Amateur Wireless

3d

No. 443. Vol. XVII

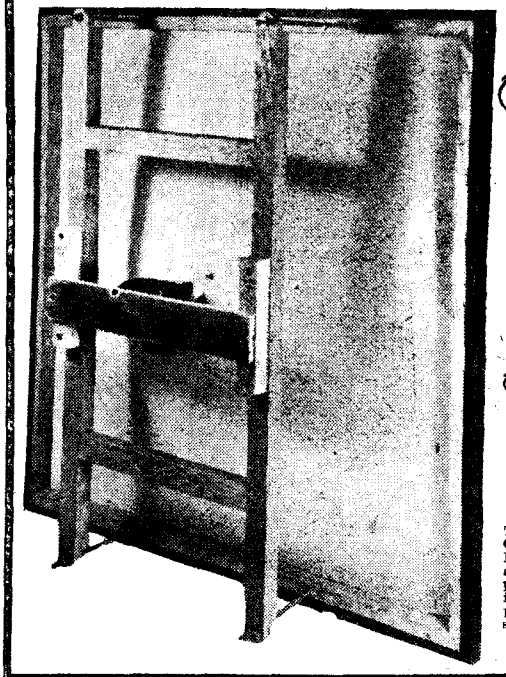
Saturday, December 6, 1930

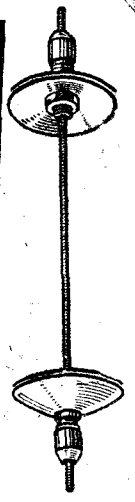
Registered at the G.P.O. as a newspaper

Christmas double number

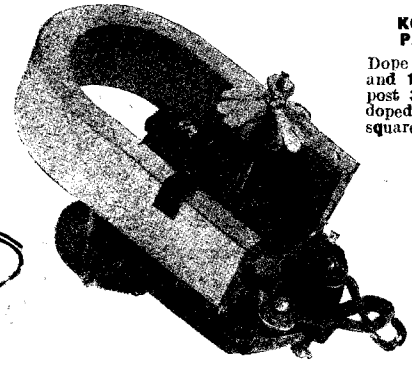
XMAS RADIO BARGAINS

The new "A.W." Linen Diaphragm Loud-speaker below is equal to, if not better than the majority of M.C. speakers.
Complete Speakers:
Size 14 in. x 14 in. .. .. 17/6, post free.
Size 15 in. x 16 in. .. .. 18/9, post free.
Size 16 in. x 16 in. .. .. 19/6, post free.
Size 16 in. octagonal .. .. 22/6, post free.
Size 24 in. x 24 in. .. .. 25/-, post free.
For constructors, kits of parts can be obtained immediately:
Size 14 in. x 14 in. .. .. 15/6, post free.
Size 16 in. x 16 in. .. .. 17/6, post free.
Other sizes made to customers' requirements.





The Double-Chuck extension Rod illustrated above is an important accessory for a linen diaphragm loud-speaker. Flexible but strong. 1/-, post free.



Above is **Junior K.D. 4-pole Loud-speaker Unit** specially designed for linen diaphragm Loud-speakers. A remarkable unit for only **9/6**, post free. There is also a **de luxe** model—the K.D. Double Magnet 8-pole Unit. For power and sweetness of tone is unsurpassed.
Price **15/6**, post free.

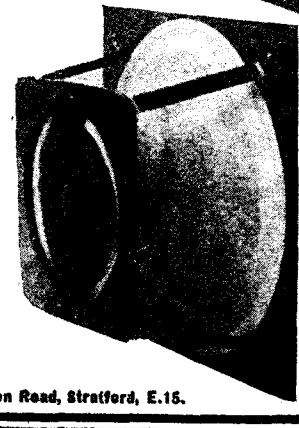
Here is the finest example of double diaphragm loud-speakers yet designed. Supplied complete by special request. Kit of parts ready for assembly consisting of parchment to size, 5-ply baffle, metal bars, unit holder, screws, etc. All finished in black. Size 12 in., **4/6**, post free. 15 in., **7/6**. Parchment paper for making cones, sizes 15 in. and 7 in., **1/-**, post free.

Write for free illustrated folder and improve your radio this Christmas.

KONE-DOPE COMPANY, 54 Idmiston Road, Stratford, E.15.

OTHER KONE-DOPE PRODUCTS.

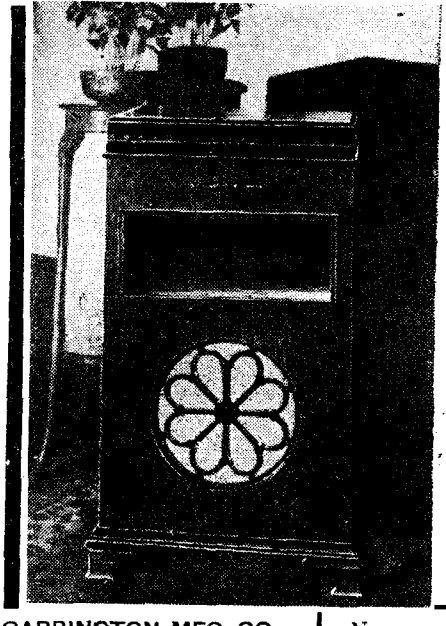
Dope for linen, **6d.** and **1/-** per bottle, post **3d.** Specially doped linen, **5/-** per square yard, post **3d.**



THE "GIPSY" FIVE PORTABLE

Here is a real portable, size 12in. × 12in. × 8in., weight 19lbs. Imitation crocodile finish, assorted colours. Beautiful tone, brings in Continentals at fine loud-speaker strength. Complete with valves, batteries, accumulators **ready to switch on, 9 guineas**, carriage paid.

A Welcome Christmas Gift



The

CAMCO CABINET WORKS

WAVERLEY Radio-Gram Cabinet

PUT it in this magnificent Radio-Gram Cabinet and it will become a handsome piece of furniture. The Camco "Waverley" is a beautifully-finished and soundly-constructed cabinet. Yet its cost is remarkably low—£5 10s. in Oak and £6 15s. in Mahogany, with 15" baseboard. Used for the "Orgola" and other well-known circuits. See it and be convinced—at our Showrooms. Also send coupon for 24-pp. Catalogue FREE

CARRINGTON MFG. CO., LTD.
24 Hatton Garden, Holborn E.C.1
(*Factory:* S. CROYDON)

Name _____
Address _____
_____
_____ A.W.

A DUAL RANGE COIL WITH A PUSH-PULL SWITCH

WIRELESS CONSTRUCTORS have in the **Sovereign Dual Range Coil** a further Sovereign Component upon which to rely. Wound upon a slotted former of moulded Bakelite for baseboard or one-hole panel fixing, it is supplied complete with good Push-Pull Switch, 6 Terminals with marked tabs and instructions. A component to give better results on both broadcast bands.

PRICES:—For Baseboard Mounting, 9/-; for Panel Mounting, 8/6. Type W.S. without Switch (Baseboard Model only), 8/-.

OTHER NOTABLE SOVEREIGN PRODUCTS . . . Wire-wound Resistances; Volume Controls; Potentiometers; Rheostats; Wave Traps; Screen-grid Coils; H.F. Chokes; Compression-type Condensers, etc. Each famous for reliability and efficiency.

Tell us if your dealer does not stock what you want. We will gladly give you the name of the nearest stockist

SOVEREIGN — OF BRITISH MANUFACTURE

SOVEREIGN PRODUCTS, LTD.
52/54 Rosebery Avenue . London, E.C.1

Watch next week's announcement for **Two New Sovereign Lines**

Don't Forget to Say That You Saw it in "A.W."

—A Better thought — Buy an 'Atlas' this Xmas!

This year's Olympia winner, and the most comprehensive range in Mains Units

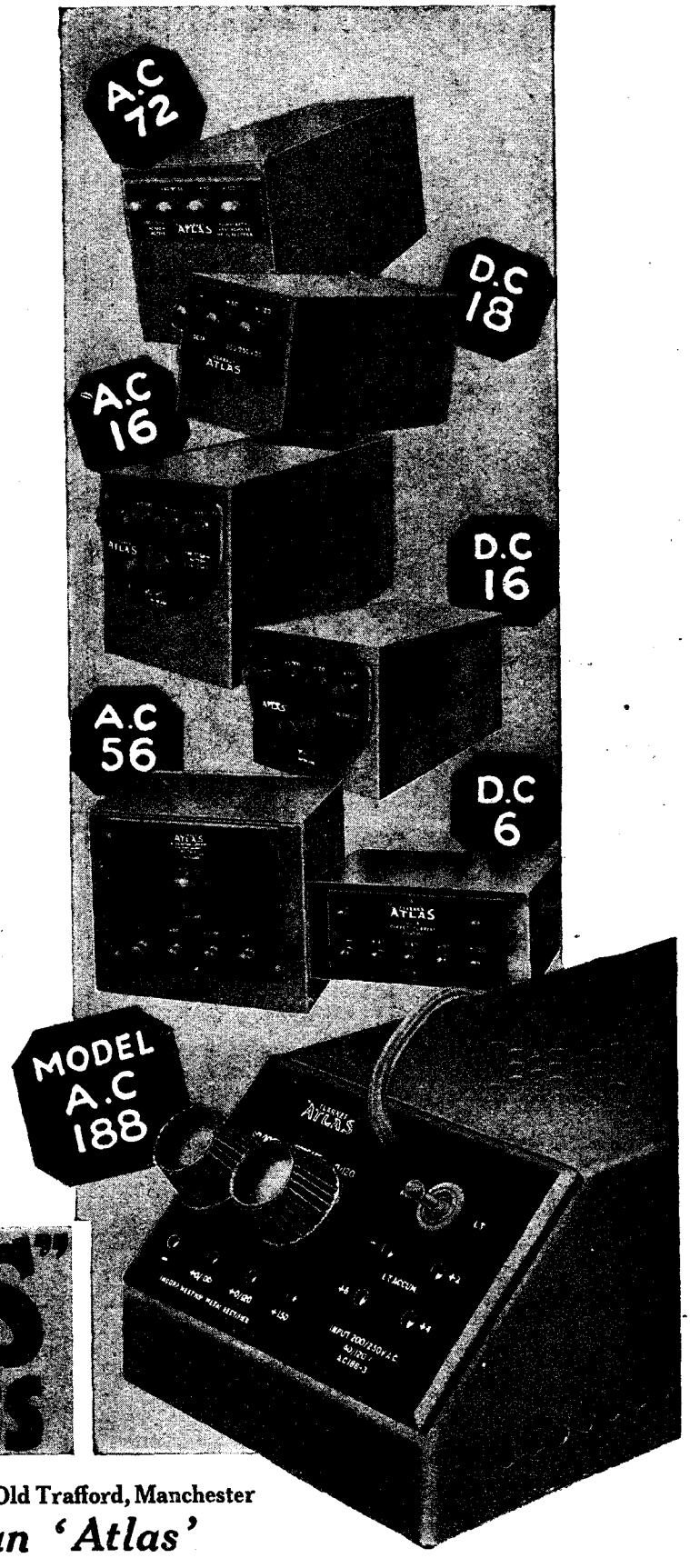
Chosen by experts as the finest Mains Units at Olympia, "ATLAS" Units are the ideal Xmas presents for yourself and friends. They are the acme of perfection in service, reliability, and economy, and are fully guaranteed for twelve months.

No matter what the set is, or whether A.C. or D.C. is in the home, the "ATLAS" Range provides a model to meet them

ALL-MAINS UNIT, MODEL A.C.188.—This is the model which was placed first in the "Wireless World" Olympia Competition. A combined H.T. Battery Eliminator and L.T. Accumulator Trickle Charger, it provides the ideal All-Mains facilities for any set—Standard or Portable—from one to five valves. Two variable tappings 0-100 and 0-120 volts, one fixed 150 volts. Output, 150 volts at 25 m/a. L.T. Trickle Charger caters for 2-, 4- and 6-volt accumulators.

Cash price. **£6**; or **10/-** down, and balance in easy monthly instalments.

Ask your dealer for Folder No. 55, or write direct to the sole makers of—



"CLARKE'S "ATLAS" MAINS UNITS

H. CLARKE & CO. (M/cr), LTD., Atlas Works, Old Trafford, Manchester

Have the best—get an 'Atlas'

C.A.V

THE ORIGINAL Jelly Acid Non-Spillable Cell

The popularity of the C.A.V. Jelly Acid Battery is not explained by the mere fact that it contains jelly electrolyte—there are other jelly electrolyte batteries! There are three reasons why the C.AV. is the most effective non-spillable yet produced.

THE JELLY ACID. Its composition is unknown outside our own laboratories. It maintains perfect contact with the whole of the plate surfaces, yet allows unrestricted gassing when on charge. It is chemically pure, and allows maximum conductivity.

THE CONTAINER. Of special construction, contains a baffle plate and moistening pad, which serves the triple purpose of arresting acid spray during charge, feeding the electrolyte with moisture to maintain an even consistency, and definitely confines the jelly to the plate chamber

THE PLATES. These have been specially developed to give the utmost possible capacity when used with C.A.V. Jelly acid.

THE WHOLE. The C.A.V. is the lightest, cleanest, and most compact non-spillable on the market. By avoiding cumbersome acid traps, the greatest possible capacity for bulk is obtained

Obtainable from our Depots and Battery Agents throughout the country and from all Radio Dealers.

TYPES and PRICES.

Type	Volts	Cap at 20 hour rate	Weight Charged	Dimensions (in inches) L.	W.	H.	Price
2NS9	2	10	2 lbs	1 3/32	3 1/8	4 7/16	12/-
2NS13	2	15	2 3/4 lbs	2 1/2	3 1/8	4 7/16	14/6
2NS17	2	20	3 1/4 lbs	3 1/4	3 1/8	4 7/16	16/-
2NS21	2	25	4 1/4 lbs	3 15/16	3 1/8	4 7/16	18/-
2AN7	2	30	5 1/2 lbs	2 3/16	4 3/16	7	16/-

- AND BEST

May we send you copy of our latest Catalogue giving particulars of all types of C.A.V., H.T. and L.T Accumulators. Write to Dept. C.4

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

ALL POSITION
NON-SPILLABLE

Perfect for Portables

Don't Forget to Say That You Saw it in "A.W."

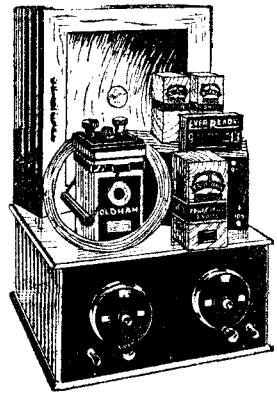
K. RAYMOND LTD.

27 & 28A, LISLE ST., LONDON, W.C.2

Nearest Station, Leicester Square Tube Station. *Back of Daly's Theatre*

RAYMOND'S "STRAIGHT THREE"

Now available on EASY PAYMENT TERMS



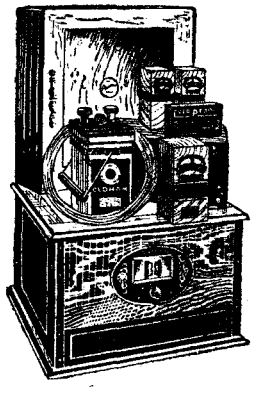
Comprising COMPLETE KIT with Three TRIOTRON New Process Valves, OLDHAM 45 amp. Accumulator, 100 v. High Tension and EVER READY Grid Bias Battery, CLIFTOPHONE £3 : 3 : 0 Loud-speaker and Aerial Equipment. *Carriage Paid*

CASH PRICE £4:5:0

DELIVERED IMMEDIATELY for 9'-

and 12 monthly payments of 9/-

"RED STAR" 3-VALVE WONDER SET



As illustrated, COMPLETE with Three TRIOTRON New Process Valves, OLDHAM 45-amp. Accumulator, 100 v. High Tension, and EVER READY Grid Bias Battery, CLIFTOPHONE £3:3:0 Loud-speaker and Aerial Equipment. *Carriage Paid.*

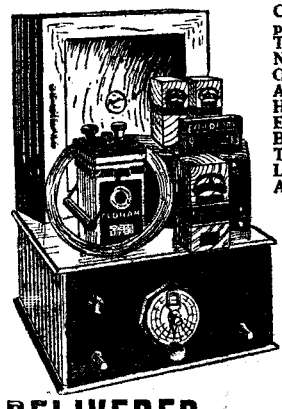
CASH PRICE £6:6:0

Ready for Use. NOTHING ELSE TO BUY

DELIVERED IMMEDIATELY for 12'9

and 12 monthly payments of 12/9

RAYMOND'S "SCREENED GRID 3"



Comprising Complete S.G. Kit with Three TRIOTRON New Process Valves, OLDHAM 45 amp. Accumulator, 100 v. High Tension and EVER READY Grid Bias Battery. CLIFTOPHONE £3 : 3 : 0 Loud-speaker and Aerial Equipment.

CASH PRICE

£5:10:0

Carriage Paid

DELIVERED IMMEDIATELY for 10'6

and 12 monthly payments of 10/6

100 SPECIAL BARGAINS

ON VIEW IN OUR WINDOWS

Part of Large Bankrupt Stock Purchase—EVERY ARTICLE GUARANTEED—NOW IS YOUR OPPORTUNITY.

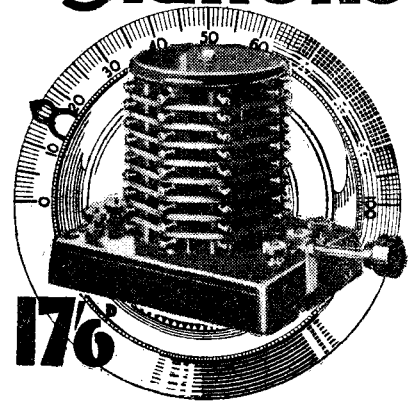
Send no Money—PAY THE POSTMAN

NOTE.—We are open all day Thursday and Saturday and every day from 9 a.m. till 6 p.m.

Pye 110 Henries Chokes, 12/6 List. Our price	4/11
Undy Pick-up and Tone Arm complete, 57/6 List. Our price	35/-
Peto-Radford 20/40 Non-spillable Portable Accumulators. Our price	5/11
Oak Loud-speaker Cabinets, 13 in. by 13 in.	4/11
Oak Loud-speaker Cabinets, to fit Blue Spot R. or P.	10/6
Chassis to fit Blue Spot R. or P., Large Type, 16 in.	6/11
Dual Range Coils, Panel Mounting	4/11
Dual Range Coils, Baseboard	4/11
Differential Condensers, .00015	2/6
Reaction Condensers, .0001	1/11
Baseboard Neutralising	1/11
S.L.F. Variable Condensers, .0005	2/6
S.L.F. Variable Condensers, .0003	2/6
Valve Holders with Terminals	each 5d.
Triotron Cone Units, latest model	8/6
Triotron T.D. 2 valves	4/6
Triotron Z.D. 2 valves	5/6
Fuller 2-volt 60 Accumulators	6/11
12 in. Cone Chassis, take any unit	1/11
15 in. Cone Chassis, take any unit	2/11
12 in. by 7 in. Oak Cabinet, complete with polished panel	8/11
14 in. by 7 in. Oak Cabinet, complete with polished panel	9/11
18 in. by 7 in. Oak Cabinet, complete with polished panel	10/11
Dual Range 6-pin Coils	4/6
200-700 metres 6-pin Coils	3/6
Sovereign Dual Range Panel Mounting Coils	6/11
Titan Coils, Dual Range	9/11
New Ormond Geared Dial	2/6
New Ormond Log Condenser	4/-
New Ormond Log Condenser with double dial	6/-
Undy 8-pole Units	16/9
Undy 8-pole Units and Chassis	32/6
Pifco All-in-One Volt Meter	12/6
Dead Beat Volt Meters	3/9
Accurate Hydrometers, Float or Ball Reading	2/6
Gramophone Pick-ups, guaranteed, British made	7/6
Panel Brackets	pair 6d.
H.F. Chokes, reliable	1/11
Fully guaranteed 5-1 or 3-1 Transformers	4/9
Set of S.W. Coils, No. 2, 4, 6, 9	set 6/6
Plug-in Coils, Nos. 25, 35, 50, 60, 75	each 1/3
Plug-in Coils, Nos. 100, 150, 200, 250	each 2/3
60x Coils, 1/9 each: 60 C.T.	each 1/4
250x Coils, 3/6: 250 C.T.	each 2/9
Wall Plugs, complete	8d.
Linen Double Chassis Solid Oak Frame, Linen fixed and stretched, complete with dope and brush, etc.	5/11
10 in. by 6 in. Aluminium, with ½-in. bend	1/3

IMPORTANT.—All letters and communications must be addressed to K. RAYMOND LTD. 27 and 28a LISLE STREET, LONDON, W.C.2 The name of the street is not sufficient.

Separate those Stations



17/6

This is a Wave Trap as well as a Tuner. It gives sharp tuning and eliminates interference. Its special winding, designed to give loose aperiodic coupling, explains the life and definition which it gives to the tuning of any circuit in which it is incorporated.

THE WATMEL UNIVERSAL DUAL RANGE TUNER beautifully finished in mottled Walnut (Bakelite) and incorporating wavelength switch.

17/6 complete.

THE WATMEL BINOCULAR H.F. CHOKE

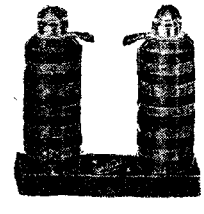
gives maximum efficiency, very low self-capacity and an extremely restricted field.

TYPE DX3

Inductance - 200,000 m.h.
Self Capacity - 1.6 m.mfd.
D.C. Resistance 1,400 ohms
Price **6/-**

TYPE DX2

Inductance - 40,000 m.h.
Self Capacity - 1.2 m.mfd.
D.C. Resistance - 450 ohms
Price **4/-**



If you cannot get these Watmel products at your dealers, send remittance and order direct to us, and the article will be dispatched by return.

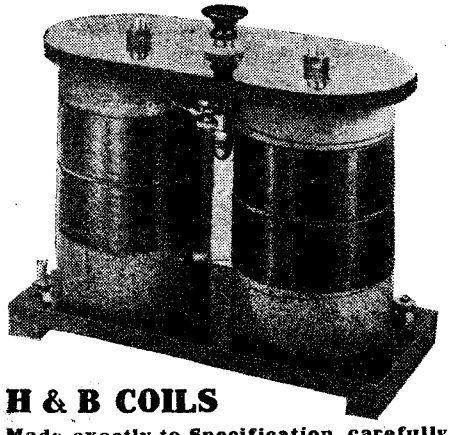
Watmel

WATMEL WIRELESS CO., LTD., Imperial Works, High Street, Edgware

Telephone: EDGWARE 0323.

M.C.12

H & B



H & B COILS

Made exactly to Specification, carefully Matched and Guaranteed.

	£	s.	d.
"CHALLENGE TWO," with reaction winding		10	6
"CHALLENGE THREE," carefully matched, per pair	1	1	0
"CHALLENGE FOUR," three Coils exactly as specified and carefully matched	1	11	6
"MUSIC MONITOR," "W.M." September		7	6
"SEARCHER TWO," "A.W.", August 23, per pair ..		9	6
"A.B.C. TWO," "W.M.", August		5	0
"BROOKMANS BY-PASS"		3	0
"MUSIC LEADER," "A.W."		10	6
"JAMES' S.G. PORTABLE 3," "W.M.", July		9	6

NOTE.—We supply Coils for any set described in "A.W.," "W.M." etc. Any Coil built to your specification. Prices on application.

SOME POPULAR H & B KITS OF THE YEAR

"ETHER SEARCHER," "A.W.", December 14, 21, January 11.

The most popular receiver designed, we sold in two months 240 kits and have received enormous number of letters from constructors giving marvellous reports. H. & B., the only specified kit (read "A.W." review, January 11), complete in every detail, special aluminium panel and new type fast and slow drum dial. Kit contains also wire, screws. **CASH PRICE, £5 5 0**
Cabinet, in oak, 17/6 extra. Valves, 39 - extra.

"INCEPTORDYNE," "W.M.," February, 1930.

The first all-wave receiver of 1930. We have sold this set to customers in every part of the world, including U.S.A., and the reports on long-distance reception are astounding. Complete kit, exact in every detail to the original, together with one pair dual-range coils, wire, screws. **CASH PRICE. £5 5 0**
Three Mullard, Cossor, or Mazda valves, 51/- extra.
Cabinet, 17/6 extra.

"NO-BATTERY MAINS TWO," "A.W."

A two with a four-valve voice. Splendid set for those who have A.C. mains. It requires no batteries or accumulators; running cost extremely low. Simple to construct, extremely easy to operate. Complete kit of all components necessary to construct this receiver, together with panel, strips, wire, and screws.
CASH PRICE, £7 1) 0

Two Marconi or Mullard valves, 31/6 extra. One rectifying valve, D.W.2, 17/6 extra.

"MUSIC MONITOR," "W.M." September.

A wonderful two-valver; gives pure and good volume on numerous stations. Simple to construct. Can be built in two hours. Complete kit of specified parts, together with H. & B. specified coil ready wound. **CASH PRICE, £2 17 0**

"SHORT WAVE TWO."

This set, described in "A.W.," November 29 issue, opens up new fields for those who enjoy getting far-distant stations.
H. & B. Special Kit. CASH PRICE, £3 18 10
Two valves, Mullard, Cossor, or Marconi, 19/- extra.

"THE REYNER HYPERDYNE."

You should read all about this set in the December issue of "W.M." It is unique in many ways.
H. & B. Kit. CASH PRICE. £7 16 10
Six Mullard or Mazda valves, £3 16 0 extra.

THE H. & B. HYPERDYNE INTERMEDIATE AMPLIFIER.

Built exactly to Mr. Reyner's specifications. Supplied complete in copper screen box with ebonite lid. Ready for immediate use.
CASH PRICE, complete, post paid, £3 3 0
Coils.—Set of three Special Intermediate Amplifier Coils, wound exactly to specification, 17/6 the set. Post paid.
Copper Box and Ebonite Lid, with necessary earthing screws, 15/-, post paid.

See "W.M." for December.

THE "FIVE POINT TWO."

Here is a first-class set that is cheap to build and gives very fine results. (See "W.M." December.)
H. & B. Special Kit. CASH PRICE. £2 13 5
Two Mullard or Marconi valves, 19/- extra.

"THE 45/- TWO."

This set has the following important features: Low first cost, simple construction, and economical working. It is a receiver which may be relied upon to give excellent results. (See "A.W." October 11 issue). **H. & B. Special Kit. CASH PRICE, £2 9 4**
Two valves, Mullard or Mazda, det. and power, 19/- extra.

A "CHALLENGE" for YOU

"Amateur Wireless" has done something specially good in these "Challenge" sets. There's a 2-, 3-, and 4-valve H & B KIT for you to select from.

THE "CHALLENGE TWO"

	s.	d.
Ebonite Panel, 9 by 6 in. (Trelleborg)	2	3
Two Variable Condensers, .0005 (Formo)... ...	9	0
Push-pull Filament Switch (Pioneer)	1	3
Two Slow-motion Dials (Brownie)	5	0
"Challenge" Coil, with reaction winding (H. and B.), exactly as specified	10	6
TWO VALVE HOLDERS (TELSEN)	2	0
0002-MFD. AND .0001-MFD. FIXED CONDENSER (TELSEN)	2	0
Grid-leak Holder (Lissen)		6
2-megohm Grid Leak (Lissen)	1	0
Pre-set Condenser, .0001 mfd. to .000005 mfd. (Sovereign)...	1	6
L.F. TRANSFORMER (TELSEN)	8	6
Two Terminal Blocks (H. & B.)		9
Four Terminals, marked: Aerial, Earth, L.S.+, L.S.— (Belling-Lee)	1	6
Five Wander Plugs, marked: H.T.—, H.T.1+, H.T.2+, G.B.+, G.B.— (Belling-Lee)	1	3
Two Spade Terminals, marked: L.T.+, L.T.— (Belling-Lee)		8
(SEE IMPORTANT NOTICES)		
CASH PRICE	**£2**	**7**	**8**

Two Mullard or Mazda Valves, 19/- extra.

THE "CHALLENGE THREE"

Receives twenty or thirty foreigners at loud-speaker volume on any evening. See "A.W.," November 15 issue. **H. & B. Special Kit.**
CASH PRICE, £5 13 1
Three valves, Mullard or Mazda, £1 19 0 extra.

THE "CHALLENGE FOUR"

This receiver employs two S.G., detector, and pentode valves, as against one S.G., detector, and pentode for the "Challenge Three." Similar circuit. Excellent for great loud-speaker volume on numerous stations.
H. & B. Special Kit. CASH PRICE, £6 15 9
Four Mullard or Mazda valves, £2 19 0 extra.

"CHALLENGE FOUR" MAINS MODEL

The additional components required for this cost **£6 18 11**

See our advertisement, page 556, "A.W.", October 8 issue.

"A.W." STANDARD H.T. UNIT (H & B KIT)

	£	s.	d.
Power Transformer, with 135-volt secondary winding (Varley)	1	5	0
Metal Rectifier (Westinghouse, style H.T.—7)	1	1	0
L.F. Smoothing Choke (Igranic)		15	6
Three 4-mfd. Fixed Condensers, 500-volt test (Mullard or Lissen)..		15	9
Five 2-mfd. Fixed Condensers (Mullard or Lissen)		7	0
120,000-ohm Variable Resistance (Regentstat)		9	6
One 25,000, one 15,000, and one 2,000-ohm Spaghetti Resistance (Bulgin or Magnum)		4	6
Ebonite Strip, 8½ by 2 in. (Trelleborg)			8
Six Terminals, marked: H.T.—, H.T.1, H.T.2, H.T.3, H.T.4, H.T.5 (Belling-Lee)		2	3
Twin Fuse, baseboard mounting (Bulgin)		2	6
Length of Mains Flex (Lewcos)		1	6
CASH PRICE	**£5**	**5**	**8**

Price of Kit includes Wire, and Screws.

IMPORTANT NOTICES

The Cash Prices for ALL Kits include Panel already drilled, all Wire and Screws needed.

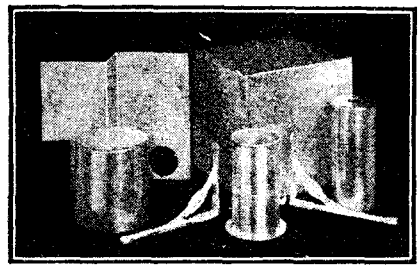
SETS BUILT FREE

If desired, we will build your set from any Kit. You must please notify us at the time you send Cash with Order.

Any kit made up to your specification if desired. Quotation by return.

Carriage Paid on All Orders accompanied by Cash. C.O.D. Charges Paid on orders over £1.

SCREENS



"CHALLENGE THREE"

Set with foil, earthing terminals, and screws, 2/6, post free.

"CHALLENGE FOUR"

Set complete, with foil, base, and screws, 3/9, post free.

	s.	d.
Standard, 10 by 6 in., with two terminals	1	9
"Lodestone 3 and 4"	1	9
"James S.G. Quality 5," set	5	6
"Brookmans 3"	2	0
"Brookmans 4," set	5	6
"Sunshine Portable"	1	6
"Clarion 1930 3"	1	9
"Inceptordyne" and foil		6
"Ether Searcher" Panel, Screen, and Base..	11	6
"Music Leader" Box	5	0
"Horizon Four"	2	6
"Continental Portable"	1	9
"James S.G. Portable" Chassis	9	6

"D.C. FOREIGN LISTENERS' FOUR"
See "Wireless World," July 16, 1930.

SCREENS AND SHIELDS (H & B SPECIFIED)

	Each
Tubular Valve Shields	3 0
Cylindrical Coil Shields	2 10
Copper Screening-Boxes, for H.F. chokes, with anode tube ..	2 9
Ditto, without tube	2 6
Aluminium Brass Plate, 15 by 11 in.	2 6
14-in. Hard Brass Strip for coil-changing switch ¼ by 3/32 ..	0 6

NOTE.—We supply Kits and Components for all "Wireless World" Sets.

SCREENING BOXES

Aluminium, 6 by 6 by 5½ in., with lid	5 0
6½ by 6½ in. with lid and screws	5 6

TRADE SUPPLIED

H & B CABINETS FOR ALL RECEIVERS

Hand-Polished Oak Cabinet, easily assembled, with 8 screws supplied. See report on page 773.

PRICES:

Sizes	
14 x 14	17/6
Carr. 1/3	
14 x 16	20/-
Carr. 1/3	
16 x 16	23/-
Carr. 1/3	
24 x 24	35/-
Carr. 2/6	

H & B COLLAPSIBLE CABINET

For "A.W." New Linen Speaker, described in issue dated November 15.

	£	s.	d.
"Foursome Portable" Cabinets, with all fittings in oak. Special Show Price	1	10	0
Repine. Special Show Price	1	12	6
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American-type Cabinets, in oak, best finish:			
14 by 7 by 10 in.		14	6
16 by 8 by 10 in.		16	6
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21 by 7 by 10 in.	1	0	0
24 by 8 by 12 in.	1	10	0

Mahogany, 3/- extra in each case.
We carry a stock of 300 Cabinets and can make any special cabinet at 3 days' notice.

H & B RADIO CO.

34, 36, 38 BEAK ST., REGENT STREET, LONDON, W.1

GERRARD 2834.

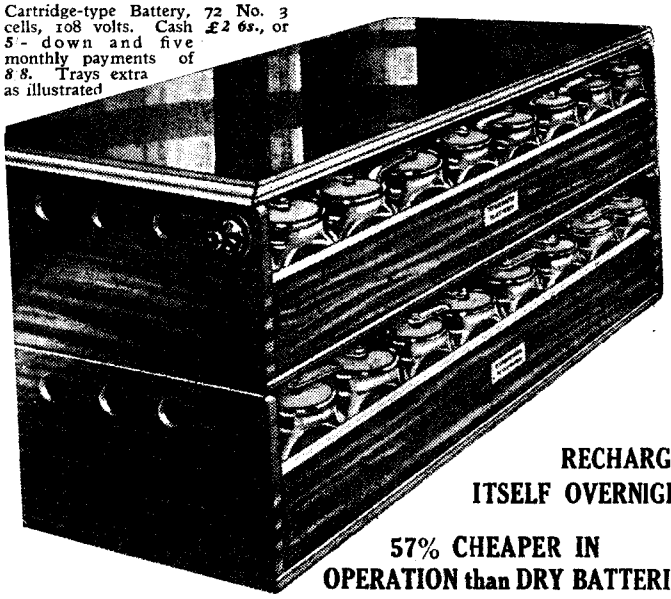
MAKE SURE OF PERFECT RECEPTION OF XMAS PROGRAMMES

GREAT ADVERTISING OFFER

To "Amateur Wireless" Readers.

5/- DOWN SECURES THIS FINE **10,000 M.A. 108 VOLT., REGENERATIVE "STANDARD" *Cartridge type* BATTERY COMPLETE**

Cartridge-type Battery, 72 No. 3 cells, 108 volts. Cash £2 6s., or 5/- down and five monthly payments of 8 8. Trays extra as illustrated



RECHARGES ITSELF OVERNIGHT

57% CHEAPER IN OPERATION than DRY BATTERIES

IMMEDIATELY IMPROVES RESULTS 50%

ABSOLUTELY NO BACKGROUND

Do not risk the disappointment of battery failure during the Xmas festivities. Install a Standard Regenerative Battery and enjoy the amazingly improved quality, tone, and volume of reception that this self-generating battery provides.
Millions of cells are in constant daily use and hundreds of glowing testimonials reach us, extolling the trouble-free, unfailing smooth and unfluctuating service of this high-capacity battery.
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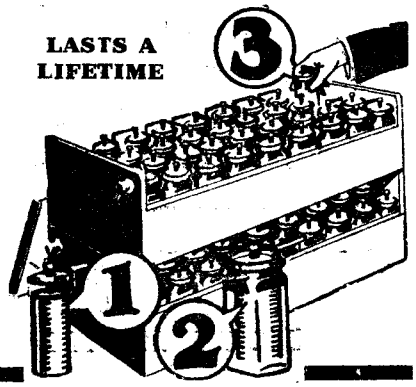

The "NIGHTINGALE" Straight Three

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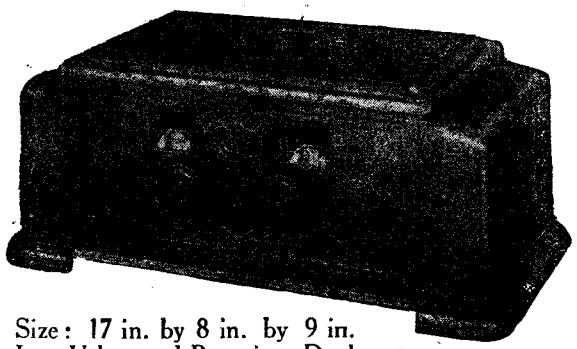
BAKELITE, MAHOGANY or WALNUT CABINETS



Size: 17 in. by 8 in. by 9 in. Less Valves and Batteries: Dual range 250-2,000 M. **£4:15:0**

BULLPHONE ELIMINATORS

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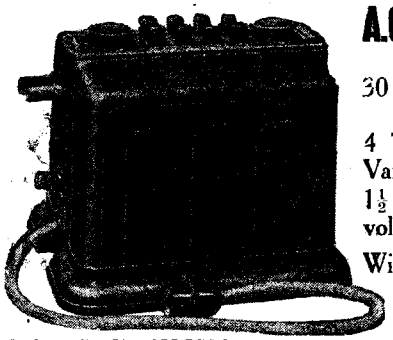

A.C.4 ELIMINATOR

(In Bakelite case)

30 milliamperes output at 150 volts.
4 Tappings, 2 Fixed, 2 Variable with Grid Bias.
1½ to 15 volts .. **£5:15:0**
With Trickle Charger **£6:17:6**

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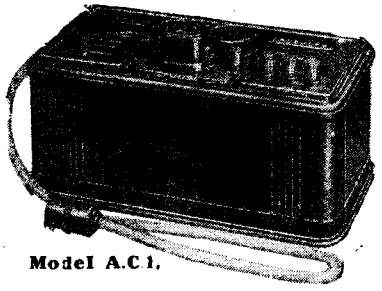
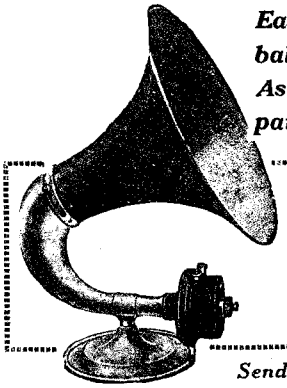
(In Bakelite case)

3 Tappings, 2 Variable, 1 Fixed. Output 120 volts at 20 milliamps **£4:12:6**
With Trickle Charger **£5:15:0**



Model A.C.1.

Easy Terms 10/- deposit and balance in monthly payments. Ask your local dealer for particulars or write direct.



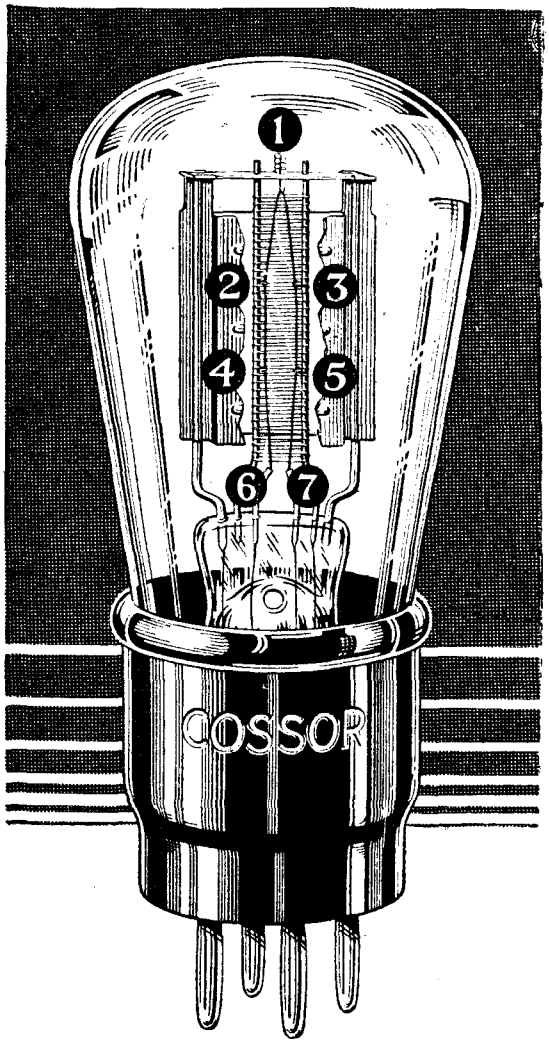
The Original
BULLPHONE NIGHTINGALE LOUDSPEAKER
Reduced to 19/6
As a special Xmas offer only
(Instalments not available.)

Send for our Free Lists and Circuits.

BULLPHONE LTD.

(Dept. A.W.) **38 HOLYWELL LANE, LONDON, E.C.2**

Seven point suspension *definitely prevents* microphonic noises



—by eliminating filament vibration

Microphonic noises in a Receiving Set are usually traceable to the Detector Valve. Nine times out of ten the cause is filament vibration. Look at the illustration alongside. This shows the internal construction of the new Cossor Detector Valve. See how the filament is held—not only top and bottom—but also by four insulated hooks spaced at intervals throughout its length. The purpose of these hooks is to damp out any tendency for filament vibration. Therefore by using this "steep slope" Cossor Detector Valve in your Receiver the possibility of microphonic noises is definitely eliminated and you are assured of greater volume with absolute tonal purity.

We have just issued a novel, circular Station Chart which gives identification details of nearly 50 stations and space is provided for entering your own dial readings. Price 2d. each they are obtainable from any Wireless Shop. In case of difficulty write us, enclose 2d. stamp and head your letter "Station Chart A.W."

Cossor 210 DET., 2 volts, .1 amp. Impedance 13,000. Amplification Factor 15. Mutual Conductance 1.15 m.a./v. Normal working Anode Voltage 90-150. *Price* 8/6

THE NEW COSSOR DETECTOR VALVE

DEFINITELY FREE FROM MICROPHONIC NOISES

0825

Don't Forget to Say That You Saw it in "A.W."

No 443. Vol. XVII. DECEMBER 6, 1930

EDITOR: BERNARD E. JONES.
TECHNICAL EDITOR: J.H. REYNER, B.Sc., A.M.I.E.E.
THE LEADING RADIO WEEKLY FOR THE CONSTRUCTOR, LISTENER & EXPERIMENTER.
RESEARCH CONSULTANT: W. JAMES.
ASSISTANT EDITOR: H. CORBISHLEY.

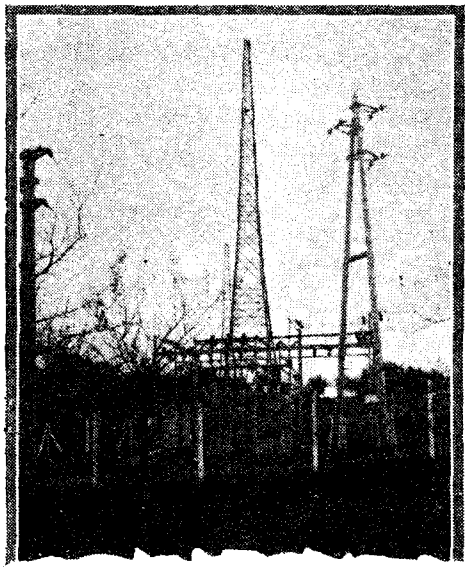
NEWS · & · GOSSIP · OF THE · WEEK

APOLOGY!

IN last week's AMATEUR WIRELESS we announced that our Christmas Number would contain 76 pages. Unintelligent anticipation! Now it is in your hands, you will find it contains 84 pages.

AMOS 'N ANDY

THE news that this pair of back-chat radio comedians will be relayed by B.B.C. stations from America via the transatlantic telephone link is not very significant to the average English listener. But in America Amos'n Andy are very well known; better known than the President himself! Every evening at 7 o'clock they are "on the air" for 15 minutes, sponsored by the Pepsodent tooth-paste firm. Every listener should make a point of hearing this relay in order to see how very different is the American idea of radio entertainment from ours. As the relay will be carried out on the transatlantic telephone, there is every chance of good reproduction.



Where the waves start. A new glimpse at the huge masts at the German regional station which opened last week. This station, Muhlacker, is near Stuttgart, and uses Stuttgart's wavelength of 360.1 metres.

NATIONAL FIGURES

NO English listener can realise how much is made of Amos'n Andy by American listeners. Many of the big cinemas cut off their programmes at 7 p.m. in the evening to relay these laughter-makers through the loud-speakers of the talking-film equipment. The telephone companies state that during the period when Amos'n Andy are broadcasting there is a perceptible drop in the number of telephone calls, the assumption being that nearly everybody is listening to the broadcast! On Broadway, in New York, the biggest electrical sign in the world advertises Amos'n Andy, who, by the way, are featured in a film entitled "Check and Double Check," to be shown in this country before the end of the year. They are such an institution in America that appointments are made in this fashion: "See you after Amos'n Andy!"

CHRISTMAS GREETINGS

FINAL arrangements between the National Broadcasting Company of America and the B.B.C. are not yet completed, but it is hoped that Christmas greetings will be exchanged by radio on Christmas Day. The Columbia organisation has decided to relay our Christmas Day service to be given in the Savoy Hill studio at 6.30 p.m. The transatlantic telephone link will be used.

FAMOUS STARS

IN a gala matinée in aid of Denville Hall to be broadcast from the London Hippodrome on Monday, December 8, we understand many theatrical stars will be heard. These will include Henry Ainley, Balliol Holloway, Noel Coward, Gertrude Lawrence, Jack and Claude Hulbert and Evelyn Laye. Listeners should make a point of tuning in these stars, who are giving their services in aid of Denville Hall, Northwood, a place of retirement for old actors and actresses.

SCHÖNBERG AGAIN

WE hear that in the week beginning December 7, the big noise music will be by Schönberg, whose "Pelleas and Melisande" will be performed by the Symphony Orchestra on Wednesday under the direction of Hermann Scherchen. Although looked upon as one of the exponents of modern music, Schönberg has been writing for over thirty years. In 1898 the performance of some of his songs created a great disturbance in Vienna. "Since when," says Schönberg, "people have never ceased to be shocked at me."

GERMAN INTERFERENCE

THE new high-power German Regional station at Muhlacker has made a very bad beginning so far as British listeners are concerned. Transmitting on 360 metres, this high-power German station is only

To the Reader

This Christmas number is the biggest we have ever had! And the best! Its contents are of a special character and have been prepared to meet many tastes and needs. Its Advertisement Pages, which will carry into your home a most valuable and remarkable collection of up-to-date information, contain the announcements of no less than 106 different firms representing very nearly all that is best in British Radio. You will read this Christmas issue from cover to cover.

The Editor.

NEWS · & · GOSSIP · OF THE · WEEK —*Continued*

9 kilocycles apart from the London Regional frequency. We have picked up Muhlacker in broad daylight at 3 o'clock in the afternoon, the strength being really terrific. The average listener in the Brookmans Park Regional area would find it difficult to separate Muhlacker from the local, but a great deal of interference is reported from various listeners. The B.B.C. has received complaints that Muhlacker is heard as a background to the London Regional. There is no suggestion that Muhlacker is heterodyning the Regional since the two stations have the necessary separation of nine kilocycles.

ETHER CHAOS GROWING

THE starting up of Muhlacker on high power, on a wavelength adjacent to that of the high-power London Regional, reveals quite clearly that the International Union at Geneva is losing its hold on the European ether situation. It seems obvious that interference will be caused if two 60-kilowatt stations are allocated to adjacent frequencies. Similar trouble occurs with Rome and Stockholm, stations the average three-valver is unable to separate. We imagine that when sufficient complaints have been received of the interference between Muhlacker and the London Regional, some other wavelength will be allotted to the German station. Why it was ever given its present position is a mystery.

SUBSIDISING OPERA

IF only to avoid a most undesirable precedent, we hope that, when the subsidising of opera is discussed in Parliament, the Government's proposal to refund some of the Treasury's share of licence revenue will be defeated. It may be argued that the B.B.C. and its listeners are gaining by some £17,000, the sum proposed for the subsidising of opera. But in our opinion it is undesirable that the Government should assume control of the manner in which licence revenue is spent.

ANOTHER METHOD

A MORE straightforward method would be for the Government to agree quite frankly that the present Treasury percentage of licence revenue is excessive, to return as much as possible to the B.B.C., and to *suggest* to it that it might help the cause of opera in this country in the same way that it has helped Promenade concerts and other musical activities. If the present proposals go through, there is no knowing what next the B.B.C. will be called upon to subsidise. For example, Granville Barker's National Theatre scheme!

THE PRINCE AGAIN

THE PRINCE OF WALES will be heard again on December 16 when he speaks at a Guildhall banquet. The Prince is beginning to be quite an "old hand" at broadcasting. Quite recently he gave two broadcast speeches within one week, one on Poppy Day at the Albert Hall, and the other at Savoy Hill. He has quite a good broadcasting voice, being quite clear and devoid of undue accentuation. It is rather interesting to note that the Prince has his manuscripts specially typed when he intends to broadcast, the typing being arranged to show the long and short sentences, so that he will know which sentences are to be spoken in one breath. This is an idea which many other broadcast speakers might follow, for many of them appear out of breath before the end of a long sentence.

NO SPECIAL MICROPHONE

THE PRINCE is treated at Savoy Hill in no different manner from other broadcasters. Usually he speaks from the small talks studio, where the gramophone broadcasts are also sometimes carried out. Unlike the King, who has a special microphone prepared for his use by the Marconiphone Co., the Prince has no microphone of his own.

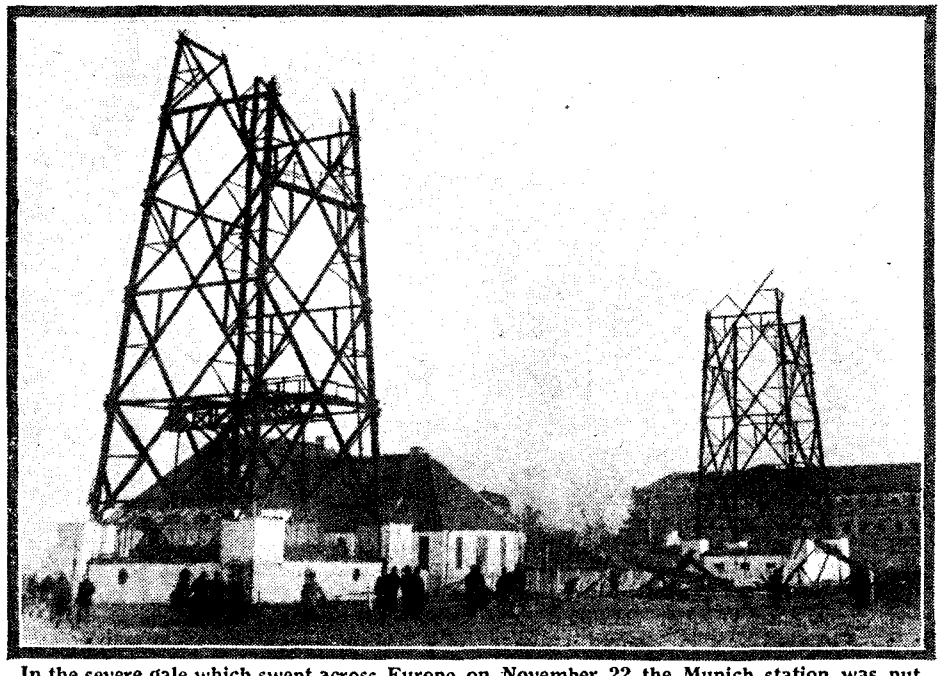
THAT INTERVAL SIGNAL

BY the time this appears in print the B.B.C. may have its interval signal in operation. At first it was thought that this would be simply a clicking metronome as used at many Continental stations, but now it appears that the note will be a little more distinctive. It will not be used for short breaks between the programmes but only to avoid an excess of piano music to fill in gaps lasting longer than five minutes or so.

"DON R'S," PLEASE NOTE!

THERE must be many wireless enthusiasts who were dispatch riders during the War and who are wondering how their old time companions are progressing. They cannot fail to be interested in the possibility of an ex-dispatch riders' reunion dinner, for it is felt that many of them would like to renew the comradeship of the war years. The difficulty is to discover names and addresses. It is suggested that all who are interested in the possibility of a reunion dinner should communicate with Mr. Ernest R. Gilbert, 14-18 Holborn, London, E.C.1. Envelopes should be marked "D.R."

SPECIAL FEATURES IN THIS ISSUE



In the severe gale which swept across Europe on November 22 the Munich station was put out of action, the two high towers supporting the aerial being blown down. A temporary aerial has been erected, pending re-construction, but transmissions are carried out only at low power. It should be borne in mind that Munich is relayed through Nürnberg on 239 metres

OUR H.T. UNIT FOR A.C. MAINS

Here is a mains unit that is quite standard; that is, it may be used in conjunction with any receiver to provide the high tension where A.C. mains are available

IF you are changing over from battery to mains operation, then the best advice you can take is to make, or buy, a really good eliminator. Nothing is so fatal in mains working as false economy.

Now, here is a standard eliminator which anyone can make up, which is low in cost and yet which is capable of delivering sufficient voltage and current to supply sets up to four and even five valves.

Low Cost

Consider cost first. In the panel on the next page is a list of the parts required and you will see that the total cost is very low, consistent with the choice of good components. Safety is covered by the fitting of two fuses, one in each mains lead.

To prevent any chance of a mistake in the wiring or layout you are advised to get the full size blueprint, price 1s. post free, from AMATEUR WIRELESS, Blueprint Department, 58-61 Fetter lane, London, E.C.4.

The construction of this eliminator is simplicity itself because there is no panel or extensive drilling to be done. There is only a small terminal strip, and all the main parts are screwed to the baseboard. These parts include the rectifier, the fuse block, transformer, choke and fixed condensers.

You will see that the voltage is cut down for the high-tension tappings by means of the new "spaghetti" flexible resistances and that variation of voltage on the screen-grid tapping is provided by means of a variable wire-wound resistance.

There are, in all, five tappings. H.T. plus 5 gives approximately 200 volts at 28 milliamperes and this tapping will be suitable for large power valves.

The next high-tension tapping, H.T. plus 4, will, with the flexible resistance fitted as standard, give about 170 volts at between 15 and 20 milliamperes. This will be suitable for smaller power valves. The H.T. plus 2 and H.T. plus 3 tappings give intermediate voltage tappings, suitable for low-frequency or detector tappings, while the H.T. plus 1 tapping is for the screening grid of screen-grid valves.

You will find the flexible resistances specified suitable for most purposes, but if you have need for any special value of voltage, you can quite easily obtain this by fitting a special value of resistance.

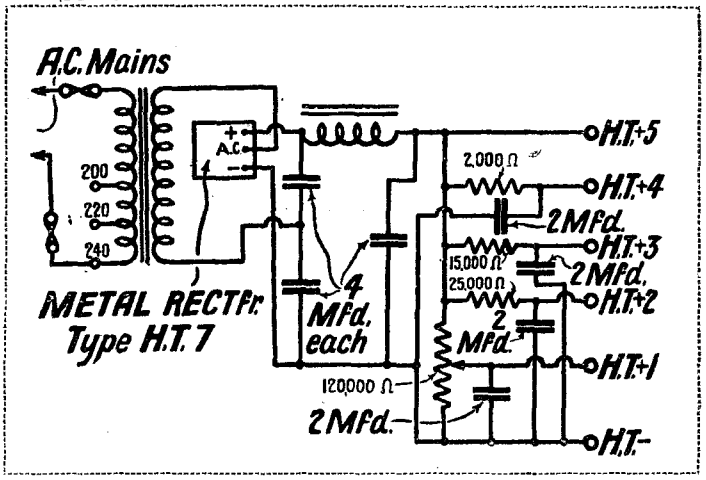
This value can be calculated by subtracting the required voltage from 200 (that is, the maximum voltage delivered by the eliminator), multiplying this by 1,000 and dividing this result by the anode current which will flow.

Expressed as a formula the process is

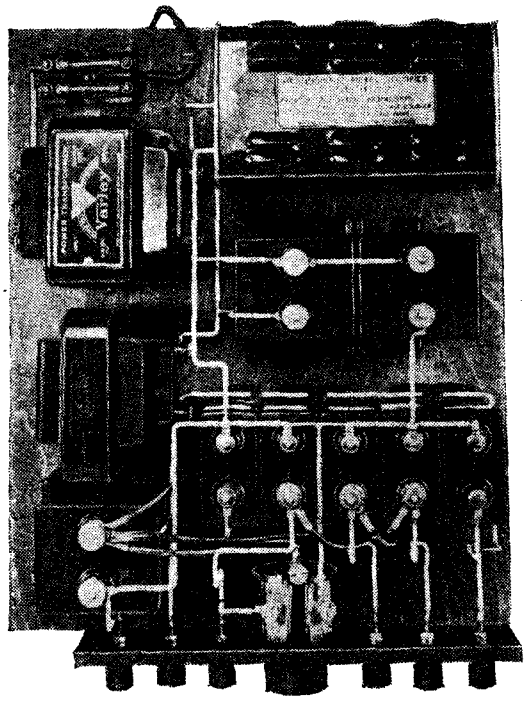
$$\text{Value of spaghetti resistance needed} = \frac{200 - (\text{voltage required}) \times 1000}{\text{(anode current)}}$$

The circuit used is of the type known as the voltage doubler, and the Westinghouse type H.T.7 rectifier must be used. This is matched up with the power transformer which is provided with tappings for 200-220-, and 240-volt mains. The tapping approximating to your mains voltage should be chosen when making connections.

The internal wiring of the eliminator should be carried out with insulated wire, and great care should be taken to have all the connections firmly soldered, because a loose wire might result in the blowing of a fuse.



The circuit of the unit. The actual layout is given on the next page



This is a plan view of the unit which can be made up by anyone, so simple is the construction

The flexible resistances have spade tags at the ends and connection is made simply by clamping under the terminal heads. There is no reason why all the parts should not be mounted on the baseboard before anything is commenced, because there is ample room in which to wield a soldering iron bit without fouling other parts.

You will see that one of the fuses (it does not matter which) is connected to terminal O and the other to the most suitable input terminal depending on the voltage of the local mains supply.

The input to the fuse block is made by means of a length of flex connecting up with the mains point. Do not use cheap flex for this. It is simply asking for trouble. Near the fuse block, the flex should be bound for the distance of 2 inches or so with insulating tape and then clamped down to the baseboard.

(Continued at foot of next page)

For the Newcomer to Wireless: THIS BATTERY BUSINESS

I USE dry high-tension batteries, as you know, and I am always hearing and reading the advice to purchase those of large capacity. Would you please tell me exactly what is the truth of the matter?

It comes to this. The man-in-the-street knows well enough that you cannot put a quart into a pint pot, but where batteries are concerned it is difficult to make him believe that you cannot take a quart *out* of a pint pot.

Please explain.

The dry high-tension battery consists of a number of cells wired in series. A Léclanché cell, no matter what its size, has always an initial E.M.F. of about 1½ volts. Do you know how these cells produce current?

I don't know that I do.

I am not going into details; I will just say that they do it by burning up zinc. The energy that they give out comes from the burning of zinc just as the energy of a steam boiler comes from the burning of coal.

I follow that.

Clearly, a given amount of zinc can result in the production of only a certain amount of energy.

That seems obvious.

In what is known as the standard-capacity high-tension battery you have cells of the same size as those used in ordinary flashlamp refills. You have only to examine one of these to realise that the amount of zinc is small.

About the size of one's thumb!

Cells of this size cannot stand up economically—no matter what some makers may claim for them—to a load much exceeding 5 milliamperes. In other words, they are excellent for single-valve sets and you can work a two-valve set from them, though really they are not big enough even for that job.

What's the average consumption of a two-valve set?

With a leaky-grid condenser detector and a power valve in the output, two-valve sets intended to give good quality from a loud-speaker generally require from 7 to 12 milliamperes.

Then that's far too much for the standard-capacity battery?

It is, and if you try to use it you will find that you have to make renewals five or six times a year.

Then what do you recommend?

There is a double-capacity battery made of cells measuring 1 in. by 2¼ in., though for some reason this particular size is not very successful. I would certainly recommend the treble capacity, with 1¼ in. by 2¼ in. cells, for any two- or three-valve set. It costs only about 30 per cent. more than the standard and it gives at least three times the number of working hours.

And for bigger sets?

The largest high-tension battery made is the super-capacity, with cells measuring 1¼ in. by 3½ in. This will stand up economically to a load of 25 milliamperes. Be careful, though, of one thing.

What is that?

Some makers apply the term "super-power" to batteries made up of 1¼ in. by 2½ in. cells.

"OUR H.T. UNIT FOR A.C. MAINS"

(*Continued from preceding page*)

Connect up the unit to your set just as you would a high-tension battery. It is not advisable to use the H.T. plus 5 tapping unless a large power valve is in the last socket because the full voltage of 200 may overload a small valve. If your set has a screen-grid valve then adjust the H.T. plus 1 tapping until a suitable value is found.

The voltages at the output terminals can be tested with a voltmeter in the ordinary way, but an unreliable reading will be given unless the voltmeter is of a very good type having a high internal resistance. There is no necessity to alter any of the internal connections of your receiver in order to make it work in conjunction with this eliminator.

COMPONENTS FOR H.T. UNIT

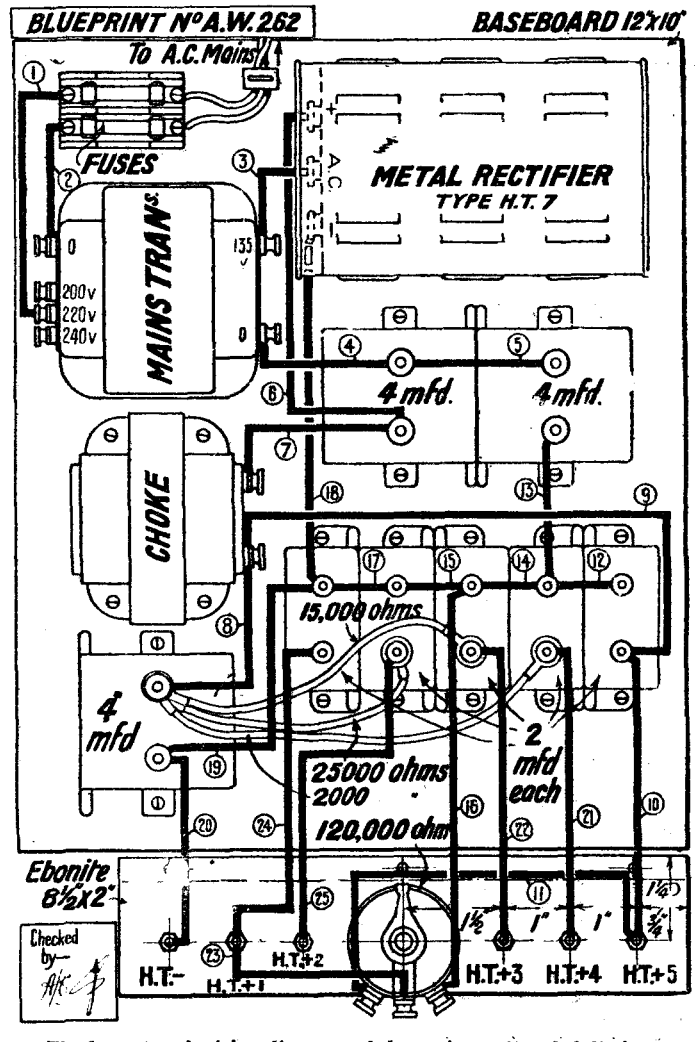
Baseboard, 10 in. by 12 in. (Cameo, Pickett, Clarion)
Power transformer, with 135-volt secondary winding (Varley, Parmeko, Ferranti, R.I., Regentone)
Metal rectifier (Westinghouse H.T.7)
Low-frequency smoothing choke (Lissen, R.I., Igranic, Varley, Parmeko, Atlas)
Three 4-microfarad and five 2-microfarad fixed condensers (T.C.C., Lissen, Dubilier, Igranic)
120,000-ohm variable resistance (Regentstat).
One 25,000, one 15,000, and one 2,000-ohm spaghetti resistances (Bulgin, Magnum)
Ebonite strip, 8½ in. by 2 in. (Becol, Keystone, Trelleborg)
Six terminals, marked; H.T.— H.T.—1, H.T.+2, H.T.—3, H.T.+4, and H.T.—5 (Belling-Lee, Clix, Eelex, Burton, Igranic)
Baseboard-mounting twin fuse (Bulgin, Readi-Rad)
Connecting wire (Glazite)
Length of mains flex (Lewcos)

If you find that the set tends to hum, then you will probably find that it is because the set itself is placed too close to the eliminator and there is induction from the power transformer or choke to some component in the set.

Another possible trouble is motor-boating. It will probably be found that the cause is the higher voltage used, and in that event you should drop down to a lower tapping.

Do not forget to switch off the eliminator when the set is not in use, and preferably switch on the set before turning on the mains.

NEXT WEEK:
A NOVEL TWO-VALVE MAINS SET



The layout and wiring diagram of the mains unit. A full-size blueprint is available, price 1/-

MAKING YOUR OWN GRAMOPHONE RECORDS

J. H. Reyner explains how, with the aid of your wireless set and simple apparatus, gramophone records can be made at home

IT is not to be wondered at that the possibility of making one's own gramophone records should attract the attention of experimenters. As a result, there are one or two systems to-day available to the public by which records can be made at home with relatively small expenditure.

There is probably a feeling that these home-recording outfits are merely toys. There have been such devices on the market in the past and the results obtainable have not been of a very high standard. The possibility of using electrical methods, however, has made a great deal of difference, and we may say at the outset that if sufficient precautions are taken, a record can be made of as good a quality as the average cheap record of to-day. I must admit that this requires a good amplifier and care in the setting up and the adjustment of the apparatus, but even with ordinary precautions it is possible to obtain a tolerably good record.

A Simple Process

The principle adopted for this home-recording is exactly the same as that used in making commercial records. First of all there is an electrical cutter, which is merely a gramophone pick-up used backwards. Instead of a needle one uses a stylus fitted with a sapphire or diamond point, and currents are supplied to this device which cause the needle to move from side to side, the process being the exact reverse of that taking place in an ordinary pick-up, where the movement of the needle generates the currents which are subsequently applied to the amplifier.

If we allow such a cutter to rest on a disc of suitable material and cause the disc to revolve in the ordinary way, it will cut a groove on the disc which will deviate from side to side according to the current supplied to the cutter, and so record the music on the disc. It is clearly necessary, however, to have some means of moving the cutter gradually in towards the centre of the record, so that the successive grooves do not foul one another. The equipment, therefore, includes some form of tracking attachment, as it is called. This point will be discussed in a moment.

There remains, finally, the disc on which the record is to be made. When making a normal record, wax is used for this purpose, as this is easily cut, and thus responds to very fine impulses. Wax, however, has no lasting properties and if it is played once through it loses much of its quality. For home-recording it is clear that we must find some material on which the record may be made direct with reasonable permanency.

At present a metal disc is used, made of an aluminium alloy which is sufficiently soft to take a cut satisfactorily and yet which will not be damaged when being replayed. In order to minimise wear on these records, fibre needles should be used, and I have found the Burmese Colour needles the most satisfactory for the purpose.

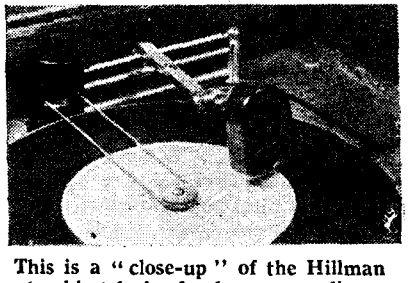
Tracking Devices

It is in the actual mechanism that the various systems differ. The Hillman system, illustrated with this article (made by the Home-Recorder Co., of Bradford), is provided with a complete tracking device which consists of an arm on the end of which is carried the electrical cutter. This is screwed down at the back of the cabinet, just clear of the turntable, and is connected up to the turn-table by means of a small spring belt. The metal disc is placed on the record, and a pulley placed over the centre pin, and locked up. This serves both to hold the record tight and prevent slip, and also to obtain a drive for the tracking device.

With this system a diamond cutter is provided and somewhat hard discs are employed. The disc is lightly lubricated before the cut is taken, a few drops of oil being sprinkled over the disc and distributed with a rag. This is just sufficient to reduce the friction, though too much oil should not be used. After the record is made the cutter is lifted off, and the record can be replayed by using the ordinary tone-arm or pick-up.

The Cairns Morrison system is somewhat different. The electrical cutter provided is designed to fit on the existing tone-arm of one's gramophone in place of the usual sound-box or pick-up. Over the centre pin of the gramophone is fitted a small gear-box from which the tracking screw projects. The tracking screw engages with a clip on the electrical cutter and the motion from the outside to the inside of the record is obtained in this way. The device is quite simple to fit. Somewhat softer discs are employed with this system and a sapphire needle is used in the cutter.

As regards the actual recording I must go into more detail in further articles. It will suffice to say for the present that an ordinary loud-speaker volume is sufficient. One can, for example, record a broadcast item by tuning up the loud-speaker to give good volume, disconnecting the leads from the loud-speaker and connecting them on to the cutter.



This is a "close-up" of the Hillman tracking device for home recording

As I said earlier, it is desirable to use a fibre needle for replaying to avoid damaging the record, and for the first two or three playings the oil in the grooves may give a slightly muffled speech. It is a good plan to wipe off any superfluous oil before the record is replayed.

For making one's own records, i.e., not making use of a broadcast programme, a microphone must be used. This is connected in place of the gramophone pick up of one's set. I will say more about this in future articles, however, and also give further particulars on some of the finer points of this home-recording scheme. I have been experimenting with it for some months, and I must confess that I have found it a fascinating hobby.

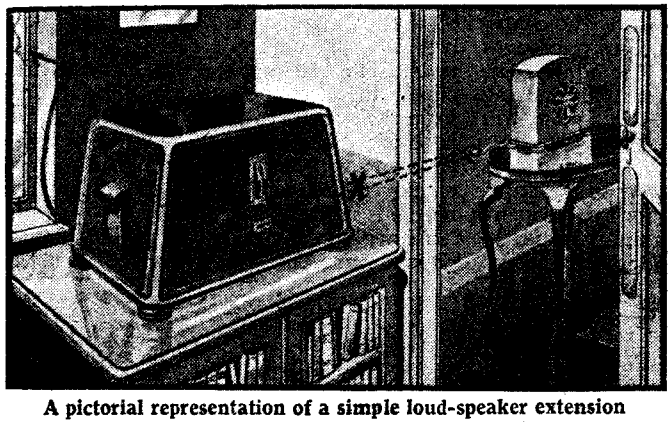
THE HOW AND WHY OF RADIO

XII—HOW TO USE YOUR LOUD-SPEAKER

If you are a beginner in wireless, now is your chance to gain a clear conception of its theory and practice. In this series of articles, specially prepared for the beginner, no previous knowledge of wireless is assumed. It is intended to deal with every aspect of the subject and the whole series will endow the beginner with sufficient knowledge to enable him to derive the greatest possible interest from the fascinating hobby of wireless

AT this time of the year, when every listener wants his set to do its very best, some notes on the right way to use loud-speakers are appropriate, particularly to readers of this beginners' series. I am assuming that some sort of loud-speaker is already installed, working from a two- or three-valver.

If the loud-speaker has been in use for a long time, it is quite possible that the unit has become partly demagnetised, either through hard knocks or through incorrect connection to the set. Demagnetisation produces a deterioration in quality and a loss of volume. Most makers are prepared to remagnetise loud-speakers for a moderate cost.



A pictorial representation of a simple loud-speaker extension

The Right Valve

One of the first things to get right is the valve preceding the loud-speaker. This will, of course, be a power valve, but it may not be the best power valve for the particular loud-speaker in use. A cabinet cone loud-speaker, driven by a balanced-armature movement, usually works best with a fairly low-impedance power valve, say 5,000 ohms, or less. With such a power valve good quality reproduction is possible, provided that only moderate volume is wanted. For greater volume a power valve of 2,000 ohms with an anode voltage of 200 volts or more is preferable.

The large types of cone loud-speaker cannot deliver good quality unless a low-impedance valve is used. The inclusion of a super-power valve enables greater volume without distortion to be obtained and results in a much better reproduction of bass notes.

If, in a search for better reproduction, the listener has purchased a moving-coil loud-speaker, some disappointment may be caused owing to the fact that the power valve impedance does not match the impedance of the moving-coil itself. Most low-resistance moving-coil loud-speakers need an output transformer. A choke-filter circuit is no use, because the object of the transformer is to match the primary winding to the power valve and the secondary winding to the moving-coil.

Another point about moving-coil loud-speakers should be remembered. They give such an even response to musical frequencies that any defect in the amplification of the set is much more appreciable than on an ordinary cone. Many sets that provide quite good reproduction on a balanced-armature cone sound very poor with a good moving-coil.

At holiday times, such as Christmas, loud-speakers are often wanted for dancing and entertaining, in rooms distant from the location of the set. On no account should the aerial wire be extended and the set moved bodily into the required room. For if this is done, a considerable amount of aerial energy will be wasted. The correct method is to extend the loud-speaker leads, which carry only low-frequency current. With good quality flex there is no loss of energy with an extension from the loud-speaker terminals to a loud-speaker in a distant room.

In well-designed sets, the anode current of the power valve passes through a low-frequency choke or through the primary winding of an output transformer. In this way no direct current flows through the loud-speaker windings, as only the low-frequency signal currents are by-passed. But in many cheap sets the anode current flows directly through the loud-speaker winding, due to the omission of an output circuit.

To such sets it is desirable to fit an external filter, if an extension is contemplated. Otherwise the high-tension current from the battery or mains unit will be led right round the house. The simplest possible output is a 1-to-1 ratio output transformer, costing about a guinea. The primary winding is connected across the loud-speaker terminals of the set. The secondary winding is connected to the twin flexible lead used for the extension, which, at the distant point, can terminate in a suitable wall socket, as shown by the picture.

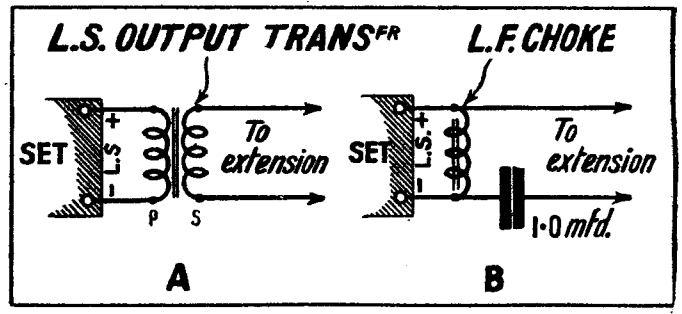
Extension Connections

The connections for this simple extension circuit are shown at A in the diagram. At B is shown an alternative method. This consists of a low-frequency choke coil connected across the loud-speaker terminals; and in series with one of the extension leads and the negative loud-speaker terminal is fitted a 1-microfarad fixed condenser; the other extension lead goes to the positive loud-speaker terminal.

With this circuit the anode current from the high-tension supply passes through the low-frequency choke, but is prevented from passing along the extension to the loud-speaker by the fixed condenser. The low-frequency signal variations are barred from passing through the low-frequency choke, but flow with great ease through the fixed condenser and so through the loud-speaker windings.

To obtain a better distribution of volume in order to entertain a party, it is a good plan to use two or more loud-speakers together, provided that the set is capable of delivering sufficient power to work them. The several loud-speakers should be connected in parallel. In other words, each set of loud-speaker leads should be connected to the loud-speaker terminals of the set.

HOTSPOT.



The connections for the extension shown in the picture are detailed at A in this diagram. At B is shown an alternative method

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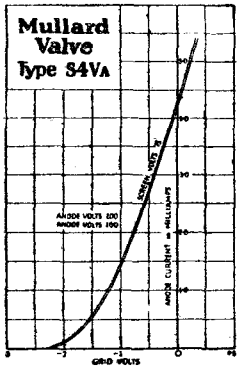

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S.4V.

Max. Heater Voltage ...	4.0 volts
Heater Current ...	1.0 amp.
Max. Anode Voltage ...	200 volts
Positive Screen Voltage	75 volts
*Anode Impedance ...	909,000 ohms
*Amplification Factor ...	1,000
*Mutual Conductance ...	1.1mA/volt

* At Anode Volts 100. Screen Volts 75. Grid Volts Zero.

S.4VA.

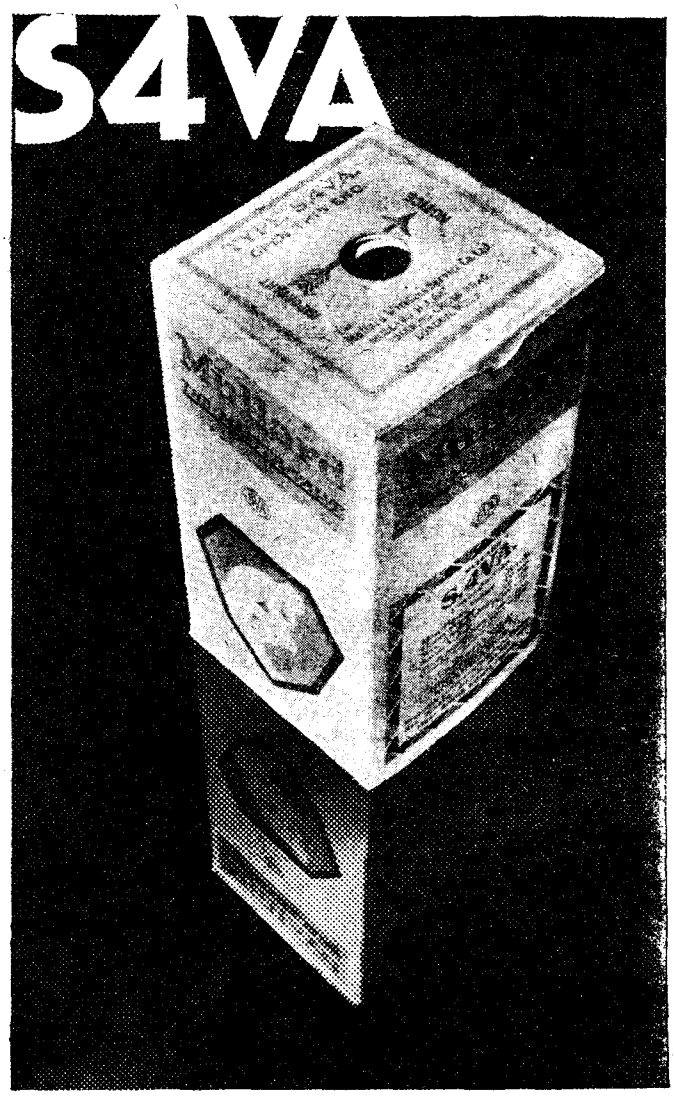
Max. Heater Voltage ...	4.0 volts
Heater Current ...	1.0 amp.
Max. Anode Voltage ...	200 volts
Positive Screen Voltage	75-100 volts
*Anode Impedance ...	430,000 ohms
*Amplification Factor ...	1,500
*Mutual Conductance ...	3.5mA/volt

* At Anode Volts 100. Screen Volts 75. Grid Volts Zero.

S.4VB.

Max. Heater Voltage	4.0 volts
Heater Current ...	1.0 amp.
Max. Anode Voltage ...	200 volts
Positive Screen Voltage	75-100 volts
* Anode Impedance ...	257,000 ohms
* Amplification Factor ...	900
* Mutual Conductance ...	3.5mA/volt

* At Anode Volts 150. Screen Volts 75. Grid Volts −1.



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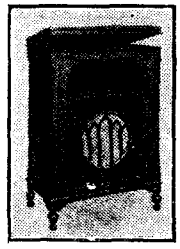

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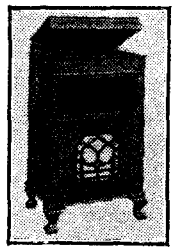

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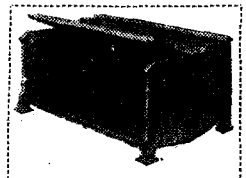

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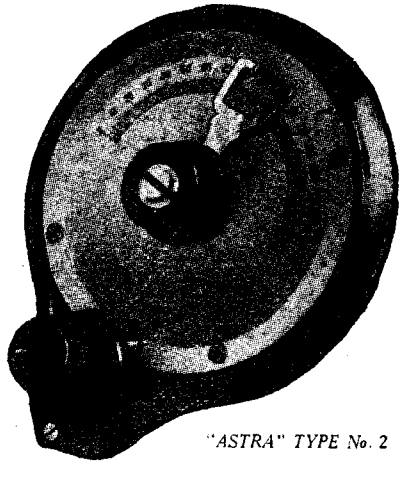

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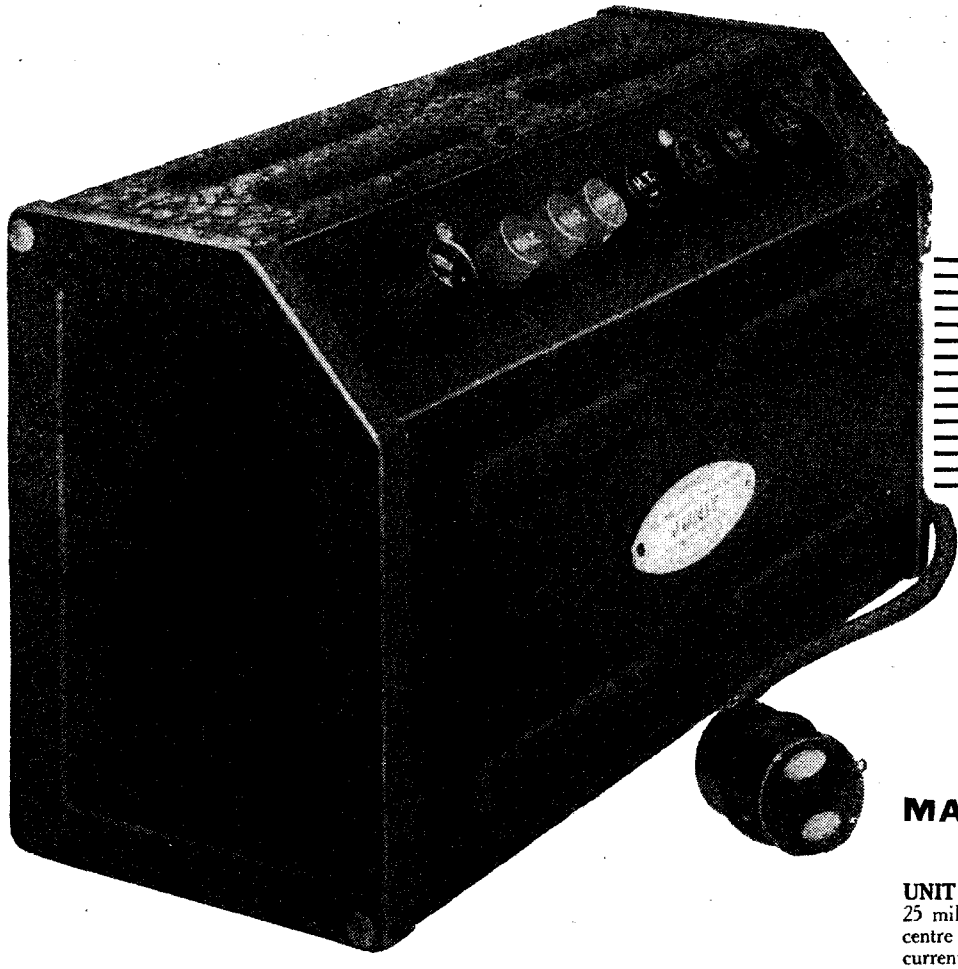

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On Your Wavelength!

A COMPARISON

I WAS thinking the other day how much radio reproduction has progressed. I had occasion to use a cheap portable gramophone, and I was positively amazed at the acoustic arrangements. There was the ordinary tone-arm, perhaps a foot long, if that. Over the end of this was a curved piece of metal about fifteen inches long, and three inches wide. This acted as a reflector and pushed out the sound into the room.

Now, without being nasty, I venture to suggest that anyone offering for sale a loud-speaker so crudely constructed as this would be received with a howl of execration. The system is obviously incapable of reproducing anything below about 200 cycles—in point of fact, I checked this with a frequency record—and yet here is the article being sold, and apparently accepted, as an up-to-date musical instrument.

Even the cheapest loud-speakers provide a reasonable length of horn, or, if they are of the cone type, introduce sufficient box resonance to boost up the lower frequencies; and I feel fairly confident that any of the wireless public would have refused point blank to buy a loud-speaker which gave so poor quality as this gramophone. It is an interesting example of the way public opinion has forced manufacturers of even the cheapest commodities to attain a certain minimum standard. It means, of course, that our loud-speakers cost us a little more; but surely, when one comes to examine it, this is worth putting up with.

HARD LINES

THE Munich station had very bad luck in having its aerial masts blown down in the recent big gale. So far as I can remember, this is the first broadcasting station to suffer in this way, which says a good deal for the care and skill of the engineers responsible for erecting the towering masts that are used nowadays. The wind pressure even on a lattice steel mast is terrific if it is a high one and is facing the full force of the gale. Curiously enough, I tried for Munich the other night before I had seen the news, and couldn't think why he didn't appear to be on the air. However, we are lucky in having a first-rate relay of Munich in Nürnberg down towards the bottom of the medium band. Actually, the relay station usually comes in more strongly than the parent, though it is apt to be more affected by fading.

A FADING PROBLEM

SPEAKING of fading reminds me of an interesting discovery that I made the other day. Having a large and powerful set in the house, I thought that I would see whether any of the medium-wave stations could possibly be picked up in broad daylight. The time was actually 1.30 p.m., and it was a bright day, with the sun shining in a clear sky. I was surprised to find that I could receive at quite respectable loud-speaker strength a very fair number of stations, including Hörby, Leipzig, Breslau, Hilversum, and Rome. They did not, of course, give anything like so much volume as they do normally after dark; still, they were there right enough, though not really worth listening to from an entertainment point of view, since the ratio of signal strength to mush strength was insufficient for first-rate reception. And now comes a rather curious and interesting point. Every one of these stations was showing a certain amount of rhythmic fading, such as we frequently experience shortly after dusk. The fading, too, was of exactly the same kind, with swings occupying several seconds from maximum to minimum and back again.

