

A TALK WITH A FRENCH LISTENER (See Page 1487)

Popular Wireless

Every Thursday
PRICE
3d.

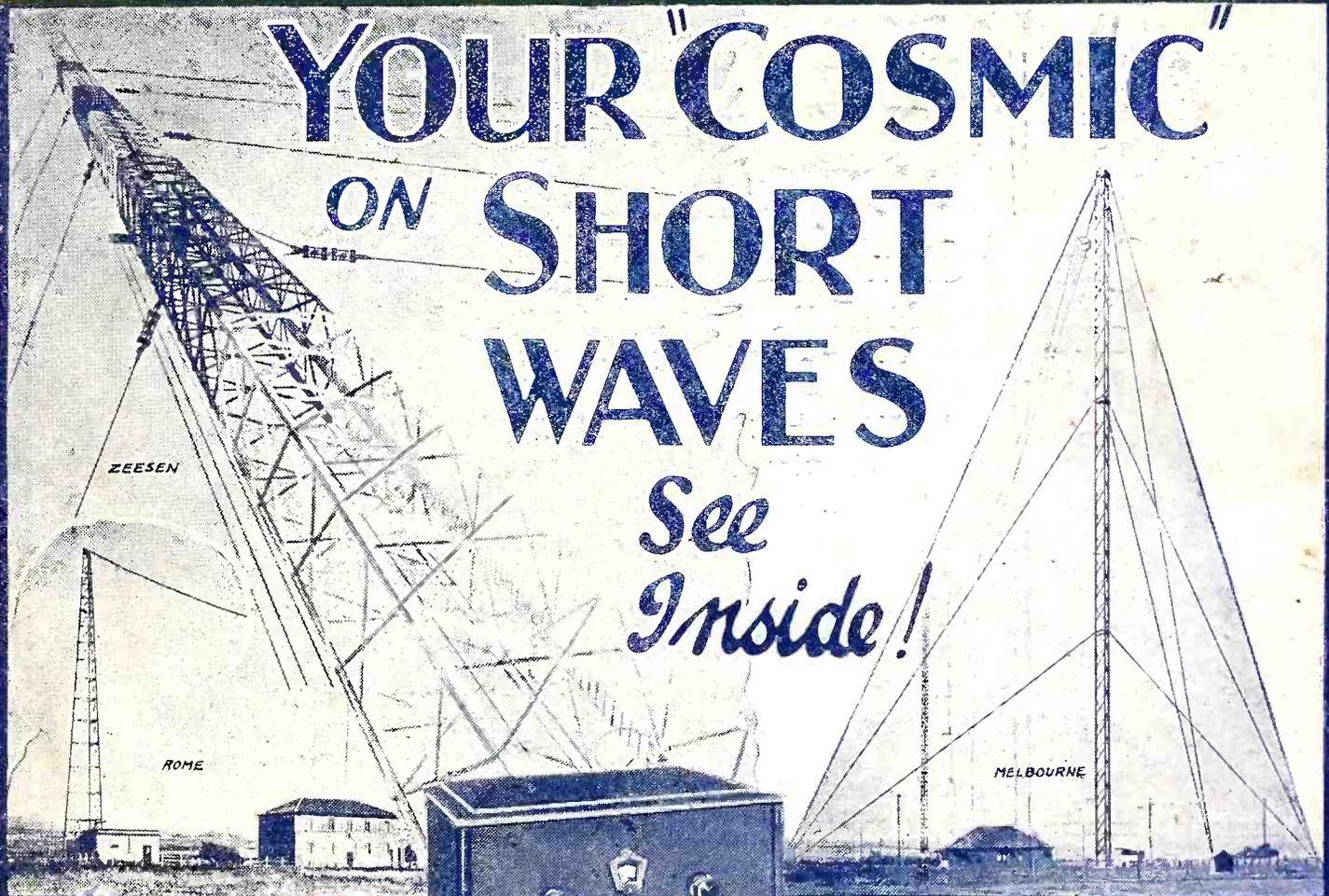
No. 509. Vol. XX.

INCORPORATING "WIRELESS"

March 5th, 1932.

YOUR "COSMIC" ON SHORT WAVES

*See
Inside!*



AND DON'T MISS :
THOSE SUNDAY PROGRAMMES
AND
SHORT-WAVE PICTURES

ALSO THIS WEEK :
SELECTIVITY AND POWER ON
YOUR "COSMIC"

By G. V. DOWDING, Associate I.E.E.

READY RADIO

Official Blueprint Kits.

See pages 1501
1502
1503

(Advt.)

COSMIC STAR



A Quality Standard Ensuring Perfect Reception and Unequalled Long-Life Economy!

THE in-built quality of Pertrix Dry Batteries and Accumulators combined with craftsmanship in manufacture definitely assures finer, farther and more pleasing reception. To change to Pertrix is to enjoy a new experience—an experience of **BETTER** wireless, smooth, silent power combined with a **LONGER LIFE** which means a new economy.

Instal Pertrix to-day and **KNOW** how good and how economical *your* set can become. Of all good Radio Dealers.

Made by
**BRITANNIA BATTERIES
LIMITED.**

at Redditch, who also make:
Batteries for Central Stations
● Batteries for Country
House Lighting ● Emer-
gency and Stand-by Lighting
Batteries for Theatres,
Cinemas, Hospitals, etc. ●
Batteries for the Starting
and Lighting, and Ignition
of Motor Cars, Motor Cycles,
Buses and Coaches ● Bat-
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Trucks, Locomotives, Ships
and Yachts ● The only
Nickel-Iron Batteries on sale
in Britain that are entirely
made in this Country.

PERTRIX

**SUPER LIFE
DRY BATTERIES
ACCUMULATORS**

**BRITANNIA BATTERIES
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Buy Your Radio this NEW EASIWAY

6/- Down

R & A "100" P.M. MOVING-COIL SPEAKER. With multi-ratio input transformer. (Cash price £2 17s. 6d.)

Balance in 11 monthly payments of 5/2.

AMPLION MOVING-COIL SPEAKER TYPE M.C.6. Permanent magnet, with output transformer. Complete. (Cash price £3 7s. 6d.)

Balance in 11 monthly payments of 6/2.

BLUE SPOT SPEAKER UNIT. 66R. With Major Chassis and cone. (37 cm.). (Cash price £2 10s. 0d.)

Balance in 11 monthly payments of 4/5.

EPOCH A2 PERMANENT MAGNET MOVING-COIL SPEAKER. Fitted with multi-ratio input transformer. (Cash price £3 3s. 0d.)

Balance in 11 monthly payments of 5/9.

CELESTION PERMANENT MAGNET MOVING-COIL SPEAKER. Type R.P.M.8, with 8" reinforced diaphragm. Excluding input transformer. (Cash price £3 10s. 0d.)

Balance in 11 monthly payments of 6/5.

MAGNAVOX PERMANENT MAGNET MOVING-COIL SPEAKER. Type D.C.142. (Cash price £2 17s. 6d.)

Balance in 11 monthly payments of 5/2.

CELESTION P.P.M. PERMANENT MAGNET MOVING-COIL SPEAKER, with Impregnated diaphragm and dual impedance input transformer. (Cash or C.O.D. £2 7s. 6d.)

Balance in 7 monthly payments of 6/8.

BLUE SPOT SPEAKER UNIT AND CHASSIS. Type 100L. (Cash price £1 19s. 6d.)

Balance in 7 monthly payments of 5/3.

W.B. PERMANENT MAGNET MOVING-COIL SPEAKER. TYPE P.M.3. With 3 Ratio input transformer. (Cash price £2 12s. 6d.)

Balance in 11 monthly payments of 4/9.

ULTRA IMP PERMANENT MAGNET MOVING-COIL SPEAKER. Complete with input transformer. (Cash price £2 15s. 0d.)

Balance in 11 monthly payments of 5/-.

ATLAS A.C. ELIMINATOR, TYPE A.C. 244. 3 Tappings, S.G., detector and power. Output, 120-v. at 20 m/a. (Cash price £2 19s. 6d.)

Balance in 11 monthly payments of 5/5.

REGENTONE W.1.F. H.T. ELIMINATOR. Tapped 60/70 v. S.G., and 120 at 12 m/a. (Cash price £2 7s. 6d.)

Balance in 11 monthly payments of 4/2.

GARRARD INDUCTION GRAMOPHONE MOTOR. Model 202. For A.C. Mains. Mounted on 12-in. Nickel Motor Plate with fully automatic electric starting and stopping switch. (Cash price £2 18s. 6d.)

Balance in 11 monthly payments of 5/3.

FORMO ECONOMY 3. With coils, less valves and cabinet. (Cash price £1 19s. 6d.)

Balance in 7 monthly payments of 5/3.

BLUE SPOT PICK-UP and TONE-ARM, with Volume Control. Cash or C.O.D. £3 3s. 0d.

Balance in 11 monthly payments of 5/9.

GARRARD 10B. Clockwork GRAMOPHONE MOTOR. 12-in. Turntable. Double Spring. Complete with fittings. (Cash or C.O.D. £2 13s. 6d.)

Balance in 11 monthly payments of 5/10.

B.T.H. SENIOR PICK-UP and TONE-ARM. Complete. (Cash or C.O.D. £2 5s. 0d.)

Balance in 8 monthly payments of 5/4.

7/6 Down

PILOT PERMANENT MAGNET MOVING-COIL SPEAKER, in handsome solid oak cabinet, with multi-ratio input transformer. (Cash price £3 15s. 0d.)

Balance in 11 monthly payments of 6/10.

EKCO H.T. UNIT. Type A.C. 25. For multi-valve sets requiring up to 25 m/a. 3 tappings, S.G., detector and 120/150 volts. For A.C. Mains. (Cash or C.O.D. Price £3 17s. 6d.)

Balance in 11 monthly payments of 7/-.

EKCO K.12 H.T. ELIMINATOR AND L.T. TRICKLE CHARGER. Delivers 12 m/a. Tapped at 80 v. (S.G.), 120/150 v. Charges 1 amp. at 2, 4 or 6 v. (Cash price £3 19s. 6d.)

Balance in 11 monthly payments of 7/3.

TELSEN TRIPLE 3. Kit of parts, with valves, baseboard, panel, wires, flex, and screws. (Cash price £4 2s. 6d.)

Balance in 11 monthly payments of 7/7.

READIRAD METEOR 3. Less valves and cabinet. (Cash price £3 15s. 0d.)

Balance in 11 monthly payments of 6/10.

10/- Down

V.3. RADIO FOR THE MILLION. With valves, less cabinet. (Cash price £5 17s. 6d.)

Balance in 11 monthly payments of 10/10.

COSSOR 234 EMPIRE MELODY MAKER. Screened-grid, Detector and Power. With valves and cabinet. (Cash price £6 15s. 0d.)

Balance in 11 monthly payments of 12/6.

EXIDE 120-VOLT W.H. TYPE ACCUMULATOR, in crates. (Cash price £4 13s. 0d.)

Balance in 11 monthly payments of 8/4.

REGENTONE W.1A H.T. UNIT. For A.C. Mains. 3 tappings, S.G., variable and power. 120/150 v. at 25 m/a. (Cash price £3 17s. 6d.)

Balance in 11 monthly payments of 6/10.

ATLAS ALL-MAINS UNIT, MODEL A.C. 188. 3 tappings, 2 variable, 1 fixed. L.T. Trickle Charger at 2, 4 or 6 v. at 1/2 amp. (Cash price £6 0s. 0d.)

Balance in 11 monthly payments of 11/1.

ALWAYS FIRST—ESTABLISHED 1919

PETO-SCOTT

77, CITY ROAD, LONDON, E.C.1. Co. Ltd.

Telephone: Clerkenwell 9406-7-8.

62, HIGH HOLBORN, LONDON, W.C.1.

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Any of the Items advertised in this page are also supplied CASH or C.O.D.

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Please send me C.O.D./CASH/H.P.

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6/- first deposit for.....

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10/- " " ".....

NAME.....

ADDRESS.....

P.A.V. 5-3-32

SEEN IT?

The March
Number of

MODERN WIRELESS

A Wonderful
Shillingsworth
NOW ON SALE**BRITAIN'S LEADING RADIO MAGAZINE—**

scores another great success with the March Number, which is now on sale. It contains many enjoyable articles, on every phase of radio, by acknowledged experts. Among the features for constructors are:—

The "BI-BAND" THREE

A logical application of the band-passing method for obtaining super-selectivity, and a breakaway in 3-valve set design, for the man who wants "distance" and unusually good quality.

AN ECKERSLEY TUNER UNIT

TO MAKE YOUR SET SELECTIVE

For the many constructors who realise the advantages of using an Eckersley Tuner, but who are unable to build an entirely new set or modify the existing one. This adaptor is *immediately* applicable to an existing outfit.

The "M.W." "CABINET" TWO

An up-to-the-minute two-valver built in console form with loud-speaker incorporated. The only external leads are the aerial and earth wires, and the set is economical to make and maintain.

Every Set-Owner and Music Lover will find something to fascinate him in the March "M.W." Here are the titles of a few of the articles you should read:—

Sir Herbert Austin on What Radio Might
Do For British Trade
Power From Low-Voltage Mains
How H.T. Batteries Are Made
Round The Turntable
Picking Your Valves
The New News ArrangementsDo Constructors Score?
A Radio Reckoner
Questions Answered
The New B.B.C. Dance Band
Trouble Tracking
On the Test BenchRecent Record Releases
On the Short Waves
Power Valve Problems
Headphone Reception on Multi-Valvers
That Air Gap
Those Mains Sets
More SelectivityINTERESTED IN
LONG DISTANCE?—*Then Read*
**THE WORLD'S
PROGRAMMES!**

"M.W.'s" Special Section for assisting you in the reception of foreign stations is packed with live information about conditions, dial readings, times to listen, hints on handling, etc.

PRACTICAL!**PRECISE!****UP TO DATE!***Here are some of the special foreign-station features in the March issue:—*What the Distant
Stations are Doing
Radio Spotlights
Getting the AmericansStation Information
Yugo Slavia's Big Noise
A Visit to Ljubljana
The Empire
Short-Wave ServiceStation Alterations
How, When and Where
Coasts of Canada
On the Medium
Wave-lengthsRadio Research
Heard in the Interval
German Technique
Using a Frame**SECURE
YOURS
TO-DAY****MODERN WIRELESS****ON SALE
Everywhere
1/-**

IMMEDIATE DELIVERY OF

PILOT AUTHOR KITS

-C.O.D.

CASH OR H.P.

KIT-BITS

Selected Components

CASH OR C.O.D.

Pay the postman. We pay post charges on all orders over 10/-

Exact to Specification

COSMIC III As described in "Popular Wireless," February 13th, 1932.

KIT "A" Author's Kit, less valves and cabinet.

CASH OR C.O.D. 70/-

EASYWAY:

12 monthly payments of 6/5

Valves as specified, £1 : 10 : 6
Cabinet, 17/6.

KIT "B"

Author's Kit, with valves but less cabinet.

CASH OR C.O.D. £5 : 0 : 6

EASYWAY:

12 monthly payments of 9/3

KIT "C"

Author's Kit complete with valves and cabinet.

CASH OR C.O.D. £5 : 18 : 0

EASYWAY:

12 monthly payments of 10/10

This is the Kit of Parts actually used and specified by "P.W." Technical Experts.

	s.	d.
1 Baseboard, 10" deep	1	0
1 Peto-Scott Panel, 14" x 7", ready drilled	4	6
1 Cyldon Extenser, Type Ex.5V	16	6
1 Telsen "Cosmic" Dual-Range Coil	5	6
1 Telsen "Cosmic" Short-Wave Coil	4	6
1 Ready-Radio .00075-mfd. Condenser	3	6
1 Ready-Radio .0003 Condenser	3	6
1 Goltone Push-pull "On-off" Switch	7	
1 Ready-Radio 3-point Push-pull Switch	1	6
1 Peto-Scott Moderator Coil Unit	2	6
1 Dubilier .0003 Fixed Condenser, Type 610	1	8
1 T.C.C. .001-mfd. Mica Condenser	3	0
1 Lissen Grid-Leak Holder	1	6
1 Lissen 2-meg. Grid-Leak	1	0
1 Graham Farish .5-meg. Grid Leak	1	6
1 Graham Farish Grid Leak Holder	1	6
3 Lotus Valve holders, Type THK	1	6
1 Lewcos H.F. Choke, Type II	6	0
1 R.I. Dux L.F. Transformer, medium ratio	4	9
9 Belling-Lee Indicating Terminals, Type R	2	3
1 Sovereign 100,000-ohm Spaghetti Resistance	1	3
1 Peto-Scott Terminal Strip, ready drilled	1	3
1 Bulgin Grid-bias Battery Clip, No. 1	6	
Connecting Wire, Flex, Screws, and 3 G.B. Plugs	6	
10 ft. Glazed Connecting Wire	6	

Any parts supplied separately. If order value over 10/- sent Carriage Paid, or C.O.D. Post charges paid.

COSMIC III STAR As described in "Popular Wireless," February 20th, 1932.

KIT "A" Author's Kit, less valves and cabinet.

CASH OR C.O.D. 87/6

EASYWAY:

12 monthly payments of 8/-

Valves as specified, £1 : 10 : 6
Cabinet, 17/6.

KIT "B"

Author's Kit, with valves but less cabinet.

CASH OR C.O.D. £5 : 18 : 0

EASYWAY:

12 monthly payments of 10/10

KIT "C"

Author's Kit, complete with valves and cabinet.

CASH OR C.O.D. £6 : 15 : 6

EASYWAY:

12 monthly payments of 12/5

This is the Kit of Parts actually used and specified by "P.W." Technical Experts.

	s.	d.
1 Panel, 14 in. x 7 in. READY DRILLED AND SLOTTED FOR PANEL CONTROLS	4	6
1 Baseboard, 10 in.	1	0
1 Ready Radio Duotune Extenser	18	6
1 Ready Radio .00075-mfd. vari. condenser	3	6
1 Ready Radio .0003-mfd. reaction condenser with slow-motion drive	7	0
1 T.C.C. .0003-mfd. fixed condenser	1	3
1 T.C.C. .001-mfd. fixed condenser	1	6
1 T.C.C. .001-mfd. mica fixed condenser	3	0
1 Goltone "Cosmic" dual range coil	5	6
1 Sovereign "Cosmic" short-wave coil	4	0
1 Peto-Scott moderator coil	2	6
2 Ready Radio push-pull "on-off" switches	1	8
1 Ready Radio 3-contact push-pull switch	1	6
1 Ready Radio radio-gram rotary switch	2	9
1 R.I. type FY1 H.F. choke	7	6
1 Lewcos L.F.T.6 L.F. transformer	10	0
3 Telsen 4-pin valve holders	1	6
1 Lissen 100,000-ohm Spaghetti resistance	1	9
1 Dubilier 2-meg. grid leak and holder	2	9
1 Dubilier .5-meg. grid leak and holder	2	9
1 Terminal strip, 14 in. x 2 in., ready-drilled	1	3
9 Belling-Lee terminals	2	3
10 ft. Glazed Connecting Wire	6	
3 Battery plugs, screws, flex, etc.	6	

Any part supplied separately. If order value over 10/- sent Carriage Paid, or C.O.D. Post charges paid.

COSMIC III

1 CYLDON Extenser, with disc drive slow motion, Type Ex.5	16	6
Set of "Cosmic" Coils, comprising Dual Range, Short Wave and Moderator Coils	12	6
Set of Specified Valves	£1	10 6
Cabinet as specified	17	6

COSMIC III STAR

1 ReadyRad Duotune Extenser	18	6
Set of "Cosmic" Coils as specified	12	0
Set of specified Valves	£1	10 6
Cabinet—to specification	17	6

COSMIC III FINISHED INSTRUMENT

Factory wired and assembled from specified components, broadcast tested. Complete with valves and cabinet and including royalties. **7 GNS.**
21/- down and 11 monthly payments of 12/6.

COSMIC III STAR FINISHED INSTRUMENT

Factory wired and assembled from specified components, broadcast tested. Complete with valves and cabinet and including royalties. **£8 : 0 : 0**
25/- down and 11 monthly payments of 13/6

RECOMMENDED ACCESSORIES

Dlex 120 v. H.T. Battery (Triple Capacity Type)	24	-
Ddex 9 v. G.B. Battery	1	-
Ede 2 v. 30/60 L.T. Accumulator	11	-
Be Spot 100 U. Unit and Chassis	£1-19	-6

ALWAYS FIRST—ESTABLISHED 1919

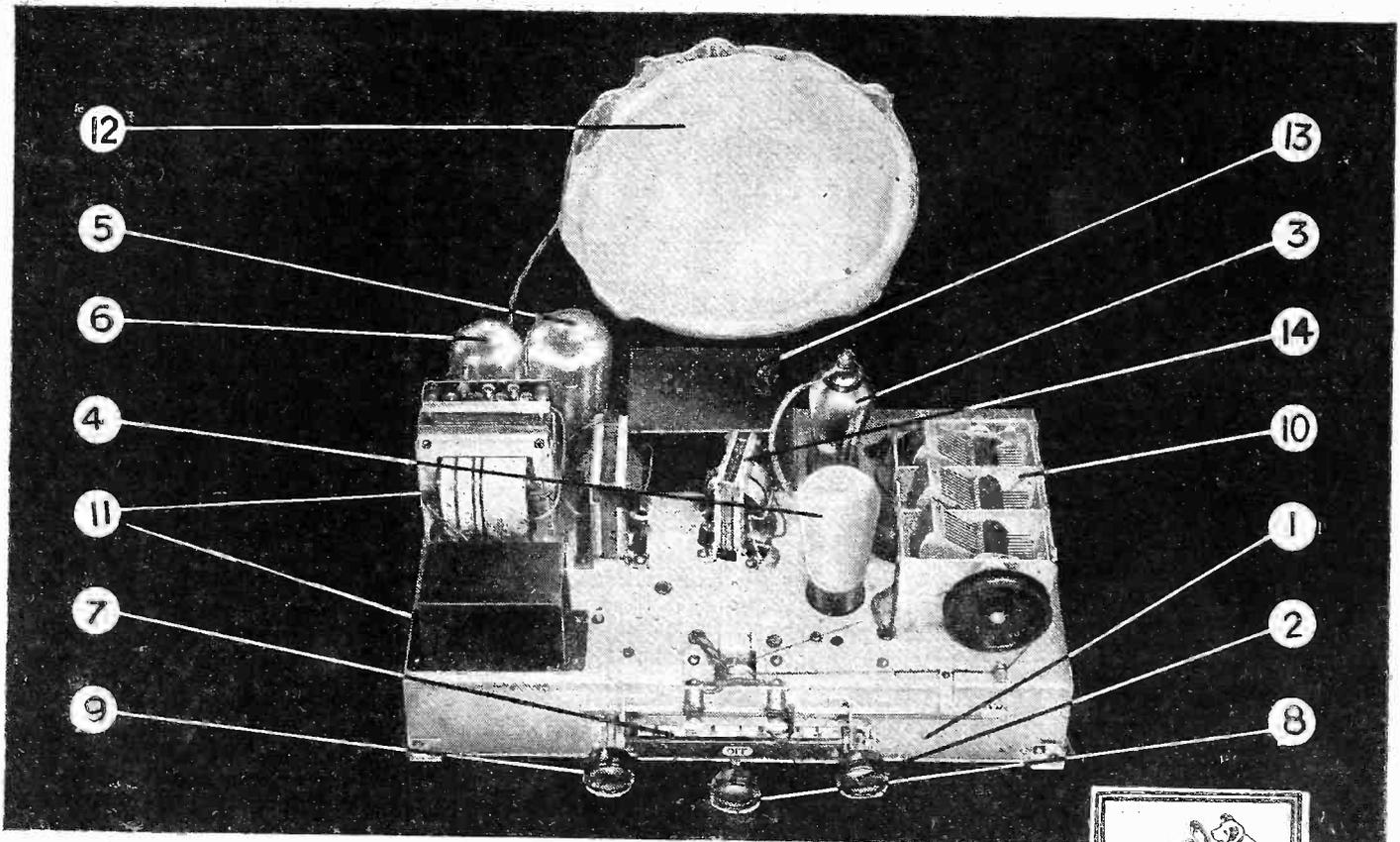
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Please send me C.O.D./CASH/H.P.

"COSMIC" III KIT A/B/C.....
"COSMIC" III STAR KIT A/B/C.....
for which I enclose £ s. d. CASH/H.P. Deposit.
NAME.....
ADDRESS.....
P.W. 5-3-32.



Precision Engineering — not at one point — but at every point!

The above photograph of the chassis and loudspeaker removed from the walnut cabinet of the "His Master's Voice" Model 435 shows the clean layout and sturdy construction of the radio-receiver that has been described in the technical press as "one of the most outstanding triumphs of the British Radio Industry."

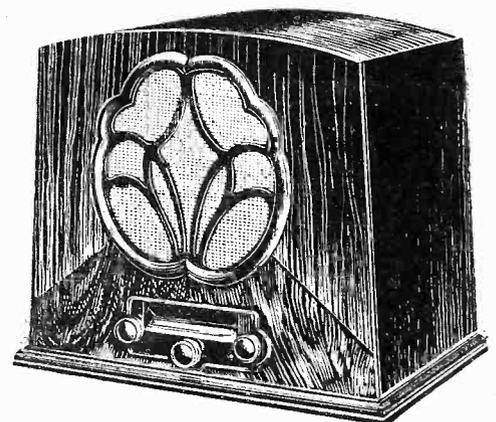
- (1) Cadmium plated chassis.
- (2) Combined "On — Off" and wavelength switch, automatically presenting appropriate scale.
- (3) Screened - grid high frequency valve making all worth-while stations audible.
- (4) Leaky-grid detector valve, ensuring superb quality of reproduction.
- (5) Super power pentode output valve.
- (6) Rectifier valve enabling receiver to be operated direct from electricity mains —no batteries.
- (7) Four separate illuminated scales showing "off," "medium waves," "long waves" and "gramophone."
- (8) Single tuning knob moving pointer across wavelength scale.
- (9) Combined volume control for radio and gramophone pick-up.
- (10) Three ganged condenser and band-pass filter circuits provide knife-edged tuning from a single knob.
- (11) Specially designed mains transformer enables instrument to operate from different voltage ranges by a single plug and socket system.
- (12) New type permanent magnet moving-coil loudspeaker, housed in a dust-proof cover to keep fine gap clear of dust.
- (13) Additional loudspeaker, remote volume control and gramophone pick-up sockets.
- (14) Interval transformer may be swivelled into position, securing the minimum of hum.

"His Master's Voice," Model 435, three-valve radio-receiver — Band-pass tuning — single dial control — incorporating moving-coil loudspeaker. $1\frac{1}{2}$ to 2 watts output. Mains aerial in A.C. Model.

Voltage ranges and consumption — A.C. : 95-164, 190-260 volts, 50-100 cycles; 35 watts. D.C. : 190-250 volts; 60 watts.

PRICE 20

or on Easy Hire Purchase Terms. GNS.

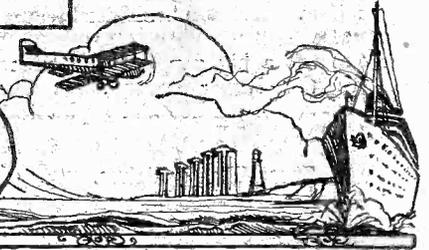
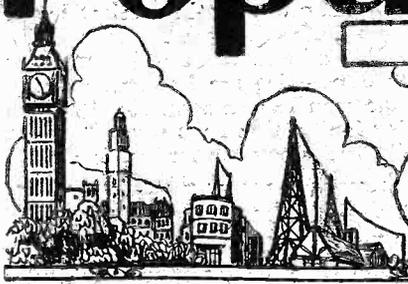


The Gramophone Co. Ltd. London, W.1.

His Master's Voice

Popular Wireless

LARGEST NET SALES



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HENRY HALL
S.G.'s AS DETS.
ARE WE SLOW?
"COSMIC"

RADIO NOTES & NEWS

WOBBLY VALVES
ROUGH ON SHANGHAI
WILD AND WOOLLY
THE COY MOTH

Welcome to Henry Hall.

HAVING dry-weped over the imminent departure of Jack Payne's band, I feel that it is the proper thing to bid his successor-to-be welcome. Payne's crowd converted me from an inveterate non-listener to dance music into an admirer of their sweet and lively noises, though I never cared much for the crooning solos.

Well, Henry, I am glad to learn that you like sweet music, and that you are not going to make the programmes too "hot." All the best! "Ariel" will have his sympathetic eye on you.

S.G.'s As Detectors.

IN "P.W." for January 9th we published an article on the application of screened-grid valves as detectors, which I hope you have all duly digested. I was reminded of this by a letter from A. S. F. (Southampton), who tells me that three months before that article appeared he clapped an S.G. into circuit in place of a det. which had gone where the good niggers go, and had achieved results as good as those given by the dear departed, with no alteration of connections or parts.

So there you are! That proves it! Oh, by the way, A. S. F., your suggestions have been noted, and the result is on the lap of the Olympians.

Are We So Slow?

ONE cannot but admire the slick way in which the E. K. Cole people whacked things about after the fire in their factory at Southend on February 4th.

Twelve hours after the fire brigade had poured a lot of water over the outfit a nucleus organisation of all departments was at work, and thirty hours after the fire 15,000 dealers had received letters informing them that the delay on deliveries would be so small as not to count. Let us set this against the complaints which we hear about slow British business firms.

"Cosmic"!

ARE you in this "Cosmic" game? Everybody's doing it! The "trade" has gone "Cosmic," which is good business, considering that it has also to

chew on "The Wireless Constructor's" "S.T.300." It's the biggest slide I have seen—barring the recent General Election—and it's backed by solid, sound reasons.

The year opens well indeed for amateur radio, and if you hear anybody hinting that home "hooking" is dying, just say "Cosmic." For a clean, intellectual, useful hobby there has been nothing to equal radio since the good old "B.O.P." amazed our great-uncles in the '80's by telling 'em how to make a pin-hole camera out of a cigar-box!

Short-Wave Business.

ALF MANN, who, I am glad to learn, is back in London and on a job, has sent us his thanks for the support which "P.W." gave to him in his attempt

Southport, England, has received his severe attention, and I hope to have an explanation shortly.

If you want details of this society and a copy of their organ, write to the Southport address and enclose 1½d. in stamps for postage.

Come, Jules!

I AM indebted to an overseas reader, A. R. C. (Caen, France), for a very interesting note on the state of radio practice in France, from which he concludes that R.F. is one stage in progress behind "Perfidious Albion." Little or no originality is shown in design, the sets being a mixture of British and American ideas.

Metal rectifiers are only just coming into use there, as also is "band-pass" tuning. Ganged condensers, too, are a novelty there, and valves are inferior to ours—which probably accounts for the exemption of Britain from their tariff wall against foreign valves.

"Where is Television?"

MR. E. T. FISK, an Englishman and ex-wireless operator, and now the biggest figure in Australian commercial radio, being the Managing-Director of Amalgamated Wireless (Australasia), Ltd., says in "Radio Monthly," referring to television on the scale of modern broadcasting: "I cannot see the prospects of such interesting achievements appearing on any large scale before the year 1935. I am not yet prepared to predict how soon after 1934 television, on the scale referred to, will be in existence." And, again, "it is as yet in an experimental stage."

Edgar Wallace.

ALAS! one of the most remarkable writers of our generation has gone in the heyday of his success! Edgar Wallace, who used to be a newsboy in Ludgate Circus, and who, by his own energy and fertility of mind became a seller and a best seller, and a seller all the time all over the world, has been removed with a suddenness which made us catch at our breath.

He won his success in fair fight against
 (Continued on next page.)

"BE PATIENT, NOW—BE PATIENT!"



Being in hospital is not half so bad nowadays, especially when the B.B.C. switches out the chamber music and puts on Roy Fox, or some lively lad who knows how to start "Kicking the Gong Around." This is a typical scene in St. George's Hospital, London.

to get new members for the I.S.W.R. Society.

Over 100 free copies of the Society's Bulletin were sent off and ten new members were enrolled. My recent note about a reader's complaint of non-attention by the society's headquarters at 106, Lord Street,

"ARIEL'S" RUNNING COMMENTARY ON RADIO (Continued)

adverse beginnings, and enjoyed it as happily as a boy. Many are the poor ones who are the warmer and healthier because of his bounty.

He has left a big gap, and his memory will live the longer because his books appeal when the erudite and sophisticated caes bore us.

Those Wobbly Valves.

IT is agreed that sometimes the colicision between bulb and base hath something lacking. Probably this ariseth in that the youth of Britain waxeth strong in the



grip! I have already revealed to ye that glue—of the tubish variety—will stick bulb to base, but as a true friend of "P.W.," J. W. P. (Waterfoot, Lancs) hath written, right laboriously, I trow, to say that he

uses wax from an old H.T. battery, I hasten to acquaint ye thereof, lest his labour be lost. But I wouldn't bet much on the holding powers of wax as compared with those abominable and stinking concoctions sold as liquid glues—Seccotine and sichlike!

It Still Goes On!

THIS 'ere Progress. It still goes on," quoth the muddleheaded old man in "The War in the Air." Why, I learn that the U.S. Army Signal Corps now has a 17½-ounce transmitter which is elevated by a balloon, the supporting wires forming aerial and counterpoise. This transmitter has a range of 11 miles and can continue in operation for 4 or 5 hours. Its signals are observed by ground direction-finders, and so the course of the balloon in the upper air can be plotted, giving valuable data for aviation and meteorology.

Rough on Shanghai.

I AM sorry, heartily sorry, for the folk in the Concessions at Shanghai, for I fear that before these Notes are published they will have had a rough time. Machine-gun fire at Garden Bridge!



Shades of twenty years ago, when I dawdled thereon, rejoicing that I was seeing new things and people. I found then a very rummy radio station, but a very efficient telephone

exchange and a general hospital replete with all manner of electrical devices of the high-frequency sort.

After showing me Chinamen being cured—or relieved—of rheumatism by lying inside huge solenoids the genial, though Scottish, chief of the hospital dined me at his house in the French Concession—and I remember yet his wine and his daughter. (Ariel! What is that you are writing? Mrs. Ariel.)

The Study of Radio.

IN reply to C.W. (Burnley) and others who seemed to appreciate my suggestion that keen amateurs ought to study the theory of wireless, and have asked for my advice on the method of approach. I would say that, without adverse reflection on many other good books, the best I know for the use of beginners is "The Elementary Principles of Wireless Telegraphy and Telephony," by R. D. Bangay, *third edition*.

It is written in simple, luminous English, and is non-mathematical. "P.W." from time to time publishes instructional series.

New Chairman of R.M.A.

IT will interest many of us to learn that Mr. Leslie McMichael, A.M.I.E.E., has been elected to the Chairmanship of the Radio Manufacturers' Association. Mr. McMichael was one of the earliest of radio

SHORT WAVES.

Very particular young man: "It was my intention to propose to you this afternoon, Gladys, but I cannot do so until the B.B.C. has decided once for all whether I am to call you 'my young lady,' 'my betrothed,' 'my fiancée,' or what not."—"Punch."

The B.B.C. apparently takes all the credit for the recently revealed fact that there is a wireless set in every second home in Britain, and assert that they won't be satisfied until EVERY home has its set.

Are they also as eager to claim credit for the fact that on Sundays nine out of every ten listeners in London tune in foreign stations?

"Is your wife fond of listening-in?" "Not half so much as she is of speaking out."—"Answers."

One of the latest inventions, we hear, is a radio-controlled collar stud, which will emit a Morse signal when anywhere but in the shirt collar.

"Atmospheric disturbances cause a 'black snowstorm' on a television reception screen," says a contemporary.

Or, guessing what they look like at the other end, is it the black looks of the televised?

Courtship—He broadcasts. She listens-in. Honeymoon—She broadcasts. He listens-in.

Now—They broadcast. The neighbours listen-in.

They haven't got no gnosis, The bally B.B.C.; Even the word "Erose" is Not said as they supposes. They suffer from cirrhosis Of their mentality.

"Punch."

amateurs, a founder of the Wireless Society of London (now the R.S.G.B.), and took an active part in the negotiations leading to the first broadcasting, which was carried out at Writtle and which was quickly followed by the formation of the British Broadcasting Company.

"In Search of Television."

MR. DOWDING'S balanced but provocative article under this title (see "P.W." January 30th) has in some quarters put the stearine in the stove—I mean "the fat in the fire"—and surprise is expressed by some of his admiring readers that our Technical Editor should

play hot and cold with the unscientific art; so to speak, of wagering on future events.

All this misconception and surprise is due to overlooking the fact that unless a scientific man can demonstrate, by some pleasing frailty, that he is also a "yuman bean," there is no room for him in modern society. And our G.V.D. is very much "one of us."

Wireless in the Wild and Woolly.

A REPORT which is attributed to Reuter states not only that the Arabs now fix aeriels to the humps of their camels and listen-in as they bumpetty-bump over the desert, but that they have installed sets at the wells where they pull up for "a swift one." Fine! Esquimaux are training walruscs to stand up and support aeriels; Tibetans are



now famous for their Yak-back Pack sets. A hunter in Brazil finds that he can get 5 SW on a 22-foot anaconda-aerial, which he has trained to swallow a gaspipe in order to straighten out the youthful curves; and the official aerial of a Zanzibar listening centre is a string of monkeys. If one lets go for a scratch, they tune in on teacher's nose-ering!

B.B.C. Interference.

SINCE the hunt is up and all are in full cry after sources of interference, what about the B.B.C. itself? It interpolates any mortal item with those Greenwich time "pips," and I verily believe that, as I have said before, it would interrupt the Trump of Doom itself with those irritating noises.

On the part of any entertainer such a maddening display of ill-taste would be an act of sheer lunacy. What can we say, then, when the B.B.C. is guilty of it, the B.B.C. which is so careful to preserve artistic values, etc.?

The Coy, Codling Moth.

IF television is destined to be a "flop" for some years to come, the makers of photo-electric cells may perchance take heart of grace—and a friendly tip—from the news that the New Jersey Agricultural College has discovered that the Codling Moth, which mucks up peach and apple crops, declines to lay its eggs in daylight or in a temperature below 60 degrees

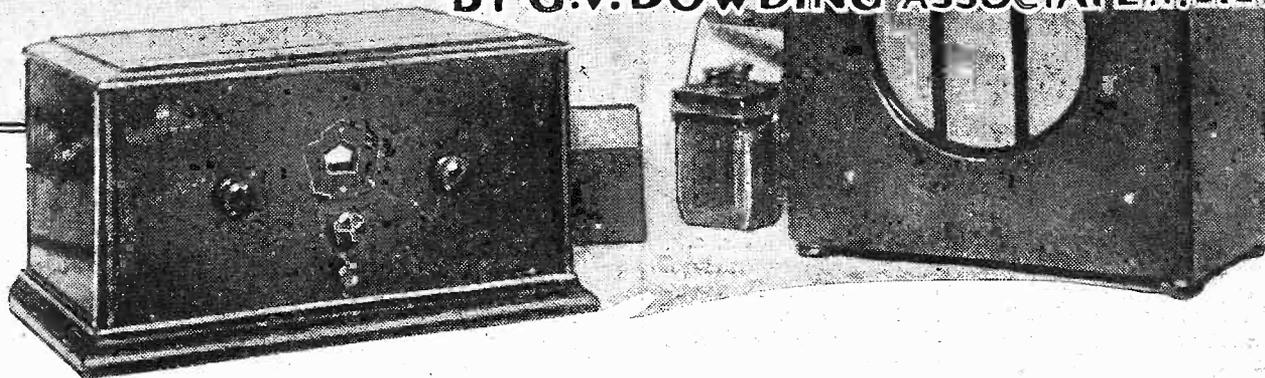


F. I can understand its diffidence in performing in the light of day, but not its quibbling about a degree or two of temperature. However, the suggested method of discouraging the Codler to produce a posterity is the flood-lighting of the orchards, the lights being turned on and off by photo-electric rays.

ARIEL

SELECTIVITY AND POWER ON YOUR "COSMIC"

BY G.V. DOWDING ASSOCIATE I.E.E.



SEVERAL of our correspondents have remarked upon the fact that we have avoided giving a full list of stations and dial readings for the "Cosmic." There were several reasons which guided us in this step.

In the first place it is only a single-dial set, and there is not the difficulty of matching two or more sets of dial readings as with some sets. With these a "log" is almost essential.

The Number of Stations.

But tabulating all the stations it is possible to receive on a "Cosmic" would make fantastic showing. In that the "Cosmic" covers three wave-bands, it is easy to compile an honest list of about one hundred and twenty, although it is extremely dubious whether any two listeners would get the same 120!

And in regard to actual dial readings—well, these will vary as with different coils and condensers, and can be of little use to individual constructors.

So, although a published "log" compiled by a skilled operator may be good "window-dressing," it is not always going to cause anything much more than confusion, and perhaps disappointment.

First Results.

We believe it is better not to lead inexperienced constructors to imagine that they are certain to receive an enormous number of stations the very first time they "go on the air" with a new set, for there is always the possibility that they will get very poor results, however good the

If you want "fool-proof" sets, "P.W." can give them to you. But as we know "P.W." readers are, in fact, intelligent and highly discriminating radio enthusiasts, we have no hesitation in bringing forward various suggestions whereby "Cosmics" can be "tinkered" with to give maximum results in the worst possible conditions. After all, it's no consolation for a man whose results are not up to expectations to know that the majority of constructors have been fully satisfied, and bearing this in mind we designed the "Cosmic" with a view to an almost unlimited flexibility.

design from which they have built up their sets.

I don't think this will happen to many "Cosmic" constructors, but it is a possibility we had well in mind when we planned this new tri-band set of ours.

"A Brick" in the Wiring.

Now what is likely to militate against success? What in such a simple instrument could cause: (1) Complete failure—dead silence; (2) very poor power; (3) insensitivity?

I should say, broadly speaking, three things: (a) Constructional mistakes; (b) faulty components or accessories; (c) abnormally bad local conditions.

The most careful of us are liable, at times, to make little mistakes, but once a little

mistake is made in the assembly or wiring-up of a wireless set it can be mighty hard to detect.

Nevertheless, it can be detected if you are prepared to spend a little time in going over the outfit point by point with meticulous care.

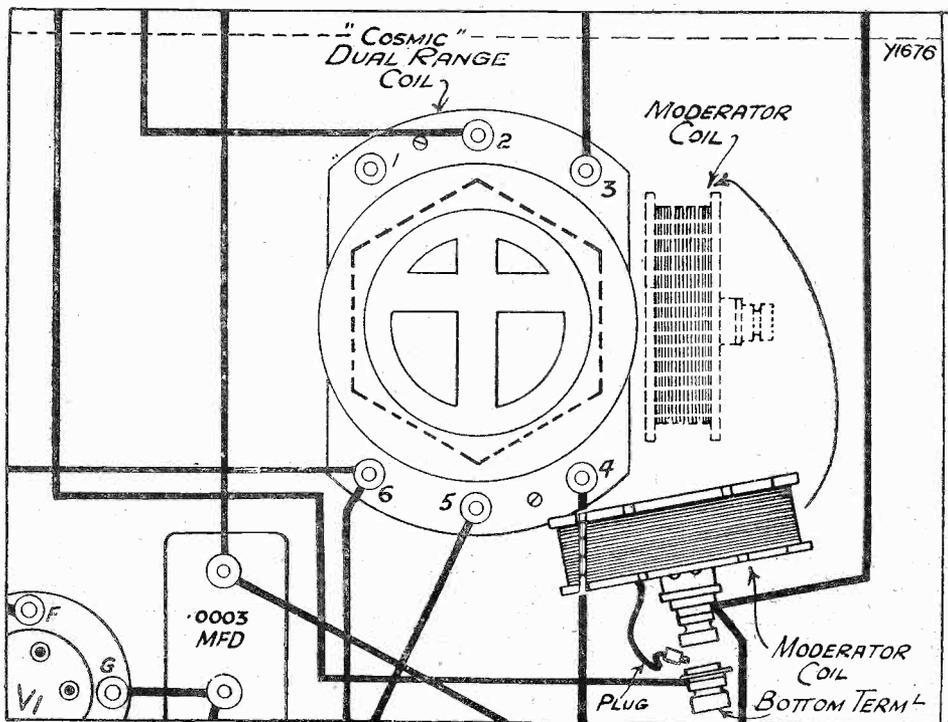
Reserve Power.

Unfortunately, it is almost impossible for the constructor to detect slight faults in components which cause sub-standard results. Worse still, such slight faults are at times encountered in the products of some of the best manufacturers. There are very few firms indeed who can claim 100 per cent perfection in production.

Again, unfortunately, it is not always possible for the constructor to appreciate

(Continued on next page.)

COMPENSATION FOR MINOR FAILINGS



Although the Moderator coil is at right angles to the dual-range coil there is a certain amount of magnetic linkage between them. This can be increased for greater volume and reduced selectivity by moving the Moderator to the new position shown above. Actually, if you have been losing power through some component or other fault, you will still retain good relative selectivity despite the change of coil position.

SELECTIVITY AND POWER ON YOUR "COSMIC"

(Continued from previous page.)

the nature of his "local conditions," by which I mean not only his geographical placing, but also the relative efficiency of his aerial and earth system.

But we are confident that the "Cosmic" has sufficient reserves to bear up against a fair percentage of failings due to the faults in class (b) and (c), although there must inevitably remain a residue of constructors who will find their "Cosmics" unable to do all that they believe they ought to.

For Any Eventuality.

However, we have "something up our sleeves" for these. (Some of you may be inclined to rate us for not telling you everything at the beginning, but we did not do this because for many the following will be quite unnecessary, and its early publication would have made you think that the "Cosmic" is a finicky set that needs to be experimented with before it will give good results.)

NO CONCRETE COMPROMISES HAVE BEEN MADE IN THE "COSMIC."

Actually it is the other way about. The "Cosmic" is extremely flexible, and it was our several months of experimenting with the circuit that enables us, and you, to be prepared for almost any eventuality!

Those many readers who have "Cosmics" working to their present full satisfaction should at this juncture cease reading my

article lest what I am going to say implants in them the seeds of suspicion, doubt and discontent.

It is so easy, even if you have the biggest and most efficient set in the world, to imagine that you could get better results—that is, if you can make no clear-cut comparisons or scientific measurements to convince yourself that you have attained something approaching perfection.

The "Cosmic" is a Detector-2 L.F. set and you are not doing it justice if you mentally compare the results it gives, say, on medium waves, with an S.G. set or a super-heterodyne.

Compare its over-all qualities with anything you like. Take its simplicity in construction, operation and maintenance, and its three-band effectiveness, and then compare it with any other tri-band instrument, or with any two-band Det.-L.F. receiver for that matter—they are your fair bases of comparison.

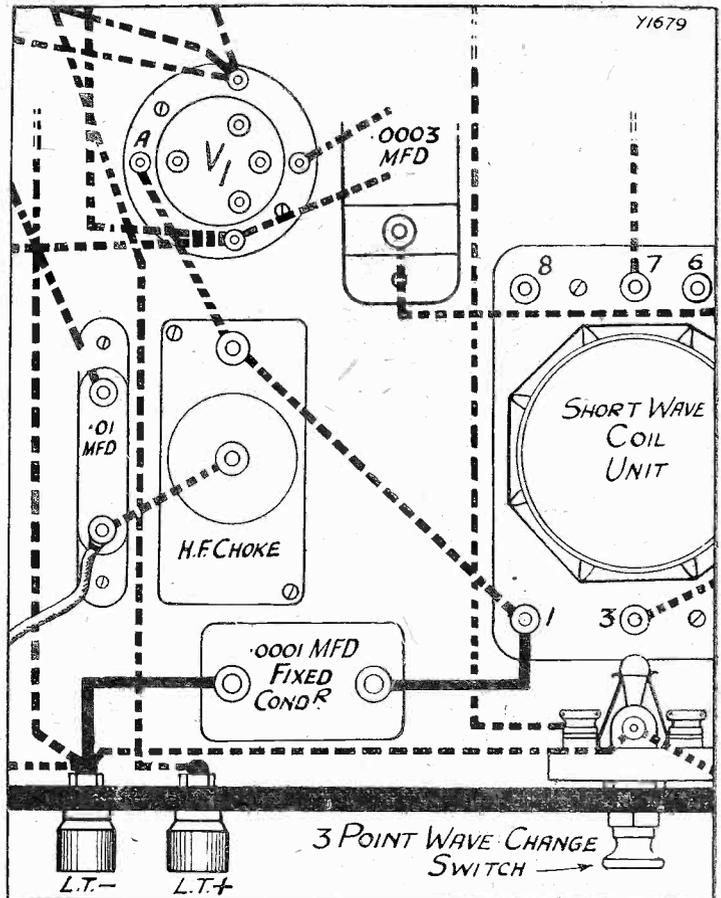
I think these will force all to agree that the "Cosmic" is an outstanding production.

But now for those who have good reason

to believe they are not getting the results they should be getting.

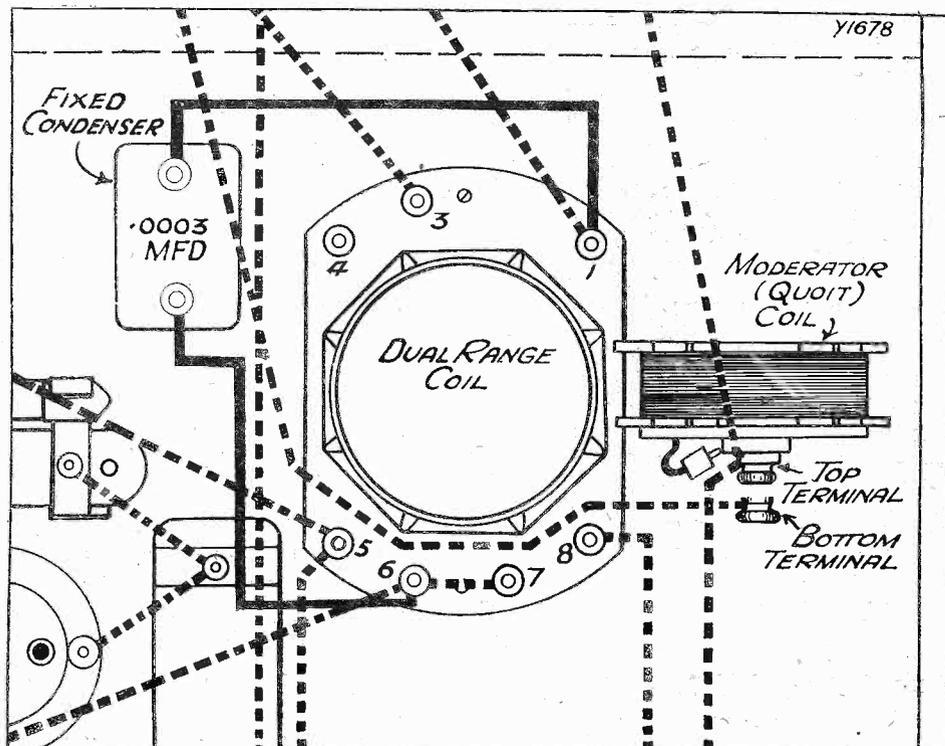
It has been said several times in preceding articles that selectivity and power are under

IS YOUR REACTION SMOOTH?



Although this .0001-mfd. fixed condenser will, in some instances, add power and improve the reaction of a "sub-standard" "Cosmic," it is only fair to say that it is liable to increase the minimum tuning on short waves by a matter of, perhaps, seven or eight metres.

DEALING WITH ABNORMAL BREAK-THROUGH



By inserting a small fixed condenser as shown it is possible to eliminate the last traces of "break-through" even in abnormally bad cases.

the constructor's control in the "Cosmic," and that no concrete compromises have been made.

Moderator Coil's Position.

Well, both factors can be adjusted within wide limits by means of the Moderator control. But if, because of some component or other failing, your selectivity or volume is not what it should be, you can extend those limits even further by varying the position of the Moderator coil relatively with the dual-range coil.

SELECTIVITY AND POWER ARE UNDER YOUR CONTROL WITH THE "P.W." "COSMIC" THREE

There is a certain amount of magnetic coupling between these two coils. If it is strengthened selectivity will decrease and power increase, and if it is weakened the reverse will happen—up will go the power and down will go the selectivity.

You can easily test this yourselves. Just remove the screw or screws which anchor the little Moderator coil to the baseboard and, taking care not to pull the leads off it, move it about a little.

(Continued on next page.)

SELECTIVITY AND POWER ON YOUR "COSMIC."

(Continued from previous page.)

There are two diagrams accompanying this article which very clearly illustrate the way you should do this. But don't feel everything is not as it should be because you are unable to maintain the greatest power without inselectivity robbing this of its value.

It is an absolutely fundamental principal that you cannot retain the same degree of power, and increase and keep on increasing the selectivity.

As selectivity goes up, volume goes down, and the set which can give every individual listener the best compromise between selectivity and power in his own local conditions is naturally superior to that one which has a fixed relationship between the two qualities.

"Sweetening" Reaction.

The "Cosmic" is vastly superior to the majority of Det.-2 L.F.'s in this respect, because you can keep on extending the range of its selectivity-power adjustment without the set becoming a mere laboratory for unpractised research.

The power may, in certain circumstances, be stepped-up quite a bit by connecting a .0001-mfd. fixed condenser between the anode terminal of the detector valve and L.T.—. This will also have the effect of "sweetening" a reaction that is otherwise a bit rough on medium or short waves.

The little component costs only a few pence, and it can be wired in circuit in a matter of moments, so we are not perturbed at the thought that many readers will, as a

matter of interest, wish to try the expedient, even though, in actual fact, their sets do not demand the addition.

There is a coil fault which produces what is known as bad "break through." That is to say, one of the medium-wave local stations tends to swamp in on the long-wave dial readings—particularly on the lower ones.

Happily there is a most effective cure for this. You obtain a .0003-mfd. fixed condenser and join it up in the manner illustrated by a further diagram.

You will then find that the "break through" will be limited to only a very small part of the Moderator adjustment.

Now I must make it clear that the above simple and interesting experiments will not offset any and every failing; the most which can be said for them is, I repeat, that they serve to increase the flexibility of the set and enable you to "hot" up the outfit to abnormal limits of the power and selectivity obtainable with a detector-2 L.F. set.

Those Hidden Faults.

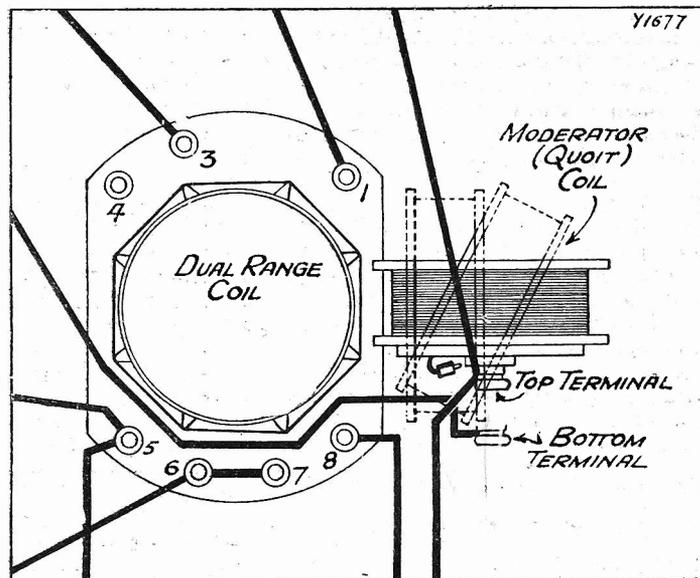
Battery, valve, aerial and component failures must be remedied, if such exist, before you can hope to obtain the results

given by a similar set operating under healthy conditions.

I say this feelingly, because it so often happens that a constructor writes critically of the performance of a set which, after investigation, is found to be working under a handicap of the above variety.

"Your so-and-so three- (or four- or five-)

AN "INFINITELY-VARIABLE" ADJUSTMENT



You can extend the limits of the power-selectivity compromise, and obtain any intermediate degree by adjusting the position of the Moderator coil, as shown above.

valver is a dud," they write, whereas what they should really say is something like this: "Your so-and-so is not working properly because of some fault which I am unable to trace." Many do address our Query Department with such words, as I am bound to admit.

However, there are, so far, very few of the tens of thousands of "Cosmicites" who have to write at all in such a vein; fewer than with any previous "P.W." set, I think, and that is saying a great deal in view of the enormous success already achieved by the "Cosmic."

But I have received a number of letters asking questions of general interest regarding the "Cosmic" in action, and these I propose to answer as best I can in an article entitled "Cosmic Queries," which will appear in an early issue of "P.W."

TIPS FOR TESTING

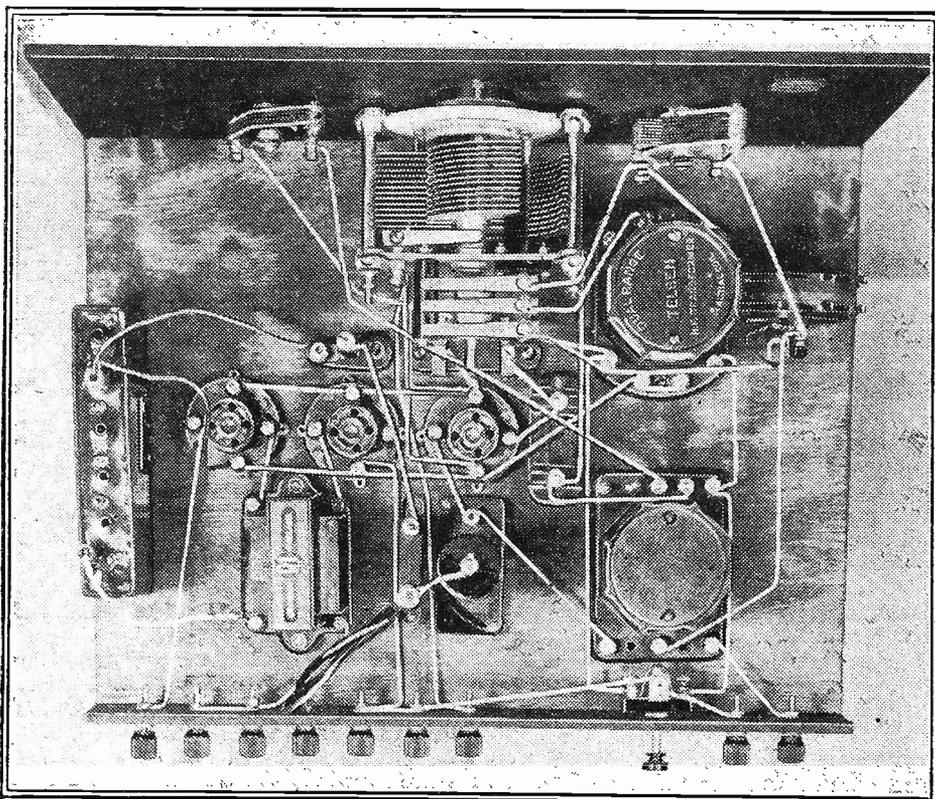
Some reminders for the radio fault-finder.

When a fault such as weak or noisy reception is confined to one wave-band, special attention should be given to the wave-change switch and its wiring.

When reception falls off, a good rough-and-ready test is to tap the detector's grid terminal with the finger. (If there is no loud response to this in the loudspeaker, the fault is on the low-frequency side of the set.)

Radio-gram users should remember that when a set fails on radio reception, the mere switching over to the gramophone will show whether or not the fault is on the low-frequency side.

A SET FOR THE DISCRIMINATING CONSTRUCTOR



There is no "take it or leave it" about the "Cosmic," as you will be able to see by the accompanying article. If you don't at first obtain its full efficiency, we show you how to go out and get it,

THOSE SUNDAY PROGRAMMES

Some more about the "Improved" Sunday-programmes rumour that was recently given prominence in the Press, and other interesting radio topics of the week.

READERS of a certain issue of an evening newspaper a few days ago must have had a pleasant shock, for therein it was announced in big type that important decisions for the brightening of the B.B.C.'s Sunday wireless programmes had been reached.

A Special Director!

The details concerning the ways and means by which the Sunday programmes were to be brightened were numerous and convincing and, according to the Wireless Correspondent of the journal in question, the B.B.C. had decided that, although the character of the Sunday programmes might not be changed drastically, their quality should be improved.

In order to achieve this, it was reported that a Director of Sunday Programmes was to be appointed. The new Director would work under Mr. Roger Eckersley, the present Director of Programmes, and make the Sunday programmes the best of the week.

Debates, Too!

For instance, there was to be more regular use of the Gershom Parkington Quintet—rarely heard on Sundays—and "of that form of bright light orchestral music which Joseph Lewis features in the week-day programmes."

Further, it was reported that Sir John Reith had decided to see the best talk of the week incorporated in the Sunday programmes. It appears that the talk need not have been necessarily on a religious subject, as long as it was superior to any other broadcast on a Sunday.

Another innovation which was included in this wonderful programme of brightening Sunday radio was that four-handed debates were to be introduced—such as "On the 9.20 Train" series, which are one of the bright spots in the Saturday evening broadcasts.

An Exciting Item.

Although the Epilogue was not to be affected, one religious service was to be broadcast on Sundays, and on only one wave-length instead of two.

The most exciting item in this report was

that Henry Hall, the new Dance Band Director, might possibly be allowed to include dance music in Sunday programmes if he could demonstrate to the satisfaction of the authorities that he could play suitable dance music—that is, suitable for the Sunday atmosphere so carefully cherished at Savoy Hill. The idea, apparently, was that Henry Hall might be allowed to play old-fashioned waltz music, slow foxtrots, and sort of "Home Sweet Home" airs with a dance rhythm. And so on.

Too Good to be True!

In fact, a most heartening but, at the same time, a most surprising account of the B.B.C.'s decision to revise its Sunday

ARE YOU BUILDING A "COSMIC"?

YOU CANNOT AFFORD TO MISS THE SET OF THE YEAR.

READERS of "P.W." will have noted the details of the "Cosmic III," given in our issue for February 13th, and of the "Cosmic Star," given in our issue for February 20th, and will have probably decided which version of this famous set they intend to build.

We urge them not to delay—build your "Cosmic" NOW, and don't miss any longer the pleasure of owning and operating the Best Set of The Year.

Thousands of readers have already built or purchased "Cosmic" sets, and so great has been the demand for details of the "Cosmic Star" that already over 293,000 copies of the issue of "P.W." for February 20th have been sold.

You can judge how the "Cosmic" has attained enormous popularity in an amazingly short time by reading the following letter from one of our leading advertisers.

READY RADIO, Ltd.,

Eastnor House,

Blackheath, London, S.E.3.

February 23rd, 1932.

Dear Sir,—I think you may be interested to know that our experience this season has

confirmed me in my belief in POPULAR WIRELESS as the most effective weekly advertising medium.

No doubt the fact that "P.W.'s" circulation holds the record has much to do with this, but I think due credit must be given to a bold Editorial policy and to the class of reader to whom the paper appeals.

The response to our advertising on the "Cosmic Star" Receiver has been sufficient in itself to establish the pre-eminence of POPULAR WIRELESS and the loyalty of its readers.

Yours faithfully,

For READY RADIO, Ltd.

(Sd.) IVOR W. E. HUSTLER,

Managing Director.

Remember, "P.W." sets have an unrivalled reputation—a fact which is chiefly responsible for "P.W.'s" equally unrivalled circulation—a circulation guaranteed by a Chartered Accountant's Net Sales certificate, and unapproached by any other wireless paper in the world.

programme policy. As one read on, one was convinced that at last something had been done at Savoy Hill to bow to public demand, and that at last some of the old-maidenish atmosphere was to be dispelled from Savoy Hill on Sundays.

Alas and alack! The sequel to this amazing and exciting account occurred the very next morning when the "Daily Telegraph" published the following:

"It was reported yesterday (not in the 'Daily Telegraph') that a special Sunday Director of B.B.C. Programmes was to be appointed in a month's time, and that in future listeners to the Sunday programmes would hear plays, talks, lighter music, and possibly dance-band music. On enquiry

at Savoy Hill yesterday I was informed by a responsible B.B.C. official that the news of the appointment of a Sunday Director of programmes and of a revision of the Sunday policy of programmes was quite unfounded."

In short, the evening newspaper in question had allowed its wireless correspondent to become so inspired with the feeling that something must be done about the Sunday programmes, that all the wonderful things which were to be done on Sundays—a few of which we have mentioned above—emanated from anywhere except Savoy Hill!

I was never more disappointed in my life to see this denial from Savoy Hill in print. Oh, if it had only been true, and if that brave decision had been made to do something about cheering up Sunday programmes!

General Ferrié.

A great wireless expert died the other day. He was General Ferrié, the Head of the Signalling Service of the French Army. He died after an operation for appendicitis at the comparatively early age of sixty-three.

In the early days of POPULAR WIRELESS

General Ferrié was courteous enough to arrange a test demonstration on our behalf from the Eiffel Tower, and kindly wrote to the paper afterwards with reference to the experiment.

In 1898, having seen some of Marconi's early experiments, General Ferrié became greatly interested in radio and, independently of others, he invented the electrolytic detector. He organised the first Radio Telegraph Service in the French Colonies, and will always be remembered in France as the man who made the French army realise the tremendous importance of wireless communication.

A Pioneer.

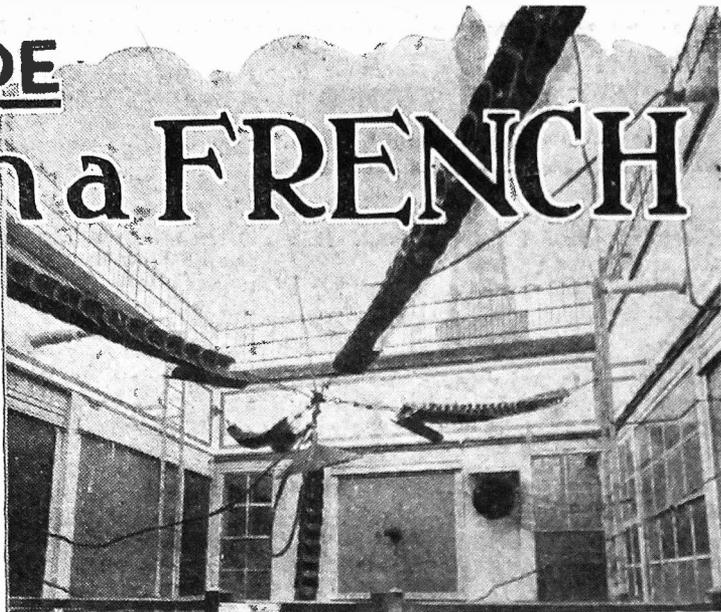
It was over 34 years ago that he first proposed to the French authorities that wireless should be specially studied from the military standpoint. He was the man who established the first army transmitting post.

During the War he did great service to the Allies as Chief of the Army Wireless Stations. He controlled the Eiffel Tower wireless station, and carried out many improvements there.

He was the originator of the historic broadcast when the American Telephone and Telegraph Company transmitted the first wireless telephone message across the Atlantic in 1915. In 1923 he was awarded the Franklin Medal in recognition of his good services, and in 1929 he was made a General in the French Army for life.

ON THE OTHER SIDE A TALK with a FRENCH LISTENER

Following the fascinating accounts of radio as seen by a Russian, an Italian, and a German, here is a conversation between a French and a British listener which will help you to understand reception conditions on the other side of the Channel.



SIPPING a cognac coffee to the strains of a café loudspeaker giving out the Radio-Paris programme, Lacroix, of a well-known trading company, gave me a good idea of the French amateur's viewpoint.

I told him of the popular British belief that French stations are the worst offenders in not sticking to their wave-lengths.

"It's all very well to suggest that our stations wander about in wave-length just to suit themselves," he said, aggrieved.

Changing the Wave-length.

"Engineers at a station do not change the tuning just for the fun of the thing. What happens is that during the course of a programme several listeners 'phone up frantically to the station and beg that the wave-length be shifted a trifle to avoid heterodyning with some German or Spanish station which, in altering a trifle in its wave-length, has set up a howl.

"What can the engineers do but agree, even if it means getting a little closer to some British station? We blame Great Britain to a large extent in taking the lion's share of the wave-lengths.

"Radio-Paris is working with 85 kilowatts and may be causing interference with 5 X X, but it has, anyway, a programme of its own; whereas your 5 X X is only a relay of what we over here can hear on five or six so-called National wave-lengths on the medium-wave band. That hardly seems fair to us, and it is still more unfair to blame our authorities for altering the wave-lengths to get a clear field.

Internal Friction.

"Alors, if the trouble between independent interests and the State could be cured there would not be the need for so many stations. The independent interests blame the P. T. T. for being narrow-minded and, in your British phraseology, red-taped.

"The P. T. T. insists that it must have control of all broadcasts. Between these big conflicting bodies we are no better off than are you British listeners who grumble at station-jamming by our transmitters.

"We do not get anything like the same programme service as you do, especially as Radio-Paris, with a mainly English programme, is the chief radio entertainment here in Paris. There is a strong feeling that

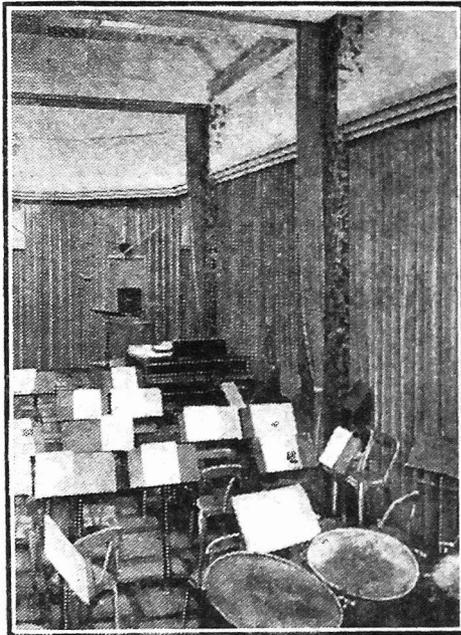
the B.B.C. could give up a few wave-lengths to our stations and feel none the worse for it."

