

There is still
time to enter

OUR TELEVISION COMPETITION

(See Page
724)

Popular Wireless

Every Wednesday
PRICE
3d.

No. 548, Vol. XXII.

INCORPORATING "WIRELESS"

December 3rd, 1932.

BUILD THE BAND-PACK



Also Featured This Week:
LOUDSPEAKER OPERATION
SHORT-WAVE HOOK-UPS
OUR NEW SET-TESTING SYSTEM
POWDER-CORE COILS



Whether it's bought
Or whether it's built,
Earth your Receiver
By fitting a FILT!

GRAHAM FARISH FILT
PERCOLATIVE CHEMICAL EARTH

If you cannot readily
obtain a FILT from
your radio dealer order
direct, post, free, from
sole manufacturers:
**GRAHAM FARISH,
LTD.,**
181, Masons Hill,
Bromley, Kent.

PRICE
2/6
COMPLETE

Christmas is Coming

so buy yourself a copy of

THE XMAS NUMBER

OF

MODERN WIRELESS

ON
SALE

THIS
WEEK

USUAL
PRICE
1/-

SPECIAL
LARGE
SECTION

"FOR THE
CONSTRUCTOR"

including
full details of how to build

THREE
FINE RECEIVERS



THE
"DIODION"
SUPER
SEVEN

THE
"METRIC"
THREE

THE
"WHOLE
WORLD"
FIVE

AND

A GIFT

FOR EVERY READER!

A unique station-identification
and set-calibration chart

"M.W." DIAL DIAMONDS

easy to use, simple to understand,
interesting to all and

FREE

ALSO

THE WORLD'S PROGRAMMES

a supplement for

THE LONG-DISTANCE LISTENER

Telling all about the
foreign stations—
when, where and
how to listen
for them

OTHER ITEMS IN THIS NUMBER
INCLUDE :—

Xmas Greetings from Daventry

— Some Seasonal Suggestions —

Radio Xmas Gifts—Better Radio—

Behind the Scenes at Queen's Hall

— "Warming-Up" a Short-Wave One,

etc., etc., etc.

DON'T MISS

MODERN WIRELESS



**"RADIO
AS IT SHOULD
BE"**

means a good set and
an **R.K.**

**Senior A.C. Unit
for
mains operation
Price - £7-15-0**

Now that R.K.'s are available at such low prices, there is no longer any need to put up with second-rate reproduction. In the R.K. range of speakers at prices from £2.17.6 there are models to suit all purses and purposes. Each is designed to give in its particular sphere of operation, the characteristic R.K. balanced reproduction and fine sensitivity. All good radio dealers will be glad to demonstrate R.K.'s. A range of output transformers, specially designed for use with R.K.'s, is available.



**Minor R.K. Permanent Magnet Model
Prices :-
Fumed Oak "ARUNDEL" model £2.17.6
Walnut "ARUNDEL" model £3.3.0**

**Senior R.K. Permanent Magnet Model
Prices :-
"WARWICK" model in Oak £8.10.0
"WARWICK" model in Walnut £8.17.6**

**Senior R.K. Permanent Magnet Model
Price :-
"WINDSOR" model in Oak £8.10.0**

The above mentioned speakers are supplied complete with multi-ratio transformer.



Specified by the B.B.C. for Broadcasting House.

B.T.H.

**MOVING COIL
EDISWAN RADIO**



REPRODUCERS

100% BRITISH

1933

MODELS

The Edison Swan Electric Co. Ltd.



155 Charing Cross Rd. London. W.C.2

W.193

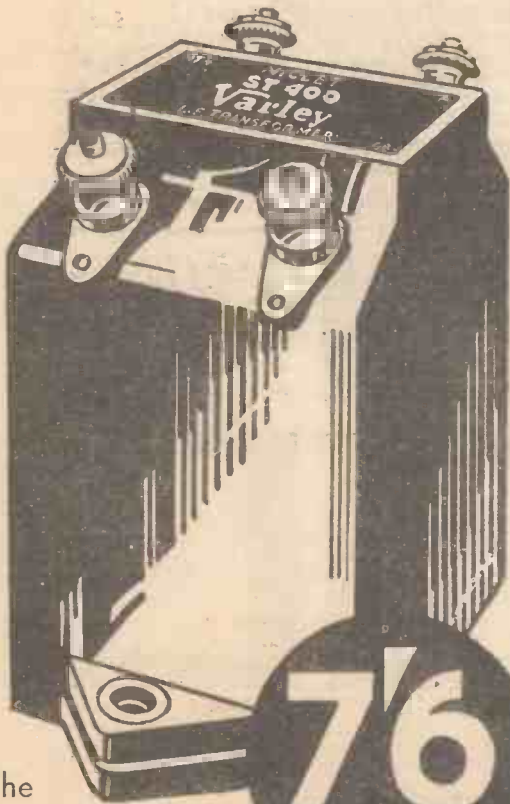
SPECIFIED

and recommended by
Mr. Scott-Taggart for the
"S.T.400"

and specially selected for the
S.T.400 READY RADIO KIT

The Varley NICLET was specified in the original "S.T.300," and Mr. G. P. Kendall, B.Sc., Chief Engineer of Ready Radio, has chosen it in preference to all alternatives for inclusion in the Ready Radio "S.T.400" Kit.

See that you get the correct model. Not a standard "Niclet," but THE S.T.400 NICLET—specially designed and labelled for this great set by Varley.



The
**S.T.400
 NICLET**

76
 READY NOW

Varley

Proprs.: OLIVER PELL CONTROL LTD.

Adv.: of Oliver Pell Control Ltd., 103, Kingsway, W.C.2.

Tel.: Holborn 5303.

"A definite advance..."



says **Mr. H.J. Barton Chapple** *Wh. Sch. B.Sc. (Hons)
 D.I.C. A.M.I.E.E.*

This well known radio and television authority pays striking tribute to the new W.B. "Mansfield" Speaker Magnetic System.

"... The ultimate result is a really astonishingly high flux density for the size of the magnet used... fidelity of tone of outstanding merit... sensitivity very noteworthy, comparable in many respects with externally energised types without the necessity for mains or batteries. The Speaker will handle an input more than sufficient for quite a large room and yet can be worked satisfactorily from a small two-valve set. My conclusions... this new P.M.4 speaker is a definite advance in the permanent magnet class."

Write for copy of Mr. Barton Chapple's full report. The "Mansfield" (patent) Magnetic System is a revolutionary development. It makes possible a magnet 30% more efficient than a good cobalt steel magnet of same weight and 10% more efficient than a chrome steel magnet of three times the weight. It enables a steel chassis to be used without magnetic loss. It eliminates the bug-bear of loss of magnetism. Ask your dealer for a demonstration; you will be **AMAZED.**

The
**revolutionary
 "MANSFIELD"
 Moving-Coil
 Speakers**



"Mansfield" Senior (Improved P.M.4) complete with 3-ratio transformer **42/-**

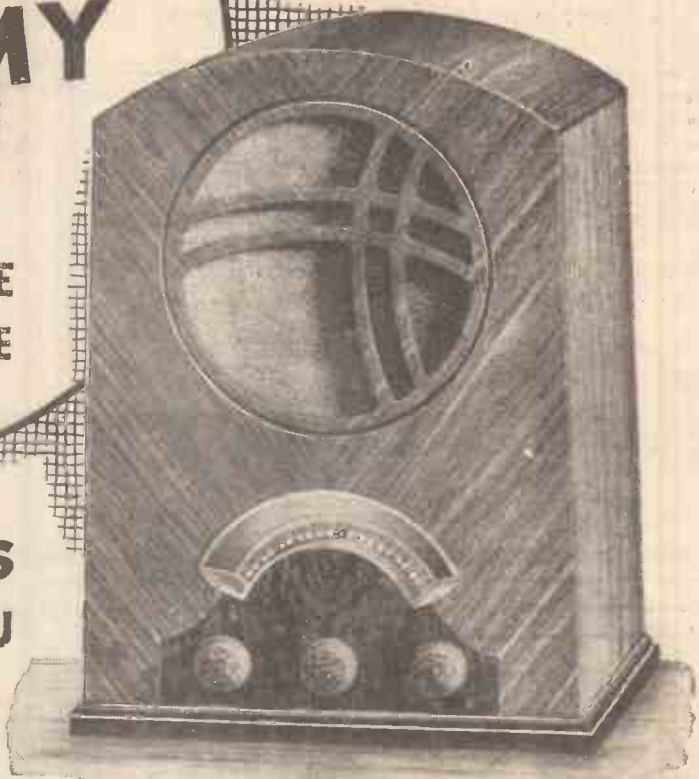
"Mansfield" Junior (P.M.5) complete with 3-ratio transformer **27/6**

"Mansfield" Cabinet in well finished Oak (for P.M.4 or 5) **25/- extra**

Whiteley Electrical Radio Co., Ltd., Dept. E., Radio Works, Mansfield, Notts.
 London Office: 109, Kingsway, London, W.C.2. Phone: Holborn 6714.
 Irish Free State Distributors: Kelly & Shiel, Ltd., 47, Fleet St., Dublin.

**TWO VALVE
ALL-MAINS
ECONOMY**

with
**THREE-VALVE
PERFORMANCE**



**MOVING COIL SPEAKERS
AND EVERYTHING YOU
WANT IN RADIO**

for 10 GNS WHY PAY MORE?

The "Manchester Evening Chronicle" reports:—

RADIO-PARIS, BERLIN, MOSCOW, VIENNA, PRAGUE, LANGENBURG, BEROMUNSTER, STUTTGART, BRUSSELS, BRESLAU, POSTE-PARISIEN, HILVERSUM, ETC., at full loudspeaker strength.

NEVER before has there been anything like the "ATLAS TWO." Never before have you heard such astounding truth of tone on any set, no matter what the price. For the first time the very personality of the artist actually lives again in your own home.

Performance, too, is just as spectacular. Programmes pour in from all over Europe, clear-cut, tone-true, and full strength. Everything you want in radio—tone, range, selectivity, moving-coil speakers, all-mains operation, A.C. or D.C., for £10/10/0 or 50/- down and nine monthly payments of 21/- each. Running costs are negligible.

Why not test the "ATLAS TWO" for yourself? Ask your dealer for a demonstration to-day and insist on the "ATLAS TWO."

For the listener without electricity there is the "ATLAS TWO" Battery Model, with P.M. Moving-Coil Speaker, for £6/10/0 (without batteries or accumulator), or 40/- down and eight monthly payments of 13/6 each.

POST COUPON NOW!

Messrs. H. CLARKE & Co. (M/cr.) Ltd.,
George Street, Patricroft, Manchester.
Please send details of the "ATLAS TWO."

Name:

Address:

30/3/12

CLARKE'S "ATLAS TWO"

H. CLARKE & CO. (M/CR.) LTD., PATRICROFT, MANCHESTER
London: BUSH HOUSE, W.C.2. Glasgow: The G.E.S. Co. Ltd., 38, Oswald Street.

99 P.M. 59'6"

The most AMAZING Moving Coil ever produced

There are moving-coil speakers and many marvellous claims are made for them. Disregard all these and fix your attention on Blue Spot 99 P.M.

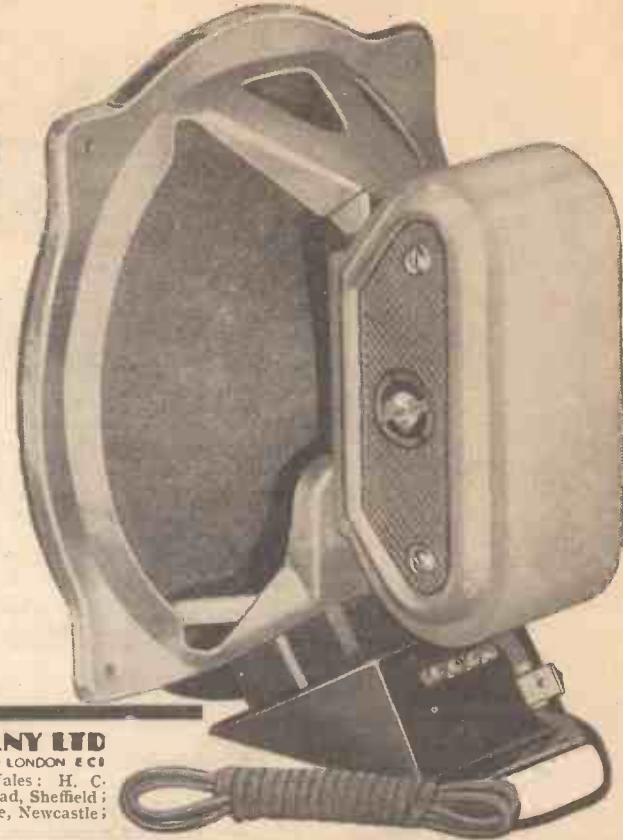
There has never been a moving-coil speaker of such stupendous achievement—never one that has genuinely earned the right to claim *perfect* reproduction. The main features of 99 P.M. are as follows:

Write for Catalogue
No. P.W.59.S.



- SPECIAL FEATURES:**
- 1 Heavy magnet forged from highest grade magnet steel.
 - 2 Powerful and permanent energy.
 - 3 Magnetic energy in air gap is exceptionally high—1,320,000 ergs.
 - 4 Pole pieces cadmium plated to prevent rusting.
 - 5 Side plates are fitted to the magnet to exclude dust and magnetic particles from being attracted into the air gap.
 - 6 Specially designed cone and speech coil. Astonishing faithful reproduction.
 - 7 Valve-matching transformer incorporated. Undistorted output, 3½ watts.

THE BRITISH BLUE SPOT COMPANY LTD
 BLUE SPOT HOUSE · 94/96 ROSOMAN STREET · ROSEBERY AVENUE · LONDON E.C.1
 Distributors for Northern England, Scotland and Wales: H. C. RAWSON (Sheffield and London), Ltd., 100, London Road, Sheffield;
 22, St. Mary's Parsonage, Manchester; 44-46, High Bridge, Newcastle;
 37, 38, 39, Clyde Place, Glasgow.



BRITISH MADE

"We're Fluxite and Solder, the reliable pair,
 Famous for Soldering — known everywhere!
 Wherever there's Wireless — there you'll find US,
 We SOLDER ALL CONNECTIONS without any fuss!"

See that Fluxite and Solder are always by you—in the house, garage, workshop—anywhere where simple, speedy soldering is needed. They cost so little, but will make scores of everyday articles last years longer! For Pots, Pans, Silver and Brassware; RADIO; odd jobs in the garage—there's always something useful for Fluxite and Solder to do.

ALL Hardware and Ironmongery Stores sell Fluxite in tins, 8d., 1/4 and 2/8.

NEW "JUNIOR" SIZE 4d. per tin.

FLUXITE SOLDERING SET
 Simple to use and lasts for years in constant use. Contains special "small space" soldering iron with non-heating metal handle, pocket blow-lamp, Fluxite, Solder, etc., and full instructions. COMPLETE, 7/6, or LAMP only 2/6.

FLUXITE LTD.
 (Dept. 324),
 ROTHERHITHE, S.E.16

ANOTHER USE FOR FLUXITE
 Hardening Tools and Case Hardening.
 Ask for Leaflet on improved method.

ALL MECHANICS WILL HAVE

FLUXITE

IT SIMPLIFIES ALL SOLDERING

"Fiddle, 'cello, big bass Drum, Cornet and Euphonium"

30' -
 Mark III

Whatever the instrument or combination of instruments, they can be immediately recognised when they are reproduced by means of the Bowyer-Lowe Mark III Pick-up. Every fundamental tone, harmonic and overtone is given its correct value without coloration, resulting in a faithful reproduction of the original recording.

Send for Catalogue.
BOWYER-LOWE & A.E.D. LTD.,
 DIAMOND WORKS, BRIGHTON.

A SUPER-SELECTIVE AERIAL

THE **SELECTANET** Reg. No. 520797 Pat. No. 371584

Super-Selective Aerial has a collective surface area of over 800 ft. of pure copper ribbon wire, woven into a tubular net only 9 ft. long. No other aerial has such a ratio. It reduces interference to a minimum. Get one to-day and improve your set. Of all dealers, or direct, postage 3d. extra, from

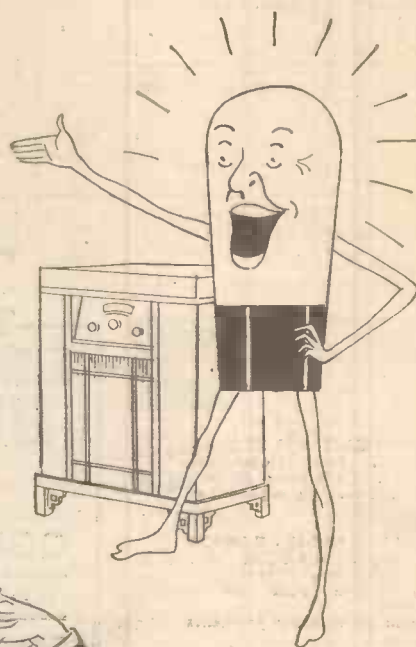
SPONG & Co., Ltd.,
 Woodville Grove, LONDON, N.15.

2/6 EACH

Osram Valves

MADE IN ENGLAND

WITH THE WEMBLEY FILAMENT



For correct types ask your wireless dealer. Also write for the OSRAM WIRELESS Guide (1932 Edition).



The Christmas tonic to any Set!

SOLD BY ALL WIRELESS DEALERS

PRESCRIBE OSRAMS for your own & your friends' sets this CHRISTMAS.

PETO-SCOTT for

ORDER YOUR XMAS RADIO NOW

TELSEN JUPITER S.G.3. Complete Kit as advertised less Valves and Cabinet. Cash Price, Carriage Paid £3/17/0. Balance in 11 monthly payments of 7/-

Send 7/- only

READY RADIO "METEOR" S.G.3. Three-valve Screened-grid Receiver with Valves, Cabinet and Permanent Magnet Moving-Coil Speaker. Tunes in short, medium and long waves without coil changing. Cash Price, Carriage Paid £8/17/6. Balance in 11 monthly payments of 16/3

Send 16/3 only

EPOCH "20 C" PERMANENT-MAGNET MOVING-COIL SPEAKER (New Edition). With 5-ratio input transformer. Cash Price £1/15/0. Carriage Paid. Balance in 5 monthly payments of 6/8.

Send 6/6 only

BLUE SPOT SPEAKER UNIT AND CHASSIS. Type 100U. Cash Price £1/12/6. Carriage Paid. Balance in 6 monthly payments of 5/2.

Send 5/2 only

BLUE SPOT UNIT AND CHASSIS. Type 99P.M. Including matched transformer. Cash Price £2/19/6. Balance in 11 monthly payments of 5/6.

Send 5/6 only

ROLA PERMANENT-MAGNET MOVING-COIL SPEAKER F.6. With universal tapped input transformer. Cash Price £2/9/6. Carriage Paid. Balance in 11 monthly payments of 4/6.

Send 4/6 only

R & A "VICTOR" PERMANENT-MAGNET MOVING-COIL SPEAKER DE LUXE. With 6-ratio input transformer and protecting grille. Cash Price £3/10/0. Carriage Paid. Balance in 11 monthly payments of 6/5.

With 6/5 order

R & A CHALLENGER PERMANENT-MAGNET MOVING-COIL SPEAKER. With special Ferranti multi-ratio input transformer. Cash Price £1/15/0. Carriage Paid. Balance in 5 monthly payments of 6/6.

With 6/6 order

CELESTION P.P.M. PERMANENT-MAGNET MOVING-COIL SPEAKER. With impregnated diaphragm and dual impedance input transformer. Cash Price £2/7/6. Carriage Paid. Balance in 11 monthly payments of 3/6.

Send 4/6 only

COSSOR MELODY MAKER MODEL 335. Complete with Valves, Speaker and Cabinet. Employs Cossor Variable-Mu S.G., H.F. Stage Detector and Power Valves. Cash Price £7/17/6. Balance in 11 monthly payments of 14/10

Send 10/- only

Radio for the Million. STATION MASTER THREE. Model A Battery Type. With 3 Valves and Cabinet for Battery use. Cash Price, Carriage Paid £5/11/0. Balance in 11 monthly payments of 10/2

Send 10/- only

SLEKTUN SCOUT S.G.3. S.G., Detector and Power, less Valves and Cabinet. Cash or C.O.D. Carriage Paid £3/19/6. Balance in 11 monthly payments of 7/3

Send 7/3 only

Radio for the Million. STATION MASTER THREE. Model B Battery Type. With 3 Valves. Speaker in attractive Cabinet. Cash or C.O.D. Carriage Paid £7/10/0. Balance in 11 monthly payments of 14/-

Send 10/- only

ATLAS ELIMINATOR. Type A.G.244. Three tappings. S.G., detector and power. Output: 120 volts at 20 m/a. Cash Price £2/10/6. Carriage Paid. Balance in 11 monthly payments of 5/6

Send 5/6 only

THIS YEAR'S WINNER

LISSEN "SKYSCRAPER" S.G.3

COMPLETE WITH VALVES

CHASSIS KIT

Chassis Model with (Lissen) S.G., Detector and Pentode Valves. Cash Price, carriage paid £4.9.6.

Delivered, carriage paid on first payment of **8/3**

Balance in 11 monthly payments of 8/3.

CABINET KIT

With Lissen Valves, Walnut Cabinet and special balanced-armature Loudspeaker. Cash Price, carriage paid £6.5.0.

Delivered carriage paid on first payment of **11/6**

Balance in 11 monthly payments of 11/6.

ONLY FROM PETO-SCOTT ON GENEROUS EASY TERMS
Carriage paid to your door

HEAYBERD H.T. UNIT D.150. Tapped variable 60/120 v. variable 0/150 fixed. Max. 25 m/a. at 150 v., 20 m/a 120 v. Cash Price £4/6/0. Carriage Paid. Balance in 11 monthly payments of 8/10.

Send 8/10 only

EKCO A.C. 18 H.T. ELIMINATOR FOR A.C. MAINS. Tapped S.G. 80 v. 120/150 at 12 m/a. Cash Price £3/7/6. Carriage Paid. Balance in 11 monthly payments of 6/3.

Send 6/3 only

GARRARD INDUCTION GRAMOPHONE MOTOR. For A.C. mains. Model 202. Mounted on 12-inch nickel motor plate with fully automatic electric starting and stopping switch. Cash Price £2/10/0. Carriage Paid. Balance in 11 monthly payments of 4/7.

Send 4/7 only

GARRARD JUNIOR "B" SPRING MOTOR. Complete with turntable. Cash Price £1/13/0. Carriage Paid. Balance in 5 monthly payments of 6/1.

Send 6/1 only

SONOCHORDE PERMANENT-MAGNET MOVING-COIL SPEAKER, with universal input transformer. Cash Price £1/12/6. Balance in 5 monthly payments of 6/-.

Send 6/- only

GARRARD AUTOMATIC RECORD CHANGER for A.C. mains. Mounted on unit plate complete ready for fitting in position, including Garrard pick-up and tone-arm. Cash Price £10/0/0. Carriage Paid. Balance in 11 monthly payments of 18/6.

Send 18/6 only

ULTRA 1933 BLUE FOX

A.C. or D.C. Mains. Detector and Pentode Valves. Moving-Coil Speaker. Complete with Valves and Cabinet. Ready for use. Cash Price, Carriage Paid £10/10/0.

Delivered Carriage Paid on first payment of

15/9

Balance in 14 monthly payments of 15/9.

AERODYNE-SCREENED GRID 3. With Variable-Mu. Complete and ready to play with Valves, Batteries and Accumulator with Moving-Coil Speaker. Cash Price, Carriage Paid £9/9/0. Balance in 14 monthly payments of 14/3

Send 14/3 only

AERODYNE ALL-MAINS VARIABLE-MU S.G. 3. Complete and ready to play, with Moving-Coil Speaker. Cash Price, Carriage Paid £15/15/0. Balance in 17 monthly payments of 20/-.

Send 20/- only

PHILIPS TYPE 830A

4-VALVE RECEIVER. For A.C. Mains. Two Screened-Grid, Power-Grid Detector and Pentode. With Moving-Coil Speaker. Provision for Pick-up and External Speaker. Cash Price, Carriage Paid £16/16/0.

Delivered Carriage Paid on first payment of

21/6

Balance in 17 monthly payments of 21/6.

ULTRA 1933 TIGER

A.C. or D.C. Mains. S.G., S.G. Detector and Pentode. Moving-Coil Speaker. Complete with Mazda Valves. Ready for use. Cash Price, Carriage Paid £15/15/0.

Delivered Carriage Paid on first payment of

20/-

Balance in 17 monthly payments of 20/-.

LISSEN S.G. 3 PENTODE BATTERY SET. In Walnut Cabinet complete with Speaker, Valves and all necessary Batteries. Wavelength calibrated. Cash Price, Carriage Paid £8/17/6. Balance in 14 monthly payments of 13/4.

Send 13/4 only

TELSEN MACNAMARA

S.G., Detector and Pentode. Complete ready to play, with Moving-Coil Speaker. In Walnut Cabinet. Cash Price, Carriage Paid £15/15/0.

Delivered Carriage Paid on first payment of

20/-

Balance in 17 monthly payments of 20/-.

STRICT PRIVACY GUARANTEED — WE DEAL WITH YOU DIRECT

EVERYTHING RADIO

SKY HAWK *Described in 'Popular Wireless' Nov. 12th.*
KIT "A"
 Author's Kit of specified components including **ready drilled ply panel** but less valves and cabinet.
 Or 6 monthly payments of 7/- Carriage Paid.
 Specified Valves £1/12/3.

CASH or C.O.D. Carriage Paid.
39/9

IMMEDIATE DELIVERY
CASH - C.O.D. - H.P.

BAND-PACK As described this week.

THESE ARE THE PARTS THE AUTHOR USED

- | | £ | s. | d. |
|--|----|----|-----|
| 1 PETO-SCOTT Panel, 14 in. x 7 in. ready drilled | 4 | 6 | |
| 1 Baseboard, 14 in. x 10 in. | 1 | 6 | |
| 1 TELSEN differential reaction condenser, .0003-mfd., type W.185 | 2 | 6 | |
| 1 LISSEN 1-mfd. fixed condenser, type L.N.133 | 2 | 6 | |
| 1 T.C.C. fixed condenser, .0002-mfd., type 34 | 1 | 6 | |
| 1 LISSEN .0003-mfd. fixed condenser, type L.M.11 | | 6 | |
| 1 DUBILIER .0002-mfd. fixed condenser, type 665 | | 6 | |
| 1 DUBILIER .02-mfd. fixed condenser, type 9200 | 2 | 0 | |
| 1 WATMEL wire-wound potentiometer, 50,000 ohms | 5 | 6 | |
| 1 GRAHAM FARISH 2-megohm resistance | 1 | 6 | |
| 1 DUBILIER 1-watt-type 5,000-ohm resistance | 1 | 0 | |
| 1 FORMO 3-gang combined condensers and coil assembly | 2 | 6 | 6 |
| 1 LEWCOS super-type H.F. choke | 6 | 0 | |
| 1 LISSEN H.F. choke, type L.N.5092 | 2 | 0 | |
| 1 TELSEN 3-point on-off shorting switch, type W.208 | 1 | 3 | |
| 3 LISSEN valve holders, type L.M.5069 | 1 | 1 | 1/2 |
| 1 IGRANIC Elfantype L.F. transformer | 10 | 6 | |
| 1 BULGIN single fuseholder, type F.5 | | 6 | |
| 2 PETO-SCOTT terminal strips, ready drilled, 2 in. x 1 1/2 in. | | 6 | |
| 6 BELLING-LEE marked wander plugs | 1 | 0 | |
| 4 BELLING-LEE terminals | 10 | | |
| 2 BELLING-LEE spade tags | | 4 | |
| 4 Yards Systolex and 2 oz. of 18-gauge tinned copper wire, screws, flex wire for battery leads, etc. | 2 | 0 | |
| 1 BELLING & LEE 60 m/a fuse | | 6 | |

KIT "A." CASH OR C.O.D. £4 16 6

KIT "A" CASH or C.O.D. Carriage Paid.

Author's Kit of specified parts including **ready drilled panel** and terminal mounts, but less valves and cabinet.

£4-16-6

or 12 monthly payments of 8/9.

KIT "B"

As Kit "A" but with valves, less cabinet, CASH or C.O.D. Carriage Paid **£6-8-9** or 12 monthly payments of 11/9.

KIT "C"

As Kit "A" but with valves and cabinet, CASH or C.O.D. Carriage Paid **£7-3-9** or 12 monthly payments of 13/3.

3 Specified Valves £1-12-3. Cabinet 15/-

PILOT STRUCTAKIT

Comprises: RED TRIANGLE Ready Drilled Ebonite Panel, 14" x 7"; 2 RED TRIANGLE Ready Drilled Ebonite Terminal Strips, 2" x 1 1/2"; Non-Warping Laminated Baseboard, 14" x 10"; Insulated Connecting Wire, Fixing Screws and Flex, etc. **8/-**

APEX *Described in 'Popular Wireless' Oct. 1st.*
KIT "A"
 Author's Kit of specified components including **ready drilled panel** and terminal mounts, but less valves and cabinet.
 Or 12 monthly payments of 7/3. Carriage Paid.
 One Set of Valves £1/12/3. Cabinet 15/-.

CASH or C.O.D. Carriage Paid.
79/-

APEX WITH EXTENSER CONTROL *Described in 'Popular Wireless.'*
KIT "A"
 Author's Kit of specified parts including **ready drilled panel** and terminal mounts, but less valves and cabinet.
 Or 12 monthly payments of 8/4. Carriage Paid.
 3 Specified Valves £1/12/3. Cabinet 15/-.


CASH or C.O.D. Carriage Paid.
90/6

PILOT BAND-PASS UNIT
 Whether your set is Mains or Battery operated, the **PILOT BAND-PASS UNIT** cuts out programme interference effectively and sharpens tuning to needle-point selectivity. It is simple to attach and can be operated by anyone without technical knowledge. No valves or extras required.
 Instantly converts any Set to Band-pass Tuning with Needle-sharp Selectivity.



CASH or C.O.D. **25/-** or 6 monthly payments of 4/6.

1933 KELSEY SHORT-WAVE ADAPTOR
 Tune-in the Short-Wave *Tunes in the World's Stations on your present Short-Wave Stations on your Existing Set.*
 Plug the Kelsey Short-wave Adaptor—fits without any alteration. No extra valve required; no extra apparatus. Ready for immediate use and sold complete with Dial Calibration Chart and simple tuning notes. "How To Hear The Short-Wave Stations." Specially compiled by an expert.
 CASH or C.O.D. **45/-** Or 9 monthly payments of 5/6.



"HOW TO BUILD 4 SHORT-WAVE SETS"
 Edited and written by Mr. G. T. KELSEY the famous Short-Wave Expert of "Popular Wireless." The only book exclusively devoted to Short Waves. Describes 4 efficient sets with full working instructions and operating notes. 48 pages and 4-colour cover. Sold in thousands at Olympia. Obtainable from all Bookstalls and Shops, W. H. Smith & Sons or direct.

1/-

PILOT AUTHOR KITS—Exact to Specification

S.T.400 CONVERSION KIT

Convert your S.T.300 to the NEW S.T.400 with the Author's Components. Kit includes Colvern Aerial Coil (Type S.T.400); Polar .0003 Differential; Lotus .00035 Differential; 2 Telsen Pre-set Condensers; 1 Benjamin Valve Holder; 1 Goltone Condenser, .0003; 1 .006 Graham Farish Condenser; 1 Dubilier .006 Condenser; 2 Igranic 2-mfd. Condensers; 2 Igranic Spaghetti Resistances (1500, 50,000); 1 Lewcos 60,000 Spaghetti Resistances; 1 Bulgin Toggle Switch; 1 Belling-Lee Anode Connector, 1 Terminal and 1 Twin Tap Plug. Wire, flex, screws. With copy "Wireless Constructor."

STOP PRESS NEWS

CASH or C.O.D.

31/-

2/- ALLOWED ON OLD COLVERN S.T.300 AERIAL COIL

PETO-SCOTT CO. LTD. 77, CITY ROAD, LONDON, E.C.1

Telephone: Clerkenuell 9406-7

West End Showrooms: 62 High Holborn, London, W.C.1 Telephone: Holborn 3248

Dear Sirs, Please send me CASH/C.O.D./H.P.

for which I enclose £.....s.....d. CASH/H.P. Deposit. Also send your FREE 1933 Radio Catalogue.

NAME

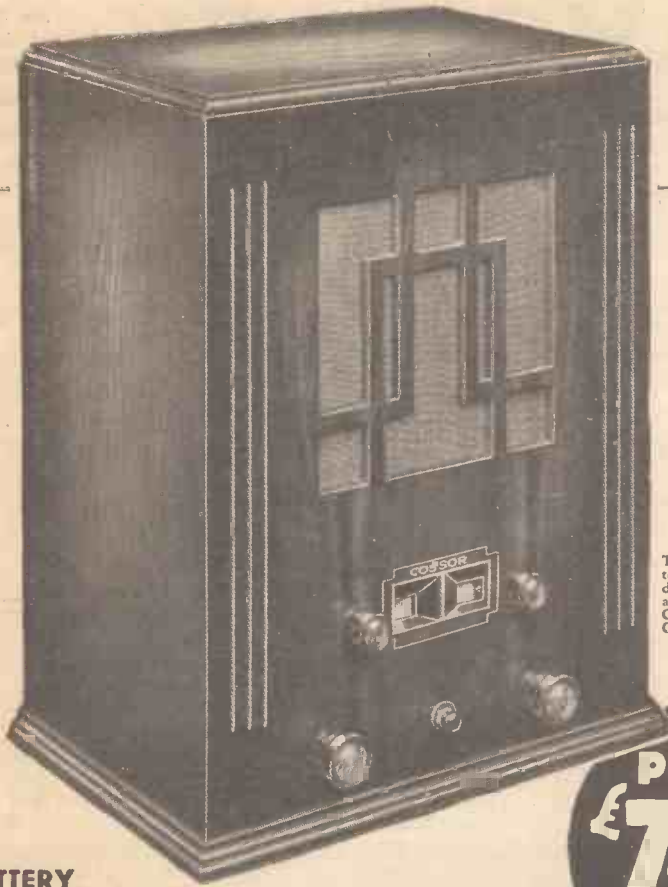
ADDRESS

P.W. 3/12/32.