IS IT CORRECT?

IF you look at the explanations generally given of the phenomenon of fading you will find it stated that during the daytime we have to rely on the ground wave, since the Heaviside layer is not in a condition to turn the reflected wave back to earth. Hence distant reception is weak. After darkness has set in the Heaviside layer becomes a good reflector and sends us along the waves that previously didn't reach us. The cause of fading is said to be due partly to changes occurring in the Heaviside layer and partly to the fact that the ground wave and the reflected wave may reach our aerials, now exactly in step (in which case we get a maximum), and now just out of step, when a minimum period of signal strength occurs. All that seems very convincing, but, in view of my experience of reception of medium-wave stations at the brightest time of the day, I am beginning to wonder if the explanation is complete.

PUZZLING

YOU see, it would be quite impossible, one would think, for the ground wave to reach my aerial from stations so distant as Breslau and Rome. In both cases these waves would have to travel over land, and not across water, for the greater part of their journey. Reception, remember, took place during bright sunshine and with a clear sky. Despite this, the Heaviside layer must have been at work, though the influence of darkness or even dusk certainly was not there to produce any changes in its lower surface or in its height above the earth. It must, of course, have happened that on that particular day, despite its bright sunny nature, the Heaviside layer was lower for some mysterious reason. And the fading may, of course, have been due entirely to undulations in the earthward surface. All the same, I must confess that I am a little puzzled. I have not had the opportunity of making further daylight attempts yet, but I hope to do so before long, and it will be interesting to see whether the same thing happens. What will be still more interesting will be to discover whether daylight reception is possible on the medium band at the height of summer if one has sufficient magnification at command. And if it is, will fading still take place?

TAKE THE HINT

GOOD though many charging stations are, I am coming to the conclusion that those that can be so classed are not nearly so common as they ought to be. In fact, I will go farther and say that those who have to use accumulators will be very well advised to run a hydrometer over their cells when they come back from the charging station. A case in point occurred the other day when a friend asked if I could take the gravity of his cells next time I was in his direction. Dropping in for a chat on the following evening, I took a hydrometer with me and measured each cell of his six-volter. There were differences between the cells, and none of them showed more than half charge. "Just as I suspected," said my friend. "Now, if you'll believe me, that battery came back only three days ago from the charging station, and I purposely haven't used it until the gravity had been measured." To make customers pay for half a charge is every bit as dishonest as selling short weight bread or coal. But I fear that the practice is rather widely prevalent. It is no unusual thing, if one visits the small charging station, to find that it is not equipped with a proper hydrometer, or, if there is one, that it is not used. The hydrometer is absolutely the only reliable method of testing the condition of accumulator cells

DANGEROUS FELLOWS

IT is a pity that the wireless business has attracted so many young fellows who went into it chiefly because they saw, or thought they saw, easy money. Many of them were mildly interested in wireless in the early days of broadcasting and, knowing just a little more than their friends, obtained local reputations as experts. Unhappily, many of the fellows who advertise themselves as radio experts do not go far beyond the ability to distinguish a grid-leak from a transformer. And the worst of it is that they will tackle anything that comes along.

Some months ago a friend asked me if he could add a note-magnifying valve to his existing three-valver. I strongly advised him not to attempt anything of the kind, for if you start tinkering with a design the result is not infrequently disaster. My counsel was that if he wanted a four-valve

On Your Wavelength! (continued)

set he had better rebuild entirely, using such of his old parts as he could and following one of the AMATEUR WIRELESS designs. However, he went along to one of these expert chappies, who forthwith told him that the job was an easy one and quoted a price for carrying it out. It was not successful; in fact, a perfectly good set was completely ruined, though a good deal of money was spent by my friend in the process, for the expert recommended that all kinds of "improvements" should be made here, there, and everywhere. The wise man makes sure, before accepting his advice, that the expert consulted really does know something about wireless.

DELAYS ARE DANGEROUS

THERE is another point about charging stations which needs watching. Not a few of them will tell you if you leave, say, a 50-ampere hour battery on a Monday that it will be ready on the following Friday or Saturday. If it is charged at 3 amperes such a battery will actually require something under 20 hours on the charger. But you are asked to leave it for 100 hours more than this. And you can jolly well bet your boots that, if you agree, your battery will be standing in a run-down or nearly run-down condition for the best part of those hundred hours before it comes near the charger. There is, as you probably know, nothing worse for a battery than to remain in a run-down condition, for sulphating sets in remarkably quickly. It is sound, therefore, to stipulate, if possible, that the battery handed in for recharging shall be returned within a reasonable time. By far the best tip really is to arrange with a reliable station to give you regular monthly service. Mine sends round on the last Wednesday in each month and collects both my H.T. and my L.T. accumulators. Each of these is capable of more than a month's working, but by having them charged regularly in this way one ensures that the gravity never drops down to near the danger limit.

A QUEER NOISE-MAKER

I WAS much puzzled the other day by an outburst of noisiness in a biggish set which employed a good deal of careful screening on the high-frequency side. There certainly was not a loose lead outside or inside it, all the valves were in good condition, and the valve-holders were guiltless. Yet the slightest jarring of the cabinet produced a terrific response from the loud-speaker. Even if one walked across the room there was a volley of "atmospherics" at every step. It took me quite a while to discover just where the source of the trouble was located.

UNUSUAL

YOU wouldn't guess if I gave you a hundred shots; so I had better tell you right away. The wave-change switch, which was of the barrel type, was supported on a little metal angle bracket fixed by screws to the bottom of the screening box of the first high-frequency valve. These screws had worked loose, though all connections to the switch were in perfect order and the contacts themselves were as good as good can be. But if that switch was rocked the crackles were instantly produced. I tightened down the screws and had no further trouble. When a set is pretty sensitive and employs a good deal of high-frequency amplification, noisiness can be caused in funny little ways like this. The explanation here is, I suppose, that, owing to the chance contact between the metal contact and the screening box, the body of the switch was sometimes properly earthed and sometimes not.

WHERE ARE THEY?

CONDITIONS for listening to European stations have been so good lately that I have sat up until the small hours once or twice to see whether anything was to be heard of the Americans. I quite expected to find one or two of them, for there are giants over there in these days. But not a sign have I been able to obtain of the 50-kilowatt WGY or any other. Conditions for listening seemed to be practically perfect on each night when I made an attempt, for there were no atmospherics; so that one could use the set in a very sensitive condition. Spark signals, too, were conspicuous by their absence, though in the days when the American medium-wave stations came over so well our pleasure was often spoilt by the morse pingings of ships and shore stations. I firmly believe that we shall receive the American medium wavers this winter once more, but I expect that we shall have to wait until the weather decides to become a little more settled. My experience is that on all wavelengths you get the best results when the glass is high and steady, and the weather not chopping and changing.

UNDER DIFFICULTIES

A LETTER which came the other day from a Colonial reader is rather an eye-opener as regards the difficulties under which some people carry on their favourite hobby. His abode is in a part of Africa where atmospherics are pretty filthy, but he carries on, despite them having, so he tells me, developed cast-iron eardrums as a result of long practice. His great complaint is that, owing to the dampness of the climate, any wire-wound components that he uses have a very short life. Coils, chokes, transformers, and resistances all succumb, for the damp makes its way into their innards, sets up corrosion, and causes breakdowns. Still, he is quite undaunted, and he writes to me to ask if I can find any maker of damp-proof components. I am not sure that his best way would not be to fit every component with a wooden containing box and, after making all connections, to fill this with melted paraffin wax.

REMEMBER THE POTENTIOMETER

TO add a potentiometer to the receiving set in order to smooth out reaction is an excellent tip. I have described it before; you take the grid-leak return not to L.T. positive, but to the sliding contact of the "pot-meter," and you can then adjust your grid potential to a nicety. But do remember to connect your potentiometer in such a way that the battery switch throws it out of action when it is turned to the "off" position. I have been surprised to find how often, when looking round friends' sets, the grid bias potentiometer so wired that it isn't cut out when the switch is turned to the "off" position. A 300-ohm potentiometer across a six-volt battery passes 20 milliamperes continuously. The drain is small, but it runs the battery down in time. Matters are still worse if you use a high-resistance potentiometer across the H.T. battery for adjusting screen-grid potentials, for milliamperes are of vast importance to the H.T.B. Yet I found a set the other day whose potentiometer drew 3 milliamperes, day and night, though the owner did not know it until my milliammeter proved it conclusively.

SEEKING SECRECY

ACCORDING to Sir Basil Blackett, the most effective method of ensuring secrecy for wireless messages of a confidential nature is to send them through the ether in "facsimile"; that is, in autograph or typewritten form by a process similar to that used in transmitting photographs. Judging by the kind of sounds one hears when picking-up television signals, I should say that anyone who went to the trouble of trying to intercept a facsimile message on an ordinary broadcast receiver would find it highly unintelligible. The time may, however, come when television receivers will make it possible to capture even the written message, in visible form. Not that one wants to do this kind of thing, but it does show the difficulty of frustrating a determined eavesdropper.

As Sir Basil point out, even the submarine cable is not immune in this respect. The current impulses, as they travel through the wire, send out a spreading field of force, which with a sufficiently sensitive receiver can be picked up a considerable distance away. This method of picking up low-frequency fields of force (as distinct from true radiation) is, in fact, now being used for guiding aircraft when landing in the dark. The aerodrome ground is surrounded by a cable fed with A.C. currents, the inductive "field" from which energizes a receiver on the plane, so as to indicate the outline of the landing field.

THERMION.

CHRISTMAS DAY at the B.B.C.

◆ ◆ ◆

Below, "Savoy Hiller" gives a word picture of the happenings at the London station on Christmas Day

"EIGHT o'clock, sir; here's your tea, and a merry Christmas to you."

The announcer rolled over with a grunt. Mary Ann was standing over him with a bright smile on her rosy features.

"Umph!" he said. "Thank you, Mary. Oh! and a merry Christmas to you also."

"Thank you, sir," answered Mary, setting down the cup. "It do seem a shame you've got to go to work to-day, sir."

"Well, well; so have a good many more, Mary. We can't *all* have a merry Christmas."

An hour and a half later the announcer was on his way to Savoy Hill. "It's a good thing I've got a car," he said to himself. "They're packing up all the tubes and buses at four."

He passed along deserted Piccadilly and the Strand, and it was not until he turned down Savoy Hill that things looked normal again.

The doors of the great building were already open, and at the reception desk sat the janitor.

"Good morning, sir, and a merry Christmas," he began.

"Oh, good morning, Smith," answered the announcer.

He was beginning to dislike the phrase, "a merry Christmas."

Passing up the stairs, he arrived at the announcer's room. Sitting at a desk was the chief announcer.

"'Morning, old boy, and a merry Christmas to you," he said. "You're on first. Your announcements are on your desk. Better look 'em through."

Our friend was becoming Scrooge-like. "A merry Christmas," he muttered, and a moment later could have shouted. The beginning sentence of his first announcement commenced:

"This is the National programme from London. Good morning, everybody, and *a merry Christmas* to you all."

And all over the country the luckless announcers who had "clicked" for duty were simultaneously cursing their luck.

◆ ◆ ◆

But, of course, things aren't really so bad as all that, for announcing on Christmas Day is generally done in relays, and our friend of the morning will probably be able to get home by four.

In the control room the same atmosphere of Christmas pervades the rather severe portals. Engineers are bustling about, testing, adjusting, and generally preparing for the day's broadcast.

This section of the community is world-famed for its repartee, and there is many a "new one" to be heard, before the red light gives the signal to commence transmitting.

Christmas morning usually starts with a church service, and if Christmas Day comes on a Sunday the service is "taken" from outside. Engineers are, therefore, hard at work testing microphones in the church, and here, again, the spirit of *bonhomie* prevails.

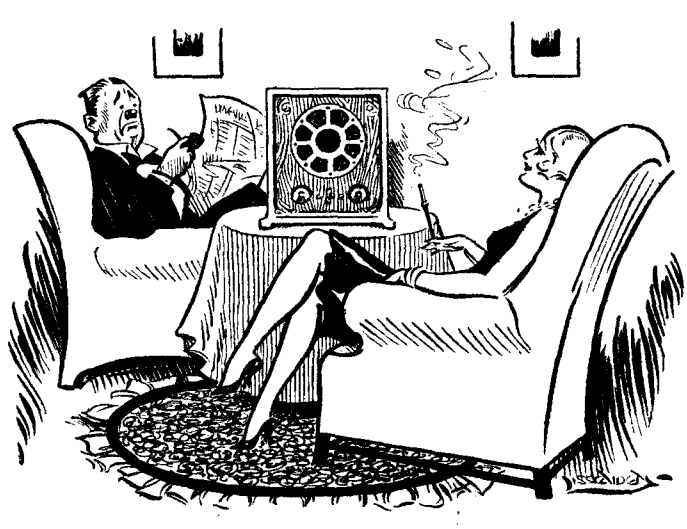
There are only three offices, besides that of the announcers, open on Christmas Day: that of the house superintendent (who also controls the reception office), the news rooms, and the cashier.

The news section, of course, has to make up the bulletin, and the cashier must be present to hand cheques or cash to the artistes performing.

Later in the afternoon the uncles and the aunts of the children's hour put in an appearance. They are in festive mood, having just had their Christmas dinner at home, and many of them arrive in paper caps, which contrast in an amusing manner with the rather drab and gloomy passages at Savoy Hill.

Then, later on, an evening programme with, perhaps, a pantomime or a vaudeville transmission. Then it is that the fun gets fast and furious. Everyone is in a happy mood, imbued with the Christmas spirit. The comedians are funnier than ever; the singers seem in specially good form; the actors act as they never have before.

Only the announcer must keep his head. He must do his job, just like he would on any other day. There must be no deviation from the strict rule. And then, at last, the "good night." The announcer is alone in the studio. Everyone else has hurried off to their parties and dances, and now there is only dance music from some hotel. The control room is almost deserted, two engineers only are operating; the lights are out in the offices; the sleepy janitor is nodding at his desk. Savoy Hill has come to the end of Christmas Day.



SHE: *"Broadcasting has passed the infant stage!"*
HE: *"Yes, but there are a lot of infants who have not passed the broadcasting stage."*

It is probable that a beam wireless service will be established next year between India and Japan.

IN MY WIRELESS DEN

WEEKLY TIPS—CONSTRUCTIONAL AND THEORETICAL

By W. JAMES.

Flexible Resistances

I NOTICE that the packets containing flexible resistances have marked upon them the current-carrying capacity of the various sizes.

This is a feature which appeals to me. How often do we use a part not knowing quite how much current it will carry?

Flexible resistances comprise a core having a resistance wire wound round it. The ends are gripped by tags and a covering of systoflex is used. These resistances are likely to be used pretty extensively, for they are cheap and effective.

Those Valve Pins

A good many solid-pin valves are now being issued. Some types of holders are not very satisfactory for these new valves and loose contacts may be expected.

It is especially necessary that mains valves should fit well. A loose grid connection may result in hum and with a really bad contact or perhaps a disconnection in the grid circuit, damage may be caused.

When the grid circuit is broken the grid bias is removed and in the case of a power valve, a heavy current will flow and perhaps damage the valve and the anode supply unit.

Silk or Enamel?

Is silk- or enamel-covered wire better for tuning coils? Sometimes you see one, and another time the other recommended.

The point is, I think, that a wire having a good coating of enamel is likely to be satisfactory and is cheap. A little more care may be needed than when winding a silk-covered wire, but the expense of this wire does not seem to be justified on many occasions.

A good many set manufacturers use coils of enamelled wire and there seems to be no reason why amateurs should stick to the silk covered.

Shielding that Set

To arrange shielding in a satisfactory manner is not quite so easy as it looks, particularly in sets having ganged tuning.

Both the inductance and the capacity of circuits are likely to be affected.

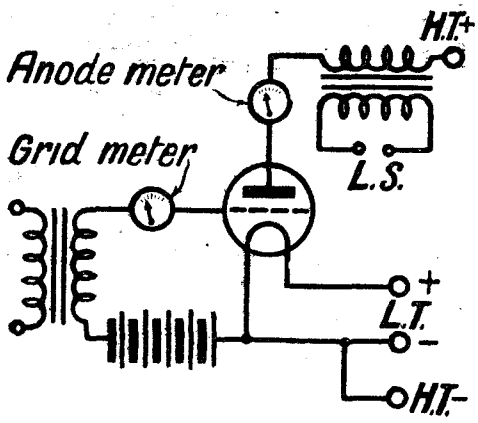
An earthed plate near a coil will tend to raise the wavelength because of the capacity effect of the coil to earth. At the same time the inductance of a coil will nearly always be altered by metal standing near it. Coils ought therefore to be symmetrically placed with regard to all shielding or the tuning may be greatly affected.

When Testing

When adjusting a set having a really powerful output stage it is just as well to include a grid meter as well as a plate circuit milliammeter.

The meters are joined as indicated in the accompanying diagram. Grid current kicks cannot always be avoided and the fact is that the amount of the distortion introduced depends largely upon the design of the last stage. If the transformer has overloaded characteristics, for example, the effect of the grid current will not be as noticeable as when the more usual type of transformer is used.

As a rule, however, grid current is to be avoided so far as is economically possible. The anode circuit meter is usually bound to show kicks on occasions, but the point in having two meters is that overloading may be avoided by making adjustments which result in both meters behaving normally.



When testing your new set it is advisable to use meters, which may be connected as shown. This method of testing is described in the accompanying paragraph

That is, the grid circuit meter should show little or no current (normally), while the anode circuit meter ought to show a practically steady reading.

Permanent-magnet M.C.'s

Permanent-magnet moving coil speakers are almost bound not to be as sensitive as the best coil excited types unless really good magnets are used. There are several sizes, of course, and the best and most expensive are really good.

When a cheap magnet is used the sensitivity will be down and my point is that the size of the magnet is some indication of the probable sensitivity. Do not expect too much when a small magnet is fitted. There are different qualities of magnets, naturally, so that size is not the only factor.

"Power" Detectors

A point made against the so-called "power" detector, which has a grid condenser of about .0001 microfarad and a grid leak of from .1 to .5 megohm, is that the circuit connected to it is damped.

Thus the selectivity of this circuit is not very great and the actual signal strength developed across the circuit is somewhat less than when a larger grid leak resistance is used.

I believe the damping effect is rather less than is commonly thought. The power detector is not quite as sensitive to weak signals as the ordinary grid detector and this may be responsible for the feeling that the power type tends to damp the circuit rather heavily.

In a power detector the grid leak should be made as low in value as possible, a value of .25 megohm being reasonable. Use also a valve of low impedance and give it plenty of power.

"SPLIT" IMAGES

IN a television receiver the scanning-disc must not only be driven at the same speed, but must also run "in phase" with the disc used at the transmitting station. For instance, although the hour-hand of a clock in New York rotates at the same speed, it is roughly 180 degrees out of phase with the hour-hand of Big Ben, owing to the difference in local time between the two countries. If the transmitting and receiving discs used in television are 180 degrees out of phase, the received picture is "split," so that one half is seen on the right-hand margin of the screen and the other half on the left-hand side, the centre of the screen being left blank. This kind of distortion is corrected by adjusting the dial knob on the televisor so as to speed up the motor until it is running in phase, *i.e.*, in correct "step" with the motor at the transmitting end.

M. A. L.

Contrary to recent reports published in the Press, the Gdingen 5-kilowatt transmitter opened by the Polish authorities is not to be used for broadcasting purposes, but as a coastal station at the disposal of the Posts and Telegraphs administration.

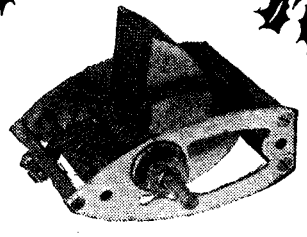
To compete with the coming Prague and Warsaw high-power transmitters, the new German stations at Muelacker, Heilsberg, Langenberg, and Konigswusterhausen have been so planned that, although primarily of 74 kilowatts, the energy can be doubled within a few weeks.

Seasonable Gifts

WE MAKE SOME PRACTICAL SUGGESTIONS

"WHAT can I possibly give him for Christmas this year?" This hardy-annual question is not necessarily best settled by a personal gift. Personal presents are not always easy to choose, but if you happen to know that the recipient is a wireless enthusiast, or even just an ordinary listener, then

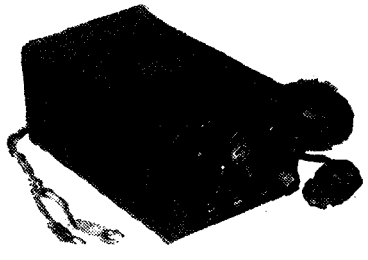
(*Continued on next page*)



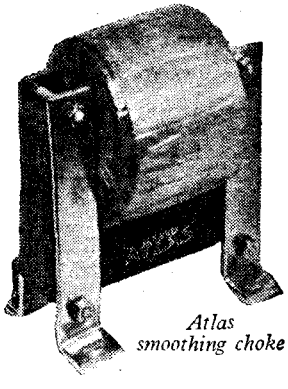
Lissen variable condenser

Hustler "Double-two" receiver

The Red Star three-valver

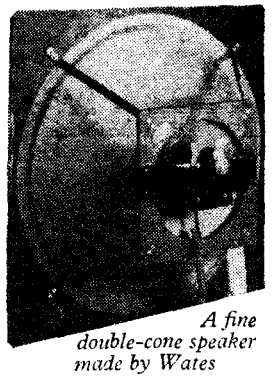


The Tannoy eliminator for portables

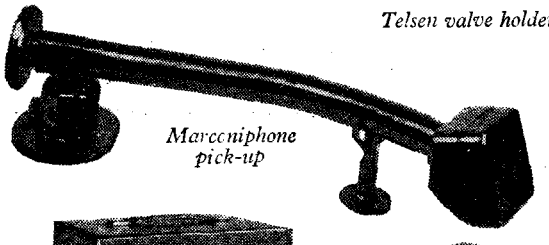


Atlas smoothing choke

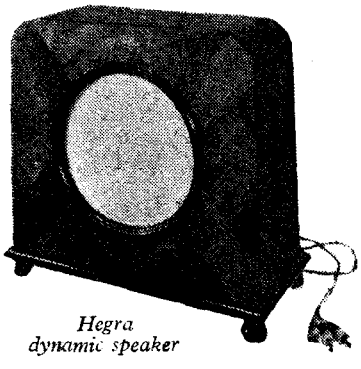
Telsen valve holder



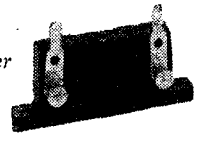
A fine double-cone speaker made by Wates



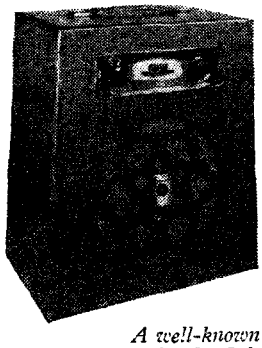
Marconiphone pick-up



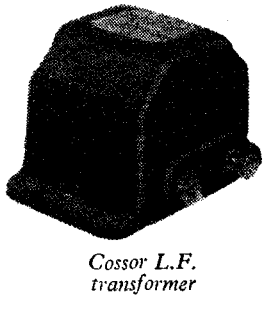
Hegra dynamic speaker



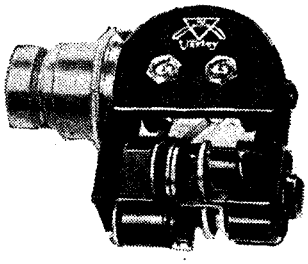
Edison Bell fixed condenser



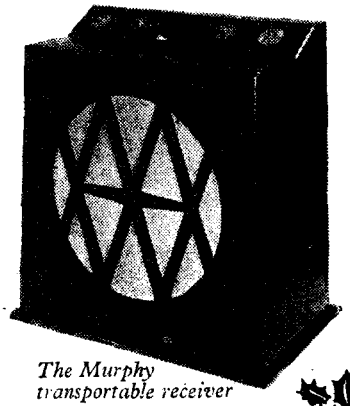
A well-known portable, the Columbia



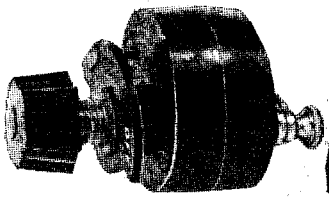
Cossor L.F. transformer

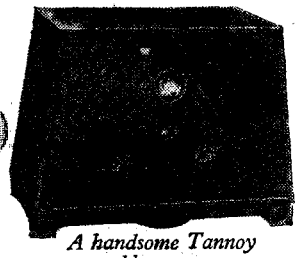


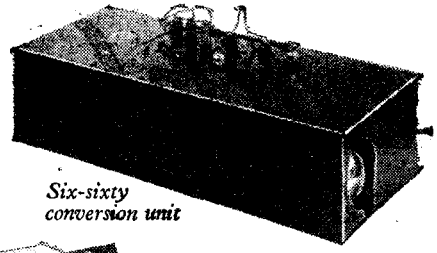
The Varley pick-up

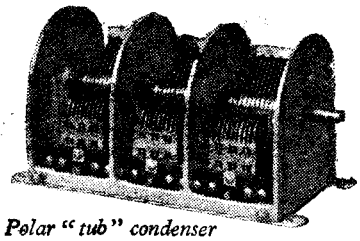


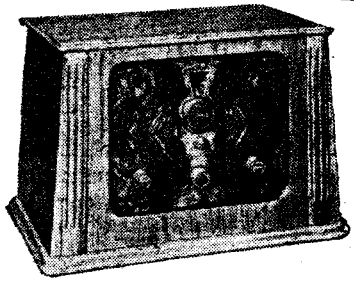
The Murphy transportable receiver

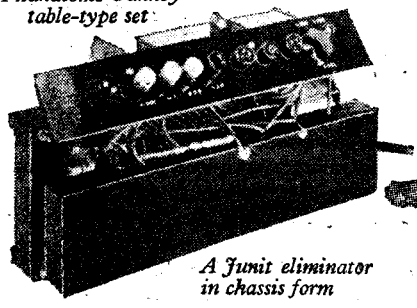

Bulgin rotary switch

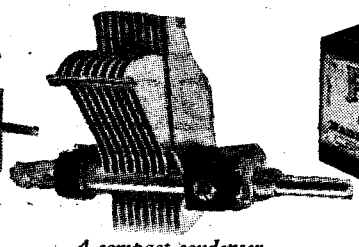

A handsome Tannoy table-type set

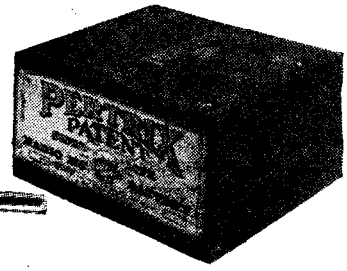

Six-sixty conversion unit


Polar "tub" condenser


A fine Varley table-model set


A Junit eliminator in chassis form


A compact condenser, the Formo



Pertrix high-tension battery

you can be sure of choosing something which will please.

You have a choice of giving a small component which needs incorporation in the set itself, a speaker or a mains unit which can be added by a non-technical set user; or you can make a wireless enthusiast out of a present non-listener by giving him a kit of parts with which to make up a set.

There is no need for you to be an expert in order to choose a piece of radio gear. Provided you know the type of set which the gift must suit, wireless dealers will give advice.

Dual-range coils which will make for better tuning, new condensers which will assist control and improve the panel appearance, transformers or resistance amplifiers which will improve purity and amplification, output choke or volume controls; each might be suitable.

A new valve is always a safe gift, provided, and it is a very important "provided," that you get one of the right type. It is no use buying an A.C. valve for a friend who uses a 2-volt accumulator and has no mains.

There are other ways of improving a set's performance, and where a Christmas radio gift may be opportune. If your friend has complained during the past few weeks of lack of selectivity, then you can safely buy a wavetrap. Dual wavetraps are available which can be pre-set to cut out either one or other of the local stations.

If the recipient is a wireless man who has a gramophone, then you might do him a good turn by giving him a pick-up. Most sets are adaptable to gramophone working.

A loud-speaker always makes an acceptable gift and it is really surprising how many sets are improved by fitting a new speaker. If you do not wish to go to the expense of buying a cabinet instrument, then you might purchase a unit or even a double-cone, or linen-diaphragm chassis, which can be used with an existing unit.

If the recipient has a portable set which works from batteries, then he is fairly sure to appreciate the gift of a grid-bias or high-tension battery, for even though his own may not be run down, it will be a safe standby at Christmas time and will prevent him from worrying whether the "juice" will give out at a crucial moment during the holiday programmes.

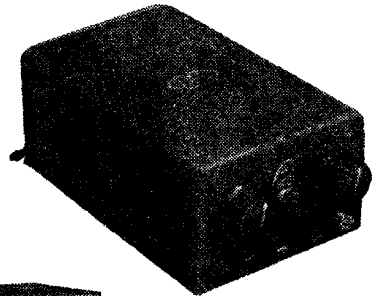
Here, again, it is wise to make some preliminary inquiries, because with some portable and transportable sets there is only a limited space available for the battery, and only certain types may fit.

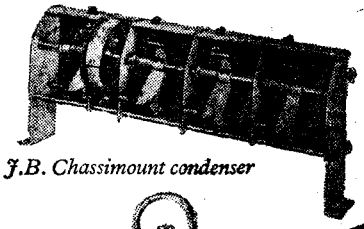
Mains apparatus is very popular nowadays and is easy to select as a present. Make sure when purchasing an eliminator that it will suit the mains supply for which it is intended and that it is capable of giving a suitable output for the set with which it will work.

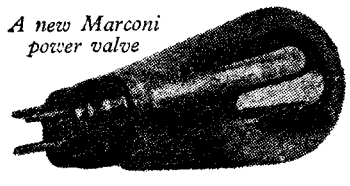
If you intend purchasing a complete set, you will find so wide a range on the market, that your choice will be governed largely by the depth of your pocket, for there are suitable receivers in every price category. There are several kits of parts on the market, too, and if you know that your friend

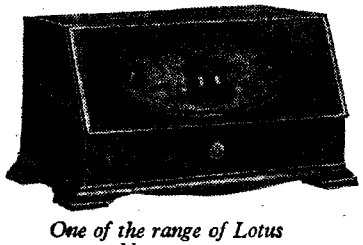
(*Continued on page 902*)

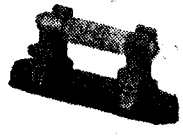

Telsen H.F. choke

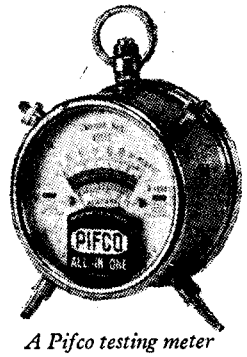

For mains users—a Tannoy H.T. unit and charger


J.B. Chassimount condenser


A new Marconi power valve


One of the range of Lotus table-type sets


Ediswan grid leak



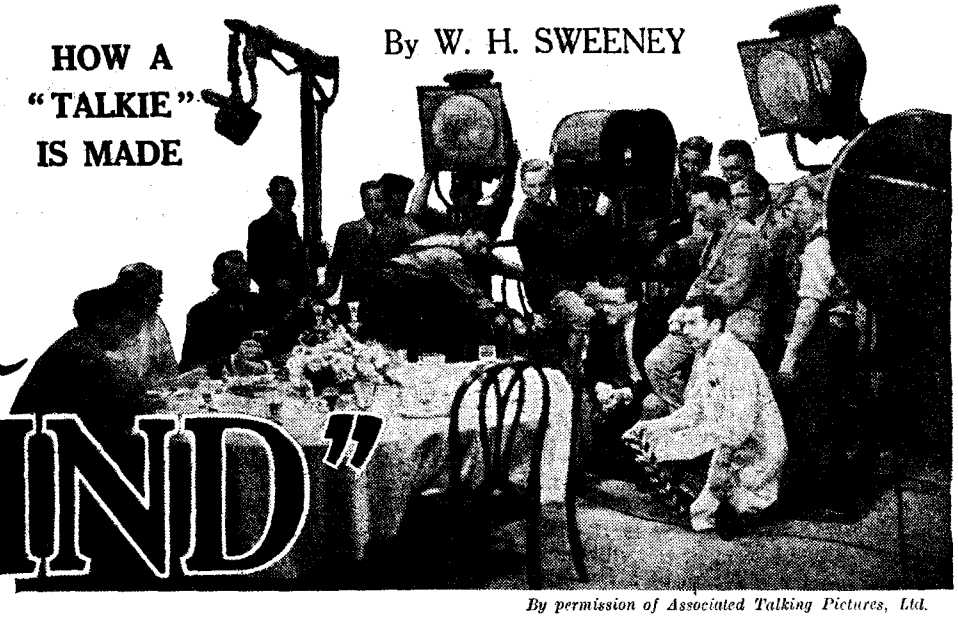
A Pifco testing meter

A good high-tension battery, the Ever Ready

"OK FOR SOUND"

HOW A "TALKIE" IS MADE

By W. H. SWEENEY

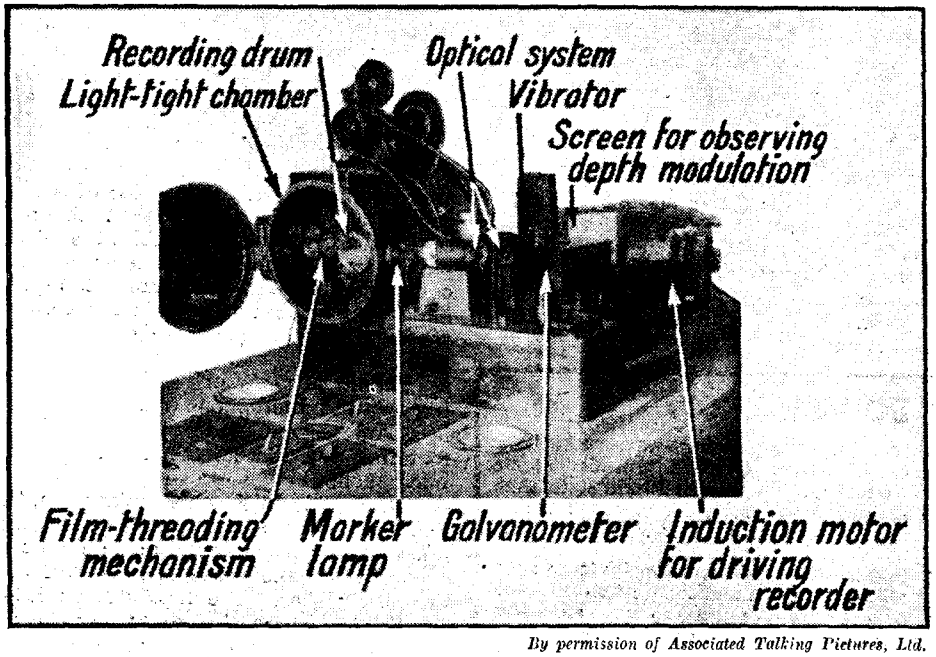


By permission of Associated Talking Pictures, Ltd.

"LIGHT 'em up!—Start your recorder!—Mark it!" . . . There is a strange silence—red lights flash all round us, a very faint whirr is noticeable, so faint as to be almost imperceptible: our eyes are dazzled by a blinding glare, nerves strung to breaking point by the unearthliness of it all. What are we waiting for—why can't someone do something? Then, just as we feel we must scream—"Crack!"—A noise like a pistol shot—and before our fascinated eyes the hitherto motionless figures come to life, their voices now low and vibrant, now sharp and passionate. We are fascinated by the reality of it, by our nearness to the drama being unfolded before us. . . . Then silence again—a staccato "Mark it!" and another "Crack!" The red lights go out, and an indescribable confusion reigns everywhere.

"That," says our guide, "was Scene 115a, Take 4, of *Fast and Furious*, our latest super production, hundred per cent. talking, hundred per cent. singing, hundred per——sorry," he broke off apologetically, "these catch phrases do stick. Anyway, now you have seen an actual scene 'shot,' perhaps you would like to know just how a sound picture is made. It's quite simple, really. You see, this is how it is done. A microphone is suspended over, or concealed near to the actors. Obviously it must not show in the picture, and there are many dodges for concealing it. Generally, it is just suspended out of range of the camera, over the players' heads. As they may be moving about while they are speaking, it is essential that the microphone shall move with them. With that end in view, we use what is known as a 'boom.' That is a sort of derrick, which can be moved about the 'floor.' In it is incorporated a device for raising or lowering the microphone, and for moving it forwards, backwards, or from side to side. Needless to say, its action is quite silent.

"Well, this microphone (in this case of the condenser variety), which includes a transmitter and associated amplifier, picks up the speech and music, which, after being converted into electrical impulses, is taken via a cable to a second amplifier. This amplifier is housed in a portable sound-proof booth, which can be moved to any suitable position from which the action on the 'set' may be observed. In the amplifier is incorporated a 'fader,' by means of which the outputs of several microphones may be mixed by the recording engineer. There is a control for varying at will the final output. In the booth is also a checking or 'monitoring' amplifier and loud-speaker, in order that the recordist may keep a check on the quality of the sound.



By permission of Associated Talking Pictures, Ltd.

Here is an explanatory photograph of the sound-recording apparatus and the camera

Track showing approximately 130~/sec. wave, assuming 95% modulation

Frequency may be calculated by dividing 18,000 by the distance between peaks, measured in mils. The width of a 100% modulated track is 70 mils. If the above track was fully modulated the valleys would come right down to the base-line

Typical sound-track for speech or music

Note the fundamentals and upper frequencies or harmonics

"The output of the main amplifier in the booth is taken to the apparatus which actually records the sound, that is, the sound camera. As the input to this must be very finely regulated, a meter is used to measure the quantity, or 'modulation level.' This may be either a modulation meter, or 'slide-back,' such as is used by the B.B.C., or it may be a replica of the light-recording device used on the recorder.

"Let us have a look at the recorder, and you will see what I mean. In its simplest form this is a device which converts the amplified electrical vibrations to light vibrations, which are allowed to make a photographic record on a strip of cinematograph film. There is also a method by which the electrical vibrations may be made to actuate a disc-record-cutting stylus, but this method, although perhaps better

known—as it is used to make all the electrically recorded discs in the gramophone industry—is not used very much for talking pictures, as recording sound on to film is more of a commercial proposition. If discs are required, they are re-recorded direct from the film sound-track.

Two Recording Systems

"There are two methods of recording sound on film. One is the variable density method and the other is the variable area. In the first, the sound record takes the form of a track running the length of the film, and being composed of a number of horizontal strips, each strip having a different density. In the second, the track is composed of a number of horizontal bands, of varying length, but of the same density. These bands are so registered on the film that they form one long track, of varying width, which in appearance is a direct record of the wave-form of the vibrations. You know what a diagram of a pure sine wave looks like. Well, if the sinusoidal output of an oscillator were led to the recorder, the track would be an accurate copy of the sine wave. Similarly, if the sine wave were modulated, or had other frequencies superimposed, then the track would show the lowest frequency as a succession of widely-spaced peaks, each peak being split up into smaller ones representing the higher frequencies and harmonics.

Variable Area

"This variable-area system is the most widely used method in this country, and is in use here at this studio. If you examine the recorder, you will see that it is fitted with a galvanometer of the Duddel Oscillograph variety. The vibrator, which is a small mirror, mounted on a wire loop, situated in a strong magnetic field, is used to convert the electrical vibrations to those of light. The speech currents are fed to the loop, which tends to twist in the magnetic field with the passage of a current through it. This twist becomes a vibration when the current is of an alternating or varying nature. The light from a lamp filament is focused on to the mirror, and reflected through a condensing and reducing system on to the film, which is moving through a light-tight chamber at a constant linear speed of 90 ft. a minute. It is interesting to note that the vibrator has to be immersed in a damping fluid of mineral oil, and the most convenient substance obtainable is a well-known medicinal aperient preparation. Incidentally, this same preparation is used in a spray for producing artificial fogs when required on the 'set.'

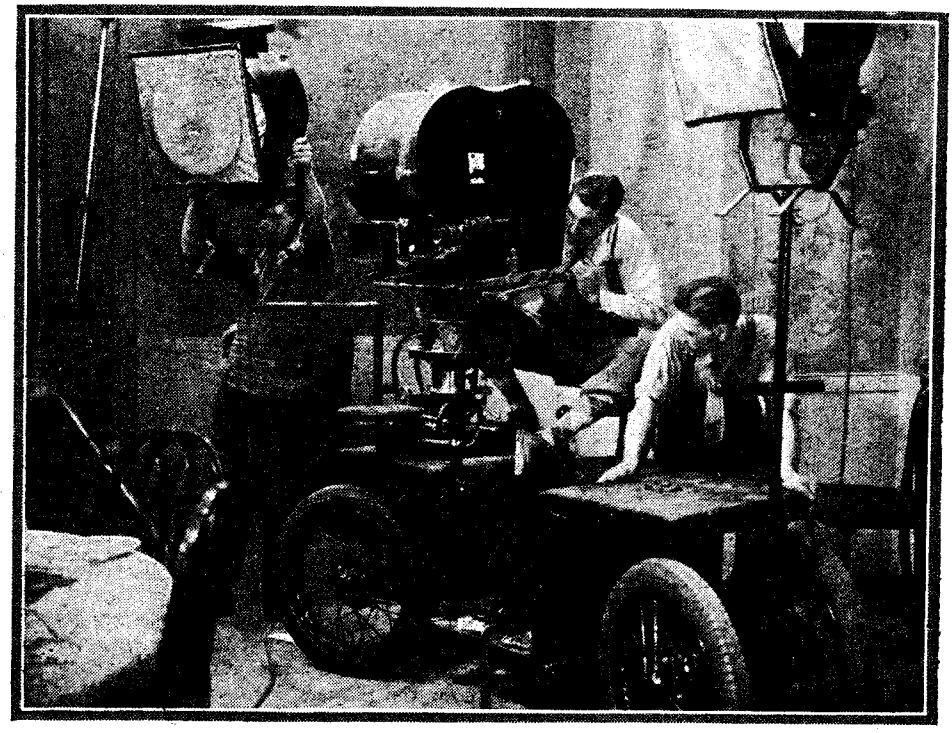
"Needless to say, the film on which the sound is registered must move exactly in synchronism with the film in the picture-cameras, as afterwards the picture and the sound-track are printed on to one strip, copies of which are distributed to the different theatres. To attain this synchronism the recorder and camera mechanisms are driven by synchronous motors, which in turn are driven by a common source of A.C. supply—in this country usually 110 volts, 50 cycles, three-phase. Synchronous motors depend for their speed of rotation upon the periodicity of the supply, and if the latter be common to both motors, it follows that the speeds will be identical.

"In order that the picture and sound-track may be accurately matched up in the printing, a marking system is used. This may be either using 'marker lamps,' or 'clappers.' In the first method, the edge of each film, sound and picture, outside the sprocket holes, is exposed simultaneously to the light from two lamps, operated by one switch. The switch is closed momentarily at the beginning and end of a scene, and this results in two marks outside the picture and track, which can be made to register in the printing machine. Actually, in practice, they are separated by a distance of 19 'frames,' or pictures, as in the projector, the film first passes through the 'picture head,' and then through the 'sound head,' thus making it imperative that the sound should be printed farther forward. The other method of marking is, as I said before, by 'clappers,' and is more generally used At the beginning and end of a scene, an assistant stands before the camera with two brightly marked pieces of wood, hinged together. These pieces of wood are brought smartly together, the noise so produced giving a characteristic wave form on the sound track. This is synchronised afterwards, a distance of 19 'frames' from the picture which shows the actual moment of impact. Of course, in the finished print all this is cut out.

The "Dolly"

"Now that you have seen how things work," continues our guide, "let us go back to the floor and see what they are doing." We accordingly troop back down thickly felted passages, bristling with "Silence!" and "No Smoking!" notices, and passing through a small door, find ourselves on the floor. Here we see a number of technicians engaged in fitting a camera to a sort of trolley, running on pneumatic-tyred wheels. "These," says our guide, "are the preparations for a 'dolly shot.' The 'dolly,' here, is a platform running on silent wheels, and on which are adjustable turntables for holding the camera and lights. On here is also mounted a microphone. This is to enable a shot to be taken of a moving figure, the camera and microphone moving with the figure. Notice how the camera is sound proofed. As putting the camera in a sound-proof booth is obviously limiting its scope, it has to be silenced *in situ*. This is achieved by using a 'blimp.' This is a cover which completely encloses the camera and driving motor. It is made of sponge rubber, and in conjunction with the new so-called silent cameras, enables the microphone to be placed quite near without detecting the noise. Of course, it is quite impossible to obtain absolute silence, and therefore a certain amount of care has to be taken in placing the microphone. Usually a 'sound nigger' or 'gobo' is placed between the microphone and camera. This is a large screen made of sound-proofing material, and deflects the sound from the microphone."

As our guide finishes his explanation, the lights, which up till now have been switched off, suddenly blaze again, and we wait in silence while the scene is rehearsed and eventually shot. The final "Mark it!—Cut!—How's that?" rings out, and as we leave the studio, a distant voice falls on our ears,—"O.K. for Sound!"



By permission of Associated Talking Pictures, Ltd.

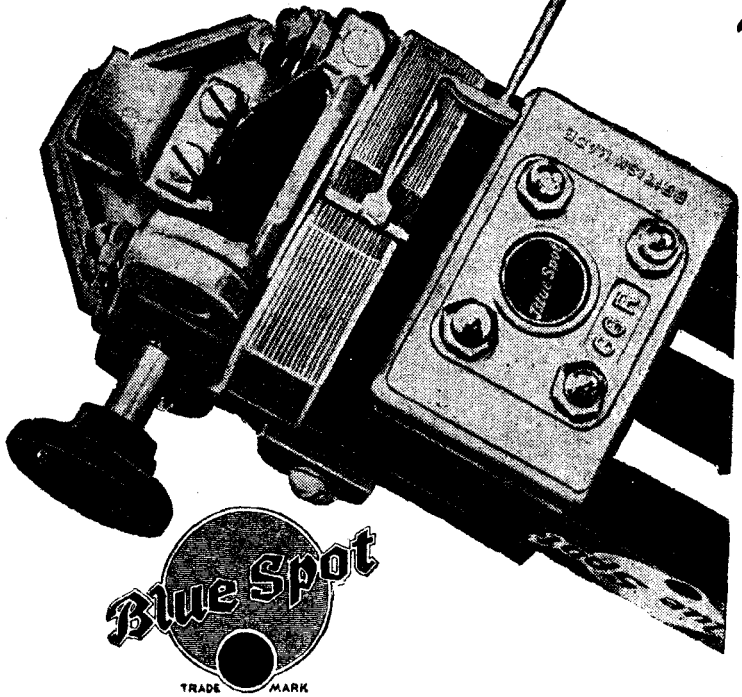
The "Dolly." Note the "blimp," or silencing cover on the camera

DO YOU KNOW—

that although our short-wave enthusiasts often grumble at 5SW's transmission, an American correspondent listener states that it is now well received, although a few months ago it was rather weak?

that it is advisable occasionally to go over all the terminals and connections in a set, pulling each wire gently to make sure that it is firmly connected, and that there are no loose joints or dry soldered connections?

AMAZING REALISM



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A Weekly Programme Criticism—By SYDNEY A. MOSELEY.

Without Fear or Favour

OUTSIDE DANCE BANDS

SOMERSET MAUGHAM'S STORIES

I HAVE received an important official reply to my request for authoritative information regarding the arrangements between the B.B.C. and outside dance bands. It comes from Mr. Gerard Cock, Outside Broadcast Director of the British Broadcasting Corporation.

"All possible steps are taken to maintain, as far as possible, varied and suitable broadcast programmes by outside dance bands," Mr. Cock informs me. "Due to a state of affairs largely brought about by the attitude and actions of certain music-publishing firms, the degree of control varies. These outside bands are not paid by us, and we have good reasons for supposing that control would be no more effective if payments were made."

◆ ◆ ◆

I am obliged for this information. It establishes the fact, once and for all, that outside bands are *not* paid and that the B.B.C. thinks that payment would not prevent plugging.

I am afraid I must contest these points, and I will do so in a future issue.

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I made it a point to listen carefully to Mr. Francis Birrell on "The Cinema" the other evening. These are my impressions. Mr. Birrell is a young man—I should say a very young man—with ideals; ideals, let me say, which do him credit. He is—but let him speak for himself. "I am sure my talks are dull. My friends say so, as well as a number of listeners."

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Now, this is charmingly modest, but again—rather young. Nevertheless, Mr Birrell has many qualities: downrightness (he doesn't mind boosting so-called Russian revolutionary films), sincerity (this is unquestioned), and a vision above the multitude.

On the other hand, he conveys rather too plainly a certain immaturity, a definite indistinctness, and an imperfect microphone manner. A trifle tactless, too. I agree with what he feels about film producers; but he could have conveyed this with a little more nicety. He must not come to the microphone to blackguard a body of listeners, however much superior one may feel towards them.

◆ ◆ ◆

"Before the Party" is not one of Somerset Maugham's best short stories. "The Letter" and "Rain" are miles ahead of it. But for broadcasting purposes the least interesting story makes the best material for the "mike." It is really a monologue, the four other characters having very little to say. Adapted by Michael Talbot and produced by Val Gielgud effectively.

◆ ◆ ◆

By the way, I seem to see Miss Hermione Gingold's name a lot these days in the programmes. Who is the talented young lady?

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Readers know I love opera, but subsidies at this period of trade depression seems strange to me. I have described it as "Rome burns—but let us sing."

It is a victory for the redoubtable Mrs. Snowden.

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I switched on early on Saturday morning and heard, unexpectedly, some well-varied gramophone records. It was, if you please, "5GB testing." I suggest to Programmes and Mr. Stone to engage as advisor the fellow who arranged this programme. Good stuff!

◆ ◆ ◆

What "*Au Lapin Qui Saute*" meant few listeners knew, and it may well have put off a number. More's the pity. It was a better production than any I have heard for weeks. Firstly, our old friend Leonard Henry was in great form, and the *ingenue*, whoever she was, acted a fine foil to him. The singing was excellent, there being some very fine songs, including an exquisite duet.

John Watts was the producer, and the cast included Leonard Henry, Greta Keller, Lenghi Cellini, Peggy Ross-Smith, Guy Pelham Bolton, Ross and Sargent, and Jack Padbury.

A MIX UP

THE CHILDREN'S HOUR

The stations got rather mixed up when I switched on to *Pelleas and Melisande*, so that I heard part of the beautiful poetry of Maeterlinck with something about "eating peas with a knife" and "the value of vitamins." A trifle mixed—what!

However, the delightful music of Debussy prevailed, because I don't eat peas and I have no need for much vitamins at fourteen stone!

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The operatic cycle, *The Belle of the Ball*, is not Herbert Oliver's best. Nevertheless these cycles are worth doing.

I wonder whether it would be possible to give *Omar* with music by Liza Lehmann?

◆ ◆ ◆

I had the choice between listening to someone in Jack Payne's band singing about "a flea's she" and a robust story of the sea in the Children's Hour.

The sea won hands down—or ears up—and I am sorry I did not listen to the earlier episodes in the *Southward Ho!* drama. How thrilling they must have been and how the kiddies must have delighted in them.

◆ ◆ ◆

I didn't think there was much poetry in sport—ancient or modern, but Mr. Marshall admirably showed that there is.

COLLECTOR: *"You're seven payments behind on your set."*
PURCHASER: *"Well, your Company advertises 'Pay as you listen,' and I've heard nothing worth listening to."*

The Ch

A TWO-VALVER FO

A GOOD many people find they can receive sufficient with a simple and inexpensive two-valve set. They have the local stations, of course, and are able to enjoy a volume of sound which is as much as can be obtained from sets having more valves but fitted with a similar output stage.

The point is that the volume to be obtained from a strong signal such as we are now considering depends entirely upon the size of the power valve and the anode supply to it. If this happens to be the same in this two-valve set as in a four-valve receiver, then the local station will be heard at precisely the same strength with both sets.

Owing to the relatively small amplification provided by the two-valve set, distant stations will normally not be heard at worth-while strength. But for those who need a set cheap to build and costing but little to maintain, the "Challenge Two" is just the thing.

Medium and Long Waves

It works very well, receives on both wavebands, is easily operated and the quality of the reproduction from a good loud-speaker will be acceptable to most listeners.

There is, in fact, no technical reason at all why the quality should not be as good as that obtained from any other set having a similar power stage.

A glance at the photographs will show how simple and straightforward it is. There is in the aerial circuit a pre-set condenser, with which you can adjust the effective selectivity of the set. Then there is the Challenge coil with its long- and medium-wave windings and a further one for reaction. This coil has its switch fitted to the top ebonite cap, where it can be easily reached. Both long- and medium-wave coils are astatically wound and the switch connects them in parallel and leaves the long wave coil in circuit by itself when it is "down." With its single reaction winding the coil is most effective.

Tuning

The reaction is controlled by an adjustable condenser, having a slow-motion dial like the aerial tuning condenser. This is perhaps not needed, except for the sake of appearance. There is also on the front panel a filament circuit switch.

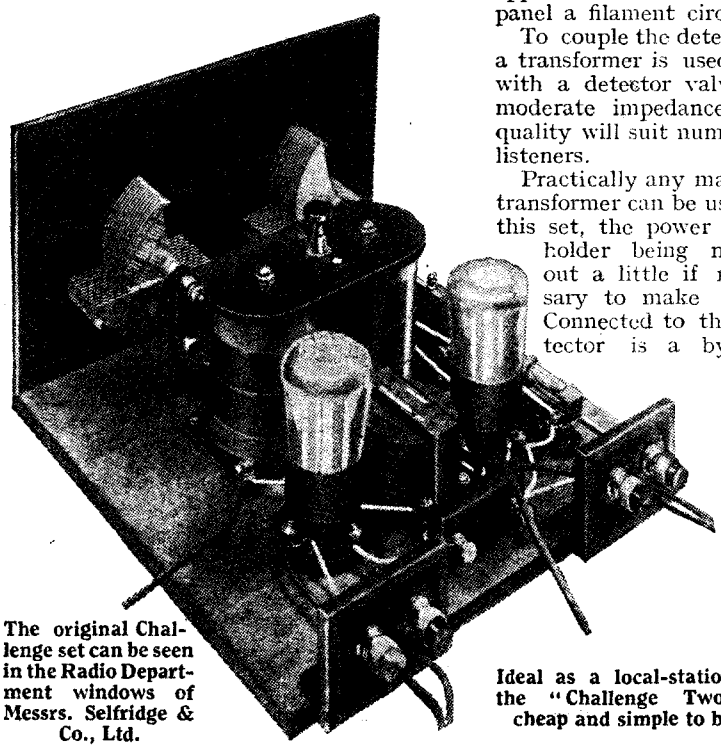
To couple the detector and power stages a transformer is used and with a detector valve of moderate impedance the quality will suit numerous listeners.

Practically any make of transformer can be used in this set, the power valve holder being moved out a little if necessary to make room. Connected to the detector is a by-pass condenser of .0001 microfarad. This improves the working of the receiver.

There are two terminal blocks carrying the aerial and earth and the loud-speaker terminals respectively. Battery leads are used and it is advisable to fit spade-type connectors for the low tension in order to avoid mistakes. The grid battery can stand on the baseboard of the set, short connecting wires being used.

The construction is so straightforward that little need be said. For wiring, a covered wire or wire and systoflex should be used and it is advisable to secure the high- and low-tension wires with small clips or staples so as to prevent them being jerked off the connecting points if they are accidentally pulled.

There are two positive high-tension wires, one being for the detector stage. This



The original Challenge set can be seen in the Radio Department windows of Messrs. Selfridge & Co., Ltd.

Ideal as a local-station set, the "Challenge Two" is cheap and simple to build

COMPONENTS FOR THE "CHALLENGE TWO

Ebonite panel, 9 in. by 6 in. (Becol, Trelleborg, Lissen).

Baseboard, 9 in. by 9 in. (Camco, Clarion, Pickett).

Two .0005-mfd. variable condensers (Formo, J.B., Lissen, Burton, Polar, Lotus, Ormond).

Push-pull filament switch (Readi-Rad, Bulgin, Benjamin, Lotus, Wearite).

Two slow-motion dials (Brownie, Formo, Lissen, Igranic, Readi-Rad, Burton, Lotus, Ormond).

Challenge coil, with reaction winding (Readi-Rad, Wearite, H. & B., Tunewell).

Two valve holders (Telsen, Lissen, Burton, Lotus, Benjamin, W.B., Igranic).

.0002-mfd. and .0001-mfd. fixed condensers (Lissen, Telsen, T.C.C., Igranic, Dubilier, Watmel, Atlas, Graham Farish).

Grid-leak holder (Lissen, E Wearite, Readi-Rad).

2-megohm grid leak (Lissen bilier, Graham Farish, Igranic)

Pre-set condenser, .0001-mf .000005-mfd. (Sovereign, Polar, mo, R.I.).

Low-frequency transformer (Ig "Midget," Telsen, R.I., L Varley, Ferranti, Lotus, Browni

Two terminal blocks (Junit, L Belling-Lee).

Four terminals marked: Earth, L.S.+, L.S.— (Bellin Eelex, Clix, Burton, Igranic).

Four yards of thin flex (Lewc

Five wander plugs marked: H H.T.+1, H.T.+2, G.B.+, G.B.— ing-Lee, Clix, Eelex, Igranic, Bu

Two spade terminals marked L L.T.— (Belling-Lee, Clix, Eelex

CHALLENGE TWO

OF GUARANTEED EFFICIENCY, SPECIALLY DESIGNED FOR "AMATEUR WIRELESS" BY W. JAMES

stage does not always need the full voltage of the high-tension supply and it is best adjusted to suit the particular valve used.

Valves

Any valve of medium impedance will be suitable for the detector stage and I should not go much above 20,000 ohms. For the power stage the biggest power valve that you can afford to run should be used. The grid bias will be adjusted to suit it and the high tension applied. Use at least 120 volts high tension if possible, as the amount of the volume will depend largely upon this.

In a set of this description, where the reaction is applied directly to the aerial circuit, care must be taken that too much reaction is not used. I will not stress the point so often made that too much reaction spoils the quality, but will remind users that interference can easily be produced. This is to be avoided and for this reason I do not recommend a set of this type for listening to foreign stations.

I know that a few will normally be heard, but the set is intended as a local-station one that can be used with an indoor or outdoor aerial.

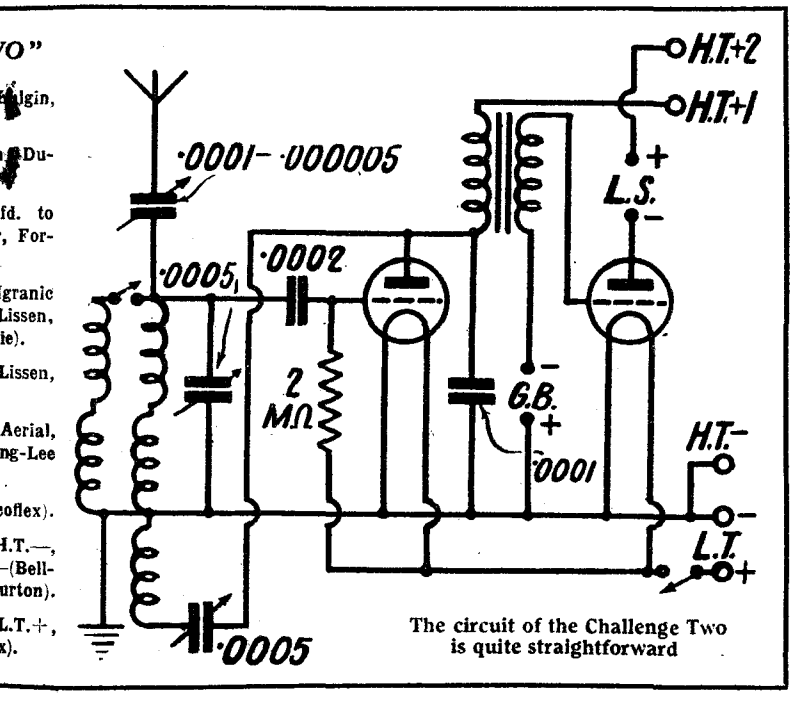
The tuning is reasonably selective and the volume is good for a two-valve set. Both will be varied by adjusting the pre-set condenser included in the aerial circuit. Thus when the spindle of this condenser is unscrewed, thus reducing the capacity of the condenser, the tuning will appear to be the sharpest and the volume will be below the maximum. As the spindle is screwed down the capacity increases. The selectivity is reduced and the volume will increase until a certain point is reached which will be satisfactory.

You will be able by experiment to find the best setting for the size of the aerial employed and the local conditions. In London there is no difficulty in separating the Brookmans Park stations, using an outdoor aerial, and the Midland Regional station is received very well. Daventry 5XX is also, of course, heard quite well, and also one or two others.

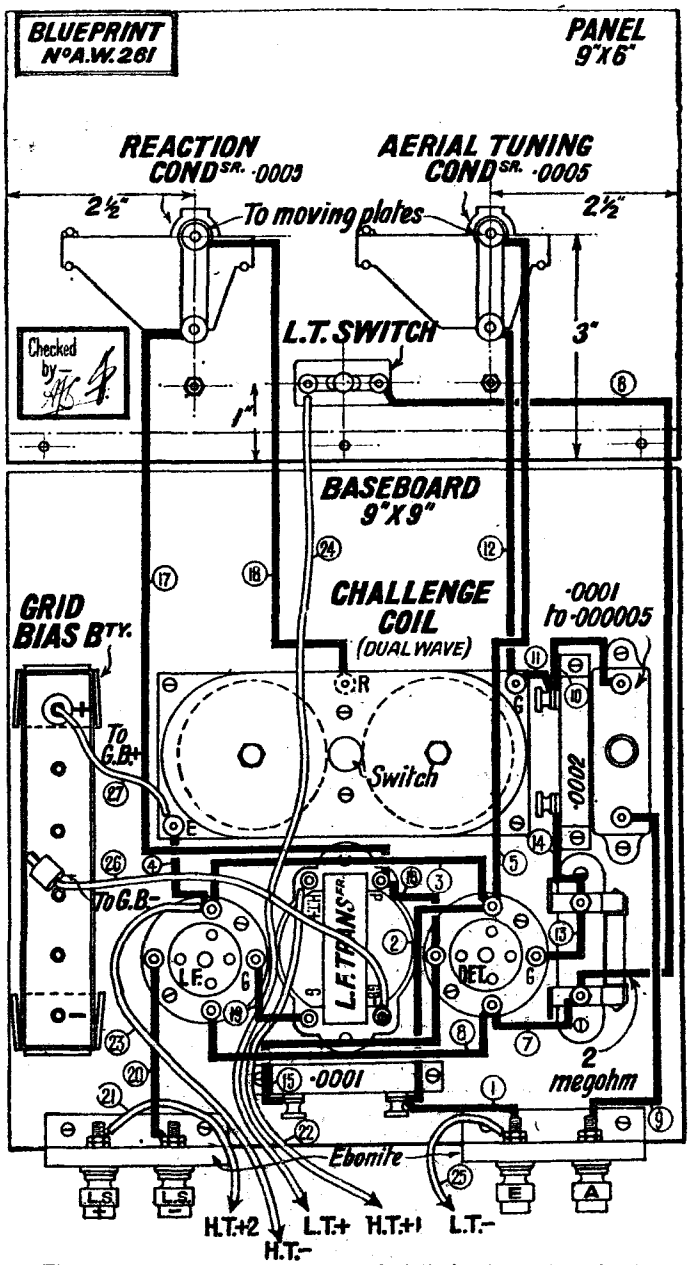
Using a Pentode

A pentode valve might be fitted by those who like the type, but a filter circuit is recommended in addition. The higher notes are usually unduly brought out with a pentode and a filter will lessen their relative strength and so improve the reproduction.

For most valves a grid battery of nine volts will be sufficient.



The circuit of the Challenge Two is quite straightforward



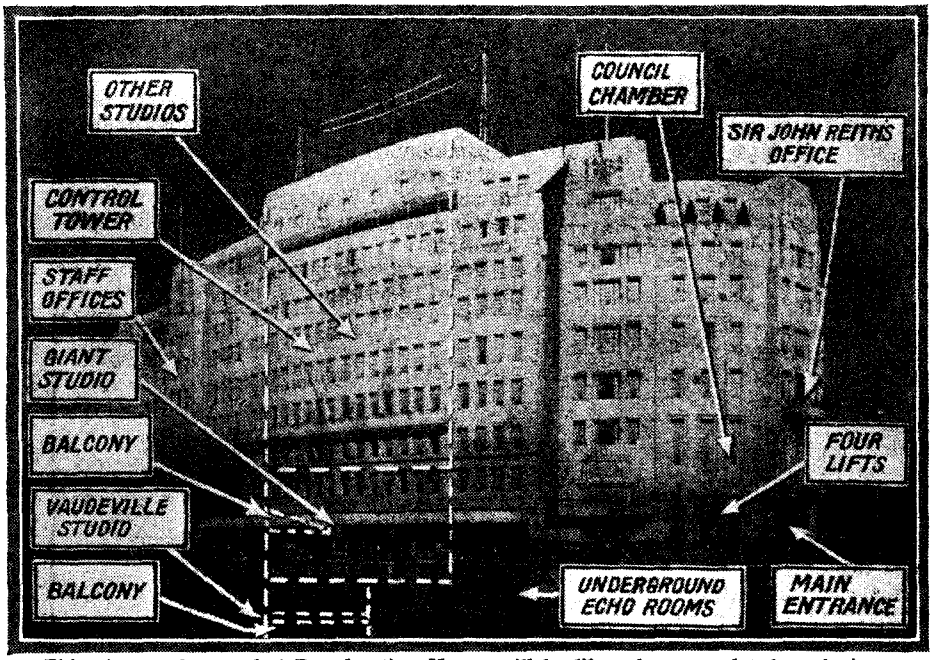
The layout and wiring diagram. A full-size blueprint of this can be obtained from these offices, price 1/-, post free

PROGRESS AT BROADCASTING HOUSE

By "A.W.'S" SPECIAL CORRESPONDENT

LONDONERS are watching with great interest the progress in the B.B.C.'s new "H.Q." in Portland Place.

The main part of the steelwork was completed some months ago and the concrete work on the front portions has now extended up to the fourth floor. The floors, which are concrete, are now complete up to the seventh. These floors embody a special sound-proof construction, the idea being to minimise disturbing noises in the studios.



This picture shows what Broadcasting House will be like when completed, and gives some idea of the location of the principal offices and studios

The control tower—the central portion of the building—containing the studios, can now be recognised, and an inspection of the inside of the building's framework, at the present stage of progress, clearly shows how this tower is arranged.

Like a Ship

A striking thing is the resemblance of Broadcasting House to a ship. The front part of the building, where the main entrance is situated, is curved like the prow of a ship. The foundations, including the concrete lining, bear an extraordinary resemblance to a ship's hull. The reason for this "rounding off" of the foundations is to overcome a difficulty which was experienced last year when the foundations were first started, in connection with an underground water strata.

So far as the average listener is concerned, one of the most impressive features of the building is the huge studio which will contain an organ and a concert platform and which will have seating accommodation for an audience of 1,000. It is understood that the public will be admitted to this studio. There will be a large gallery and the steel supports for this are already in position. As yet, the walls of this gigantic studio are only in the bare brick stage, but when the internal decorations are started special methods of controlling the acoustic properties of the hall will be embodied.

Down below this studio (which occupies half of the basement) will be another studio used principally for vaudeville items, while in the sub-basement also will be test rooms, and two or three echo rooms.

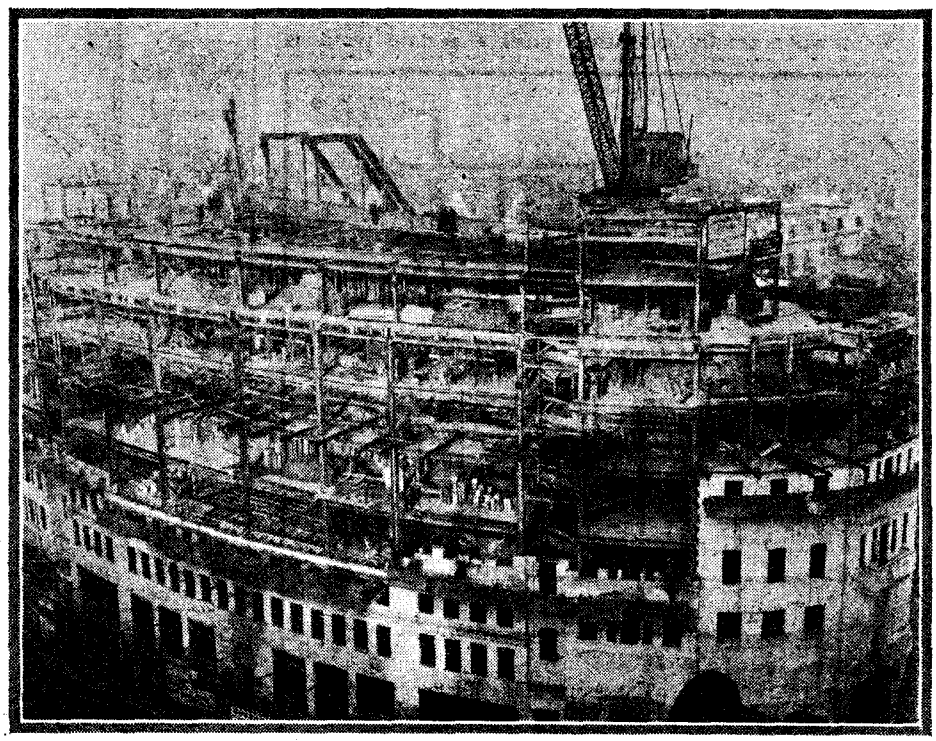
Special arrangements are being made for heating and ventilating the whole of Broadcasting House and down below ground level are three huge 5,000-gallon tanks holding oil fuel for the water-heating arrangements. The boilers are already installed.

The efficient ventilation has been something of a problem because straightforward ventilating systems also provide good sound conduits and so the deadening effect of the sound-proof floors and central well construction would be nullified. However, a novel system of ventilation, making use of sound-proof air ducts, is being installed, and throughout Broadcasting House there are miles of huge tubes carrying fresh air to every part of the central tower and basement. There is a 600 ft. well now being drilled for the water supply, and many thousands of gallons of water will be utilised. This is an artesian well, of course.

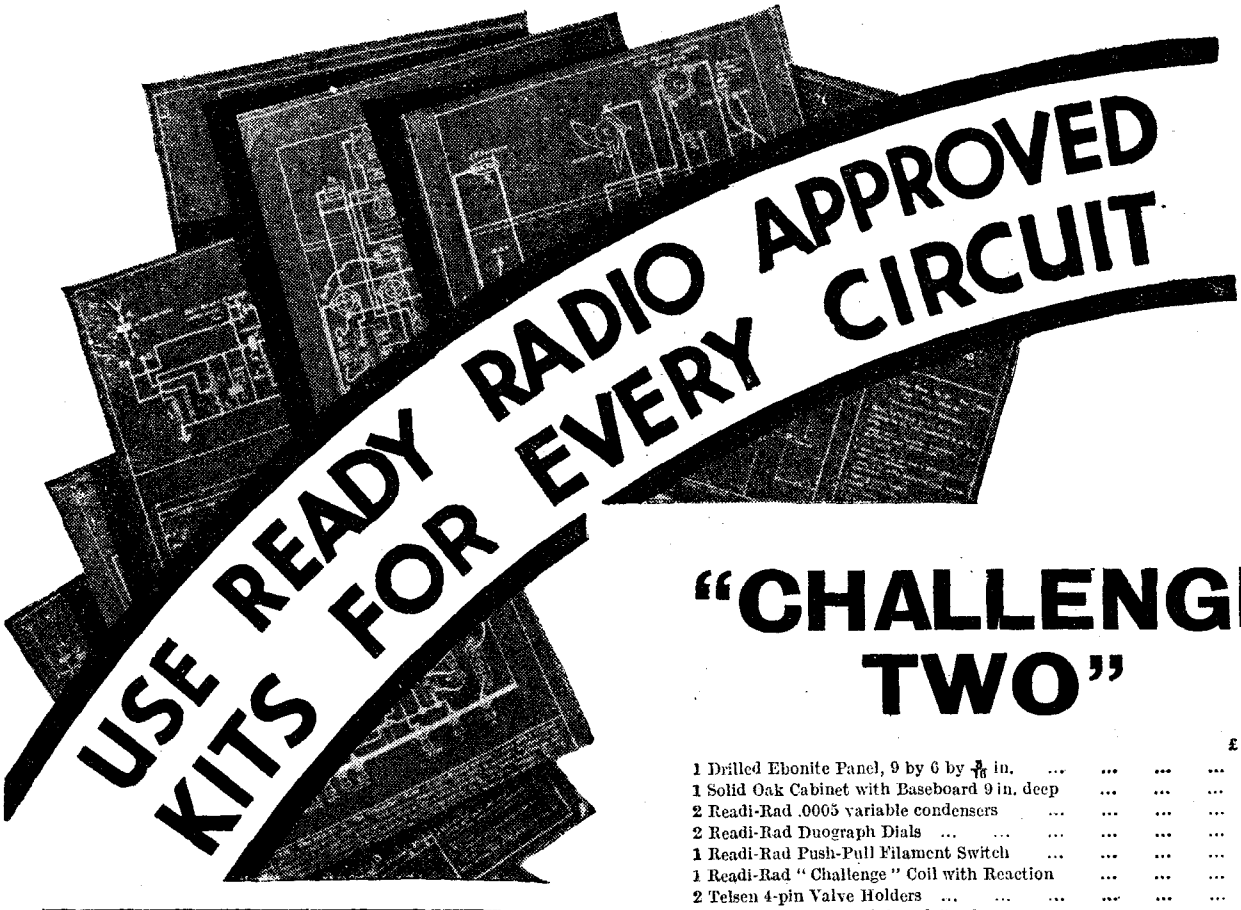
Studio Location

At this stage is it possible to see how the various studios, offices, and entrances will be arranged? The main entrance is, as has been explained, at the prow of the building. This entrance hall leads into a vestibule where there will be four lifts reaching to the top of the building. Stairs will lead down to the main entrance of the public studio, and there will also be entrances on each side of Broadcasting House leading directly into this studio. Immediately above the main entrance is the B.B.C. Council Chamber, and above this again is Sir John Reith's suite of offices.

At present the inside of the building is a maze of girderwork and scaffolding, but the present rate of progress shows that the building will be complete, as was officially forecast, by 1932.



An actual photograph of the new B.B.C. headquarters in their present state of construction. Comparison with the picture above will indicate the internal arrangements



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1 Westinghouse Metal Rectifier, HT7 ...	1	1	0
1 Igranic, type "C30" Choke		15	6
3 Dubilier type BC 4-mfd. fixed condensers		18	0
5 Dubilier type BC 2-mfd. fixed condensers		18	4
1 Regentstat 120,000 ohms, type "A" ...		9	6
1 Bulgin Link Resistance, 25,000		1	6
1 Bulgin Link Resistance, 15,000		1	3
1 Bulgin Link Resistance, 2,000		1	0
1 Bulgin Twin Fuse Holder with Fuses (F11)		2	6
1 Ebonite strip, 8½ in. by 2 in.		1	1
6 Belling-Lee "B" Terminals		3	0
1 Packet "Jiffilinks" for wiring		2	6
1 Length Twin Flex, Plug Adaptor, Screws, etc.		1	7

Total complete £6:3:0

Or 12 equal monthly payments of ... **11/3**

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CASH OR EASY PAYMENTS

"CHALLENGE TWO"

	£	s.	d.
1 Drilled Ebonite Panel, 9 by 6 by $\frac{3}{16}$ in.		3	0
1 Solid Oak Cabinet with Baseboard 9 in. deep		16	0
2 Readi-Rad .0005 variable condensers		9	6
2 Readi-Rad Duograph Dials		13	0
1 Readi-Rad Push-Pull Filament Switch			10
1 Readi-Rad "Challenge" Coil with Reaction		10	6
2 Telsen 4-pin Valve Holders		2	0
1 Readi-Rad .0001-mfd. Fixed Condenser			10
1 Readi-Rad .0002-mfd. Fixed Condenser			10
1 Readi-Rad 2-meg. grid leak and Holder		1	4
1 Pre-set Condenser, type F		1	6
1 Telsen "Radiogrand" L.F. Transformer		12	6
2 Junit Terminal Blocks		1	4
4 Belling-Lee "B" Terminals		2	0
1 Packet "Jiffilinks" for Wiring		2	6
2 Valves, as specified, Detector and Power		19	0
4 Yards Single Flex; 5 Indicated Wander Plugs; 2 Spade terminals; Screws, etc.		2	7

£4:19:3

KIT A less valves and cabinet **£3 : 3 : 9**
or 6 equal monthly payments of **11/3**

KIT B with valves less cabinet **£4 : 2 : 9**
or 6 equal monthly payments of **15/-**

KIT C with valves and cabinet **£4 : 19 : 3**
or 6 equal monthly payments of **18/-**

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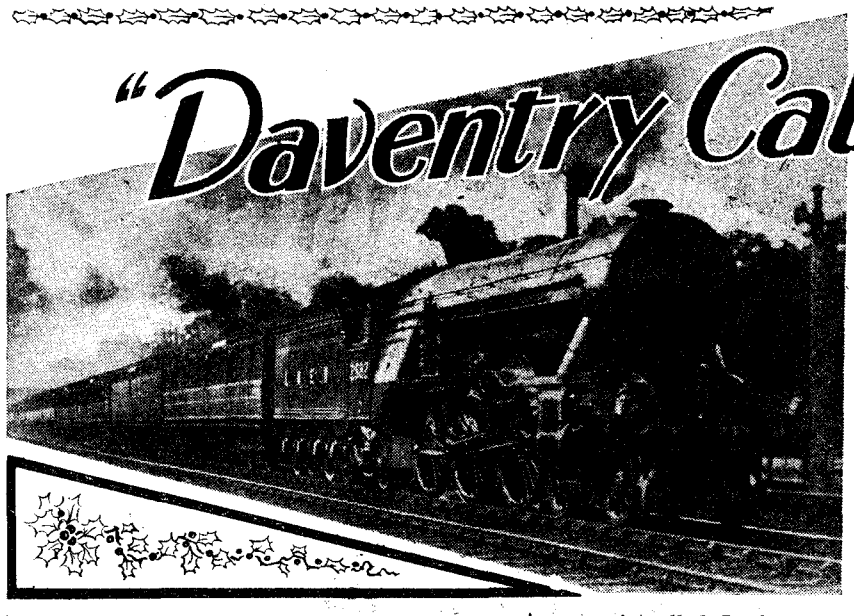


"Daventry Calling" ON THE TRAIN

Our Special Commissioner records his impressions of the recent L.N.E.R. experimental run on the Leeds express, equipped with radio for the reception of broadcasting by the passengers en route.

ALTHOUGH various stunts have been carried out with radio on British trains, there has been no serious attempt to give passengers a regular broadcast reception service. But following a trial in the L.N.E.R. train that runs to and from Leeds, I am now able to give readers a personal account of reception *en route*. This reception is now available to all passengers travelling on the train I refer to.

In company with a large party of journalists, I was taken from King's Cross to Hertford and back, in order to hear how Daventry could be received. Soon after the train pulled out of the terminus, a dining-car attendant brought us each a pair of Brown's lightweight headphones, which we were invited to plug into a conveniently placed socket.

Excellent Reception

The first thing I heard was a crackling noise, followed by an obvious readjustment of the distant set; after that I was able to listen with comfort to Daventry broadcasting the service from Westminster Abbey. At this time the train was going fairly fast. The undercurrent of crackles continued. Then the train stopped for a minute or so. During that stop the crackles disappeared entirely, the music and singing coming through with great clarity. When the train started I carefully listened for the return of the crackles, but none was heard. The train went slowly on, doing less than twenty miles an hour. The excellent reception continued, and was only marred by crackles when the train had gathered speed.

Effect of Tunnels

As we went under a tunnel the signals disappeared entirely, but the crackles continued. On the return journey I think the reception was better than on the outward journey. The crackles were much less irritating.

Looking in the guard's van, where the receiver was installed, I asked the engineers in charge whether the crackles could be stopped. But it seems that this particular train has all manner of electrical machines in the vicinity of the set. Where possible, the interfering machines have been screened. Perhaps a little more experimenting may result in the total elimination of the crackles. This man-made static interference must be overcome before the reception can be called one hundred per cent. satisfactory.

Radio Paris

Personally, I must confess that the reception was much better than I had expected. Both volume and quality were very satisfactory. As an indication of future possibilities, I ought to record the fact that on the return journey the set picked up Radio Paris at excellent strength.

The apparatus on the train was installed under the direction of Mr. H. N. Gresley and Mr. Leslie McMichael, by Messrs. L. McMichael, Ltd., of Slough.

The Receiver

In the guard's brake van a standard McMichael three-valve all-mains set is fitted. It derives its power from a rotary converter coupled to the train lighting set. The aerial is a thirty-foot wire stretched along the roof of the van, outside the train.

As the set has a screened-grid high-frequency valve followed by a detector transformer coupled to a power valve, the reserve of volume must be considerable. The headphones fitted throughout the train are connected to the output of the set through an external transformer.

Simple Operation

To reduce vibration the set is housed in a thickly-padded wooden case. So far as I could see the set was not screened. To bring it into action the railwayman in charge simply closes a switch, which brings the rotary converter into action and so starts up the set already tuned to Daventry's wavelength.

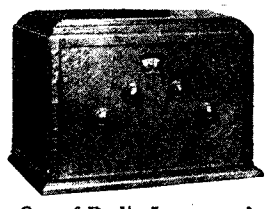
The next few months will show whether the travelling public is prepared to support the idea of radio on the train. If it does, then very probably other L.N.E.R. long-distance expresses will be fitted.

A typical scene in the dining-car. Notice how the phones are plugged in the backs of the seats

---

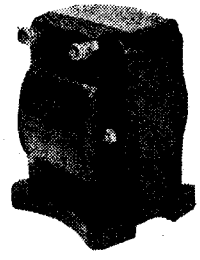
The construction of the powerful radio station at Chenju, near Shanghai, has been completed, states the Chinese Ministry of Communications. The station is to be used for the dispatch of messages to and from Europe and America, and should be in full operation this month.

MORE CHRISTMAS RADIO GIFTS (Continued from page 888)

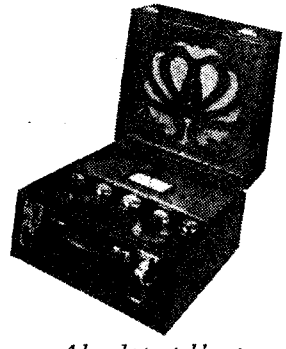


One of Radio Instrument's new cabinet receivers

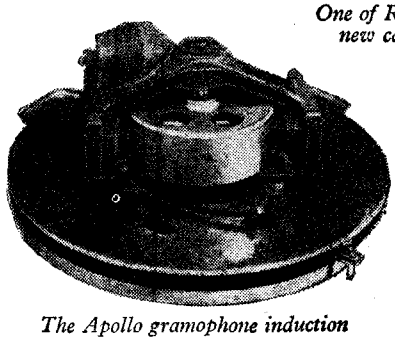
A fine Kolster-Brandes receiver



A useful Lewcos component—a low-frequency choke

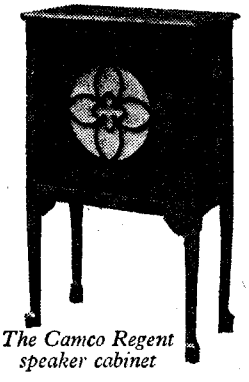


A handy portable set, made by Kone-Dope

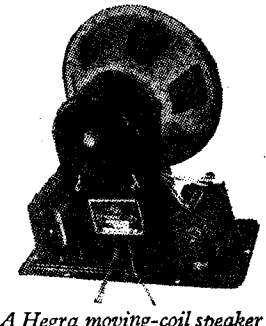


The Apollo gramophone induction motor

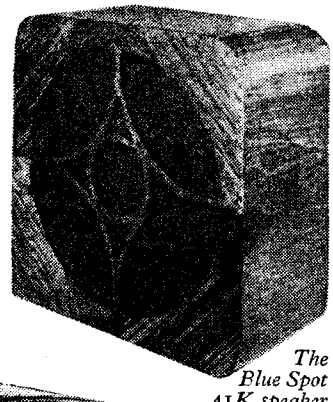
The C.A.V. non-spill accumulator in three positions. This accumulator is ideal for portable sets



The Camco Regent speaker cabinet



A Hegra moving-coil speaker in chassis form



The Blue Spot 41K speaker

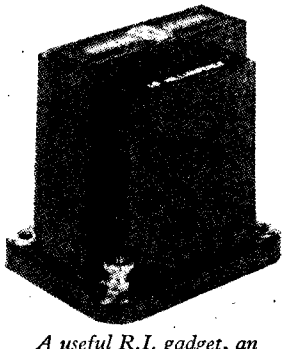
(Continued from page 888)

is keen on "tinkering," then you are quite safe in giving him a set of parts with which to make his own receiver.

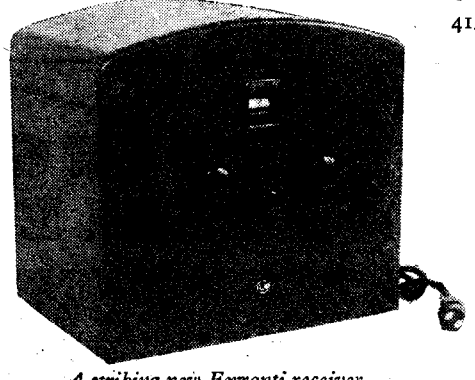
Alternatively, if price is the difficulty and yet you want to make a present of a complete set, you might care to buy a kit and construct it yourself. This will make a very acceptable gift.

Another suggestion is that you should make up a small unit as a gift for a friend whose set needs improving. "A.W." blueprints are available for units of all kinds: high-frequency distance-getters, short-wave adaptors, gramophone amplifiers, volume controls, wavetraps, output choke filters, and so on. Even home-made mains units are available.