Wisely, I changed the subject and talked about licences.

Complicated Licence Scheme.

"Ah, that is rather involved!" he said. "We all have to pay a licence fee of one franc per year—practically nothing, you might say. This is paid to what is known as the *Contributions Indirectes*, and we have to take the fee to some local centre, just as

A RADIO-PARIS STUDIO



Here is a general view of the big Radio-Paris studio opened not long ago in the Champs Elysées.

you English people pay your rates. Motor-car licences are paid in this way, too.

"This isn't all. There is a luxury tax of 12 per cent. on sets which cost more than 500 francs, and on parts costing more than 50 francs. And, although our gear is cheap, one does not get very much of an outfit for 2,000 francs.

"Foreigners have to pay an additional tax of 10 francs a year, and down on the

Riviera this tax results in quite a considerable income to the licensing authorities because there are many British and American visitors with portable sets.

"There is a long-standing conflict between private broadcasting authorities and the State. It would be a jolly good thing if this quarrel could be settled.

"There are one or two stations working without any licence at all, in open defiance of the law.

"I can quite understand that on good evenings these may cause interference with you British listeners, in spite of the fact that the power is only a small fraction of a kilowatt.

Censoring the Programmes.

"Our *Sûreté Générale* (secret police) are supposed to spot broadcasting stations and, working hand in hand with the Ministry of Postes, Telegraphs and Telephones, these two bodies control all ordinary broadcasting.

"Apart from actually tracking down stations, the *Sûreté Générale* keep a watch on programmes and stop such things as *risque* stories and the broadcasting of false stock market reports which would affect share values.

"Both these things caused a little trouble a few years ago when there was no censorship, and self-respecting Parisians made representations to the *Sûreté Générale* because they felt that, with the immense range of the French long-wavers, this kind of thing would cause a bad impression throughout the world.

The Government Stations.

"The Government itself has eleven stations. These are the Eiffel Tower, Lille, Rennes, Limoges, Bordeaux, Toulouse-Pyrenees, Montpellier, Marseilles, Superior School of Ministry of Postes, Telegraphs and Telephones in Paris, Grenoble and Lyons."

"I have heard the term C.F.R.," I said. "What does that mean?"

"The big corporation, The Compagnie Generale T.S.F., controls two other companies, Compagnie Française de Radiophonie and Radio-France. Radio-France runs commercial stations, the other one running broadcasting stations in competition with the State.

"This Corporation is popularly known (Continued on next page.)

A TALK WITH A FRENCH LISTENER

(Continued from previous page.)

as C.F.R., and these letters are just as significant as your B.B.C. in England. It is C.F.R. which runs Radio-Paris."

"That's a bone of contention, eh?" I remarked.

A Sore Point.

"Radio-Paris is probably the most heard station in and around Paris, but, speaking frankly, it is not the most popular station.

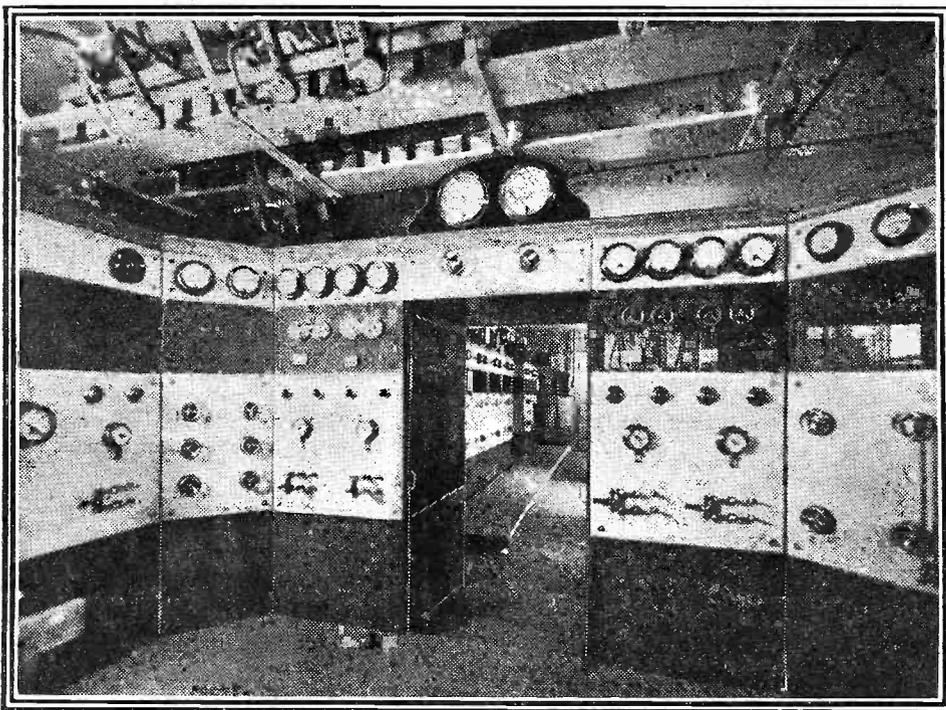
"In our opinion, the B.B.C. news service is nothing like so good as our *Journal Parlé*, because it is so impartial and there is nothing human about it. Nevertheless, Daventry's weather reports and news bulletins are of vital interest to us.

Useful Bulletins.

"We not only can tell what the weather in the future is going to be like, when the squalls blow over from the Atlantic and reach the British Isles before they do Paris, but we can tell from British news what political events of importance will take place.

"Of course, we Radio-Paris listeners get a news bulletin long in advance of the first B.B.C. news bulletin.

EIFFEL TOWER'S UNDERGROUND TRANSMITTER



This picture provides an interesting glimpse into the famous Eiffel Tower Station, which is located in the gardens around the base of the huge structure from which it takes its name. Broadcasting is only one of its functions, the equipment being Government-controlled.

"You see, it is too English. The average Parisian is a patriotic fellow who reads his daily papers during *l'heure aperiitif* on the boulevards, and imagines that every one of your British Chancellors of the Exchequer is out to steal his francs. He has no violent anti-British feeling, but he has a secret dislike of too much anglicisation and Americanisation of French things.

"The idea of Radio-Paris and Toulouse running special programmes for British listeners is just as galling to him as though your Brookmans Park devoted evenings to Wagner in order to please German listeners, and gave the announcements in German! He dislikes the English announcements from Radio-Paris.

Long Waves Very Popular.

"In spite of this, most sets within range of the C.F.R. station are tuned to 1,725 metres practically every morning, for there is nothing much else on.

"And in the evenings, too, when the Eiffel Tower station's programme is not too bright, you will find the average Parisian tuned in to Radio-Paris or 5 X X. Your Daventry comes in very well, despite its distance.

Practically every day there is an exchange and news report at one o'clock. Other bulletins of the same kind are given on most days at six o'clock, followed by an agricultural bulletin for farmers, at 7.45 and 9.15 in the evening.

[Ed. NOTE.—The next article in this exclusive "P.W." series will be "A Talk with a Spanish Listener."]

MAKING MITRE JOINTS

Some Useful Hints for the Cabinet Maker.

THIS type of joint is used quite a lot in wireless cabinets. The correct method of making the joint consists in first marking out the angle to be sawn—a

square can be purchased which includes the necessary angle, 45 degrees, in its construction.

The gauge is placed on the wood to be sawn as shown, and carefully marked with a hard pencil or a steel scriber. Accuracy in marking and sawing is very essential.

The wood is then placed on the bench hook and cut very carefully with the tenon saw. When using the saw, try to keep it in an upright position, or the mitre will suffer. R.T.

THE ECKERSLEY TUNER IN MANCHESTER

A reader finds it rejuvenates the "Comet."

The Editor, POPULAR WIRELESS.

Dear Sir,—May I take this opportunity of congratulating Captain Eckersley on the performance of the "Comet" revised by the inclusion of an Eckersley coil. I have handled a number of the "P.W." sets—especially Detector and 2 L.F.'s—but this last set is greatly ahead of all the others on the grounds of selectivity, sensitivity and volume.

The important and surprising feature of the Eckersley set is its wonderful selectivity; surprising because it only consists of a Det. and 2 L.F.'s, which generally is not too closely associated with selectivity. Situated in Manchester, 18 miles from Moor-side Edge (North Regional), Rome can be obtained free from North Regional, Midland Regional, which seems to be peculiarly inconsistent in this district, is easily obtainable, free from all interference. A host of stations can be obtained, including Toulouse, Mühlacker, Strasbourg, Hamburg, Frankfurt, Vienna, Brussels and London Regional. I have been unable to test the band below London Regional satisfactorily, as I have not been able to procure a series aerial condenser with shorting pin. Consequently the above results are the more remarkable as no extra selectivity device has been introduced.

On the Long Waves.

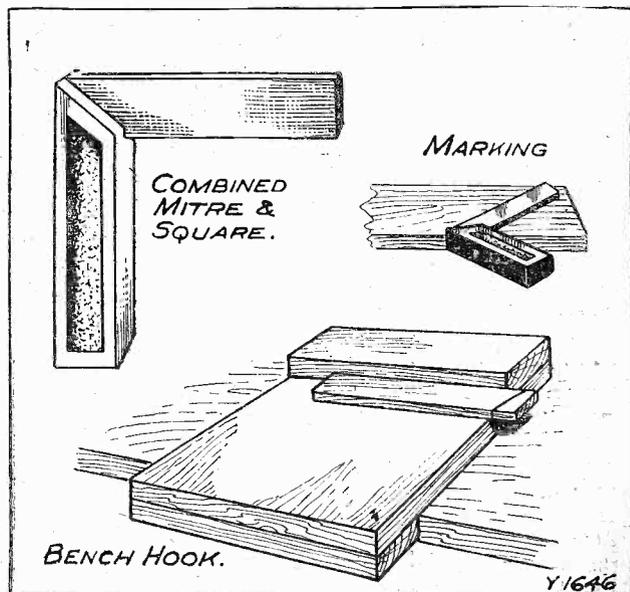
The performance on the long waves is also exceptional, being a distinct improvement on the "Comet." Nine stations are received on the speaker—Radio Paris, Königswusterhausen, and 5 X X all being obtained free from one another.

In view of these results it seems peculiar that the Manchester dealers should be so prejudiced against the set. It is a matter of considerable difficulty to obtain the parts for the set—the series aerial condenser panel type being unobtainable in Manchester.

Every one of the claims made by the inventor can be substantiated and the set thoroughly recommended to all readers, especially those who are situated near to a powerful regional station.

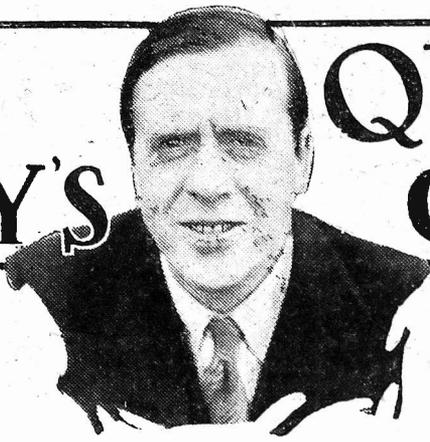
Yours sincerely,
S. BARRATT.

THOSE TRICKY CORNERS



In the accompanying short article the best method of making mitre joints is concisely explained.

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.

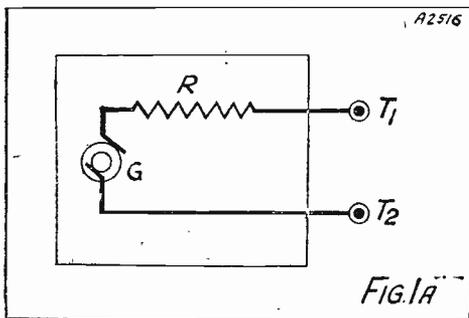
Using a Tapped Choke with a Pentode.

C. E. T. (Leeds).—"Why is it that when using a pentode I find that altering the position of the tapping point on my tapped output choke gives me a definite variation in quality? Yet, if I use a tapped output choke with an ordinary power valve no difference in quality is noticeable?"

It would help a great many people if they drew a valve as a generator of current, voltage and variable frequency in series with a large resistance, which for rough purposes can be the value of what many people call the "valve impedance," as shown in my sketch.

G is the generator and R the resistance (Fig. 1A) and this is equivalent to the valve with anode impedance Z (Fig. 1B), the output terminals being T₁ and T₂.

THE VALVE AS A GENERATOR



Our Chief Radio Consultant explains to a Leeds reader that the valve should be considered as the equivalent of the factors inside the square—a generator of variable frequency in series with a resistance.

Now if you connect a loudspeaker between T₁ and T₂ and run the frequency down from 10,000 to 50 cycles, the voltage across T₁ and T₂ will fall as often as the frequency gets below some figure—between 1,000 (say) or 100 (say).

Why? Because the loudspeaker impedance is lower the lower the frequency, therefore it wants to take more current—but the resistance R prevents the current rising, so the voltage across T₁ and T₂ gets less as the frequency of the generator is lower and as the resistance R is bigger.

Now the resistance R (or the internal impedance) of a pentode is very high, and the volts output therefore falls very rapidly as the frequency is decreased below, say, 2,000. That is why, to prevent this effect the pentode has to be used with an auto-transformer (or transformer), which makes the current output for given load less.

So if you ask the valve to supply more current by tapping up the transformer, you must lose bass, because the loudspeaker wants more current, and the resistance R prevents it.

Inside the H.T. Battery.

D. T. (Kennington).—"I recently pulled an old H.T. battery to pieces, and found that in some cells the zinc casing was covered by a white paste, whereas the others were quite clean.

"Why is it that some cells should break out in this way and not the others?"

Which link of a chain will break when an apparently uniform chain is subjected to the same increasing pull? One doesn't know why such and such a link goes first; one can only say the forging was not so good, that there was not quite the same uniformity in the metal, and so on.

Just the same way in a battery of many cells: some "go" before the others because they weren't quite so well made, etc., etc. Someone's got to give way first!

Overloading a Transformer.

A. J. B. (Kettering).—"I am using in my set a mains transformer for the filament supply designed to give 4 volts, 2 amps. I have been taking 4 amps. for a considerable time, and the transformer is still O.K. Is it usual for manufacturers to work with such a large safety factor, or will any mains transformer do this?"

It is not usual to be able to work a transformer at twice its power rating. If you were buying a 10,000 kilovolt-ampere transformer, you would not find it would stand up to a double overload! But in very small power work you can afford—in fact, you sometimes must afford—to have a larger factor of safety than when big powers are considerable.

I should think, however, you would risk some danger in burning out the transformer, using it as you do. Feel it after an hour's working. Is it too hot to bear your finger on it?

If it is, it won't last long. If it isn't, it may carry on for a bit.

ONLY IN "P.W."
can you read Capt. Eckersley's replies to listeners' own problems.
AND REMEMBER—
Captain Eckersley's technical articles appear only in
"POPULAR WIRELESS"
and **"MODERN WIRELESS"**

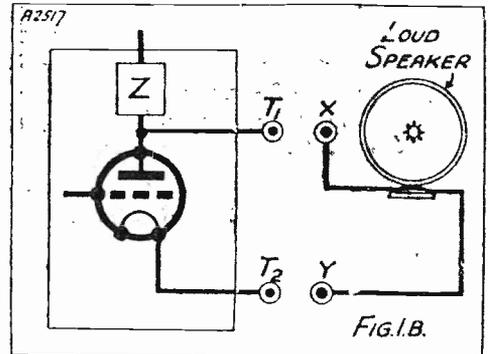
The Effect of Filtering the Loudspeaker Currents.

R. P. B. (Chelsea).—"It is often recommended to employ a choke output filter to keep the anode current of the last valve from flowing through the speaker windings.

Is it, however, altogether beneficial to do this? Would it not be better to let the speaker windings carry current in the right direction with a view to preventing loss of magnetism in the permanent magnets? I refer, of course, to the case of a moving-iron loudspeaker."

Other things being equal, you have a given flux exerting a given pull on the

VOLTS ACROSS THE LOUDSPEAKER



Here is a typical output circuit, as referred to in the reply to the first question. If a pentode is used instead of a 3-electrode valve the voltage drop across T₁, T₂ is accentuated as explained.

armature, and you add and subtract flux, and hence you add and subtract pull on the armature.

Whatever the value of the initial flux, and provided its pull is balanced by the counter-pull of the armature, the additions and subtractions of flux will give a resulting change independent of the initial pull.

Let Pf = flux pull and Pa the armature pull in a quiescent state, and p the extra pull due to A.C. currents. Then Pf - Pa + p and Pf - Pa - p are equal to + or - p if Pf = Pa. But it is an integral part of the design to give Pf and Pa special values.

The only object in not allowing current to flow in the windings is to maintain this condition. Many speakers will not be affected by the increase of Pf, but it is on the whole advisable not greatly to upset the given conditions.

Besides, it's bad practice to let the H.T. get on to the speaker, isn't it?

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

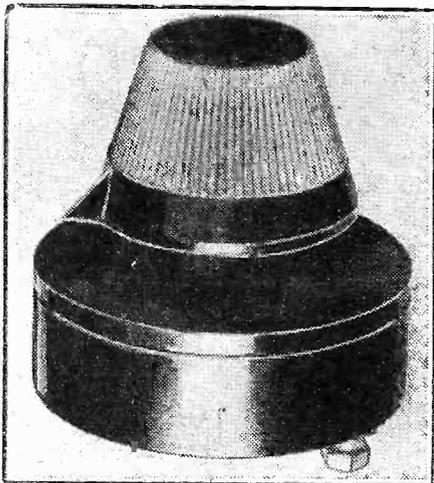
Tested and Found—?



THE READIRAD VOLUME CONTROL.

VOLUME controls of the potentiometer type have not always been universally satisfactory articles. They aren't even to-day. And it is not always possible to gauge the efficiency or otherwise of such a device until it has been in use for some time.

A GOOD COMPONENT



A good movement and a completely protected resistance element are features of the Readirad L.F. Volume Control.

The most usual troubles encountered are contact failures and an upset in the resistance element value.

The first may make itself very noticeable in an erratic variation as the component is adjusted. But the second is much more insidious in its effects if it is not accompanied by the first.

A bad fault of this nature can seriously throw the set off its performance without it being obvious to the inexpert that the volume control is to blame, for there may still be a smooth control in regard to relative volume.

But a freedom from this sort of thing is guaranteed in the Readirad Volume Control by a special method of construction. The resistance element is completely sealed up and contact is made to it through a series of small stud affairs.

Thus two ends are served, for there is also an effective contact and no wear imposed on the resistance element in the process.

The action is particularly gratifying; it is smooth, even and positive. And the

construction of the component is on entirely sound lines.

Its resistance is 300,000 ohms, and the price 5s. 9d.

A NEW LISSÉN LINE.

Messrs. Lissen, Ltd., have sent me preliminary details of their new Dual-Range Shielded Coil. And from these advance details it would seem that it is a very interesting component. When my samples arrive I will be in a position to tell you more about it.

"AKROS."

Flexible cords such as are usually used for loudspeaker and mains unit leads generally comprise two rubber-covered wires in a tubular fabric sheathing. To preserve a neat, round shape, cotton filling is provided.

It is this filling or padding which tends to make it difficult for constructors to fashion a tidy joint when such material has to be cut to a length.

Also, it is not a completely satisfactory method, inasmuch as the cotton readily absorbs moisture.

Therefore, its elimination is most desirable, and Messrs. Ward & Goldstone, Ltd., accomplish this in their new "Akros" by making each rubber-covered wire semi-circular in shape.

The fabric sheathing then fits snugly, and an entirely satisfactory result is achieved.

"Akros" costs little more than ordinary connecting cord, and is available in a useful range of gauges and finishes.

WORTH SENDING FOR.

The pamphlet dealing with the Permanent Magnet Moving-Coil "Motor" Speaker, published by the Tekade Radio & Electric Co., Ltd., should be in all constructor's hands.

GIVE YOUR ADDRESS.

It is pointed out that many people write to radio manufacturers for catalogues, etc.,

and don't give their full addresses. We are asked to request our readers to make sure that they do not omit such vital information.

THE H.S.W. SHORT-WAVE ADAPTOR.

Messrs. Hustler, Simpson & Webb are marketing a short-wave adaptor, completely assembled in a solid oak cabinet, at 35s. The coils cover a 15-100-metre wave-band.

THE "AMAZING" THREE.

I have just received a complete kit of parts for building up a Graham Farish "Amazing" Three set.

It is a Detector-2 L.F. receiver, and it

PLEASE NOTE.

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 of 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!

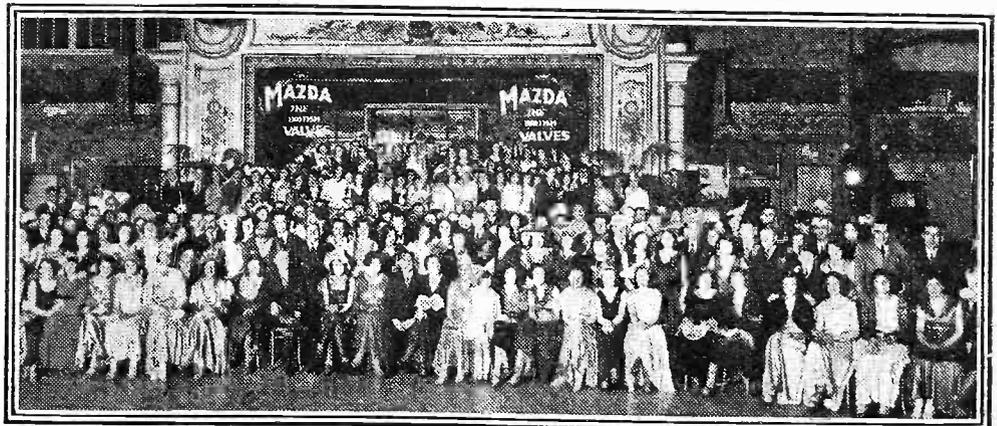
And readers should note that the subsequent reports appearing on this page are intended as guides to buyers, and are, therefore, framed up in a readily readable manner free from technicalities unnecessary for that immediate purpose.

retails at the very low price of 38s. 6d. Among the special features in it are a screened coil of special design; a moulded bakelite panel having all scales, markings, and indications engraved on it; a moulded bakelite "well" chassis, with position for each component engraved and, as with the panel, all fixing holes drilled.

It does seem to be a very nice job, and it is apparent that thought and imagination have been put into the design. The designers have visualised the needs and special requirements of constructors and have arranged the layout, etc., accordingly.

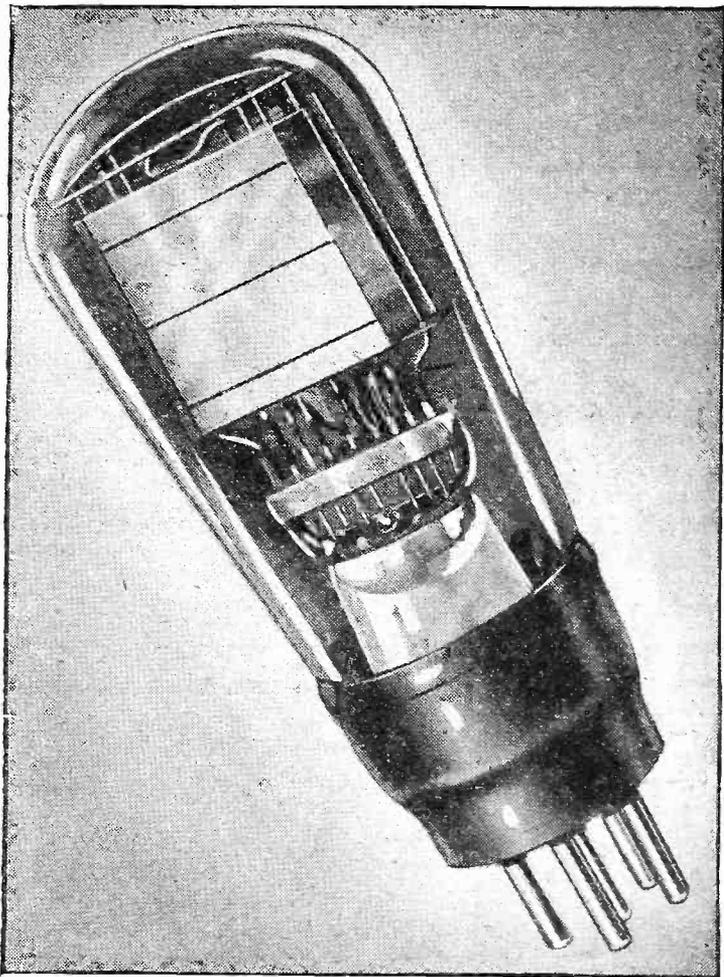
During the week I will be testing this "Amazing" Three, and shortly—perhaps in the next issue—a report on its performance will probably appear.

AT THE SIGN OF THE "MAGIC LAMP"



The Cosmos Social Club gave a dance at the Cosmos Lamp Works and, no doubt, the lighting was as brilliant as the scene was gay! It is at this huge factory that the famous Mazda valves are made.

THE NEW LOW CONSUMPTION HIGH EFFICIENCY PENTODES



★ FOR THE MAN WHO USES BATTERIES PEN 220

Here is the solution to the output stage problem in battery operated receivers. The Mazda Pen 220 gives an astonishingly high undistorted output for an anode current of only 5 m/a. It is the ideal output valve for portables.

PRICE 20/-

★ FOR THE MAN WHO HAS AN ELIMINATOR PEN 220A

A valve which delivers a huge undistorted power output for an anode current of not more than 18 m/a, the Pen 220A needs only 150 volts on the anode and can be made to give excellent results with 120 volts and a current of only 12 m/a. It is undoubtedly the valve for the man who wants really magnificent volume for the operation of large moving coil speakers.

PRICE 20/-

Mazda Valves are 100% British made and designed by British engineers.

The amazing

MAZDA THE BRITISH VALVES

The Edison Swan Electric Co. Ltd.



EDISWAN RADIO

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

At the present time there is a certain amount of unrest amongst European stations. There is rather a lot of wave-length wandering and listeners are reaping the unpleasant consequences in the large number of heterodynes that they find.

Take the case of Palermo. The wave-length assigned to this station is 542 metres which rightly belongs to Sundsvall. Palermo tried this wave-length for a time, though so far as I can make out he never got *exactly* on to it on any night.

More Wave-Length Wandering!

Then he shot down almost on to Riga's wave-length, and since then he has been wandering about at the top of the broadcast band, heterodyning now this station, now that. Another poisonous heterodyne is that which has been caused with Brussels No. 1 by the arrival of a new Russian station which began operations only one kilocycle away.

Bad offenders in the matter of wave-length wandering have been Sair Sebastian in the neighbourhood of 455 metres, the Norwegian relays just below, Radio LL (who has heterodyned Hamburg), Radio Vitus (Cardiff has been a sufferer), Radio Lyons and Radio Eiege.

Down below 250 metres wave-length wandering has been worse than I have ever known it. One rather disquieting sign is that there appears to be a big number of unauthorised or experimental stations at

STATIONS WORTH HEARING

Some practical distant-programme Notes compiled by a special contributor who nightly searches the ether in order to obtain really up-to-the-minute information for "P.W." readers.

work. One may try in vain to obtain the call-sign of many of them, and they seldom use the same wave-length on two consecutive nights.

Representation must have been made by the U.I.R. and it is to be hoped that the governments of the countries concerned will take appropriate action.

Reception on the long waves is particularly good and there is much less heterodyne-trouble up there. Radio-Paris, though, suffers occasionally from the attentions of a station—apparently Russian—working on almost the same wave-length.

Motala has not been up to the mark for a little while and Kalundborg has had periods of curious weakness. Otherwise the long-wave stations are first-rate.

Not Very Reliable.

For reasons already given, the bottom of the medium waveband has not been a good hunting ground recently. It is generally worth while to run rather rapidly over the portion between about 220 and 250 metres, for often there is a station or two to be picked up quite clear of interference. But possible heterodynes prevent us from re-

garding any station on these wave-lengths as reliable.

Above 250 metres matters are very much better. Gleivitz, Toulouse P.T.T., Horby, Leipzig, Turin, Heilsberg and Bratislava have not suffered at all from interference and all are receivable in normal condition with excellent volume and quality.

I still have not definitely identified Tallinn, though this station, which works on the channel immediately below Hilversum's (299 m.), is shown as having an output power rating of 11 kw. Perhaps readers living in more northerly districts have been luckier.

A Few Bright Spots.

Hilversum is particularly good at present and Bordeaux is quite free from interference. Genoa is usually rather mixed up with other stations, but one can occasionally receive him quite free from interference. The same applies to Marseilles.

Goteborg seems to be rather below par, but Breslau is strong and reliable. Working upwards, we have good stations in Brussels No. 2, Brno, Strasbourg and Frankfurt.

Hamburg is good only when you can catch him free from a heterodyne. Katowice is an immense signal and on many sets wipes out Dublin on the one side and Sottens on the other. Toulouse Midi is generally very good and I can record splendid reception from Lwow on many nights. Stockholm is rather below normal, but Rome keeps up well.

THE Technical Editor remarked a fortnight ago, in his description of the "Cosmic Three Star," that short-wave fiends never seemed to show any waning of interest or any desire for sleep. This was admirably confirmed two days ago by the arrival of a package of prodigious dimensions, which turned out to be a log of stations heard since our competition.

Still At It!

This came from W. H. R., who won the broadcast side of the competition, but, nevertheless, possesses such an insatiable thirst for DX that he keeps on at high pressure!

When "P.W." runs to 200 pages I shall be able to print one of W. H. R.'s logs in full. It would probably cause what the Dailies call "an unprecedented sensation."

On top of what I term "the usual DX," W. H. R. has apparently logged Johannesburg, during the afternoon, on 49.4 metres. Other star turns are Chi-Hoa, Nairobi several times, and exceptionally consistent reception of W3XAL. I would like to live in Plymouth—I can't get them myself near London with anything like the consistency of W. H. R.!

The only other matter of interest in the week's post has been a very tame sequel

SHORT-WAVE NOTES



News and views regarding an exciting and fascinating wave-band.

By W. L. S.

to the wonderful letter mentioned last week. I wonder why it is that some folk, having made a set "as per specification," immediately turn and rend the designer if it doesn't do everything claimed for it within the first two days? In spite of the general simplification of published sets nowadays there is always the need for a little patience, and, especially, careful re-reading of the author's remarks about the construction and operation of the set.

W. W., of Exeter, in the course of an interesting letter, mentions a little trouble that I remember having met myself. I refer to the picking up, at goodly strength,

of the broadcast programme when one is listening on an oscillating short-waver.

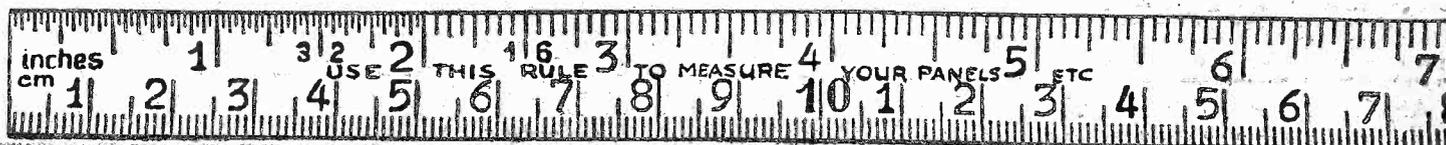
This is almost invariably due to the re-radiation of rectified current from a near-by broadcast receiver: in W. W.'s case it is a four-valver next door. Whatever station the broadcast set is tuned to, that station occupies the whole short-wave band, but only when the short-waver is oscillating.

I used to find that the omission of the earth-lead on the short-wave set cured the trouble. If it doesn't, I think the provision of an untuned S.G. stage in front of the detector should cut it out entirely.

An "Empire Listening" Movement!

W. W., among many others, mentions the excellent way in which Nairobi has been coming over of late. Conditions certainly are abnormally good for South Africa, for I find that the South African "hams" are quite good on the 40-metre band, where I hardly ever remember hearing them before this year.

I think our next Competition will have to take on an "Empire" flavour, in view of the signals from Nairobi, Johannesburg and the various Canadians. It would certainly cut down the field for searching to something of easier dimensions,





**LISTEN
TO THE
WORLD**

NOW

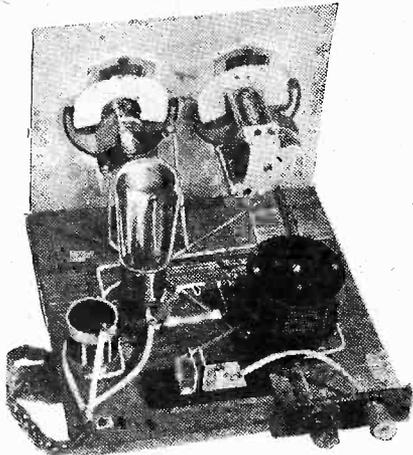


Illustration of chassis only

NOT A "KIT." Your Aerodyne Adaptor arrives ready to use in handsome Oak Cabinet—tested under broadcast conditions before despatch.

TWO COILS SUPPLIED: No. 1, 15-50 metres. No. 2, 50-100 metres.

CASH PRICE ONLY 35/-
or 15/- down & 5 monthly payments of 5/-.

Attach the AERODYNE Shortwave Adaptor to your set (a few seconds work) and practically all the world's stations are at your finger tips. You can switch from New Zealand to New York—Pittsburg to Moscow—South Africa to Canada—from practically anywhere to anywhere, ALL WITH CLEAR-EST REPRODUCTION made possible by the amazing selectivity of the AERODYNE Shortwave Adaptor. (If you wish to listen back again to the ordinary programme simply disconnect the adaptor and replace valve.) The Aerodyne Adaptor gives you ANY WAVELENGTH FROM 15 to 100 METRES.

Read this extract of a letter from the wireless expert, Mr. C. E. Runeckles (SU8RS).

"I would like to say how favourably impressed I was with the appearance, and above all, with the performance of this adaptor. I tested it under the most unfavourable conditions, i.e. before two transformer-coupled stages, not re-coupled, and somewhat to my surprise there was no trace of threshold howl, that bugbear of S/W receivers, and reaction was very smooth indeed, using a Cossor 210 det. Valve.

I can claim a pretty extensive knowledge of S/W receivers of all sorts, being an amateur transmitter, and holder of one or two records, as well as being the holder for the past year of the Radio Society of Great Britain's "Worley Talbot" Trophy, awarded me for my pioneer work on ten metres, and I can truthfully

say that, judging from the short test I made, the adaptor will make almost any B/C rec. a 100% Short Waver.

Special Super-Het Model (for use with Receivers incorporating one or more stages of H.F. amplification). **PRICE 45/- CASH** or £1 down and six monthly payments of 5/-.

Coils supplied for the Amateur Wave-bands of 10 and 160metres. 10 metres, 4/6 each. 160 metres, 5/6 each.

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Post to:

HUSTLER, SIMPSON & WEBB, LTD.,
317, Hoe St., Walthamstow, London, E.17.

Dear Sirs,

Please despatch to me carriage free, an
AERODYNE Shortwave Adaptor Standard Model,
AERODYNE Shortwave Adaptor Super Het Model.
(cross out line not required).

for which I enclose

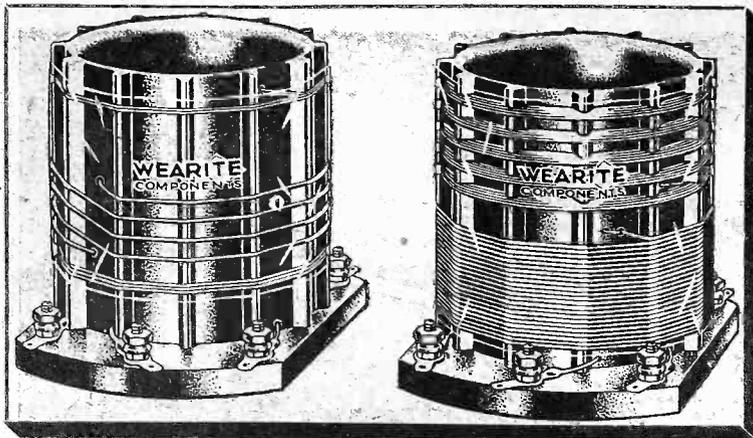
..... cash with order.

or.....first hire purchase deposit.

Name.....

Address.....





USE 'WEARITE' COILS IN YOUR "COSMIC"

—and get the performance that the designer intended

These WEARITE components will help you to better results

WEARITE H.F. CHOKE

An efficient choke working from 10 to 2,000 metres without marked resonances.

List No. H.F.S.

PRICE 6/6

WEARITE ON-OFF SWITCH

A single hole self-cleaning push-pull action switch of compact design.

List No. G. 22.

PRICE 1/-

WEARITE 4 PIN VALVE HOLDERS

Soundly built holders with spring sockets. Of highest quality bakelite.

List No. S.1.

PRICE 1/3

With such an efficient receiver as the "Cosmic" the tuning circuits *must* be above suspicion. Make certain of the performance of your "Cosmic" by using "WEARITE" coils — coils that are backed by a reputation second-to-none.

9/- per pair

or 5/6 for the Dual-range, and 3/6 for the Ultra Short-Wave range.

Write for Special Lists applicable. USE THIS WEARITE EARTH TUBE!



No Screwdriver. No Spanner. Just a Match.

PRICE 3/6

If you have any difficulty in obtaining your Wearite components, write to us direct quoting the name of your dealer.

THE FIRST NAME IN RADIO COMPONENTS



WRIGHT & WEAIRE, LTD., 740, High Road, Tottenham, N.17. Telephone Tottenham 3847/8/9.

9910

WE BUY FROM YOU— IF YOU BUY FROM US

Here is the chance you've wanted for years! Tell us in detail what you have to sell and we will give you a price without any obligation to you.

Many applications have been received without sender's address. If you have had no reply, please apply again.

I WANT TO SELL

SET MAKER.....CABINET OR PORTABLE?.....

MAINS OR BATTERY?..... HOW MANY VALVES?.....

YEAR BOUGHT..... SPECIAL POINTS.....

VALVES MAKE..... TYPE NUMBER.....

MAKE..... TYPE NUMBER.....

MAKE..... TYPE NUMBER.....

SPEAKER MAKE..... TYPE.....

I WANT TO BUY

COSMIC III ★ READY RADIO KIT "A" ..	£4 19 6
(Including specified Mullard valves) "B" ..	£5 17 6
(Including valves and cabinet) "C" ..	£6 18 0
CELESTION PPM PERMANENT MAGNET MOVING-COIL SPEAKER (complete with dual-ratio input transformer)	£2 7 6
R & A "100" PM MOVING-COIL SPEAKER (complete with multi-ratio input transformer) ..	£2 17 6

OR

STATE WHETHER CASH OR H.P. TERMS

NAME..... ADDRESS.....

SENDING IN THIS FORM PUTS YOU UNDER NO OBLIGATION.

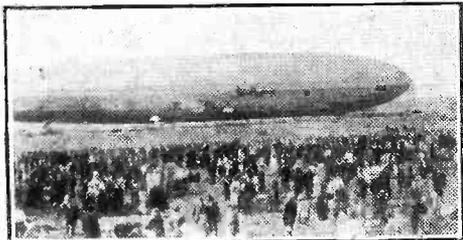
MUTUAL RADIO BUYERS
235, Regent Street, London, W.1.

SHORT-WAVE PICTURES

A MPLITUDE modulation, because of fading at the receiving end, has proved unsuitable in radio-picture transmissions for half-tone pictures on short waves.

This is why the black-and-white processes had to be resorted to in such cases, the various shadings of the original photo being either by photographic or electric

A COMPARISON



The top picture is the original photo and the bottom one shows how it was received on short waves and the old-time modulation method. In the centre you see the picture as it came over in accordance with the new "channel-shifting" scheme.

means, converted into a pure alternation of black and white, and special methods to effect this have been devised.

An Interesting Lecture.

In a lecture recently delivered in Berlin at a meeting of Radio engineers, Prof. Fritz Schroeter gave an interesting account of a new method developed by himself and his assistants in the Radio-Photographic Laboratories of the Telefunken people. The new scheme is what Dr. Schroeter terms a "channel-shifting" method.

By Dr. ALFRED GRADENWITZ.

The description of a new scheme which enables pictures to be sent through the ether at increased speed to places thousands of miles away.

Before discussing this, the following should be understood: The actual limit of the ordinary method is dependent not only upon considerations relating to the fineness of subdivision, but, in the case of short waves, as well on Echo Phenomena.

The New Method.

The new method of transmission developed at the Telefunken Laboratories is not affected by Echo Phenomena to any larger extent than a picture transmitted over long cable lines is affected by differences in the times of travelling of various frequencies.

However, this method also makes due allowance for other peculiarities of short-wave transmission: *Fading*, in connection with the reception of modulated carrier-waves, is known continually to vary within the side-band, a phenomenon known as "selective fading."

Whereas fading of the carrier-wave invariably results in the omission of signals, selective fading at any given moment only affects a narrow frequency section of modulation, and if a signal be built up of several frequencies, it is still transmitted, though with a certain distortion. The causes of selective fading is a mutual shifting of phases of the two side-bands, due to fluctuations in the times of travelling.

The new method of half-tone transmission, then, was based upon telegraph keying and heterodyne reception, and what was aimed at was to shift the heterodyne frequency in the receiver by altering the carrier-wave itself.

The best way of altering the radiated carrier-wave was found to be the use of several distinct control frequencies, which, being selected

photo-electrically by the half-tone shades of the scanned picture, will act alternately upon the amplifiers of the transmitters.

The new method is based upon the current curve as obtained in connection with the usual photo-electric scanning of a half-tone picture and which, in the case of transmission through a cable, is immediately supplied to the receiver.

In the case of a short-wave transmitter, the continuous amplitude modulation is converted into a discontinuous scale of graduated frequencies, the range of amplitudes being subdivided into a corresponding number of intervals being made to correspond with a given shade modulation upon which the length of the carrier-wave, in turn, will depend in actual practice.

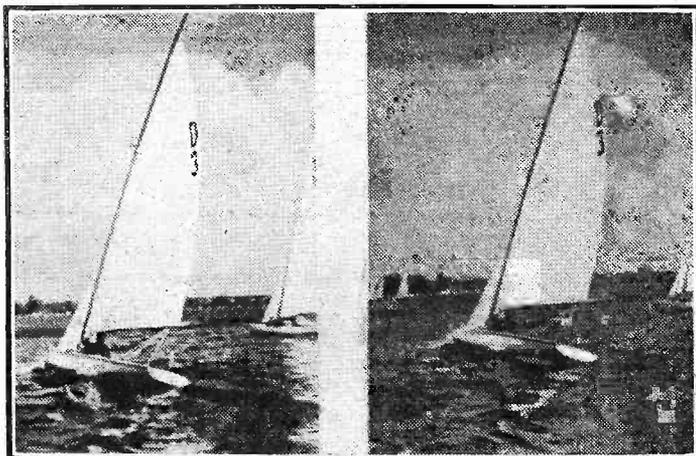
Quartz Crystal Control.

The continuous variation of luminous shadings is thus converted into a stepwise variation of the transmitting frequency, the steps of which should be kept constant with the best means available.

A heterodyne is made use of in the receiver to obtain given intermediate frequencies. The various ranges of luminous shadings in the picture being made each to correspond with one of a series of ducts.

This scheme is obtained in actual practice by means of a loop oscillograph, the mirror of which is turned through an angle proportionate to the amplitude of the incoming picture current, thus moving a light index over a certain number of photo cells.

WHICH IS THE ORIGINAL?



A photo and its radio-photographic reproduction at a distance by the new method. The original is on the left.

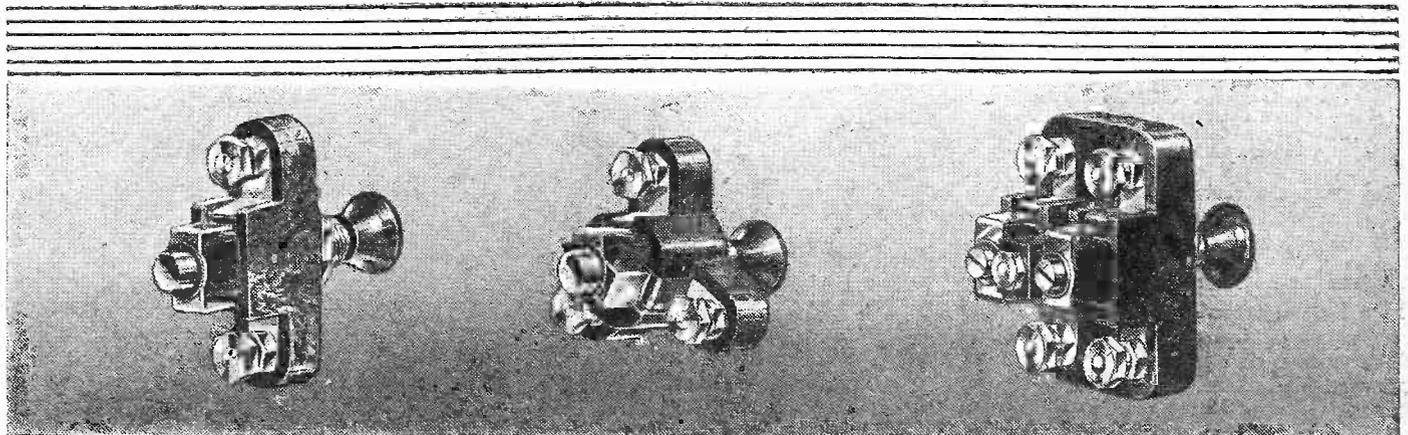
NEARER CLEARER



MORE LIVELY THAN BEFORE

TELSEN

THE SECRET OF PERFECT
RADIO RECEPTION



“**C**HANGING over to Telsen is like taking the wool out of your ears”—that is the verdict of an enthusiastic Telsen constructor which inspired the illustration on the opposite page. Telsen Components in your set give you a realism which is astonishing—they enable you to sit back and **hear**, without straining forward to listen—they bring every item on the programme ‘nearer, clearer, more lively than before.’

**TELSEN
DUAL RANGE AERIAL COILS**

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TELSEN 154
(H.F. Transformer) ... 5/6

TELSEN W.76
(Selectivity Control) ... 7/6

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Logarithmic Variable
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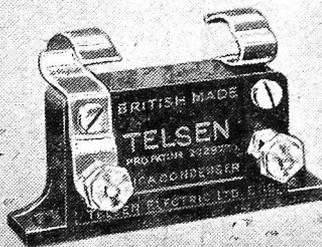
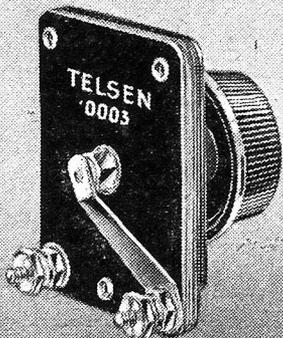
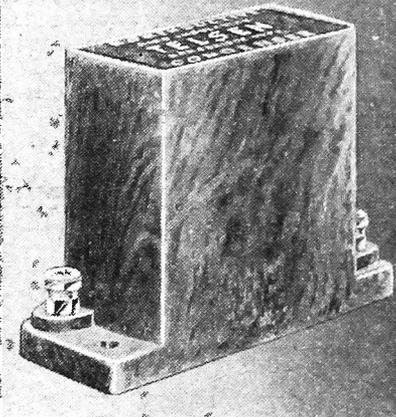
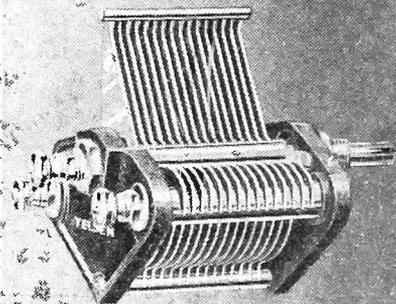
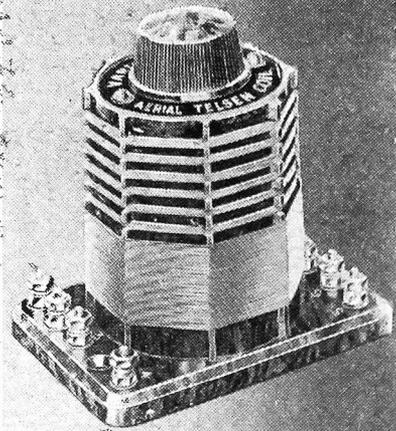
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Prices from 1/6

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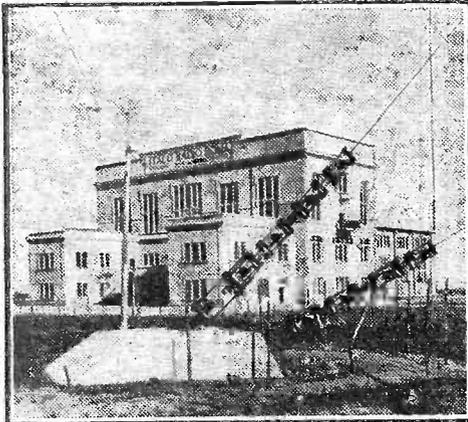


I THINK it is reasonable to assume that of the vast number of readers who have built, or who are building, our new "Cosmic" receiver, there will be many—possibly even the majority—who have never before operated a set on short waves.

Well, let me assure you right at the very beginning that you have got a real treat in store!

I've handled dozens of short-wave sets during the last few years, and on those grounds alone I think I might almost be forgiven for saying that I consider myself reasonably "hard baked" when it comes

THE VOICE OF ITALY



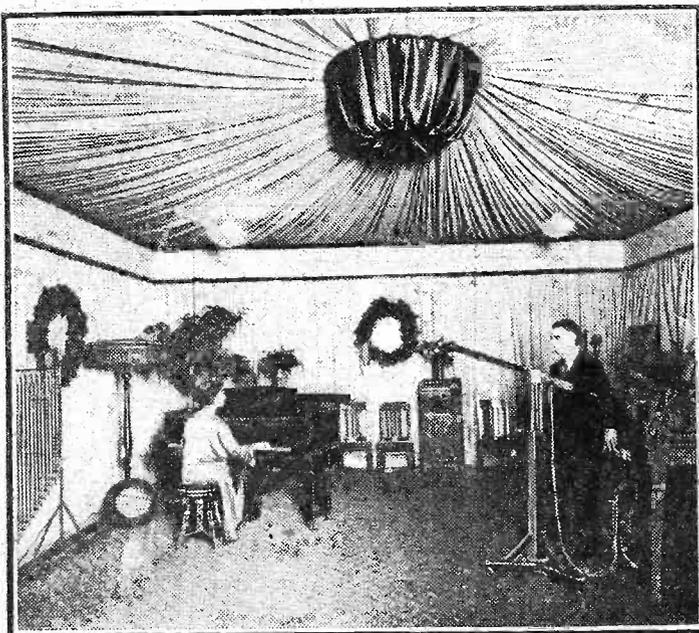
The short-wave station at Rome comes over remarkably well. His advertised wave is 80 metres, although the transmissions are sometimes heard on 25.4 metres.

to getting a kick out of short-wave ether-probing. And yet I begin to have my doubts!

For on the very first evening that I took one of our "Cosmics" home to give it a half an hour's run on short waves, I started at eight o'clock with the firm intention of chucking it by nine at the latest, and I finally crawled up to bed in the very small hours of the morning!

But that is only one instance. Subse-

ONE OF THE "PUNCH-MERCHANTS!"



"This programme comes to you through the courtesy of . . ." Yes, this is the studio at KDKA right enough. Almost every listener to short-wave stations is familiar with the powerful transmissions that emanate from Pittsburg, Pennsylvania,

quently I have spent many an entertaining evening roaming round the world with the "Cosmic," and for the present, at any rate, I have given up all hope of becoming healthy, wealthy and wise—that is, if going to bed early has got anything to do with it!

I don't want you to imagine from that that it is absolutely necessary to spend half the night "knob-twiddling" in order to hear these stations from thousands of miles away. Nor do I wish to convey the impression that there is nothing worth hearing during conventional listening hours.

Stations Galore!

That is just the trouble, there is *always* so much of interest to be heard below 60 metres that when you do start roaming round time slips by before you know where you are, and it is only when you hear anything such as a time signal from some far-off country and decide, just as a matter of interest, to see what time

"P.W.'s" Chief Radio Consultant, **CAPTAIN P. P. ECKERSLEY**, has an interesting message for YOU—and it is going to be part of "P.W.'s" special broadcast transmission from Station CT1AA!

MAKE A LARGE CROSS AGAINST MARCH 18TH

And look out for the Full Details in "Popular Wireless."

difference there is between that particular country and your own, that you wake up to the fact that you should have been between the sheets hours ago!

I am seriously thinking of setting the alarm clock when next I settle down to an evening with the "Cosmic" on short waves. From previous experience with this remarkable set, I'm not at all sure that such a scheme would not be well worth while!

Be Prepared.

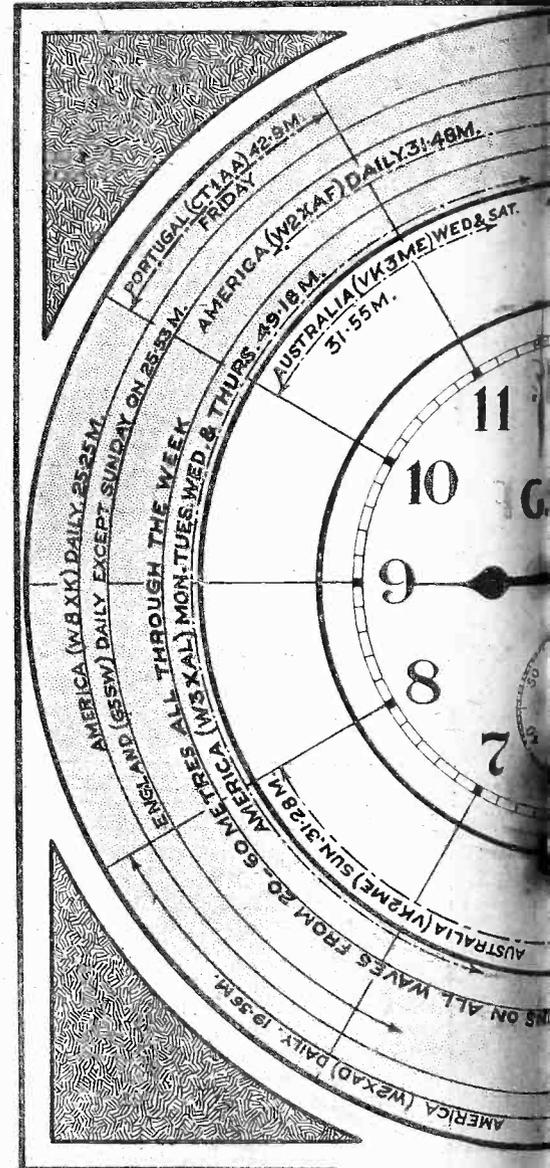
You might be wondering what all this has got to do with an article entitled "Your 'Cosmic' on Short Waves." Well, it is just a timely warning of the sort of thing that you can expect when you manipulate that transformation switch at the back.

It is all very well to say in advance that you won't get all that excited about it, but just wait till you get

YOUR "COSMIC" SHOW WAVES

By G. I. who gives you some on the subject of w together with a few concerning "P.W." broad

ROUND THE SHORT-WAVE



This specially prepared short-wave clock will prove useful to all who are interested in short-wave reception. It tells you in an instant which of the more powerful short-

BELOW 30 METRES ABOVE 30 METRES



able advice
reception,
inary details
cial Lisbon

WORK WITH THE "COSMIC"



wavers you can expect to receive at any hour of the day or night. Cut it out when you have read your "P.W." and keep it handy for reference.

"hitched" to a really distant station, and then try and drag yourself away and go to bed! I'll take my hat off to you if you succeed.

As I have said previously, I expect the "Cosmic" will have raked in a great many who have never before tackled this fascinating short-wave business, and, to be quite candid, it's *not* quite so straightforward as ordinary broadcast reception. But that is only to be expected when it is remembered that the movement of the transformation switch brings about an increase in frequency of approximately ten to one.

It's Kilocycles That Count.

After all, it is frequency that counts when it comes to tuning considerations, with a ten to one increase in going from broadcast to short waves, it is only logical that the dial will need to be turned

ten times more slowly in order to achieve the same measure of success.

If YOU want to hear the inimitable Captain "P.P.E.'s" voice via the ether, make a special point of calibrating your set in advance!

You can do it to-morrow (Friday) night from 10 to 11 p.m.

THE WAVE-LENGTH IS 42.9 METRES

And you will probably find it between 165 and 175 degrees on your "Cosmic" tuning dial.

It is rather necessary to stress the importance of this slow manipulation on short waves, for I am convinced that it is failure to observe this procedure that accounts for considerably more than half the "no-signals" troubles with new hands at the game. But I do not want to create the impression that you will require months of experience before you can hope to succeed. Not a bit of it.

Practice Makes Perfect.

Like most other things, there is a knack in it, and when you've had a couple of evenings with the "Cosmic" on short waves you shouldn't have any difficulty in obtaining results every bit as good as mine have been. But more about that later.

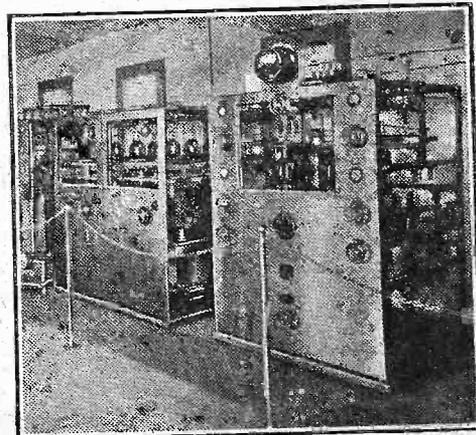
For the moment I want you to imagine that you are with me, spiritually, on one of my recent "Cosmic"

tests, and by that means I am hoping that you will be able to get a clear idea of the exact procedure to be adopted when searching round on short waves.

On the table before us is the "Cosmic" all connected up and ready for use. We will assume that this is our first test of the set on short waves, and that in consequence we must go through the normal procedure necessary when testing out a new short-waver.

Well, the first thing is to find out whether it will oscillate satisfactorily. So let us

DOWN UNDER!



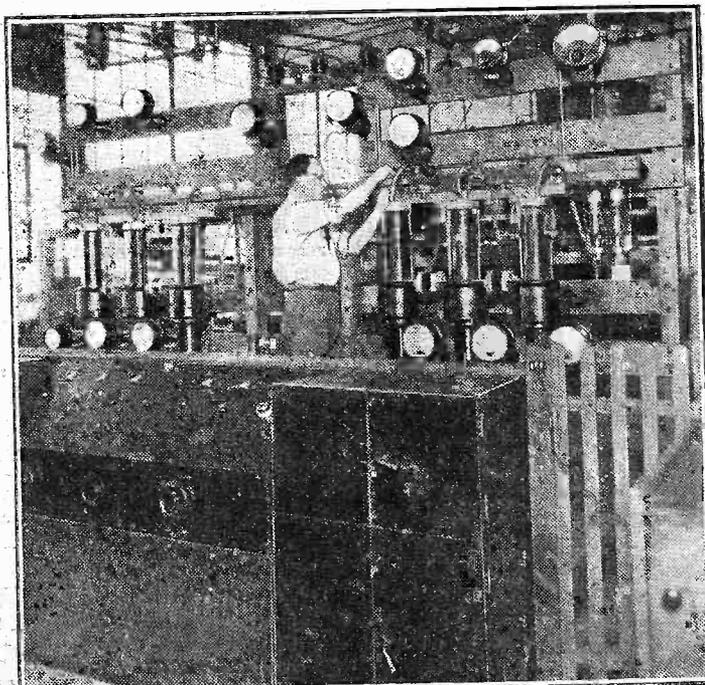
Melbourne (Australia) is often heard very well in this country under the call-sign of VK3ME. Here you see a section of the well laid-out short-wave transmitting gear.

switch it on. There—now we can soon find out.

Hm! Sounds lively enough, anyway, but we must be systematic and start with the tuning-dial at minimum. What's that—why have I set it at 100 degrees? Well, that is minimum of one-half of the extenser, and on short waves, although it doesn't very much matter over which half we tune, it is,

(Continued on next page.)

BEHIND THE SCENES AT SCHENECTADY



It is hardly surprising that W2XAF and W2XAD, the twin short-wave transmitters at Schenectady, should also be referred to as "punch-merchant" stations, for our picture above shows only a part of the giant transmitting apparatus that is used by them.

YOUR "COSMIC" ON SHORT WAVES

(Continued from previous page.)

if anything, slightly better to tune over the half that is normally long-waves.

Now let's see if it oscillates. Slowly advance in a clockwise direction this knob on the right until—yes, it oscillates there.

station calling "C Q," which is a sort of general call to all stations. But we won't waste time listening to that; let us get on up. Eight—nine—and so up to twenty, then phe-oo-ee! Gosh! this is a good carrier, let us try and resolve it.

Notice the carrier-wave whistle is exactly the same as on broadcast waves—it starts right up high, and as you *very slowly* adjust the tuning it comes down to a low growl and then goes up high again on the other side. Now to resolve it we must endeavour

the question of conditions has a lot to do with it, you can always count on finding *something* of interest.

And if, on account of thoroughly bad conditions, you do not succeed in getting America the first time, well, don't immediately jump to the conclusion that your set is at fault. Just give it a rest for a day or two and then have another go.

Nothing to go Wrong.

If it oscillates satisfactorily, and it seems reasonably lively, well, you can take it from me there is nothing very much wrong with the set.

By the way, talking of oscillation, I've got an idea that one or two of you "P.W." readers still go in for "outsizes" in aerials. To which you may feel inclined to retort "Well, what has that got to do with oscillation?"

Well, the fact of the matter is that in designing the aerial coupling for the short-wave side of the "Cosmic" the turn numbers and spacing were adjusted to give the maximum efficiency in conjunction with average-size aerials. It is just possible, therefore, that if you use the "Cosmic" on short-waves with a large aerial, you may come up against "dead spot" difficulties.

Dead spots can be detected by the complete absence of oscillation over certain narrow bands here and there in the tuning range, and they can very easily be overcome on our flexible "Cosmic" by using a neutralising-type series-aerial condenser between the set and the aerial lead-in. I don't anticipate for one moment that many of you will find such a condenser to be necessary, but if you do, then you must not forget to short it out when the set is in use on broadcast and long wave-lengths.

A Little Wrinkle.

Here's another wrinkle you might like to try, although I'm not at all sure that I ought to tell you this one, because the last thing in the world that I want to convey is that it is possible by drastic action to improve upon the fundamental "Cosmic" design! That, very definitely, is *not* possible.

But the conditions under which short-wave reception can best be attempted vary so tremendously that, however universal

(Continued on page 1504.)

"P.W." CALLS UP LISBON



This interesting picture was taken while "P.W.'s" Technical Editor, Mr. Dowding, was discussing with the manager of C T I A A the final details of our special broadcast. Mr. Kelsey is seen on the left making notes of the proceedings.

all right. How do I know? Well, can't you hear that noise that sounds somewhat like escaping steam? Yes, that's oscillation.

You see, you just advance this reaction control knob until you reach the point where it seems almost as if you have opened the safety-valve of a steam-engine. And when you go beyond that point the set is oscillating. Simple, isn't it?

Next thing is to determine whether it will do that all the way up the dial. Left-hand on the tuning control, right hand adjusting the reaction knob, and so we advance twenty degrees at a time, noting carefully whether it still oscillates at every readjustment. Yes, it oscillates right up to 200 degrees, so now we can listen for signals.

On "The Edge" of Oscillation.

Best to start down at minimum again, and we must advance the reaction knob until it is just a fraction beyond the point where the "escaping steam" commences. And we must not forget to turn this tuning control ten times more slowly than we should on the normal broadcast waves.

Slowly—very slowly—one hundred and one, two, three, four, five—swish, now the set has stopped oscillating; so we must advance the reaction knob a trifle more. Yes, that reaction control requires almost constant readjustment in order to maintain the set in a state of oscillation.

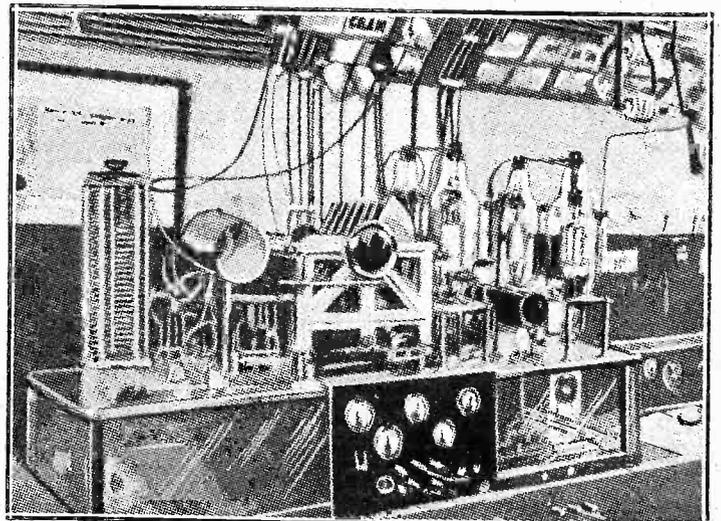
Six—seven—ha, here's a whistle: "dah-di-dah-di. dah-dah-di-dah." It's a C.W.

to keep that low growl position while we decrease the reaction control to the point where the set *just* stops oscillating, and then, if the station is strong enough, we shall hear speech. You will notice that I have to make very delicate adjustments to the tuning control in order to keep that low growl condition as the reaction is decreased.

Ah, music—sh! it has stopped: "This program comes to you through the courtesy of the Baked Beans Corporation." No need to tell you that is American! A hundred-and-twenty degrees, that is about twenty-five metres; yes, that is W S X K.

Get the idea? You see, it is all a matter of careful tuning and delicate adjustment, and when you go about it in that way, there is really nothing very difficult. You will find you can tune in stations like that all the way up the dial, and although in the reception of the really distant stations

THE "HELLO, ENGLAND" SIDE OF IT

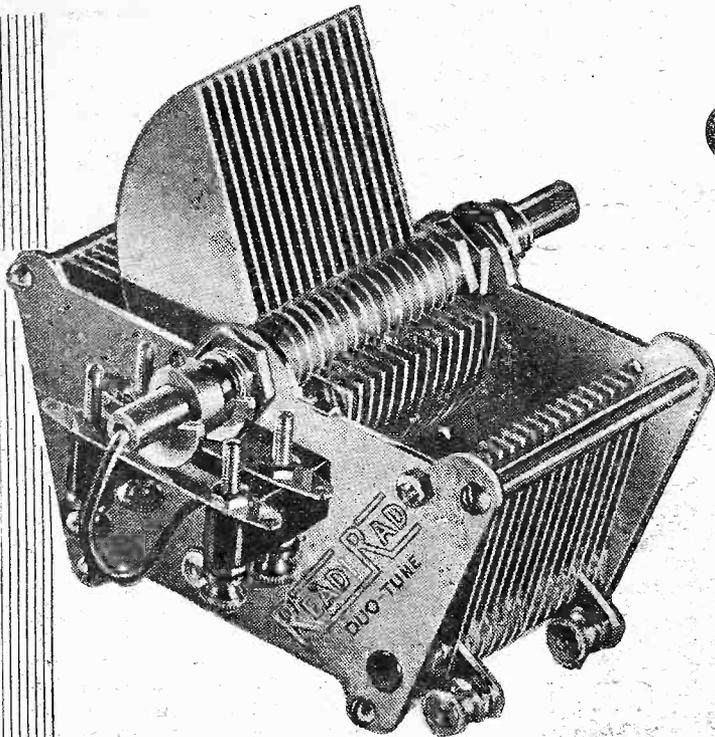


This is part of the elaborate equipment at Lisbon that will enable YOU to participate in this highly-interesting broadcast. Be sure not to miss "P.P.E." via the ether!

Popular Wireless, March 5th, 1932.

You must use a DUOTUNE CONDENSER

for your
COSMIC STAR



READIRAD DUOTUNE 15'6

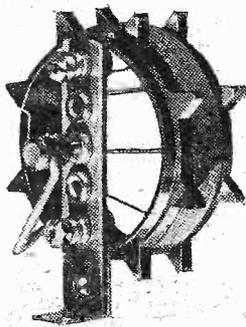
(Extenser Model, Patent Pending)

The Readirad DUOTUNE is essential for the "Cosmic" and for every modern all-wave receiver. It is the only condenser of its kind. Not only does it provide automatic switching from medium to long waves (on the famous Extenser principle) but also at the flick of a switch it is converted from a .0005 - mfd. condenser to a .00025 - mfd. condenser. It combines all the advantages of wide tuning range with easy station separation.

An important feature is that all the plates are in use all the time so that no losses are introduced and maximum efficiency is maintained over both tuning ranges.

The DUOTUNE was specially designed for the "Cosmic" Star by G. P. Kendall, B.Sc.