ANY ITEM SUPPLIED SEPARATELY—ORDERS OVER 10/- SENT C.O.D. CARRIAGE AND POST CHARGES PAID

"Selectivity is of a high order..

Volume is enormous..
Quality is excellent.."



writes Yorkshire user

YORKS.
21/9/32.

Dear Sirs,

..... I feel bound to send you a note of appreciation.

Selectivity is of a high order, comparing very well with a well-known set using a band-pass input filter and costing 20 gns.

Volume is enormous, I have to use the volume control for fear of making myself unpopular with neighbours.

Quality is excellent, as would be expected.

My aerial consists of 25 feet of wire round the picture rail. The number of stations I get would take much room to list.

I consider it to be the best set for the price—
Yours truly,
Signed.....

The originals of the testimonials here reproduced may be inspected at our Head Office, Coszor House, Highbury Grove, London, N.5.

EVERY day we receive letters like the above. Other users write... "logged 49 stations"... "tone excellent—38 stations"... "not heard any Set so pure"... etc. etc. — overwhelming evidence of the efficiency of this remarkable Receiver. Equipped with Coszor Variable-Mu Valve — individually shielded coils — graded volume control — every up-to-date feature of design—the Coszor Melody Maker is undoubtedly to-day's greatest value in Screened Grid Radio. Send at once for full details—use the coupon.

PRICE
£7.17.6

BATTERY

MODEL 335 with Self-Contained Loud Speaker

Kit of Parts includes Coszor 220 V.S.G. Variable-Mu Metallised Screened Grid, Coszor 210 H.L. Metallised Detector and Coszor 220 P. Output Valves; Individually Shielded Coils, Coszor L.F. Transformer; All-Metal Chassis and all parts for assembling the Receiver as illustrated; handsomely finished cabinet 18½ in. high, 13½ in. wide, 10½ in. deep and 10 in. Balanced-Armature Loud Speaker with rear adjustment. Provision is made for fitting Gramophone Pick-up Socket and Plug. **Price £7.17.6**

Hire Purchase Terms: 17/6 deposit and 9 monthly payments of 17/6

ALL-ELECTRIC MODEL 337

with Self-Contained Loud Speaker

Kit of Parts includes Coszor M.V.S.G. Variable-Mu Metallised Screened Grid, Coszor 41 M.H. Metallised Detector, Coszor 41 M.P. Output and Coszor 442 B.U. Rectifier Valves; Individually-Shielded Coils; Coszor L.F. Transformer; All-Metal Chassis; Coszor Mains Transformer and all parts necessary for assembly. Handsomely finished cabinet 18½ in. x 17½ in. x 10½ in., Balanced-Armature Loud Speaker with rear adjustment. Provision for fitting Gramophone Pick-up Plug and Jack. **Price £11.15.0**

All-Electric Models for A.C. Mains only, 200 to 250 volts (adjustable), 40-100 cycles.

Hire Purchase Terms: 25/- deposit and 11 monthly payments of 21/-

BATTERY MODEL 334

Kit of Parts, similar to Battery Model 335 except that no loud speaker is supplied. Handsomely finished cabinet 9½ in. high, 13½ in. wide, 10½ in. deep. **Price £6.7.6**

Hire Purchase Terms: 14/- deposit and 9 monthly payments of 14/-

ALL-ELECTRIC MODEL 336

Kit of Parts, similar to All-Electric Model 337 except that no loud speaker is supplied. Handsomely finished cabinet 10½ in. high, 17½ in. wide and 10½ in. deep. **Price £9.15.0**

Hire Purchase Terms: 19/6 deposit and 10 monthly payments of 19/6

COSSOR MELODY MAKER

ALL-ELECTRIC MODEL 338

Kit of Parts for building Coszor All-Electric Melody Maker Model 338 Chassis. Specification identical with Model 336 except that no cabinet is supplied. Kit includes escutcheon and template for drilling your own cabinet. **Price £8.15.0**

Hire Purchase Terms: 32/6 deposit and 8 monthly payments of 20/-

Prices do not apply in I.F.S.

A. C. COSSOR LTD., Highbury Grove, London, N.5. Depots at Birmingham, Bristol, Glasgow, Leeds, Liverpool, Manchester, Newcastle, Sheffield, Belfast and Dublin.

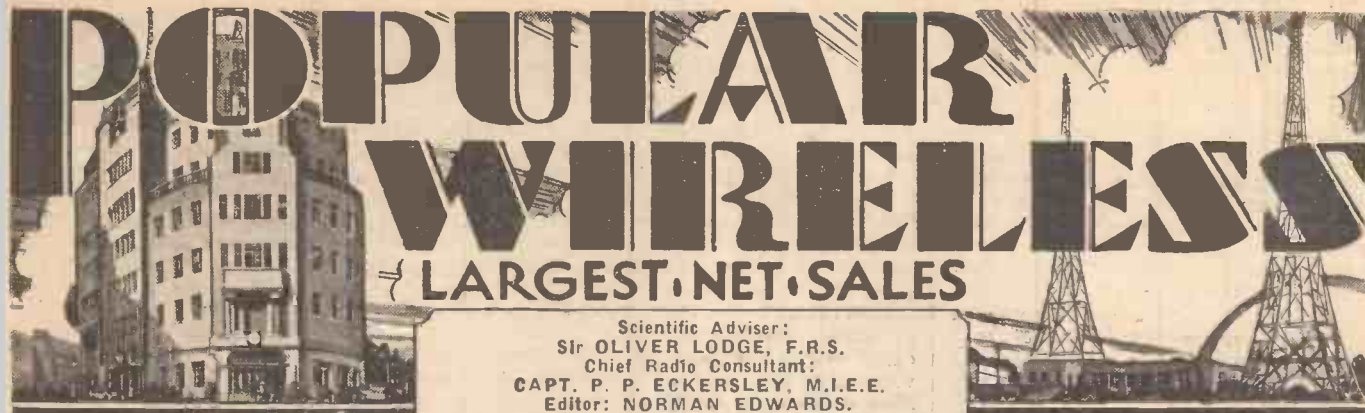
To A. C. COSSOR LTD.,
Melody Dept., Highbury Grove,
London, N.5.

Please send me free of charge a full size Constructional Chart, which tells me how to build the Coszor ^{*Battery} ^{*All-Electric} Melody Maker.
(* Strike out type not required.)

Name.....
Address.....
P.W. 3/12/32.

My usual
Retailer is.....
Address.....

**COUPON BRINGS
YOU FULL-SIZE
CONSTRUCTIONAL CHART**



Scientific Adviser:
 Sir OLIVER LODGE, F.R.S.
 Chief Radio Consultant:
 CAPT. P. P. ECKERSLEY, M.I.E.E.
 Editor: NORMAN EDWARDS.
 Technical Editor: G. V. DOWDING, Associate I.E.E.

**A BAD SHOT
 GRAMOPHONE STORIES
 COLD LAMPS
 NAVIGATION AND RADIO**

RADIO NOTES & NEWS

**ADOLPHUS AND THE
 SCOTS
 A BILL-TOPPER
 CHRISTMAS AGAIN
 HOW IT BEGAN**

Short Waves.

JUST as the future of radio seems to be with the short waves, so the minds of radio amateurs are more and more tending towards them. Already there is a great body of amateurs who long ago forsook the mediocre paths of short distance reception, but the cult is spreading like wildfire amongst beginners.

A lad of fourteen, known to me, who is going away to school, asked to be given, not a handsome portable, but a single-valve set and pair of telephones! The young blighter knew what is what.

Three "Outers."

MY esteemed correspondent, C. S. P. (Shortlands, Kent), scores what Bisley would term three "outers"—or, in fact, just plain "misses"—by alleging that I am one of three differently-named gentlemen, each of which resides near him. Sorry! Not so. Just "Ariel!"

Much as he tempted me I must repeat that I am bound to remain behind the veil. We must agree to love at a distance. I like his diagram of his latest transmitter and am recommending it to Rugby! And as to early "ham" radio, I will tell him and the world more about that shortly. It's a promise.

New Gramophone Trick.

THE Italian Minister of Communications has uncovered what I think must be quite a new thing in the annals of gramophony. It would appear that from time to time gramophone records are sent through the post at "sample" rate, although they bear reproductions of verbal messages from the senders to the addressees.

Henceforward, any zealous correspondent who wishes to "add weight" to his epistle by enshrining it in his own voice, must pay the ordinary letter rate.

Re-creating Voices of Past.

IT is said that in ten years Caruso earned over £600,000 in royalties on the gramophone records which he made. He is now gone, and the records are old and produced by an old process.

By a very clever method, almost akin to face-building as practised by surgeons on war-stricken victims, the Gramophone Company has re-created this glorious voice on new records.

OUR CHRISTMAS NUMBER

can be your Christmas number for the usual threepence next Wednesday morning!

From the specially designed cover in bright colours, right through to the last page, the Christmas "P.W." will be packed with topical articles of radio interest.

Sir John Reith, Sir Ambrose Fleming, Captain P. P. Eckersley—these are but a few of the famous people who write for you in POPULAR WIRELESS

NEXT WEEK

Wednesday. Usual Prices 3d.

Grafting Voice on Orchestra.

PROBABLY you will like to know more of this undoubted marvel. An original Caruso disc is reproduced with a pick-up, combined with filters and boosters to correct deficiencies. The resulting record is then played over to the accompaniment of a full orchestra, the whole being re-recorded.

The process is to be used for re-creating the voices of Patti, Melba and other great singers who recorded when the art was not so advanced as it is now.

"Better Radio."

THIS is the title of a regular monthly feature which is "starring" in "Modern Wireless" much to the embarrassment of those who look after that magazine's "make up" because of the insistent demands of the public for its enlargement.

Composed mainly of practical hints and tips, and fully illustrated by most attractive little photographs, diagrams and sketches, this Section has something to offer the constructor, the listener, the "grammy" enthusiast, in fact, everyone except the chap who knows everything. I may say that reading "Better Radio" is a habit which is acquired after the reader has seen one month's selection.

If you don't know it, try it, and you will thank me for drawing your attention to it.

Contribution to Science.

MR. E. B. MYERS, one of De Forest's early assistants, has invented a lamp which can produce 1,000,000 candle power; he did it for the sake of television.

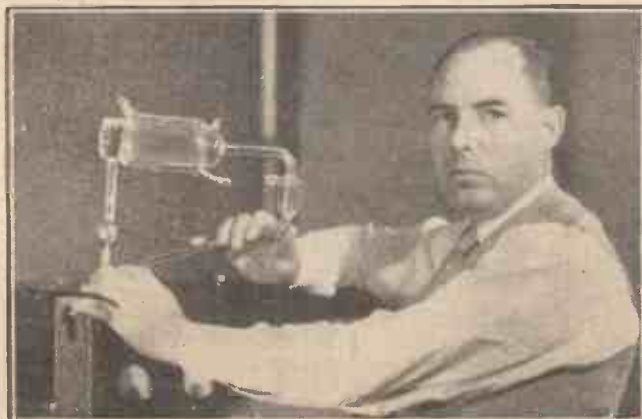
Limitations of space will not allow me to describe this marvel of "cold" light production, though I may say that the basic factor in its operation is the disassociation of the mercury atom in a bulb energised by high-frequency currents flowing round it in a coil of copper tubing. The light is so "cold" that the tube can be held in the hand.

Direction-Finding Wins Out.

SO valuable has wireless direction-finding proved to navigators that the art has at last won the fullest recognition. Under the new Statutory Wireless Telegraphy Rules of the Board of Trade, which come into force on January 1st, 1933, all passenger ships of 5,000 tons gross tonnage and upwards must be fitted with D.F. apparatus before January 1st, 1935.

(Continued on next page.)

TOWARDS TRUER TELEVISION?



Did YOU enter for the "P.W." Television Competition, full details of which were given in our last number? There is still time to send your 50-word postcard and win a television viewer for nothing! And you will then be specially interested in Elman B. Myers, in the shirtsleeves above, who recently introduced the "cold light" lamp shown, which he claims is just what true television needs!

NEWS—VIEWS—AND INTERVIEWS (continued)

Weather Maps by Radio.

ANOTHER device which I have no doubt will be fitted on most ships during our lifetimes is the facsimile weather map receiver. The results of many weather reports are co-ordinated on a single map which is then transmitted by what is commonly called "picture telegraphy" to ships at sea, which transcribe the radio signals into a visible image on paper. A commonly-used size of map measures 8½ in. by 11½ in.

Thanks, Brum!

COMING into the office with that Monday feeling, I face a pile of letters; letters in pink envelopes and written with violet ink; letters on bill-heads and posh,



embossed note-paper, from all sorts and conditions of readers. The first opened points out a misplaced comma. He's right. I knew better, but wanted to be quite clear. The next queries a wavelength and the next hauls me up hill and down dale for objecting to the G.M.T. "pips." Then comes one from W. J. F. (Birmingham), which pours balm upon the Monday feeling. He likes us, in spite of all-comers, and says so. Well, we journalists are not exactly little girls, to go dizzy when complimented, but an occasional word of appreciation helps us to go on counting "the game" more than the "prize." Dowding, Rogers, Bird, Johnson-Randall and self thank you. And Ole Man Editor jest smiles.

Footnote to History.

THIS year Sweden celebrated the tercentenary of the death of its great warrior-king, Gustavas Adolphus, and a detachment of the Royal Scots had the honour of taking part. Why? Because Scots fought with Adolphus and acquitted themselves so well that he used to refer to them as his right arm.

On December 6th Scottish listeners will hear Mr. George Malcolm Thomson talking on "Scotland and the Snow King," when the exploits of their ancestors under Adolphus will, I doubt not, send them flying to the pipes!

Fishermen's Night.

WELL, of all the—Hem! I understand that anglers—and you know what they are!—met together at the Peacock Inn, Newhaven, recently to sing their songs and utter their



traditional falsehoods. The queer thing about this is, however, that so far as my information goes, the proceedings were broadcast to Scottish listeners only. Did stirring tales of free bait, borrowed boats, and stolen hooks make this item a bill-topper for Caledonia?

The Prince's Evening.

I SHALL get a wiggling from at least three colleagues for this par., which is, strictly speaking "not my pigeon." Strange as it may seem I have not been listening to broadcasting very much lately. But I made a point of being free to listen to the special vaudeville on November 15th, when the Prince of Wales spoke.

Henry Hall, Jack Payne has got you beat, I'm afraid. Miss Casalis and Miss Desmond, clever as you both are, please show some versatility, especially Miss Desmond. I have no time for Georges Sevinsky; he sounds like a Russian Maurice Chevalier!

The Newalls, Marion Harris and the Hulberts failed, I thought, to hit the highest spots of which they are capable.

SHORT WAVES.

A tabby cat which entered one of the B.B.C. studios recently was captured after a search lasting thirty-six hours, and it is now thought that it was anxious to find out why mice were not included in the Fat Stock Prices.—"Punch."

"Women," we are told, "are again going in for ear-piercing." So we have heard from the loudspeaker in the flat above.

According to an authority, the B.B.C. can produce the best broadcast programmes in the world.

Then, why doesn't it?

Wife: "And another thing; just because the wireless announcers address you as 'Hello, Everybody,' you needn't think you are!"—"Answers."

RESOURCE.

Said the doc. to the nurse: "Oh, dear, dear! There's no chloroform left, that is clear.

Switch on to the local
And I've no doubt folk'll
Go under with 'ether' so queer!"

"The Atwater-Kent factory produced sets at the rate of 8,000 every five SECONDS," we read in the "Melbourne Listener."
This must be what they call Production Plus.

"In her grandiloquent drawing-room Lady Darley sat."—Extract from novel.
The loudspeaker again.—"Punch."

Another Tenth Birthday.

SWEDEN'S radio broadcasting service ought to celebrate its tenth birthday about this time, and a very good and popular service it is. The increase in Swedish listeners during that period is not so sensational as that of the British, but is nevertheless remarkable; the licence holders in Sweden has risen from 5,000 to 600,000, whilst those here have risen from 18,000 to more than 5,000,000.

Haver and Lee.

I DON'T know about you, but on the all-too-rare occasions that these two toughs are billed by the B.B.C. I cancel all my engagements and snuggle down into my pipe and slippers by the fireside. Did you ever hear how they came to co-operate? Well, Haver was one day out swimming—and he is a good swimmer—when Lee arrived on the watery scene and began to drag him ashore.

Haver asked Lee what he was up to. "I'm saving your life," replied Lee. "But I'm not drowning," quo' Haver. "I can't help that. I want a medal," said Lee. "This bloke has brains," thought

Haver. Hence the duet, and the "round hole in a square peg."

Huge Demand for Coco Cola.

A CINCINNATI Coco Cola firm broadcast that listeners who would telephone to them within an hour would receive a few free bottles of the stuff. No less than 25,000 people tried for free drinks (if you can call IT a drink!), tied the telephone exchanges into knots and only succeeded in getting through to the extent of something under 1 per cent. Say, what is there in Coco Cola, anyway? In view of the distinct possibility of the U.S.A. going dampish no doubt the 25,000 were merely seeking souvenirs of Prohibition as heirlooms and museum pieces.



Mars Yet Again.

BLUSHINGLY and apologetically I beg to report that according to a newspaper which has a considerable interest in Lord Beaverbrook, there is to be an attempt to annoy Mars with Morse signals transmitted by a beam of light from the top of the Jungfrau, Switzerland.

Why it is hoped that Mars will understand all this I cannot conceive. Bless my soul, the living (things on Mars (if any) may be unicellular organisms, unable to see, or superior beings unable to think on so low a plane as the race that produced Morse. For goodness' sake, let's keep to our own planet!

"Go Farther and Fare Worse?"

I SEE now why the English are slow to change. We are on the horns of a pretty dilemma, for on one hand we hear rumours that the B.B.C. is to be made a branch of the Civil Service, with entrance examinations, quill pens, pensions and more scarlet tape than ever, and on the other hand here is this agitation for Americanising the ether by making it the battleground of salesmen.

No! Let's stay as we are! Half the world is already coming round to our way of broadcasting.

Do They Need It?

THE announcement that in Leeds a 'bus has been fitted with a microphone and a loudspeaker, as an experiment, for advising travellers of the approach of

stopping places on dark nights, seems to argue that the Leeds 'bus-conductors are less stentorian than those of London, though I believe that to be a libel. 'Bus-conductors are a race set apart and specially gifted with voices which will penetrate anything made of ordinary molecules. To give them a mike and a speaker is like trying to induce Niagara to fall over a bit quicker!



ARIEL.

OUR NEW SET TESTING SYSTEM

BY

G. V. Dowling,
ASSOCIATE I.E.E.

A description of the apparatus used to ensure that all "P.W." Sets achieve the highest possible standards of efficiency. You are shown how they are checked for selectivity, sensitivity and quality by precise meter measurements.



HOW would you, the home constructor or listener, gauge the efficiency of a wireless set? I think I can answer this question for you. You'd hook it up on your aerial and see how many stations it could tune in and what degree of programme separation it appeared to give.

That would be a practical test for what you could get out of the set in certain conditions on the particular evening of the test; but another listener, testing the same set during another evening, might, and probably would, get very different results.

Too Many Variables.

Such tests have little or no scientific value. There are too many variable, unknown, and uncontrollable factors. Let me enumerate a few: (1) The listener's skill in operating the receiver; (2) the local conditions; (3) ether conditions at the time of the test; (4) the individual characteristics of the aerial and earth used; (5) the state of the batteries; (6) the condition of the valves; (7) the listener's hearing and his state of mind.

Number seven is most important. "State of mind?" I can hear you saying. "What has that got to do with it?" A great deal, I can assure you. I know from bitter experience.

One's imagination can lend wonderful colouring to the performance of a set, or, on the other hand, it can rob it of a great deal.

When I try out on an aerial a new set embodying novel features which appeal to me, I, like everybody else, am optimistically receptive, especially if the set is of my own design.

To Err is Human.

I am subconsciously prepared to enthuse over its good qualities and gloss over its bad qualities. An ordinary sensitivity will tend to appeal to me as colossal power and average selectivity as unique.

Were it somebody else's set, I might be more critical. Such is human nature!

But it is at least eight years since we relied only upon human nature in testing "P.W." sets. Such remarks as "it sounds good" or "it tunes in fifty stations" do not constitute sound technical judgment even when uttered by a qualified engineer.

They are merely rather loose generalities which could be said of almost any set by anybody.

Which reminds me of a postcard I received from a "P.W." reader about seven years ago. I had said in an article "This receiver will receive at least forty stations."

Said my correspondent pointedly, "My crystal set will receive all the stations in the world . . . so long as it is taken near enough to them."

The fact is that mere station lists pasted on a set counted for little then and practically nothing now.

It is certainly interesting when a "P.W."

reader in, say Hull, reports the reception of sixty stations on a "P.W." two-valve set, or a Liverpool listener claims forty on a four-valver.

Instruments Replace Imagination.

Such items have news value; they indicate that certain sets are giving intense satisfaction to certain users. They should, however, be regarded more as testimonials of successful assembly rather than as proofs of performance standards.

Our central aim in designing "P.W." receivers is to produce instruments giving results equal to or better than the best sets

in existence of similar fundamentals, circuit formations, but having exceptional operating or economy attractions—or both.

And we test for sensitivity, selectivity and quality with scientific measuring instruments, not with our ears and imagination.

As I have said, we have been doing this for a long while now, and I believe we are unique in radio journalism in this respect.

But quite recently, in pursuance of our determined policy of never standing too long on one spot, we have re-designed and rebuilt our set-testing gear.

Recent Innovation.

In addition to our 5-kw. Universal A.C. power plant, we have installed a second rotary converter for A.C. receivers, and we have erected an entirely new all-metal enclosure.

This last is a sound-proof cabinet completely metal lined. When the technician takes a set into it and shuts the door he knows for certain that he is cut off from all extraneous magnetic and electric influences. Even the illuminating light bulb is fed through special filters!

(Continued on next page.)

THE COPPER-LINED CABINET



Every "P.W." set is tested with instruments in this completely metal-lined and entirely sound-proof enclosure.

OUR NEW SET-TESTING SYSTEM

(Continued from previous page.)

There are devices with which he can regulate the admission of strictly controlled synthetic broadcasting of any strength, degree of modulation, and wavelength. This he feeds into the set and, with the aid of precise meters, he can exactly measure the energy at any point of the set up to and including the loudspeaker terminals.

Thus he obtains figures which record in black and white what amount of amplification the set is capable of giving.

A curve is plotted from certain variable condenser adjustments and frequencies that reveals the selectivity of the set.

More Examined than Passed.

Finally, the output of the set is examined for audio-frequency response, and the technician retires to prepare his report.

This procedure is adopted for all "P.W." sets whatever their types or sizes.

Mr. Rogers, Mr. Johnson Randall and myself decide in consultation whether or not the various sets have reached desired degrees of efficiency. And I don't mind admitting that many more models go into the cabinet than are passed out!

Of course, our tests don't end there. In addition, the sets are put through all the ordinary tests, but not until they have undergone the above-described scientific examination.

An Invitation.

They are put through their paces on ordinary aerials and critically examined for stability, etc. We fully appreciate the necessity of supplementing scientific tests by "practical" ones.

Indeed, we make a practice of trying out our new sets under home radio conditions in different areas.

Finally, each set has a certificate prepared for it, and this is signed by Mr. Johnson Randall and myself.

Now you will note one vital thing which runs as an underlying thread through our whole system. It is even more vital than the thoroughness of the actual testing!

It is that no set can "get through" on the authority of one man using his own judgment. It is often said that there must be a human element in every organisation. We do not agree.

There is no one human element in existence which is infallible, and so we have made sure that our "P.W." set-testing and

passing system is independent of the human element.

If a set fails to conform with certain clearly defined scientific standards, it stands no chance at all of reaching that stage of the proceedings where mere opinions are brought in.

I wonder if any reader of "P.W." would like to witness the whole series of tests from start to finish? That is, with the solitary exception of the home tests, of course.

Figures of Merit.

It takes an hour or two working quickly, but it is intensely interesting.

If those who would care to see the work done will drop me a line, I'll see if I can arrange visits at times convenient to them.

They will see sets scientifically tested for sensitivity, selectivity and quality of reproduction in the shielded cabinet and see the response curves actually being prepared.

And then they will have the opportunity of witnessing aerial tests in which we do not rely upon the ether alone to produce heterodyne whistles and jamming. We take certain parts of the various wave-bands and deliberately worsen the conditions by injecting synthetic interference.

CALIBRATED AND CONTROLLED TRANSMISSIONS



In addition to ordinary "aerial" tests, "P.W." sets undergo all-wavelength tests under strict laboratory conditions. Here you see the instrument which produces synthetic broadcasting of varying kinds.

We do this because we know that bad though the congestion of the European ether may now be, it is quite possible that it will grow very much worse in the future.

And "P.W." sets are now being designed to combat the unknown future as well as the muddled present.

For the benefit of my more technical readers I will add that we have fixed arbitrary L.F. output values, and that "figures of merit" are calculated from the relations between these and measured injections from our adjustable signal generator which pass

through an attenuation net-work. Average aerial loads can be computed and duplicated.

The "figures of merit" vary for different classes of sets, and are changed as and when advancements in component and circuit technique demand a general raising of performance minimums.

Readers may wonder why we do not publish the curves and figures given by our various sets under these strict test conditions.

I have often pondered over the question. But there are snags.

Only a trained engineer can interpret such things properly, and they can at times prove definitely misleading to the uninitiated.

For example, there might be and often are "paper" discrepancies between the performances of different receivers which are far less important than they would at first sight appear to be.

It takes a considerable amount of experience to visualise the actual results a set will give from its laboratory response curves.

Summarised Comparisons.

It is true we could always publish standard figures as criteria and briefly summarise the comparisons afforded.

But that is still not satisfactory, because it would be necessary to survey the whole problem every time lest large numbers of new readers jumped to wrong conclusions, because there was no explanation at length about circuit fundamentals, operating and cost factors, and so on.

So I consider on reflection no good purpose would be served unless we could devote two or three pages of repetition matter to every set, which is quite unthinkable.

Of course, the information is available to accredited representatives of the trade, and these are able to witness the actual tests almost any time they like. (In a rather more limited way the invitation is now extended to readers.)

In conclusion, I must say a few words about our new A.Z. System. It will be obvious that we are very well equipped to apply this in a thorough manner.

We can operate independently of fluid conditions such as aerial-earth variations and so ensure that our standard is cast-iron in its rigidity.

Every Electron.

We are determined to give "P.W." readers every electron of energy and every metre of wavelength that can be embraced by given groupings of radio apparatus.

And we shall spare no expense, time, or trouble in striving for this ideal.

There is a school of thought which seems to consider that sets for home constructors should be designed under kitchen-table conditions.

I consider that that is an insult to the home constructor.

He has a right to expect his set designs to be developed for him just as carefully as are the best of the commercial receivers.

Further, he ought to be re-assured that active research is pursued by creative technicians, so that the home-construction movement can give a lead to the radio industry, and not ingloriously tail along behind.

I cannot conclude better than by saying "Watch 'P.W.'". We shall shortly follow up these words with rather startling proof of our contentions.

Watch "P.W."

Short-Wave HOOK-UPS

A review of circuits for short-wave working, their derivation and application, by our short-wave expert. W. L. S. writes from unique first-hand experience.

Anyone with sufficient knowledge to analyse these things will at once recognise this as a series-fed circuit, by which we mean that the H.T. is fed to the anode in series with the anode coil (reaction coil). This has the advantage of making the H.F. choke relatively unimportant, which is not the case with parallel-fed circuits.

Now for some smaller details. The Fig. 2 circuit works best for short waves, in my opinion, with the following constants. Three pairs of coils should be used, and they can be conveniently arranged to cover wavebands of roughly 18-30, 30-50 and 50-100 metres. This can be done with a .0001 tuning condenser.

Coil Details.

My personal preference is for four-pin units comprising a grid coil and a reaction coil, but separate plug-in coils are quite effective. In any case, with a diameter of about 2½ in., the three grid coils for these bands will need roughly 3 turns, 8 turns and 15 turns. Their respective reaction coils should have something like 3 turns, 6 turns and 10 turns. The aerial coil should have about 6 turns and be provided with variable coupling.

The reaction coil, incidentally, should never have to be larger than the grid coil, and should generally be smaller. If the set won't oscillate with a small reaction coil, there is something wrong with it, and it's not the circuit.

Coupling between the coils should be as tight as possible. Always try to use a small reaction coil with very tight coupling rather than a large one half a yard away!

With these conditions a suitable size for the reaction condenser is .00025. The grid condenser may be .0001 or .0002—I don't like anything larger myself, from my own practical experience, irrespective of theory—and the grid leak should be the highest value one can use with good results.

In further articles in this short series I intend to deal with various other circuits, always with relation to their practical use, in such a way as to prove my statement that "the best circuit is the circuit you like best."

fixed and the condenser across the 'phones variable.

There, at once, you have your first practical arrangement of capacity-controlled reaction. Instead of waving two large coils about in mid-air, one can gently turn the spindle of a variable condenser, and even equip it with a slow-motion dial for fine adjustment. Improvement No. 1 has arrived.

Now imagine that this condenser is taken, instead of being just across the 'phones, from the "live" side of the 'phones straight down to earth. Fig. 2 shows this, and an H.F. choke has also been inserted between the condenser connection and the 'phones. The latter component is not an essential part of the

FROM SWINGING COIL TO CAPACITY CONTROL

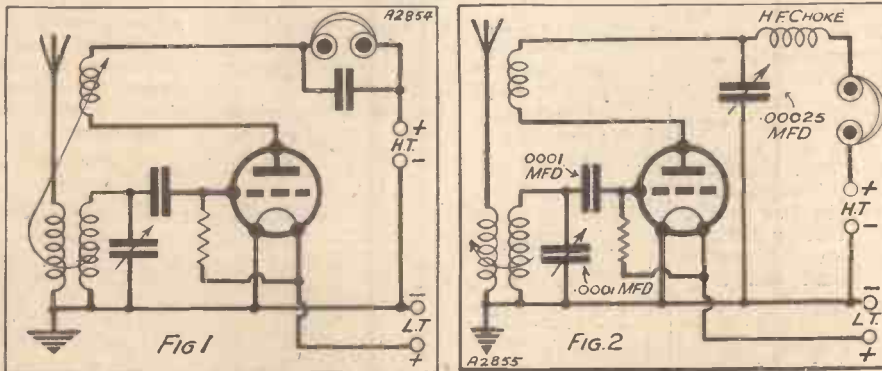


Fig. 1 shows a circuit with the "good old" swinging coil reaction, in which a fixed condenser is used across the 'phones. Fig. 2 is a derivation of this circuit, the by-pass condenser is now variable and differently connected to act as a reaction control.

circuit, but is generally used in case the headphones do happen to have a sufficiently high capacity to keep the set oscillating when the reaction condenser is set at zero.

The Smallest of Changes.

This, Fig. 2, is a thoroughly practical short-wave receiving circuit with which one can hardly go wrong, and it has been arrived at simply by making the smallest of changes to a well-known circuit arrangement that has been used ever since the three-electrode valve was invented!

PERHAPS the question that reaches me more frequently than any other from readers is "What is the best short-wave circuit?" If only there were a cut-and-dried answer to this question it would save the Query Department, the readers, and myself a deal of trouble. But there isn't.

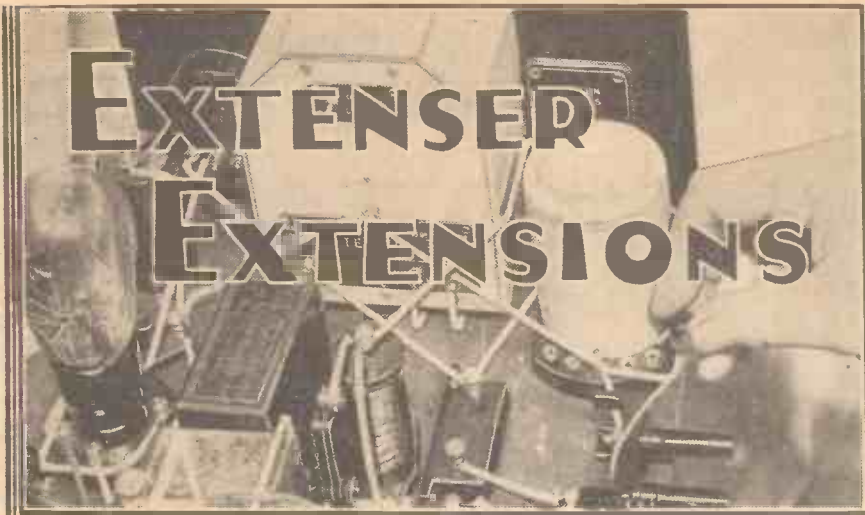
The nearest approach to a reply that I can think of is this: "The best circuit for you to use is the one that you find you can get on with best."

About the Detector.

We will commence by talking about detector circuits. There are not half so many different detector circuits as some people imagine. One cannot be very original with an ordinary oscillating detector, and yet one can draw its circuit and lay it out in several different ways. Fig. 1 shows the receiving circuit that we all start with. Ingredients: One detector valve, one grid coil, one reaction coil, tuning condenser, grid condenser and leak, and practically nothing else. Reaction is controlled by the "flopping-coil" method, which is much despised, and rightly so.

As a circuit, even for short-wave work, it is perfectly efficient and reasonable. The only trouble is that the operator needs to be very careful in his handling of the reaction control, and there is no excuse for using this primitive method when so many superior methods have been evolved.