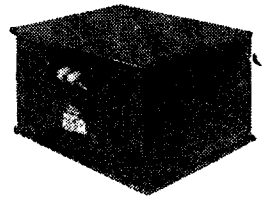
A "safe" present for any acquaintance is a Letts's Quickref AMATEUR WIRELESS Diary—a very seasonable present and one acceptable to any wireless enthusiast. Another novel gift (you might also try giving it to yourself) is a year's subscription to "A.W."



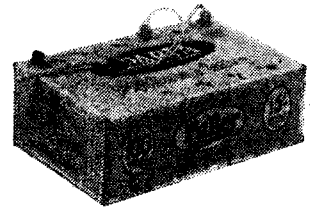
A useful R.I. gadget, an L.F. choke



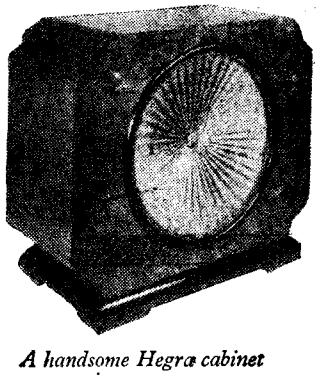
A striking new Ferranti receiver. This is mains-operated



An Ekco mains unit

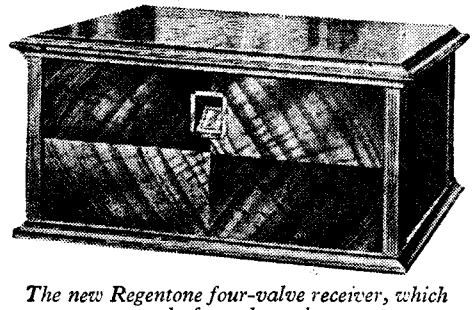


A Fuller high-tension battery



A handsome Hegra cabinet instrument

The Mullard Orgola "Four"

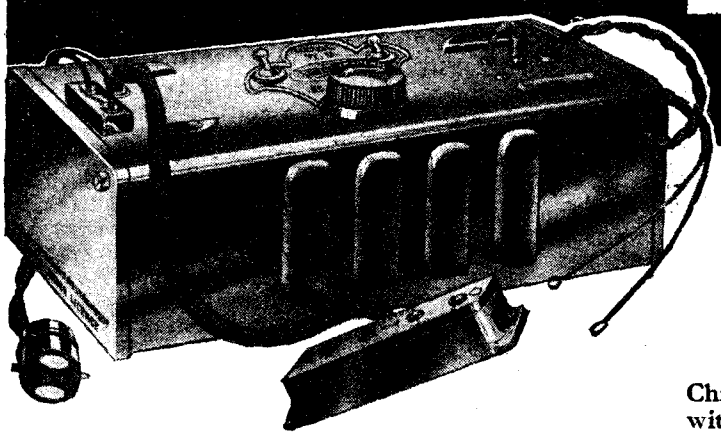


The new Regentone four-valve receiver, which works from the mains

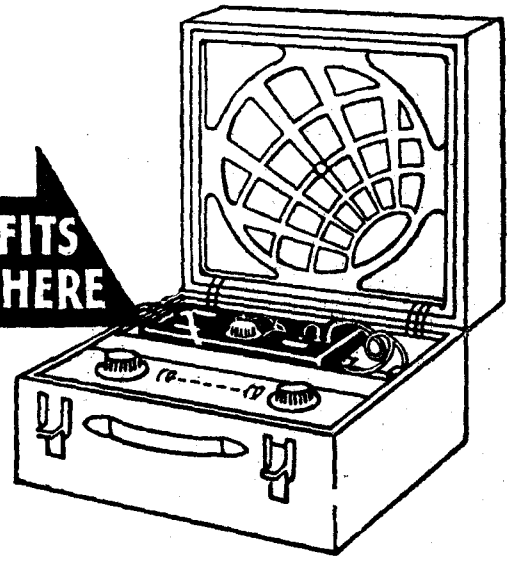
FOR CHRISTMAS —

ELECTRIFY YOUR SET— ANY SET, ANY PORTABLE

WITH REGENTONE



IT FITS IN HERE



Christmas brings the necessity for radio at its best, with no fear of failing batteries. Electrify your set —any set, even a portable—with a Regentone Combined Unit. In the Regentone range there is a Unit to suit any set—***your friends' sets as well as your own***—and no Christmas gift is more acceptable. It takes but two minutes, and from the moment you plug into the light or power point, you are assured of better, more convenient radio, more economical and more reliable. Leading British Set Manufacturers recommend Regentone Combined Mains Units for these reasons: they are absolutely safe and silent in operation; they are so effectively screened that they can be used ***inside*** Portable Receivers without trace of hum; they have a special plug and socket arrangement connecting ***externally*** the mains leads to the unit, enabling you to attach any length of flex in place of the standard lengths supplied, with no dangerous connections—an exclusive Regentone feature; they incorporate the Regentstat—the only totally wire-wound radio resistance capable of carrying current with values as high as 180,000 ohms.

COMBINED MAINS UNITS A.C. and D.C.

for any set, even a portable. Regentone Combined Units are suitable for all the well-known sets of to-day—McMichael, K.B., Pye, Selectors, Rees-Mace, Marconiphone, Amplion, Mullard Orgola, Cossor Empire 3, Osram Music Magnet 4, and in fact, all popular 2-, 3- and 4-valve Receivers.

Many of Britain's leading Set Manufacturers are recommending Regentone for use in their own sets.

MODEL W.5. A.C. Combined Unit (illustrated) (H.T. with L.T. Charger) **£5 : 17 : 6**

D.C. Combined Unit (H.T. with L.T. Charger) **£3 : 19 : 6**

Write for our FREE Art Booklet— "The Simple Way to All-Electric Radio"—giving full particulars of the Regentone range.

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REGENT RADIO SUPPLY CO., 21, BARTLETT'S BLDGS., HOLBORN CIRCUS, LONDON, E.C.4

Tel: Central 8745, 5 lines). Irish Free State Distributors: Kelly & Shiel, Ltd., 47 Fleet Street, Dublin.

Why not make use of wireless music for dancing during the Christmas festivities? There will be plenty of broadcast dance music

Christmas DANCING to RADIO

Here is some first-hand information, written by JACK PAYNE himself, on the Christmas dancing programmes

"ON with the dance!"

I have just been glancing through the advance programmes of the dance music and lighter material which will be broadcast at Christmas time, and it certainly does seem that listeners should have no cause to grumble about the amount of syncopation which will be broadcast.

Being at the wrong end of the loud-speaker, as it were, for Christmas dancing, I can only trust that listeners who are dancers will make the best use of it. Naturally, my time being mostly occupied with the broadcasting of dance music I have not the same opportunities as have many other listeners to dance to radio music; but it is my experience that there is something very fascinating about dancing to music from the loud-speaker. While I know that a large proportion of listeners regularly makes use of radio dance music and arranges times to suit the broadcasting, there are a few who are constantly grumbling that dance music is never broadcast at the times when dancers might reasonably need it.

They make me think that by constant grumbling they hope to establish a new Brookmans Park devoted solely to the dissemination of syncopation!

My own view is that for dancing in the home the best way to get the most enjoyment is with a judicious use of radio music in conjunction with the radio-gramophone. I shall not be giving away a secret if I say that I am as anxious as the keenest dancer for the most dance music to be broadcast; but one must take a logical view and realise that each phase of broadcasting must be allotted a proportionate time; and when you come to think of the number of nights when dance music is carried on till midnight I think you will agree that dance music times are not disproportionate.

Those Non-dancers

There is, of course, the old vexed problem of Christmas dance music for non-dancers. I have never made any secret of the fact that the dance music which I broadcast is purposely designed for *listeners* as well as for *dancers*.

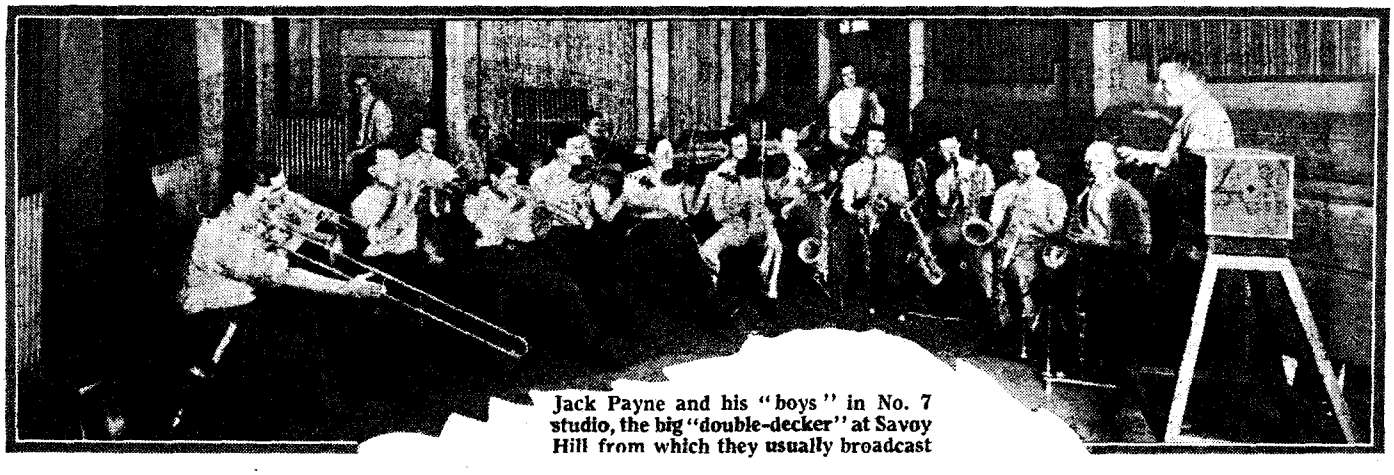
I cannot hope in every tune to please both sections of the listening public equally well. If listeners are sometimes bored with tunes in which the rhythm predominates, then they must think kindly of their dancing friends; but I pride myself that these instances do not often occur.

In any case, modern dance music and modern methods of orchestration make for easy listening and dancing alike. I have several elderly friends who had never progressed beyond the old-fashioned waltz stage and who are rather ashamed of airing this fact at public dances, but in the privacy of their own homes they often enjoy a hop in time with the loud-speaker. Although dance fashions change there is still a large proportion of waltz-time music and even the old folks can dance to this.

And now may I say a word about my side of the microphone? I am making a special effort at Christmas time to give dance music of a popular character and patriotic people who view with alarm the influx of American "canned" music will be glad to know that the same proportion of British to competitive music will be given.

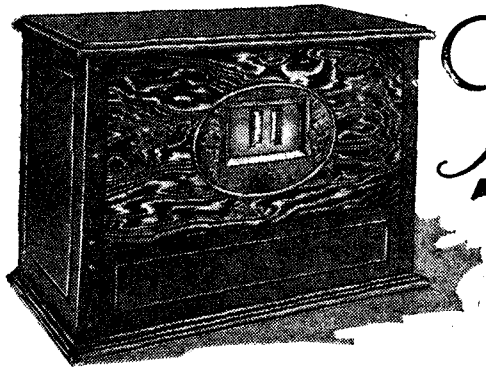
Looking up my record for five weeks, I find that I have broadcast 180 British tunes, 381 American and 12 Continental. As so many people think that *all* dance music is American, I think that speaks very well for British composers. I do claim that, having to review some hundred new dance tunes every week, I deal with more British dance music than any other orchestral leader.

The great call is for variety. Dance orchestras in big hotels and clubs play to dancers, even habitués, who come in, at the most, two or three times a week. On the other hand, my broadcast listeners are my constant friends and I have always to be on the look-out for something new.



Jack Payne and his "boys" in No. 7 studio, the big "double-decker" at Savoy Hill from which they usually broadcast

SETS OF DISTINCTION



The RED STAR THREE-VALVER

Makers: Red Star Radio, Ltd. *Price: 4 guineas, without valves*

AT the time of the Olympia Show we discerned a new star in the radio firmament. It was, in fact, the Red Star, makers of inexpensive radio sets. At present this newly-formed company markets two-valve and three-valve battery sets, at prices considerably below what is generally accepted as the standard.

Recently the makers gave me an opportunity to try the Red Star three-valve battery set, using valves and batteries of my own choice. When I received the set I was immediately impressed with its good appearance. There is nothing cheap-looking about it. In fact the brown wood and metal case is most attractive and neat.

Battery Arrangements

There is room at the bottom of the cabinet for a standard-capacity high-tension battery of 120 volts, together with a 9-volt grid-bias battery. Flexible leads coming from the baseboard of the set make connections to these batteries. There are three high-tension-positive plugs and two grid-bias-negative plugs. The accumulator has to be connected externally. Terminals at the back provide for this connection and for the aerial and earth and loud-speaker leads.

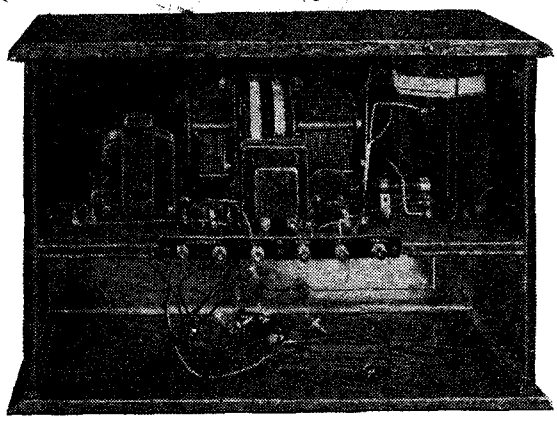
On the front of the set is mounted an oval-shaped escutcheon plate, carrying two drum dials, left for tuning and right for reaction. Both these dials read from zero to 100 degrees and have slow-motion movements. Below them is a small knob, which controls a combined master switch and wave-changer. To the left it gives long-wave tuning and to the right short-wave tuning.

Nothing could be more simple than the controls of this set. Before testing it, I selected three suitable valves in accordance with the makers' suggestions. The first valve was a Cossor 210DET, the second valve a Mullard PM1LF and the third valve a Mullard PM2. Medium-impedance valves were chosen for the first two stages, because these valves precede low-frequency transformers having only medium impedance primaries.

With these valves and H.T.+1 connected to 45 volts, H.T.+2 to 80 volts and H.T.+3 to 120 volts, I found the total anode-current consumption was only 9 milliamperes. The use of a standard-capacity battery is therefore justified, since this type can economically deliver 7 or 8 milliamperes. The total low-tension current was .4 ampere, so a 30-ampere-hour accumulator would last over 70 hours per charge.

The Circuit

The circuit, comprising a detector with reaction and two transformer-coupled low-frequency-amplifying valves, is undoubtedly the simplest possible combination of three valves. But unless great precautions are taken in the design of the set the great magnification after detection is liable to cause unselective tuning. Knowing this, the makers have adopted several methods of preventing broad tuning. The biggest



The internal arrangements allow of easy access: there is ample space for standard-capacity batteries

point in the design is the entire shielding of the interior components. When the back is removed one can see the back shield, which is also readily detachable.

Two alternative aerial coupling taps are provided on the dual-range tuning coil as a further aid to selectivity. In extreme cases the makers show how still further selectivity can be achieved by changing the detector from the leaky-grid-condenser system to a form of anode-bend detection.

A Practical Test

My tests were done with an aerial of 70 feet, utilising the aerial tap C, which is the less selective of the two available connections. The London Regional was at its maximum at 66 degrees on the tuning dial. It had disappeared again at 56 and 73 degrees, showing that the spreading effect was not serious, being only 17 degrees.

For some reason the National station was more broadly tuned. It was at its maximum at 33 degrees and had not disappeared until 23 and 46 degrees, showing a spread of 23 degrees. Even so, in view of the circuit, the selectivity is, in my opinion, quite satisfactory.

Most readers will judge the sensitivity of the set by the number of stations that can be picked up at loud-speaker strength. On this basis the Red Star three is very sensitive. I was able to tune in no less than twenty-three loud-speaker signals during an evening's tests on the medium waves.

Starting at the top end of the scale, Milan was very strong at 97. Next came the Midland Regional at 93, causing a little interference with Langenberg at 92. Then came Paris 87, and much more strongly Rome, 85, then Stockholm, 83.

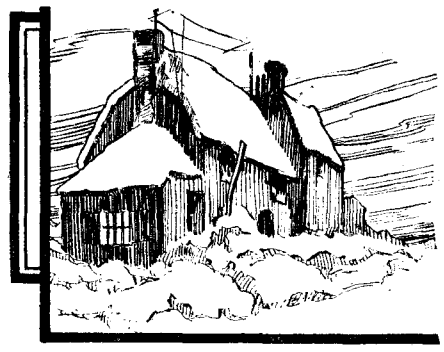
Katowice at 79 was very good, followed by Frankfurt at 75 and Toulouse, 73. Hamburg, 70, suffered from Regional at 65. Göteborg, 54, Bordeaux, 49, and Hilversum, 47, were fair. Bratislava, 41, was good. Turin, 38, was interfered with by National, 33, which also interrupted Leipzig, 30.

Nürnberg, 23, Kiel, 15, and Cologne, 8, were very strong. On the long waves the set was just as sensitive, bringing in Radio Paris at 100, Zeesen at 94, Daventry, 89, Eiffel Tower, 80, Warsaw, 73, Kalundborg, 50, and Oslo, 36.

As regards quality of reproduction, this is surprisingly good, in view of the fact that there are two stages of transformer coupling. It is necessary to use medium-impedance valves for the first two stages to ensure this very satisfactory state of affairs. Altogether, the Red Star "three" is fine value for money.

SET TESTER.

Three people, a piano and a microphone will be responsible for the feature programme which is being broadcast from the Aberdeen studio on December 6 under the title "Fresh Farin'—New Drawn frae the North."



Christmas and the Short Waves

By R. W. HALLOWS

Christmas-time is, as a rule, one of the best parts of the whole year for reception upon wavelengths between about 25 and 80 metres. And since these are particularly easy to receive, both the beginner and the old hand alike should be in for a good time.

WITH the Christmas holidays extending over four days this year, the short-have enthusiast will have a real chance of enjoying himself to the top of his bent with his "wavelet" set.

A kindly providence seems to be watching over the short waves at Christmas-time. This is *the* season of the year when atmospherics are least likely to interrupt matters; *the* season, too, when fading is usually least in evidence.

When I mentioned that wavelengths above 25 metres were usually particularly good I had in mind the fact that most of us indulge in short-wave reception chiefly during the evening. Apart from European stations, the best short-wave telephony transmitters—those which always provide a thrill—are the high-power relays of the U.S.A. broadcasting stations. Eastern Standard Time, which prevails over a wide part of the nearer side of the United States, is five hours behind ours. At Christmas-time, therefore, it is dark in New York by 9.30 p.m. G.M.T. and transmissions on the wavelengths referred to travel best over great distances when the whole of their route is in darkness. We can therefore put in some short-wave reception quite early in the evening.

The Best Times

But we can hope for equally good things from the shorter wavelengths—those between 15 and 25 metres. To be at their best these demand quite different conditions. The strongest reception is obtained usually when the transmitting end is in daylight and the receiving aerial in darkness or vice versa. This means that we should obtain strong signals from a little before dusk onwards from stations to the east, whose time is ahead of our own.

Transmissions which are generally particularly good at Christmas-time are those from the two Dutch stations PLE and PLF, in Java. One or other of the Australian stations is almost sure to be transmitting at Christmas and ideal conditions should prevail.

Full-power Transmissions

Though it is not perhaps generally known, most of the American short-wave stations do not nowadays transmit on full power except upon special occasions. There are exceptions to this, but it holds good for many of the stations which are household words. You may have noticed that, though you have heard little of, say, W2XAD, W2XAF, the relays of KDKA, and so on, for a long while, they nearly always come up to the scratch when the relay of such an event as a boxing match is taking place. Generally, the reason why you receive them so much better then is not that conditions have improved, but quite simply that they are using far more power than they were doing previously or will do on succeeding nights.

At Christmas-time every station wants to send out its programmes to citizens of its own country in the distant parts of the earth, and one can therefore be pretty sure that it will be using the very greatest amount of power that it is allowed to put into its aerial.

No matter if your short-wave set is not particularly up to date, spend one of your free days in bringing it out of its retirement and seeing that all its components are thoroughly up to the mark. If I may offer a word of advice, I would say suspect every joint in a set that has been out of use for some time. I don't mean that all are likely to be broken down or anything of that kind. The odds are, though, that one of them may be shaky, for even the most skilled solderers make a "dry" joint at times.

Getting the Knack

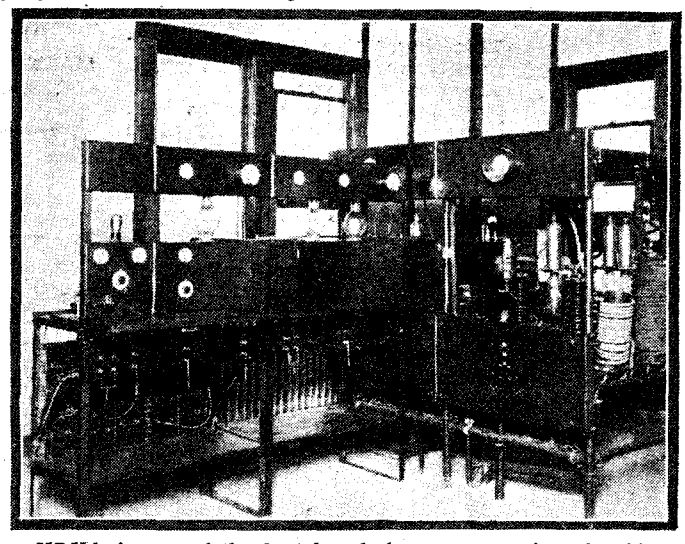
Should you be a newcomer to the fascinating pastime of short-wave reception, you will be well advised to spend one of your holiday evenings with a friend who is an old hand. Though there is nothing difficult about bringing in short-wave signals—the veriest beginner will be able to receive several stations if he turns his knobs slowly, searches with the set just oscillating, and slackens off reaction slightly when a carrier is picked up—it is surprising what a difference a single lesson from an expert can make to one's abilities in tuning the receiver.

Watch an Expert

If you pay a visit to a friend who is a short-wave expert, take your telephones with you. Persuade him to connect them, as well as his own, to his set and listen as well as watch whilst he tunes. You will soon learn to recognize the very faint first signs that some stations give of their presence and you will discover how it is that, though his set is no whit better than your own, he finds a score of transmissions where you previously found two or three.

A SPEAKER COMPARISON

IT has been estimated that the output power required to operate a loud-speaker in a room roughly fifteen feet square is 5 watts in the case of a cone diaphragm driven by an electro-magnet movement, and 12 watts in the case of the moving-coil speaker. This seems rather surprising in view of the fact that the mechanical inertia of the vibrating system is usually less in the case of the moving-coil than in the moving-iron type of speaker. On the other hand the amplitude of swing, and therefore the "electric" inertia is greater in a moving-coil system when it is reproducing the lower notes properly. What it amounts to is that the magnetically-driven speaker is capable of "giving its best" on a much smaller input than a moving-coil instrument. M. B.



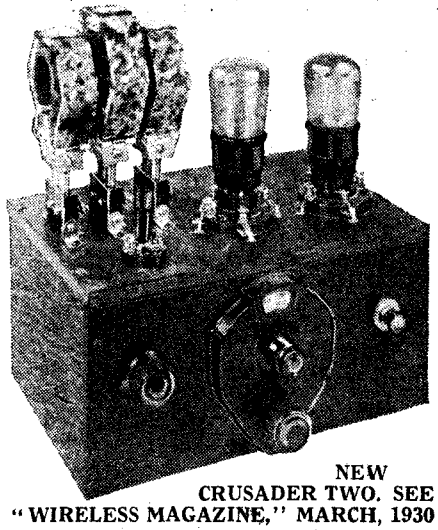
KDKA is one of the best heard short-wave stations in this country. This is the crystal-controlled transmitter of that station

From December 30 all Italian ships of more than 1,600 tons must be adequately equipped with radio transmitters and receivers.

German wireless listeners are protesting against the proposal put forward by some members of the Reichstag to impose an extra tax on all classes of radio instruments.

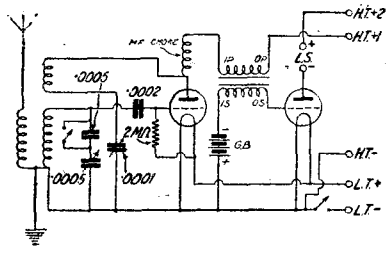
FIVE GOOD SETS AND THEIR CIRCUITS

Designed, built and described by the Technical Staff of "Amateur Wireless" and "Wireless Magazine." Full details in the issues mentioned. Full-size Blueprints of every set described.

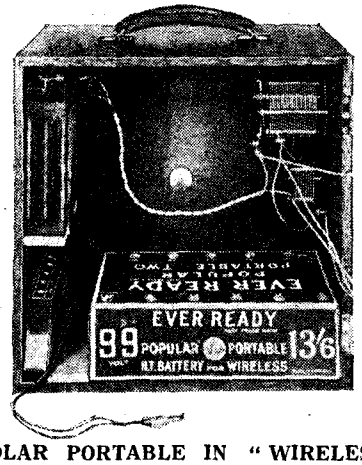


NEW CRUSADER TWO. SEE "WIRELESS MAGAZINE," MARCH, 1930

Tunes ultra-short, medium, and long waves. Cheap to build, this two-valver has a detector and a transformer-coupled amplifier. A potentiometer for the detector gives smooth reaction. Blueprint W.M. 182, price 1s., post free.

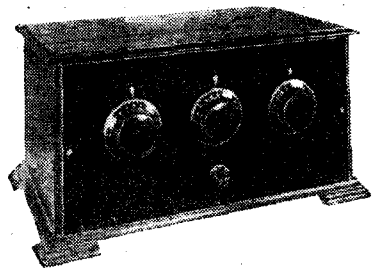


CIRCUIT OF THE NEW CRUSADER—A TWO-VALVER FOR ALL WAVES



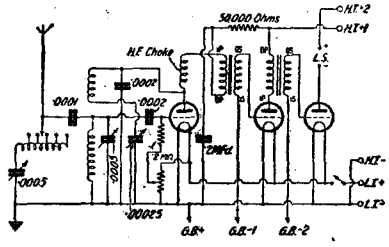
PEDLAR PORTABLE IN "WIRELESS MAGAZINE," DATED MAY, 1930

This inexpensive two-valve portable is specially designed for the loud-speaker reception of Regional programmes. The "Pedlar Portable" is entirely self-contained. The detector and low-frequency amplifier work from a frame aerial. W.M. 195 is a useful full-size blueprint to be had post free, 1s.

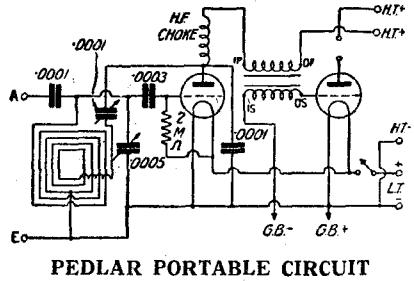


BROOKMANS BY-PASS THREE. SEE "AMATEUR WIRELESS" DATED FEBRUARY 8, 1930

A straightforward three-valver made selective by the use of a well-designed wave trap. A fine set for listeners near Brookmans Park or Daventry. Apart from the trap coil, tuning is done with simple plug-in coils. An anti-motorboating device prevents instability in the powerful low-frequency amplifier. The detector has a very sensitive circuit. Blueprint A.W. 220, price 1s., post free, gives full working details.

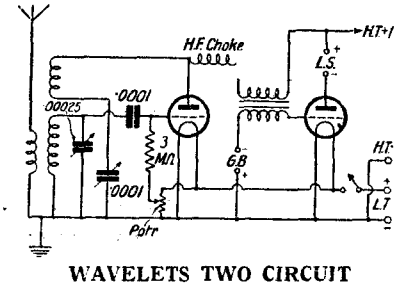


CIRCUIT OF BROOKMANS BY-PASS 3

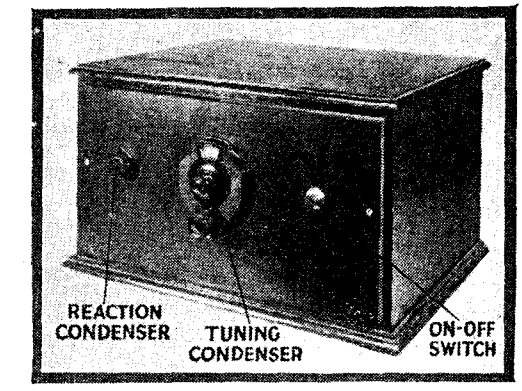


PEDLAR PORTABLE CIRCUIT

It should be noted that every set described in AMATEUR WIRELESS *can be built from a* FULL-SIZE *blueprint. This invaluable aid to the constructor can be used as a drilling template and as a point-to-point guide in wiring.*

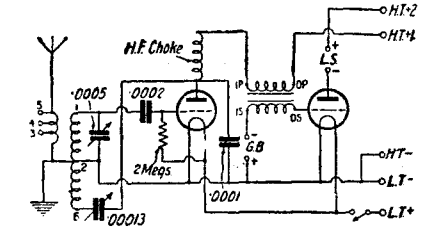


WAVELETS TWO CIRCUIT

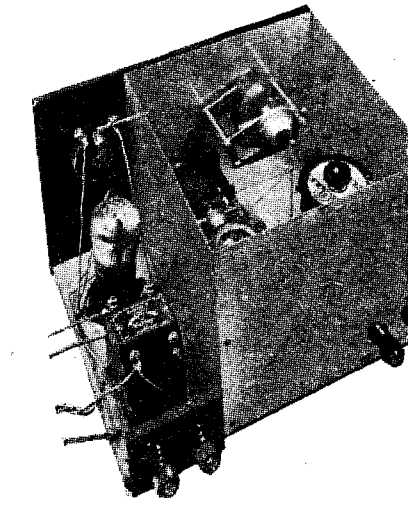


GLEANER TWO. SEE "WIRELESS MAGAZINE," DATED JULY, 1930

Can be built for a £5 note. An ideal set for the beginner. No soldering is needed in the construction, which can be followed with ease from blueprint W.M. 201, price 1s., post free. The circuit consists of a detector and a transformer-coupled amplifying valve.



CIRCUIT COMPRISES A LEAKY-GRID DETECTOR AND A TRANSFORMER-COUPLED POWER VALVE



WAVELETS TWO. SEE "AMATEUR WIRELESS," DATED MAY 3, 1930

For short-wave reception, with interchangeable six-pin coils, this specially-screened two-valver is ideal. Its unconventional construction can be readily followed from blueprint A.W. 229, price 1s., post free. Due to the special construction of this set, world-wide reception is made easy. There is no hand-capacity effect when tuning.

THE ABC OF B.B.C.

A is the Announcer,
Whose voice is so charming,
And likewise his smile,
Is just as disarming.

B are the Birthdays,
And Uncle begins
With numerous greetings,
And, of course, " Hello Twins."

C are the Comedians,
Though stale they may be,
Thank Heaven their jokes,
Can't all be B. B.C.

D is the Director
Of Programmes, poor chap,
Will nobody give him
A pat on the back?

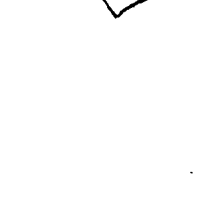
E are the Effects
(A galloping horse?
Two coconut shells
And a wall, of course).

F are the Furious
Letters received,
From non-licence holders
Whose feelings are peeved.

G are the Grundys,
Who also complain,
Why must we have more
Dance Music again?

H are the Hours
Devoted to Talks.
These hours by Listeners
Are devoted to walks.

I are the Items
Which make up the time.
We'll now take some music,
Then Big Ben will chime.

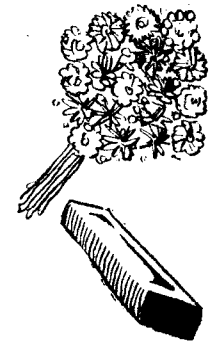


J stands for Jack,
The rest is quite plain,
I'll tell you no more,
And so save you Payne.

K is the Kindliness
Received at the station,
If to pay them a call
Is your contemplation.

L are the Listeners,
Three millions or so,
Land's End to John o' Groat's,
If stood in a row.

M is the Microphone,
That sensitive power,
That's caused the most blasé
Of persons to cower.



N is the News,
You hear it twice nightly,
Market Prices for Farmers,
Are told, oh! so brightly.

O is the O.B.
You've heard the assembly,
Cheering each run
In the Boat Race at Wembley!

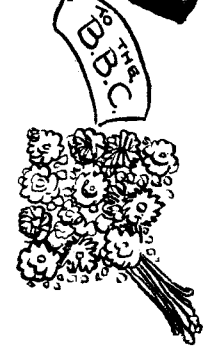
P's the Professor
Who talks on " The Worm."
One day I suppose,
The Listener will turn.

Q is the Queen's Hall,
From whence come the Prom's,
Straight to the firesides
Of Harry's, Dick's, and Tom's.

R is the Red Lamp,
When showing, no noise,
Except that which is made,
By Jack Payne and his Boys!

S are the Studios,
So please take your fill
Of Talks, Plays, or Music,
Or perhaps Vaudeville.

T are the Talks,
By some heard with relish,
While others think
They are perfectly—rotten!



U are the Uncles,
You've heard them, perchance,
From 5.15 till 6,
Assisted by Aunts.

V are the Vaudeville
Programmes we hear,
Twice, perhaps thrice,
Throughout the whole year.

W's the Wavelength,
Of varying length,
That's why we receive
At varying strength.

Now **XYZ** is the
Call-sign of Mars,
And XXX is the
Call-sign of Pa's!

ERIC A. ROBERTS.

YOUR NEW SET AND HOW TO MAKE THE MOST OF IT

A seasonable article of special interest to non-technical set-owners, by Alan Hunter

Music with Bridge—via a Marconi portable

A NEW set is always an exciting affair; and at this time of year many new sets will be in process of installation, ready for the Christmas festivities via ether. Now, I suppose that, at a fair estimate, I "install," for a brief test period, at least two sets every week. These sets are as varied as the proverbs in Christmas crackers. So perhaps I can help some "A.W." readers by a little Christmasy advice on the new set.

Portables are favourite radio installations, continuing to hold their own against all other types. They involve no fuss in installation. You can walk into a radio store, buy a portable, bring it home and play it to the family. It is as simple as a gramophone.

Portables

Well, if you are saying it with portables this Christmas, just remember that the batteries are *not* everlasting. The 2-volt accumulator in a portable set is usually quite a small cell of, say, 20 ampere-hours capacity. A set with four or five valves will take .5 ampere in filament current, so a 20 ampere-hour accumulator will last just under 40 hours. And when the set is new it is surprising how many hours use it has! So do not dissipate 35 hours of the accumulator's charge on the days preceding Christmas, or the festive season will, in a radio sense, certainly peter out before Boxing Day.

The new portable will probably have a brand new high-tension battery. In most of the portables I have tested, this battery is expected to deliver over 10 milliamperes. The discharge rate of the standard-capacity battery is about 7 milliamperes, which means that the battery is overworked all the time the set is in use. Seven or eight weeks is about the limit of the useful life of such a battery.

The pity is that, after this period, the set still goes on working and (so accommodating is the human ear) the gradual deterioration in volume and quality is not noticed until one night, when some special item is wanted, the family is horrified to find the set refuses to utter a sound. So, if the portable is not *quite* new, and has been in action for a few weeks, buy a new high-tension battery for Christmas.

Before leaving battery portables I would emphasise the fact that the amount of distortionless volume from a portable or any set working from a 100-volt high-tension battery is definitely limited. Short of the point where good quality ceases and a mere blare begins, there is enough volume to fill the average room. But if that room is full of noisy people, all talking at once, this amount of loud-speaker volume may well seem inadequate. The temptation to increase the volume is great, but instead of causing the dire din that inevitably follows from overloading a small power valve—switch off. The assembly will then very soon quieten down if they really want to hear an item.

At Christmas time the set is expected to supply the family with music for dancing. While Jack Payne's and other dance bands will fill this need at frequent intervals during the holiday broadcasting, there is sure to be a clamour for dance music when the price of fat pigs or some other item of national importance is being broadcast.

Most new sets, particularly those working from the mains, are fitted with a gramophone pick-up switch. I wonder more use is not made of this fitment. Perhaps some non-technical listeners do not realise that every good set is also a potentially good gramophone-record amplifier. I often hear very fine radio music in homes where they put up with the most appalling gramophone-record reproduction, usually supplied by a cheap or old-fashioned mechanical machine.

Here is a Columbia set—a receiver of distinctive appearance

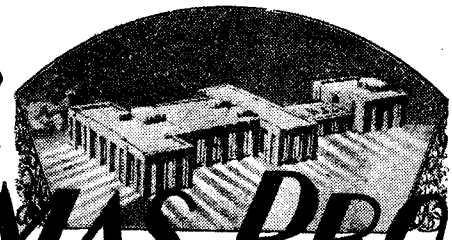
Two popular Ediswan models — the power Pentode Two and the All-Electric Three for D.C. mains. Set Tester will describe his tests of the first-mentioned in next week's issue

A Useful Adjunct

Listeners with really good sets might do much worse than to spend a pound or so on a gramophone pick-up—one that will fit the tone arm of the mechanical gramophone. Then the family can have music, particularly dance music, whenever they want it. I favour the plan of "remote playing." The idea is to have the set and pick-up in one room and to run the loud-speaker leads to the party room, so that radio or gramophone dance music can be effectively faded in and out.

Whatever its type, unless it be extremely cheap, the new set will be expected to bring in some of the foreign stations during Christmas. At this period, also, the owner

(*Continued on page* 925)



The B.B.C. CHRISTMAS PROGRAMMES

An article by our B.B.C. Correspondent giving a forecast of the holiday programmes

ON that first broadcasting Christmas, in 1922, when the B.B.C. (British Broadcasting Company) was barely six weeks old, it was on the cards that the activities of the young Colossus would be suspended for a day. It was a very attenuated staff who would have to carry on and certainly there was no prospect of relief at some other time as compensation for Christmas duty.

Early Efforts

However, with a heroism worthy of the cause, a few brave souls sacrificed their Christmas feasting and gathered at Marconi House to provide a programme—a mere skeleton as compared with the modern Christmas programme—and perhaps as many as ten thousand listeners up and down the land heard the result. A wonderful Christmas Day it was for them.

And this is how the programme ran: At five o'clock Vivienne Chatterton and her husband, Stanton Jefferies—the latter still with the B.B.C. at this 1930 Christmas as chief of Balance and Control—opened with children's songs. Kenneth Ellis, Charles Penrose, and Olive Sturgess filled up practically the rest of the evening with songs. Cecil Mannering, the entertainer, gave a turn. Sufficient material was found for two news bulletins, but their content matter is now lost in the mists of antiquity. The programme ended at 10.30 p.m.

A year later, on Christmas Day, 1923, 2LO started up at 6.30 with a children's programme. The London Wireless Orchestra followed, at 7.30, with Klohr's "Federation March" and the "Poet and Peasant" Overture. Then an entertainment entitled "A Merry Christmas Party" was given by John Henry, Helena Millais, Ronald Gourley, and Jay Kaye. Only one news bulletin was broadcast and at 10.30 the Savoy Orpheans were heard. Already the B.B.C. was suffering for its sins of commission. One critic, obviously an opponent of syncopation, sent a "goodwill" message to the B.B.C. in the shape of an offer "to slit the throats of the entire Savoy Band for the sum of fourpence."

Steady Progress

You will perhaps assume, but wrongly, that the B.B.C. staff, although grown by Christmas, 1924, to imposing proportions, were yet disinclined to forsake entirely the temptations of creature comforts at home for the doubtful pleasures of the studio; because the programme in that year started later than in the previous two years. At 7.0 o'clock Sir Hall Caine gave a talk, and this was followed by a light orchestral programme, with two singers and two entertainers in support, winding up with dance music. But it was not lethargy—stringency of funds, rather—that deflected the energies of the programme builders. Actually, the number of licences in force was 700,000 and the amount of money due to the B.B.C. was £430,000; but payment by the Post Office was made in arrear and the Company had received under £70,000. However, it was decided that no break should occur in the daily broadcasting service; and let it be said here, that no one at Savoy Hill conceives for a moment that a break ever will occur in the daily task, short of the necessity enforced by the end of the world.

The Pioneers

The B.B.C.'s struggle through infancy to adolescence is an oft-repeated tale; but the public's memory is so restricted that it has, no doubt, forgotten who has entertained them through the microphone on Christmas Days of the past. Are they not worthy of some special niche in the story of broadcasting, these artistes, not only because of their professional talents, but on account of the self-sacrifice involved in turning up at the broadcasting studio on a Christmas Night, the while they contemplated mentally the comfortable firesides which they have been induced to leave? The list of artistes is not a very long one; here it is:—Will Hay, George Grossmith, Stiles-Allen, Bransby Williams, Mabel Constanduros, Jack Hylton, Ian Hay, Wynne Ajello, Walton O'Donnell, and those few who have been mentioned earlier.

DO YOU KNOW—

that occasionally one comes across valves which have a slightly higher filament consumption than is stated by the makers? With portable sets, where it is possible to fit only a small accumulator, this increase may affect the period over which the accumulator will run when recharging.

It is no reflection upon these artistes, nor upon those who have been asked to broadcast on any Christmas Night and wouldn't, to say that one of the main difficulties of the programme builders is to find just the people who are wanted for the programmes. Artistes are only human in their desire to escape work for this day of all days. And so this year time creeps on and we come perilously close to Christmas before the casting of the programmes is completed.

This Year's Programmes

So far as the main seasonal items for Christmas week are concerned, the programmes have already taken shape. The pantomime shall have pride of place; for is it not the pivot of all Christmas entertainment? The pantomime, then, will be provided by Ernest Longstaffe, a playwright who has composed revues, musical numbers and pantomimes for broadcasting over several years past.

Instead of reserving this entertainment until after Christmas, the B.B.C. intends, this year, to broadcast it to regional listeners on Christmas Eve and to National listeners on Christmas Night.

When Savoy Hill asked Mr. Longstaffe to suggest a title for his fourth Christmas broadcast pantomime, he replied airily: "Oh, let us make it 'Little Red Riding Hood.'" Mr. Longstaffe says: "When time began to press and it came to writing the book, I found that beyond the fact that one Red Riding Hood walked through a forest to take her grandmother some goodies and a wolf said: 'Pull the string and the latch will fall,' there was little to guide me. I hied me to a little bookshop at the top of Drury Lane, kept by an old woman with one watery eye and one dry one and said: 'Have you the story of Red Riding Hood, please?' to which she replied: 'Lumme; wot 'cher fink it is—Christmas?'

"The British Museum was my next hope; but although the librarians were quite prepared to supply children's books as used in the something-or-other dynasty they did not show the slightest interest in a plain, unvarnished version of my pantomime. I therefore made up my mind that I must sit down and write my own version of the little red girl's adventures. I started at 7.30 one Sunday morning and, with the exception of a break for lunch and tea, kept at it until 11.30 that night.

"Now I am very busy with the music. The B.B.C. has promised me quite a large orchestra, with horns, a harp and other luxuries which warm the heart of a music writer. Last of all will come the fitting of songs, and I am going to chose the very best melodies of the year irrespective of their origin. All I hope is that the good folks who listen to my pantomime will get as much pleasure out of its performance as I am having in its making."

On Monday, December 22, the Nativity Play from the fourteenth-century church of

(*Continued on page 922*)

A NEW RECEIVER

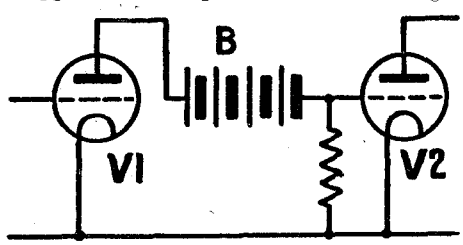
Some preliminary details of the Loftin-White Two, a novel mains-operated set to be described in next week's issue

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

A SHORT time ago I gave some particulars of a new Loftin-White circuit which has become rather popular in America. (AMATEUR WIRELESS, Nos. 422 and 423.) I suggested at the time that experiments were being carried out with the idea of making this circuit suitable for British valves; these experiments have now proved successful.

The Loftin-White arrangement is somewhat similar to the Simplex Wireless system, invented by a former member of the AMATEUR WIRELESS staff, Mr. J. F. Johnstone. It is possible to give a simple explanation of the action in a few words, but for a more detailed explanation the reader is referred to the article already mentioned. The diagram shows two valves coupled by means of the Loftin-White system. The second valve will be seen to have across its grid circuit a negative voltage provided by a grid-bias battery in series with the anode circuit of the first valve. If the first valve is conductive, this battery circuit is completed and the anode current of the second valve is reduced. We make the first valve conducting to a variable extent by applying voltages across the grid and filament, and therefore, the anode current of the second valve is also varied in a corresponding fashion. As there are no inductances or condensers which vary in impedance with the frequency, this system is capable of giving great purity of reproduction.

This simple arrangement has been developed to apply to alternating-current working. Instead of using separate batteries, a fairly large voltage is generated which is applied across a potentiometer. Voltages



The Loftin-White system of coupling

are tapped off at various points on this potentiometer to give exactly the same effect as that described in the above simple outline. The net result is an arrangement which contains resistances only as far as the inter-valve coupling is concerned, so that it has an almost uniform characteristic over the whole frequency band right down to the very lowest frequency.

Low Cost

A certain number of condensers must be used, of course, for smoothing the voltage, which is obtained from the A.C. mains by the use of the usual methods, but these do not enter into the inter-valve coupling. Moreover, it will be clear that as the system is so simple, the construction is considerably cheapened.

The early experiments with the system at Elstree gave extraordinary results. The volume output from the P625 valve was capable of operating our standard loudspeaker at what was considered uncomfortably loud volume.

American practice uses a high-frequency stage prior to the first valve in the amplifier as a matter of course, but it was felt that there would be many readers in this country who did not want to go to the trouble of an H.F. valve. On the other hand, attempts to use the arrangement as it stood to provide reaction and to operate satisfactorily did not meet with immediate success, and it was only after some considerable experiments had been made that a satisfactory system was evolved. The arrangement now, however, will give loud volume with great purity on the local stations and, with a gramophone pick-up, will dance twenty couples with ease, and this was felt to meet the needs of the majority of readers.

Full details of a two-valve receiver will be given in next week's issue.

RADIOGRAMS

A REVIVAL of *The Flowers Are Not For You to Pick*, which was specially written for the microphone by Tyrone Guthrie, will be broadcast on the National on December 18 and on the Regional on December 19.

To those who like to see broadcasting artistes in the flesh, an opportunity will be afforded on December 13, when a popular concert is given at Kingsway Hall, London.

Excerpts from Bach's "Christmas Oratorio" will be relayed from Malvern College to Midland Regional on December 14. The work will be given by the Malvern College Choral Society.

'Cello solos by Harry Miller will be heard by Midland Regional listeners on December 16.

The Wednesday free concert at 1.15 p.m. on December 17 will be given in the National Museum of Wales. Those who make a point of attending the concert should note that the Wednesday concert is now fortnightly in the Museum, the concert on alternate weeks being in the Exchange.

The National Orchestra of Wales concert at the Patti Pavilion, Swansea, on December 16, will be a Wagner one, with Walter Widdop and Stiles Allen as vocalists.

The weekly concert at the City Hall on December 20 is a Christmas concert. Harold Williams and the Lyrian Singers will be the artistes.

Excerpts from a matinee in aid of Denville Hall, Northwood, the home of retirement for actors and actresses, will be relayed from the London Hippodrome on December 8. Many stars will be heard, including Henry Ainley, Noel Coward, Gertrude Lawrence, Sir Gerald du Maurier, Claude and Jack Hulbert and Evelyn Laye.

The first relay from Warsaw will be heard by Regional listeners on December 17, a Polish National programme having been arranged specially for that evening.

Another "Ragtime" Party takes place at the Birmingham studios on December 11.

The twelfth and last of the series of talks on "Science and Religion," which are broadcast nationally on Sundays, will be given on December 14 by Dr. L. P. Jacks, of Manchester College, Oxford.

Radio Toulouse appears to have abandoned its irritating "ding-dong" between gramophone records broadcast from the studio. In its place, one stroke on a gong is given to attract the attention of listeners before an announcement.

Apart from Radio Normandie (Fécamp) France in the north-west possesses a new broadcasting station. It is situated at Caen and styles itself: Radio Nord-Ouest. Transmissions are made daily on 329 metres between midday and 1.30 p.m. and a news bulletin followed by a concert is broadcast at 7.15 p.m., G.M.T.

When Submitting Queries . . . . . .

Please write concisely, giving essential particulars. **A Fee of One Shilling** (postal order), a stamped addressed envelope, and the coupon on the last page must accompany all letters. The following points should be noted.

The designing of apparatus or receivers cannot be undertaken.

Modifications of a straightforward nature can be made to blueprints, but we reserve to ourselves the right to determine the extent of an alteration to come within the scope of a query.

Queries *cannot* be answered personally or by telephone.

Christmas Greetings - Light Waves from the Stars

"May the jolliest lilt of life's musical comedy ring in your ears at this season." Yours sincerely,

Harold Kimberley

Gershom Parkington wishes all listeners sincere good wishes for Christmas, 1930.

"Un Bon Souhait .... To all readers a right merry Christmas and a New Year brim full of happiness" —Votre sincerement,

Ysette Darnac

"'The man's a fool,' my own expression about myself, and yet I would not change it. When I think of my correspondence, letters charming-pathetic, letters cheery-tragic, letters from the old folks, the exiles from home, the sick, and the sightless, then to all those I have amused, bored, or left just indifferent, wherever and whoever you are, I wish you just what the privilege of broadcasting has given to me—I wish you great happiness."

Leonard Henry

"Hello, Folks! Here's wishing you all a joyous Christmas and happy New Ears—sorry, Years."—Yours with holly on,

Tommy Handley

"'Greetings,' said he, 'to all this Yule, From Stainless Steve (the man's a fool). To little Nell, her Dad and Mamma, Good health and prosperity comma. May everything for you be bon in A.D. 1931.'"

Stainless Stephen

"Here's comfort to the sad, health to the sick, good fortune to the needy, and love to you all."

Mabel Constanduros

"My very best wishes to all listeners for a merry Christmas and prosperous New Year."

Jessie Alliston

"THE B.B.C. CHRISTMAS PROGRAMMES"

(*Continued from page* 916)

St. Hilary, Cornwall, will come to us again via the Plymouth stations of the B.B.C. The play is by Rev. Bernard Walke, and he asks listeners to remember that it is performed not as entertainment but as an act of worship on the part of the village actors. The whole church is their stage about which they move, from the west end to the Jesus Chapel, as the action dictates.

An interesting programme for regional listeners is "A Christmas Miscellany," which will be heard on December 23. With Gershom Parkington Quintet music, the voices of the Wireless Singers and a fifteenth-century background, the programme will range through Chaucer and Shakespeare to Ben Jonson, Herrick, Tennyson, and Bridges.

The Lord Mayor's dinner at the Guildhall to little Londoners on December 23, will provide a broadcast breathing the spirit of Christmas. Listeners may visualise the arrival of the sheriffs and aldermen in their gorgeous civic robes and the festive scene as the scarlet-coated trumpeters sound the fanfare which ushers in the plum pudding. To many of these crippled children the Lord Mayor is Father Christmas.

On December 23 also, an excerpt lasting nearly an hour and a half will be given from *The Love Race*, relayed from the Gaiety Theatre.

Christmas Eve brings a relay of carols from Whitechapel Parish churchyard, and for this the Wireless Choir and part of the Wireless Military Band will journey to the East End. Year after year the carol singer decreases in number. The B. B. C. singers have taken their place and bring their music nearer still to our fireside.

The programme on Christmas Day opens with a relay from Canterbury Cathedral, followed, after a short interval, by cinema organ music by Reginald Foort. The service will be heard on Midland Regional also, and this station will have the Shipping Forecast to enable listeners to tune in and not oscillate after the service has begun.

The regional wavelength will be given over to a long spell of gramophone record broadcasting—from noon until 3.0 p.m., to be precise—to enable listeners to test the new sets which the B.B.C. staff hope may be found among the gifts in many a home this Yuletide. Jack Payne and the B.B.C. Dance Orchestra play from 5.15 to 6.15.

In the evening Rev. J. A. Mayo, rector of Whitechapel, will conduct a studio service at 6.30. Mr. Mayo was the first parson to broadcast for the B.B.C., having taken part in its first Christmas programme in 1922.

It is unlikely that any news bulletin will be given on Christmas night; and so, after the pantomime, an orchestral concert will take place, followed by a programme of reminiscences, in which the spirit of Christmas will arouse happy memories in the listener's heart. The evening will close with dance music, starting on the regional wavelength at 10.15, and on the Daventry national wavelength at 10.45, and lasting until 1.0 o'clock on Boxing morning.

At some period in the Christmas night programmes an interchange of Greetings between Britain and America will be relayed, fitting in as nearly as possible with the time when all good Americans are eating their Christmas dinner. The arrangements for the relay have yet to be made, but it is hoped that some eminent persons on both sides of the Atlantic may consent to take part in the broadcast.

The last play of the year will be *The Silver King*, which is to be heard by regional listeners on Boxing Day.

EVERYBODY'S ALL-ELECTRIC RADIO-GRAPHOPHONE

by

Columbia

Made by the makers of Columbia graphophones and records, this instrument is popularly priced yet retains a quality worthy of the high Columbia standards. It brings a Columbia Radio-Graphophone within the reach of thousands of homes. A demonstration (see coupon) will enable you to appreciate its merit.

OAK
40 gns.

A.C. mains supply for H.T., L.T., and gramophone motor. Moving Coil Speaker. 3-valve screen-grid circuit with Super-power output. Illuminated single tuning control, marked in wavelengths.

MAHOGANY
43 gns.

* I should like to hear Model 310 playing in my home. Please arrange this without cost or obligation to myself.
* I should like a copy of the Columbia Radio Book and/or catalogue of Radio-Graphophones.

** Cross out if not required.*

Cut this out and post it in an unsealed envelope bearing a ½d. stamp to:—

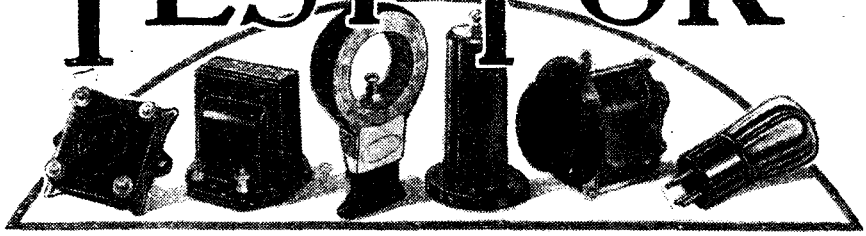
Columbia, 102, Clerkenwell Road, London, E.C.1.

NAME .....

ADDRESS .....

.....

WE TEST FOR YOU

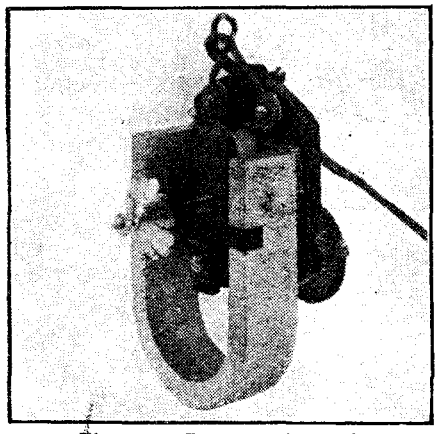


A weekly review of new components and tests of apparatus.

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

Kone-Dope Speaker Unit

WE have received for test a simple but robust speaker unit made by the Kone-Dope Co.



The Kone-Dope speaker unit

This unit consists of two pole pieces of laminated iron, in conjunction with a large horseshoe magnet. A vibrating reed is mounted over the pole pieces and may be readily adjusted to give the minimum gap with maximum sensitivity by rotating a knob in a clockwise direction.

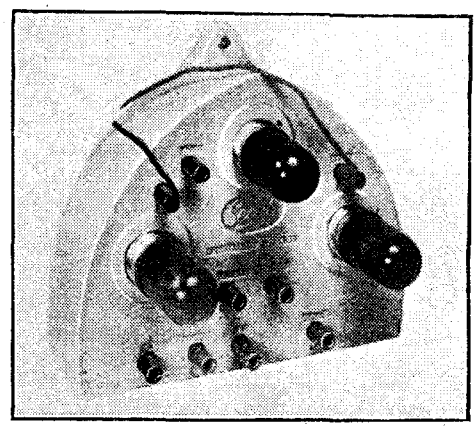
When mounting in a cabinet it is necessary to drill three holes to take the fixing screws, and a clearance hole for the adjusting spindle.

During tests, the unit was mounted to a 10-in. cone of known efficiency behind a 2-ft. baffle. It was found that sensitivity was up to standard, and the tone full in quality. Tested on a strong output such as might be obtained from a super-power valve, there was no tendency to dither. It is not to be expected that a simple and inexpensive unit of this type could reproduce with equality the full audio-frequency spectrum; nevertheless the reproduction was pleasant to hear, and the articulation of speech satisfactory.

Paroussi Eliminator

AN eliminator and battery trickle charger, for D.C. mains, selling at 30s. complete, is an attractive proposition. Such is the briefest description of the Secol eliminator-charger, obtainable from Messrs. E. Paroussi, 10 Featherstone Buildings, High Holborn, W.C.1.

In this, the current from the mains is



A novel direct-current eliminator, marketed by Paroussi

passed through three resistance lamps, which in conjunction with reservoir condensers provide three voltage tappings,

(Continued on the next page)

BROADCAST TELEPHONY

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

Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN			
25.53	11,751	Chelmsford (G5SW)	15.0
200	1,500	Leeds	0.16
242	1,238	Belfast	1.2
261.3	1,148	London Nat.	68.0
288.5	1,040	Newcastle	1.2
288.5	1,040	Swansea	0.16
288.5	1,040	Stoke-on-Trent	0.16
288.5	1,040	Sheffield	0.16
288.5	1,040	Plymouth	0.16
288.5	1,040	Liverpool	0.16
288.5	1,040	Hull	0.16
288.5	1,040	Edinburgh	0.4
288.5	1,040	Dundee	0.16
288.5	1,040	Bournemouth	1.2
288.5	1,040	Bradford	0.16
301	995	Aberdeen	1.2
309.9	968	Cardiff	1.2
356.3	842	London Reg.	45.0
376.4	797	Manchester	1.2
398.9	752	Glasgow	1.2
479	626	Midland Reg.	38.0
1,554	193	Daventry (Nat.)	35.0
AUSTRIA			
246	1,220	Linz	0.6
246	1,220	Salzburg	0.6
283.6	1,058	Innsbruck	0.6
352	851	Graz	9.5
453	666	Klagenfurt	0.6
517	581	Vienna	20.0
BELGIUM			
203	1,456	Ververs	0.3
206	1,457	Antwerp	0.4
212	1,415	Binche	0.2
216	1,391	Chatelineau	0.25
243	1,235	Courtrai	0.1
244.7	1,226	Ghent	0.25
244.1	1,229	Schaerbeek	0.5
509	590	Brussels (No. 1)	1.2
338.2	887	Velthem (Louvain)	15.0
DENMARK			
281	1,067	Copenhagen	1.0
1,153	260	Kalundborg	10.0
ESTONIA			
401	748	Reval (Tallinn)	0.7
FINLAND			
221	1,355	Helsinki	15.0
291	1,031	Viipuri	15.0
1,796	167	Lahti	54.0
FRANCE			
200	1,500	Radio Roubaix	0.2
222.9	1,346	Fécamp	1.0
235.1	1,275	Nimes	1.0
240.6	1,247	Béziers	0.6
249.7	1,201	Juan-les-Pins	0.5
256	1,171	Toulouse (PTT)	1.0
265	1,130	Lille (PTT)	15.0
272	1,103	Rennes	1.2
286	1,049	Montpellier	2.0
286.8	1,040	Radio Lyons	0.5
296.4	1,012.1	Limoges (PTT)	0.08
300	1,000	Strasbourg	1.0
304	988	Bordeaux (PTT)	35.0
315	952.5	Neuilly (Paris)	0.3
316	958.5	Natan-Vitus	0.7
316	950	Marseilles (PTT)	1.5
328.2	914	Grenoble (PTT)	1.2
329	911	Caen (Normandy)	0.6
329.5	910.3	Poste Parisien	1.2
GERMANY			
31.38	9,560	Zeesen	15.0
218	1,373	Flensburg	0.6
227	1,319	Cologne	1.7
227	1,319	Münster	0.6
227	1,319	Aachen	0.31
232.2	1,292	Kiel	0.3
239	1,256	Nürnberg	2.3
246.4	1,217.2	Cassel	0.3
253.4	1,184	Leipzig	2.3
259.3	1,157	Gleiwitz	5.6
270	1,112	Kaiserslautern	0.25
276	1,085	Königsberg	1.7
283.6	1,058	Magdeburg	0.6
283.6	1,058	Berlin (E)	0.6
283.6	1,058	Stettin	0.6
316.6	947.6	Bremen	0.3
318.8	941	Dresden	0.3
325	923	Breslau	1.7
360	833	Stuttgart	75.0
372	806	Hamburg	1.7
390	770	Frankfurt	1.7
418	716	Berlin	1.7
HOLLAND			
31.28	9,590	Eindhoven (PCJ)	30.0
299	1,004	Hilversum (also testing on 1,110m.)	8.5
299	1,004	Radio Idzerda (The Hague)	0.6
1,071	280	Scheveningen-Haven	5.0
1,875	160	Huizen	8.5
HUNGARY			
210	1,430	Budapest (Csepel)	1.0
550	545	Budapest	23.0
IRISH FREE STATE			
224.4	1,337	Cork (1FS)	1.5
413	725	Dublin (2RN)	1.5
ITALY			
80		Rome (3RO)	9.0
296	1,103	Turin (Torino)	8.5
312	916.2	Genoa	1.5
332	905	Naples (Napoli)	1.7
441	680	Rome (Roma)	75.0
453	662	Bolzano (IBZ)	0.2
501	599	Milan (Milano)	8.5
NORWAY			
361	824	Bergen	1.0
363.1	826.1	Fredriksstad	0.7
453.2	662	Porsgrund	1.5
453.2	662	Nidaros	1.2
1,060	283	Oslo	75.0
POLAND			
214.2	1,400	Warsaw (2)	1.9
231	1,283	Lodz	2.2
244	1,229	Cracow	1.5
312.8	959	Wilno	0.5
338.1	887.1	Poznan	1.9
381	788	Lvov	2.2
409.8	732	Katowice	16.0
1,411	212.5	Warsaw	14.0
SPAIN			
251	1,193	Barcelona (EAJ15)	1.0
266.7	1,125	Barcelona (EAJ13)	10.0
349	860	Barcelona (EAJ1)	8.0
368	815	Seville (EAJ5)	1.5
413.8	725	Madrid Espana	1.0
424.3	707	Madrid (EAJ7)	2.0
460	652	San Sebastian (EAJ8)	0.5
SWEDEN			
230.6	1,301	Malmo	0.75
257	1,166	Hörby	15.0
300.2	999.3	Falun	0.65
322	932	Göteborg	15.0
438	689	Stockholm	75.0
542	554	Sundsvall	15.0
770	389	Ostersund	0.75
1,229.5	244	Boden	0.75
1,348	222.5	Motala	40.0
SWITZERLAND			
318.8	943	Basle	0.65
403	743	Berne	1.1
459	653	Zurich	0.75
678.7	454.6	Lausanne	0.6
760	395	Geneva	1.5

"WE TEST FOR YOU"

(*Continued from preceding page*)

one marked S.G., the second, "detector," and the third, "power." A porcelain case, having overall dimensions of 6½ in. by 6½ in. by 4½ in., forms the holder for the lamp and the output sockets.

Tested in our laboratory on an input of 240 volts, an output of 170 volts was obtained from the power socket with a consumption of 20 milliamps. From the detector socket 85 volts were obtained at 6 milliamps, and from the screen-grid socket 120 volts were obtained at 8 milliamps. The unit was then tried with a variety of receivers and was found to give good hum-free reception.

"YOUR NEW SET—AND HOW TO MAKE THE MOST OF IT"

(*Continued from page* 914)

of the set has the leisure to get to know the relative settings on the tuning dial of the more important stations.

The really keen owner of a new set known to have a good range of reception, is referred to the article "On the track of those thirty stations" in AMATEUR WIRELESS dated November 1. But for the more casual ether searcher I can name the outstanding stations.

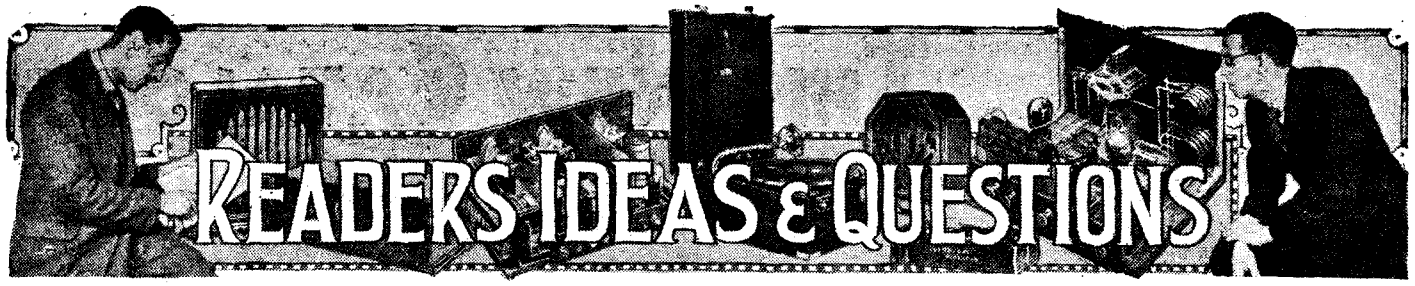
The long waves are full of such stations; set the wave-range knob to "long," turn the knob, dial, or whatever tuning control is fitted, to the Daventry mark. Then move upwards a few degrees for Radio Paris. Move down a little below Daventry for the Eiffel Tower. Right at the top of the scale is Huizen, and right near the bottom is Oslo. Just above Oslo is Kalundborg.

These stations do not depend upon darkness for their good reception; but when we go down to the medium waves the strength is not good on any foreign station until after about 5 o'clock in the afternoon. Logs may be compiled of 30, 40, or even 50 stations by the old hand. The man in the street, trying out a new set for the first time, need expect less than a dozen good foreign signals.

One of these will almost certainly be Budapest, at the very top of the scale. A few degrees lower will be heard Vienna. Not far below the Midland Regional, Rome and Stockholm will be found, within a degree of each other. Just above the London Regional is Toulouse and not far below the London Regional are Strasburg and Bordeaux. Below the London National are Cologne and Nurnberg, all easily identifiable.

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

General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets. **Contributions** are always welcome, will be promptly considered, and if used will be paid for. **Queries** should be addressed to the Editor, and the conditions printed at the head of "Our Information Bureau" should be closely observed. **Communications** should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4.



Testing Moving Coils

SIR,—We are writing to draw the attention of readers to a point in connection with the demonstration of moving-coil speakers, which, although one would expect it to be widely known, yet experience indicates that such is not the case. We refer to the employment of a baffle board or suitable cabinet when demonstrating moving coils.

The theory of operation of these speakers indicates that a baffle is essential if the bass notes are to be produced, and this fact is fairly well known amongst experimenters. A considerable number of cases have, however, been brought to our attention where amateurs and dealers have tested moving-coil speakers without the use of a baffle, with consequently very poor results.

This procedure is excused on the grounds that other speakers, with which comparison is made, have been tested under similar conditions, but obviously a moving-coil speaker of any make if operated without a baffle or suitable cabinet to isolate the sound emitted from the front of the diaphragm from that emitted from the back, can give only a caricature of the results of which it is capable when normally used.

FERRANTI, LTD. (Hollinwood).

Those Nationals!

SIR,—L.S.J. (Stoke-on-Trent) asked recently what is to prevent the five Nationals using one wavelength for the same programme. Personally, I can think of no reason, unless it is that the B.B.C. is desirous of preventing the reception of alternative programmes from abroad. Like L.S.J., I cannot see either the need for the proposed high power for the small areas to be served.

I am so fed up with the interference by Brookmans Park with the foreigners that I listen-in on Sundays only now between 6 and 8 p.m., when Brookmans Park is not on the air to spoil everything. That is to say, two hours a week instead of about twenty-six under the old conditions.

D. R. P. (Richmond).

The Northern Regional

SIR,—A correspondent in Stoke-on-Trent suggests putting all National programmes on one wavelength after the manner of the present relays.

If he lived in this district, where we are situated on the half-way line between Stoke and Liverpool, he would not give the matter any further consideration. When you tune to the "common wave" the result in your speaker is a roar comparable with the entire air forces of the world passing overhead!

J. D. H. (Newton).

Stroboscopic Testing

SIR,—We notice a mention is made in "A.W." No. 437 of the stroboscopic method of testing. You might be interested to know that this method by what is called the Plateau disc is almost obsolete now, and the big picture corporations in this country and the United States are using the Ashdown Rotoscope almost exclusively. We have applied it to the examination of high-frequency electrical discharges necessitating a shutter speed for the instrument of 1,500 per second.

A. J. ASHDOWN, LTD. (London, S.W.1).

"British Broadcast Two"

SIR,—Perhaps the following remarks concerning your "British Broadcast Two" will be of interest. I have had for about a year a well-known factory-made all-mains A.C. two-valve set, employing detector and pentode valves. I am about fifteen miles from Brookmans Park and use a 60-ft. indoor aerial of Super Electron wire. With my all-mains set I get plenty of volume from Brookmans Park and fairly good signals from 5GB. I can only get a faint whisper from 5XX.

I built the "British Broadcast Two" a few weeks ago, and I was amazed at the results. I use only a small power valve.

The volume from Brookmans Park is as good as with the all-mains set and the quality is better. Both stations are separated easily. Furthermore, 5GB comes in a little louder than with the mains set, and 5XX very much louder using the same aerial and earth. I have also heard on the speaker Turin, Radio Toulouse, and Rome, but, of course, not very loudly.

C. V. T. (London, W.13).

Mains Working

SIR,—In the concluding sentence of his recent article on mains working, Mr. Kenneth Ullyett states that it is a bad plan to have the trickle charger running at the same time as the set.

As a matter of practical experience, I have been running a Ferranti charger for the last two and a half years, and it is usually running with the set. I asked the makers if this procedure was likely to harm the charger, and they replied that I needn't worry if I didn't mind the hum. As my mains unit is very generously smoothed, I find no hum to mind. The valves in the set have been going for three years, often five, six, or even eight hours a day; so I can't see much harm in the arrangement myself.

G. M. P. (Tunbridge Wells).

With a good charger there should be negligible hum, but the danger is in the increased low-tension voltage. A freshly charged accumulator may have a voltage of considerably over two volts per cell, and the continued application of this (with a charger always in circuit) will very probably shorten the valve life. There is the risk, too, that the accumulator may accidentally be disconnected, when the charging voltage will be applied direct to the valves.—KENNETH ULLYETT.

LISSEN ACCUMULATOR

Free CARRIER SUPPLIED

One more triumph of Lissen organisation—one more example of Lissen value for money—the Lissen L.T. accumulator. Here is a complete range of highly efficient accumulators, sturdily built to give absolute satisfaction in use and long life. These accumulators are designed to give absolutely trouble-free service. The plates are all very thick, the containers are strongly made, and the general appearance and finish of the Lissen accumulators is far in advance of usual standards.

All the Lissen accumulators listed below are supplied with strong carrier, free.

12/6 BUYS YOU The LISSEN FOUR-POLE ADJUSTABLE BALANCED ARMATURE UNIT

The Lissen 4-Pole Balanced Armature Unit brings something approaching loud-speaker perfection within the reach of everybody who owns a radio set. You can build any type of cone loud-speaker with it; you can use it with a big baffle board, or put it in a cabinet. You can build a linen diaphragm loud-speaker with it, or you can buy it completely assembled and ready to connect up to your set. It has a fine adjustment, and you therefore get the utmost volume from it without chatter.

In brown moulded case with attachment for fitting to any type of cone. PRICE **12/6**

Cast aluminium Chassis, specially designed to give the best results from the Unit. PRICE **7/6**

13-in. cone for use with the above, **2/6**

H.T. ELIMINATORS YOU CAN USE WITH YOUR SET LIKE A BATTERY

The current you get from Lissen Batteries is the purest power you can get for radio. But if you want to use an eliminator, use a Lissen Eliminator. You'll then get H.T. current from your mains *smoother, steadier, better* than before.

There are 4 types of Lissen Eliminator: one of them will almost certainly be just right for your set. Tell your dealer what voltage your mains supply is and whether it is A.C. or D.C.; tell him what output you require, or what valves you are using, and he will show you the Lissen Eliminator to suit your needs.

Then you only have to take your battery out and put the Lissen Eliminator in its place. No need for special wiring. These Lissen eliminators are cased in insulating material and the lead is heavily insulated cab-tyre flex.

TYPES AND PRICES

D.C. MODEL "A" (100-150 volts and 200-250 volts.) Employs 3 H.T.+ tappings; H.T.+1, giving 80 volts for S.G. valves; H.T.+2, giving 60 volts at approximately 2 m/a for detector valves; H.T.+3, giving 120/150 volts at 20 m/a. Price .. **27/6**

D.C. MODEL "B" (100-150 volts and 200-250 volts) Employs 3 H.T.+ tappings; H.T.−1 and H.T.+2 are continuously variable (by means of two control knobs) and capable of giving any desired voltage up to 120/150 volts at approximately 2 m/a; H.T.+3, giving 120/150 volts at 20 m/a for power valves. Price .. **39/6**

A.C. Model "A"

Tappings as in D.C. Model "A." 100-125 volts and 200-250 volts.

Price **£3:0:0**

A.C. MODEL "B"

Tappings as in D.C. Model "B" 100-125 volts and 200-250 volts.

Price **£3:15:0**

PRICES DULL EMITTER (Type G.M.)

L.N.503 2-volt, 20 amp. hours **4/6**

L.N.504 2-volt, 20 amp. hours ... **8/6**

Multiple plate type, glass containers.

L.N.500 2-volt 20 actual amp. hours **9/6**
L.N.502 2-volt 45 actual amp. hours **13/6**
L.N.560 2-volt 60 actual amp. hours **17/6**

EXTRA CAPACITY

L.N.555 2-volt 24 actual amp. hours **10/6**
L.N.557 2-volt 48 actual amp. hours **14/6**
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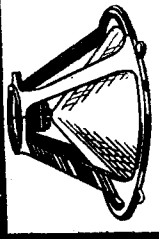
LISSEN ELIMINATORS

LISSEN LTD., Worple Road, ISLEWORTH, Middlesex. (Managing Director: T. N. COLE).

COMPLETE ASSEMBLY

with which you get the nearest possible approach to moving-coil tone and fine full volume without chatter.



Ready for use or to mount in a cabinet. PRICE **22/6**

GIVE YOUR SET A XMAS GIFT

H.T. from the mains

No more worries

A Saving of 40%

IF you want to be sure that your set will be working at its best during the Christmas holidays replace your old-fashioned H.T. dry battery *now* with a Stal H.T. Eliminator.

The Stal Eliminator gives you H.T. direct from the mains in a steady flow—free from violent fluctuations and free from the steady loss of power which is inevitable with the old style dry battery. That is why the Stal Eliminator cannot fail to improve the performance of your set.

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Get a Stal Kit to-day and have it in service for Christmas. You will save at least 40% and the Stal will give you as good service as the dearest eliminator you can buy.

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40m/a Senior Kit. Output, 175 v. 40 m/a. 3 variable tappings. **60/-**

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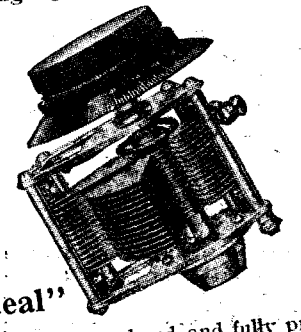
Polar makes tuning easier

because:

The Fast and Slow motion control as fitted to the "IDEAL" gives you direct and definite control over your condenser with *no* noisy gears to be sprung in or out.

The reduction movement runs on ball-bearings and the main shaft is suspended on ball races at either end, resulting in an action which is marvellously smooth yet precise.

The entire condenser is rigidly built in a stout frame ensuring rigidity of rotor vanes.



The "Ideal"

Reduction movement enclosed and fully protected. One-hole panel mounting. Built throughout of chemically cleaned, hard brass.

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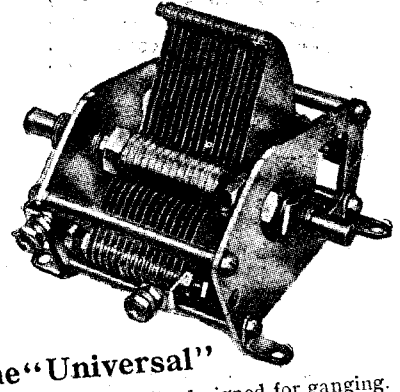
Phosphor Bronze Balls 6d. extra.



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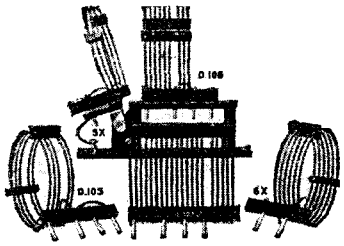

SHORT WAVE INDUCTANCE UNIT

This Unit forms the complete inductance portion for a short-wave receiver, providing variable aperiodic aerial coil, grid coil and reaction winding. Complete with stand and 5 coils, it covers efficiently the whole short waveband from 15-95 metres.

Price **22/6** complete with full circuit details.

(Extra coils for B.B.C. waveband can be obtained)

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For use in screen-grid S.W. circuits. Obtainable for all wavebands from 12.5 to 2,000 metres. Air wound on a skeleton bakelite former. Special banana type pins ensure perfect contact.

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Easy Terms
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The Lotus rigid type Valve Holder is only 1⅛" in diameter and is available with or without terminal units. The current-carrying capacity is considerably in excess of what is required for the ordinary valve holder. Universal for 4- or 5-pin Valves.

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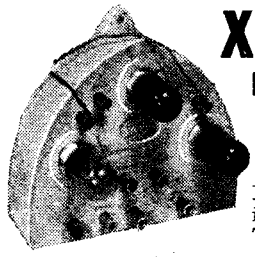

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The SECOL D.C. Eliminator is the GIFT OF THE GODS.

For 30/- it will make your set an ALL MAINS RECEIVER. (It will do the same for your friend's).

Simple to work, economical. Eliminates H.T. Battery, Charges your accumulator and is entirely guaranteed.

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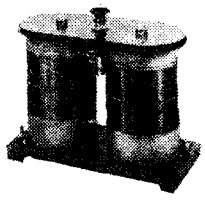
These are some comments by satisfied customers.



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as specified
10/6 each.

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FULLY GUARANTEED CONDENSERS

PRICES		
1 mfd.	500 v. D.C. test	2/-
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2 mfd.	1,000 v. D.C. „	4/6
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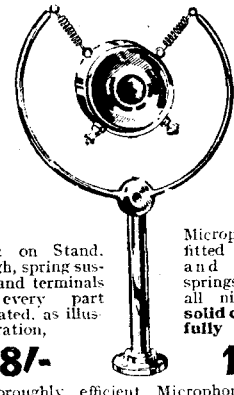
Franklin Resistors 1¼" × ¼". Indestructible, constant, accurate, non-inductive.
Anode Resistances, Grid Leaks, De-couplers, etc. Plain Caps 1/- each. Screw Terminals 1/3 each. Clips for intermediate tappings 2d. each. Clips for mounting to panel 3d. each.

Please apply for price list.

FRANKLIN ELECTRIC CO. LTD., 187-189, Ilford Lane, ILFORD, Essex. *'Phone: Ilford 0281*

INEXPENSIVE MODERN
PUBLIC ADDRESS and Speech and Music Transmission Microphone



Complete on Stand. 10 in. high, spring suspension and terminals fitted, every part nickel-plated, as illustration,
18/-

Microphone only, fitted with hooks and terminals, springs supplied, all nickel-plated, **solid construction, fully guaranteed,**
12/6

This thoroughly efficient Microphone has been especially designed for use with small Valve Amplifiers, or in connection with Wireless Sets which are adapted to work from a Gramophone Pick-up. When connected to two or three L.F. Stages, through a Microphone Transformer, this Microphone is GUARANTEED to transmit speech and music without distortion and with ample volume to fill a large hall.

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special design to obtain best possible results from sensitive Microphones when connected to Valve Set, or Valve Amplifier; best Transformer for clear speech with volume speech and music transmission, Public Address Microphones, etc.; Prim. and Sec. terminals; **full directions and diagrams of connections free.** Goods by return post. **6/-**

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'Phone: Museum 8329.

Postcard Radio Literature

For Valve Users

I RECOMMEND every set owner to write to the Mazda people for a fine book, a copy of which I have just received, giving full details of the new Mazda valves. These valves are backed by the research and manufacturing experience of three huge manufacturing concerns, the Edison Swan Electric Co., Ltd., the British Thomson-Houston Co., Ltd., and Metropolitan Vickers Electrical Co., Ltd., which perhaps explains why they have so quickly earned a wonderful reputation. **112**

The Simple Way

The "Simple Way to All-electric Radio" is the full title of a new booklet, describing all the Regentone eliminators and the new mains-driven four-valver. To anybody thinking of changing over to mains operation, this book is practically a necessity. **113**

The New Pye Sets

I have, on a previous occasion, referred to the Pye "twin-triple" portable; but you must not think that it is the only star in

(*Continued on next page*)

POSTCARD RADIO LITERATURE

(Continued from preceding page)

the Pye range. A new and finely-produced catalogue has just been sent me which gives full details of other Pye sets and accessories. You should have this. **114**

News from Varley

I like the new Varley catalogue, a copy of which I have just been glancing through; it should be in the hands of every set builder and can be obtained through my free catalogue service. **115**

GET THESE CATALOGUES FREE.

Here "Observer" reviews the latest booklets and folders issued by well-known manufacturers. If you want copies of any or all of them FREE OF CHARGE, just send a postcard giving the index numbers of the catalogues required (shown at the end of each paragraph) to "Postcard Radio Literature," "AMATEUR WIRELESS," 58-61, Fetter Lane, E.C.4. "Observer" will see that you get all the literature you desire.

Messrs. Warners Radio inform us that every purchaser of any component, no matter how small, at one of their branches, will receive a voucher automatically entering him for a special Christmas draw, the first prize for which is an Osram Music Magnet receiver.

Home builders of sets, who appreciate the convenience of complete kits of parts when it comes to making up a receiver, will be interested to know that Messrs. Ready Radio, of 159 Borough High Street, London Bridge, S.E.1, supply kits of parts for every receiver published in "A.W." These kits can be obtained by easy payments, if desired.

A LIST OF OUR BLUEPRINTS APPEARS ON PAGE 936

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Easy Tune Short-wave 2 (D, Trans)	AW242
Searcher Two (D, Trans)	AW245
Arrow Two (D, Trans)	AW249
Forty-five-shilling Two (D, 8 Trans)	AW250
Challenge Two (D, Trans)	AW261
Searcher Short wave 2 (D, Trans)	AW259
Brookman's Two (D, Trans)	WM168
New Crusader (D, Trans)	WM182
Radio-Record Two (SG, D)	WM187
Gleaner Two (D, Trans)	WM201
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Everybody's All-electric Three (SG, D, Trans) —A.C.	AW221
1930 Clarion Three (SG, D, Trans)	AW223
Beginner's Regional Three (D, 2LF)	AW233
Britain's Favourite Three 1930 (D, 2 Trans)	AW243
Car Three (D. R.C. Trans)	AW244
The "A.W." Exhibition 3	AW247
Brookman's Three (SG, D, Trans)	WM161
Community Three (D, RC, Trans)	WM164
Brookman's Push-Pull Three (SG, D, Trans) 1/6	WM170
All-nations Three (D, 2 Trans)	WM178
Inceptordyne (SG, D, Pentode)	WM179
Brookman's A.C. Three (SG, D, Trans) 1/6	WM184
Music Marshal (D, 2 Trans)	WM190
Gramo-Radio D.C. Three (SG D Trans)	WM196
Concert Three (D, 2 Trans)	WM199
New Lodestone Three (HF, D, Trans)	WM205
De-Luxe Three (D, RC, Trans)	WM209
Five-Point Three (SG, D, Trans)	WM212
Falcon Three (A.C. Set)	WM217
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Electric Four (All A.C.—SG, D, RC, Trans)	WM162
Brookman's Four (2SG, D, Trans)	WM174
Transportable Four (SG, D, 2 RC)	WM180
Super Q4 (SG, D, 2 Trans)	WM189
Lodestone Four (HF, D, RC, Trans)	WM193
Searcher's Four (SG, D, RC, Trans)	WM194
Invitation Four (SG, D, RC, Trans)	WM200
Regional Band-pass Four (SG, D, RC, Trans)	WM211
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1930 Five (2HF, D, RC, Trans)	WM171
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Continental Portable (SG, D, Trans)	AW240	1/-
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James Portable SG3 (SG, D, Trans)	WM203	1/-
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Copies of the "Wireless Magazine" and of "Amateur Wireless" containing descriptions of any of these sets can be obtained at 1s. 3d. and 4d. respectively, post free. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine."

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AGENTS WANTED to sell Wireless Goods, all makes in sets, components and accessories. Cash or easy terms. Liberal commission.—New Auto Supply Co., 241 Park Road, Aston, Birmingham.

RADIO SATISFACTION.—Osram, Mullard Kits, Cossor, Varley, McMichael Sets, Speakers, Kits assembled, no extra. Portables and Transportables. Delivery free. London area same day C.O.D. Send card for quotation. Batteries, Valves, Pick-ups, etc., at right prices.—Dudley, 37 Hartley Street, London, E.2.