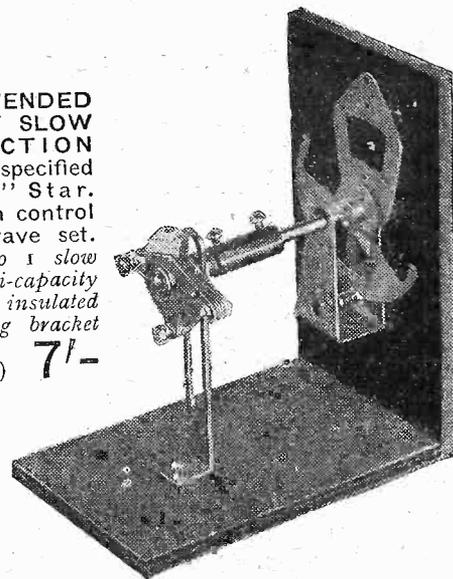
Fit a DUOTUNE in place of your present condenser and bring your present set right up to date. Full-size blue print of the "Cosmic" Star is supplied with every DUOTUNE showing the connections.



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wound strictly to
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READIRAD EXTENDED
ANTI-CAPACITY SLOW
MOTION REACTION
EQUIPMENT as specified
for the "Cosmic" Star.
The ideal reaction control
for every all-wave set.
(Consists of 20 to 1 slow
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extension with insulated
coupling, mounting bracket
and .0003 - mfd. variable
condenser.) 7/-



FULL-SIZE BLUE PRINT FREE.

Send four 1½d. stamps for a copy of Mr. Kendall's Book entitled "10 Hows for Modern Radio Constructors" (published at 6d.) and we will include a "Cosmic" Star Blue Print FREE.

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I enclose four 1½d. stamps. Please send me a copy of Mr. Kendall's Book and free full-size blue print of the "Cosmic" Star together with complete list of Ready Radio "Cosmic" Star Components.

Name

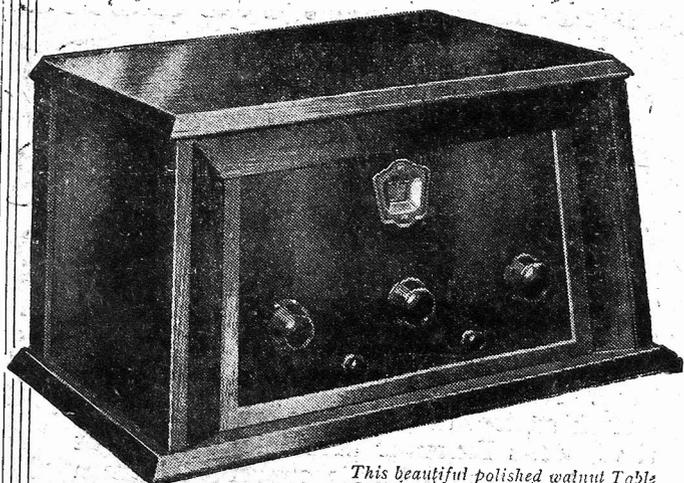
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Build your COSMIC STAR



This beautiful polished walnut Table Cabinet has been specially designed for the "Cosmic" Star, but is also equally suitable for any set with a panel not exceeding 12" x 7" and baseboard 14" x 10". Price 21/-

with a READY RADIO Official Blue Print Kit

KIT "A"

Complete Kit of Components together with panel (ready cut and drilled), baseboard, Jiffilix for easy non-soldering wiring and free blue print.

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KIT "C" Complete Kit of Components as Kit "B" together with Table Cabinet illustrated above and free blue print. **£6.18.0**

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Kit A, including above. Deposit 12/6 and 11 monthly payments of 12/6
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1 Duotune Extenser	15	6
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1 ReadiRad Moderator Coil	2	6
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1 ReadiRad Standard H.F. Choke	4	6
1 Lewcos 100,000-ohms Spaghetti Resistance	1	6
1 ReadiRad Radiogram Switch	2	9
1 T.C.C. 0003 Fixed Condenser, Type "S"	1	3
1 ReadiRad Wave-Change Switch	1	6
1 R.I. Hypermite L.F. Transformer	12	6
1 Grid Leak, 2 megohm and Holder	1	4
1 T.C.C. 01 Fixed Condenser, Type 40	1	9
1 Grid Leak, 5 megohm, and Holder	1	4
9 Belling-Lee Terminals, Type "R"	2	3
1 Packet of Jiffilix for wiring	2	6
3 Belling-Lee Wander Plugs	-	6
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£4 9 6

Any Component can be purchased separately

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Visit our Showrooms at 159, Borough High Street, London Bridge, S.E.1 (2 minutes from London Bridge Station) to see and hear the wonderful "Cosmic" Star.

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TO INLAND CUSTOMERS.—
Your goods are dispatched post free or carriage paid.

TO OVERSEAS CUSTOMERS.—
Everything Radio can be supplied against cash. In case of doubt re-

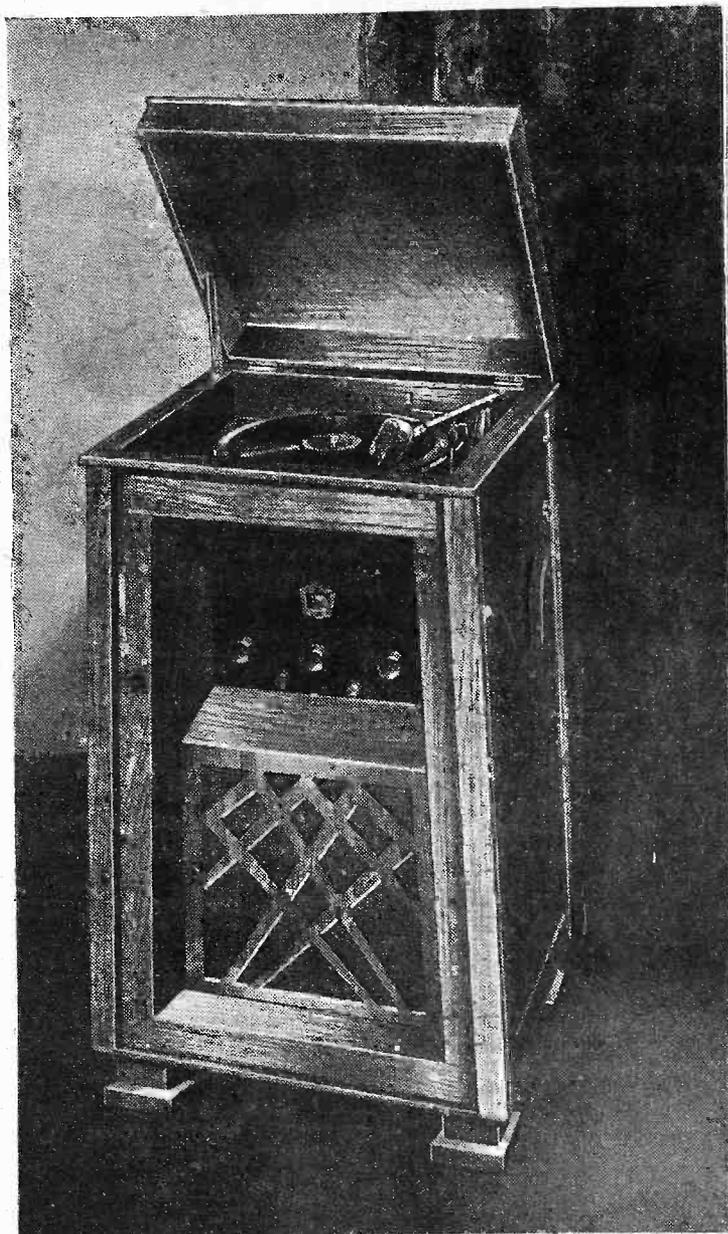
garding the value of your order, a deposit of one-third of the approximate value will be accepted and the balance collected by our Agent upon delivery of the goods. All goods are very carefully packed for export and insured, all charges forward.

'Phone: Lee Green 5678.

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Build a Cosmic Radiogram with a Ready Radio Cabinet and accessories



Ready Radio Radiogram Cabinet

With this beautiful cabinet you can convert your present set to a Radiogram of the most modern and artistic design. This cabinet is of highly polished walnut with lift-up lid, automatic support and a needle cup. Overall-size 3' 3" x 22" x 17". Suitable for any receiver having a panel not exceeding 12" x 7" and a baseboard 16" x 10".

Price £3.7.6

or deposit of 15/- and 6 monthly payments of 10/-.

"COSMIC" STAR RADIOGRAM KITS BY EASY PAYMENTS

Kit "B" (full set of components and valves) with Radiogram Cabinet and R & A type 40 Loudspeaker Chassis.

Deposit of 20/- and 11 monthly payments of 18/6

The above Kit may be purchased in combination with any of the accessories listed. Examples:

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Or Kit "B" with Radiogram Cabinet, Speaker and Battery Equipment as detailed on opposite page.

Deposit of 20/- and 11 monthly payments of 21/6

ReadiRad Pick-up	£	s.	d.
ReadiRad Volume Control	1	7	6
Collaro B.30 Double Spring Gramophone Motor with Automatic Stop		5	9
	1	13	0
	<u>£3</u>	<u>6</u>	<u>3</u>

ReadiRad Pick-up	£	s.	d.
ReadiRad Volume Control	1	7	6
R & A type Loudspeaker Chassis		5	9
		16	6
	<u>£2</u>	<u>9</u>	<u>9</u>

or 10/6 down and 5 monthly payments of 9/-.

As above but with R & A type 100 Permanent Magnet Moving Coil Speaker, with Matching Transformer

£4 10 9 or 10/- down and 9 monthly payments of 10/6.

ReadiRad type B.S. A.C. Mains Unit, 150 volts H.T. & Trickle Charger for 2, 4 or 6 volts

£5 17 6 or 10/9 down and 11 monthly payments of 10/9.

Atlas or Ekco D.C. Mains Unit

£1 19 6 or 8/6 down and 5 monthly payments of 7/-.

or 10/- down and 7 monthly payments of 9/-.

As above but with Collaro A.C. Induction Motor

£4 13 3 or 10/6 down and 9 monthly payments of 10/6.

As above but with Macom Motor, type A, suitable for D.C. Mains

£4 5 9 or 10/- down and 9 monthly payments of 9/6.

CASH or C.O.D. ORDER FORM

To: **READY RADIO, LTD.,**
Eastnor House,
Blackheath, S.E.3.

Please dispatch to me at once the following goods.....

for which (a) I enclose (cross out line) £.....
(b) I will pay on delivery (not applicable)

Name.....

Address.....

P.W. 5/3/32

To: **READY RADIO, LTD.,**
Eastnor House,
Blackheath, S.E.3.

Please dispatch to me the following goods.....

for which I enclose first deposit of £.....

Name.....

Address.....

P.W. 5/3/32

EASY PAYMENT ORDER FORM

YOUR "COSMIC" ON SHORT WAVES

(Continued from page 1500.)

in its application our original design may be, almost inevitably there are bound to be a certain few for whom a minor adjustment may make it possible to obtain just that little bit extra that counts for so much on short waves.

So that if you are one of the "certain few" who can't quite get to the ends of the earth with your "Cosmic" on short waves, well, try the dodge of connecting a piece of wire between terminal No. 3 on the short-wave coil (No. 2 on the coils numbered from 1 to 6) and the plunger of the transformation switch at the back.

Well Worth Trying.

You will notice that I say to the plunger of the switch. Well, that is because this alternative connection scheme must not be common to any of the other terminals on the switch when the plunger is pushed in. As a matter of fact, just for the sake of trying it out, you have no need even to go

THE DETAILS CONCERNING "P.W.'s" SPECIAL SHORT-WAVE PROGRAMME FROM LISBON.

DATE. FRIDAY EVENING, MARCH 18.
TIME. COMMENCING AT 10 p.m.
WAVE-LENGTH. 42.9 METRES.
POWER. 2 KW.
CALL SIGN. CT1 AA.

to this trouble, for you can quite easily bend up a piece of stiff wire to form a third contact to be shorted to the other contacts only when the switch plunger is pulled out. That will do the trick all right.

Then, if you find the little wrinkle appears to be advantageous, well, you will probably consider it worth while going to the expense of a four-contact switch in order to do the job properly. After all, the new switch will only cost you about 9d., and it is not as if the present switch is wasted, for there are dozens of uses to which you can put that at some future time.

Use a Four-Point Switch.

So that if you happen to be one of the few for whom this little alternative scheme seems desirable, well, take my advice and do the job properly by fitting a proper four-contact push-pull switch. The three wires which go to the present switch will, of course, be joined to three of the terminals on the new switch, and the remaining terminal will be joined to the terminal I have indicated on the short-wave coil. That's all there is to it!

Now I am afraid that I am getting towards the end of my space, so I am going

to conclude by giving you just an *approximate* idea of where to adjust the tuning dial of your "Cosmic" for certain wave-lengths, and I am also going to say a word or two concerning the more powerful stations to look out for.

The small band of stations in the neighbourhood of 20 metres will probably be found at the very minimum of the tuning condenser. As to whether your particular

them at about 125 degrees on your tuning scale.

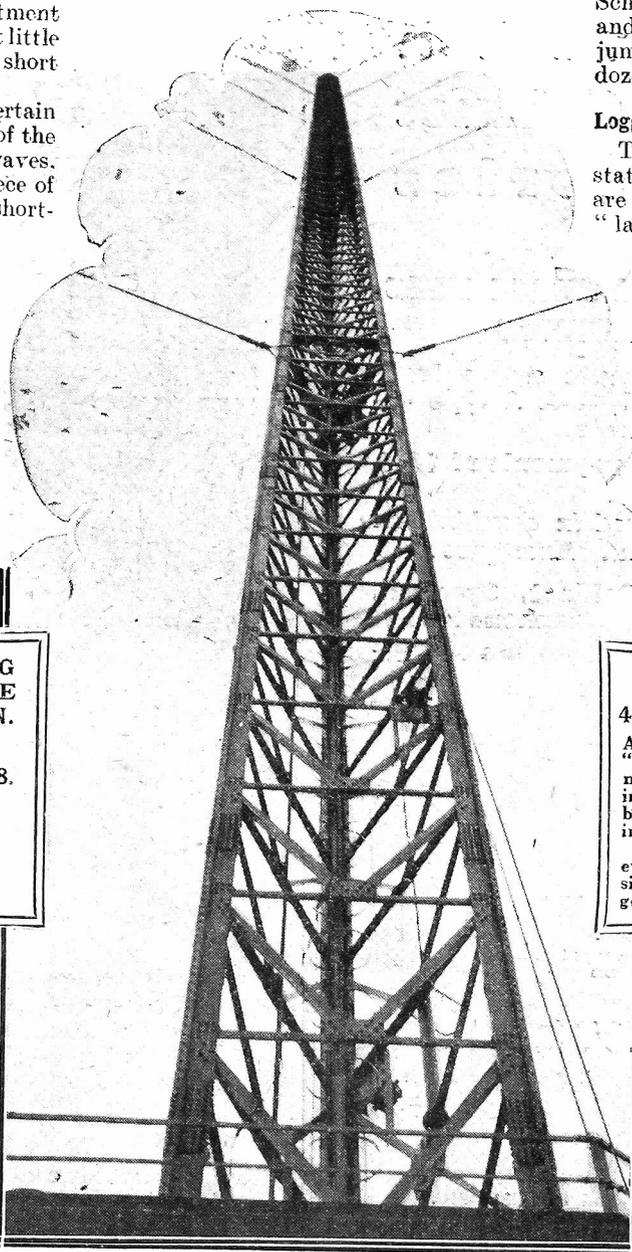
Between 155 and 165 degrees, on your scale, which you will probably find is about 30 to 32 metres, there is a whole bunch of interesting stations. Just to mention a few of the more important ones, there is Agen at 30.75 metres, Sydney (Australia) at 31.28 metres, Melbourne (Australia) on the same wave, Zeesen on 31.38 metres, Schenectady (W 2 X A F) on 31.48 metres, and Bandoeng on 31.86 metres. The next jump is to 40 metres, where dozens and dozens of amateur stations begin to come in.

Logging the "Landmarks."

There are, of course, a great number of stations between 32 and 40 metres, but we are only concerned at the moment with "landmarks." When you get the set roughly calibrated you will be able to find dozens of really loud stations that we haven't mentioned.

The beginning of the amateur band will probably be found at about 190 degrees on your dial, and when you reach maximum, then pull out the capacity-change switch and turn the condenser back to 165 degrees, which roughly corresponds with the wave-length at which you left off on the lower range.

The setting of 165 degrees with the capacity-change switch pulled



CALIBRATE YOUR SET FOR 42.9 METRES BEFORE THE DATE!

A special announcement of interest to every "P.W." reader will be made at the commencement of our Lisbon programme and in order not to miss the opening, you would be well advised to calibrate your "Cosmic" in advance.

CT1 AA. can be heard every Friday evening from 10 p.m. onwards, and his signals are usually received at remarkably good strength in this country.

out you will probably find to be about 42 metres. Proceeding up the scale, 175 degrees will bring you in the neighbourhood of 44 metres, 185 degrees to 48 metres, and right at the top of the scale will give about 54 metres.

There is one little tit-bit that I have saved up as a sort of happy concluding note, and that concerns a station to which I haven't yet referred.

Locating Lisbon.

Between about 160 and 170 with the capacity switch pulled out you will find station CT1 AA on a wave-length of 42.9 metres. It is from this station that "P.W." is glad to be able to announce that a special programme for "Cosmic" owners will be transmitted on the evening of March 18th, commencing at 10 p.m.

Every single reader of "P.W." is cordially invited to participate in this important test, and, although we are unable to give you complete details until the next issue, we can tell you that the voice of "P.W.'s" Chief Radio Consultant, Captain P. P. Eckersley, will be heard over the air on this occasion. Be sure not to forget the date, March 18th, at ten "pip-emina"!

version will get down to the two American stations just above 19 metres is a matter which will depend upon the way in which you have carried out your wiring. If the wiring is short and well spaced, well, you will probably find that you can just tune them in.

The two stations in question, which come in very well indeed at times, are W 2 X A D and W 8 X K on 19.56 and 19.72 metres respectively. Anything much below 20 metres is usually considered to be what is known as a daylight wave, and, in consequence, the best time to listen for them is late in the afternoon, while it is still light over the best part of the Atlantic.

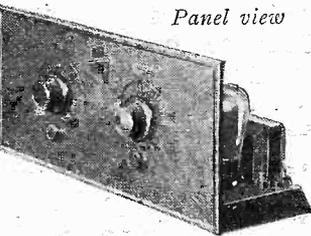
Two more good "landmark" stations, W 8 X K and G 5 S W, are in the neighbourhood of 25 metres, and you should find

NEW

in design and low in price

build it and listen to-night

With the production of this revolutionary receiver, Graham Farish—makers of famous Radio Components for 11 years—enter the Kit-set field. The "AMAZING 3" (amazing in more ways than one) incorporates Graham Farish components exclusively, built around a specially-designed dual-wave coil of remarkable efficiency. All-British and Continental reception over the entire waveband becomes a commonplace!



Panel view

Selectivity is far above the average for a set of the "straight three" type! Regional station separation is as defined as that of any set costing many times the price! As for assembly—every Component "falls in place"! Your dealer has the "AMAZING 3" in stock now. Ask him for the FREE Descriptive Leaflet—or use the coupon below. You can assemble the Kit to-night!



All-British

Underneath of Chassis.

The ONLY KIT with

- A specially designed SCREENED COIL.
 - A Moulded BAKE-LITE PANEL, with scale readings and indications in relief and fixing holes drilled.
 - A Moulded BAKE-LITE well CHASSIS, with position for each component outlined in relief and fixing holes drilled.
 - The majority of wires concealed beneath chassis.
 - A factory-built appearance when finished.
- Single-knob tuning. No soldering.
- Spanner and Screwdriver—the only tools required—provided with each Kit.
- Each Kit packed in attractive Orange and Black Container.

Already . . . !

Eastbourne: "I got splendid results, both at home and abroad. I consider you are quite justified in claiming your Kit as the 'Amazing 3'."

Nottingham: "Have got the 'Amazing 3' built, and it is truly amazing. I have never heard a better set, and am more than pleased with it."

Liverpool: "I must first congratulate you on producing such a fine Kit as the 'Amazing 3,' which I think is great value for the money."

Cornwall: "On that the set is stable, and the quality of reproduction excellent. Taking the set on finish and price basis, it is, certainly, an 'Amazing 3.'"

The GRAHAM-FARISH

"AMAZING 3"

SCREENED COIL

Emergency Coupon!

In case of difficulty send this coupon for FREE Descriptive Leaflet to GRAHAM FARISH LIMITED, Bromley, Kent.

Name.....

Address.....

Use a Graham Farish Speaker for best results from your "AMAZING 3."

THE MIRROR OF THE B.B.C.

By O.H.M

BEECHAM AND THE B.B.C.

BOTHER ABOUT SUNDAY PROGRAMMES—SIR KINGSLEY WOOD'S INTEREST—THE BIG DANCE BAND CHANGE-OVER.

THE Delius programme is by no means the whole story of forthcoming co-operation between the B.B.C. and Sir Thomas Beecham. And the curious thing about it is that neither Sir Thomas Beecham himself, nor those at broadcasting headquarters responsible for operatic and allied interests appear to realise that in future much closer co-operation seems to be inevitable if the interests they represent are to be served.

Bother About Sunday Programmes.

There is probably on the average one sensational "leading" story about the B.B.C. every week. One can tell, however, what is happening inside by assessing the nature of the reaction.

This is particularly true of the storm of resentment which greeted a recent amusing imaginative effort about prospective reforms of Sunday programmes. There was nothing in the story actually, but the B.B.C. has become so self-conscious about the weakness of its position on week-end programmes generally that the denials were furious.

I am watching the situation, and shall give exclusive advance information of policy changes, if any.

Sir Kingsley Wood's Interest.

Sir Kingsley Wood, as Postmaster-General, is having to make a special report on broadcasting in time for the Prime Minister to make up his mind about the Board of Governors after this year. Incidentally, a good many Members of Parliament are disappointed that the terms of reference of the business committee of investigation into the Post Office do not appear to include the B.B.C.

The answer to this is, I believe, plain. Lord Plender, the moving spirit of the enquiry into the Post Office, nominated Mr. Harold Brown, the new Governor of the B.B.C. Mr. Neville Chamberlain approved.

There is a strong movement to support the continuance in office of Lady Snowden after this year.

The Big Dance Band Change-over.

The large studio on the top floor at Broadcasting House, the first of a score to be completed and decorated, has been used for the past fortnight for rehearsals

by Henry Hall's new B.B.C. Dance Orchestra which, on Thursday, March 15th, takes over the work so admirably carried out by Jack Payne and his Boys.

Henry's Men.

The band consists of fourteen members, among them two players from Mr. Hall's Gleneagles Hotel Dance Band—F. B. Gillis, leader of the saxophone section, and E. Cramar, another saxophonist; Harry Robbins, drummer, and one of Jack Hylton's famous players; W. Mulrancy, trombone, previously with Percival Mackey; Frankie Wilson, trumpeter, who has played

in Ciro's and the Dorchester House bands. Others are J. Hieenor and Cyril Stapleton, violinists; R. Matthews, oboist, all of whom have come straight from college, the last-named being only 16 years of age. Other members are F. Williams and J. Denahy, saxophonists, who are well-known London players; J. Phillips, a pianist from Edinburgh; T. Farrar, bass, from the Midland Hotel, Manchester; and G. Dickinson, guitar and tenor saxophone, from Liverpool.

Unlike Jack Payne, Henry Hall has decided not to make any announcements himself: this side of the programmes will be done by Val Rosing, a vocalist whose voice is already familiar with listeners to vaudeville programmes. I understand that negotiations are going on for filming the band in action as part of one of the news reels which will be shown in cinemas all over the country during the week of the band's first broadcast.

No doubt the band will wear its uniform of blue tunics with black collars and cuffs, which Mr. Hall considers more appropriate than the conventional evening dress.

Meanwhile, I understand that Jack Payne and his Boys will make their farewell appearance in vaudeville on Wednesday, March 9th, when they take part in the London Regional programme with the Nesbitt Brothers, Stainless Stephen, Peggy Cochrane, Harry Hemsley, Patrick Waddington, Mamie Soutar and Blake Adams, and Ashmoor Birch.

National listeners in the same week are
(Cont. on page 1515.)

SAVES TIME IN RUNNING COMMENTARY



This cheery chap is pleased because his field-glasses don't need holding, being strapped on like a pair of headphones, as shown. He finds the running commentary quite easy now.

THE LISTENER'S NOTEBOOK

A rapid review of some of the recent radio programmes.

MR. DU GARDE PEACH'S production. "The Mary Celeste" was a fine piece of realism. Creaking winches, moaning winds, lashing seas, sea-shanties, blasphemous old sea-dogs, their fears and superstitions—all were there to lend colour to a good story, and, what was most remarkable, there was a total absence of staginess about it all. Every character, from captain to deck-hand, was well drawn and well played; but if there was an outstanding one it was "Dutchy." I liked him, because he had no lapses. He was Dutch—and good Dutch, too—all through.

That's more than I can say about the "Americans" in the play that preceded "The Mary Celeste." They lapsed into

English all too frequently. By the way, need the plot have been laid in America at all?

Although the effects in "The Mary Celeste" were good, they were only possible because of the excessive bawling of the ship's crew. Nothing could drown that. There is, however, a very great danger of losing the thread of a story when effects are too obtrusive, and particularly when the dialogue is given in conversational voice.

I always think this does happen in the Saturday night Train Conversations. In this type of show we certainly want to hear the subject of the conversation; the noises are of secondary importance, and will

(Continued on page 1516.)

THE "COSMIC" THREE

Dear Sir,—I feel that I must write to you regarding that marvellous set, the "Cosmic" Three. I have never before heard so many stations on a three-valver of the det. and 2 L.F. type, whilst the volume leaves nothing to be desired.

This is the first time I have ever been on the short-wave band and so cannot compare results, but I got several telephony stations on the loudspeaker and a good few Morse, too.

I feel sure that this set will prove to be one of the most popular you have ever designed.

Yours truly,

S. G.

Roman Road, Barnsbury, N.7.

EVERY BATTERY-SET SHOULD NOW HAVE "PENTODE OUTPUT"



THE Lissen Power Pentode Valve takes no more current than any ordinary power valve. It consumes actually only 7 m/A of H.T. current and can be run economically off ordinary batteries. **THERE IS, THEREFORE, NO REASON WHATSOEVER WHY EVERY BATTERY-DRIVEN SET SHOULD NOT EMPLOY THIS POWERFUL LISSSEN VALVE.**

If you want extra volume, try this valve. If you want all the foreign stations at full loud-speaker strength, try it. Particularly in conjunction with a cone loud-speaker try this Lissen Power Pentode Valve—it produces a new brilliance of tone which pleases every ear and automatically corrects the tone balance of the music.

You do not have to alter the wiring of your set at all. You do not have to increase the battery power. This one valve gives you much more volume, much clearer, louder, finer radio altogether. Ask for the Lissen Economy Power Pentode P.T.225. **PRICE 12/6**

The **LISSSEN**

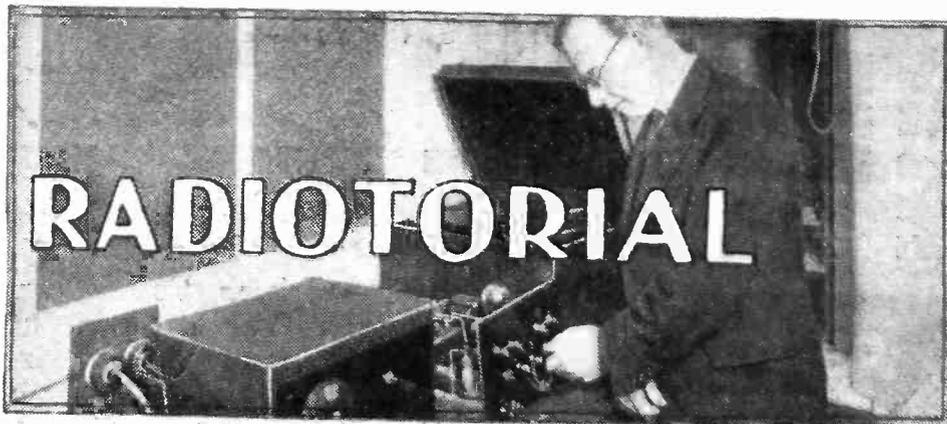
THE LIVELY LISSSEN DETECTOR

If you want to liven up your tuning—if you want extra range, greater sensitivity—get a Lissen Detector Valve for your set. You will find its lively responsiveness bringing in the foreigners like magic.

Match it up to a well-built set and work it in harness with other suitable Lissen valves, and you will be amazed at the results you get, the distance-searching you can do. Ask for Lissen H.L.210. **PRICE**

5/6

ECONOMY POWER PENTODE



RADIOTORIAL

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. Lile 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 subject 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.

THE "COSMIC" WITH AN ORDINARY TUNING CONDENSER.

A. L. (Rotherhithe, London, S.E.).—"As I cannot possibly run to the price of an Extenser, I was hoping to use an ordinary .0005 instead for tuning the 'Cosmic'."

"Is it possible to do this, as I have the condenser on hand? And also a 3-point and a 4-point wave-change switch."

"If so, please give the necessary wiring in words."

It can be done, using a 4-point switch of the type that separates all four contacts in the one position, and joins them all together in the other.

What you have to do is to join one of the contacts on the switch to the moving vanes of the tuning condenser, and then treat the other three contacts on the switch exactly as if they were the self-changer contacts on the Extenser, wiring them as shown on the blue print.

For the sake of clarity, we give the wave-change switch connections below. (Note that the switch must be a 4-point, of the kind described above.)

One switch contact to moving vanes of the .0005-mfd. variable condenser (and also to F of V₁, V₂, V₃, etc., as shown on the blue print connected to moving vanes).

The second switch contact to the bottom terminal on the Moderator coil-quad.
The third switch contact to 3 on the dual-range coil.
The fourth switch contact to M on the Moderator condenser and to the number 1 terminal on the dual-range coil.

Don't forget that the new wiring should be as short as possible, and well spaced. And be sure to use only a 4-point switch of the right type, with a good, strong, positive action that makes firm contact at all four points.

COUPLING THE OSCILLATOR.

M. W. E. (Brighton).—"My super-het has a band-pass unit in front of the first S.G., and the 'E' terminal of this does not go direct to earth, but goes via the (separate) coupling coil of an oscillator unit."

"Thus the oscillator coil is in the main aerial-earth lead, and it seems to me to be

(Continued on page 1510.)

IS YOUR SET GOING WELL?

Perhaps the 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 an unrivalled service.

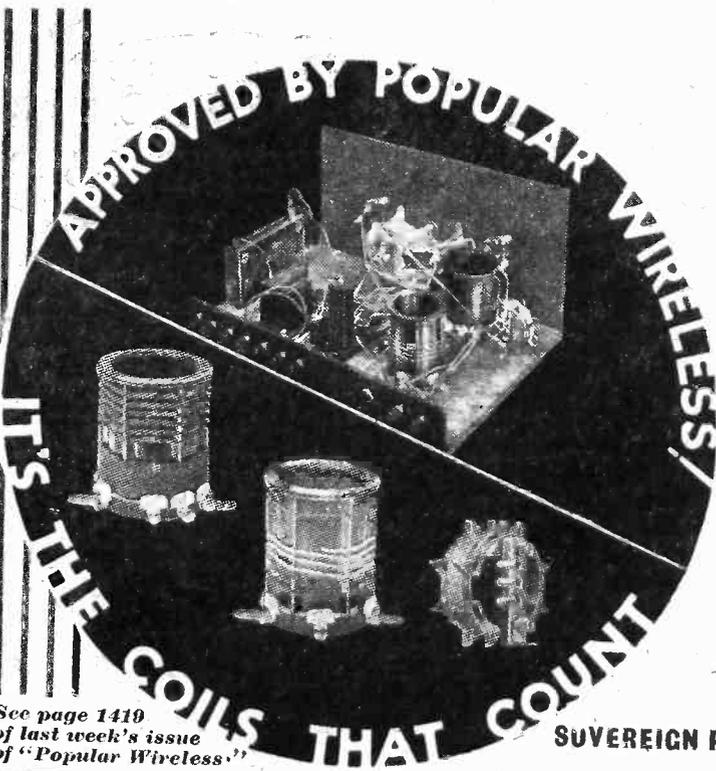
Full details, including scale of charges, can be obtained direct from the Technical Query Dept., POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4.

A postcard 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.

YOUR COSMIC III A SOVEREIGN SET

—Build it with the Sovereign "Cosmic" Kit



THIS is Sovereign time! Never before has such great value been offered in Kits for a "P.W." boom set. 90% of the components in the Sovereign "Cosmic III" Kit are made by Sovereign and the rest are equally reliable. The whole kit has the approval of "Popular Wireless." You have read what the wonderful "Cosmic" III will do—now build it with Sovereign—you will be astonished at the results. If you have difficulty in obtaining one of these Kits send direct to the makers. Remember, Sovereign is specified in the original "Cosmic" Sets.

Complete kit in sealed Sovereign carton less valves, cabinet and baseboard

52/6

- Sovereign "COSMIC" Short-Wave Coil (specified in original "COSMIC" III STAR) 4/-
- Sovereign 100,000-ohms Spaghetti Resistance (specified in original "COSMIC" III) 1/3
- Sovereign "COSMIC" Dual-Range Coil (officially approved for both "Cosmic" Sets) 5/-
- Sovereign Moderator Coil (officially approved for both "Cosmic" Sets) 2/6
- Sovereign .00075-mfd. solid dielectric Condenser for tuning the Moderator Unit 3/-
- Sovereign .0003-mfd. Reaction Condenser 2/6

SOVEREIGN IS SPECIFIED IN BOTH "COSMIC" SETS THIS IS YOUR GUARANTEE

SEND FOR THE SOVEREIGN CATALOGUE—IT'S INVALUABLE TO "COSMIC" BUILDERS.

SOVEREIGN PRODUCTS LTD., 52/54, ROSEBURY AVENUE, LONDON, E.C.1

Telephone: Clerkenwell 2788/9.

See page 1419 of last week's issue of "Popular Wireless."

ELECTRIFY YOUR SET WITH REGENTONE

—the experts' choice

Manufacturers of famous sets specify Regentone Mains Units for their sets. Experts have proved them satisfactory with the best kit circuits. The wireless press praises Regentone: for their efficiency; for their unfailing reliability; for their freedom from mains hum.

Electrify your radio with Regentone. You can get a Regentone Mains Unit for your set from 7/6 down—less than the cost of a new H.T. battery.

Write for the Regentone Art Booklet all-electric radio—or get it from your dealer.



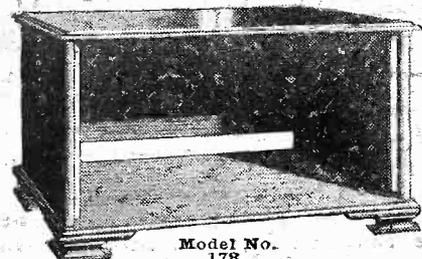
7/6 DOWN

Regentone Model W.1.F. (H.T. only). Three tapings (S.G., Detector and Power). Output 120-150 volts. 12 m/a. Price 50/-



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This OSBORN RADIO CABINET SPECIFIED FOR THE "COSMIC" THREE



Model No. 178.

CHAS. A. OSBORN,
(Dept. P.W.),

The Regent Works, Arlington St., London, N.1. Telephone: Clerkenwell 5095, and at 21, Essex Road, Islington, N.1. Telephone: Clerkenwell 5634.

Model No. 178. Specified for the "Popular Wireless" "COSMIC THREE" A Radio Cabinet in Figure Oak or Mahogany, 14" x 7". Inside measurement, 10" from back to front, allowing ample room for baseboard. Opening at top. Fine workmanship throughout.

PRICES:—
Machined Ready to Assemble: Oak, 7/-; Mahogany, 8/6.

Assembled Ready to Polish: Oak, 10/-; Mahogany, 11/6.

Assembled and Polished: Oak, 13/-; Mahogany, 14/6.

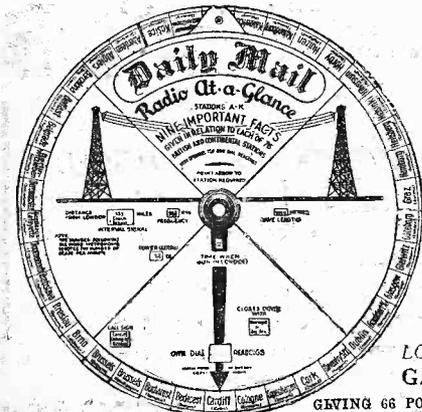
All Models Carriage Paid. Send 3d. in stamps for new 1932 Beautifully Illustrated Catalogue.

ALL ROUND THE WORLD ON ONE DIAL!

PRICE 14/6 FOR BEST RESULTS use only

EXTENSER CONDENSER
OFFICIALLY SPECIFIED FOR "COSMIC III"

FREE!
Wiring diagram sent on request. Write to
ARTHUR PREEN & CO., LTD.,
Golden Sq., London, W.1.



IDENTIFY FOREIGN STATIONS

AND LOCATE THEM IMMEDIATELY WITH THE AID OF THIS CLEVER RADIO WHEEL WHICH IS A HANDY AND PERMANENT RECORD AND CAN BE HUNG ON YOUR WIRELESS SET. DOUBLE SIDED. DIAMETER 10 INS. **1/-**

LOOK OUT FOR THE NEW WHEEL GARDENING "At-a-Glance"

GETTING 66 POPULAR ANNUALS AND VEGETABLES. PRINTED AND ILLUSTRATED IN 8 COLOURS.

At all Stores, Stationers, Bookstalls, etc., or if any difficulty write direct to FRANK PITCHFORD & CO., LTD., WELL ST., LONDON, E.C.1

RADIOTORIAL QUESTIONS AND ANSWERS.

(Continued from page 1508.)

possible to take it out and couple it instead to the second band-pass circuit via the reaction winding there, which is not used.

"I presume I should use a condenser to couple it. Do you think it would be worth trying, and, if so, what value of condenser?"

It would certainly appear to be worth trying, as the alteration is very slight, and it might result in a cleaned-up input. Any small fixed condenser would do, say, .0002. (In many cases no condenser is needed, but it would be safer to use one.)

USING A MILLIAMMETER TO CHECK TUNING AND OTHER ADJUSTMENTS.

D. R. (Cranbrook Park, Hford).—"I have got a milliammeter connected in the plate circuit of the detector of my three-valve set, which is an H.F. Det. L.F., using A.C. valves.

"I cannot understand the working of this, as regards a check on tuning, and should be glad of your explanation. As stated in 'P.W.'"

tuning condenser, I can make the milliammeter drop perhaps .1 of a milliamp by careful adjustment of this control. Then I can drop it still another .1, or perhaps .2, by adjusting aerial tuning also.

"In addition, I have a selector coil, and when this is adjusted (leaving the other two alone) I can get yet another drop in the reading, accompanied also (as in the other cases) by stronger reception as I get exactly in tune on the selector.

"There is also a potentiometer controlling the screen volts, and adjusting this will often cause a still further decrease in plate current of the detector.

"Finally there is a selectivity condenser, which also affects the milliammeter. Why do all these controls cause detector plate current to drop?"

"It certainly makes exact adjustments possible, but I should like an explanation, as throwing any one of them out shows up by a slight movement on the milliammeter needle at once, whilst taking the aerial off or the switching off of the station causes quite a tremendous rise in plate current. Why is this?"

"P.W." PANEL. No. 61. ACCUMULATOR ACID.

The electrolyte for accumulators is dilute sulphuric acid, which is poisonous and corrosive.

If spilt on a carpet, on clothes, curtains, or similar fabrics, it will quickly "eat away" the material.

Should such an accident occur, the spilt acid must be "neutralised" by liberal applications of ammonia, or washing soda, followed by plentiful washing in clean water. Such treatment will completely remove the danger of damage.

I find that the plate current is reduced—quite a lot—when I tune in a strong programme. But there are no less than five controls on the set which can be made to affect the detector's plate current in this way.

"For instance, if I tune in London Regional roughly, by ear, and then adjust the H.F.

You are observing some very interesting effects when tuning with a sensitive milliammeter in the detector circuit as described.

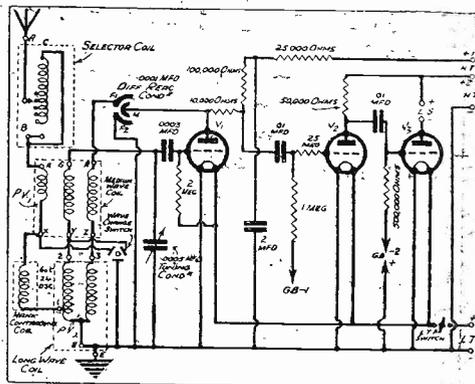
What is happening may be briefly accounted for as follows:

With no programme tuned-in the detector plate current will be a certain value, say, 2 milliamps. But if a station is tuned in, its carrier-wave has the effect of setting up a voltage on the detector's grid, and (in

the case of the ordinary grid leak and condenser arrangement) this received voltage causes the detector plate current to decrease.

When the detector's grid circuit is brought exactly in tune with the received impulses, the voltage developed at the grid is greater than when the circuit

MISSING LINKS No. 29 A GOOD THREE-VALVER.



This diagram shows the two "components" that were purposely omitted from last week's diagram.

It will be seen that one was a 1-megohm grid leak, and the other a 25-megohm resistance used as an H.F. stopper between the grid leak and the grid.

is slightly out of tune, so exact adjustment is possible by watching the needle's response.

Similarly, the aerial-circuit tuning supplies greater voltages to the following stage when it, too, is brought exactly into tune. By correctly tuning this stage you cause the detector plate current to drop still farther.

By adjusting the selector you carry the process a step farther, and a further slight drop in anode current results because the aerial delivers maximum voltage when brought exactly in tune.

All the foregoing adjustments have derived the extra sensitivity from accurate tuning. But extra

(Continued on page 1512.)

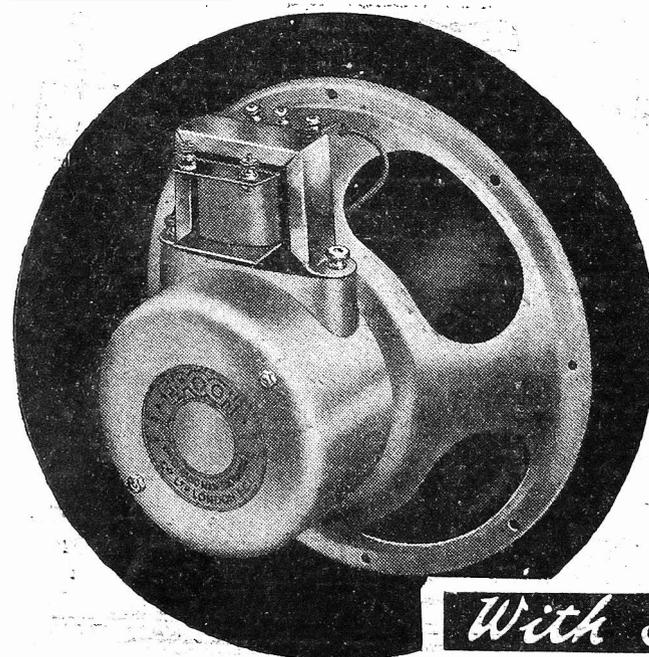
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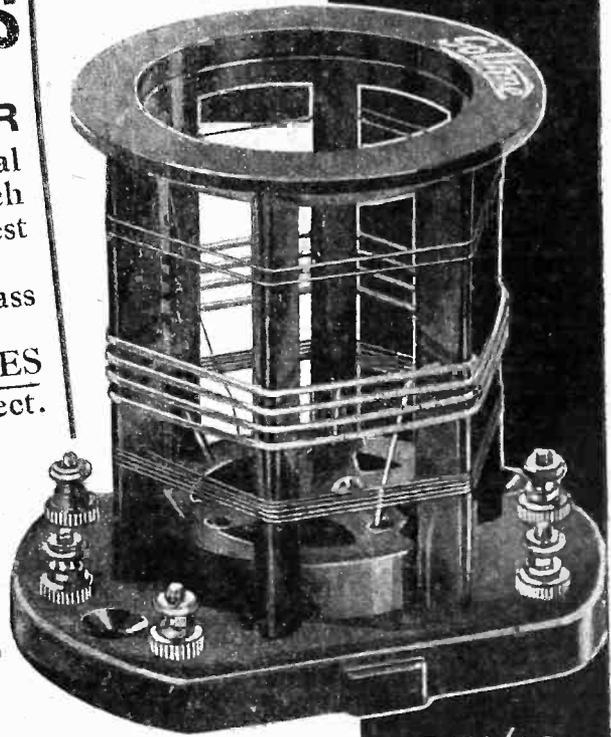
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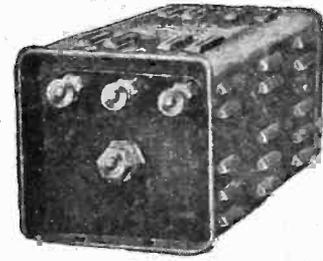
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RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 1510.)

sensitivity can also be obtained by correct setting of the screening-grid voltage.

When this is done the voltage amplification by the S.G. valve will be increased, and this, too, will have the effect of building up the voltage on the detector's grid. The effect on plate current will be another decrease.

Note that the more sensitive you make the set the more the plate current falls. Any slight mistuning will cause it to rise a little, and thus, in the arrangement you are using, you have a valuable check on the working of the various H.F. controls.

You can get far more accurate tuning this way than by ear, so it is particularly useful for preparing tuning curves, etc.

CONNECTIONS OF A DOUBLE-GRID VALVE.

"DOUBLE-GRID" (Chesterfield).—"Could you give me some information about the new double-grid or 'Bi-grid' valves which are now being used? I have never seen it stated, but I want to know:

(a) The order of the electrodes inside the valve, i.e., whether control grid is placed nearer to the filament or to the plate?

(b) Is the extra terminal connected to one of the grids or to plate? (I presume the actual pins are as near as possible like ordinary valves, with the filaments and possibly grid or plate connections as in other valves?)"

Regarding (a), the order of the electrodes is, first, filament, next extra grid, next control grid, and finally plate.

(b) The extra terminal or fifth pin is joined to the extra grid, and thus all the other electrodes correspond with those of an ordinary valve, namely, two filaments, and in line between them the grid (nearer) and opposite this the plate.

A PRICE CORRECTION.

The price of the "Atlas" Mains Unit D.C. 15/25 is 39s. 6d., and not 35s. 6d. as we were given to understand in the original specification.

TWO TRANSFORMERS IN "ECONOMY" THREE.

P.L. G. (Great Yarmouth).—"My set is the famous 'Economy' Three, and although it has been going good for over a year it is still a wonderful proposition for long distance and good quality. A friend has asked me about building a similar set for him, but he wants to make a slight change in it.

Instead of using R.C.C. between the detector and first valve, and a transformer between the other two valves, he wants to employ two transformers, one in each plate circuit. Would this be quite O.K., or do you think that the resistance is better?

we strongly advise you *not* to make the change suggested in the "Economy" Three.

Our reason for this is that the set, as its name implies, was built as a low-cost receiver, with the very minimum of expensive apparatus, etc. And such a change as you suggest would be liable to upset the stability of the set.

You might find that it would tend to "motor-boat" or be unstable, or produce unpleasant quality compared with your own receiver, all of which could have been avoided by sticking to an R.C.C. unit for the low-frequency stage in question, instead of using two transformers as suggested.

"KNOCKING OUT THE TWINS."

G. V. C. (Huddersfield).—"I am told that the best way of knocking out the twins, when searching for distant stations, is to put in a

NEXT WEEK

FINDING THOSE FOREIGNERS

A long, illustrated article dealing with the fascinating subject of station identification.

A TALK WITH A SPANISH LISTENER

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POPULAR WIRELESS - PRICE THREEPENCE

"We should connect the markings on the transformer exactly the same as the markings on the resistance capacity unit, which we understand is quite O.K."

So far as electrical connections go it is quite O.K. to connect up the corresponding points in a low-frequency transformer to those formerly occupied by a resistance-capacity coupling unit. Nevertheless,

Brookmans Rejector, like the one described in 'P.W.' when the London station was new. It was one in which two plug-in coils were used, and the tuning condensers were of the solid dielectric kind, with switches mounted beside them to cut off one or other station, as necessary.

(Continued on page 1514.)

"NEW SETS FOR OLD"

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Model Valves Remarks

Present set: Make Mains or Battery Valves

Date of purchase Present condition

Original cost of set Whether new when purchase

Balance of purchase price would be payable by me as follows:—

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* Delete unwanted words.

N.B.—An extra charge is made for Hire Purchase facilities.

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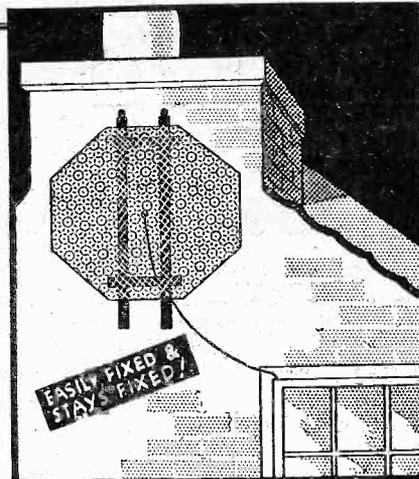
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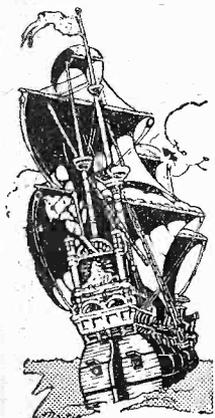
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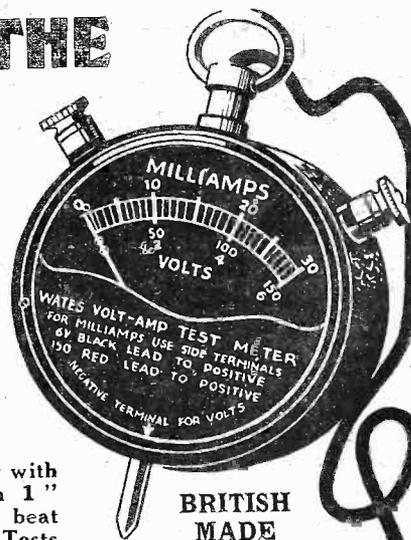


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WATES 3 in 1 POCKET METER

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 1512.)

"Could you give me a list of the parts necessary and the internal connections?"

All you need is a couple of terminals (A1 and A2), a couple of on-off switches (S1 and S2), one .0003 fixed condenser, one .0005 variable condenser, and two .00075 variable condensers. You will also need two plug-in coil holders, and the necessary coils for the wave-band on which you wish to use the wave-trap. Suitable coils for your case would be one 50 and one 60 or 75 X coil. The connections are as follows:

The A1 terminal goes to the moving vanes of the .0005 variable condenser, to the fixed vanes of one of the .00075 variable condensers, and also to one side of the .0003 fixed condenser. The remaining side of this fixed condenser is connected to the remaining side of the .00075 condenser, and also to the plug of one coil holder, and to one side of the S1 switch.

The other side of this switch goes to one side of the other switch, to the socket of the coil holder referred to above, to the remaining side of the .0005 variable condenser, and also, by a flexible lead, to the tap on the coil which will be placed in the other coil holder.

The pin end of this second coil holder is joined to the remaining side of S2, to the A2 terminal, and to the fixed vanes of the second .00075 variable condenser. The moving vanes of this condenser are joined to the other side of the second coil holder, and that completes the connections.

The aerial is then joined to A1, and the A2 terminal goes to the aerial terminal on the set.

THE S.G. BY-PASS CONDENSER.

P. C. A. (Lincoln).—"What is the object of having a large fixed condenser connected to the screen of an S.G. valve when it is effectively isolated in the valve itself and is not supposed to carry any current from the distant stations?"

The screen of the S.G. valve needs a fairly high voltage on it from the H.T. battery in order that it may work correctly, and thus it is joined to H.T. positive, generally via a resistance. The other end of the H.T. supply will be connected to earth, and normally a steady current will flow from the battery through this resistance developing a small voltage across it.

This might not be detrimental. But if high-frequency currents started to flow across the resistance (as they might easily take it into their heads to do), they would give rise to high-frequency voltages on the screen which would upset the working of the valve. It is to prevent this possibility that the by-pass condenser is used, and it is joined right across between the screening-grid and filament in the case of battery valves, or to the cathode circuit in the case of A.C. valves.

Such a condenser has very little impedance from a high-frequency point of view, and is almost equivalent to short circuiting the grid to the earth, which is

TECHNICAL TWISTERS

No. 103.—CONNECTING CELLS IN SERIES.

CAN YOU FILL IN THE MISSING LETTERS?

When similar cells are joined in series the of each will be added to the other's, so the total will be that of one multiplied by the number of cells.

The current supplied by such an arrangement is not increased, and is approximately the same as that obtainable from

The ordinary high-tension battery consists of a number of 1½-volt units joined in series, and thus in a 60-volt battery there are cells.

A disadvantage of the series connection is that one defective cell renders the whole faulty.

Last week's Missing Words in order were: Voltage, Voltage, Capacity, Number, Sixty, Two, Current.

exactly what is required to prevent H.F. voltage differences appearing there and upsetting the operation of the valve.

As far as the high tension is concerned the condenser, of course, acts as an insulator, and it is, therefore, possible to arrange the steady voltage on the screen to the desired potential without shunting the battery, at the same time maintaining the screening grid effectively earthed so far as high frequency is concerned.

CONNECTIONS FOR THE DUAL RANGER.

5 P. V. (Plymouth).—"As a regular reader of POPULAR WIRELESS I would like a little information. I have built the Dual Ranger, but I cannot get it to work properly. I do not seem to see the wiring on my coil quito. The one on your blue print is lettered, but mine is not. It has got three leads, a black, a green and a white. There are also two tappings.

"And could you tell me why there is a copper foil on some three valve sets and not on others?"

The coloured leads mentioned correspond to the following connections. Black = L.T. neg. and earth, green = reaction, white = grid.

Copper foil is used to prevent the magnetic fields surrounding the various coils, etc., from reaching out and affecting other parts of the circuit where they are not wanted.

There are various reasons why it is not always necessary to use copper foil, but generally speaking it is required when very high magnification is being handled (in such cases the fields from the coils reach out a comparatively long way), and when there is not much room to spare inside the set so that the components have to be placed rather closer together than is normally desirable.

Generally the multi-valve sets must have copper shielding, etc., because the more power that is being handled the more necessary it becomes to keep down this unwanted feed-back from one part of the set to another.

THE "COSMIC" 3.

"Cosmic" builders are reminded that a large free wiring diagram showing the exact wiring for the "Formo" Extender in the above circuit can be obtained from the makers on request.

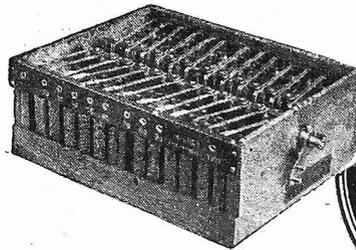
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MIRROR OF THE B.B.C.

(Continued from page 1506.)

hear Leonard Henry sponsoring a resqueed American programme on Monday, March 7th; while on Saturday, March 12th, there is another of the popular entertainments by Street Artistes.

Music Hall."
Quite a new experiment in broadcast live-venue presentation will be tried at the large studio at Big Tree Wharf on the north side of Waterloo Bridge on Saturday, March 26th, when the artistes will "do their stuff" on a stage with the orchestra below them and the microphone strung in the air.
The programme is appropriately entitled "Music Hall," because it will approximate more to an actual music-hall relay, but combining the advantages of studio acoustics and a fairly big audience in front of the performers instead of, as happens at Savoy Hill, being located behind the layers. Eight separate turns will be booked for the show, the intervals between being filled with music provided by the B.B.C. Theatre Orchestra.

Crown For Sale."
"Crown for Sale," an operetta which, as mentioned last week, has been specially written by Denis Freeman and Mark

PLAYING THOSE RECORDS!

Don't fail to order next week's "P.W." in which will appear a long article on PICK-UP PROGRAMMES ON THE "COSMIC" THREE.

OUT ON THURSDAY. USUAL PRICE.

subbock to suit the personality of Violet Coraine, and performances of which are to be given on Friday and Saturday, March 11th and 12th, is a story which promises well for microphone drama.

It concerns an American millionairess who having agreed to save a small central European kingdom from bankruptcy by marrying the Crown Prince, decided to change her mind at the last moment and try a President, because she thinks that republics are more economical to run. The man begins when she sends her English maid, whose part will be taken by Miss Coraine, to break the news to the Prince.

She is mistaken for her mistress and recorded a public reception. In such a story other complications are, of course inevitable; but I think I have divulged enough to whet the appetites of most listeners.

Better Relays.
The installations of special broadcast circuits by the Swiss authorities between their leading cities has resulted recently in greatly improving the relays from Geneva of international importance. What are called "music quality" circuits, that is lines that have a sufficient range of frequencies to allow of the faithful transmission of music, are now available from London to Geneva.

New Times Sales Co

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PILOT PERMANENT MAGNET MOVING-COIL SPEAKER, in handsome solid oak cabinet with multi-ratio input transformer. Cash or C.O.D. £3 15s. 0d. only. Balance in 11 monthly payments of 6/11. With 6/11 order

ULTRA IMP PERMANENT MAGNET MOVING-COIL SPEAKER. Complete with input transformer. CASH PRICE £2 : 15 : 0. Balance in 11 monthly payments of 5/-. With 5/- ORDER

ATLAS A.C. ELIMINATOR, TYPE A.C.244. Three tappings, S.G. Detector, and Power. Output, 120 volts at 20 m/a. Cash price £2 19s. 6d. Balance in 11 monthly payments of 5/6. With 5/6 order

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Kit of parts less valves, cabinet, base-board, panel, wires, flex, and screws. Cash price £2 12s. 6d. Balance in 6 monthly payments of 8/3. With 8/3 order

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Screened Grid. Detector and Power. With Valves and Cabinet. Cash price £6 15s. 0d. Balance in 11 monthly payments of 12/6. With 10/- order

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S.G., Detector and Power. Complete with Valves and Cabinet. Cash Price £9 19s. 6d. Balance in 11 monthly payments of 18s. 3d. With 18/3 order

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With Valves less Cabinet. Cash price £5 17s. 6d. Balance in 11 monthly payments of 10s. 10d. With 10/- order

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Less Valves and Cabinet. Cash price £3 15s. 0d. Balance in 11 monthly payments of 6s. 11d. With 6/11 order

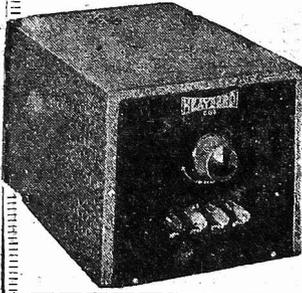
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THE LISTENER'S NOTEBOOK

(Continued from page 1506.)

become less important still as the weeks pass. Such noises must lose their novelty with repetition, and, consequently, become stale.

And the conversations themselves. Though they are good, I think that, at times, they might be more topical. Wouldn't it be truer to life to hear folk discussing a play, a film, a big race that is coming on, or football—in fact, why not have a medley of sport talk? After all, isn't this what people do almost invariably discuss in a train on a Saturday night?

Have you noticed how popular the word "fundamental" is with speakers nowadays? It would be unique to hear a talk in which this word did not occur. Sir A. Salter is the latest to follow the fashion.

When is Mr. Desmond McCarthy going to mention a new book in his "New Books" talks? He never mentions one in a blue moon. Fancy dealing with Pepys Diary in a talk entitled "New Books"!

"Mass of Life."

Of the week's music I suppose Delius' "Mass of Life" would be considered the big thing. Personally, I couldn't stand more than half an hour of it. It was too complex for me, and far beyond my comprehension. I needed enlightenment.

Consequently, I gave it up in favour of Mr. Joseph Lewis's Community Singing programme. Here I was pleasantly entertained. Mr. Lewis has a most agreeable voice, and seems born for his job. His wit is sparkling, which the National Chorus seemed to appreciate as much as we did. By the way, who was the enthusiastic tenor who came in a-bar or two too soon in "Jerusalem"? If Bateman was listening, I'm sure this incident will inspire a new picture with the title "The Tenor Who—"

The only adverse criticism I have of the Community Singing item is that Mr. Lewis seemed inclined to forget his unseen choir. His back was too often to the microphone, with the result that we missed a lot of his small-talk. The National Chorus laughed heartily, but we were often left guessing.

What a lot of Mozart we are having lately! I wish they weren't so prone to do things to death. Even the best music must jar in time.

Plum of the Month.

I was amused recently to hear a new gramophone record described as the "plum of the month." The singer was a female. Not a single word of the song could be heard. If ever a woman sang with "a plum in her mouth" she did. I hope the record will be more correctly described the next time it is put on.

Have you noticed an attempt by vaudeville artistes to introduce fresh matter into their turns? Clapham and Dwyer, Norman Long, Claude Hulbert and Enid Trevor, all had new stuff to put over, which, I'm sure, was appreciated. But their manner was still the same. Whereas freshness in matter is always possible, freshness in style, it seems to me, is a different and more difficult proposition. Familiarity breeds contempt, and

if these admittedly talented people aren't able to alter their style their popularity must wane. In their own interests, I think, artistes should sometimes retire from the microphone for a while, after which they could stage a great come-back.

TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio reception.

By Dr. J. H. T. ROBERTS, F. Inst. P.

That Extra H.T.

WE all know perfectly well from experience how much the working of a set is often improved by a little extra H.T. voltage, or perhaps I should say how noticeably the performance of the set falls off if the H.T. is allowed to drop even a comparatively small amount from its rated value.

The last 20 or 30 volts makes a very big difference, and although, as I say, we are very conscious of this, we may not perhaps stop to think of the reason. It is because the power output of the set increases much more rapidly than in proportion to the anode voltage.

Theoretically, in fact, the power output varies more rapidly than as the square of the anode voltage. If it varied according to the square of the voltage, then an increase of 10 per cent in the anode voltage would produce an increase in the power output of about 21 per cent.

Actually, as I say, the increase is considerably more than this. An increase of 20 per cent in the voltage will theoretically produce an increase of over 50 per cent in the power output. So you see that there is all the difference in the world between, say, 90 volts and 120 volts H.T., assuming, of course, that the higher voltage is suitable for the particular case.

"Liveliness."

I am led to these observations because a few days ago I was operating a receiver rather below the rated H.T. voltage, and couldn't seem to get any "life" into it at all. Eventually I was able to add 30 volts extra H.T., which brought it rather above the rated value, but the liveliness of the set was then most pronounced.

Of course, the above remarks are based upon theoretical considerations, and in practice the addition of an extra percentage of H.T. voltage will not, in all cases, have the same effect on the liveliness of the set; sometimes it will be much more noticeable than others, but it is always worth trying.

I should add that it is assumed in the foregoing that the grid bias is increased to correspond to the increased H.T. voltage and that the input is also raised in accordance with the new conditions. Merely increasing the H.T. voltage without increasing the input or grid bias will not, of course, give you the desired improvements.

Sharpening the Tuning.

Extra selectivity without much loss of signal strength can often be obtained by a very simple little dodge. Generally the

(Continued on next page.)

TECHNICAL NOTES

(Continued from previous page.)

grid condenser is connected to the end of the coil closest to the anode of the H.F. valve.

But if it is disconnected from this point and connected instead to another point a little removed from that end of the coil—that is, towards the earth end—so that only a part of the tuned circuit is included between the filament and grid of the detector, the tuning is often sharpened up quite considerably. This is due to the fact that the damping effect of the detector is reduced.

If the H.F. valve is a screen grid, this sharpening up of the tuning may result in the screen-grid valve circuit being set into oscillation. If this happens you might try using a little lower voltage on the screen, or alternatively (as I mentioned in these Notes some time back) putting a little grid bias on to the screen-grid valve.

Of course, if you go too far away from the anode end of the coil—that is, too near the earth—you will begin to get appreciable reduction in signal strength, and the secret lies in finding a position for the tapping which will give you the necessary sharpening up of the tuning without serious depreciation of signal strength.

H.F. in the Speaker.

When the loudspeaker is included in the set with a frame aerial and the two are very close together, as in a portable receiver, it often happens that the H.F. current gets into the loudspeaker, where it may cause all sorts of trouble, such as howling and instability generally. Consequently, it is a good plan in these cases to connect a small fixed condenser across the loudspeaker terminals so as to by-pass the H.F. current.

When the loudspeaker is a fair distance away from the aerial, as in an ordinary set, it is not so necessary to connect a condenser across the loudspeaker; but even in these cases you will often find it an advantage. At any rate, there is no harm in trying it if you happen to have a suitable fixed condenser handy, and you will soon see whether there is any noticeable improvement to the operation of the set.

Pentode Economy?

I have several times been asked whether the pentode valve is really economical as compared with an ordinary 3-electrode stage. There is a prevalent idea that the pentode is an expensive valve to run, more particularly in regard to anode current.

Before going into further detail the answer to this question broadly is that the pentode, the modern version, is no more expensive to run than a corresponding 3-electrode stage and, in fact, in some cases, is actually more economical. The only thing about the pentode is that it requires special output circuits to get the best results as regards quality.

Apart from that, it is particularly sensitive to a relatively small input and requires less volts to drive it than the corresponding triode. On the other hand, of course, the 3-electrode valve is cheaper in the first instance, and you can take more liberties with it in the sense that it gives perhaps better quality under ordinary conditions.

(Continued on next page.)

CELL-TO-CELL LEAKAGE ELIMINATED



Above you see how the current can creep along the smooth unbroken top of the old-type H.T. Accumulator. Compare with it the separate air-spaced cells of the Lively 'O' (right). Note also that additional means are now provided for using ordinary wander plugs for tappings.

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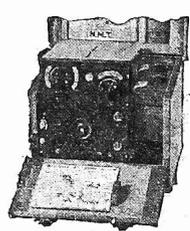
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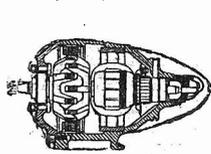
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TECHNICAL NOTES

(Continued from previous page.)

Power Rating

The pentode valve corresponds to the screen-grid valve for high-frequency amplification, and may be described as a low-frequency version of the S.G. It is much more sensitive than the ordinary 3-electrode valve in the sense that for a given output it requires a smaller input.

For instance, for an output of, say, ½ watt with an ordinary 2-volt valve in the last stage, a grid swing of 20 volts or more may be necessary, while with a pentode the grid swing will be probably less than half that amount. The pentode valve has a relatively high A.C. resistance, often as much as 40,000 to 50,000 ohms, although some recent types of pentode have an A.C. resistance not more than 20,000 ohms.

This means that the pentode tends to over-emphasise the upper audio frequencies, which gives to the reproduction a rather high-pitched quality sometimes described as "tinny." As I mentioned in these "Notes" a little time back, this effect, whether with a pentode valve or any other, can be largely overcome by means of a tone control consisting of a condenser and a fairly high resistance in series with it, the whole arrangement being connected across the loudspeaker.

In the case in question the resistance may be, say, 15,000 ohms and the condenser 0.01 microfarad. This has the effect of selectively short-circuiting the higher frequencies more than the lower ones, and so tends to counteract the over-emphasis of the higher frequencies.

Anode Current.

As regards anode current, there is really little to choose between a modern pentode and a 3-electrode valve, in fact in some cases the latter will actually take more anode current than the pentode. Another important point is that comparatively recently pentodes have been made with a small output of about ½ watt, whereas originally the pentode output was much more than this. It follows from all this that while consuming only about the same anode current as the corresponding 3-electrode valve the pentode will give the same power with only a half or one-third of the input.

One way of expressing it is to say that it "makes better use" of the power which it draws from the battery. As I have said before, however, the pentode must always be considered in relation to suitable output circuits and proper operating conditions.

Useful Data Wanted.

Those who are more experienced in the interpretation of valve curves will be accustomed to the type of curve showing the relationship between anode volts and anode current for different values of the grid voltage. These curves are of little use to the ordinary person, but they help us with regard to the impedance of the loudspeaker to work with the valve under the conditions in question.

As regards the amount of undistorted output, this may be subject to a good deal of difference of opinion, which explains why the makers find it difficult to place any very precise value upon it.

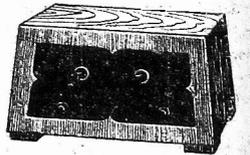
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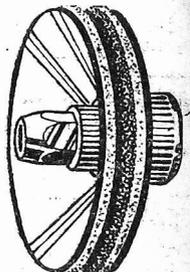
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TESTING YOUR SET
By H. A. RAMPTON.

If your new set refuses to work, or your old one suddenly goes wrong, you will trace the fault easier and quicker by testing each stage separately. The first thing to do is to make sure that the trouble is not caused by the batteries being run down, by a faulty earth or aerial, a dud valve or speaker, or faulty leads.

You will probably have verified all this. How does one set about testing a stage by itself? It is very simple, and once you have learnt the small alterations to try, you will be amazed at the ease with which you can isolate a fault. When the search has been narrowed down to one valve and its associated components, it is often possible to guess the culprit within a very few moments.

As an illustration, let us take the case of a typical four-valver in which the first valve is an S.G., choke-fed to a grid detector. This is resistance-coupled to an L.F. stage which is in its turn coupled by a transformer to the output power-valve. The detector is decoupled. This is, in parts, probably very similar to your own set.