Note that it is necessary, with this circuit, to use a fixed by-pass condenser across the headphones. Without this it probably could not be made to oscillate, although that would vary with the capacity of the particular headphones and cords in use. Now, imagine the reaction coil



IN the two short articles that have appeared recently in POPULAR WIRELESS on the Extenser method of wavelength control, it has been explained how this ingenious device acts and how it may be incorporated in the average tuning circuit.

We have seen how the switch contacts on the Extenser take the place of the wave-change switch controlling the normal tuning coil, and the simplicity of the method has been illustrated by diagrams.

Multi-band Tuning.

There are naturally extensions of the idea that can be utilised, and it is our object in this page to bring to your notice one of the most important of these. We refer to the use of the Extenser as a double waveband selector.

In certain instances it is desirable to construct a receiver that will cover not only the medium and long wavebands, but also the ultra short waves of some 20 to 50 metres. Also in connection with multi-band coils it may be desirable to cover continuous bands of wavelengths in some given order.

In such cases the Extenser is particularly useful. In the first case it can be so arranged that by the addition of a selector switch the Extenser can be used to tune, say, over a band of 20 to 50 metres and without stopping to cover the medium broadcast waves as well. Alternatively it can be used to cover the short waves in two bands, making tuning very easy, and by the use of the selector again it can continue to cover the broadcast medium and long waves as well.

Simplified Set Design.

Thus with only one switch action the Extenser can make it possible to cover four bands of wavelengths without what is normally called wave-switching.

The multi-band coil also makes use of this property of the Extenser, and by the use of an externally connected switch, placed in a convenient situation on the set, the Extenser will cover any four bands of wavelengths it is desired.

This makes it very much easier to handle a set of this nature than it would be with separate switching for each waveband and the Extenser has greatly simplified set design for that reason.

We mentioned last week the ganged Extenser. This is a particularly useful model, for with its six switch contacts it

Some timely notes on switchless wave-changing.

By a "P.W." TECHNICIAN.

enables a number of circuits to be controlled automatically with the tuning.

The famous "Cosmic" receiver is an example of three-band tuning with the Extenser employed to simplify the switching arrangements. The set is illustrated here, and it will be remembered that it covered the ultra short waves from about 20 to 50 metres, and then it took in the medium waveband and the long waves up to about 2,000 metres.

Special Type of Extenser.

The method of doing this was to make the Extenser responsible for the medium and the long-wave control while a separate switch transformed the receiver from a broadcast set to a short-waver. The Extenser undertook the tuning of all waves, and to facilitate the tuning on the very high frequencies a special type of Extenser was introduced by Ready Radio.

This had split fixed vanes, the vanes being assembled in two insulated groups. When the set was being used on the normal

wavelengths the two groups were connected together, and the capacity of the whole Extenser was .0005 mfd. On short waves, however, the vanes were separated and only one half of them was used.

This had the effect of halving the capacity of the Extenser, and thus with only .00025 mfd. the tuning of the ultra short waves was considerably easier.

Totally Screened.

Recently a further model of the Extenser has been placed on the market, to simplify the construction of sets with screened-grid stages where canned coils were employed. The Extenser is totally screened so that it can be incorporated in a receiver with the greatest of ease, and if used with a canned coil there is no need for the troublesome vertical inter-stage screen that used to be so common last season.

This screen is not necessary in a well-designed set using screened coils and Extensers, for there is very little likelihood of feed-back between the anode and grid circuits of the screened-grid stage, and consequently the sets are perfectly stable although no special screening is used.

This type of Extenser was used in the "Olympic" Four that was on show at the Radio Exhibition in August. It created a great deal of interest, and has proved itself one of the most useful of all the different models of this fascinating tuning device.

Notable Radio Development.

It is particularly compact for it has a special solid dielectric which enables the size to be greatly cut down.

Known as a Telexor, it is a development that will prove valuable for a long time to come, and if set builders wish to do away with the troublesome and quite unnecessary wave-change switch controls it is the ideal solution.

The Extenser is most fascinating to use, and is undoubtedly one of the most notable radio developments of recent times.

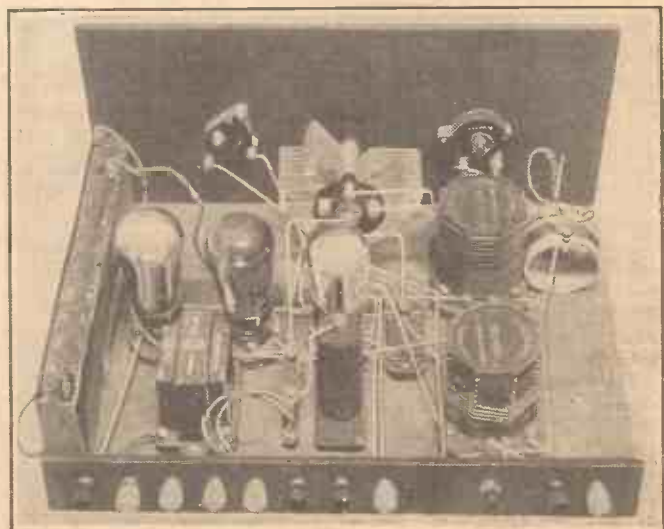
The outstanding feature of modern set design tendencies is the elimination of unnecessary panel controls. This is highly commendable, as an excessive number of knobs makes for confusion in handling the set.

The Extenser has done much to simplify set handling.

THREE-BAND EXTENSER TUNING

SIMPLIFIED WAVE-CHANGE IN PRACTICE

This famous "Cosmic" was controlled without a wave-change switch by the neat and effective Extenser.



LOUD-SPEAKER OPERATION

Some Final Hints on Practical Working Conditions.

By
A. JOHNSON-RANDALL.



WHAT sort of circuit gives the best results from the point of view of quality?

This is a debatable point, because it depends so much upon the response of the loudspeaker to different frequencies.

In practice the listener has to take the loudspeaker curve for granted. In any case, loudspeaker response is a difficult thing to measure accurately, and I personally plump for a set that gives me fairly even amplification of the musical notes ranging from, say, 50 or 60 to 5,000-6,000.

Under practical working conditions I realise that I do not quite achieve these results, because the tuning circuits of the receiver, plus reaction, are bound to lower the amplification of the higher notes.

Tone Compensation.

There is only one way of tackling this loss due to the H.F. tuning circuits, and that is by employing tone compensation, as I explained in my article in the issue of "P.W." dated November 5th.

It is the L.F. side which concerns us most at the moment. The detector I am neglecting, because I assume that it will be a leaky-grid type in the case of a battery set, or possibly a power grid if an all mains design.

The main point to remember is that for quality you should keep the value of the grid condenser as low as possible, and not use a grid leak higher than 1 megohm.

A grid condenser of .0001 mfd. and a leak of 1 megohm for a battery set, while for a mains set .0001 mfd. and .25 megohm



are good values.

On the L.F. side, the popular resistance-capacity coupling and transformer combination takes a lot of beating, but there are snags in this. For example, the anode resistance value should be kept low and not allowed to exceed 100,000 ohms.

A higher value than this, if used in a reaction circuit (for instance, in the plate circuit of the detector), is liable to make reaction control difficult, and a by no means unimportant factor is the loss of high notes.

Everything in a wireless set, with the exception of the loudspeaker in certain cases, tends to lower the high note response.

You have your tuned circuits, the reaction control, the detector valve and the R.C. stage, all of which do their best to see that a certain proportion of the high notes are not amplified so much as the remainder of the musical scale.

On the other hand, making sure of the bass in an amplifier is fairly easy these days, provided the R.C. coupling condenser is

not smaller than .01 mfd. and the L.F. transformer is a good one.

In a straight set it is inadvisable to use a higher ratio of transformation than 3½ or 4:1, but higher ratios are used in some cases; for example, for tone controls.

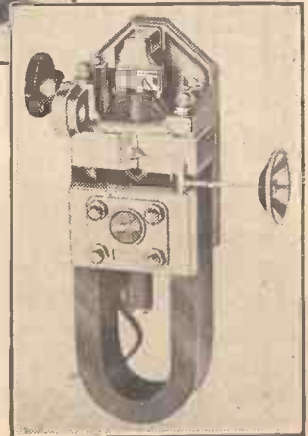
Those who find the reproduction "woofy," in spite of the fact that they have taken pains to choose suitable values and well-designed components, should remember that high selectivity may be the cause, and if the loudspeaker results sound unpleasing to the ear, then they should try one of the tone controls at present on the market.

Bias Importance.

In loudspeaker reproduction it always pays to use as much high tension as possible. It is surprising what a difference there is

between 100 and 120 volts, or between 120 and 150 volts.

Another important factor is that of grid bias. When you buy an output valve, or for that matter any L.F. valve, take particular note of what grid bias is recommended for the particular H.T. voltage you intend to apply to its anode.



Blue Spot's famous 66R is illustrated to the right, and adjoining it is a Celestion Cone Unit, type M. A feature of the Gecophone loudspeaker chassis (above) is the cone mounted by a special method of floating suspension with the unit inside it.



This permanent-magnet type of moving-coil loudspeaker is the popular Ferranti M1.

THE MIRROR OF THE B.B.C.

By O. H. M.

THE B.B.C. ESCAPES ECONOMY

BIRTHDAY LESSONS—SHORT-WAVE PROGRAMME DIFFICULTIES
—MORE "SONGS FROM THE SHOWS"—THE EMPIRE'S GREETINGS.

THE drastic recommendations of the Economy Group of young Conservatives, effecting or rather recommending measures which would result in saving many millions in public expenditure, left the B.B.C. alone, to the surprise of Parliamentary circles.

I understand that this was not accidental; that, in fact, strong pressure was exercised to get the Committee to call attention to B.B.C. finances on the lines of the May report of last year. In the end, however, the counter action taken by the B.B.C. killed the move. This being so, and relations between the B.B.C. and the Post Office having improved, it is now unlikely that the former will suffer any more raids for at least two years.

The practical result, of course, is that building development of new stations and offices can continue uninterrupted.

Apparent Mistake.

The public reactions to the special programmes of Birthday Week have taught the B.B.C. a good deal. For one thing, the obvious popularity of foreign relays, such as the special programme from Berlin, removes misgiving about the value of international broadcasting.

Another point was the apparent mistake from the B.B.C. point of view in omitting Dr. Adrian Boult from handling the main Symphony Concert of the week.

The distinguished guest conductor for whom Dr. Boult stood down did a fine performance, which was appreciated to its full value in musical circles. But the fact remains that the generality of listeners would have preferred Dr. Boult on this special occasion.

Secret—And Satisfactory.

Next week a distinguished company of the press and public officials will visit the new short-wave transmitting apparatus at Daventry.

Already secret tests have been satisfactory. The technical side seems to be developing rather better than according to plan.

Programme difficulties, however, have yet to be overcome. These are concerned chiefly with the demands of the Musicians' Union and the copyright owners. It seems that the B.B.C. will have to secure the written permission of everyone whose work is to be mechanically reproduced or even read by an announcer.

It follows that there will be complicated negotiation on the subject of fees because most programmes will be repeated four times in the twenty-four hours.

No Easy Selection.

John Watt is giving his next "Songs from the Shows" revue on Monday and Wednesday, December 5th and 7th, when the programme will be framed on the history of the London Pavilion. This famous theatre goes back to the Victorian

'fifties, before the building of Shaftesbury Avenue in 1886, when slums extended all the way from Regent Street to Drury Lane.

Vesta Tilley, Jenny Hill and Bessie Bellwood were some of the "stars" of the Pavilion, but Mr. C. B. Cochran has also contributed much to its fame, and it will not be easy for Mr. Watt to select his programme from the mass of good material available.

A Magnificent Show.

I understand that one of the most interesting items in the Christmas programmes will be the broadcasting of telephone greetings from different parts of the

"THAT WILL BE 10/-, PLEASE!"



Mr. Fox, who bought the five millionth radio licence only a few weeks ago, was on the crest of a wave of purchasers, and already licence figures have soared towards the sixth million, with no sign of slackening!

THE LISTENER'S NOTEBOOK

A rapid review of some recent radio programmes.

A FIRST-CLASS row has resulted from some outspoken comments by a famous French journalist following the production of Georges Ohnet's "Maitre de Forges." His relentless use of certain adjectives in some descriptive passages anent the group of actors and actresses—all very popular, by the way, with the French listening public—who were responsible for the production, has aroused widespread indignation.

Most of his criticism is uninteresting as far as we are concerned. We don't know the play he criticised, nor did we listen to it. But particular remarks of his, I take it, are applicable to all radio plays, and so are definitely not without interest.

He says: "Broadcast actors and actresses

Empire—Canada, Australia, New Zealand, Egypt, South Africa, and other places.

You will remember that a similar programme was arranged last Christmas, but at the last minute it was cancelled, to the disappointment of most people, although Gracie Fields nobly surrendered her own festive celebrations to come to the studio. Gracie put on a magnificent show, and then handed her fairly handsome fee to charity—which was still more handsome, and indicative of what we know to be her kindly nature.

I shall have more to say about this and other Christmas programmes at the appropriate time.

Success Assured.

Monday, December 12th, brings the next of the series of County Week programmes, several of which have already been broadcast to Midland Regional listeners. Lincolnshire is the next in the series, and the Week will be introduced in a talk by the Rt. Hon. the Earl of Yarborough, Lord Lieutenant of the County.

Lord Yarborough's talk will be followed by a Pageant written by Miss E. M. Town-

send, in which will be presented salient features of Lincolnshire history, including the founding of Grimsby, the building of Lincoln Cathedral, King John's unfortunate trip across the Wash, and the sailing of the Boston Pilgrims. The successful broadcast of the Pageant is assured, by its presentation by Mr. Charles Brewer.

Other features of the Week include an organ recital by Dr. Gordon Slater from Lincoln Cathedral, also on Monday, December 12th, when among the items will be the organist's own "Easter Allelujah."

must realise that wireless transmissions are not heard by a mixed assembly of people, as in a theatre packed from floor to ceiling, and, consequently, these transmissions should be devoid of all attempts at dramatic style.

"They are listened to by groups of never more than two or three persons. Therefore, wireless plays should be interpreted as if they were being read in the family circle, under the lamp, without declamation, but with intimacy and simplicity. Acted otherwise, they become ridiculous."

Actors Out of Touch.

The suggestion that listeners, even if they only number two or three in a group, feel out of touch with the actors, through being hemmed in within the narrow confines of their own four walls is fundamentally wrong. I would more readily believe the reverse.

In fact, I do believe that to be a fact. Actors do feel very much out of touch with their audiences, and their acting suffers in consequence.

(Continued on page 734.)



RECOMMENDED WRINKLES

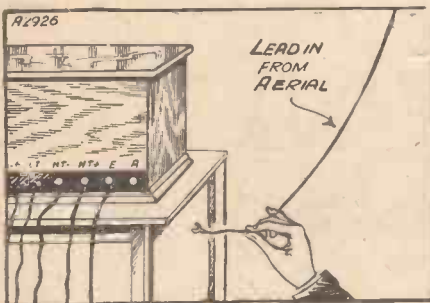
INSIDE OR OUT?—TUNING UPSET—UNSEASONED WOOD—COILS AS CHOKES—DRILLING A PANEL—
Etc., Etc., Etc.

TRACING INTERFERENCE

If you are troubled by crackles and cannot make up your mind whether these are due to something inside the set or to outside causes, take off the aerial and earth leads while the set is switched on and crackling.

The cessation of the trouble each time either lead is removed is definite proof that the interference is external, while the

IS IT THE AERIAL?



If noises stop when the lead-in is off, you can be sure they do not originate in the set.

absence of any alteration in the noises is equally definite proof that they are due to something in the set or batteries, and are not being introduced from outside.

HIGH-FREQUENCY FADING

A FAULT peculiar to some radio-gram or cabinet sets is that noticeable when receiving a distant station, the signal being unsteady or "wavy."

This may be due to high-frequency fading; but it should be remembered that the effect may actually arise from the sound waves set up by the loudspeaker in the cabinet vibrating the reaction condenser plates (or less probably the tuning condenser plates), or, again, slack leads.

When receiving weak signals the receiver is operated in its most sensitive condition, the reaction control often being advanced to the edge of oscillation.

Thus any slight movement may upset tuning momentarily, while a rapid succession of movements, as when the reaction condenser's plates vibrate, would result in "wavy" reception.

If you suspect this, it would be a good scheme to try the speaker away from the cabinet, or another speaker at the other side of the room, the original speaker being disconnected, of course.

CABINET WARPING

HAVING made what at first appears to be a very nice-looking cabinet, it is very annoying to find that it warps after a few weeks. Of course, this is due to the fact that wood is not properly seasoned (that is, the sap has not dried out completely).

Although it is impossible to prevent wood of this description from warping, you will find that by polishing both sides of the wood in the next cabinet you make, the trouble will be overcome to a very great extent.

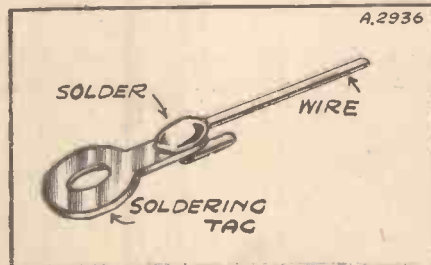
SOLDERED CONNECTIONS

WHEN making soldered joints it is sometimes difficult to hold the wire firmly on the soldering tag while the solder cools.

If the wire is passed through the hole in the tag and nipped over tightly quite a good joint is made by the pressure itself.

The addition of solder is then much easier and also the completed joint is much more secure.

TAG SECURITY



If the wire is passed through the hole in the tag and bent, as shown, it will hold securely.

USE FOR PLUG-IN COILS

THOSE constructors who have a number of plug-in coils on hand may not know that these coils can often be used satisfactorily as H.F. chokes.

For instance, a No. 25 coil can be employed in a short-wave set for wavelengths up to fifty metres or so, and a No. 250 serves quite well on the 200/250 waveband.

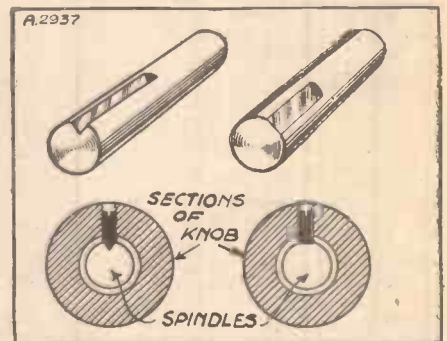
The only difficulty is on the long waves, where a very large coil is necessary, but this can be overcome by using the two biggest coils in series.

Remember this when you are trying your next experimental "hook-up."

FIXING KNOBS

IT is often found difficult to prevent the knob of a reaction condenser, volume control, or a similar device turning on its spindle.

SLOTS FOR SPINDLES



File a flat or a V, and your dial will never twist on the spindle.

However, this trouble can easily be prevented by filing a flat on the spindle and placing the knob so that the securing set-screw rests on the flat when screwed home.

To make the knob even more secure a V-shaped slot can be filed on the spindle, but this is rather more difficult although well worth while.

GUARDING YOUR GRID BIAS

SOMETIMES a grid-bias battery will suddenly go "dud" for no apparent reason at all. In such instances the internal insulation will have failed in some local area.

On applying a voltmeter test, you will find that only one or two of the cells are really

(Continued on next page.)

RECOMMENDED WRINKLES

(Continued from previous page.)

dead, the remainder being normal. The cure in such an instance—if “cure” it could be called—would be to bridge over the dead cells, and to use the battery at the resultant lower voltage.

Another point with regard to G.B. batteries is to make sure that the plugs fitting into them really fit snugly and neatly into their respective sockets. Wobbly plugs have been known to give rise to all sorts of mysterious grid-bias troubles, crackling and other extraneous noises in the reception often being traced to this fault.

If your G.B. leads are over-long and tend, by their weight, to pull the plugs out of their sockets, put an elastic band around the G.B. battery. The leads will then be held tightly in position close to the side of the battery.

In order that your G.B. battery may not become overworked, it is a good plan to

THE BARE BONES



Your grid-bias battery would look like this if you opened it up, but don't try it with a new one! Note the six component cells and the insulation between them.

label it with the date of its introduction into the set. Six months from that date you should be thinking of getting another battery to replace it.

It is bad practice to adjust the grid bias of your set when the H.T. is “on.”

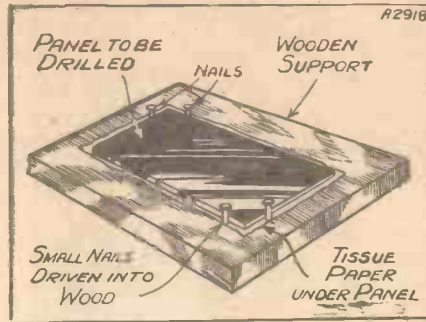
When using a G.B. supply on the H.F. side of your receiver you can sometimes get improved results by putting a small fixed condenser across the G.B. leads, a condenser of approximately .01-mfd. capacity being the most suitable. This condenser acts by short-circuiting any stray H.F. impulses which may tend to pass to the battery. The precaution, therefore, is advisable. I do not say it is essential, for in properly designed sets it should not be necessary.

HOLDING PANELS STILL

YOU need two hands to work a drill for boring the holes in ebonite panels, so you cannot hold the panel at the same time to prevent it twisting round as soon as the drill begins to come through the ebonite into the wood beneath.

But if you do not hold it still you cannot finish drilling; and, at the same time, the surface of the panel is almost sure to get scratched.

FIXED FAST



Nails in a heavy base will hold the panel rock-steady while you drill it.

Four small nails, driven in as indicated by the sketch, will hold the panel as firm as you like.

A RAINPROOF LEAD-IN

MY favourite wet-weather device for protecting the aerial lead-in consists of a porcelain tube having a right-angle bend at one end. This I purchased from the twopenny junk-box of a neighbouring radio dealer.

I slip this porcelain tube over the ordinary ebonite lead-in rod, securing it firmly in position by enlarging the hole in the woodwork so that the porcelain tube may be wedged tightly into it.

Then I pass the aerial down-lead through an ordinary egg insulator. At the other side of this insulator, I attach about 1 ft. or 18 in. of wire to which is secured at the other end a heavy weight (preferably a non-metallic one), which is so adjusted that it keeps the down-lead taut and enables the lead-in wire to enter the porcelain tube from underneath, thus keeping the rain out.

ACID-PROOF HYDROMETER HOLDER

PERHAPS the most messy operation connected with the maintenance of radio apparatus is testing accumulators with a hydrometer. The last few drops can rarely be expelled from the instrument, but usually remain inside, to be finally flicked on to the carpet or other valuable furnishings. The question of the storage of the instrument is also a difficulty, as cardboard boxes quickly perish with acid



ACID-PROOF HYDROMETER CONTAINER

action. It is a simple matter to construct an acid-proof container such as is illustrated in the accompanying sketch. With this holder at hand the hydrometer can be withdrawn from the accumulator vent and immediately inserted into the receptacle.

A suitable piece of wood is shaped up as shown, and the size determined by the hydrometer to be accommodated. A length of old bicycle inner-tube is cut somewhat longer than the hydrometer. One end may be sealed up with rubber solution, though this is not absolutely essential.

The tube is then fixed to the wood backing with three drawing-pins after having been turned back as suggested in the illustration. Two pins inserted at the opening complete the holder, which can be hung in any convenient position.

“SILVERING” BRASS SCREWS

IT is often necessary to provide screws which match the remaining ones in a receiver, particularly when you are “doing-up” an old set.

Often enough you may have to secure a panel in its frame, and you will find that you only possess brass screws suitable for the job, whereas, in order to match the remaining screws and components, “white” screws should be used.

This and all similar difficulties are easily overcome, however. All you need to do in

HOW IT IS DONE



Just a dab of solder, as explained, and you get a first-class silver effect.

order to “silver” any number of brass screws is to take each screw between a pair of pliers, dab the head of it into a little flux, and then to hold it for a second or two in the flame of a spirit lamp or non-luminous gas-jet. Then, when the screw-head is well heated, rub a stick of solder over it, and quickly wipe it away with a rag.

In this way, you will get a thin deposit of solder on each screw head, thus converting your brass screws into “silver” ones.

TROUBLE WITH VIBRATION

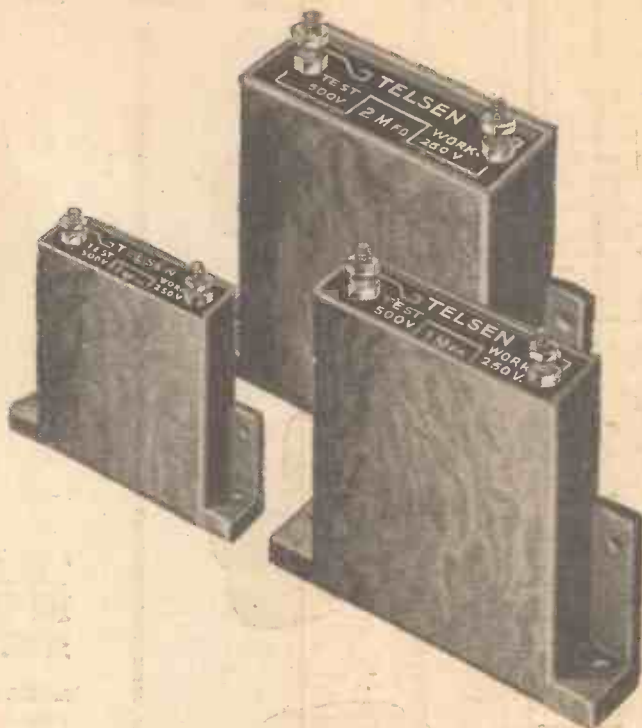
WHEN a loudspeaker and set are housed in a radiogram or similar cabinet, trouble is sometimes experienced due to microphone noises caused by sound waves from the speaker causing the set and valves to vibrate.

As a precaution the back of the cabinet should be covered only with a piece of silk, a solid wooden panel being avoided. It is also helpful to stand the receiver on a sheet of sponge or Sorbo rubber which assists in absorbing vibration.

TELSEN

SELF-SEALING CONDENSERS

DESIGNED in accordance with the principles formulated as a result of the most recent research, and manufactured by the most modern plant in the world from the finest materials it is possible to obtain, these Telsen Self-Sealing Condensers represent a very definite advance on current condenser practice, embodying numerous features of outstanding importance. Only the highest quality foil paper and the finest linen tissue are employed in the exclusive method of manufacture, each individual plate being self-sealing and the case itself being finally triple-sealed with a newly discovered bitumastic compound, for permanent efficiency. Every condenser is subjected to rigorous tests up to Post Office and Admiralty standards, the exclusive method of construction making them genuinely non-inductive. It is only because of this unique combination of research, plant, materials, method of manufacture and rigorous testing that Telsen Self-Sealing Condensers give such high insulation with such freedom from breakdown — such lasting efficiency under all conditions of use.



TELSEN SELF-SEALING BAKELITE CONDENSERS

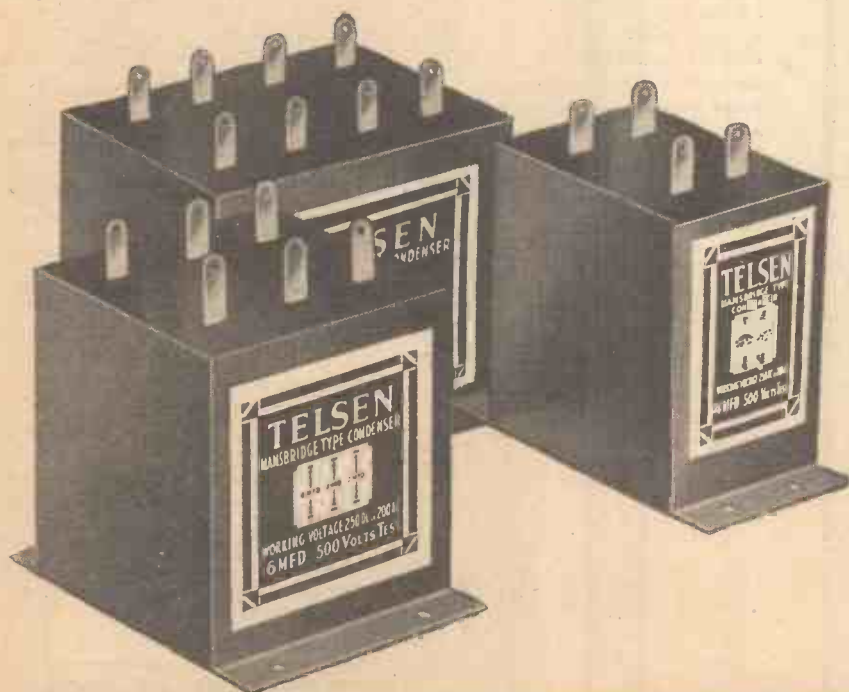
In attractive moulded bakelite cases, specially designed for 2-way fixing...

Cap. Mfd.	500 Volt Test	1000 Volt Test
.01	1/6	2/6
.04	1/9	2/9
.1	1/9	2/9
.25	2/-	3/-
.5	2/3	3/3
1	2/3	3/6
2	3/-	5/-

TELSEN SELF-SEALING BLOCK CONDENSERS

In metal cases with soldering tags...

Cap. Mfd.	500 Volt Test	1000 Volt Test
4	5/6	9/6
6	8/-	14/6
8	10/6	



TELSEN
RADIO COMPONENTS

IT'S THE 'LASTING EFFICIENCY' THAT COUNTS

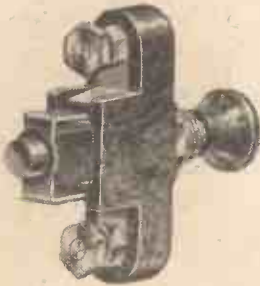
ANNOUNCEMENT OF THE TELSEN ELECTRIC CO., LTD., ASTON, BIRMINGHAM

TELSEN

H.F. CHOKES, PUSH-PULL SWITCHES & VALVE HOLDERS

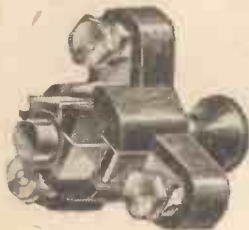
TELSEN TWO-POINT SWITCH

For use as battery switch, or as wave-change switch, with the dual-range S.W. Coil unit. Employs a "knife" type self-cleaning contact, and a positive snap action, a series gap reducing self-capacity to a minimum ... 1/-



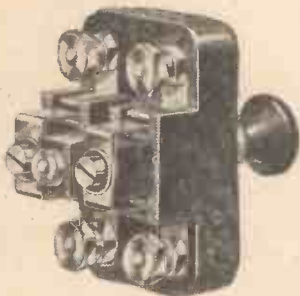
TELSEN THREE-POINT SWITCH

The perfect wave-change switch for use with a dual-range aerial coil or for breaking L.T. and H.T. currents simultaneously 1/3



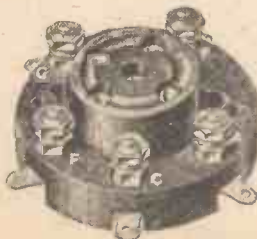
TELSEN FOUR-POINT SWITCH

Highly suitable for use in wave-changing on two coils or an H.F. Transformer, or for switching pick-up leads or an additional speaker. 1/6



TELSEN VALVE HOLDERS

An improved range of valve holders in both solid and anti-microphonic types. Employ special contact sockets of one-piece design with neat soldering tag ends and terminals. Extremely low self-capacity.



Rigid type
4 pin 9d.

Anti-Microphonic
4 pin 1/-

Rigid type
5 pin 1/-

Anti-Microphonic
5 pin 1/3

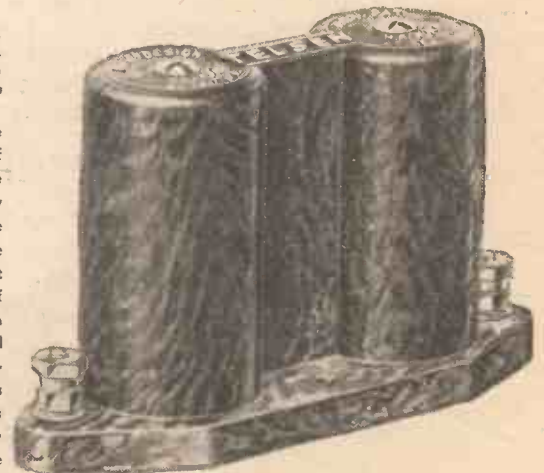


TELSEN STANDARD H.F. CHOKE

Covering the entire broadcast band, and occupying only the minimum of baseboard space, the Telsen Standard H.F. Choke has proved deservedly popular ever since its introduction. With an inductance of 150,000 microhenrys, a resistance of 400 ohms, and an extremely low self-capacity, it is highly suitable for use in reaction circuits, and is constantly being specified in this respect by the leading set designers 2/6

TELSEN BINOCULAR H.F. CHOKE

In H.F. amplification, the performance of a choke is of supreme importance. Where the very highest efficiency is the primary requisite, the Telsen Binocular H.F. Choke is the inevitable choice. It has a high inductance of 250,000 microhenrys, with a very low self-capacity and a practically negligible external field (due to its binocular formation). It is from every point of view the ideal choke—and where high class circuits are concerned definitely the essential choke 5/-



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RADIO COMPONENTS

TELSEN RADIO COMPONENTS ARE 100% BRITISH

ANNOUNCEMENT OF THE TELSEN ELECTRIC CO., LTD., ASTON, BIRMINGHAM

CAPT. ECKERSLEY'S QUERY CORNER

Under the above title, week by week, our Chief Radio Consultant comments upon radio queries submitted by "P.W." readers.



Don't address your letters direct to Capt. Eckersley; a selection of those received by the Query Department in the ordinary way will be answered by him.

HOME CHARGING—WHAT IS AN AMPLIFIER?—AN AERIAL PROBLEM—SWITCHING

Charging Without Mains.