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WET BATTERY REPLACEMENTS.—New Process Sacs, approximately 20,000 m.a., 2/6 per dozen. Particulars free. —Scottish Batteries (A.W.), Braeside, Uphall Station.

REPUTABLE firm requires representatives in all towns for the sale of probably the best-known All-Electric Receiver. (Whole or spare time). Salary and commission. Box 47, c/o "Amateur Wireless," 58 Fetter Lane, E.C.

WE WILL ACCEPT YOUR SURPLUS APPARATUS (making you a high allowance) in part payment for any new apparatus; your inquiry will be dealt with promptly. Bostock & Stonnill, 1 Westbourne Terrace, S.E.23.

Have YOU a "Cossor Empire Set" "Brookmans Three" "Mullard Orgola" or...?

then READ THIS and CONVERT it in 10 minutes to ALL-MAINS A.C. Operation

Equally suitable for most battery-operated sets.

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Telephone: CITY 3733 3734

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Amateur Wireless
Wireless Magazine

58/61, Fetter Lane, London, E.C.4

October 24th, 1930.

The Six-Sixty Radio Co. Limited,
17/18, Rathbone Place,
Oxford Street,
London, W.1.

Dear Sirs,

Six-Sixty Conversion Unit

You have sent us a Six-Sixty Conversion Unit with the request that we should place it under careful test and let you know the result.

Members of my Technical Staff have tested the unit with six different sets - four of them constructor sets described in "Amateur Wireless" and "Wireless Magazine", and two of them manufacturers' kit sets. The home-constructor sets were the "Brookman's Three", the "Clarion Three", the "Ether Searcher" and the "Exhibition Five", and the manufacturers' sets were the "Cossor Empire Kit" and the "Mullard Orgola Kit".

The unit, in effect, converts the sets from battery operation to complete A.C. mains operation, and I have pleasure in reporting that in all six cases its use gave excellent results. The conversion is a matter of ten minutes only, and in every case the result was eminently satisfactory.

Yours faithfully,

Bernard Jones.

Editor.
"Amateur Wireless"
"Wireless Magazine"

FREE

The Six-Sixty Booklet which tells how any set can be a much better set and up to date. And all about the famous SIX-SIXTY range of valves and equipment. Write for it NOW.

SIX-SIXTY

(B.V.A. RADIO VALVES AND EQUIPMENT)

Advertisement of Six-Sixty Radio Co., Ltd., Six-Sixty House, 17/18 Rathbone Place, Oxford Street, London, W.1. Tel.: Museum 6116/7.

Everybody can have better radio this Christmas

Good company . . . bright lights . . . a cheery fire . . . happy laughter . . . and music clear and pure from a good radio that has been made better by Pertrix. What more *could* one wish for?

It is because NO sal-ammoniac is used in a Pertrix Battery that it gives the purity of current that is so essential in obtaining perfect reception.

So don't forget, make it a Pertrix Christmas this year, and *enjoy* your radio.

Pertrix Accumulators more than do their bit in giving you better L.T. current, too.

Give Pertrix Dry Batteries and Accumulators as Presents this Year

DRY BATTERIES

60 volt Standard	8/-	60 volt Super	13/-
96 " "	11/9	100 " "	21/-
100 " "	13/-	120 " "	25/6
120 " "	15/6	150 " "	31/-

The Improved Pertrix Accumulators are sold in all capacities at prices ranging from 4/6. Ask your dealer.

PERTRIX
SUPER LIFE
DRY BATTERIES AND ACCUMULATORS

"The batteries you can trust"

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Amateur Wireless,
December 13, 1930

TWO FINE "TWOS"—

—AND HOW TO BUILD THEM

Amateur Wireless

and Radiovision

Every Thursday 3d

Vol. XVII. No. 444 Saturday, December 13, 1930

The LOFTIN-WHITE 2

A NOVEL MAINS SET

Registered at the G.P.O. as a Newspaper

No. 444. Vol. XVII. DECEMBER 13, 1930

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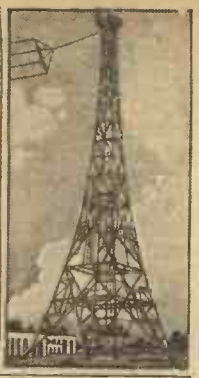
Amateur Wireless and Radiovision



EDITOR: BERNARD E. JONES.
TECHNICAL EDITOR: J.H. REYNER, B.Sc., A.M.I.E.E.
THE LEADING RADIO WEEKLY FOR THE CONSTRUCTOR, LISTENER & EXPERIMENTER.
RESEARCH CONSULTANT: W. JAMES.
ASSISTANT EDITOR: H. CORBISHLEY.

NEWS · & · GOSSIP · OF THE · WEEK

BREAKING RECORDS

WELL, what did you think of last week's Special Christmas Number of "A.W." with its attractive coloured cover and its 84 pages packed with features of real interest to every radio man? Readers who omitted to order their copies and were disappointed when they found the local newsagent had sold out, missed a treat. We hope they will accept our apologies, but then we have so often advised "order your copy *now*." Some of the chief features in this double number—the popular "Challenge Two," for instance—are continued in this issue.

MUHLACKER STILL INTERFERES

COMPLAINTS about the new high-power German station at Muhlacker, near Stuttgart, continue. The B.B.C., in a recent statement, points out that since November 21 Muhlacker has been on high power, transmitting 9 kilocycles above the frequency allotted to the London Regional, by international agreement. Early last week the possibility of a re-arrangement of wavelengths was discussed, but so far no change can be recorded. Meanwhile, the German authorities have promised to take every precaution against over-modulation, which would, of course, increase the present trouble.

GENEVA STATEMENTS

WE understand that Mr. Arthur Burrows, of the International Broadcasting Union at Geneva, has stated that the present working of the 75-kilowatt Muhlacker station in a channel adjacent to the high-power London Regional is a test of whether the waveband made available by the Washington Conference, and the 9-kilocycles separation provided by the Prague Conference, are any longer practicable. We think the two provisions referred to could hardly have visualised the high power of present broadcasting.

Another radio aid for the Army. Following on the news of the radio-equipped tanks comes this eight-wheeled armoured car, which is fitted up with a transmitter and a receiver, so that it can keep in touch with its objective while on the move. This new monster—a Crossley—is having its eight-wheel chassis and its radio gear tested out in the Derbyshire hills

PRINCIPAL CONTENTS

A B.B.C. OPINION

BY the way; in connection with the subsidised opera scheme mentioned recently in "A.W.", on page 852, the B.B.C. says: "The B.B.C. is glad of the opportunity of again taking action which promises not only to be as effective in the cause of opera as it was in the saving of the Promenade concerts, but also to be of at least equal importance in enriching programmes and enhancing the value of the service to listeners."

NEW RADIO PLAYS

IN the January list of plays to be broadcast by the B.B.C. we note a considerable amount of original material. During the first week we shall hear *The Key to the Situation*, a thirty-minute play by Lance Sieveking. The second week is notable for *The Path of Glory*, by L. Du Garde Peach, a play lasting seventy minutes. A thirty-five minute play during the third week is *Mackintosh*, by Somerset Maugham. The last week of the month of January should be noted for a one-hour broadcast version of *Edward II*, by Marlowe. The B.B.C. continues to show that in radio drama it can lead the world.

A NEW PRAGUE PLAN

ELSEWHERE in this issue the suggestion is made that the time is ripe for the formulation of a new plan of wavelength

NEXT WEEK: FULL DETAILS OF THE "CHALLENGE" RADIO-GRAMOPHONE

NEWS & GOSSIP OF THE WEEK—*Continued*

distribution. The present trouble between Muhlacker and the London Regional will certainly be accentuated as more stations go on to high power. By 1932 we shall, in all probability, find that the present 25 per cent. of stations on high power will have increased to at least 75 per cent. It is well that the International Radio Telegraphic Convention plans to meet in Madrid in 1932. There will be plenty of trouble waiting for it! But it is the International Union's hope that an appreciable extension of the present wavelength band will then be granted.

WHAT AMERICA WANTS

JUDGING by latest news from America, the B.B.C.'s Symphony Orchestra is so much appreciated that the National Broadcasting Company has arranged for a further relay of the performance to be given on December 17. The 5SW short-wave transmitter has proved highly successful in the American relays of British programmes, and is to be used on this occasion. In one American newspaper we note a plea for the relay of more B.B.C. vaudeville shows and plays, which, the American writer contends, are done much better in this country than in the U.S.A.

TRANSATLANTIC APPLAUSE

WHAT must surely be a record in transatlantic radio applause was a message that arrived from America at the conclusion of the B.B.C.'s first Symphony Orchestra performance relayed by the N.B.C. of America. Hardly had the tones of the first selection, Borodin's Symphony in B minor, died out when Sir Henry Wood was handed a cablegram from America, congratulating him on the splendid performance which, according to the sender, Alfred H. Grebe, a pioneer American radio experimenter, was received with so much clarity in New York that every one of the instruments was recognised.

REAL STOICISM

WHEN Walton O'Donnell was recently rehearsing the Wireless Military Band in one of the studios at Savoy Hill, a small boy popped his head in the door and exclaimed excitedly: "Excuse me, sir, but your car has been stolen!" By way of reply Walton O'Donnell turned to the boy and said: "Tell someone else to see about it." The boy disappeared. "And now, gentlemen," said Walton O'Donnell, turning to the band, "let us take that last movement again." Such indifference to personal affairs in the interests of listeners is surely rare!

ALL WELSH

TWO vaudeville programmes made up entirely of gramophone records were recently broadcast from London, and they were a great success; but when it comes to Welsh. . . . ! Anyway, an all-Welsh record variety programme will be given from Cardiff on December 23, which will include leading Welsh artistes and well-known Welsh songs recorded by the principal gramophone companies.

FOR SLEUTHS

LISTENERS who are keen on amateur detective work will be able to gratify their Watsonian instincts when the B.B.C. starts up in January with the first twelve instalments of a new detective series. These will be broadcast every Saturday night. Such well-known exponents of detective fiction as Dorothy Sayers, Agatha Christie, Clemence Dane and Freeman Wills Crofts will help to develop the plot. The last detective serial broadcast by the B.B.C. proved to be one of the most popular stunts of the year.

CHRISTMAS DANCE MUSIC

SO much has been written of the great possibilities of using the B.B.C.'s transmissions to enliven the Christmas festivities that we made a special point of asking the B.B.C. what it had arranged in the way of dance music. We are glad to be able to say that on Christmas night and Boxing night dance music will continue from 10.30 to 1 a.m. There will thus be plenty of scope for late revels via radio.

WHO THEY ARE

AS we said last week, on December 31 Amos 'n Andy are to be relayed from America to B.B.C. stations. They broadcast in the interests of a toothpaste firm, but that is not evident in their material. Amos is Freeman Gosden, formerly an actor, and Andy is Charles Correll, who has been a bricklayer and an amateur minstrel.

THE NEW SCOTTISH STUDIO

THE largest broadcast studio in Britain was in use last Saturday, when the Right Hon. Wm. Adamson, M.P., Secretary of State for Scotland, opened the new Scottish Broadcasting House at Queen Street, Edinburgh. Apart from its size, the studio is remarkable for its theatre, in which vaudeville, plays and concerts will be performed, while a large audience will be able to watch as well as to listen from the galleries and floor. The lighting is in the most modern style and the coloured fabric which lines the walls to prevent echo and to produce the true effect of silence essential for broadcasting has been woven by the "Edinburgh Weavers," who have also been responsible for the beautiful tapestry in the small talks studio, which will be decorated in the manner of a study, so as to give a talker all the circumstances of his own home. The third studio, of intermediate size, will be used for the broadcasting of chamber music and songs. The building is one familiar to Edinburgh citizens as the old Queen's Hall.

A striking view of the new double-decker "studio" of the Scottish Broadcasting House. This building was formerly the old Queen's Hall in Edinburgh, and this fine studio, the largest in the country, has been converted from the concert hall

A JULES VERNE DREAM!

LORD INCHCAPE, chairman of the P. and O. Line, said last week: "It is perhaps not extravagant to anticipate that a time will come when ships will be propelled, heated, and lighted by the wireless transmission of current. It is possible that the sun's endless stores of heat and radiant energy may yet be harnessed to the service of mankind. That should still further reduce the cost of ocean travel." It should, but the idea of transmitting power by wireless still, unfortunately, seems too Jules Verneish to be true!

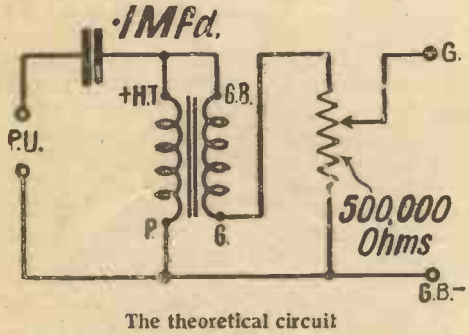
Signorina Maria Luisa Corsini, the present announcer at the Turin studio, was chosen by listeners from 180 candidates heard over the microphone during a period of more than one month.

MAKING A GRAMOPHONE TONE CONTROL

With the aid of the simple device described below you can effect a wonderful improvement in the quality of your pick-up reproduction. The bass can be accentuated and the volume controlled

ONE of the big advantages of working a pick-up through your wireless set, so that you get electrical reproduction of gramophone records, is that it is easy to control the volume.

This is a thing which cannot conveniently be done with the ordinary gramophone unless it is modified to include some kind of acoustic damper. Merely shutting down the *louvres* in front of the gramophone horn is not satisfactory, because, although this cuts down the volume, it muffles the sound. You can get a really satisfactory



The theoretical circuit

control of volume in an electric gramophone.

What is not so generally realised, though, is that with electric reproduction it is quite a simple matter not only to control the volume, but to control the tone.

This is a most useful idea, because in your collection of records you probably have several which you prefer to hear either with more or less bass.

As rough examples, dance bands and orchestral recordings sound well with a rather accentuated bass, whereas too great an accentuation of the low notes is undesirable in vocal records, because the predominance of the bass may give a "boomy" effect to speech, which does not make for reality.

There is nothing very difficult in making up a tone control, and the only thing which is important is that you should get the values of the components quite correct.

As you will see from the accompanying photographs and layout, there are only three main parts needed for this little tone-control unit, these being a fixed condenser, a low-frequency transformer, and a variable resistance. There is a small terminal strip carrying two sets of terminals and the resistance. The resistance forms a volume control.

Any small piece of plywood does as a "baseboard" for these few parts. The layout given here is merely a suggestion, but it need not be followed closely nor, indeed, need the unit be made up separately. It can, if desired, be included in the gramophone amplifier. However, it is well worth having the control within easy reach of the turntable, so that while the record is playing you can vary the amount of bass accentuation.

How it Works

The theory of this unit is quite simple, and depends upon the fact that the average pick-up deals more efficiently with the higher tones than it does with the lower, and its characteristic curve "falls off," as we say, on the lower frequencies.

The low-frequency transformer windings and the coupling condenser in this tone-control unit combine to make an acceptor circuit which is resonant at about the point where the pick-up is deficient.

Because of the special connections of the low-frequency transformer, a step-up effect is also gained, and this, combined with the boosting of the bass, produces a very effective tone. The volume is controlled by the resistance, but the tone is practically unaffected.

Obviously, the point on the characteristic curve at which the bass note accentuation takes place is dependent upon the values of the fixed condenser and of the low-frequency transformer. It is recommended that for the average pick-up the condenser should have a value of .1 microfarad and the transformer should have an inductance of 50-henries.

You will have no difficulty about connecting up the condenser, transformer, and resistance, and the only important point to note is that on the transformer the H.T. plus and G.B. minus terminals should be connected together. The grid terminal is then connected to one end of the resistance and the anode terminal to the other.

The pick-up is connected on the condenser side of the unit of course, and the resistance side is then connected to the amplifier. To get best results out of this unit keep both these sets of leads from the pick-up to the unit and from the unit to the amplifier as short as possible.

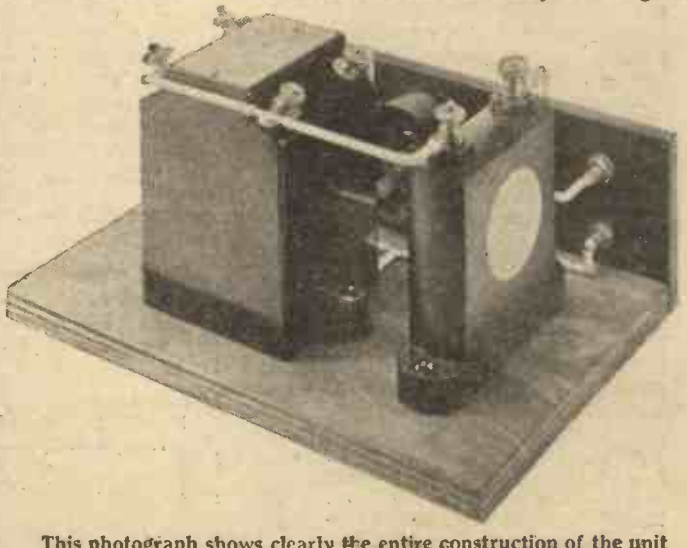
Using the Unit

It will be found that adjustment of the volume control has no effect upon the bass note boosting action of the unit—or, at least, it should have no effect if the following amplifying stage is properly set up. This volume control will be found very handy with pick-ups which are not already provided with a strength control.

You might consider it worth while fitting a switch to the unit or to the gramophone amplifier so that the bass-boosting section of the unit can be cut out if necessary. This will be found a particular advantage if one has a large stock of varied records vocal and orchestral, some of which call for more bass, and some for more treble.

It is really surprising what a deal can be done in this way, and what fine effects can be obtained—a big advantage over the mechanical gramophone.

With a unit such as this you can give owners of mechanical gramophones a real surprise, for there is no ready means of altering the tone of a mechanical gramophone while a record is playing, though a certain difference can be obtained with individual records by fitting different needles, and by the use of special fibre

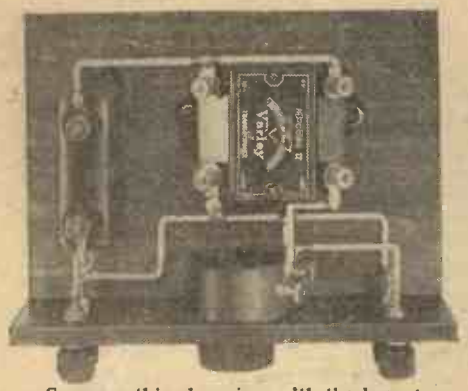


This photograph shows clearly the entire construction of the unit

(*Continued on next page*)

needles such as the Burma Colour needle.

With a pick-up, though, it is not advisable to experiment with needles. Usually one particular type (generally loud-tone



Compare this plan view with the layout opposite

steel) is best suited to each pick-up, and tonal change should be effected by a tone-shifter or bass-accentuator such as our little unit.

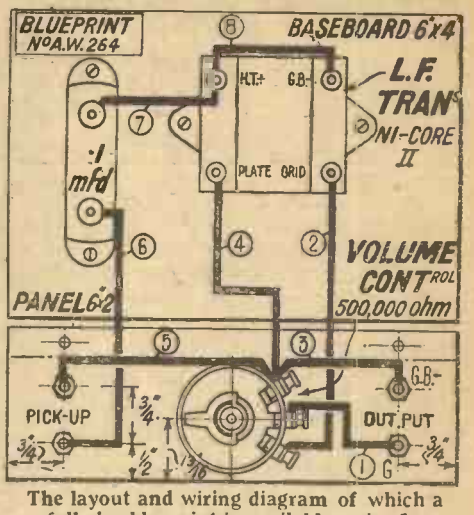
If a switch is provided, putting the unit in and out of action, then at a moment's notice a genuine "pedal" bass can be added to an organ record, for example, or the normal treble-accentuation of the pick-up can be used to give a realistic tone to a vocal record, or perhaps to instrumental records such as violin solos.

Care must be taken in wiring-up the unit to connect the volume control exactly as shown.

There are several different methods of volume control connection for pick-ups, but many of them cause a change in tone as the volume is cut down. This would nullify the effect of the bass-booster, and in this unit a scheme of connections has been adopted which really does result in a satisfactory control of volume without tonal change.

Make up this little unit exactly as shown, using the values specified, and you cannot fail to be pleased with the improvement it will effect to your radio-gramophone.

If you have any doubt as to whether the periodicity of the 50-henry .1-microfarad boosting circuit is best suited to your pick-up, then the makers of the pick-up should be consulted. We have selected



The layout and wiring diagram of which a full-size blueprint is available, price 1/-

values which are best suited to the large majority of pick-ups on the market.

THE BARGAIN

WHETHER it was the "Bankrupt Stock" placard or the little knot of shop-gazers that first attracted my attention I can't say. The fact remains, I crossed the road and edged my way in towards the window. The display, as I soon discovered, was nothing more than an assortment of feminine garments, such as silk stockings and—well, such as silk stockings and so forth. I was on the point of turning away when I happened to catch sight of something that really did appear a bargain. I hesitated, battling with my diffidence; then, squaring my shoulders, I entered the shop.

From behind the counter a pretty girl inquired my wishes.

"You . . . you have some ladies' . . . some . . . in the window at one and eleven," I stammered.

The girl thought for a moment. "Night-dresses?" she hazarded.

I nodded faintly. "At one and elevenpence," I repeated.

"I'll get them."

Just to my right three women were discussing something pink; I sought for a patch of empty counter and riveted my eyes on that. Happily, the pretty attendant was not away for long. Slapping down a big white parcel, she broke the string and whipped aside the paper.

"A remarkable line, sir," she declared. "It's only possible by the fact that nowadays so many ladies prefer pyjamas."

"R-really." With a sudden movement she laid hands upon the top-most garment and shook it out for my inspection. "Yes, thank you," I said, hurriedly bundling it together. "I'll take that."

"I hardly fancy that this particular one is what you want," smiled the girl. "You see, it's an outsize."

"But it's right—exactly right."

She regarded me intently. "Are you quite sure?"

I drew myself up.

"I know what I have come in here to buy," I remarked with dignity.

Without another word the girl turned and parcelled up my purchase.

◆ ◆ ◆

The above took place some days ago. When George called round the other evening I told him all about it. I thought the story rather bored him. But he was tremendously taken with my new loud-speaker, and wants me to make a linen diaphragm for his. I think I will. After all, I've still got plenty of cambric left.

P.S.—At the time of writing some nine-pennyworth of the nightdress is grappling with a talk on "The Psychology of the silkworm," by Prof. Thredbear. Terribly dry, of course, but a wonderfully rich tone.

MICHAEL LAWRENCE.

BROADCASTING FINANCE

IN Parliament last week Mr. Lees-Smith informed Sir W. Mitchell-Thomson that the total receipts from wireless receiving licences during the year ended March 31, 1930, and their distribution, were as follows :—

	£
Total receipts	1,537,377
Deduct 12½% (for Post Office expenses of management) ...	192,172
Deduct contribution to cost of conversion of "spark" stations, etc.	6,686
	1,338,519
Paid to B.B.C. (based on licence receipts for previous year) ...	963,171
Balance accrued to Exchequer	£375,348

The corresponding figures for the financial year ending March 31, 1931, were estimated to be as follows :—

	£
Total estimated receipts	1,725,000
Deduct 12½%	215,625
Deduct contribution to cost of conversion of "spark" stations, etc.	3,150
	1,506,225
Payable to B.B.C. (based on licence receipts for previous year) ...	1,069,648
Balance accruing to Exchequer ...	£436,577

Mr. Lees-Smith said he was not in a position to furnish particulars of the total income of the British Broadcasting Corporation from all sources during the same two periods; but the total income during the year ended December 31, 1929, was shown in the Third Annual Report (Command Paper No. 3,599 of 1930) as £1,097,337 7s. 3d.

THE SUPERHETERODYNE

THE superhet receiver seems definitely to be coming back into favour. For instance, the new Stenode Radiostat is a superhet circuit with tuned intermediate-frequency stages and fitted with an extra selective filter in the shape of a piezo-electric crystal, followed by a shaping circuit for restoring the "cut" sidebands. One peculiarity of supersonic reception is that a given station can often be picked out at two different points on the tuning-dial, one point corresponding to the sum and the other to the difference of the signal and local frequencies. This is, however, not always a disadvantage, because if the desired station should happen to overlap with another station at one of the tuning points, it will almost certainly come in free from interference at the alternative setting.

M. B.

Critical comments on the present distribution of wavelengths among European stations by ALAN HUNTER

SINCE the winter began, we long-distance listeners have had a hectic time. Within our hands are sets capable of tuning in to the ends of the earth, of reproducing dozens of signals at loud-speaker strength. But, even assuming the set is good, how many of Europe's galaxy of broadcasters can *you* receive?

The answer will vary according to the reader's standard of reception. Critical listeners reject all stations that cannot be heard at a strength and quality similar to the local station; their nightly log is never more than a dozen stations and is often less.

Others, less critical, are willing to sacrifice a little, to put up with a background of interference, with varying strength and with some deterioration in quality. Then a log of twenty or thirty stations can be fairly readily compiled.

Necessary Co-operation

I imagine everybody must know that Europe's stations, controlled by dozens of separate organisations, are really trying to work together in wavelength allocations. It is clear to all concerned that complete co-operation in wavelength distribution is essential for the operation of the individual organisations. The Prague Plan is practical evidence that this condition is appreciated. Under this Plan, countries are allocated so many frequency channels, the number and position (in the frequency range allotted to broadcasting by the Washington Convention) being determined by a formula that takes into account such factors as geographical location, political importance, population, and transmitting power.

No one has ever pretended that the Prague Plan is perfect; but how can any perfect plan be formulated when one is faced with the insoluble difficulty of getting a quart into a pint pot? There are far too many stations for the frequencies available. The total frequency range between 550 and 200 metres is 955 kilocycles. As each station must be 9 kilocycles from the two adjacent stations, we can see that 107 stations can be fitted in on this basis.

Dividing the Wavelengths

In deciding how to share out these frequency channels to the twenty-six broadcasting countries of Europe, the Prague Conference really was up against it. Yet if one cares to count the present number of stations between the limits mentioned, namely 550 and 200 metres, the total is 108. Superficially, the plan seems to have worked out extremely well; but further investigation shows that the 9-kilocycle stipulation has not been maintained. Now, however you may look at it, the fact is this; that as soon as the 9-kilocycle separation is reduced you get trouble, due to the modulations of the adjacent carrier waves overlapping and producing audible heterodyne notes.

Going round the dial at the present time, I can count nearly as many heterodynes as stations. That would not happen if the stations were 9 kilocycles apart. Unfortunately, the original 9 kilocycles separation of existing stations has, it would seem, been entirely nullified by newcomers. A few examples will show what I mean.

Talking in kilocycles, Vienna 581 is the required 9 kilocycles from Brussels 590, but in between is now Archangel 585. Midland Regional 626 and Langenberg 635 are 9 kilocycles apart, but in between is Simferopol 630. An international common wave 662 and Paris 671 are 9 kilocycles apart but in between is Moscow 665.5. Paris 671 and Rome 680 are 9 kilocycles apart but in between is Norway 674. Berlin 716 and Dublin 725 are 9 kilocycles apart but in between is Rabat 721. Over a dozen of these sandwiched stations are noted between the wavelengths of Vienna and Turin.

Clearly, then, the nightly cacophony of side-band whistles is not entirely due to stations wandering from their allotted frequencies. In fact it is a hopeful sign that most of the big stations now keep dead on their allotted frequencies of transmission. Lower down the wavelength range the congestion does not appear to be so bad, no doubt because the low waves, being erratic in range and strength, are not so keenly competed for. One has only to remember the ineffectiveness of the London National station on 261 metres—which for all its 68 kilowatts is poorly heard outside the swamp area—to realise why no station exactly scrambles for a wavelength below 300 metres.

A New Plan Wanted

In condemning the present Prague Plan, one must make considerable allowances for two facts that are often overlooked. The first is the limitation in the number of stations imposed by the necessity for at least 9 kilocycles separation. The second fact is seldom understood; it is that the Prague Plan, or any other plan, cannot function on the assumption that listeners in one country want to hear broadcasting stations from another. All that can be visualised is non-interference, within a country's broadcasting organisation, from foreign stations.

The Plan might make Great Britain fit for heroic B.B.C. subscribers to listen in, but it cannot arrange matters so that British listeners can hear Italian stations with the same degree of non-interference. So with Italy; the Italians have a right to expect Rome and Turin and the other Italian stations to give good service in Italy; but they must not expect to hear Scandinavian stations over 1,000 miles away with the same degree of perfection

Operating one of the large tuners at Radio Paris—a "big noise" on the long waves

A good many listeners imagine that if all stations were equally separated by 9 kilocycles they could take their pick of Europe, irrespective of the location of the set. But take a simple example; Rome on 680 kilocycles is 9 kilocycles from Stockholm on 689 kilocycles. In London we are roughly midway between, with Rome 900

(Continued on next page)

ANALYSING SPEECH and MUSIC

In order to make a closer study of the behaviour of sound, as handled by broadcasting and sound-picture systems, the engineers of the Acoustical Research Department of Bell Laboratories in America have recently developed special sound analysing apparatus

IN the reproduction of speech and music, not only in broadcasting but in sound pictures, engineers now have to know exactly what the sounds consist of. There are two variable quantities in sound: namely, frequency of vibration and amplitude.

A broadcast sound consists, as a rule, not of one frequency but of many; and these are of various amplitudes. The peculiar quality of a sound depends upon which frequencies are present and upon their relative amplitudes. These variables in sound account for the different timbres of the same note as played by a piano, a violin, or other musical instrument.

From our point of view it is interesting to note that, if any of the component frequencies of a sound are not reproduced at the correct amplitude, the reproduced sound is distorted and unnatural. But we seldom hear one sound alone, since in speech and music different sounds follow each other in quick succession and are recognised as syllables or notes. The component frequencies are therefore changing from moment to moment.

H. R. Dunn and S. D. White recording with the new Analyser in the Bell Laboratories

In analysing speech and music it is not essential to determine the magnitude of each separate frequency at every moment, but it is very desirable to know the range of frequency and the manner in which the magnitudes vary over different sections of this range. Knowledge of both average and peak magnitudes is desirable. This information can now be obtained by means of new apparatus designed in the Acoustical Research Department of the Bell laboratories.

The sound to be measured is first picked up by means of a condenser microphone, such as is commonly used for making sound pictures and as used by many American broadcasting studios. The sound is then amplified to some convenient level before being passed on to the measuring apparatus. One measurement gives the average amplitude and the other measurement gives the peak amplitude.

In order to analyse a sound into constituent bands of frequencies, a group of 13 filters is employed. Ten of them divide the range from 62.5 to 8,000 cycles into convenient bands. The twelfth passes all frequencies below 62.5 cycles and the thirteenth all above 8,000 cycles. A fourteenth filter is sometimes used to cover the extremely high frequencies between 8,000 cycles and 11,300 cycles. Further amplification is provided after the transmitter output has passed through the filter.

It will be clear that measurement can only be made on one frequency band at a time, so the selection being played or the words being spoken must, for complete analysis, be repeated fourteen or fifteen times; once to allow readings for each of the fourteen frequency bands and once for all bands taken together.

Tests with this new apparatus have been made on speech using male and female voices; also in various manners of speaking and at various distances from the microphone. Street noises have also been measured. For music, short selections have been played by most of the common instruments, including piano and organ; and of entire orchestras composed of different numbers of instruments.

Many interesting results have been obtained from these measurements, which, by enabling sound to be analysed into its constituent frequencies and amplitudes, should eventually lead to more natural reproduction in broadcasting and sound pictures.

"WANTED—A NEW PRAGUE PLAN"

(*Continued from preceding page*)

miles south and Stockholm 900 miles north. On an average set we find these stations overlapping, but it is not probable that overlapping occurs when one is listening to Rome in Rome or to Stockholm in Stockholm, because the distance of the adjacent transmissions is nearly 2,000 miles. There is, indeed, a great deal more in station separation than the literal 9 kilocycles.

Muhlaker

How true this is can be emphasized by the latest trouble in Europe's ether. I refer to the starting of the Muhlaker station near Stuttgart. When Stuttgart was on 360 metres we, in London, with an average set, heard nothing of it, because only 9 kilocycles away is the London Regional. To-day the power of Stuttgart-Muhlaker is 75 kilowatts, but the frequency separation remains unchanged. Consequently complaints are coming in to Savoy Hill—"numbers of complaints," as the B.B.C. cautiously states—of serious interference between Muhlaker and London Regional.

Whenever a new high-power station starts up we hear talk of the "race for power." But of all Europe's medium-wave broadcasting stations I can only find twenty-two having a power rating of more than 10 kilowatts. Part of the problem is, in fact, due to the lack of high-power stations, and not to their increase in number. If there were more high-power stations there would be fewer stations altogether, because numerous low-power stations could be closed down.

To me, as a confirmed listener to foreign stations, the need for a new Prague Plan seems urgent. Since the last allocation many organisations have rationalised their stations, closing down redundant low-power stations whose service areas have been taken over by the new high-power stations. We can only hope that this rationalisation will continue rapidly, that more high-power stations will come into being and that many of the smaller stations will eventually close down, so releasing coveted frequencies for the formulation of a new Plan, to restore something like order.

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On Your Wavelength!

PICK-UPS AND VOLUME CONTROL

I INVENTED a new form of volume control the other day for a gramophone pick-up. I was experimenting in order to try and avoid that "zizzing" noise which one obtains with many pick-ups, particularly with some forms of record in which there is a good deal of "top." On these upper frequencies many gramophone pick-ups play audibly themselves, and in fact, one can often listen to the music without the amplifier switched on at all. If one's amplifier and loud-speaker are giving a loud volume, this effect is not noticed, but where one is cutting down the volume to ordinary room strength, the effect may be particularly unpleasant.

The trouble is aggravating if, as in my case, one is using a volume control which has to be cut down rather a lot. This almost inevitably loses the upper notes and the loud-speaker does not reproduce the treble properly. Therefore, one has the bass and middle register coming from the loud-speaker, and the top coming from the pick-up, sounding like a squeaky Jack-in-the-box that somebody has shut up. My experiments were designed to overcome this defect by reducing the volume from the pick-up itself, so that I should not have to use so much volume control externally.

A NOVEL EXPERIMENT

ONE of the most satisfactory ways, of course, is to use a step-down transformer, and I tried this with a certain amount of success. Another method is to make the pick-up itself less sensitive by increasing the gap. On my own pick-up I was able to do this quite nicely, and I made the gap about twice the size it was originally, giving the needle considerably more play, and thereby minimising the wear on the record. At the same time the voltage was cut down by something like one half, and I was able to play the record practically flat out without unpleasant loudness. For ordinary work I then just put a suspicion of volume control in and I found that I got the top out of the loud-speaker now, and the zizzing was not so noticeable.

It was while I was carrying out these experiments that I removed the magnet altogether. The results, of course, immediately faded away to nothing, and I found that by holding the magnet in my hand close to the pick-up I could bring the strength up. In fact, I could do the wizard act very well by simply passing my hand over the pick-up and the music came up as soon as I went anywhere near it. If I placed the magnet in the wrong position unfortunately it lifted the pick-up clean off the record, and let it fall down again with an annoying bang, which was not good for the record. It is, however, quite an interesting little experiment to do, and one which can be easily carried out. Simply remove the magnet from the pick-up and hold it near the pick-up again, leaving a gap of perhaps a quarter of an inch. As the magnet gets nearer and nearer so the volume gets louder and louder. In fact I think I must design a special pick-up with an adjustable magnet as a new form of volume control!

LOOKING WELL AHEAD——

IT is always fascinating to try and probe into the future, though it takes a bold man to don the mantle of a prophet when it comes to possible radio developments. I see, however, that the Earl of Inchcape is already anticipating the time when ships will not only be propelled on their way by wireless energy but will also be heated and lighted by the same means. He doesn't say exactly how it is going to be done, or what would happen to any conducting body that might by accident cross the path of such a mighty beam of radiated power. Possibly the answer is similar to that given long ago by Stephenson to the farmer who was concerned about the problem of cattle straying on to the new railway. "It wull be verra bad for the coo." At the same time I would not go so far as to rule Lord Inchcape's prophecy out of court. Inventors are already trying their hand at the problem of transmitting power by wireless, and I do not put it beyond the bounds of possibility that they will one day find ways and means of doing so safely.

——AND A GLANCE BACKWARDS

WHILST on this subject I remember an ingenious suggestion, put forward many years ago by the famous inventor Tesla, for distributing wireless energy over the whole surface of the earth. I think he called it the "world oscillator." Roughly, the idea was to set up a powerful transmitter at a given point, and to tune the aerial to such a frequency that the outward going oscillations meet in phase at the Antipodes, and so set up a permanent "standing-wave" formation. The energy of the system was to be maintained by a steady input from the original transmitter, whilst power could be drawn at any desired point by merely erecting a receiving aerial. Ingenious—to say the least of it—and calculated to make one wonder whether there really is anything new under the sun!

AN OLD FRIEND

AS I write I can see workmen carrying out of the garden door my aerial mast, which they have just removed. It is a little sad to part with an old friend which during many years of service has helped to give me an enormous amount of pleasure by enabling my wireless set to bring in broadcasting from all over the world. At the same time, I never thought him beautiful; and living, as I do, in a particularly windy spot, there were times during great gales when I felt a little nervous, despite the strong wire stays that supported him. But why, the reader may ask, has "Thermion" uprooted his aerial mast? Simply because I find that the screen-grid valve of to-day makes an indoor aerial of some kind all that is necessary for wireless reception. My house, as a matter of fact, contains no less than four of these in various places. For my own use I have a wire running round three sides of one room and a frame in another. The two remaining indoors belong to junior members of the family.

INDOOR AERIAL RESULTS

MY own experience with indoor aerials is an interesting one, though I don't claim that it holds good everywhere. What I find is that if you use the same set first on an outdoor and then on an indoor aerial —I am assuming, at least, one good stage of H.F. amplification—you will receive just about as many stations on either, though signal strength on the indoor collector will be smaller and you will need to push the reaction coupling rather tightly. Add a high-frequency stage to the receiving apparatus to be used with the indoor aerial, and it is just a little better all round than a set with one stage less used with the outdoor wire.

OTHER GOOD POINTS

AND the indoor collector has other advantages, quite apart from not spoiling the amenities of one's garden or making your hair stand on end when high winds are blowing. Being a less efficient collector of wireless impulses than its outdoor counterpart, it certainly brings in a smaller amount of interference from spark signals when these are about, and my own impression is that one is not nearly so much troubled by atmospherics. I have known nights on which X's of the mild, grumbly sort were about when I have heard nothing of them, though friends using outdoor aerials have reported that they were a distinct nuisance. Actually, spark signals and atmospherics affect a collector in very much the same way, both producing shock excitation, if they are powerful enough, and setting the aerial vibrating at its natural frequency. The more efficient the aerial is, the greater is its liability to shock excitation and vice versa. This is probably why the indoor arrangement often gives you a quieter background. And it needn't be an eyesore if you rig it up, as I do, about a foot below the ceiling, using white wire, miniature white insulators, and white whipcord for suspension purposes. In fact, unless your attention is called to it, you would probably never notice that it was there.

SURPRISING

IT is surprising how well an indoor aerial may serve a small set with no high-frequency amplification at all. For local reception of the Brookmans Park stations I often use a simple two-valve set consisting of detector and a very low-impedance note-mag. This same unambitious receiving set will bring in both Daventrys at full loud-speaker strength, and it will also give a very good account of itself when tuned to Strasbourg, Nürnberg, Rome, and Radio-

On Your Wavelength! (continued)

Paris. Many other stations are receivable, though, of course, at smaller volume.

THE BEST TYPE?

CURIOUSLY enough, you can never tell either how an indoor aerial is going to behave in any particular house or what type will be the best to use. Speaking generally, a wire suspended round three sides of a room is usually as good as anything, but there are cases where better results are obtained from several parallel wires slung between spreaders the length of an attic. Or, again, a single vertical wire hung down the well of a staircase may be better than anything else. Much depends upon the locality and upon the actual construction of the house itself, as well as upon the amount of screening introduced by other buildings in the neighbourhood. I have one friend, for instance, who lives just north of the Crystal Palace, and can receive nothing from a southerly direction owing to the blanketing effects of that building.

SCOTLAND'S ACQUISITION

THE opening of the new Broadcasting House in Edinburgh has provided Scotland with excellent headquarters for the B.B.C. officials responsible for her entertainments and with magnificent studios for the artistes providing them. At present the Scottish Broadcasting House is looking after Glasgow and Aberdeen, and the Edinburgh and Dundee relay stations. When the Scottish regional station is erected it will take charge of the regional programme radiated therefrom. The opening ceremony was quite thrilling. I heard it from Aberdeen, which was coming through very well on that particular night, and felt that all Scotsmen must appreciate the excellent programme provided.

HIGH TENSION

THE opening of the new Stuttgart station at Muhlaker has not been all jam so far as listeners in this country are concerned, for it has resulted in the London Regional programmes being mainly "jam." The interference experienced at present in most localities is quite sufficient to ruin the programmes, and complaints from all quarters are pouring in. I observe this morning a statement by the B.B.C. that they are reporting the matter to the International Committee in the hope that Stuttgart may be induced to accept either a small change in wavelength or a reduction in power. For myself, I should say that it is unlikely that the latter suggestion will recommend itself to the Germans.

The B.B.C. was the first to introduce super-power stations on to the broadcast band, and I have always said that by so doing it was simply "asking for it." If somebody starts shouting you down the only thing to do is to put your voice into training until you can shout a bit louder than he can. Stuttgart is now giving London a taste of his own medicine, and the dose is not pleasant.

THE RACE FOR POWER

IF the B.B.C. does not like Stuttgart, what will Germany and other nations think of us when the Regional Scheme is in full swing, with nine British super-power stations transmitting within the limits of the broadcast band? Their only apparent course is to erect super-power stations of their own, and when this is done we are likely to arrive at a position of stalemate, since every station will jam every other. I cannot, I never could, and I don't think I ever shall, see the necessity for the use of more than about 10 kilowatts at the very outside by a broadcasting station. Considering the efficiency of modern receiving apparatus, this should give an ample service area, and it would not produce the enormous swamp areas that we are suffering from now and shall suffer from still more in the near future. One thing I do know, and that is that the old 2-kilowatt 2LO at twenty-six miles gave me far better quality than the new 54- and 68-kilowatt Brookmans Park stations at fifteen.

HAVE YOU REALISED?

YOU may, if you like, spend an interesting and very instructive half-hour by working out just what reception conditions will be like when all of the nine British transmissions are in operation on the broadcast band. Most people have not realised what things are going to be like, but what I am going to suggest will bring it home. The only necessities are a list of European transmissions in order of frequencies and a pencil. We are pretty safe in assuming that each of the whole super-power stations will have an average wipe-out of two channels on either side of its own wavelength. If it doesn't blot stations clean out it will, at all events, interfere with them so badly that they won't be worth receiving. Very well, then. Begin with 242 metres, Belfast's present wavelength. This corresponds to a frequency of 1,238. Adding eighteen to this, you have the upper limit of interference, and subtracting the lower—or t'other way on if you are thinking in wavelengths. With your pencil you can now blot out Nurnberg, Beziers, Cracow, and the common wave above, which doesn't matter very much. The National already accounts for Horby, Gleiwitz, Moravska-Ostrava, and Lille. Out they go. The 288.5-metre wavelength means a blot-out of everything between Copenhagen and Vibourg. The 301-metre wavelength accounts for Hilversum, Bordeaux, and Zagreb. The wipe-out patch overlaps, though, that of the 309.9-metre wavelength, so that you can wipe out everything until you get to Gothenburg.

AND STILL MORE

THE London Regional takes in—or, rather, takes out—Graz, Barcelona, Stuttgart, and Bergen; and it is met by the blanketing of the 376-metre wavelength, which accounts for Radio LL, Hamburg, Genoa, and Lvov. The 398.9-metre wavelength almost meets this, though Toulouse may be left clear between the two. Anyhow, it wipes out Frankfurt and Bucharest. On the other side it accounts for Berne and Kattowitz. If Dublin's power goes up, as seems likely, Berlin and Madrid Union Radio disappear. On the 479-metre wavelength 5GB wipes out Langenberg, Lyons Doua, and Prague. Blacken out all the areas mentioned and then see what is left. You will find that it doesn't amount to much. Heaps of the stations remaining are such as can be received only under the most favourable conditions with ordinary sets, and it really seems as if Budapest, Rome, Strasbourg, and probably Toulouse, will be the only foreign stations regularly receivable. Put that in your pipe and smoke it!

TRIED OUT AT LAST

I HAVE had my Stenode now for three days, and in next week's AMATEUR WIRELESS I will tell you all about its doings. I would do so now but for the fact that it takes a bit of time to calibrate a large set like this and to identify all the stations that it brings in. The set, too, has proved so engrossing that I have spent so many happy hours with its controls that I left myself no time in which to write fully about its doings. All I can tell you now is that it *does* live up to its reputation and that it is an absolute marvel to handle. At fifteen miles from Brookmans Park, where the wipe-out is so terrific that a good set with two S.G. stages is doing jolly well if it can bring in Barcelona or Hamburg perfectly clear of interference, this wonderful receiver gives you Stuttgart or Graz, one 3.7 metres above London and the other 4.3 metres below, at full loud-speaker strength and perfectly clear. It is exceedingly easy to operate, for there are only two tuning knobs, and such is its punch that you simply have the whole of Europe to choose from. Mine, as a matter of fact, is working with a tiny home-made frame with 16-in. sides, but with this it will bring in stations such as the 300-watt Kiel at full loud-speaker strength in the evening, whilst in the daytime I can receive at quite good volume Langenberg, Hilversum, Berlin, and a good many of the bigger Continental medium-wave stations.

THERMION.

DO YOU KNOW—

that if you experience constant "motor-boating" in a set in which one or two low-frequency transformers are used, the trouble may be cured by reversing the connections to one, but not both, of the windings? Generally speaking it is better to reverse the secondary winding.

that it is most important to clean away the transparent lacquer from metal shields before making connection to them? Some shields are provided with terminals for earthing and it is important to see that the lacquer with which the metal work is covered in order to preserve the colour, does not insulate the terminal from the shield itself.

that if you charge your accumulators at home, and you have several in parallel, you should put an ammeter in circuit occasionally to see that proper charging current is flowing through each? It sometimes happens that when accumulators are charged in parallel the internal resistance causes one to be charged at a higher rate than the others.

ANNOUNCERS TELL THEIR STORIES

The control room at the Copenhagen Station

Campbell McCallum, of Copenhagen, on:

A STUDIO PRACTICAL JOKER

TO DX listeners on the Continent the name McCallum is well known. Professor McCallum, of the Radio Vienna station, has become quite an institution and is quite a "star" turn in Vienna's radio programmes.

What is, perhaps, not so well known is the fact that there are two McCallums upon the Continental ether. The Copenhagen station also boasts of a popular exponent of the art of teaching by wireless, of the same name.

Campbell McCallum—a Gordon Highlander—who, with his 6 ft. 6½ in., is a worthy (if not wordy) representative of the Old Country, for the last nineteen years has left no means untried in his efforts to anglicise Denmark by broadcasting.

Campbell McCallum, a well-known broadcaster at Copenhagen

"In the Army days," says this announcer, "I was a signalling instructor, and have been profoundly interested in everything to do with 'flag-wagging,' telegraphy, and radio ever since. You will, therefore, understand something of my joy when, some seven years ago, I was invited to act as 'wireless teacher' to the Danish capital. In those days our energy was considerably less than even 1 kilowatt, so we did not carry much beyond the boundaries of Copenhagen; but the mere fact that one's voice could be heard at all, even that distance, was then still so marvellous, that I felt that I had been invited to lecture to the world.

"Yes, those were amusing times, believe me. None of the regimental regime then which is now the order of the day.

"There was a jolly editor—chief of a certain Danish wireless weekly now long since defunct—who was always in or near the station on the off-chance of picking up news items for his paper. An incorrigible joker, he was, if ever there was one. He was always up to some prank to disconcert the engineers or the station 'orchestra,' such as it was.

"One of his favourite 'stunts' was to turn off the lights in the studio in the middle of a talk, leaving the unhappy victim in pitch darkness. A moment later it flashed on again, only to disappear a second time before the lecturer had recovered from the shock!

The Bowler Hat

"In those days the 'talks studio—a dingy, dusty room up under the roof of the General Telegraph Office—was supplied with a telephone receiver from the engineer's control room and with a switch to turn on and off the microphone.

"One day, when I was hard at work inculcating the rudiments of English into Danish listeners (I often wonder whether there were any) a practical joker entered the studio and, leaning on my shoulder, tried to whisper advice and comments! By the aid of dumb show, he was induced to leave, without doing any very serious harm, so far as I could gather during the course of my lecture.

"Shortly after the engineer on duty signalled to me to switch off the microphone and to answer a telephone call. 'What is the matter in there,' he called, 'we can't understand a word you say?'

"I glanced at the back of the microphone (which was encased and not normally seen by the speaker) and I saw a large bowler hat firmly jammed down over the 'mike' and effectually muffling anything I, or anyone else, might have to say.

"Nowadays, of course, all that sort of thing is definitely at an end. Nothing more orderly and circumspect could possibly be imagined than the studio and station arrangements at Axelborg, the building containing the studios.

"So well controlled, in fact, are the microphone arrangements, that on one occasion, at least, the inability of an announcer to switch the 'mike' on and off at his own convenience as had hitherto been the case, led to an amusing little contretemps.

Studio Lights

"The arrangements are these. The intending speaker enters the talks studio—a small but extremely lofty room brilliantly lit—where, high above his head he will see three bulbs: white, green, and red. White indicates silence, green that he is being announced, and red is the signal to begin. He cannot see or hear the announcer. He is shut up in a windowless, sealed dungeon, and is alone.

"A certain speaker did *not* spot the signal lights and, having no idea that the green light was on and that he was, therefore, being announced at that moment, he seized the water jug and poured himself a brimming glass of 'Adam's ale.' Very shortly afterwards some listeners 'phoned to inquire if Copenhagen had been submerged by a tidal wave! The speaker's glass had been right in front of the microphone and the pouring of water had sounded like a rushing torrent!"

E. Holm, the Copenhagen Station Director

More about The CHALLENGE TWO

The constructional details of this receiver, designed by W. JAMES, were given in last week's issue. Below are some useful notes on its operation

IT is easy to tune a set having detector and low-frequency stages. There are just the two knobs to turn The wavelength coil switch is on the top of the coil unit inside the set and the filament circuit switch is the one mounted on the panel.

Turning the left-hand dial alters the wavelength and the right-hand one alters the amount of the reaction. This reaction control will normally be used for regulating the strength of the signals as no other volume control is fitted.

Be careful not to allow the set to oscillate, as you do not want to interfere with other listeners. The amount of the magnification provided by the set is dependent upon the valves used, the characteristics of the transformer and the setting of the reaction circuit. With a detector valve having a magnification factor of 20 and a good transformer with a ratio of 3 to 1, the actual magnification of the stage is proportional to sixty times the effectiveness of the valve as a detector.

Then there is the last stage. With a power valve having a magnification factor of 6, the signals applied to it are magnified practically by this amount.

Thus you will see that it is important to use valves having the greatest amplification factors. But the impedances of the valves must not be too high, or the quality will be poor and perhaps the volume will be rather less than expected.

The Power Stage

In the case of the power valve, the impedance must not be too high, say, above about 5,000 ohms. What really matters is the "goodness" of the valves used, this being expressed by the slope.

A valve of 4,000 ohms impedance and having a slope of 2 is a much better valve for a small set anyhow than a valve of equal impedance but having a slope of only 1. Steep-slope valves should always be used for detection, a steep slope-valve being one having a high value of "slope." The detector valve ought also to be a quiet one.

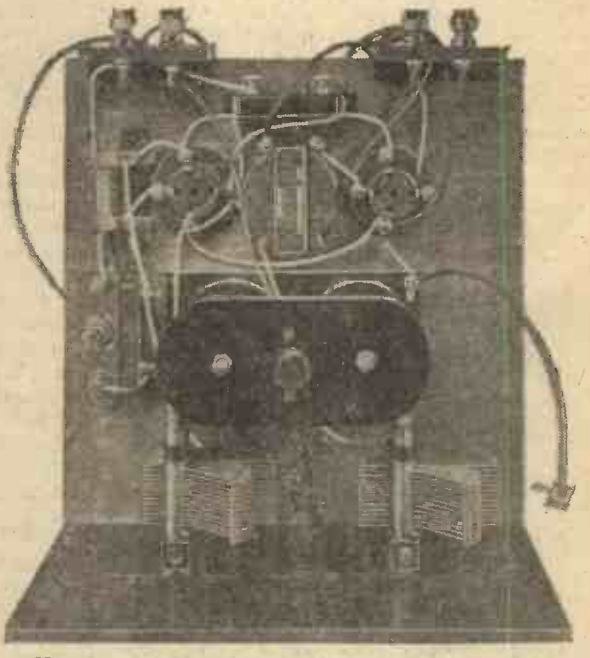
One of the newer types of detector valves would, therefore, be well worth having. You cannot expect the quality or the volume to be good if the valve has too high an impedance for the transformer following it. A reasonably good transformer ought therefore to be used and it would be foolish to buy the cheapest without regard to quality.

Some people make a point of always using an output choke-condenser circuit and one could, of course, be fitted to the "Challenge Two" set. The advantages of a choke-condenser output are first, that the *steady* anode current is prevented from passing through the coils of the loud-speaker, and, secondly, that the choke effectually stops the passage of low-frequency currents through the high-tension battery circuit.

Thus there are substantial advantages for the use of a filter output circuit. The chief disadvantage is the cost, and this I know will stop many builders of this little set from including one. You must not make the mistake of thinking that because only two valves are used the high-tension current is not very much.

It might well be 8 milliamperes and a battery which will supply this current economically should be used. With a bigger power valve the current will be more than 8 milliamperes and a larger battery ought to be used.

I should use a moderately sized, but sensitive loud-speaker. Too large a loud-speaker will not be satisfactory in many instances.



Here is an additional view of the "Challenge Two" to those given last week

The volume, as I have explained before, depends almost entirely upon the size of the power valve and the amount of the high tension. The biggest valve that you can afford to run should be used.

COMPONENTS FOR THE "CHALLENGE TWO"

Ebonite panel, 9 in. by 6 in. (Becol, Trelleborg, Lissen).

Baseboard, 9 in. by 9 in. (Cameo, Clarion, Pickett).

Two .0005-mfd. variable condensers (Formo, J.B., Lissen, Burton, Polar, Lotus, Ormond).

Push-pull filament switch (Readi-Rad, Bulgin, Benjamin, Lotus, Wearite).

Two slow-motion dials (Brownie, Formo, Lissen, Igranic, Readi-Rad, Burton, Lotus, Ormond).

Challenge coil, with reaction winding (Readi-Rad, Wearite, Clarke's "Atlas," Tunewell, H. & B., Parex).

Two valve holders (Telsen, Lissen, Burton, Lotus, Benjamin, W.B., Igranic).

.0002-mfd. and .0001-mfd. fixed condensers (Lissen, Telsen, T.C.C., Igranic, Dubilier, Watmel, Atlas, Graham Farish).

Grid-leak holder (Lissen, Bulgin, Wearite, Readi-Rad).

2-megohm grid leak (Lissen, Dubilier, Graham Farish, Igranic).

Pre-set condenser, .0001-mfd. to .000005-mfd. (Sovereign, Polar, Formo, R.I.).

Low-frequency transformer (Igranic "Midget," Telsen, R.I., Lissen, Varley, Ferranti, Lotus, Brownie).

Two terminal blocks (Junit, Lissen, Belling-Lee).

Four terminals marked: Aerial, Earth, L.S.+, L.S.—, (Belling-Lee, Eelex, Clix, Burton, Igranic).

Four yards of thin flex (Lewcoflex).

Five wander plugs marked: H.T.—, H.T.+1, H.T.+2, G.B.+, G.B.—(Belling-Lee, Clix, Eelex, Igranic, Burton).

Two spade terminals marked L.T.+, L.T.— (Belling-Lee, Clix, Eelex).

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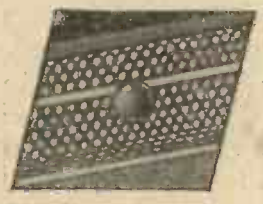

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The ball in the small cage at the top of the cell indicates the state of charge. When it floats the cell is charged, when it sinks the cell requires re-charging. One float only does the job. No need now to commit to memory a verse of poetry.

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As with all Pertrix Products, the price of this type of accumulator, compared with its ultra efficiency and unsurpassed quality, is low. PAC1, with a capacity of 20 a.h. on slow discharge, is 4/6. PAC2, with a capacity of 45 a.h. on slow discharge, is 8/6.

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WORKING VOLTAGES OR TEST VOLTAGES?

AN IMPORTANT STATEMENT BY THE TELEGRAPH CONDENSER CO., LTD.

At the present time there is some confusion regarding the most suitable method of indicating Condenser voltages. Some manufacturers, including ourselves, mark their Condensers with their actual *working* voltages. Others adopt the more spectacular method of indicating *test* voltages.

Because test voltages are obviously much higher than actual working voltages, the Condenser buyer may be led to believe that the higher voltage indicates a more efficient and better insulated condenser. This is not necessarily the case.

In the past it has been fairly safe to assume that the continuous working voltage of a Condenser was half of its stated test voltage. Unfortunately, this method of grading Condensers can no longer be universally relied upon since it has been found that Condensers of similar capacity and size have been sold stamped with varying test voltages, but with no indication as to the working voltage. (This formed the subject of a statement issued by us earlier this year in reference to condensers of foreign manufacture).

We, therefore, recommend all users in their own interests to see that the Condensers they purchase are definitely marked with their maximum working voltage. This will always be found on "T.C.C." CONDENSERS.

T.C.C. CONDENSERS

TELEGRAPH CONDENSER CO. LTD., N. ACTON, W.3

(C933)

A Weekly Programme Criticism—By SYDNEY A. MOSELEY.

Without Fear or Favour

MODERN MUSIC

"Dr. JEKYLL AND Mr. HYDE"

THE Foundations of Music series finds a ready supporter in me; but the other evening when I switched on I thought it the "Kitten on the Keys." Alas, it was merely Stravinsky!

◆ ◆ ◆

Now, this is not a general sneer against modern music. The night before I had heard the "Bolero for Orchestra" by Ravel, which the B.B.C. admits, when it was heard for the first time in London at one of the B.B.C. concerts last winter, "bewildered" a number of hearers. As a matter of fact, the other night a man left the hall in the middle of it, while the lady who accompanied me wrote on the programme "Chinese torture."

But I fully enjoyed it; so did she, in fact, as she afterwards admitted. It was something decidedly novel, the persistent drum-rhythm gradually catching hold of one and, as more and more instruments joined in, carrying one away. Whatever it was a year ago, this year it was an undoubted success.

◆ ◆ ◆

Leon M. Lion certainly got away with his wireless interpretation of *Dr. Jekyll and Mr. Hyde*. He imparted all the horror, tragedy, and pathos into the dual characters, and truly deserves honours for the occasion. Mr. Utterson, played, according to the programme, by Henry Ford, was clearly understood, but the Doctor, down on the programme as William Fazan, may have had a good bedside manner, but not the perfect broadcasting voice.

Poole, the butler, played by Carleton Hobbs, was also clear.

I thought that the prologue, spoken by Hugh Dempster, sounded as if he were reading a part. Of course, there are dramatic difficulties in the play, but, on the whole, one of the best plays for broadcasting.

◆ ◆ ◆

Readers of this page know full well how often I have endeavoured to put the best possible aspect of Talks in my criticisms. But I have had so many complaints that it is my duty to speak out.

The Talks have degenerated into a procession of dreary, badly delivered "lectures." Whoever is responsible for these talks is well intentioned and idealistic, but absolutely without a sense of balance.

Now, these lectures are not rubbish. They are good stuff, but so devoid of interesting presentation and delivered in a funereal, high falutin' style that not one in ten thousand listens. I can assure my friends at Savoy Hill that the volume of complaints is not made up of jazz-ites and low-brows, but of all types of listeners.

◆ ◆ ◆

As keen as I am on astronomy, I could not listen through the half-hour talk of Sir Arthur Eddington's lecture on "Science and Religion" or even Reginald McKenna's important lecture on "Monetary Policy."

I am glad by the way the latter was described *as* a "lecture." That is the worst of it all; they should be talks, and I haven't heard a real broadcast talk for weeks.

◆ ◆ ◆

I am wondering what was the result of "The Week's Good Cause" when a departure was made from the usual method of appeal by a dialogue between Leon M. Lion, Gwen Davies, and Mrs. Seymour Obermer.

It is an extraordinary thing, but I could distinguish scarcely one word in twelve,

Our Cartoonist's impression of Lady Tree

TALKS OR LECTURES?

TOO BAD!

and I assumed something had gone wrong with my set, when the announcer came on, and his voice was perfectly clear and distinct. What is the explanation of this?

◆ ◆ ◆

I was not too favourably impressed at my introduction to the "Foursomes." Their chorus of "Oh, please do!" sounded like school children enticing uncle to sing. One of the voices at least suggested change of title to "The Vocal Wobblers."

Incidentally, Ronald Frankau always invites comparison with Leonard Henry, and I fear comes out second. Where Frankau gives the impression of a conscious effort to be clever, Henry manages to keep spontaneous.

◆ ◆ ◆

Pity that Stuart Ross and Joe Sargent have to sing such varied stuff, but the xylophone solos come over well; although what an asset television would be to Teddy Brown!

◆ ◆ ◆

Two bright letters. One complimentary, which I shall not quote, and the other, which I shall quote, from A. H. Browett, "Beverley," Dale Park Avenue, Carshalton, Surrey, who says: "If you do not like the programme between 1 and 2 o'clock on Saturday, do not switch on; but there are thousands who do. Perhaps you prefer switching on on Sunday afternoon at about 5.30. This is just the time I like to have a sleep. It does me more good."

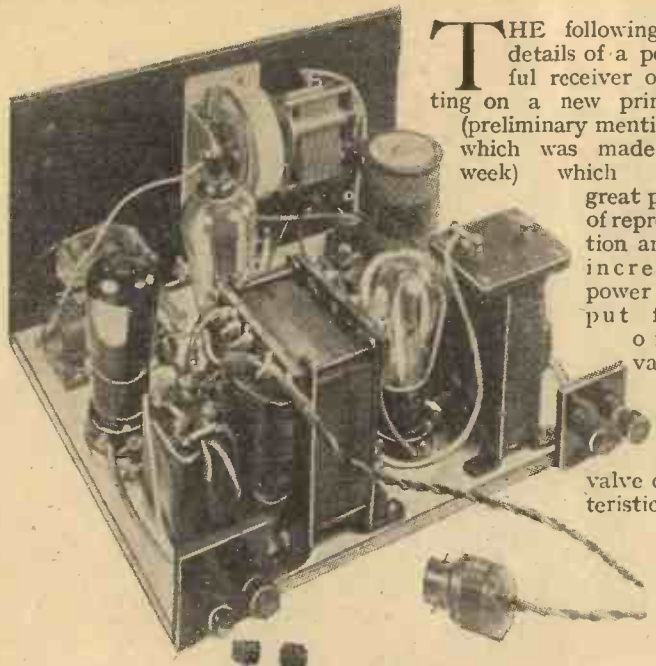
All I can inform my polite correspondent is that from letters I have received other listeners do not agree with him.

◆ ◆ ◆

I was caught the other day in "The Children's Hour." I listened attentively to an exciting story where a certain Inspector Garvell set a trap; and, by Jove, he set it all right! But just as the wicked robbers were being rounded up there came a pause, and the intimation that it was "to be continued in our next." Too, too bad!

◆ ◆ ◆

I do not remember having heard Jamieson Dodds over the wireless before. Jamie is a nice fellow, and I am glad to say that he was a great success; and he could give lessons to certain members of the Carl Rosa Opera Company, whom I heard the same afternoon, in point of enunciation.



Although the "Loftin-White 2" is built upon orthodox lines, it will be noticed its actual make-up differs considerably from an ordinary receiver and for a mains set is particularly simple

The LOFT

A NOVEL MA

THE following are details of a powerful receiver operating on a new principle (preliminary mention of which was made last week) which gives great purity of reproduction and an increased power output from one's valves. The trouble with the usual forms of inter-valve coupling is that their characteristics vary with the frequency of the current, and therefore different notes are amplified to a varying extent. In modern times this variation only becomes appreciable at the lowest and the highest frequencies, where we get what is called a "cut-off"; but with the present system, no such cut-off occurs until well outside the usual audible limits.

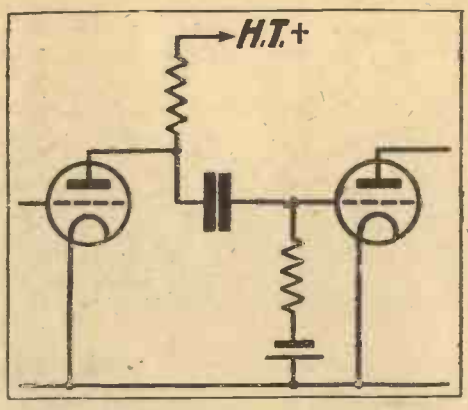
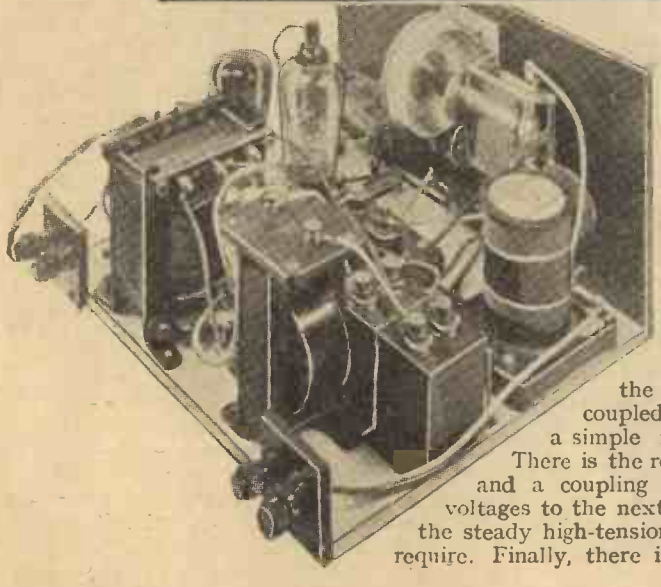


Fig. 1.—A simple resistance-coupled circuit

This is because of the peculiar arrangement used to couple one valve to the next. Resistances only are employed, without any coupling condensers, so that one has the advantages of resistance coupling without its defects. The simplest way to explain the operation is by evolving the system from a resistance-coupled arrangement. Fig. 1 shows a simple resistance-coupled circuit. There is the resistance in the anode lead, and a coupling condenser to transfer the voltages to the next valve without transferring the steady high-tension voltage which we do not require. Finally, there is the grid leak in order to polarise the grid of the second valve to the correct bias.

Fig. 2 illustrates the same system applied in a somewhat different manner. As before, we have a resistance in the anode circuit of the first valve, but this is connected directly to the grid of the second valve. The voltages are, therefore, transferred directly across without any loss on the way, but the grid of the second valve is now at the same steady potential as the anode of the first valve. If the filaments were connected together as in Fig. 1, the arrangement would not work, for the large positive voltage on the grid would render the second valve inoperative. Therefore, we do not connect the filaments together, but place a battery in between them approximately equal to this voltage, so that the second valve now operates under its normal condition.

This is the basic principle of the Loftin-White arrangement, and it will be seen to



COMPONENTS REQ

Ebonite panel, 12 in. by 8 in. (Trelleborg, Becol, Lissen)

Small drum dial, with .0005-mfd. variable condenser (J.B., Burton, Polar, Formo, Lotus, Ormond)

.0001-mfd. reaction condenser, (Polar, Lissen, Bulgin, Lotus, J.B., Dubilier, Formo, Keystone)

Pick-up jack and plug (Lotus, type J.K.2 : Igranic)

400-ohm panel-mounting potentiometer (Lissen, Varley, Igranic, R.I., Sovereign, Rotor)

Single-pole mains switch (Claude Lyons, Bulgin, Utility, Igranic)

Baseboard, 12 in. by 10 in. (Clarion, Camco, Pickett)

Two four-pin and one five-pin valve holder (Burton, Telsen, Lotus, W.B., Benjamin)

Dual-range coil (Lewcos, D.W.A.)

.01-mfd. fixed condenser (Dubilier, T.C.C.)

Two 1-mfd. fixed condensers (Dubilier, T.C.C., Lissen, Igranic, Ferranti)

2-mfd. fixed condenser (Dubilier, T.C.C., Lissen, Igranic, Ferranti)

Two 2-mfd. fixed condensers (800 volt D.C.
Ferranti,
.5-meg
Grid-le
Bulgin)
50,000
(Bulgin)
100,00
(Bulgin)
20,000
(Bulgin)
5,000-
vern, Fe
400-oh
High-f
ley, Liss
Mains
secondar
5-volt C.
amp, 4-
Wearite)
Smooth
Varley, L
Two t
(Read!-R
Four
L.S.—, A
Burton,
Screen-
Lee)

involve very simple coupling apparatus. It requires that the valves shall have separate batteries on their filaments, or that independently-heated cathodes shall be used, which comes to the same thing, and if we are using A.C. valves, this is quite an easy matter. Instead of using a battery to obtain the necessary voltages, we generate a large voltage of 400 volts, and connect this across a potentiometer on which we take tappings at different points to obtain the correct voltages.

The Potentiometers

This potentiometer arrangement can be seen in the circuit diagram Fig. 3. There is a simple eliminator circuit first of all providing 400 volts. This is applied to the reservoir condenser, after which there is a smoothing choke, and then a potentiometer consisting of a number of different resistances all in series. The potentiometer is made up this way because some of the resistances have to carry more current than others. For example, the 100,000-ohm and the 25,000-ohm resistances have only to carry a few milliamps, and are, therefore, of the spaghetti type. The remaining resistances have to carry 30 or 40 milliamps, and are, therefore, power resistances.

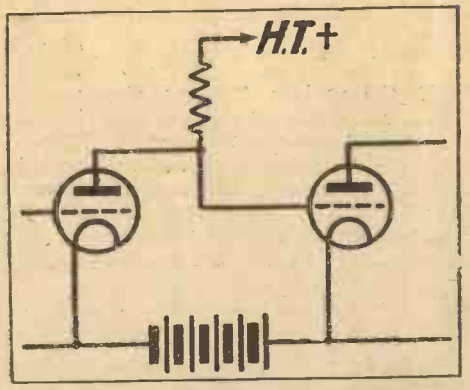


Fig. 2.—A modified resistance-coupled circuit

It is not necessary to go into the circuit in great detail, and it will be sufficient to sketch its operation briefly. Across the grid circuit of the first valve, is either the tuning coil or a gramophone pick-up, according to circumstances. Free grid bias is obtained on this valve by means of the 50,000-ohm resistance in the cathode lead. The screen-grid of this first valve is connected to a suitable point on the potentiometer which gives the correct voltage. The anode circuit is connected direct to the grid of the power valve as already mentioned, the H.T. end of the .5-megohm resistance in the anode circuit being connected to a suitable point on the potentiometer. The filament of the power valve is connected to a point a little farther down on the potentiometer, this point being so chosen that the filament potential is just a little negative with respect to the anode potential of the first valve (which is the same as the grid potential of the power valve) so that we obtain the necessary grid bias.

The output from the power valve goes to two terminals for the loud-speaker in the usual way. It is desirable to use an output transformer or choke-output circuit, but this has not been included in the receiver itself, in order to simplify its construction.

The Hum Balancer

There is one other matter of interest to which reference should be made, and that is the hum balancer. Between the cathode of the first valve and a suitable point on the potentiometer a 2-microfarad condenser is connected. This connection is made variable, being connected to the slider of a potentiometer, and it will be found that as the slider is moved round, so the hum decreases and becomes a minimum at one point. It is an easy matter to adjust the hum to the minimum when the receiver is first made, and thereafter this hum balancer does not require to be altered. It may, perhaps, be altered occasionally when receiving weak signals.

The construction of this set follows straightforward lines. The eliminator portion is arranged along the back of the baseboard, with the power transformer on the right-hand side, and the other components occupying the remainder of the baseboard.

The tuning coil is on the left front end of the baseboard, a dual-range coil being used to tune in both wavebands. The tuning condenser is in the middle of the panel, the reaction condenser on the right, and the hum balancer on the left. The remainder of the components are distributed over the baseboard, in the proper circuit order, so that although the whole arrangement is compact, it is quite easy to wire as the leads are quite short.

Resistances

The only point that requires any comment is the use of the strip or spaghetti resistances. In several cases this form of resistance has been used, and as it is covered with insulating sleeving, it is at first sight indistinguishable from the ordinary wiring of the set, which in this instance has also been covered with insulating sleeving. The position of the resistance is clearly marked on the blueprint, and if this is followed no difficulties should arise.

TIN-WHITE 2

INS SET WITH A NEW PRINCIPLE

UIRED

test) (Dubilier L.S.B., T.C.C., Igranic)
ohm grid leak (Dubilier)
eak holder (Lissen, Dubilier,
-ohm spaghetti resistance
0-ohm spaghetti resistance
-ohm spaghetti resistance
ohm power resistance (Colranti, Varley)
m resistance (Colvern)
requency choke (Telsen, Varley, Readi-Rad, R.I., Lewcos)
transformer, with following ies; 375 v.-0—375 v., 40 m.a., .T. 1.6 amp, 6-volt C.T. .25 volt C.T. 1 amp (Savage,
hing choke (Lotus, Igranic, Lissen, R.I.)
erminal strips, 2 in. by 2 in. tad, Junit, Belling-Lee, Becol)
terminals marked: L.S.+ A, E (Belling-Lee, Clix, Eelex, Igranic)
-grid connector (Belling-

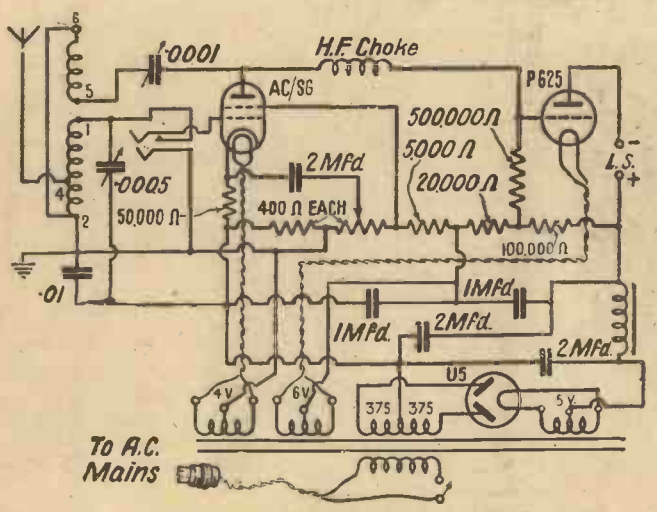


Fig. 3.—The Loftin-White circuit showing the novel coupling arrangements and mains drive

"THE LOFTIN-WHITE 2" (Continued from preceding page)

A metallised form of leak should be used for the .5 megohm resistance in the anode circuit of the screen-grid detector valve. This is important, as I have found that the composition type of leak changes its value rather badly under the influence of the anode current flowing through it. As the whole circuit is a rather nicely balanced one it is important that the resistance values should not vary much from those specified. The use of a metallised leak avoids any difficulty in this connection, since the value does not change with the current flowing through it, up to the limits required in this receiver.

Operation

The operation of this set is simple in the extreme. The valves required are AC/SG for the first valve, P625 for the second valve, and a U5 for the rectifier. Equivalent valves to these, made by other manufacturers, may of course be used, provided that their characteristics are reasonably the same. It should be borne in mind, however, that the rectifier valve has to stand 375 volts on each anode, and that the ordinary type of rectifying valve will not do. The total anode current is in the neighbourhood of 30 milliamps.

Having placed the valves in the correct sockets, the aerial and earth should be connected up and also the loud-speaker. The power plug should then be connected to the mains and the set switched on. Set the hum balancer in the mid position and vary it a little on either side to find which is the best point for minimum hum. That is all that is required. The set is now ready to receive stations. For gramophone reproduction the pick-up must be plugged into the jack immediately underneath the tuning condenser. This automatically changes the connections and turns the set into a gramophone amplifier. A volume control should be provided on the pick-up.

For radio the plug is removed, and the stations are tuned in on the main dial in the usual manner, adjusting the strength with reaction as required. Anode-bend rectification is used, since our experiments have shown that this method suits the Loftin-White circuit. It means, however, that the detector stage is not particularly sensitive and the receiver, therefore, must be considered as a local-station set.

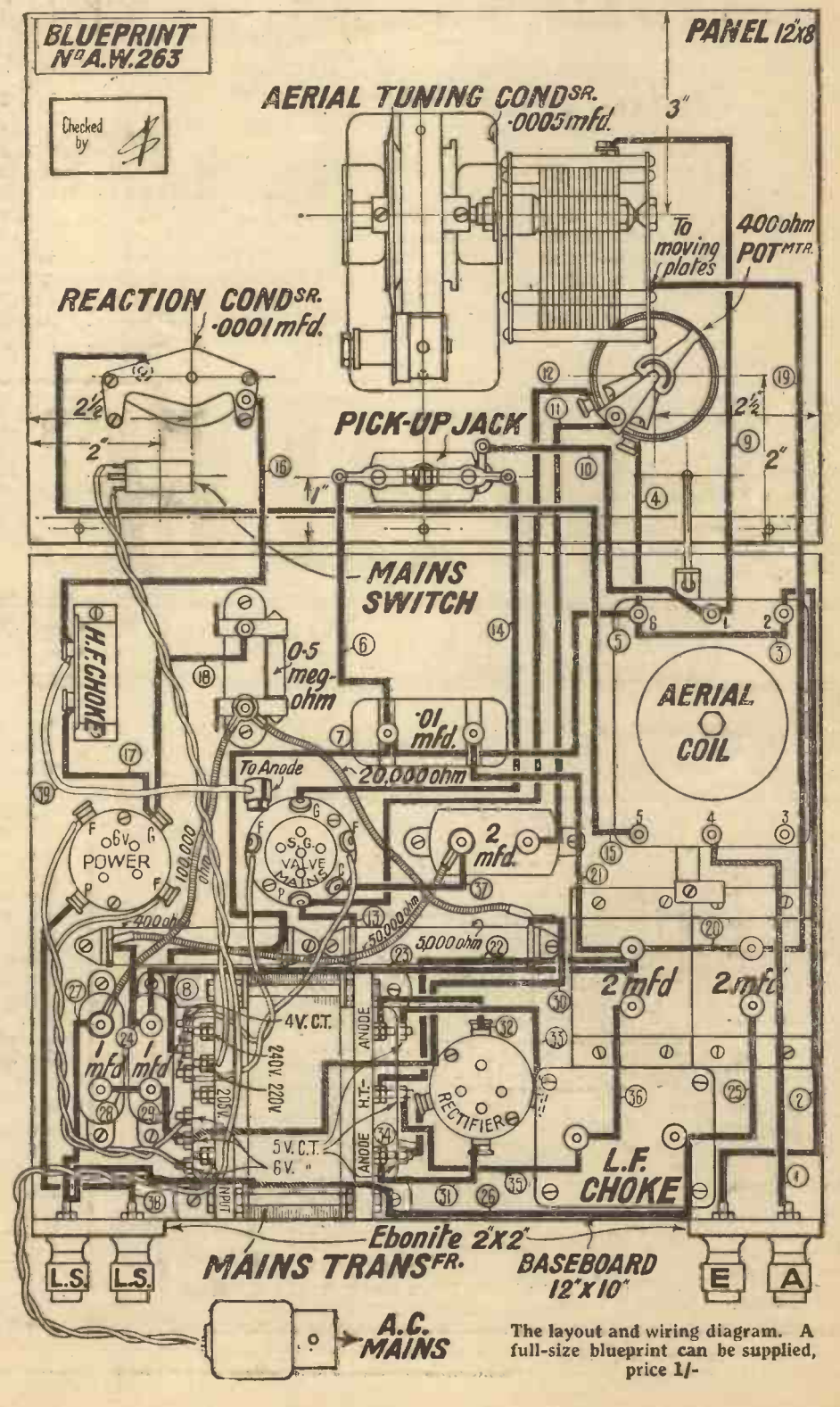
It will give excellent quality with loud volume on the local stations, and, as I mentioned in an earlier article, the volume on a pick-up is truly extraordinary.

FOR GRAMO-RADIO ENTHUSIASTS

THERE'S good news for radio-gramophone enthusiasts who are on the look-out for a new instrument or who want to get better results than at present. In next week's issue will be a worthy addition to our successful series of "Challenge" sets—a "Challenge" radio-gramophone. This is the very latest thing in radio-grams, being a four-valver with one screen-grid stage, and having most up-to-date gramophone amplifier arrangements, and an induction-motor turntable drive. Don't miss this!

FIGURE OF MERIT

AMONGST the various "characteristics" of a valve, mutual conductance is one of the most important. It represents the ratio of "mu" or amplification factor to internal-resistance, and is often referred to as the "performance factor" of the valve. Actually it measures the change in plate current corresponding to a change of 1 volt applied to the grid. Another term which measures the performance of a valve is the so-called "figure of merit." This is calculated by dividing the square of "mu" by the internal resistance. In actual practice the value of internal resistance usually quoted for screen-grid amplifiers is a more or less artificial figure which seldom holds good when the valve is in operation. M. A. L.



The layout and wiring diagram. A full-size blueprint can be supplied, price 1/-

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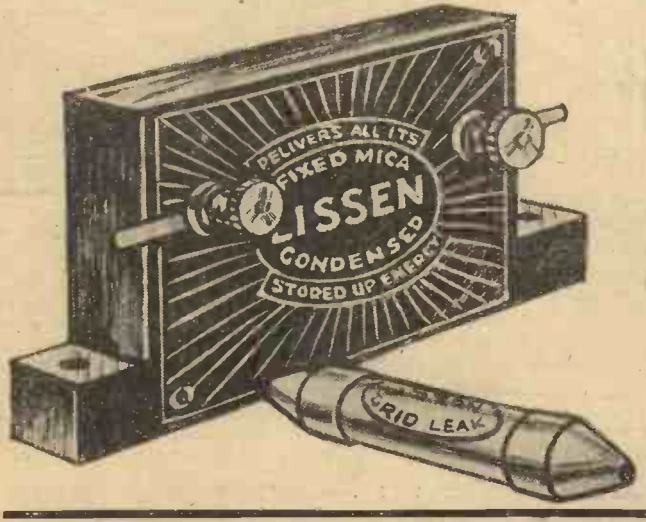
Deliver all their stored-up energy

BECAUSE you are using bigger H.T. voltage—because you are seeking always more power and more purity from your set—because you are going out for ever more distant stations—your need for condensers that will stand up to all demands without leakage and without breakdown is more urgent now than ever.

Lissen Fixed Condensers have become the standard fixed condensers in almost every published circuit. Accurate to within 5 per cent. of stated capacity.

·0001 to ·001 mfd., 1/- ea.
·002 to ·006 mfd., 1/6 ea.

Insist upon Lissen parts always



H.T. ELIMINATORS YOU CAN USE LIKE A BATTERY

MOULDED CASES MADE of INSULATING MATERIAL—HEAVY "CAB TYRE" FLEX LEADS

D.C. MODEL "A"
(100-130 volts and 200-250 volts)
Employs 3 H.T.+ tappings: H.T.+1 giving 80 volts for S.G. valves; H.T.+2 giving 60 volts at approx. 2 m/A for detector valves; H.T.+3 giving 120/130 volts at 20 m/A. PRICE .. **27/6**

D.C. MODEL "B"
(100-130 volts and 200-250 volts)
Employs 3 H.T.+ tappings: H.T.+1 and H.T.+2 are continuously variable (by means of two control knobs) and capable of giving any desired voltage up to 120/130 volts at approx. 2 m/A; H.T.+3 giving 120/130 volts at 20 m/A. for power valves. PRICE .. **39/6**
D.C. Models working on 100/110 Mains Voltage give output of approx 10 per cent. above value.

The current you get from Lissen Batteries is the purest form of current you *can* get for radio. But if you want to use an eliminator, use a Lissen Eliminator. You'll then get H.T. current from your mains smoother, steadier, better than before.
There are 4 types of Lissen Eliminators: one of them will almost certainly be just right for your set. Tell your dealer what voltage your mains supply is and whether it is A.C. or D.C.; tell him what output you require, or what valves you are using and he will demonstrate for you the Lissen Eliminator to suit your needs.

A.C. MODEL "A"
Tappings as in D.C. Model A.
100-125 volts and 200-250 volts.
PRICE £3 : 0 : 0

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Tappings as in D.C. Model B.
100-125 volts and 200-250 volts.
PRICE £3 : 15 : 0

LISSEN ELIMINATORS

LISSEN LIMITED

WORPLE ROAD, ISLEWORTH, MIDDLESEX.

SETS OF DISTINCTION

The Ediswan Power Pentode Two

Makers : Edison Swan Electric Co., Ltd. Price : £14-19-6

EMPLOYING "amazing Mazda valves," as they are described, the new Ediswan two-valver for A.C. mains put up a splendid performance when I tested it recently. The detector valve is an AC/HL, an indirectly-heated 4-volt mains valve of very high efficiency. Transformer coupled to this is the AC/Pen, an indirectly-heated pentode. The combination is extremely powerful and gives results comparable with a three-valver using battery-operated valves. The high-tension supply is derived from the A.C. mains by means of a UU60/250 rectifier valve.

Convenient Arrangement

I had to insert these valves before the set could be tested. In doing so I noted that the positions of the valves are very clearly engraved on the brown bakelite platform. Looking into the interior of the set, by removing the back of the cabinet, I noted a particularly neat mains voltage-tapping device, marked 200, 220 and 240 volts. A small link bar is adjusted to correspond with the voltage tapping nearest to the voltage of supply.

Connection to the mains supply is by means of a usefully long length of flex. At one end is a 2-pin plug for inserting in a wall socket and at the other end is a special bakelite socket for insertion in the back of the set. There is no separate mains switch.