If you have a high-frequency stage, the first thing that should be tried is transferring the aerial from its connection on the aerial coil to the intervalve coil. This cuts out the first stage.

Incidentally, in looking over a friend's set the other day I traced the trouble to a cheap H.F. choke. Remember always to use a good component of well-known make in this position as it is vitally important.

Try Telephones.

If, with the aerial in its new position, the set works satisfactorily, you will probably find that the first tuned circuit does not function properly or else the S.G. valve is not receiving its correct voltages.

If the set still refuses to work, connect a pair of telephones or the loudspeaker across one of the L.F. coupling components. If you have mains-drive, it is best to connect a condenser in series with each telephone lead; the value for testing is unimportant, but may be about 1 to 2 mfd. With a loudspeaker this precaution is not necessary.

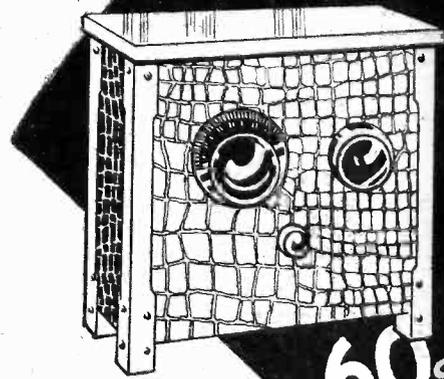
In the present case, if the set now worked, we might assume a burnt-out transformer primary, wrong voltages or none at all on the power valve, bad connections, or a faulty or reversed bias battery.

If you connect a milliammeter in the anode lead of the power valve incorrect bias will show up in excessive H.T. current.

The next position for the telephones is across the coupling resistance (this might be the primary of a second transformer in your set) in the anode of the detector valve. Don't make a mistake and connect it across the decoupling resistance as it would then be impossible to receive any sort of signals.

In the correct position, and with the aerial connected to the intervalve coil (the aerial coil in a det. L.F. set), the set should work. Any fault must now lie in the detector or its associated components. Suspect the grid leak first; or it might be a broken decoupling resistance, a bad connection or wrong voltages.

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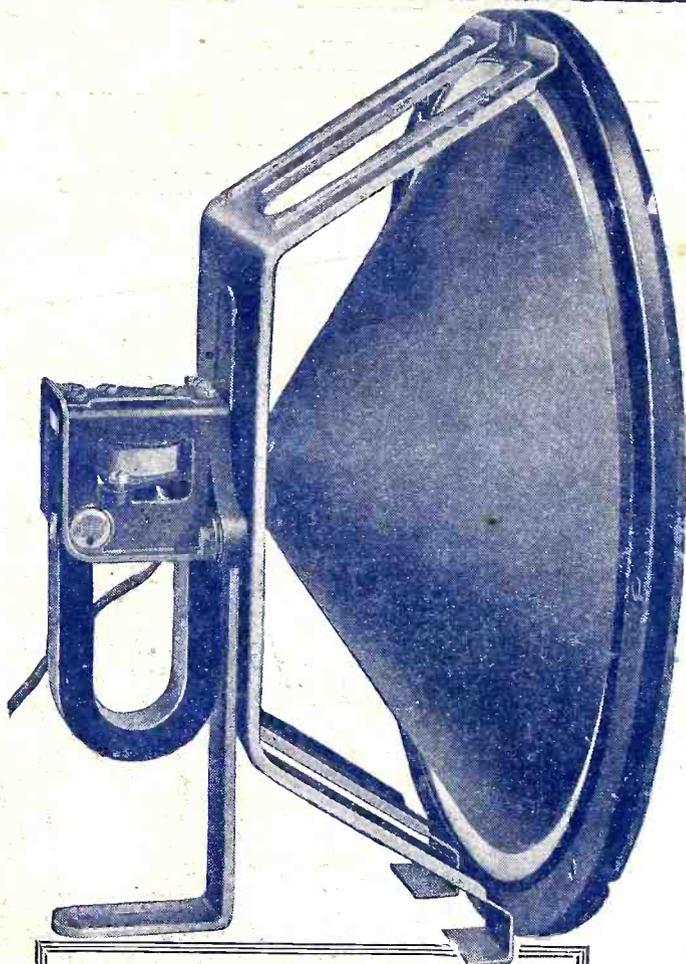
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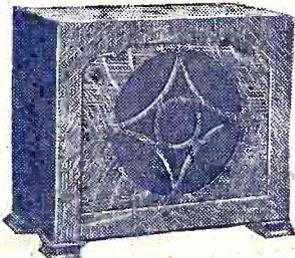
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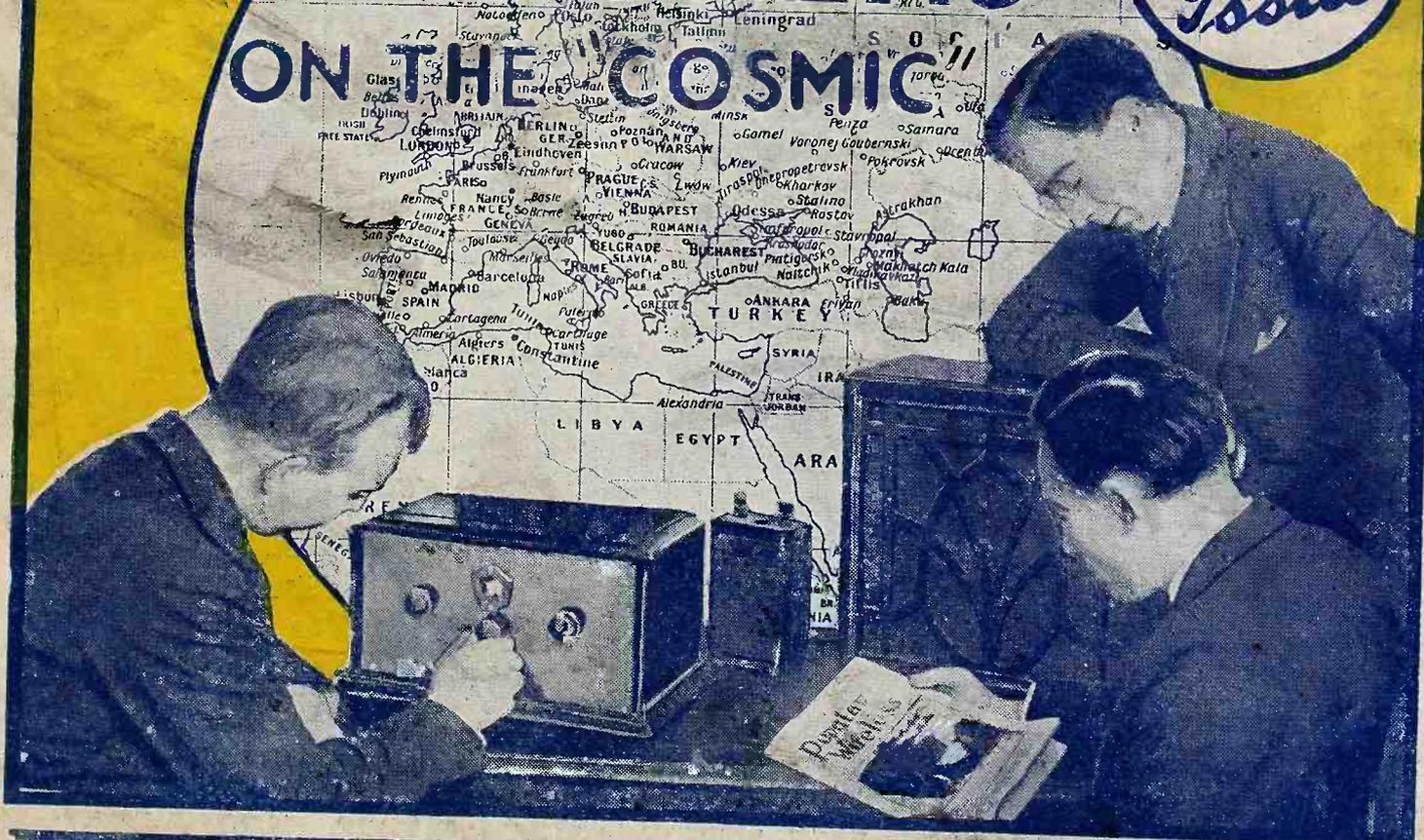
INCORPORATING "WIRELESS"

March 12th, 1932.

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*In
this
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**Build the COSMIC STAR
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See pages
1545,
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SPECIAL PETO-SCOTT COIL OFFER FOR COSMIC SETS
Complete set of Cosmic Coils comprising Peto-Scott Dual Range Coil, Peto-Scott Wave Coil and Peto-Scott Moderator Coil. Officially approved and made to fit the Blueprint.
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MODERATOR COIL. As solely specified in both our up-to-date Coil winding department. The design of the Peto-Scott Moderator Coil is registered.
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CASH or C.O.D. 87/6
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Cabinet, 17/6.

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EASYWAY:
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Author's Kit, complete with valves and cabinet.
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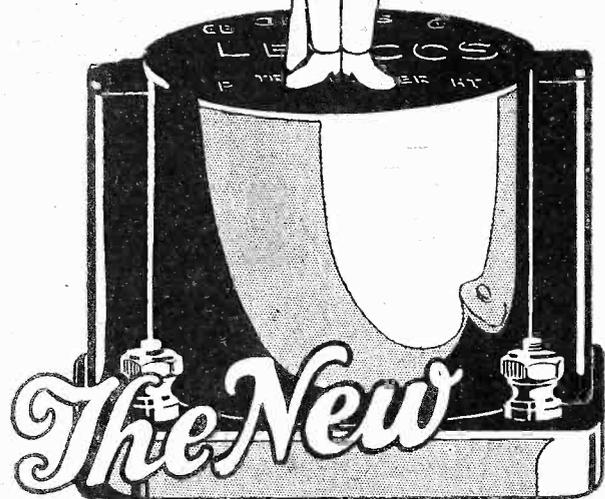
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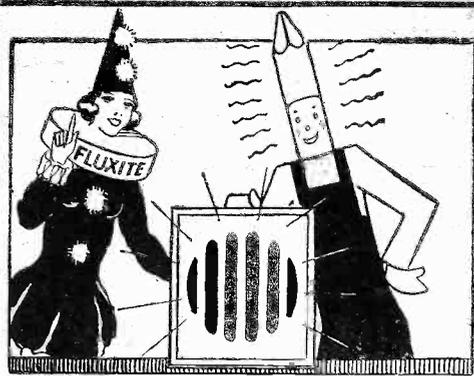
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is a faithful sentry over your loudspeaker. From the recruiting stage—the raw material—it is "trained" to be on guard against the enemies of perfect reception—distortion, and lack of L.F. amplification. This LEWCOS Transformer is British to the core and reports of its conduct in action show that its performance is magnificent and has yet to be surpassed.

We respectfully request the public to order through their local radio dealer as we only supply direct to the trade.

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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.

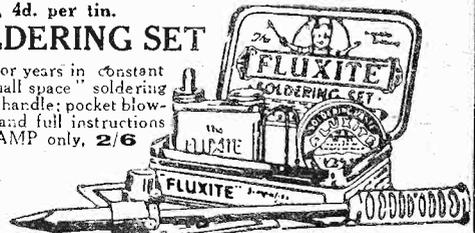
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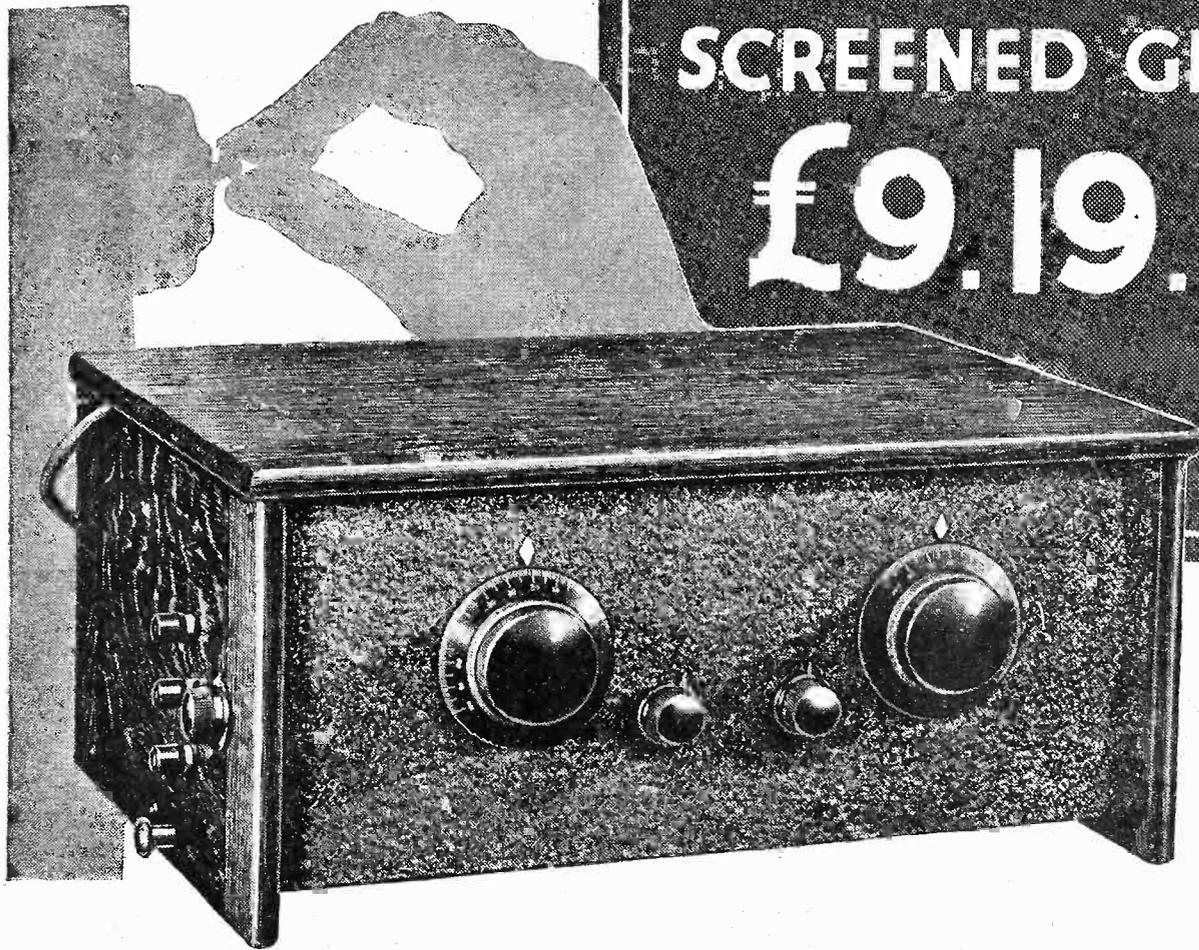
The Sherlock Holmes of your Radio

12/6

There is no instrument like it. You must have one to secure best reception. Tests everything in your Set!

Your radio or Electrical Dealer can supply. If any difficulty, write to PIFCO LTD., HIGH ST., MANCHESTER.

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SCREENED GRID
£9.19.6**



HERE is Britain's greatest All-Electric Wireless value—the Cossor All-Electric Melody Maker Model 235—a powerful 3-valve Screened Grid Receiver that works entirely from the electric light mains, for only £9.19.6!

Think of the convenience of being able to plug in to a light or wall socket and enjoy the programmes—no accumulator to recharge, no H.T. Battery to replace.

Because it uses the latest type of Cossor

A.C. Mains Valves this remarkable Receiver is exceptionally efficient—it gives you a wide choice of European programmes in addition to B.B.C. Stations. It is just as simple to use as a battery-operated Set and it uses less power than the smallest lamp in your home. Use the coupon below and get full details.

**ALL-ELECTRIC
MODEL 235**

Price includes handsome oak cabinet Cossor Metallised Screened Grid, Metallised Detector, Power and Rectifier Valves, Heavy-duty Mains Transformer and all parts necessary for home assembly of the complete Receiver as illustrated **£9.19.6**

Hire purchase terms: 20% deposit and 10 monthly payments of 20%.

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EMPIRE
Melody Maker**

Models 234 & 235

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A new edition of the Cossor Station Chart is now available price 2d. Ask your Dealer for a copy of this useful novelty or write to us enclosing 2d. stamp.

To Messrs. A. C. Cossor, Ltd., Melody Dept., Highbury Grove, London, N.5.
Please send me free of charge a Constructional Chart which tells me how to assemble the Cossor Melody Maker.
(Fill in type required, viz., Battery-operated or All-Electric).

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Address.....

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

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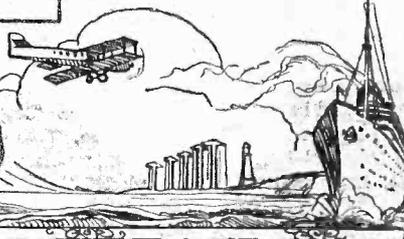
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Popular Wireless

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MUSIC OF HUNGARY
"ADMIRAL GUINEA"
MY WORD!
H. F. SURGERY

RADIO NOTES & NEWS

THAT FLASH
ON MY BLOTTER
AN ULTIMATUM
THE NEWCOMERS

Mass Music of Hungary.

ADMIRERS of Hungarian music will be interested to know that a magnificent concert of classical and modern items has been arranged for to-night (Thursday, March 10th). Quite a number of European stations are "hooked up" for this, and you can take your pick from the following: Budapest, 550 metres; Belgrade, 430.4; Vienna, 517 metres; Zagreb, 307 metres; Ljubljana, 574.7 metres.

In addition to the stations of South-East Europe given above, the concert will be relayed by Madrid, 424.3 metres, and Barcelona, 252 metres; and also by Hilversum on 298.8 and Huizer on 1875 metres.

Two Hundred Performers.

HALF-WAY through this concert of Hungarian music, which, by the way, is being sponsored by "Tungsrams," there is one item of very special interest—the Hungarian Coronation Mass Benedictus.

It will be sung by a choir of one hundred voices, supported by the full orchestra of one hundred players. This should be really magnificent!

"Cosmic."

IAM more of an ordinary "listener" nowadays than a technical tinkerer, but I see quite clearly that with the "Cosmic" my colleagues have given a new impetus to amateur construction; they have raised it to a different plane altogether, and lucky are the "new chums" who make a start with this extraordinary set. The letters which we have had concerning "Cosmic" have been lyrical in their praises. I quote at random from one: "Congratulations on your really greatest production yet—the 'Cosmic.' Three—exactly what many 'fans' have been waiting for a long time, as well as being a DX man's ideal all-round receiver." That is from E. D. (Southend-on-Sea), for whose letter and diagram we return thanks.

"Admiral Guinea."

THIS play, which was produced by the B.B.C. a few days ago, was one of Stevenson's "flops." He wrote it in collaboration with W. E. Henley shortly

after he began to live at Bournemouth in 1884, ten years before he died, and it was originally produced in London in 1897. In 1885, you may be interested to learn, he wrote to Henley as follows: "The reperusal of the 'Admiral,' by the way, was a sore blow; oh, gad, man, it is a low, black, dirty, blackguard, ragged piece: vomitable in many parts—simply vomitable."

A Somewhat Better Play.

ON Sunday next the B.B.C. are to broadcast a radio version of "Othello," a departure from the customary dead level of seventh-day fare which is courageous and commendable, though I think I could

negative electron upon an axis having north and south magnetic poles, the real cause of wireless echoes, magnetism, light, and heat." Isn't it rather debasing such a theory to apply it to the mere tuition of telegraphists, when it might instruct the world's greatest physicists?

My Word!

I UNDERSTAND, as a result of my assiduous study of the Press, that the Board of Governors of the B.B.C. has decided to ask for the resignation of any employe of the Corporation found to be the guilty party in a divorce suit. I say that I read that in the newspaper world; I cannot swear that it is true, but if it is, then I, who am something of a Puritan yet all of an Englishman, say that the decision is abominable. Perhaps if we had men—and women, if you like—of the world on the Board of Governors, we should be better off. I am growing a little weary of "manse" rule in broadcasting. Even Blue-beard might announce fat stock prices satisfactorily to the people who pay for them—and pay the Governors!

OLD FOLKS AT HOME



This is good old Charlie Coborn, the 80-year-old music-hall comedian, tuning in the London greetings on his golden wedding-day.

name one esteemed official of the Corporation who will have an acute attack of conscience about it. However, get ready your Shakespeares and prepare to hear a goodly matter. Henry Ainley is to represent the Moor!

The Cause of Heat.

IAM glad to observe that Mr. F. Waterhouse has invented an apparatus for use in teaching the Morse code, but the advertisement of it says: "From the theory of this instrument new light is thrown upon the nature of electricity with formulated proofs regarding the rotation of the

proper questions, and if Southport cannot answer them perhaps the Editor of the "News," Mr. C. J. Daly, will do so. We deserve that much attention, having given the "League" space out of the goodness of our hearts.

The Other S.W. Organisation.

A. E. B. (Rotherhithe) will have observed that from time to time I have given publicity to the club which he mentions in his letter; in fact, I have treated it quite as well as the "League" of South-
(Continued on next page.)

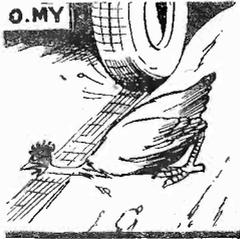
NEWS—VIEWS—AND INTERVIEWS (Continued)

port. Pending the shedding of light upon the matters dealt with in the preceding paragraph, I propose to retire awhile from the boosting business and devote any paragraphs which I may have to spare to the interests of local clubs, who never have appealed in vain to "P.W." for a "leg up" in the shape of a short notice.

Does your club issue a balance sheet? If so, may I have a copy, please?

High-Frequency Surgery.

INTENSIVE research in the realm of surgery by use of waves of about 6 metres is being carried on, and considerable progress has been made in the study of the effects of such high frequencies on living tissues, bacteria, blood, etc. There is evidently a vast field of knowledge to be opened up in this direction, but many frogs and other small living things must be sac-



rificed in the work.

Recent experiments included the paralyzing of a frog's leg and a chicken's brain. The chicken remained crouched, motionless, and with no apparent desire to eat for many weeks. It was then killed for anatomical examination. I hope this sort of thing is really necessary and not merely for curiosity.

That Flash.

WHAT a lot of valves are being smashed nowadays! If the makers knew how mighty is the flow of letters about the "flash" they would buy themselves Rolls-Royces. Many are the theories to account for the flash which is observed. I believe the correct explanation is that the metallic magnesium which is deposited on the inside of the bulb, not having a protective film of oxide, oxidises with such rapidity when the air rushes into the bulb that it is burnt; hence the flash or flame.

Several readers have given this explanation, and I back it myself. In the case of electric-light bulbs, I am told that phosphorus is used as a "getter," and oxidises when the bulbs are broken, emitting a smell of phosphorus.

Noted on My Blotter.

ALTHOUGH I cannot "keep" a diary, I can and do "keep a blotter," which zealous office boys frequently equip with clean sheets, throwing away my priceless records of telephone numbers, lunch appointments, debts, etc.



I find in the left-hand top corner of this week's sheet the 21st of March noted as the date of the B.B.C.'s international broadcast of

British music. On the 18th and 19th the O.B. Department will be heavily engaged with

the Grand National (snow permitting!), the Boat Race and the Scotland v. England Rugger match.

Wireless for Schools.

IHAVE opposed the school radio business consistently as a time-wasting irruption into the educational life of our young. Therefore I am rejoiced that the "Leeds Mercury" should print an article entitled "Too Much Wireless for the Schools," in which I see the words, "Whether the school broadcasts are any use or not, the point is that they are not the business of the B.B.C." There are too many distractions already provided for our kids. A young boy tells me that the last two chemistry lessons he has enjoyed consisted of shows of cinema films of New Zealand sheep farming!

SHORT WAVES.

Maid (a wireless fan, speaking at telephone): "Would you mind holding on, please? Madam won't be a minute or two. In the meantime, I'll put on a gramophone record."
—"Punch."

The electrical pressure of an onion, we read, is equal to that of one-fiftieth of a single accumulator cell, and has, moreover, the consistency of an electric standard. It is suggested that a suitably wired bed of onions could be planted outside the drawing-room window for supplying H.T. to our wireless sets.

This news of the ohm life of an onion is, indeed, most enlightening.

A bachelor fan, so 'tis said,
Fixed his set to listen in bed;
But the talks and wails
And the thrice-told tales
Make him think he's married instead.

"The BROADCAST will begin at 9.15," says an American paper.
We want ours buttered, not jammed, please.

WISE CRACKS.
People who live in glass houses should not use indoor aerials.
Static in radio reception is like a mother-in-law in married life.

A WIRELESS LOVE SONG.
The force between us, you're aware—
You'll pardon my insistence—
Varies inversely as the square
Of intervening distance.

Who has short-circuited our arcs?
Let's banish all deterrents
And turn our intermittent sparks
To alternating currents!

New Australian Station.

TOWARDS the close of 1931 Riverina Regional station, 2CO, Corowa, the most powerful of the national broadcasting stations of Australia, was put into public service. It is situated about three miles outside Corowa, N.S.W., near the River Murray. It works on 538 metres (360 kc.), and would strain a "Cosmic" to its utmost, I'll bet.

However, "hope springs eternal," and there's no harm done by trying!

You License Yourself.

TAKE note! If you pay your wireless licence on Monday and peg out on Tuesday, the heir to your set should take out another licence on Wednesday. If the "van" cops him while he is attending your funeral, goodness alone knows what

penalties he may incur! I advise you, therefore, to leave your licence in your will to whoever inherits your set. That will make the lawyers sit up and think. But, I say, what rot! A similar ruling applies, I understand, to a dog licence. Better take out all your licences in the names of your heirs!

Television in the U.S.A.

A REPORT from Washington seems to indicate that in spite of the strides which television is said to have made in the U.S.A., the Federal Radio Commission, which regulates radio work and play in the States, does not consider that the art has reached a stage of commercial utility, largely on account of the small number of stations which can be operated without interference.



On the other hand the "Telegraph and Telephone Age" thinks that the time is not far distant when every telephone will have a television apparatus attached to it, and coins the word "Sightophony" for the business. But if television doesn't improve a lot they will have to use the word "myopiaphony," too!

An Ultimatum.

THIS is to notify the gentleman with a step-father in Heckmondwike and a snag in his "Magic" Three that most of his ink is wasted because he is so economical of punctuation marks. We are yearning to help him, but just as our combined brain-power has given us the drift of one letter, bang comes another and upsets our theories. Average length of seven letters is eight foolscap pages, in violet ink, all mixed up with the step-father. We should welcome a letter from the iron bedstead johnny as a change. Have you found the parrot yet? We are all on edge about her. Especially Mr. Bird.

Newcomers to Radio Research.

IHAVE the honour to announce, on the strength of advices received from America, that two newcomers to radio research have just arrived in Chicago, where they will get to work under the direction of a radio company, and will specialise in the study of the sounds which are outside the range of the human ear. These scientists are natives of Venezuela



and I believe they are man and wife—a charming combination, reminding one of the famous partnerships of the Curies, the Sidney Webbs, the Brownings, and so on. But I ought to add that their names are Poncho and Martina, and that they are ringtailed monkeys!

ARIEL.

ON THE OTHER SIDE A TALK WITH A SPANISH LISTENER

SPAIN may be behind the times in some respects, but in new trade it is getting very up to date. There is, I learned while in Paris, a sort of publicity organisation which distributes to visitors (at the Spanish frontiers) illustrated pamphlets and brochures detailing the advantages of Spanish holiday resorts and giving trade opportunities.

This same publicity concern, run by the Government, sends out agents into other countries when big international contracts are going. By a lucky chance I met one of these agents in Paris. He was engaged in electrical work and was in private life a wireless enthusiast.

The Madrid Station.

I asked him several pointed questions about Spanish broadcasting.

"The E A J 7 station in Madrid," he said, "works at intervals from about 11.45 in the morning, but if you look at the programmes of our biggest station, Radio Barcelona, you will see the sort of thing which we regularly get: 7 p.m., *Trio music*; 7.30 p.m., *Market prices*; 8 p.m., *Football talks*; 8.15, *Gramophone records*; 9 o'clock, *time signal and weather forecast*; 9.5, *Orchestral selections*; 10 o'clock, *News bulletin*; 11 o'clock, *Gramophone records till the close down at midnight*.

Not so complete as your B.B.C. stations, eh?"

"Your stations appear to shut early," I remarked.

Early Closing.

"Our stations appear to close down early, but it must be remembered that we do not go on British summer-time and, for a greater part of the year, Spain is behind the French and British programmes."

"Can you give me some hints on recognising Spanish stations?" I asked. "Most of us do not know Spanish: it is so different from French."

"Although Spanish is an easy language to understand when

No doubt you have often listened to the languorous music from Madrid or one of the other Spanish stations, and you may have wondered what the Spaniards themselves think of their broadcasting service. Well, here is an interesting and right up-to-date account from the lips of a keen Spanish listener, in which many useful reception-hints are embodied.

written down, the rather guttural pronunciation, so different from French, probably makes it difficult for you to understand the Spanish announcers.

"The call E A J 7 given from Madrid, is pronounced *Eh-ah-hota-sieteh*. The words 'Union Radio Madrid' are pronounced in the French fashion. This call is given very frequently between items.

Easily Identified.

"It is easy to identify Madrid, too, because Siegfried's bugle-call theme from the opera is played with one finger on the piano, as a sort of interval signal. If you don't happen to pick up Madrid until the

end of the evening, then look out for the 'Buenas Noches, Senores, hasta manana,' which is the good-night farewell.

"The E A J 1 given out by the new Barcelona station is pronounced *Eh-ah-hota-oono*. At Barcelona also they announce that a station is *instalada en la cumbre del Tibidabo, Parque del Hotel Florida*, which you see, is a nice free advertisement for the hotel where the station is!"

I asked about broadcasting organisations, wireless licences and so on.

A Powerful Weapon.

"For the past two or three years," said my friend, "broadcasting has been in a state of flux, and since the revolution matters have been even worse.

"When Alfonso was on the throne, our Government was very anxious to keep all the various broadcasting concerns together and make one central company very much on the lines of your B.B.C.

"Not a bad plan. In fact, had they been able to get a State broadcasting concern together, before the political trouble started, it would have been a powerful weapon in the King's hands.

"But they didn't manage to get the organisation through in time, and although there have been more restrictions as a

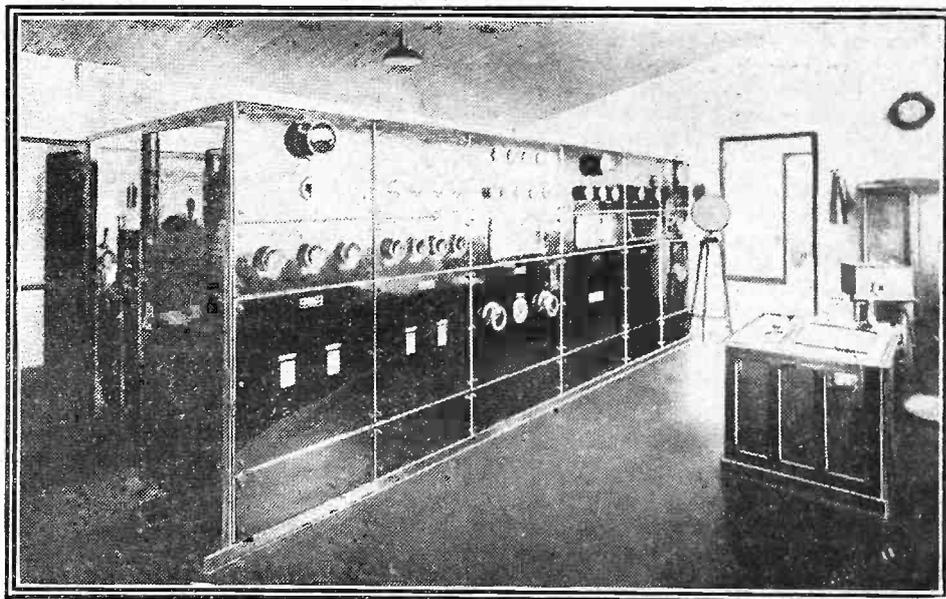
result of the revolution, the organisation of our broadcasting is still in a muddle. There are three chief companies, the Union Radio, Radio Iberica and Radio Espana.

On Commercial Lines.

"These run broadcasting on commercial lines and give a small amount of advertising. As many of your visitors to our Spanish holiday resorts will know, there are a multitude of small newspapers all over the country, and although none of them has any great weight, their combined effect has a big influence on the average citizen's mind.

"Their combined
(Continued on next page.)

HOW BARCELONA PUTS ITS PROGRAMME ON THE AIR



This is a general view of the Barcelona station, E A J 1, that works on 349 metres—a little below the London Regional. Although not a high-power station, it comes over with a great punch, announcing itself as "Radio-Barcelona."

A TALK WITH A SPANISH LISTENER

(Continued from previous page.)

effect is generally directed against broadcasting. There is a strong idea that the real use of broadcasting is for giving out news, and the minor newspapers feel that they will be wiped out if there is any extension of the present broadcast news service.

"Of course it is a mistaken idea, because most of our stations do not start a main programme until the early evening. A good many listeners, especially in the North of the country, tune in to your Daventry and Radio Paris and get the world's news before they go out to buy their own evening papers!

News Bulletins.

"From some stations a little news is broadcast in the early afternoon and an ordinary bulletin at ten, but it is mostly sports news and minor political stuff; nothing very important, I'm afraid."

"What about station jamming?" I asked.

"We have seven exclusive wave-lengths, not too many, I think, for a country of our size. The present stations are fairly well spaced and the only wave-lengths which are absolutely in the thick of the congestion are those of Barcelona, on 349 metres, and the new Valencia station, which is now testing on 268 metres with about five kilowatts.

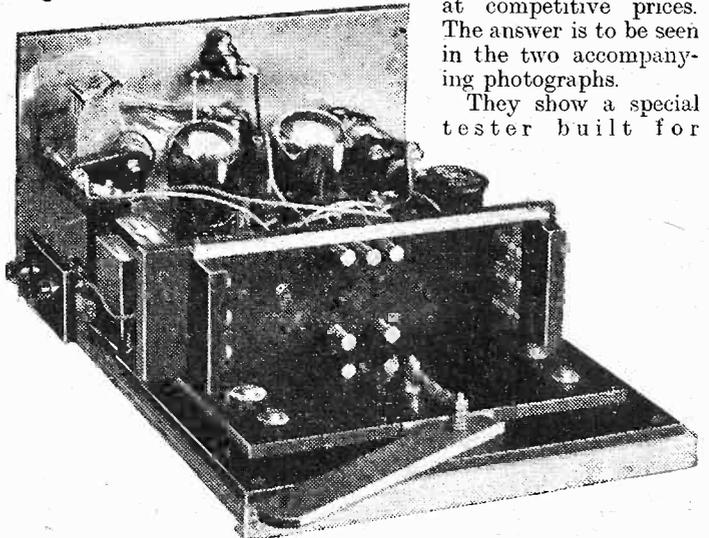
"The other stations are San Sebastian, Madrid (E A J 7), the Madrid Espana station, Seville, and the old Barcelona station which still works on 252 metres with an eighth of the power of the new E A J I station."

EDITOR'S NOTE.—We are pleased to be able to announce that we have secured, for inclusion in this exclusive and interesting "P.W." series, an article dealing with broadcasting in the Far East, and entitled "A Talk with a Japanese Listener."

DID YOU KNOW THAT?

If reaction with a differential condenser is too "fierce," the necessity of removing turns from

QUICK CONNECTIONS!



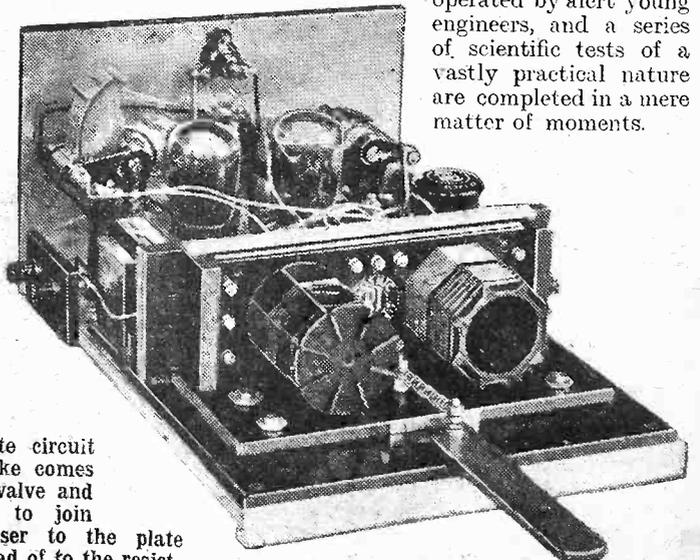
The special instrument designed and built by R.I. for testing their Cosmic coils.

Cosmic Coil units. It comprises, in effect, a two-valve Cosmic set with an ingenious quick connection arrangement for the coil units.

A coil unit is slid into the grooved carrier at the back and the lever pulled out. This lever causes the plungers you can see in the first photo to make efficient contact with the coil unit terminals.

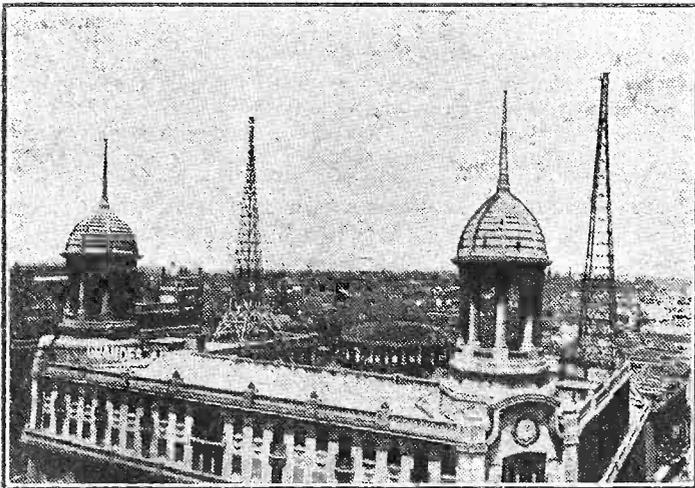
The various wave-meters, etc., are rapidly operated by alert young engineers, and a series of scientific tests of a vastly practical nature are completed in a mere matter of moments.

A COMPLETE TEST



Instantaneous connection is made to all the terminals of the coil unit.

IN THE CITY OF MADRID



These masts, erected in the heart of Madrid, will remind London listeners of the old 2 L O, which employed a similar pair of masts in Oxford Street.

"As far as wave-lengths go, we seemed to do very well out of the Prague Conference, but listeners all over the country are agreed that the present wave-length jamming is worse than hopeless.

"Judging by reception in other countries, stations are well heard even at Madrid, which is, of course, hundreds of miles inland. Perhaps it is because Spain is surrounded by water. The American stations come in wonderfully."

The Next Conference.

"They're having the next wave-length conference in Madrid, aren't they?" I inquired.

"Yes," he said, "it is a bit of ironic humour that the next conference is to be at Madrid. This is a conference not only of broadcasting stations officials but of commercial wireless engineers throughout the world, to whom broadcasting is only a side line—and we devoutly hope a new kind of Prague plan will be settled at Madrid, nobody would be more enthusiastic than us about cutting down station jamming.

between aerial and input to the set is frequently minimised or lost altogether by bad spacing between the new coils and the old.

When adjusting the trimmers of ganged tuning condensers, remember that the best trimmer position for results near the top of the dial may not be best for results near the bottom of the dial. (Generally speaking this latter is the more important setting.)

A common error in plate circuit wiring where the H.F. choke comes between the plate of the valve and a coupling resistance is to join the L.F. coupling condenser to the plate side of the H.F. choke instead of to the resistance side.



PICK-UP PROGRAMMES

on the

"COSMIC" THREE

Constructors of the now-famous "Cosmic" receivers are in a unique position in the matter of providing themselves with exactly the programmes they desire. For in addition to the possibilities of finding broadcast entertainment on one of the three wave-length bands covered by the set, they are able to "broadcast" home-made programmes on their sets by means of the gramophone pick-up. The following article tells how this is done, and gives some valuable advice upon the operation of the "Cosmic" radio-gram.

By K. D. ROGERS.

THOSE who have built either the "Cosmic" Three Star or the earlier model of the "Cosmic" receiver will by now have realised that they have a truly remarkable set in their possession. For it is a set that is not only capable of world-wide radio reception, without any coil changing, but it is also capable of providing home-made concerts of your own exact choice through the medium of the gramophone pick-up.

An Alternative to Radio.

This alternative to broadcast reception is a very great asset, for it enables the owner of the set to have musical entertainment at whatever hour of the day he chooses.

"But," you will say, "this will cost much more than the set by itself, and it will entail a fairly intimate knowledge of radio-gram operation."

Nothing is farther from the truth. The addition of a pick-up need cost very little, and the other odds and ends such as gramophone motor, volume control, and so on, may not have to be purchased at all. You may have them on hand.

At any rate, you need not spend much even if you have to buy everything fresh. On the other hand, you can expend many pounds if you feel in a luxury mood. "It all depends on you," as the once-famous dance number has it.

Perhaps I should explain what I mean by this remark before I go any farther. Here goes!

The constructor of a radio-gram receiver—such as you will have when you have added a pick-up to your "Cosmic"—need only have in addition to his set a pick-up and a gramophone motor; the latter being supported on a very rough piece of wood.

"The Whole Hog."

On the other hand, he can go the whole hog and equip himself with the latest H.M.V. playing desk, with or without automatic record changer, and complete with pick-up and volume control. He can also go to the expense of a record cabinet of the latest self-finding variety. If he does he will have a bill of something like £40.

There is another alternative that I shall say something about later, and that is the purchasing of a complete radio-gram kit of the "Cosmic" Star, which is provided for a very modest sum by one of the well-known kit suppliers.

Meanwhile, however, let us see how we can use either the "Star" model or the

original "Cosmic" receiver as a radio-gram receiver. The "Star" set is already provided with a pick-up switch, and in the case of the other this or a jack can very easily be added.

We will deal with the "Star" model first. Assuming that the set has been built without any idea of making it a complete radio-gram

receiver; without getting a complete kit of radio-gram parts as mentioned above, we can easily turn it into this dual-purpose set stage by stage.

Concerning the Cabinet.

We will assume for the moment that we have no gramophone, and therefore no gramophone motor and turntable. Therefore we shall have to get one at some stage of the proceedings. Before we come to that, however, we will decide whether we are going to house the whole outfit under one roof in a complete radio-gram cabinet, or whether we are to keep the set in an ordinary cabinet and have the gramophone motor and pick-up in another alongside.

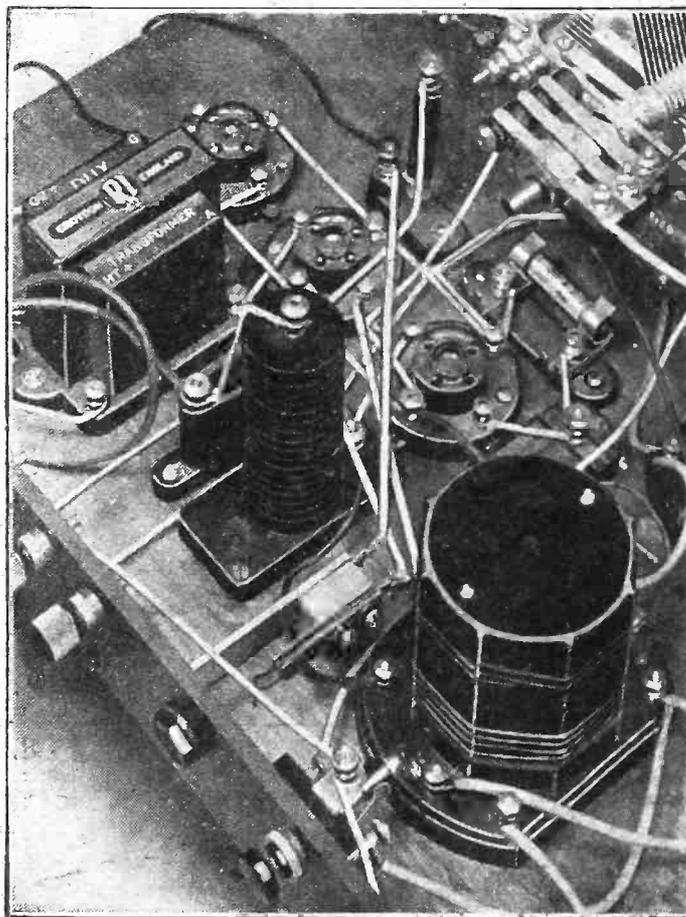
A Neat Job.

The former makes the neater job, and if no set cabinet has been purchased it will work out cheaper. On the other hand, if the set is already in a satisfactory home it may be preferred to keep the gramophone side separate rather than to scrap the set cabinet and put the whole lot in one piece of furniture.

This is easily decided, and whichever is done it makes no difference to the extra bits required to turn the set into a radio-gram receiver.

(Continued on next page.)

PROVIDING PRIVATE PROGRAMMES



This is a close-up of the pick-up jack inserted in the original model of the "Cosmic" Three. The jack is an ordinary break type, such as the Igranac P.62, known as a "single circuit closed" jack.

PICK-UP PROGRAMMES

(Continued from previous page.)

These are the pick-up, the gramophone motor and turntable, and a volume control to vary the power of the record reproduction. All these can be conveniently housed in with the separate gramophone unit, or in the radio-gram cabinet with the set.

The Driving Motor.

Let us discuss the motor first. This can be of two main kinds: clockwork or electrically driven. If you are working your set from a mains unit (for H.T.) and you can afford a few pounds, you will find an electric motor a very delightful luxury. I say luxury because it is really that. It makes absolutely no difference to the quality of the results, but it does save the somewhat bothersome winding up every one or two records.

The electric motor can be either of the A.C. induction type, or a general-purpose motor which will operate on either A.C. or D.C. If you have A.C. mains available the former type is the better. The cost will vary with the make and type from about £2 upwards.

A clockwork motor, on the other hand, can be obtained for half that price, and a reliable motor, too. This is a point, however, that the set owner will have to decide for himself.

The motor decided upon, it can be fitted in the cabinet leaving a fair space for the pick-up (it is perhaps best to get this latter before fitting the motor) and for the volume control.

A Wide Choice.

But let us pass on to the pick-up. Here again one has a wide choice. But unlike the motor a variation in the make or type of the pick-up can have a marked effect in the tone of the reproduction. The various motors can only offer more or less unimpor-

amplified and turned into sound by the set and the loudspeaker.

Various Loudspeakers.

Now you know that various loudspeakers have equally various "tones." They prefer to reproduce the different parts of the musical scale in various proportions. The perfect speaker gives all notes an equal chance, but that speaker is yet to be found, though near approaches have been designed.

I am referring to the speaker in rather a loose way as applied to one particular set, to which it may or may not be accurately matched. But that is how the combination of set and speaker will affect your choice of a pick-up.

For, continuing, if the set-plus-speaker combination (which I shall refer to in future as the speaker) gives very brilliant reproduction—the high notes coming out particularly well—then it will probably be best to choose a pick-up that has a useful bass lift, for we do not want anything above about 4,500 cycles to be reproduced in the gramophone music, for the simple reason that it is not there.

Cutting Out Scratch.

This may sound Irish, but the fact of the matter is that if the pick-up tries to reproduce notes above that figure it will merely succeed in producing a lot of surface noise from the record.

In this case you would only have to cut it out with a scratch filter before you could enjoy the reproduction, and it would be better to avoid this at the start by choosing a pick-up that does not have this tendency, but has a useful bass "lift" that will give well-balanced results with your particular speaker.

Such pick-ups are to be found in several makes, among which are H.M.V., Marconi-phonograph, Blue Spot, A.E.D., etc.

Naturally, the reverse set of circum-

stances holds good. If you have a rather

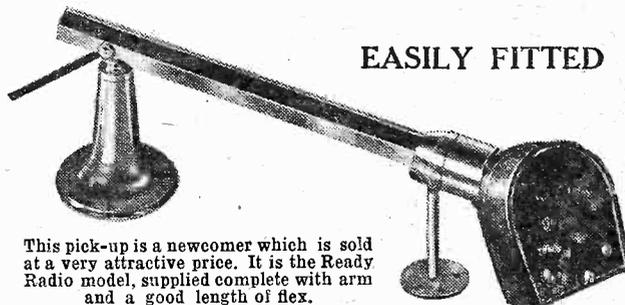
"mellow" speaker, perhaps you can do with a pick-up that has a particularly brilliant response, though it must not be deficient in low notes. Such an instrument can be found among the B.T.H., Audak, Graham Farish, Ready Radio, and other makes.

Here, however, let me say that because a pick-up gives particularly good results at one end of the musical scale it must not be assumed that it is lacking elsewhere.

And the best way to choose your pick-up is, of course, by getting it on trial if you can from your local dealer and testing it on your own set at home.

But the foregoing will, I hope, give some assistance to those who are adding the gramophone side to their sets.

There are other points to consider, but before I leave the subject of pick-ups I would remind you that these instru-



This pick-up is a newcomer which is sold at a very attractive price. It is the Ready Radio model, supplied complete with arm and a good length of flex.

ments can be obtained (not always in the same make) either with a tone-arm complete or as an adaptation to take the place of the sound-box on the ordinary gramophone.

This brings me to another aspect that I have not yet touched upon. If you have a gramophone you will not need the new motor, for with a pick-up that is of the adapter type all you have to do is to remove the sound-box of the gramophone, place the pick-up on instead, connect it to the set, and go right ahead.

Armchair Control.

An excellent pick-up for this purpose is the H.M.V. Model 11, as this is supplied with very long leads and an armchair volume control.

With the new motor, or the complete radio-gram cabinet scheme, the pick-up and tone-arm combined is, of course, the best. But whatever type you go in for it is absolutely essential that you have a volume control to enable you to adjust the power of the reproduction to your liking.

The volume control can be of two kinds: for fixing on the motor board, or of the armchair variety. There is no room on the set for it, and if there were it is far more desirable to have the control where the pick-up is than to have it on the panel of the receiver.

This is obvious when you remember that the set itself will not be touched during the time that records are being played, and that it is quite probable that the gramophone motor and the pick-up will be some feet away from the receiver.

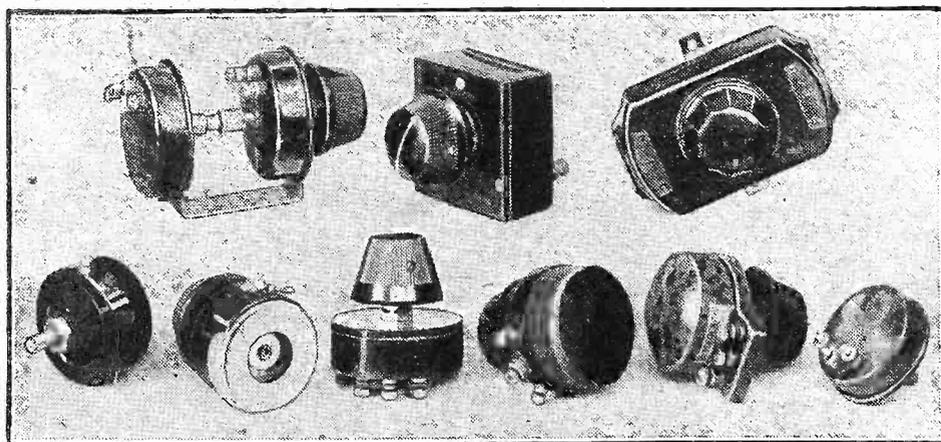
Just a Matter of Type.

That being the case, the choice of the volume control becomes a very easy job. All you have to decide is whether you will have the added luxury of an armchair control, such as is provided by the H.M.V. pick-up and volume control, or whether you will control the reproduction from the gramophone unit.

In any case, this control is not a question of constant variation, the control is merely set when the record begins and then left during the whole item.

(Continued on next page.)

ADJUST THE VOLUME TO YOUR LIKING



Here is a selection of volume controls which are suitable for pick-up work. The top row, from left to right, shows a ganged Magnum control (for use when it is desired to control two circuits at once—in the "Cosmic" only one of these units is required). Next we have the A.E.D., and the H.M.V. armchair control. Below, the illustration shows examples of the Varley, Clarostat, Ready Radio, Wearite, Sovereign, and Graham Farish controls.

tant differences; the pick-up is the vital part of the gramophone side of the set.

Let me explain. The pick-up is an electro-mechanical device which converts the wobbles imparted to its needle by the record into electrical variations that are

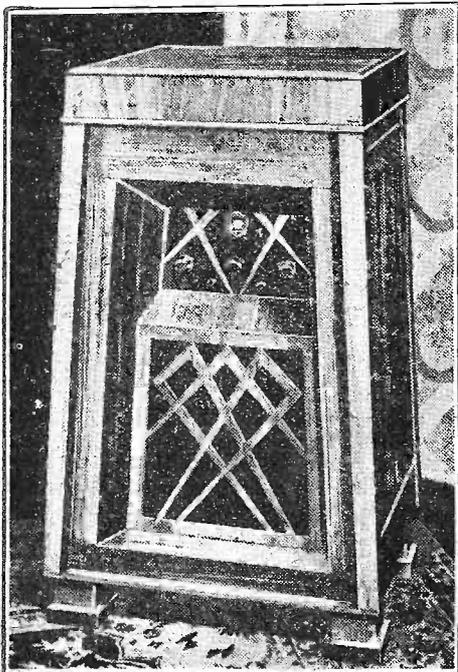
stances holds good. If you have a rather "mellow" speaker, perhaps you can do with a pick-up that has a particularly brilliant response, though it must not be deficient in low notes. Such an instrument can be found among the B.T.H., Audak, Graham

PICK-UP PROGRAMMES

(Continued from previous page.)

The ordinary type of potentiometer of a value of some 250,000 or 500,000 ohms is suitable unless the makers of the pick-up recommend some other value, and this can be mounted on the motor board of the gramophone very easily.

MODERN ART



If you wish to make your "Cosmic" Three into a really "posh" job it is a good plan to house it in an attractive radio-gram cabinet. A very modern design is provided by Messrs. Ready Radio, and is illustrated above.

The connections of the volume control are very simple, one end of it being taken to the one tag of the pick-up, and the other side of the control to the other tag of the pick-up and to a grid-bias plug. The centre terminal on the potentiometer goes to the set, as we shall see in a minute.

In connecting up the gramophone unit let us deal with the "Cosmic Star" first.

This has a special switch at the back (on the terminal strip) for changing over from radio to gramophone and vice versa. There are three terminals on that switch, two of which are already connected to various points in the set.

Not At All Difficult.

The third is left unattached—the terminal on the left of the switch as we look at it from the terminal strip.

This is now connected to the lead that comes from the centre terminal of the volume control that we have mounted on the motor board of the gramophone. The other lead from the volume control (which we said had to be connected to one terminal or tag of the pick-up and to a grid-bias plug) is plugged into the grid-bias battery at 1½ volts or so, or it can be connected into the G.B.1 plug that is already used in the set.

That is all that has to be done in the case of the "Cosmic Star." In the "Cosmic" original, set the addition of a pick-up is

quite easy, but it means the mounting of a jack on the terminal strip.

This jack is of the usual break type with three contacts. And it is easily mounted between the wave-change switch and the L.T. plus terminal.

The connections are as follow: Remove the lead that now joins the grid terminal of the second valve holder to the .01-mfd. condenser, and instead connect the grid to the outside contact on the jack.

Connecting the Jack.

The now free terminal of the .01-mfd. condenser is taken to the centre contact on the jack, the latter having been mounted so that the two springs that are close together are on the right as we look at the jack from the back of the set—i.e. the frame is to the left.

The remaining terminal (the frame) on the jack is joined to the terminal on the .5-meg. grid leak that goes to the grid bias—1 lead. The fact that we have the grid leak still in circuit when the pick-up is used will not affect the reproduction, and it will prevent any objectionable noise occurring when the pick-up plug is placed in position in the jack.

The connections of the pick-up to the plug are: Centre terminal of the volume control on the motor board to the terminal on the plug that makes contact with the jack spring, and one outside terminal on the control to the remaining side of the pick-up and to the remaining contact on the jack.

One Valve Idle.

If you are not sure which way round to connect the volume control (arranging it so that turning the knob to the right increases volume), a trial and error test will show whether it is correctly attached. If on test you find that the control works the wrong way, increasing volume when turned to the left, a reversal of the leads going to its two outside terminals will effect a cure.

In each case in the addition of the pick-up to the "Cosmic" sets the first valve is not used when the gramophone is employed, the introduction of switching into the detector circuit being inadvisable in a receiver that has to operate on the very short waves.

When you have chosen your pick-up and have got the alterations to the receiver completed, you will be anxious to try it out. If you have a gramophone, you will be able to give a test with some of the records that you will no doubt have on hand, but if you have previously not been interested in the realm of what is impolitely, but rather succinctly called "canned" music, you will be looking round for some records.

Naturally I cannot lay down any hard-and-fast rules on choosing records, but a few suggestions may be of use. There are certain features in radio-gramo-

phone reproduction that are not found with the acoustic gramophone (provided a good loudspeaker is used), and which a careful choice of a few records will enable you to demonstrate very easily.

I refer to the increased bass reproduction that is a feature of the electrical reproducer as compared with the acoustic type, and a cleanness of high notes that is particularly gratifying. To bring these out you want good records of such things as cinema organs, symphony orchestras, good dance bands, and piano records.

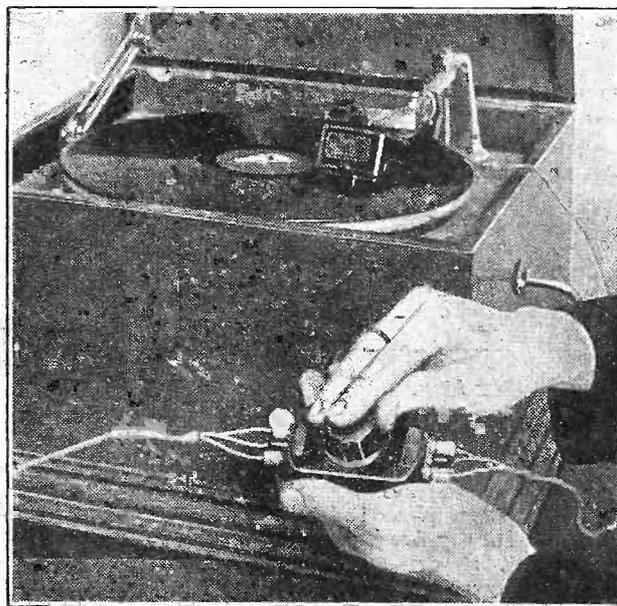
I will not mention any particular discs here, but if you have a look at the latest H.M.V., or other notable gramophone concerns' catalogue, you will soon be able to pick up the type of records you want. An alternative, of course, is to spend a few minutes at a fairly large gramophone store (where they will be likely to have a good stock), and hear a few records over.

Suitable Records.

But in order to give you a little idea of what to look out for, and so help to save time, I would suggest you hear some of the records made by Quentin Maclean and Reginald Foort, on various cinema organs; Ambrose, New Mayfair, Savoy Hotel Orpheans, and Jack Payne dance bands; and such orchestras as the Philadelphia Symphony, the Berlin State, London Symphony, and for lighter music the New Light Symphony.

Records with piano solos are made by most of the notable pianists, Mark Hambourg and Livitsky being particularly good recorders, while on the syncopated style we have Raie da Costa, and Billy Mayerl.

CONTROL AT A DISTANCE



This picture shows the convenience of the H.M.V. pick-up head (Model 11) which can be fitted on to the existing tone-arm of a gramophone, and also the H.M.V. volume control previously mentioned. An alternative to the provision of a pick-up and gramophone motor, etc., is the use of the playing desk shown in the heading—one of the complete outfits made by the Gramophone Co.

As regards needles, I must leave the choice to you. It will depend upon the actual pick-up which type will best suit. On the other hand, the standard loud steel needle will suit every make, but it has to be changed after every side.

TUNING YOUR SUPERHET

Getting the "feel" of a receiver is half the battle in long-distance reception, but there is a peculiar strangeness experienced when one goes on to a superhet. for the first time. In this article you will find many tips which will help you to feel at home more quickly.

By A. S. CLARK.

The superhet. has returned with a vengeance, and apparently returned to stay. Which, of course, is not so very surprising since selectivity is its shining point, and is at the same time a most vital property of a real distance-getter.

There are many different superhet. designs, but in one way nearly all of them are alike. The majority have as principal controls an oscillator tuning condenser (or Extenser) and a main tuning condenser (or again, Extenser).

Single Knob "Supers."

I said the majority, because the science of efficiently ganging together the oscillator and main tuners is now sufficiently improved for single-knob supers to be getting about. What is here termed the main tuning is mostly aerial tuning, but in cases where an aperiodic H.F. stage is used this is not the case.

No reaction control is needed on a superhet., and in the absence of this it becomes one of the easiest receivers to tune. That is, if you know how.

But you must go about it in the right way, for it is somewhat different from the tuning of an ordinary set. In fact, anyone not used to superhets. can easily meet a number of quite puzzling things.

No, I won't go into the story of beat reception—this has been explained enough times already. I'll just content myself with the practical considerations, which after all are what count.

First of all, the tuning of the oscillator coil is bound to be on the sharp side, on both long and medium waves, though not quite so much so on the long. The sharpness of the other control depends upon the type of circuit in use, whether band-pass, frame or otherwise.

Anyhow, the first thing to get is the local programme or programmes on medium waves. Assuming the aerial tuning is quite sharp it's not a bit of good swishing the dials aimlessly backwards and forwards.

Systematic Searching.

You might be lucky and hit the local with a bang, but more likely than not you will simply be rewarded with a dead silent background. The first disconcerting thing!

More system please! Start with the tuning dial at say five degrees and slowly—mark that, slowly—move the oscillator from zero upwards. If you do not hear anything by the time you reach maximum, move the tuning forward another five degrees and come slowly down to zero on the oscillator again.

Carry on with this procedure until you do hear a station. You won't have to wait long, and it may be the local, or it may just as likely be somebody else's local.

That's a way superhets. have. When you've got a programme, tune it in to its maximum on the aerial tuning condenser, and if it is at all loud continue turning the oscillator dial until you hear it again.

Yes, that's all right. There are two oscillator readings for practically all stations on a super., so make a note of these three readings—one aerial tuning and two oscillator.

Logging the Stations.

Now, having found a point where the dials are in step, it will be easy to work upwards in readings and note down settings for other stations. Stick to the upper or lower oscillator settings according to which seems the louder on most stations, and you will soon have a lot of stations logged.

Generally, oscillator couplers are nowadays designed for the use of the lower readings. Still, that's no reason why you should not try both.

It is possible, supposing you are using

just possible for two transmissions to come in at once.

The bottom oscillator setting for one station may turn out to be exactly the top setting of another, and so they will both come in at once. That is, assuming, of course, that they can both crowd through the aerial circuit.

The remedy for this is to use the other oscillator setting for the wanted transmission. You will be extremely unlucky if this also turns out to be just right for two stations as well!

Sometimes, instead of the two programmes coming in on top of one another, one will come through with a heterodyne of the other on it. The remedy is just the same; simply turn to the other oscillator setting of the wanted station.

No Reaction.

One great advantage of a superhet. over a receiver that has a reaction control, is that once found the readings for stations remain put, and there is not one particular dial on which the setting depends upon the amount of reaction employed.

And as a last word, everything in the foregoing applies equally to the long wave-

A "PENNY-IN-THE-SLOT" RADIO RECEIVER



This automatic slot machine for radio programmes is being tried out in a barber's shop in Philadelphia. It is a five-valve which will work from mains or batteries, and a red light comes on as a warning about a minute before it stops, so that one can insert another coin in time to avoid missing a desirable part of some item. It should be a bit better than the usual papers that are provided to while away the time until one's turn comes to respond to "Next, please!"

the upper oscillator readings, that at the top of the tuning dial you will find that you cannot go high enough with the oscillator adjustment. If this turns out to be the case, then for these readings you must revert to the lower oscillator settings.

Dodging Interference.

When a "flattish" aerial circuit is being used, the procedure is just the same. But most of the tuning will be obtained on the oscillator dial, the setting of the other not being critical.

But there is one snag in this flat aerial circuit business. In spite of the stations being well separated by the oscillator, it is

band, with the exception that here there will most certainly be only one oscillator reading, which, if such is possible, makes things even simpler.

The reason for only one reading is not difficult to explain. The fact of the matter is that a given number of kilocycles means a much larger wave-range on long waves than on medium.

Thus there is a much bigger wave-length difference between the received long-wave station and the oscillator frequency on the long waves. Because of this the condenser will not cover a sufficiently large band to get both readings in on the oscillator condenser.

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.

Reversing the Secondary Leads.

R. R. (Dulwich).—"Some time ago I had great difficulty in preventing motor-boating with a receiver using two transformer-coupled L.F. stages, and I found that the trouble was cured by reversing the connections to the secondary terminals of one transformer. I am unable to account for this, and should be pleased if you could give an explanation."

Motor-boating is caused by the low-frequency cascade connection of valve circuits bursting into momentary oscillation, which oscillation in building up paralyses itself, but a moment later builds up again—and repeats the process *ad infinitum*.

Oscillation will occur when the fortuitous couplings between valves arrange for electrical impulses to be thrown to and from the different valves in a certain phase relationship.

For instance, it is only by arranging the relative flux of windings of main coil and reaction coil in a receiver using the retroactive principle that the set can be made to oscillate; if the reaction coil is reversed the set will not oscillate.

So in your low-frequency circuits you stopped oscillation by reversing a coupling coil, and so reversing the phase of one of the voltages feeding back.

Why Not Tune the L.F.

B. R. (Hornsey).—"I understand that the only difference between an H.F. amplifying stage and an L.F. stage is the actual frequency amplified. Why is it that the H.F. stage requires tuning to the actual frequency (or the band of frequencies) and the L.F. stage does not?"

Suppose you arranged the high-frequency circuits to amplify equally over a range of frequencies from 1,500 kilocycles per second to 500 kilocycles per second (200 metres to 600 metres wavelength).

Then you would tune in every broadcasting station simultaneously! You could, if your set was sensitive enough, hear all the programmes at one and the same time. Not so good!

But if your high-frequency circuits only magnify sensibly between plus or minus 5 kilocycles around the frequency of carrier-wave of one station, then you are sensitive only to the transmissions from one station—much better!

Suppose you tuned your low-frequency circuits so that they could respond only to

plus or minus 10 cycles around, say, 1,000 cycles, you wouldn't hear music or speech, you'd just hear occasional squeaks. But if your low-frequency circuits respond equally from 50 to 5,000 cycles a second, you hear most of the required spectrum of music and speech. And that's what you want to do!

Fixing a Frequency Filter.

S. B. (Manchester).—"When designing a set where it is proposed to cut off frequencies above a certain point, where should the condenser and resistance be joined—across the loudspeaker, across the filter output choke, or in the first L.F. stage?"

Actually, you can use a filter anywhere.

formed from many components carefully calculated (and the calculations are pretty complex), give a sharp cut—it's a bit taily.

You can make very good high-impedance post detector filters with sharp cuts by using low-frequency tuned circuits, but how to do it would be giving away valuable trade secrets not mine to give.

Why Did the Lamp Glow?

R. D. W. (Highgate).—"I have an all-mains set using indirectly-heated A.C. valves. Across the heater circuit of the detector valve I have a small indicating lamp.

"When only one side of the mains is broken, the indicating lamp, instead of going right out, glows at half brilliancy. When, however, both mains leads are broken with a D.P. mains switch—or the switch is transferred to the other mains lead—the lamp is extinguished."

I can only suppose there's some complex system of earths which arrange for the primary of the transformer to pass current through its winding when the earthed side of the mains only is broken.

It's a little difficult to be more exact without a full diagram of connections, but I think you will find that my explanation is right in principle.

Using the Old H.T. Battery.

D. R. (Felixstowe).—"My H.T. battery is rather old. It started life with 120 volts, but now only registers 60 volts.

"I intended to add another 60-volt battery to bring the voltage up to the original 120 volts. My dealer says that this cannot be done. Why?"

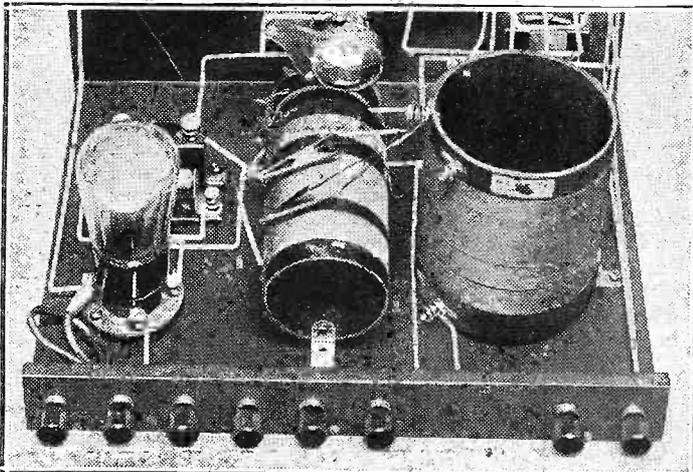
It can be done sometimes, as a matter of fact, but it's not good practice and may not work. Because when a dry battery runs down it develops a high internal resistance.

Another way of saying the same thing is that the run-down battery will only give so-and-so much limited power.