H. J. G. (Manchester).—"I understand that the condition of an accumulator is judged by the specific gravity of the acid, and in so far as I can discover this seems to be the only change. Why not recharge an accumulator by merely refilling with acid with a S.G. equal to that of a fully charged accumulator?"

The change of the specific gravity is due to the fact of making a chemical change on the lead plates—the chemical change on the lead plates would not take place by changing the specific gravity of the acid; the change of specific gravity is symptomatic of the change. The battery is not charged by changing the specific gravity of the acid. Q.E.D.?

Do Loudspeakers Amplify?

P. L. (Birkenhead).—"Does a loud-speaker act as an amplifier? I ask this because I find that if a pair of 'phones is connected to my set in place of the loud-speaker there is plenty of distortion, but nowhere near the same volume of sound."

Query! Definition of amplifier?

If we mean by amplifier a device which puts out more energy from its output terminals than it accepts at its input terminals, then a loudspeaker is *not* an amplifier.

If one machine uses the energy input to it so efficiently that it puts out more energy than another machine which, being less efficient, puts out less energy, then that one machine appears to amplify more than the other.

No! It's purely a question of efficiency. You have a given hot fire and apply it to one heat engine and get half a horse power, while the same fire applied to another heat engine may result only in one-tenth of a horse power—that doesn't mean that the more efficient machine was an amplifier.

The loudspeaker deals more efficiently with the energy input to it than the tele-phones.

A Peculiar Effect.

U. M. (Hounslow).—"I have been using an A.C. mains receiver of a very well known make for nearly a year and have noted a very peculiar effect. When first I obtained the receiver a certain interval was noted after switching on before signals came through, and I was informed that this was normal and was merely due to the valve filaments taking a little time to heat up. Lately I have noticed that this interval has

increased in length, being now nearly double as long, and yet I am assured by the makers that the receiver and valves are perfectly in order. Could you suggest any explanation of this effect?"

No, not positively. Could it be that the valves are losing some of their emission but not enough to matter? Could it be that the mains supply voltage—No, perish that thought! Might it be that an anode resistance is faulty, and suddenly makes contact—

All rather futile—very sorry. "Ask me another one do!"

One Aerial, Two Sets.

H. L. O. (Croydon).—"I frequently wish to have two receivers in operation in different rooms at the same time, one being used on broadcast wavebands and the other

NOT WHAT IT SEEMS



No, not a 1920 crystal set, but a complete transmitter and receiver! This Hungarian youth claims to be able to effect two-way communication over a distance of five miles with his diminutive apparatus.

on short waves, but unfortunately I have only one aerial erected, and it is not convenient to duplicate this. Is there any reason why both receivers should not be connected to the same aerial, and would this affect the reception with either of the receivers?"

Provided each of the receivers is very

loosely coupled to the same aerial, I see no reason why you should not use one aerial for two receivers. The way I should go to work would be to leave the broadcasting circuits as before, and "show" the aerial terminal of the short-wave set to the down lead of the common aerial.

In other words, use very small capacity coupling for short waves, because the capacity coupling is in some measure determined by the effective impedance of the capacity, and this impedance is less the higher the frequency.

Try a piece of insulated wire attached to the aerial terminal of the short-wave receiver, and wrap this once or twice round the down lead of the aerial connected normally to the broadcast receiver.

First or Last?

P. R. (Chadwell Heath).—"I have a mains unit for H.T., and I am in doubt as to whether I ought to switch the H.T. off before I switch off the valve filaments or vice-versa. Does it make any difference?"

Always switch off filaments last, always switch on filaments first. You see, when the filaments are on the valve circuits are conductive, and so a load is thrown on the mains unit.

A mains unit works by interposing a valve in the H.T. circuit. This valve has resistance. Usually there is a choke, and this has resistance. So when there is no load on the mains unit, there is no current through it, and so the valve and choke resistance does not drop the volts and the volts rise.

As there is no current taken by the load, all the current flows into the smoothing condenser until no more current can flow, because the charge on the condenser raises its voltage to the peak value of the voltage supplied through the rectifier.

This is about 1.4 x the mains voltage. So you strain things more than is necessary if you don't switch on the load before the mains unit.

STATIONS WORTH HEARING

WHAT stations should be receivable with a three-valve set at the present time? As the three-valver with a screen-grid high-frequency valve, a detector and either pentode or power output is such a popular set nowadays, I have been asked this question by quite a number of people.

The answer depends, of course, to some extent upon the locality in which the set is used, for some places are much better than others for long-distance reception. Another important factor is the aerial and earth system.

All Good Stations.

I have made one or two tests lately with an up-to-date three-valver of good average performance, and here are the stations that I would class as being definitely within its normal range. Beginning at the lower end of the medium waveband, Fécamp, Nurnberg, Trieste and Frankfurt (when the London National is silent) are all good stations, and a little higher up genuine loudspeaker reception should be obtainable from Turin, Heilsberg and Hilversum. Bratislava may also come in, but this depends rather upon the degree of selectivity, owing to the wipe-out of the big Heilsberg station.

Bordeaux Lafayette may be expected, and Göteborg is generally well heard, except when conditions are unfavourable. Immediately above the Swedish station's wavelength comes a group of stations which

SHORT WAVES are "looking up" once more. Conditions have improved already, and there is every prospect of a good winter season. Apart from this, the details about the Empire station are "out of the bag," and an expectant hush hangs over the world of short-wave listeners.

That, at any rate, is what a real journalist would say about it. In actual fact, the short-wave listener abroad is pretty certain that he is in for a good time, and that Rome and Radio-Colonial will no longer rule the roast.

Opinions from Nigeria.

For the benefit of those who do not know the arrangements, I had better make it clear that the new station will use the wavelengths of 49.6 metres, 31.5 and 31.3 metres, 25.5 and 25.3 metres, and 16.9 metres. The reason for the two "pairs" of wavelengths in the 31 and 25-metre regions is that aeriels suitable for different directions will be used.

The 49.6-metre transmission, as might be expected, is to serve South Africa and Canada; 31.5 is intended for West Africa and 31.3 for South Africa; 25.5 is for Australasia only, and the 25.3 and 16.9-metre waves are meant for India.

The wavelengths seem well chosen, in the light of previous experience, and I should not imagine that listeners anywhere in the Empire will have the slightest cause for complaint after a few months.

I have had a long and interesting chat recently with a reader from Nigeria, and

Realising the importance of providing listeners with up-to-the-minute news about long-distance stations and conditions, "P.W." publishes every week the notes of a Special Correspondent who nightly searches the ether in order to provide a log that is really up to date.

provide one of the most exacting tests of selectivity.

These are Breslau, the Poste Parisien and Milan, all working upon neighbouring channels. Any of them is within the range of a three-valver if it can perform the necessary separation.

Brussels No. 2, Strasbourg, Toulouse, Leipzig, Rome and Stockholm may all be classed as definite "three-valver" stations. Towards the top of the band, Berömunster, Langenberg, Prague, Florence, Brussels No. 1 and Budapest are in the same category.

Long Wave Expectations.

Of the long-wave stations a reasonably good three-valver should bring in the majority, though if it is operated within thirty or forty miles of Daventry it may not be able to separate Zeesen cleanly from 5 X X. Oslo, Kalundborg, Motala, Radio-Paris and Huizen should be within its powers, and to these must be added Warsaw



have learned quite a lot about the special problems facing short-wave listeners abroad. There are times when it is useless to expect to do much above 30 metres on account of atmospheric conditions. Luckily things are generally quieter in the 25-metre region, and, lower still, atmospheric conditions are rarely bad enough to cause a close-down.

Set par excellence.

The choice of wavelengths is an important matter, and varies with the seasons. Naturally, we know all about that at home here, from our experiences with W 8 X K, for example.

One point that he stressed particularly was that a headphone receiver is not the slightest good to the average overseas short-wave man. The social conditions are

and the Eiffel Tower at times when one of them is not working.

There are many other stations which, though not certainties with a three-valve set, may be regarded as possible or probable. One of the most interesting of these is Csepel, or Budapest No. 2, on 210 metres.

Gleiwitz and Hörby may be picked up when the London National is silent. Bruno often provides first-rate reception, and Söttens comes in well just above the Midland Regional. Madrid Union Radio may be heard after 10 p.m., and both Vienna and Munich are worth attention on good nights.

What I have tried to do is to outline the results that may be obtained with an average set with an average aerial and earth under average conditions. A specially selective or sensitive set may do better than this, whilst the performances of one that does not shine in these respects will not be so good.

Amplly Sufficient Volume.

Again, listeners who live close to the North National may not be able to receive either Bordeaux or Hilversum satisfactorily, whilst in the neighbourhood of Daventry, Leipzig, Söttens and Katowice may prove difficult.

And then there is the word "reception" itself. I use it in the sense of loudspeaker reproduction with volume amply sufficient for a room of average size. There are numbers of other stations that can be brought in, with rather smaller volume.

Many of these, though, are especially good on certain nights, and you may find a transmission which was barely audible at the beginning of the week roaring in on the Friday or Saturday. In any case, the three-valve set is a magnificent provider of entertainment nowadays, and the number of alternative programmes that it makes available is always a big one.

R. W. H.

such that a good loudspeaker job is necessary, and no one cares to cut himself off from the rest of the community for hours on end wearing headphones.

I have received reproaches from several different quarters for neglecting the super-het., and, as the result of a talk with the Technical Editor, am getting down to it once more. There is no doubt that the super is the set par excellence for telephony reception; it has only been the fact that certain snags peculiar to the short-wave super-het. have made it rather unpopular that has kept me from describing one of late.

The One-valver grows up.

The average home reader is just as keen on amateur Morse as on long-distance broadcast, and the super is frankly pretty poor for weak Morse reception.

But for the man who is not thrilled by the mere prospect of hearing an unintelligible noise from a new "DX scalp," it is *the* thing.

Meanwhile, the one-valver is growing up into a detector-and-R.C. set. Of course, I have left the original one-valver untouched—I would not part with it for worlds! But I have built an exactly similar detector into the new "two," and am spending my time trying all sorts of funny coupling schemes to make quite certain that the background ratio is not being increased.

When I am really satisfied the results of my labours shall be made known.

W. L. S.

Graham Farish says

IT COSTS ME MONEY

It costs me literally thousands of pounds to tell you about my products. My business instincts, my Scottish caution tell me it would be money wasted to exaggerate my claims. That's why you can safely follow my recommendation to try G.F. Components. Believe me, you'll find them a step ahead of any you've tried before.



Graham Farish **OHMITE** RESISTANCES

The popular and efficient resistances for all general purposes. All values 300 ohms to 5 megohms. 1/6d. each.



BETTER THAN WIRE WOUND

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EACH

FIXED Graham Farish **CONDENSERS**

In a complete range of capacities, upright or flat mounting. Registered design No. 723271. Every condenser is tested on 750 volts D.C. The capacities are accurate within fine limits, and every condenser can be thoroughly relied upon.

.00005 mfd. to
.004 mfd.

.005 mfd. to
.01 mfd.

1/6 1/6



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S4VB



Only ten years ago, and we were using crystal detectors and earphones. Radio has advanced far since then, is always advancing—Mullard progress proves that. Now the age of All Mains radio is here. Mullard have looked ahead and produced mains valves to meet the conditions of the future. Rigid Unit Construction abolishes microphony. The S4VB screened-grid valve has low inter-electrode capacity which gives greater stability allowing the valve to be used with high efficiency tuned couplings to give large stage gain.

PRICE 19/-

MADE IN ENGLAND

The valves specified for the "S.T.400" are: P.M.12A. (Met.), P.M.1H.L. (Met.), P.M.2D.X., P.M.2A. or P.M.202.

ASK T.S.D.—Whenever you want advice about your set or your valves—ask T.S.D.—Mullard Technical Service Department—always at your service. You're under no obligation whatever. We help ourselves by helping you. When writing, whether your problem is big or small, give every detail. Ask T.S.D.

Switch over to

Mullard
THE MASTER VALVE

RECEIVERS OF RENOWN



No. 13.—THE VARLEY "SQUARE PEAK" SUPER-HET.

A MAGNIFICENT LONG-RANGE RECEIVER FOR A.C. MAINS.

WHAT is 1932 perfection ?

Were we to attempt to answer that question by reference to any one instrument in particular, we should without a doubt be skating on very thin ice! The old adage of "One man's meat, etc.," was never more true than of radio.

But, faced as we are to-day with the so far unequalled problem of an ever-increasing number of stations to an already overcrowded European ether, there are certain conclusions that can be drawn and which, in general, can be said to constitute the requirements of an ideal set for modern conditions.

Defining the Ideal Set.

Surely, in this connection, the ideal set is the one that will provide the bulk—if not all—of the European programmes as programmes and not, as is so often the case, as a conglomeration of cacaphony?

It is always so easy to talk about the ideal if one neglects the practical considerations, but supposing we do consider the practical aspects, supposing we do get down to the vital considerations. Is such a design possible?

Frankly, if the ideal is taken to mean every available programme in Europe free from interference, then quite definitely the answer is "No"; not on account of any failings on the part of the manufacturers, but due entirely to the stations themselves failing rigidly to adhere to their allotted wavelengths.

But if the literal interpretation of the word "ideal" is stretched to the extent of meaning a set that will provide the bulk of the European stations at real programme-value strength, then we have very good reasons for knowing that such a design is possible. That is only one of the conclusions at which we have arrived as a result of the tests to which we have just subjected the new Varley "Square Peak" Super-het.

Approaching Perfection:

Even to this day, despite the years of progressive development that have elapsed there are those who frown at the mention of a Super-het. But any objections of sufficient magnitude to outweigh the acknowledged advantage of almost unlimited range that may have applied to "supers" of a year or two ago are certainly non-existent to-day.

What better proof could we bring forward

than to quote from experiences with the Varley "Square Peak" Super-het.?

You examine the dial: you find that the actual stations are marked on it. You turn the control knob until the name of Rome on the dial tells you that you are listening to that most famous capital. Rome is there. There are no half-larks about it, no dim and distant murmurings all but lost in an ear-splitting imitation of a firework display. Real honest-to-goodness programme value!

You turn on, through station after station. You know them all by name. In ten minutes you have swept the Continent

mention that the pleasing balance between bass and treble given by this set is ample evidence of L.F. correction to compensate for the high-note loss to which super-hets in general are prone.

Still one more doubt lingers in your mind—operation?

It would be an insult to your intelligence to ask you if you can turn a door-handle. To be asked if you can operate the Varley Super-het would be tantamount to the same thing!

The "door-handle" in this case is the knob immediately below the station-indicating dial. Apart from the knob on the left by which you regulate the volume to suit your own particular requirements, it is the only control with which you need be concerned. And you just have to turn it!

Ingenious Wave-change Switch.

The knob on the right only comes into action when it is desired to switch the set on or off, and when you want to change from one waveband to the other, it is done in an ingenious way by sliding the escutcheon plate up or down.

The set is designed for use with an external aerial and earth, although the aerial need be nothing more than just a length of wire round the picture rail.

(Continued on next page.)

TECHNICAL SPECIFICATION

GENERAL DESCRIPTION: Five-valve super-het. for A.C. mains with built-in moving-coil speaker.

CIRCUIT DETAILS: Five valves (excluding rectifier) arranged as follows: S.G. H.F. stage (M.M.4V); combined oscillator and 1st detector (A.C./PEN.); one intermediate (M.M.4V.); 2nd detector (354V.) pentode output (A.C./PEN.); (Rectifier is a D.W.3).

CONTROL ARRANGEMENTS: Central knob is for tuning. Volume is regulated by knob on left. Right-hand knob is mains "on-off" switch. Wave-changing is effected by means of a sliding escutcheon plate which operates a switch.

SPECIAL FEATURES: (1). Simplicity of operation. (2). Provision for pick-up. (3). Sockets for external speaker. (4). Compactness. (5). Output of 1,600 milliwatts. (6). Current consumption of only 60 watts.

PRICE: 26 guineas including valves and royalties.

MAKERS: Varley (Oliver Fell Control, Ltd.), 103, Kingsway, London, W.C.2.

from the Baltic to the Levant, from Ireland to Bucharest and the eastern fringes of Europe!

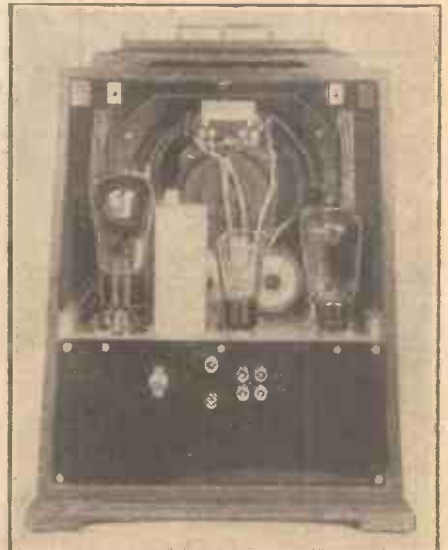
Fascination beyond words—anticipation—adventure! Never knowing quite what you will hear next, yet always certain that there are literally scores of programmes from which to choose. Freedom—yes, that's it, freedom!

Freedom to hear that which pleases you and to reject with a movement of the fingers that which palls. Freedom to say a defiant but definite "No" to the locals. Freedom to linger for an hour or so in any one of a hundred different cities!

That is radio as near to perfection as we shall see it for several years to come—that is the Varley "Square Peak" Super-het. As for quality of reproduction, when, as in the present case, one can almost forget in the sheer enjoyment of listening, that there is a radio link at all, there is hardly any need further to praise the merits of the moving-coil loudspeaker employed.

Nor is it necessary other than briefly to

BEHIND THE "SQUARE PEAK"



Inside, as outside, the Varley "Square Peak" Super-het. is both attractive and well arranged. It is housed in a handsome cabinet with a concealed drop-in handle.

THE VARLEY "SQUARE PEAK" SUPER-HET.—(Continued from previous page)

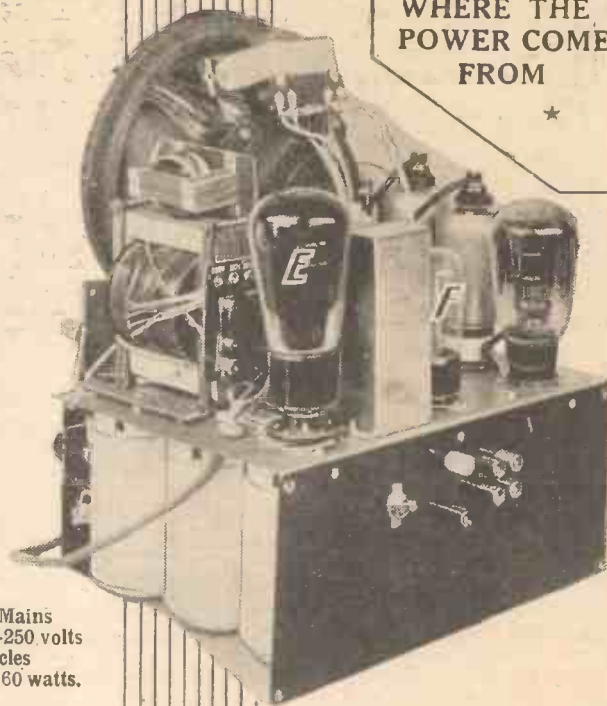
A LESSON IN COMPACTNESS

★



WHERE THE POWER COMES FROM

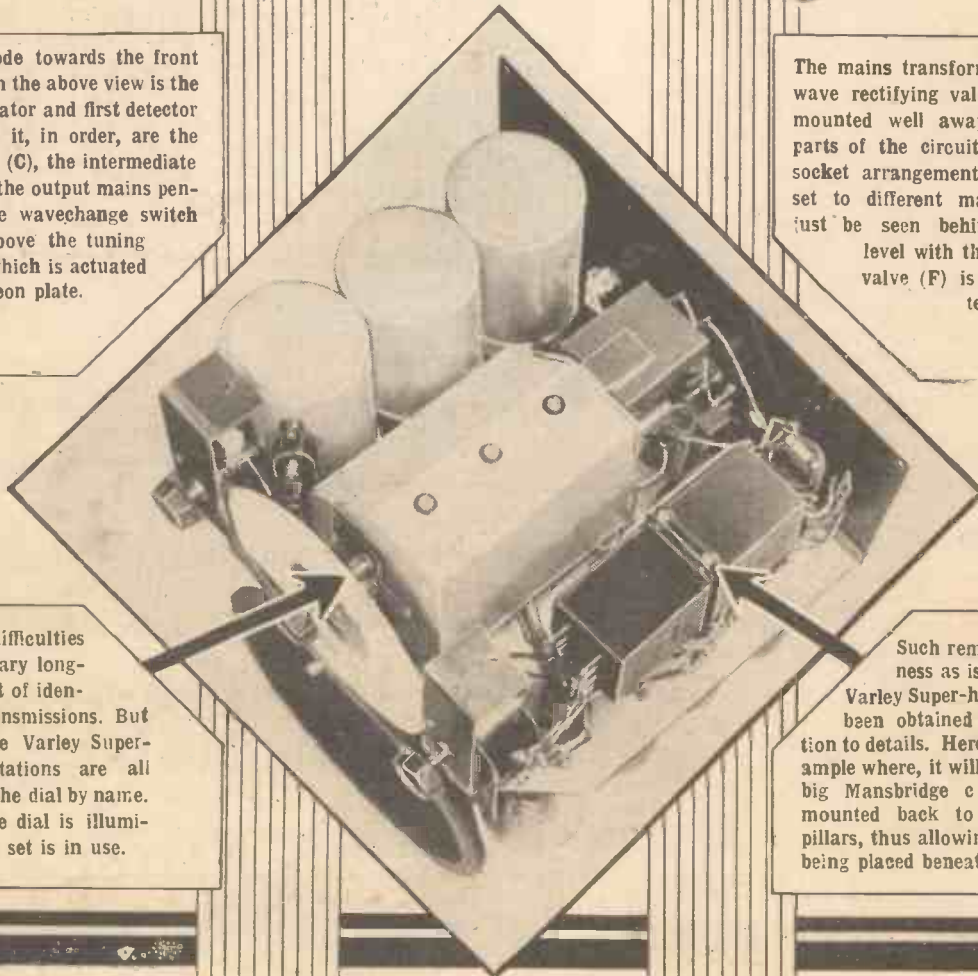
★



For A.C. Mains
100-200 or 200-250 volts
40-100 cycles
Consumes only 60 watts.

The A.C. Pentode towards the front of the chassis in the above view is the combined oscillator and first detector (D). Next to it, in order, are the S.G. H.F. valve (C), the intermediate valve (B), and the output mains pentode. Note the wavechange switch immediately above the tuning control knob, which is actuated by the escutcheon plate.

The mains transformer and the full-wave rectifying valve (E) (above) are mounted well away from the vital parts of the circuit. The plug and socket arrangement for adjusting the set to different mains voltages can just be seen behind the rectifier, level with the letter E. The valve (F) is the second detector.



One of the difficulties with any ordinary long-range set is that of identifying distant transmissions. But not so with the Varley Super-het. for the stations are all marked round the dial by name. Incidentally, the dial is illuminated when the set is in use.

Such remarkable compactness as is to be found in the Varley Super-het could only have been obtained by careful attention to details. Here is a typical example where, it will be noted, the two big Mansbridge condensers are mounted back to back on metal pillars, thus allowing for components being placed beneath them.

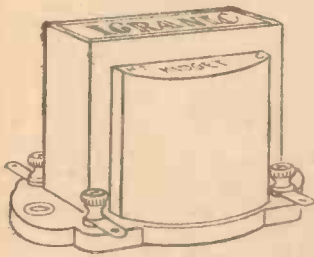
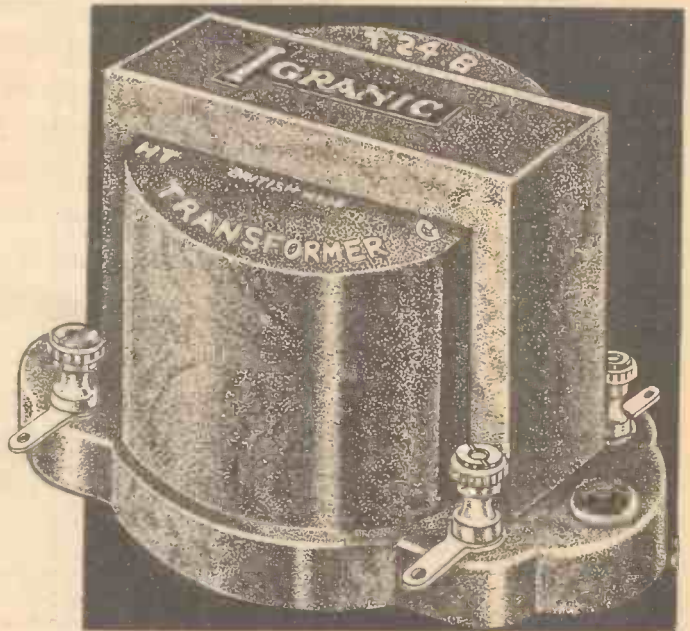
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IGRANIC
 DEVICES

TRANSFORMERS

You cannot expect IGRANIC results unless you build on IGRANIC components, and if there is one component more than any other in which you must have unquestioning faith, it is the Transformer. In the designing, construction and finishing of IGRANIC Transformers nothing is left to chance—they are built to the highest standards, and only works' efficiency of the highest order enables them to be priced so economically.

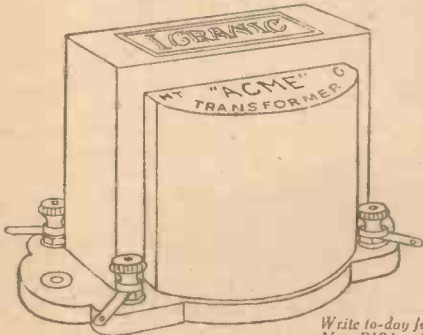
IGRANIC "T.24B" Transformer

A good general-purposes transformer at a popular price. Neatly cased in brown bakelite, with terminals and soldering tags. Weight 10 oz. Size $2\frac{3}{16}$ " x $2\frac{1}{16}$ " x 2". Ratios: 3:1 and 5:1. Price **5/6**



**IGRANIC
 'MIDGET'
 TRANSFORMER**

A masterpiece in miniature—it weighs only 6½ ounces, and its size is $2\frac{3}{8}$ " x $1\frac{1}{8}$ " x $1\frac{1}{8}$ ". Primary inductance over 60 Henries. Beautifully finished in brown bakelite. Ratios—3:1 and 5:1. Price **10/6**



**IGRANIC 'ACME'
 TRANSFORMER**

The Transformer 'par excellence'—employs the Igranac patented bi-metal core which permits of high current-carrying capacity without loss of inductance. Ratios—3:1 and 6:1. Price **17/6**

Write to-day for fully illustrated Catalogue No. R194 of complete new range of Igranac Quality Components. Igranac Electric Co. Ltd., 149, Queen Victoria Street, London, E.C.A.

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 COMPONENTS WILL
 BE THE MAKING
 OF YOUR SET.**

SEND FOR THE 1932 CATALOGUE

**A STATEMENT THAT HAS APPEARED
IN MORE THAN
100,000,000
COPIES OF RADIO TIMES AND HAS
NEVER YET BEEN CHALLENGED!**

No current is purer than the current of a Lissen Battery — no current is longer lasting — none flows so smoothly, none so noiselessly. Ask firmly by name for a Lissen High Tension Battery — every radio dealer sells it.



There is an exclusive process used in the Lissen HT. Battery which makes it last longer and provides pure high tension current that makes your radio vividly real!



SCORNED by The B.B.C.!

Or UNCLE PODMORE DEPOSED

by Lance Sieveking

AT the corner of the staircase on the first floor in the old Savoy Hill building hung a lighted glass notice which said "SILENCE."

My attention was called to this on the occasion of my first visit to the B.B.C. to have tea with my old friend Walter Fuller, then the London Station Director and subsequently the Editor of the "Radio Times." I immediately hushed my voice and walked on tiptoe, in case I should disturb anyone doing that secret and unknown thing known as "broadcasting."

On my way out there were two men with pickaxes knocking down a wall within two yards of the notice. However, such was the force of suggestion upon my disciplined mind that I again hushed and tiptoed. Strange.

Great Hodges' Bust.

Not long after that a distant relation died in Bognor. I must tell you that I can make a proud boast. I am related to the four Great English Families. I refer to the Great Families of Smith, Hopkins, Hodges, and Podmore.

We won't go into all the intermarriages and bars-sinister and so on. Enough to assert that I have the blood of the Smiths in my veins. But more especially is it important to observe, that the blood of the Hodges runs also through the same channels, for it is the bust of the Great Hodges of which I am about to tell.

The distant relation died in Bognor and left me a vast white marble bust in the best Roman Senator style, standing upon a huge green marble pillar. It was the bust of the Great Hodges, one of my sixteen great-grandparents (male, needless to say).

Plum Pudding Fortress.

He made, I was credibly informed, a huge fortune by acting as builder and contractor to Signor Martello, putting up, in collaboration with him, the round plum-pudding fortresses against the Napoleonic invasion that are still a familiar feature of the South coast of England.

A great man. Yet he was scorned by the B.C.C. I will tell you in what manner.

At that time I was administering

Some amusing reminiscences by the brilliant playwright and producer who has recently been responsible for brighter vaudeville.

talks. I write it thus, because I felt like that about it. I was in a dispensary of the spoken word it seemed to me. The unscen patients attended several times a day, and it was my job to make up the prescriptions and administer the doses. And watchful, like some old marble watchdog, Uncle Podmore presided behind my chair.

From where he stood he could just catch a glimpse of the sooty tombstones in the churchyard of the Savoy Chapel, and now and then, when my swivel chair was twisted in his direction I thought I could detect on his rather morose countenance a trace of strong irritability at the row the starlings in the trees outside were kicking up. (How one used to bellow into one's telephone at Savoy Hill!)

All manner of people used to come and sit in the chair on the other side of the table; poets, footballers, clergymen, ex-

plorers—and all the while, as I uttered to them the phrases of my office. I was conscious that I had them securely at my mercy; cowed, in some way they were at a loss to understand, by the blank marble eye of Uncle Podmore over my shoulder. Several times people had been heard afterwards to remark: "There's something about that chap" (meaning me) "which I couldn't quite sum up." I could have told them! But why give away a good secret?

A Long Lost Son.

It was during the summer months of 1928 that I started making confusion among the plays, and so had to go to another room on another floor. All my household gods were heaved and dragged down the passages after me—my collection of early musical boxes—old memoranda and card-indices of dead ideas (a heavy load) and, inevitably, Uncle Podmore on his pillar. (He was, I'm afraid, separated from his pillar for the journey, and looked quite put out by being so unceremoniously carried. The gentleman with the green baize apron hugged him like a long-lost son.)

In the new room he stood beyond the windows, on the left. Not such a dominant position, but good enough. We carried on, he and I, for some weeks, in peace. And then one day someone—I have never to this day discovered who—did a Shameful Deed, and for a time life was very black indeed.

I came in from lunch and started back in horror. There was Uncle Podmore with a hat (fortunately a male hat) all cockeye on one side of his head. His cheeks were rouged, his noble lips were vermilion and a bent and busted cigarette stuck out from between them.

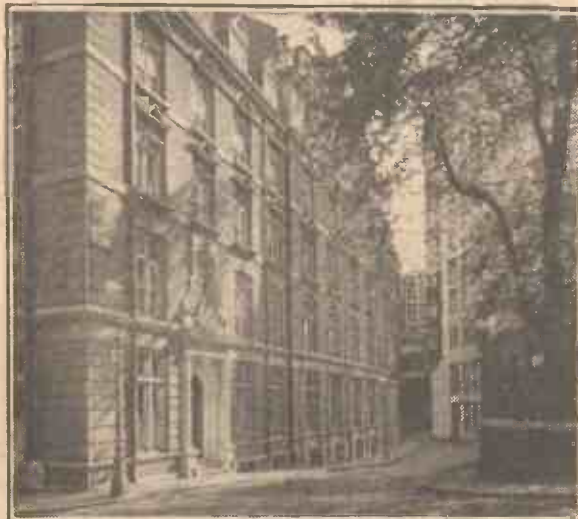
Gruesome Sight.

He looked—there is no other word—tipsy. He didn't look any of the other words that are used to describe that state. His age, period and general personality demanded that word alone: tipsy.

It was a gruesome sight. He looked tipsy and disreputable with-

(Continued on next page.)

THOSE SAVOY STARLINGS



For some unknown reason starlings are particularly fond of the trees facing Savoy Hill, and their chatter often causes the curious wayfarer to linger and listen. According to Mr. Sieveking they quite annoyed his Uncle Podmore.

SCORNED BY THE B.B.C.

(Continued from previous page.)

out having had anything to drink, if you can imagine it. And through this disgraceful façade one perceived the stern pride of the old man. Yet with a lurking fear somewhere I thought. Maybe it had occurred to him that Signor Martello might see him like this.

I rushed to his side. It was the work of an instant to remove the hat and cigarette. But rub as I would I could not get the rouge off his cheeks and lips. The marble of him was retaining it according to its tradition.

Disgrace to the B.B.C.

I stood back from him and looked searchingly at him. There was no disguising the fact. Uncle Podmore was an abomination.

No longer could he be allowed to preside over my interviews with distinguished (and other) visitors. He would disgrace me. More, he would disgrace the whole B.B.C. He must be done away with.

A wild thought occurred to me. Would it—could it be taken for suicide if he was found on the pavement of Savoy Hill in a thousand fragments? No. They would never believe it no matter how many notes of explanation I forged in his writing. There must be some other way.

During the days that followed Uncle Podmore stood with his face to the wall. Sometimes, when the weather was chilly, he was completely draped in my overcoat. (Not for his comfort, be it said, but just because I had to put it somewhere.) Time went on, and meanwhile, I racked my brains for a Plan.

Bequest to the Nation.