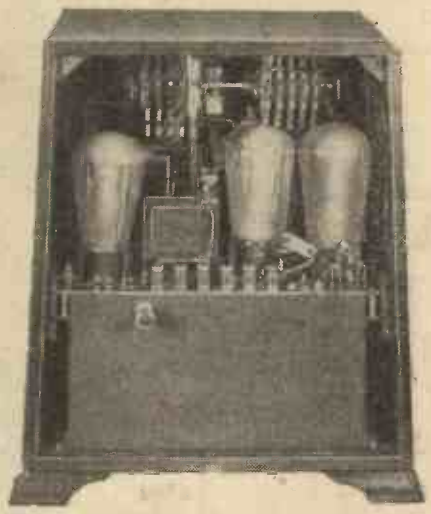
The controls, mounted on the front of the extremely attractive walnut cabinet, impressed me with their simplicity and handy size. The main control is a large tuning disc, rotating an easy-to-read dial engraved from zero to 100. Above the tuning control are three knobs. That on the left is for fine tuning, necessary owing to the inclusion of a two-circuit tuning arrangement. On the right is a knob marked "Volume," but it really controls reaction. I wish the makers had marked this knob "Reaction." The knob at the top is for changing the wavelength range, left for medium waves and right for long waves.

Tuning

In a two-valve set it is unusual to employ a two-circuit tuner. I see that primary and secondary tuning circuits are included in this Ediswan set. A two-gang condenser is included, with a separate aerial-tuning condenser for final trimming work, in conjunction with the two special tuning coils. These coils are mounted on a horizontal shaft so that the coupling between them can be varied to provide different degrees of selectivity.

The adjustment of coil coupling is not intended as a variable control device. Once the best degree of coupling has been determined there is no need for further adjustment. As a matter of fact the makers adjust the coupling for average conditions when the set is tested at the factory.

As a means of coping with the strong transmissions from Regional centres, such as Brookmans Park and Daventry, this variable coupling of tuned primary and secondary coils is highly effective. This is



The back of the Ediswan Power Pentode Two : note the special coils at the top

the first set having two valves to include such elaborate means of achieving selectivity. But when one remembers how considerable is the amplification of the two Mazda valves in this set, the need for selective tuning circuits is readily appreciated.

Using the normal aerial terminal (an alternative is provided for remote conditions of reception) I determined the selectivity by tuning in the National station from Brookmans Park. Maximum at 7 degrees on the tuning dial, the National had disappeared at 15 and could still be heard at zero degrees. This spread of 15 degrees is moderate for such a set. The Regional station was at its maximum at 49 degrees and could still be heard up to 58 and down to 38 degrees, a spread of 20 degrees, which in my opinion is very satisfactory.

I quickly got used to the operation of this set, the auxiliary tuning knob on the left being easy to work in conjunction with the main tuning disc. That selectivity has not been achieved at the expense of volume was proved by the great strength of the Midland Regional, which came in at 92 degrees. Just below it at 90 degrees I was surprised to hear Langenburg at fair loud-speaker strength. Rome at 77 was heard at good loud-speaker strength and so was Stockholm as 75 degrees. Toulouse at 57 was very strong, as was Goteborg at 33 and Bratislava at 18. Altogether I counted twenty strong carrier waves, all of which could have been resolved into loud-speaker signals of various strengths.

Good Quality

For listeners wanting a good local-station set the Ediswan Power Pentode Two more than adequately fills the bill. And for those who are prepared for critical adjustments of reaction and tuning this little set is quite capable of bringing in several of the more powerful foreign stations, especially if a good aerial can be erected.

I tested this set with one of the new inductor dynamic loud-speakers. I can say of the quality of reproduction just this; it is really first-class. The set fully justifies the use of a good loud-speaker.

When Submitting Queries . . . . . .

Please write concisely, giving essential particulars. **A Fee of One Shilling** (postal order), a stamped addressed envelope, and the coupon on the last page must accompany all letters. The following points should be noted.

The designing of apparatus or receivers cannot be undertaken.

Modifications of a straightforward nature can be made to blueprints, but we reserve to ourselves the right to determine the extent of an alteration to come within the scope of a query.

Queries *cannot* be answered personally or by telephone.

THE HOW AND WHY OF RADIO

XIII—MAKING THE MOST OF REACTION

If you are a beginner in wireless, now is your chance to gain a clear conception of its theory and practice. In this series of articles, specially prepared for the beginner, no previous knowledge of wireless is assumed. It is intended to deal with every aspect of the subject and the whole series will endow the beginner with sufficient knowledge to enable him to derive the greatest possible interest from the fascinating hobby of wireless

EVERY beginner should know something about reaction. In simple sets reaction is indispensable. By its aid the signals passed on to the anode circuit of the detector valve from the grid circuit are reintroduced at the grid. The rectification process, as I have often explained,

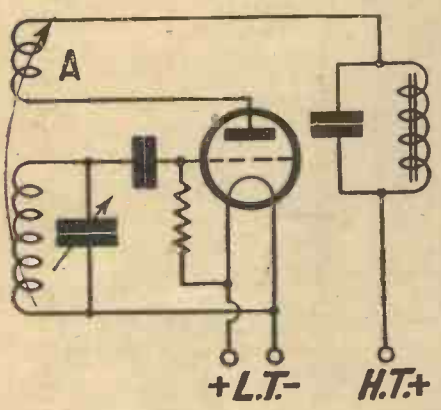


Fig. 1. Simple magnetic reaction circuit with variable reaction coil coupling

does not eliminate the high frequencies, but merely allows the super-imposed low frequencies of speech and music to actuate the low-frequency side of the set.

What Reaction Is

Reaction is the process whereby these high frequencies in the anode circuit are made to do useful work. Their reintroduction into the grid circuit results in a considerable build-up of the incoming signal. In a reaction set a signal arrives at the grid, is passed through the anode circuit, is reintroduced into the grid circuit, and is then finally by-passed to earth.

The grid circuit of the detector has a certain power loss, which can be made up by regeneration, that is, the reintroduction of grid voltages from the anode circuit. So long as the grid circuit is absorbing power, reaction, or regeneration, as it is sometimes called, is taking place.

It is quite easy to see that the power loss of the grid circuit may be more than compensated by reintroduced energy. And when this happens the regeneration process merges into oscillation, which means that the valve itself causes oscillations in the grid circuit, without the help of an outside signal.

The valve cannot act as a good detector while it is oscillating (except under a very special circumstance) so it is clear that the greatest permissible amount of regeneration is provided just before the valve starts to oscillate. The object of all reaction systems is to feed back energy gradually, so that the amount of regeneration can be controlled, and so that when the maximum regeneration is wanted the feed back can be increased to that critical point just before oscillation.

Three Reaction Types

In this short article we can discuss only three of the many ways of obtaining reaction. The simplest possible way is shown by Fig. 1. The arrow, through the tuning coils connected across the grid circuit and the coil in series with the anode and the primary of the low-frequency transformer, indicates that the two coils are variably coupled together.

This system is known as magnetic reaction, whereby the high-frequency current flowing in the anode circuit is induced into the grid circuit, the amount depending upon the degree of coupling.

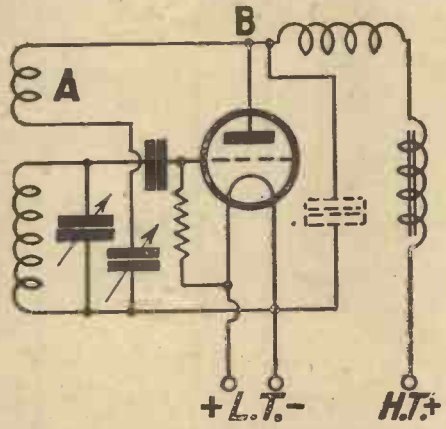


Fig. 2. Capacity-controlled reaction with fixed reaction coil coupling. Note dotted by-pass condenser

A very important point of this circuit is the .0001-microfarad fixed condenser shunted across the transformer primary. Without this condenser the reaction would be erratic, due to the difficulty of the high-frequency current passing through the high impedance of the primary windings.

This circuit is not in great use these days, except in one or two commercial sets, where a fine mechanical control over the coil coupling can be more readily achieved than by the amateur with standard accessories. There is no electrical drawback to the circuit, which, in my opinion, gives just as good results as the circuit of Fig. 2. But it is much easier to vary a capacity than to vary an inductance. For this reason the Fig. 2 circuit is now almost universal.

Capacity Reaction

Fig. 2 is not so different from Fig. 1 as might at first be thought. The coil A in Fig. 2 is passing the high-frequency current of the anode circuit in just the same way as in A of Fig. 1. But the *amount* of current passing through the coil of Fig. 2 is under control, while the degree of coupling between the coils is constant; whereas in A of Fig. 1 the amount of current flow is constant but the *degree of coupling* is under control. Both actions have the same effect. High-frequency from the anode is induced into the grid circuit by a controllable amount.

In Fig. 2, the greater the capacity value of the variable condenser in series with coil A and low-tension negative, the greater is the flow of high-frequency anode current; and so the greater is the reaction effect. Since variable condensers are designed to give a very fine variation in capacity, this Fig. 2 system provides a very good control of reaction.

Its effective working depends upon the diversion of the high-frequency anode current, normally flowing through the anode circuit, to the parallel reaction circuit. At point B in Fig. 2 the high-frequency anode current has the choice of two paths, one through coil A and the condenser, and the other through the transformer winding.

It chooses the reaction circuit because of the insertion of the high-frequency choke in series with the anode and the transformer. The impedance of the choke to high-

(*Continued on next page*)

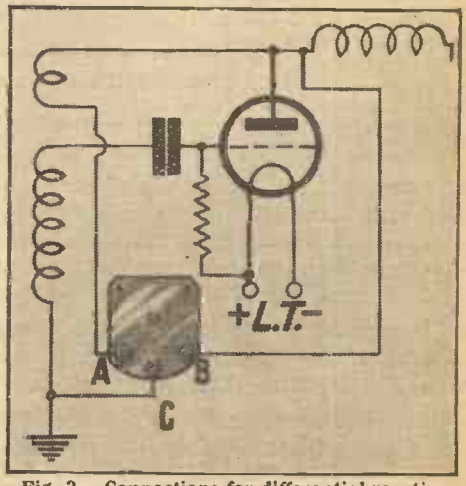


Fig. 3. Connections for differential reaction condenser

frequency current is very high compared with the impedance of the variable reaction condenser. Sometimes the primary winding of the transformer has sufficient impedance to high-frequency to enable the high-frequency choke to be dispensed with. Where great economy is desired, the choke can, therefore, be omitted. But erratic reaction and instability in the low-frequency side may quite easily be caused by the omission.

Under detector articles I have stressed the need for by-passing the high-frequency of the anode current to earth, to ensure stability on the low-frequency side, to produce efficient detection and to provide smooth reaction. A careful study of Fig. 2 will show that the high frequency is by-passed through the reaction coil and condenser, but by a varying amount.

Feed Back

When little or no feed back is taking place, due to the low capacity setting of the reaction condenser, *little or no high-frequency by-passing is effected.* This is a bad feature of a circuit that has held sway for many years. The inclusion of a .0001 microfarad condenser across the anode and low-tension negative, as shown by the dotted lines in Fig. 2, remedies this defect by providing a constant by-pass independent of the variable by-psas imparted by reaction. This small by-pass condenser does not affect the working of the reaction and greatly assists in bringing about good detection and low-frequency stability.

Differential Reaction

Lately, a special three-plate reaction condenser, called the differential, has been widely used to bring about the same effect as a two-plate variable and a two-plate fixed condenser. Fig. 3 shows this development. A and B are equal-sized sets of fixed vanes, with the moving plates C common to both. As C moves away from A the reaction capacity between A and C is decreased and so, therefore, is the reaction by-pass of high-frequency to earth. But in moving from A, C moves towards B, increasing the capacity between C and B as much as it is decreased between C and A. Now the capacity between B and C corresponds to the fixed by-pass condenser capacity shown by the dotted lines in Fig. 2. So as the reaction by-pass decreases, the B to C capacity increases, thus maintaining a constant high-frequency by-pass between the anode and earth, while providing a variation of reaction between the anode and earth, via the reaction coil and the A to C portion of the differential.

HOTSPOT.

The British Blue Spot Co., Ltd., inform us that they and their customers are being caused trouble by loud-speakers, units, etc., imported from abroad and wrongly purporting to be "Blue Spot" products, and they ask us to request readers to see for themselves that the product bears the "Blue Spot" trade-mark, which appears in their advertisements from time to time. Readers should see that the goods are contained in standard packings which, in the case of units and chassis, are of yellow and two blues.

IN MY WIRELESS DEN

WEEKLY TIPS— CONSTRUCTIONAL AND THEORETICAL

By W. JAMES.

Control of H.F.

THE potentiometer method of controlling the amount of the high-frequency signal applied to the first valve in the set is satisfactory up to a point. Given a good potentiometer, a fairly smooth variation is obtained.

The fact is, that owing to the capacity of the valve to which the potentiometer is connected, we do not obtain true potentiometer action. Thus, if the arm is set three-quarters of the way towards the full on position, we do not apply three-quarters of the signal to the valve. We apply rather less.

And when the setting is half way we apply a good deal less than half the signal strength to the valve, provided, that is, that the resistance of the potentiometer is about 100,000 ohms. With a lower resistance instrument the effect is not nearly so marked.

If you draw the circuit you will see that when the potentiometer is set anywhere but full on, the grid of the valve has a resistance in series with it. This resistance in series with the capacity of the valve produces the cutting down effect described. At the same time, the effective capacity across the tuned circuit is reduced and so is the amount of the feed back. This last effect is important, as the behaviour of the rest of the set may be affected.

Some Pick-up Points

During the week I had occasion to test a pick-up supplied complete with carrying arm and volume control. By the way, why do they still call a carrying arm made specially for a pick-up a "tone arm"?

The pick-up was fairly satisfactory, but I could not help noticing that the tonal qualities changed according to the setting of the volume control. When the control was adjusted so as to lower the volume, the relative strength of the higher notes fell off rather rapidly. This is unusual when the control is a suitable potentiometer, so I had a look at the volume control fitted. It turned out to be a plain adjustable resistance.

You may hardly believe me, but this is true. Of course, the resistance acted to load the pick-up and changed its frequency response characteristics every time an adjustment was made.

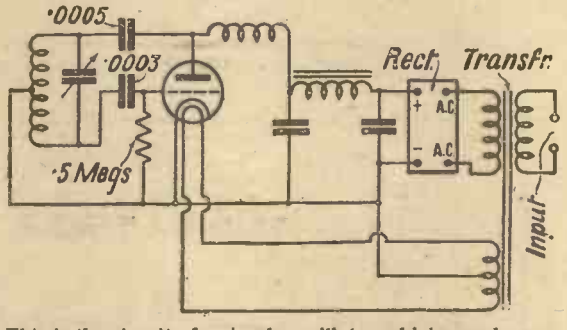
This just shows how careful you have to be. What I did was to fit a potentiometer in the usual way. Then I adjusted the resistance on the pick-up carrier to provide the best average tone.

A Simple Oscillator

There are occasions when a simple oscillator is needed for testing purposes. One of the simplest is shown in the accompanying diagram.

With an indirectly heated valve and a mains unit, ample power is readily to be obtained. A centre-tapped coil will be suitable. Its ends are connected to the tuning condenser and the tapping goes to the cathode. There is a grid condenser and leak and a high-frequency choke.

A plug-in type coil is perfectly suitable for this work. Do not overlook the fact that both sides of the tuning condenser are alive. If a modulated output is not objected to the smoothing condenser and choke of the mains part may be left out. Then the output will have a 100-cycle modulation for a supply frequency of 50 cycles and using a full-wave rectifier.



This is the circuit of a simple oscillator which may be very helpful in testing sets and checking up wavelengths. Full details are given in the accompanying paragraph. It will be seen that the unit is mains driven, and therefore has very constant characteristics, which is a great advantage in testing

Any valve will do. It is better to use one of medium impedance as a rule, however, as we do not want to overload the rectifier. The oscillations will normally be of good strength and will be picked up by a receiver some distance away. All sorts of uses can be found for a simple oscillator of this description and it could, of course, be roughly calibrated.

Trailing Speaker Wires

A point I have written about before, I know, is that the speaker wires ought not to pass close to the aerial wire or lie near the unscreened coils of a set.

Often there are high-frequency currents in the speaker wires. There ought not to be, but the fact is there often are. And if the loud-speaker wires lie near the tuned circuits of the aerial itself, the set may be made unstable.

With a good high-frequency stopper in the detector stage and perhaps a condenser between the anode of the last valve and earth, the high-frequency currents flowing in the speaker wires will be negligibly small. When the currents are relatively large, however, trouble can be caused.

Naturally, the effect is much more noticeable in the case of a set having a powerful high-frequency amplifier. In portable sets, in which the speaker is quite near the frame aerial, precautions must be taken or howling will result.

Safe Mains Working

Mains sets, having relatively high voltages, ought to be fitted in some way with a device which will cut off the supply when the lid or back is opened. Under normal working conditions the voltage may be only 200 or so, but if, through a fault or when testing, the load is off, the voltage across the output of the mains unit and therefore the voltage actually applied to the anode circuits, may be 300 or more.

If the cover must be unscrewed one is reminded, I suppose, of the high voltage. But when the lid is hinged a switch ought to be fitted which will open the circuit when the lid is raised. It is not difficult to fit a protective device. A plug and socket can be arranged, for example, so that when the cover is opened the socket is pulled off the plug. It is usually easy enough to fit up this safety arrangement and it is quite effective, even when the socket must first be removed before the cover can be moved. Some may prefer the safety switch idea, such as was included in the Ferranti safety boxes for mains units.

Screening-off Valves

I see that some designers fit a screen having a hole in it through which the screen-grid valve passes, while others do not bother with this, but cover the valve as a whole or leave it standing without shielding it at all.

When the coils and condensers are completely shielded, there may seem no great advantage in also shielding the screen-grid valve. But actually, unless the valves in the set are well spaced, the stability is increased by covering the screen-grid valve and sometimes the detector as well.

A fairly strong coupling may exist between valves if they are close together. This is avoided by shielding. In sets having more than one high-frequency stage shielding carefully cannot be overlooked.

WE TEST FOR YOU

A weekly review of new components and tests of apparatus.

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

A Station Indicator

MANY sensitive portable sets have the advantage of being particularly selective, owing to the directional properties of their frame aerials, and it is thus possible to receive numbers of foreign and English stations free from interference. Having picked up a station one can endeavour to obtain the utmost strength by rotating the frame into the correct position. When a number of stations are received, however, it is somewhat difficult to remember the optimum frame directions, and one can miss stations altogether owing to lack of this knowledge.

We should, therefore, think that the Popular Station Indicator made by the Danipad Rubber Co., Ltd., will be of real value to readers.

It consists essentially of a compass mounted in the centre of a semicircular chart. At various positions on this chart popular English and Continental stations are printed against a set radius.

In attempting to receive a station, rotate the Indicator until the compass needle points towards the name on the chart, then place the portable set up against or parallel with the lid; it will then be pointing in the right direction.

A novel idea, a station indicator for portables

It follows that the direction of different stations with respect to the north magnetic pole varies in different parts of the country; a number of different Indicators are, therefore, made for the various large centres such as London, Liverpool, Glasgow, Cardiff, Edinburgh, Birmingham, Leeds, and English and Welsh counties.

This device, which sells at 5s., may be recommended to readers.

Climax H.T. Unit

A NEAT and serviceable H.T. eliminator for use on D.C. mains has been submitted by the Climax Electrical Co. Smoothing apparatus and breaking-down

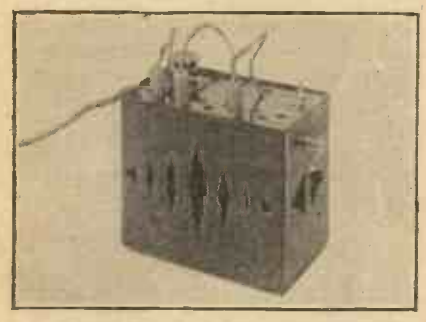
(*Continued on page 967*)

"WE TEST FOR YOU"

(*Continued from page 966*)

resistances are incorporated in a metal case measuring 4¼ by 2½ by 3¾ in. high. On the top is an ebonite panel containing various sockets for selection of voltage. Three tappings complete with wander plugs are supplied, these being marked Screen Grid, V.1. and V.2. Ten different voltage tappings are provided marked from 50 volts to 200 volts. An interesting feature of this eliminator is the provision of a four-pin reversing plug, allowing the mains to be reversed, if by chance the mains cable has been inserted incorrectly.

On 240 volt mains, we obtained an output of 230 volts at 20 milliamps, 215 volts at 40 milliamps, and 205 volts at 60 milliamps. On the other tappings the rated voltages were obtained with reasonable load currents indicating adequate design. Despite its small size, therefore, this eliminator is capable of giving a high output and



A good H.T. unit for D.C. mains, made by Climax

yet will provide reduced voltages of suitable values for the requirements of the average set.

A Linen-speaker Accessory

THE new "A.W." linen-diaphragm speaker has proved exceptionally popular. The system is made possible by means of a tensioning wire, which takes the place of the smaller diaphragm, and allows an increased tensioning of the main diaphragm to be obtained.

Messrs. Moore & Co., 101 Dale Street, Liverpool, specialise in cone speaker parts of all varieties, and they have designed a serviceable tensioning wire for single-diaphragm linen speakers. It was originally found necessary to use Bowden cable for this work, on account of its exceptional strength, and non-resonating qualities. Messrs. Moore use Bowden nipples on the ends of the wire, these may be fitted into slots cut in two metal brackets provided for attaching to the sub-frame of the speaker. The length of the wire is one foot, as specified, and is threaded through a hole in a cone chuck which is provided with two celluloid and two brass cone washers.

This system should still further increase the simplicity of constructing one of these new speakers.

The Kone Dope Co. It should be noted that the address of the Kone Dope Co. now is 1 Plashet Road, Upton Manor, E.13.

The Future of Belfast

SIR,—Your paper has a very large number of readers in Northern Ireland (one of the worst places for wireless reception in Europe), and I am sure we would all like to learn something of the probable fate of our Belfast station when the Regional Scheme nears completion.

Great Britain has only ten exclusive wavelengths. When the five great regional twins, London, Midland, Wales, Northern, and Scotland, are going, all ten will be needed (including long-wave Daventry) and there will be simply no room for Belfast.

There seems to be three alternative possibilities:

1. The reduction of 2BE to a "national" relay station on a "common" wavelength. This is what some of us fear most.

2. The removal of the transmitter to a central site (such as Magherafelt or Dungannon), with an increase of power to cover all or most of the six counties—in fact a small regional with one wavelength. We would then have the alternative of 5XX Daventry or the Scottish or Northern Regionals, that is, such of us who can afford three-valve sets. But in this case where is the wavelength to come from?

3. It is possible, however, that owing to the small number of licences in Northern Ireland, the B.B.C. intends to close down the station altogether. J. D. (Belfast).

Dance Orchestras

SIR,—I am right glad to note that Mr. Moseley's friend "Harold" has discovered Marius B. Winter's Dance Band, as in my opinion this is one of the very best, and should be bracketed with Ambrose and Gross Bart—in any order one pleases—as the premier broadcast bands, for tone, rhythm, time—in short pleasing! I have discussed this with many wireless fans, and it seems to be a unanimous opinion. While on the subject of music, I very much agree with Mr. Moseley's preference for the hotel orchestras to the "brassy" effect of certain "Grand" orchestras, which are very unsuitable for wireless, though the musicians may be—as they say—of the very best quality in themselves, to hear in a cinema.

"OLD FOGEY" (Beaconsfield).

Fitting a Pick-up

SIR,—It is my intention to use a gramophone pick-up in conjunction with my receiver. It is a straightforward detector and two L.F. receiver, having grid leak rectification. Can you advise me of what alteration to the wiring is necessary to enable me to achieve my object?—W. S. (Surbiton.)

You should disconnect the wire between the grid leak and condenser and the grid of the detector valve. Connect the grid of the valve to the arm terminal of a single-pole change-over switch, and wire up the grid condenser and grid leak to one switch-contact terminal. Connect the other switch-contact terminal to one terminal of the pick-up and take a flexible lead from the other terminal of the pick-up to a black wander plug. This plug should be inserted in the grid bias battery (at present in use with the receiver) at about one and a half volts negative. A volume control of some kind should be connected across the pick-up terminals.—ED.

Adding an Output Filter

SIR,—Hearing a conversation among fellow-passengers in a train concerning the advantages of using a choke-filter out-

"READERS' IDEAS AND QUESTIONS"

(*Continued from preceding page*)

put circuit with a loud-speaker, I am writing to ask if you can give me some hints on the components and wiring required for such an arrangement.—J. L. (Bedford).

Choke-filter output systems are incorporated in the design of most of our receivers which are intended for powerful speaker reproduction, but it is not necessary that you incorporate the components and wiring inside the cabinet of your set. They may be added externally and in the following manner. Connect one terminal of an L.F. output choke to the terminal marked L.S. positive on your set. Now connect the other terminal of the choke to the terminal marked L.S. negative on your set. Attach another piece of wire to the L.S. negative terminal on the set and take it to one terminal of a 2-microfarad fixed condenser. The other terminal of this fixed condenser should be connected to one of the terminals of your speaker. The other terminal of the speaker should be connected to the terminal marked negative L.T. on your set. Any well-known make of L.F. output choke, having an inductance of 20 to 32 henries and capable of carrying 50 milliamperes or more can be used.—ED.

"Dud" Components

SIR,—Recently "Thermion" gave an experience of "dud" components. The following is a recent one of mine. In putting together a short-wave two-valve set I came across :

1. A choke : one terminal severed due to corrosion by acid (soldering).

2. Two-microfarad condenser : one terminal fast and corroded; smell of amyl acetate.

3. Rheostat : ineffective over half its travel—broken wire.

4. Slow-motion dial : jerky—backlash.

5. Pentode : dud.

Happily, in cases Nos 1 to 4, I had bought from an honest dealer, who, at once and without question, admitted that the articles were faulty and replaced them. In case No. 5 I was told they could not replace unless the makers compensated them. I informed them my contract was with them, not the makers, and it would mean the County Court if I did not receive another valve. I did receive one!

W. E. H. (Seaford).

A Mains Matter

SIR, For the past two years I have used a James Touchstone Four receiver and this has given great satisfaction. The set is worked from an A.C. mains H.T. unit and operates a moving-coil speaker. Quite recently I noticed a falling off in quality. Can you help me to get the clear cut reproduction which I originally obtained from my receiver?— A. K. (London, E.)

If you are using one of the older type A.C. mains H.T. units, it probably has a valve rectifier incorporated in it. This rectifying valve, after two years' service, has no doubt finished its useful term of life. To prove whether the valve in your rectifier is faulty or not, you are advised to test the actual current consumption for each valve in your set. If the valves do not appear to be getting their rated amount of anode current, you may be sure the rectifying valve requires replacing. Should you decide to test the output voltages from your eliminator unit, use a voltmeter having a resistance of at least 1,000 ohms per volt.—ED.

BROADCAST TELEPHONY

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

Metres	Kilocycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN			
25.53	11,751	Chelmsford (G6SW)	15.0
200	1,500	Leeds	0.16
242	1,238	Belfast	1.2
261.3	1,148	London Nat.	68.0
288.5	1,040	Newcastle	1.2
288.5	1,040	Swansea	0.16
288.5	1,040	Stoke-on-Trent	0.16
288.5	1,040	Sheffield	0.16
288.5	1,040	Plymouth	0.16
288.5	1,040	Liverpool	0.16
288.5	1,040	Hull	0.16
288.5	1,040	Edinburgh	0.4
288.5	1,040	Dundee	0.16
288.5	1,040	Bournemouth	1.2
288.5	1,040	Bradford	0.16
301	995	Aberdeen	1.2
309.9	968	Cardiff	1.2
356.3	842	London Reg.	45.0
376.4	797	Manchester	1.2
398.9	752	Glasgow	1.2
479	626	Midland Reg.	38.0
1,554	193	Daventry (Nat.)	35.0
AUSTRIA			
246	1,220	Linz	0.6
246	1,220	Salzburg	0.6
283.6	1,058	Innsbruck	0.6
352	851	Graz	0.5
453	666	Klagenfurt	0.6
517	581	Vienna	20.0
BELGIUM			
206	1,456	Verviers	0.3
206	1,456	Antwerp	0.4
212	1,415	Binche	0.2
216	1,391	Chatelineau	0.25
243	1,235	Courtrai	0.1
244.7	1,226	Ghent	0.25
244.1	1,229	Schaerbeek	0.5
338.2	887	Velthem (Louvain)	15.0
509	590	Brussels (No. 1)	1.2
CZECHO-SLOVAKIA			
263	1,139	Moravska-Ostrava	11.0
279	1,076	Bratislava	14.0
294	1,020	Kosice	2.5
342	878	Brunn (Brno)	3.0
487	617	Prague (Praha)	5.5
DENMARK			
281	1,067	Copenhagen	1.0
1,153	260	Kalundborg	10.0
ESTONIA			
401	748	Reval (Tallinn)	0.7
FINLAND			
221	1,355	Helsinki	15.0
291	1,031	Viipuri	15.0
1,796	167	Lahti	54.0
FRANCE			
172.5	1,739	St. Quentin	0.3
200	1,500	Radio Roubaix	0.2
210	1,430	Radio Touraine	0.2
222.9	1,346	Fécamp	1.0
235.1	1,275	Nimes	1.0
240.6	1,247	Béziers	0.6
249.7	1,201	Juan-les-Pins	0.5
256	1,171	Toulous (PTT)	1.0
265	1,130	Lille (PTT)	15.0
272	1,103	Rennes	1.2
286	1,049	Montpellier	2.0
286.8	1,040	Radio Lyons	0.5
296.4	1,012.1	Limoges (PTT)	0.08
300	1,000	Strasbourg	1.0
304	988	Bordeaux (PTT)	35.0
315	952.5	Neuilly (Paris)	0.3
316	950	Natan-Vitus	0.7
316	950	Marseilles (PTT)	1.5
328.2	914	Grenoble (PTT)	1.2
329	911	Caen (Normandy)	0.6
329.5	910.3	Poste Parisien	1.2
347.7	862.8	Strasbourg (PTT)	12.0
370	810.5	Radio LL (Paris)	0.5
385	779	Radio Toulouse	15.0
447	671	Paris (PTT)	2.0
466	644	Lyons (PTT)	2.3
1,445.7	207.5	Eiffel Tower	15.0
1,725	174	Radio Paris	17.0
GERMANY			
31.38	9,560	Zeesen	15.0
218	1,373	Flensburg	0.6
227	1,319	Cologne	1.7
227	1,319	Münster	0.6
227	1,319	Aachen	0.31
292.2	1,292	Kiel	0.3
239	1,256	Nürnberg	2.3
246.4	1,217.2	Cassel	0.3
253.4	1,184	Leipzig	2.3
259.3	1,157	Gleiwitz	5.6
269.8	1,112	Augsburg	0.3
276	1,085	Heilsberg	75.0
283.6	1,058	Magdeburg	0.6
283.6	1,058	Berlin (E)	0.6
283.6	1,058	Stettin	0.6
316.6	947.6	Bremen	0.3
318.8	941	Dresden	0.3
325	923	Breslau	1.7
360	833	Muhlacker	75.0
372	806	Hamburg	1.7
390	770	Frankfurt	1.7
418	716	Berlin	1.7
452.1	662	Danzig	0.25
473	635	Langenberg	17.0
533	563	Munich	17
559.7	536	Kaiserslautern	0.5
566	530	Hanover	0.35
570	527	Freiburg	0.3
1,635	183.5	Zeesen	35.0
1,635	183.5	Norddeich	10.0
HOLLAND			
31.28	9,599	Eindhoven (PCJ)	30.0
299	1,004	Hilversum (also testing on 1,110m.)	8.5
299	1,004	Radio Idzerda (The Hague)	0.6
1,071	280	Scheveningen-Haven	5.0
1,875	160	Huizen	8.5
HUNGARY			
210	1,430	Budapest (Csepel)	1.0
550	545	Budapest	23.0
ICELAND			
1,200	250	Reykjavik (shortly testing)	16.0
IRISH FREE STATE			
224.4	1,337	Cork (1FS)	1.5
413	725	Dublin (2RN)	1.5
ITALY			
80		Rome (3RO)	9.0
296	1,013	Turin (Torino)	8.5
312	916.3	Genoa	1.5
332	905	Naples (Napoli)	1.7
441	680	Rome (Roma)	75.0
453	662	Bolzano (IBZ)	0.2
501	599	Milan (Milano)	8.5
LATVIA			
525	572	Riga	12.0
LITHUANIA			
1,935	155	Kaunas	7.0
NORTH AFRICA			
363.4	825.3	Algiers (PTT)	13.0
416	721	Radio Maroc (Rabat)	10.0
1,350	222.2	Tunis Kasbah	0.6
NORWAY			
364	824	Bergen	1.6
363.1	826.1	Fredriksstad	0.7
453.2	662	Porsgrund	1.5
453.2	662	Nidaros	1.2
1,060	283	Oslo	75.0
POLAND			
214.2	1,400	Warsaw (2)	1.9
234	1,283	Lodz	2.2
244	1,229	Cracow	1.5
312.8	959	Wilno	0.5
338.1	887.1	Poznan	1.9
381	788	Lvov	2.2
409.8	732	Katowice	16.0
1,411	212.5	Warsaw	14.0
PORTUGAL			
240	1,250	Oporto (Teatro Apollo)	0.25
320	937.6	Lisbon (CTIAA)	0.25
ROMANIA			
394	761	Bucharest	16.0
RUSSIA			
427	702	Kharkov	4.0
720	416.6	Moscow (PTT)	20.0
800	375	Kiev	20.0
824	364	Sverdlovsk	25.0
937.5	320	Kharkov (RV20)	25.0
1,000	300	Leningrad	20.0
1,065	281.7	Tiflis	20.0
1,073	279.6	Rostov (Don)	4.0
1,103	272	Moscow Popoff	40.0
1,200	250	Kharkov (RV4)	25.0
1,304	230	Moscow (Trades' Unions)	100.0
1,380	217.5	Bakou	10.0
1,481	202.5	Moscow (Kom)	20.0
SPAIN			
251	1,193	Barcelona (EAJ15)	1.0
256.7	1,125	Barcelona (EAJ13)	10.0
349	860	Barcelona (EAJ1)	8.0
368	815	Seville (EAJ5)	1.5
413.8	725	Radio Espana	1.0
424	707	Madrid (EAJ7)	2.0
460	652	San Sebastian (EAJ8)	0.5
SWEDEN			
230.6	1,301	Malmo	0.75
257	1,166	Hörby	15.0
300.2	999.3	Falun	0.65
322	932	Göteborg	15.0
436	689	Stockholm	75.0
542	554	Sundsvall	15.0
770	389	Ostersund	0.75
1,224	245	Boden	0.75
1,348	222.5	Motala	40.0
SWITZERLAND			
320	937.5	Basle	0.05
403	743	Berne	1.1
459	653	Zurich	0.75
678.7	454.6	Lausanne	0.6
760	395	Geneva	1.5
TURKEY			
1,200	250	Istanbul	5.0
1,958	153	Ankara	7.0
YUGOSLAVIA			
306.8	978	Zagreb (Agram)	0.7
431	696	Belgrade	3.0
524.7	522	Ljubljana	2.8

AT THE QUEEN'S HALL

SIR LANDON RONALD conducted the performances of Beethoven's "Leonora Overture No. 3" and the "Fifth Symphony" on December 3. His interpretation of this symphony is classic, but the concert did not come up to expectations.

Moiseiwitsch played the "Emperor Concerto" in the Russian manner. The orchestra supported him well, but this pianist, with all his ability, is temperamentally unsuited to play Beethoven. He played with great technical skill, but Tchaikowski was ringing in his ears.

L. R. J.

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Contributions are always welcome, will be promptly considered, and if used will be paid for.

Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4.

RADIOGRAMS

THE short studio service on Christmas evening, which is to be conducted by Rev. J. A. Mayo, Rector of Whitechapel, will be relayed by the Columbia Broadcasting Company of America.

Two band concerts will be broadcast from Midland Regional on December 27. In the afternoon the Hasland Prize Band, conducted by H. T. Moseley, will be heard.

Several carol programmes early this month will remind listeners of the approach of Christmas. The annual carol concert by the Royal Choral Society will be relayed from the Albert Hall on December 20, on the National.

On December 18 a midday relay will take place on the Regional of a carol service from St. Martin's Church, Birmingham; and on December 21 the Wireless Singers will be heard by Regional listeners in modern carols.

The Wireless Military Band will include Christmas music in its Regional programme on December 22, while on Christmas night the B.B.C. Orchestra, conducted by Joseph Lewis, will play seasonable items. Cardiff station will broadcast Welsh carols on December 22.

Gillie Potter states that he will begin on December 12 a new series of talks entitled, "Heard at Hogsmorton." In these talks, he aims, so he says, "to tell the truth," and the first of the series will deal with "The Truth about Russia!"

Listeners unable to pick up the Radio Maroc (Rabat) programmes direct can hear the Oriental transmissions through Radio Toulouse every Saturday evening, the latter station having arranged to relay the Rabat entertainments through the short-wave transmitter.

The new Radio Paris station at Essarts-le-Roi is now ready for testing, and preliminary experimental broadcasts will be made as soon as the special cable connecting the transmitter to the Paris studio has been laid. Although nominally of 60 kilowatts aerial power, when necessary the output of the new plant can be doubled, thus making Radio Paris one of the most powerful broadcasting stations in Europe.

Radio Sud Ouest (Bordeaux) has returned to its broadcasts on 237 metres. For the present and until authority has been obtained to increase the power of the plant, transmissions will only be made between 11.30 a.m. and 12.30 p.m. and from 6 to 8 p.m. G.M.T.

The gigantic 800-ft. masts at the Rugby wireless station sway only 8 ft. in a moderate wind.

The B.B.C.'s permanent musical combination in Glasgow is now known as the "Studio Orchestra." This does not portend any alteration in its character, however. The change from "Octet" to "Orchestra" has been made because augmentations are made from time to time.

WIRELESS IN PARLIAMENT

From Our Own Correspondent

MR. SNOWDEN, the Chancellor of the Exchequer, informed Mr. Oswald Lewis that His Majesty's Government had agreed, subject to the voting by Parliament of the necessary funds, to make a grant of £5,000 for the last quarter of the current calendar year and a grant of £17,500 a year for five years, beginning on January 1, 1931, towards the expense of presentation of grand opera, not merely at Covent Garden, but also in the provinces. The remaining necessary funds would be provided by the British Broadcasting Corporation and by private subscriptions. The Government grant would actually be paid through the British Broadcasting Corporation, a special addition to their normal income being made for that purpose, and a revised agreement between the Postmaster-General and the Corporation would be laid before Parliament in due course.

Mr. D. G. Somerville asked the Postmaster-General whether, in view of the fact that the State proposed to give a subsidy to opera out of taxation, the money being derived from the proportion of revenue annexed by the Treasury from broadcasting licences, he would consider the reduction of the amount of such licences since money, not needed for the purposes of broadcasting, was applied to purposes to which many subscribers objected owing to the economic depression in the country.

Mr. Lees-Smith said he felt sure that the general body of listeners would prefer the opportunities which they would obtain of hearing grand opera to an equivalent reduction in the licence fee, which would amount to 1¼d. per annum.

Mr. Oswald Lewis asked whether the rent of Covent Garden Opera House was to remain as at present throughout the period of the proposed Government grant; and, if not, what the rent was now and what increase was to be made in it.

Mr. Lees-Smith said that up to December 31, 1932, the new opera company would acquire the benefit of the existing lease of the Covent Garden Opera House held by the Covent Garden Opera Syndicate, Ltd., and at the present rent; and the agreement between the company and the British Broadcasting Corporation might be terminated at December 31, 1932, at the option of either party.

Mr. Lewis asked what was the present rent and what would be the additional rent when the lease was ended.

Mr. Lees-Smith said that the present rent, he thought, was between £3,000 and £4,000 a year. The termination of the lease would not be until two years hence, and the agreement provided that the payment by the Government and the agreement with the B.B.C. should be terminated at that time if the new arrangements were not satisfactory. At the end of the two years the new rent would have to be arranged.

Mr. L. Smith asked the Postmaster-General if he would state the annual sum appropriated by the Post Office during each of the last two years from the total revenue of the British Broadcasting Corporation; whether this sum was on a fixed percentage basis representing the exact cost of collection; if not, what was the basis; whether

(*Continued on next page*)

"WIRELESS IN PARLIAMENT"

(Continued from preceding page)

the sum accruing to the Post Office was more than the cost of collection and, if so, how much; what amount had been handed over to the Treasury in each of the first two years; and what percentage this sum represented of the total amount received for licences.

Mr. Viant, who replied, said that the gross revenue from wireless receiving licences was apportioned in accordance with clause 18 of the B.B.C.'s licence, which was published as a Parliamentary Paper, Command No. 2756, of 1926. The Post Office retained 12½ per cent. of the total revenue to cover management expenses; the British Broadcasting Corporation was paid a certain percentage of the remainder based on a sliding scale, and the balance accrued to the Exchequer. The commercial accounts showed that the Post Office retained £169,773 for management expenses in 1928-29, as against a cost of £152,028, and £192,172 in 1929-30, as against a cost of £154,811. The balance which accrued to the Exchequer was £291,885 for 1928-29 and £375,348 for 1929-30, representing about 21 per cent. and 24 per cent. respectively of the total wireless licence revenue for the year.

Mr. Lees-Smith informed Captain Cazalet that it was probable that the supplementary agreement between the British Broadcasting Corporation and the Post Office would deal with other matters besides the opera grant, and he was not yet in a position to say when it would be concluded.

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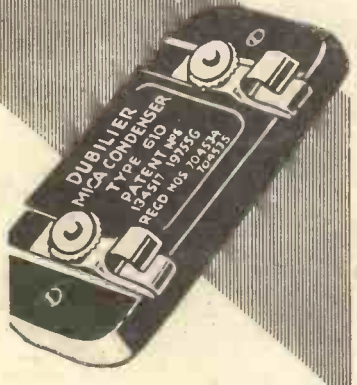

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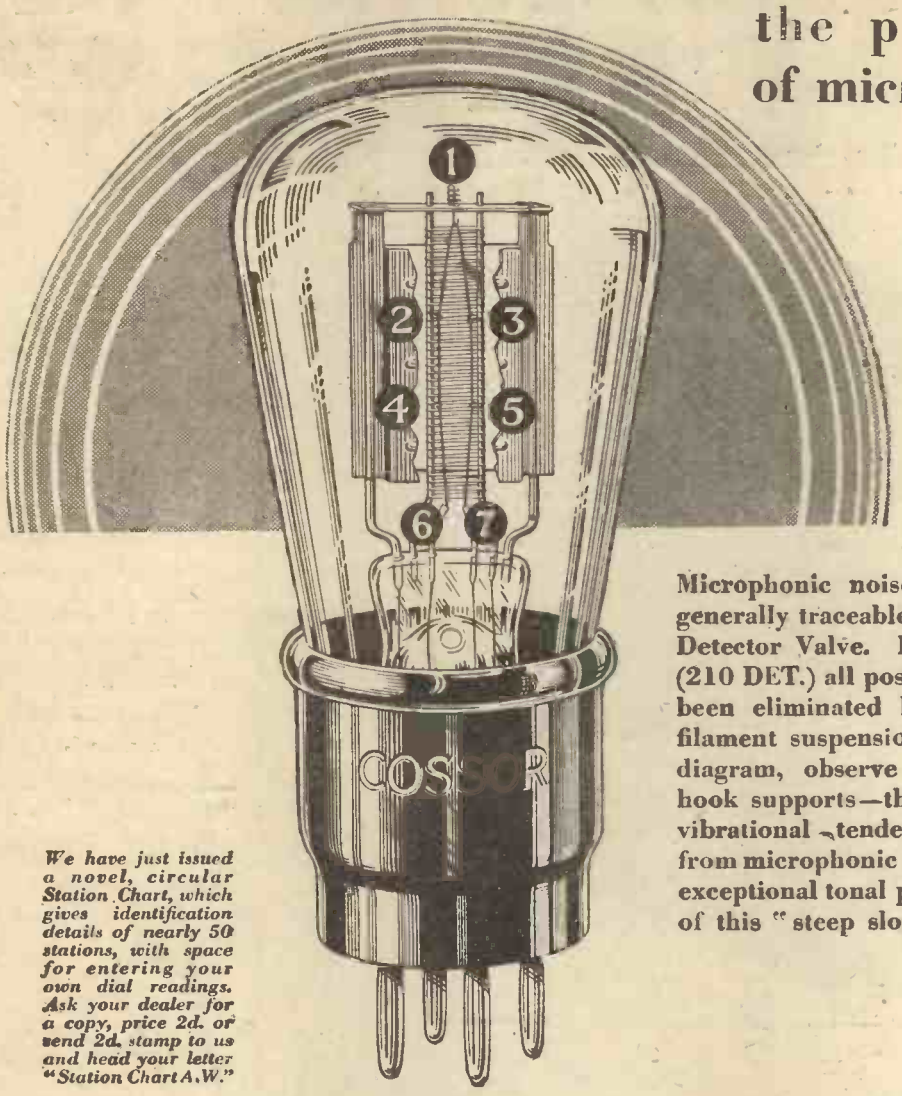

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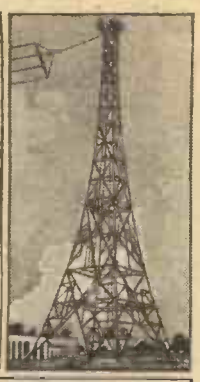

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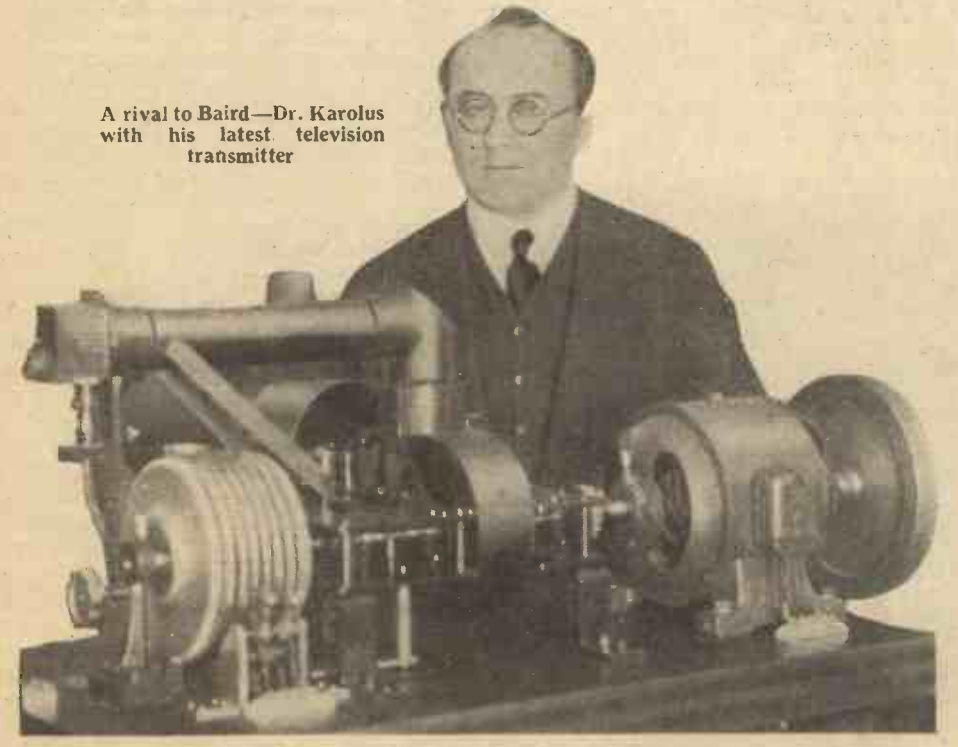
NEWS · & · GOSSIP · OF THE · WEEK

RUSSIA AGAIN!

WHAT a fuss was raised last week about the broadcast of "red" propaganda from a Russian station. In the Commons the reply of the Soviet Government to two British protests was read. In regard to the protest against the recent broadcast of propaganda in English from Moscow, the Soviet Government say that this was done by a trade union body, and, although they deny that it was a breach of the no-propaganda agreement, they promise that steps shall be taken to prevent a recurrence. The Commissar's reply concluded: "I can say that at the time that the Union of the Central Council was given the right to broadcast, no messages of this nature were contemplated, and taking into consideration Mr. Henderson's (Foreign Secretary) declaration as to the undesirability of such broadcasts in the future, it will be impressed on the Union of the Central Council that no such messages should be transmitted." Yet Russian broadcasts seem to be ninety per cent. propaganda.

A LONG LANDLINE

IT is hoped that when the B.B.C. broadcasts the Nativity Play from the fourteenth century church of St. Hilary in Cornwall, the excellent work done by the landline staff will again show to good effect. Listeners will, on Monday, December 22, be able to see whether the long landline from Plymouth to London introduces distortion. The last two or three broadcasts with this line have been very successful. We should like to correct the misconception that the play, which is by Bernard Walke, is an entertainment. It is an act of worship on the part of the villagers. The whole church is the stage about which they move during the play.



A rival to Baird—Dr. Karolus with his latest television transmitter

PRINCIPAL CONTENTS

AN EXPLORING PORTABLE!

SURELY one of the strangest adventures that ever befell a portable was the lot of a Marconiphone which travelled 8,000 miles from south to north of the continent of Africa in the back of a six-year old car. Two intriped English women set out last April to attempt the hazardous feat of travelling by land from Cape Town to Cairo, and as their only link with civilization for long periods of the journey, the two adventurers decided to take a portable set. It kept them company in the desert, and picked up a healthy "bag" of DX stations.

A GRUMBLE FROM U.S.A.

IN a letter that illuminates the present state of affairs in American broadcasting, H. F. Cappel, of Dayton, Ohio, says: "I believe it might pay the N.B.C. to find out just what programmes attract the public and what kind of programmes are turned off. I don't believe they get the true picture from letters received at the studio. If radio advertisers would undertake such a survey, radio programmes would be changed rather quickly and radio announcers would be paid a premium for brevity." We hear many complaints from America that the advertising announcements are too long winded.

SOME EXCERPT!

WHAT must be one of the longest broadcast excerpts will be that relayed from the Gaiety on December 23, when

NEXT WEEK: A ONE-COIL ONE-VALVER FOR ALL WAVELENGTHS

NEWS & GOSSIP OF THE WEEK—*Continued*

the B.B.C. will broadcast one and a half hours of *The Love Race*. These excerpts will be of the first and second acts of the play. The cast includes such well-known stage people as Laddie Cliffe, Stanley Lupino, and Madge Elliott. Altogether this should be one of the most popular of recent broadcasts. And the free advertisement afforded by radio should certainly increase the box office receipts!

FOR SET-TESTERS

WHETHER our contributor "Set-tester" proposes to work through the Christmas holiday is unknown to us, but we see from the London Regional programme that, on Christmas Day, gramophone records are to be broadcast from noon till 3 p.m. The B.B.C. explains this lengthy broadcast of "canned" music in its statement that "it will enable listeners to test the new sets that may be numbered among their Christmas gifts."

A STUDIO FOR BRISTOL

WE have it on the authority of the B.B.C. that, in preparation for the western regional transmitter, a studio is to be erected at Bristol. This will save artistes the journey between Bristol and Cardiff, which is still to remain the western regional headquarters. The erection of the Bristol studio is part of the B.B.C.'s regional policy, whereby one of the twin transmitters at each region will call upon all the available entertainment talent within that region. No doubt other studios will be erected as the regional scheme develops.

POLAR DIAGRAMS CONTINUE

MEANWHILE, B.B.C. engineers are still roaming the Somerset countryside with the famous test van. At the moment it is resting at the village of Kilve, not far from Minehead. The 3-kilowatt transmitter is sending out the usual signal so that engineers can wander around drawing circles of field-strength. Polar diagrams by the dozen are being drawn, to determine the most suitable site for the western regional transmitter.

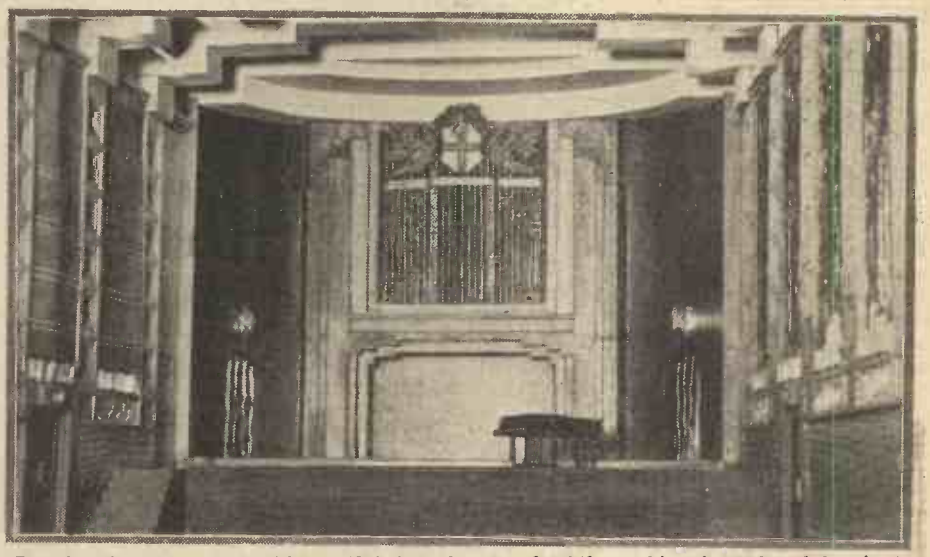
NO EDUCATION "WAR"

ONE of the daily papers has, it would seem, concocted a little war at Savoy Hill. In fact, no such war is in progress, but the writer in question alleges that adult listeners refuse to be taught! He says they want to be amused and demand *entertainment* from the B.B.C., not education. All of which has been said before. But the B.B.C. does not agree that their policy of broadcast adult education has failed. There is more than a chance that it will be extended.

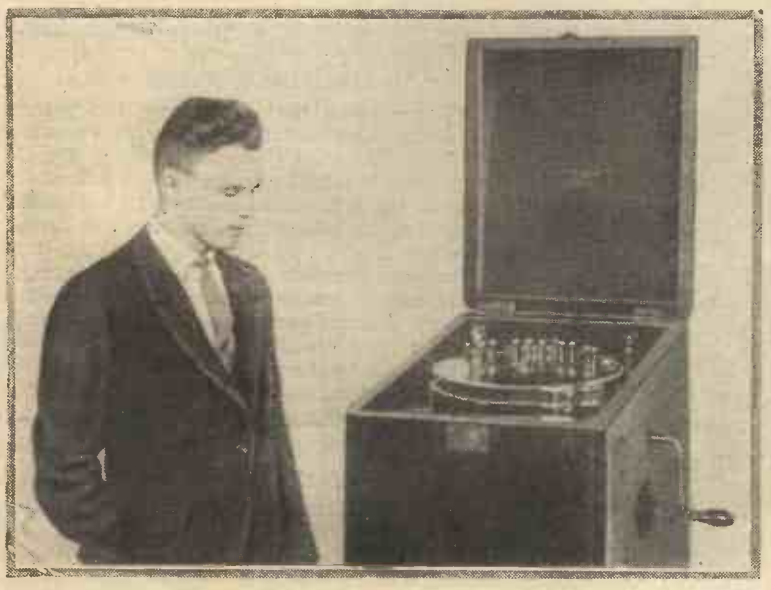
PEACEFUL PENETRATION

WE say there is a chance of this happening because the B.B.C. states that it is considering a statistical survey of listeners' tastes, habits, and requirements with regard to education. The idea is to determine the most generally acceptable method of presentation and the most suitable timing for educational talks. Ways and means of making this inquiry are now being discussed between the Executive Committee of the Central Council, the B.B.C., and statistical experts. Between them they certainly ought to make things hard for the entertainment enthusiasts. Still, most people can now tune in one of the foreign stations that still retains the ingenious idea that people listen for entertainment!

A BROADCASTING HOUSE STUDIO



Broadcasting House as it will be. This is a photograph of the architect's model of the giant studio which will be the chief feature of the new Broadcasting House in London. An organ is hidden by the grille at the back of the stage



An automatic S O S sender. If this American idea comes into general use it will over-ride the old sea dictum that an operator stays at his post in case of emergency. This machine will continue transmitting S O S signals and latitude and longitude messages for 14 hours; it has a range of 50 miles.

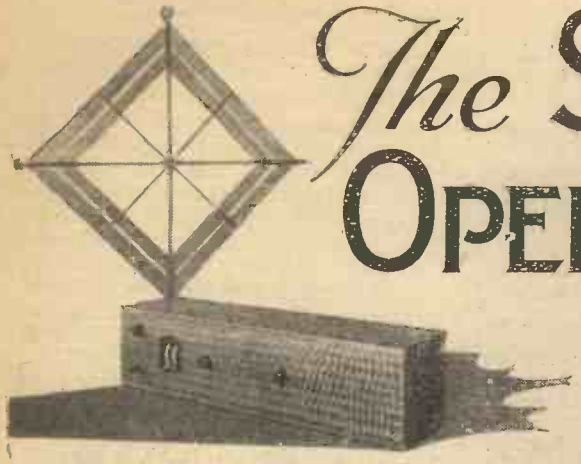
ABOUT WAVELENGTHS

SINCE the change-over in wavelengths between the London National and Regional stations, for periods when only one station is broadcasting, fewer complaints have been received of poor reception. The 356-metre station at Brookmans Park has undoubtedly a much greater service range for British listeners than the 261-metre station. Of course, in all regional centres there will have to be one fairly short wavelength and, if the region is lucky, it will have one fairly long wavelength. For the Northern Regional centre the National outlet will be on 301 metres, and the Regional on 479 metres. We southern listeners will have a good opportunity to test the relative carrying powers of these two wavelengths when the stations start up within the next six months.

THE "ROOSTERS"

ONE of the bright spots of the vaudeville broadcasts during Christmas will be the ever popular War-time concert party, the "Roosters." They are doing a sketch by Percy Merriman entitled "Tommy's Christmas," and this should be well worth watching for.

The B.B.C. has renewed for the ensuing season its arrangement with the Reid Orchestra, of Edinburgh, for the broadcast of excerpts from five of the orchestra's concerts. These will be relayed from the Usher Hall, Edinburgh, on Thursday evenings.



The STENODE OPENS THERMION'S EYES

An account of a practical test of the first privately-owned Radiostat in the world

EAGER as I am to see progress made in wireless, I must confess that I am always a little sceptical about new inventions for which big claims are made. However wonderful may be the results produced in the laboratory or at demonstrations, I am never prepared to accept

The cabinet model Radiostat as used by Dr. Robinson on his American tour

them in their entirety until I have had the apparatus in my own house and operated it with my own hands. I approach any new things in wireless, therefore, hoping for the best, but quite prepared to meet, if not the worst, at all events a severe disappointment.

Hence, when I had installed my Stenode —which is, by the way, the only one in the world now in private ownership—I placed a large salt cellar on the top of it so that the desirable grain should be handy if needed. The model that I am using you can see in the first photograph, whilst the second shows the original laboratory pattern in three large boxes. I hasten, by the way, to mention that the gentleman shown operating the set is not your "Thermion." My set measures 26 in. in length by 10½ in. in depth by 8 in. in height. The actual model which will eventually be placed on the market is considerably smaller and it will have only one tuning knob, whereas mine has two thumb-controlled dials. However, I could not wait for the final model to be ready, so I had a set specially made for me from the drawings of what we may call the intermediate pattern; that is, the stage on the road towards compactness and simplicity which comes between the original laboratory type and what will be the broadcast receiver. It is no use, by the way, writing to me to ask where you can obtain one. For the moment you cannot, and when sets are available the various manufacturing firms who are making them will, no doubt, advertise the fact.

Simplified Tuning

The two condenser dials tune respectively the frame aerial and the oscillator. In the type that will go on to the market these two will be ganged. The photograph shows four other knobs, but one of these was unnecessary and has since been removed. The only ones now remaining are that near the bottom left-hand corner of the set which operates a wave-change switch, the one near the condenser dials which works a volume control, and one rather to the right of the middle of the set by means of which switching on or off is done.

I need hardly tell you what was the first test I made after switching on. What would you have done yourself? Wouldn't you have tried to see whether Stuttgart and Graz could be received with the London Regional in full blast? In case, by the way, you are not familiar with the wavelength tables, let me mention that each of these stations is separated by 9 kilocycles from "Raucous Reg.," Stuttgart being 3.7 metres above and Graz 4 metres below. My aerial is just fifteen miles from Brookmans Park, whose wipe-out is such that, used in conjunction with an indoor aerial, a selective "straight" set containing two screen grid stages is very rarely able to receive Barcelona (18 kilocycles away) on the one side, or Hamburg (18 kilocycles away) on the other, completely free from interference. With less than two H.F. stages or with a set of ordinary selectivity the blanketing effect extends a good deal farther.

A Convincing Test

Well, first I found the London Regional, and then I tuned just a tick upwards. There was Stuttgart roaring in, and even in intervals of the programme nothing was to be heard of London. Then I dropped down a tick below London—and in came Graz. Now, Graz is a still more convincing test station; first of all, because the wipe-out effect is usually rather greater below than above and, secondly, because the Austrian transmitter is not, as a rule, strongly received. When he is coming in at all well he is absolutely clear of London, and even when he is at his weakest a little careful tuning entirely cuts out interference.

That test was my first eye-opener. I had seen the Stenode separate the stations in London where Brookmans Park's field strength is much less, but, frankly, I did

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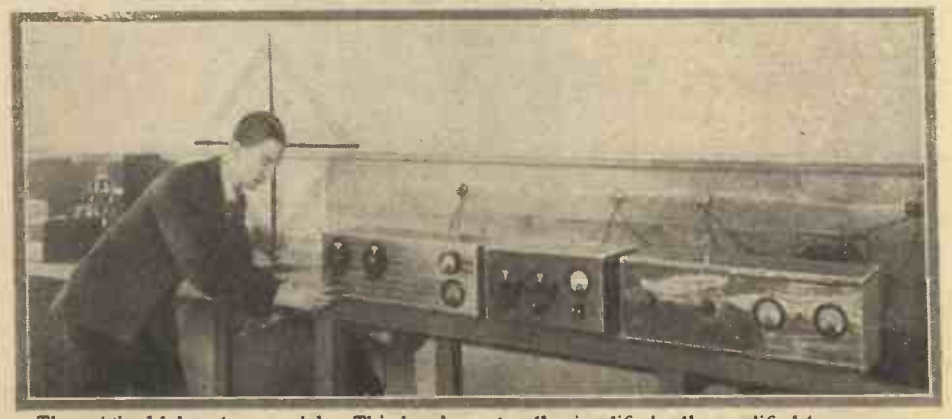

The original laboratory model. This has been greatly simplified; the modified type appears in the heading

not expect that it would do so in my house. Its selectivity, by the way, is not produced by the directional properties of the frame. Stuttgart and Brookmans Park lie very much in the same direction from me, but even if I turn the frame directly towards Brookmans Park and tune to Stuttgart, I don't hear a sound of the Regional.

"Pretty good," thought I, "but I really will test the thing out." At fifteen miles "Noisy Nat." on 261.3 metres is a very much stronger transmission than "Raucous Reg." and has a far greater wipe-out. Could the thing possibly bring in Gleiwitz or Moravska-Ostrava, the National's next door neighbours in the wavelength tables? They lie 9 kilocycles above and below, the wavelength difference being 2 metres in the case of Gleiwitz and 2.1 in the case of the Czechoslovakian station. I got both of them quite clear. The selectivity then was amply proved.

Next for sensitiveness. Having made a rough calibration of the set, I thought that it might be a good idea to work upwards from Leeds. Though Leeds has a rating of only 160 watts and is 200 miles away, I found him at the first attempt, tuning straight on to the loud-speaker and obtaining fine volume ; though there was, of course, the fading that one associates with all shorter-wave transmissions. Working slowly upwards, I found three Swedish-speaking stations before I encountered Warsaw No. 2 on 214.2 metres. Clearly, then, the three must have been Joenkoeping, Kristinehamn, and Gävle. Two series of jumbled sounds indicated common wavelengths, and then came Helsinki, which was fair, though not strong. Fécamp, a small French station, came in well and Cork was a big signal.

I won't go through them in detail. Let me just say that Beziers, Belfast, Lotz, Juan-les-Pins, Leipzig, Toulouse (PTT), and Hörby were all pulled in at fine strength before the National was reached.

Nearly Every Station

After three days with the Stenode, which time sufficed for an accurate large-scale calibration chart to be made, I had received on the loud-speaker, with three exceptions, every European station between 200 and 550 metres that has an individual channel. The exceptions were Almeria, Barcelona No. 2, and Oviedo, none of which appeared to be working. The stations received included such tiny fellows as Fredriksstad and Freiburg.

With a set of this kind, then, the whole of Europe, at any rate, is the wireless man's oyster. I have not yet had time to explore in detail the long waves, but I have not the least doubt that within a day or two I shall have logged every station contained within their compass.

One most important point remains. I can hear the reader asking by this time: "Selectivity and sensitiveness are all very well, but what about quality?" Thanks to the corrector circuit which it incorporates, one can adjust the reproduction to suit one's own likings. It ought by all the theories to be utterly lacking in top, and if it were so it wouldn't suit me at all, for I am not of those who like "woomfy" loud-speaker working. As a matter of fact, the upper notes are magnificently brought out and you can have as much real bass as ever you like by merely altering the value of a resistance. Both speech and music from short-, medium-, or long-range stations are as good as one could desire.

When I first thought of acquiring the set it occurred to me that my batteries were in for rather a bad time, since I am not fortunate enough to have electric light in the house. I have been pleasantly surprised by the modest current consumption of both H.T. and L.T. of this big set. The filament current is .7 ampere, or exactly what my first single-valve set consumed. The high-tension current totals 30 milliamperes, which is well within the compass of even a small high-tension accumulator battery.

This is the kind of set that one has been longing for ever since wireless was wireless. I still have a lurking fear that I shall wake up and find that I have dreamt it all.

THERMION.

THE FAIR SEX—

Savoy Hill has been trying out a Lady Announcer recently, but there seems no immediate possibility of the fair sex monopolising the B.B.C. microphone. Other countries have tried it with success. Italy specialises in women broadcasters.

The probable reason for this is, that the Italian language is almost as liquid as the French, and certainly not so gutteral as the Spanish. It is admirably suited to the female voice, and the diction of these lady announcers is extraordinarily clear, as you can prove for yourself by tuning in to at least four of the Italian stations which can be heard on practically any night.

Radio Roma, the giant 75-kilowatter, has Signora Luisa Boncompagni (4) at the microphone—a very popular personality with a bell-clear voice. At Naples is Signora "Rosa di Napoli"(1)—literally "Rose of Naples"—which is a pet-name given to this announcer by listeners.

Other women announcers use their microphone "stage-names," in preference to their real names; Signora Maria Rosa (2), for instance, at the Turin station. Her real name is Signa Cosini. Turin is well received in this country, owing to its power of over 8 kilowatts.

Still another woman announcer is to be found at Genoa (Radio Genova). Here Signora Lia Cavinagli (3) does her bit before the microphone, both in announcing and directing programmes, and you may often hear her on 379.5 metres.

Apart from the rather natural interest which centres on a woman at the microphone, there is a very real advantage in the feminine voice, for some purposes of announcing, the higher frequencies predominating, and making for clarity. It is notable that women's voices are often more easily heard over the telephone, there not being so much bass to "cut off,"

—AND THE MICROPHONE

and this makes for a greater sound intelligibility which may be an advantage where reception conditions are difficult.

It is rather surprising that America, who would be willing to try anything enterprising in the announcing line, to make publicity broadcasts more popular, has never gone in seriously for women announcers. Perhaps it is because America has a "bass" complex, as you may gather from the tonal balance of most talkie films.

In this seasonable article ALAN HUNTER tells how to get those foreign stations and how to identify them when they have been logged. Outstanding B.B.C. items are included.

Photo : Marconiphone

TUNING IN—— The CHRISTMAS BROADCASTS

"YOU experts say it is easy to get foreign stations; but let me tell you that all *I* ever hear are the two London stations. And even if I got these wonderful foreigners I should never know one from the other!"

Now, that sort of remark—actually made to me a few days ago—is enough to provoke a really heated discussion. Instead, it has prompted me to write this article. Supposing we start by asserting that, under present conditions, almost any valve set can be made to receive several foreign stations. Then in answering the question: "Well, why don't *I* get them?" we shall surely come across several valuable hints and tips.

Before we venture abroad, let us see what the home stations have to offer for Christmas. A pantomime, provided by Ernest Longstaffe, will be broadcast to Regional listeners on Christmas Eve, and to National listeners on Christmas night. *Little Red Riding-Hood*, in its radio version, should be very acceptable to listeners young and old.

I expect a great many listeners will be looking forward to Monday, December 22, when the Nativity Play from the fourteenth-century church at St. Hilary, Cornwall, will be broadcast. The B.B.C. engineers have made great strides in land-line quality, so in this broadcast there is no reason why distance should not lend enchantment.

Regional Broadcasts

For Regional listeners on December 23, a Christmas Miscellany is promised. So is a broadcast of the Lord Mayor's Dinner at the Guild Hall. This evening is also notable for the broadcasting of a very long excerpt from *The Love Race*, relayed from the Gaiety Theatre, London.

One of the departures in this year's Christmas programmes by the B.B.C. is a long spell of gramophone records, from noon until 3 p.m. on Christmas Day, via the Regional station. Dance music from the regional and the Daventry national wavelengths will start at 10.45 p.m. on Christmas night and continue until 1 a.m. on Boxing morning.

A taste of long-distance reception, for those who listen only to the local station, will be the interchange of greetings between Britain and America, which it is hoped to broadcast some time during Christmas night.

As far as I can see from advance programme information, the B.B.C. is offering listeners every inducement to remain tied to the local station! Some of the programmes certainly breathe the spirit of the festive season. But as Christmas will, this year, extend from Wednesday to the following Monday, there is a glorious opportunity for local listeners to become quite expert in receiving foreign stations.

Foreigners on a Two-valver

I have said that nearly every valve set of to-day is capable of bringing in some foreign stations. Even a two-valver, provided it has reaction, can, with careful manipulation, reproduce at moderate loudspeaker strength such stations as Rome, Toulouse and Cologne. The more efficient the aerial and earth with such a set, the greater will be the strength of foreign stations received. So if the two-valve owner has ambitions to cross the channel by radio this Christmas, I suggest an overhaul of the aerial system. The earth wire might well be renewed, for this connection is just as important as the aerial wire.

I frankly admit that you must be fairly expert to get foreign stations on a two-valver, however good the aerial may be. Usually it is a question of understanding the reaction control, and of realising that adjustments of the reaction knob imply re-adjustments of the tuning knob. The detector valve in a two-valver owes its sensitivity to the application of reaction. If reaction cannot be applied gradually and smoothly, the detector valve cannot be brought to its most sensitive condition, which is just below the point of oscillation.

Here is a simple test to determine whether reaction is being efficiently applied to the detector valve. Increase reaction until the detector valve oscillates at, say, 50 degrees on the tuning dial. Then decrease the tuning dial setting and see whether oscillation ceases at the same point that it started. Sometimes it will be found that there are several degrees between the point where oscillation starts and the point where it stops.

This is known as reaction overlap. It is caused by incorrect working of the detector valve. When present, it prevents the

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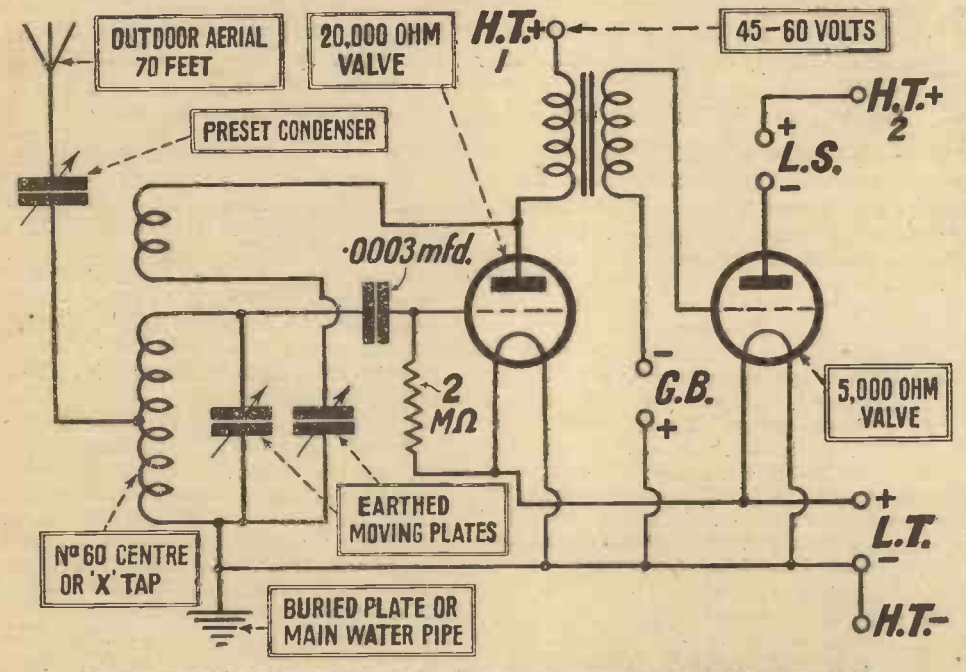

Outstanding points that need attention in a two-valve set for long-distance reception

For the Newcomer to Wireless : MUTUAL CONDUCTANCE

I NOTICE that in all published data for valves the factor mutual conductance is given. It must be very important, for often a strong point is made of the big mutual conductance of a particular valve, but I haven't the least idea what it means. I wonder if you could explain?

We may call the mutual conductance the efficiency factor of the valve. The higher the figure the better is a valve fitted to do the work for which it is designed.

Please go on.

Let us take an analogy. In order to see the relation between motor car engines of to-day and those of twenty years ago we could very well make a comparison between them in the matter of horse-power produced from a given engine weight. For example, if an old engine was found to weigh 500 lb., and to have a horse-power of 10, we could say that its weight efficiency factor was 10 divided by 500, or .02. A modern engine might give the same horse-power with a weight of only 200 lb. Here the weight efficiency factor would be 10 divided by 200 or .05. Do you follow the idea?

Yes, that's quite plain.

To simplify matters we could knock off the two noughts from the weight in pounds and we should then have efficiency factors of 2 and 5, which would serve very well for the purpose of comparison.

I follow. Now about valves.

If you think for a moment you will realise that generally speaking high amplification goes hand in hand with high impedance in the wireless valve.

Is that so? Wait a minute. I've got a valve list in my pocket. Yes; here's an R.C. valve with an amplification factor of 50 and an impedance of 60,000 ohms. And then there's a medium impedance valve of 20,000 ohms with an amplification factor of 20. This power valve has an impedance of only 3,500 ohms, but the amplification is 8. The next one is a super-power valve with an impedance of 2,000 ohms, and an amplification factor of 5. Yes, I realise that a high amplification factor seems to mean a high impedance.

If you had looked through a similar list published five or six years ago you would have found that impedances were ever so much higher in proportion to the amplification factor. For example, the original Ora valve had an amplification factor of only 7, but an impedance of 40,000 ohms.

Do you mean that progress has been made by getting a bigger amplification for a given impedance?

That's it exactly, and the higher the relation between amplification and impedance the more efficient the valve is. Take, for example, an output valve. Here we want low impedance in order to bring out the deep notes, but we also want a respectable amplification factor to provide sufficient volume. Suppose we fix 1,500 ohms as the most desirable all-round impedance for the output valve in a wireless set, then clearly the bigger the magnification we can get with such an impedance the better the valve is.

That's quite clear. But just how does mutual conductance come in?

The mutual conductance figure is simply the amplification factor divided by the impedance. If we left the impedance figure complete this would give us the mutual conductance in amperes, but as we want the answer in milliamperes we multiply the amplification factor by 1,000 before making the division.

Here's a valve with an amplification factor of 3.6 and an impedance of 1,400 ohms.

Then the mutual conductance is 3,600 divided by 1,400 or just about 2.6?

Yes, that's the figure given.

"TUNING-IN THE CHRISTMAS BROADCASTS"

(*Continued from preceding page*)

detector valve from working at its maximum sensitivity. One way of reducing the trouble is to lower the anode voltage of the detector valve. If the two-valver has only one high-tension positive connection, and reaction overlap is noted, it is worth taking a separate high-tension-positive lead from the detector valve circuit. If the two valves are transformer coupled, the anode voltage for the detector will be supplied through the primary winding. The end of the primary remote from the anode of the detector valve should be taken to a voltage of, say, 45 to 60 volts.

On a two-valver with good reaction, and assuming a moderately efficient aerial, one should be able to bring in at least three foreigners. The easiest is probably Rome, on 441 metres. This station should be heard between the settings for the Midland Regional and the London Regional stations. It is a very easy station to identify. They have a lady announcer at Rome who says: "*Eh-yar Radio Roma.*" As Rome nearly always relays Naples in the evening, she says "*Radio Roma Napoli.*" Another distinctive feature of Rome is the interval signal, which, once heard, can never be forgotten. An air is played by means of oscillating valves.

As this station has a power of 75 kilowatts its 900 miles distance from London does not prevent it from being heard with great clarity on almost any set. The lady announcer ends up with "*Buona notte a tutti!*"

Another station a two-valver can pick up quite easily is Toulouse. Although it is over 500 miles from London, Toulouse is one of the strongest signals received from the Continent. They always seem to have the same announcer at this station. His "*Allo. Ici Radio Toulouse!*" is unmistakable. And the announcer always says "*Ici Radio Toulouse*" before and after every item broadcast. The dial setting for Toulouse is about 10 degrees above the London Regional setting.

The third station for two-valvers is Cologne. On a wavelength of 227 metres this station is very strongly heard in London. It is really not very far away, only 300 miles. But its power is only 1.7 kilowatts. To those unaccustomed to foreign station reception the German announcement from Cologne is rather a teaser. Here it is: "*Achtung fur die Westdeutschen Sender.*" This means attention for the West German transmitter.

As Langenberg relays Cologne, one hears the same announcement. On most two-valvers it should be possible to hear Langenberg, although as it comes in only a degree or so below the Midland Regional setting there is a probability that it will not be received clear of interference.

The long wavelengths are worth the attention of two-valvers, and for that matter three-valvers. If Daventry 5XX is heard at really good loud-speaker strength, there is every reason to expect Radio Paris at moderate loud-speaker strength. This powerful French station should be heard 10 degrees or so above Daventry. The call sign between announcements is: "*Ici Radio Paris.*"

Just below Daventry is the Eiffel Tower station, which should also be heard quite easily on simple sets. These two French stations are little more than 200 miles from London, they are on fairly high power, and their long wavelength transmissions do not become attenuated in the manner common to medium wavelengths. Another advantage of these long wavelength stations is that they can be heard during daylight just as well as at night. Moreover, they do not fade like medium waves.

Although I have barely fringed the possibilities of long-distance reception on medium-power sets, I hope I have convinced some readers that this Christmas is going to be well worth while in a radio sense. The great power of foreign stations as received here is making us realise that our tight little island is no longer immune from Continental influence. Tune in a German orchestra playing, rather inevitably, something by Johann Strauss, or a novelty orchestra from Gay Paris and then see if you do not agree that variety is the spice of life!

Everybody can have better radio this Christmas

Good company . . . bright lights . . . a cheery fire . . . happy laughter . . . and music clear and pure from a good radio that has been made better by Pertrix. What more *could* one wish for?

It is because NO sal-ammoniac is used in a Pertrix Battery that it gives the purity of current that is so essential in obtaining perfect reception. So don't forget, make it a Pertrix Christmas this year, and *enjoy* your radio.

Pertrix Accumulators more than do their bit in giving you better L.T. current, too.

Give Pertrix Dry Batteries and Accumulators as Presents this Year

DRY BATTERIES

60 volt Standard		8/-	60 volt Super		13/-
90 "	"	11/9	100 "	"	21/-
100 "	"	13/-	120 "	"	25/6
120 "	"	15/6	150 "	"	31/-

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"The batteries you can trust"

On Your Wavelength!

A D.C. PROPOSITION

A.C. USERS seem to be fairly well catered for these days, but D.C. has not received the same attention. True, there are quite a number of published designs and several manufacturers will supply mains sets for D.C., but one cannot really consider the average D.C. user to be adequately treated.

A particularly difficult supply to deal with is the 100-volt D.C. which is found in various parts of the country. It is almost hopeless to try and work a radio set from such a supply, because by the time one has taken grid bias and filament voltages there is only about 80 volts left. One can, of course, use a separate grid battery and be content with a small output, but it has to be a very small one. The undistorted power output increases rather more rapidly than the square of the voltage, so that if we can double our voltage we get at least four times the noise.

One solution of the difficulty is to use 80 volts of accumulators and to push these in series with the mains, making a grand total of 180 volts. When the set is not in use, a switch can be thrown over which puts these accumulators on charge across the mains, thereby keeping them always up to scratch. This then becomes a practical proposition, for with 180 volts and two P650's in parallel or push-pull one can begin to talk business.

CONCERNING MAGNETISM

I SEE that the Royal Society has appointed Dr. Kapitza to a Messel Professorship and have given a grant of £15,000 to the University of Cambridge for a special laboratory in which his startling researches into magnetism are to be continued. In spite of all our gropings, we have to admit that the essential nature both of magnetism and electricity still remains a profound mystery. More work has, perhaps, been carried out in purely electrical research than in the sister science though Professor Kapitza is now adjusting the balance. He has already succeeded in creating magnetic fields having the enormous intensity of 350,000 gauss, and hopes to increase this to a million lines per square centimetre. For the former figure a generator rated at 2,000 kilowatts sends a current of no less than 72,000 amperes through a small coil. The current is naturally only momentary, or it would disrupt the winding—and everything else within range, I should imagine. The new experiments are expected to throw fresh light upon the constitution of the atom, and more particularly upon the physical nature of electric resistance.

THE B.B.C. IN SCOTLAND

THINGS are looking up beyond the Border. When opening the new B.B.C. premises in Edinburgh, Mr. Adamson, the Secretary for Scotland, laid stress on the fact that not only was the new studio the largest and best equipped in the whole of Britain, but that the B.B.C. intended to make fresh efforts to foster Scottish sentiment and tradition. He did not, however, proceed to hit the nail right on the head by promising an immediate reduction in the licence fee! But, quite seriously, I am glad to see signs of improvement in the B.B.C. service for our northern readers, because judging from some of the letters I occasionally get from that quarter, they seem to have had some serious grounds for complaint.

HOW DO YOU FIND IT?

MY aerial is just fifteen miles as the crow flies from Brookmans Park. Therefore it requires no great stretch of the imagination to perceive that the field strength of the London Regional transmitter is pretty considerable in my locality. When I tell you that, even with a small transportable with self-contained frame aerial, the strength is such that I have to use a hefty amount of volume control to prevent the roof from being lifted, you will obtain a useful working idea of the way in which "Raucous Reg" comes to me and to my friends and neighbours. This being so, you would imagine that he would be capable of drowning any interference arriving from a range of several hundred miles; in other words, that he would sit upon Stuttgart, drowning the latter's voice. But it is not so, dear reader. With a receiving set selective enough to have a useful gap of complete silence between Rome and Stockholm, and to bring in Langenberg quite free from 5GB (the latter being just forty-five miles away), Stuttgart pushes his way through the London programme and causes constant interference. What reception of "Raucous Reg" must be like for those who live further away from him than I, I can only imagine.

THE NEXT MOVE

AT the moment we appear to have reached one of those queer little deadlocks that arise when neither side will budge an inch. The B.B.C., in its usual futile way, makes a statement about the "inevitable interference," and talked vaguely about possible wavelength changes on the part of Stuttgart. Meantime the German authorities are fairly happy, since in their own service area they are successfully shouting down "Raucous Reg," and they maintain that if anybody does change his wavelength it will not be Stuttgart. In passing, I quarrel rather with the adjective "inevitable" as applied by the B.B.C. to the interference. With my Stenode I can receive "Raucous Reg" clear of Stuttgart and *vice versa*. It would appear, then, that the interference is *not* inevitable.

STILL MORE

I WILL return to this question in a moment. Meantime, I just want to breathe the word Heilsberg. The new Königsberg transmitter located at Heilsberg will have come into operation by the time that this appears in print. It is to begin gently (!) with a power of 75 kilowatts, but in a matter of weeks this will have risen to 120. On many receiving sets his signals are bound to interfere with those of "Noisy Nat," and I suppose we shall have more soothing syrup from the B.B.C. on the subject. The result, though, is likely to be that large numbers of listeners will be able to receive neither the London Regional nor the London National clear of interference; and goodness knows what steps, if any, will be taken by the B.B.C. to produce an amelioration of reception conditions. There will be still more fat in the fire when 5GB comes down to a wavelength not far removed from that of "Raucous Reg," and the second northern Regional programme is pushed out on Aberdeen's wavelength.

WHAT'S THE REASON?

TO return to that word "inevitable." I mentioned just now that with my Stenode interference by Stuttgart with the London Regional programme is perfectly avoidable. But for some reason, which completely baffles me, the B.B.C. never appears to have heard of the Stenode Radiostat. I have searched in vain the columns of its official publications for any mention of this British invention, to which other papers, such as AMATEUR WIRELESS and the *Wireless Magazine*, have devoted large amounts of space since they realised its importance. And not only the technical papers, but also most of the important lay organs recognise that the Stenode is not just a stunt.

If the inventors of this system were a manufacturing concern I could to some extent understand the B.B.C.'s position. But they are not. What they do is to say to manufacturers: "Here is our invention. Come and hear it, ask for any tests you like, and if you are completly satisfied we will give you full particulars and grant you a licence to manufacture." Many important firms have taken out these licences, and one imagines that they must have been pretty well satisfied before doing so. Yet the B.B.C. has never heard of the Stenode!

A DIFFERENCE

GETTING on for two thousand years ago it was said that a prophet was not without honour save in his own country. Dr. Robinson, the inventor, is a prophet in so far as he has shown us the way out of our present wireless difficulties. He is at the moment not in his own country, but in America, and there he is receiving his full due of honour. Not only the wireless papers, but also each and every one of the big lay papers has made a "splash" feature of the Stenode, using such headlines as only Americans know how to use.