Thus suppose your set requires 1 milliamps. Suppose the run-down battery will only give $\frac{1}{2}$ I milliamps, then even with a new battery in series the old one refuses to give the necessary amount and your set is starved of the required power.

Sometimes a run-down battery will for a week or two longer give the required amount and then it is possible to use a new battery in series. But, in any case, the old one won't last long and it's better to chuck it away and dodge trouble.

DON'T FORGET THE CLIP ADJUSTMENT



If your set incorporates a "P.J." coil or any similar arrangement with a flex lead and clip, don't forget that to find by experiment the best position for the clip is the first step towards giving the set its correct degree of selectivity

It is preferable, however, to use the filter immediately following the detector because, suppose there's a lot of mush coming from the detector, it's better to clean up the signal before passing it on to the other valves.

This is not absolutely fundamental, it's merely better style. By the way, remember a resistance/condenser filter does not, unless

ONLY IN "P.W." can you read Capt. Eckersley's replies to listeners' own problems. AND REMEMBER—Captain Eckersley's technical articles appear only in "POPULAR WIRELESS" and "MODERN WIRELESS"

THE MIRROR OF THE B.B.C.

By O.H.M.

NONSENSE ABOUT "ENQUIRIES"

PUBLICITY FOR B.B.C. OFFICIALS — THE AMATEUR ORCHESTRA OF LONDON.

THERE has been so much nonsense published recently about the imminence of a Parliamentary enquiry into the B.B.C., and "growing public alarm," that it is perhaps worth while saying as a fact that the B.B.C. was never farther from such a contingency than it is at present.

The truth is that the B.B.C. is stronger by far than ever before. Licences in January increased by nearly 150,000, and that without any special Post Office enforcement campaign. Programmes are getting better if only because they are becoming more challenging and in some respects more acutely interesting.

This does not mean that the B.B.C. is perfect or anywhere near it; but it does mean that broadcasting in this country has taken a new lease of life, or has acquired a new measure of vitality.

Publicity for B.B.C. Officials.

This is a subject which I think needs "lining up," to use an expression which I hear frequently from friends at the B.B.C. When I was writing for "P.W." about six years ago, there was a rigid application of an anonymity rule for all regular members of the staff and the directors of the company. Things have changed a good deal in the interval and there may be excellent reasons for the change.

But, so far as I can see, while it is obviously right from the point of view of showmanship to publicise the names of programme performers, artistes, and conductors, there should be either a line drawn somewhere to prevent favouritism, or no line drawn!

My suggestion is that as a break has obviously been made in the old rigid rule,

THE POSTMASTER-GENERAL



This is Sir Kingsley Wood, who will be remembered for his recent interesting talk on Savings. His position as P.M.G. makes him responsible to Parliament for all the broadcasting in this country.

it should be abandoned and publicity given with due and dignified reserve to all microphone personalities and performers of interest to the public, whether they happen to be members of the staff or not.

The Amateur Orchestra of London.

I hear that the B.B.C. has decided to take half of the special concert of the Amateur Orchestra of London, conducted by Mr. Wynn Reeves, which will be given at the Kingsway Hall on April 11th.

Only one commentator, instead of two as in previous years, will describe the Oxford and Cambridge Boat Race on Saturday morning, March 19th. He is Mr. John Snagge, whose voice as an announcer is already well known to listeners and who counted the strokes and generally dealt with the progress of last year's contest.

The calling of the landmarks and the chatty stuff about the crowds and the aeroplanes will be cut out, since the race is no longer a novelty for listeners and takes only about twenty minutes, all of which is wanted for talking about the crews.

In other respects the commentary will follow the usual lines, in that a portable short-wave transmitter will be installed on the launch "Magician," which will follow the crews at a distance of about sixty feet, in their great effort from Putney to Mortlake.

The commentator stands in the bows of the launch, protected, with his microphone, from the wind and spray by a tarpaulin. The transmitter is in touch with a temporary receiving station on the roof of Harrods' depository, from where the commentary will be passed by land-line to Savoy Hill.

Immediately after the race, Mr. Gerald Cock, the O.B. Director, will dash from the "Magician" to Twickenham, where at

2.50 p.m. a commentary is due to begin on the Scotland versus England match.

By the end of the match Mr. Cock will have had quite enough hustling for one week, because his plans are to spend the night previous to Boat Race day motoring back from Aintree after seeing through the broadcast commentary on the Grand National that afternoon.

Our most famous steeplechase is one of the most difficult "O.B." jobs of the year, since it was decided that owing to the difficulty of keeping the runners in sight

CARDIFF'S CHIEF



Mr. E. K. Appleton, Director of the Cardiff Station, who is responsible for the Sunday afternoon "Joan and Betty" Bible stories.

the commentary on the actual race shall be given in two distinct parts.

This was done last year by Mr. R. C. Lyle describing its progress over that portion of the course on the Grand Stand side of Becher's and Valentine's Brooks, and Mr. W. Hobbiss watching events over the remainder of the course, including Becher's

(Continued on page 1558.)

THE LISTENER'S NOTEBOOK

A rapid review of some of the recent radio programmes.

HAVING heard all that the first of the Vaudeville critics has had to say, we are asking ourselves whether Mr. Herbert Farjeon has served any useful purpose. I am inclined to think he hasn't, because he didn't go far enough. His first talk was negligible as criticism; his last was merely a defence of criticism. The two intermediate talks criticised the producer, and not the *artistes* who needed the criticism. And yet I've read that the latter have raised their voices in protest. Against what? My impressions of B.B.C. Vaudeville—during the Farjeon period, at any rate—are that the shows are too unequal in quality to command a regular following.

The talked-of Raymond Watson is only another edition of Gillie Potter without the

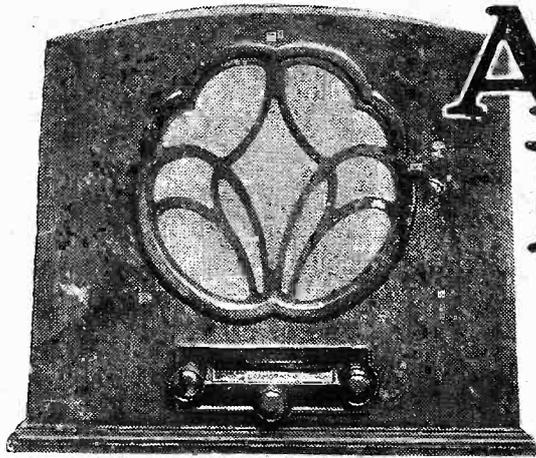
latter's pronounced mannerisms. However, he did his bit very pluckily, although the studio audience was, one could sense, very cold. I daresay they were fed-up directly they found him leading off by making fun of announcers. This is played out.

Those Vaudeville Turns.

Hyde and Burrill were in "It's Nothing Serious," and, it may be added, nothing new or really entertaining. Jeanne de Casalis is overdoing the Mrs. Feather business, and I wonder at the B.B.C. passing some of the patter. This was, to say the least of it, doubtful in places, and reminiscent of the days of Marie Lloyd and Bessie Bellwood.

Jack Morrison, as an impersonator,

(Continued on page 1558.)



An ingenious tuning-scale is fitted.

A BAND-PASS MAINS SET

Below are some interesting details of the latest all-electric hand-pass receiver made by H.M.V. The set is known as model 435, and incorporates many ingenious features.

By K. D. ROGERS.

I HAVE recently had an opportunity of testing the first H.M.V. straight radio set—Model 435, and needless to say I was very glad of the chance.

H.M.V. have built up such a reputation in the world of mechanised music that I naturally expected something good. I was not disappointed, and the results obtained fully justified my expectations.

The sensitivity of the receiver is very high, and the selectivity of the band-pass circuits is all that is likely to be required by the majority of listeners.

Ample Selectivity.

On test in London the H.M.V. 435 very easily separated the local stations and left plenty of room between them for the reception of foreigners.

With the aid of reaction it was easily possible to get either the North Regional or Langenberg free from one another, though both stations came in at good strength.

Altogether some 20 or more medium wave stations were heard at good strength, while on the long waves a good half dozen provided real programme value.

Provision is made on the set for a pick-up, and with the H.M.V. playing desk a very fine radio-gramophone is obtained.

The set is A.C. driven, consuming but 25 watts, and delivering an output of between 1½ and 2 watts undistorted power. Provision is also made for additional loudspeakers besides the moving-coil speaker incorporated in the set itself.

The transformer coupling of the pentode L.F. stage (the set is S.G., Det., Pentode) is of the shunt-fed variety, but one of the most ingenious parts of the set is the control switch.

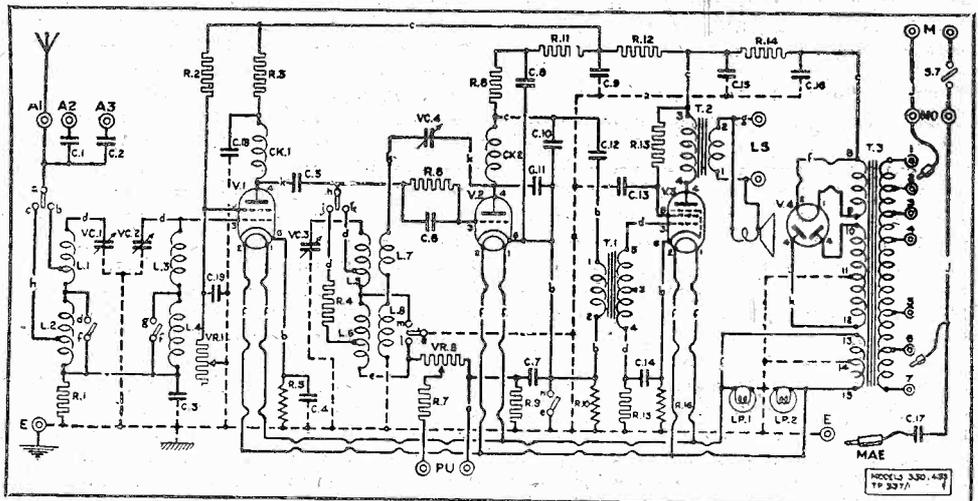
This is arranged as a longitudinal rotating dial scale with semi-exterior lighting. The scale rotates simultaneously with making the necessary wave-length switching

changes in the circuit, introducing a separate wave-length scale for medium and long waves.

When the word gramophone appears, the switch is in the gramophone position, and when OFF is shown the set is switched off.

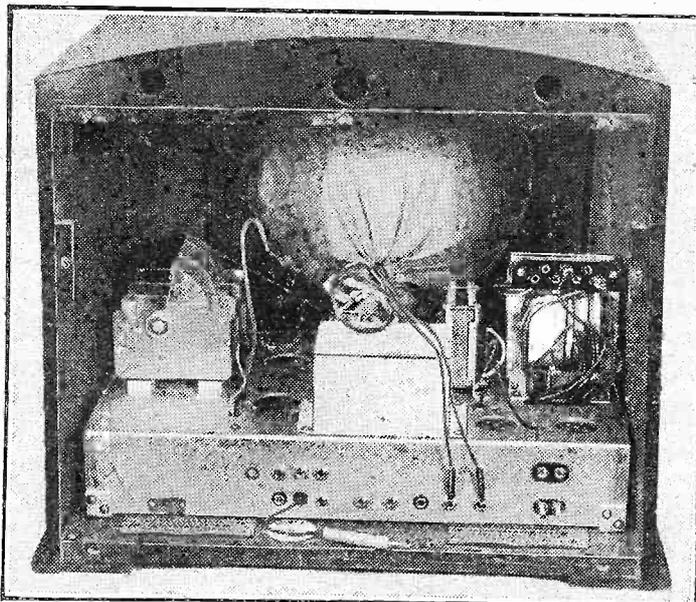
The price of the 435 is not excessive, as for the 20 guineas asked, H.M.V. have produced an instrument that fully upholds the reputation for first-class workmanship enjoyed by the gramophone company for many years. The finish of the set is, of

HOW H.M.V. ARRANGE THE CIRCUIT



This is the theoretical circuit of the model 435. Note how the ganged volume control operates on both the S.G. and the pick-up circuits. Shunt-fed transformer coupling between the detector and the pentode ensures good L.F. response.

A REALLY DELIGHTFUL DESIGN



The interior of the receiver is a masterpiece of neat, efficient design. In this photograph you can see the little that can be seen of the actual "works" as the screening is very complete. The three gang condenser and the power transformer however, are visible on either side of the loudspeaker.

course, in the popular walnut, while the size, and the fact that a mains aerial device is provided makes it exceptionally handy.

The loudspeaker is of the permanent-magnet type, specially strong magnets of cobalt steel being employed, and the acoustically balanced cone of new material ensures that first-class quality shall be obtained.

I have given some idea of the set's possibilities on test in the Metropolis, and of its technical qualities. Now, in the last few lines, let me give it due praise for its behaviour under the more normal conditions found some few miles out from Charing Cross.

Very Fine Performance.

With a standard aerial of about 50 ft. length, and 30 ft. high, practically all the important European stations, and not a few of the lesser lights, were heard at good strength.

The programme pulling value of this set cannot be denied, for it combines extreme ease of handling with a sensitivity that is above the normal for a set of so few valves. It is, indeed, one of the finest "threes" I have tested.

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found-?

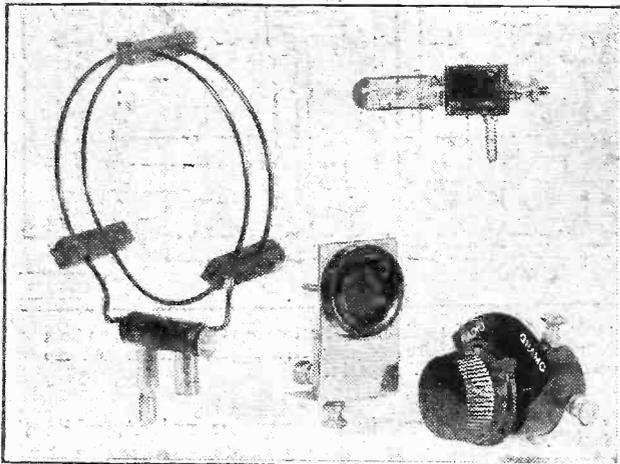


NEW SETS FOR OLD.

A MOTOR-CAR owner can always obtain an allowance on his old car against the purchase of a new one. But radio enthusiasts are not universally provided with such a service.

However, there is at least one firm which conducts business in the enterprising "part exchange" manner. It is Radialaddin, Ltd., of 42 and 48, Berners Street, London, W.1, and they are prepared to give allow-

COMPONENTS WORTH NOTING



The four Melbourne Radio items mentioned in this column.

ances on any types of old sets against the purchase of new sets.

There do not appear to be any snags whatever, and I can add that I have personally heard one or two good reports of the concern.

FROM MELBOURNE RADIO.

With all the interest that is now being devoted to the subject of short-wave reception there must surely be a strong demand for short-wave components.

Of these, coils are probably the most important. You must have special coils, of course, and on the short waves they must be efficient coils.

Melbourne Radio have an excellent line of them and I owe them an apology in that I should have included a report on their coils in this page several weeks ago, but I overlooked them and they did not even get their rightful turn in the rather long waiting list.

However, I am able to say that they are very good coils indeed, as good as any I

have tried. They are made on a "minimum insulation," and "air-spaced" basis, and what little ebonite there is is very good ebonite.

I can give them full approval for all "P.W." sets designed to take plug-in coils and for general experimental use.

Other useful and well-made Melbourne items to hand include a rotary switch, a wander plug fuse holder, and a pilot lamp. Useful gadgets all, and every one worth the close consideration of the discriminating constructor.

THE "MAGNADENSER."

Burne-Jones & Co., Ltd., are now making a solid dielectric variable condenser which they have styled the "Magnadenser." It is available in .0002 mfd., .0003 mfd., and .0005 mfd. capacities at 2s. 6d., complete with knob.

It is a well-made component and incorporates sound features of design, including a positive connection to the moving vanes.

The movement is smooth, and an H.T. test proved that its insulating qualities are above the average.

THE "AMAZING" THREE.

I have now been able to test the Graham Farish kit set, details of which appeared in our last issue.

You will remember that I paid tribute to its neatness and its cleanness of design.

I should also say that it is much smaller than the average "three" and we find its assembly to be particularly simple. It is hard to see how anyone,

however slight his knowledge of the art of home-construction, could possibly go wrong.

And yet it bears a much more polished and refined appearance than the majority of home-assembled receivers.

The circuit comprises an anode bend detector and two L.F. stages. It is necessary carefully to adjust the detector H.T. and grid bias voltages, but when this is done very good results are given by the little set.

Remembering its price, a performance whereby at Tallis

House, in daylight, Radio Paris was receivable at good loud-speaker strength, clear of 5 X X, and the North Regional available also at good volume is certainly quite attractive for such an inexpensive instrument.

And all this was when the lower coil tap was in use. Greater power is available for those not requiring the maximum selectivity obtainable on the receiver.

The London National and Regional could be separated fairly easily, although it was essential that the G.B.'s and H.T.'s should be properly set.

PLEASE NOTE.

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 of 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!

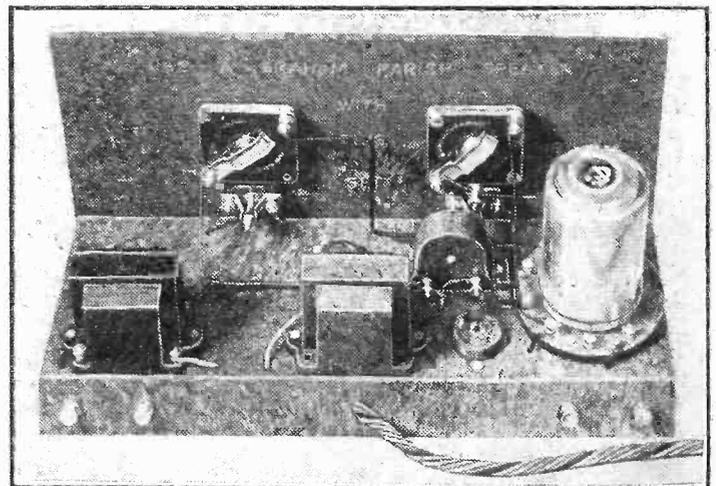
And readers should note that the subsequent reports appearing on this page are intended as guides to buyers, and are, therefore, framed up in a readily readable manner, free from technicalities unnecessary for that immediate purpose.

Altogether I consider the "Amazing" Three an interesting proposition. It is superior to some commercial kit sets selling at higher prices, although I must add by way of a P.S. that the general standard of these is not, in my opinion, a high one, and that is why I fancy the Graham Farish set should commend itself to many enthusiasts.

PERTRIX H.T. BATTERIES.

There is a leaflet obtainable from all good radio dealers which very clearly details the whole range of Pertrix H.T. batteries. It enables you to see at a glance the particular Pertrix which is likely to suit a certain type of set. In passing I must mention that I have always found Pertrix batteries to be very good, and this is quite an unsolicited appreciation!

THE GRAHAM FARISH KIT SET



Excellent chassis mouldings are a feature of the "Amazing" Three.

MARCONI HL.2

The outstanding general purpose valve for 2-volt users

Marconi HL.2 is a medium impedance valve of exceptional merit, which should certainly fill at least one position in battery-operated receivers. Its long, straight steep characteristic (shown here) gives altogether flawless amplification, its performance as detector in sets with one or more S.G. stages being equally notable. All the most advanced features enter into its construction (lower inset) mica bonding and multiple filament suspension ensuring extreme stability and absolute consistency.

There are other Marconi 'HL' valves of similar merit for 4 and 6 volts (upper inset) and for A.C. Mains.

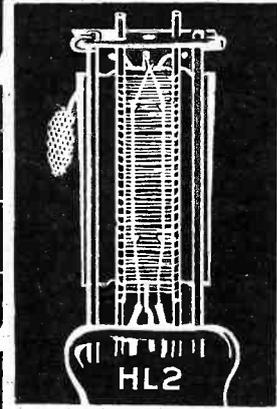
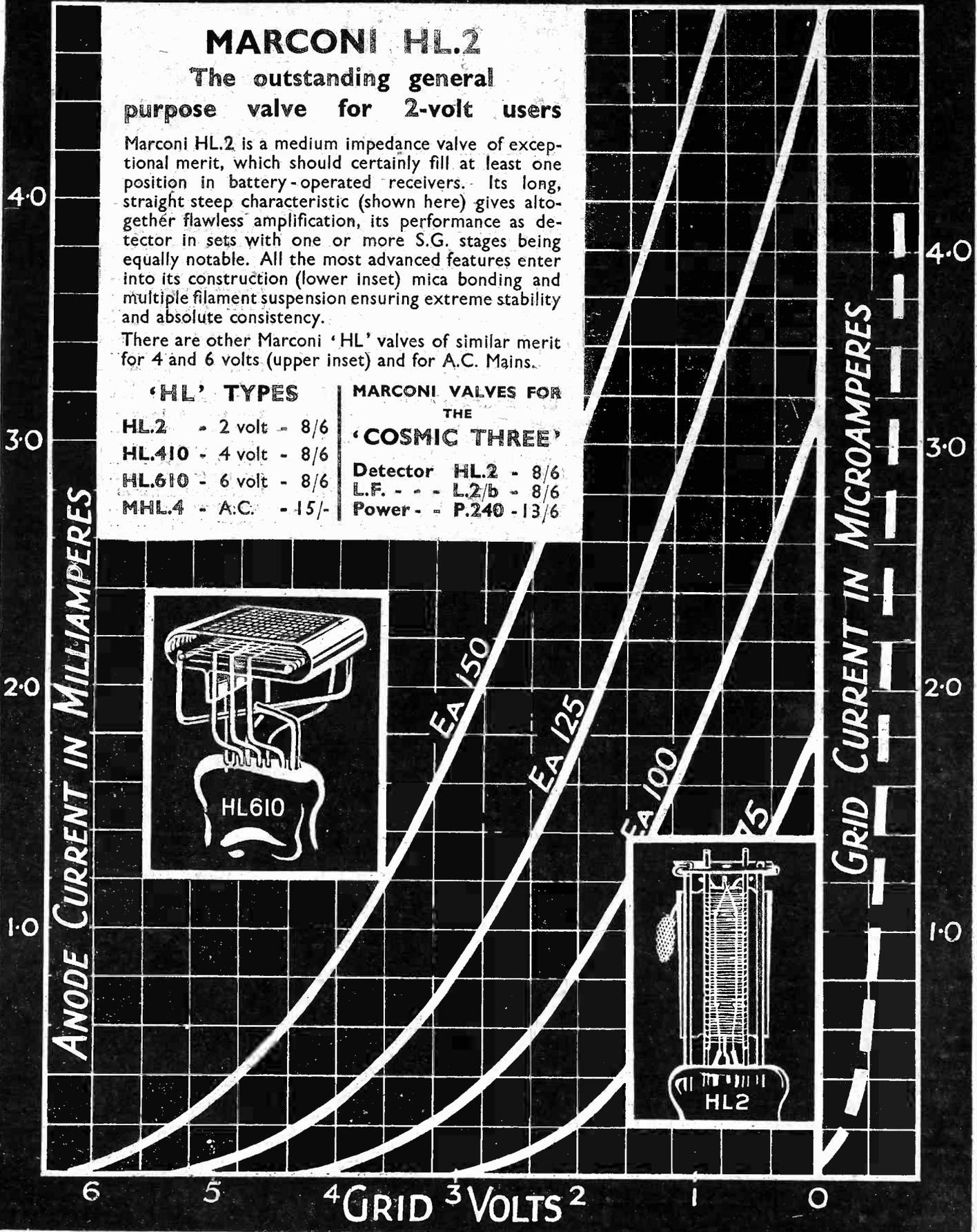
'HL' TYPES

- HL.2 - 2 volt - 8/6
- HL.410 - 4 volt - 8/6
- HL.610 - 6 volt - 8/6
- MHL.4 - A.C. - 15/-

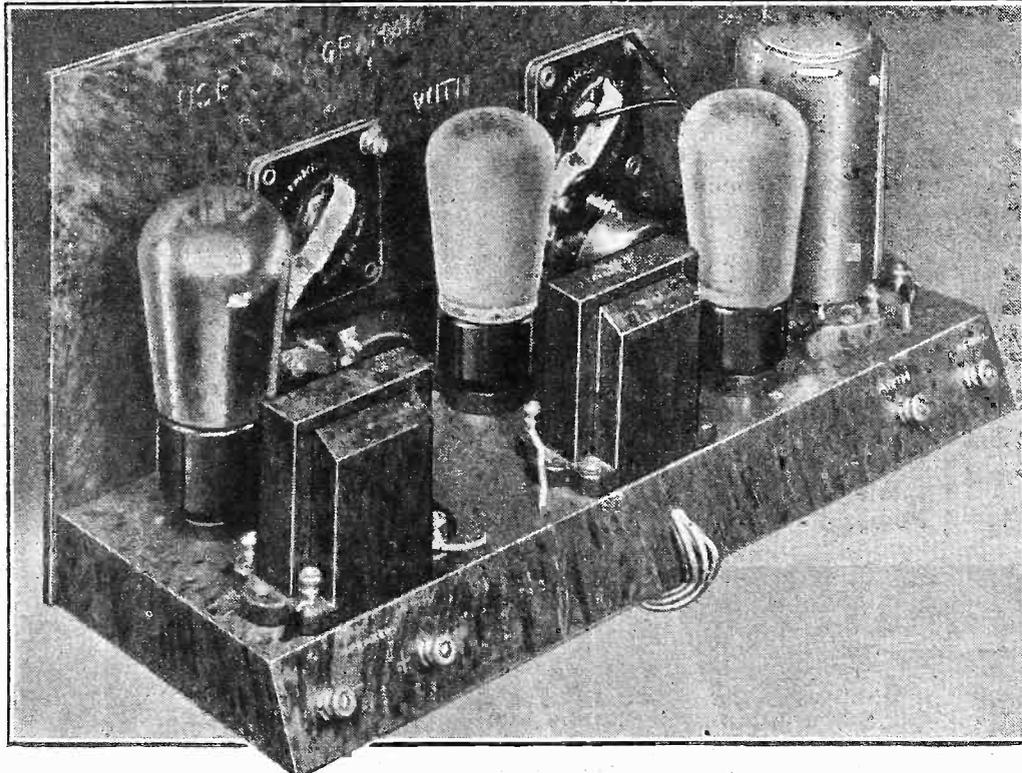
MARCONI VALVES FOR THE

'COSMIC THREE'

- Detector HL.2 - 8/6
- L.F. - - - L.2/b - 8/6
- Power - - P.240 - 13/6



See what the "AMAZING 3" offers YOU!



List of Components:

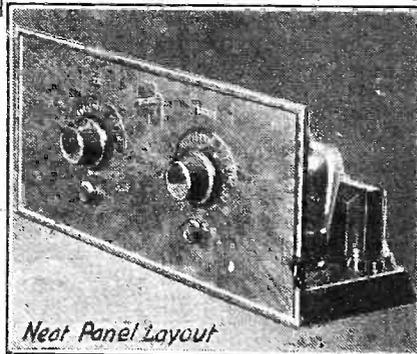
1 Moulded and Engraved Panel ..	3/6
1 Moulded and Engraved Chassis ..	4/6
1 Snap L.F. Transformer ..	5/6
1 Snap H.F. Choke ..	2/-
1 Snap L.F. Choke ..	5/-
1 Screened High-efficiency Coil ..	7/6
1 Littlos '0005 Log Mid Line Con- denser ..	2/-
1 Littlos '0003 Reaction Condenser ..	2/-
1 On-and-off Battery Switch ..	8d.
1 3-point Push-pull Switch ..	9d.
3 4-pin Sub-panel Valve Holders ..	1/6
2 Fixed Condensers ..	3/-
1 50,000 Ohmite ..	1/6
1 1-meg. Ohmite ..	1/6
1 Battery Cord ..	1/6
Wander Plugs, Terminals ..	2/-
Fixing Screws, Clips ..	6d.
Sleeving, Wire ..	6d.
Spanner and Screwdriver ..	6d.
Full-size Blueprint, easy instructions ..	6d.
TOTAL	47/3

SOLD COMPLETE FOR 38/6

—The ONLY KIT with:

- A specially designed SCREENED COIL.
- A Moulded BAKELITE PANEL, with scale readings and indications in relief and fixing holes drilled.
- A Moulded BAKELITE well CHASSIS, with position for each component outlined in relief and fixing holes drilled.
- The majority of wires concealed beneath chassis.
- A factory-built appearance when finished.
- Single-knob tuning. No soldering.
- Spanner and Screwdriver — the only tools required—provided with each Kit.
- Each Kit packed in attractive Orange and Black Container.

AT ALL RADIO DEALERS.



Neat Panel Layout

What others think:

EASTBOURNE—
"I got splendid results, both at home and abroad. I consider you are quite justified in claiming your Kit as the 'Amazing 3.'"

NOTTINGHAM—
"Have got the 'Amazing 3' built, and it is truly amazing. I have never heard a better set, and am more than pleased with it."

LIVERPOOL—
"I must first congratulate you on producing such a fine Kit as the 'Amazing 3,' which I think is great value for the money."

CORNWALL—
"On test the set is stable and the quality of reproduction excellent. Taking the set on finish and price basis, it is certainly an 'Amazing 3.'"

The GRAHAM-FARISH "AMAZING 3" SCREENED COIL

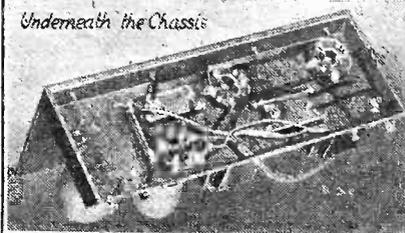
Emergency Coupon!

In case of difficulty send this coupon for FREE Descriptive Leaflet to GRAHAM FARISH LIMITED, Bromley, Kent.

Name.....

Address.....

Use a Graham Farish Speaker for best results from your "AMAZING 3." SEND DIRECT WITH CASH IF YOUR DEALER DOES NOT STOCK.



Underneath the Chassis

B.B.C. DEVELOPMENTS

Many knotty problems have to be solved by the B.B.C. Engineers from time to time, and technical developments are always following one another in rapid succession. Here is a very lucid account of this important side of the B.B.C.'s work.

By NOEL ASHBRIDGE, Chief Engineer of the B.B.C.

IN discussing the question of possible developments in broadcast transmission, I do not propose to go deeply into problems which only affect the economical working of the transmitter itself, but to deal more with possibilities which are of direct concern to the listener.

However, questions of efficiency and the development of new types of valves are extremely interesting to broadcast engineers, because although present-day transmitters are very efficient from the point of view of reliability and reproduction, they are not efficient from the point of view of the amount of energy wasted.

These Interfering Sidebands.

In other words, in order to get high-quality reproduction it is still necessary to work the power valves at a very low efficiency, and consequently vast quantities of power go to heating cooling water.

Incidentally, the permissible upper temperature of this cooling water is not high enough to allow much use to be made of the waste heat. As to valves, there is no doubt that there will be further steady development in connection with the high-power types used for broadcast transmitters.

The present valves we use are good, but not perfect, and the coming of more and further improvement to the sealed-up or glass type of valve, as well as development on totally different lines, including the continuously evacuated type, is almost certain during the next few years. However, special methods of transmitting, which would affect the service of broadcasting in a more direct way, are probably of greater interest to listeners generally.

At present all broadcast transmitters work on the plain, straightforward double side-band system, and each one covers a total frequency band width of approximately 20-30 kilocycles. At the same time the separation between stations is 9 kilocycles in most cases, and it is only

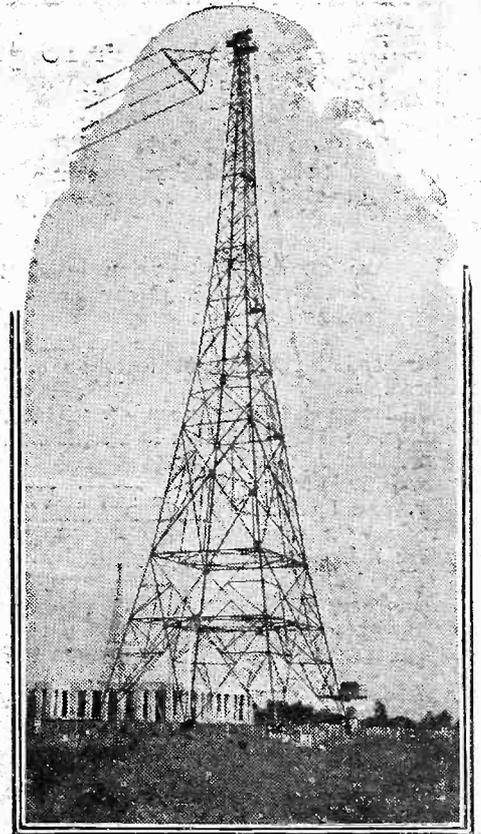
due to the fact that the higher musical frequencies are radiated at much less strength than the lower ones that prevent outrageous interference.

Three Possible Cures.

This does not mean, of course, that the higher frequencies are not radiated at their correct value, but that they are produced in ordinary speech and music at less strength than the lower ones. It is only too well known that frequently there is interference due to this small separation of 9 kilocycles, and that this interference is a serious international problem. The obvious cure of arranging the stations with wider separations between them has already been discussed very fully indeed. It is interesting to consider, however, whether any improvement could be effected by using some special transmitter, or unusual type of aerial. There are at least three fairly obvious possibilities of this kind:

1. The use of directional aerials.
2. The use of aerials which confine the radiation approximately to a horizontal plane.
3. The use of single side-band working.

First of all with regard to ordinary directional transmission, in general this would be quite feasible from the point of



view of aerial arrangement; in fact, it is already being done in this country and abroad.

For instance, 5 G B radiates slightly more energy in the direction of the densely populated districts of Birmingham and Wolverhampton than it does in the London direction. The aerials for 5 G B are supported on the 500-ft. towers at Daventry, which also support the 5 X X aerial, and they take the form of two slightly-inclined vertical wires, one wire stretching from the top of each mast to the ground.

The supply of high-frequency energy to these two aerials is by means of transmission lines, which can be made to give the correct phase relationship in the aerials by adjusting their lengths. I believe, also, that some degree of directional effect is used for the new station of 120 kw., near Prague. There is no fundamental difficulty, therefore, in the use of directional aerials for broadcasting.

Prague's Plan.

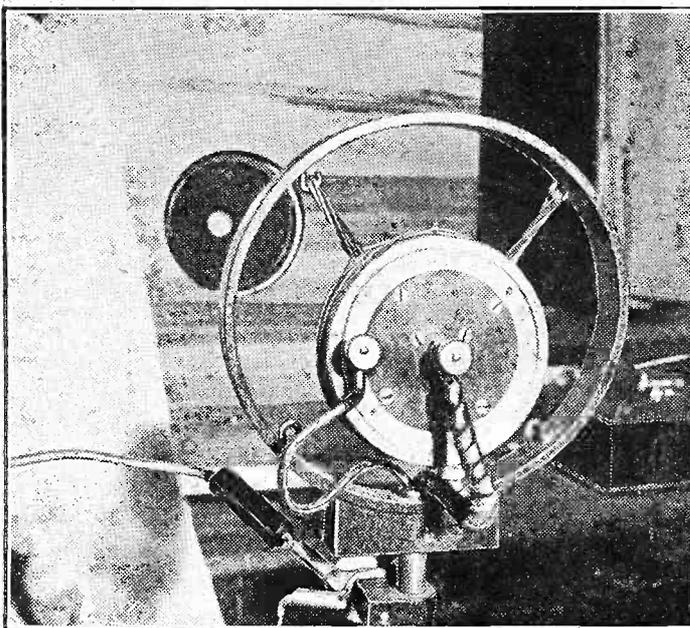
However, when one comes to consider this problem in a general way, in most cases there are serious difficulties. For instance, if one wished to prevent our stations in this country interfering with the Continental stations, it would be necessary for all the high-power stations to be situated on the East Coast and equipped with aerials which radiate beams mainly in a westerly direction.

This would mean that the stations could not be placed in or near the dense centres of population, and for this reason a great deal of useful service area would be, to a large extent, wasted.

Nevertheless, I think that this method of working could be applied on the Continent to some extent in connection with the stations which have to serve a large city situated near the frontier, but this would

(Continued on next page.)

PUTTING A MIKE THROUGH ITS PACES



The B.B.C. have been testing out several new types of microphones recently, and their technical staff have made many interesting discoveries. This photograph shows a new "mike" undergoing test. The loudspeaker seen in the background produces standard signals, and the microphone's capabilities are judged by the strength and quality of the reproduction in its output circuit.

B.B.C. DEVELOPMENTS

(Continued from previous page.)

give protection in the neighbouring countries against direct interference, rather than that due to side-band jamming, since it is arranged normally that neighbouring countries have considerable spacing between their allotted wave-lengths. One such case is that mentioned already, namely Prague, and there are other cases where this method of transmitting might at least be considered.

With regard to the second possibility, namely, confining radiation to a horizontal plane, this is much more difficult technically, and I think I am right in saying that no high-power station in regular service has yet definitely obtained the desired results.

Service Area.

There are two possible advantages to be considered from eliminating radiation at an angle to the horizontal: first of all the question of whether mutual interference can be reduced as between different countries, and, secondly, the extension of the service area of the station itself.

In connection with the former, it has to be borne in mind that if there were no radiation at a steeper angle than about 10 degrees with the horizontal, it is probable that indirect ray reception at night would still be possible, but presumably such reception would only be strong at considerable distances.

It is perhaps difficult from the practical point of view to visualise an aerial which would allow no radiation at all other than horizontally, and therefore reception due to radiation at angles of the order of 10 degrees or thereabouts would always exist.

"Single Side-band."

This means that in the case of Stuttgart reception would probably still be strong over a large part of England. Thus it is doubtful whether this can be looked upon as a cure for mutual interference between neighbouring stations. However, some benefit might accrue in this connection if the indirect ray at distances of the order of 200 to 300 miles were reduced, and the allocation of waves were revised. Again, if this could be done, it might reasonably be expected that the range free from fading might be extended considerably, this meaning, of course, a very large increase of service area.

At the present time the service area of

most high-power stations is limited at night time by its own indirect ray, unless it has already been limited by the indirect ray of one or both of its neighbours. In most cases, however, the first state of affairs exists.

Therefore, if the value of the indirect ray at distances between, say, 80 and 150 miles from the station is reduced, we should get a greater range free from fading. This might be achieved if an aerial could be designed which gave no radiation above somewhere about 20 degrees to 30 degrees. Of course, the above assumes that the simplest form of reflection takes place at the Heaviside Layer.

Finally, with regard to single side-band working, we have to consider whether a reduction of mutual interference would be

THE WORLD'S FIRST RADIO CITY.



A view of the excavations in New York from which will arise "Radio City," a huge block of skyscrapers in which will be centred the radio and television activities of New York.

possible were all stations working on this principle.

It would seem clear that in cases where one particular station was experiencing mutual interference with its neighbour on one side, but not on the other, some benefit would result if the two stations in difficulties were to adopt single side-band working. If, however, there is interference generally, then the use of this method would not seem to be practicable.

Ultra-Short Possibilities.

There are, however, one or two peculiarities in connection with single side-band working, the principal one being the fact that unless square-law detection takes place at the receiver there will be distortion, and the present tendency is to obviate square-law detection in receivers and obtain straight-line detection.

Therefore, in considering this particular method for cutting out side-band troubles,

one has to take into account very carefully the normal design of receivers used by listeners.

Again, it is to be remembered that the power of a station with one side-band cut off is obviously less than when both are present, and generally some considerable modification of transmitters would be necessary. It would probably be rather difficult internationally to come to an agreement to make a drastic alteration to existing transmitters, having regard to the natural reluctance of engineers to modify an expensive transmitter which has only recently been put into operation.

Thus it will be seen that some of the newer forms of transmitter technique are not at any rate easy to apply to broadcasting transmitters; nevertheless, it would be a great mistake to ignore these possibilities when considering the future.

Another obvious transmitting development is afforded by the possibilities of transmitting by ultra-short waves, namely, wave-lengths between, say, 5 and 9 metres, but this is a separate question altogether.

COMPLIMENTS FROM CONSTRUCTORS

Some letters received from enthusiastic "P.W." readers.

THE W. L. S. FOUR.

The Editor, POPULAR WIRELESS.

Dear sir,—Having constructed the "S.G." Four, designed by W. J. S., and having given the same a thorough test, I am forwarding you my results.

It certainly is a "hot-stuff" set, not only on the short-waves, but on the medium and high. On the short-waves I have Zeesen at tremendous strength from early afternoon onwards; also 2 R O, Moscow, and Pontoise, have also received W 2 X A F, W 1 X A 2, H V J, W 2 X A D, L S X, and many others.

On the medium-waves I have had over sixty stations, while on the high I have had nine. I have a large selection of plug-in coils covering from 15 to 2,000 metres. My aerial is 100 ft., and about 50 ft. high, clear of any roofs, but I am not blessed with a short earth. This wire is 50 ft. long; still I get some wonderful reception. I also use the set for gramophone work, having inserted a switch in the S.G. so that I can cut it out when using gramophone. My speaker is the 66R. Bluespot with large baffle-board, and the tone is perfect, either on radio or gramophone, with enough volume to fill a large hall.

I wish to thank W. L. S. for this splendid design which certainly brings in the stations. I am so pleased, that I am giving the set a new cabinet. When I have had the set going for six months I will be able to give further reports; in the meantime, thanks for a first-rate radio set, and best wishes for 1932.

Yours faithfully,

BRUCE FERGUSON.

Strathbungo, Glasgow, S.1.

THE KUKKA-BURRA AGAIN!

The Editor, POPULAR WIRELESS.

Dear Sir,—With reference to Short Wave Notes in POPULAR WIRELESS, dated 20th Feb., I live only a few miles from Virginia Water, and shall be interested to get into touch with W. H. C.

Incidentally, I am an "S.G.4" owner, and for the first time I tuned in Sydney on Saturday last at 12.45. I heard a piece by Sydney Cinema Orchestra, followed by a piece by Australian Municipal Orchestra. I heard the call-sign, V K 2 M E, and also the Kukka-burra. At 13.00 it was announced that a special call was to be made to W G Y (N.Y.), and I was able to take down the message of congratulation on the tenth anniversary of that station. I was able to get full headphone strength, and, in fact, it was understandable on the loudspeaker by other members of the family.

There is one point about the "S.G.4" which I put down as the cause of a lot of my troubles early on. This is the adjustable condenser on the metal screen dividing the H.F. from L.F. section. The terminals of the condenser go right through to the bottom, and must have been touching the metal screen which is, of course, earthed. I am now perfectly satisfied with my "S.G.4."

Yours faithfully,

G. NEWMAN.

Sunmead Road, Sunbury-on-Thames.

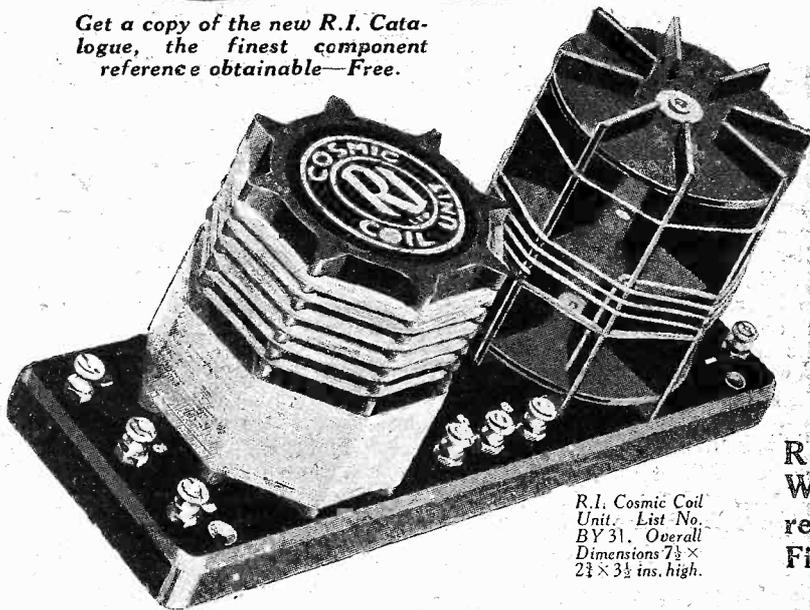
Build the 'COSMIC' III

with the



When you build any circuit with R.I. productions as the principal components you *know* the set is bound to give the best possible results as claimed by the designers. R.I. is the hall mark of British radio manufacture. Every designer and experienced set builder relies upon R.I. because he knows they are the unfailing components that never disappoint.

Get a copy of the new R.I. Catalogue, the finest component reference obtainable—Free.



R.I. Cosmic Coil Unit. List No. BY 31. Overall Dimensions 7½ × 2½ × 3½ ins. high.

R.I. COSMIC COIL UNIT

The R.I. "Cosmic" Coil Unit is specified for the "Cosmic" III, because of the **distinctive and exclusive advantages** that it possesses. It combines in **one complete unit, coils for long, medium and short waves**, ensuring easiest fixing and most compact set assembly. A fact of paramount importance is the skeleton construction of the short-wave coil former, which **reduces dielectric losses to a minimum—a vital point in this circuit.** Every individual coil is **carefully tested**, before release, on the "Cosmic" III circuit, and checked with a wavemeter over the entire range of broadcast and short-wave bands.

12/6

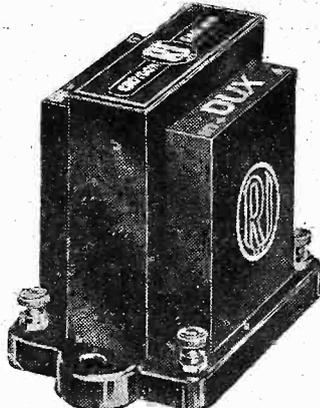
R.I. have produced this full-sized **WIRING CHART** for the benefit of "P.W." readers. Ask for a free presentation copy. Fill in the coupon below, hand it to your dealer, or post direct to R.I.



DUAL ASTATIC CHOKE

This choke is pre-eminently best for the "Cosmic" III and "Cosmic" III Star, because of its remarkable efficiency on the short waves as well as the medium and long waves. It is the only choke that cuts out all blind spots and resonant losses—an important feature for short-wave work. Freedom from H.F. interference with adjacent components is assured by its astatic winding and skeleton form of construction.

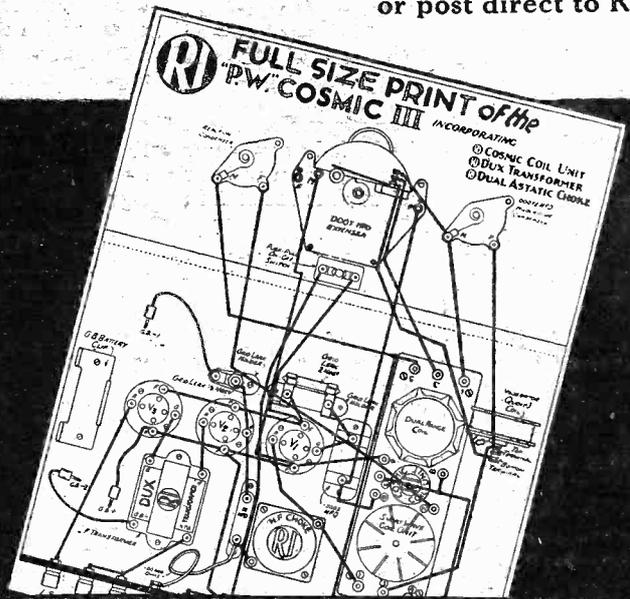
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"DUX" TRANSFORMER

The "P.W." designers' first selection for the "Cosmic" III. A remarkable transformer that has attained enormous popularity by unequalled performance in hundreds of thousands of sets. "DUX" has been specified as first selection for the "Cosmic" III because it is the lowest-priced transformer that is really efficient and which gives the good L.F. amplification which is a vital feature in the circuit.

6/9



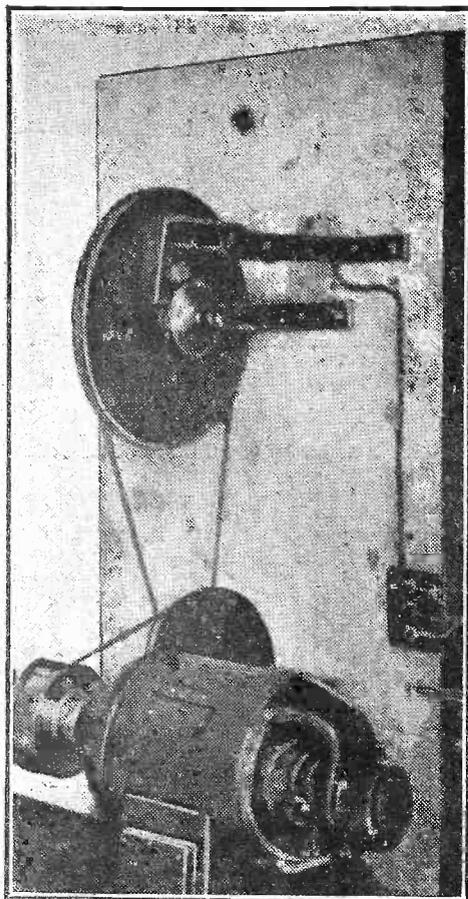
To Radio Instruments Ltd., Croydon, Surrey

Please send me a free copy of the full-size wiring chart for the "P.W." "Cosmic" III.

Name

Address

IT'S A CUCKOO!



This rather weird-looking apparatus is the "cuckoo" that comes on in the intervals between items at Ljubljana, the Yugo-Slavian station which works on 575 metres.

A GREAT many builders of the already famous "Cosmic" have found, when turning the dials to see what the set will do, that it has promptly introduced to them an amazing variety of foreign stations. And the babel of different tongues has been almost overwhelming to those who do not speak any foreign language.

Who Are They?

Who, for instance, is the lady announcer right at the bottom of the medium waves? And, on the long waves, what is the station

A LONELY LISTENER IN SOVIET RUSSIA



This lonely old Siberian peasant has just made himself something hot in the teapot, and is settling down to enjoy a Russian programme. The Soviets contemplate an enormous radio "drive," with many high-power stations as part of their Five-Year Plan.

a little below Daventry's dial reading that rings a sleigh bell in the interval? Also which station is it near Glasgow's wave-length that blows a syren blast like a steamer?

These and other questions can best be answered by an imaginary tour of the tuning dials; and we will start from the bottom of the medium waves and go upwards, so that if you do not work from a tuning chart you will have some idea of where the stations come in.

The Best Way.

A tuning-curve or calibration chart is, of course, the best way to find and identify foreigners, and though you may not wish to go to the trouble of this, you must certainly have a pencil and paper near the set to record the more interesting dial readings for future reference.

Let us suppose, then, that the set is all ready and that we are going to explore the tuning-dials from 0 to 100. For simplicity's sake, we will deal throughout with the tuning-dial alone, although, of course, it is assumed that both reaction and moderator will be used to aid this when necessary, as already outlined in the previous articles in "P.W."

What will be our first station at the bottom of the dial?

Your "Lowest" Station.

If you live in the Belfast area you will probably find that your local station occupies that place, but in most cases it will not be a British station, but a foreigner that comes in right down the bottom of the dial. If it is a lady announcer, speaking clearly with a melodious voice, you can be sure that your lowest wave-length foreigner is Radio Trieste.

The lady in question pronounces it "Rahdio Tree-ess-tay." Trieste is now linked for broadcasting purposes to Turin and Genoa, so that any or all of these call signs may be heard at times.

All these stations, together with the new Florence station, will form the north Italian group, or, as they call it, the "Nord Italia."

Unmistakable.

Another hint that you are listening to Trieste is sometimes given by its interval signal, which takes the form of a night-ingale's song. Italian is such a pretty language that even a news bulletin sounds quite melodious, and the names of the towns particularly will often be sufficient proof that this is the country you are listening to.

FINDING THE



Every listener who likes to bag long-distance, primarily for "Cosmic" owners it is packed with what kind of set you use you should read the picturesque personalities of the ether,

By P.

Rome and Milan are referred to as "Roma" and "Milano," and if you pick up Radio Trieste sending an opera late at night be sure to wait for the good-night. Usually the Italian stations make quite a little ceremony of this, and after a little speech the lady announcer says very clearly "Finny Della Trans-missy-oh-knee," which

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DISTANCES FROM LONDON OF W

Algiers	1039	Heilsberg	881
Barcelona	707	Hilversum	232
Berlin	579	Kalundborg	542
Bratislava	800	Katowice	835
Brussels	200	Langenberg	311
Budapest	900	Leningrad	1306
Dublin	288	Lyons	456
Genoa	645	Moravska Ostrava	813

SE FOREIGNERS SMIC



... will enjoy this article, for although written up-to-date reception wrinkles. So no matter how long a tour of the dials, with its glimpses of helpful hints on station identification.

... is really "finish the transmission." Then come two fine martial airs, one being the Royal Italian march and the other the Fascist Hymn; and finally the lady wishes you "Good-night" in the words "Buona-Notte, Signore."

FAMOUS RADIO STATIONS

London	768	Rome	890
Paris	1003	Stuttgart	
New York	3000	(Mühlacker)	453
London	214	Sydney, N.S.W.	10,500
London	640	Toulouse	552
London		Trieste	755
London	125	Warsaw	899

worrying about, but all the following are worth noting: 253 metres, Gleiwitz, Germany; 255 metres, Toulouse, France; 257 metres, Horby, Sweden; 259 metres, Leipzig, Germany; and 261.8, London National.

In the London area neither Leipzig nor Horby have a fair chance, with the London National so close in wavelength, but in other parts of the country both are received well. The Toulouse station referred to is not the main one, but one using low power that does occasionally get over well in Britain.

"Achtung, Achtung."

Gleiwitz may be recognised by the fact that it relays the Breslau programme. Like all the other Germans, he precedes his announcements with the word "Achtung, Achtung," and in the intervals he sometimes puts on a very fast-ticking clock, beating about 200 times to the minute.

Before going further, perhaps we ought to make it quite clear that we do not expect you to get all these stations the first time that you turn the dials after reading this article. Just how many foreigners your set will bring in depends partly on where you live, partly on how you handle the set, and partly on components efficiency, and so forth, so that it is impossible to say which station you should, or should not, pick up.

A Tremendous Field.

Moreover, as they transmit at different times you cannot expect to go from one to the other in the way we are able to work up the dial in theory. But all the stations named in this article are "probables," in the sense that they have at different times been picked up by "P.W." readers using "Cosmics," or using sets of an inferior class.

The first station above London National is Moravska-Ostrava, on 263.8 metres. The station is often picked up (except in the London districts) although it does not use high power, and is situated in Czecho-Slovakia. The name is pronounced exactly as it is spelt, "Moravska-Ostrava."

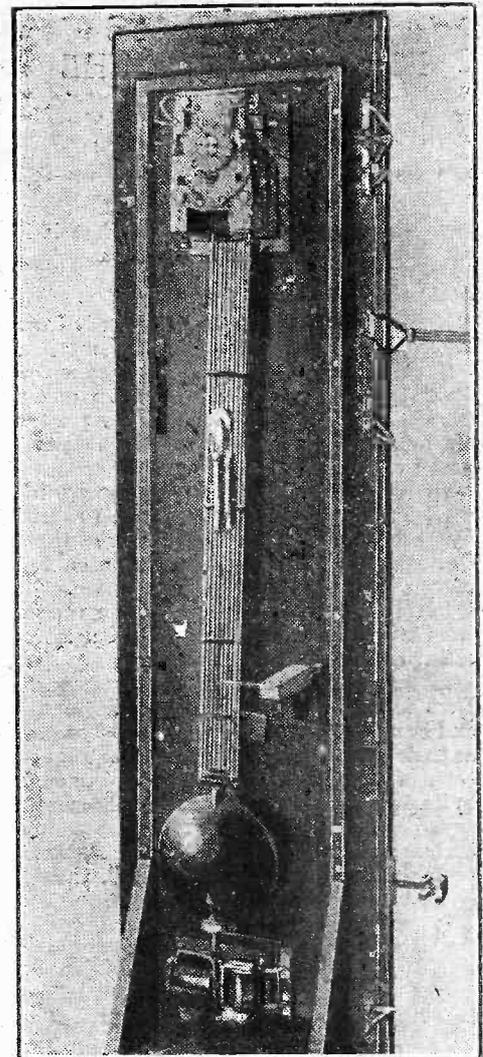
It frequently relays the Prague programme in which the announcement comes from Prague, and the name of that station is given as "Radio Praha."

Italy Again.

Immediately above this are four or five comparatively unimportant stations, and then we come to Turin, Italy, on 273.7 metres; and Heilsberg, Germany, on 276.5 metres.

This latter relays Konigswusterhausen,

GERMANY'S "PIPS"

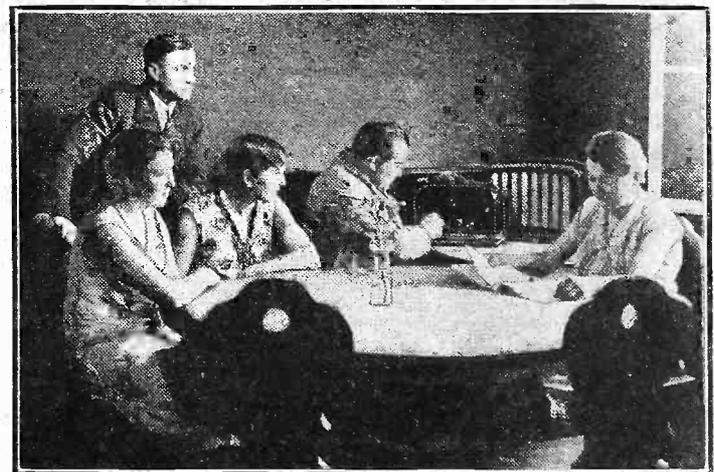


This is a photograph of the time-signal apparatus controlling the radio impulses that go out from the giant German station at Nauen. At one time they were relayed by all German stations, but nowadays only Konigswusterhausen and one or two other broadcasting stations radiate the Nauen time-signal.

and is easily recognised by the characteristic German "Achtung." It is one of the most reliable stations on the medium waves.

(Continued on next page)

HOME RADIO IN HAMBURG



Next to Britain, Germany has the largest number—about four millions—of licence-holders in Europe. Here is a typical family listening to the programme from Hamburg, on 372 metres.

FINDING THOSE FOREIGNERS ON THE "COSMIC"

(Continued from previous page.)

and although situated in Eastern Prussia it can sometimes be heard in daylight.

Areas of Jamming.

The next station working upwards from Heilsberg is Bratislava, on 279 metres; but neither this station nor Copenhagen, on 281 metres, will be picked up unless conditions are really good, for they are too far away to be heard, well on the small power employed.

Above this are two of Europe's "common" wave-lengths—that is wave-lengths shared by several stations. There are three Germans and one Austrian station on 283 metres, and the result on a sensitive set is a burbling medley of sound, quite useless from a programme point of view, but interesting as a wave-length marker.

Listeners in Aberdeen, Bournemouth, Dundee, Edinburgh, Newcastle, Plymouth and Swansea will all recognise 288.5 metres as their local station's wave-length. Though each of these programmes is pure enough in its own district, the effect on a listener in, say, Kent, far away from them all, is a curious mixture, through which the National programme can be just recognised, though badly mutilated!

A "Hefty" Dutchman.

There are similar common wave-lengths occupied by foreign stations on 291 metres and 293 metres, so all that will be heard on

this part of the wave-band is a burble of unintelligible gurgles and whistles.

A little higher up, however, on 299 metres, we have Hilversum, and above it the North National on 301.5 metres. In the south and east of England Hilversum is an excellent programme, but farther north it is difficult to disentangle him from his neighbour, the North National, owing to the fact that the latter employs 50 kw., whilst Hilversum uses comparatively low power.

In Norfolk, Sussex, Essex and Kent, Hilversum is often strong enough to give good daylight reception. The next wave-length to North National is Bordeaux Lafayette, and this Frenchman is easily recognised because he is the only foreigner which comes in at good strength between the North National and the Cardiff wave-length, which is 309.9 metres.

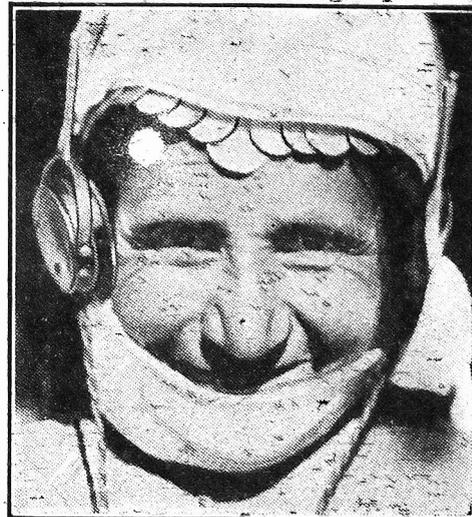
Another Common Wave.

Above Cardiff is another common wave-length, shared by a Polish and a French station with Genoa, Italy, which has recently been coming over well owing to improvements at the transmitter. Genoa will be often linked with the Trieste programme, already referred to, but is not usually clear enough from its neighbours to make a good recognisable announcement.

At this part of the dial the stations are packed very tightly and there is another common wave-length on 309 metres, but Breslau on 325 metres and Milan on 331.5 metres are worth singling out for special mention.

Still ascending the dial, we come to Brussels No. 2 station on 338.2 metres. About half the population of Belgium speak Flemish and the other half speak French, and this station, Brussels No. 2, announces exclusively in Flemish. It usually closes down with a brief news bulletin at 10 p.m.

"GO ON WITH YOU!"



This is an Armenian peasant laughing at a wise-crack on the radio. Only a few years ago such people led wild, nomadic lives and rarely, if ever, saw any signs of civilisation as we know it.

Gramophone records are a favourite here, but there is often an orchestral concert commencing at 8 or 8.30 p.m.

Between this point and the London Regional on 356 metres the most likely station to stand out is Strasbourg-Brumath, France, on 345 metres. This is a double-tongued or bi-lingual station, and gives its announcements in the French and German languages, because Strasbourg is on the Franco-German borderland.

We All Know Mühlacker.

A very famous German station lies just on the other side of London Regional, which comes next, namely, Stuttgart Mühlacker. This is one of the best of the German Regional stations and, as London Regional listeners know to their cost, it is so powerful that it is quite capable of interfering with their own Regional programme when long-distance conditions are good.

Several degrees above Stuttgart we have Hamburg on 372 metres, and Glasgow, who works on 376.4 metres. Hamburg is a well-received station—except in the Glasgow area, where the local, of course, is generally too much for him—and in addition to the usual German "Achtung, Achtung," Hamburg can be recognised by the blast of a siren which is used for its interval signals.

Those who can read Morse will also be able to identify Hamburg without a doubt by the letters H A (. . . . —) used as a preliminary signal, and during the intervals of the programmes.

Radio Toulouse.

A degree or so above Glasgow on 385 metres we have Radio Toulouse—surely one of the best known of the foreign stations. Frequent and clear announcements of the name make this station easy to recognise, and its Sunday gramophone concerts are well known to British listeners.

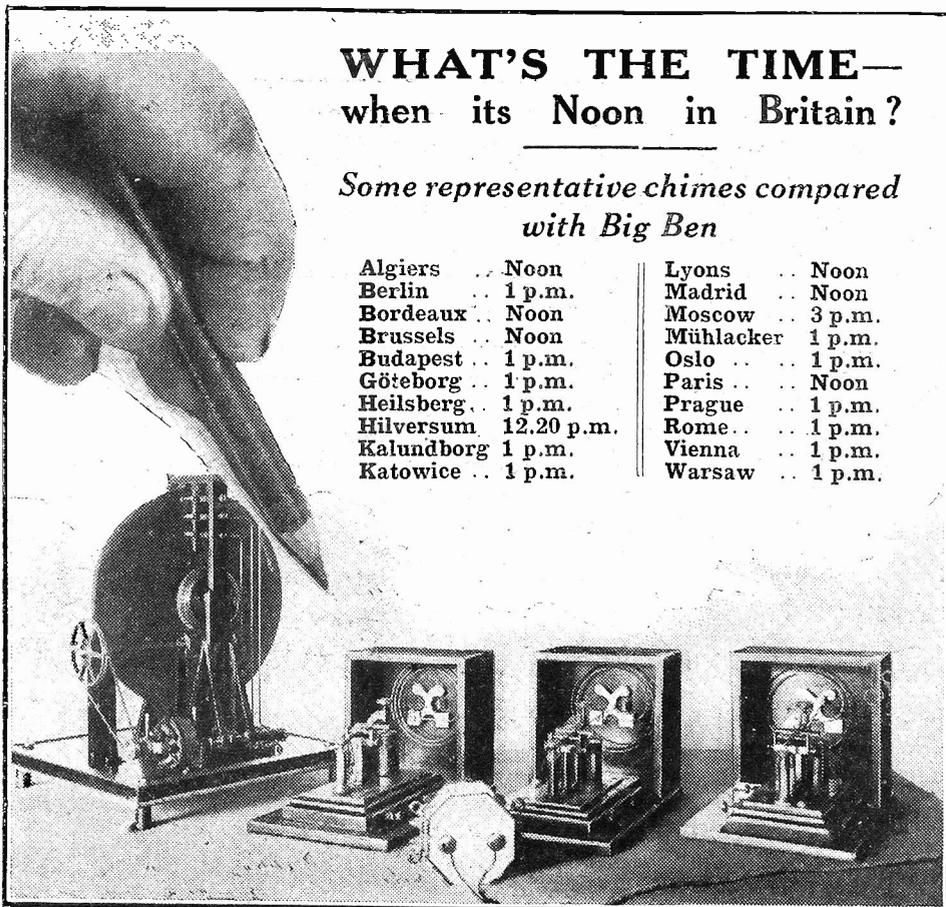
Still ascending the dial, the next station is the Midland Regional on 398.9 metres, and above this are three important foreigners, the first being Radio Suisse Romande (Switzerland). This station works on 403 metres, announces in French, and relays the programme from Lausanne or Geneva. It closes down fairly early in the ordinary way,

(Continued on page 1546.)

WHAT'S THE TIME— when its Noon in Britain?

Some representative chimes compared
with Big Ben

Algiers .. Noon	Lyons .. Noon
Berlin .. 1 p.m.	Madrid .. Noon
Bordeaux .. Noon	Moscow .. 3 p.m.
Brussels .. Noon	Mühlacker 1 p.m.
Budapest .. 1 p.m.	Oslo .. 1 p.m.
Göteborg .. 1 p.m.	Paris .. Noon
Heilsberg .. 1 p.m.	Prague .. 1 p.m.
Hilversum 12.20 p.m.	Rome .. 1 p.m.
Kalundborg 1 p.m.	Vienna .. 1 p.m.
Katowice .. 1 p.m.	Warsaw .. 1 p.m.



The READY RADIO

COSMIC STAR KIT

is the Official
Blue Print Kit



This beautiful polished walnut Table Cabinet has been specially designed for the "Cosmic" Star, but is also equally suitable for any set with a panel not exceeding 12" x 7" and baseboard 14" x 10". Price 21/-

LIST OF PARTS as shown on Blue Print

	s.	d.
1 Ebonite Panel, 12" x 7", drilled to specification	4	0
1 Plywood Baseboard, 14" x 10"	1	0
1 Ebonite Terminal Strip, 14" x 2"	1	0
2 L.T. Switches	1	8
1 Readirad '00075 Moderator Condenser	3	6
1 Duotune Extender	15	6
1 Slow-Motion Disc Drive for above	3	0
1 Readirad '0003 Extended Slow-Motion Reaction Condenser with Bracket	7	0
3 Valve Holders	1	6
1 R.I. "Cosmic" Dual Coil Unit	12	6
1 Readirad Moderator Coil	2	6
1 T.C.C. '001 Fixed Condenser, Type "S"	1	6
1 Readirad Standard H.F. Choke	4	6
1 Lewcos 100,000-ohms Spaghetti Resistance	1	6
1 Readirad Radiogram Switch	2	9
1 T.C.C. '0003 Fixed Condenser, Type "S"	1	3
1 Readirad Wave-Change Switch	1	6
1 R.I. Hypermite L.F. Transformer	12	6
1 Grid Leak, 2 megohm and Holder	1	4
1 T.C.C. '01 Fixed Condenser, Type 40	1	9
1 Grid Leak, 5 megohm, and Holder	1	4
9 Belling-Lee Terminals, Type "R"	2	3
1 Packet of Jiffilinx for wiring	2	6
3 Belling-Lee Wander Plugs	1	6
Flex, screws, etc.	1	2

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**Official Blue Print
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Complete Kit of Components together with panel (ready cut and drilled), baseboard, Jiffilinx for easy non-soldering wiring and free blue print.

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OR BY EASY PAYMENTS
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KIT "B" Complete Kit of Components as Kit "A" £5. 17. 0
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together with Table Cabinet illustrated above and free blue print.

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1 Pertrix 120 volt H.T. Battery	15	6
1 Pertrix 2 volt 30 amp. Accumulator PXC3	11	0
1 Pertrix 9 volt G.B. Battery	1	3
1 R & A type 40 Loudspeaker Chassis	16	6

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Kit B, including above. Deposit 15/- and 11 monthly payments of 15/-
Kit C, including above. Deposit 17/- and 11 monthly payments of 17/-

Convert your present set to an ALL-WAVE Receiver with Readirad Cosmic Coils—recognised as the finest of their kind. Designed by G. P. Kendall, B.Sc. Dual-Range Coil 6/6. Short-Wave Coil 4/6

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To: READY RADIO, LTD.,
Eastnor House,
Blackheath, S.E.3.