One morning I recollected that the sub-director of a certain Public Gallery had once expressed his willingness to accept Uncle Podmore for the nation. I hoped that the old gentleman had not overheard the extremely tactless remark made by the sub-director as he departed. It was to the effect that it was because the Gallery did not possess any work by the sculptor and not on account of the subject.

But this set me on more likely lines. I dismissed the notion of making Uncle Podmore a bequest to the nation on three counts. (1) Because I couldn't remember exactly who the Sub-director was, nor of which Gallery; (2) Because I was gravely doubtful if "The Subject" would be acceptable in his newly-decorated condition; and (3) Because in the event of his being a bequest outside the building, I might have to pay for his removal to his new home, and he had cost £4 10s. 0d. to arrive where he stood at present.

A Dry Bath.

But if not outside—then, happy thought!—inside! Why not? Thoughtfully I took out my pocket-knife and began to scratch

his face. The red came off a little. I attacked the lips with greater vigour and broke the blade of the knife. Not to be beaten I rang a bell and got some sandpaper, and proceeded to give Uncle Podmore a thorough dry bath.

When I had finished he was almost his old white self again. That afternoon he faced towards the room again, and in his blank eye I thought I caught a glint of gratitude. "Not a bad old boy," I thought, "but what a bore! No. Clean or foul he must go!"

Fine Rolling English.

On the following day I dictated a memorandum. It was addressed to a High Official of the Administration. (I mean a really "High" Official, not one of those called "High Officials" by the writers of "chatty pars.")

It was a fine rolling piece of English

not calculated to stir me either to gratitude or enthusiasm.

It said, briefly, that the writer did not think "Uncle Podmore" would adorn any part of the B.B.C. as well as he adorned my room; and who was he, anyway, that he could claim to be related to Broadcasting.

In the Worst Taste.

With great dignity I dictated a reply to my secretary. "He is my great-grandfather. Without his intervention I should never have existed. Therefore he is, in part, the Father of the B.B.C." At the sound of my voice I thought Uncle Podmore nodded in grave approval; but it may have been an illusion.

In due course I received my memorandum back again with "Ha! Ha!" written at the foot of it; which I thought in the worst possible taste.

I meditated taking Uncle Podmore down to the Control Board Room and holding him out to the Assembled Board as once an infant king was held out to the Welsh People.

But on second thoughts I decided not to. Maybe it was lack of enterprise.

Then came the move to Broadcasting House. In the rush of events I made a rather hasty decision.

The pillar was sent to my home, where it now supports a group of flowers, and Uncle P. himself was banished through a small window on to a balcony that runs along outside my new room.

And there he stands (rather shorter than before) and glares in at me while the rain streams down his pallid cheeks; and pigeons go to sleep on his head. And there he will continue to stand I imagine, unless I can think of a new plan.

We Shall See.

Should I, for example, rely on the whole matter having been forgotten, and put forward again my magnificent offer to the B.B.C.—saying that he is Henry Hall's great-grandfather. A happy idea! We shall see. He would look well in the niche over the front door, balanced on that great stone ball.

"But why Uncle Podmore?" you ask. That was just a slip of the tongue on his first arrival. But it stuck.

HOME OF BROADCASTING—AND UNCLE PODMORE



"Then came the move to Broadcasting House and Uncle P. was banished through a small window on to a balcony that runs along outside my new room."

eloquence, a masterly example of the art of prose. In it I suggested that the British Broadcasting Corporation might care to accept the gift of a fine marble bust, together with the green marble pillar on which it stood.

The bust, I explained would adorn any studio, or would lend dignity to any of the three entrances. On the other hand there was the Drawing-Room, in which Important People were put to wait. Here in company with a carpet by Heal and a picture by Van Gogh, this noble bust would be an object of admiration by all.

You may find it hard to believe, but I did not receive any answer at all to this memorandum. Or, at least not for a long time. And when it did come it was

SO THIS IS SWITZERLAND!

Switzerland's new station at Mt. Genere, which is due on the air shortly, is sure to be mistaken for an Italian, as this will be the language employed.

Beromunster (officially called Schweizerische Landessender) always announces in German, but it is a Swiss Regional station. (Wave-length 459 metres.)

Sottens (officially styled "Radio Romande") is usually mistaken for a French station, because that is the language used. It is in Switzerland, and works on 403 metres.

The "BAND-PACK"



A new simplification in the construction of a band-pass receiver is introduced in this efficient, selective and simple-to-operate three. The circuit incorporates a variable- μ volume-control H.F. valve.

By the "P.W." Research Dept.

and ganged condenser all wired up and ready to drop into a set.

They are no more difficult to wire up than simple coil units and have fewer external connections than some of these.

But you have the assurance that all the parts are balanced up to work together properly.

And as we have already said, they vastly facilitate the assembly of a set.

We have used one of these new band-pass units in the "Band-Pack," as has no doubt been gathered from the name itself.

Highly Efficient Circuit.

But so simple does it make the assembly of the set that many may not at first appreciate that it includes a highly efficient circuit of a most modern nature.

Glance at the theoretical diagram. You will observe that there is first a complete band-pass entry which imposes high selectivity.

(Continued on next page.)

SIMPLE ASSEMBLY

IN this set we take advantage of the very latest technique in the application of band-passing.

It will be obvious to anyone who listens to the clamouring medley of noises emanating from the European ether these days, that special steps must be taken if distant station reception is to be worth while.

Success of Band-Passing.

One of the most attractive systems for obtaining good selectivity is band-passing. But until recently it has had drawbacks. It involves the necessity of an additional tuned circuit, and anything in the way of control complication is unattractive these days.

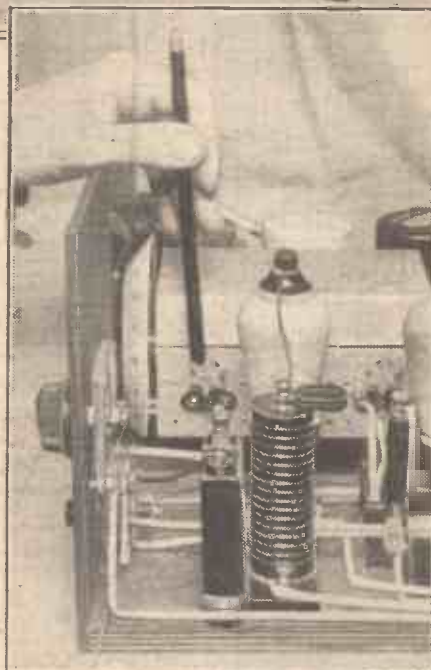
But this disadvantage can be overcome by resorting to ganged condensers. However, this is not a solution which the constructor can enjoy without qualification.

The success of band-passing depends upon a very careful disposition of capacity and inductance values, and even circuit wiring can throw out these sufficiently to offset the band-passing by undesirable features.

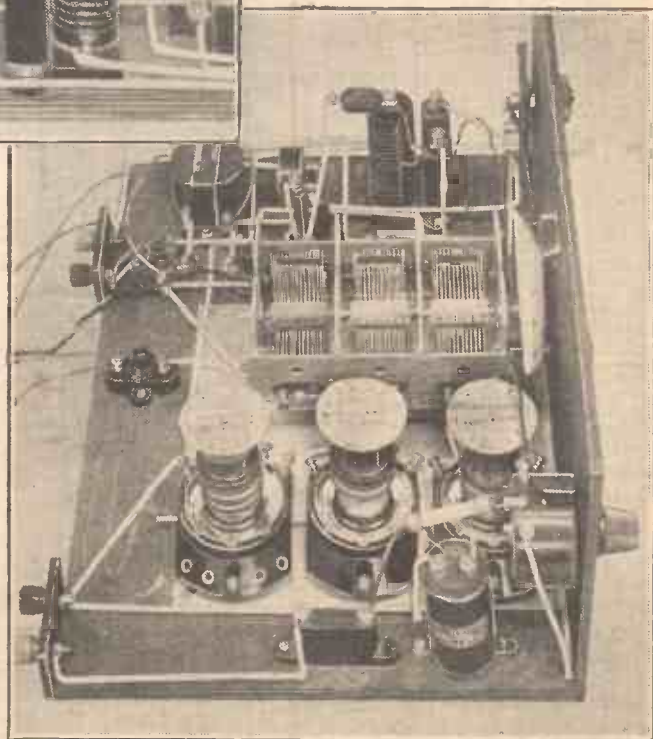
Difficulties Surmounted:

Nevertheless, the constructor can now surmount even these difficulties. Or, rather we ought to say, these difficulties have been overcome for him by enterprising manufacturers.

There are now available complete band-pass units embodying the necessary coils



The three coils and the three-gang condenser are supplied ready mounted to a metal plate, which ensures their correct spacing. The three-gang condenser is simply trimmed by turning the small "wheel" on its side.



RAPID GUIDE TO VALVE CHOICE

	H. F. Stage	Detector	Output Valve	Output Valve Mains Unit
Mullard	P.M.12	P.M.1H.L.	P.M.2A.	P.M.202
Cossor	220S.G.	210H.L.	220P.A.	230X.P.
Mazda	S.G.215	H.L.2	P.220	P.220A.
Marconi	S.22	H.L.2	LP.2	P.2
Osram	S.22	H.L.2	LP.2	P.2
Tungsram	S.210	H.210	P.220	S.P.230
Lissen	S.G.215	H.L.210	P.220	P.X.240
Eta	B.Y.6	B.Y.1814	B.W.604	B.W.602
Six-Sixty	215S.G.	210H.L.	220P.A.	220S.P.

THE "BAND-PACK"

(Continued from previous page.)

Then there is a variable-mu S.G. H.F. amplifying valve, with its attendant volume control.

This S.G. valve is coupled to the detector valve by a tuned grid circuit and the detector employs differential reaction.

You will see that there is no need to anticipate any of those troubles due to reaction feeding into a band-pass system, for the simple reason that the interval coupling is a straightforward tuned grid.

A fuse is incorporated as it is in all "P.W." sets now.

Apart from the major item, the band-pass unit, there are few components and these are all standard in type with plenty of alternative makes available.



The trimming wheels are easily spotted in this photograph, which also shows the two H.F. chokes side by side in the foreground.

Details will be supplied with the band-pass unit for fixing it to the panel and baseboard—a simple enough operation. If you purchase a complete kit of parts from one of our advertising kit suppliers the panel will be prepared for you.

We have used a tag condenser (.0001 mfd.) which fixes by its own "tag" direct to the H.F. choke, as you will see in the wiring diagram. Needless to say, a baseboard mounting condenser could be employed. Also baseboard mounting resistances can

be used instead of those shown suspended by their own connections.

The battery leads are taken straight out, and these should consist of insulated, stranded wire, not the single strand material



To show how the screens are well spaced from the coil windings, the front "can" has been "ghosted" to show the coil inside.

THESE ARE THE COMPONENTS YOU WILL NEED

- 1 Panel, 14 in. × 7 in. (Lissen, Peto-Scott, Permcol, Becol, Wearite, Goltone).
- 1 Baseboard, 14 in. × 10 in.
- 1 Cabinet for 14 in. × 7 in. panel and 14 in. × 10 in. baseboard (Cameo, Lock, Gilbert, Moreo, Peto-Scott, Osborn).
- 1 .0003-mfd. .00035-mfd. differential reaction condenser (Telsen Type W185, Polar, Ready Radio, Igranic, Graham Farish, Bulgin, Goltone, Lotus).
- 1 1-mfd. fixed condenser (Lissen Type L.N.133, Telsen, Ferranti, Dubilier, T.C.C., Igranic, Peto-Scott, Sovereign, Goltone).
- 1 .0001-mfd. fixed condenser (Dubilier Type E65, Igranic, T.C.C., Telsen, Formo, Ferranti, Graham Farish).
- 1 .0002-mfd. fixed condenser (T.C.C. Type 34, or see above).
- 1 .0003-mfd. fixed condenser (Lissen Type L.N.11, or see above).
- 1 .02 mfd fixed condenser (Dubilier Type 9200, Telsen, Igranic).
- 1 50,000-ohms wire-wound potentiometer (Watmel, Igranic, Lewcos, Colvern, R.I., Varley, Wearite, Sovereign).
- 1 2-megohm resistance (Graham Farish, Dubilier, Lissen, Igranic, Ready Radio).
- 1 5,000-ohm resistance (Dubilier 1-watt type, Graham Farish, Colvern).
- 1 Formo three-gang combined condenser and coil assembly.
- 1 H.F. choke (Lewcos Type Super, Wearite, R.I., Bulgin, Teiser, Varley, Igranic, Goltone, Ready Radio, Lotus, Sovereign, Dubilier, Peto-Scott).
- 1 H.F. choke (Lissen, L.N.5092, or see above).
- 1 Three-point on-off shorting switch (Telsen Type W.108, Lissen, Bulgin, Ready Radio, Tunewell, Goltone, Sovereign, Ormond, Keystone, Wearite, Graham Farish).
- 3 Valve Holders (Lissen Type L.N. 5069, W.B., Telsen, Bulgin, Ready Radio, Wearite, Igranic, Ormond, Benjamin, Clix, Goltone).
- 1 L.F. transformer (Igranic Type E1fn, Atlas, Bulgin, Multitone, Lissen, Varley, R.I., Telsen, Slektun, Ferranti, Graham Farish, Tunewell, Ready Radio, Lotus, Lewcos, Sovereign).
- 1 Single fuse holder (Bulgin Type F.5, Telsen, Goltone).
- 2 Terminal strips, 2 in. × 1½ in. (Peto-Scott, etc.).
- 7 Plugs (Bulgin, Clix, Igranic, Belling & Lee, Lissen).
- 4 Terminals (Clix, Belling & Lee, Bulgin, Igranic).
- 3 Spade tags (Belling & Lee, Clix, Bulgin, Lissen).
- 4 Yds. of Systoflex and 2 ozs. of 18-gauge tinned copper wire (Goltone, Wearite).
- 1 60 m/a fuse (Belling & Lee Scrufuse, Bulgin, Goltone, etc.).
- Wire for battery leads, screws, etc.

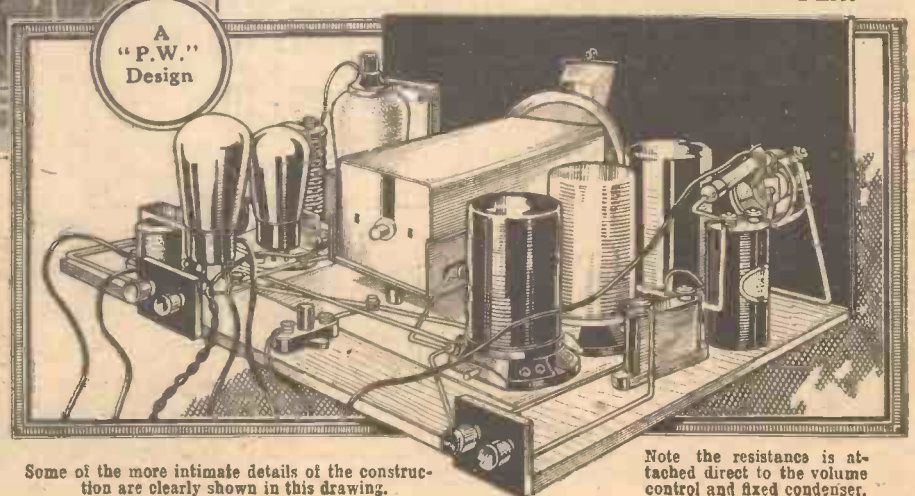
such as you will wire up the components with.

There is nothing more which need be said about the construction of this

An adjustment for selectivity is provided by the sockets on the aerial band-pass coil. With the plug in Number 1, a good selectivity is given—as good as with most ordinary sets at the very least plus the superior quality due to band-passing.

(Continued on page 714.)

A PERSPECTIVE FOR PROSPECTIVE BUILDERS



Some of the more intimate details of the construction are clearly shown in this drawing.

Note the resistance is attached direct to the volume control and fixed condenser.

S.T.400

All keen constructors are now building the new 4-valve wonder set which gets over 100 stations. Amazingly selective—tested in all parts of the country.

Designed by the famous inventor,
Mr. JOHN SCOTT-TAGGART, A.M.I.E.E., F.Inst.P.



Cabinet can be supplied separately, without speaker at £2

Build your S.T.400 with the authorised Ready Radio Kit approved by Mr. John Scott-Taggart, A.M.I.E.E., F.Inst.P., who writes:—

"With reference to my S.T.400 Receiver, described in the current issue of 'The Wireless Constructor,' I have received for test from Messrs. Ready Radio Ltd. a kit of parts in accordance with the circuit. This kit has been tested and has proved entirely satisfactory."

The Ready Radio Kit is absolutely complete down to the last screw and includes panel (ready cut and drilled), base-board and Jiffilinx of the correct length for easy wiring

£4.17.6

Or by Easy Payments—deposit of 9/6 and 11 monthly payments of 9/9

Ready Radio S.T.400 Kits are packed in special cellophane covered dust-proof cartons. Unless your kit is packed in this special carton it is not a genuine Ready Radio S.T.400 Kit.

MODEL A

Complete Kit as above, with four specified valves and handsome walnut cabinet fitted with Permanent Magnet Moving-Coil Speaker.

£10:10:0

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MODEL B

Complete Kit with four specified valves

£6:16:9

Or deposit of 12/6 and 11 monthly payments of 13/9

FREE WITH EVERY KIT Full-size blueprint and full-size photo-plans with easy-build wiring chart and copy of "Wireless Constructor" containing full instructions. **EVERY COMPONENT EXACTLY FITS THE BLUEPRINT.**

READY RADIO '303'

The 3-valve set you can build in twenty minutes

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with full instructions

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The all-wave version of the famous S.T.300

£3.15.3

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Ready Radio Kits are stocked by all leading radio dealers. If any difficulty—order direct

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READY RADIO
S.T.400 REBUILDERS' KIT
for all S.T.300 owners

35/-

Everything necessary to convert your S.T.300 to the correct S.T.400 with full instructions and blueprint.

THE "BAND-PACK"

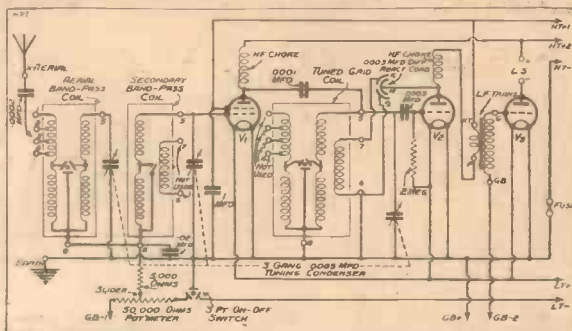
(Continued from page 712.)

But you can increase the selectivity still further if you need to do so, by plugging in to one of the other sockets. Number 4 provides the highest degree, but use the lowest one you can—Number 1 if possible.

The ganged condenser will be fairly well in trim and the set should work at once and give first-class results.

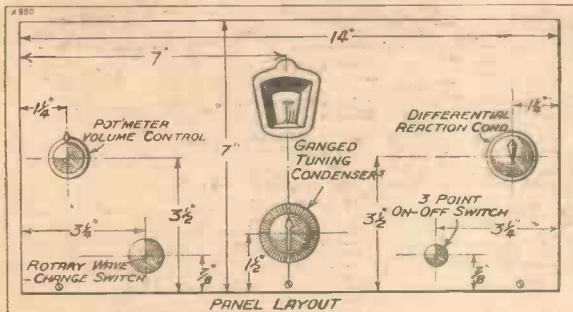
To get the last ounce out of it, however, you will need to adjust the condenser trimmers. This is a quite easy task. As, however, so many readers have been seeking information on the subject of "trimming" a reply in general terms, but covering the

"Band-Pack" in particular, is given in the Radiatorial section of this issue.



The panel-drilling diagram and the wiring diagram are all that you need to construct the set from, but you will find the theoretical circuit diagram above of interest also when going over the set's features.

PRACTICAL AND THEORETICAL

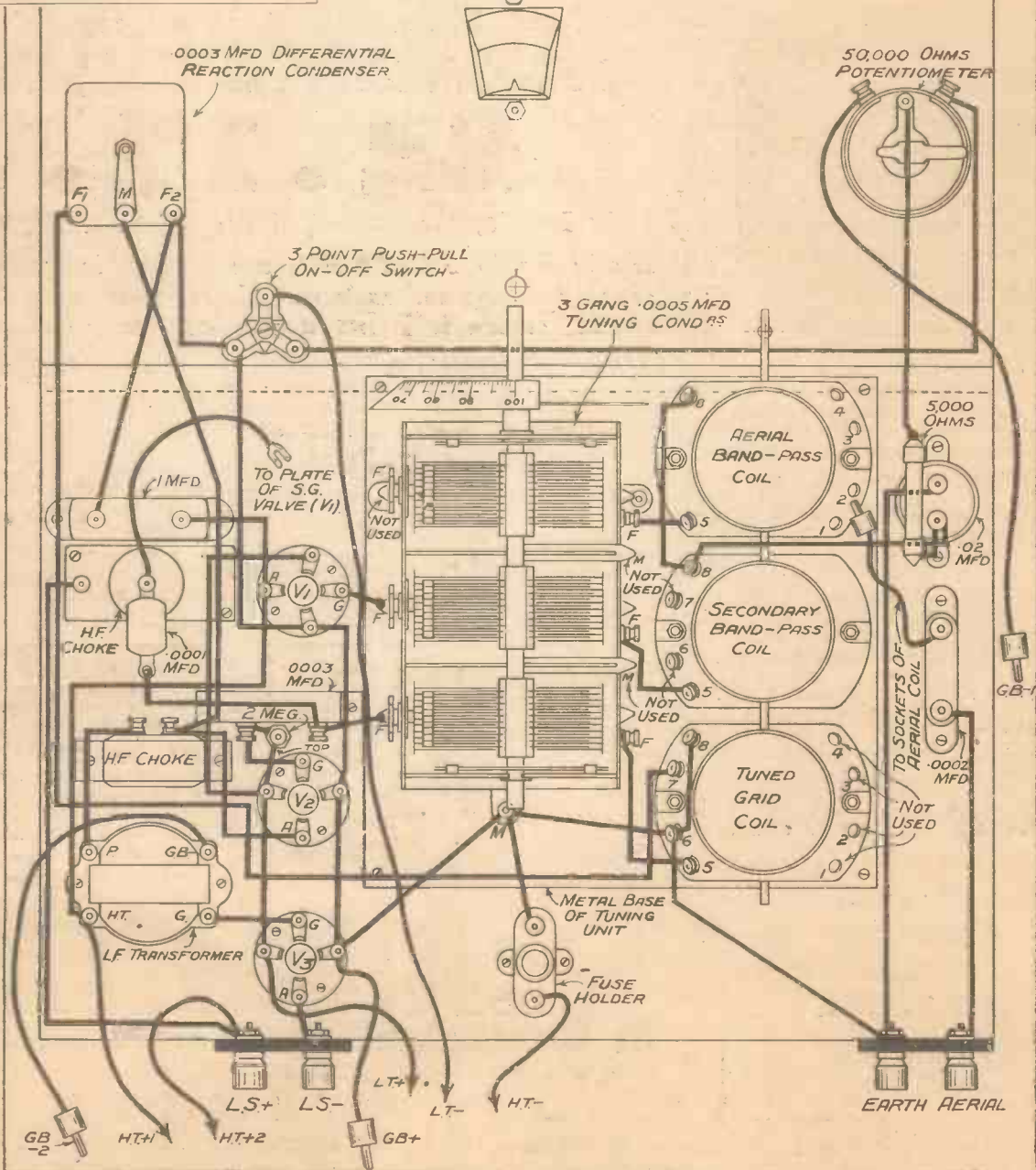


THE WIRING

There's little of it and it's easy to carry out. The G.B.-1 plug goes in the highest negative tap on the G.B. battery, volume being adjusted by the potentiometer.

ACCESSORIES.

- BATTERIES.** -- LT. Accumulator: Oldham, Ediswan, Lissen, G.E.C., Exide, Pertrix. H.T. Battery: This should be of ample size to deal with the requirements of the valves chosen: Ediswan, Drydex, Lissen, Pertrix, Magnet, Ever Ready, Marconiphone, G. B. Battery.—See above list.
- LOUDSPEAKERS:** G.E.C., Ferranti, Marconiphone, Baker's Selhurst, R. and A., W.B. Ormond, H.M.V., Lanchester, Celestion, Clarke's Atlas, Blue Spot, Epoch.
- MAINS UNIT.**—This should have two positive tappings with outputs to suit valves chosen, i.e., Atlas, Heayberd, Ferranti, Ekeo, Regentone, Tunewell, R.I.
- AERIAL AND EARTH EQUIPMENT.**—Electron "Superial" and Graham Forish "Filt".



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THE ONLY KIT YOU CAN BUILD YOURSELF EMPLOYING METALLISED S.G. HIGH - MU DETECTOR & ECONOMY POWER PENTODE VALVES

Lissen have published a 1/- Constructional Chart, giving the most detailed instructions ever printed for the building of a wireless set.

You can't go wrong—you are told what to do with every part, every wire, every terminal—everything is identified by photographs. Everybody, without any technical knowledge or skill, can safely, and with **COMPLETE CERTAINTY** undertake to build this most modern of radio receivers from the instructions given and the parts Lissen have supplied.

This new Lissen **SKYSCRAPER** Kit set is the only one on the market that you can build yourself employing a Metallised Screened-grid Valve, High-Mu Detector and Economy Power Pentode. Around these three valves Lissen have designed a home constructor's kit the equal of which there has never been before. Why be satisfied with whispering foreign stations, when you **CAN BUILD WITH YOUR OWN HANDS** this **LISSEN SKYSCRAPER** that will bring in loudly and clearly distant stations in a profusion that will add largely to your enjoyment of radio?

COMPLETE IN CABINET WITH LOUDSPEAKER £6.5^s OR 11/6 DOWN AND TWELVE MONTHLY PAYMENTS OF 10/6



KIT COMPLETE INCLUDING METALLISED S.G. HIGH MU DETECTOR & ECONOMY POWER PENTODE VALVES 89/6

NOW YOURS FOR ONLY 8/6 DOWN

To-day you can buy the **LISSEN SKYSCRAPER KIT** on Gradual Payment Terms.

Skyscraper Chassis Kit, complete with Valves, **CASH PRICE 89.6.** Or 8/6 down and twelve monthly payments of 7/6.

Skyscraper Kit complete with Walnut Cabinet and inbuilt Loudspeaker, as illustrated, **£6 5s.** **CASH;** or 11/6 down and 12 monthly payments of 10/6.

You can get the Lissen Skyscraper Chart **FREE** from any radio dealer, or by posting the **COUPON** on right direct to factory.

LISSEN SKYSCRAPER KIT 3

COUPON

Insert this **COUPON** in unsealed envelope with only halfpenny stamp and address to:—

LISSEN LIMITED, Dept. P.W.13, Worples Road, Isleworth, Middlesex. Please send me **FREE** copy of your 1/- Skyscraper Chart.

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SHORT WAVES AND LONG CHANCES

By AUSTIN FOX,

Who tells of some recent developments in American technique as applied to television and the very high frequencies.

AMERICA is wading into the short-wave field again with both feet; and with her usual youthful enthusiasm—or that of a slightly absent-minded press—is talking about these short waves as though they were something entirely new under the sun.

That there are some real novel developments in the work is not to be denied, however, and it is worthy of notice.

Ultra-Short Waves.

The latest excitement is over the story appearing in the papers about the Westinghouse Electric and Manufacturing Co. set built in East Pittsburg by Dr. E. I. Mourontseff, using what may well be considered as ultra-short radio waves.

The main advantage, aside from the general technical improvement of radio valves, transmission, etc., of the Mourontseff work on that of the Frenchmen would therefore appear to lie in the fact that they are now using parabolic mirrors, according to the best short-wave transmission principles; and that they have succeeded in putting behind these waves a greater amount of power.

To Mars?

The only comment that might be made on these happy dreams of optimistic engineers and press agents for finally talking to Mars is that all their assumptions are based upon a remarkably empty and peacefully static space—as were those possibly premature plans for hitting the moon with a rocket, and other such interstellar adventures.

That the ultra-short waves of the new set might reasonably be expected to penetrate the Heavyside Layer, some 80 miles above our earth, and finally escape into space, is not too hastily to be denied; but that they would or could traverse 32,000,000 miles of this same space is quite another matter.

New Television Station.

As astronomers are just beginning, in a quite upsetting manner, to point out, we have apparently forgotten in all our calculations the eminent probability of vast clouds of meteoric dust, huge meteors, remnants of exploded stars, and a mass of galactic debris which would make for the rocket navigator a perilous voyage indeed; and might well create all sorts of peculiar disturbances in fast-flying wireless waves—absorption by these iron meteoric shoals, electro-magnetic disturbances by too-close proximity to other heavenly bodies, possibly heavy interference by the wild cosmic rays of recent fame, etc.

One might suspect that it would be as easy for a blind man to drive a torpedo-

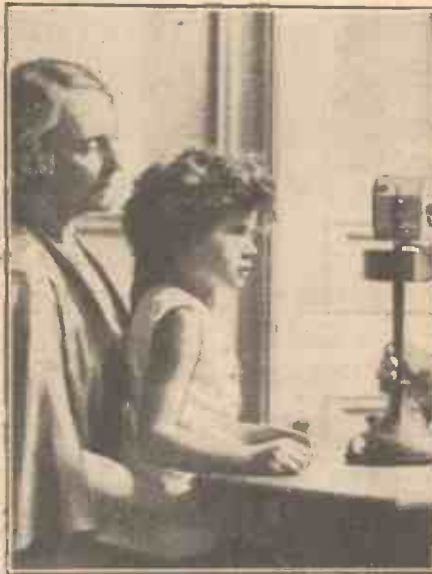
boat destroyer through the Grecian Islands at full speed as for any of us to break through the unknown and only partially chartered regions of outer space; and hence any thought of interplanetary communication should be taken with at least a grain of—shall we say?—cosmic salt.

The other short-wave work which is attracting some attention around New York at the present time is that of the new television experimental station being constructed on the top of the Empire State Building, the highest building in the world to-day. On the eighty-sixth floor of this mighty structure a station using what the engineers term “quasi-optical waves”—waves so short that they behave somewhat as light waves—will soon be in operation, for use of the laboratory men of the National Broadcasting Company.

Peculiar Distortion.

It is not for the general public, and in fact is still being guarded carefully from prying eyes or inquisitive journalists. In a

ATLANTIC NO OBSTACLE



Mrs. Katherine Tilt Jones is a well-known and regular American broadcaster, and while on holiday in this country she carried out her talks as usual by transatlantic 'phone. Janet, aged 5, also said a few kind words to the American public.

talk with Mr. Frank Mason, in charge of Public Relations of the N.B.C., he assured me that he knows nothing himself of the details of the work, and that it was being done entirely for the purpose of “finding out” more about short-wave television.

The main difficulty of the short wave, of course, is its quick absorption by a high building. To get short waves through these New York skyscrapers would require the force of some sort of radio transmission “gun,” which would fairly blast them through.

Even this might not solve the problem, as there still could appear strange streaks of strong and weak signals and other peculiar distortions. But it is for this reason that the short-wave sets are being placed on tall buildings for the time being.

The Empire State Building is supposed to have a vision “horizon” of sixty-four miles, say—from St. Paul's Cathedral in London



The extensive experiments in Europe with very short wavelengths are being paralleled in America, and this is Dr. Mourontseff, of the Westinghouse Laboratory, examining his ultra-short-wave apparatus.

to Oxford or a little beyond—during the clearest of clear days.

Short Waves from High Towers.

This means that the short television waves could in many districts be directed to receiving sets whose owners would be able to distinguish, in such clear weather, the glint of the sun on the chromium-plated airship mooring mast of the massive Empire State Building. They would need high visibility for the television reception, perhaps; and, if it be true that short waves from high towers are the most efficient type of television transmission so far, then it is not impossible to conceive of future television stations all built on such “Eiffel Towers.” One such tower to each city would enable a local population to pick up the television waves; and if land-wire transmission of images were used, as in telephoto work or in the present Bell Telephone Laboratories wired television, one single central station could feed all the re-broadcasting stations of the British Isles.

Laboratory Experiment.

However, as the N.B.C. engineers insist, this is pure laboratory experiment at the moment. No one knows what they may find when they eventually begin work in their crow's nest so far up above New York.

Certainly it is useless to defer buying a new radio set until the advent of the new art, for even the most optimistic of the serious-minded scientists and engineers connected with the work are inclined to think that it will be at least ten years before any final step may be achieved.

MAKESHIFT COUNTERSINKING

NEATLY countersunk screws always improve the panel appearance of a radio receiver.

If a proper countersink-bit is not to hand, the operation can be very successfully carried out with an old drill several sizes larger than the hole it is required to treat. But it must be an *old drill* and one that has certainly seen better days, otherwise it will do more harm than good. The drill should be used lightly, no attempt being made to start it cutting, but just allowing it to rub away the ebonite very gently until a neat cavity large enough to take the screw-head is formed.

Revolution!
THE 'BLOCK'
PLATE-LESS
ACCUMULATOR

*lasts twice
 as long on
 every charge!*

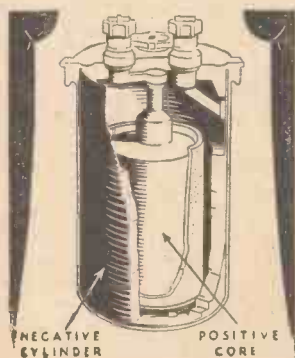
WHAT A CHRISTMAS GIFT!