IN GERMANY

THERE is another rather interesting point whilst we are on this subject. I

On Your Wavelength! (continued)

happened to pick up the other day a back number of the official publication of one of the most important German broadcasting authorities. Turning over its pages, I was struck by a large heading: "*Der Stenode Radiostat.*" There followed a long article by one of the most eminent of German wireless engineers, dealing with the Stenode principle. The article concluded by saying that the writer was making laboratory tests and that he would shortly give the full results of these. Meantime, this particular broadcasting authority has found the Stenode Radiostat so good that it is making regular use of it for the reception of foreign programmes for relaying purposes. Some day, perhaps, the B.B.C. will awaken to the fact that a British inventor has produced something of importance in the field of wireless.

HIGH POWER

WHAT will be the ultimate result of the shouting-down competition in which the wireless authorities of Europe are now so happily engaged? The B.B.C. began it, and now I think it is rather wishing that it hadn't. In less than a couple of years it will be wishing this still more so. Readers will give me the credit of admitting that I was one of the very few people who from the very first denounced the Regional Scheme as being utterly futile. If it is still decided to carry it through, the ultimate results are going to be these. First of all, we shall snaffle nine wavelengths on the broadcast band and make use of a super-power transmitter on each. This will mean that hundreds of thousands of present-day receiving sets will be rendered useless for any purpose but local reception. So far as I can see, the only foreign stations that are likely to be receivable when the scheme is in full operation will be Rome, Stockholm, and possibly the higher wave stations, such as Vienna and Budapest, which come through well only when conditions are particularly favourable.

COMPETITION!

RESULT number two will be the coming into operation of fifty or sixty even higher-powered stations in foreign countries, and unless we are very careful even local reception without interference may become impossible. And there is another cloud, no larger than a man's hand as yet, on the horizon. This is the Russian threat or promise to install within two years a hundred 100-kilowatt stations operating within the limits of the broadcast band. Let Europe pursue its present course of broadcasting development and the jammiest of jams is inevitable.

A SOLUTION!

I DON'T like destructive criticism, and I am going to offer once more a constructive suggestion that I made some time ago. Experience has already proved that high-power stations with wavelengths below a bit over 300 metres are pretty well useless, since their service areas are so restricted. Therefore, if we intend to put out super-power on the wavelengths at present used by Cardiff, Aberdeen, the relays, and Belfast, we know perfectly well that no particular good is going to come of it. The whole of this country can be adequately served by five high-power stations. My own suggestion would be to increase the power of 5XX to 100 kilowatts and to send the National programme out from this station only. With a power of 100 kilowatts on a wavelength of 1,554 metres, 5 XX should be able to give excellent reception on even single-valve sets throughout the country. There is not the slightest need to cater for crystalisers since in a year or two from now there probably won't be a crystal set in existence; the need for greater selectivity will automatically wipe out the crystal set, anyhow. The Regional programmes I would have transmitted by four stations, using the highest "broadcast" wavelengths that we possess. We have four of these in the wavelengths now used by 5GB, Glasgow, Manchester, and the London Regional. We could therefore reduce our requirements to four channels on the broadcast band, and if we went to the next Conference prepared to take a step of this kind I have little doubt that other countries would fall into line. At present the whole position is simply silly, and we are heading for chaos as fast as we can.

THE INTERVAL SIGNAL

AT last, we are to have an interval signal for our home stations, and I, for one, am very glad to hear it. It is more than five years now since I first advocated this improvement in the columns of AMATEUR WIRELESS. What happened then, and still happens to-day—especially at Christmas-time, when thousands of new sets come into use—is that during programme intervals people think that they have lost the transmission and start searching for it with reaction tight coupled. Up and down they howl during what is meant to be a silent interval, and when the music starts again it generally takes them some little time to find the proper adjustment once more. If there is an interval signal something comes through all the time, and those who are using valve sets for the first time do not panic. But why—oh, why—make this signal the soulless and completely unoriginal ticking of a metronome? To my mind, interval signals should always be such that the station sending them out is easily recognised.

A SUGGESTION

AND the solution is really delightfully simple. Why not have for the National transmitters the first four notes of "Rule, Britannia," sent out by a valve oscillator? At present there are only two National transmitters, and no one is going to mix up 261.3 with 1,554 metres. If and when the others come into operation they could be numbered and each could send the four notes in question plus one, two, three, four, or five dashes. Then for the Regionals. Why not four or five notes of one of the old London street cries for London, "The Cock of the North" for Scotland, and so on? Valve oscillators are very satisfactory, and they are already in use by many foreign stations, as readers doubtless know. If the scheme suggested were adopted, any British station could at once be identified by its interval signal.

THERMION.

DOCTOR WIRELESS

(A medical officer has reported that the population of Daventry has become healthier and happier since the wireless station has been established.)

1

Oh, wireless is so bracing,
Better far than sport or racing,
For it brings you health, as well as happiness.
So away with melancholy,
For the ether is so jolly,
And all your petty ailments plague you less.

2

If neuralgia makes you bellow,
Then Miss Harrison's sweet 'cello
Will charm it, as she does the nightingale.
And an hour of Ridgeway may go
Far to cure your old lumbago,
And for wrinkled brows the Kiddies' Hour can't fail.

3

If arthritis makes you shiver,
And you suffer with a liver,
You will find that Mrs. Buggins is no bane.
A melodious cadenza
Will banish influenza,
And jaded nerves are soothed by Jazzing Payne.

4

A morsel of old Schubert
Is better far than Tube air,
Its glorious 'mid Daintree's dales and hills.
An orchestra symphonic
Is a never-failing tonic,
And you'll save a host of chemist's little bills.

5

Sciatica is painless
With a dose of Stephen (Stainless),
And Leonard Henry drives the gout away.
While if the doldrums find you,
I hardly need remind you,
You might do worse than try the "Roosters" lay.

6

Oh, headphones are so jolly,
So away with melancholy
And let us hear no more of strain and stress.
Plump for cheery Doctor Wireless,
For dispelling ills he's tireless,
And he brings you health as well as happiness!

Percy Merriman.

THE HOW AND WHY OF RADIO

XIV—WHAT YOU SHOULD KNOW ABOUT METERS

If you are a beginner in wireless, now is your chance to gain a clear conception of its theory and practice. In this series of articles, specially prepared for the beginner, no previous knowledge of wireless is assumed. It is intended to deal with every aspect of the subject and the whole series will endow the beginner with sufficient knowledge to enable him to derive the greatest possible interest from the fascinating hobby of wireless

TO a beginner, the inanimate nature of wireless must always be a handicap. One cannot see the wheels going round, so to speak. An electric current is not easy to imagine; nor is a high-frequency wireless wave. But through the "eyes" of meters we can gain some idea of what is happening inside the set. We can see the effect of a wireless wave on the current flowing through the battery or other source of power. We can even see signs of distortion that the ear cannot hear.

Fig. 1. Two positions of a voltmeter are shown here—one measuring the maximum voltage of a battery and the other subsidiary voltages

The two meters most commonly used in wireless are the voltmeter, which measures volts, and the ammeter, which measures amperes. The voltmeter shows how much voltage is applied to the anodes of the valves; whether the battery is running down; other very useful facts can be determined with this meter. Suppose we have a set worked from a 120-volt high-tension battery; there might be two positive high-tension supplies, one going to the 120-volts maximum and the other to 72 volts. While the set is working, a voltmeter can be used to see whether the required volts are being applied. Note that the meter has positive and negative terminals, which must be connected to like poles of the battery, otherwise the needle will be deflected in the wrong direction. Fig. 1 shows the two positions of the voltmeter for determining the value of the maximum voltage and of the subsidiary voltage.

The voltmeter is said to be in parallel with the battery. The battery connections are not intercepted. The positive side of the voltmeter is connected to the positive end of the battery and the negative of the voltmeter to the battery negative. The voltmeter has a very high resistance for the object is to keep the current flowing through the meter as small as possible. If an appreciable current flows through the voltmeter winding, some voltage will be dropped across the meter and so the reading will not be accurate.

The best voltmeter is the one that takes the least current to deflect the needle across the scale. In the moving-coil voltmeter are many turns of fine wire. The resistance may be as much as 1,000 ohms for every volt on the scale. A voltmeter reading from 0 to 250 volts would therefore have a total resistance of 250,000 ohms. The accuracy of such a meter is near enough for all amateur needs, and is much greater than with the moving-iron meter, which draws appreciable current from the battery.

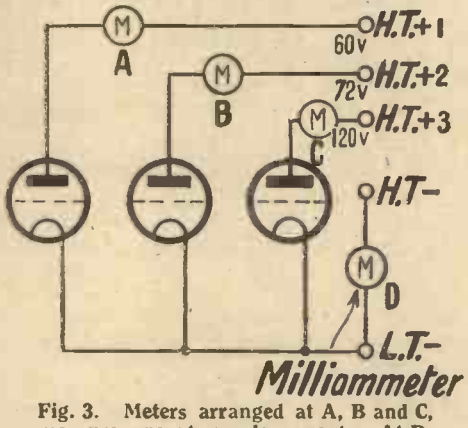


Fig. 3. Meters arranged at A, B and C, measure separate anode currents. At D, total current

One may often hear and be mystified by the expression "load voltage." This is the only voltage that counts. It is the value of the potential difference between the positive and negative of the power supply when that supply is delivering power. So a voltage reading of a battery, or mains unit, should always be taken when the set is working, for then the load voltage will be determined and not the no-load voltage, which is the value of the potential difference recorded when the supply is not delivering power.

This load voltage is most important in battery eliminators. It so happens that the load voltage of a mains unit is seldom as high as the no-load voltage. To take a voltmeter reading of a unit not delivering current to the set is to record something misleading. A unit might give 200 volts on no-load and when delivering say 20 milliamperes of current only 150 volts. A run-down battery would also show a higher voltage on a no-load test than when connected to the set.

Voltmeters are available in various voltage ranges. Some are wired so that two or three voltage ranges can be covered in one instrument, as, for example, 0-to-10, 0-to-50 and 0-to-250 volts. The low reading voltmeter is not often wanted, since the filament voltage and the grid-bias battery voltage are not usually in doubt.

Now we come to the ammeter, which works on the same principle as the moving-coil voltmeter. That is to say, current flowing through the coil tends to move the coil so that its flux is at right angles to the plane of the magnet surrounding it. We say that a clockwise twisting torque is exerted between the coil and the magnet, against the anti-clockwise torque of the springs connected to the pointer.

In an ammeter the fine-wire coil is shunted with low-resistances, so that when the meter is inserted in series with an electrical circuit its resistance is negligible. In this the ammeter differs from the voltmeter. Remember this simple rule:

Voltmeter; high resistance; parallel.
Ammeter; low resistance; series.

We very seldom need an ammeter in the wireless set, since the only large current is that taken by the filaments, usually a total of between .5 ampere and 1 ampere—in a battery-operated set. We are much more interested in the small currents flowing in the anode circuits of the valves. To measure these curents we use the milliammeter, which has its resistance shunts arranged so

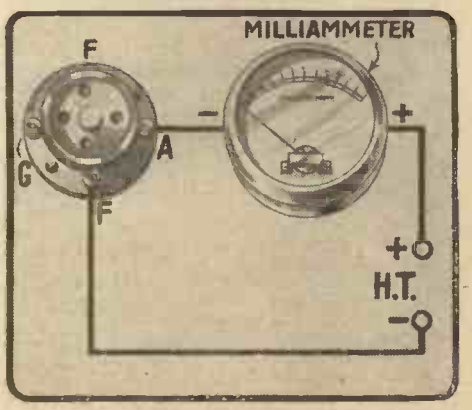


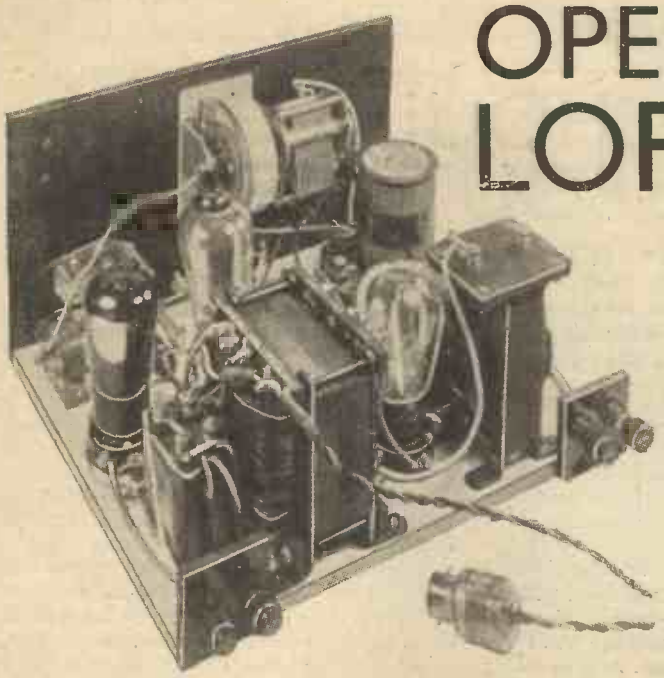
Fig. 2. This is how a milliammeter is used to show the anode current of a valve

(Continued in third column of next page)

OPERATING THE LOFTIN-WHITE 2

Some further notes on the novel mains receiver described in last week's issue

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



THE simplicity of this receiver is such that little remains to be said over and above what was given in the constructional details last week. Provided that reliable resistances are used, which are within a few per cent. of the stated values, the set will work without any difficulty and will give very pleasing results.

Circuit Features

I have been asked what the particular feature of the circuit is. The inquirer had apparently tried some experiments with the system (details of which have appeared in certain American papers) and had not obtained good results. The reason for this is that the resistances have not been correctly chosen for our British valves, and as the circuit is one in which the various voltages at the different points must be just right, the results *are* disappointing if the values are incorrect.

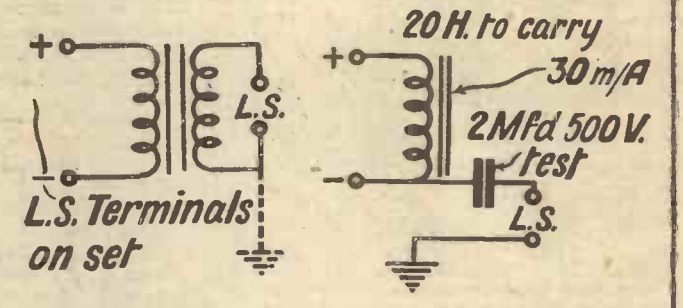
I had just the same difficulty at first and the circuit behaved rather like a poor two-valver of the ordinary variety. When the necessary alterations had been made, however, the difference was remarkable. It gives more volume than any ordinary two, even of the transformer-coupled type; while, of course, the cost is considerably cheapened, due to the fact that the smoothing required is less than usual, and resistances are used for intervalve coupling. Finally, since there are no coupling condensers, it is particularly good on transients.

I referred last week to the desirability of using a choke- or transformer output circuit. The last valve handles a current of some 30 to 35 milliamps, and this passing through the winding of the average loud-speaker will not be desirable for any length of time. True, in this case, the current grows to its normal value slowly and dies away again just as slowly, so that the high voltages usually produced by the sudden interruption of the current will not occur. It is, however, desirable to incorporate some isolating device, and this has the further advantage that it effectually isolates the loud-speaker from any possible high voltage in the set.

The diagram illustrates two forms of output circuit both of which would be suitable. The device is not included in the set itself, partly in order to keep the cost low, and partly because many readers themselves possess some such arrangement. For example, I have been using this receiver with a moving-coil speaker, which possesses a built-in transformer and therefore the difficulty is removed.

This loud-speaker, by the way, is a large auditorium model, yet I can produce loud volume from this simple two-valve set with surprising quality. A gramophone pick-up, of the ordinary sensitivity, giving about .5 to 1 volt, will produce adequate volume.

It is as well to reiterate that this set is only intended for local-station work. It will receive the Midland Regional programme at Elstree at good volume, but it is not intended for distant reception. I hope to describe very shortly a three-valve Loftin-White set, having one stage of H.F., and this is capable of a really remarkable performance. For all ordinary work, however, this two is efficient and inexpensive.



Two forms of output circuit suitable for the Loftin-White 2

COMPONENTS REQUIRED

Ebonite panel, 12 in. by 8 in. (Trelleborg, Becol, Lissen)

Small drum dial, with .0005-mfd. variable condenser (J.B., Burton, Polar, Formo, Lotus, Ormond)

.0001-mfd. reaction condenser, (Polar, Lissen, Bulgin, Lotus, J.B., Dubilier, Formo, Keystone)

Pick-up jack and plug (Lotus, type J.K.2 : Igranic)

400-ohm panel-mounting potentiometer (Lissen, Varley, Igranic, R.I., Sovereign, Rotor)

Single-pole mains switch (Claude Lyons, Bulgin, Utility, Igranic)

Baseboard, 12 in. by 10 in. (Clarion, Camco, Pickett)

Two four-pin and one five-pin valve holder (Burton, Telsen, Lotus, W.B., Benjamin)

Dual-range coil (Lewcos, D.W.A.)

.01-mfd. fixed condenser (Dubilier, T.C.C.)

Two 1-mfd. fixed condensers (Dubilier, T.C.C., Lissen, Igranic, Ferranti)

2-mfd. fixed condenser (Dubilier, T.C.C., Lissen, Igranic, Ferranti)

Two 2-mfd. fixed condensers (800 volt D.C. test) (Dubilier L.S.B., T.C.C., Ferranti, Igranic)

.5-megohm grid leak (Dubilier)

Grid-leak holder (Lissen, Dubilier, Bulgin)

50,000-ohm spaghetti resistance (Bulgin)

100,000-ohm spaghetti resistance (Bulgin)

20,000-ohm spaghetti resistance (Bulgin)

5,000-ohm power resistance (Colvern, Ferranti, Varley)

400-ohm resistance (Colvern)

High-frequency choke (Telsen, Varley, Lissen, Readi-Rad, R.I., Lewcos)

Mains transformer, with following secondaries; 375 v.-0—375 v., 40 m.a., 5-volt C.T. 1.6 amp, 6-volt C.T. .25 amp, 4-volt C.T. 1 amp (Savage, Wearite)

Smoothing choke (Lotus, Igranic, Varley, Lissen, R.I.)

Two terminal strips, 2 in. by 2 in. (Readi-Rad, Junit, Belling-Lee, Becol)

Four terminals marked : L.S.+ L.S.—, A, E (Belling-Lee, Clix, Eelex, Burton, Igranic)

Screen-grid connector (Belling-Lee)

"WHAT YOU SHOULD KNOW ABOUT METERS"

(Continued from preceding page)

that the pointer moves for thousandths of an ampere, or milliamperes. The milliammeter, measuring milliamperes, is connected as shown by Fig. 2.

Note that the milliammeter intercepts the anode circuit between the anode of the valve and the positive side of the power supply. The positive and negative connections of the meter must be connected as shown; that is, negative to anode and positive to battery positive. As shown, the meter will record the anode current of that particular valve. To measure the total current consumption of a three-valver with separate anode feeds, the meter must be connected in the negative battery lead, since that is common to all.

Fig. 3 shows how the separate anode currents of each valve can be measured by inserting the milliammeter at A, B and C, and how the total anode current can be measured at D.

HOTSPOT.

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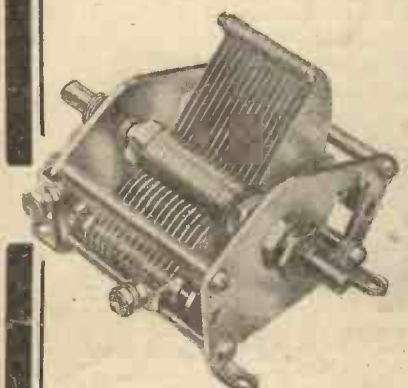

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BROADCAST ARTISTES IN PICTURE

ETHEL WALKER.—As an exponent of modern music, especially that of MacDowell, Miss Ethel Walker is especially noted.

DORIS VANE.—One of the original "Follies" of Pellissier's famous troupe. Miss Vane is a fine singer and act ..s.

JOSEPH LEWIS.—Late of the Birmingham station, is now at Savoy Hill, where he takes an active part in the practical side of programme making.

JERRY HOEY.—For many months now Jerry Hoey has directed the fine little orchestra known as the Piccadilly Grill Band.

JESSE STAMP.—Chief trombone player in the Queen's Hall Orchestra. A pupil of the Manchester Royal College, Mr. Stamp has played in all the great orchestras.

JOHN PERRY.—A tenor of exceptional quality and compass; as he has sung some thirty principal roles, his experience may be considered wide.

SIGNOR LENGHI-CELLINI.—In the earlier days of the Queen's Hall concerts, his name frequently appeared.

HELEN ALSTON.—A fine singer, she is known on all the big concert halls, as well as broadcast concerts.

ESTHER COLEMAN.— A singer who has made her name by her artistic work and the many recitals she has given.

ARTHUR KENNEDY.— A well-known provincial musician and conductor, often heard through the Regional station, when he conducts the Midland Wireless Orchestra.

MARY OGDEN.—A fine contralto. Born in Manchester, she went in particularly for oratorio work.

LEONARDO KEMP. — At present running the orchestra which broadcasts twice weekly from the Piccadilly Hotel.

MURIEL CHILDE.—A clever artiste, who has been heard over the ether as well as in many provincial concerts and halls.

THERMION SAYS:

"GIVE YOUR SET A CHRISTMAS PRESENT"

I SHALL never forget the Christmas when Mrs. Thermion, full of loving pride, handed me the compliments of the season and the world's worst transformer. Of course, one should not look a gift transformer in the primary impedance. Still, one glance was sufficient to show it to be the kind of thing that causes stout fellows to be filled with a longing to bury it deep in the barrenest part of the garden.

Since then we have come to a much better arrangement, such as I strongly recommend to all readers. She presents me with silk stockings and things, and I give her valves and moving-coil loud-speakers. Then, when the glad season is over, we solemnly swop presents.

It is, I think, the duty of every wireless man to give his set a Christmas present; and here I may remark that the business of squaring your conscience is the easiest thing in the world, once you know how. For instance :—

"I would like to give my set a new output valve, but it *does* seem a bit selfish."

"Doesn't the family enjoy the music from your set?"

"Why, of course."

"And won't the valve improve the music?"

"There's no doubt about that."

"Then, by giving it a new valve you are performing a most unselfish deed, since you are increasing the joy of your family."

You see?

Of course, the best present that you can give your set, really, is a thorough overhaul, going over all the wiring and possibly substituting up-to-date components for old ones. And there is a nice long time to do it in this Christmas, for there are four whole days' holiday from the Thursday onwards. But I am not going to recommend this course, for I know that if I did so thousands upon thousands of families would heap curses upon my head, since the wireless set would be silent over the whole of the Christmas holiday.

A Few Hints

Still, if you won't let on that I am responsible, I can, I think, give you one or two little hints and tips that will help to pass the holiday time happily whilst greatly improving the performance of the set. For instance, a jolly and quite inexpensive little present to the family is a slow-motion dial for the reaction control. This can be fitted in a trice (whatever a trice may be!), and it does make the tuning-in of foreign stations a whole heap easier. And if those valves have seen their best days I am sure that the family would appreciate a new lot.

And then there's that low-frequency transformer—not, perhaps, the world's worst, but, at any rate, not quite the world's best. At the glad season you might as well make the family a really good present and buy them an up-to-date transformer, even if it does cost thirty bob. You can change a transformer pretty quickly without disarranging the set, for all you have to do is to whip off the terminals and lift aside the connecting wires. Out with the baseboard-mounting screws, and there you are. Reverse the process, and the new component is in place.

And here's a present you can give the set and the family with the pleasant feeling that, however much you spend on it, you are saving money hand over fist. What I mean is a super-capacity high-tension battery to replace the little fellow that you use and ill-use at the moment. Honestly, no standard-capacity battery is up to working anything bigger than a two-valver economically. I have tested hundreds and hundreds and hundreds of them in the laboratory, and I know what they really can and can't do.

Of course, if you have lighting mains in the house, one of the best presents that you can give the set is an eliminator. You needn't alter a single wire if you buy one of the type that incorporates an L.T. trickle charger.

SOME USEFUL SUGGESTIONS

Igranic Elkon rectifier

Westinghouse H.T. rectifier

Telsen transformer

Clarke's 'Atlas' H.T. unit

Exide accumulator

Lissen variable condenser

Ediswan two-valver

An R.I. Varicap condenser

(Above) Varley table-type receiver. (Right) The new Marconiphone 560 set

A Weekly Programme Criticism—By SYDNEY A. MOSELEY.

Without Fear or Favour

THE MOST POPULAR CONDUCTOR?

THE TWO PAYNES

IF, the play by Lord Dunsany, which was rather reminiscent of the *Aladdin* and *Brass Bottle* type of play, justified its production by Lance Sieveking. I preferred the beginning, in which Ernest Thesiger and Gladys Young were a pair of Cockneys. The scene in the East was noisy and not new, and I was longing for the epilogue which would bring us back to the pair of Cockneys.

To my amazement, however, Mr. Thesiger had dropped most of his Cockney accent and maintained his "dream speech," which was a pity. As a Cockney Mr. Thesiger was *par excellence*. So were Gladys Young and Olive Walter. Lilian Harrison acted the part of a vamp with a certain cuteness.

◆ ◆ ◆

Naturally, the producer tried one of his modern stunts, but, although his method of producing the passage of time would probably irritate many people, it rather had my approbation. Indeed, I go so far as to say that it was clever.

◆ ◆ ◆

Who is the most popular conductor of the big B.B.C. Symphony Orchestra? I would have plumped for Adrian Boult, and then for Sir Henry Wood, judging from the applause of the audience. But Sir Landon Ronald, I think, comes an easy first, for the orchestra for the first time joined in vociferous applause. This is where Arthur Catterall again shows himself a good leader.

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Some critics aver that we should get younger conductors and hint that Sir Henry Wood has had his innings. Certainly Sir Henry lacks the fire and gymnastics of the man I used to watch night after night before the War, but there is no gainsaying that he is still a popular favourite.

◆ ◆ ◆

And, talking about the Symphony Concerts, why can there not be some arrangement whereby a bell would just tinkle one minute before the conductor raises his baton, so that the attendants would automatically close the doors, and we should not have the spectacle of the conductor having to wait for people to be seated, not only keeping the visible audience waiting, but also the millions of listeners?

STORY TELLING

CRITICISMS

I was prepared to criticise the Weekly Theatrical Cartoon, for it is rather late in the day to boost theatrical stars. However, Elizabeth Pollock's portrayal of Marie Tempest was quite good, and easily justifies the series. But what always occurs to me is that theatrical people seem to get all this big free publicity. What about musicians, artistes, doctors—yes, and even authors?

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Mr. G. O., of Tooting, in an interesting letter says he is going to "start something" by contesting the claim that Teddy Brown is the world's greatest xylophone player. Indeed, he will arouse Teddy's warmth by suggesting that he should buy the latest book on harmony!

"Carry on with your good work of criticism," concludes my correspondent. I will. But must add that the xylophone, without criticising Mr. Brown's technique, comes over very well indeed. I agree with my correspondent, however, that playing masterpieces to ragtime is very distasteful to lovers of good music.

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I shall have to write an article one day about the B.B.C. entering into competition with the music-halls. Here is a "top of the bill" announcement of "So-and-So and his B.B.C. Dance Band." Isn't that tantamount to invading the music-halls?

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Incidentally, here is an amusing incident worth repeating. One of my readers was passing a music-hall and noticed on a bill: "Jack Payne" and "A B.B.C. Star" prominently displayed. He went in on the spur of the moment and found that it was Jack Payne, the B.B.C. whistler, who was appearing.

On another occasion in London Jan Ralfini was described in large letters as "a B.B.C. star." Some people think that this is an unjustifiable use of the B.B.C.'s name. Yet it is difficult to see how the B.B.C. can stop it.

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I still give full marks to Cardiff for the Joan and Betty Bible stories, although the King in "Daniel and the Lions' Den" sounded sometimes rather unkingly. That is the way to teach the Bible. Pity there isn't a similarly interesting way of learning irregular verbs.

◆ ◆ ◆

I see the Bach Cantatas still go strong. I am told that these are costly transmissions. Why? They "didn't ought" to be!

◆ ◆ ◆

The Gershom Parkington Quintet still holds its own; and who can say that it doesn't deserve it, despite the "grand" orchestras and "splendid" bands.

◆ ◆ ◆

I am afraid that all was not well with A. J. Alan in his latest effort, "The Well." Not only was A. J. in bad form, but his material was even more slender than usual.

I rather gather from some of my friends that A. J. has an arresting personality, for he certainly managed to impress a critical friend of mine, with whom he dined and to whom he read a story. But in my house, where he has had much support, that last effort was regarded as the limit.

◆ ◆ ◆

I listened to James Agate the other night, and he certainly maintained the lead as an intelligent, yet not too highbrow, critic. He is also mature, and the only pity is that the B.B.C. has failed to find somebody as good for its cinema criticisms.

Amos'n Andy the famous Americans who are to be relayed on December 31

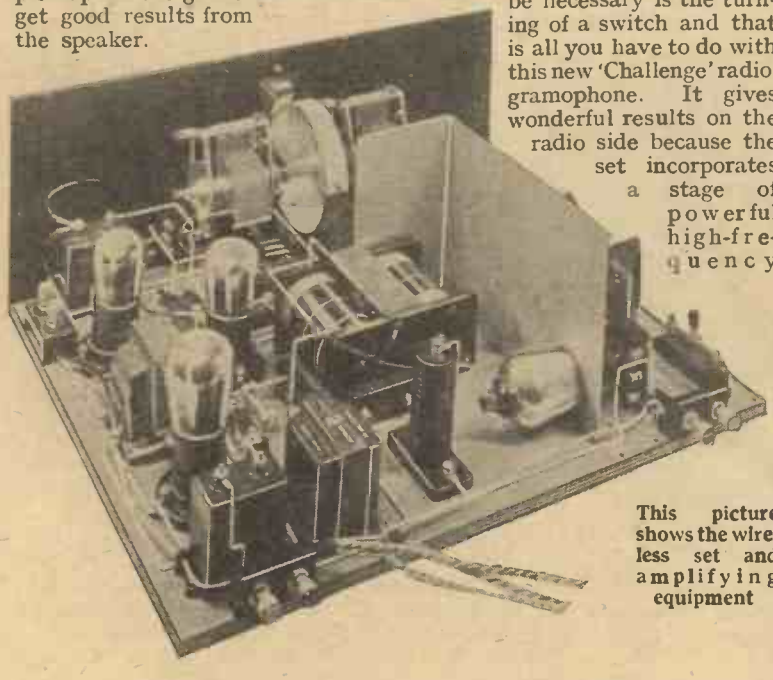
The "CHALLE RADIO-GRAM

A powerful four-valve wireless set provided its use in conjunction with a gramophone assembly makes a very fine dual-pu

HAVE you a radio-gramophone? If you have not, then in all probability the only two reasons are that you think the cost would be excessive and that you think the constructional difficulties would be beyond you. Here is the "Challenge Radio-gramophone" to disprove both these notions. It is basically a four-valve set which is as easy to make up as any of the previous sets of the successful Challenge series—and that is saying something—and it is built in a cabinet carrying the other essentials for a radio-gramophone, turntable, pick-up and speaker.

Of course, it is possible to get electric reproduction with gramophone records with practically any set having two or more valves, and it is easy to connect the pick-up in the grid circuit and get good results from the speaker. However, with many set users that is not the most convenient plan because it means having trailing wires from the pick-up, which has to be mounted externally with the turntable and motor board, to the set. Moreover, it may not be possible easily to switch over from radio to gramophone working, and at times that may be a serious disadvantage. The very best plan is to make up the radio side and gramophone equipment in one cabinet, preferably building a special set for the purpose. In this way you can be sure of having a set designed to give equally good results on radio and gramophone working and which will incorporate easy change-over arrangements.

The most that should be necessary is the turning of a switch and that is all you have to do with this new 'Challenge' radio-gramophone. It gives wonderful results on the radio side because the set incorporates a stage of powerful high-frequency magnification and it will put new life into your old records because of the well-arranged low-frequency and power amplification stages.



This picture shows the wireless set and amplifying equipment

Wireless Set and Gramophone

From the accompanying photograph you will see that the appearance of the complete instrument is more than pleasing. It is at least equal to a very expensive commercial radio-gramophone, the performance and appearance alike being well up to the most costly standards. Briefly, it may be explained that the receiver is quite a

Components for the "Challenge" Radio - Gramop

Ebonite panel, 18 in. by 7 in. (Becol, Keystone, Trelleborg).

Baseboard, 18 in. by 14 in. (Camco, Clarion, Pickett).

Two .0005-mfd. variable condensers (Polar Universal, Lotus, Lissen, Ormond, Formo, J.B., Burton, Igranic, Utility).

Slow-motion drum-drive (Polar, Ormond, Lotus, J.B., Utility, Burton).

.0003-mfd. reaction condenser (Lotus).

Double-pole change-over rotary switch (Wearite No. 122, Utility).

1-megohm volume-control (Rotorohm, Gambrell, Igranic, Claude Lyons, Sovereign).

One dual-range aerial coil, and one anode coil with reaction winding, Challenge type (Tunewell, Clark, H. & B., Wearite, Parex, Readi-Rad).

Horizontal-mounting valve holder (Junit, W.B., Parex, Wearite).

Three valve holders (Lotus, Benjamin, Telsen, Burton, Lissen).

Four fixed condensers, one .0003-mfd., one .005-mfd., one .0002-mfd., and one .0001-mfd. (Lissen, Telsen, Readi-Rad, T.C.C., Dubilier).

1-mfd. fixed condenser (T.C.C., Dubilier, Lissen, Igranic).

Two 2-mfd. fixed condensers (T.C.C., Dubilier, Lissen, Igranic, Ferranti, Formo).

Grid-leak holder (Lissen, Bulgin).

2-megohm grid-leak (Dubilier, Lissen, Readi-Rad, Igranic).

High-frequency choke (Lewcos, Readi-Rad, Lissen, Varley, Formo, Tunewell, R.I.).

Low-frequency transformer (Telse Lissen, Varley, Burton, R.I., Fe Igranic).

Low-frequency choke (R.I. Hyp Igranic, Lissen, Varley, Wearite).

Pre-set aerial condenser, .000 max. (Formodenser type F, Polar, reign, Lissen).

One 30,000-ohm and one 80,0 spaghetti resistance (Bulgin).

Three terminal blocks (Bellin Lissen, Junit).

Six terminals marked Aerial, Pick-up (2), L.S. (2) (Belling-L. Eelex).

Aluminium partition screen H. & B., Readi-Rad, Wearite).

Piece of aluminium foil, 8½ in. by (Parex, H. & B., Readi-Rad, W

7 in. length of half-inch angle

2 in. extension rod, coupler and for change-over switch (Wearite).

Wire and 7 yds. flex.

Six wander-plugs marked H.T.—, H.T. 2, G.B.+, G.B.—1, G.B.—2 (B Lee, Clix, Eelex),

Two spade terminals marked L.T.—, (Belling-Lee, Clix).

Screen-grid connector (Belling-Lee

Electric gramophone motor (Ap

Pick-up and tone arm (Ediswan).

Moving-coil loud-speaker (Hegr

Gramophone cabinet (Camco, Wa

Novotone [optional], Gambrell).

ENGE" [9] AOPHONE

with pick-up arrangements; is optional, but the entire urpose instrument

separate unit in the cabinet. Above it is the motor board carrying an induction motor and pick-up, while below it is the moving-coil speaker and the batteries or mains eliminator.

It is proposed to describe the receiver first and in a subsequent article the layout of the gramophone side will be dealt with fully. The receiver can, of course, be made up by anyone in need of a good four-valver and the gramophone switching arrangement can be dispensed with if required, although it is not recommended that this should be done. The question of cost, which naturally worries most constructors, is determined by the accessories which you use in conjunction with the set. The set itself is relatively inexpensive. In an accompanying panel will be seen a list of the parts needed, the original parts used in this set being specified first and suitable alternatives are also given in most cases. At the outset you are advised to examine the circuit diagram, for this shows the general working of the set and explains why it is that good results are obtained, both with radio and gramophone working.

The Circuit

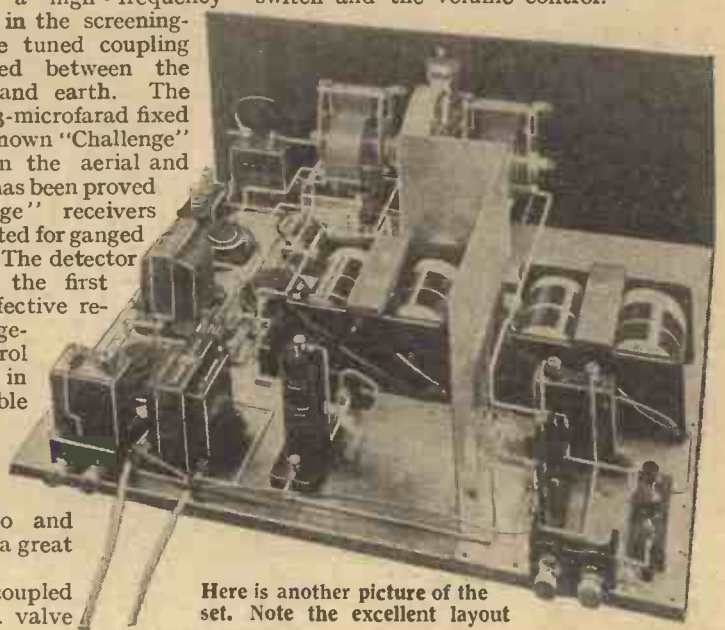
Essentially the circuit is of the screen-grid, detector, R.C. and transformer-coupled type. The aerial and high-frequency circuits are ganged so that the set is virtually of the one-knob control variety. There is, of course, a subsidiary reaction control, but this is not at all critical for ordinary working. It is only when the set is pressed to its limits in order to receive very distant foreign stations that critical control of reaction is called for.

The high-frequency coupling is of the shunt-feed type, a high-frequency choke being inserted in the screening-grid anode circuit, the tuned coupling circuit being connected between the detector valve grid and earth. The coupling is via a .0003-microfarad fixed condenser. The well-known "Challenge" coils are used both in the aerial and anode circuit and as has been proved in previous "Challenge" receivers these are admirably suited for ganged tuning arrangements. The detector valve is coupled to the first power valve by an effective resistance capacity arrangement, a volume control being provided here in the form of a variable grid leak for the L.F. valve. It should be noted that this volume control is effective equally on radio and gramophone working—a great advantage.

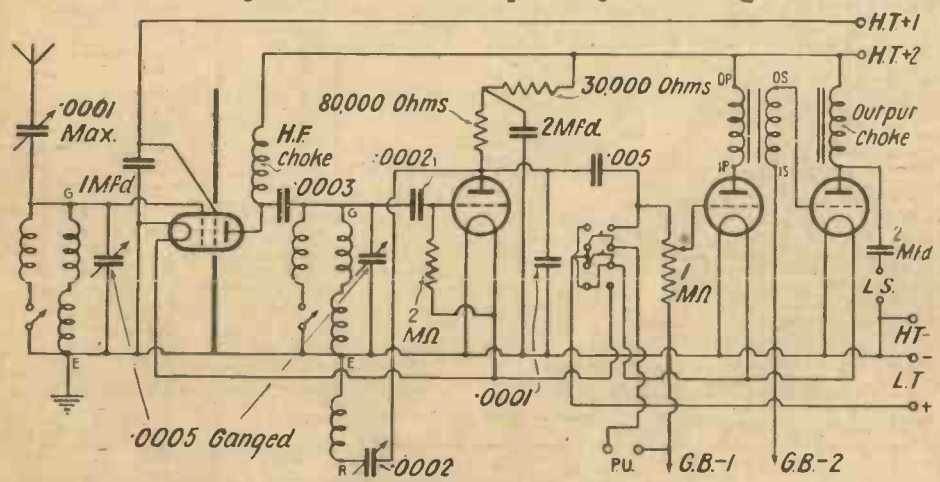
The power valve is coupled to the preceding L.F. valve by a transformer and of particular interest is the output circuit provided in the anode supply to the power valve. This output circuit is of the choke-filter type and the coupling condenser is so arranged that the speaker is on the earth side of the set. This is an efficient arrangement in every way, and it is a big advantage if you want to erect an external speaker in conjunction with the speaker incorporated in the gramophone. With this output filter circuit in use you have no danger of getting a shock from the extended speaker wires.

Controls

The pick-up switch arrangement is included in the grid circuit of the first low-frequency valve. It is very conveniently arranged, for in the mid-position it switches the set off, in one position it brings into circuit only the two valves necessary for gramophone working and in the other position it cuts out the pick-up and switches on all four valves for radio operation. On the front of the panel are the controls for tuning and reaction, the radio-gramophone switch and the volume control.



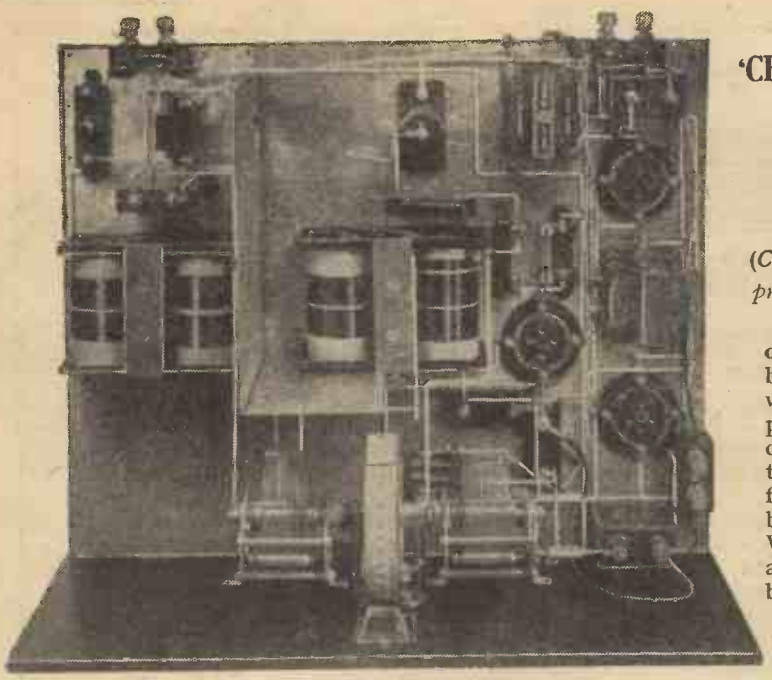
Here is another picture of the set. Note the excellent layout



The circuit of the receiver unit of the radio-gramophone

It is quite safe to let any member of the family handle this radio-gramophone outfit. The local stations can be tuned in even by an absolute novice and there is no difficulty in getting good results on the gramophone side.

So far as construction is concerned, the first step should be to obtain a copy of the full-size blueprint which can be obtained, price 1s. 6d., post free, from the Blueprint Department, AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4. You will find this particularly handy because although the construction of the receiver unit of the "Challenge" radio-gramophone is on quite straightforward lines, there is no reason why you should make it more difficult by not having a full-size chart.



This photograph together with the diagram below indicates the layout and wiring quite clearly

"THE 'CHALLENGE' RADIO GRAMO-PHONE"

(*Continued from preceding page*)

As in any powerful receiver having high radio- and audio-frequency magnification, the layout of the parts is very important and, frankly, it is not easy to get this layout correct unless the blueprint is used. Panel drilling is quite easy although there is, of course, the aperture to be cut for the drum dial escutcheon plate. If you are not very handy with a fretsaw, then probably the easiest way of cutting out this aperture is by drilling small holes around the marked out rectangle until the centre portion of ebonite can be lightly tapped out. Take care when mounting the ganged condenser to get the whole assembly quite central. If desired the actual mounting of the condenser can be left till a later stage when the panel has been attached to the baseboard and some of the wiring has been done. True, this will leave more room for the wiring up of the reaction condenser, volume control, wave-change switch and radio-gramophone switch, but there is no need to do this if you are at all skilful with the soldering iron.

Assembly and Wiring

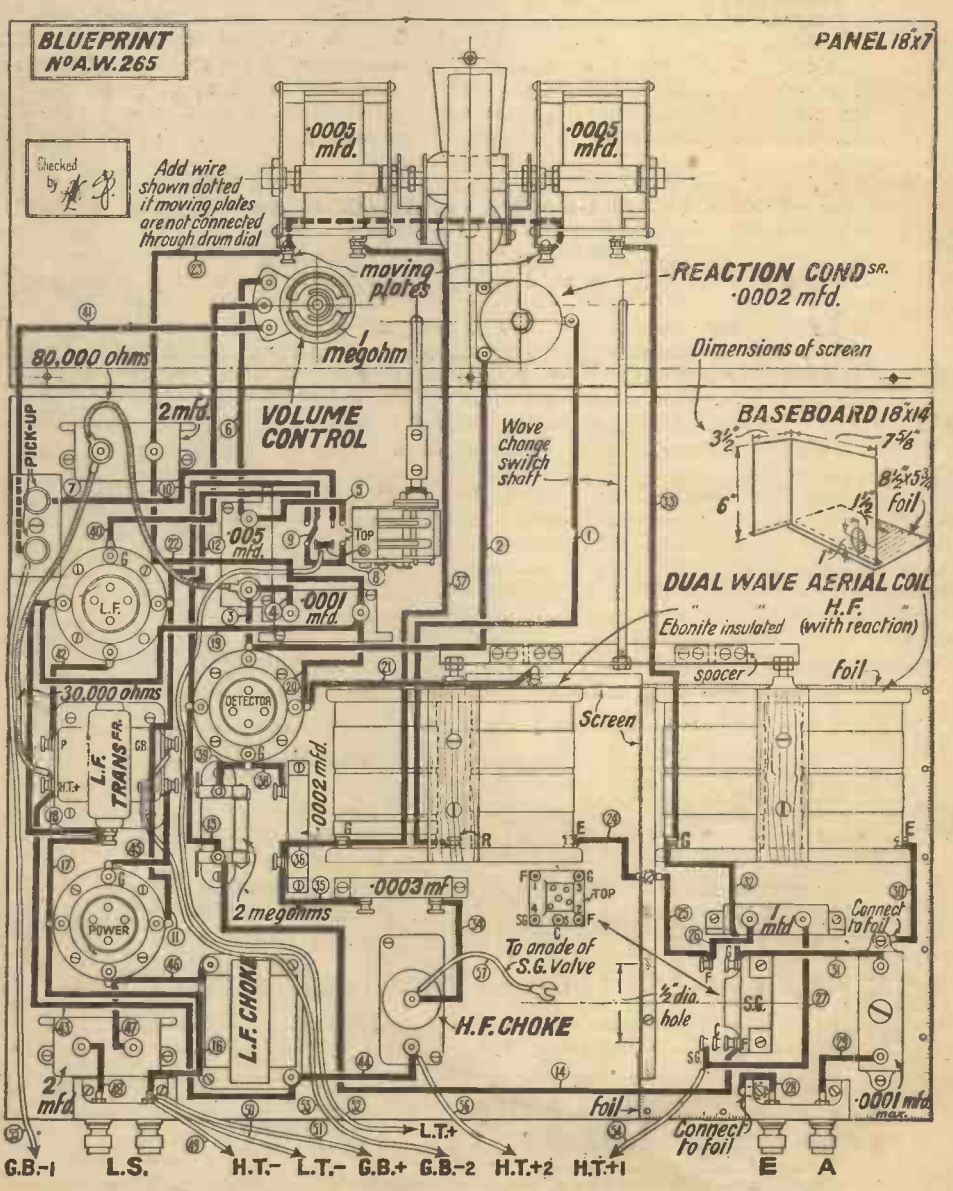
The next job, after the panel has been fixed to the baseboard, is to mount the baseboard parts in their places. Before the components on the high-frequency side are screwed down it is, of course, necessary to put down the small "floor" of foil. This should be cut to the size shown in the full-size blueprint, and tacked at the rear right-hand corner of the baseboard. Then the screen may be mounted and this will act as a rough guide to the correct positions of some of the other parts.

All the other parts, including the "Challenge" coils, and the two terminal circuits can be screwed down for there is ample room in which to carry out the wiring. The coils can be bought ready made or they can be wound at home. Full details for constructing the "Challenge" coils were given in AMATEUR WIRELESS No. 436. It will be seen that these coils are placed on their sides, little securing strips of plywood being used to hold the ends of the formers in place.

The dotted line on the blueprint, between the two sections of the tuning condenser, indicate the connections which must be made if a condenser is used in which the moving-vane sections are not joined. The switch-ganging strip (for wave changing) and the control rod can be bought with the coils or made out of brass scrap.

And now for wiring. You will have no trouble in this if you follow the blueprint closely. The theoretical connections are quite simple and if you follow the blueprint you will see the best positions for the wires. Be sure to make no mistakes when wiring up the radio-gramophone switch. The best plan is to tick off on the blueprint each wire as its actual counterpart is put in position in the set. You will see that rigid wire is used for all the main connections, although flex leads are used for the high-tension, low-tension, and grid-bias supplies and flexible resistances are used in two places. When the wiring is finished the set is ready for an initial test, and in next week's issue it will be explained how the set may be operated and how the other units of the radio-gramophone are assembled.

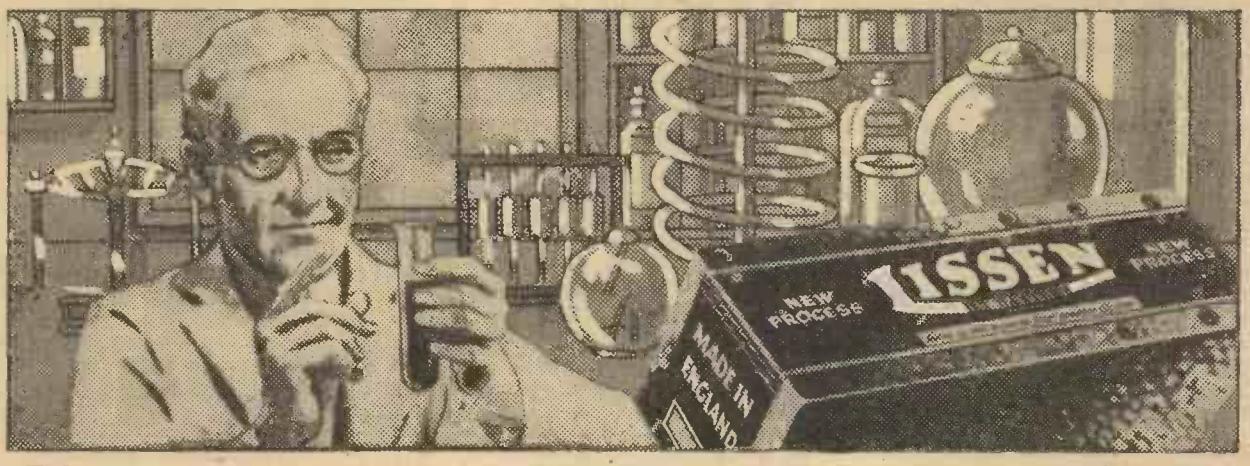
See this radio-gramophone in the Radio Department windows of Messrs. Selfridge and Co. of Oxford Street, this week.



The layout and diagram. A full-size blueprint of this is available, price 1/6

CHEMICAL MAGIC

AS THE BASIS FOR A SECRET PROCESS *PRODUCING SUPER-NORMAL CURRENT-PER-CELL FROM A LISSEN HIGH TENSION BATTERY*



How to save money on your outlay for H.T. current and how to capture anew the thrill you enjoyed when first you heard radio!

The reason you get more power from a Lissen Battery is because more power is put into it by the exclusive process and chemical combination which you can only get in a Lissen Battery.

No battery delivers more pure power for so long and for so small an initial outlay. The active chemicals in a Lissen Battery are so perfectly balanced that their chemical activity continues much longer than has ever before been known in the cells of high-tension batteries. *So much for economy.*

Then for purity of power, for noiselessness of current flow, for smoothness, for the entire absence of any ripple or hum, the Lissen Battery has never been rivalled. Even after months of use the power of a Lissen Battery is so pure that your loud-speaker utterance is still natural and true.

LISSEN BATTERY POWER GIVES SPARKLE AND BRILLIANCE OF TONE TO EVERY ITEM !

BE FIRM IN THE WAY YOU SAY YOU WANT A LISSEN BATTERY

LISSEN LIMITED, WORPLE ROAD, ISLEWORTH, MIDDLESEX.

60 volt 7/11 100 volt 12/11 Also made in all sizes, all voltages, all capacities to suit your needs.

SETS OF DISTINCTION

The COLUMBIA MODEL 309

Makers: Columbia Graphophone Co., Ltd. *Price: £12 - 12 - 0*

ENTIRELY novel in design is the latest product of the Columbia Graphophone Company, Limited. This is an all-electric two-valver for A.C. mains. It can be used on all supply voltages between 100 and 250 volts, provided that the right model is ordered. Still another model is available for D.C. mains supplies.

According to the makers, the power consumption of the A.C. model I recently tested is only 20 watts. This means that the set can be run for 50 hours for the price of a unit of electricity. In other words the running cost is negligible.

At 12 guineas Columbia 309 would, in any case, be an inexpensive two-valver. But when one realises that this price includes a very good quality cone loud-speaker a great bargain is at once apparent. Model 309 is, in fact, entirely self-contained, except for an aerial and earth. At the beginning I said that this set was novel. The novelty lies in the fact that instead of tuning in stations one switches them in.

Tuning Controls

In place of the usual variable condenser control there are two separate pairs of tuning and volume controls. One pair is used to bring in one of the local stations and the other pair the remaining local station assuming of course that the set is used in a Regional area. Each tuning circuit has a limited range, covering whatever wavelength is desired, by the insertion of one of ten available plug-in coils. For my test I was supplied with coils D for the London Regional station and coil A for the London National station. These coils, in conjunction with the two small range variable condensers, are flexible enough in wavelength range to allow the station for which they are designed to be tuned in on widely differing aerials.

By this simple means of switching from one complete tuning circuit and volume control to another similar circuit, a great simplicity of control has been effected. For once the two stations have been tuned in and their volumes adjusted to the desired degree, no further tuning is necessary to select which of the two alternative stations is wanted. It is simply a matter of pulling a switch up or down.

The four small knobs for tuning and volume control of each station are hidden under a readily-removable escutcheon plate mounted at the bottom of the cabinet, just under the loud-speaker grille. Through this escutcheon plate projects the station switch on the left and the mains on-off switch on the right.

Model 309 is essentially a local-station set, being especially suitable for the loud-speaker reproduction of twin Regional programmes, as from Brookman's Park or Daventry. The circuit consists of an indirectly-heated A.C. detector valve, transformer-coupled to a pentode output valve. The combination provides great amplification, so that only a modest aerial is needed to give good loud-speaker reproduction.

For my test I used a 40-foot vertical length of wire coming from the top of the house to the bottom; by no means an efficient aerial. On this I got the National and Regional stations from Brookman's Park, at amazing strength for a two-valver. Using some reaction the volume could be increased to an enormous extent. So strong were these local stations that I succumbed to the temptation of trying for distant stations.

On tune 1, I got Turin at full loud-speaker strength, as well as Cologne, Rennes and Bratislava. On tune 2, I logged 6 other foreign stations. The set does so much better than intended that it is a pity larger control knobs were not fitted for the benefit of ether searchers!

Selectivity

As regards selectivity the set had to separate the two Brookman's Park stations. This was done with ease.

No trace of interference could be detected during the reception of each of the twins. Moreover, adjustments to tune 2 and volume 2 had no interaction on the adjustments of tune 1 and volume 1. For listeners living at greater distances from the local station, a more efficient aerial than mine would be needed. To provide for selectivity with a fairly long aerial the makers have fitted Model 309 with a series aerial condenser at the back, near the aerial and earth terminals.

Quality of reproduction on Model 309 frankly took me by surprise; it is really good. The pentode counteracts the natural low pitch of the cone loud-speaker, resulting in a well-balanced tone. Speech is crisp and clear and orchestral broadcasting has plenty of bass.

A Fine Set

The illustrations hardly do justice to the fine appearance of Model 309. It is dignified and useful. It is one of the most tidy sets tested for a long time. The size of the cabinet, which is of well-finished oak, is smaller than the average container of cone loud-speakers. Altogether Model 309 is an exceptionally fine two-valve all-electric set. Once again Columbia have produced a winner!

SET TESTER.

The Heayberd L.T. Transformer.—An error appeared in the Heayberd advertisement appearing in the November 15 issue of "A.W." The text of the advertisement indicated the advisability of constructing a low-tension eliminator incorporating the Heayberd low-tension power transformers. It is, of course, quite unnecessary to build such an eliminator. All that is required is that the receiver should be fitted with indirectly-heated A.C. valves, the valves being operated by the Heayberd L.T. transformer giving exactly 4 volts. The transformers have three secondary terminals, the centre one of which, indicated by a sign, connects to earth (or to H.T.—). The two outer terminals giving 4 volts connect to the heater terminals of the A.C. valves. For wiring purposes the 4-volt terminals of the transformer may be regarded as the 4-volt terminals of an accumulator. It will therefore be readily seen that by substituting the present valves in a receiver for indirectly-heated A.C. valves and using the Heayberd L.T. transformer with A.C. mains, it is far more economical to run than an accumulator.

Recently a Dutch subscriber put a call through from Amsterdam to Turin with the request that an S.O.S. be broadcast in order that he might get into touch with his parents then travelling in Italy. The transmission was carried out by the Rome and Turin stations on the same evening. Later, the latter studio was informed by a listener in Venice that the family had left that city for Florence. As the address was available it was telegraphed by the Italian authorities to Amsterdam without delay.

GETTING THE TRANSIENTS RIGHT

Some Points to Note in the Quest for Quality Reproduction

By Our Technical Editor.

MOST readers will have heard of transients. They may perhaps have heard their learned friends discoursing on the subject and have wondered whether these transients, whatever they may be, are likely to affect them to any serious extent. The answer to this question depends entirely upon the circumstances. I suggested a short time ago in an article on resistance coupling, that the design of an R.C. amplifier depended on the musical tastes of the listener, and if one's musical perception is not strongly developed, or for that matter, if the loud-speaker being used is incapable of rendering the various passages with the correct delicacy, then it is useless spending time and money in making improvements which will not be noticed.

What a Transient Is

This transient question is very largely a case in point. There are many effects in music, and for that matter, even more in speech, where the current suddenly changes from one value to another. If, for example, one produces a "p" sound, this is the result of an explosion of air from the lips, and this sudden air wave hitting the microphone produces a sudden pulse of current, which is not repeated. Such a phenomenon is, therefore, termed a transient, to make a distinction from the ordinary sounds which are more or less gradual in their change and repeat themselves many times. With a pure note, for instance, the current increases to its maximum and then falls away to zero in a gradual manner and continues to do the same thing over and over again. The number of times this process takes place in one second determines the frequency or pitch of the note, but it will be seen that a transient term, which only occurs once, is quite a different story.

Resistance Coupling

Now the ordinary amplifier, even if of poor quality, will give some sort of response to an explosion transient such as we have just considered. It will not give a faithful response, and therefore the output will be distorted. The result of this will be that the music would lose a little crispness or "attack" as we call it, while speech (which contains a very high proportion of these transient terms) would not be absolutely natural. It would be perfectly intelligible, but one could detect at once that there was a difference between the reproduced speech and the actual speaker.

Therefore, if one is going all out for the best reproduction, assuming that one is able to appreciate it (and it is little use to blink the fact that many of us are not keenly musical), it is necessary to see that one's amplifier responds in the highest possible degree to these transient terms. I was present at a lecture in Liverpool quite recently, where an amplifier was described which handled faithfully a very difficult wave form produced by suddenly switching the current on and then off twice a second (i.e. a frequency of 2 cycles only). With any ordinary form of amplifier such variation of current would be hopelessly distorted. The chokes and condensers in the circuit would slow up the changes and the current, instead of starting and stopping sharply, would become "round-shouldered." The difference is shown in Fig. 1.

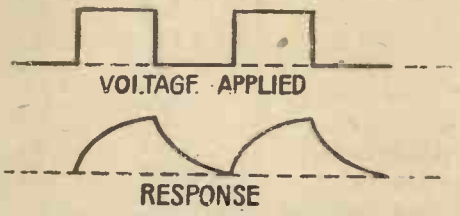


Fig. 1. Showing how inductance and capacity can distort a wave form

In order to avoid any such distortion, resistance coupling is often resorted to, particularly with relatively low values of resistance. Since there are no chokes in the circuit, the only source of distortion we have is the coupling condenser. Consider Fig. 2, which represents a simple resistance-coupled circuit. There is a high-tension voltage applied to the anode resistance, while the grid of the second valve is connected to L.T.— through a G.B. battery.

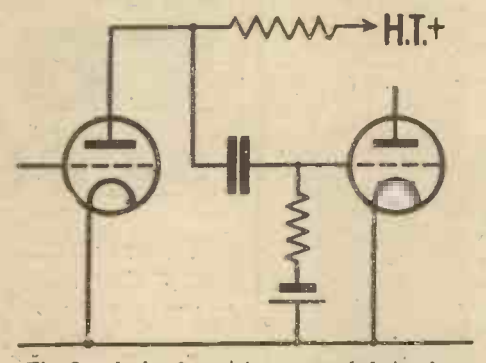


Fig. 2. A simple resistance-coupled circuit

In consequence, there is a definite difference in voltage across the coupling condenser (indeed, this is what it is there for), and the condenser is, therefore, charged.

Effect of Sudden Change

Suppose we suddenly alter the voltage on the grid of the first valve. The anode current will change, and therefore the voltage on the anode of the first valve will change, because of the different voltage drop on the anode resistance. At once we have a different voltage across the coupling condenser, which will require that the condenser shall charge or discharge to some extent in order to readjust itself to the new condition. If we are to avoid distortion this alteration in the condition must take place almost instantaneously.

It can be shown that for this condition to occur the condenser must be large. In the article already referred to, I gave several figures for the value of the coupling condenser which was stated to be the minimum satisfactory for good reproduction. We now see, however, that for the best quality the value of coupling condenser must be considerably increased. Theoretically it may be increased indefinitely with continuous improvement in the result, and one must call a halt somewhere; generally speaking, a value of 1 or 2 microfarads is sufficient to obtain satisfactory amplification of transient phenomena.

This large increase in the value of the coupling condenser is only necessary or desirable where one has a really good loud-speaker, which is capable of detecting the difference between good and bad "attack."

OUR LISTENING POST

By JAY COOTE

IN radio it is not always the big voices which shout the loudest; in fact, many of these stentors have a pernicious habit, at times, of fading away into oblivion, whilst their juniors keep up a steady chatter in the ether. Much of interest can be found by searching for these little "one-horse" studios which, once captured, provide impromptu entertainments of which details are seldom available in the programme papers. Such a one is Radio Normandie at Fécamp (France). What its actual aerial power is nobody except its owner really knows, but in the south coast of England its broadcasts romp into my loud-speaker with the energy of many of the ten and fifteen kilowatters.

Try for it any evening towards 8 p.m., tuning in between Cork and Cologne, for Normandie works on 222.9 metres. Possibly some difficulty may be experienced in keeping out the Rhineland transmissions, but a frame aerial solves the problem with its directional properties.

Fécamp boasts of a woman announcer whose enunciation is so clear that if you only possess a smattering of the language you should understand every sentence. Her news bulletin is a comprehensive one—real, live, up-to-the-minute information on events of interest even to foreign listeners. The concert which follows is mainly composed of gramophone records, but reproduction is of the very best and far superior to such recitals offered to us by many wealthier studios. There is no regular interval signal, although now and again during a pause in the programme you may hear a silvery-toned bell, but the exact time is announced by a melodious carillon relayed from the old Benedictine monastery. Fécamp is not far from Le Havre and on Friday evenings we are taken over to that port for a concert from the Hotel Frascati.

I need hardly ask whether you have logged Muhlaker broadcasting the Stuttgart or Frankfurt-am-Main programmes on 360 metres, for it would be almost impossible not to pick it up when you twirl the condensers. A 75-kilowatt station cannot be ignored, and we must make the best of it even if, at times, it swamps our reception of the Regional. On any Friday at 3 p.m., a relay is made of a concert from the Wiesbaden Kurhaus which possesses an orchestra of some 90 musicians broadcasting in a hall with remarkable acoustic properties.

WHAT ARE THE SOUND WAVES SAYING?

THE sound waves have brought us a good deal of César Franck's music recently and, so far as I am concerned, it is more than welcome. Fate was cruel to Franck. He was a truly great musician and a straightforward, honest man; yet there is no story in musical history that tells of a musician so consistently ignored during his lifetime.

He came of Flemish stock and was descended from a long line of artists and painters; one of his ancestors was the famous Jêrome Franck who held an appointment as painter to Henri III. Strange as it may appear, in view of the life-stories of many of the great composers, we here have an instance of a father actually wishing his son to become a musician!

César Franck was sent at an early age to the Conservatoire at Liège; he must have been a brilliant youngster because it is on record that he had finished his course of studies there before he had attained his eleventh birthday. Twelve months later the family settled in Paris so that he could continue his studies at the Conservatoire there.

Franck gained most of the prizes for which he was at all eligible, and concerning one of them there is an interesting story told. Old Cherubini was the professor at the time, and a harder nut to crack could not have been found in the city. Franck went before him to play a test. A piece was placed in front of him and he was expected to perform it at sight. In doing so he calmly transposed the work a minor third, a feat which will appeal to those who appreciate it. Cherubini, however, was not pleased. Whether he thought Franck was trying to show off or not is not recorded, but Cherubini refused him the first organ prize and made some excuse to give him the second. His teacher interfered and there seems to have been some unpleasantness, but in the end Franck was given a special prize.

Franck had a bad time in the financial sense when he left the Conservatoire; he taught a good deal but money seems to have been scarce. It is not surprising, for the year was 1848, and the Revolution in Paris did not serve music well. When Franck married Mlle. Desmousseaux, the bridal party had to climb some barricades in order to enter the church of Notre Dame de Lorette, where Franck was organist.

Ultimately, after many vicissitudes, Franck was appointed professor at the Conservatoire, a fact which surprised him, because he had always been outspoken and had always refused to be mixed up in various intrigues connected with the institution. He worked slavishly at his compositions and wrote many admirable works. *Les Béautitudes* is, perhaps, one of his best known now, but there was a difficulty in getting it recognised at the time. He had it performed at his own house by some of his pupils and asked several noted people to come. Most refused, and those who did come honoured him by leaving before the end. There were only two people in the audience at the finish.

WHITAKER-WILSON.

IN MY WIRELESS DEN

WEEKLY TIPS— CONSTRUCTIONAL AND THEORETICAL

By W. JAMES.

Dual-range Coils

IN many circuits we use a dual-range coil having a tap on the medium-wave coil for the aerial. This tap is useful, as the selectivity and magnification are both probably better when the aerial is taken to the tap instead of to the top of the coil.

The wavelength range with a given tuning condenser is greater, too. This is because the effect of the capacity of the aerial is reduced by connecting it to the tap. Now, these advantages are usually not obtained when we switch over to the long wavelengths, for the reason that the aerial is not connected to a tap on this coil.

Simplified switching is responsible, and you cannot obtain the best possible results without making the medium- and long-wavelength circuits in the best way. In the Binowave coils separate long- and medium-wave aerial connections are used in order that the efficiency of the coils shall be high on both wavebands.

Compact coils are sometimes not very efficient, although perhaps they are quite good for their size, and this point of the best aerial connection is bound to crop up. Sometimes a single separate aerial winding is used for both wavebands, but here again something is lost in the interests of simplicity and cheapness.

Those Mains Valves

Should we use a directly or an indirectly-heated power valve in an A.C. set?

Given a good and suitable directly-heated power valve, the hum is negligible, being hardly heard at all. The characteristics are as good, as a rule, as those of the indirectly-heated type, and valves working with an anode voltage of 200 and giving a good power output are available.

Myself, I feel that a directly-heated valve is a more simple job than the other type. I often use them, and have found the results to be good. A centre-tapped transformer or a wire potentiometer of low resistance may be used, and grid bias may be obtained by including a resistance in the high-tension negative return in the usual way. The centre tap must be fairly accurate, or a hum may be heard.

Low Loss

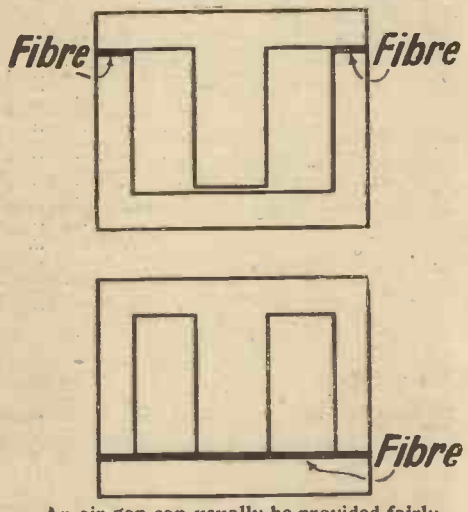
Although low-loss constructions are not now given as much attention as a few years ago, the need for avoiding the use of materials having doubtful electrical properties remains.

Cardboard is, for instance, sometimes used for coil formers. This may be satisfactory, but will probably not be unless it has been carefully treated. Good quality ebonite and bakelite formers are worth using for coils which will be fitted in a set of reasonable efficiency. Most of the prepared tubes are suitable, too.

Transformer Troubles

It is often supposed that the iron core of transformers and choking coils ought to be so well made that air gaps do not exist. This is not true when a direct current is passing through one of the windings as well as the alternating current.

Both transformers and choking coils



An air gap can usually be provided fairly easily in transformers and chokes by the method shown

should have the highest inductance under working conditions. It is true that the greatest inductive effect is obtained when the direct current is very small or when there is none at all.

But in practice the current may be, say, 3 or 4 milliamperes in the case of the intervalve transformer and perhaps 20 or 30 milliamperes in the case of the choking coil. Tests show that in many instances the greatest inductance under the working conditions is obtained by providing an air gap.

It is possible, in fact, to obtain a fairly uniform inductance over a range of direct currents by carefully proportioning the core, air gap, and number of turns. In practice the gap is provided by fitting a thin piece of fibre or other material at a joint in the magnetic circuit, or two pieces may be used as shown in the accompanying diagram.

A Band-pass Filter

Those who have tried a set having a band-pass filter will, no doubt, have noticed double-hump tuning. This indicates that the circuits are out of tune or else the coupling is too tight.

Attention to the ganging of the two circuits forming the tuned filter may put matters right, but if you find that the pronounced double humps continue, then the coupling should be reduced. Reaction effects may be partly responsible for the poor tuning, or there may be stray couplings.

In any case, a reduction in the coupling will produce the desired result, bringing the humps together. Band-pass circuits are very interesting and much time can be spent in finding the best values.

For testing, a meter connected in the anode circuit of the detector is valuable. Do not overlook the fact that the resultant tuning curve depends upon the characteristics of all the tuned circuits.

If, therefore, the filter circuit is in the aerial and a tuned intervalve coupling is used, be sure to note the combined effect, rather than that of the filter alone. The best scheme, naturally, is to have single-knob tuning.

A Problem

I have been asked to explain why a set, which appears to work very well when an output choke filter is used, motor-boats badly when the filter is taken away and a speaker transformer is fitted.

This happens in a number of instances, as a matter of fact. The filter circuit in practice tends to stop the varying currents produced by the last valve from entering the high-tension supply.

These currents pass through the condenser of the filter and the speaker to the filament or cathode of the last valve. If the choke is a poor one, a proportion of the varying currents may pass to the high-tension supply.

Naturally, the lower frequency currents would leak away to the high-tension supply before the currents of higher frequency.

It is the lower frequencies which usually cause the motor-boating or oscillations, and when the choke is not a good one the trouble may be experienced. When a transformer is used the circuit is usually much more prone to motor-boat, as the protection afforded by a good output filter circuit is not present.

Squealing may also occur; but the real fault lies, of course, in the high-tension supply or the anode-circuit feeds. With a high-resistance supply and poor filtering of the supplies to the circuits, motor-boating is to be expected.

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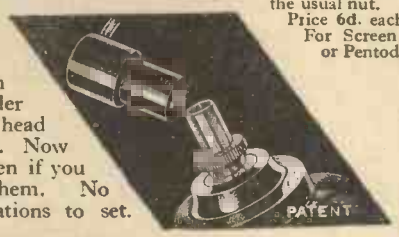

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The "Searcher Short-wave Two"

SIR,—With reference to the "Searcher Short-wave Two" (published in AMATEUR WIRELESS No. 442), the coil unit actually shown is one which we have now ceased to manufacture and there is likely to be some confusion when amateurs who intend building the receiver order the type 585 unit included. The layout and connections are somewhat different in the case of the new coil. Further, if the unit is wired in the way shown, that is, with the grid coil and reaction coil feeds reversed, although the set will operate on the short waveband, any amateur buying the extra broadcast coils to fit to the unit will find that his results are adversely affected and on the 5XX coil this will not work at all.

We recommend that the earth end of the aperiodic coil be coupled to the grid end of the aerial coil.

Stratton & Co., Ltd. (Birmingham).

Heterodyne Interference

SIR,—My receiver, a plain detector and two L.F. stages, has quite recently developed whistling and poor selectivity. This seems only to occur around the London Regional wavelength. Until about two weeks ago I was able to receive this station with good volume and clear of interference, but now everything seems to be spoilt by mush. I have had my valves tested, aerial and earth overhauled, batteries recharged and renewed, and still the trouble persists. Being very much an amateur, I should welcome any assistance.

F. E. (Molesley).

You are experiencing heterodyning and interference from the new high-power German station, situated just outside Stuttgart. We are afraid there is nothing you can do to avoid the interference, but the matter has been reviewed by the B.B.C. and steps are being taken to have a greater separation between the London and Stuttgart stations' wavelengths. —ED.

Simple Gramophone Amplifier

SIR,—Having constructed the Simple Gramophone Amplifier which was discussed in AMATEUR WIRELESS for November 15, I find that it is impossible to obtain a sound from the unit except by disconnecting the grid-bias negative 1 connection. Is this as it should be or can you advise how to remedy the trouble? A. B. (Worthing).

Unfortunately a slight error occurred in the wiring plan published for the amplifier in question and this accounts for your difficulty. You should disconnect the flexible lead, which is joined to the centre terminal of the volume control, and take it to the lower terminal of the volume control, that is, to the terminal which is connected to wire No. 15. It is really immaterial whether the flexible wire going to G.B.—1 is connected to the top or lower terminal of the volume control, provided that it does not join the centre terminal of the volume control.—ED.

"The Challenge Four"

SIR,—I have constructed the "Challenge Four" and, whilst I am satisfied that the receiver is capable of receiving a great number of stations, it seems that the selectivity is not so good as one could wish for in a set containing two stages of screen-grid H.F. amplification. I experience considerable interference from the two London stations, even when using quite a small outdoor aerial, and several of the foreign

(*Continued on page* 1010.)

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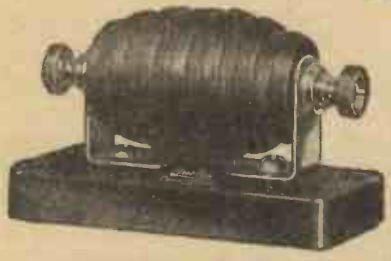

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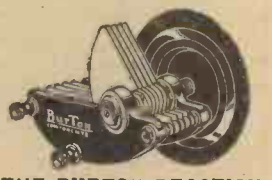

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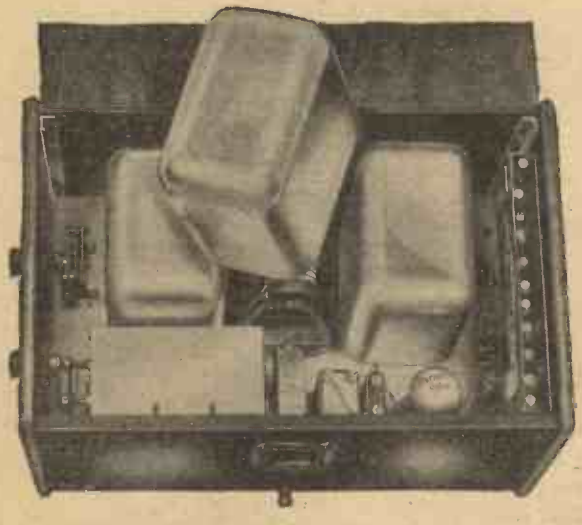

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Conducted by our Technical Editor: J. H. REYNER, B.Sc., A.M.I.E.E.

Burndept Needle-armature Pick-up

THE Burndept needle armature pick-up is one of those components which will appeal to the man who requires quality, for it does undoubtedly set a standard for pick-ups of all types; yet the sensitivity is well below the average. Generally speaking, a 3-stage amplifier is required for operating the pick-up at full volume with a moving-coil speaker: although when converting a wireless set, the detector valve can be used for one stage.

The design of this pick-up is such that the needle when inserted becomes the vibrating armature, having a mass so small that the natural period of resonance comes outside the audible limit, so far as gramophone reproduction is concerned. The needle movement is generous, and so lightly damped that it will follow the lowest frequencies and obtain the utmost life out of any record.

The characteristic of this pick-up is, save for minor and unimportant resonances, almost ideal. There is a rise towards the bass frequencies, counteracting to some extent for the inevitable restriction in amplitude of such frequencies on a record. Further, the high frequencies are well reproduced, and may be controlled by a

Burndept needle-armature pick-up

resistance or suitable condenser placed across the pick-up.

Tested on our standard two-valve amplifier, feeding a powerful moving-coil loudspeaker, the results were inadequate, due to the small voltage output from the pick-up. With the addition of another stage, however, the strength was brought up to standard, and we have no hesitation in saying that the reproduction was as near perfection as we have experienced from any gramophone record. There seems to be a complete absence of resonance, and in consequence all the instruments in an orchestra can be heard in their true relation, if the recording is good.

Grosvenor Batteries

MANY of the modern super-power valves when working with high anode voltages require a grid bias exceeding 9 volts. Although it is possible to use two 9-volt batteries in series, it is often preferable to employ a single battery of higher voltage.

The Grosvenor Electric Batteries, Ltd., of 2-3, White Street, London, E.C.2, who have had much experience in the manufacture of H.T. and grid-bias batteries, have sent in for test a 16-volt battery measuring 9 in. long by 1 in. wide by 2¾ in. high. Tappings are taken out to sockets every 1½ volts, every other socket being clearly labelled with its voltage.

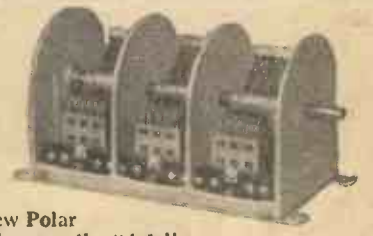
One of the range of Grosvenor batteries —a high-test high-tension battery. A test on a grid-bias battery is described in the accompanying paragraph

We applied to this battery the normal test for H.T. cells of standard capacity. The discharge rate was commenced at 7 milliamps and continued until it had fallen to 3½ milliamps; this it did after 260 hours of use, representing a useful output capacity of approximately 1,500 milliampere hours. This figure is well above the average fixed for standard cells, and indicates that the battery should give a good performance in actual use.

Although a grid-bias battery is seldom called upon to supply any current, it has been our experience that those cells capable of standing up well to a continuous but suitable discharge rate have the longest "shelf" life.

Polar Tub Condenser

AN examination of sets that have been in use for several years often reveals faults in the variable condensers. Either the plates have become buckled or dust has collected to such an extent that tuning is accompanied by crackling noises.



A new Polar condenser—the "tub"

In the new Polar screened gang condenser, all precautions have been taken by the

(*Continued at foot of next page*)

RADIOGRAMS

IT is reported from Savoy Hill that the announcing staff has adopted for Christmas week the catch phrase, "Modulation in all things."

According to a report from Belgium, the Grand Duchy of Luxemburg, anxious to own a high-power transmitter in order to establish a daily broadcasting service, has taken the decision to grant a concession, with full power, to exploit microphone publicity. As the necessary income for operating such a station could not possibly be derived from the listeners' tax, sufficient revenue might be acquired by radio publicity, and it is hoped to induce French and German business concerns to sponsor programmes.

According to statements issued by the control station of the *Union Internationale de Radiodiffusion* at Brussels, a deviation of more than one kilocycle from their allotted wavelengths by the European stations generally has been greatly reduced. From October, 1929, to April, 1930, the percentage of culprits has dropped from 14 to 9 per cent. of all transmitters in operation.

The Belgrade (Yugoslavia) short-wave transmitter on 30 metres, may be heard working every Monday evening between 8 and 9 p.m. G.M.T.

A French company, recently constituted with a working capital of one million francs, proposes to run a broadcasting station in Normandy. It has not yet been definitely decided whether the site will be at The Havre or whether the present Radio Normandie (Fécamp) transmitter is to be taken over and increased in power.

Some drastic changes in wavelengths are likely to be carried out by the French State broadcasting stations within the next few weeks. Ecole Supérieure (PTT), Paris, which is now almost completely swamped by Rome nightly, may change its wavelength with Radio Maroc (Rabat). Similarly, Radio LL (Paris), interfering in the French capital with the reception of the PTT Strasbourg broadcasts, will be asked to take over the Lille wavelength for its own.

Listeners report the reception of telephony from Tokio (Japan) between 10 a.m. and midday G.M.T. daily, on 24.8 metres.

Barring the Moscow morning physical exercises, the Posen studio claims to be the earliest station on the air; its first transmission takes place at 4.15 a.m. G.M.T. daily.

Daily, between midday and 2 p.m. G.M.T., the new Velthem-Louvain station tests with gramophone records simultaneously on 508.2 and 338.2 metres. Its power is gradually being increased to 15 kilowatts in the aerial.

The French Ministry of Posts and Telegraphs has now authorised the transfer of Radio Paris to its new home at Essarts-le Roi, near Rambouillet, where the high-power station is rapidly nearing completion Within a month the special cable connecting the station to the studio will be laid and the tests will start forthwith. The *Poste Parisien* has also been allowed to remove its plant to Limours, outside city limits.

It may, perhaps, be taken as a commentary on the B.B.C.'s policy with regard to Scottish broadcasting that the increase in the number of licences north of the Border compares by no means favourably with other parts of the United Kingdom. Only about 7,500 licences are issued monthly on an average in Scotland, while Ireland can boast about 10,000, with Wales in the neighbourhood of 5,000.

The number of wireless licences held in Czechoslovakia at the close of September last was 290,395, an increase of 2,791 in the course of that month and 18,990 more than at the end of September 1929. It is expected that by the close of the year the total will reach 300,000.

Experiments carried out by the Technical section of the University of Jena at Chemnitz (Germany) having demonstrated the utility of ultra-short waves for broadcasting stations destined to serve the smaller towns, the German Posts and Telegraphs at Berlin have decided to construct a special transmitter with a view to further tests.

"WE TEST FOR YOU"

(*Continued from preceding page*)

makers, Messrs. Wingrove & Rogers, to prevent the gradual development of faults. This condenser, known as the "Tub," has the appearance of a model tunnel, the outer metal case being alone visible. In front there is an attractive oxidised bronze escutcheon plate with a large diameter and clearly marked rotary-controlled dial. Removal of the cover reveals three sets of fixed and moving plates fitted to a common metal spindle, with substantial metal screening between each set.

The maximum and minimum capacities of each condenser were measured separately, the variation in values being negligibly small. The minimum in each case was 30 micro-microfarads, a value slightly higher than usual, but not likely to cause any serious limitation to the wavelength range. The maximum capacity was approximately .00054 mfd. Those who are building up-to-date sets, and wish to dispense with condenser troubles can be recommended to use one of these "Tub" gang condensers.

"READERS' IDEAS AND QUESTIONS"

(Continued from page 1006)

stations overlap each other. Can you suggest how the selectivity may be improved?

A. R. (Ilford).

You are situated well within the swamp area of the new London stations and will experience difficulty in preventing shock-effect reception with your receiver. You should not use an outdoor aerial, but a small indoor one, consisting of not more than 10 ft. of wire. A good low-resistance earth connection should be obtained to maintain the efficiency of the aerial-earth system at maximum to offset the reduced receptive qualities of the small indoor aerial. If it is still found that the London stations occupy more of the tuning dials than is desirable, each screen-grid H.F. stage, and also the detector stage, should be completely screened in metal boxes. Finally, the whole receiver should be housed in a metal-lined cabinet or metal screening box.—ED.

A Strange Phenomenon

SIR,—I was interested to read the letter, in your issue dated November 29, from W. M. (Manchester), regarding the red glow accompanied by a click which proceeded from his loud-speaker and coincided with a vivid flash of lightning.

The red glow appears to have persisted for some appreciable time, for, if the lightning flash was so vivid, the comparably small red glow would not be noticed. As the time of persistence of vision is in the neighbourhood of one-tenth of a second, the glow must have lasted longer than that.

W. M. is using an indoor aerial, which would hardly pick up a sufficient static charge to produce a glow discharge that would extend for a foot in all directions.

Let us now come to a possible explanation of what W. M. saw. If we allow our eyes to glance at the unobscured disc of the sun or at any other brilliant source of illumination and then look at a dark surface, we see an image of the source of illumination in a reddish colour on the dark ground.

W. M. is sitting in his room listening to the programme from Manchester and probably looking out of the window at the progress of the storm. The sky is overcast and the room is probably dark. Suddenly he sees a vivid flash of lightning, hears a click from the loud-speaker and, turning to it, sees—the red image of that portion of the sky that he has just seen brilliantly lit by the flash.

R. D. F. (Liverpool).

When Submitting Queries . . . . . .

Please write concisely, giving essential particulars. **A Fee of One Shilling** (postal order), a stamped addressed envelope, and the coupon on the last page must accompany all letters. The following points should be noted.

The designing of apparatus or receivers cannot be undertaken.

Modifications of a straightforward nature can be made to blueprints, but we reserve to ourselves the right to determine the extent of an alteration to come within the scope of a query.

Queries *cannot* be answered personally or by telephone.