Please dispatch to me at once the following goods.....

for which (a) I enclose (cross out line) £
(b) I will pay on delivery (not applicable)

Name

Address

P.W. 12/3/32

To: READY RADIO, LTD.,
Eastnor House,
Blackheath, S.E.3.

Please dispatch to me the following goods.....

for which I enclose first deposit of £.....

Name

Address

P.W. 12/3/32

CASH or C.O.D. ORDER FORM

FINDING THOSE FOREIGNERS ON THE "COSMIC"

(Continued from page 1544.)

and usually must be heard before 9 p.m., at which hour it gives the final news.

An Interesting "Pole."

Just above Radio Suisse Romande is Katowice, Poland, on 408 metres. This station has male and female announcers, and although generally the Polish language is used, it sometimes announces in French. The name as pronounced sounds like "Kattovecha," and its interval signal is an unusual one, being hammer strokes on an anvil.

Late on Friday evenings Katowice gives out a sort of answers-to-correspondence by radio, conducted in the French language.

Frequently answers are given to British correspondents, their names and addresses being read out slowly and carefully, which alone serves to distinguish this station from its neighbours.

Immediately above Katowice there is Dublin on 413 metres. And coming in a degree or so above that is Berlin, who works on 419.5 metres. Like most of the German stations, Berlin closes down with "Deutsche Uber-Allen"—familiar to English ears as the hymn-tune "Austria."

"Radio Roma" Calling.

Just above Berlin, Madrid and Stockholm may be received, but the next really outstanding station is Rome on 441 metres. The clear-voiced lady announcer, with her "Radio Roma" is too well known to need description, and as this programme is relayed by Naples the announcement is often "Roma-Napoli."

Apart from the common wave-lengths, the next important mark on the dial is 459

metres, occupied by Beromunster, the Swiss Regional. Beromunster serves German-speaking Switzerland, so it uses this language, and the programmes come from Berne or Basle.

Incidentally, its official title is a real mouthful—"Schweizerischer Landessender"! and like the other Swiss Regional, Radio Romande, it usually closes down quite early, about 9 p.m.

Europe's Giant.

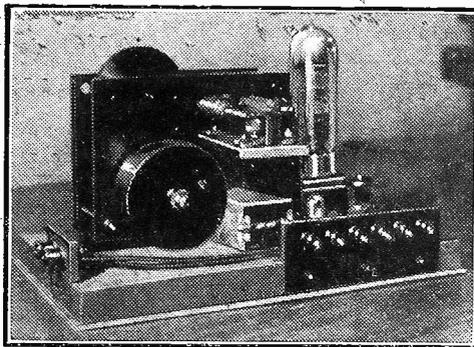
Lyons, on the next wave-length, is sometimes received, but more important is the station just above that, namely, Langenberg, on 473 metres. It is in the "West Deutscherrundfunk" Group (West German Broadcasting), and about one degree above

HOW THEY LISTEN IN JAPAN



A group of listeners in "The Land of the Rising Sun," where radio has made phenomenal strides and is now in a highly-developed state, quite comparable with our own service.

IN THE INTERVAL



Many stations use distinctive interval-fillers, on the lines of the B.B.C.'s "doomp, doomp," and this is the apparatus used at Budapest, on 550 metres.

we have the North Regional station on 480 metres.

The most powerful medium-wave station in Europe, Prague, comes next, using a wave-length of 488.6 metres, and thus it "sits on top" of the North Regional transmission! Both men and women announcers are employed here, and announcements are sometimes made in German, English and French, as well as in Czech.

Another interesting newcomer is Florence, just above Prague. Its strength is good now, and is likely to improve when the station has quite settled down on its full power.

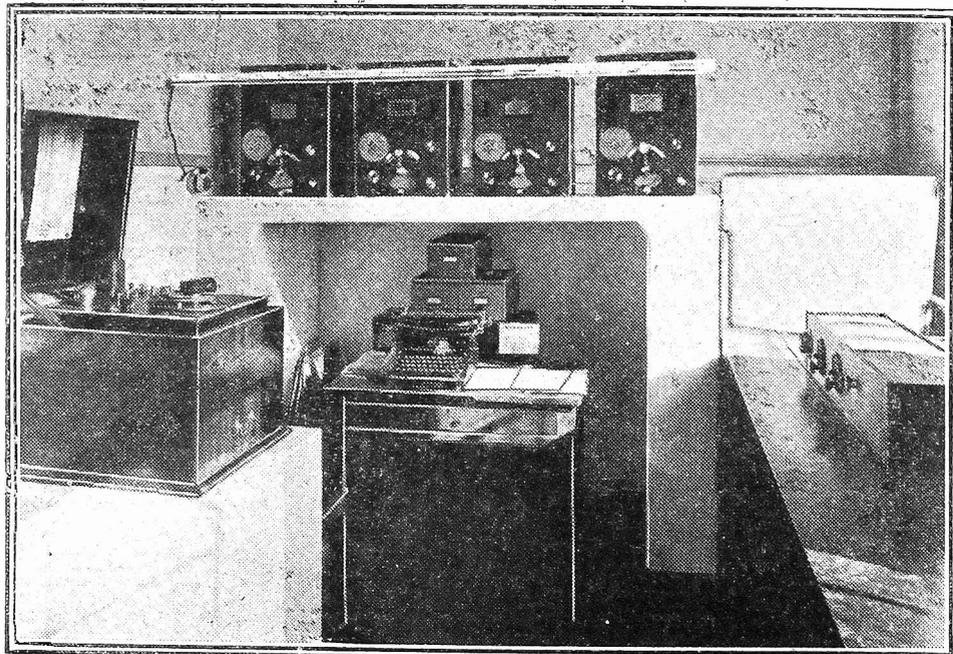
LOOK OUT FOR LISBON!

The Lisbon short-wave station, CT 1 A A, who works on Fridays at 10 p.m. on 42.9 metres, will be sending out a special programme for British listeners

NEXT WEEK! TUNE IN TO CT 1 A A

10 p.m.—March 18th—42.9 metres

WHERE THEY WATCH THE WAVE-LENGTHS



This is a view of the B.B.C.'s own receiving station at Tatsfield, Kent. Here a staff of engineers watches the ether, notes the wave-lengths and any tendency to wobble, and generally keeps a sharp eye on the broadcasting situation.

We are now nearing the top of the dial, and one of the best stations in this region is Brussels No. 1, on 509 metres. It is usually going strong until about 10 in the evening, when a short news bulletin is given, the language used being French.

Vienna, who calls himself "Rahdio Vcen," comes next on 517 metres, and the powerful German sometimes heard just above that is Munich, on 533 metres. He uses a musical box as an interval signal.

If you are able to hear any other higher wave-lengths than this it will probably be Budapest, on 550 metres, easily identified because it pronounces its name frequently, and as spelt. Space does not permit us to deal with the other wave-bands now, so we must leave consideration of these till next week.

READY RADIO COSMIC STAR RADIOGRAM EQUIPMENT

The finishing touches
to a
wonderful receiver

"COSMIC" STAR RADIOGRAM KITS BY CASH OR EASY PAYMENTS

Kit "B" (full set of components and valves)
with Radiogram Cabinet and R & A type 40
Loudspeaker Chassis £10:1:0 or
Deposit of 20/- and 11 monthly payments of 18/6

The above Kit may be purchased in combination
with any of the accessories listed. Examples:

Kit "B" with Radiogram Cabinet, Speaker,
Pick-Up, Volume Control and Gramophone Motor.
£13:7:6 or

Deposit of 25/- and 11 monthly payments of 25/-

Or Kit "B" with Radiogram Cabinet, Speaker
and Battery Equipment as detailed on page 1545.
£11:9:0 or

Deposit of 20/- and 11 monthly payments of 21/6

ReadiRad Pick-up	£	s.	d.
ReadiRad Volume Control	1	7	6
Collaro B.30 Double	5	9	
Spring Gramophone			
Motor with Automatic			
Stop	1	13	0
	<u>£3</u>	<u>6</u>	<u>3</u>

or 10/- down and 7 monthly
payments of 9/-.

As above but with Collaro A.C.
Induction Motor - £4 13 3

or 10/6 down and 9 monthly
payments of 10/6.

As above but with Macom Motor,
type A, suitable for D.C.
Mains - £4 5 9

or 10/- down and 9 monthly
payments of 9/6.

ReadiRad Pick-up	£	s.	d.
ReadiRad Volume Control	1	7	6
R & A type Loudspeaker	5	9	
Chassis			
		16	6
	<u>£2</u>	<u>9</u>	<u>9</u>

or 10/6 down and 5 monthly
payments of 9/-.

As above but with R & A type 100
Permanent Magnet Moving Coil
Speaker, with Matching Trans-
former - £4 10 9

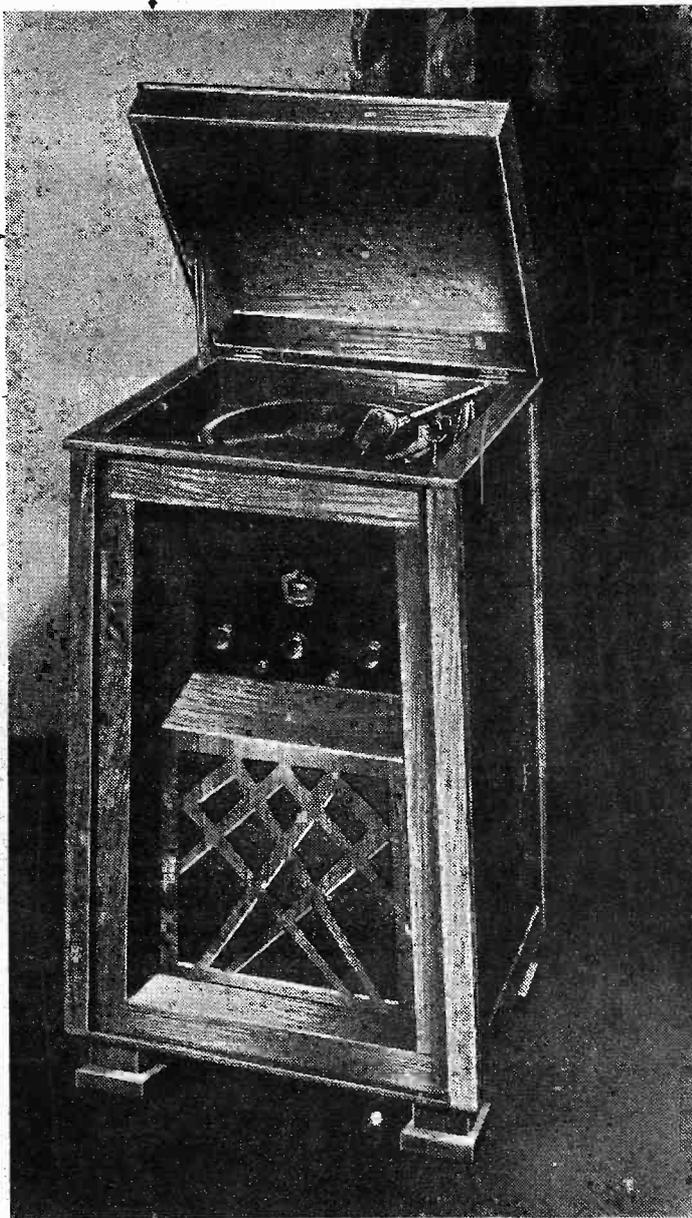
or 10/- down and 9 monthly
payments of 10/6.

ReadiRad type B.S. A.C. Mains
Unit, 150 volts H.T. & Trickle
Charger for 2, 4 or 6 volts £5 17 6

or 10/9 down and 11 monthly
payments of 10/9.

Atlas or Ekco D.C. Mains
Unit - £1 19 6

or 8/6 down and 5 monthly
payments of 7/-.



Ready Radio Radiogram Cabinet

With this beautiful cabinet you can convert your present
set to a Radiogram of the most modern and artistic
design. This cabinet is of highly polished walnut with lift-
up lid, automatic support and a needle cup. Overall size
3' 3" x 22" x 17". Suitable for any receiver having a
panel not exceeding 12" x 7" and a baseboard 16" x 10".

Price £3.7.6

or deposit of 15/- and 6 monthly payments of 10/-.

For Order Forms see page 1545.

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against cash. In case of doubt re-

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SEVEN-METRE RECEPTION

Very shortly the B.B.C.'s Seven-Metre experiments will be in full swing, and here is a contribution from a "P.W." short-wave expert dealing with the possibilities of this little-explored waveband.

EVERY reader of "P.W." who possesses a short-wave receiver seems to be writing to me lately to enquire just what this 7-metre broadcasting will mean to him when it arrives. Although that is a question that we shall not be able to answer properly until the B.B.C. actually starts up, some of us have had sufficient experience of wavelengths of this order to hazard a pretty shrewd guess.

Let us examine the facts and try to piece them together. Some four years ago amateur transmitters were licensed to use 8 metres for experimental work. There was very little difficulty, even then, in building quite a good receiver for the wavelength—the chief trouble was the transmitter. Since we may well hope that the B.B.C. has the technical side of this well in hand, we need not worry ourselves about the transmitters any more.

The Disappearing Trick.

From the receiving point of view, the results we used to obtain on 8 metres were rather curious. Work with portable receivers tuned to a fixed transmitter showed that, up to distances of 10 miles or so, signals on 8 metres were as strong "watt for watt" as on any other wavelength used. A 10-watt transmission at 10 miles distance produced quite a good, readable signal on a single- or two-valve receiver. But at some point between this and 20 miles the signal just disappeared, and the most sensitive receiver could not find it.

This sums up the most important property of these wavelengths—strong for a few miles, then—*nothing*. These experiments, of course, were on 8 metres. And, although you would not realise it until you were told, 8 metres is as far from 7 metres as 5 X X is from London Regional—and about *ten times* as far!

This rather startling fact is quite enough to suggest that the behaviour of the 7-metre wave may be very different. But, if anything, the difference will be that it will fall off still earlier. As evidence pointing to this we have two known effects: First, that 10-metre signals can be heard up to 40 or 50 miles before they disappear; and secondly that 5-metre signals seem to go after 7 or 8 miles at the very most.

Everything points to the fact that, as you go downwards from 10 metres, signals are absorbed after travelling for shorter and shorter distances. In passing, we might mention that when conditions for long-distance work are good the 10-metre waves "come down to earth" again.

They May Come Down Again.

British amateurs have put 10-metre signals of fairly low power into the United States, South Africa, and India. But, although long-distance work of this kind on 10 metres is very freakish, short distance work is as reliable as on any other wavelength known. Two amateurs can work across London on 10 metres as easily as

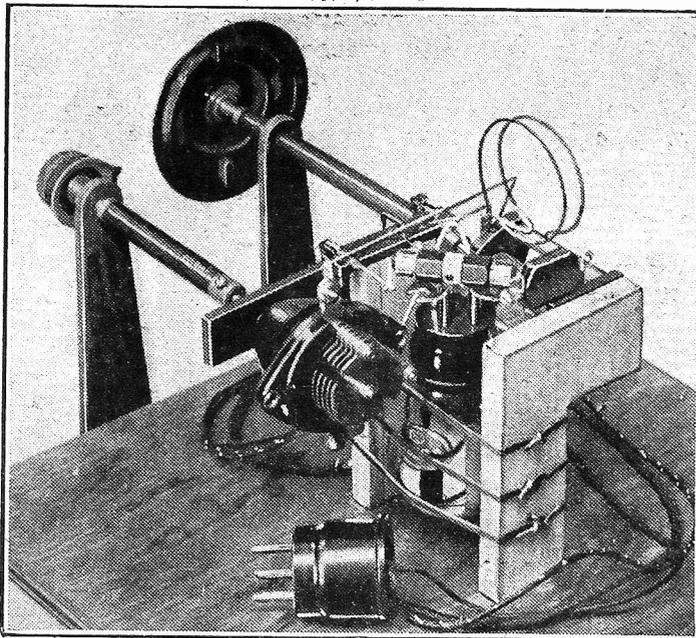
they can on 150 metres—sometimes it is even *more* reliable than the longer wave.

By studying this little collection of facts we can arrive at the following: That a broadcast transmission on 7 metres may be expected to be *very* strong up to a distance of between 10 and 15 miles, after which nothing more will be heard of it. It is just possible that there may be isolated freak cases of the waves "coming down" again in Australia or some distant point, but it seems very unlikely.

Ideal for Local Work.

Thus 7 metres would appear to be an ideal wave for purely local broadcast. The B.B.C. could run a 7-metre station in every big town and, moreover, run them all on the same wave without interference,

AN ULTRA-SHORT-WAVE ADAPTOR



The famous Kelsey 7-metre adaptor, which was described in "P.W." some weeks ago. The very small tuning and reaction coils should be noted, as they each have only one turn, with a diameter of about two inches. This novel device for ultra-short-waves is very simple in construction, and therefore remarkably inexpensive to build.

because of the limited range of the transmissions.

For the Towns Only.

You will probably think this a little hard on the country dweller (particularly if you are one yourself), but it is obvious that 80 per cent. of the B.B.C.'s audience live within a few miles of a town. Think of the number of licences accounted for by London, Birmingham and Manchester only! The country dweller will still have 5 X X and, perhaps, some of the Regionals within easy working range of him—he will just have to forgo the pleasure (perhaps a doubtful one) of tuning in a 7-metre receiver.

And now let us see what it will mean from the town listener's point of view. Just at

present a 7-metre receiver, it must be admitted, is a tricky thing to build and handle. I wouldn't go so far as to call it *difficult*, but "tricky" it certainly is.

Alternative Programmes.

But as soon as the 7-metre broadcast plan shows some signs of maturing, you will find plenty of good designs for receivers available, and certainly commercial models will appear on the market. I want to keep off the technical side of it in this article, so we will assume that the receivers *will* be available. (W.L.S. has apparently forgotten the very efficient and most practical Kelsey 7-metre adaptor which was recently described in "P.W."—TECH. EDITOR.)

This being so, you will probably have a simpler set than you use now, which will just bring you in your local programme, with perhaps an alternative from the same station. Your set will be designed for this purpose; there will be no complicated controls for searching for foreigners—it simply won't be any good! You will have a set that anyone in the family can operate, just to switch over from Clapham and Dwyer to a Symphony Concert at will. That is, if the plan comes to maturity and the alternative-programme scheme is decided upon. Unfortunately, we dare not leave out that "if" at the present moment.

Two Receivers.

My own private opinion is that it *will* come, and that it will bring with it a very desirable state of affairs—one will be able to have an "exclusively-local" receiver for 7 metres, and a "long-distance-getter" covering all waves from 20-2,000 metres, or perhaps just from 180-2,000 metres. And our local programmes will be free from 9-ke. whistles, from Müh-lacker, and from all the characteristic interference noises of the 200-550 broadcast band.

So we have at least something to look forward to. May it come soon!

THE ECKERSLEY THREE

A letter from a reader who has made two, and is very pleased.

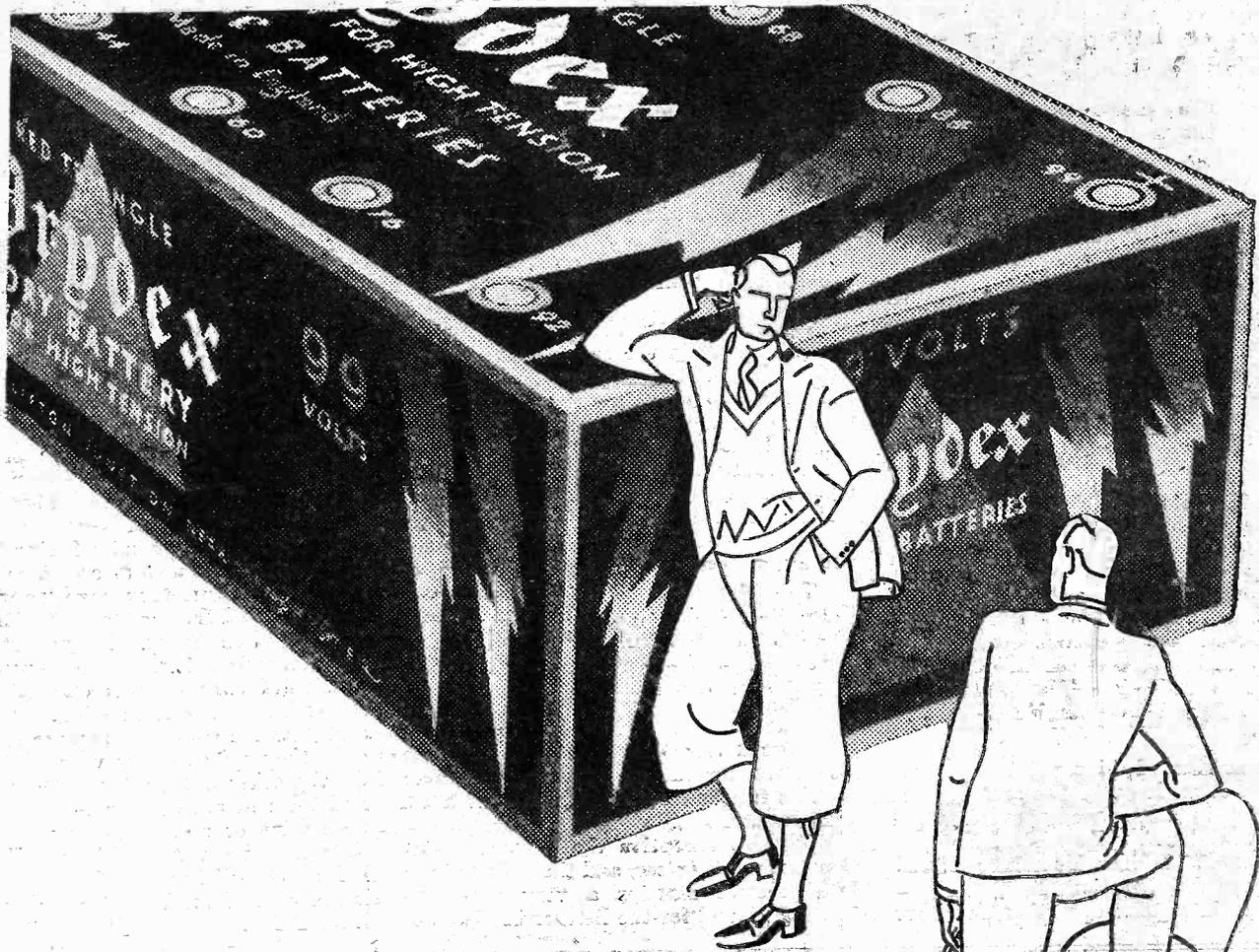
The Editor, POPULAR WIRELESS.

Dear Sir,—Re the Eckersley Three published in "Popular Wireless," 9th January.

I have made up two sets, and find they do the job fine and quite up to the remarks made by Mr. Eckersley.

I came across one trouble—namely, that when the set was switched off I got a short howl. I put this down to my coupling the negative H.T. to the positive L.T. I reversed over to the H.T. being coupled to the negative L.T., altered the wiring necessary. This stopped the howl, and both sets are giving fine results.

Yours truly,
Deal, Kent. F. E. WALDEN.



**“ Never mind -
 come in and hear it
 on mine. I’ve just put in a new
 Drydex ”**

● THE Exide DRY BATTERY

Made entirely in England, employing British labour and British capital.

Obtainable everywhere from all good dealers in sizes and types to suit every wireless set. Also for torches, cycle lamps and bells. For wireless low tension use Exide 'C' or 'D' Type Batteries.

Mr. H. G. B. of E. Greenwich, S.E.10, writes:—

“ . . . was surprised in the difference in tone and volume of my set, but apart from that I am still using the same battery after 9 months of continual use.”

Exide Batteries, Exide Works, Clifton Junction, nr. Manchester. Branches at London, Manchester, Birmingham, Bristol, Glasgow, Dublin and Belfast

IT is a curious instance of the irony of fate that heterodyne interference should have shown a big increase at the very time when by all the rules it should have been on the wane. In winter time, when the ranges of stations are at their greatest, a heterodyne may easily occur between two stations hundreds of miles apart.

As the nights shorten heterodynes normally tend to become less and less in evidence owing to the diminution of transmitting ranges. But this year two new factors have complicated the situation.

Increased Separation.

First of all it has been found necessary to increase the separation between certain high-powered stations from 9 to 10 or 11 kilocycles; the London Regional, for instance, now works on 843 kilocycles, and Mühlacker on 832 kilocycles, whilst there is a 10-kilocycle interval between Moravaka-Ostrava and the London National, and again between the latter station and Leipzig.

The provision of bigger intervals has naturally not made easier the arrangement of stations in the already overcrowded medium wave-band. The second factor is the coming of a considerable number of new and fairly powerful stations.

Some are in regular operation and have

STATIONS WORTH HEARING

Some practical distant-programme Notes compiled by a special contributor who nightly searches the ether in order to obtain really up-to-the-minute information for "P.W." readers.

had more or less to elbow their way in; others are still in the experimental stages, and certain of them appear to regard it as their right to conduct their experimental transmissions on any wave-lengths that they feel inclined to grab.

This business of wave-length-snatching by experimental or unauthorised stations has lately assumed very serious proportions. In a recent week nearly thirty of them—mainly unidentifiable—were recorded as being at work, and in few instances did they use the same wave-length on two consecutive nights.

Long-Waves Best.

The number of heterodynes have naturally reduced the list of stations from which really good reception is obtainable. The long waves are the least affected, though a Russian transmitter has interfered at times with Radio-Paris.

With this exception the long-wave stations are mostly clear, and the region above 1,000 metres remains a very profitable hunting ground for the listener in search of

since the introduction of the present wave-length plan.

My list of star stations on the medium band at the present time is: Prague, Langenberg, Rome, Stockholm, Katowice, Toulouse, Brussels No. 2, Goteborg, Hilversum and Heilsberg.

A Few "Probables."

Others which just miss falling into the star class on account of occasional heterodynes, or because they have "off" nights every now and then, are Gleiwitz, Bordeaux, Breslau, Strasbourg, Lwow, Hamburg, Milan, Brussels No. 1, and Budapest.

A third class consists of stations of a rather more uncertain kind. They are always worth going for, because if they are good they are generally very good indeed. On the other hand, one may be unable to find them at all, or hear them as no more than faint or rather muzzy voices. This class includes Vienna, Beromunster, Paris P.T.T., San Sebastian, Grenoble, Genoa, Bratislava, Nuremberg, Cologne and Toulouse P.T.T.

THE past week has been, for me, a week of tests—another name for *hard work*. So much has this been the case that I have not found a moment to listen for short-wave broadcast, having spent all my time on the amateur bands.

As I remarked before, half our talk of bad conditions is occasioned simply by the fact that the stations are not on the air, and this week has proved it up to the hilt. Put up some tests that bring all the "hams" into action, and "conditions" will appear good at once!

What can be wrong, for instance, when we hear South Africa and Ceylon before mid-day on 20 metres, Japan and Hawaii at 8 a.m. on 40 metres, and Hong Kong, India, Malaya, and the Antipodes practically all day? Not much, I should say.

"Doing His Bit"!

I can imagine some of the victims of my Competitions gloating at the thought of W. L. S. himself having to keep the phones on for twenty-four hours at a stretch. But don't worry—he rather likes it!

By the time you read these notes, the second half of the "International Good-Will Tests" will be due. Even if you have no transmitter, and are not a member of the A.R.R.L.—the organisers—they will be interesting to you if you are keen on listening to the amateurs.

For the first three days, March 11th,

SHORT-WAVE NOTES



News and views regarding an exciting and fascinating wave-band.

By W. L. S.

12th, and 13th, there are "rotated" listening periods for the amateurs of each continent. Thus for three stretches each day of two hours each, all Europe forgets that it has transmitters and settles down to listen to distant signals. And very quiet and peaceful it is to have the European babel off the air now and then!

There is no need for me to give you the exact times—they will be obvious if you listen. For the last three days—March 14th, 15th, and 16th—every owner of a transmitter, great or small, is making it function as hard as he can, trying to get into touch with the DX men that he has heard during the first three days.

The results will be reported in QST, the A.R.R.L. Journal, probably in August,

for these reports take some analysing. Eventually every transmitter will be listed in such a manner as to show how many times his signals have been heard in any and every country in the world. That's an undertaking for you!

Here is one small item of "red-hot" news. The experimental station at Vienna (Radio-Wien, U O R 2) is now transmitting on 49.4 metres. Tests are made on Tuesdays and Thursdays from 13.30 to 18.00, and from 19.00 to 21.00 G.M.T.

Have You Heard Him?

The station directors ask for reports of reception to be sent on postcards to Radio-Wien, Johannesgasse 4b, Vienna. All reports will be acknowledged by QSL card.

My informant, N. V. P., of Cologne, tells me that the station announces in German, but sometimes asks for reports in broken French and English.

W. F., of Aberdeen, believes that he has traced my identity, and that I am Mr. E. J. Simmonds, of G 2 O D, who used to write short-wave articles for "P.W." May I assure him—and others who have made the same suggestion—that he is quite incorrect?

I know Mr. Simmonds well, and am sure he would be hurt at the thought that my disconnected ramblings should be attributed to him! As to my real identity—ask "Ariel"; even he won't tell you!

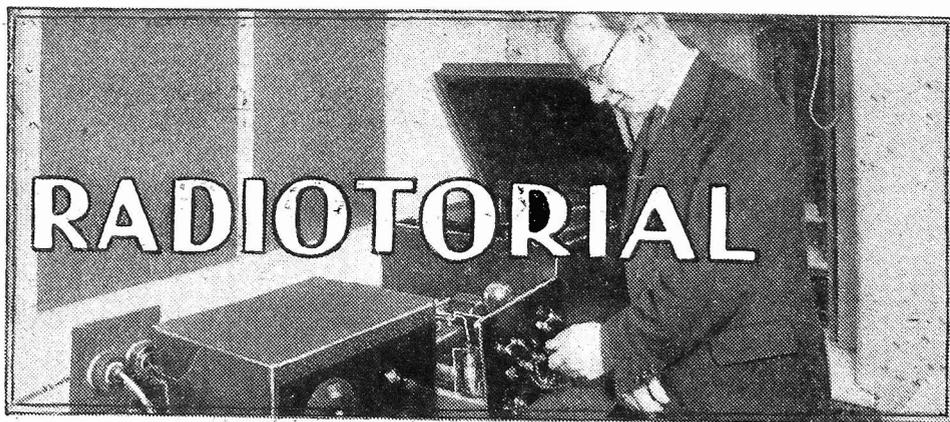


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Model of the S.T.300—
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RADIOTORIAL

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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. Lile 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 specialties described may be the subject 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

DE-COUPLING THE DETECTOR.

P. A. (Motherwell).—“My only trouble is a fall-off in quality which commences after the high-tension battery has been in about a month. Up till then the speech is very clear, and music good, but after that time music becomes a little harsh and speech is distinctly less clear.

“I am told that all it requires to put this right is for the detector to be ‘de-coupled’ by a resistance and condenser. Tracing out the circuit from the original blue print I see that the detector valve has got a separate high-tension supply from the H.T.+1 terminal. Is it possible, therefore, to make the alteration in the lead to this terminal, and not interfere with the internal wiring at all? If so, how should I connect the resistance, and what value is required?”

With separate detector H.T. supply it is quite easy to de-couple successfully outside the set. All that you have to do is to disconnect the H.T.+1 lead from the battery and proceed as follows.

Join the H.T.+1 battery tap to one side of a resistance holder. The other side of this holder to the H.T.+1 terminal, and also to one side of a 2-mfd. fixed condenser.

Then join the other side of this condenser to H.T. neg. (or L.T. neg., or any point connected to these), and when you have inserted a 20,000- or 30,000-ohm resistance in the holder the alteration is completed.

Note that the condenser will now be joined right across H.T.+1 and H.T.—, so it must be of good quality. And don't be surprised if your set needs a few more volts than you formerly gave the H.T.+1 terminal.

WHO WAS RIGHT?

H. L. (Bestwick).—“I wish to contradict a statement or so made by Captain Eckersley in his ‘Query Corner,’ when replying to M. K. C. (Eltham Park) in a recent issue of ‘P.W.’

“M. K. C. asks if a .0005 variable and a .0005 fixed condenser in series would result in a .00025 variable condenser. I say it would, and Captain Eckersley says that it would not, although his formula proves that .00025 is the proper result. His formula is $C_1 \times C_2 / .0005 \times .0005$

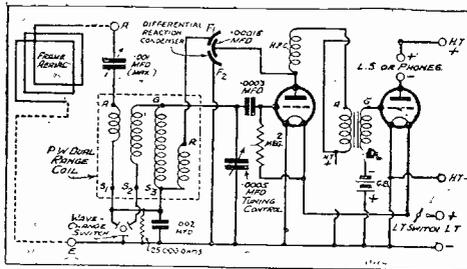
$C_1 + C_2 / .0005 + .0005$, which when worked out is .00025, as M. K. C. wanted, not .000166 as Capt. Eckersley evidently thinks.

“He also says that M. K. C. wanted .000125 when he really wanted .00025. My opinion is that Capt. Eckersley has gotten himself properly mixed up!”

We are afraid you have misunderstood the reply H. L. It is not Capt. Eckersley who is “mixed up” but you!

What M. K. C. asked in the original question was “My set has a .0005-mfd. condenser. Can I place a .0005-mfd. fixed condenser in series with it to

MISSING LINKS No. 30 A SIMPLE TWO-VALVER.



Here is the circuit of a Det. and L.F. receiver with two components purposely omitted. Can you fill them in correctly?

LOOK OUT FOR THE ANSWERING DIAGRAM NEXT WEEK.

reduce its capacity and so obtain the same effect as a .00025-mfd. variable condenser.”

Capt. Eckersley replied “not quite,” and he showed, by a brief example, why not.

We have italicised part of M. K. C.'s question, because we wish to emphasise that part. For what is “the effect of a .00025-mfd. variable condenser,” when tuning?

In effect it is a .00025-mfd. condenser when “all-in,” (maximum capacity); it is a very small condenser indeed when “all out” (minimum capacity), and it varies proportionately in the intermediate positions.

Thus, half way on a .00025-mfd. condenser gives a capacity of .000125 mfd. And what Capt. Eckersley emphasises is that when a .0005-mfd. fixed condenser is joined to a .0005-mfd. variable condenser you get a .00025-mfd. maximum, but the tuning effect is not quite the same.

For, as the formula shows, the half-way position under such conditions does not give .000125 when the variable condenser is half-way, because the fixed condenser has not altered.

If you apply $C_1 \times C_2 / C_1 + C_2$ to the half-way position you get the following values:

$$\frac{.0005 \times .00025}{.0005 + .00025} = .000166 \text{ mfd.}$$

What M. K. C. had hoped was that a half-way setting would give .000125 like the other tuning condenser. But as Capt. Eckersley so clearly puts it, “a variable condenser does not, if a fixed series condenser of its maximum value is connected in series with it, behave all the way round as a halved variable condenser.”

WAVE-CHANGE SWITCHING FOR “POP VOX” FOUR.

R. A. W. (Twickenham).—I have made one of your ‘Pop-Vox’ Four sets, but using only medium waves employing P.J.3 and P.J.2 coils.

“I wish to add 2 long-wave coils. I have purchased two commercially-wound coil quitois, first coil marked (E.G.T1.T2.), second coil marked (AR E.G.T1.T2.).

“I wish to use 3-point and 4-point wave-change switches and ordinary .0005 V. condensers (I cannot afford Extensers yet).

“(a) Could you tell me the connections for same? Also, I wish to use a 1-meg. volume control, 3-terminal type, in lieu of 1-meg. grid-leak.

“(b) Is this O.K., and what are the connections for this?”

With regard to (a), you do not mention the make of the coil, but if this is one of the approved coil quitois the connections for this and for the three-point switch will be as follows.

Y on the P.J.2 will now go to G on the coil quito instead of to earth, and also to one of the contacts on the wave-change switch. X on the P.J.2 will go to a .001-mfd. semi-variable condenser, and will also go to another of the contacts on the three-point switch. On the coil quito will go to the negative H.F. grid-bias terminal, to the .01-mfd. condenser, to the moving vanes on the first tuning condenser, and also to the remaining contact on the three-point wave-change switch.

That will complete the alterations for this part of the circuit, the remaining side of the .001-mfd. condenser being put on T1 or T2 as desired.

The other circuit is treated in much the same way, and the moving vanes of its variable tuning condenser will still go to L.T.—, etc., but they must be disconnected from P.J.3. The second coil quito will then be joined up in the following manner:

E on the second coil quito goes to the L.T. and earth, etc. G on this coil quito goes to Y on the P.J.3 and to one terminal of the four-point switch. “A R” terminal goes to other contact on the four-point switch and to Z on the P.J.3. X on the P.J.3 is connected to the third contact on the four-point switch and also by means of a flexible lead to the clip, which is tapped on to T1 or T2. Finally, the fourth contact on the wave-change switch is joined to the moving vanes of the second variable tuning condenser and so to earth, L.T., etc.

(b) It is quite O.K. to use a 1-megohm volume control in place of the 1-megohm grid leak and all you have to do is to join the terminal which is connected to the slider to the grid of the third valve, and simply use the end terminals as a grid-leak, one of which will go to the G.B.—3 lead and the other to the .01.

USING THE OLD H.T. BATTERY AGAIN.

L. G. (nr. Hertford).—“Here in the country with nothing to do in the evening but listen to the wireless, the set is usually on for about six hours a day, and that is very hard on the H.T. battery. The expense for this is the worst part of keeping up a wireless set, I find, and in this connection perhaps you can give me some advice.

“To give the ‘Cosmic’ a fair chance I bought a new battery instead of trying to use the old one, although there is still some volts left in it. And when the set was tried out I certainly did not grudge buying it a battery for itself!”

“However, the other one has still a good deal of useful life in it; I believe, although it could not give quality results on three valves at the strength handed out by the ‘Cosmic.’ So I am wondering if I can use it to supply just one

(Continued on page 1554.)

“P.W.” PANEL, No. 62. OUTPUT CONNECTIONS.

It is well known that when a power valve is in action interference with its input (grid) connections may cause damage to the valve.

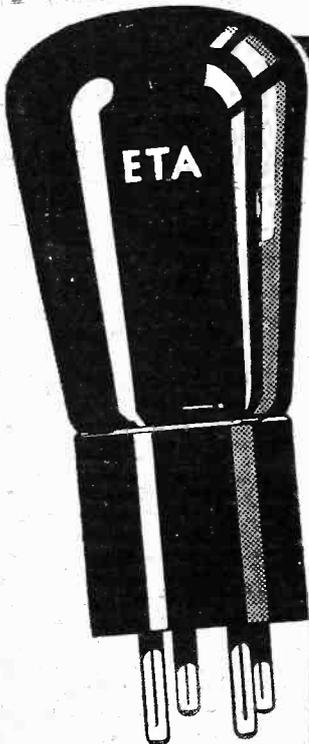
It is not generally realised that with pentode output valves interference with the loudspeaker connections may also cause damage.

This is particularly true of mains pentodes, unless an “equaliser” is connected across the choke, which has the effect of guarding against the trouble.

From Abroad

- MORNING**
- 10.—Stuttgart.—Concert.
 - 10.10.—Huizen.—Songs and Piano Recital.
 - 10.25.—Hilversum.—Gramo.
 - 10.40.—Hilversum.—Gramo.
 - 11.—Heilsberg.—Orchestra conducted by E. Wilcken. Berlin (Königs Wustehausen).
 - Gramo.
 - 11.5.—Stuttgart.—Gramo.
 - 11.10.—Huizen.—Piano.
 - 11.30.—Beromünster.—Orchestra.
 - 11.35.—Stuttgart.—Künzel Orchestra.
 - 11.40.—Huizen.—Gramo.
 - 11.55.—Huizen.—Orchestra. Hilversum. Orchestra.
 - 12.5.—Langenberg.—Orchestra: Dances

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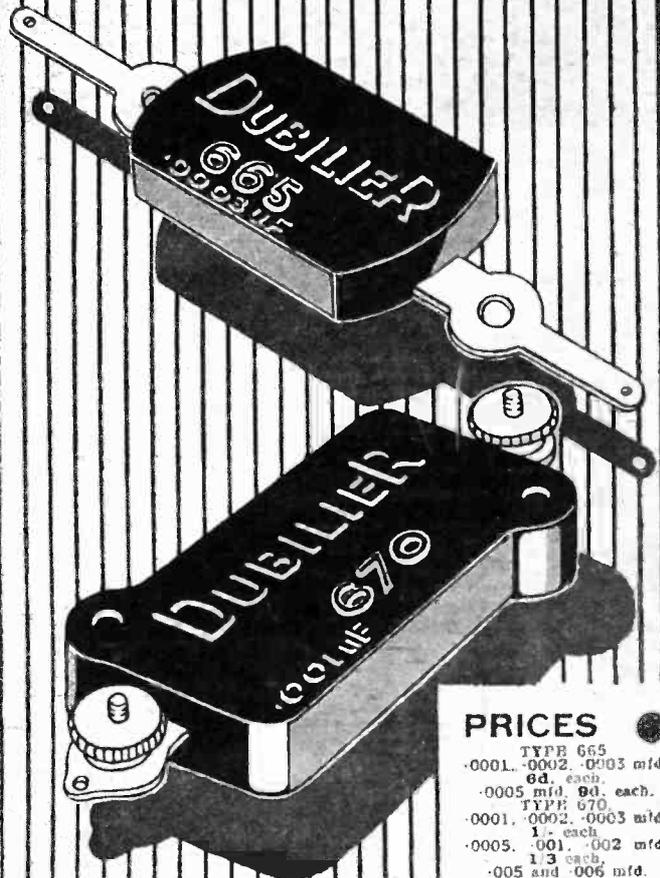
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Ducon Works, Victoria Road, N. Acton, London W.3.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 1552.)

of the valves, as I have seen explained in POPULAR WIRELESS?

"If this is possible, please give the full connections for the battery leads themselves, as well as any that may be necessary in alterations of wiring."

Although it is quite useless to expect a really old battery to give satisfactory service, in the circumstances in which you are placed it would be a pity not to try and use the battery if there is really a limited service life open to it. The alterations are so very simple that you could try them in a few minutes.

We suggest you use the extra battery to supply the high-tension to V1, and we will describe the alterations as they are particularly simple.

IS YOUR SET GOING WELL?

Perhaps the 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 an 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 postcard 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.

First of all, stand your extra battery near the main battery and join its H.T. to the other H.T.—by means of a flexible lead. (This lead, of course, can go to the H.T.—terminal on the set or to the H.T. negative terminal on the battery, as these points are really the same.)

To supply H.T. to V1 via the extra battery instead of from the main battery, all you now have to do is to take the plug that comes from H.T.+1 on the set out of the main H.T. battery and put it in to the desired voltage on the extra battery. That is all!

REACTION IN THE "MAGIC" THREE.

M. R. S. (East Ham).—"My set is a 'Magic' Three, which I made myself from 'P.W.' On the local station it is A1, but I find it rather difficult as regards to trying for foreigners owing to its floppy reaction.

"I can hear the stations through the reaction, but when I attempt to decrease same it goes out altogether with a loud pop, and I hear nothing else. Could you tell me what is the cause of this and if there is anything I can do to the set to stop it?"

We are very surprised that you get this trouble with the "Magic," for one of the strong features of this set was its smooth and easy reaction control. The commonest cause of the trouble you describe is incorrect value of grid leak, and the trouble will be more marked if the grid condenser and the high-tension values are not right.

Sometimes the actual grid leak is O.K. but a fault occurs in connecting it, so that it is not actually in circuit at all, and a very high resistance takes its place—composed of spurious resistances such as the leak across the insulation. So make sure that all the grid-leak connections are O.K. and that it is firmly held in place in its clips, and then borrow another, or several grid leaks of different values, and replace the present one, at the same time varying the H.T.

Unless you have gone hopelessly away from our specification it is improbable that you will notice any difference owing to an alteration of grid condenser, but the variation of the H.T.+1 plug is important to get best results. In some cases, this partly depending upon the particular detector valve in use.

You do not say what coil values you are using, but it is easy to obtain a floppy reaction effect if too large a reaction-coil is used, so this is a point deserving attention. Do not forget also that a very important part in smooth reaction control is played by the adjustment of the slider on the potentiometer

Keep it in about the half-way position for the above tests, and then when the set is going well you can adjust it finally on a weak station.

The main facts about the setting of this control is that if the slider is pushed round to that end of the potentiometer which is connected (via a switch, etc.)

TECHNICAL TWISTERS

No. 104.—MODERN TUNING COILS.

CAN YOU FILL IN THE MISSING LETTERS?

Modern tuning coils are nearly all of the type wound on a former.

Sometimes the coil is divided into two sections connected in and wound astatically.

The object of this is to reduce the "spread" of the magnetic field and prevent undesired interaction. Such an arrangement may be a coil.

Although this type has a very restricted magnetic field it is not so efficient as the plain using external to prevent unwanted interaction.

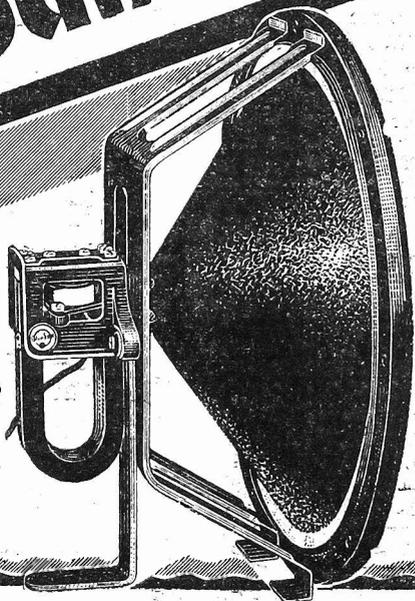
Last week's missing words (in order) were: Voltage, Voltage. One cell. Forty. Battery.

to L.T.+ you get maximum sensitivity, combined often with a certain tendency to ploppiness; whereas if the slider is pushed round to the opposite position, and is thus brought near to the end which is connected

(Continued on page 1536.)

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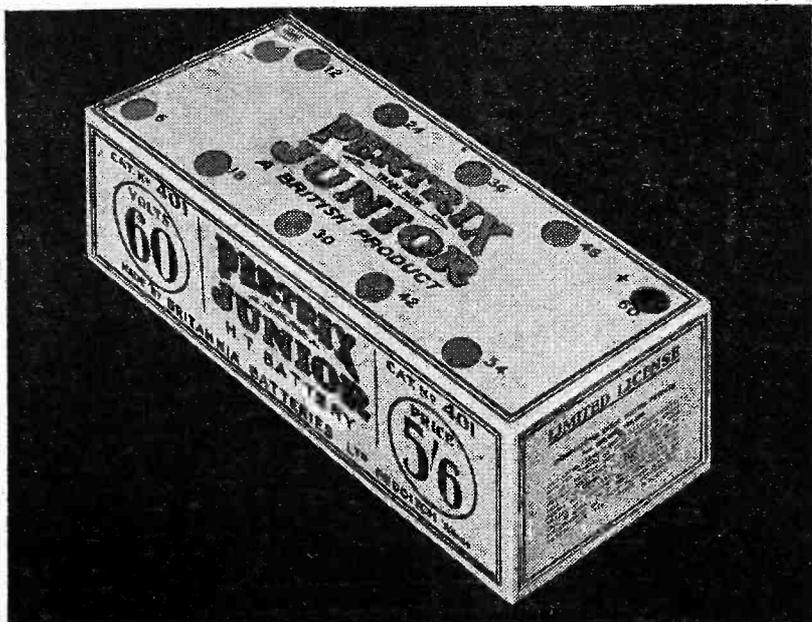
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emission—nine milliamps



RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 1554.)

to the L.F.—lead, reaction control becomes much smoother, but there is not quite so much sensitivity as is obtained in the other position.

Thus the slider alone gives a very complete control over reaction in all the other values are O.K., and it is for this reason that we are surprised you have been having trouble in getting a smooth decrease in reaction.

A final hint worth remembering is that if you have a spare general-purpose or similar type valve on hand, it may give better reaction control than the valve which you are at present using in the detector position of the receiver.

H.F. OR L.F.?

T. G. W. (Liverpool).—“All I have decided so far is that I shall need three valves to work the moving-coil speaker at good strength. But I cannot find out what are the merits of the different ways of arranging these three in circuit.”

“Either an H.F., Det. and L.F. arrangement, or the more usual Det., 2 L.F., will give the necessary strength, I am told. And the choice of the latter type of circuit with its enormous ‘punch’ obviously does not mean I shall be tied to local stations, for reports of this class of set getting far-distant foreigners are quite common.”

“What then is the advantage of H.F. instead of one of the L.F.?(if any). Assuming a fairly average sort of outdoor aerial, 50 ft. at one end, dropping to 30 ft. at the house end, which sort of set would be preferable for quality ‘local’ work, and ample alternatives when the set is handled as a ‘DX-er’?”

“It will be fixed about 30 miles from the North Regional, and used all day for this station, and for touring Europe on those evenings when the Northern programmes don’t appeal too strongly. What should it be—‘Det 2 L.F.’ or ‘H.F., Det. and L.F.’?”

Yours is an easy question to answer because you are so suitably situated for good results from a Det. and 2 L.F. set.

Perhaps the best way to illustrate the respective merits is to say that in the Det., 2 L.F. type of receiver the great volume obtainable is the chief advantage, and this is accompanied by very easy handling for all normal purposes.

Against these advantages there is the fact that two or more main tuning circuits are used, though this is counteracted to some extent by the reeding of the reaction’s importance as a control. And the two tuned circuits can be ganged if desired, so that the first rough adjustments are carried out as for one condenser. The tendency nowadays is towards a need for greater selectivity, but it seems probable that

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Will be another splendid three-pennyworth, and will include a long and absorbing account of

A TALK WITH A JAPANESE LISTENER

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A FILTER FOR YOUR “COSMIC”

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“COSMIC” QUERIES

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FINDING FOREIGNERS

—full of practical reception hints covering the long- and short-wave programmes

NEXT WEEK’S “P.W.” ORDER TO-DAY. USUAL PRICE

There is only one main tuned circuit, but reaction is rather important on distant stations with this class of receiver.

The merit of the H.F., Det. and L.F. circuit is that it is often much more selective than the other. Great volume is obtainable with it, and a much higher reliability factor where very long-distance programmes are concerned, many of these being rendered almost as reliable after dark as “locals” by efficient H.F. amplification.

the Det. and L.F. will definitely remain as the most popular set for all-round use in conditions like those described.

A surprisingly high degree of selectivity can be obtained with sets using a Detector as first valve, if a “hotted-up” input circuit is employed, as in the “Cosmic.” (Certainly the older type of Det., 2 L.F. would not bear comparison with these later types—

(Continued on page 1558.)

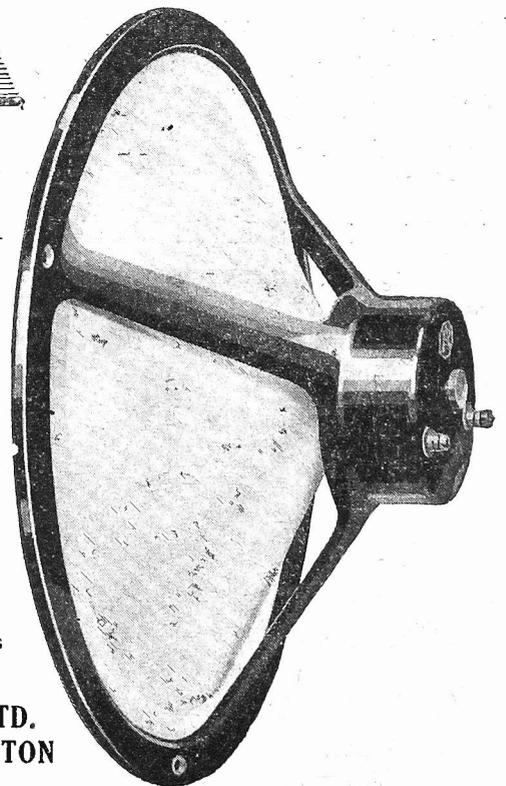
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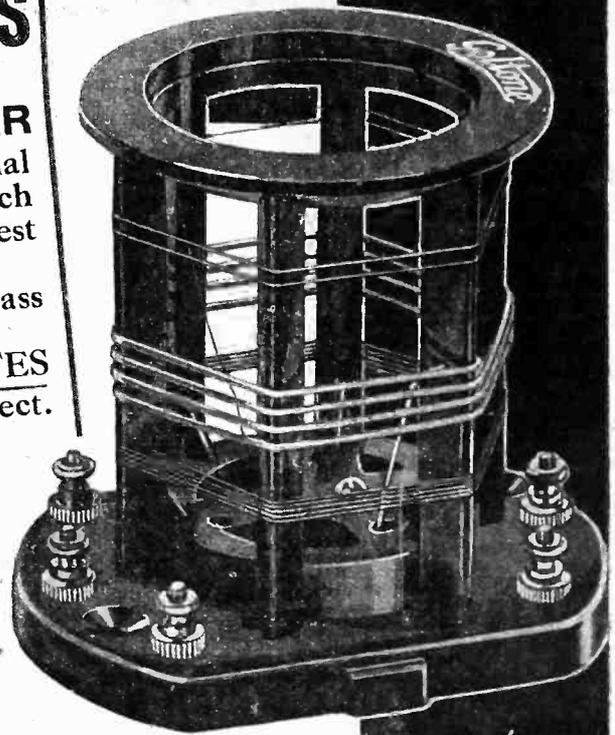
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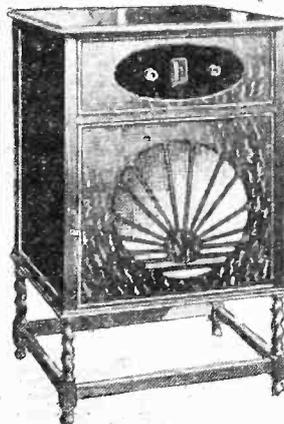
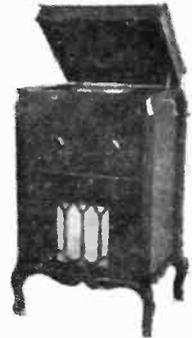
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RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 1556.)

in fact not long ago it would have seemed impossible to get the equivalent of "Cosmic" selectivity on a simple set.)

On no account be persuaded to try one of the old-fashioned Det., 2 L.F.'s—if it is to be this class of circuit get one of the "Cosmic" standard where really good selectivity is obtainable. This would give you numbers of foreigners, and even if the ether does "crowd-up" still more than it is at present, you would, in the situation described, have ample selectivity in reserve.

Perhaps the best, if not the only way to decide your problem in general terms is to decide, once and for all which is more important—the foreigners or all-round reception? If the main requirement is powerful, easily-handled local-station work and foreigners, decide on the Det. 2 L.F.

If, on the other hand, it is really the distant foreigners that you are chiefly counting on, decide in favour of the H.F., Det. and L.F. circuit.

WINDING COILS FOR ECKERSLEY TUNER.

R. W. (Peterhead).—"For the pleasure of constructing it I am going to make up an Eckersley Tuner of my own, and I have been reading over the details which have appeared in 'P.W.', namely those in the December 12th issue, and those in 'P.W.' dated February 20th.

In one case the directions of the tuned windings are given as the same and in another case the direction of the medium-wave is given as opposite to that of the long winding. Which way is right?"

Although there appears to be a discrepancy in the two descriptions; actually this is not the case, for the relative "direction of windings" will depend not so much on the way the turns are originally put on the coil as on the method of connecting them when completed.

In the original brief description this point was not touched upon, but in the fuller description in the "Radiotorial" columns of February 20th the method of winding and the connections for that method are given in detail. These should be followed closely, when the coil will resemble the "officially" manufactured models.

MIRROR OF THE B.B.C.

(Continued from page 1534.)

Brook, the Canal Turn and Valentine's Brook.

An announcement will be made of the change-over from Mr. Lyle to Mr. Hobbiss, and at the conclusion of the race there will be another change-over to Mr. Lyle, who will repeat the result several times.

There will, of course, be the usual opening description of the general scene before the race, with the names of runners and jockey's and an account of the parade of horses to the starting post.

The New Dance Orchestra.

So much limelight has been focussed on Henry Hall and the New B.B.C. Dance Orchestra that their opening broadcast on Tuesday, March 15th, will be looked forward to by millions of listeners anxious to hear how they compare with Jack Payne and his "Boys."

Coincident with the debut of the new band, hundreds of cinemas will show a short sound news film of the band in action in Studio 8a on the top floor of Broadcasting House.

The film will include an introductory announcement by the B.B.C.'s chief announcer, and the band playing the specially written 'Signature and "passing out" numbers. "It's Just the Time for Dancing" and "Till Next Time."

The New Dance Orchestra will take part in their first vaudeville on Saturday, March 19th, when the artistes include Harry Tate, the Carlyle Cousins, Ronald Gourley, and Alexander and Mose.

THE LISTENER'S NOTEBOOK

(Continued from page 1534.)

selected such songs as "Meet me in the Cowshed," and dragged out Gus Elen's "It's a great big shame." All very mediocre. Not even could Marius B. Winter's dance orchestra save the situation, his vocalists certainly failing to please my ear.

If this is the sort of stuff now being put on at our big London music halls, it is not to be wondered that these places are losing money and patrons.

The Gilbert and Sullivan hour, on the contrary, was sheer joy; and made one long for more. Both clarinet and cornet came through well—as they always do. It was a pity that, after the Overture to the "Pirates of Penzance" we were given only "The Mikado." I would have preferred excerpts from the other G. and S. operas. But that, perhaps, is a treat in store for us.

This wasn't the only Gilbert and Sullivan we were favoured with. The Commodore Theatre Orchestra included selections from "The Gondoliers" in one of their lunch-time programmes, while Copenhagen concluded a programme of English music one evening with selections, unfortunately, again from "The Mikado."

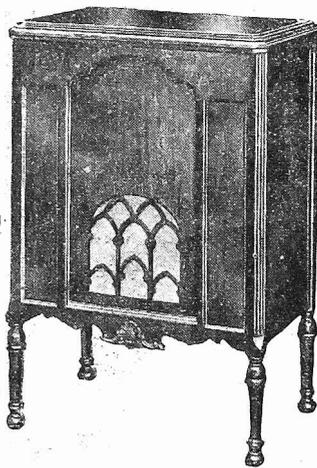
I realise, after listening frequently to French transmissions, how fortunate we are to be spared from the accordion vogue. It is a dreadful instrument, real, or at least,

(Continued on page 1560.)

● A finer
HAND
finish

● MODERN
designs

● Stronger
CONSTRUCTION



The "MERTON"

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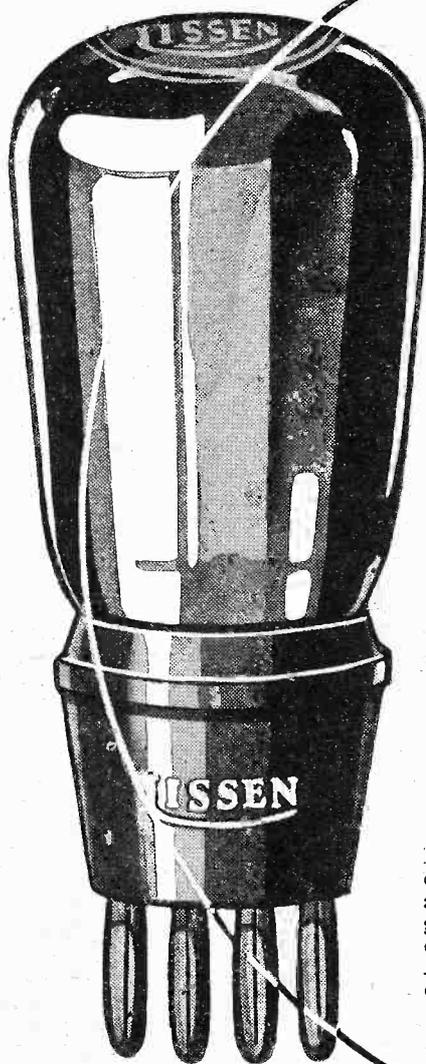
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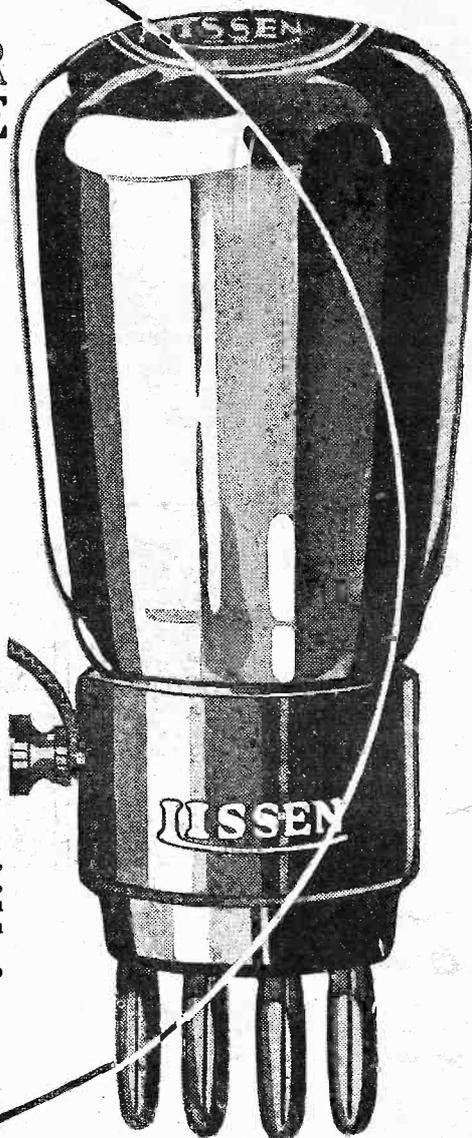
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THE LISTENER'S NOTEBOOK

(Continued from page 1558.)

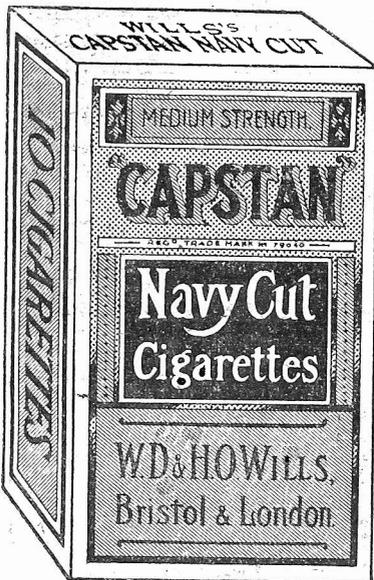
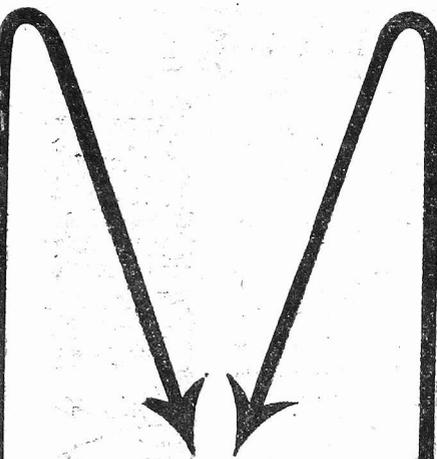
it seems to be after a time. On the other hand, do we appreciate the B.B.C. orchestra (all sections) as much as we ought? I was very struck with the Mendelssohn programme given by Section D, under the direction of Stanford Robinson, the other evening. How well all the instruments seemed to combine, and how restrained the playing was! This was particularly noticeable when accompanying the soprano solo in Psalm 95, "Come let us Sing."

* * * * *

The least said about "The Forsaken City" the better, but I would like to ask whose was the brain that conceived such an idea? "Bring out your dead!" isn't the sort of thing we want to hear repeated ad infinitum at any time; but now when a 'flu epidemic is raging it seemed to be adding insult to injury. Surely there are many more illuminating stories in the pages of history than the Great Plague of 1665. Let us have these for preference, if we are to be given history!

* * * * *

It makes me wonder whether the kiddies will have to listen to the "Murder of the Princes (1483)," or to a detailed account of the "Burning of Ridley and Latimer



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TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio reception.

By Dr. J. H. T. ROBERTS, F. Inst.P.

Reaction "Overlaps."

I DARESAY you have noticed that sometimes when reaction sets in you have to turn the knob back a little way before the reaction ceases. Suppose, for example, that reaction starts at a position 80 on the dial and you turn the knob beyond this point and then turn it back, you might expect reaction to cease again at the same reading of 80.

When the set is operating under the proper conditions the reaction will cease at the same point—or practically the same point—as that at which it starts. If there is a considerable overlap, however, it shows that the conditions are wrong and in these circumstances you will find it impossible to get that nice balance between reaction and tuning which is so necessary for picking up weak or distant stations.

If you are troubled seriously with "reaction overlap," the best thing to do is to look to the value of H.T. voltage which is used and also to the values of grid leak and condenser. The trouble may also, by the way, be traced to an unsuitable detector valve. The ordinary values of .0002 microfarad, and 2 megohms for the grid condenser and leak, will generally be found suitable with a voltage of perhaps up to 100 volts.

Effect of L.F. Coupling.

If, however, instead of using the ordinary L.F. transformer of a conventional ratio, the detector happens to be followed by a transformer with some special ratio, this having an unusual primary inductance value, or if resistance coupling is used, you will naturally require a different value of H.T. Sometimes, for instance the H.T. voltage may need to be considerably lower and the grid leak may often be increased with good effect.

By the way, you will often find that a mains valve will work very well in the detector position without seeming to be so critical as the corresponding battery-driven valve. In such a case you are not so likely to get into trouble with reaction overlap, and altogether reaction seems to be much more manageable.

With regard to mains-driven detector valves, you may, however, get a bit of trouble with A.C. hum, and this is often made worse by a bad earth connection. The poor earth connection will also upset the tuning and reaction at the same time, so that if you find this trouble with a mains detector you should give particular attention to the earth.

Use Twisted Flex.

Another important point with the detector or, for the matter of that, any of the valves in a mains set, is to prevent any stray A.C. field from the filament leads. One of the simplest ways to do this is to use twisted flex for the leads.

(Continued on next page.)

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(1555)," one of these evenings. There's no telling, for they've already had "The Last of The Niblungs!"

* * * * *

Much has been, and is still being written, about the attractions of Sunday Continental broadcasts, but reference is generally made to musical turns. To those who are interested in British politics (and there must be many), I can warmly recommend the talks on British Statesmen given by Copenhagen, and broadcast by Kalundborg at noon every Sunday. They are splendidly delivered, the English being quite as good as the best we hear from our home stations. Pitt, Melbourne, Peel, Canning and Palmerston are some of those I have listened to, and I hope I shall not miss Gladstone and Beaconsfield.

This may sound a bit heavy for a Sunday noon, but I shall be surprised if you don't find these talks very interesting. I couldn't switch them off!

TECHNICAL NOTES

(Continued from previous page.)

Often enough I am told by people that they cannot get very many stations on their sets, sets which are specified to give quite a large number of Continental stations. Generally, the trouble is simply due to the fact that the owner of the set does not take sufficient care with the proper management of the tuning and reaction.

These must be smoothly applied so as to bring the detector to a point just short of oscillation and get the maximum sensitivity. Unless you operate the set very carefully in this way, a fraction of a degree at a time, you are practically certain to miss some of the fainter stations; you cannot simply set the reaction knob and expect this setting to serve for different adjustments of the tuning control. The two must be operated together.

Mains Valves.

With an A.C. mains valve, whether fed by raw A.C. current or indirectly heated, readers are sometimes a little puzzled with regard to the application of the grid-bias voltage. As a matter of fact, it is really quite simple, as a moment's consideration will show.

You know that with an ordinary battery-heated filament we have a difference of potential at the ends of the filament about equal to the voltage of the filament battery (assuming there is no filament rheostat in series). Clearly, we have to reckon the voltage of the grid in relation to some part of the filament, and the point we take is the negative end.

So that if there is a grid-bias voltage of, say, 9 volts, and the voltage of the filament battery is 6 volts, then the grid will be 9-volts negative with respect to the negative end of the filament and 15 volts negative with respect to the positive end of the filament.

The same thing, of course, applies with the anode voltage. We may have 100 volts between the anode and the negative end of the filament, but if the filament has 6 volts on it there will only be an anode voltage of 100 minus 6—that is, 94 volts—between the anode and the positive end of the filament. At any rate, it doesn't matter very much so long as we have some definite point from which to reckon.

A.C. Output Valve.

But with a filament supplied by alternating current you might at first think that there was no such "anchor" point. In practice, with the indirectly-heated cathode, the position is simpler than with the battery-heated filament, because the indirectly-heated cathode is insulated from the A.C.-operated heating filament inside and, although it receives heat and becomes an electron emitter, its potential is "floating," unless it is connected to some definite source of potential.

So if we connect the cathode by any point to the grid via a grid-bias battery, we have that many volts (whatever the voltage of the G.B. battery may be) between the whole of the cathode and the grid. As a matter of fact, it is usual to connect the cathode to the centre tapping of the transformer winding which supplies the heating current. This centre-tap,

(Continued on next page.)

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TECHNICAL NOTES

(Continued from previous page.)

together with the cathode, then become, for the purpose of reckoning voltages, equivalent to the negative end of the filament in the case of a battery-heated valve.

Magnifying the Hum.