**2 V.
 80
 AMP.
 HRS.
 11/6**

THIS is the power source of a new era—a neat, richly coloured cylinder in place of the admittedly crude, present-day accumulator. It is the independent patent of Mr. Leonard Fuller, M.I.E.E. (whose father and grandfather made world-famous accumulators from the days of Faraday on). Called the Block plate-less Accumulator, it gives 80 amp. hours at little more than the cost of a modern 40 amp. hour accumulator. It will not run down when out of use (no waste of

the charge). And how it lasts! (It is almost unbreakable). The diagram shows its secret—the inefficient “plates” of the modern accumulator are avoided by a special process that enables the accumulator cylinder itself to be made the negative electrode, the positive electrode being a central core. (Hence the ideal of unimpeded active surface, and even radial action.) Consider the result—twice the life per charge; more compact; simpler; immeasurably stronger. More than a battery-de-luxe—a revolution! Get a Block Accumulator from your dealer to-day, and be rid of old-time battery inefficiency.



BLOCK BATTERIES LTD ABBEY ROAD BARKING

The best S.T. 400's will be built with Direct Radio guaranteed kits

SALES ENGINEER

S.T. 400 STANDARD MODEL

1 R.I. "Hypermito" trans. & d. former	£ 12 6
1 J.B. aerial coupler, .00004-mfd.	4 0
2 Colvern S.T. 400 coils	9 10
2 Ormond 0005 mfd. variable condensers, type B.493	15 0
1 Polar .0003 mfd. differential condenser	3 0
1 Lotus .00035 or Polar .0003-mfd. differential condenser	3 0
1 Ready Radio .0001-mfd. differential condenser	2 6
2 Telsen .0003 mfd. pre-set condensers	3 0
3 Valve holders	1 6
1 W.B. Universal valve holder	1 0
2 Ready Radio 2-pt. switches	1 8
1 Telsen binocular choke	5 0
1 Ready Radio Standard H.F. choke	1 6
1 T.C.O. .0003 mfd. fixed condenser, type "S"	1 3
1 T.C.O. .006-mfd. fixed condenser, type "8"	2 0
1 Dubilier .006 mfd. fixed condenser, type 670	1 6
2 T.C.O. 2-mfd. fixed condensers, type 50	7 8
1 Dubilier 1-mfd. fixed condenser, type 9200	2 9
1 Dubilier 1-meg. grid leak with holder	1 4
1 Igranite 1,500 ohm spaghetti resistance	1 0
1 Lewcos 50,000-ohm spaghetti resistance	1 6
1 Lewcos 20,000-ohm spaghetti resistance	1 6
1 Lewcos 60,000-ohm spaghetti resistance	1 6
1 Bulgin toggle switch, type S.80	1 6
11 Belling-Lee terminals, HT-1, HT-2, HT-3, HT-4, LT-1, LT-2, LS-1, LS-2, A, E	2 3
1 Screen and foil	3 0
1 Panel, drilled	4 6
1 Terminal strip drilled	1 3
1 "Easyfix" baseboard connecting wire, flex, plugs, etc.	1 6
4 Valves to specification	1 19 3
1 Special "159" cabinet	1 1 0
1 Calibrator easy station finder. No charge.	-
£7 19 9	

SCOTT-TAGGART'S S.T. 400

KIT Model 1	(less valves and cabinet) £4 : 19 : 6
Or 12 equal monthly payments of 9/3	
KIT Model 2	(with valves less cabinet) £6 : 18 : 9
Or 12 equal monthly payments of 13/-	
KIT Model 3	(with valves and cabinet) £7 : 19 : 9
Or 12 equal monthly payments of 15/-	

KIT No. 1	(less valves and cabinet) £5 : 15 : 0
or twelve equal monthly payments of 10/9	
KIT No. 2	(with valves less cabinet) £7 : 17 : 0
or twelve equal monthly payments of 14/6	
KIT No. 3	(with valves and cabinet) £9 : 2 : 0
or twelve equal monthly payments of 16/6	
KIT No. 4	(with valves and special "159" S.T. 400 De Luxe Console cabinet and Epoch A2 Dance Orchestra Speaker) £12 : 15 : 0
or twelve equal monthly payments of £1:4:0	

JUST SIX of many REASONS why you must INSIST on a DIRECT RADIO SCOTT-TAGGART S.T. 400 KIT

1. Delivery from stock by return.
2. 12 months' guarantee.
3. Tested and approved components only.
4. Free service and technical advice.
5. Automatic station calibration.
6. Generous easy payments without red tape.

OFFICIAL DEMONSTRATION
The "S.T. 400" will be demonstrated daily at 159, Borough High Street, London Bridge, S.E.1. Come and hear the amazing results for yourself.

Special Features Exclusive to the DIRECT RADIO DE LUXE "S.T. 400" KIT

1. Greatly improved and modernised panel layout.
2. Illuminated dials.
3. Side-by-side tuning dial indicators.
4. Slow-motion differential control.
5. Simplified tuning ensuring easy station searching and calibration.
6. Modern type walnut toggle switches throughout.
7. Modern design walnut cabinet with beautiful walnut grained ebonite panel.
8. Super-power output giving maximum volume without distortion.
9. All components exhaustively tested and especially chosen to give record results.
10. NO complications in wiring involved.

S.T. 400 DE LUXE

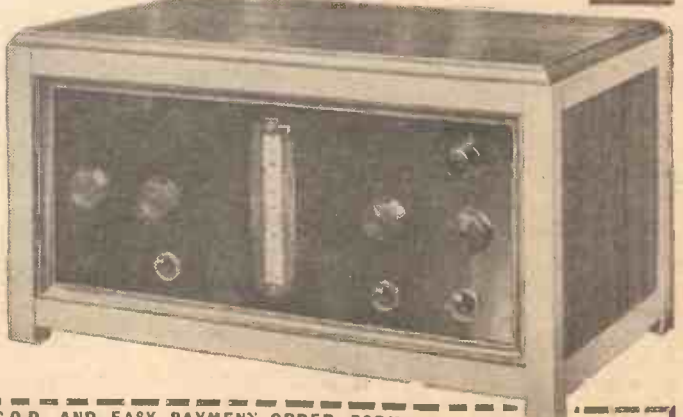
Obtainable only from the Official Distributors.

1 R.I. "Hypermito" trans. & d. former	£ 12 6
1 J.B. .00004 aerial coupler	4 0
2 Colvern S.T. 400 coils	9 10
1 S.T.M. P.11 C.O.N. slow-motion illuminated double full vision scale type F.V.V.	12 6
2 Ormond No. 8 log condensers, .0005-mfd.	8 0
1 Polar .0003-mfd. slow-motion differential condenser	6 6
1 Lotus .0005-mfd. differential condenser	3 0
1 Ready Radio .0001-mfd. differential condenser	2 6
3 Valve holders	1 6
1 S.G. type valve holder	1 0
3 Becker walnut toggle type 2-pt. switches, No. 460	5 6
1 Telsen binocular S.G. choke	5 0
1 Ready Radio H.F. choke	1 6
1 T.C.O. .0003-mfd. condenser, type "S"	1 3
1 T.C.O. .006-mfd. condenser, type "8"	2 0
1 Dubilier .006-mfd. condenser type 670	1 6
2 T.C.O. 2-mfd. condensers, type 50	7 8
1 Dubilier 1-mfd. condenser, type 9200	2 9
1 Dubilier 1-meg. grid leak and holder	1 4
1 Bulgin 1,500-ohm spaghetti resistance	1 0
1 Lewcos 50,000-ohm spaghetti resistance	1 6
1 Lewcos 20,000-ohm spaghetti resistance	1 6
1 Lewcos 60,000-ohm spaghetti resistance	1 6
11 Belling & Leo walnut terminals	2 3
1 Screen and foil	3 0
1 Walnut panel, drilled	5 0
1 Special walnut terminal strip, drilled	2 0
1 "Easyfix" baseboard	2 0
1 Ready Radio H.T. fuse and holder	1 0
1 Dial light, low consumption type	6
2 Telsen .0003-mfd. max. pre-set condensers	3 0
1 Special S.T. 400 De Luxe "159" walnut cabinet	1 5 0
4 Valves: PM12A, PM2DX, PM1HL, PM202	2 2 0
1 Calibrator easy station finder. No charge.	2 0
£29 9 0	

"THE BAND-PACK"

1 Panel, 14" x 7" Permcoll, ready drilled	£ 4 6
1 Easyfix baseboard, 14" x 10"	1 0
1 .0003-mfd. .00035-mfd. differential reaction condenser, Ready Radio	3 0
1 T.C.O. 1-mfd. fixed condenser, type 30	2 10
1 T.C.O. .0002-mfd. fixed condenser, type 30	2 4
1 T.C.O. .0003-mfd. fixed condenser	1 3
1 Dubilier .0001-mfd. fixed condenser, type 665	6
1 Dubilier .02-mfd. fixed condenser, type 8200	2 0
1 Lewcos 50,000-ohm wire-wound potentiometer	3 0
1 Dubilier 2-megohm resistance	1 0
1 Dubilier 1-watt 5,000-ohm resistance	1 0
1 Formo three-gang combined condensers and coil assembly	2 6 6
1 Ready Radio S.G. H.F. Choke	1 0
1 Ready Radio Standard H.F. Choke	1 6
1 Ready Radio 3-pt. on-off switch	1 6
3 Valve holders	1 6
1 R.I. Dux L.F. transformer	1 6
1 Single fuse holder and fuse	1 0
2 Terminal strips, 2" x 1 1/2"	1 3
6 Belling-Lee plugs	1 0
4 Belling-Lee terminals	10
3 Mullard Valves: PM12, PM1HL, PM2A	1 12 3
1 "159" cabinet	1 0 0
Flex, screws, connecting wire, etc.	1 5
1 Calibrator easy station finder. No charge.	-
£7 2 9	

KIT Model 1	(less valves and cabinet) £4 : 10 : 6
or 12 monthly payments of 8/6	
KIT Model 2	(with valves less cabinet) £6 : 2 : 9
or 12 monthly payments of 11/6	
KIT Model 3	(with valves and cabinet) £7 : 2 : 9
or 12 monthly payments of 13/6	
KIT Model 4	(complete kit with valves, "159" Walnut Console Cabinet and Epoch 20th Century Moving Coil P.M. Speaker) £9 : 5 : 0
or 12 monthly payments of 17/-	



CASH, C.O.D. AND EASY PAYMENT ORDER FORM.
To: Direct Radio Ltd., 159, Borough High Street, London Bridge, S.E.1

Please dispatch to me at once the following goods

for which (a) I enclose (b) I will pay on delivery (Cross out line) (c) I enclose first deposit of {not-applicable} £.....

NAME

ADDRESS

Pop.W. 3/12/32

DIRECT RADIO LTD., 159 BORO' HIGH ST., LONDON BRIDGE

FROM THE TECHNICAL EDITOR'S NOTE BOOK

TESTED AND FOUND-?



NEW INTERSTAGE COUPLER

EFFICIENCY and simplicity nearly always go hand in hand in radio, although it may often happen that there are tendencies to exalt the one at the expense of the other.

But this certainly does not apply to the new Goltone H.F. Coupling Unit. Here you have the two qualities in perfect harmony.

The unit contains a high-inductance H.F. choke, a decoupling resistance and by-pass condenser and a coupling condenser. In fact, all the subsidiary elements of modern S.G. or Variable-Mu H.F. interstage coupling. (The team is completed, of course, by a coil unit and tuning condenser.)

The whole group is enclosed within a metal can, which is well spaced from the carefully compacted components.

This complete shielding which results—for even the anode connecting lead is screened—removes practically every possibility of H.F. "feed back," and when a screened coil is employed high magnification becomes completely manageable.

The unit can be used by itself as an untuned H.F. Coupler, although the advantages of adding a tuned circuit are very great.

THE GOLTONE COUPLING UNIT

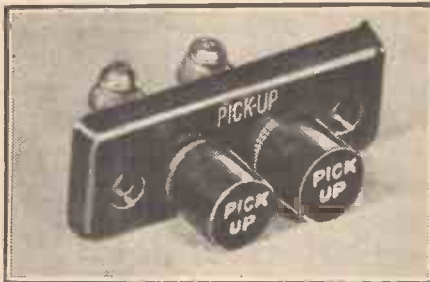


The H.F. choke and the decoupling and coupling components needed in an S.G. stage are all embodied in this Goltone unit.

The Coupler only costs 9s., and the individual components in it would cost as much to buy separately. Therefore, the added compactness, the shielding (very important, that) and the reduction of wiring are practically all clear gain.

The component parts are of high-grade construction and the bypass condenser is non-inductive. This, together with the

FOR RADIOGRAMS



This neat fitment is made by Messrs. Belling-Lee.

presence of screening and short wiring, amply justifies its comparatively low capacity value.

I have had the Goltone H.F. Coupling Unit thoroughly tested in its elements and as a whole, and it has proved to be as I have already intimated, as efficient as it is convenient in form.

A PLUG AND SOCKET STRIP

When I look at this season's plugs and sockets I wonder why it was that those of, say, 1928 (or many of them at any rate) were so unsatisfactory.

They are such simple articles, but even nowadays one is apt to meet plugs which won't fit sockets nicely, and sockets which refuse anything but bits of match stalks carefully trimmed.

The fact is plugs and sockets demand just as careful craftsmanship in their way as do apparently much more intricate devices if they are to be satisfactory. Belling-Lee are terminal and plug specialists; they make many millions of them every month of every year and have been doing so for a long time.

Therefore, it would be more than strange if their plugs and sockets did not connect

sweetly and effectively. These remarks are occasioned by the neat little plug and socket strip illustrated on this page.

It only costs 9d., but many constructors will appreciate the finishing touch it gives to a set. It is obtainable in other letterings besides the one shown.

My only criticism is that the sockets could with advantage be "lipped over" a little more. One in my sample can be pushed out—but it takes rough handling to do that.

CONSTANT INDUCTANCE

You may remember that there was quite a bit of correspondence in "P.W." some few months ago about air gaps in chokes and transformers.

The object of an air gap is to enable the component having it to maintain a constant inductance although the current flowing through it may be of any value up to a specified maximum.

The gap is a complete break in the iron core, so instead of this forming a completely uninterrupted circuit, a layer of air of a certain thickness is interposed.

I haven't the space to discuss the merits of the system here, but you have a practical example of its application in the Igranitic type C.H.2 Choke. This is fitted with two windings, and these can be used in either series or parallel.

In series they offer an inductance of 40 henries at any current up to 40 m.a., the resistance being 600 ohms.

In parallel any current up to 80 milliamp. can be handled and the inductance is now 10 henries.

The Choke is very substantially made, and can be used with confidence in smoothing circuits, or as an output choke, etc. I always regard adaptability as a great advantage in radio components, and no doubt all constructors appreciate this quality, not the least because of its economy appeal.

The Igranitic C.H.2 is two chokes in one, and at 9s. 6d. is excellent value for money.

(Continued on next page.)

AN IGRANIC CHOKE



The type C.H.2 Igranitic Tapped Constant Inductance Choke.

TESTED AND FOUND—?

(Continued from previous page.)

PROTECTING THE SET

It would seem from some home-built sets I have examined that at least a few constructors aim at protecting fuses rather than at ensuring the fuse protects the set.

But fuse parsimony is indeed a false economy. It is much better to prescribe to the belief that fuses are made to be blown, rather than that a fuse should have a "breakdown" value well above the normal current passing through the circuit it is supposed to protect.

The fuse must be the weakest current-carrying link in the whole chain or it ceases to be useful.

But the fuse must be easily accessible and replaceable or there will be a great temptation to safeguard its life by making it over-robust.

I am in favour of panel mounting fuses, for mains sets in particular. Not necessarily the front panel, but a panel that is at least on the exterior of the set, perhaps even at the back.

A BELLING-LEE FUSE



This fuse is designed for panel mounting.

There is a Belling-Lee fuseholder that is neat enough for fitting anywhere on a set in this manner.

You can see the component parts of it in a photo which appears above.

The bottom part remains permanently fixed to the set, and the neat little knob can be pulled out bringing with it the tubular fuse element. This last is as quickly detached and a new one can be put in and the whole device brought back to normal in a matter of seconds.

It is a very efficient article and at 1/6 complete with one fuse it will bear no criticism in regard to price.

THE TELSEN TERMINAL BLOCK

When a battery cord is used instead of a series row of terminals, there are still the aerial, earth and loudspeaker connections to be made.

Of course, these could be taken from the interior of the set, but it is far better to have terminals for them.

And there are very neat two-terminal blocks available. For example, Telsen manufacture them, and Telsen prices and moulding expertness are well-known.

The Telsen terminal block is a particularly attractive production, and although it is simple in character it none the less bears the stamp of careful design and skilful production.

It is an axiom that the small things make or mar a manufacturer's reputation; Telsen are not likely to, and in fact they do not fail in this regard, as is clearly proved by this terminal block.

NEW EELEX TERMINAL

The new A1 Terminal now being manufactured by Messrs. J. J. Eastick & Sons, embodies a useful original idea. Its indication is interchangeable. With each set of four terminals 24 indicating tabs are supplied, and unwanted ones can be changed at the dealers for any others in the wide range of 40 that is available.

It has other attractive features, too. The freely rotating head cannot come off and provision is made for the reception of a wander plug.

It will take spade or tag terminals or wire. It is a robustly designed article and is given a good nickel-plate finish.

A HEYBERD UNIT

Messrs. Heyberd pay a graceful tribute to our monthly sister journal, "Modern Wireless," in styling one of the most popular of their new mains units the M.W. 1.

This model is the outcome of suggestions made by the Research Department of "Modern Wireless."

The outstanding feature of it is that it has an alternative output switch enabling a choice of two outputs to be made.

When this switch is in the minimum position the unit is ideal for battery sets and provides tapings up to 150 volts at 30 milliamperes.

The other switch position takes the

maximum output up to 200 volts at 50 milliamperes and renders the unit suitable for A.C. valves.

Additionally, in each case there is a variable tapping and a further fixed tapping.

It is a magnificent unit and its adaptability makes it a most attractive proposition.

The smoothing is excellent and I regard it as the peak of mains unit achievement.

Readers having A.C. mains should make a

FOR BATTERY OR A.C. SETS



The Heyberd Mains Unit is adaptable by simple switching for either battery or A.C. valves.

special point of acquiring literature about it and studying its specification and price before making their choice of unit. It may not be as cheap as some, but it has a generous output and is designed and built on really sound engineering lines.

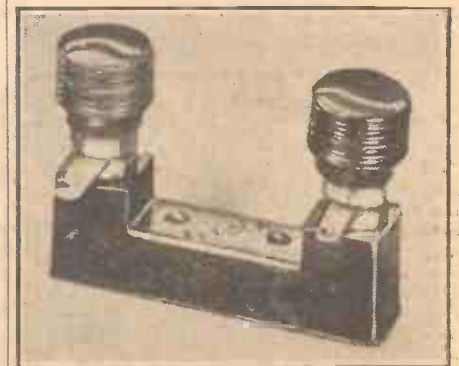
FOR CRYSTAL SETS

Messrs. Ward & Goldstone are making a first-class substitute for natural crystal. It is styled "Rotorite," and is sold at 6d. in the form of a neat moulded tablet. It is sensitive all over its surface.

"Rotorite" can be fitted to any standard crystal detector without trouble.

I have carefully tried it in the Research Department, and find it to be a highly-effective detecting material.

FIRM FIXING

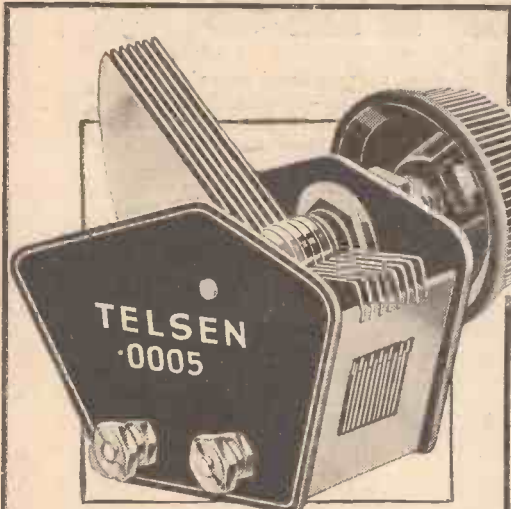


Note the fixing holes for vertical screws in this Telsen terminal block.

Manufacturers and traders are invited to submit radio apparatus of any kind for review purposes. All examinations and tests are carried out in the "P.W." Technical Department with the strictest impartiality, under the personal supervision of the Technical Editor. We should like to point out that we prefer to receive production samples picked from stock, and that we cannot in any circumstances undertake to return them, as it is our practice thoroughly to dissect much of the gear in the course of our investigations! And readers should note that the subsequent reports appearing on this page are intended as guides to buyers, and are, therefore, framed up in a readily readable manner, free from technicalities unnecessary for that immediate purpose.

TELSEN

DIFFERENTIAL, REACTION & TUNING CONDENSERS



TELSEN DIELECTRIC TUNING CONDENSERS

New design of great rigidity and exceptional compactness, ensuring the utmost efficiency in use even where space is very limited. The well-braced vanes are interleaved with a minimum of the finest solid dielectric, giving absolute accuracy of tuning. Supplied complete with knob.

In capacities '0005 and '0003 **2/6**

TELSEN AERIAL SERIES CONDENSER

The ideal volume and selectivity control, solidly constructed, with very low minimum capacity. The externally keyed switch-arm when rotated to a maximum position, connects with a contact on the fixed vanes, thus short-circuiting the condenser for maximum volume. Supplied complete with knob.

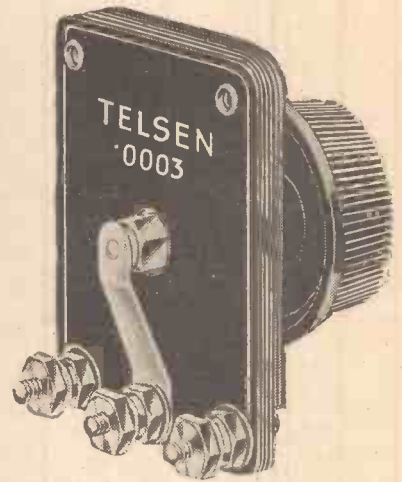
Capacity '0003 **2/3**



TELSEN DIFFERENTIAL CONDENSERS

Improved type of exceptionally rigid construction. The rotor vanes are keyed to the spindle and fitted with definite stops. A strong nickel silver contact makes connection to the rotor, a positive connection being made to the stator vanes. Supplied complete with knob.

In capacities '0003, '00015 and '0001 **2/6**



TELSEN REACTION CONDENSERS

Built to the highest standards of efficiency, embodying every improvement and refinement indicated by the latest research. The vanes are interleaved with the finest solid dielectric, the construction throughout being of great rigidity and exceptional precision. Supplied complete with knob.

In capacities '0003, '00015 and '0001 **2/-**

In capacities '00075 and '0005 **2/6**

TELSEN

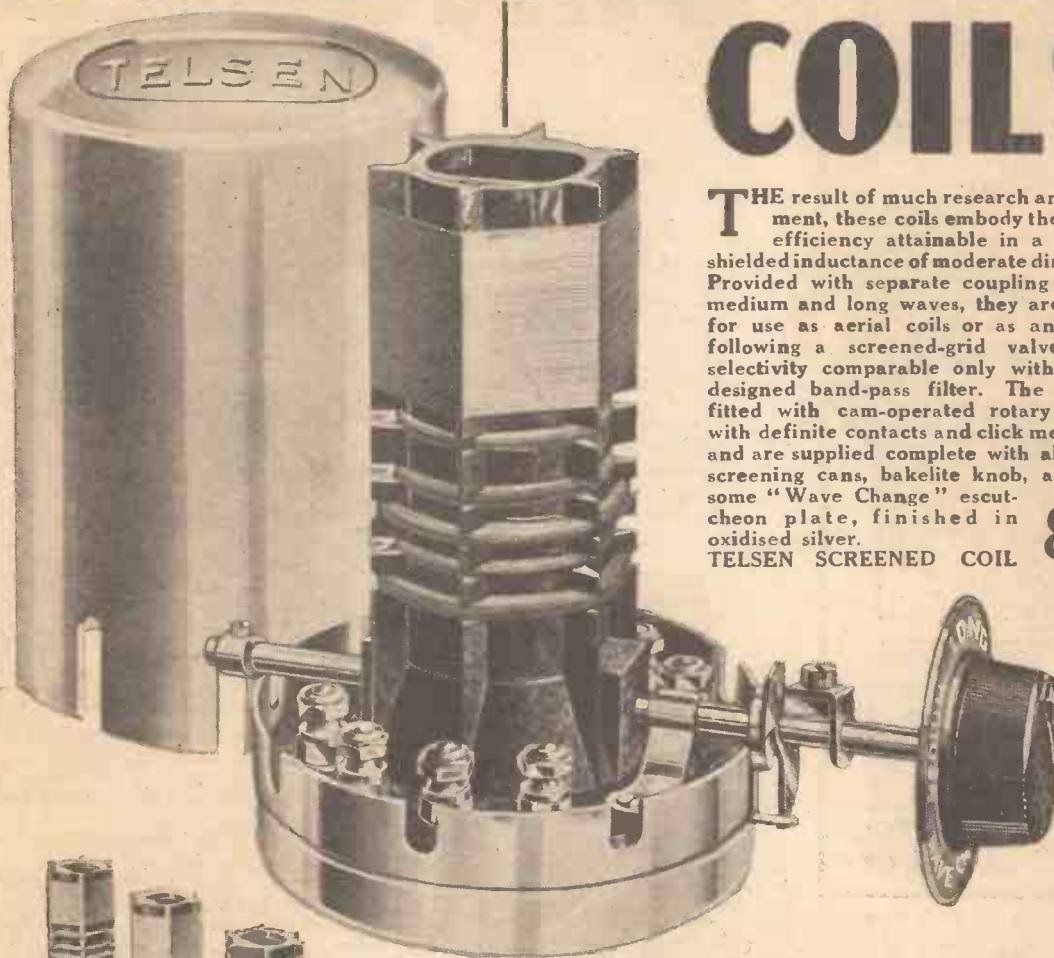
RADIO COMPONENTS

TELSEN RADIO COMPONENTS ARE 100% BRITISH

ANNOUNCEMENT OF THE TELSEN ELECTRIC CO., LTD., ASTON, BIRMINGHAM

TELSEN

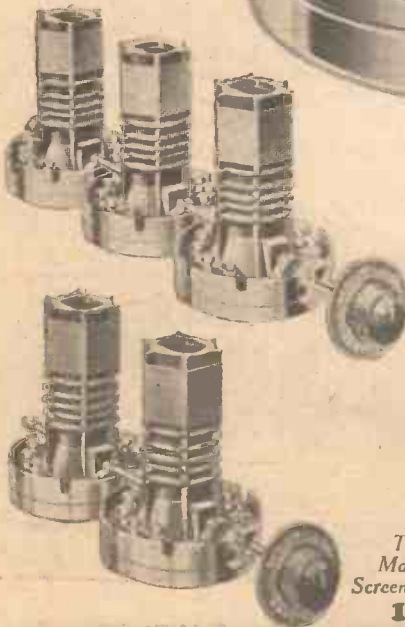
SCREENED TUNING COILS



THE result of much research and experiment, these coils embody the ultimate efficiency attainable in a perfectly shielded inductance of moderate dimensions. Provided with separate coupling coils for medium and long waves, they are suitable for use as aerial coils or as anode coils following a screened-grid valve, giving selectivity comparable only with a well-designed band-pass filter. The coils are fitted with cam-operated rotary switches with definite contacts and click mechanism, and are supplied complete with aluminium screening cans, bakelite knob, and handsome "Wave Change" escutcheon plate, finished in oxidised silver.

TELSEN SCREENED COIL

8/6



Triple Matched Screened Coils
25/6

Twin Matched Screened Coils
17/-

Full instructions are supplied with every Telsen Screened Tuning Coil, shewing you the alternative methods of mounting the coils, either singly or in twin-matched or triple-matched form as required.

TELSEN
RADIO COMPONENTS

TELSEN RADIO COMPONENTS ARE 100% BRITISH

ANNOUNCEMENT OF THE TELSEN ELECTRIC CO., LTD., ASTON, BIRMINGHAM



RADIO TUTORIAL

All Editorial communications should be addressed to the Editor, POPULAR WIRELESS, Tallis House, Tallis Street, London, E.C.4.

The Editor will be pleased to consider articles and photographs dealing with all subjects appertaining to wireless work. The Editor cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped and addressed envelope must be sent with every article. All inquiries concerning advertising rates, etc., to be addressed to the Sole Agents, Messrs. John H. Lillie, Ltd., 4, Ludgate Circus, London, E.C.4.

The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialities described may be the subjects of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

QUESTIONS AND ANSWERS

POINTS TO REMEMBER WHEN ERECTING AN INDOOR AERIAL.

J. H. R. (Peterborough).—"I was recommended to get a kit of parts for your 'Apex,' and although I was not particularly interested in foreign stations at that time, it brought in so many of them (and so easily, too!) that I am now keen on keeping a supply of alternative programmes from abroad. ("O.K.," ses you! "The 'Apex' will do it.")

"But here is the snag. I am now up against it. We are going to move into a new house (top flat in big house) at the end of the

IS YOUR SET BEHAVING ITSELF?

Perhaps your switching doesn't work properly? Or some mysterious noise has appeared and is spoiling your radio reception? Or one of the batteries seems to run down much faster than formerly?

Whatever your radio problem may be remember that the Technical Query Department is thoroughly equipped to assist our readers, and offers its unrivalled service.

Full details, including scale of charges, can be obtained direct from the Technical Query Dept., POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4.

A post card will do. On receipt of this an Application Form will be sent to you post free immediately. This application will place you under no obligation whatever, but, having the form, you will know exactly what information we require to have before us in order to solve your problems.

LONDON READERS PLEASE NOTE: Inquiries should NOT be made by phone or in person at Fleetway House or Tallis House.

quarter, and the builder seems to have erected it with the determination of making an outside aerial impossible.

"Short of erecting a network of connections, or else running a wire across other people's gardens, I can't do an outside aerial at all, so I propose to use the roof space. Please give me some hints about the best way to do this, wire to use, etc."

If you have a nice roomy space under the roof you ought to be able to erect quite a good indoor aerial, which is not so much inferior to the outdoor

type as one might suppose from all that has been said about their comparative merits.

General rules to observe are that none of the wires should be run really close to walls, pipes (especially pipes), ceilings, etc., and the lead from aerial to set should be as short and direct as possible.

So choose the set's position with this in mind, and use stand-off insulators where necessary.

For the aerial a good arrangement is three or four copper wires—7/22 or the insulated "bell wire"

"P.W." PANELS, No. 100.—BUDAPEST.

The Budapest station, which works on 550 metres, is situated at a distance of about 800 miles from London.

"Hallo! Hier Budapest," and "Voici le poste radiophonique Budapest Hongrie" are the usual announcements.

The opening signal is a nine-note phrase in two-part harmony—G sharp, B, A, B, G sharp, B, A, B, G sharp.

will do nicely—stretched parallel right down the length of the space available. The wires should be about 2 ft. apart and well insulated.

At one end (or, if better at the middle of the span) all the wires are joined together in a V effect and soldered to the one that "carries on" as the down-lead to the set. Keep this lead-in as short and direct as possible on its journey to the set's aerial terminal, and pay close attention to earthing also. (Probably

for this, using switch to change over from one to the other."

Provision for connecting a gramophone pick-up into the circuit of the "Pop-Vox" receiver may be arranged in the following simple manner:

A single-pole, double-throw switch (preferably of the push-pull pattern) and two terminals will be (Continued on page 730.)

A TRUE-VIEW OF A TUNER



Wave changing, selectivity and "on-off" switching are all controlled by the single knob of this Ready Radio Coil Unit which should be viewed stereoscopically.

the water pipe will be your best method, but try anything that looks good if this should prove unsatisfactory.

You should get plenty of foreigners with such an arrangement.

FITTING A GRAMOPHONE PICK-UP.

G. L. (Aylesbury).—"I was very taken with the 'Pop-Vox' when it came out, and it has proved a fine set for distance and tone. I

DO YOU KNOW—

the Answers to the following Questions?

There is no "catch" in them, they are just interesting points that crop up in discussions on radio topics. If you like to try to answer them you can compare your own solutions with those that appear on a following page of this number of "P.W."

1. What foreign station will answer letters over the microphone in French? It can often be heard talking to listeners in England after 10 p.m. on Tuesdays and Fridays.
2. What is a watt?
3. Which country in Europe has the largest number of listeners?
4. When plugging in a mains set to the lighting system, does it matter which way round the connections are made?

shall stick to it all winter, but one alteration I should like to make is to fit a pick-up for gramophone reproduction. Please give details



"P.W.'S" TELEVISION COMPETITION

FREE TELEVISION VIEWERS FOR READERS.

viewers are going to be invited to submit reports of their experiences with them. But this is not a condition attaching to their acceptance of the apparatus. There are no obligations of any kind.

Reports Paid For.

But they are to be given the chance of contributing reports if they want to do so, and we expect most of them will, because it will be a golden opportunity to do work of definite scientific value.

FOUR SIMPLE RULES

1. Describe in not more than 50 words what you consider to be an ideal television programme item—and, very briefly, why.
2. Only one entry can be accepted from each reader.
3. Entries must be written on postcards and be posted to The Editor, "Popular Wireless," 5, Carmelite Street, London, E.C.4 (Comp.), to arrive not later than December 7th, 1932. The word "Television" should be written in the left-hand corner.
4. The Editor's decision must be accepted as final and legally binding, and this is an express condition of entry. No correspondence will be allowed. Employees of the proprietors of "Popular Wireless" must not compete.

We do not expect them to do it for nothing, however, and their reports will be paid for at our usual generous rates for contributions.

We shall ask for two reports.

1. A resumé of their experiences, and candid views of their first reception tests; this will be in the nature of an interim report; and:
2. Their considered views subsequent to at least one month of more or less continuous looking-in.

Television Investigators.

We are hoping that our six prizewinners, who all have the chance to become "P.W."

Television Investigators as just explained, will be a very mixed lot!

The fact that one may know little or nothing about radio and another be an experienced engineer doesn't matter a scrap; in fact, it will be all the better.

Television is being broadcast for all to "look-in" who care to spend the necessary time and money to make it possible for them to do so.