LATEST NEWS OF THE NEW NORTH REGIONAL STATION

By a Special Correspondent

THE aerial masts for the North Regional station, at Moorside Edge, near Slaithwaite, have now been finished. Each one stands 500 feet high on a massive concrete base. They are steel lattice masts of the type used at Daventry for 5XX, not the self-supporting type used at Brookmans Park. Each mast is supported by 21 stout wire guys. Two aerials will be suspended between the three masts, one to radiate the National programme on 301 metres wavelength and the other to transmit the North Regional programme on 479 metres (the present wavelength of Midland Regional).

The aerials have not yet been erected, but rapid progress is being made with the installation of the apparatus in the station building, which is a replica of that at Brookmans Park One of the two transmitters is being prepared for the first test transmissions, which are expected some time next month. The engineer-in-charge of the Belfast station, Mr. Wheeler, has been transferred to Moorside Edge, to take charge there, and he is already on the spot. He will have a staff of about twenty assistant engineers.

The two transmitters will be brought on the air by gradual stages. At first the test transmissions will be outside of the normal programme hours. Gradually the periods of transmission will be extended until a full daily service is being given. It is expected that the North Regional transmitter, on 479 metres, will be the first to start testing, and, consequently, the first to give regular programmes. Its programmes will be partly relayed from London and partly produced in the Northern Region. It is anticipated that the northern studios at Manchester and Leeds will contribute the majority of the material on this wavelength. The National programme, on 301 metres, will be relayed from London, of course. It will probably be June before transmitters are in full swing.

By that time the present transmitters in the North of England will have been permanently closed down, with the exception of Newcastle.

The new station will be heard at considerable strength not only in the North of England, but also in the North Midlands, North Wales, the Isle of Man, and Ireland.

The 1931 "'The Wireless & Gramophone Trader' Year Book and Diary" should prove of valuable assistance to wireless manufacturers and retailers. All the technical wireless and gramophone data and broadcasting information has, of course, been revised to date. The trade directory portions are printed on various tinted papers for ease of reference. They include lists of manufacturers, manufacturer's agents and wholesale factors—their addresses and telephone numbers; proprietary names of wireless goods and their makers and a buyer's guide. The *Year Book* is issued to subscribers to "Trader" Journals at the special price of 3s. 6d., post free, the price to non-subscribers being 5s. 6d., post free.

BROADCAST TELEPHONY

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

Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN			
25.53	11,751	Chelmsford (G5SW)	15.0
200	1,500	Leeds	0.16
242	1,238	Belfast	1.2
261.3	1,148	London Nat.	68.0
288.5	1,040	Newcastle	1.2
288.5	1,040	Swansea	0.16
288.5	1,040	Stoke-on-Trent	0.16
288.5	1,040	Sheffield	0.16
288.5	1,040	Plymouth	0.16
288.5	1,040	Liverpool	0.16
288.5	1,040	Hull	0.16
288.5	1,040	Edinburgh	0.4
288.5	1,040	Dundee	0.16
288.5	1,040	Bournemouth	1.2
288.5	1,040	Bradford	0.16
301	995	Aberdeen	1.2
309.0	968	Cardiff	1.2
356.3	842	London Reg.	45.0
376.4	797	Manchester	1.2
398.9	752	Glasgow	1.2
479	626	Midland Reg.	38.0
1,554	193	Daventry (Nat.)	35.0
AUSTRIA			
246	1,220	Linz	0.6
246	1,220	Salzburg (testing shortly)	0.6
283.6	1,058	Innsbruck	0.6
352	851	Graz	9.5
453	666	Klagenfurt	0.6
517	581	Vienna	20.0
BELGIUM			
206	1,456	Verviers	0.3
206	1,456	Antwerp	0.4
216	1,391	Chatelineau	0.25
243	1,235	Courtrai	0.1
244.7	1,226	Ghent	0.25
244.1	1,229	Schaerbeek	0.5
338.2	887	Velthem (Louvain)	12.0
509	590	Brussels (No. 1)	1.2
CZECHO-SLOVAKIA			
263	1,139	Moravska-Ostrava	11.0
279	1,076	Bratislava	14.0
294	1,020	Kosice	2.5
342	878	Brunn (Brno)	3.0
487	617	Prague (Praha)	5.5
DENMARK			
281	1,067	Copenhagen	1.0
1,153	260	Kalundborg	10.0
ESTONIA			
401	748	Reval (Tallinn)	0.7
FINLAND			
221	1,355	Helsinki	15.0
291	1,031	Viipuri	15.0
1,796	167	Lahti	54.0
FRANCE			
172.5	1,739	St. Quentin	0.3
200	1,500	Radio Roubaix	0.2
222.9	1,346	Fécamp	1.0
235.1	1,275	Nimes	1.0
240.6	1,247	Béziers	0.6
249.7	1,201	Juan-les-Pins	0.5
256	1,171	Toulouse (PTT)	1.0
265	1,130	Lille (PTT)	15.0
272	1,103	Rennes	1.2
286	1,049	Montpellier	2.0
286.2	1,047.9	Radio Lyons	0.5
296.4	1,012.1	Limoges (PTT)	0.08
300	1,000	Strasbourg	1.0
304	988	Bordeaux (PTT)	35.0
315	952.5	Neuilly (Paris)	0.3
316	950	Natan-Vitus	0.7
316	950	Marseilles (PTT)	1.5
328.2	914	Grenoble (PTT)	1.2
329	911	Caen (Normandy)	0.6
320.5	910.3	Poste Parisien	1.2
347.7	862.8	Strasbourg (PTT)	12.0
370	810.5	Radio LL (Paris)	0.5
385	779	Radio Toulouse	15.0
447	671	Paris (PTT)	2.0
466	644	Lyons (PTT)	2.3
1,445.7	207.5	Eiffel Tower	15.0
1,725	174	Radio Paris	17.0
GERMANY			
31.38	9,560	Zeesen	15.0
217	1,387	Konigsberg	1.7
218	1,373	Flensburg	0.6
227	1,319	Cologne	1.7
227	1,319	Münster	0.6
227	1,319	Aachen	0.31
232.2	1,292	Kiel	0.3
239	1,256	Nürnberg	2.3
246.4	1,217.2	Cassel	0.3
253.4	1,184	Leipzig	2.3
259.3	1,157	Gleiwitz	5.6
269.8	1,112	Augsburg	0.3
276.5	1,085	Heilsberg	120.0
283.6	1,058	Magdeburg	0.6
283.6	1,058	Berlin (E)	0.6
283.6	1,058	Stettin	0.6
316.6	947.6	Bremen	0.3
318.8	941	Dresden	0.3
325	923	Breslau	1.7
360	833	Muhlacker	75.0
372	806	Hamburg	1.7
390	770	Frankfurt	1.7
418	716	Berlin	1.7
452.1	662	Danzig	0.25
473	635	Langenberg	17.0
533	563	Munich	17
559.7	536	Kaiserslautern	1.0
566	530	Hanover	0.35
570	527	Freiburg	0.3
1,035	183.5	Zeesen	35.0
1,035	183.5	Norddeich	10.0
HOLLAND			
31.28	9,599	Eindhoven (PCJ)	30.0
299	1,004	Hilversum	8.5
299	1,004	Radio Idzerda (The Hague)	0.6
1,071	280	Scheveningen-Haven	5.0
1,875	160	Huizen	8.5
HUNGARY			
210	1,430	Budapest (Csepel)	1.0
550	545	Budapest	23.0
ICELAND			
1,200	250	Reykjavik (shortly testing)	16.0
IRISH FREE STATE			
224.4	1,337	Cork (1FS)	1.5
413	725	Dublin (2RN)	1.5
ITALY			
80	3,750	Rome (3RO)	9.0
296	1,013	Turin (Torino)	8.5
312	916.2	Genoa (Genova)	1.5
332	905	Naples (Napoli)	1.7
441	680	Rome (Roma)	75.0
453	662	Bolzano (IBZ)	0.2
501	599	Milan (Milano)	8.5
LATVIA			
525	572	Riga	12.0
LITHUANIA			
1,935	155	Kaunas	7.0
NORTH AFRICA			
363.4	825.3	Algiers (PTT)	13.0
416	721	Radio Maroc (Rabat)	10.0
1,350	222.2	Tunis Kasbah	0.6
NORWAY			
364	824	Bergen	1.0
363.1	826.1	Fredriksstad	0.7
453.2	662	Porsgrund	1.5
453.2	662	Nidaros	1.2
1,073	279.6	Oslo	75.0
POLAND			
214.2	1,400	Warsaw (2)	1.9
234	1,283	Lodz	2.2
244	1,229	Cracow	1.5
312.8	959	Wilno	0.5
338.1	887.1	Poznan	1.9
381	788	Lvov	2.2
409.8	732	Katowice	16.0
1,411	212.5	Warsaw	14.0
PORTUGAL			
240	1,250	Oporto (Teatro Apollo)	0.25
320	937.6	Lisbon (CTIAA)	0.25
ROMANIA			
394	761	Bucharest	16.0
RUSSIA			
427	702	Kharkov	4.0
720	416.6	Moscow (PTT)	20.0
800	375	Kiev	20.0
824	364	Sverdlovsk	25.0
870	344.8	Tiflis	15.0
937.5	320	Kharkov (RV20)	25.0
1,000	300	Leningrad	20.0
1,103	272	Moscow Popoff	40.0
1,200	250	Kharkov (RV4)	25.0
1,304	230	Moscow (Trades' Unions)	100.0
1,380	217.5	Bakou	10.0
1,481	202.5	Moscow (Kom)	20.0
SPAIN			
251	1,193	Barcelona (EAJ15)	1.0
266.7	1,125	Barcelona (EAJ13)	10.0
349	860	Barcelona (EAJ1)	8.0
368	815	Seville (EAJ5)	1.5
413.8	725	Radio Espana	1.0
424	707	Madrid (EAJ7)	2.0
460	652	San Sebastian (EAJ8)	0.5
SWEDEN			
230.6	1,301	Malmo	0.75
257	1,166	Hörby	15.0
300.2	999.3	Falun	0.05
322	932	Göteborg	15.0
436	689	Stockholm	75.0
542	554	Sundsvall	15.0
770	389	Ostersund	0.75
1,224	245	Boden	0.75
1,348	222.5	Motala	40.0
SWITZERLAND			
320	937.5	Basle	0.65
403	743	Berne	1.1
459	653	Zurich	0.75
678.7	454.6	Lausanne	0.6
760	395	Geneva (testing on 1,010m.)	1.5
TURKEY			
1,200	250	Istanbul	5.0
1,961	153	Ankara	7.0
YUGOSLAVIA			
306.8	978	Zagreb (Agram)	0.7
430.5	696.8	Belgrade	3.0
574.7	522	Ljubljana	2.8

MICROSCOPIC!

X-RAYS are identical in everything except wavelength, or frequency, with wireless waves. So, of course, is ordinary light. In fact light waves stand roughly midway in frequency between X-rays and the shortest wireless wave that has yet been produced in the laboratory. In modern science, X-rays are at present being used to extend the powers of the microscope. In the ordinary way it is quite impossible to "see" any object that is smaller than the wavelength of visible light. But by using the still more minute X-rays, photographs are now being taken of molecules that the human eye will never be able to see directly, even through the most powerful microscope.

B. A. R.

Blue Spot Literature.—Traders will be interested to know that adhesive labels referring to Blue Spot speakers as Christmas gifts can be obtained from Blue Spot House, 94-96 Rosoman Street, Rosebery Avenue, E.C.1.

Part Exchange.—Owners of old sets should note that at any branch of Messrs. Warners, old receivers are taken in part exchange for 1931 Osram Music Magnet Four sets. The balance may be arranged in easy monthly payments if desired.

R.I. Eliminators.—In connection with the Radio Instruments announcement on page 877 of "A.W." No. 443, it should be noted that the type D20/3 eliminator, price £2 12s. 6d., is for D.C. supply, and not for A.C., as stated. The model A20/3, price £4 15s., is for A.C. supply.

RADIO AT SEA

MANY amateurs believe that the radio gear on board ship, and even on the new liners, is of the out-of-date spark and crystal-detector variety.

This is quite a mistake; the new Booth liner *Hilary*, for instance, has been fitted up with the very latest radio transmitters and receivers.

The valve transmitter for interrupted continuous-wave telegraphy will operate on wavelengths between 600 and 800 metres with a power of 1½ kilowatts. Its distinctive penetrating note in transmission will be very effective where atmospheric interference makes communication difficult at times.

The receiver will also be capable, to a large extent, of overcoming interference, as it is fitted with a rejector circuit covering the wavelengths which are most subject to interference. The valves, too, have a very high amplification factor, which increases considerably the distance over which signals can be received. The new Marconi receiver is particularly suitable for all the requirements of a ship's wireless service, as it more than covers the complete waveband used in commercial work.

Very short wavelengths, as well as very long ones, are now used for the transmission of useful information to ships, and this is provided for by the receiver's wavelength range of 15 metres to 20,000 metres.

K. U.

"Postcard Radio Literature."—It should be noted that the Superlamp catalogue reviewed on page 848 of "A.W." No. 442 is available only to the trade.

All interference with broadcasting programmes is ruthlessly banned in Yugoslavia; the latest law decrees that whoever willingly or through neglect spoils the reception of the wireless entertainments, on conviction will be liable to one year's imprisonment or a fine amounting to 10,000 dinar (roughly £400).

It is reported that the Marconi International Marine Communication Co. has the order to manufacture and install nine complete wireless sets with direction finders on new vessels of the British Tanker Company's fleet.

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

General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets.

Contributions are always welcome, will be promptly considered, and if used will be paid for.

Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4.

Postcard Radio Literature

Well Worth Having

EVERY set can be improved by the addition of some gadget or other, and practically every gadget likely to prove of interest to the radio man is included in a new book which I have just received from an old friend, A. F. Bulgin & Co., Ltd. I advise you to write for a copy of this, which can be obtained free through my catalogue service. **116**

Down in Price

Did you know that the new model 56 Marconiphone set has just been greatly reduced in price? A.C., D.C., and battery-driven models are all subject to this big price reduction. The model 56 is a five-valver, of course, with three screen-grid stages, and you can get full particulars from a Marconiphone booklet, to be had free. **117**

For Mains Users

There is no reason why you should not make up your own mains eliminator, and in the new range of Heayberd kits of parts for eliminators you are sure to find one that suits your needs. Models are available for alternating and direct-current mains. **118**

Junit Eliminators

Everyone seems to be talking about the new Junit eliminators, a new line so far as Junit is concerned. If I remember rightly this was described recently on the AMATEUR WIRELESS "We Test for You" page, and you can get full particulars in a new Junit folder. **119**

For Better Radio

I dare say 90 per cent. of set users have two-volt valves. A little booklet I have just received from Mullard deals with two-volters and it gives full particulars of the new P.M.'s. **120**

R.I. and the Mains

These new all-insulated R.I. high-tension units seem to be the "goods." I advise designers who are changing over to mains operation to get the latest literature which gives full information about these new units, in which the new alloy Nikalloy is used. **121**

GET THESE CATALOGUES FREE.

Here "Observer" reviews the latest booklets and folders issued by well-known manufacturers. If you want copies of any or all of them FREE OF CHARGE, just send a postcard giving the index numbers of the catalogues required (shown at the end of each paragraph) to "Postcard Radio Literature," "AMATEUR WIRELESS," 58-61, Fetter Lane, E.C.4. "Observer" will see that you get all the literature you desire.

MORE RADIOGRAMS

The Compania Radio Internacional de Brazil, an associated company of the International Telephone and Telegraph Corporation, has been granted a concession to construct radio stations and carry on international radio-telegraph and radio-telephone services from Brazil. Stations will be installed to give telephone service to Europe and the U.S.A., as well as other countries connected to the international network of South America. The concession is for a period of ten years.

Although no wireless listening tax is in force in Holland, all owners of wireless apparatus must register with the Dutch telegraph authorities. According to the latest statistics, on October 1 last 233,314 receiving licences had been issued, thus showing that 2.98 per cent. of the population was interested in radio entertainments. Sweden, on the same date, numbered 466,750 licence holders.

Radio Toulouse has always been well received in certain parts of the West of Scotland, and the strength of transmission has undergone a further appreciable increase since the new transmitter was brought into operation by the big French station.

Although 1,000 lire were offered as a prize and 370 different suggestions were considered by the studio authorities, the Rome broadcasting station has not yet discovered a suitable interval signal. In the meantime between programme items the Naples Pan flute is heard.

NEXT WEEK'S ISSUE

Readers should note that next week's issue, dated December 27, will be On Sale on Tuesday, December 23. Just before Christmas Eve!

Order your copy for the holidays

FULL-SIZE BLUEPRINTS

When ordering, please send Postal Order, NOT STAMPS

CRYSTAL SET (6d. each)

Regional Crystal Set WM176

ONE-VALVE SETS (1s. each)

Monodyne AW258
Hartley Single-valver WM198

TWO-VALVE SETS (1s. each)

Talisman Two (D, Trans) AW194
No-battery A.C. Mains Two (D, Trans) .. AW230
No-battery Gramo-radio 2 (D, Trans) .. AW238
1930 Talisman 2 (D, Trans) AW239
Searcher Two (D, Trans) AW245
Arrow Two (D, Trans) AW249
Forty-five-shilling Two (D, 8 Trans) AW250
Searcher Short wave 2 (D, Trans) AW259
Challenge Two (D, Trans) AW261
Loftin White Two (A.C. Mains) AW263
Brookman's Two (D, Trans) WM168
New Crusader (D, Trans) WM182
Gleaner Two (D, Trans) WM201
Music Monitor (D, Trans) WM208
Merlin Two (A.C. Set) WM213
Five-Point Two (D, Trans) WM220

THREE-VALVE SETS (1s. each)

1930 Ether Searcher (SG, D, Trans) AW211
Best-by-Ballot Three (SG, D, Trans) Price 4d. free with copy of "A.W." AW217
Everybody's All-electric Three (SG, D, Trans) —A.C. AW221
1930 Clarion Three (SG, D, Trans) AW223
Beginner's Regional Three (D, 2LF) AW233
Britain's Favourite Three 1930 (D, 2 Trans) .. AW243
The "A.W." Exhibition 3 .. .. AW247
Brookman's Three (SG, D, Trans) WM161
Brookman's Push-Pull Three (SG, D, Trans) 1/6 WM170
All-nations Three (D, 2 Trans) WM178
Inceptordyne (SG, D, Pentode) WM179
Brookman's A.C. Three (SG, D, Trans) 1/6 .. WM184
Music Marshal (D, 2 Trans) WM190
Concert Three (D, 2 Trans) WM199
New Lodestone Three (HF, D, Trans) WM205
De-Luxe Three (D, RC, Trans) WM209
Five-Point Three (SG, D, Trans) WM212
Falcon Three (A.C. Set) WM217
New Brookman's Three (SG, D, Trans) .. WM218
Five-point Short-waver (D, RC, Trans) .. WM223

FOUR-VALVE SETS (1s. 6d. each)

Horizon Four (SG, D, 2 Trans) AW237
Challenge Four (2SG, D, Trans) with copy of "A.W.," 4d. post free AW251
Challenge Four (2SG, D, Trans, mains operated) with copy of "A.W.," 4d. post free AW252
Challenge Radio Gramophone (SG, D, RC, Trans) AW265
1930 Monodial (2SG, D, Trans) WM158
Brookman's Four (2SG, D, Trans) WM174
Lodestone Four (HF, D, RC, Trans) WM193
Searcher's Four (SG, D, RC, Trans) WM194
Invitation Four (SG, D, RC, Trans) WM200
Regional Band-pass Four (SG, D, RC, Trans) WM211
Five-Point Four (SG, D, RC, Trans) WM216
Regional A.C. Four (SG, D; RC, Trans) .. WM222

FIVE-VALVE SETS (1s. 6d. each)

James Quality Five (2SG, D, RC, Trans) .. AW227
All-wave Lodestone Five (HF, D, RC, Push-pull) WM146
1930 Five (2HF, D, RC, Trans) WM171
Dual-screen Five (2SG, D, RC, Trans) .. WM185
Radio-Record Five (SG, D, Trans-parallel) .. WM188
Overseas Five (3SG, D, Trans) WM191
Regional A.C. Five (3SG, D, Trans) WM224

SIX-VALVE SET (1s. 6d. each)

Hyperdyne Receiver (Super-het) WM221

PORTABLE SETS

Continental Portable (SG, D, Trans) .. AW241 1/-
Pedlar Portable Two (D, Trans) .. WM195 1/-
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James Portable SG3 (SG, D, Trans) .. WM203 1/-
Foursome Portable (SG, D, 2 Trans) .. WM206 1/6

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"A.W." Gramophone Amplifier AW205
Two-valve Amplifier AW216
"Mag" Gramo Unit AW224
Simple Gramophone Amplifier AW257
Radio-Record Amplifier (DC Mains) WM183
Selecto Amplifier (HF, Unit) WM210

MISCELLANEOUS (1s. each)

Simplest H.T. Unit AW197
By-pass Unit (Wavetrap) with copy "A.W."—4d. AW218
"Twin" Brookman's By-pass (6d.) AW222
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Simplest H.T. Eliminator for D.C. Mains .. AW234
Choke Output Unit AW240
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"A.W." Improved Linen-diaphragm Speaker AW248
Handy L.T. and G.B. Unit for A.C. Mains .. AW254
Novel Linen-Diaphragm Speaker AW260
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Our H.T. Unit for A.C. Mains AW262
Gramophone Tone Control AW264
Staminator Unit for A.C. Mains WM202
Universal Push-pull Amplifier WM204
Outspan Short-wave Adaptor WM207
"W.M." Standard A.C. Unit WM214
"W.M." Standard D.C. Unit WM215
Falcon A.C. Unit WM219

Copies of the "Wireless Magazine" and of "Amateur Wireless" containing descriptions of any of these sets can be obtained at 1s. 3d. and 4d. respectively, post free. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine."

AMATEUR WIRELESS 58-61 FETTER LANE LONDON, E.C.4.

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INFINITELY SUPERIOR
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THE Sovereign Dual-range Coil, made with the characteristic thoroughness that distinguishes all Sovereign Components, is specified and used by every constructor who appreciates the value of permanently good reception. Wound on a slotted former of moulded Bakelite, for one-hole or baseboard mounting, it is supplied complete with positive contact Push-pull Switch, 6 tabbed Terminals and instructions. Get better results on both wavebands by fitting this reliable component.

Prices: Baseboard Mounting 9/-; Panel Mounting 8/6. Type W.S. without Switch (Baseboard Model only) 8/-.

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Give your set a Tungar this
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Advt. of The Edison Swan Electric Co., Ltd. Incorporating the Wiring Supplies, Lighting Engineering and Radio Business of the British Thomson-Houston Co., Ltd.

ASSOCIATED ELECTRICAL INDUSTRIES, LTD.

B.94

ALL MAINS COMPONENTS
WESTINGHOUSE RECTIFIERS

Filta Bank Condensers

2 mfd. (By-pass) ...	3/3
4 mfd. (Reservoir) ...	5/3
4.4.4 mfd. (Voltage Doubler)	15/-
4.4.2.2 mfd. (Half-Wave)	15.6

require the best Condensers, Transformers and Chokes.

Write for Full List

THE MAINS POWER RADIO CO.
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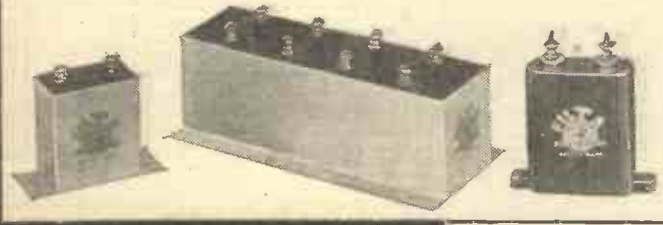

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Adjustable Length Tracking Angle Spring Tension

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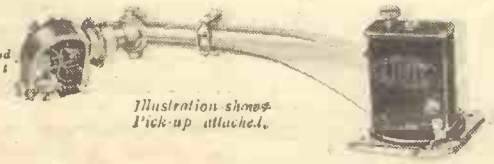

Illustration shows Pick-up attached.

PICK-UP ARM 15/6 EACH

Obtainable through all factors and dealers or write

LIMIT RADIO LIMITED, ALBION ST., LONDON, N.1

WESTINGHOUSE

GIVE YOURSELF CHEAPER.. BETTER . . LESS-TROUBLE RADIO

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Prices are from 15/-.

Our forty-page booklet, "The All Metal Way, 1931" gives full details of the most suitable type for any particular purpose, with recommended circuits. Send the coupon with 3d. in stamps for a copy.

THE WESTINGHOUSE BRAKE & SAXBY SIGNAL CO., LTD.
82 York Rd., King's Cross, N.1
Telephone: North 2415

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PLEASE WRITE IN BLOCK LETTERS.

NAME.....

ADDRESS.....

A.W. 20/12/30

WESTINGHOUSE

Don't Forget to Say That You Saw it in "A.W."

Printed in England.—Published by Bernard Jones Publications, Ltd., 58/61 Fetter Lane, London, E.C.4
Sole Agents for South Africa: CENTRAL NEWS AGENCY, LIMITED. Sole Agents for Australasia: GORDON & GOTCH, LIMITED. Saturday, December 20, 1930

POPULAR COIL TYPES—BY W. JAMES

THE "ONE-CONTROL ONE"—FULL DETAILS

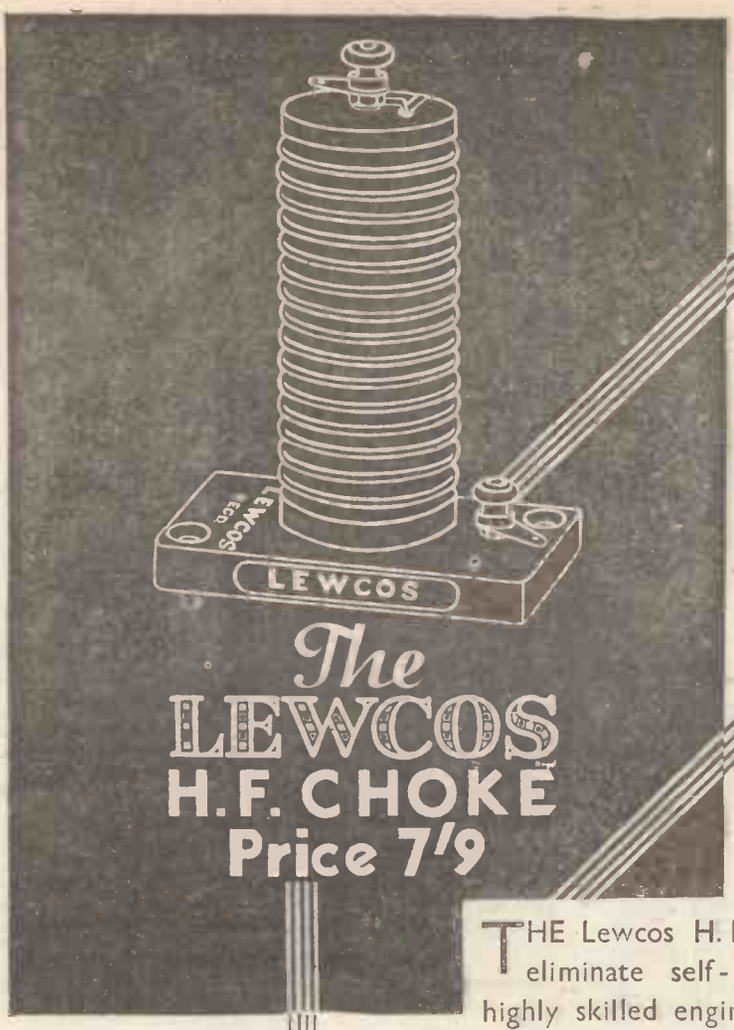
Amateur Wireless

and Radiovision

Every Thursday 3d

Vol. XVII. No. 446 Saturday, December 27, 1930

Registered at the G.P.O. as a Newspaper



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MADE BY MASTER-CRAFTSMEN

THE Lewcos H. F. Choke is specially constructed to eliminate self-oscillation. Scientific research by highly skilled engineers shows that this choke can be used with complete confidence in its efficient performance on all wavelengths from 20 to 2,000 metres.

The following are extracts taken from an appreciation by Industrial Progress (International) Limited, Bristol. ". . . the Lewcos H. F. Choke is, in our opinion, *the most efficient choke we have tested* . . . and *its design places it in the front rank of high-class components.*"

In short, the Lewcos H. F. Choke fulfils its purpose because it is constructed on a scientific basis with the best materials by master craftsmen.

Write to-day for a fully descriptive leaflet Ref. RA 33, which shows the choke curves and gives tested values.

THE LEWCOS H. F. CHOKE IS SPECIFIED FOR THE "CHALLENGE RADIO-GRAMOPHONE" RECEIVER DESCRIBED IN THIS ISSUE.

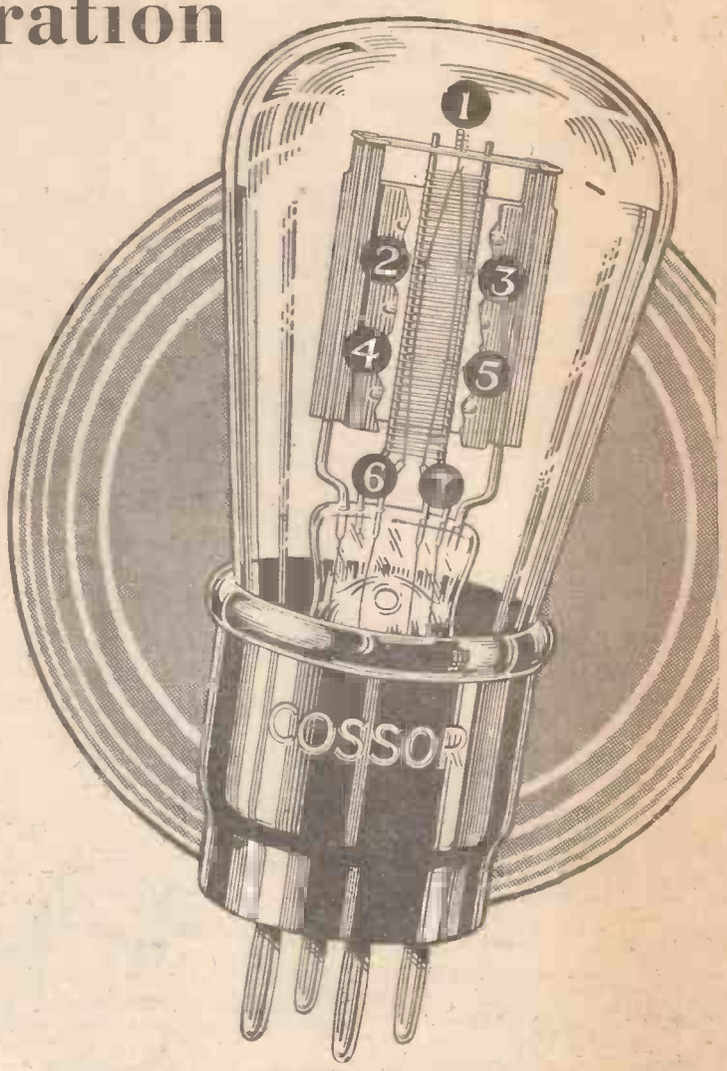
LEWCOS RADIO PRODUCTS FOR BETTER RECEPTION

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED, CHURCH ROAD, LEYTON, LONDON, E.10

Seven point suspension *definitely prevents* filament vibration

—the primary cause of microphonic noises

The cause of microphonic noises in a Receiving Set is generally to be found in a faulty Detector Valve. Usually it is due to filament vibration. The new Cossor Detector Valve (210 Det.) has been specially designed to overcome this fault. Filament vibration is rendered impossible by a new method of seven point suspension. The diagram shows the four insulated hooks which secure the filament in position and damp out any tendency to vibration. The use of this "steep slope" Cossor Detector Valve not only eliminates microphonic noises, but ensures great volume with exceptional purity of tone.



The New Cossor 210 DET., 2 volts, ·1 amp. Impedance 13,000. Amplification Factor 15. Mutual Conductance 1·15 m.a./v. Normal working Anode Voltage 90-150. *Price* 8/6

We have just issued a novel circular Station Chart, which gives identification details of nearly 50 stations, with space for entering your own dial readings. Ask your dealer for a copy, price 2d. or send 2d. stamp to us and head your letter "Station Chart A.W."

THE NEW

COSSOR DETECTOR

DEFINITELY FREE FROM MICROPHONIC NOISES

A. C. Cossor Ltd., Highbury Grove, London, N.5.

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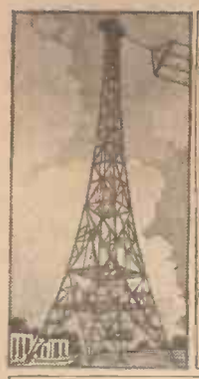
No. 446. Vol. XVII DECEMBER 27, 1930



Amateur Wireless and Radiovision

EDITOR: BERNARD E. JONES.
TECHNICAL EDITOR: J. H. REYNER, B.Sc., A.M.I.E.E.
THE LEADING RADIO WEEKLY FOR THE CONSTRUCTOR, LISTENER & EXPERIMENTER.
RESEARCH CONSULTANT: W. JAMES.
ASSISTANT EDITOR: H. CORBISHLEY.

NEWS · & · GOSSIP · OF THE · WEEK

USEFUL "NUMBER TEN"

HAVE you noticed how much use the B.B.C. is making of the new "Number 10" studio—the converted wharf? An AMATEUR WIRELESS representative has recently been present at several B.B.C. orchestral broadcasts from this huge studio and has been able to make interesting comparisons between this studio and, say, the Queen's Hall. There is a great deal more echo in "Number 10" than there is in any public hall—a trifle too much for an audience in the room itself—but when one goes to the listening cabinet outside, where the amplifiers are situated, the quality is just right.

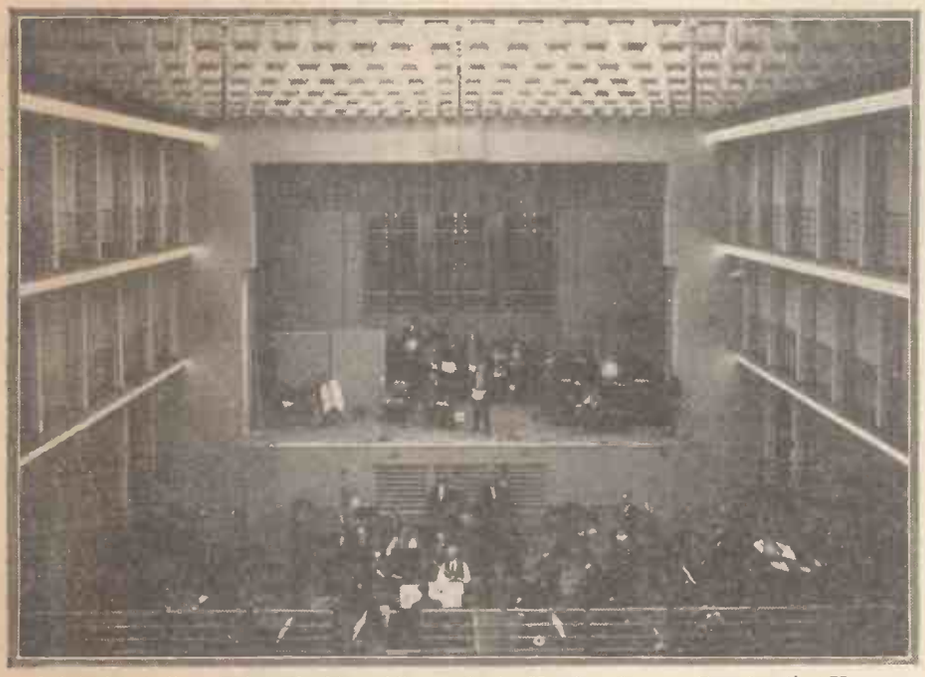
IN SHIRT-SLEEVES

BUT the advantage of "Number 10" over a public hall is the possibility of informality. Most of the conductors so far have followed Dr Boult's example and have conducted in shirt-sleeves, and that spirit of *bonhomie* has been reflected in the orchestra, the members of which dress, sometimes in quaint garbs, for comfort in playing and not for appearance, as they have to do in a concert hall. The orchestra is arranged, too, exactly to suit the microphone, whereas in a public hall conventional arrangement has to be studied. Everyone may not like these big orchestral broadcasts, but undoubtedly if they are to be done they are worth doing thoroughly; and "Number 10" is the right place.

AS IT IS ABROAD

BY the way, it must be surprising to big Continental conductors like Hermann Scherchen, used to the giant studios in Berlin, to see that the best we can do in that direction is a converted wharf! But when Broadcasting House is complete, the giant studio there will replace "Number 10." It is a good plan, at present, to have a small audience. The announcers are said not to like "Number 10" being open to the Press, but the orchestra shows no dislike to an audience; rather the reverse, in fact!

HAMBURG'S LATEST



A futurist studio. This is the big public studio in Hamburg's new Broadcasting House, which is designed on very futuristic lines. A complete wall in this studio can be moved to vary the acoustic properties

PRINCIPAL CONTENTS

B.B.C. MAN FOR CANADA

MR. TYRONE GUTHRIE left by the *Mauretania* last Tuesday for Canada, where he will produce a series of historical dramas for the Radio Department of the Canadian National Railways. This is the first time a serious attempt has been made in Canada to broadcast plays written specially for the microphone. The broadcasts will embrace the whole Dominion and will be transmitted simultaneously from stations stretching across the country from Halifax to Vancouver.

"THE SILVER KING"

THE SILVER KING, one of the best remembered of Victorian melodramas, one in which Wilson Barrett distinguished himself and one which brought its author, Henry Arthur Jones, a fortune, is to be broadcast in Christmas week, on the Regional wavelengths on December 26 and nationally on December 27. The producer, Peter Creswell, will not modernise the play, but will follow implicitly the Victorian style of presentation; which supports the theory of Savoy Hill that a demand exists

NEXT WEEK: A SHORT-WAVE SUPER-HET ADAPTOR FOR YOUR SET

NEWS & GOSSIP OF THE WEEK—*Continued*

among listeners for a return to a type of play that was in favour a generation past.

CHICAGO'S GIANT STATION

NOW Chicago can boast of a super-station which has been erected on top of the world's largest building, the Merchandise Mart. The new station is two stories in height; comprises more than 66,000 square feet; contains six studios, four of which are two stories high, and plans are completed for additional studios when needed.

A HUGE STUDIO

MORE than 56,000 square feet of soundproof material was used in the construction of the studios of the Chicago station; there are more than ninety-five light fixtures in the studios and more than 33,000 watts of electricity are used to light the largest studio, Studio A, alone. The station includes a number of innovations which are the result of years of experimental work on the part of a large staff of engineers. There are four landline control booths, which are, in fact, miniature studios.

A PICKWICK PARTY

A DICKENS' dream fantasy, entitled *A Pickwick Party*, will be broadcast on the National wavelengths on December 29. It has been written by Stanley C. West, with music by Marjorie Broughton. Most of the well-known characters in Dickens' works will come to life, the scene being the Marquis of Granby Inn and the time Christmas Eve. Here will congregate Sam Weller (Kingsley Lark), Mr. Pickwick (Stanley Cooke), Mrs. Micawber (Gladys Palmer), Dora (Elsie Griffin), Jingle (Bernard Ansell), Mr. Wardle (Robert Chignell), Mr. Micawber (Joseph Farrington), Sairey Gamp (Lena Maitland), and many others. Howard Rose, the B.B.C.'s senior producer, will direct the *Pickwick Party* production.

NEW PLAYS

IF this country ranks first in the production of radio plays, Germany is certainly a good second. It is interesting to learn that a new German radio play, entitled *The Italia*, written round the airship disaster, is to be broadcast by the B.B.C. some time in the new year. Clemence Dane's *Will Shakespeare* is also to be done by the B.B.C. dramatic department.

TO BE RELAYED

On December 31 Amos'n Andy are to be relayed from America to B.B.C. stations. They broadcast in the interests of a tooth-paste firm. Amos is Freeman Gosden, formerly an actor, and Andy is Charles Correll, who has been a bricklayer and an amateur minstrel

NO B.B.C. REPERTORY COMPANY

THE experiment carried out by the B.B.C. during the past year of a permanent repertory company has not been a success. We learn that the contracts of the three women and five men comprising the repertory company will end this month. The past year's experience has shown that it is not feasible to cast the many and varied plays produced by the B.B.C. from such a small repertory company. And a sufficiently large repertory company to meet the B.B.C.'s needs would be too expensive. So the old method is to be re-introduced, whereby players are engaged as required.

TICK-TOCK!

BY now most readers will have heard the B.B.C.'s new interval signal. A "slave" dial, connected to the B.B.C.'s electric-clock system is fixed inside a box with a microphone near by to pick up the tick-tocks. Whenever the interval signal is wanted the engineer has only to energise the microphone. The B.B.C. describes the tick-tock as "low and soothing." The particular timbre of the note is imparted by the box in which the dial is fitted. We heard the note during the National programme last Sunday. This interval signal can be sent to any station requiring it, always provided that the landline is available.

ANNOUNCERS, PLEASE NOTE!

THE way of a B.B.C. announcer is indeed hard, as we are again reminded by the latest recommendations made by the B.B.C. Advisory Committee on spoken English, at their tenth meeting on Thursday, November 20, 1930. Looking through their latest list of words of debatable pronunciation it seems hardly credible that there are so many variations in spoken English. But how do *you* pronounce quaff, liqueur, sleight, threepence, and bulwark? These are but a few examples of words that are pronounced in all sorts of queer ways.

GRAND GOOD-NIGHT

AS usual, the B.B.C.'s last broadcast of the Old Year is the Grand Good-Night arranged by Mr. J. C. Stobart. It is interesting to note that the first speaker of the New Year radio will be the Archbishop of Canterbury.

RETROSPECT

ON December 31, when the Old Year has only forty-five minutes to go, the B.B.C. is broadcasting a novel radio retrospect through National stations. Short statements of events that have occurred during 1930 will be linked together, and illustrated or amplified by music or small dramatic scenes. Two or three narrators will verbally link up the multitude of events to be dealt with. The compiler of this programme told us that it will be rather like looking through the wrong end of a telescope. We shall see—or, rather, hear.

A MEMORABLE YEAR

DURING the past year over 400,000 licences have been added to the B.B.C.'s grand total. Estimating five listeners to a licence, we arrive at the very satisfying conclusion that the B.B.C.'s audience has been enlarged by at least 2,000,000 people during 1930. It has been a big year in the B.B.C.'s history. The National Orchestra, the opening of Brookmans Park, the opera arrangements, the Science and Religion series; these are but a few of the events in a crowded radio year

LOOKING AHEAD

IF the last year has been memorable, the forthcoming year should be no less so. For in 1931 we shall hear the opening of the new Northern Regional stations at Moorside Edge. This event should do much to stimulate interest in broadcast reception, especially in the North, where listeners have not so far had the advantage of alternative programmes. Another outstanding event in 1931 will be the move from Savoy Hill to Broadcasting House. With the magnificent new studios of the new headquarters we shall undoubtedly experience better broadcasting, notably of vaudeville.

A radio telegraph service between Portuguese East Africa and the Portuguese colony of St. Thome and Principe is to be inaugurated shortly.

The "CHALLENGE" RADIO-GRAMOPHONE

The wireless side of this instrument was described in last week's issue. In this article details of assembly and the gramophone are given

THIS, the latest edition of the successful "Challenge" series of sets, is a radio-gramophone consisting basically of a four-valve set capable of giving fine results both on radio and gramophone working. Full details for building the set section were given in last week's issue and all intending constructors of the Challenge radio-gramophone should make a point of reading the details which were given in that issue.

The receiver unit is one section of the gramophone, the others being made up by the moving-coil speaker, the turn-table motor and pick-up. Each of these units raises several points.

The receiver unit fits below the motor board and it is advisable, if you do not intend to use the motor specified, that you should choose one having not too great an overall depth.

Motor and Pick-up

The motor specified is the Paillard Apollo induction motor, which has been used with great success in "A.W." tests. This has an automatic stop and switch and instructions for wiring are given with each motor.

The pick-up is the new B.T.H. model.

A blueprint is available of the gramophone layout and in this the drilling centres apply only if the specified motor and pick-up are used. If any other make of pick-up is employed, then it is essential that you get the tracking quite right. As the method of doing this varies with each make of pick-up it is impossible to give detailed information. The drilling centres are, however, correct for satisfactory tracking with the B.T.H. arm.

A Moving-coil Speaker

It is recommended that the Hegra moving-coil speaker, type A3, be used. This is shown in the accompanying photograph and has been used in tests of the "Challenge" Radio Gramophone.

The battery leads for high tension, low tension and grid bias come down from the receiver to the battery compartment, which is at the back of the moving-coil speaker. These sets of leads are plaited into three separate groups. It is not advisable to plait together the high-tension and grid-bias wires.

A separate terminal strip is provided for the aerial and earth terminals, which should be connected, as short and direct as possible, to the aerial and earth. Speaker terminals are also provided, and as an output filter circuit is incorporated in the receiver it is unnecessary to bother about speaker polarity. Direct connection should be made with the input terminals of the moving-coil speaker.

The connections between the pick-up and the set should also be as short as possible and should be kept well away from the mains leads going to the motor terminals, otherwise there is a possibility of induction.

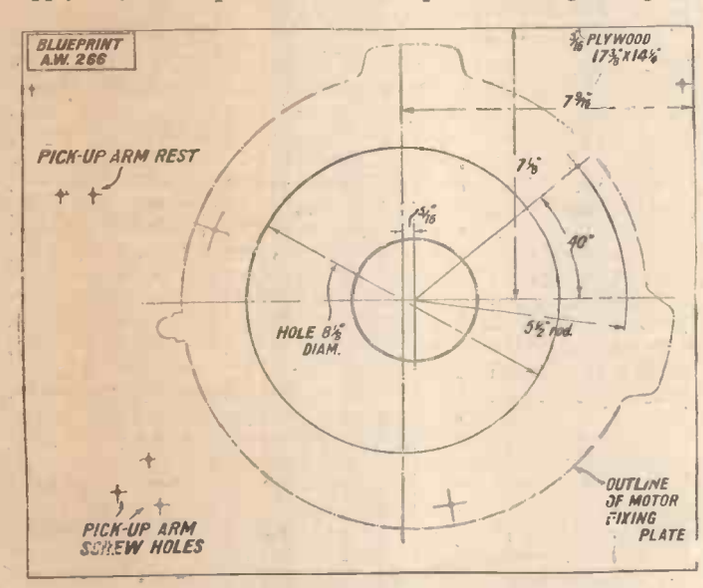
It is necessary to make a careful choice of valves in order to get good results. Either 2-, 4- or 6-volt valves can be used according to the supply available.

The screen-grid valve can be chosen from the following two-volters or from the equivalent four- and six-volters: Mullard PM12, Cossor 220SG, Marconi S215, Osram S215, Six-Sixty 215SG, Mazda 215SG, Lissen SG215.

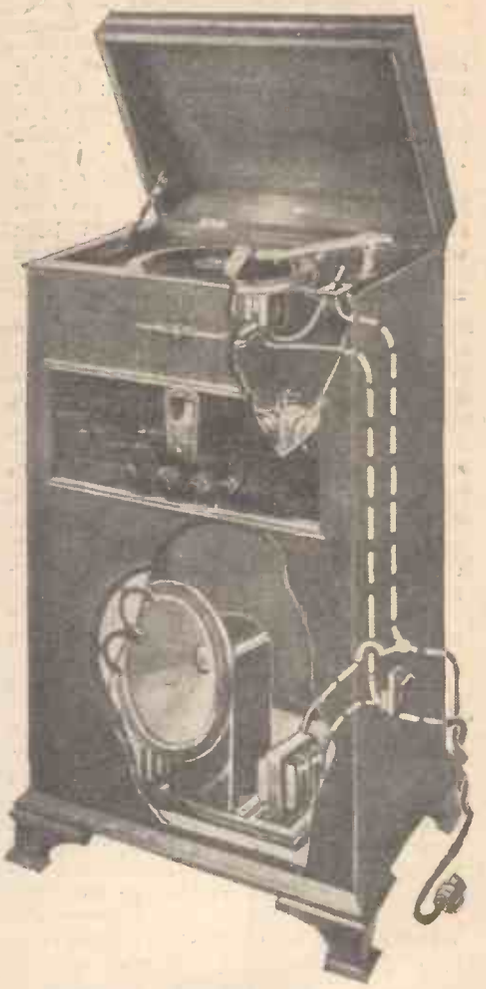
The detector valve is rather important for good results on the radio side and it is recommended that one of the following 2-volters or the 4- or 6-volters be chosen: Mullard PM1HF, Cossor 210HF, Dario Univ., Marconi HL210, Osram HL210, Six-Sixty 210HF, Mazda HL210, Lissen HL210.

The first low-frequency valve should be an ordinary L.F. type valve. It is not advisable for ordinary work to employ a power valve in this stage. Suitable 2-volters are the following: Mullard PM1LF, Cossor 210L, Marconi L210, Osram L210,

(*Continued on next page*)



This is a layout of the gramophone motor board. A full-size blueprint is available, price 6d.

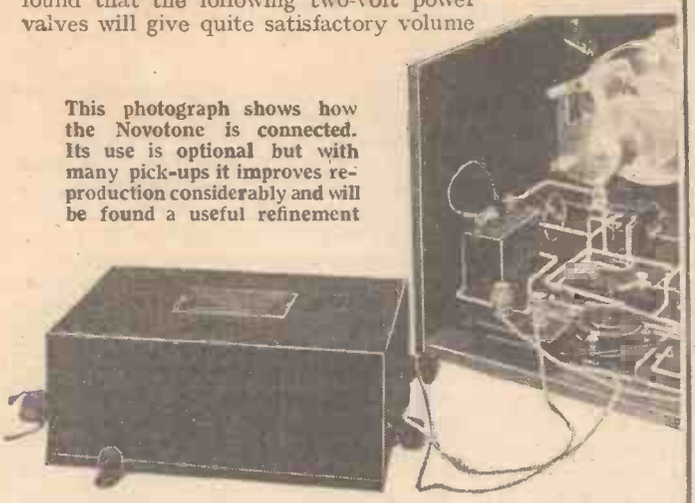


In this cut-away picture the assembly and internal wiring are clearly shown

"THE 'CHALLENGE' RADIO-GRAMOPHONE" (Continued from preceding page)

Six-Sixty 210LF, Mazda L210, Lissen L210, Dario Univ.

There is, of course, a direct relation between the type of power valve which it is possible to use and the high-tension supply available. If very great volume is required, then a large power valve should be used in conjunction with a mains eliminator or high-tension accumulators capable of standing up to a high discharge at well over 150 volts. For ordinary working it will be found that the following two-volt power valves will give quite satisfactory volume



This photograph shows how the Novotone is connected. Its use is optional but with many pick-ups it improves reproduction considerably and will be found a useful refinement

combined with economy so far as high-tension demands are concerned: Cossor 220P, Dario SP, Marconi P2, Osram P2, Six-Sixty 220P, Mullard PM2, Mazda P220A.

Be sure to use adequate grid bias, for this has a marked effect on high-tension consumption. Provided the set has been wired up correctly and that valves and input voltages are correct, the set should at once give satisfactory results on the gramophone side. Preliminary adjustment of the ganging is necessary before the best radio results can be obtained.

If the Challenge coils have been bought ready made, then they will already be matched and the two halves of the ganged condenser should be set exactly at zero, together with the drum dial pointing to nought.

Should any discrepancy arise in the ganging as the condenser is turned over its whole scale a slight adjustment of the pre-set condenser in the aerial lead will correct for this. This additional adjustment will not be called for in ordinary working, though, and its need will only be apparent when the set is pressed to its full limits.

You will find that the best results are obtained with quite a short aerial, and an indoor aerial will be found satisfactory in most districts.

Components for the "Challenge" Radio-Gramophone

Ebonite panel, 18 in. by 7 in. (Becol, Keystone, Trelleborg).
Baseboard, 18 in. by 14 in. (Camco, Clarion, Pickett).
Two .0005-mfd. variable condensers (Polar Universal, Lotus, Lissen, Ormond, Formo, J.B., Burton, Igranic, Utility).
Slow-motion drum-drive (Polar, Ormond, Lotus, J.B., Utility, Burton).
.0003-mfd. reaction condenser (Lotus).
Double-pole change-over rotary switch (Wearite No. 122, Utility).
1-megohm volume-control (Rotorohm, Gambrell, Igranic, Claude Lyons, Sovereign).
One dual-range aerial coil, and one anode coil with reaction winding, Challenge type (Tunewell, Clarke, H. & B., Wearite, Parex, Readi-Rad).
Horizontal-mounting valve holder (Junit, W.B., Parex, Wearite).
Three valve holders (Lotus, Benjamin, Telsen, Burton, Lissen).
Four fixed condensers, one .0003-mfd., one .005-mfd., one .0002-mfd., and one .0001-mfd. (Lissen, Telsen, Readi-Rad, T.C.C., Dubilier).
1-mfd. fixed condenser (T.C.C., Dubilier, Lissen, Igranic).
Two 2-mfd. fixed condensers (T.C.C., Dubilier, Lissen, Igranic, Ferranti, Formo).
Grid-leak holder (Lissen, Bulgin).
2-megohm grid-leak (Dubilier, Lissen, Readi-Rad, Igranic).
High-frequency choke (Lewcos, Readi-Rad, Lissen, Varley, Formo, Tunewell, R.I.).
Low-frequency transformer (Telsen Ace, Lissen, Varley, Burton, R.I., Ferranti, Igranic).
Low-frequency choke (R.I. Hypercore, Igranic, Lissen, Varley, Wearite).
Pre-set aerial condenser, .0001-mfd. max. (Formodenser type F, Polar, Sovereign, Lissen).
One 30,000-ohm and one 80,000-ohm spaghetti resistance (Bulgin).
Three terminal blocks (Belling-Lee, Lissen, Junit).
Six terminals marked Aerial, Earth, Pick-up (2), L.S. (2) (Belling-Lee, Clix, Eelex).
Aluminium partition screen (Parex, H. & B., Readi-Rad, Wearite).
Piece of aluminium foil, 8½ in. by 5½ in. (Parex, H. & B., Readi-Rad, Wearite).
7 in. length of half-inch angle-brass.
2 in. extension rod, coupler and bracket for change-over switch (Wearite).
Wire and 7 yds. flex.
Six wander-plugs marked H.T.—, H.T.+1, H.T.+2, G.B.+, G.B.—1, G.B.—2 (Belling-Lee, Clix, Eelex).
Two spade terminals marked L.T.+, L.T.—, (Belling-Lee, Clix).
Screen-grid connector (Belling-Lee, Clix).
Electric gramophone motor (Apollo).
Pick-up and tone arm (Ediswan).
Moving-coil loud-speaker (Hegra).
Gramophone cabinet (Camco, Waverley).
Novotone [optional] (Gambrell).

NOTES ON HOME-RECORDING

SETTING THE CUTTER

THE general principles involved in home-recording have already been described in these columns ("A.W." No. 443). I mentioned in that article that there were various technical details requiring attention.

One of the most important points in the whole system is the cutter used for actually engraving the track on the metal disc. With the Cairns-Morrison system this is a sapphire, and I have found these particularly good when they are new. There is a tendency for the point to wear, however, and I am told that the Cairns-Morrison outfit will be shortly marketed with a diamond point. The Home-Recorder outfit is provided with a diamond point which is almost permanent. It was explained to me that one point will cut many thousand records. I am not quite sure from my own experiments whether I agree with this, but there is no doubt that the diamond point is a more permanent one, and requires less adjustment once the correct position has been found

Generally speaking, the diamond points are supplied with a small nick in the holder, and the holder should be mounted in the electrical pick-up with this nick facing one, when the tracking arrangement is running along the back of the gramophone. Little harm is done, however, by experimenting to find which is the best position. Take a test record with a series of short cuts, of perhaps 15 seconds each, stopping the machine and rotating the diamond a quarter of a turn each time. One of the cuts will be found to be definitely superior to the others from the point of view of freedom from scratch and clarity of reproduction.

The Best Cut

With the sapphire point the preliminary adjustments are not great, for the points are finished off in a cone instead of having facets, as in the case of the diamond point, and almost any position is a good one. To be on the safe side, a few experiments should be tried, even with a sapphire point.

After a little experience the quality of the cut can be determined from the noise which is produced as the record is being made. Any sort of scraping noise is to be avoided. At first, one may think that a scraping is essential in order to get a good cut, but in point of fact the action is more a burnishing than a cutting one, and when the cutter is operating under its best condition the noise given off is only a faint hissing. Any position of the cutter which gives a rough surface on the record when the finger is drawn lightly across it will be found to give scratch when the recording is reproduced.

So much for the cutter itself. I may conclude by pointing out that the depth of cut has little effect on the scratch. When a correct point has been found, a heavy cut may be taken with as good results as a light cut, and therefore, the greatest weight possible should be placed on the cutter in order to obtain a deep groove which will track well when replayed. I shall have more to say about the matter of tracking in the next article.

J. H. R.

Tuning Problems of To-day

Alan Hunter gives some useful hints on tuning arrangements best suited to present-day broadcasting

JUST now we are at the peak of winter reception. How bad, good, or indifferent is the selectivity of the set has now been proved. I will broadly define selectivity as the measure of a set's ability to separate one particular station from all others. Such a definition embraces the distinct tuning conditions for the separation of two powerful local stations one from the other; for the separation of two strong but

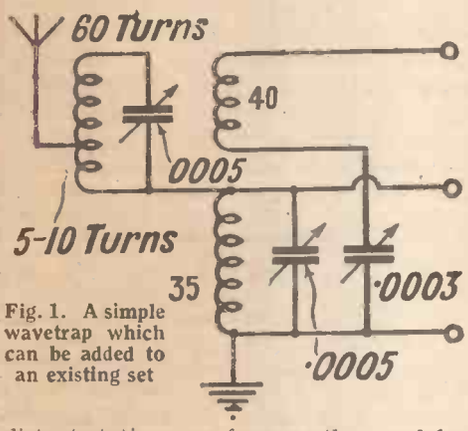


Fig. 1. A simple wavetrap which can be added to an existing set

distant stations one from another; and for the separation of a strong local from a distant weak station. The need for some distinction between these requirements is not always appreciated. So I will deal with what might be termed special selectivity and general selectivity.

In every existing or proposed regional area in this country are two high-power stations, whose transmissions cannot be separated unless the set has a measure of selectivity. I call this special selectivity because there is a technique in merely separating two powerful local stations that is quite distinct from the technique for the other conditions mentioned.

One can take great liberties with the sensitivity of a set whose only job is to receive and separate the two locals. For one thing, the aerial wire can be cut down to 30 or 40 feet, since the transmitting power is so considerable that even on such a short wire the energy will be sufficient to work the set. The consequent reduction in the damping of the aerial system on the tuning circuit increases the selectivity, often to the extent needed for separation.

So great is the energy available that the tuning circuit itself can be made more selective by having two separate tuned coils loosely coupled together. Sometimes no special precaution need be taken to cut down the length of the aerial; nor need the tuning be anything more complicated than a simple coil and condenser. For, since only one of the two programmes is wanted at any given time, the other can be cut out with a wavetrap, as in Fig. 1.

The wavetrap is a special selectivity device, effective only in cutting out one station in favour of another. It is easy to see that, were a third station wanted, distinct from either of the twins, the wavetrap circuit of Fig. 1 would be useless because the twin not being trapped would cause interference. Fig. 1 is, in fact, a make-shift, recommended only where the set has already been installed and where structural alterations cannot be made.

Special Selectivity

In this country special selectivity is often much more important than general selectivity. Often the only stations wanted are the two Regionals, no provision being desired for foreign-station reception. I should hesitate to say that a series of tuned circuits is essential for such listeners, but I do think the Fig. 1 arrangement is the least desirable in spite of the fact that it is widely adopted.

A much more straightforward way of tuning can be obtained with one or other of the three circuits shown at A, B, and C in Fig. 2. The circuit at A is my favourite for a simple two- or three-valver. It has the merit of great flexibility; and that with simplicity of operation. It consists of a centre-tapped coil and a pre-set condenser in series with the aerial lead and the centre-tap. Across the whole coil, which for the medium band should be a No. 60, is the usual .0005-microfarad tuning condenser I have also indicated the reaction system suitable.

With this circuit I have found the Brookmans Park stations easy to separate. Each station is loudly heard with an appreciable silent space between the dial setting for each. The selectivity is to some extent controllable by the pre-set aerial condenser, although the centre-tap connection also helps to give selective tuning by lowering the damping effect of the aerial and earth across the tuning coil.

Fig. 2B shows the standard loose-coupled arrangement of primary and secondary coils. A 35 aerial coil and a 60 secondary coil, each tuned with a .0005-microfarad condenser, has been found suitable to cover the medium waveband. But unless one has plenty of power to play with, either through proximity to the transmission or large amplification in the set, I do not particularly care for this arrangement. Too much energy is lost between the coupled circuits. Added to that is the need for two tuning adjustments for each signal heard.

Fig. 3C deserves the serious attention of all experimenters. I frankly disown originality, but having tried it I think there are possibilities. As can be seen, the 60 centre-tapped coil is tuned by the .0005-microfarad condenser, with the aerial taken to the centre tap as at A. But instead of connecting the detector to the coil end remote from the earth end, it is also connected to the centre tap. So in effect the coil-damping is very light, because both

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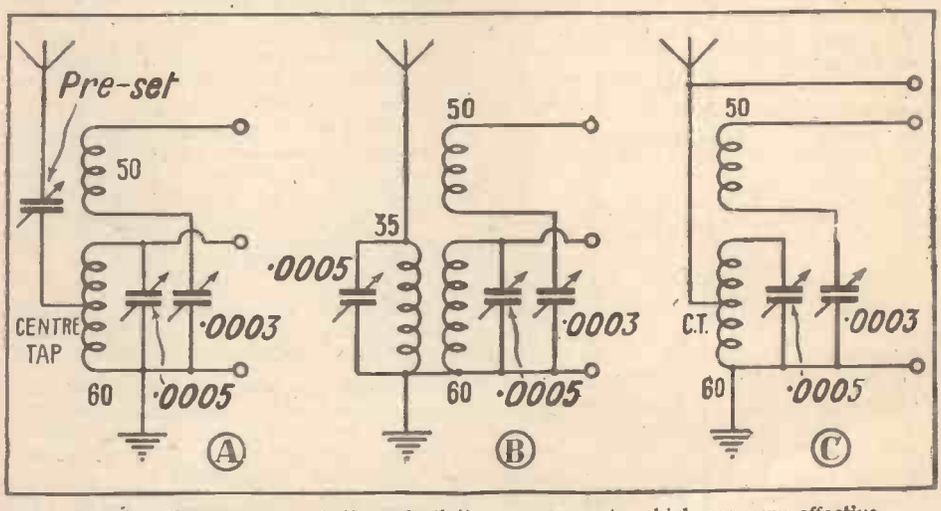


Fig. 2. Here are some better selectivity arrangements which are very effective

For the Newcomer to Wireless: Impedance

LAST time you explained to me what mutual conductance meant. During our conversation we spoke often about valve impedance and I would like to be quite sure that I really understand just what this quality is. Is it the same thing as plate-filament resistance?

No. Something absolutely different.

Well, perhaps you will tell me first of all about plate-filament resistance.

That's a varying figure which depends upon filament temperature, plate voltage, and grid-biasing voltage. But it remains constant of course for any particular adjustment of these three. You find the plate-filament resistance by Ohm's law, simply by dividing plate volts by plate current. If, for example, a valve with 100 volts on the plate passes 10 milliamperes of current with a given grid bias, then the plate-filament resistance is 100 divided by .01 ampere or 10,000 ohms. Those actually are the figures for the Marconi P410 valve, but the impedance of this valve is 5,000 ohms only.

I think I begin to see daylight. Valve resistance is concerned with direct current only and valve impedance with oscillating currents—isn't that so?

That's it exactly. Now as you know an oscillating impulse produces changing volts and changing currents. To find the direct-current resistance of the valve we divide the plate voltage by the plate current. The impedance is found by dividing the *change* in plate volts by the *change* in plate current.

I follow the idea, but just what do you mean by the change in plate volts?

If you look at a family of valve curves you find that characteristics are plotted for different plate voltages. In that of the P410, for example, there are curves for 75, 100, 125, and 150 anode volts. Here it is.

I see.

In other words, if you compare the 75-volt characteristic with the 100-volt, you see the difference produced by a change in plate volts of 25.

I've got that all right.

Now, if you look at the family you will see that the plate current with 100 volts H.T. and no grid bias is 15 milliamps. Change the plate voltage by 25, or in other words reduce it to 75, and the plate current goes down to 10. It follows that taking 100 plate volts as a basis, a change of 25 volts produces a 5-milliampere change in current. To find the impedance we divide 25 volts by .0005 ampere and the answer is 5,000. Actually, if you have the data for the amplification factor and the mutual conductance you can find the impedance at once by dividing the mutual conductance into the amplification factor and adding on three noughts. Here the amplification factor is 7.5 and the mutual conductance 1.5. Again we get the answer 5,000.

Why do the makers always give the impedance and so on at grid bias zero?

I have often wondered, for these figures are quite misleading. The actual impedance, mutual conductance and amplification factor of a valve are totally different under working conditions with a strong grid bias. The amplification factor and the impedance go up and the mutual conductance naturally goes down. Another time we will discuss just what the amplification factor is.

"TUNING PROBLEMS OF TO-DAY"

(*Continued from preceding page*)

aerial damping and detector damping (quite an appreciable factor) have been reduced simultaneously. With this circuit much interesting work can be done. I suggest a solenoid coil of 60 turns, tapped at every three turns, wound on a 2½ in. diameter former, with 24-gauge wire. The combined aerial and detector tap can then be varied to suit different selectivity requirements.

The circuits of Fig. 2 confer general selectivity on a simple set, say a two- or three-valver. Not only can two strong locals be separated, but both can be separated from a weaker and more distant station. Fig. 2A is especially useful for this purpose, since it is possible to increase the selectivity on the pre-set condenser to the limit where no further reduction in volume can be tolerated.

H.F. Amplification and Selectivity

So far I have been assuming that the tuning arrangement of the set directly precedes the detector and is not interrupted by a stage of high-frequency amplification. Had Fig. 2B embraced such a stage, I should have said it was preferable to Fig. 2A or Fig. 2C. Which brings me to an important point: high-frequency amplification is essential in a really selective set.

It is a very big step from the simple circuits of Figs. 1 and 2 mentioned to the stringent requirements imposed upon the designers of multi-valve sets. In these the need is for at least three tuned circuits, and if possible, four. To avoid losing energy in transferring the signal from one stage of tuning to the next, we have to insert a high-frequency stage. Thus in a set with three tuned circuits, we usually find two high-frequency valves in front of the detector.

One of the things that are worrying designers at the present time is the relation between the stage gain and the number of stages of high-frequency amplification. Due to the great sensitivity of modern valves, it is conceivable that a set with three tuned circuits (two high-frequency valves) may be less selective than a set with only two tuned circuits and one high-frequency valve.

A three-valver, with high-frequency, detector, and low-frequency stages, using battery valves, might be quite selective; but the change over to A.C. valves might produce unselective tuning, due to the increased amplification of the A.C. valve. With a given tuning circuit, the more the amplification the less is the actual selectivity.

DO YOU KNOW—

that 5SW has been experimenting recently with different types of aerials? Announcements are made occasionally when a new aerial is in circuit.

that with small sets there is a temptation to work too close to the reaction point, and you may be causing interference without a howl actually being heard in the set? Oscillation on the threshold point of reaction is very trying to neighbours and usually distortion is noticeable in your own reception.

that Poland's new giant 1,411-metre station has water-cooled filaments? The valves used cost about £500 each.

that although the power rating of the B.B.C. stations has been altered, the actual power emitted has not been increased? The rating has merely been altered to conform to existing standards.

The second of the German Regional high-power transmitters was started up on December 10; it is that of Heilsberg in East Prussia, operating on the Königsberg wavelength of 276 metres (1,085 kilocycles). For the present the power is only 75 kilowatts, but within the next few weeks it will reach 120 kilowatts in the aerial. The original Königsberg transmitter will remain in use for a few months and now operates on 217 metres (1,387 kilocycles).

It is reported that the Munich aerial masts destroyed by the recent gales are not to be re-erected on the same site, as in their fall they caused considerable damage to the Stadelheim Prison. As in the case of Muhlacker, the masts will be constructed of wood at a greater distance from the transmitter. In the meantime signals from Munich remain on the weak side as the full power of the plant cannot be used.

Work on the new 60-kilowatt Radio Toulouse transmitter is being hurried along, but it is not expected to have the station ready before next spring.

Not satisfied with the power of the Moscow (Trades' Unions) station, it is stated that the Soviet authorities are now considering the installation of a 150-kilowatt transmitter at Bogorodussja to relay the capital programmes.

On Your Wavelength!

A QUEER SHORT

I CAME across a short-circuit in a big set the other day, and the way in which it was tracked down may be useful to readers as an example of systematic fault-finding. The set, by the way, was entirely strange to me. I did not know the circuit, no circuit diagram was available, and an inspection of the interior of the cabinet showed that the wiring was horribly complicated. The symptoms were these. Every now and then, whilst reception was in progress, a deafening roar would suddenly issue from the loud-speaker. This would continue until the cabinet was smartly rapped, when it might cease. Jarring or rapping the cabinet produced a terrific response from the loud-speaker. Quite clearly, two uninsulated points in conductors carrying current at widely different potentials were very close together, and the slightest jar was sufficient to bring them into contact or to move them a little away from one another. Now, when you have a short-circuit the best course is to disconnect your high-tension battery, or the eliminator if one is used. The reason is that every time the short occurs you place a terrific strain upon the source of H.T. supply. Having disconnected, take a grid battery and connect the H.T. negative lead to its negative socket. Take a milliammeter and place a resistance of 1,000 ohms or so in series with it. If you have not a resistance of this order the primary of an old transformer will do perfectly well.

The purpose of the resistance is to prevent the milliammeter from being overloaded when a short occurs. Connect the milliammeter to the 9-volt positive socket of the battery and then connect H.T.+1 to the unoccupied terminal of the resistance. Now shake and jar the set, watching the milliammeter meantime. If its needle does not move, then the short is not between H.T.+1 and H.T.— (which is, of course, the same thing as L.T.— in the modern set.) Next try with H.T.+2 and similarly with each H.T.+ lead in turn. When one of them is connected up, jarring will cause the milliammeter's needle to kick. You know then that you have narrowed down your search to circuits served by the H.T. positive lead in question.

CONTINUING THE SEARCH

IF the resistance has a value of 1,000 ohms the greatest amount of current that can flow from the 9-volt grid battery when a short-circuit occurs is 9 milliamperes. You are therefore perfectly safe in continuing your trouble-hunting by endeavouring deliberately to cause a short-circuit inside the set. A further advantage of using only 9 volts is that you can fiddle about inside the cabinet with your valves and be quite sure of not receiving shocks. In the particular set in question screening was extensively used, all of it being earthed. One, therefore, naturally suspected that the H.T.+3 lead, to whose circuits the short had been tracked down, was coming into contact somewhere with the screen. But there was another pointer which was useful. The resistance in circuit was actually just 1,000 ohms; so that on a dead short the milliammeter should have read 9 milliamperes. Actually it showed only 3. By Ohm's law, therefore, there was a total resistance of 3,000 ohms in action. A thousand ohms were accounted for by the resistance used. The other 2,000 must be somewhere inside the set. The natural deduction was that the short-circuit was taking place at a point between which and H.T.+3 there was interposed a resistance of 2,000 ohms. Now, what was likely to provide such a resistance? Inspection of the set showed that either of two components might be responsible. There was a choke in the plate circuit of one valve served by H.T.+3 and a transformer primary in the plate circuit of another.

NEARLY THERE

THE search was therefore narrowed down to these two circuits. Watching the milliammeter, I got my hand right down inside the cabinet and went over every wire of the first, prodding it, shaking it, and generally endeavouring to cause a short. Nothing happened. Similar negative results were obtained when the second circuit was treated in the same way. I tried pressing harder upon wires and components. I found that when I pressed down the bottom of the metal box containing the second circuit I could cause the short to occur. Then I found that by pressing one side of the box inwards I could also make the milliammeter kick. Was the copper screen coming into contact with a bare patch on one of the wires passing through it? Investigation showed that it wasn't, but I found that something else was happening. Across the primary of the transformer was a very small condenser with metal ends. This transformer was mounted quite close to the screen and the condenser had become slightly displaced in its clips. Normally it was a fraction of a millimetre from the screen, but the slightest bending of the latter or even jarring caused contact to take place.

SYSTEM DOES IT

NOW that short might have taken hours or even days to find if one hadn't gone about the job systematically. In actual fact, it took far less time to locate and to rectify than has been required to write this brief description of the proceedings. The whole secret of finding faults quickly and certainly is to narrow down your field of search by eliminating possibilities until you come to probabilities and then eliminating probabilities until you reach certainty. And if you haven't got a milliammeter you can use telephones just as well in nearly every case.

VALVE LIFE

IT is a very rare thing nowadays for a valve to come to the end of its useful life by the actual burning out of its filament. With bright-emitters this kind of thing used to happen every now and then, for a thin filament run at a temperature in the neighbourhood of 2,000 degrees centigrade became brittle in course of time. The modern valve perishes in a different way. It is designed to have a working life averaging rather better than a thousand hours, which means during that time its filament will retain sufficient thoria or oxide coating to provide the necessary emission at a temperature of about 700 degrees centigrade. The sensitising element, however, is used up in time and the emission begins to decline more or less rapidly. Unfortunately, there are still many who believe that so long as its filament is intact a valve must be in good order. Not infrequently I receive letters from correspondents who boast that their valves have been in use for three, four, or even five years. As a rule, these letters go on to state that the set is not so selective as it might be and that a curious and baffling form of distortion is noticed, combined with loss of volume. "One of the components must be at fault," say the writers, "for we *know* that the valves are all right." And I jolly well know that the valves are all wrong. It is most illuminating if you come across a man who gloats over obtaining three or four years' service from a valve to pull out a milliammeter and take, then and there, a simple curve of this particular tube. You will find, if you care to make the experiment, that it is *rather* different from the original.

A SOUND RULE

THE soundest of sound rules is to vet your valves or have them vetted at the end of their first thousand hours' working. This applies particularly to low-impedance valves of large emission, for with them the sensitising ingredients are likely to be used up more quickly than in types whose emission is not so copious. The effects on quality, too, are particularly serious if the output valve is "drying up." How should a valve be vetted? Well, here is my tip. When it comes into service put it into its appropriate holder in the set, make the H.T. volts 100, and apply the proper grid bias. Then put a milliammeter into the H.T. positive lead that serves it and read the current passing. On a small stick-on label write the date and, say, "H.T. 100; G.B. —7½, 6 milliamperes." Vetting simply means repeating the process. If now you find that with the same H.T. and G.B. voltages the emission is down a good deal, you can take it for granted that the time has come to pension off this particular valve. If its characteristics are not too bad, you may be able to find a use for it in another position where only a small emission is required.

MODERN COILS

THE modern dual-range coil, with its wave-change switch, is a very convenient arrangement, but it does limit the possibilities of a receiver in a way that the

On Your Wavelength! (continued)

old-fashioned plug-in coils did not. For instance, some of these up-to-date coils will not allow the reception of the air service telephony transmissions on 900 metres, which still provides a lot of fun and thrill for those who can tune them in. Also none of these coils tunes below 200 metres, and there is a great deal of most interesting telephony between 100 and 200 metres which could be heard on any decent receiver, provided that the coils would tune down there. Besides French and German relays of the longer-wave stations, which can often be had at excellent strength and free from jamming when the ordinary wavelength is horribly heterodyned, there is, particularly on Sundays, a great deal of amateur telephony round about 160 metres which will provide much amusement.

PIANO TRANSMISSIONS

SAVOY HILL does not yet seem to have solved the problem of perfect piano transmission. There still seems to be one studio or one microphone which distorts this type of music horribly. The B.B.C. must know about it, for everything that goes out is carefully watched, both aurally and by measuring instruments. Why do they go on doing it? Every listener to the Brookmans Park transmissions must have had the experience of hearing really dreadful piano music and then, a few minutes later, in another part of the programme, without any change at all in the receiver, piano music that is really good. Without doubt the fault is in the transmission.

A MAINS HUM POINT

NOT long ago a nasty hum developed suddenly in one of my all-mains receivers. I took off the cover of the mains unit to see if any connection had broken loose, thereby switching off the current, but could see nothing. On replacing the cover and switching on again all was well for about an hour, and then the hum started again. After a while the cover was taken off the mains unit and the safety switch shorted so that a watch could be kept on the interior. Every now and again, for no apparent reason, one filament of the full-wave rectifier valve went out and the hum promptly started. Apparently there was a break in the filament and sometimes the two ends made contact and sometimes they did not. At any rate the rectifier valve finally ceased to function on one side, was replaced, and all hum trouble stopped.

Really good condensers tested with at least twice the normal voltage delivered from the rectifier after smoothing are necessary in an all-mains set, because, for some thirty to fifty seconds, whilst the cathodes of the indirectly-heated valves are heating up, considerably more than the normal voltage is across all condensers on the H.T. part of the circuit. In one rectifier I have been using, rated to deliver 200 volts at 100 milliamperes, the voltage, on switching on, when no current is being taken, is 350. As the cathodes heat up this gradually falls to 240, which is the potential difference at which the receiver works when taking about 55 milliamperes.

IN SERIOUS VEIN

I WONDER what proportion of those who listen in amazement to Sir A. S. Eddington and Sir James Jeans expounding the vastness of the universe and the utter insignificance of man would trouble to glean the same information from the published works of these eminent scientists? Although I certainly do not agree with the view that the chief aim of the B.B.C. should be to "uplift" rather than to entertain, I must confess I like to hear it occasionally in serious vein, and never more so than when either of the learned professors mentioned above, or Sir Oliver Lodge, is at the microphone. Most of us are too busily occupied in the dreary routine of business life to find leisure to keep pace with modern scientific thought as expressed in current literature, but such astounding discoveries are being made nowadays that it would be a thousand pities not to get an occasional glimpse into what is afoot.

TWO POINTS OF VIEW

NOT so long ago I happened to dine in the company of a distinguished man of letters. In due course the conversation drifted—or perhaps I led it—to my own pet subject, where I hoped to find a safe and congenial topic, but it turned out otherwise. "Have you a wireless set?" I asked somewhat diffidently. "No," was the abrupt reply. "Someone did persuade me to get a set, but I kicked it out after two days. I hated the thing." Naturally this knocked the wind out of my sails and I collapsed. After dinner, however, I heard an entirely different point of view expressed, this time by a lady guest. "I consider broadcasting a positive boon to the housewife," she said. "Most of us, especially in the suburbs, where life is apt to be a trifle dull, look forward to the luncheon-hour dance music as a regular tonic after the morning round of household duties. I find it such good company, that it gives the midday meal quite a restaurant flavour. Then to have tea with Moschetti! It helps to make one forget the day-long absence of the 'man of the house.' I certainly think no self-respecting husband should leave his wife alone in a suburbia without the company and comfort of a wireless set."

INTERFERENCE FROM THE MAINS

ON one of my periodical visits to Elstree the other day, I found that for some time past an interference had been noticed whenever any reasonably high-powered sets were in use. The trouble had, apparently, come to a head when testing a portable receiver, since unless everything was switched off it was apparently impossible to receive signals. This proved the last straw and made it essential that something should be done about it. An exhaustive examination was, therefore, undertaken to find which particular portion of the electric lighting system was causing trouble.

A PROLIFIC SOURCE OF NOISE

KNOWING the terrific noise which can be caused by a leaky plug or lamp-socket adaptor, all these were examined and, much to the disgust of the investigators, were found to be O.K. The next thing that happened was that the megger was transferred from the plugs themselves to the wiring, with the result that the insulation proved to be below par. All sorts of determined efforts did not solve the problem and, therefore, a special cable was run out from the source of supply to the laboratories to replace the existing mains cable. Rather to Mr. Reyner's joy, this did not cure the trouble.

I asked him why he was so pleased with this result and he informed me that he had been afraid that the lead-covered cable itself had developed a bad leak, which would have meant the replacement of the whole cable, since a leak at one part would probably only be the forerunner of further breakdowns. When the main cable proved not to be the offender, therefore, he felt very cheered. The difficulty still remained, however, and it became necessary to isolate the whole of the lighting equipment into small portions and to test the insulation of each individually. When this was done it was found that in many cases the resistance was lower than it should be, and the only method of testing was to run fresh circuits of a temporary character to various pieces of apparatus and see if the trouble still occurred.

THE FAULTY JOINT

ACCORDINGLY a number of flex leads were run from the main distribution board in the laboratories to electric fires and other apparatus and it was found that no interference was obtained. Therefore the interference was arising from some defect in the original wiring. This defect was ultimately located. In a laboratory one's electrical installations are not always carried out strictly in accordance with the I.E.E. wiring rules, and in one place a tee-joint had been made. The ordinary cable had been bared, an extra piece of cable connected up in circuit, and the whole joint had then been covered with black insulating tape. This was the source of the trouble. On removal of this insulating tape the trouble disappeared completely. The joint was remade by using Empire tape first and then putting the black insulating tape over the outside. It all goes to show what a very simple factor caused the dickens of a lot of trouble.

THERMION.

DO YOU KNOW

that when you connect up your high-tension eliminator to the portable it is most important to get the variable tappings the right way round? In most of these units one tapping is provided, especially for the screen-grid, and if this is connected in error to the main high-tension circuit then it will be hopelessly overloaded.

INTERFERING MÜHLACKER

THE radio reception topic of the moment is: Why does Stuttgart, which was formerly of no great account in the European ether, now jam the London Regional programme? The answer is that the old Stuttgart is no more. Its place has been taken by a giant regional transmitter at Mühlacker, a small town midway between the city of Stuttgart and Karlsruhe.

This transmitter represents the first attempt made by the German broadcasting authorities to copy our Regional scheme. The new Mühlacker station, which has an aerial output of 70 kilowatts, will serve one large area of Germany. The power at Heilsburg is being put up from 75 to 120 kilowatts to cover another area, and later Königswusterhausen will butt forth with a medium-band transmitter of the same power.

These three stations will cover the Northern, Central and Southern areas of Germany, and will replace existing low-power relays. The Mühlacker transmitter is on a height above the River Enz on the borders of Baden. Two 330-ft. masts tower above the station building; it is interesting to note that these masts, which are of the self-supporting lattice type, are made of wood, whereas the Brookmans Park masts are steel.

Naturally, high voltages and enormous power are called for to produce an aerial output of 75 kilowatts; this can be increased to 120 kilowatts, by the way, and sad would be the fate of British listeners to the London Regional station if this were done!

The high-tension supply, which is at 12,000 volts, can be obtained either from a dynamo or via a bank of rectifier valves from the power mains connected by overhead lines with Stuttgart.

Valve Control

In the last stage of the transmitter, which is valve and not crystal controlled, are 20 huge water-cooled valves. Eighteen of these normally stand up to full power, two being kept as reserves. A switching arrangement enables these to be brought into circuit within a few seconds in the event of a breakdown.

These valves are probably the largest water-cooled valves used for ordinary broadcasting purposes. Whereas at Brookmans Park distilled water is used for cooling (distilled water has a higher ohmic resistance), and is kept in the cooling system, the cooling water being externally cooled by tap water passed over the radiators, at Mühlacker a running water system is used.

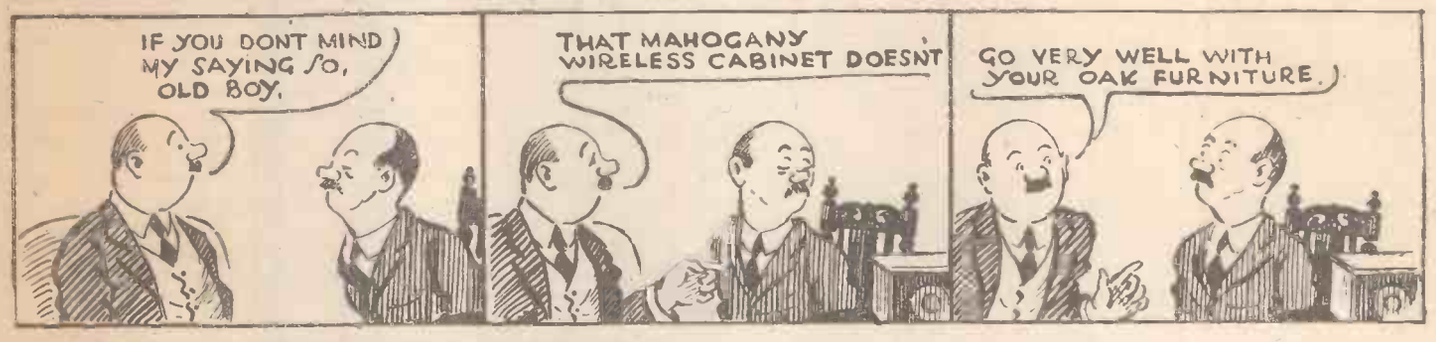
A large water tower has been built just outside the station and overlooking the town of Mühlacker. This provides an ample head of water for the cooling system.

A novel feature of the station is the large control desk which carries the minor controls, meters, and indicating lights. At the back of this is a panel carrying controls and meters leading from the generator room at the rear. Tuning is carried out with huge variometers wound with copper tubing.

The programmes for the new Mühlacker station are provided by a studio in Stuttgart and a landline links up the transmitter with the studio centre. As is well known there is an extensive landline system in Germany and by means of this Mühlacker can be linked up with practically any German studio.

KENNETH ULLYETT.

MR. FLEX WANTED TO CHANGE THE CABINET—



—BUT DECIDES TO CHANGE THE SUBJECT

THE HOW AND WHY OF RADIO

XV—SIMPLE FORMULÆ YOU SHOULD KNOW

If you are a beginner in wireless, now is your chance to gain a clear conception of its theory and practice. In this series of articles, specially prepared for the beginner, no previous knowledge of wireless is assumed. It is intended to deal with every aspect of the subject and the whole series will endow the beginner with sufficient knowledge to enable him to derive the greatest possible interest from the fascinating hobby of wireless

TO a novice in radio, the very word formula is apt to intimidate. But there are some formulæ that must be grasped before one can graduate in this series on the How and Why of Radio. This week only two formulæ are dealt with, but other equally important ones are reserved for the next article.