I should say something about the power stage of an A.C. set, because here we sometimes use a valve the filament of which is supplied with raw A.C. In this case the filament itself is used as the electron emitter or cathode, instead of being used (as in the case of the ordinary indirectly-heated valve) as the heater for the cathode which surrounds it.

Now, at first sight, you might think that this would cause all kinds of complications due to A.C. hum; but bear in mind that it is only the last stage, and there is no amplification following the valve to magnify the hum.

This is one of the reasons why there is no serious trouble due to the hum of the raw A.C. A further reason is that the filament of such a valve is usually comparatively thick, and so the variations in temperature with the alternating current are lessened.

Grid Bias with A.C.

Obviously, in this case your grid-bias connections must be somewhat modified, and the usual thing to do is to connect to the centre of the output winding of the heating transformer for your "negative filament connection."

Sometimes this centre tap of the transformer is not available, and therefore a potentiometer resistance is connected across the output of the transformer and a centre-tapping taken on this potentiometer, which amounts to the same thing. The total resistance of the potentiometer may be up to about 100 ohms.

The use of the potentiometer instead of the centre-tapping of the winding of the transformer is also sometimes a distinct advantage, because if there should be any slight error in the electrical position of the centre-tap on the transformer winding (that is to say, if it should not be at the precise electrical centre) you would get more A.C. hum than need be, whereas with the potentiometer you can adjust the slider until you find the best position.

A New Principle?

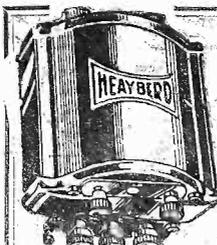
Concerning improvements in valves, it is really wonderful, on the one hand, what great strides have been made in the design of valves for special purposes, which give us the opportunity of choosing highly efficient valves for particular circuits, whilst, on the other hand, it is perhaps equally surprising how little there is new in the way of principle.

One of the drawbacks of a low-impedance valve is that it consumes a relatively high H.T. current and perhaps it may be possible before long, to have a valve of this kind which is much more economical in anode current than those at present in use. If such a valve were forthcoming it would be a great advantage.

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(Continued on next page.)



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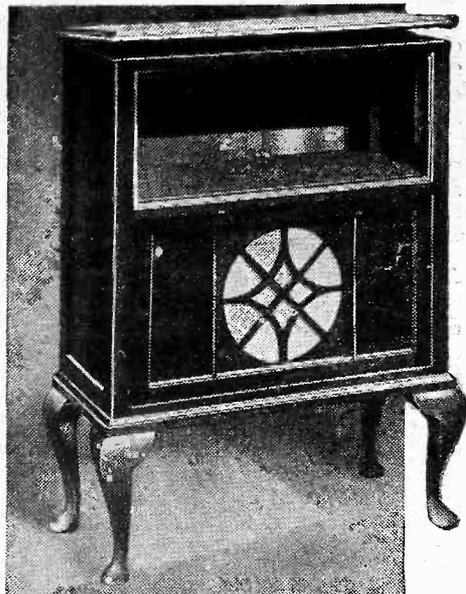
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TECHNICAL NOTES

(Continued from previous page.)

without any filament-heating current—the "cold" valve, in fact—but whilst many extremely ingenious suggestions have been made for the construction of such a valve, so far as I know no valve of this kind has been successfully made and used.

Incidentally, talking about the cold valve, which at the beginning of broadcasting seemed such a highly desirable object, I should doubt very much whether it would cut nearly so much ice in these days because, after all, the mains-operated valve takes a lot of beating, and if electric mains are available the heating current is really a matter of very little importance.

I do not know whether statistics are available as to the number of radio amateurs who are without electric light supply; I have heard the figure put at between fifty per cent. and seventy-five per cent. of the whole body of wireless users.

How Many Battery Users?

If it is even as high as fifty per cent. it shows that there are a very large number of people who still have to haul their batteries about for recharging or rely upon a recharging service.

But even here again the dull-emitter now has its filament-heating current reduced almost to vanishing point—after all, you can scarcely expect a valve to operate on much less than 1 amp.—and so a cold valve would have to be very efficient and very attractive, and its cost would have to be at most very little greater than the present cost of an average receiving valve, if it were to have any chance of gaining a footing.

The Output Stage.

I was talking in these Notes a little while back about output stages, and several readers have written to me on this point, in some cases describing their experiences with particular types of output transformer.

You know that you may have a perfectly good receiver and a perfectly good loud-speaker but, if the output of the receiver is not suited to the speaker, the quality is bound to suffer.

Not only does the output circuit prevent a considerable proportion of the H.T. voltage from being cut off from the valve, but also, by isolating the loudspeaker, it prevents any danger of shock to the user of the set and keeps the direct current out of the windings of the loudspeaker, so avoiding partial saturation and the danger of breakdown.

The output circuit must have a relatively low D.C. resistance so as to be able to carry the necessary anode current, whilst at the same time the primary and secondary (assuming a transformer output) must match the output stage of the set and the loudspeaker respectively.

Variable Ratio Transformers.

All this is common knowledge, but it is not everybody who has the means at his disposal to obtain these desirable conditions or even to measure up the constant in question so as to know what the requirements are.

If, however, you had a number of primaries of various inductances and all

(Continued on next page.)

NEW NON-INDUCTIVE RESISTANCE TYPE 3

46

This new all-British resistance embodies many new and novel features which guarantee far steadier performance than resistances constructed on old, obsolete principles.

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- Furthermore, the wire contacts shown make contact with the resistance element so that the moving contact does not wear out the element. This guarantees even and true contact always.
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- Self-cleaning wiping contacts. This ensures perfectly clean contact always.
- Silent in operation.
- 6. Price 4/6.**

We recommend this resistance (Type 3) only for values above 50,000 ohms where wire-wound potentiometers are not required. Patents for this new resistance have been applied for.

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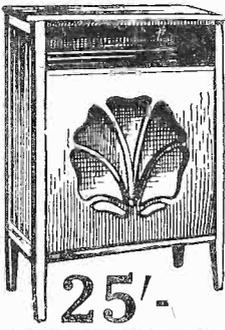
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TECHNICAL NOTES

(Continued from previous page.)

of low D.C. resistance and a number of secondaries of different inductances. It would be a comparatively simple matter to try different combinations so as to get the best result—by actual aural test—without necessarily knowing the values of the quantities with which you were dealing.

Several readers tell me that they have used the "Instamat" output transformer made by the Ready Radio people, and are very pleased with the results. This output transformer, as you know, is provided with a number of tapings on both the primary and secondary, and two switches so that any particular tapping can be instantly selected.

The operation of the "Instamat" is simply equivalent to trying different primaries in the output of the receiver and different secondaries in series with the loudspeaker, but by virtue of the switches these different tests can be made practically instantly.

This is very important, as in this way you can determine by ear whether the result is getting better or otherwise, which it is very difficult to do if you have to fiddle about removing one component and trying another.

By the time you have shifted the components you have forgotten what the last arrangement sounded like, and you cannot make any really reliable comparison. But with the "Instamat" arrangement it is a very simple matter indeed to tell whether you are getting "hot" or "cold."

The "Instamat."

The standard model is for all ordinary types of loudspeaker, whilst the "Major" is for low-resistance moving-coil speakers. The latter instrument gives various ratios from 10 to 1 to 25 to 1. The primary resistance is something less than 40 ohms, whilst the secondary resistance is around 2 ohms—rather less than 2 ohms in one instrument which I tested.

The primary inductance in this model has a maximum value of somewhat below 10 henries with a very small D.C. current, but at 100 milliamps, this falls to about one-third of this amount. This, however, is of no importance in practice, and I have found that the instrument gives, according to the ear, a very good and uniform response over the necessary audio-frequency range.

Trouble with H.F. Choke.

I wonder how many of my readers have experienced trouble with howling and instability in a circuit due to a high-frequency choke reacting with some neighbouring component? I have more than once had this effect occur when the choke was too near to the grid condenser, for instance. You might not think of this at first, but a moment's reflection will show you that there is quite a possibility of electrostatic effects taking place between the two components.

If you have this trouble and have any reason to suspect that it may be due to the cause mentioned above, you can easily try a temporary screen around the choke. Almost any roughly made metal cylinder will serve the purpose, and it need not necessarily be closed at the top.

By the way, the screen should not be too close to the choke, otherwise you will

get trouble from this cause as well. The screen should preferably be connected to earth. Then if you find that this temporary screen seems to improve matters appreciably, you can set to work and fit a proper screen as a permanency.

One does not always think of high-frequency chokes in the same category as H.F. coils, but there is a definite similarity, and in cases where trouble arises from this cause a similar remedy is indicated.

Adding Extra Smoothing.

With a home-constructed mains unit—or, for the matter of that, sometimes with a commercial unit—you may find that you still get an A.C. hum, as if the smoothing arrangements were not sufficiently effective. If you have trouble of this kind you can very easily tell whether it is due to the smoothing condensers being of insufficient capacity.

All you have to do is to take a separate condenser of, say, 2 microfarads capacity and connect this in turn in parallel with each of the smoothing condensers used in the unit. It should be connected by means of two short leads of insulated wire bared at the ends and just twisted around the condenser lugs, the hand being entirely removed while the tests are made.

Do not put it on and hold it in position with the fingers: for one thing you may not get the right effect in this way, and for another thing you may get an electric shock. You will soon be able to tell whether this extra condenser, shunted across any of the condensers in the unit, is making an appreciable difference.

Of course, if you find that it is, and that in some particular position it pretty well cuts out the hum, then obviously you want to fit it in and wire it up permanently as an addition to the unit.

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Every Set-Owner and Music Lover will find something to fascinate him in the March "M.W." Here are the titles of a few of the articles you should read:—

Sir Herbert Austin on What Radio Might Do For British Trade
Power From Low-Voltage Mains
How H.T. Batteries Are Made Round The Turntable
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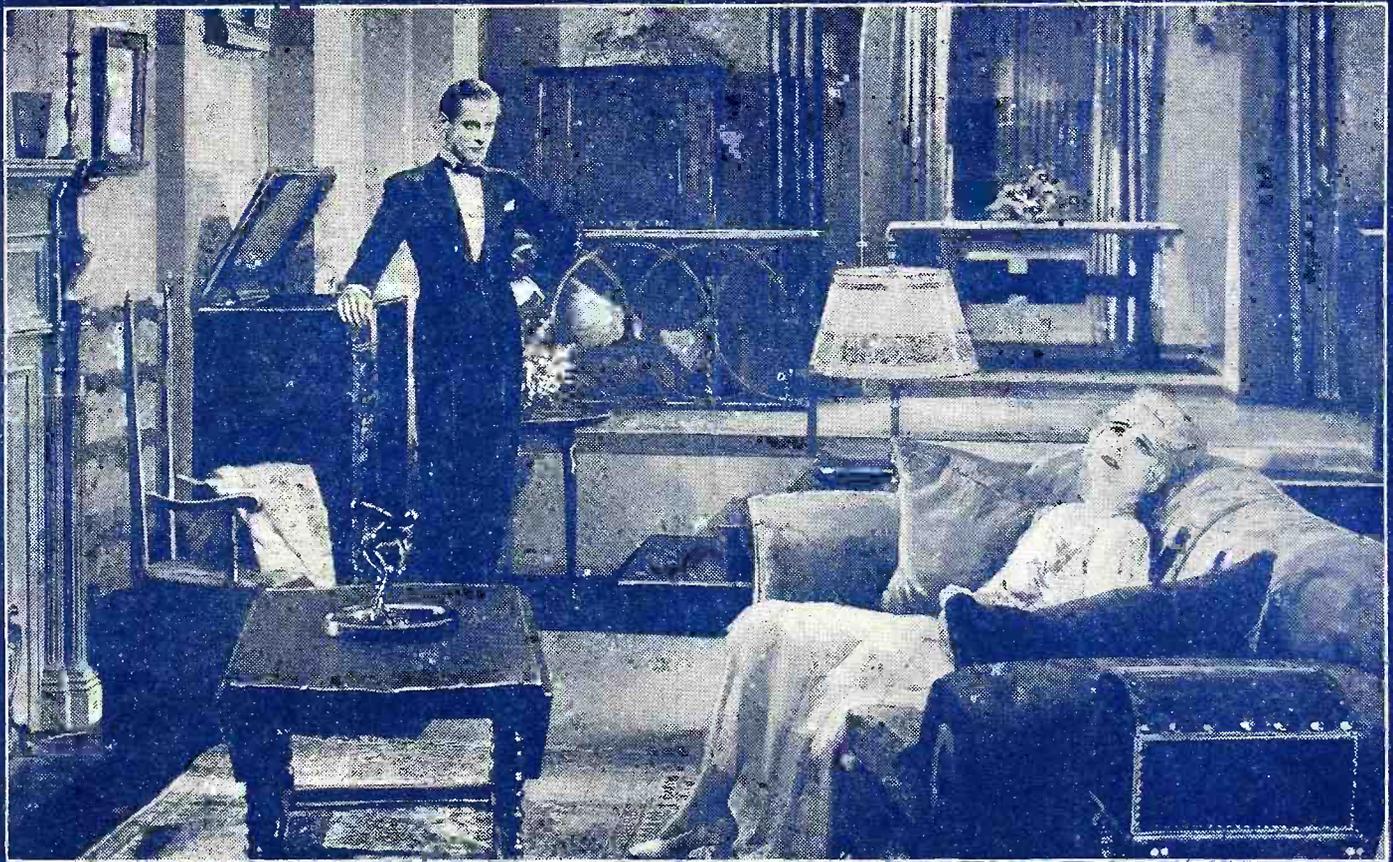
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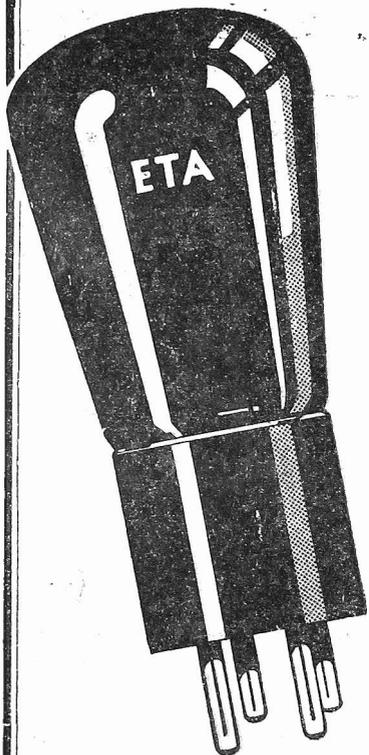
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See Page 23

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(Ad. 1.)

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B.T.H. SENIOR PICK-UP AND TONE-ARM. Complete. (Cash or C.O.D. £2 5s. 0d.) Balance: 8 monthly payments of 5/4.

7/6 Down

PILOT PERMANENT MAGNET MOVING-COIL SPEAKER. In handsome solid oak cabinet, with multi-ratio input transformer. (Cash price £3 15s. 0d.)

Balance: 11 monthly payments of 6/10.
EKCO H.T. UNIT. TYPE A.C.25. For multi-valve sets requiring up to 25 m/a. 3 tappings, S.G., detector and 120/150 volts. For A.C. Mains. (Cash or C.O.D. Price £3 17s 6d.) Balance: 11 monthly payments of 7/-.

VOXKIT 1932 OAK CONSOLE. (Radio only.) Overall: 37 in. high x 22 in. wide x 15 1/2 in. deep Panel (Fret) 12 in. x 7 in. Baseboard 18 in. x 12 in. Front panel fretted or drilled to customers' specification. (Cash Price £3 15s. 0d.) Balance: 11 monthly payments of 6/10.

EKCO K.12. H.T. ELIMINATOR AND L.T. TRICKLE CHARGER. Delivers 12 m/a. Tapped at 80 v (S.G.), 120/150 v. Charges 1/2 amp. at 2, 4 or 6 v. (Cash price £3 19s. 6d.) Balance: 11 monthly payments of 7/3.

10/- Down

B.T.H. SENIOR PERMANENT MAGNET MOVING-COIL SPEAKER. (Valve. £5 12s. 6d. Cash or C.O.D.) Balance: 11 monthly payments of 10/3.

EXIDE 120-VOLT W.H. TYPE ACCUMULATOR, in crates. (Cash price £4 13s. 0d.) Balance: 11 monthly payments of 8/4.

RECENTONE W.1A H.T. UNIT. For A.C. Mains. 3 tappings. S.G., variable and power. 120/150 v. at 25 m/a. (Cash price £3 17s. 6d.) Balance: 11 monthly payments of 6/10.

ATLAS ALL-MAINS UNIT MODEL A.C.188. 3 tappings, 2 variable, 1 fixed. L.T. Trickle Charger at 2, 4 or 6 v. at 5 amp. (Cash price £6 0s. 0d.) Balance: 11 monthly payments of 11/1.

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Messrs. PETO-SCOTT CO. LTD., 77 City Rd., London, E.C.1
 Please send me C.O.D./CASH/H.P.

I enclose **6/-** first deposit for
 (Cross out amount not required.) **7/6**
10/-

NAME

ADDRESS

P.W. 19-3-32

When your friends ask you, as a radio expert, which is the best Wireless Receiver remember what the Press has said about **HIS MASTER'S VOICE** MODEL 435 — PRICE 20 GUINEAS

"This is one of the best sets we have tried this season. Its many technical points will interest the enthusiast and its wonderful performance will thrill the ordinary listener . . . Model 435 incorporates many requirements not found in the usual straight set. . . . One could not wish for better selectivity." *Wireless Magazine*

"It would be difficult to overdo praise for this excellent table-console set, which has a great many points that distinguish it from the ordinary run of sets. . . The quality of reproduction from the self-contained moving coil loudspeaker is simply great. The deep rich bass and the clear-cut treble combine to give a balance of tone not often found in table-sets."

Amateur Wireless

"Practically every modern feature likely to enhance the performance of the set and simplify its operation has been incorporated. Sensitivity is well above the average for a receiver of this type. Separate tuning scales are provided for both wavebands . . . We found the calibration quite accurate and very helpful. All scales are illuminated by concealed lamps."

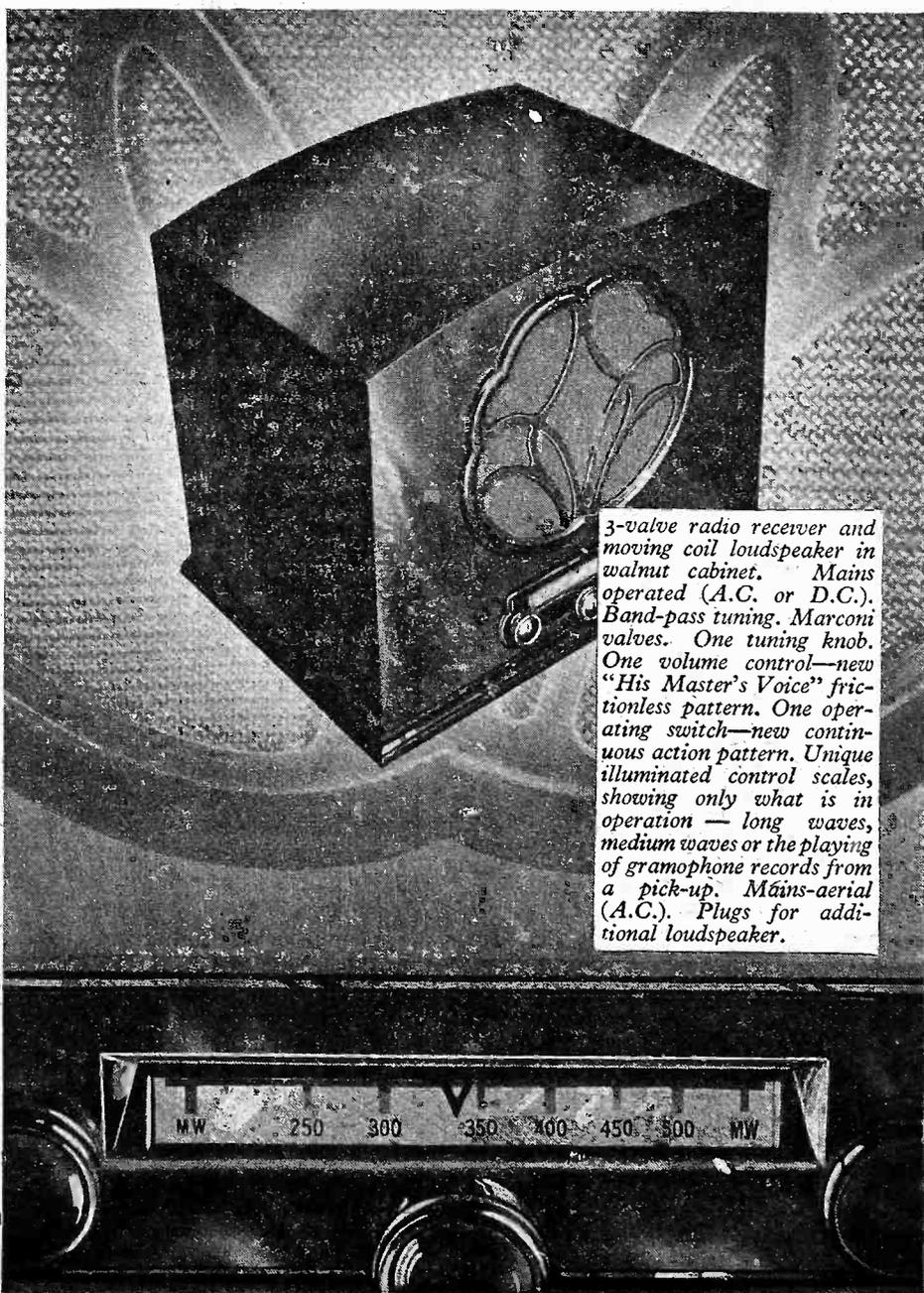
Wireless World

His Master's Voice



Above price does not apply in Irish Free State.

The Gramophone Co. Ltd., London, W. 1

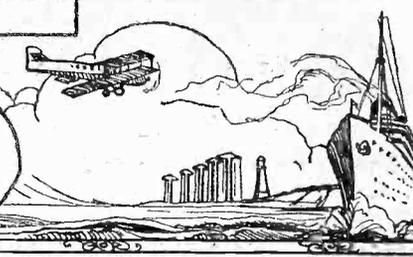
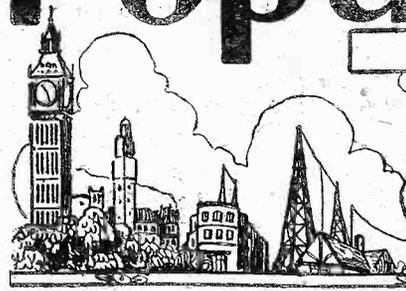


3-valve radio receiver and moving coil loudspeaker in walnut cabinet. Mains operated (A.C. or D.C.). Band-pass tuning. Marconi valves. One tuning knob. One volume control—new "His Master's Voice" frictionless pattern. One operating switch—new continuous action pattern. Unique illuminated control scales, showing only what is in operation — long waves, medium waves or the playing of gramophone records from a pick-up. Mains-aerial (A.C.). Plugs for additional loudspeaker.

Popular Wireless

LARGEST NET SALES

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.
 Assistant Technical Editors:
 K. D. ROGERS, P. R. BIRD,
 A. JOHNSON RANDALL.



LAI D ASIDE
 "ON APPRO."
 HENRY HALL
 NEW ITALIAN

RADIO NOTES & NEWS

A FAILURE
 HIGH SPOTS
 TOOTH - PASTE!
 THE "DOOMP"

Laid Aside.

AS I write these Notes I am in full enjoyment of the well-known fore-taste of the Bad Place—just emerged from the paradise of the flu. My cough could be broadcast as an imitation of a bull singing "The King's Horses" in Wapping Tunnel. The knobs of the set are too cold to twiddle, and 'baccy tastes like smouldering "plimsolls."

I glance out of the window at the aerial and observe that the lilac trees are putting forth little green shoots of leaves, as though to tantalise me with visions of the spring; they and the cats which are fighting on my rarest rock-plants are apparently the only living things in the garden.

Boy, bring forth my short-wave set and make it oscillate horribly. It may warm me!

"Cosmic."

IN a way it is warming to ponder upon our great All-Wave Wonder Wireless Work, known as "Cosmic" for short. Anyone who constructs this receiver accurately may be certain that he has the "last word" in such apparatus, and that he is equipped for world-wide listening. Take my tip and begin on the "Cosmic" now, while copies of "P.W." and blueprints are available for "it is the goods"; to which testimony you may add the more important judgment of the "trade." Look at the support given to "Cosmic" by the trade. Unprecedented in my experience.

Sets "On' Appro."

FOR your information be it recorded that radio dealers are now permitted by the Post Office to issue receivers on approval for fourteen days without a licence being taken out in respect of such; either by themselves or the prospective customers; but a list of the transactions must be kept by dealers.

When a customer agrees to buy a set, which has been installed on approval he must at once get a licence if he does not already possess one. It is, however, still necessary for dealers to hold licences in respect of their own premises.

Canadian Radio.

LATEST statistics show that on December 31st, 1931, there were 548,342 licensed radio sets in Canada, which is about twice the number recorded in 1929; this works out roughly to one set for every four homes. As to individual towns, Toronto heads the list with 75,240, Montreal is second with 68,150 and Vancouver third with 27,574.

cymbals, triangle, and those hanging metal tubes for bell effects? Perhaps the drummer will deal with such odd jobs in his spare time.

New Italian Station.

THE latest step in the reorganisation of the Italian broadcasting system is the opening of the new station at Florence. This station, made at Chelmsford by Marconi's, is rated at 20 kilowatts (new rating), and modulation can be effected up to 100 per cent. The normal wave-length is 500.8 metres (599 k.c.), but can be varied between 250 and 550 metres. It is working at present on a temporary aerial, but when the final aerial, a quarter-wave "T" type on two 100-metre masts, is ready, Florence should be one of the favourite European stations.

LOOKING-IN ON THE SHORT WAVES



This young lady is giving the short-wave fraternity in Chicago a surprise, for she is "tuning" one of the new television transmitters, just placed on the market there at \$50 a time. There are over 30,000 licensed short-wave transmitting stations in the U.S.A., and it will be interesting to see if the idea of sending pictures instead of 'morse appeals to any large proportion of the owners.

Henry Hall's Dance Orchestra.

THE fourteen accomplished members composing this orchestra were selected by Mr. Hall out of some seven hundred applicants. The orchestra is made up of four saxophones, two violins, and one each of the following: trumpet, oboe, trombone, piano, guitar, drum, together with string bass and a vocalist. But what about

Definitions of Ether.

I AM indebted to the "Scientific American" for recalling that Lord Salisbury once defined the ether as a word designed to provide a nominative case for the verb "to undulate." That always tickled me, and it sounds finer the more one ponders upon it. Dr. W. F. G. Swann, of the Franklin Institute has now Americanised this as follows: "The ether is a medium invented by man for the purpose of propagating his misconceptions from one place to another. Of all suitable fluids invented for the stimulation of the imagination, it is the only one which, so far, has not been prohibited." Very happy, that!

A Great Little Book.

ONE of the most wonderful publications for amateurs that has come my way is the "Radio Amateur Call Book Magazine," the Winter Number of which Mr. F. T. Carter, Flat A, Glencogle Mansions, Streatham, London, has been kind enough to send to me. No keen amateur can get his claws on to this book and guarantee to go to bye-bye at a reasonable hour. The annual subscription is 18/6; single copies, 5/6, post free anywhere. Write to Mr. Carter about it; he compiles the Great Britain section. I'll wager that

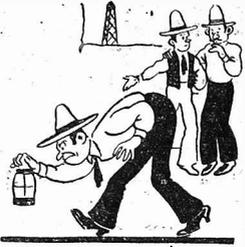
(Continued on next page.)

NEWS—VIEWS—AND INTERVIEWS (Continued)

once you see a copy you will want to learn Morse, make a DX set, and, probably, want to become an amateur transmitter. Well, you'll see! In any case, you will want to have a S.W. long-distance set on the amateur band. Swelp me!

A Suggestion.

ON reading the Argentine radio papers and realising the discontent which is rife there, it seems to me that there might be an outlet for British talent in the most go-ahead



I note a recent cartoon depicting two men looking at a third who, bent double, has a lantern. "This chap, being a proprietor of a broadcasting station, has gone mad." "What is he doing with that lantern?" "He is looking for an artist."

Failure of a "Try On."

ALL-MAINS" users in particular and radio folk in general will rejoice in the defeat of the electricity department of the Grimsby Town Council, which some time ago brought forward a pretty little proposal to charge four shillings a year to owners of radio sets using "eliminators." The Council rejected the idea by a heavy majority. A fine precedent would have been set up, and no mistake, had the matter gone otherwise. I did not see what arguments the department produced, but whatever they were, I do not understand why a Grimsby man can't do what he likes, within the law, for current which he pays for.

"High Spots on the 8.55."

I KEEP my ears open as I journey to the City, and the 8.55 swears by the following B.B.C. "features." Christopher Stone and his grammy, Elsie and Doris



Waters, Haver and Lee, Vernon Bartlett, Leo Henry and his chuckle, Jack Payne & Co., Jeanne de Casalis as "Mrs. Feather," Mabel C., of course, Dean Inge, because of his "well-off" voice; it is Oxford "swank" in excelsis. Ron Gourlay, his pluck and skill. A. J. Alan is a godling, but, like Halley's Comet, only rarely on show. Gillie Potter, who ought to be bound by law to appear once a week; and H. G. Wells.

Finally, the whole carriage hates Foundations of anything, and simply loathes Fat Stocks.

"Now Then, 'Ariel'."

UNDER this provocative title there appeared a long letter on page 734 of "P.W." November 28th, from my esteemed business pupil, Mr. W. Werner. I wish I could devote to my reply the space which his letter deserves. He has got the original subject, "whether radio advertising pays," dreadfully mixed with irrelevant points. However, to tackle the main matter—I have already told him that the reason why business firms in the U.S.A. continue their radio ads. is because each is afraid to drop them. I am not surprised that he failed to get his statistics, but I am amazed that he was innocent enough to ask for them.

Tooth Paste and Sentiment.

I DOUBT whether my grandpa used tooth paste, but I certainly see no reason why I should use a particular kind because the maker pays certain comedians to broadcast. Am I to buy a cloth which I

SHORT WAVES.

Recent atmospheric conditions are said to have had the effect of making clocks and watches slow, thus causing late arrivals at the office.

Office clocks are, of course, unaffected by atmospheric conditions.—"Punch."

The following advertisement recently appeared in a contemporary: "Condensers 0005 Vernier and Ortona 3 Coil toners."

We should be pleased to receive these new lines for review.

What is the difference between a native of Aberdeen and an accumulator?

The accumulator can be overcharged.

It was recently reported that it had taken two engineers three weeks to communicate with each other by wireless. It might have been almost as quick to use the telephone.

OH, THOSE TALKS!

Talk! Talk! Talk!

Till the brain begins to swim.

Talk! Talk! Talk!

Till the eyes are heavy and dim.

Recitals, the weather and news.
Topical talks and such themes,
O'er highbrow stuff I fall asleep,
To syncopate them in my dreams.

don't care for, merely because the tailor plays the flute next door to me? I wonder what W. W. would do if another firm of tooth-paste makers put Alex. and Mose "on the air." An awkward position for a sentimental tooth-cleaner, to be sure! If he makes his purchases out of gratitude its lucky that elephant merchants don't sponsor programmes!

A Few Odd Points.

AS for my never missing a chance to "take a crack at things American," well, I do not think I miss a chance of doing that at anything—I am so international-minded, you know! If America supplies me with so many chances, that is due to her genius for providing matter for comedy. However, I fully agree that, as W. W. suggests, American radio is bewildering, though I dissent from the accusation that I belittle the efforts of my fellow

"fans." What have they to do with sponsored tooth-paste? All the best, W. W.! May radio advertising—in America—never stop; for if it were to do so, where would you be? Why, you might even have to pay a licence fee and buy tooth-paste on logical principles!

Coals of Fire!

AFTER having written the above paragraphs about the value of radio advertising, it felt to me like "coals of fire" on my head to receive from W. W. a card of greetings showing half a sun and a head of parsley perched a-top of half a beetroot, the whole representing, in metaphor, the sun and flora of California.



Well, hard words break no bones, and there is no ill feeling, bo! California is a darned fine place to think about, but England is the place to live in. The happy medium, old son!

More About Dials.

ON February 6th I palmed off on you a second-hand, but perfectly good, joke about a lady who S.O.S'd because her dial had slipped. Hence I was seized with hysterical laughter, a few days after I wrote the paragraph, when I received a letter from a lady relation which ran, in part, as follows: "What do the lines on my dial mean?" (Bless'er'art, she hasn't a wrinkle!) "Do the long ones mean long waves and the shorter ones short waves? Aren't they rather dreadfully mixed up? The man who brought the radio set said they were 'arbitrary,' but I think he was trying to show off. Please explain all this terrible mystery, for all we hear is something very German in the background. Do the knobs move themselves, or must I touch them?" Oh, baby!

The Changing "Doomp."

I FANCY that the B.B.C.'s ghostly interval signal has changed; the ghost has taken off his goloshes and seems to walk with a firmer tread. In fact, it sounds to me as though he is partially materialized and has some meat on his ribs. Or, perchance, he has got his goloshes wet and is walking on linoleum instead of bare boards along an empty corridor. Unless my ears deceive me, the signal now has less "doomp" and more "ponk." Ever read Poe's ghastly yarn about the "Tell-Tale Heart," which began to beat after its owner, murdered, had been put under the flooring? Well, the B.B.C. must know about it, for the "doomp" is IT, to the tick! ARIEL.



"P.W.'s" SPECIAL PROGRAMME FROM —

ESTACÃO RADIO CT1AA THE "GARDEN OF EUROPE" STATION

TO-MORROW (Friday) evening I rather imagine that there is going to be more of a concerted movement of L.T. switches than there has ever been before on short-waves!

For to-morrow evening is the occasion of the special "Cosmic" broadcast from Lisbon, and at ten "pip-emma" a programme is to be radiated from CT1AA—the famous Portuguese short-wave station—for the special benefit of "P.W." readers.

This special programme, the full details of which are given on this page, will continue for two hours, and, judging by the conditions prevailing at the time of writing, there is every prospect that the transmission will be received in this country at excellent strength.

Ever since our preliminary announcement that a special short-wave transmission for "Cosmic" owners was to take place, a tremendous amount of interest has been shown by "P.W." readers all over the country, and we should like to take this opportunity of thanking all those who have sent good wishes for the success of the broadcast.

An Acknowledgement.

We should also like to take this opportunity of tendering on behalf of "P.W." readers our thanks to Signor Abilio

By G. T. KELSEY.

To-morrow (Friday) evening is the occasion of the "Cosmic" broadcast from Lisbon, and every reader of "P.W." is cordially invited to participate in this highly interesting experiment. The final details concerning our programme, which includes a talk by Captain Eckersley, are discussed in this article, and an interesting announcement is made regarding "P.W.'s" original "Cosmic" record.

Nunes Dos Santos for the efforts he has made at the Lisbon end to ensure the complete success of the broadcast.

As for the programme itself, well, every

item promises to be one of unusual interest, and, of course, the real tit-bit of the evening follows immediately after "P.W.'s" greetings to its readers, when Captain Eckersley will "say a few words" as only Captain Eckersley could say them!

For that reason alone, even if there were no other, we are confident that not a single reader with, or within reach of, a short-wave receiver, will want to miss this special programme, for the merits of our Chief Radio Consultant as a microphone personality are already too widely known to need repetition here.

So make sure that your set is "short-waving" all right at ten p.m. to-morrow evening!

The "P.W." Research Department has made elaborate arrangements for the establishment of listening posts in quite a number of districts, and a comprehensive report of the results obtained will be published in due course.

Reports Welcomed.

But we want to make it much more of a combined effort than that, and so we are going to ask every reader to consider himself for the purposes of this test as a "P.W." listening post.

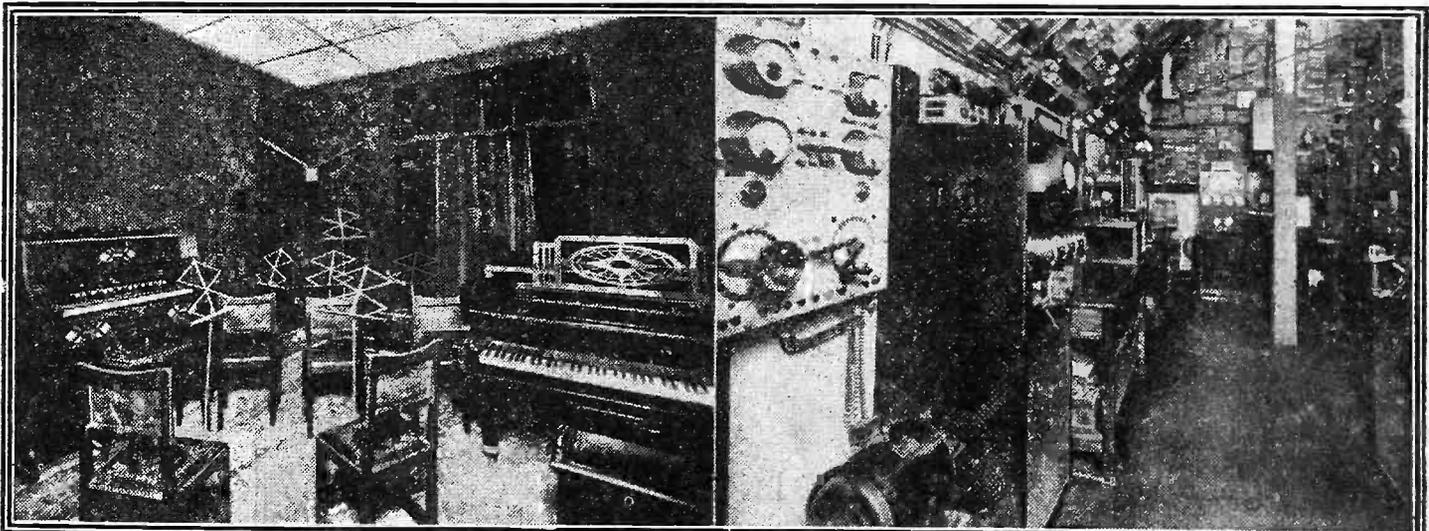
We know that all "Cosmic" owners will be tuned to 42.9

(Continued on page 40.)

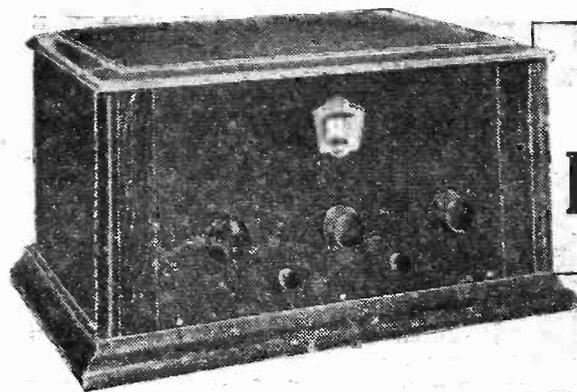
THE "P.W." PROGRAMME

- 10.00 p.m.—Opening Announcement by Signor Abilio Nunes Dos Santos, followed by an Opening March.
- 10.05 p.m.—A pot-pourri of Popular Music.
- 10.15 p.m.—A short address to the world in the world's universal language, Esperanto.
- 10.30 p.m.—"P.W." Readers are introduced to the Music of Portugal with Pianoforte Selections.
- 10.35 p.m.—"P.W.'s" Greetings to its Readers, followed by an Address by our Chief Radio Consultant, Captain P. P. Eckersley.
- 10.45 p.m.—Something out of the ordinary, "The Eldest Ally," by Doctor Penha Garcia, Director of the Lisbon Agricultural Society.
- 11.00 p.m.—The Portuguese Fados.
- 11.15 p.m.—The Popular Songs of Portugal. (Every reader is invited to join in the choruses!)
- 11.30 p.m.—English and Portuguese Literature by "N."
- 11.40 p.m.—The Giant Adamastor—Luis de Camoes (The Luziadas.)
- 11.45.—In the Sunny South—A Popular Feast.
- 12 midnight.—God Save the King and "A Portuguesa" (The Portuguese National Anthem.)

TWO VIEWS OF THIS POPULAR PORTUGUESE BROADCASTER

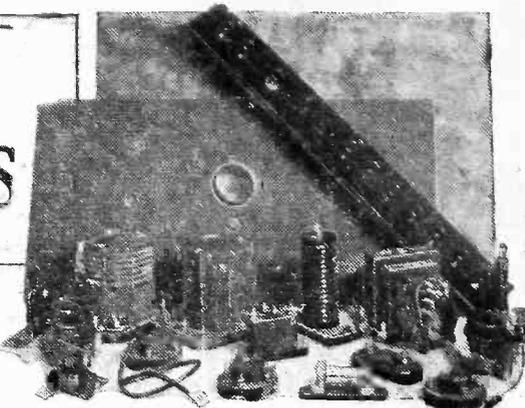


"Hello, Everybody!" This is CT1AA calling to "Popular Wireless" readers! And here we see two interesting views of the station from which our programme is to be radiated. On the left is No. 2 studio at Lisbon, from which the musical items will be broadcast, and the right-hand picture shows part of the elaborate transmitting gear at CT1AA.



FINDING FOREIGNERS

"Cosmic" owners and other searchers of the long and the short waves will find below many practical hints on receiving famous foreign stations.



THE first programme at the bottom of the long-wave dial is Leningrad, on 1,000 metres. This station would more often be picked up in this country but for the fact that its programme is generally lost behind a barrage of Morse from many direction-finding stations—useful for navigation, no doubt, but of no earthly use to listeners!

A little above them, and well received in Northern England, comes Oslo, on 1,083 metres, and just above it Kalundborg, Denmark, "the Great Dane." Both of these announce frequently and clearly.

English Talks From Russia.

The Moscow Trade Union station works on 1,304 metres, and as much of its programme is of a propaganda nature it is given in several languages, including English. Quite long talks in English are to be heard, usually of a strongly political nature.

Lack of space forbids us enlarging upon these activities, so we must pass over this.

Motala radiates the Stockholm programme and generally closes down about 10 p.m. A little higher on the dial we come to Warsaw, Europe's most powerful long-waver, on 1,411 metres.

Men and women announcers are employed,

and the name sounds like "Varshova." This station comes over so well that it can often be heard in daylight, but is very close in wavelength to its neighbour, Eiffel Tower, on 1,445 metres.

"Tour I-Fell."

Eiffel Tower, of course, is too well known to need much introduction, and all we need say about it is that the name as pronounced sounds like "Tour I-Fell."

On 1,554 metres is Daventry National, which, by the way, is to be greatly gingered up by the B.B.C. in the near future, and immediately above it comes Königswusterhausen, the long-wave Berlin relay. A degree or so above that, again, is Radio-Paris, on 1,725

metres, famous for its Sunday afternoon gramophone record concerts, and a useful station to remember when the clock stops overnight, for it sends out a time signal at 8 a.m.

The Upper Limit.

Finally, right at the top of the dial, we have Huizen, Holland, which up to the end of March is radiating the Hilversum programme. By a special arrangement these two transmitters change studios every three months, so until April 1st the actual Huizen programmes go out from the Hilversum station, on 298.8 metres.

English is sometimes used from here, but the Dutch announcements are so clear that there will never be any difficulty with these stations if their habit of swapping wavelengths is remembered.

Although in the foregoing account a great many stations receivable on the "Cosmic" have necessarily been passed over, the listing of medium- and long-wave programmes is child's play compared to those which may be received on the short waves. For the short-wavers are notoriously variable, and an American station which may be coming in very strongly one evening may fade away to almost inaudibility a few days later.

Moreover, short waves are liable to dull periods, when reception seems poor in all parts of the world; but, on the other hand, when they *do* wake up you never know whether it will be America, the Dutch East Indies, or even Australia that may come in like a local!

On short waves, too, the time at which transmission is carried out is very different from medium- and long-wave stations, all of which are better at night than by day. So that short-wave enthusiasts are reminded of last week's article. They should also watch W. L. S. in "Short-Wave Notes" for up-to-the-minute reports on reception possibilities, and as he cannot possibly say all the interesting things that are to be said about this truly fascinating field, here are a few hints about getting America, which provides one of its greatest thrills.

Regular Announcements.

Unlike the rest of the world, the American stations break off the programmes and give their call-signs at each hour and at each fifteen-minute interval between. Thus, if you pick up an American station at five minutes past ten, you must hang on for ten minutes to hear the call at ten-fifteen. If you miss it you must hang on for another quarter of an hour, to hear it at ten-thirty.

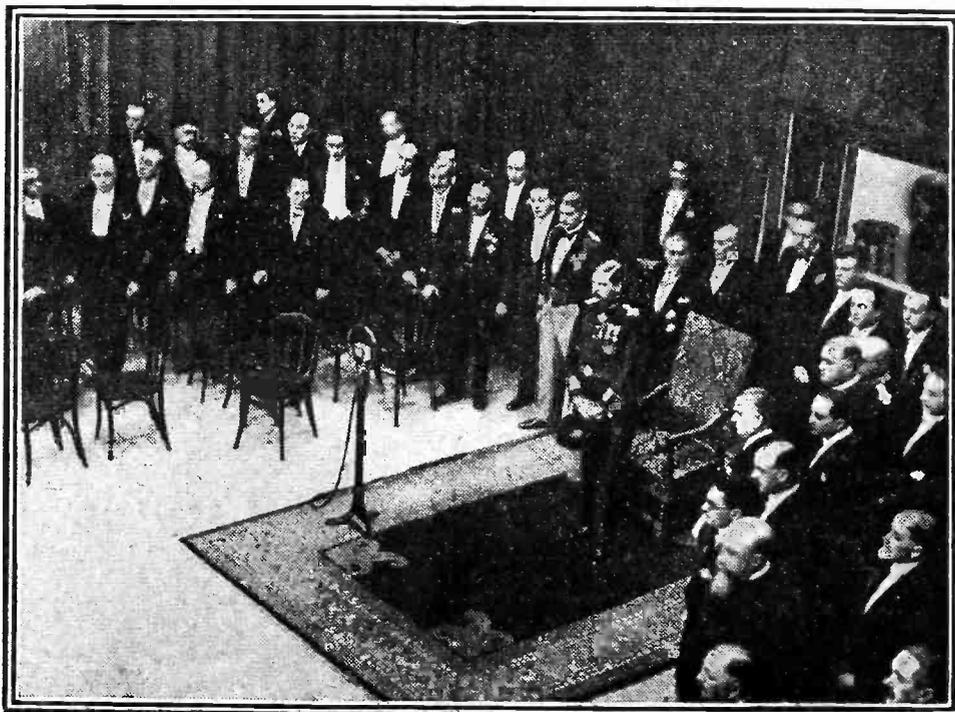
No devotee of the talkies will have any difficulty in identifying the language, but there is one peculiarity of American pronunciation that is worth while calling attention to. The Americans do not recognise the letter Z.

A Difference.

They pronounce it "Zee," so it is very easily mistaken for P or B or D, unless this is remembered. In announcing Springfield, Massachusetts, for instance, on 31.35 metres, the American will say "This is station WIXA Zee," where an Englishman would say "This is WIXAZ."

It is a point well worth remembering.

KING CAROL BROADCASTING FROM BUCHAREST



Here is the historic scene at the opening of the Bucharest Broadcasting Station, which works on 394 metres. It uses a metronome that ticks 160 to the minute.

ON THE OTHER SIDE



A TALK WITH A JAPANESE LISTENER

THROUGH a B.B.C. man I met a Japanese student now over here in London to study modern subjects, broadcasting included.

He had been back in Nagoya less than a year ago, so he knows all the latest news about Japanese radio. I had previously imagined that radio in the sunny land must be primitive, but in conversation I learned otherwise.

"I suppose the trouble with China," said this student, "has shown you British listeners that our broadcasting is quite in line with yours."

"Before telling you about our elaborate system of simultaneous broadcasting all over the Japanese islands, I should explain that prominent Western concerns have been responsible for some of the stations, Marconi's, Standard Telephones, and others.

Great Progress.

"Progress in radio manufacture has got so far that there are three firms making valves, even transmitting valves, and there are, I should think, about forty competent radio manufacturers. The chief demand is for crystal sets, but I will deal with this point later.

"A big organisation, Annaka, builds transmitters, and one of these is used as a standby in Tokyo.

"Our broadcasting has been in existence since about 1924. In fact, immediately the B.B.C. was in full going order and press reports began to reach Japan regarding your early Covent Garden opera broadcasts and news bulletins, our Government decided that something must be done to find a Japanese Broadcasting Corporation.

A Government Concern.

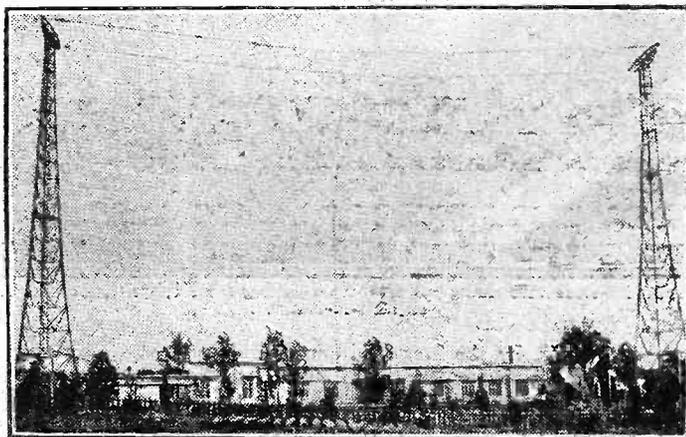
"The late Count Goto, a Governmental leader, was responsible for starting the Nippon Hoso Kyokai (Broadcasting Corporation), and he sent a representative over to England to study the way the B.B.C. were doing things. Count Goto realised

Our Special Correspondent interviews a Japanese radio enthusiast who gives some interesting sidelights on radio reception to-day in sunny Japan.

that a semi-private enterprise like the old British Broadcasting Company was no use to us, and he started the Hoso Kyokai much in the same way as your present Corporation.

"The Hoso Kyokai started in 1925, and there was the usual Government Charter which settled licence fees and so on.

THE GREAT "J O A K" OF JAPAN!



This is the high-power Tokyo station, which rejoices in the letters J O A K for its call-sign. Its technical equipment is thoroughly up to date and efficient.

"The idea was that the Corporation shouldn't work for profit and that the one yen a month (about two-shillings) collected from all-listeners should go towards station upkeep. Many of the programmes are provided free. Some of the news bulletins, for instance, are given by the local papers, which get publicity out of it.

"We started off with three 1-kilowatt stations. Japanese engineers were given the job of erecting these, but as the Government was very anxious to get the transmissions started, and there was no Japanese

plant available, they put the contract in British hands.

"The great volcanic eruption which caused a national calamity very soon after the start of broadcasting was a setback; but, to cut a long story short, the damaged buildings were repaired and the country benefited by the news service, which was kept going all through the disaster. Now there are seven big stations, and independent stations on the Island of Chosen, and at Taiwan and Davien."

"How many listeners are there?" I asked.

"There are about 70,000 licensed listeners, and the small monthly fee is collected by Government officials. There aren't any figures for 'pirates' yet, but probably there aren't many, because people in the country districts, who know so little about wireless that they can't even build crystal sets, go to local wireless centres for advice, and pay their licence fee as a matter of course!"

Many Crystal Sets.

"Why crystal sets?"

"There are far more crystal sets than valve sets because valves cost eight or nine yen. This is a lot of money for the country folk, and they can make a crystal set complete for two or three yen.

"We estimate that there are about seventy-six per cent of crystal sets in the whole country, and it is only in the chief towns like Tokyo that there is a great proportion of valve-set users.

"The reason for that is that there are three stations at Tokyo, two of which are generally working, and more than crystal-set selectivity is needed. It will be worse when some of the new relay stations start up."

"What will they do?"

"There are to be five relay stations taking their programmes on the buried telephone cable which runs the whole length of the main island. These will be crystal controlled, and at least two of them.

(Continued on next page.)

A TALK WITH A JAPANESE LISTENER

(Continued from previous page.)

will be working on synchronised wave-lengths."

"How do you fare for wave-lengths?"

"There are no wave-length troubles, and the only interference is from shipping. Some owners of big sets manage to hear the American programmes, and one friend of mine in Nagoya has a short-wave super-het. which picks up Chelmsford!"

"The Japanese Broadcasting Corporation has a testing laboratory just outside Tokyo, and Mr. Yokoyama, the Chief there, has a short-wave outfit which they are trying to make stable enough for occasional B.B.C. relays."

Relayed From London.

"When the speeches of the Japanese delegates at the Naval Disarmament Conference two years ago were broadcast, it was a short-wave super-het. at Mr. Yokoyama's laboratory which relayed the speeches. I was in England at the time."

"I heard that it wasn't a great success, as it was in the early morning and there were too many atmospheric. When your new Empire stations start up it may be possible to get regular B.B.C. relays."

"This will help the Japanese Broadcasting Corporation, which is going all out to teach English. All the stations on the Tokyo-Nagoya land-line circuit give daily three-quarter-of-an-hour English talks. Your English word 'radio' is in popular use in Japan."

Incidentally, my student friend pronounced it "radd-yo."

"All the stations open at about nine in the morning, and most of them shut down by ten o'clock at night. There is still a sort of curfew order in force with regard to evening entertainment."

"How do they choose your programmes?"

"Mr. K. Iawahara, the President of the Japanese Broadcasting Corporation, has set up a committee of six experts, and they decide the programmes for the chief stations about a month ahead."

The Children's Hour:

"What are they like?"

"Generally, the morning is taken up with practical home talks, which appeal to the modern women of the 'new Japan,' and with light orchestral music. There is a Children's Hour at six on very British lines."

"You know, proverbially, how children are revered in Japan and how special Feast

days are set apart for them, when there is a general flying of kites. The broadcast Children's Hour is therefore more important than you would at first think, because it is one link with the old customs of Nippon."

"There is a big American influence in Japan, and this applies strongly to any modern things like broadcasting. In some ways this is fortunate. We have copied the National American game of baseball, and Outside Broadcasts of baseball and *sumo* games are given every week-end."

Occasional Television Transmissions.

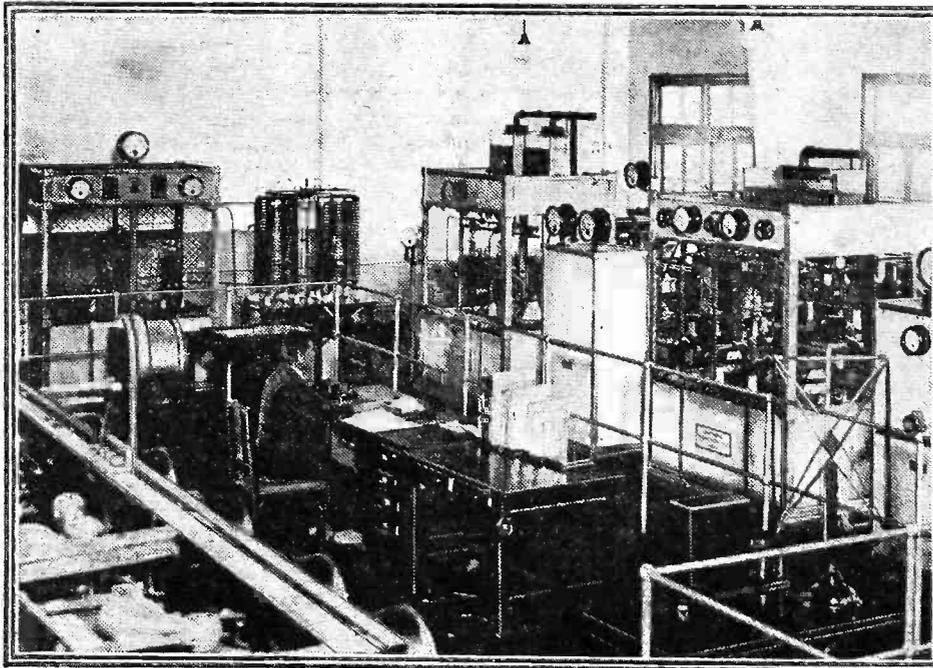
"An American television concern has started a branch in Tokyo, more with the idea of carrying out long-distance tests with the Chicago Headquarters than with the object of interesting Japanese listeners."

"Occasional television transmissions are given with an ordinary rotating disc system. I should think it highly improbable that any television sets have been sold, but it is this American system which is always demonstrated at Fair times."

"What about wave-lengths? Could we hear your stations?"

"There is a big British Marconi broadcaster in Tokyo and a 10-kilowatt station

INSIDE A BIG JAPANESE BROADCASTING STATION



A picture of the British-made transmitting gear in the main building of the Tokyo station, with the Japanese engineer-in-charge.

built by the Standard concern. They have picked wave-lengths of 345 metres and 375 metres. Similar stations at Osaka and Nagoya work on wave-lengths just above and below these."

"These stations serve the country districts, and the Hoso Kyokai has started a travelling service van which goes out to help any listener who writes into the station and says that he is in trouble with his set."

"They will probably have to continue this scheme for a few years until the present people have become more accustomed to the *Amerikya* idea of broadcasting!"

EDITOR'S NOTE.

The next article in this fascinating series will be "A Talk with a Dutch Listener."

RECEPTION REMINDERS

H.F. Grid Bias—Using Compression Condensers—Setting a Trimmer, etc.

The absence of proper negative grid bias on an H.F. valve is a frequent cause of flat tuning.

Generally speaking it is not advisable to use a compression-type condenser connected between filament and plate of a detector valve for bypass purposes, unless a fairly large fixed condenser is joined in series with it (about 0002 mfd. or more will do).

Usually the trimmer on a band-pass condenser should not be set all out, or all in, but in an intermediate position.

When using old valves, remember that although the valve makers give data for certain types, it occasionally happens that the types themselves sometimes change considerably while retaining the old number, etc. So unless this point is watched the valve-maker's own recommendation may be wrong for the old valve in question.

A deficiency in high-note response is sometimes due to the employment of very long loudspeaker leads of twisted flex, the self-capacity of which is enough to give rise to the effect named above.

Unsatisfactory reaction, especially on short waves, can sometimes be remedied by including a fairly high resistance in series with the reaction coil.

When a set employs one H.F. valve it is a good plan to occasionally check if this is "pulling its weight" by transferring the aerial to the anode terminal of the H.F. valve, thus converting the set to a plain Detector-L.F. arrangement. (A small fixed condenser should be inserted in the aerial lead for this test.)

When adjusting trimmer condensers it is a good plan to have a milliammeter in the detector's plate circuit and to tune accurately by the aid of this before adjusting the trimmers, or what appears to be better balance may prove to have been readjustment of slight mistuning by the trimmers.

A good idea of the efficiency of the aerial can be obtained from a set with reaction on the anode of the H.F. valve by picking up a carrier-wave without the aid of the first tuning adjustment, and then carefully noting the effect of bringing aerial circuit into tune.

When D.C. mains are used to supply H.T. to a radiogram, it is often an advantage to "isolate" the pick-up, in the same way that a loudspeaker output is filtered.

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.

The Alternative Earth.

D. J. (Barking).—"As I am unable to obtain a good earth connection unless a long lead to the receiver is used, I have been considering using two separate earths. One of these would be connected to a water cistern and would require only a short lead, and the other would consist of a long lead connected to a metal plate buried in the earth.

"Do you think that connecting both these earths to the receiver would be any improvement over using only one or other?"

I don't know! It's impossible to be definite on a subject like this, there are so many variables.

I should say, however, that your best plan is to connect a single earth to the water-pipe. If that doesn't give good results there's no harm in trying the other scheme, but you must in the end decide which is better. Sorry!

A Lead Plate for Earth.

G. B. F. (Hull).—"Is there any reason why a sheet of lead should not be employed as an earth plate—so far as I can discover this would be practically indestructible and also far cheaper than copper?"

For the purposes of broadcasting receiver earths, lead is just as good. Because although lead has a smaller conductivity than copper, earth resistance, within limits, is not very important in deterring the strength of signal. But in a transmitting station the earth resistance is very important, and one has to use copper because of its superior conductivity.

So a lead plate is good for receiver work. Bury it as deeply as you can, and choose a spot where the earth is nice and moist. Make two or three different connections to it, and then, should one come off, you will not have to dig the hole again.

Crystal Detector Following an S.G. Valve.

S. N. (Birmingham).—"I am building a new wireless set and I want to employ as few valves as possible. Is there any objection to my using an S.G. stage, followed by a crystal detector and one L.F. stage. It seems to me that a crystal will enable one valve to be eliminated with a consequent saving in current."

Yes, it's all right I suppose to use a detector of the crystal type following an S.G. valve, but (a) a crystal is apt to give unreliable service; (b) a crystal is apt to get overloaded by the strong signals given it by an S.G. valve; (c) a crystal may be spoiled if the S.G. valve causes oscillation.

But there's nothing theoretically wrong with the idea—it's purely a matter of practical difficulty.

High Frequencies and Low.

D. I. (Ilford).—"I have been reading some articles on wireless, and have encountered two expressions—high frequency and low frequency. Are these two related and when is 'low frequency' sufficiently high to be called high frequency?"

on 300 metres, then it creates currents in the receiver aerial having a frequency of 1,000,000 a second. This is the high frequency.

But they put on that filthy tuning note, say, and this modulates the intensity of the million a second frequency up and down about 1,000 cycles a second. This is a "low frequency."

Your detector cuts out the high frequency (one million) and passes on the low frequency (one thousand) to your loudspeaker. Thus low frequencies are sound frequencies, and may use from 30 to 20,000 (but we usually take 10,000 as the upper limit), high frequencies may be as low as 20,000 cycles with very long waves never used in broadcasting.

Thus high-frequency currents are aerial currents, and in wireless practice may use anything from three hundred million (wave-length 1 metre) to 20,000 cycles per second (wave-length 15,000 metres). The latter not much used.

Low-frequency currents are power-circuit currents (50 cycles per second for usual electric light and power distribution alternating-current systems), and speech and music currents for modulating and working loudspeakers, and in this case may have frequencies from 30 to 20,000 cycles per second, but the usual gamut is 30 to 10,000 cycles per second.

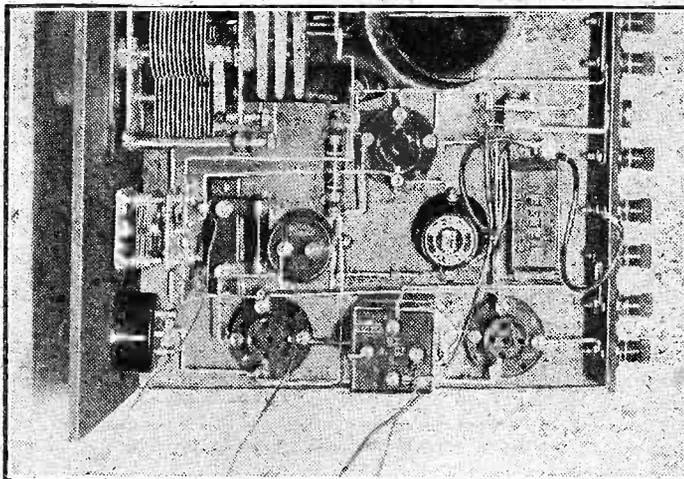
A Glowing Fuse.

B. T. (Eltham).—"My receiver is of the type with a Det. and two L.F. stages, and has a 60-milliampere fuse connected in series with the H.T.—lead. I have noticed that occasionally when heavy music is being received the fuse bulb glows dimly, and I cannot understand why this should be, as the valves used should only take about fifteen milliamps with the grid-bias voltages used."

Look at it this way. A loudspeaker takes power to work it, and a great deal of power too, compared with what some people estimate.

In my opinion, the last valve of a good set should give a peak power of about 2 watts! Now all this power has to be fed from the high-tension supply, and in your case through the fuse. The fuse glows when lots of power is being passed, particularly if overloading takes place.

PROVIDING FOR A PICK-UP



It is quite an easy matter to reproduce your gramophone records electrically, but the extra wiring should be short if instability is to be avoided. One very neat and successful arrangement is to use a jack mounted on the terminal strip, as shown (top right) in this three-valver.

High frequency and low frequency are somewhat ambiguously used terms. In general, all "wireless" currents are "high frequency," all speech and music currents are "low frequency."

Suppose you have a station transmitting

ONLY IN "P.W."

can you read Capt. Eckersley's replies to listeners' own problems.

AND REMEMBER—

Captain Eckersley's technical articles appear only in

"POPULAR WIRELESS" and "MODERN WIRELESS"

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found—?



TWO BULGIN PRODUCTS.

THERE are some people who seem to take a delight in craftsmanship pure and simple. They will perform the most arduous tasks in order to accomplish the unusual, the ultra-tricky, the hyper-intricate in a display of amateur engineering.

For example, they will scorn an easy-to-handle material like ebonite and use plate glass for their set panels! Fancy cutting condenser escutcheons out of plate glass! Yet there are enthusiasts who do such things.

USEFUL ITEMS



Constructors will welcome these two new products—particularly "Quickwyre."

Good luck to them! say I. Let us admire their patient skill. But most of us are prepared to undertake only the easiest of mechanical operations in the building of radio sets—the easier the better!

And the tougher the insulation on the wire we use for connections and the harder it is to bare the ends . . . the more we wish we had bought bare wire or that untidy, soft cotton-covered stuff.

So our enterprising friends Messrs. Bulgin, who seem to have the power to read the hearts of constructors, have weighed in with "Quickwyre," which deserves a place of honour on every workbench and kitchen table in the land.

It has an elastic and entirely neat fabric insulating covering. Snip off the right length, push the covering back with the fingers, solder or screw up the bright wire end which is revealed, slip back the insulation, and the job is done—and done as neatly as a factory finish.

No scraping about with a knife, no frays, 6d. per 10-ft. coil in red and black—a pretty big sale . . . unless I'm badly mistaken.

Of more limited interest, but no less praiseworthy in its way, is the new Bulgin Potential Divider. This is a 20,000-ohm resistance able to carry 30 m/a, and has 11 tapings. A compact, serviceable component, it costs 3s. 6d.

ROUND THE TRADE.

The Junit Manufacturing Co., Ltd., inform us that they are now able to give delivery of the components required for the Midget Power Unit in kit form.

PLEASE NOTE.

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 of 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.

Tekade Radio & Electric, Ltd., say it has been brought to their notice that certain retailers are showing moving-coil and inductor type loudspeakers, which are claimed to be "Motor" speakers, but in actual fact although a "Motor" moving-coil speaker is in production it is not yet in distribution, and neither a "Motor" speaker nor unit of the inductor type has yet been produced.

TESTING YOUR SET.

Every listener should possess a meter. I say "listener" advisedly, for there seems to be an impression that meters are used by or, rather, are useful to only the experimenter.

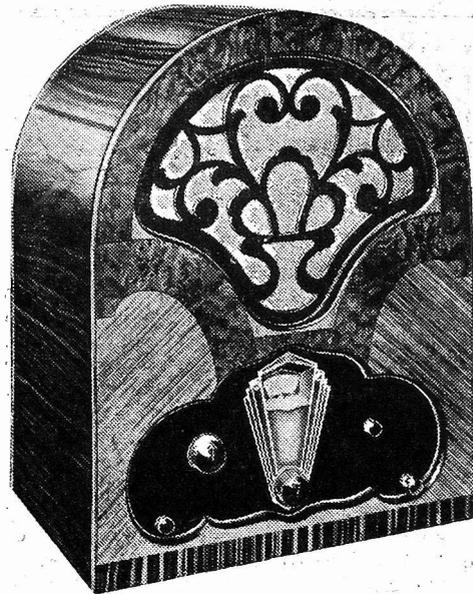
But no radio set, particularly if it is of the battery-driven type, can be maintained properly unless the user is able to test the condition of at least his G.B., L.T. and H.T. batteries.

Fortunately, there are combination instruments able to test the voltages of all such batteries. They are not, and can hardly be, precision instruments of the nature used by scientists in laboratories.

But accuracy to an umpteenth point is not necessary and, anyway, few could pay the price for such even if it were needed.

An excellent example of practical versatility is provided by the Wates Universal Test Meter. This inexpensive device enables you to test voltages between 0 and 6, and 0 and 150 volts, and current between 0-30 milliamperes. Additionally, you can take direct readings of resistance from 0 to 2,000 ohms.

FOR A TELSEN SET



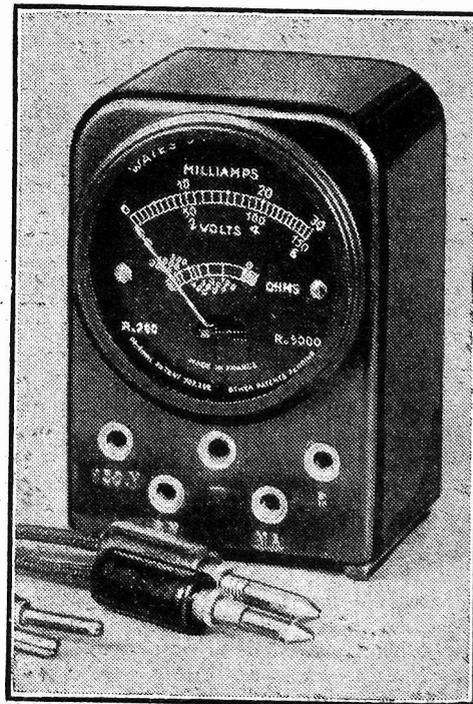
This handsome cabinet was specially designed by Radiocabinets Ltd. for the Telsen Triple Three.