But we do not think that at present more than a comparative handful of enthusiasts are attempting to make use of these television broadcasts.

Hurry With Your Entry!

Our competition makes it possible for six "P.W." readers to "look-in" and see what television has to offer. And their views on the subject may prove invaluable.

We are deliberately avoiding saying anything which may prejudice them one way or another. What we desire, above all else, are completely impartial, entirely uninspired criticisms.

And we, as no doubt are all our readers, are looking forward with the intensest of interest to the outcome of this bold experiment.

In conclusion, we once again express the hope that every "P.W." reader will enter the simple postcard competition for which the valuable television viewers, complete with detailed operating instructions, are to be given as prizes.

Entries must reach us on or before December 7th, so hurry up or you will be too late.

LONG-DISTANCE RECEPTION

VIENNA'S MASTS—HUIZEN AND HILVERSUM—AMERICAN PRONUNCIATION.

The masts of the new Vienna station are of German design, and are of the composite type constructed of steel and wood.

Radio Excelsior, the new Buenos Aires station, was constructed at the Chelmsford works of the Marconi Co.

Huizen and Hilversum, the two popular Dutch stations, have an arrangement by which they exchange transmitters every three months. Thus at the end of the year Hilversum, which now announces as "Hilversum," will become "Huizen," and vice versa.

American medium-wave stations are often receivable in this country after midnight, on good long-distance sets, even of the two- or one-valve types.

As all Americans pronounce Z as "Zee," stations with call-signs like WBZ are given as W B Zee, and are usually mistaken for W B C, W B G, W B B, W B P, etc.

When trying for very long-distance reception remember that the best conditions for certain countries occur at certain well-defined times of the day, and it is a long chance against reception at other times. (Details of the best times are regularly given by "W. L. S." in his Short-Wave Notes.)

DO you want a tested television viewer for nothing? If so, you must hurry up and send your postcard entry as there are now only a few days remaining before the closing date of our competition arrives.

Don't be put off by such thoughts as, "I know I shouldn't be lucky enough to win one." Luck may certainly play a little part in the success of one or two of the ultimate prizewinners, but it may be your good fortune to experience some of that luck.

If you take a postcard, give a few minutes thought to the question, "What would make a good television programme item—and why?" and pen anything up to fifty words on the subject, you may hit on just the item, or reason that will bring you one of the prizes.

Will Cost Only a Penny.

Someone has got to win them; why not you? In fact, six readers will win! It will cost you no more than the penny for the postage stamp; the television viewers are to be delivered carriage free wherever the winners may live.

The Editor will judge the entries on generously broad principles, and literary ability will prove of little or no advantage to those who possess it.

We want your thoughts on the subject rather than skilful wording.

Even if you do not win one of the television viewers, you will have the satisfaction of knowing that you have contributed in some measure to the development of television. For the entries are to be classified and analysed and the results published in POPULAR WIRELESS for the benefit of all concerned.

But our great television scheme does not end here; that is only the first part of it.

The six readers who win television

THERE IS STILL TIME FOR YOU TO ENTER OUR
TELEVISION COMPETITION AND WIN A FINE VIEWER

New Times Sales Co 18 MONTHS TO PAY

ULTRA 1933 "TIGER"



A. C. or D. C. MAINS. S.G., S.G. Detector and Pentode. Moving-Coil Speaker. Complete with Mazda Valves. Ready for use. Cash Price, Carriage Paid **£15/15/0**

With order **20/-**

Balance in 17 monthly payments of **20/-**

Ultra "Panther." Cash or C.O.D. **£18/18/0**. Or 18 monthly payments of **24/3**.

STRICT PRIVACY GUARANTEED

THIS YEAR'S WINNER

LISSEN "SKYSCRAPER 3."
Chassis Model with (Lissen) S.G., Detector and Pentode Valves. Cash Price, **£4/9/6**. Carriage Paid. Balance in 11 monthly payments of 8/3.

LISSEN "SKYSCRAPER 3" KIT.
With Lissen Valves, Walnut Console Cabinet and Special Balanced Armature Loudspeaker. Cash Price, **£6/5/0**. Carriage Paid. Balance in 11 monthly payments of 11/6.

PHILIPS TYPE 830A

VALVE RECEIVER
For A.C. Mains. Two screened-grid, Power-Grid Detector and Pentode. Provision for Pick-up and External Speaker. Cash Price, Carriage Paid **£16/18/0**.



With order **21/6**

Balance in 17 monthly payments of **21/6**

ULTRA 1933 "BLUE FOX"



A. C. or D. C. MAINS. Detector and Pentode Valves, Moving-Coil Speaker. Complete with valves and cabinet. Ready for use. Cash Price, Carriage Paid **£10/10/0**.

With order **15/9**

Balance in 14 monthly payments of **15/9** only

COSSOR MELODY MAKER MODEL 335. Complete with Valves, Speaker and Cabinet. Employs Cossor Variable-Mu S.G., H.F. Stage Detector and Power Valves. Cash Price, **£7/17/6**. Balance in 11 monthly payments of 14/10.

BLUE SPOT SPEAKER UNIT AND CHASSIS. Type 100U. Cash Price, **£1/12/6**. Carriage Paid. Balance in 6 monthly payments of 5/2.

BLUE SPOT UNIT AND CHASSIS. Type 99P.M. Including matched Transformer. Cash Price, **£2/19/6**. Balance in 11 monthly payments of 5/6.

EPOCH "20C" PERMANENT MAGNET MOVING-COIL SPEAKER (New Edition). With 5-Ratio Input Transformer. Cash Price, **£1/15/0**. Carriage Paid. Balance in 5 monthly payments of 6/6.

W.B. PERMANENT MAGNET MOVING-COIL SPEAKER. Type PM4. Complete with Transformer. Cash Price, **£2/2/0**. Carriage Paid. Balance in 7 monthly payments of 5/9.

ATLAS ELIMINATOR. Type A.C.244. Three tappings. S.G., Detector and Power. Output: 120 volts at 20 m/a. Cash Price, **£2/19/6**. Carriage Paid. Balance in 11 monthly payments of 5/6.

GARRARD INDUCTION GRAMOPHONE MOTOR. For A.C. mains. Model 202. Mounted on 12-inch nickel motor plate with fully automatic electric starting and stopping switch. Cash Price, **£2/10/0**. Carriage Paid. Balance in 11 monthly payments of 4/7.

TELSEN JUPITER S.G.3

Sent carriage Complete Kit as Paid on first advertised less payment of Valves and Cabinet. **7/-** Cash Price, carriage paid.

Balance in 11 monthly payments of 7/- **£3.17.0**

CELESTION P.P.M. PERMANENT MAGNET MOVING-COIL SPEAKER with impregnated diaphragm and dual-impedance input transformer. Cash Price, Carriage Paid, **£2/7/6**. Balance in 11 monthly payments of 4/6.

R & A "CHALLENGER" PERMANENT MAGNET MOVING COIL SPEAKER. With special Ferranti multi-ratio input transformer. Cash Price, Carriage Paid, **£1/15/0**. Balance in 5 monthly payments of 6/6.

LISSEN S.G.3

PENTODE BATTERY SET. In Walnut Cabinet, complete with Speaker, Valves, and all necessary Batteries. Wavelength Calibrated. Cash Price, Carriage Paid **£8/17/6**



With order **13/4**

Balance in 14 monthly payments of **13/4**

AERODYNE SCREEN GRID 3



WITH VARIABLE-MU. Complete and ready to play with Valves, Batteries and Accumulator with Moving-Coil Speaker. Cash Price, Carriage Paid, **£9/9/0**.

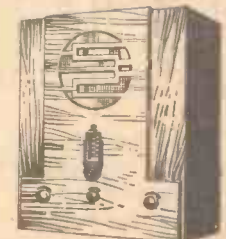
With order **14/3**

Balance in 14 monthly payments of **14/3**

ALL-MAINS MODEL with VARIABLE-MU VALVE. Cash Price, Carriage Paid, **£15/15/0**. Or by 18 monthly payments of **20/-**.

TELSEN "MAGNAMARA"

(For A.C. Mains) **S.G., DETECTOR, AND PENTODE.** Complete, ready to play, with Moving-Coil Speaker. Unstained Cabinet. Cash Price, Carriage Paid **£12/12/0**



With order **16/-**

Balance in 17 monthly payments of **16/-**

In Walnut Cabinet. Cash or C.O.D. **£15/15/0**. Or by 18 monthly payments of **20/-**.

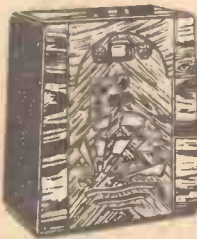
S.T.400 FINISHED INSTRUMENT



Assembled with EASIBILT S.T. 400 Kit, every Component Guaranteed. Aerial Tested. Complete with Set of Valves and Table Model Oak Cabinet. Batteries extra. Or 12 monthly payments of 15/6. **8 Gns.** Carr. Paid.

PYE "G"

(For A.C. Mains)



3 VALVE, with Band-Pass Tuning. Variable-Mu, Power Grid and Pentode. Complete, ready to play with Moving-Coil Speaker. Walnut Cabinet. Cash Price, Carriage Paid, **£18/18/0**.

With order **24/3**

Balance in 17 monthly payments of **24/3**

NEW TIMES SALES CO. 56 LUDGATE HILL, LONDON, E.C.4

Dear Sirs: I enclose £ s. d. as first payment for

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ADDRESS

P.W. 3/12/32

EVERYTHING CARRIAGE PAID

Pioneers of Radio on Easy Terms in 1924, we shall be pleased to quote you by return for all your Radio Requirements. We carry stocks of all leading Manufacturers' Products advertised in this journal. Any parcel of components or accessories over £2 supplied on Easy Terms. Send for NEW CATALOGUE.

POWDER-CORE COILS

A New, Interesting and Thoroughly Practicable Phase in Receiver Tuning.

Discussed by J. C. JEVONS.

WHEN dealing with tuned circuits one is naturally inclined to think first of inductance and capacity—the two factors which determine the wavelength to which the circuit responds. Unfortunately, it is impossible in practice to separate inductance—which always takes the form of a coil of wire—from a certain amount of ohmic resistance. If one could only discover some form of inductance that had no resistance, quite a lot of problems would be solved, particularly in connection with selectivity.

Perpetual Motion

Resistance in a circuit necessarily introduces damping, which is merely another word for electrical friction. For instance, a tuned circuit having no resistance (i.e. containing only pure inductance and capacity) would in effect be a type of perpetual motor, because it would oscillate for ever under the action of a single impulse.

But when resistance (electrical friction) is present, the oscillations have to work against it, and this tends to damp them down. The higher the resistance the quicker an applied oscillation tends to die out—or, in other words, the less selective the circuit becomes.

Damping, therefore, is the enemy of selectivity. The less the damping, the higher the selectivity, and vice versa. So

all good designers do their utmost to keep the ratio of resistance to inductance in a wireless circuit as small as possible.

One way of securing this result is to use stranded wire, such as Litz, and to space the windings well apart. But this involves other difficulties, such as extra cost, an inconveniently large size, and a wider spread of the magnetic field from the coil, which in turn gives rise to trouble by interaction with other parts of the circuit. To screen such a coil means further expense, and more valuable room taken up.

Produced by Chemical Means

Another and better solution has now been found. It is rather a curious and unexpected remedy, because it involves winding a high-frequency coil around an iron core. In the ordinary way an iron-cored coil is quite out of place on the high-

frequency side of a set, and is always confined to the L.F. circuits.

The effect of an iron core is generally to increase the magnetic field around the windings to such an extent that the coil simply refuses to allow radio-frequency currents to flow in it. It will, of course, allow low-frequency or rectified currents to flow in it, but that is another story.

How, then, is it possible to use an iron-cored coil for high-frequency work with

A ROMAN HOLIDAY



Wireless was represented by Marconi himself in the great Fascist "March on Rome" anniversary, and here he is seen before making his address to the microphone.

advantage? The answer is that the iron core actually consists of a very fine powder—so fine, in fact, that if it were not protected from contact with the air it would ignite spontaneously by oxidation.

(Continued on page 728.)

a B.B.C.

We had to abbreviate to get the title in the heading but B.B.C. stands for better Bakelite Condenser which is the new condenser produced by Utility.

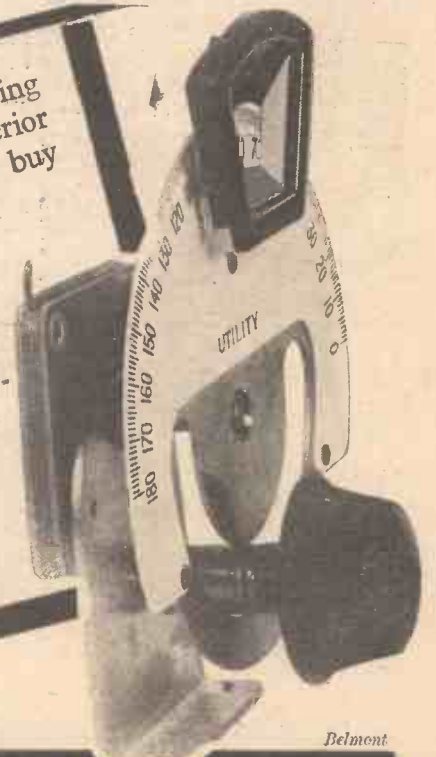
It is made for the man who has to eke out his shillings but the quality is the Utility standard and there is no higher standard.

If your dealer does not stock we will supply you direct and post free.

WILKINS & WRIGHT LIMITED
Utility Works, HOLYHEAD ROAD, BIRMINGHAM
London Agent: E. R. Morton, Ltd., 22 Bartlett's Buildings, Holborn Circus, E.C.4

So don't take the risk of using bakelite condensers of inferior make, buy a Utility and buy safety.

PRICE
complete with bracket and illuminated disc dial 4/6
Condenser separate 2/-



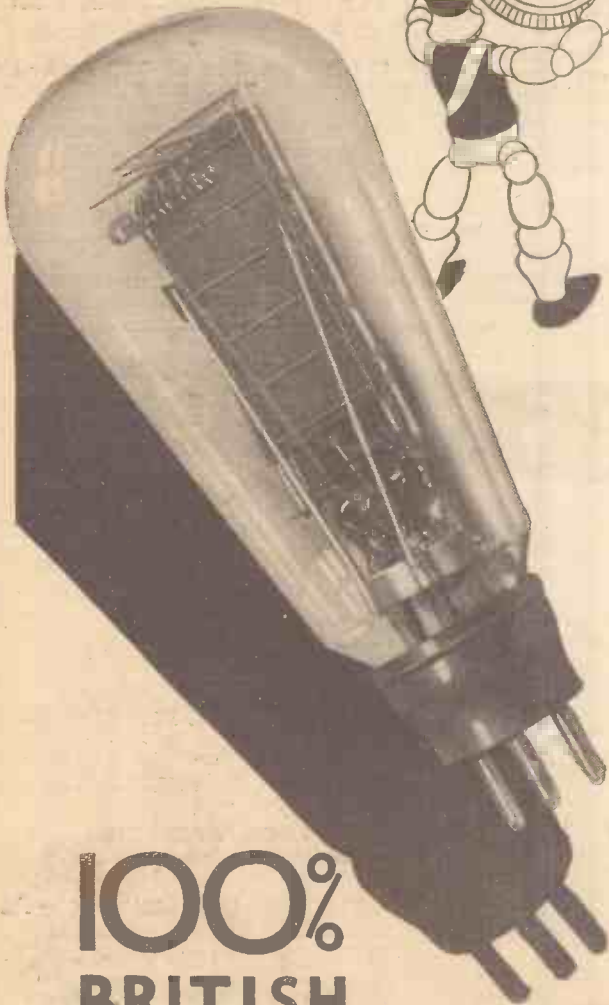
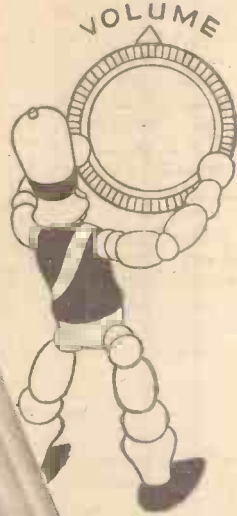
Belmont

**BETTER BAKELITE
CONDENSERS BY**

Utility

FACTS YOU SHOULD KNOW ... ABOUT THE MAZDA RANGE OF POWER OUTPUT VALVES

LOOK
FOR "EDDY"
IN YOUR
DEALER'S
WINDOW



A good receiver, whether battery or mains operated, can be made or marred by the power valve. Each type of Mazda Power valve has been designed to give its most efficient performance under specific conditions. Here is a guide to the selection of the correct Mazda Mains Power Valve for your particular purpose.

THE AC/P—a low consumption power valve for operating balanced armature speakers. It is sensitive to comparatively small inputs, and will give good results on anode voltages as low as 150.

THE AC/P1 will handle a bigger signal input and will satisfactorily operate a moving coil speaker. It requires 200 volts H.T.

THE PP5/400 is a heavy power output valve capable of fully loading a large moving coil speaker. The anode current at 400 volts is 60m/a with 30 volts bias.

For Battery operated receivers there are the following:

P220 and P220A, both capable of giving ample volume with a reasonable input. The former valve is particularly recommended where economy of anode current is a consideration.

Full details of these and other useful Mazda types will be found in the Mazda catalogue, sent FREE on request.

Mazda valves are fitted by all the leading receiver manufacturers. All good radio dealers stock them.

The amazing
MAZDA
THE
BRITISH
VALVES

100%
BRITISH

Designed by British Engineers

The Edison Swan Electric Co. Ltd.



155 Charing Cross Rd. London W.C.2

Mazda Radio Valves are manufactured in Great Britain for

The British Thomson-Houston Co. Ltd., London and Rugby.

V.109

POWDER-CORE COILS

(Continued from page 726.)

It is impossible to produce the necessary degree of fineness by grinding or crushing, or, in fact, in any mechanical way. It must be done by chemical means, generally by reducing iron oxide in a stream of hydrogen gas. As soon as the pure iron particles are deposited, they are covered with a heavy oil or varnish in order to protect them from contact with the air. The coated particles are afterwards compressed into a solid mass, which is then used to form the H.F. core.

The oil also serves to insulate each particle electrically from every other particle.

No Eddy Currents.

It is no longer a single conductor, as is an ordinary iron core (or even a series of conductors, as is the case when the core is laminated), but an immense multitude of microscopic pieces of iron. The result is that the formation of eddy currents is prevented, and so one saves an enormous amount of damping (lost energy) which would otherwise occur.

On the other hand, the permeability of a powdered core is higher than air. That is to say, it induces a larger magnetic field, for a given current flowing in the coil, than would be set up if the coil were air-cored. Now the greater the magnetic field the higher is the inductance of the coil.

The powdered-iron core, therefore, in-

creases the inductance of a given coil by a certain amount, though not so much as a solid-iron core. At the same time the ohmic resistance remains constant, because that depends solely on the length of the wire in the coil. In short, the powder core reduces the ratio of resistance to inductance, and therefore brings us nearer to the ideal conditions for selectivity.

In the new Ferrocart coils, the wire is wound toroidally around the core, so that there is practically no external field, and therefore no need for external screening. Further, for a given inductance, the Ferrocart coil is only one-third the size of a well-designed air-cored coil.

Selectivity Increase.

The relative compactness of the Ferrocart coil is one striking advantage of the new system, whilst the fact of not having to pot-screen it is another. But the chief merit arises, as previously explained, from the fact that the ratio of resistance to inductance is much smaller than in the ordinary type of coil, and the selective response of the circuit is correspondingly increased.

Coils with finely-powdered iron cores have been used in America for some time, particularly by a designer named Polydoroff, who introduced a scheme known as "permeability tuning," which does away with the necessity for using variable condensers.

Common Control.

He mounts the powdered cores of the H.F. coils so that they can be moved axially in and out of the windings. All the movable cores are linked up to a common

control, and the H.F. circuits are then tuned simply by varying the depth to which the cores extend inside the windings. In other words one gets exactly the same tuning control as that given by a set of ganged condensers, with the added advantage of securing a higher degree of selectivity than usual.

ITEMS OF INTEREST

When the Daventry National station is rebuilt by the B.B.C. (at the completion of the Regional Scheme) its power will be quadrupled.

The Lille, France, station (265.4 metres) expects to install a high-power transmitter shortly.

The Madrid Conference (on Broadcasting wavelengths, etc.) is expected to last until December.

The wavelength-check station for Norway, corresponding to our own Tatsfield, is situated on Jeloy Island.

The insertion of an old L.F. transformer's primary or secondary in the H.T. plus lead that feeds the detector is often successful in curing hum. Especially if the set side of the winding is then joined to earth through a large fixed condenser.

To obviate the necessity for employing engineers at the lonely site of the Budapest high-power station it was proposed that distant control could be employed, being carried out at regular intervals by visiting engineers.

GET THIS NEW BOOK

THE DESIGN AND
CONSTRUCTION OF
RADIO POWER UNITS

T.C.C.

Including suitable
circuits for the
elimination of inter-
ference with Radio
reception

6s

ISHED BY THE
CONDENSER CO LTD.

IT TELLS YOU ALL ABOUT

RADIO POWER UNITS—and how to build them.

NOTES ON A.C. POWER UNITS.

OPERATING RECEIVERS ON D.C. MAINS.

ABOUT T.C.C. ELECTROLYTIC CONDENSERS.

ELIMINATION OF INTERFERENCE.

FOUR T.C.C. POWER UNITS with full constructional Details.

ROTATING RESISTANCE CALCULATOR

PACKED full of real useful information and data, this T.C.C. Booklet shows you how to run your set off the electric light (A.C. Supply)—It shows you how, once and for all, to cut the cost of expensive batteries, and to get better radio. With a chapter on D.C. mains apparatus, this book should be in every electric light user's hands. Get your copy now!

COUPON

Please send me a copy of your book "The Design and Construction of Radio Power Units," for which I enclose six penny stamps to cover cost and postage.

Name.....

Address.....

P.W. 3/12/32.

Please write in Block Letters

Ask your Dealer

If you have any difficulty in obtaining a copy of this book. Fill in the coupon and post to us with six penny stamps. We will send you a copy by return.

T.C.C.

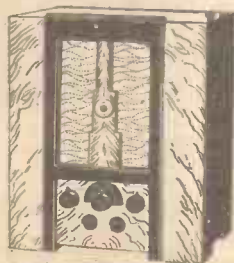
ALL-BRITISH
CONDENSERS

1882

Each the Best in its Class

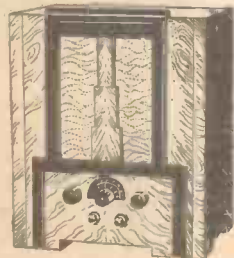


The "PEER."
3 Valve S.G. Det. Power and band pass filter. 3 tuned circuits, single knob control, variable selectivity. Permanent Magnet Moving Coil Speaker. Price, including valves .. **£14 : 14 : 0**



The "GENERAL."
2 valve detector and power, transformer coupled. Special selectivity control. Floating cone speaker with 4-pole Balanced Armature unit. Price, including valves and batteries .. **£5 : 5 : 0**

The "DUKE."
A de-luxe two valve, employing same circuit as the "General" and with improved cabinet. Special coupling transformer and moving coil speaker (permanent magnet). Price, including valves .. **£6 : 15 : 0**



MARLBOROUGH Preference Radio
MARLBOROUGH Preference Radio—this is the radio that England wanted. Before production was put in hand, extended investigations were made to discover the preferences of radio listeners. These preferences have been scrupulously observed and each Marlborough Radio instrument has been built to give the best possible performance.

Visit your dealer and ask him for a demonstration. Examine the beautiful cabinet work, hear the beautiful natural tone of the speaker, see how it separates the powerful transmitters. Then look at the chassis and inspect the fine components used.

Then you will decide to buy a Marlborough Radio before this season closes. Full details of the various Marlborough models will be sent post free on request.

Trade Enquiries to:
MARLBOROUGH RADIO CO., LTD.,
PRIMROSE WORKS, ASHTON RD., OLDHAM, LANS.
Telephone: 4213-Mains Oldham.

MARLBOROUGH PREFERENCE RADIO RECEIVERS



Stowe and Bowden



THE MILNES H.T. UNIT

Supplies smooth and constant H.T. Current from your Low Tension Accumulator

THE MILNES H.T. Supply Unit marks a revolutionary advance in H.T. Power supply. Fed by the L.T. Accumulator, it is capable of supplying ample current for the largest sets. The high efficiency and economy of the Milnes H.T. Unit has been tested and proved by the Wireless Press and users throughout the world. Christmas is the time for presents, and you cannot find a better or a more useful present for any Wireless owner. It will mean a considerable saving on H.T. current this year and for many years to come.

Read these Test Reports of Technical Press

"AMATEUR WIRELESS."—
JULY 30.

"It employs a series of cells containing special nickel and steel plates, and uses a solution of caustic potash as an electrolyte. It is impossible for the cells to be ruined by sulphation and since the plates are made of steel, damage due to internal shorting is obviated. The unit tested gave a perfectly even and noiseless discharge."

"POPULAR WIRELESS."—
SEPTEMBER 3.

The cells do not suffer from the disadvantages of the lead type, for they are immune against sulphation and under- and over-charging do them little or no harm. Moreover, as no acid is used there is no corrosion. And it supplies its H.T. current with a regularity and evenness more reminiscent of mains than batteries.

"WIRELESS WORLD."—

"The charging current is derived from a 6-volt L.T. Battery, yet it provides an H.T. supply of from 90 to 200 volts, according to size of unit installed. The switch can be left in the charging position whenever the receiver is not in use, and no wastage of L.T. current will accrue. We have tested one of the latest Milnes Units and find it perfectly satisfactory.

An all-night charge from a 6-volt accumulator suffices to keep the battery in tip-top condition, and there is very little additional work imposed on the L.T. battery."

"MODERN WIRELESS."—

"The Milnes H.T. Supply Unit comprises a bank of nickel-iron type secondary cells which can be charged from an L.T. Accumulator when this is not working the set. The unit has been giving excellent service and there are no signs of depreciation."

NEW FACTORY

The increasing demand for the Milnes Unit by the private wireless user and the Government services has compelled us to acquire a new factory. In this way, early deliveries are ensured.

PRICES	
90 volt	£2 18 0
120 volt	£3 16 0
150 volt	£4 14 0
(Electolyte extra.)	

MILNES RADIO CO., VICTORIA WORKS, BINGLEY, YORKS



MILNES H.T. SUPPLY UNIT

SEND FOR THIS FREE BOOKLET

Stowe and Bowden.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 723.)

required. These may conveniently be fitted above, and on either side of the dial of the Extender condenser. Viewing the dial from the front of the cabinet, the switch should be on the left and the two terminals on the right.

First of all, remove the two leads from the G terminal of the V1 valveholder which go to the .0003-mfd. grid condenser and 2-meg. grid leak respectively. The terminal of the .0003-mfd. condenser thus left blank is connected directly to the blank terminal of the grid leak.

The G terminal of V1 is now connected to the centre contact of the single-pole double-throw switch. One of the other switch contacts is joined to the terminal of the grid leak which has been connected to the .0003-mfd. condenser.

The remaining switch contact is connected directly to one of the two terminals. The other terminal is provided with a flex lead, terminating in a wander-plug for insertion in the grid battery.

The change from "radio" to "gramo." is effected by pulling out the switch knob or pushing it in. On the "radio" side the circuit remains essentially as before.

On the "gramo." side, the detector valve is disconnected from the high-frequency circuits and automatically converted into an L.F. amplifying valve. It should, accordingly, be operated as such.

The H.T. it receives via the H.T. + 1 terminal may be increased to the maximum voltage available with benefit. The pick-up terminal which is connected to the grid battery should pick up therefrom a negative voltage recommended by the maker of the detector valve as suitable for grid bias when the valve is used for amplification at the H.T. voltage employed.

The value of this grid bias will not usually exceed 1½ volts.

THE "W.L.S." ONE FOR SHORT WAVES.

A. C. D. (Workshop, Notts).—"I am a new reader of your book, which I have been reading now for the last month or so.

"I am very interested in short waves, and I have noticed that there have been various reports about a 'Short-Wave One-Valve Set' in POPULAR WIRELESS.

"Will you please tell me if I can obtain the back number of POPULAR WIRELESS describing the 'S.W. One-Valve Set'?"

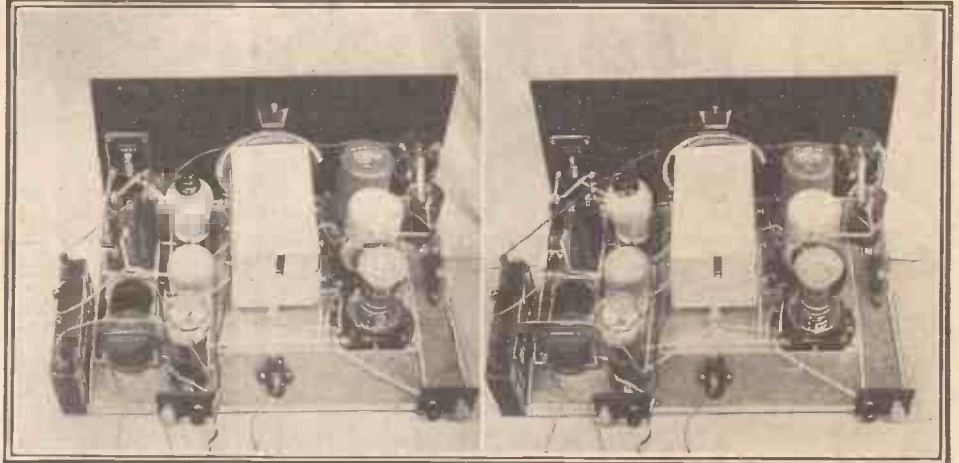
"If the back number is still available, where have I to send for same?"

"In conclusion I should like to say how good your book really is."

The "W. L. S." One was described in the April 10th, 1932, number of "P.W."

You can obtain this—or any other back number of "P.W." which is still in print—from the Amalgamated Press, Ltd., Back Number Dept., Bear Alley, Farringdon Street, London, E.C.4. Price 4d. per copy post free.

THE "BAND-PACK" THREE AS A STEREO



The fine set described on preceding pages is here shown in dual perspective for owners of "P.W." True-viewers.

THE ANSWERS

TO THE QUESTIONS ON PAGE 723 ARE GIVEN BELOW.

- (1) Katowice, in Poland. The genial announcer welcomes English correspondents who pick up the station on 408 metres.
- (2) The watt is the unit of electrical power. It is equivalent to 1 ampere flowing at a pressure of 1 volt.
- (3) Great Britain is now an easy first, with well over 5,000,000 licences in force.
- (4) Generally not, for A.C. mains, but if a D.C. mains set plug is reversed you hear nothing.

DID YOU KNOW THEM ALL?

A GREAT Set-for a Good Reason

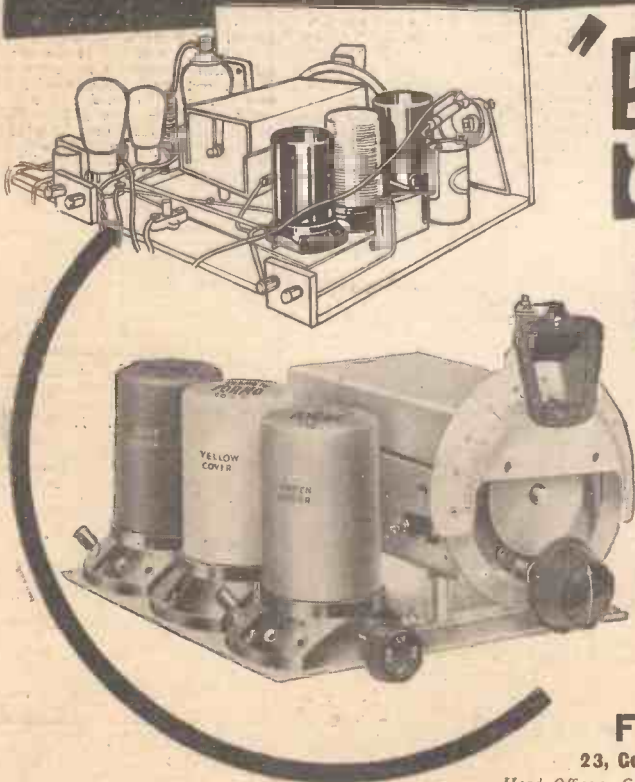
The POPULAR WIRELESS

"BAND-PACK"

with a



GANGED TUNING UNIT



A fine example of how a far better set can be built with a Formo Matched Coil and Condenser Assembly. The heart of the "BAND-PACK" is a Formo Triple Gang Tuning Unit—specified without alternative—and the result is an amazingly straightforward set giving the home constructor something new in finer performance.

The complete Formo Assembly provides the finest possible band-pass tuning, with selectivity and volume adjustable to almost any degree. It is all ready for the set—perfectly matched, simplifying construction and giving remarkable results. It's the "making" of a better set. Ask your dealer.