The easiest radio formula to understand relates to wireless waves, their speed, their frequency and their wavelength. This formula states that the wavelength of a station is equal to the speed of the waves divided by the number of waves emitted per second.

Wavelength and Frequency

All wireless waves travel at the same speed, the speed of light, 186,000 miles per second. In terms of the existing theory of the ether, through which medium wireless waves are said to be transmitted, we can say that when a wireless wave vibrates at a given point, the ether is disturbed one second later at a point 186,000 miles away. It is rather like tapping a large jelly at one end, and so causing a wobble at the other end, without materially moving the jelly as a whole!

Whatever way one visualises the velocity of wireless waves, the fact remains that all stations send out waves of the same velocity: 186,000 miles per second, or 300,000 kilometres per second. The frequency with which wireless waves are sent out depends entirely upon the tuning circuit of the transmitter. We can look upon frequency as the number of waves passing a given point in a second.

Since all waves travel at the same speed, the greater the number that pass a given point in a second, the shorter must be the wavelength of each. This fact is easy to understand and is expressed in the formula: wavelength equals speed divided by frequency. Knowing any two of these, we can therefore determine the third.

Suppose we have a wavelength of 300 metres. As we already know the velocity is 300,000 kilometres per second, we can easily work out the frequency. Thus 300 metres equals 300,000 kilometres divided by frequency; that is, frequency equals 300,000 kilometres divided by 300 metres, which equals 1,000 kilocycles It is often useful to interpret wavelengths as frequency, for the stations of Europe are

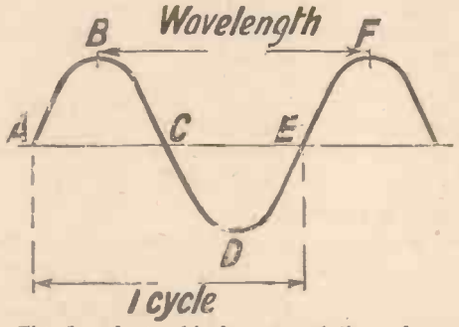


Fig. 1. A graphical representation of a wave, showing the relation between frequency and wavelength

separated (or are supposed to be) by 9 kilocycles. Looking up an official list we can see Aberdeen on 301 metres, with a corresponding frequency of 995 kilocycles.

Ohm's Law

Now let us deal with the most used formula in radio, Ohm's Law. This Law states that "the current is directly proportional to the E.M.F., and inversely proportional to the resistance." A short statement, but enough to scare any beginner. Before we can interpret the law let us understand its constituents.

Current, E.M.F. and resistance need explaining. Current is the measure of the rate of flow of electrons, the movement of which constitutes an electric current. Now 10^{19} electrons make a coulomb, which is the unit of quantity in electricity. The unit of current is the ampere, and we say an ampere is the rate of flow of one coulomb per second. We are not often concerned with the actual amount of electricity, but we always want to know the rate of flow. So forget coulombs, and remember that one ampere will flow through a closed circuit when a pressure of 1 volt is impressed upon it, and when its resistance is 1 ohm. Current is the measure of the rate of flow of electricity. The unit of current is the ampere.

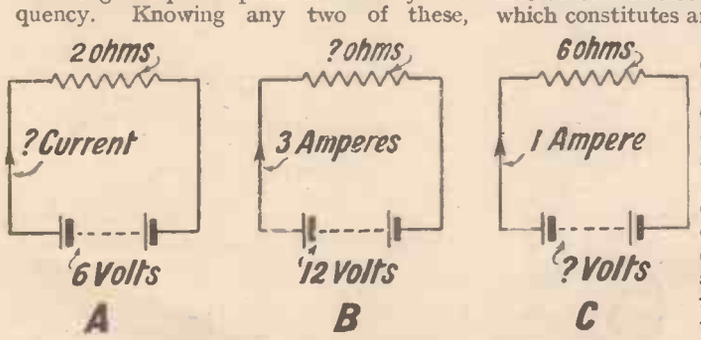


Fig. 2.—These three diagrams show the relationship between voltage, current and resistance, and, as explained in the text, how, if two factors are known, the other can be easily calculated

Voltage, known also as electro-motive force, electric pressure and potential difference, is the term used to denote the force that tends to cause electricity to flow. Current flow is coulombs per second. The analogy is clear for current. It also holds good for voltage. As water pressure is measured in pounds per square inch, electric pressure is measured in volts. The unit of electric pressure is the volt, which is the electro-motive force needed to force the current of one ampere through a resistance of one ohm.

That brings us back to Ohm's Law, for there is no difficulty in visualising resistance, which in electricity is clearly analogous to friction in mechanics. Resistance is the property of matter of opposing the flow of electrons, which flow tends to take place when a difference of potential or voltage is introduced.

Now we can understand the meaning of

$$I = \frac{E}{R}$$

or in other words current (I) in amperes, equals voltage (E) in volts, divided by resistance (R) in ohms. This is the practical expression of Ohm's Law. The equation can be expressed in three different ways so that an unknown quantity can be worked out if the other two quantities are known. (1) Current equals voltage divided by resistance. (2) Resistance equals voltage divided by current. (3) Voltage drop equals current multiplied by resistance.

Let us apply these three equations to three simple problems (see Fig. 2). At A is shown a closed circuit with a potential difference of 6 volts and a total resistance of 2 ohms. What current is flowing? From equation (1) we get

$$I = \frac{6}{2} = 3.$$

So the current flowing in circuit A is 3 amperes.

At B is a closed circuit with a potential difference of 12 volts and a current of 3 amperes is flowing. What is the resistance? From equation (2) we get

$$R = \frac{12}{3} = 4.$$

So the resistance of circuit B is 4 ohms.

In the circuit C the current flowing is 1 ampere and the resistance is 6 ohms. What is the voltage drop across the resistance? From equation (3) we get

$$E = 1 \times 6 = 6.$$

So the voltage drop across the resistance of circuit C is 6 volts.

HOTSPOT.

A Weekly Programme Criticism—By SYDNEY A. MOSELEY.

Without Fear or Favour

REQUESTS

SIR JOHN REITH

LET me tell Mr. Jack Payne that his persistent playing of "Searching for That Thing Called Happiness" is, in the words of the song, wearying—wearying.

"And," somebody asks me, "will he please tell us *why* he sings?

I personally like the form among Jack's boys, but people tell me there is far too much repetition of the stunt songs.

The quick-time song, "A Good Time Coming," is bright. But could you follow a word?

◆ ◆ ◆

Will the B.B.C. kindly forbid requests? It is the obvious and cheapest form of advertisement. Some of the most flagrant plugging is emphasised by these "special requests."

◆ ◆ ◆

The relay from the Hippodrome, London, looked very promising in print, and the visible audience had its money's worth, judging from the applause. The Hulberts, whose performances in *Follow a Star* I thoroughly appreciated when I *saw* them at the Winter Garden Theatre, were hardly a wireless turn, and I think, judging from listeners' points of view, the German lady who sang deserved all the applause Evelyn Laye obtained!

◆ ◆ ◆

A few comments I desired to make last week on "Contrasts" were unavoidably crowded out. They are worth mentioning as a hint to a certain producer that if he produces much more of this unimaginative nonsense his stock will evaporate to nothing. The sea songs were scarcely a fair contrast and poor Mr. Allison's forceful impromptu style was pitiably cramped in *reading* his spoof report. This sort of production should never have passed Mr. Roger Eckersley.

◆ ◆ ◆

I went to the Aldwych Club to hear Sir John Reith on "Broadcasting." He certainly made a fine case and an excellent impression. I found Sir John to be a refreshing speaker with a balance of light and shade. His views on monopoly sounded more acceptable than his remarks on monopolistic publications. What a fine debate the subject would make! I'll take him on if he likes.

◆ ◆ ◆

Unfortunately—I say this as a debater!—I have to admit that the Director-General's ideals are fully shared by me. Indeed, I almost thought that he borrowed my comparison of a very long time ago between broadcasting under *one* control and the cinema under competitive interests.

My only plaint is that a monopoly leads to abuses, and some of these I fully explained to him last time I had a conversation with him.

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Delighted to find that at long last the B.B.C. has recognised the justice of my criticisms regarding the educational lectures. But, while some revision is necessary, I pray the powers that be, however, not to go to extremes and wipe out all interesting talks of which we have not a few.

The programme people should study the speech of their chief to which I refer above. Let that standard be a model, for, although one desires brightness in programmes, it does not mean we ought to pander to the jazz fiends and the back-chat comedians' crowd. Isn't there such a thing as a happy medium?

◆ ◆ ◆

The eminent German conductor, Hermann Scherchen, conducting the Symphony

An impression of Gladys Ancrum

THE THEATRE DEBATE

A FUNNY PAIR

Concert at the Queen's Hall the other night, must have wondered why there were so many empty seats on such an important occasion. But other distinguished people in the audience were equally at a loss. The answer to the mystery was that there was some sort of pantomime being performed amongst the staff of the B.B.C., and that apparently was the greater attraction!

◆ ◆ ◆

Reverting to talks, it would never do, for instance, to substitute the wonderfully inspiring talk on the stars by Sir James Jeans for "I met her in Munich," or wherever the place is. Jazz for Jeans would indeed be a sorry exchange.

◆ ◆ ◆

Some Other Private Lives, which was broadcast with Mr. Noel Coward, the author of the play, and Miss Gertrude Lawrence, lost its effect by reason of the fact that the majority of listeners were not acquainted with the play which it parodied.

◆ ◆ ◆

John McCormack was a treat to hear, and I am told that his fee for broadcasting is usually some £2,000, but, as there was a possibility of the Pope listening to him, this time he condescended to do it for nothing. Quite a scoop for the B.B.C.!

◆ ◆ ◆

The discussion on "What is Wrong with the Theatre" between Mr. Hugh Walpole and Mr. Osbert Sitwell, with Mr. Charles B. Cochran in the chair, proved to be interesting; but C.B.C. certainly got away with some valuable free advertising. I often wonder why the B.B.C. permits advertising of this nature when it shuts its eyes to advertising revenue in other directions.

In the debate Mr. Sitwell easily came out top. As for Mr. Cochran's statement that censorship is unnecessary—well, well!

◆ ◆ ◆

A funny pair of most promising cross-talk comedians are Alexander and Mose. They use quaintest expressions and most of their gags are new. "Oh, hush yer mouf!" does not look funny, but in the "mouf" of Mose—or was it Alexander?—was very funny.

◆ ◆ ◆

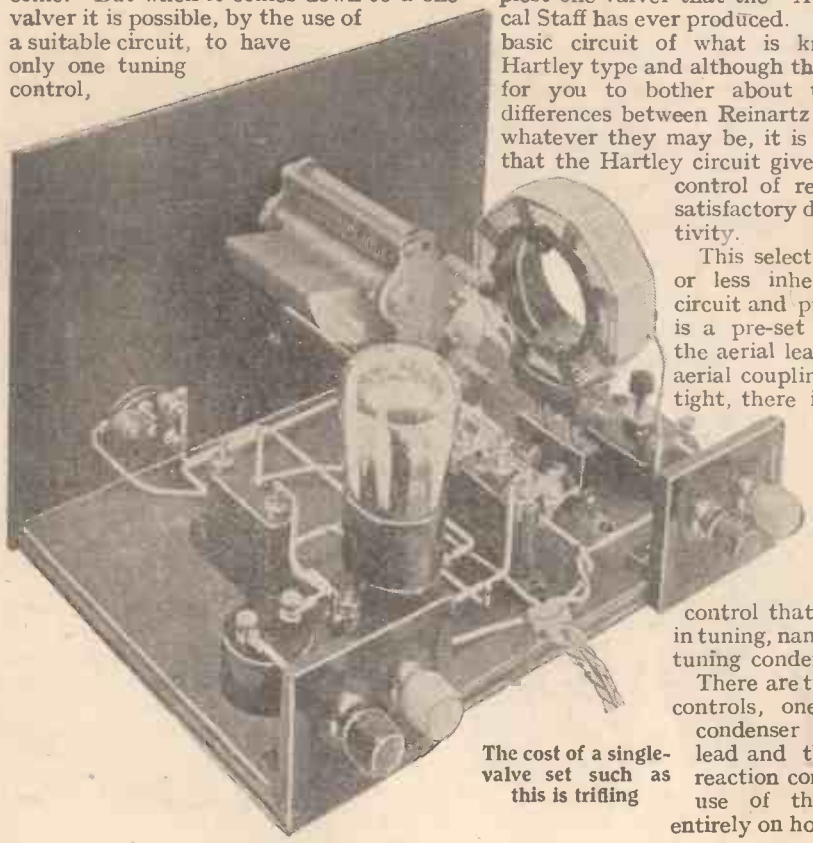
Miss Mary Adams's talk on "The Future of the Race" appears to have roused a controversy.

THE ONE-CONTR

SIMPLE TO BUILD AND SIMPLE EMPLOYING PLUG-IN COILS

THE great charm of a one-valver is that you can make it very simple to operate and very cheap to build and yet it can be quite efficient and reasonably selective.

If you put a high-frequency stage in front of it you increase its selectivity but at the same time you make it more difficult to operate because there may be two or even three tuning controls. On the other hand, if you follow it by a low-frequency amplifier you increase the possibility of distortion. In a three-valver, therefore, having high-frequency, detector and low-frequency stages, you have all these possible snags to overcome. But when it comes down to a one-valver it is possible, by the use of a suitable circuit, to have only one tuning control,



The cost of a single-valve set such as this is trifling

combined, of course, with an auxiliary reaction control

The difficulty is to get a sufficient degree of selectivity — not on the long-wave band, where it is relatively unimportant, but upon the medium waveband where nowadays you can get enough stations to satisfy the average listener.

With a simple set—a one or two valver, for instance, the long-wave band can be practically disregarded. By doing so, the only big station which will be missed is Radio Paris. Daventry 5XX is, of course, repeated on the medium wave-band, and there are so many other stations to be heard between 250 and 500 metres that the other long-wave stations need not be taken into account.

Well, here is what is probably the simplest one-valver that the "A.W." Technical Staff has ever produced. It embodies a basic circuit of what is known as the Hartley type and although there is no need for you to bother about the technical differences between Reinartz and Hartley, whatever they may be, it is worth noting that the Hartley circuit gives a very nice control of reaction and a satisfactory degree of selectivity.

This selectivity is more or less inherent in the circuit and provided there is a pre-set condenser in the aerial lead so that the aerial coupling is not too tight, there is no need to have any additional aids to getting sharp tuning. For this reason there is in this new set only one control that is important in tuning, namely the aerial tuning condenser.

There are two subsidiary controls, one the pre-set condenser in the aerial lead and the other the reaction condenser. The use of these depends entirely on how and where th instructor intends to operate the set.

This one-control one-valver will give fine phone strength of B.B.C. stations at anywhere within reasonable distance. For this, critical control of reaction is not necessary. On the other hand, you can use the set for ether searching and provided you are satisfied with phone reception (it is, of course, impossible to work a speaker unless a pentode valve and a special circuit are employed), it is surprising what a large number of foreign stations can be heard at quite good strength.

COMPONENTS REQ

Ebonite or bakelite panel, 9 in. by 6 in. (Trelleborg, Becol, Keystone, Lissen).
Baseboard, 9 in. by 6 in. (Camco, Clarion, Pickett).
.0005-mfd. variable condenser (Burton, Lissen, Polar, Formo, J.B., Lotus, Ormond).
.0001-mfd. reaction condenser (Lissen, Bulgin, Lotus, J.B., Readi-Rad).
Push-pull filament switch (Bulgin, Benjamin, Readi-Rad, Lissen).
.0002-mfd. fixed condenser with series clips (T.C.C., Lissen, Readi-Rad, Dubilier, Graham-Farish, Telsen).
.0001-mfd. fixed condenser (T.C.C., Dubilier, Lissen, Readi-Rad, Telsen, Graham-Farish).
Pre-set aerial condenser, .0003-mfd. maximum capacity (R.I. "Varicap," Sovereign, Polar, Formo).
2-megohm grid-leak (Dubilier, Lissen, Igranic, Watmel, Rotor-Electric).
High-fr
Lissen, B
Tunewell)
Valve-h
Clix).
Single
Lissen, Ig
Slow-m
Igranic, R
Connect
Two ter
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L.T.— (C
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No. 6
(Tunewell
No. 200
Atlas, Lew

Cost is low, as might be expected. In an accompanying panel will be seen a list of the parts needed, the first mentioned parts being those used in the set illustrated, alternatives being given in most cases.

Simple Construction

The set is quite simple to make up and the circuit diagram, the wiring plan and the photographs given here will suffice for most constructors. Novices may, however, prefer to work with the aid of the full size blueprint, which can be obtained, price 1s., post free, from the Blueprint Department, AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4.

Panel drilling is easy, all the parts being of the one-hole fixing type. Do not forget, though, the small hole for the slow-motion dial fixing bolt, and the two small holes along the lower edge for the wood screws. It is advisable to fix the panel to the baseboard before mounting the two condensers and the low-tension switch. The full-size blueprint shows, of course, exactly where to

ROL ONE

TO USE—A USEFUL ONE-VALVER AND THE HARTLEY CIRCUIT

drill the holes and also indicates where the baseboard components should be mounted.

The two terminal strips can be bought complete or they can be made out of scrap ebonite if desired. Terminals are provided only for the aerial and earth and the speaker output connections. Lengths of flex are provided for the high- and low-tension connections.

No difficulty should be experienced in wiring, all the connections being quite short and direct. If you can solder, then it is best to use the rigid wire system, but if you shirk this simple job then it is perhaps better to use short lengths of uninsulated wire covered with insulated sleeving.

It is advisable to check over all the connections when the wiring is finished because this prevents the possibility of the valve being burnt out or the high-tension running down through a short circuit.

Naturally, with most detector valves, better results are obtained with a full 60 volts (or in some cases between 80 and 100 volts) than with a run-down battery! A standard capacity battery works quite well with this set, though, and there is no need to have anything elaborate.

Suitable 2-volt detector valves are the Mullard PM2DX, Cossor 210HF, Marconi HL210, Osram HL210, Mazda HL210, and Six-Sixty 210HF. Other 2-volt valves which might be tried are the Marconi H2, Osram H2, and the Mullard PM1HF. The 4-volt and 6-volt equivalents of any of these valves may be used, of course.

So far as coils are concerned, ordinary centre-tapped coils may be used for medium-band working, a suitable size being coil No. 60. It is possible, though, that on the long wave-band, better selectivity may be obtained with a double-tapped coil, and for wavelengths above 1,000-metres a double-tapped coil No. 200 may be used.

A Fine Performance

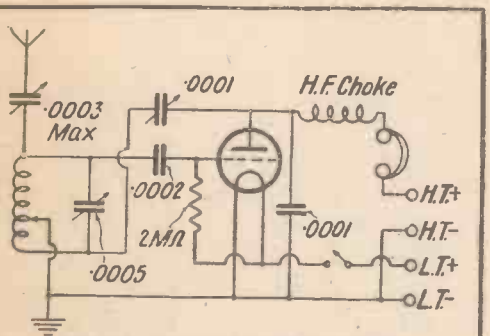
On a rough test, with a 50-ft. aerial London National was obtained at 15 degrees on the dial, Regional at 46 and Midland Regional at 75. Milan, Langenberg and Rome were heard at 77, 71 and 65 degrees respectively.

This is a fine little one-valver for the local station man who is satisfied with phone reception and who likes to make an occasional ether tour. The original receiver can be seen this week in the Radio Department windows of Messrs. Selfridge & Co., Ltd., of Oxford Street, London.

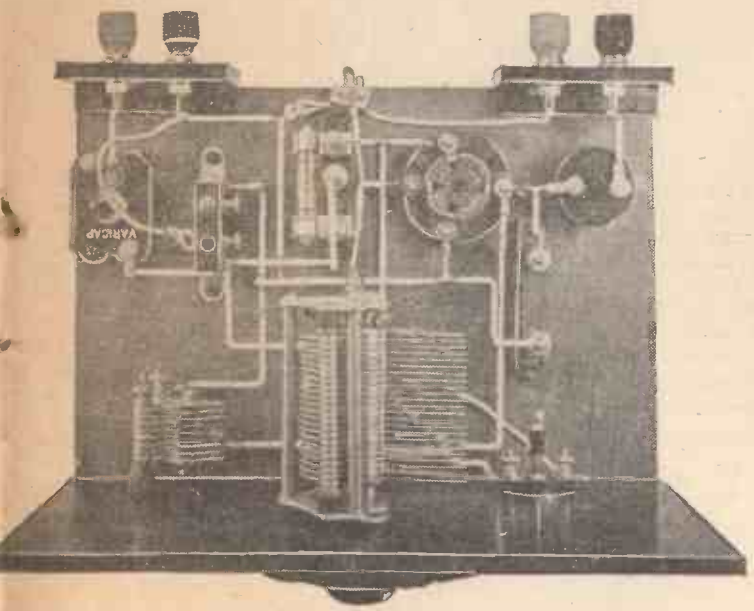
UIRED

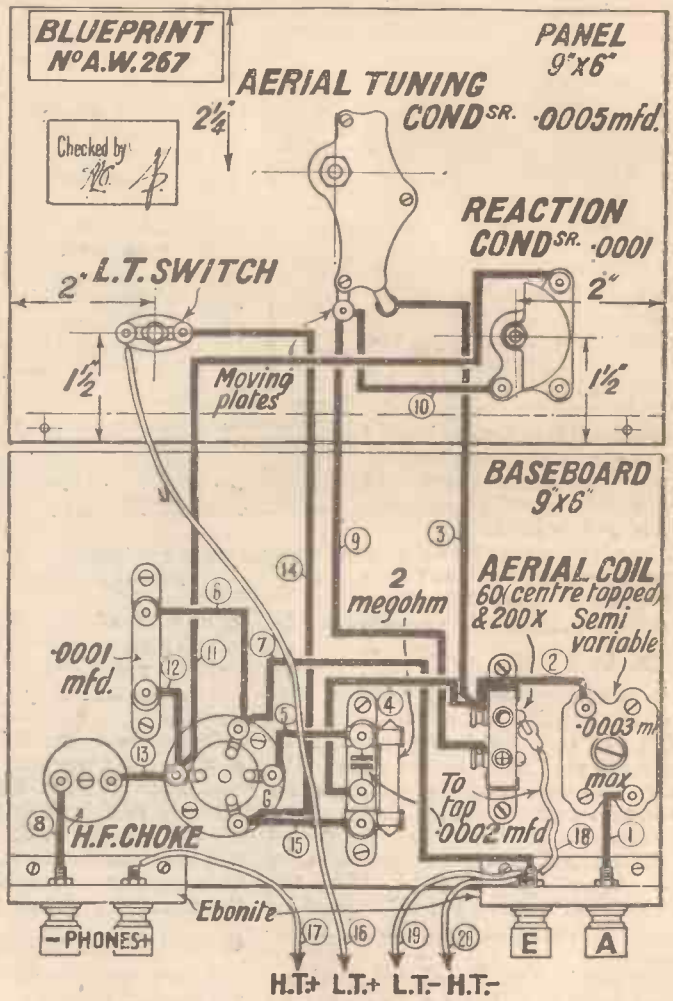
requency choke (Readi-Rad, Sulgin, Telsen, Igranic, Lewcos,
.
nolder (Telsen, Benjamin, Lotus,

baseboard coil-holder (Lotus, ranic).
otion dial (Brownie, Lotus, Readi-Rad).
ting wire (Glazite).
rminal blocks (Junit).
rminals, two red and two black ing-Lee, Igranic, Burton, Eelex).
ade terminals marked L.T.,+ lix, Eelex, Belling-Lee).
nder plugs marked H.T.+, and lix, Belling-Lee, Eelex, Igranic).
rds of thin flex (Lewcoflex).
) centre-tapped plug-in coil , Atlas, Lewcos).
) double-tapped coil (Tunewell, wcos).



This is the circuit diagram of the "One-control One." The arrangement of the tuning on Hartley lines should be quite clear. Note the H.F. by-pass arrangements





Here are the plan view, layout and wiring diagram, which show clearly the construction. A full-size blueprint of the set is available, price 1/-

IN MY WIRELESS DEN

WEEKLY TIPS—CONSTRUCTIONAL AND THEORETICAL

By W. JAMES.

Those Stalloy Cores

THE cores of transformers used as inter-valve couplings are usually of stalloy, or similar material, or of one of the special high permeability steels. Chokes are also made up with special cores.

These facts make it necessary for us to be careful not to overload by passing too much current through the windings and it is a wise precaution to obtain the makers' curves.

You will find that whilst one type of transformer will carry successfully a current of say 4 milliamperes, another type is satisfactory only when the current is less than 2 milliamperes.

Not that the winding itself will be damaged if this current is exceeded. It will, as a matter of fact, probably carry up to 10 milliamperes without overheating. The point is that the performance falls off so quickly, as the current is increased above 1 or 2 milliamperes.

This is becoming a serious matter, for the tendency is to use detectors, for example, with 100 or 120 volts on their anodes, when the anode current may well be 4 milliamperes even if it is not more.

In this manner the performance of a small transformer having a core of special high-permeability steel may be made inferior to that of a small transformer having a core of stalloy or similar material. There is no excuse for wrongly using components, such as transformers, these days, but I am very much afraid mistakes are often made.

H.F. Choke Details

It is generally realised, I suppose, that the characteristics of a high-frequency choking coil may be greatly affected by mounting it very near metal screens. The capacity may well be altered and therefore the natural wavelength of the choke.

Its inductance, too, may be reduced, and this will affect the choking action. Care should, therefore, be taken that the effectiveness of a choke is not impaired by placing it in a set where its characteristics are altered.

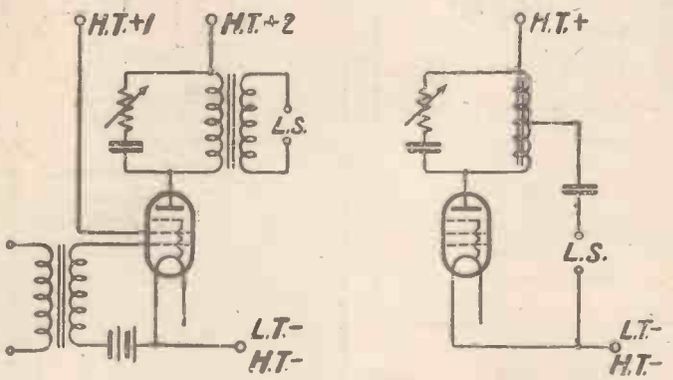
Do not overlook the fact that chokes have external fields and that a pair of chokes used near together in a set may be so strongly coupled that the results are gravely affected. Instability and loss of magnification may often be traced to this nearness of the chokes.

Pentode Output

We all know that large voltages are supposed to be set up across the output of a pentode in the absence of a suitable load and last week I had convincing proof of this when the speaker wire fell off while I was holding the speaker terminals on the set.

I never thought I should have had such a severe shock, but still we put up with these things when experimenting.

If I had fitted a safety circuit all would have been well. The one generally used consists of a resistance and condenser connected across the output as indicated in the accompanying diagram. For the condenser use a make capable of standing high working voltages and having a capacity of .005 or .01 microfarad. The resistance may be adjustable, a component having a maximum value of 50,000 ohms being suitable.



Connections of resistance and condenser across the output of a pentode for tone control and safety

This filter reduces the relative strength of the high notes and by adjusting the resistance, the tone may be varied over wide limits.

It may be connected across the primary of the output transformer, as indicated, or across the choke of a choke-capacity connection. In this choke-capacity circuit the speaker is joined to the centre of the choke and the choke is, therefore, used as an auto-transformer which suits most pentodes and the so-called high-resistance speakers.

Careful Matching

I have dealt on various occasions with the need for carefully matching the coils to be used in a set tuned by a single multiple condenser, but have not referred to the condenser itself.

We usually rely upon the manufacturers to provide a correctly matched tuning condenser, but it is not always wise to accept the component without testing it. Perhaps I should say that the condensers are usually very good, but when the tuning of the set seems rather less selective than expected and when we know the coils are satisfactory, it is then time to look into the matter of the capacity across each coil.

We have circuit capacities as well as the condensers themselves and we will assume that at one frequency the tuning condensers have been adjusted to put the circuits into tune. If now we find that at a different frequency the circuits are no longer accurately in tune, we may expect to find the gang condenser inaccurate.

It is difficult to correct a tuning condenser, as you will discover if you try and I advise that the component be left alone and be returned to the makers. Sometimes a set of moving plates will be bent by accident; inspection may show an obvious fault. It is not wise to start bending plates, for you will find that as soon as the thing is put right in one position, it is put out in another.

Useful Indoor Aerials

There can be no doubt about the usefulness of a good indoor aerial. When the set itself is not particularly selective, when, in fact, it provides rather more magnification than its selectivity warrants (judged on an outdoor aerial), good results are to be obtained from a relatively short aerial.

Unfortunately, indoor aerials have widely varying efficiencies and you might easily be surprised at the poor collecting powers of some examples. It is not possible to obtain much more than local-station reception with a three-valve set when using some indoor aerials. When the aerial wire is concealed, for instance, the damping effect of the near-by wall may be such that little is received.

Those who are not afraid to put up an aerial in such a way that it is fairly efficient will usually obtain good results. The difficulty is, that many people consider that an indoor aerial need comprise just a fine wire tacked to the picture rail. With such an aerial the range of reception is restricted.

Some people put the aerial along a passage, or in the loft of the house and are satisfied with the results. Others use a short length of wire and take care to arrange it well away from walls and the ceiling. By doing this they provide an aerial which is small but good.

SETS OF DISTINCTION

The MARCONIPHONE CONSOLE

Maker: Marconiphone Co., Ltd. *Price: 38 guineas*

SO great is the Marconiphone Company's faith in the new Marconiphone console four-valver that they recently asked me to attend a test carried out under extremely unfavourable conditions A short aerial was erected in the yard of Jack Straw's Castle, Hampstead, where the set was installed for the test. This locality is well within the "swamp" area of the Brookmans Park transmitters, so one would expect the selectivity of the set to be sorely tried.

First of all let me give some details of this new Marconiphone product. It is undoubtedly the best-looking console I have yet examined. As can be seen from the illustration, the design is unorthodox, especially in relation to the controls. Apart from the fact that controls are reduced to a bare minimum, they are also hidden from sight when the set is in operation. Two sliding flaps are arranged on the top of the cabinet, so that a small control panel can be exposed when it is desired to tune in a station.

Single-knob Control

Tuning is done with a single knob, controlling three separate tuned circuits and a clearly-engraved dial, which is calibrated in medium and long wavelengths. When the set is in operation this calibrated dial is brightly illuminated. It is one of the best dials I have yet handled.

Just beyond the knob for tuning is a knob controlling a multi-contact switch, providing radio or gramophone reproduction, medium or long waves, and putting the set out of action when not required. I think one of the distinctions between the modern factory-built sets and the home-constructed set is the way in which the manufacturer is able to simplify control, as has been admirably done in this console.

With the flaps closed only one control is visible. This is the volume control knob, fitted just above the artistically-designed opening for the loud-speaker on the front of the cabinet.

The idea is that, when one has tuned in a station or put on a record the only alteration in control is that affecting volume. This volume control is extremely clever. When gramophone records are being reproduced, it controls the pick-up voltage, but during radio reception it controls the voltage of the screen-grid valves. In effect the one knob serves two functions.

So much for the controls, which, as I should like to emphasise, are reduced to the last degree of simplicity. Part of this simplification of control has been made possible by the inclusion of highly-efficient A.C. valves.

Two screen-grid valves precede the detector, which is transformer-coupled to a pentode power valve. Although there are three tuned circuits, efficient ganging has enabled all three to be operated by a single knob. The whole constructional work embodied in the metal chassis is unique. In fact, during an inspection of the chassis reproduced on this page, I was reminded more than anything of an automobile. All the working parts are readily taken apart and I imagine the servicing must be very simple. For the first time in this country a colour-code system of wiring has been included in a factory-built set. This again should help to simplify servicing.

The model I examined is for A.C. mains, between 200 and 250 volts. There is no D.C. model available. The power consumption of the A.C. model is 35 watts. This may seem surprisingly low for such a powerful set. But one must remember that the moving-coil loud-speaker is a permanent-magnet type, which takes no current from the supply. Moreover, the only valve taking appreciable anode current is the pentode. The two high-frequency valves and the detector take very little anode current.

The unique chassis of the Marconiphone Model 560 all-electric console receiver

Now for my experiences at Jack Straw's Castle. The first station I got on turning the tuning knob was Budapest, which came at the 550-metre mark. This station was strongly received on the short outdoor aerial. I also tried the mains as an aerial. With this connection I was surprised to find that Budapest was almost as strong as with the outdoor aerial.

Vienna and Brussels were the next two stations received. Next followed Milan at the 501 mark. Some interference was caused by the Midland Regional station at the 479 mark. Rome at 441 and Stockholm 436 were both extremely powerful with the outdoor aerial. I was very pleased to find that Toulouse 385 was quite clear of the London Regional at 356.

Good Selectivity

Between the London Regional and National stations, which were, of course, very strongly received, I was able to locate five other strong signals. In view of the unfavourable conditions of the test, I certainly think the selectivity, as noted during my handling of the set, is very satisfactory. The London National at 261 had a spread of 40 metres and the London Regional at 356 a spread of 45 metres. These readings must be considered in relation to the proximity of the set to the Brookmans Park stations.

Quality of reproduction is so good that in my opinion the pentode as a power valve is no longer a debatable practice. Of course, the makers have matched the moving-coil loud-speaker to the pentode and in this way the pentode is able to function as it should. The reproduction was equally good on radio and gramophone reproduction.

From my tests, I can say that this console set can be worked without an external aerial. For flat-dwellers the mains aerial attachment enables the set to be used as an entirely self-contained radio set and gramophone amplifier.

SET TESTER.

POPULAR COIL TYPES

W. James reviews the different types of coil used in receivers and explains their several features.

COILS are interesting. They are of all shapes and sizes. Some have cylindrical formers. Others have slotted formers or tubes with ribs.

The fact is that the shape of the former does not matter very much, so long as the winding is suitably proportioned.

Length and effective diameter are factors of importance. So is the size of the wire, and the electrical properties of the wire, its covering and the former, are all factors helping to govern the electrical, as well as the mechanical goodness of a coil.

The screen, too, when one is used, must also be considered as well as the switch which is usually part of the coil. When there are two windings, one for the medium wavelengths and the other for the long, it is not always possible to consider them

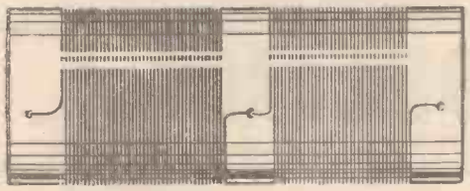


Fig. 2. An astatic coil on a single former

separately, for one usually influences the other.

The two windings may be joined in series or parallel, Fig. 1, or separate circuits may be used as indicated. Sometimes the coils are further divided.

Perhaps one tube is used for both medium- and long-wavelength coils, Fig. 2. There may be two formers; one being fitted inside the other, as in Fig. 3. On the other hand, the formers may be arranged side by side.

Thus there are many ways of arranging coils and it would be difficult, indeed, to say which is the better method. Sometimes space is all important and a really compact coil is needed.

Efficiency, in another case, might be the chief requirement; size being a matter of secondary importance. Then, again, when the coil is to be used with several others in a multi-valve set, losses can not only be tolerated, but are actually needed in order that the resulting tuning curve shall be satisfactory. In another design the field of the coil might have to be the minimum, because of the desire to economize in the shielding.

With completely shielded coils, the shape of the coil will probably be carefully considered in relation to the size of the shield-

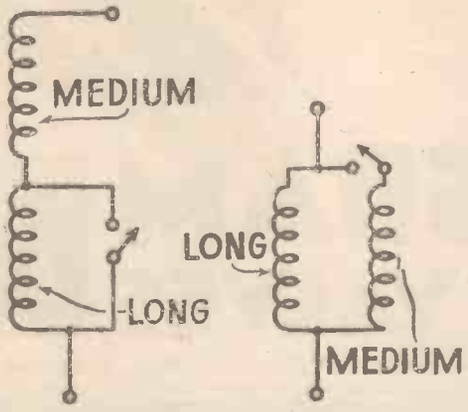


Fig. 1. Two simple switching arrangements

ing case. Some coils are wound by putting all the wire on the former in the same direction. Such coils usually have quite a large stray magnetic field. This will obviously vary with the length and diameter of the winding, a relatively long thin coil having a different field from a fairly

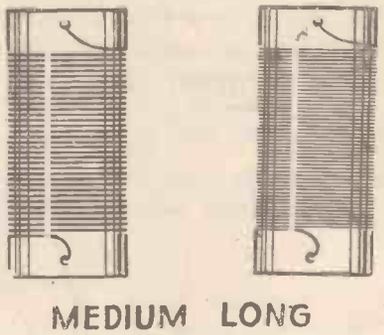


Fig. 4. Another arrangement of medium- and long-wave coils

short coil of larger diameter. Other coils are wound in two parts with the idea of minimizing the stray field. There are two usual constructions shown in Fig. 5.

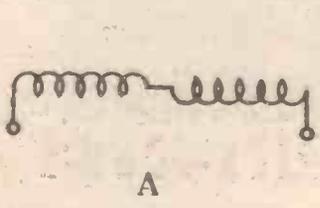


Fig. 5 (A and B). Two astatic arrangements

Fig. 6. A toroidal coil

In Fig. 5A, a single former is used, but if the first half of the coil is wound in a clockwise direction, the other half is put on in an anti-clockwise direction. Thus the magnetic fields produced by the two parts are in opposition. In fact, if one part were wound directly over the other part we should have the magnetic fields cancelling, and there would be no inductance.

In practice, a small space exists between the inner edges of the two parts; as this space is increased so the number of turns needed for a given inductance is reduced.

This type of coil is often used. It is cheap to make and is useful in many circuits, particularly when complete shielding is not provided. The second type, Fig. 5B, is

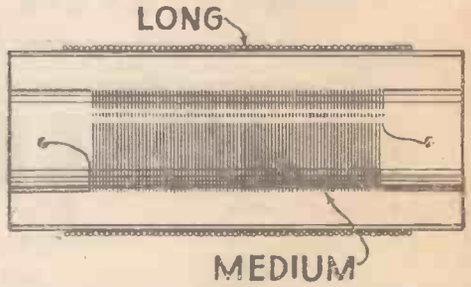


Fig. 3. A compact dual-range coil with the medium coil inside the long-wave one

not so widely used in these days; two formers are needed and the inductance depends upon the space between them.

This type, sometimes called the binocular type of coil, is usually made to stand upright. When there are other coils of the same type arranged in a straight line, for example, the magnetic coupling is usually quite small. In a further type of coil called the toroidal, a continuous winding bent into a circular shape, as in Fig. 6, is used.

This coil if properly constructed behaves as a single loop of wire as regards the stray field and therefore the magnetic coupling between coils of this type will be quite small. Cost of manufacture and size appear to be the factors which have stopped the toroidal coil from being popular with amateurs.

In sets of the detector and low-frequency type a good coil is usually required and it need not be of any of the special types. A toroidal coil, or one of the astatic types, would, of course, work, but the extra cost involved produces no corresponding advantage.

We do sometimes take a coil which is handy and use

(*Continued on next page*)

it, but the point is, that the ordinary coil can be used and being simple in construction and being the most easily made to have the lowest losses, it has obvious advantages. In sets having a single screen-grid stage, there are usually two coils and they must either be carefully shielded or be used with partial shielding if they are of one of the astatic types.

With a set having two screen-grid stages and three tuning coils, great care is needed. If the coils are of too low loss construction, the tuning may be too sharp and magnetic couplings must be avoided.

Modern practice amongst manufacturers is completely to screen the coils themselves. Good results can, however, be obtained by using astatic type coils and sufficient shielding. It should be remembered that as the coils are in different circuits they must be shielded to avoid electrostatic, as well as magnetic couplings. Fairly complete shielding may therefore, be necessary, even though the coils themselves have astatic type windings.

I said above that the long and medium wavelength coils might influence each other. In a compact coil unit, where the long and medium wave sections lie near together, it is possible for the performance on the medium wavelengths to be seriously affected. If the natural wavelength of the long-wave coil for example, is anywhere in the medium-wave band, then the signal strength will be poor.

Absorption will occur, the effect being as though the medium-wave coil possessed great losses at about the place corresponding to the natural wavelength. Then, again, there may be other losses, all tending to lower the effectiveness of the coil. Some coils are poor, because these points have not received the attention which they deserve. In designing them, great care must be taken to avoid the long-wavelength coil tuning to a wavelength within the range of the medium-wave coil.

A medium-wave coil should be tested by itself and then the effect of the long-wavelength part should be noted. Sometimes short circuiting the long-wave part is better than putting it in parallel with the medium-wave coil. It depends upon the windings used, and their relative positions. In fact, the design of a compact coil is not quite so simple as it looks.

WIRELESS IN PARLIAMENT

From Our Own Correspondent

MR. VIVANT informed Mr. Hurd that a scheme proposed by the British Broadcasting Corporation for the provision of an Empire broadcasting service was submitted to the Communications Committee of the Imperial Conference. One of the details of the scheme was the broadcasting of three news bulletins daily which, it was stated, would be supplied to the British Broadcasting Corporation by a news agency on terms which had been arranged with them. A copy of the scheme and of the Communications Committee's report on it would shortly be published. The Committee recommended that, as a first step, the British Broadcasting Corporation should communicate particulars of the scheme to the broadcasting authorities in the dominions and should ascertain their views on the subject. If, after studying the scheme, any Press organisation wished to discuss the proposed arrangements for the broadcasting of news, he would suggest that it should approach the British Broadcasting Corporation.

Continental Interference

Captain Hacking invited the Postmaster-General to make a statement on broadcasting, pointing out that there had been a good deal of complaint from the south-east of England of interference caused by certain Continental stations. He hoped the Postmaster-General would make representations to those stations that they should use wavelengths which would reduce interference to a minimum.

Mr. Lees-Smith said that as Russia was not invited to the International Radio Conference held in Washington some years ago she considered that she was not bound by the international regulations of wavelength and she used certain wavelengths which were inconvenient to other nations. Russia did attend by invitation the last Conference held at Prague, but while agreeing to come to a certain extent within the general international regulations, she insisted on operating some of her previous wavelengths.

As to television, an arrangement had been come to between the Baird Company and the B.B.C. by which the Baird Company were given the right of sending television pictures and voice production for half an hour six times in the week outside broadcasting hours.

HOW TO GET THE BEST OUT OF YOUR DETECTOR

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

THE grid detector is by far the most popular, particularly as it has been shown that if it is not misused it gives the best form of rectification. Its principal drawback lies in the damping which it imposes on the tuning circuit immediately preceding it. This damping, or added

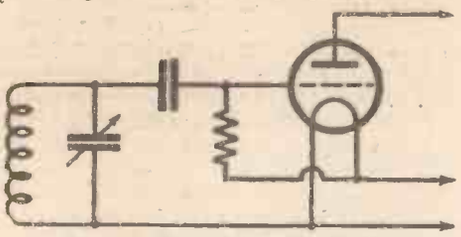


Fig. 1. Normal detector circuit

resistance, effect causes the circuit to tune more bluntly than it would do by itself, so that the selectivity of system suffers. Only a relatively small proportion of radio users seem to be aware that this poor selectivity can be remedied very easily, and of those who are aware of this fact, a still smaller percentage take any steps to avail themselves of the possibilities.

Refer to a number of circuits at random, either published or used in manufactured sets. Probably more than 90 per cent. of those circuits which use grid rectification connect the detector valve straight across the tuned circuit immediately preceding it. Indeed, most people confronted with the circuit shown by Fig. 1, would imagine that it was a perfectly satisfactory arrangement, and would not criticise it for a moment.

Yet the fact remains that the resistance of the grid to filament path of a detector is something under 100,000 ohms, whereas the effective resistance of even an average tuned circuit is at least double this value. Without going into mathematics we can see that the effect of this heavy leak (for that is what it amounts to) across the tuned circuit will increase its resistance very considerably—in fact, by more than double in the majority of cases. Now, not only does this make the tuning flat, giving a poor selectivity, but it also loses signal strength. If we pick up a signal of a given value, the tuning operation magnifies the signal. It is because of this that we are able to tune, for the signals that are not tuned in are not magnified, and therefore, unless the source of the signal is very close at hand, no effect will be experienced.

Magnification

What is more, this magnification (which is really something for nothing, since it is quite distinct from the magnification produced by the valves in the circuit) is dependent directly upon the resistance. If we double the resistance we halve the magnification, so that we have not only lost selectivity, but we have lost signal strength.

The remedy is not to connect the detector valve across the whole circuit, but to connect it across a part of the circuit only. A convenient tapping point is the mid point of the coil. If we do this, the leak caused by the detector is only connected across half the coil, and this is equivalent to four times the resistance across the whole circuit. Our resistance, therefore, becomes somewhere in the neighbourhood of half a megohm

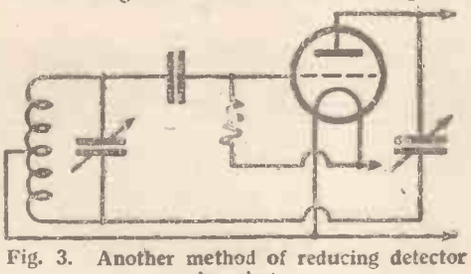


Fig. 3. Another method of reducing detector damping

instead of 100,000 ohms, with a result that the circuit at once becomes more lively, and it tunes definitely more sharply.

What is more, the resistance of the circuit is greatly reduced, and therefore it develops more voltage. True, we are only making use of half this voltage, but it is easy to show theoretically and just as easy to demonstrate by actual trial that the gain is as great as the loss, and that if we take a centre tap we shall obtain just as

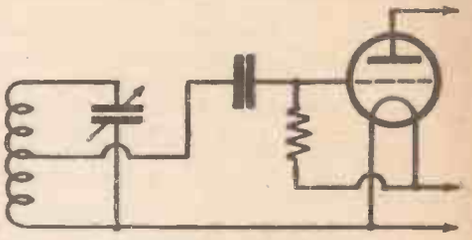


Fig. 2. In the Hartley circuit the valve is connected across half the tuned circuit only

good or even better signal strength than before, and noticeably sharper tuning. Now, if one can detect by ordinary ear a difference in the tuning between two circuits, the difference in actuality is very marked, so that there is no argument whatever as to the value of this method of connection.

A Centre-tap

The reader may ask why is this not done universally. Really, I do not know. I must confess I do not always do it myself, partly because coils one uses to-day are often not provided with a centre-tap. I do not put this forward as an excuse. I admit I ought to practise what I preach, but I do recommend all those who can to try the effect of taking a centre tap on their detector.

The Hartley circuit, a very popular simple circuit, owes much of its efficiency to the fact that the detector valve is only connected across half the coil. In this case the desirable effect is obtained automatically by virtue of the circuit itself, but it is quite possible to use a centre tap equally effectively in other circuits, and it is to be hoped that we shall make more use of this simple solution of our troubles in the future.

OUR LISTENING POST

By JAY COOTE

HAVE you already heard the peculiar interval signal which emanates from the PTT Strasbourg high-power station? It is not exactly a bell, it is not a buzz, but the clang of it reminds one of a man hammering in a boiler factory. It is unmistakable when once you have picked it up, and a very distinctive and individual signal. Should you hear it, stand-by for a while, as, taking all in all, Radio Strasbourg is the most powerful and, possibly at the same time, the best of all the official French stations. It is unfortunate, for some, that its wavelength should be so close to London, as on an outdoor aerial it has definitely a wipe-out effect on Barcelona and Brunn. When the latter blossoms out as a 34-kilowatter that particular portion of the waveband may become unpleasant for wireless listeners.

As Strasbourg was installed to give a regional service to Alsace and Lorraine, it uses both French and German in its announcements, for the present generation in those re-conquered provinces knows little of the former language. You will hear a woman's voice giving out items in French, followed by a German translation by a man. The name of the station is also given both ways: *Ici Radio Strasbourg* (*Strasboor*) and *Hier Radio Strasburg* (*Shtrars-bourg*).

It is a busy studio, for it comes on the air daily at 11 a.m. with gramophone records, and only closes down towards 11 or 11.30 p.m., after a relay of a concert or dance music from the Café de la Paix, from the Odéon, or from the Caveau de l'Aubette, a famous wine bar in the fashionable quarter of the city. During the day you may pick up news bulletins in both languages, at regular intervals, followed by gramophone recitals of dance melodies or light popular music. At lunch time, and again at tea time, a special broadcast is made and the main evening entertainment usually takes place towards 8 or 8.30 p.m. As a daily programme the new station is an asset to the distant listener, as there is no difficulty in securing reception of its powerful signals at any time.

Arrangements have been made by the Copenhagen station to broadcast a daily service from the Cathedral through the Kalundborg high-power transmitter.

The British Wireless for the Blind Fund

A Christmas-day Appeal

OUR readers will, no doubt, remember that a year ago the Right Hon. Winston Churchill, M.P., broadcast an appeal on behalf of the above fund, of which the object is to provide, wherever practicable, every blind person in Great Britain and Northern Ireland with a wireless set.

We are informed that up to the present date approximately £25,000 has been subscribed, but to complete this scheme another £20,000 is required. Mr. Churchill has, therefore, once again agreed to broadcast an appeal on Christmas Day.

We should like to feel that all our readers had made up their minds to listen-in on that day at 7 p.m. We cannot conceive a more worthy object than providing wireless sets to the blind. The person with sight finds it very difficult to realise what a boon a wireless set can be to a blind individual, and we think the best we can do is to quote from a leaflet published by the above fund :—

"Broadcasting is the blind man's daily newspaper, his own personal means of entertainment, education, and enlightenment. It should be as impossible for those who read these words to imagine a blind man without his wireless set as to imagine themselves without eyes."

During the present year over 6,000 crystal sets have been supplied by the fund, and an order has just been placed for 5,000 single-valve receivers, the distribution of which will commence in January, 1931. These sets have been specially designed for use by the blind, even to the addition of a Braille dial to enable the set to be tuned more easily.

It will be seen from the above remarks that 8,000 sets at least are still required, and the committee of the fund earnestly hopes that the sum of £20,000 still needed to complete its object will be forthcoming to enable them to order the balance of the sets during the month of January.

Donations should be forwarded to the Right Hon. Reginald McKenna, British "Wireless for the Blind" Fund, 226 Great Portland Street, London, W.1.

Listening with one of the crystal sets supplied to the blind

DO YOU KNOW—

that if your set works from mains and has A.C. valves it is very important to get the valves a good fit in their sockets. A loose contact in an A.C. set is liable to produce crackling noises and mains hum.

that it is sometimes possible to get good reception without an aerial by connecting the earth through a small condenser to the aerial terminal. You can sometimes use two earths in this way, one acting as an "aerial" and the other as the real earth.

"Britain's Favourite Three"

SIR,—I have constructed the 1930 edition of "Britain's Favourite Three" receiver and find the adjustment of the volume control very critical for best reception and the adjustment causes crackling in the speaker and also rushing noises. Is this due to a faulty volume control and how can the trouble be remedied?

G. W. (Kent).

Your trouble is certainly due to your volume control being somewhat faulty in action, and the best way to overcome the difficulty is to replace the variable volume control with a fixed anode resistance of 100,000 ohms and then to connect up the volume control directly across the terminals marked Grid and Plate of the first L.F. transformer. In this way the volume control will still act as a volume control, but as it will not be carrying any of the current which operates the valves, the crackling and rushing noises will be eliminated.—ED.

The "Quality Five"

SIR,—When the "Quality Five" was first suggested by Mr. W. James, I was among those who wrote expressing an interest in this circuit. I did not commence building until September, and the receiver has been in operation now for some five or six weeks.

This receiver is a great delight to me and I am at a loss to understand why you have not heard from many readers who have built the set, unless of course, like me, they put it off until the winter.

The points that appeal to me are the separate controls, and after an experience of ganged tuning the efficiency of separate tuning is most striking. Further, the tuning is quite easy and presents no difficulty. Also I like the separate H.T. terminal for each valve.

The quality of reproduction is all that can be desired. As regards selectivity, I need only say there is no difficulty in separating Zeesen, Daventry, and Radio Paris. I get some eight or nine stations on the long waves, all at full strength.

J. H. (London, E.C.).

Plug-in v. Solenoid

SIR,—Apart from the convenience of the solenoid coil, I often ask myself whether it is superior to the ordinary plug-in type. These latter may be less convenient to use in so far as they necessitate coil changing as a rule.

The windings of a solenoid coil are *fixed* and cannot be easily altered without much trouble. It may be a comparatively easy matter to reduce turns of wire, but it is a more difficult matter if turns are to be added. Here is a practical illustration of what I mean. For a long time I had been using a detector valve which required a reaction coil of fifty turns for efficient (capacity) reaction over the whole dial. A few days ago I was induced to try another valve of a different make with a much lower impedance, though with fairly high amplification factor. When I came to use reaction for distant stations the valve went into violent oscillation with only a very small portion of the moving vanes in mesh. Naturally, I immediately reduced the size of the reaction coil, trying a No. 40, and although this improved matters, there was still a good portion of the condenser "in hand." I next tried a No. 35, which made things so much better that I was satisfied.

I naturally asked myself what would have been the position had I been using a solenoid coil, with its fixed number of reaction turns of wire? If I had had to reduce them to a correct value it would not only have caused a lot of trouble, but had I at any future time again used another kind of detector valve, I should probably have found the reaction all wrong again. This is why I stick to my "plug-ins," as they are so adaptable to varying conditions.

A. J. W. (Chorlton).

Our Beginners' Articles

SIR,—I am one of those persons who have taken up wireless recently and I know practically nothing about it. I am absolutely wrapped up in your weekly articles for beginners. They are really splendid; the information, particularly for folks like me, is valuable.

I hear wireless fans talk about circuits. They speak about the aerial circuit, the grid circuit, the plate, and well, I don't understand what constitutes each of the afore-mentioned circuits! I would be pleased if in one of your articles for beginners you would kindly explain what it is that forms or constitutes each of these.

To those who understand those circuits, they might consider me ridiculous. Still, I assure you, to me they are mysterious.

J. McM. (Manchester).

The Regional Scheme

SIR,—May I congratulate "Thermion" on his notes, particularly those appearing under the sub-headings: "Have You Realised," "The Race for Power," and "And Still More."

Everything he says is correct.

I consider (1) the erection of powerful transmitters using six times more power than necessary is foolish, because in many instances they interfere with one another and (2) that their interference with and blotting out of most of the best foreigners is unsportsmanlike and un-English.

It is up to the public and the wireless trade to hammer away at the B.B.C. until we get a return to sane conditions.

D. R. P. (Richmond).

LET "AMATEUR WIRELESS" SOLVE YOUR PROBLEMS.

The Limit in High Tension

SIR,—N. T. H (Balham) may be interested to know of a similar experience I have had with a one-valve set. About four years ago I had one of Scott-Taggart's circuits rigged up, using a Marconi DER.

I got perfect reception *without any high tension at all*, H.T. + and H.T.— being short circuited! H. M. V. (Southend).

Medium-wave Stations in Daylight

SIR,—I was much interested in "Thermion's" remarks regarding daylight reception of medium-wave stations. I am rather badly situated here, but with a four-valver (two S.G.) I frequently hear such stations as Rome, Langenberg, Stuttgart, etc., in daylight at quite fair L.S. strength and have often wondered how the direct ray has managed to reach me.

This morning (10 a.m.) Rome is audible, though faint, on the L.S., but yesterday (7th inst.), at 3 p.m., I got astoundingly loud reception on the L.S. from several stations, including Berne!

I was interested also to hear, for the first time, good L.S. reception from a station just above Budapest. This I have identified as Augsberg, relaying Munich, which was itself barely audible on the L.S. Evidently after the destruction of Munich's aerial by gale, the aerial strength of Augsberg (normally only .3 kilowatt) has been greatly increased.

L. H. L. (Braunton, N. Devon).

AMPLIFYING PHOTO-ELECTRIC EFFECTS

OWING to the high internal resistance of photo-electric cells of the alkali-metal type, it is possible to connect such cells across the grid and plate of the valve and to secure a high amplification-ratio. The resistance of a selenium cell is too low to permit of its being similarly coupled to the amplifier, because the grid would then assume the same potential as the plate, and the amplifier become saturated. It is accordingly connected across grid and filament in the usual way. This gives a lower amplification ratio, which is, however, offset to some extent by the fact that the emission from a selenium cell is greater than from a photo-electric cell. M. B.

"Filta" Condensers.—It should be noted that the price of the bakelite-cased 2-microfarad "Filta" condenser is 3s. 3d., and not 4s. 10d., as stated in a recent test report. These condensers are British made by the Condenser and Electric Co. for the Mains Power Radio Co., of 57 Farringdon Street, E.C.4.

Postcard Radio Literature

A Good Set

IT'S gratifying to see how many people are going in for two-valvers these days. One of the simplest and neatest battery-driven "twos" I have come across is the "Burton Empire Two," which sells at 57s. 6d., and which seems to be amazing value for money. I advise you to write to Burtons for the folder describing this. **122**

Transformer Repair

Transformers do not often break down these days, but when they do then their repair is a specialised job. Anticipating any trouble of this kind with the windings of transformers, speakers, or phones, why not write to the Transformer Repair Co., through my catalogue service, for literature showing the service offered? **123**

A De Luxe Cabinet

Picketts are specialising in gramo-radio cabinets at the moment and I have just seen what is undoubtedly one of the best radio-gramophone cabinets on the market, a model known as the Radiogram De Luxe. It is impossible to describe this in a short space, but full measurements, particulars, and illustrations can be obtained from Picketts. **124**

A "Nipper"

A new transformer has just been brought out by the Fotos valve people, the Concerton Radio and Electrical Co., Ltd. This is known as the Nipper, and it is a smaller model of the big Fotos super-transformer which is already well known. The Nipper transformer is described in a folder available. **125**

A Blue Spot Goliath

One of the high spots of the Blue Spot range of speakers is the Goliath Model 29K. This is described in an illustrated folder to be had from the British Blue Spot Co. **126**

New Brown Prices

Great reductions have just been made in the prices of some of the Brown sets and kits of parts. You should be well informed about this and should write to S. G. Brown, Ltd., through my catalogue service, for an illustrated folder, giving the latest details and prices. **127**

A Novel Set

There seems to be several points of interest about the Electrocet Pyramid mains receiver, which is described in a leaflet I have received from the Electrocet Radio Co. This concern also makes some very good high- and low-tension eliminators for A.C. mains. **128**

Permanent Magnets

It is surprising and gratifying to see how quickly permanent-magnet moving-coil speakers have come into popularity. I like the look of the new W.B. permanent-magnet moving coils, and I have been making a study of the internal construction as explained in a new W.B. leaflet. **129**

For Big Work

If you are making up an amplifier for any sort of public-address work, or even for big-volume dance music for the home, then you should get a copy of the new Rothermel book which gives a lot of interesting information on this side of radio work. **130**

Clarostats

What a large number of sets seem to have Clarostats fitted in them, these days. Clarostats form a very handy means of resistance control and a new booklet issued by Claude Lyons, Ltd., tells all about them and the various ways in which they may be used. **131**

Radio Gramophones

Perfectavox, Ltd., have issued a fine illustrated folder giving particulars of the new radio-gramophones. The Perfectavox Minor, fitted with a screen-grid receiver, seems to be excellent value for money. **132**

GET THESE CATALOGUES FREE.

Here "Observer" reviews the latest booklets and folders issued by well-known manufacturers. If you want copies of any or all of them FREE OF CHARGE, just send a postcard giving the index numbers of the catalogues required (shown at the end of each paragraph) to "Postcard Radio Literature," "AMATEUR WIRELESS," 58-61, Fetter Lane, E.C.4. "Observer" will see that you get all the literature you desire.

WE TEST FOR YOU

A weekly review of new components and tests of apparatus.

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

Tannoy Eliminator

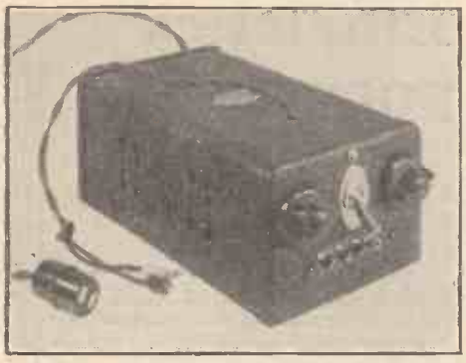
THERE are various ways of adapting a battery-driven set to work off the mains. One may retain the low-tension accumulator and merely use an H.T. eliminator, or with certain alterations to the wiring it is possible to fit A.C. valves and dispense with the accumulator.

The man who possesses an accumulator can dispense with his H.T. batteries and fit a trickle-charger, since this will save the periodic visits to the charging station. A trickle-charger has the advantage of keeping the cells in good condition, due to the low rate of charge, but it is always a good plan to switch on the charger methodically every day, for under such conditions the accumulator will have an exceptionally long life.

We have received for test a combined Tannoy H.T. unit and trickle-charger. This complete unit is housed in a metal case measuring 9 by 5 in. by 3¾ in. high. Internally the lay-out is very compact; a metal rectifier supplies the H.T. current and a second metal rectifier is connected to a pair of accumulator leads. An external switch provides the change-over from H.T. supply to accumulator charging.

Three high-tension positive sockets are provided; two of these are variable and are controlled by rotary potentiometers. The final positive tap gives the full output volts.

When tested on a wireless set we were impressed by the absence of hum. A voltage of 150 was obtained with a total current of 17 milliamps, this had fallen to 140 volts at 20 milliamps, and 100 volts at 30 milliamps. On switching over to charge a



A combined H.T. unit and trickle-charger made by Tannoy

2-volt accumulator, the rate was found to be .42 amp. This fell to .32 amp. with a 4-volt accumulator, and to .22 amp. with a 6-volt accumulator. The leads may be left attached to the accumulator when the switch is not in the position of charge.

These figures for output voltages and currents show that this little unit is admirably suitable for the average two, three and four-valve set, and it can be recommended to readers.

"R.C." Indoor Aerials

NOW that our system of high-powered stations is growing, it is almost safe to predict that there are more indoor than outdoor aerials in use. From an aesthetic point of view one can seldom admire an outdoor aerial and one may hope that in the course of a few years it will become almost extinct.

There are many ways of erecting an aerial inside a room, one commonly adopted being to place the wire round the picture rails. In some cases this method has much to commend it, but in others the unavoidable damping of the aerial due to the proximity to the wall, is a considerable disadvantage. It is generally preferable to hold the wire away from the wall.

"R.C." aerials form a solution to many of the problems of erecting an indoor aerial. These aerials are made in a number of types, one having a span of 12 ft. with a diameter of 2½ in. and consisting of parallel wires held apart by wooden rings. Strong rubber rings at the end form a means of insulation. The aerial can be strung up across a room from one part of the picture rail to another. The price of this aerial complete is 2s.

The second type submitted for test is also priced at 2s., and consists of a collapsible spiral of wire 55 ft. long. Any span can be obtained up to 30 ft. in length. Due to a double string support the aerial will not sag appreciably and has the advantage that it is adaptable to any size of room. We tested these aerials in comparison with our standard laboratory indoor aerial, comprising a length of copper wire round three walls of the laboratory, and held well away from the wall. The standard "R.C." aerial gave a voltage pick-up over 50 per cent. of that received with our standard. The collapsible spiral aerial had a voltage pick-up from 30 per cent. to 40 per cent.

If readers have experienced satisfactory results with a carefully erected indoor aerial, they will not be disappointed with these "R.C." aerials.

New Astra Dial

IN a recent AMATEUR WIRELESS we tested an Astra Dial marketed in this country by Messrs. Emkabe Radio Co., Ltd. We commented on the smoothness and freedom from backlash of the gearing, and the practical nature of the adjustable clutch of this gearing.

We have now received from Messrs. Emkabe Radio Co., Ltd., a novel adaptation of this dial in which the front metal plate is in black with white engraving, the marking being in luminous paint at every 10 degrees, with the number shown at every

A new Astra dial, which has luminous figures

20 degrees. There is a further mark in luminous paint on the window of the cursor.

In daylight the appearance of this phosphorescent paint is attractive, and at night it is useful. The lettering shows up quite plainly in the dark and one experiences no difficulty in tuning to a station. Further, it is possible to find one's way to the set without the aid of a light.

The price of this dial is 4s., and it can be recommended.

New "Cortabs"

READERS who have made up a set having a number of battery leads, will appreciate the advantage of labelling them, so that one may connect up the batteries properly and without risk of burning out valves. Messrs. Money Hicks, Ltd., have recently placed on the market a new and improved version of their well-known Cortabs these being called the "De Luxe" edition. A selection of these has been sent to us for test, and includes all the usual markings, while in addition labels may be obtained with the lettering Pentode Valve, Screen H.T., etc.

These tabs are fitted on the flexible leads by forcing the lead through a narrow restriction at either end. Thus secured the tabs will not shake off. A feature of the H.T. tabs is a white oval in the centre on which the voltage may be marked with a pencil or pen, further aiding rapid connection.

These tabs are certainly useful and may be recommended.

BLUEPRINTS

When Ordering, please send a Postal Order, NOT STAMPS to—

BLUEPRINT SERVICE, AMATEUR WIRELESS, 58-61 FETTER LANE, LONDON, E.C.4

CRYSTAL SETS. 6d. each, post free.

B.B.C. Brookman's Park Set AW206

ONE-VALVE SETS. 1s. each, post free.

Monodyne AW258
One Control One AW267
Hartley Single-valver WM198

TWO-VALVE SETS. 1s. each, post free.

Talisman Two (D, Trans) AW194
Easy-Tune Two (D, Trans) AW226
Wavelets Two (D, Trans) AW229
No-battery A.C. Mains Two (D, Trans) .. AW230
No-battery Gramo-radio 2 (D, Trans) AW238
1930 Talisman 2 (D, Trans) AW239
Scarcher Two (D, Trans) AW245
Arrow Two (D, Trans) AW249
Forty-five Shilling Two (D, Trans) AW250
Searcher Short-wave 2 (D, Trans) AW259
Challenge Two (D, Trans) AW261
Loftin White 2 (A.C.) AW263
Clipper Two (D, Trans) WM135
A.B.C. 2 (D, Trans) with copy "WM"—1s. 3d. WM160
Brookman's Two (D, Trans) WM168
Programme Two (D, Trans) WM177
New Crusader (D, Trans) WM182
Gleaner Two (D, Trans) WM201
Music Monitor (D, Trans) WM208
Merlin Two (A.C. Set) WM213
Five-point Two (D, Trans) WM220

THREE-VALVE SETS. 1s. each, post free.

Knife-edge Three (D, RC, Trans) AW201
Everybody's Three (SG, D, Trans) AW209
1930 Ether Searcher (SG, D, Trans) AW211
New All-Britain Three (HF, D, Trans) .. AW214
Brookman's By-pass Three (D, 2 Trans) .. AW220
Everybody's All-electric Three (SG, D, Trans) —A.C. AW221
1930 Clarion Three (SG, D, Trans) AW223
Auto-coupler Three (D, 2LF) AW225
Beginner's Regional Three (D, 2LF) AW233
Britain's Favourite Three 1930 (D, RC, Trans) AW243
Car Three (D, RC, Trans) AW244
The "A.W." Exhibition 3 .. .. AW247
New Year Three (SG, D, Pentode) WM123
Lodestone Three (HF, D, Trans) WM129
Simple Screen Three (HF, D, Trans) WM131
Dynamic Three (AC—SG, D, Trans) WM136
Short-wave Link (D, RC, Trans) WM142
Fanfare (D, 2 Trans) WM157
Brookman's Three (SG, D, Trans) WM161
Community Three (D, RC, Trans) WM164
New Q3 (SG, D, Pentode) WM167
Brookman's Push-Pull Three (SG, D, Trans 1/6) WM170
Celerity Three (SG, D, Trans) WM173
All-nations Three (D, 2 Trans) WM178
Inceptordyne (SG, D, Pentode) WM179
Brookman's A.C. Three (SG, D, Trans 1/6) .. WM184
Music Marshal (D, 2 Trans) WM190
Concert Three (D, 2 Trans) WM199
New Lodestone Three (HF, D, Trans) WM205
De-luxe Three (D, RC, Trans) WM209
Five-point Three (SG, D, Trans) WM212
Falcon Three (A.C. set) WM217
New Brookmans Three (SG, D, Trans) .. WM218
Five-point Short-waver (D, RC, Trans) .. WM223

FOUR-VALVE SETS. 1s. 6d. each, post free.

Clarion All-electric Three (SG, D, Trans—A.C. Rectifier) AW200
Music-Lover's Gramo-radio (SG, D, RC, Trans)—1s. 6d. AW202A
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Horizon Four (SG, D, 2 Trans) AW237
Challenge Four (2SG, D, Trans) with copy fo "A.W.," 4d. post free AW251
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Dominions Four (2SG, D, Trans) WM134
Arrow (SG, HF, D, Trans) WM154
1930 Monodial (2SG, D, Trans) WM158
Electric Four (All A.C.—SG, D, RC, Trans) .. WM162
Brookman's Four (2SG, D, Trans) WM174
Super Q (SG, D, 2 Trans) WM189
Lodestone Four (HF, D, RC, Trans) WM193
Searcher's Four (SG, D, RC, Trans) WM194
Invitation Four (SG, D, RC, Trans) WM200
Regional Band-pass Four (SG, D, RC, Trans) WM211
Five-Point Four (SG, D, RC, Trans) WM216
Regional A.C. Five (SG, D, RC, Trans) .. WM222

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James Quality Five (2SG, D, RC, Trans) .. AW227
All-wave Lodestone Five (HF, D, RC, Push-pull) WM146
1930 Five (2HF, D, RC, Trans) WM171
Dual-screen Five (2SG, D, RC, Trans) .. WM185
Radio-Record Five (SG, D, Trans-Parallel) .. WM188
Overseas Five (3SG, D, Trans) WM191
Regional A.C. Five (3SG, D, RC, Trans) .. WM224

SIX-VALVE SETS.

Hyperdyne Receiver (Super-het) WM221

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Music Leader (SG, D, RC, Trans) with copy "AW" .. .. AW203 -/4
Merry-maker Portable (D, 2 Trans) .. AW228 1/-
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Continental Portable (SG, D, Trans) .. AW241 1/-
1929 Chummy (SG, D, Trans, RC) .. WM145 1/6
Pedlar Portable Two (D, Trans) .. WM195 1/-
Pedlar Portable Three (D, 2 Trans) .. WM197 1/-
James Portable SG3 (SG, D, Trans) .. WM203 1/6
Foursome Portable (SG, D, 2 Trans) .. WM206 1/6

AMPLIFIERS. 1s. each, post free.

Screened HF One AW129
Screen-grid HF Amplifier AW138
A.W. Gramophone Amplifier AW205
Beginner's Amplifier (IV.) 9d. AW210
Brookman's Separator (HF Unit) AW212
Two-Valve Amplifier AW216
"Mag." Gramo Unit AW224
Simple Gramophone Amplifier AW257
True-tone Amplifier (3 v. Trans, RC) WM47
Auditrol Amplifier WM132
Concentrator H.F. Unit WM169
Radio-Record Amplifier (DC Mains) WM183
Selecto Amplifier (HF Unit) WM210

MISCELLANEOUS. 1s. each, post free.

By-pass Unit (Wavetrap) with copy "AW"—4d. AW218
A.W. Paper Loud-speaker AW231
James H.T. and L.T. Charging Unit AW232
Choke Output Unit AW240
Simple Tester Unit (6d.) AW246
"A.W." Improved Linen-diaphragm Speaker .. AW248
Handy L.T. and G.B. Unit for A.C. Mains .. AW254
Ohmic Coupled DX Unit AW255
Novel Linen-diaphragm Speaker AW260
Our H.T. Unit for A.C. Mains AW262
Gramophone Tone Control AW264
Short-wave Adaptor for Dominions Four .. WM140
Two Ampere Low-tension Unit WM147
A.C. Mains Amplifier WM149
A.C. Mains Unit for All-wave Lodestone Five WM151
H.T. Unit for A.C. Mains WM159
"W.M." Linen-diaphragm WM172
Trimmer (Selectivity Unit) (6d.) WM181
Brookman's "Wipe-outs" WM186
Short-wave adaptor for Overseas Five WM192
Staminator Unit for A.C. Mains WM202
Universal Push-pull Amplifier WM204
Outspan Short-wave Adaptor WM207
"W.M." Standard A.C. Unit WM214
"W.M." Standard D.C. Unit WM215
Falcon A.C. Unit WM219

Copies of the "Wireless Magazine" and of "Amateur Wireless" containing descriptions of any of these sets can be obtained at 1s. 3d. and 4d. respectively post free. Index letters "A.W." refer to "Amateur Wireless" and "W.M." to "Wireless Magazine."

ALL BLUEPRINTS ARE FULL SIZE

BROADCAST TELEPHONY

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

Metres	Kilocycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN			
25.53	11,751	Chelmsford (G5SW)	15.0
200	1,500	Leeds	0.16
242	1,238	Belfast	1.2
261.3	1,148	London Nat.	08.0
288.5	1,040	Newcastle	1.2
288.5	1,040	Swansea	0.16
288.5	1,040	Stoke-on-Trent	0.16
288.5	1,040	Sheffield	0.16
288.5	1,040	Plymouth	0.16
288.5	1,040	Liverpool	0.16
288.5	1,040	Hull	0.16
288.5	1,040	Edinburgh	0.4
288.5	1,040	Dundee	0.16
288.5	1,040	Bournemouth	1.2
288.5	1,040	Bradford	0.16
301	995	Aberdeen	1.2
309.9	968	Cardiff	1.2
356.3	842	London Reg.	45.0
376.4	797	Manchester	1.2
398.9	752	Glasgow	1.2
479	626	Midland Reg.	38.0
1,554	193	Daventry (Nat.)	35.0
AUSTRIA			
218.5	1,372	Salzburg (testing)	0.6
246	1,220	Linz	0.6
283.6	1,058	Innsbruck	0.6
352	851	Graz	9.5
453	666	Klagenfurt	0.6
517	581	Vienna	20.0
BELGIUM			
206	1,456	Verviers	0.3
206	1,456	Antwerp	0.4
216	1,391	Chatelineau	0.25
243	1,235	Courtrai	0.1
244.7	1,226	Ghent	0.25
245.3	1,223	Schaerbeek	0.5
338.2	887	Velthem (Louvain)	12.0
509	590	Brussels (No. 1)	1.2
BULGARIA			
319	941	Sofia	2.0
CZECHO-SLOVAKIA			
263	1,139	Moravska-Ostrava	11.0
279	1,076	Bratislava	14.0
294	1,020	Kosice	2.5
342	878	Brunn (Brno)	3.0
487	617	Prague (Praha)	5.5
DENMARK			
281	1,067	Copenhagen	1.0
1,153	260	Kalundborg	10.0
ESTONIA			
401	748	Reval (Tallinn)	0.7
FINLAND			
221	1,355	Helsinki	15.0
291	1,031	Viipuri	15.0
1,796	167	Lahti	54.0
FRANCE			
172.5	1,739	St. Quentin	0.3
200	1,500	Radio Roubaix	0.2
222.9	1,346	Fécamp	1.0
235.1	1,275	Nimes	1.0
240.6	1,247	Béziers	0.6
248.5	1,207.3	Juan-les-Pins	0.5
256	1,171	Toulouse (PTT)	1.0
265	1,130	Lille (PTT)	15.0
272	1,103	Rennes	1.2
286	1,040	Montpellier	2.0
286.2	1,047.9	Radio Lyons	0.5
296.4	1,012.1	Limoges (PTT)	0.08
300	1,000	Strasbourg	1.0
304	988	Bordeaux (PTT)	35.0
315	952.5	Neuilly (Paris)	0.3
316	950	Marseilles (PTT)	1.5
328.2	914	Grenoble (PTT)	1.2
329	911	Caen (Normandy)	0.6
329.5	910.3	Poste Parisien	1.2
345.2	869	Strasbourg (PTT)	12.0
370	810.5	Radio LL (Paris)	0.5
385	779	Radio Toulouse	15.0
447	671	Paris (PTT)	2.0
466	644	Lyons (PTT)	2.3
1,445.7	207.5	Eiffel Tower	15.0
1,725	174	Radio Paris	17.0
GERMANY			
31.38	9,560	Zeesen	15.0
217	1,387	Konigsberg	1.7
218	1,373	Flensburg	0.6
227	1,319	Cologne	1.7
227	1,319	Münster	0.6
227	1,319	Aachen	0.31
232.2	1,293	Kiel	0.3
239	1,256	Nürnberg	2.3
246.4	1,217.2	Cassel	0.3
253.4	1,184	Leipzig	2.3
259.3	1,157	Gleiwitz	5.6
269.8	1,112	Augsburg	0.3
276.5	1,085	Heilsberg	75.0
283.6	1,058	Magdeburg	0.6
283.6	1,058	Berlin (E)	0.6
283.6	1,058	Stettin	0.6
316.6	947.6	Bremen	0.3
318.8	941	Dresden	0.3
325	923	Breslau	1.7
360	833	Muhlacker	75.0
372	806	Hamburg	1.7
390	770	Frankfurt	1.7
418	716	Berlin	1.7
452.1	663	Danzig	0.25
473	635	Langenberg	17.0
538	563	Munich	17
559.7	536	Kaiserslautern	1.0
566	530	Hanover	0.35
570	527	Freiburg	0.3
1,635	183.5	Zeesen	35.0
1,635	183.5	Norddeich	10.0
HOLLAND			
31.28	9,599	Eindhoven (PCJ)	30.0
299	1,004	Hilversum	8.5
299	1,004	Radio Idzerda (The Hague)	0.6
1,071	280	Scheveningen-Haven	5.0
1,875	160	Huizen	8.5
HUNGARY			
210	1,430	Budapest (Csepel)	1.0
550	545	Budapest	23.0
ICELAND			
1,200	250	Reykjavik (shortly testing)	16.0
IRISH FREE STATE			
224.4	1,337	Cork (1FS)	1.5
413	725	Dublin (2RN)	1.5
ITALY			
80	3,750	Rome (8RO)	9.0
296	1,013	Turin (Torino)	8.5
313.2	958	Genoa (Genova)	1.5
332	905	Naples (Napoli)	1.7
441	680	Rome (Roma)	75.0
453	662	Bolzano (IBZ)	0.2
501	599	Milan (Milano)	8.5
LATVIA			
525	572	Riga	12.0
LITHUANIA			
1,935	155	Kaunas	7.0
NORTH AFRICA			
363.4	823.3	Algiers (PTT)	13.0
416	721	Radio Maroc (Rabat)	10.0
1,350	222.2	Tunis Kasbah	0.6
NORWAY			
235.5	1,275	Stavanger	0.5
240.6	1,247	Kristianssand	0.5
364	824	Bergen	1.0
363.1	826.1	Frederiksstad	0.7
453.2	662	Porsgrund	1.5
453.2	662	Nidaros	1.2
1,073	279.6	Oslo	75.0
POLAND			
214.2	1,400	Warsaw (2)	1.9
234	1,283	Lodz	2.2
244	1,229	Cracow	1.5
312.8	959	Wilno	0.5
338.1	887.1	Poznan	1.9
381	788	Lvov	2.2
409.8	732	Katowice	16.0
1,411	212.5	Warsaw	14.0
PORTUGAL			
240	1,250	Oporto (Teatro Apollo)	0.25
320	937.6	Lisbon (CTIAA)	0.25
ROMANIA			
394	761	Bucharest	16.0
RUSSIA			
427	702	Kharkov	4.0
720	416.6	Moscow (PTT)	20.0
800	375	Kiev	20.0
824	364	Sverdlovsk	25.0
870	344.8	Tiflis	15.0
937.5	320	Kharkov (RV20)	25.0
1,000	300	Leningrad	20.0
1,103	272	Moscow Popoff	40.0
1,200	250	Kharkov (RV4)	25.0
1,304	230	Moscow (Trades' Unions)	100.0
1,380	217.5	Bakou	10.0
1,481	202.5	Moscow (Kom)	20.0
SPAIN			
251	1,193	Barcelona (EAJ15)	1.0
266.7	1,125	Barcelona (EAJ13)	10.0
349	860	Barcelona (EAJ1)	8.0
368	815	Seville (EAJ5)	1.5
413.8	725	Radio Espana	1.0
426.7	704.7	Madrid (EAJ7)	2.0
460	652	San Sebastian (EAJ8)	0.5
SWEDEN			
230.6	1,301	Malmo	0.75
257	1,166	Hörby	15.0
300.2	999.3	Falun	0.65
322	932	Göteborg	15.0
436	689	Stockholm	75.0
542	554	Sundsvall	15.0
770	389	Ostersund	0.75
1,224	245	Boden	0.75
1,348	222.5	Motala	40.0
SWITZERLAND			
244	1,229	Basle	0.5
403	743	Berne	1.1
459	653	Zurich	0.75
678.7	454.6	Lausanne	0.6
760	395	Geneva (testing on 1,010m.)	1.5
TURKEY			
1,200	250	Istanbul	5.0
1,961	153	Ankara	7.0
YUGOSLAVIA			
306.8	978	Zagreb (Agram)	0.7
430.5	696.8	Belgrade	3.0
574.7	522	Ljubljana	2.8

THE RAMAN EFFECT

THE modern view is that radiation is not continuous but takes place in definite bundles of energy, called "quanta." In the case of light the radiated quantum is released from the atom by the sudden jump of an electron from one orbit of spin to another of smaller radius. The Raman experiment affords one of the few available proofs of the quantum theory. It consists of passing a ray of monochromatic light through benzene. The scattered light-ray is found to contain new rays which are either a definite part, or a definite multiple of the original wavelength. The explanation is that in its passage through the benzene the original light has in some cases acquired additional quanta from the benzene molecules, and in other cases has lost quanta to them.

M. B

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Please write concisely, giving essential particulars. A **Fee of One Shilling** (postal order), a stamped addressed envelope, and the coupon on the last page must accompany all letters. The following points should be noted.

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RADIOGRAMS

ACCORDING to the revised Swiss broadcasting scheme, the new Berne station is testing on 403 metres, and the Munchenbuchsee plant, which up to the present has acted for this city, is to be transferred to Geneva. The site of the latter station has been moved to the Plateau of St. Georges, where aerial masts 250 feet high have been erected.

In view of interference with Dresden on 318.8 metres, the Basle broadcasting station has reduced its wavelength to 244 metres (1,229 kilocycles).

The French authorities have refused to renew the licence previously granted to the Natan-Vitus broadcasting station at Romainville-Paris and have ordered the station to suspend its transmissions.

Bordeaux-Sud-Ouest (France) has resumed its daily broadcasts on 237 metres. As a regular feature the studio will relay talkie films from the local cinemas.

It is probable that a beam wireless service will be established next year between India and Japan.

A report from Prague states that the work on the 150-kilowatt transmitter now under erection at Boehmisch Brod is nearing completion, but that as the plant is under test in Paris, the station may not start working until next spring.

The Radio Maroc broadcast programmes are relayed to the Rabat short-wave transmitter. The station re-broadcasts them on Tuesdays, Thursdays, and Saturdays between 1 and 2 p.m. on 24 metres, and on Saturdays and Sundays between 9 and 10 p.m. G.M.T. on 48 metres. All announcements are made in French, the call being: *"Ici Radio Maroc, station de l'Office Cherifien."* As an interval signal a metronome can be heard, and the transmission closes down with the playing of "La Marseillaise."

Tests are being carried out by the new Salzburg (Austria) relay station on 218.5 metres until arrangements can be made to work all the Austrian subsidiary transmitters on one common wavelength.

Two more stations were recently added to the Norwegian broadcasting system by the opening of Kristianssand on 240.6 metres (1,247 kilocycles) and Stavanger on 235.5 metres (1,275 kilocycles), both radiating a power of 500 watts in the aerial. Local concerts are transmitted daily, but from 7 p.m. G.M.T. the stations relay the Oslo programme.

It is stated that both the Palermo and Trieste (Italy) stations may be ready to go on the air in January next.

Morse interference on the wavelength of Königswusterhausen-Zeesen has now been definitely traced to RAX, a powerful Moscow telegraphy transmitter.

Ecole Supérieure, Paris, has decided to do without a studio orchestra; since December 1 the luncheon hour concerts have been replaced by gramophone recitals. These are usually relayed to Eiffel Tower.

Some twenty express trains on the Warsaw-Lodz (Poland) main line have been equipped with radio receiving apparatus for the use of passengers.

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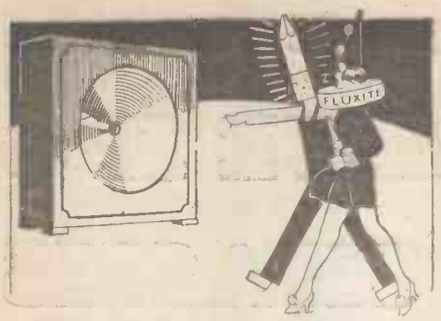

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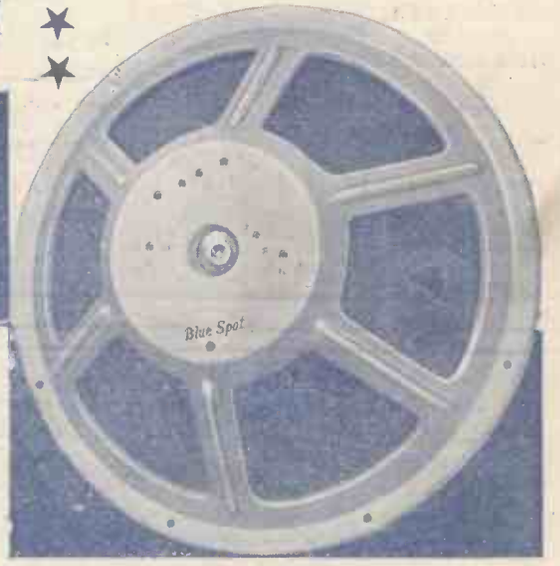

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