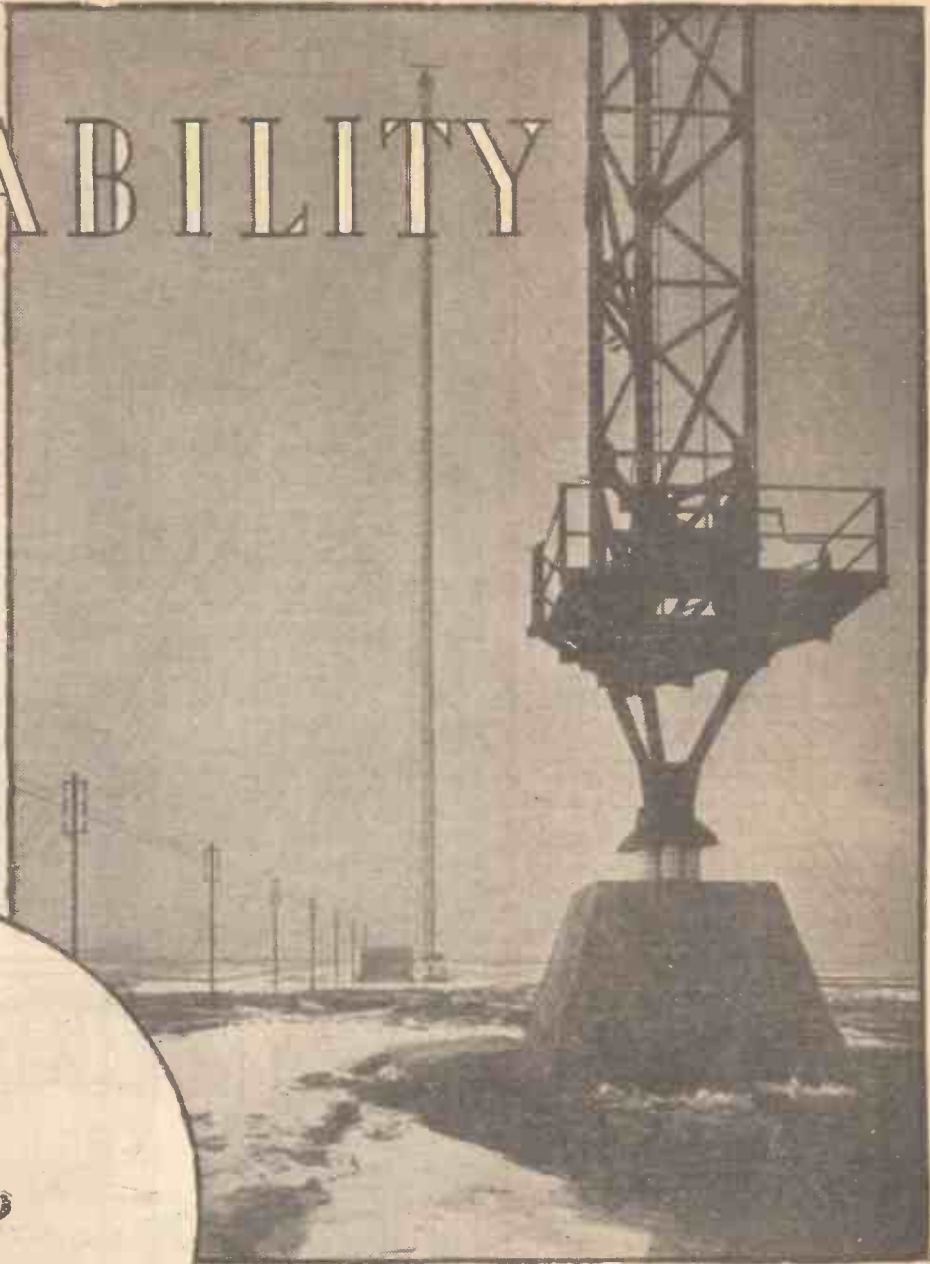
Also write for the Formo Catalogue and for Free Blueprints of the new Formo Band-Pass Circuits.

FORMO, London Showrooms,
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Head Office: Crown Works, Regent's Park, Southampton.

TRIPLE GANG	
Band-Pass Tuning Unit as specified for the "Band-Pack" and illustrated on left	
	46/6
Catalogue No. 69c.	
DUAL GANG - 33/6	
Cat. No. 72c.	

RELIABILITY



The Insulated Base of a 500ft. North Regional transmitter mast, with an aerial feeder but in the background.

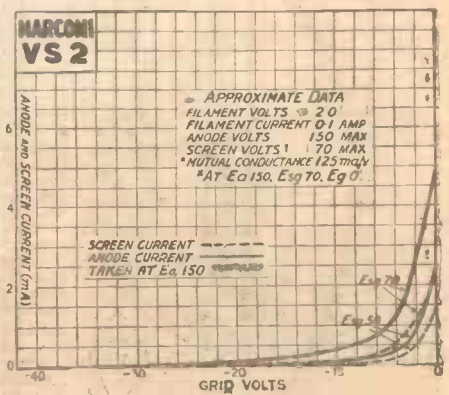
The
B. B. C.
trusts to
MARCONI
VALVES

police work; as for light-ships and lighthouses—when ever everything depends on the valves—they choose Marconi.

VS.2: A NEW 2-VOLT VARIABLE-MU

FROM mast top to insulated base; from Moorside Edge to the last studio detail at Portland Place, the B.B.C. leaves nothing to chance. Day in and day out their service must continue uninterruptedly. For the most important units of all—for the valves upon which everything depends the B.B.C. have always trusted to Marconi. As at sea or in the air; as for international communications or for

VS.2 is the latest Marconi development, providing the user of a battery-operated receiver with the enhanced selectivity, purer tone and perfect control of volume which only a Variable-Mu Valve can give. It is comparable in range and sensitivity to its famous A.C. counterpart, the VMS.4, and offers definitely improved performance to almost every user of a 2-volt S.G. Receiver. The price is only 16/-



The Marconiphone Co., 210/
212, Tottenham Court Road,
London, W.1.

TRADE JOTTINGS

By G. T. KELSEY

BY the time these notes appear in print, the festive season will be well on the way, and you will no doubt be turning your attention to ways and means of entertaining your Christmas guests.

If you want something really original and entertaining to the last degree, there is plenty of scope for hours of amusement in the H.M.V. holiday list of records.

There are, for instance, two special records called "Guess the Tunes," on each of which twenty famous semi-classical melodies are recorded. A number is announced before each tune is played, and when the needle is moved to the inner circle of the disc, the announcer gives details of the titles of the pieces.

Then there is an excellent racing game recorded under the title of "Back Your Fancy," which will provide hours of amusement. The Christmas list also includes "fortune-telling" records, and I must not omit a reference to a special disc by Claude Hulbert in which he introduces you to no fewer than seventy-two different limericks with interchangeable last lines.

How Many Stations?

What is the highest number of stations that has ever been received on any one commercial receiver? It's rather an interesting thought, isn't it, and I should be glad to hear of readers' experiences.

I do not want to dishearten you in telling you what has been done in other countries in this connection, but according to a

report that has just come to hand from New Zealand, a listener there has succeeded in logging no less than 291 verified stations on a "Majestic Model 21" receiver!

The conditions in this country, alas, are not nearly so favourable for "piling up the stations," but if by chance anyone can beat that astonishing figure (short-wave telephony stations included) then I will

"P.W.'s" postcard literature scheme saves you time and money! Week by week in these columns reviews are given of all the latest catalogues and leaflets appertaining to every aspect of radio, and if you want any or all of the literature to which reference is made, you need only send a postcard giving the numbers of those in which you are interested, and the required literature will be sent off to you free of charge except where otherwise stated. The reference numbers in each case are given at the end of the appropriate paragraph, and applications need not be limited to any one particular issue of "P.W." Postcards, on which your name and address should be printed in block capitals, should be sent to G. T. Kelsey, at Tallis House, Tallis Street, London, E.C.4.

defray the cost of a special cable to let our friends "down under" hear all about it! Old Timers!

Talking of records, I have just seen a letter from a gentleman in Birmingham in which he says that he has been using two Marconi valves since 1923, and that although they have done approximately 18,000 hours' service they are still in excellent condition! I am open to bet that he uses fuses!

All the same, it is an excellent tribute to the robust construction of Marconi valves.

The Cabinet Question.

The tendency to make radio cabinets more artistic, in fact, real pieces of furniture, is more marked this year than ever before.

I have just been examining the new "Kabilok" catalogue, wherein is listed the fine range of cabinets made by Messrs. W. & T. Lock Ltd., of Bath, and which is really "the goods." The prices, too, are right.

One model in particular, the "Lansdown"—a beautifully finished console cabinet in shaded walnut which will accommodate the set, the loudspeaker, batteries or mains unit, etc.—strikes me as a particularly attractive proposition at the modest price of £3 19s. 6d.

Perhaps you would like to learn some more about the "Kabilok" range of cabinets, in which case I shall be pleased to arrange for a copy of this list to be sent to you if you will send me the usual postcard. (No. 10)

"Akrite" not "Ulrite."

Will readers kindly note that the name of the famous Goltone aerial which, up to now, has been known as the "Ulrite" aerial, has recently been changed to "Akrite" to avoid confusion with another similarly named product.

A FAMOUS NAME



The good ship "Ferranti," named after the great radio technician.

REALISE the IMPORTANCE OF YOUR RESISTANCES! PREVENT TROUBLE

With **ERIE** GRID LEAKS & RESISTORS



Used exclusively by all leading Radio Manufacturers And now for the first time available to the amateur.

Half the constructor's troubles are due to unstable grid leaks and resistances.

Let ERIE carry the load. They are guaranteed in every respect. Safe, silent, stable and impervious to humidity fluctuations, they will solve one of your biggest problems as they have solved the similar problems of the leading Radio Manufacturers.

All values, one, two, three and five watts. 50 ohms to 4 megohms.

WRITE FOR LEAFLET.

ERIE RESISTORS carry an unqualified GUARANTEE against OPEN-CIRCUITING

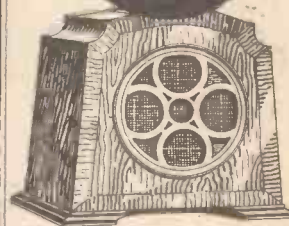
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USED IN THE B.B.C. STUDIOS

How the B.B.C. has ended "Boominess"

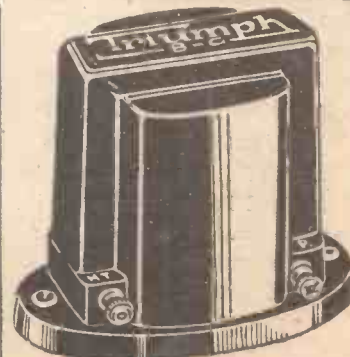


There is only one way to cut out resonance and boom, which spoils the lower notes and distorts speech—fit the patented Howe Box Baffle to your Loud-Speaker.

This latest development, as used by the B.B.C., can now be obtained complete, ready for use with your own Speaker. It will give you purity and perfection such as you never realised was possible. Complete in case, ready for use, from 30/-.

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The famous 'Triumph' Transformer suitable for 1st or 2nd stage of L.F. amplification, 5/1 ratio 3 1/2-1. Price 5/-

7-1 model. Price 10/6

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J. B. DIFFERENTIAL.
·0003, 4/6. ·0001, 4/-.
Insulated centre spindle. Bakelite dielectric between vanes.

J. B. MIDGET.
·00004. Complete as illustrated, 4/-.
Small dimensions. Low minimum capacity. Ebonite insulation. Rigid one-piece frame.

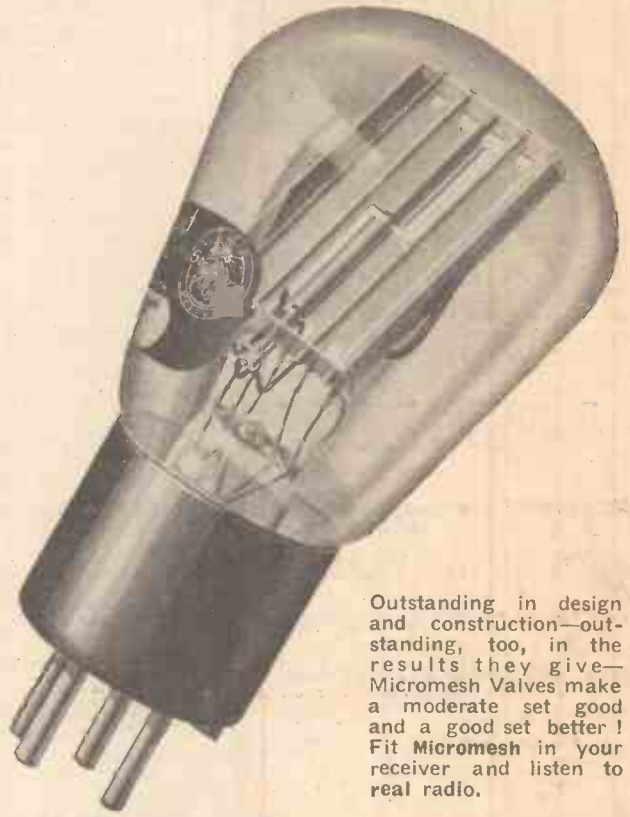
J. B. POPULAR.
Slow-motion type (35/1).
Capacity, ·0005. Complete with 3" dial, 8/6. Extra heavy gauge brass vanes. Rigid nickel-plated frame. High-grade ebonite insulation.

Ask
to
see
them
at
your
dealer's



Advertisement of Jackson Bros., (London Ltd.), 72, St. Thomas' Street, London, S.E.1. Telephone: Hop 1929.

Micromesh THE MODERN VALVE FOR MODERN RADIO



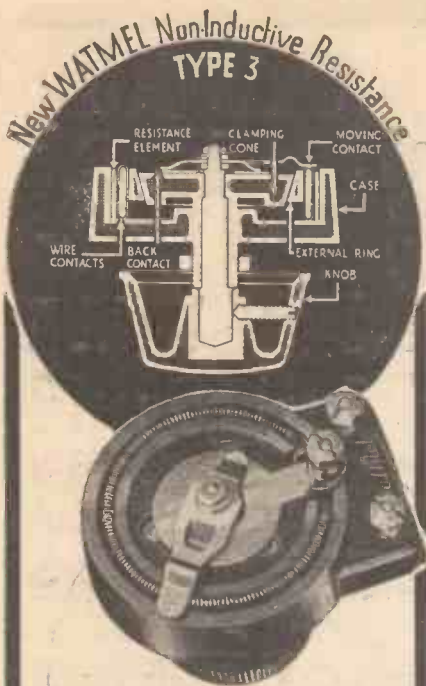
Outstanding in design and construction—outstanding, too, in the results they give—Micromesh Valves make a moderate set good and a good set better! Fit Micromesh in your receiver and listen to real radio.

- Type H.L.A.I., Detector List Price 13/6
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 - Type R.2. 15/-
- Write for the "Micromesh Valve Leaflet"; also for details of Standard Sets and Loud-speakers.

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This new all-British resistance embodies many new and novel features which guarantee a higher degree of efficiency and a far steadier performance than resistances constructed on old and obsolete principles.

Advantages:—

1. The extremely firm and even contact with the element. This is obtained by a new patented clamping cone which directly it is screwed down forces the external ring against the wire band.
The pressure is so great that perfect all-round contact is made with the element which will not vary under any circumstances.
2. Self-cleaning wiping contacts. This ensures perfectly clean contact always.
3. Non-inductive.
4. Silent in operation.
5. Price

4/6

We recommend this resistance (Type 3) only for all values of or above 50,000 ohms where wire-wound potentiometers are not required.

Patents for this new resistance have been applied for.

Write for free Component Catalogue and also for our free Circuit Diagrams.

If you have any difficulty in obtaining Watmel components, write direct to us.

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GET THE BEST OUT OF ANY SET

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EDGWARE.

Telephone: Edgware 0323.

M.C. 76

THE LISTENER'S NOTEBOOK

(Continued from page 696.)

But when the play is a good one, and the production has some pretensions to realism, listeners can easily forget their environment, no matter whether it be a theatre, drawing-room or kitchen, and giving full rein to their imagination can follow the various stages of the play as they are unfolded.

I think immediately of "The Three Musketeers," and particularly of D'Artagnan's hasty ride to the coast to take ship to England. One felt it was a long ride, hurriedly accomplished. One became breathless with him; one shared with him the hazards he took.

Totally Inadequate.

This was anything but ridiculous, and no reading, however beautifully rendered, could have done justice to it. I think, too, of the skirmishes between the Musketeers and the Cardinal's guards. Reading would be totally inadequate for these.

They need the completest declamatory acting, aided, as well, by all the devices of the Effects Department. The result was very effective and no one could call it ridiculous.

In point of fact, I've nothing but praise for the way "The Three Musketeers" was produced, although I may, perhaps, be allowed to register a mild protest against the speed at which the play went, especially in its opening stages. I do hope this non-stop craze won't spread beyond the walls of the Variety studio.

In a play where the cast is a big one, producers must remember how difficult it is for the listener to distinguish between voices. Fortunately, D'Artagnan had a curiously distinctive voice, which was easily recognisable. Had it been less distinctive, I am sure we would have been left wondering what was what on several occasions.

The females partially saved the situation by their marvellous restraint. Even so, they weren't able to prevent the play from finishing a quarter of an hour ahead of time.

It seems very bad organisation to me to finish a performance, billed to last an hour, a quarter of an hour before time. Don't rehearsals teach producers anything?

Noble Gesture.

Whether Mr. Vernon Bartlett was responsible or not for the venerable President's speech from Prague I don't know, but the fact remains that, interesting as the speech was, it was considerably at the expense of his own talk.

Our Foreign Correspondent's talk is such a high light in the week's programmes that we don't like to have it curtailed. His talk from Prague opened and progressed for a time so promisingly that when it came to an abrupt end I couldn't refrain from expressing some disappointment.

I don't wish to appear ungrateful to the aged President for his noble gesture. I can assure him that his remarks were listened to with rapt attention; nowhere could he have found a more appreciative audience.

But if Mr. Bartlett is going to get distinguished personalities from other capitals to help him out in future talks, let them come on at the end of his talk, and not in the middle.

FURTHER NOTES ON THE A-Z SYSTEM

We have had many interesting letters on the above subject from readers, some of which are dealt with below.

THE preliminary details of the new A-Z system, which is being inaugurated by POPULAR WIRELESS, has created a most gratifying amount of interest among readers, a vast number of whom have written in giving their views and suggestions concerning the scheme.

Many express their disgust with the characteristics of some of the present-day receivers and coils, and are most emphatic in their remarks.

Some of the suggestions are most useful, and we should particularly like to thank Mr. H. W. Bulstrode, of West Hampstead, and Mr. G. F. Flemmick, of Broadstone, Dorset. These two readers have had much experience with all sorts of sets and tuning systems, and give detailed accounts of their experiences.

In regard to the query from the latter reader, we should like to say that we, too, have had a great deal of trouble from the noise he mentions, and that in our case we get the trouble below 250 metres. It is constant during most of the daytime, but so far we have been unable to identify the source.

As many readers state, there is often difficulty in getting above Brussels No. 1 with many sets, and it is our intention to go into the matter thoroughly in the near future.

Complete A-Z Set.

We have also been asked if we will give details of a complete "A-Z" set, and this will be done very shortly, we hope, either with commercial coils as the basis or with the home-made variety. This set will be able to tune over the whole of the broadcast bands, from 170 to 2,000 metres, and you will hear more about it in future numbers of POPULAR WIRELESS.

In many cases of sets that are already constructed, it will be possible to convert to the A-Z tuning without anything serious in the way of wiring alterations being required, and this point, too, will be discussed later on.

There is a great deal yet to be said about the A-Z and tuning ranges in general, and we shall be publishing further articles on the subject from time to time.

No-Gap Tuning.

No-gap tuning will be dealt with next, and it will be shown how advantageous it is to have access to all the various stations that are nightly, and during the day for that matter, pushing out their programmes to all Europe. A lot of these stations are being wasted as far as British listeners are concerned, and some of these stations are going to increase their power in the near future. It is a shame to have to miss them because the set will not tune to them, isn't it?

So look out for the A-Z articles and sets that are coming along; they will affect you very closely.



6 volts
1 amp.

Price
13/-

CONSTANT NON-DETERIORATING OUTPUT

Tests carried out with various Westinghouse Metal Rectifiers show that, even after six years' continuous operation at full load, no deterioration sets in.

No other form of rectification can rival this performance—no other can maintain its efficiency for more than a fraction of this period. Therefore, if you have A.C. Mains and wish to instal the most efficient and trouble-free source of high or low tension supply by the simplest, safest and most satisfactory method, get a copy of "The All Metal Way, 1933" which tells you all about Metal Rectification.

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POST THIS COUPON TO-DAY!

Please send me a copy of "The All Metal Way 1933" for which I enclose 3d. in stamps.

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GIVES LONGER LIFE
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Type E.L.9. 80 a/h capacity	12/3
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● That's the secret, "balanced capacity," the newest principle in modern accumulator making.

The scientific design of the positive and negative plates which preserves exact electrical "balance" allows this accumulator to be charged more quickly, and to give a longer life per charge. Twenty-five years experience in battery building has gone to produce the Ediswan "Extra Life" cell. Here are some of the additional refinements incorporated: screwed vents, non-interchangeable and non-corrodible connectors, British made containers of clear glass and metal carriers which fit neatly round the containers.

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The **AMPLION**
M.C.22
PERMANENT MAGNET
M.C. SPEAKER
Price 39/6

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**fitting an
additional
speaker.....**

You obtain real portability and also simultaneous Radio reception in all parts of the house—just the thing for Christmas. The Amplion P.M. speaker is particularly suited to these requirements on account of its Universal Transformer. Connect it to a 2-valve battery set or an all-mains super-het., and the quality will be the same, sweet and pure.

Write to-night for our leaflet P.302, which fully describes this speaker.

AMPLION

AMPLION (1932) LTD., 80/82 ROSOMAN ST.,
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TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio technique.

By Dr. J.H.T. ROBERTS, F. Inst. P.

Metallised Valves.

THE anode connector to a screen-grid valve should always be insulated in such a way that even if it accidentally comes loose, or happens to touch some other conductor whilst it is being fitted, there will be no danger of a short-circuit. This is more than ever important when a metallised screen-grid valve is used because, of course, the metal coating is connected to the H.T. negative.

Only the other day I was watching an amateur fiddling about with a metallised screen-grid valve and an anode connector with a bare metal tip. Every moment I was expecting a frightful short-circuit to take place and sparks to fly, but fortunately nothing happened, which was more by good luck than good management.

Dual-Range Coils.

Dual-range coils are very convenient for avoiding the need for coil-changing when listening alternately to stations on two widely different wavelengths, such as Daventry, Radio-Paris, and so on, as against ordinary broadcast wavelengths. These coils have enjoyed great popularity.

They are mounted in such a way that the electro-magnetic field produced by the coils shall not interfere with other components in the circuit. The long-wave coil especially has to be wound in a divided or sectioned "former," so that the self-capacity of the whole is kept as low as possible.

The coil is provided with a base or with pins for fitting into a base and sometimes is arranged in two parts wound in opposite directions, so that the two portions of the winding tend to neutralise each other, the object being, of course, to avoid interaction with other components.

Astatic Coils.

An arrangement of coils like this, by the way, is called "astatic." Many people think that the astatic arrangement of coils is new and was invented with radio, but the astatic coil arrangement is really old. One of its commonest uses is in connection with galvanometers, which are really a delicate form of ammeter.

In a galvanometer the moving system is generally suspended by a very fine thread, and is provided with a tiny mirror, about a quarter of the size of a threepenny piece, upon which a beam of light is directed, the reflected beam then falling upon a graduated scale and so indicating the rotation of the moving system.

If the swinging coil of the galvanometer were not astatic it would be liable to swing about owing to stray electro-magnetic fields, such as the fields from electric tramcar cables and so on. But by using two or more coils wound in opposition the overall effect of a distant or extended source of interference is obviated.

(Continued on next page.)

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The best in its Class.

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EPOCH MINOR P.M.	27/6 5/1	5 of 5/1

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No. 1030. Price 4d. each.



Reg. Design 771548.

Cheaper model to fit under existing nut on valve top and plug in sideways. Care must be taken not to remove terminal nut while connector is plugged on, but in other respects this type of S.G. Anode Connector is perfectly safe. Anode Connectors are also useful for Pentode Valves, Tapped Coils, and for quick hook ups.

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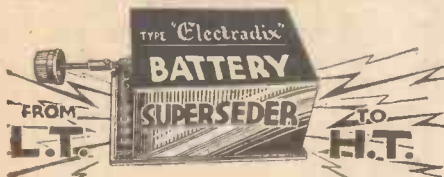
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TECHNICAL NOTES

(Continued from previous page.)

Avoiding Interference.

The field coils of the galvanometer are then arranged so as to operate locally on only one of the windings. The swinging system is, therefore, astatic in respect of outside interfering influences, but it is not astatic in respect of the coils of the galvanometer itself. This very simple and clever arrangement works admirably in a galvanometer and, as mentioned above, the idea has since been applied to radio tuning coils.

Tuning Coil Characteristics.

The characteristics of a tuning coil depend not only upon the diameter of the "former" and the number of turns of wire, but also upon the size of the wire itself and the spacing between adjacent turns. There are, in fact, other conditions which influence the tuning characteristics of the coil, but the above are the principal ones. I mention this because with modern multiple tuning circuits it is necessary to be able to produce coils which are (within at any rate a very small percentage) identical in characteristics with one another.

Coil manufacturers have succeeded remarkably well in turning out matched coils on a commercial basis and coils can now be had quite cheaply which are extraordinarily similar in their characteristics. Having got so far with the coils, it then becomes possible to gang the corresponding condensers so that several circuits can be tuned simultaneously.

Incidentally, the condensers also must be very closely alike in characteristics. By the use of pretty accurately matched coils and condensers, it is possible to tune three or even more circuits simultaneously.

High-Tension Switching.

There is a good deal of difference of opinion as to whether the high tension should be switched on before or after the valves have reached their operating temperature. With battery-operated valves, if the two are switched on simultaneously there is not really very much in it, because the valves attain their working temperature almost instantaneously.

The question becomes more important with indirectly-heated A.C. mains valves where, of course, the valves may take several seconds before "coming on." Some people argue that the H.T. should not be switched on until the filaments are fully operating, as otherwise a peak voltage effect is produced, which may be damaging to the condensers as well as to the valves themselves.

On the other hand, it is argued that if the valves are allowed to heat up first and then the H.T. is switched on, there may be a rush of current which will cause damage to the transformer or loudspeaker.

Peak Voltages.

It seems to me to be largely a question of what is the peak H.T. voltage, and what the condensers will stand. If you are using battery-heated valves and an H.T. mains unit, the static voltage of the unit when no current is actually flowing may be considerably greater than the working voltage when the valves are heated and the anode current is flowing.

(Continued on next page.)

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TECHNICAL NOTES

(Continued from previous page.)

Personally, I take the view that it is better to switch on both H.T. and L.T. simultaneously, and to allow the anode current to build up gradually as the valves attain their normal working temperature. Amongst other things, I think this is much better for the loudspeaker, particularly if this is connected directly in the anode circuit. Of course, if you use an output filter circuit, the effect is not quite so bad.

Automatic Switching.

However, if you particularly want to arrange for the anode current to be switched on automatically after the valves have warmed up, you can now get a little thermal delay switch quite cheaply, which is thrown into action by the filament current and automatically switches on the H.T. after the filament current has been flowing for a pre-determined time.

This little delay switch is on exactly the same lines as the flashers which operate the lights in shop windows, or electric signs—the lights which you see going in and out intermittently. The principle is a tiny bi-metal strip (that is, two different metals welded together), and a tiny heating coil warms this up when the current flows; owing to the unequal expansion of the different metals composing the strip, the strip bends when warm and so breaks the warming current. It then cools and goes back to its original position, thereby re-establishing contact and switching on the heating current again.

A "P.W." Device.

You may be interested to know that I designed and made a little device on precisely these lines about six years ago which, if I remember rightly, was described in "P.W." It was not for precisely the same purpose, however.

It was intended particularly for a bright emitter valve, when we used to vary the filament current through very wide limits by means of rheostats, and it could be set by means of a small adjusting screw so that if the filament current exceeded a safe value the flasher would start switching on and off, and the effect in the receiver was unmistakable.

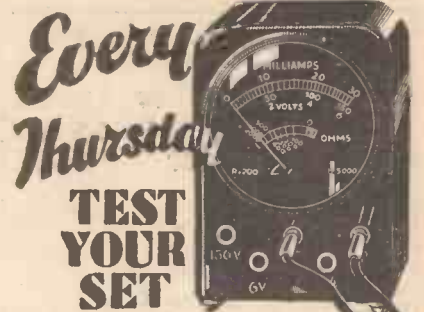
This provided a warning that the filament current was too high. The whole device was contained in a small metal container about the size of a two-shilling piece and about half an inch deep.

"A.C. Every Time."

I have, in several cases, heard readers rather lament the fact that their D.C. supply, to which they had become accustomed, was to become A.C., which they seem to dislike; but I think this is quite a mistaken view.

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(Continued on next page.)



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TECHNICAL NOTES

(Continued from previous page.)

That Output Filter.

An output-filter circuit is not always essential, but in the vast majority of cases it will be found that it is a great advantage, while in some circumstances it amounts practically to a necessity. It has several advantages, one of which is that it keeps the battery current out of the windings of the loudspeaker, whilst in addition the speech currents go to earth after traversing the loudspeaker and so the danger of motor-boating from this cause is avoided; I dare say you know that when the speech currents are allowed to pass back through the batteries motor-boating is often set up.

A further advantage of the output circuit is that by suitable arrangements it enables the output to be matched up with the valve, and also it is possible to introduce a suitable degree of tone correction which is very useful in some special cases.

Choke Feed.

The choke which is used in the feed to the anode of the output valve may have a value of something over 20 henries for most valves, but for a pentode valve this value should be considerably increased, up to perhaps twice the amount.

If the impedance of the output valve is lower than the average, for instance, if it is a special super-power valve, then the inductance value of the feed choke in the anode circuit may be somewhat reduced. The anode is then connected to the loudspeaker through a fairly large capacity condenser which may be one or two microfarads or even more, the other terminal of the loudspeaker being connected to earth.

When Using Output Transformer.

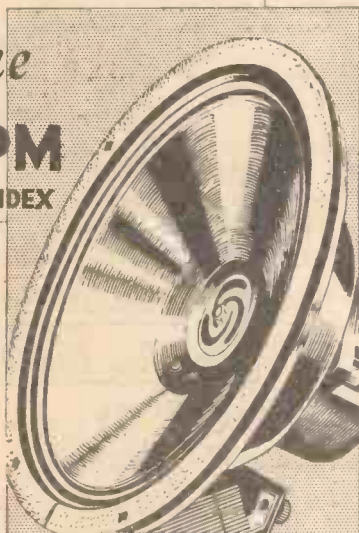
Sometimes people think that if an output transformer is used, for example, if a high-ratio step-down transformer is employed as intermediary between the output of the set and a moving-coil speaker, it is unnecessary to use a choke feed for the last valve.

This is not really the case, and even when a transformer is used in this way in the output it is still desirable to use a choke feed in the anode, because this keeps the high tension out of the transformer and also tends to overcome back coupling and motor-boating.

If a pentode valve is used in the output stage, it is important to make sure that the loudspeaker used is suitable for the output valve, or that the circuit is adjusted to meet the characteristics of the loudspeaker. I have pointed out more than once in these Notes that many people fail to get the results they should get with a pentode output stage because they do not take sufficient care to marry up the valve to the loudspeaker.

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Checking Up The Adjustments.

Repeat this on one or two more stations around the lower half of the dial.

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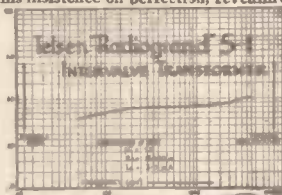


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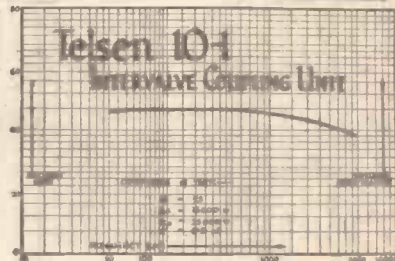
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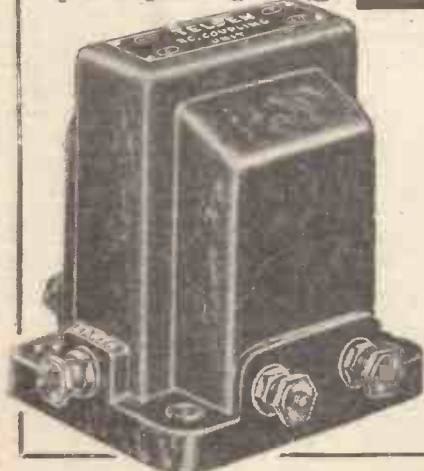
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SHORT WAVE

"ANTINODAL"

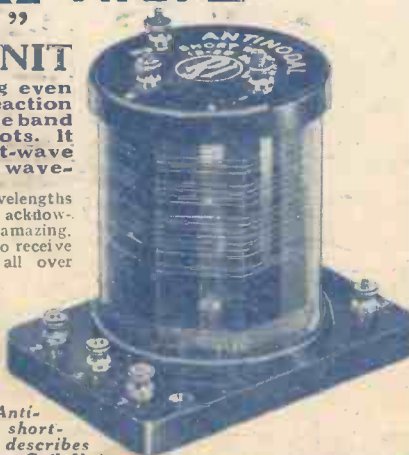
Short-Wave COIL UNIT

The only short-wave coil giving even reception and smooth reaction throughout the whole short wave band and entirely bridging dead spots. It has made reception on the short-wave bands as easy as on all other wavelengths.

Its critical handling of all the short wavelengths from 12 to 80 metres is universally acknowledged by experimenters and others as amazing. By its critical tuning they have been able to receive and separate short-wave stations from all over the world. Thus "Antinodal" has absolutely overcome short-wave reception difficulties and has definitely revolutionised present short-wave practice.

List No. BY 33. Base 2½ × 3½ ins. Overall height 3½ ins.

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Ask your dealer or write to us for the "Antinodal" booklet, which deals fully with short-wave problems and their solution and describes in detail the "Antinodal" Short-Wave Coil Unit.

'DUX' AUDIRAD

A Combination component dealing with L.F. and stopping the unwanted H.F. frequencies. Specially suitable for all modern circuits — particularly mains receivers, it is universally acknowledged as the most efficient choke in its class. L.F. Inductance 25 henries. H.F. Inductance of H.F. stopper 10,000 micro-henries. Maximum D.C. current 50 m.a.



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