So, besides being able to test accumulators and H.T.'s, it provides for all ordinary "servicing" tests.

Instructions are included showing how these can be done without the need of expert knowledge.

It is quite a small device, and on test I found it to be perfectly satisfactory. Messrs. Wates should do very well with this latest product of theirs, for their potential customers are limited only by the number of listeners in the land.

A COMPLETE TESTER



You can test practically anything with this Wates Universal Meter.



PRESENTATION PROBLEMS

By VAL GIELOUD.

THE present situation of the broadcast play is rather a curious one. On one side there is a certain amount of evidence to prove that there is a steadily increasing number of listeners who listen and enjoy listening to radio drama, and a corresponding tendency in broadcast programmes to allot more time to and to enlarge upon the importance of broadcast play production.

"Why Try?"

On the other, there remains a very large number of people, including many intelligent people and many constant listeners, who persist in treating the broadcast play either as a very indifferent substitute for the theatre or—still more discouraging—who say flatly that it is ridiculous to try to broadcast plays; drama cannot be broadcast, and why do we continue to attempt the impossible?

In various talks and articles, I have done my best to deal with the point of view which regards the broadcast play as secondary theatre.

The broadcast play is not an attempt to compete with the stage. Producers at Savoy Hill are not trying a fall with Mr. Cochran or Sir Gerald du Maurier on their own grounds. And for the most part writers and producers of radio drama are not aiming at the same audience which visits the theatre.

The Die-Hards,

The die-hard opponents of the broadcast play in all its forms are for the most part to be found among those people who believe that the West End of London is not only the centre of the world, but also the world itself; and who forget that there are very many persons, leaving out of account invalids, elderly people and the very young, who live in circumstances which prevent them from ever going near a theatre, and whose experience of drama, apart from broadcasting, must be confined to the reading of plays.

I might perhaps argue that the fact that the audience for radio plays is increasing is sufficient justification for their production or, alternatively, I

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**"The way that things are put—
what a difference it makes!"**

You may thoroughly enjoy a "Conversation in the Train," though a talk on the same subject would leave you cold. In this interesting contribution the B.B.C.'s Director of Productions shows how the broadcast play has tended to improve radio showmanship.

* * * * *

might maintain that practice in this particular medium, not only in its production by those who handle it, but also in listening to it by those who hear it, is improving the standard of broadcast plays so considerably that every day they are getting nearer to the point at which they can, purely as a form of entertainment, issue a direct challenge in their own line, either to the films or to the stage.

I think that, to some extent, this last contention is true, but I am diffident about insisting upon it when the inevitable implication is that I am crying my own wares and even possibly blowing my own trumpet.

I would prefer to say something here about a contribution to broadcasting which, in my view, has been made by broadcast drama, and which is, for the most part, either ignored or simply not realised. The broadcast play as a medium for the expression of drama has, with all its faults, given a certain amount of entertainment, provided a certain amount of familiarity with certain classics, and provoked a certain degree of controversy; and all these things are in their way good.

"Presented by—"

But the broadcast play has made one contribution of the most vital importance to programmes as a whole. I suggest that it is to the development of the broadcast play that an appreciation of the importance of "presentation" as applied to most broadcast work is due. Let me explain a little further.

Do not for a moment suppose that I am claiming that this contribution is due to any outstanding brilliance, capacity or even common sense on the part of the members of the department most immediately concerned. It has nothing to do with individuals. It merely has to do with inevitable circumstances.

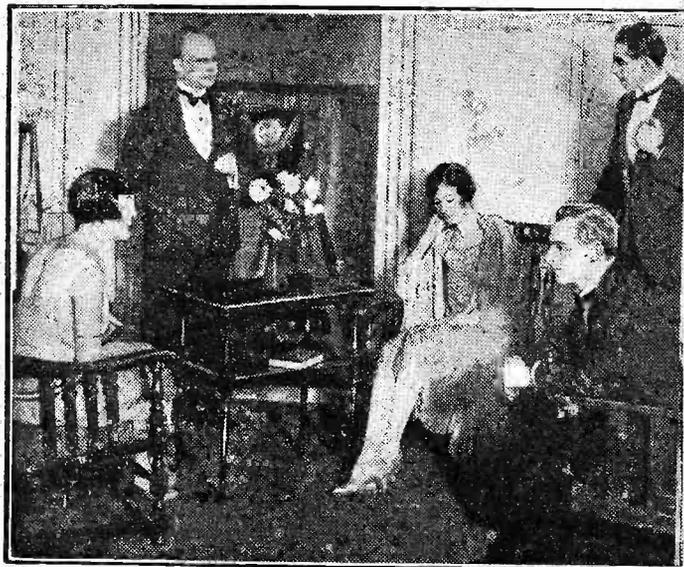
Any student of broadcast programmes will realise what I am talking about at once when he thinks of certain programme items that appear in the lists of B.B.C. output that cannot, by any flight of fancy, be called plays, and yet owe not only the success they may achieve but even the framework on which they are built, to this word "presentation."

"Songs from the Shows."

As examples, I might quote the "Conversations in the Train," which are "presented" talks, "Songs from the Shows" which are "presented" programmes of popular songs and, of course, such special programmes as those which celebrate New Year's Eve, Empire Day and Armistice Day, or programmes of the type of "Crisis in Spain" or "The Hundred Days."

It can be seen from these
(Continued on next page.)

THE VOICE MUST SHOW THE CHARACTER



In a radio play, the only way of "getting the characters across" is by means of the voice, so each player must be distinguishable from the others immediately he speaks. This is a scene from a radio play broadcast from Manchester.

PRESENTATION PROBLEMS

(Continued from previous page.)

examples that there is a continually increasing tendency for this "presentation," which is simply one aspect of the technique of production, the technique of showmanship, to spread from the realm of the simple straightforward broadcast play into many other fields of broadcast output.

Why should this idea of presentation have originated with the broadcast play? The answer is extremely simple. When broadcasting began it was naturally not considered, in the first instance, as a new medium at all. The microphone was thought of simply as a way of eavesdropping upon other mediums.

Just Eavesdropping.

If you are broadcasting a concert, or a speech from a public banquet, the idea of any special presentation of that programme item to the microphone is, on the face of it, quite unnecessary. You are, after all, only hearing in your own home what you would, but for a change of place, be hearing in the concert hall or the banquetting room.

And in the first instance the same method was applied to the radio play. Microphones were put close to a stage, and the audience heard what it could. It was, however,

MR. VAL GIELGUD



A recent portrait of the author of this article. It is largely due to developments made under his supervision that the present high quality in radio plays has been attained.

soon discovered that while, by putting a microphone into a concert hall, provided your technicians knew their job, you could hear your concert perfectly well, if you did the same thing in a theatre you got an extremely unsatisfactory result.

The eavesdropping method simply did not do, and therefore it was necessary to transfer the whole problem of broadcasting drama away from the eavesdropping microphone in the theatre and to put it into a studio.

From that point the following stages of two studios, a dramatic control panel, effects, and all the rest of the elaborate apparatus which now makes up the art of radio drama, followed perfectly naturally, simply and inevitably.

Drama, in short, came to be specially presented to the microphone because in no other way could drama be broadcast satisfactorily. All this happened, I repeat, not because the people responsible for broadcast drama were unusually intelligent, but because unless some solution of this sort had been discovered their job could not have been done at all.

The Taste for Drama.

But if this matter of presentation had stopped short in achieving its success—and I say advisedly its limited success—with broadcast plays, its contribution to broadcasting would have been small. For however fascinating and however interesting the broadcast play may be, it is doubtful if it can ever appeal to the majority of licence-holders.

A taste for drama is by no means universal, as theatrical managers have learnt to their cost. But those responsible for broadcast programmes as a whole have been quick to realise that this art of presentation is one that need by no means be confined to broadcast drama; that not only is the broadcasting of plays a special medium, but that the broadcasting of practically everything is a special medium, and that if it is worth while to treat drama in a particular way because it is being conveyed to its audience through the microphone, it is probably also sound to consider whether other items do not require and deserve special treatment of the same kind on their long road from the brain of the programme builder to the ears of the listening audience.

Running Commentaries.

It would, of course, be nonsense to pretend that some of the greatest pleasure and many of the greatest successes achieved by broadcasting are not those that arise from bringing the listener into the closest possible contact with something that is actually happening.

The Cup Final, the Schneider Trophy, the Ceremony of the Keys, the relays from Covent Garden, or a speech by the Prince of Wales, have an immediate appeal and a programme value which need a minimum of qualification by presentation however skilful; though in parenthesis one might refer to various types of running commentaries as one rather elementary method of special presentation.

But once a programme item leaves the sphere of actuality and enters that of a studio, it is not only advisable, but almost imperative, that "presentation" should take a hand, and broadcast showmanship, in the best sense of those words, be called upon to give that programme item its best opportunity and its widest appeal.

The New Art.

The opera or concert that is broadcast from the studio, the talk or the discussion that is broadcast from a studio, are in this sense affected by the same circumstances as the play which is broadcast from a studio. They are, in the first place, handled not for the benefit of people looking on and listening in the same room, but for people who are hearing at a distance, and it is

the duty of those who present any programme item broadcast from a studio to think of that item in those terms.

Plays had to be treated thus, and that they were so compelled is their principal contribution to the whole art of broadcasting, in so far that they have brought special presentation into the limelight and proved its value.

HAVE YOU HEARD HIM?



This is Sidney Kyte, whose band has recently been added to those which broadcast. They are heard playing from the Piccadilly Hotel.

STOPPING THAT HUM.

A useful reminder and a hint about electrolytic condensers.

ALTHOUGH the permanent-magnet moving-coil loudspeaker appears to be gradually ousting all other types, there must still be a large number of those instruments which required a six-volt accumulator to provide the magnetising current. Some of them took as much as 1 ampere, and, needless to say, it was no easy matter to keep an accumulator going which was capable of feeding such a hungry monster.

These loudspeakers can be supplied with current very conveniently and economically by a suitable dry rectifier, or perhaps a mercury arc rectifier, but in many cases a very disturbing hum is experienced. Owing to the large current flowing, the addition of a fixed condenser of 4 mfd. or so across the output of the rectifier is of little use as a cure.

Use One of These!

Fortunately, however, there are several very good low voltage electrolytic condensers on the market, with a capacity of about 2,000 mfd. If one of these is connected across the output of the rectifier, in nine cases out of ten every trace of hum will disappear. Great care should be taken to see that it is connected up the right way, otherwise damage will result.

The positive terminal of the condenser should be joined to the positive terminal of the rectifier. And, of course, the negative to the negative of the rectifier.

A FILTER FOR THE "COSMIC"



By
A. S. CLARK

MANY readers who have made up a "Cosmic" Three set will remark on seeing the title of this article: "Good! Just what I want." They will be those who are used to working with an output filter.

But others will want to know, "Why should I fit an output filter? What shall I gain by doing so?" and then, after pausing to consider for a moment, "Surely, if one were really necessary, it would have been incorporated in the original designs."

A Desirable Addition.

All of which constitutes the right attitude to bring to radio. Our explanation is that a filter is not *essential*, but is *very desirable*; and before you get the chance to say, "Why?" we will "step on the gas" and get along with the advantages of this little refinement to the finest all-round set ever designed. Sticking right out from the rest is "improved quality." Yes, I know what you want to tell me; you want to inform me that your quality is already jolly good. Of course it is, isn't the set the "Cosmic"? But that's no reason why you should not make it even better, in fact, it's every reason why you *should* go one better and get it as near perfect as possible.

Before going any further, let me tell you that the extent to which you will notice a difference depends (a) upon the quality of the speaker you are using, and (b) upon the degree to which the things overcome by a filter are extant at the present in your particular combination of conditions and accessories.

Improved Quality.

Take (a), the better the loudspeaker you use, the bigger the difference a filter circuit will make. A poor speaker has no reason to sound much better on a good input than on a bad input, but change a good speaker from a good input to a bad one and it will immediately emphasize all the defects.

But enough of that. What about (b)? If we deal with the reasons why the choke and condenser improve quality, we shall at the same time be pointing out the "things" which are mentioned under (b) as being possibly extant in the set.

First of all, there's voltage on the plate of the last valve, a power valve, requiring from 5 to 20 milliamps of current according

Do you use a mains unit for H.T.? Have you long extension leads for the loudspeaker? Or are you a stickler for getting the very best quality possible? These questions are all bound up with the use of an output filter, and this article tells you how easy it is to fit one to your "Cosmic" receiver.

to its class. Everyone knows that voltage must be kept well up if the full power handling capabilities of the valve are to be retained, and unfortunately, H.T. volts are more easily lost than gained, particularly where dry batteries are concerned.

Yes, and a loudspeaker can cost you 40 whole volts, too! That is, if it is connected directly in the anode circuit.

With a filter, the choke takes the place of the loudspeaker and only wants a meagre few volts off the H.T.

This has nothing to do with getting wet, but a piece of cloth soaked in water forms a good analogy.

You can't make a saturated piece of cloth carry any more water, and no more can you make a magnetically saturated piece of iron carry any more magnetism, or magnetic lines of force.

Protecting the Speaker.

The anode current from the valve may saturate the speaker's magnets, consequently the varying audio-frequency currents will not have their proper effect on the magnetism, consequently the speaker will not emit sounds in accordance with the "speech" currents, consequently we get distortion.

Therein lies point No. 2. With a filter the steady current goes through the choke and only the fluctuating current through the speaker. So there is no possibility of speaker magnetic saturation.

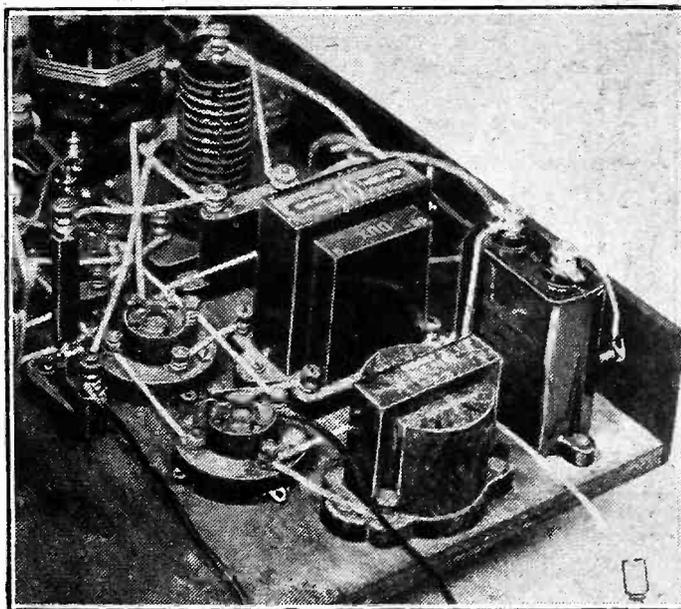
It can be shown (we needn't bother how) that the output from the last valve depends upon the impedance in its plate circuit. Within limits, the higher the impedance the greater the power.

Effect on Impedance.

The plate impedance in the case of the power valve is the impedance of the loudspeaker, no matter whether a filter is in use or not. But there is this difference: without a filter the impedance is less, because a steady current through a choke (which is what the speaker constitutes) lowers its impedance.

The impedance being less, the mag. is less, and as volume goes down, so the apparent volume of the base in relation to the high stuff gets less. So quality is spoilt by lack of bass. That is

SEE HOW NEATLY THEY FIT IN



The L.F. choke and large fixed condenser in the foreground of this photograph of the low-frequency end of the original "Cosmic" Three, are the only components necessary to incorporate an output filter.

Point No. 1: We can get more power without distortion due to the filter.

Next we come to loudspeaker saturation when used directly in the plate circuit.

point No. 3.

(The reason for the varying ratio of bass to high stuff is too complicated to go into

(Continued on next page.)

A FILTER FOR THE "COSMIC"

(Continued from previous page.)

here. It is largely bound up with that abstruse item known as a decibel.)

Finally, Point No. 4. Feed-back in a set may cause distortion quite apart from whether it produces the well-known low-frequency howl.

It is due to the L.F. or "speech" fluctuations in a plate circuit causing corresponding fluctuating voltages across the H.T. supply, due to a high internal-resistance battery or not-too-good mains unit.

Saving the Situation.

This fluctuating voltage gets applied to the anode of a preceding valve and hence back to the grid of the valve under consideration, and instability is caused by low-frequency reaction.

Actually, this point, so far as mains units are concerned, is one of the cases where an output filter can prove most useful. As a matter of fact, it is likely with some mains units that passable results cannot be obtained until a filter is fitted.

An output filter keeps the fluctuating anode current of the last valve out of the H.T. supply, thus avoiding this type of distortion when the supply is not all it might be so far as internal resistance and decoupled-tappings are concerned.

Other advantages of an output filter, apart from quality considerations, concern long loudspeaker leads and possible shocks when mains units are in use. In the first case, voltage drop in the extension wires is avoided, and also possible leaks to earth. In the second, the H.T. supply is isolated from the speaker leads.

Well, if you have read as far as this, it is safe to assume you have decided to fit a filter, so without more ado we will get on to the necessary details. You will need two extra components—an L.F. output choke of about 20 henries, and a 2-mfd. fixed condenser. The choke should be one rated to carry the current that your power valve passes.

Two Extra Components.

These two components apply whether the set is the original "Cosmic" or the "Cosmic" Star. We will deal with the former first.

There is ample room for the two components on the corner of the baseboard near the loudspeaker terminals, and one of the photographs show them in place. You will have to move the grid-bias battery clip, but if you happen to be using a small power valve that does not require more than 9 volts G.B., there will still be room for the battery on the baseboard, but nearer to the panel.

If, on the other hand, you wish to accommodate a long battery, you must fit it to the back of the cabinet, on the inside, of course. You will find it is just as convenient in this position.

Mount the condenser parallel with the terminal strip, and next to it. The choke comes next to the condenser, but mounted longwise parallel with the edge of the baseboard.

Changing Over.

The wiring alterations are quite easy, but before you commence putting on the new leads there are two of the old ones that must be removed. These are as follows:

The lead joining the plate of the last valve to the L.S. negative terminal, and the wire from the L.S. positive terminal to H.T. plus 2.

ALL YOU NEED

- 1 small output choke (about 20 henries) (E.I. Andrad, Igranic Midget, Ferranti B.S. Wearite H.T.5. Telsen, Varley, Graham Farish).
- 1 2-mfd. fixed condenser (Telsen, Dubilier, T.C.C., Lissen, Hydra, Helsby, Igranic, Ferranti, Graham Farish, Sovereign).

The new connections are as follows: Join the plate of the last valve to terminal of the choke nearer to the panel and also to the terminal of the fixed condenser farther from the end of the baseboard. The other side of the choke goes to high-tension positive 2, and the remaining side of the fixed condenser to the terminal marked L.S. negative, and L.S. positive goes to H.T. negative.

Incidentally, the loudspeaker terminals will no longer be positive and negative, and it will not matter in which way the speaker is connected up. The reason why loudspeaker terminals are marked when

the magnets it may actually do so in the long run, with the result that the speaker will lose its sensitivity.

Since the use of a filter removes the steady current from the speaker, there is no need to worry how the latter is connected up.

Now for the alterations in the case of the "Star" model. These are a little more comprehensive, but are, at the same time, just as simple, two similar components being required.

The "Star" Model.

A glance at the second photograph shows that space is a little more limited, and the parts have to be rather packed. The grid-bias battery in the case of this model is not normally housed on the baseboard, so that the question of moving it does not arise.

But instead it will be necessary to move the low-frequency transformer a little in most cases. Some of you may find that you have just enough room without moving this component; it will depend largely upon the make of the transformer and the make of choke that you use.

If you have to move it, undo the two screws that hold it to the baseboard, but do not take off any of the connections, as these will be long enough for the small movement necessary. Just push the transformer towards the .01 fixed condenser, and then screw it to the baseboard again.

Similar Components.

The two new components have to go between the third valve holder and the terminal strip, but before you can fit them in place the .001 condenser across the output will have to be moved. This has to go round to the other side of the third valve holder, and is eventually arranged to be still across the output.

There are four wires that you will have to take off, and it is as well to move them before unscrewing the .001 condenser. They are as follows:

The lead from anode of third valve to the .001 fixed condenser and also from this condenser to the L.S. negative terminal. Then there is the lead from the other side of this condenser to the filament terminal of the valve holder and, last of all, the L.S. positive to H.T. plus 2.

Wiring Up.

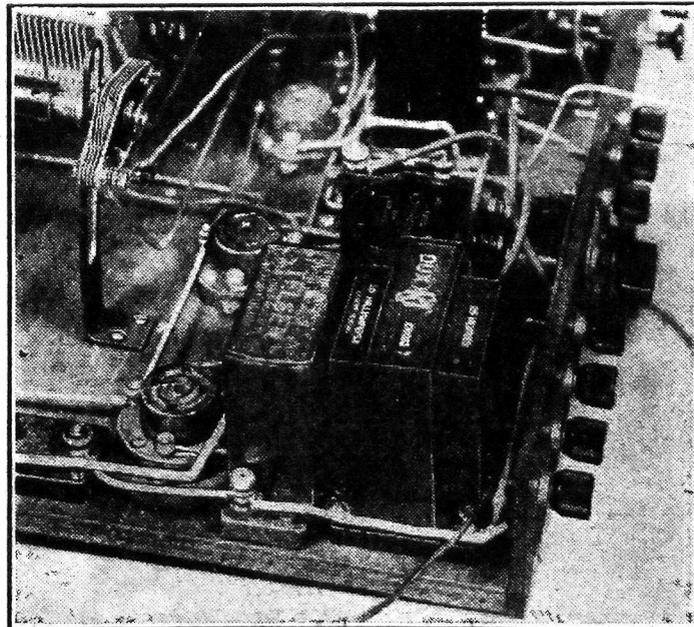
The flex lead on one terminal of the .001 condenser should be left in place. It will still act as the G.B. plus connection. When you screw this condenser in its new position arrange it so that the flex lead is on the terminal nearer to the panel.

The condenser—that is to say, the extra one—and the choke are screwed down parallel to one another. The choke being nearer to the terminal strip, as shown.

Now for the new connections. Rejoin the terminal of the .001 that has the flex attached to the filament of the third valve holder, and the other terminal of it to the nearer terminal of the 2-mfd. condenser.

(Continued on page 35.)

A REFINEMENT FOR A FINE SET



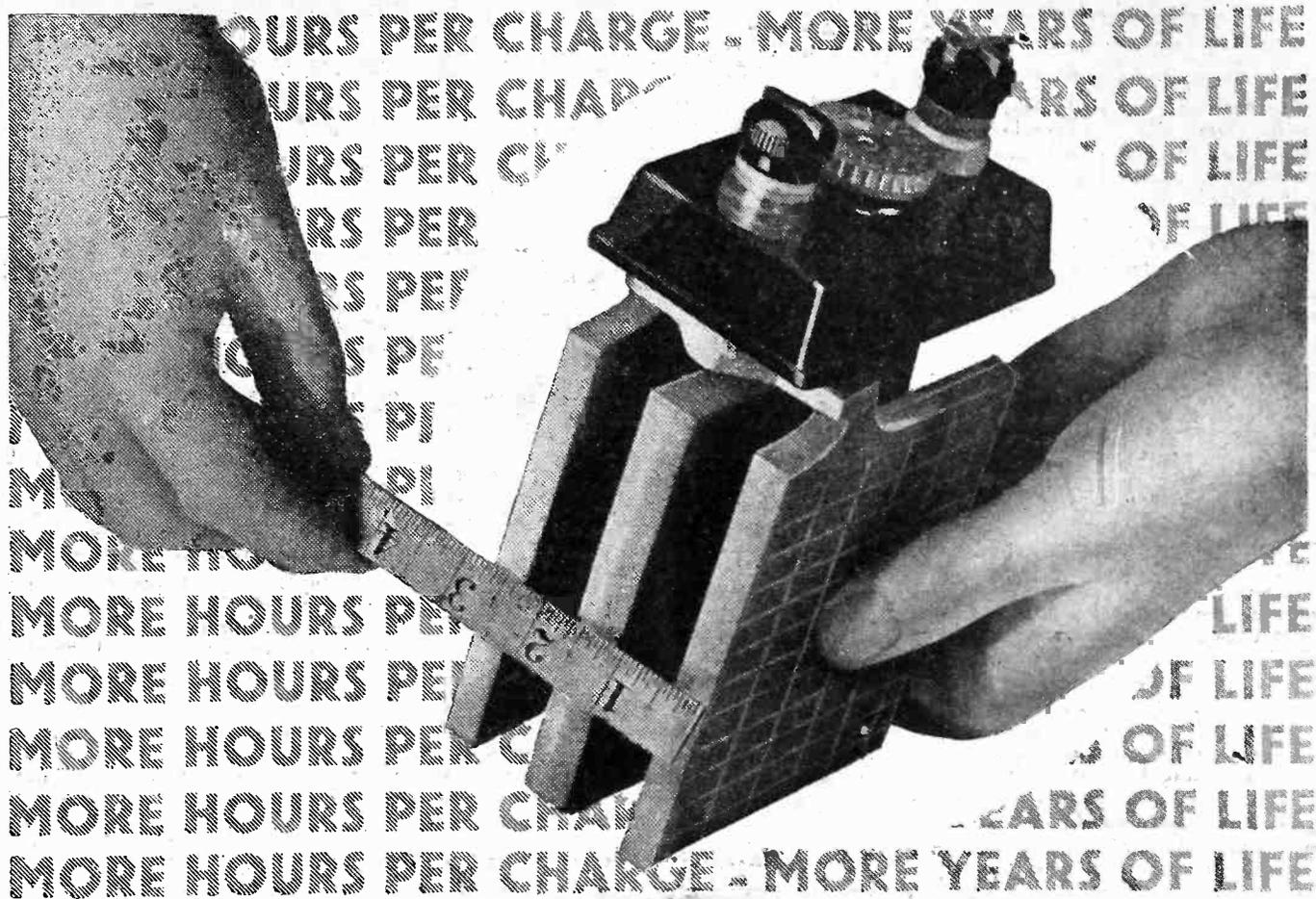
This is the filter corner of the "Cosmic" Star receiver, showing the output choke and 2-mfd. condenser in place. The alterations to fit these two components are very simple, and can be done in a few moments.

there is no filter is so that the steady current that flows through the speaker will be in the right direction.

Don't Spoil Your Speaker.

The magnets in the speaker are semi-permanent, and often the steady current tends to magnetise them more, or to reduce their magnetism according to which way it flows. If it flows so that it tends to weaken

• MAMMOTH PLATES •



PRACTICAL TESTS with modern wireless sets over long periods under normal conditions have established the infinite superiority of Mammoth Plates. Fuller Super Accumulators for low discharge service are fitted with these exceptionally long-lived plates in addition to all the other unique Fuller features—micro-porous paste, double

grease-cup terminals, moulded polarity signs, safety carrying handle and patented life-preserver. Fit a Fuller now and benefit by—less frequent recharging, longer battery life, rapid recuperation, low losses during idle periods. You cannot buy a better battery at any price—and it is British made and comes to you efficiently dry charged.

Actual photograph of plates from a Fuller L.D.G.H. Accumulator. 2 v. 60 a.h. Price 9/6 Dry charged. (Other sizes for low intermittent current service). Full list of H.T. Dry Batteries and L.T. and H.T. Accumulators on request.



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Machine made and tested throughout... long life... emission up to 20 m/amps. From 60 to 120 volts. Prices 5/3 to 15/3. Also complete ranges of Standard, Triple, Portable and Grid Bias Dry Batteries, etc. list D.3.

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FULLER ACCUMULATOR CO. (1926) LTD., CHADWELL HEATH, ESSEX. Phone: Seven Kings 1200
Grams: "Fuller, Chadwell Heath." Contractors to British and Overseas Government Departments, Railways, etc.

THE MIRROR OF THE B.B.C.

By O.H.M.

HENRY HALL TAKES OVER

DAVENTRY TO DROITWICH — FUTURE OF THE CHILDREN'S HOUR.

HENRY HALL is now in complete command of the new B.B.C. Dance Orchestra, and it is perhaps permissible for me to say that in the past two months during which the change-over has been in process of development there have been several critical stages, at any one of which the present situation might well have been imperilled.

This is no fault of Mr. Jack Payne. It was the last stand of those interests aiming at "song plugging" from within the B.B.C. I am sure that there is no danger of the new regime falling foul on this account.

My only regret is that the B.B.C. does not seem to have had the courage to make Henry Hall responsible for clearing "plugging" from the outside dance band programmes. Anyway, good luck to Henry, so far as I can give it to him.

Daventry to Droitwich.

It was characteristic of the B.B.C. that it should have apparently purposely evaded the opportunity of major publicity provided by the decision to move Daventry to Droitwich. No doubt this was carefully calculated, and I think I can see a certain element of leg-pulling in it.

Because, while some popular newspapers were "spreading" apocryphal news of changes in Sunday programmes and dramatic representations of Titanic disasters, the B.B.C. quietly intimated one of the most important moves in its history. That 5 X X and 5 G B will go from Daventry to Droitwich does not mean that Daventry will be abandoned.

I am now giving exclusive authoritative advance information that in future Daventry with all its equipment and more to come will be the British Empire Short-Wave Round-the-Clock Broadcasting Station.

Future of the Children's Hour.

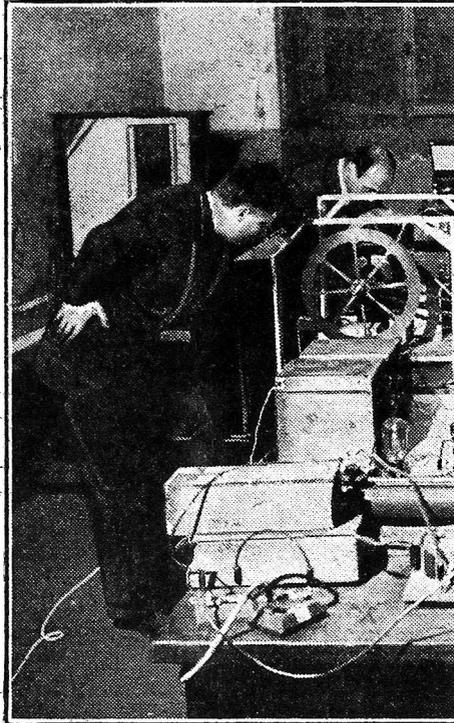
I gather that there is some question as to whether the Children's Hour will be carried on so far as London is concerned. My view is that it might be carried on

provided it is handled with the true professional touch.

Uncles and Aunts might still appear, but not under amateur auspices, and I believe this would be a considerable advantage.

We all know that the broadcast programmes on Good Friday are different from

"MOVIES" ON THE AIR.



It's bad enough when an ordinary set develops a fault, but how would you like to look for trouble in a "set" of this kind? It is used for televising cinema films, and has given some very promising results around Milan, where it is installed.

those of any other day of the year, and that they are appropriate to the solemnity of the day. Very few people would wish them otherwise, and it is the unquestioned acceptance of this long-continued policy that stamps British broadcasting and the service it gives as the highest and finest in the world.

Apart from the short daily service at 10.15 a.m., and the time signal and weather forecast, British stations will remain silent until the afternoon, when the Royal Air Force band is giving a concert for National listeners, with a programme by Reginald King's Orchestra as an alternative on the London Regional wave-length.

The Victor Olof Sextet and the Theatre Orchestra are afterwards providing the National programme until 6.30 p.m., when a service will be relayed from St. George's Chapel, Windsor. For some years a "Parsifal" concert has been broadcast from Queen's Hall on Good Friday evening, and Sir Henry Wood is again conducting, Muriel Brunskill (contralto) and Harold Williams (baritone) being the solo artistes. The concert will be divided at 8.30 p.m. for the reading of what news there may be, after which it goes on until 11.30 p.m.

Jack Payne Again.

London Regional listeners have a concert by the City of Birmingham Orchestra at 4 p.m., and an early evening programme by the Wireless Military Band until 8.30 p.m., when there is a reading. An hour's recital by Solomon (pianoforte) and Margaret Elwes (mezzo-soprano) finishes at 10 p.m., when the transmitter closes down.

Back to normal on Saturday, March 26th, there is a vaudeville entertainment, a concert of students' songs, and an orchestral programme on the National wave-lengths, with chamber music by the London Wind Quintet, and a relay of vaudeville items from the Argyle Theatre, Birkenhead, for Regional listeners.

Jack Payne's Dance Band pays a return visit to the studio on Easter Monday evening to give an hour's "show" for London Regional listeners, which I understand he is planning on rather original lines.

(Continued on page 36.)

"FOREIGNERS GALORE"

—and all at loudspeaker strength," says an enthusiastic Bradford reader who has just built a "Cosmic."

The Editor, POPULAR WIRELESS.

Dear Sir,—I built your "Cosmic III" for a friend of mine, and we both agree, and also everybody that has heard it, that it is absolutely the best three-valve set yet heard. I put a temporary aerial and earth-up to test it, and received "foreigners" galore, and the best part about it is that they are all full loudspeaker strength. It will cut Moorside Edge out here in Bradford by simply turning the reaction knob; and the moderator tuning unit is absolutely the goods, just like adding a couple of valves to the set when you operate it.

My friends were that enthusiastic about it that they have got me to write this letter in appreciation of your wonderful circuit, and you may use it in any way you wish.

Yours respectfully,

E. BESWICK,

Bradford, Yorkshire.

THE LISTENER'S NOTEBOOK

A rapid review of some of the recent radio programmes.

I RECENTLY drew attention to the way lecturers and others were pouring out profuse thanks for the congratulatory letters they had received. Now, we have a broadcaster, Mr. Gerald Heard, appealing for some sign of appreciation (or otherwise). Well, in this case, I think a pat on the back is well merited, but I hope Mr. Heard will not cut down his most interesting remarks by giving up his time to thanking Mr. Blank of Round the Corner for his postcard.

Then came the unexpected revelation by James Agate that it was seriously contemplated cutting out the Theatre Talk, and that the decision depended upon the words "yes" or "no," whichever one figured most on postcards. Remembering

the part the theatre has played in our national life, and allowing also for the inroads of the Cinema, I cannot imagine that the proposed elimination of a talk on the theatre is going to meet with approval.

To my mind, there should never have been any idea of such a thing, but maybe, attention might be given to the subject-matter, with a ringing of the changes on the talkers. Mr. Agate was not at his best with Julius Caesar.

Talking of postcards reminds me that Moscow extends a hearty invitation to all and sundry, whatever their politics or creed, to send picture postcards of their native town, in return for which the sender

(Continued on page 34.)

How to use a POWER PENTODE

YOU can use a Lissen Power Pentode in any battery-driven two-valve set, or any set employing only one L.F. stage, and *double the volume without adding to the running costs.* You can get the foreign stations, that before were but whisperers in your loudspeaker, at fine strength; or you can have a torrent of pure sound from your local station that will make every item enjoyable.

There is no need to alter your receiver at all. Simply replace your power valve with a Lissen Power Pentode according to the instructions given inside the carton in which the valve is packed. The *economy* Power Pentode this Lissen valve is called, because it only takes 7 m/A. of H.T. current—no more than an ordinary power valve. Therefore, you can use it with your present battery and enjoy the extra volume and brilliant tone that "Pentode Output" gives to a set.

Ask for a Lissen Power Pentode; P.T.225. Price

12/6

THE VALVE FOR LIVELIER DETECTION & BIGGER RANGE

The Lissen Detector Valve—H.L.210—liven up your tuning, gives you extra range, greater sensitivity. It is so responsive that it brings in the foreigners like magic. Not only this, but it passes a crisper, more powerful signal on to the L.F. stage of your receiver, and you get louder, clearer radio altogether. Ask for Lissen H.L.210. Price

5/6



P.T. 225.

12/6

LISSEN

economy
POWER
PENTODE

CONDITIONS for long-distance reception continue to be very fine indeed as regards both the number of stations obtainable and the volume at which they can be received. I am glad to be able to report, too, a noticeable decrease in the amount of heterodyne interference that has occurred on the medium wave-band. Last week heterodyning had begun to assume formidable proportions, and at one time it seemed as if we were in for a return to chaos on the medium wave-band.

American stations continue to be received quite well shortly after midnight. If there are no atmospherics about and conditions are found to be otherwise good, earlier in the evening, it is always worth while to try for U.S.A. stations if you happen to be sitting up late.

Medium-Wave Americans.

Amongst those which I find it easiest to receive at present are WIOD, WTIC, WPG, and WBZ. On especially good nights many others can be heard with a set that has reasonably good high-frequency amplification.

On this side of the Atlantic the long waves remain as good as ever, and there has been less trouble from the heterodyne of Russian origin that was at one time marring Radio-



Some practical distant-programme notes compiled by a special contributor who nightly searches the ether in order to obtain really up-to-the-minute information for "P.W." readers.

Paris's programmes. Zeesen is at the top of his form just now, whilst magnificent reception is obtainable from both Kalundborg and Oslo at almost any time.

Frankfurt and Budapest.

On the medium wave-band a station which has shown extraordinary improvement of late is Frankfurt. The heterodyne, which used to be such a nuisance, has very seldom been noticed on recent evenings, and Frankfurt comes through with remarkable volume and quality. Make a note of him, for he is worth attention.

Let me bring to your notice also Budapest, who was particularly good on many nights. He is not absolutely reliable; you may find on some nights that he is quite weak. On others, though, he will give you all the volume that you want.

This station's programmes are so good that it is always worth while to tune to his wave-length to see if he is coming in well. Vienna sees considerable variations. Partial jamming has occurred on a good many

occasions, but, like Budapest, he has his nights!

Completely reliable stations towards the top of the band are Brussels, Prague, and Langenberg. Beromunster, who has been off colour for some little time, has now returned to form, and I don't think

that you will have any complaints to make if you tune him in.

Both Rome and Stockholm generally supply excellent reception. We cannot call Dublin exactly a foreign station, but I mention him in my list, since he is outside the B.B.C. group. The Irish station has shown splendid strength on many occasions recently.

More Recommendations.

Katowice is usually first rate, though he suffers from an occasional weak night. Toulouse is always to be found. Lwow is excellent when he has a chance, but you may find on certain nights that interference spoils reception.

Hamburg has very much improved. Don't forget to tune in Stuttgart if you are operating the set at a time when the London Regional is silent.

I have heard Barcelona much better recently than for some time past, and Strasbourg, too, has furnished remarkably good volume and quality.

THIS season of the year seems to be dedicated to the breaking of short-wave (and other) records. Here we have our old friend F. N. B. again, claiming to have heard all continents within *eleven minutes*.

It is not a true "H.A.C.," as that applies to broadcast only, but he certainly has heard an amateur in each of the six continents within that time. The eleven minutes were between 8.50 p.m. and 9.1 p.m., and all stations were on 40 metres except the "Yank" who was on 20.

"Choose the Weapons."

F. N. B. now feels so truculent that he has issued a challenge to all the more rabid of "P.W.'s" following of short-wave fans. M. S., of Harlow, is particularly mentioned as one with whom F. N. B. would like to try conclusions. M. S. (or anyone else accepting this) is to "choose the weapons," and W. L. S. is to fire the starting gun—presumably by means of his chronometer.

We could make quite an interesting contest out of this, the idea being to see, who finds, for instance, the greatest number of West-Coast Canadians, or East Indian stations during one week-end. More of this later.

J. B. M. (Glasgow) mentions, for the first time, a station signing LSL (Buenos Aires) on about 30 metres. This has been logged at 11 p.m.

My recent remark to the effect that I never remember having heard an Australian on 'phone has brought forth a letter from

SHORT-WAVE NOTES



News and views regarding an exciting and fascinating wave-band.

By W. L. S.

E. J. L. of Streatham. He heard the famous contact between Messrs. Simmonds (G2OD) and Maclurcan (VK2GM) in March, 1926.

Both stations worked 'phone on that occasion. The wave-length was 40 metres, and the input at the Australian end 250 watts. I imagine that very few Australians now use that power! Many thanks, E. J. L.,

Those Nine Yanks.

I was somewhat pained to receive a letter from D. T. (Ipswich) that rather indicates that the said gentleman doesn't trust me. He thinks the results of the competition should have been given in full, and doesn't like W. H. R. (the winner) to be described as having heard "Nairobi, Chi-Hoa, Sydney, nine Yanks, and several

others." As a competitor himself he doesn't think this is fair play.

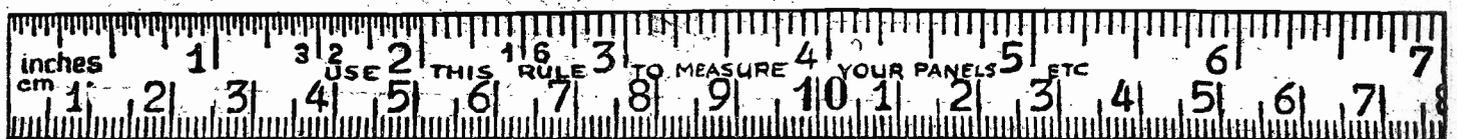
Well, D. T., if I *had* published the list you still wouldn't have been any better off; besides, the Editor has more important stuff on hand than mere lists of short-wave stations.

W2XAD and W2XAF.

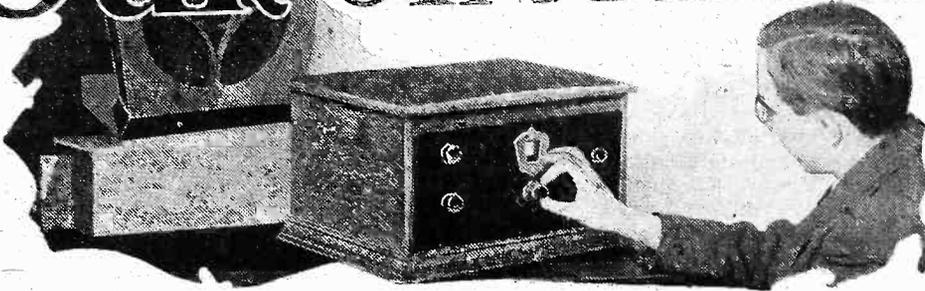
There has been a lot of talk about "bad conditions" during the past winter and this spring, but when I look back it seems to me that this had not been at all a bad season for those able to read Morse, whatever it may have seemed to the telephony-only men.

From combined evidence coming from readers' reports and my own observations, it appears that W2XAD (19.56 metres) is now coming over quite well at almost any time between noon and 10 p.m. The fact that the 20-metre American amateurs were coming in later than usual set me down a few degrees one evening recently, and at 8.30 p.m. I found W2XAD quite as loud as I have ever heard him. On the "Four" he was positively dangerous to the windows, and on the "One" he was a really comfortable headphone strength.

I should say that by the time you read this W2XAD will be the star station right up to 11 p.m. W2XAF, on the other hand, can only be described as "fair." He varies somewhat, and never appears to be really strong.



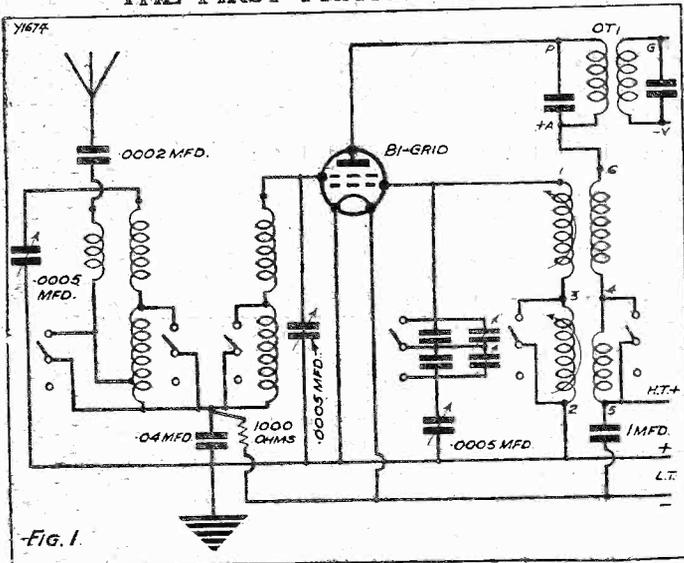
OUR SINGLE DIAL SUPER



An interesting account of some of the experiments conducted by the Research Department in an attempt to evolve a really successful one-dial tuning super-het. set. These experiments were completely successful

and full constructional details of the final and perfected receiver will appear in our NEXT ISSUE.

THE FIRST PRACTICAL STEP



The initial tests were carried out with a bi-grid valve and tuned-grid windings, as above.

use of three special coils carefully matched by the makers. With the oscillator coil designed by us, provision has been made for varying the inductances of the medium and long-wave tuned sections, and with the addition of the series-paralleled condensers remarkably accurate "ganging" is possible, despite variations in the commercially made band-pass coils available for use with the oscillator.

The reader will see therefore that only one

special coil is required, and its construction is such that it may be made by any careful constructor, and probably it will be marketed complete at a later date.

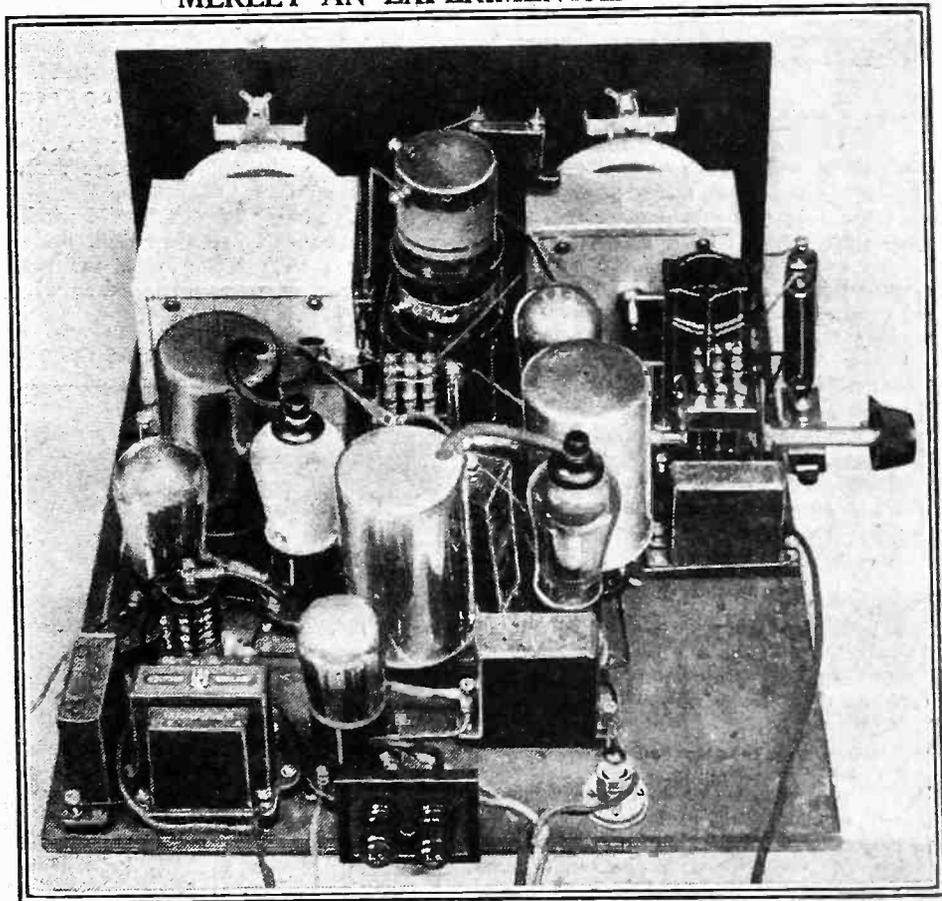
Before proceeding to describe the experiments, it would be as well to enumerate the facts governing the design of the oscillator system. It has already been mentioned that the oscillator operates so many kilocycles above the fundamental frequency, the exact number depending on the intermediate frequency of the band-filters.

The "Difference" Frequency.

Furthermore, in the last article it was made clear that this "difference" frequency remained constant over all wavebands. The oscillator coil, owing to its higher frequency response has, in terms of metres, a lower wavelength range, and

(Continued on next page.)

MERELY AN EXPERIMENTAL MODEL!



This very excellent super, which gives a most impressive performance, was built up in order to try out the possibilities of the new principles to be embodied in "P.W.'s" one-dial instrument.

THERE is a saying "the proof of the pudding is in the eating," which in radio equivalent is as good as stating that a theoretical calculation is not conclusive until it has been proved practically. Thus, the purely technical considerations put forward in the article published in this journal on February 6th ("P.W." No. 505) can hardly be appreciated without reference to the practical experiments.

It should be borne in mind that the object of the tests and calculations was to devise a circuit arrangement whereby the oscillator tuning on a super-het. could be coupled mechanically with the aerial tuning system to allow for single dial tuning.

A Choice of Coils.

Whereas the aerial circuit (either of the band-pass or "plain" type) tunes to the incoming signal, the oscillator must resonate at so many kilocycles above the fundamental, the "difference" in the two frequencies corresponding to the chosen intermediate frequency. Various schemes based on extensive research with super-hets. in general were put forth as being of practical value.

The ultimate aim has been to design an oscillator arrangement which could be used in conjunction with a standard band-pass aerial coil, but which could nevertheless be so adjusted that without alteration it could be employed with many commercial makes of aerial coils.

So far the only single-dial super-het. described has achieved its object by making

OUR SINGLE DIAL SUPER

(Continued from previous page.)

consequently a lower inductance on each wave-band compared with the aerial coils.

Under these conditions the wave-ranges in metres covered by the oscillator coil are considerably less than in the aerial circuit, and it is logical to assume the capacity required to tune the oscillator coil can be less than in the other circuits.

Capacity of Oscillator Condenser.

It is obvious that if one of the sections of the "ganged" condenser is to be utilised,

oscillator circuit on the medium wave-band was calculated to respond from 1,488 to 624 kc., or from 202 to 481 metres. On the long waves the oscillator was to tune from 424 to 274 kc., or 708 to 1095 metres.

The oscillator unit was accordingly wound approximately for these wave-bands, portions of the tuned windings being arranged on the small rotors fitted inside the main ribbed former. Initial tests were conducted with tuned grid windings and with a bi-grid valve as in Fig. 1.

It would be a wearisome business to describe the many slight deviations made

from this circuit, and a waste of valuable space to illustrate

the many dozens of graphs made as a

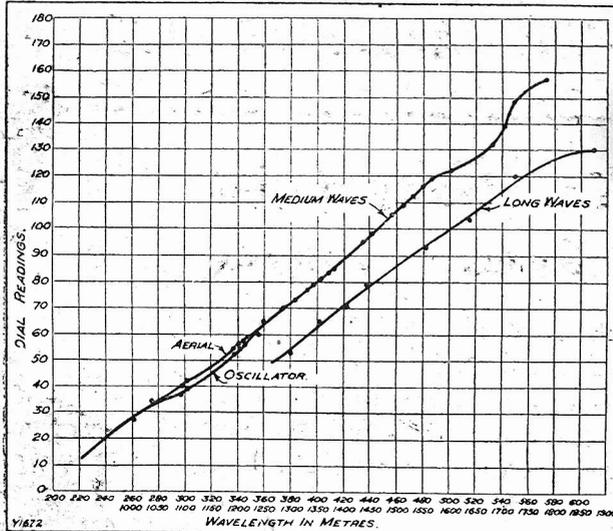
result of the conditions outlined. Let it be sufficient to say that despite innumerable combinations of inductance and capacity it was not found possible with the coils in question to produce identical dial readings over each wave-band, the nearest approach

being 18 degrees in 180 at the top and bottom ends of the scale: for the major part of the scales the condensers were, of course, in step.

Investigations with tuned grid windings were consequently discontinued, and the oscillator coils reversed with the tuning condenser connections for tuned anode.

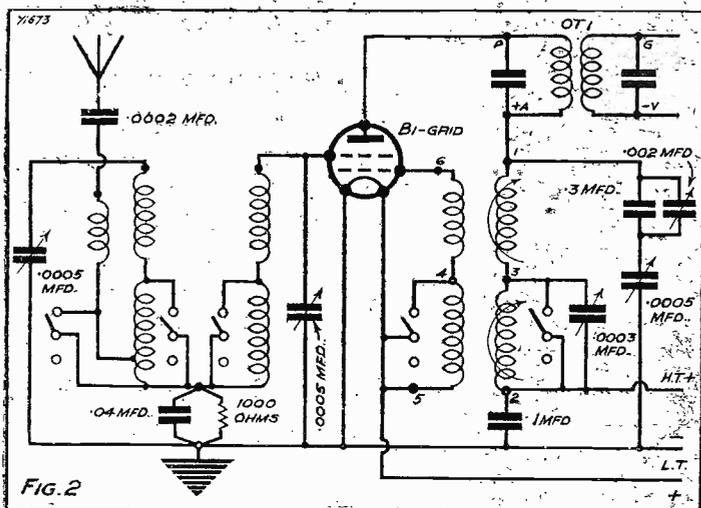
Naturally, in readjusting the oscillator unit, it was found essential, particularly at the bottom end of each wave-band, to remove many turns of wire not only from the

A GRAPHIC ILLUSTRATION



The astoundingly successful results achieved are clearly illustrated above. The two experimental dials were absolutely in step except for one small part of the medium-wave curve.

ONLY ONE SPECIAL COIL



This diagram shows how the coils and condensers were re-arranged.

having a similar capacity and movement, it may have a condenser placed in series with it in order to reduce its effective capacity. On the long wave-band where the condensers have to tune over a smaller frequency range (the "difference" frequency remaining constant), it is possible to employ the same scheme, plus a small pre-set condenser across the long-wave tuned winding to achieve a similar effect.

Owing to the popularity of the "P.W." "Super-Quad" and "P.W." "S.Q. Star," it was decided to construct an experimental receiver on the same lines, but including two S.G. intermediate stages to allow for greater tolerance in the choice of valves and components, and avoiding the necessity for a single "hotted up" S.G. stage and high-ratio L.F. transformer

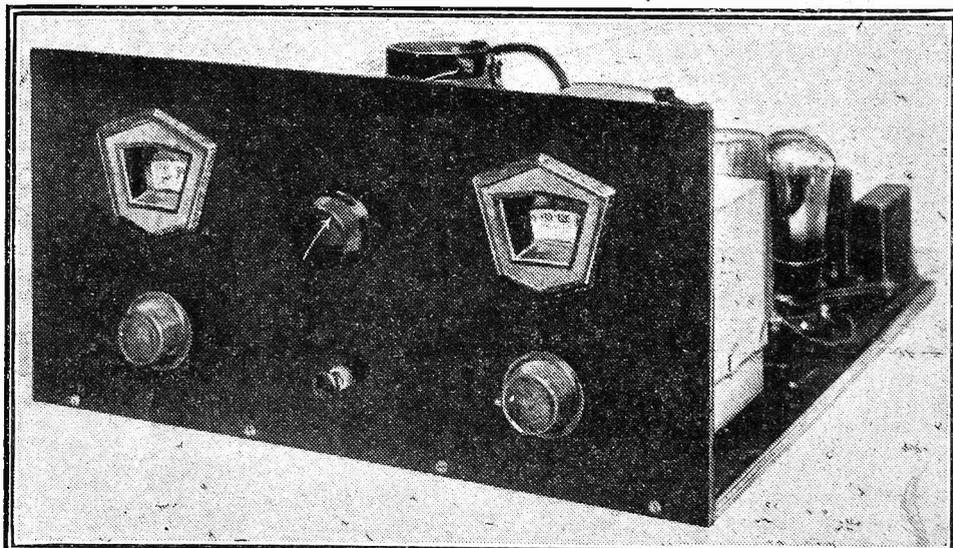
A Special Test Model.

A photograph of the set in question is given herewith, and naturally it bears no resemblance to the final design, as actually separate tuning condensers were incorporated for comparing the dial readings, a very necessary prelude to the final tests.

For all the tests, a Varley "Square-Peak" coil was chosen, as in the "Super-Quad," covering 220 to 600 metres and 1,000 to 2,000 metres respectively. A set of band filters of well-known make and rated at around 126 kc. were also selected, and after careful measurement were found to resonate at 124.

Allowing for this latter frequency, the

THIS LOOKS NICE, BUT . . . !



The final achievement lay in completely eliminating one of these tuning controls without any sacrifice of results.

Build the COSMIC STAR

THE ALL-PURPOSE, ALL-EFFICIENT, ALL-WAVE SET

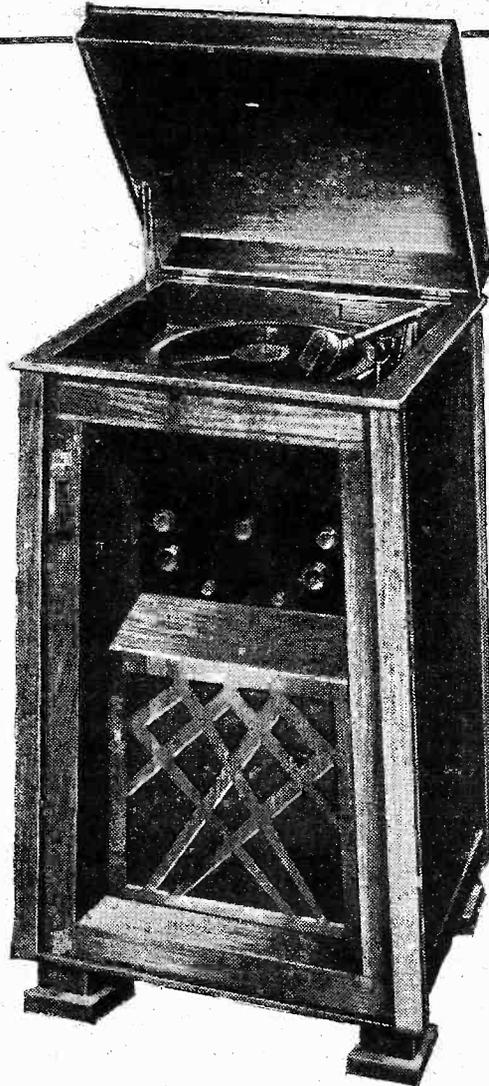
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The Readirad DUOTUNE is essential for the "Cosmic" and for every modern all-wave receiver. It is the only condenser of its kind. Not only does it provide automatic switching from medium to long waves (on the famous Extenser principle) but also at the flick of a switch it is converted from a '0005-mfd. condenser to a '00025-mfd. condenser.

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(Extenser Model. Patent Pending)



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With this beautiful cabinet you can convert your present set to a Radiogram of the most modern and artistic design. This cabinet is a highly polished walnut with lift-up lid, automatic support and a needle cup. Overall size 3' 3" x 22" x 17". Suitable for any receiver having a panel not exceeding 12" x 7" and a baseboard 16" x 10".

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Complete Kit of Components together with panel (ready cut and drilled), baseboard, Jiffilix for easy non-soldering wiring and free blue print.

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Complete Kit of Components as Kit "B" together with beautiful Table Cabinet and free blue print.

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TO INLAND CUSTOMERS.— Your goods are dispatched post free or carriage paid.

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READY RADIO

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for which (a) I enclose (cross out line) £
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Name.....
Address.....

P.W. 19/3/32

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for which I enclose first deposit of £.....

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Address.....

P.W. 19/3/32

EASY PAYMENT ORDER FORM

DUAL-PURPOSE REACTION CONDENSERS

A FEW weeks ago I gave details of how two components could be combined so as to be controlled by one knob, simplifying the operation of a receiver and at the same time helping to clean up the panel appearance. The two components in question are to be found on most receivers, and are the reaction condenser and the volume control—two items that most logically should be combined.

The method explained requires a special component. Consequently it is not a scheme with which the constructor can experiment, unless, of course, he has a very well-equipped workshop, is a good mechanic, and is prepared to turn out the special component for himself.

A Combined Control.

But at the same time, the idea of going progressively from maximum volume to controlling reaction, with the one knob, is very attractive. So here is another way of accomplishing the same effect which anyone can try out quite easily, and in most cases on present receivers.

Actually it has one very big advantage over the original scheme; it enables volume controlling to be carried to a much lower limit, and in most cases to a complete zero. Another point is that reaction is obtained by the differential method instead of with a single "plain" capacity.

Put briefly, the idea is to so arrange the input connection that the differential reaction also acts as a differential volume control. First of all let me explain the arrangement with the aid of the circuit shown on this page, and then I will tell you how to try it out in practice.

To consider the reaction control part we just ignore the two wires that are marked input. There is the ordinary grid coil and reaction coil coupled to it, and one set of fixed vanes on the differential reaction condenser goes to L.T.— and one to reaction coil.

Perfectly Straightforward.

The moving vanes go to plate as usual, but are taken via a compression-type condenser instead of direct. This condenser simply serves the purpose of altering the effective capacity of the differential condenser so far as reaction is concerned.

It is set so that the receiver will just oscillate with the differential condenser adjusted for maximum reaction (moving vanes fully meshing with the F_1 fixed), and the tuning at the position where the most reaction is required to make the set oscillate.

Describing an ingenious circuit arrangement which enables you to make one component serve two distinct purposes.

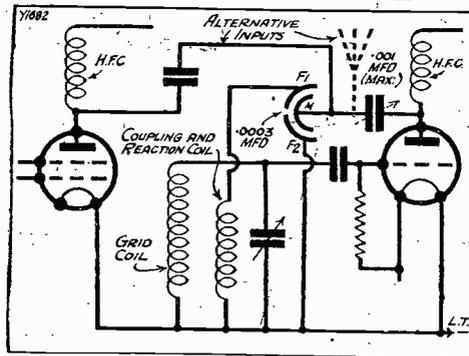
Maximum reaction can therefore be obtained on any wave-length.

Now to consider the volume control part. For the time being we will suppose the set has no reaction, and so we ignore the compression-type condenser and the connection via it to the valve's anode.

What have we left. Why, a straightforward differential input condenser. When the moving vanes are fully in mesh with the F_1 fixed, the input circuit is simply straight through the condenser capacity and reaction coil (now acting as coupling coil) to earth.

If, on the other hand, they are fully meshed with the F_2 fixed vanes, the input is passed directly to earth via the capacity,

SEE HOW IT'S DONE



The differential reaction condenser controls volume as well as feed-back.

and no coupling is obtained with the coil, so volume will be at its minimum. Stray capacities usually prevent this from being absolutely zero.

In the opposite position volume is at maximum. At intermediate positions, some coupling takes place and some by-passing, so that intermediate values of volume are obtained according to the setting of the moving vanes.

In practice both these effects, differential volume control and differential reaction will take place at the same time. When we are at minimum volume (moving vane meshed with F_2 fixed) we are also at zero reaction. Which is only right, because minimum volume means that the station was coming through too loudly, and so no reaction is wanted.

At the other end of the scale we have just the opposite. Volume controlling is at maximum volume, and at the same time we get maximum reaction, both necessary with really weak transmissions.

A cursory consideration may suggest that we have the apparent drawback that reaction begins before volume controlling is at its maximum volume setting. In reality, on the contrary this is somewhat of an advantage.

Constant Selectivity.

It has the result of keeping the degree of selectivity fairly constant over the whole movement of the condenser. So in turning up volume we are not increasing the risk of interference from unwanted transmissions;

Due to the use of the compression condenser, reaction will not really become operative until the differential condenser is well round towards the F_1 "end." But by suitably choosing the value of the differential condenser this position can be well up the volume controlling scale.

As the knob is turned towards maximum volume and reaction, selectivity tends to become less because of the closer coupling of input to the input-reaction coil. At the same time it tends to become greater because of the increase of reaction; thus the balancing effect.

As the circuit shows, the input may come from either the aerial or a preceding H.F. stage. So you can try the scheme with a detector and low-frequency set using differential action, or with a parallel-fed H.F. set using differential reaction on to the detector's grid coil.

Well Worth Trying.

You will have to connect a compression condenser in the lead from the plate of the valve to moving vanes of reaction condenser, and it may be suitably of the .001 max. type. Any value of differential reaction condenser can be tried, but for good results one about .0003 or more is desirable.

While the amount of reaction is variable by means of the compression condenser, the maximum coupling is fixed by the size of the reaction coil, and it may not be big enough for best results. Naturally it is wound with reaction in view and not coupling.

Anyway, this is a drawback to the adaptation and not a fundamental lacking in the scheme, for a coil specially wound for the job could be suitably proportioned. If you try it, I can promise you at least a very interesting experimental experience.

THE
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A new standard in Set construction

Every part carefully designed and beautifully finished

The Triple Ganged FERRANTI Tuning Condenser supplied calibrated in conjunction with FERRANTI Band-Pass Coils, is provided with a unique 3-point suspension of its chassis, thus preventing distortion of the chassis which usually occurs in mounting. It is sealed and adjusted to plus or minus 000000125 M.F. at minimum capacity, and to plus or minus 00000075 M.F. at maximum, providing correct Band-Pass operation when the Set is assembled; a result not previously ensured in any Constructor's Set.

The band width is approximately constant, and with no reaction is 10 kilocycles on the medium waves, and 8 kilocycles on the long waves.

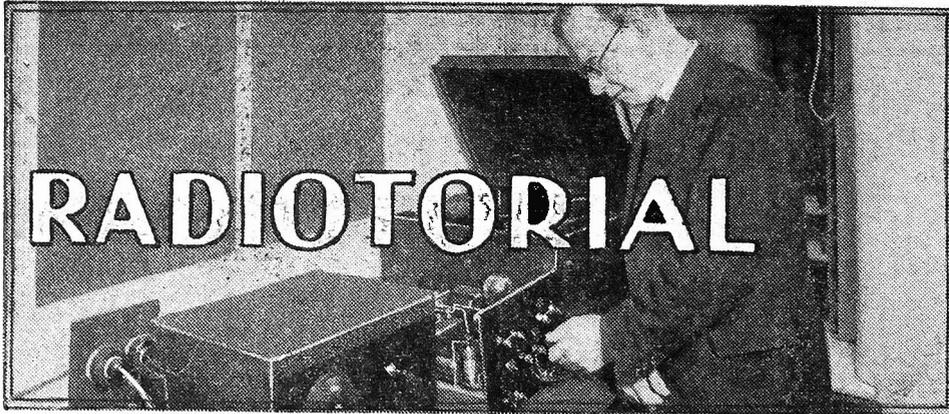
Battery and A.C. Mains types are available, and constructional charts may be obtained from your dealer, or direct from us.

A.C. Mains Kit, including Marconi Royalty (exclusive of Valves, Cabinet, Panel and Baseboard)		£11 3 6
With Panel and Baseboard	£11 8 6	With Cabinet, Panel and Baseboard £12 13 6
Battery Kit, including Marconi Royalty, without Valves, Panel and Baseboard		£7 7 0
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Band-Pass H.F. Stage only; suitable for either A.C. Mains or Battery Set, including the conversion of any Set of the Screen Grid Three type to meet present-day requirements in selectivity and quality		£3 13 6

This H.F. stage comprises :—1 FERRANTI Triple-Ganged .0005 Tuning Condenser with slow motion illuminated dial. 1 FERRANTI Band-Pass Input Unit with Wave-Change Switch. 1 FERRANTI H.F. Transformer and Detector Unit, complete with Detector Valve Holder, Grid Leak and Grid Condenser and Wave-Change Switch. 1 FERRANTI Screened Grid Valve Screen with 5-pin Valve Holder. 1 FERRANTI non-inductive Band-Pass Coupling Condenser, Type C11 : .06-mfd. 1 FERRANTI H.F. Volume Control Condenser with cut-out contact. 1 FERRANTI hand-capacity plate for Reaction Condenser, and 1 FERRANTI H.F. Filter.

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RADIOTORIAL

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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 specialties 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

CHARGING FROM D.C. MAINS.

M. R. (Ilford).—"I am told it is possible to use the electric light supply to charge a small accumulator by connecting the latter in series with the house supply. I do not understand this. How can this be done?"

Properly fitted by a qualified man, such an arrangement is perfectly safe and satisfactory, but we must remind you that an electric light company nearly always makes it a condition of the supply that they are notified if any such alteration to the house connections are carried out.

Generally no objection is made if a qualified electrician is employed, and probably he will understand exactly what to do if you explain your requirements.

HOW ARE YOUR RESULTS NOW?

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

A postcard 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.

One simple arrangement is to employ a double-pole double-throw switch of a suitable protected type, the centre contacts being joined in series with that electric light main which is earthed. Two of the switch's outer contacts are joined together, so that when thrown over in this position the ordinary mains connection is restored and the circuit is exactly as formerly.

The other two contacts on the D.P. D.T. switch are taken to two insulated terminals, to which the battery to be charged will be connected. The negative of the battery must go to the negative side of the leads, and when the switch is thrown over to this position the current which is being used in the house for lighting, etc., passes through the accumulator and "trickle-charges" it.

The running cost is negligible because there is no difference at all in the amount of current you are taking, but only a very slight diminution in the brilliance of the lighting.

A GOOD SUGGESTION FROM A READER.

We have often commented on the very helpful way in which "P.W." readers pass on good tips and hints to one another, and we are indebted to an Edinburgh reader for the following excellent idea.

His letter speaks for itself. He says:

"Dear Sir,—I was interested in your reply to H. L. in the February 6th issue of 'P.W.' May I suggest an alternative scheme, which gives great satisfaction on a 'Comet' Four?"

"Parts required—One double-throw double-pole switch (panel control), one non-inductive resistance, 100,000 ohm or 50,000 ohm. Mount the switch on the panel, cut the positive filament wire to the screen-grid valve, connect one end to the centre pole of switch nearest the panel, and the other to the right pole nearest panel.

"Connect the other centre pole of the switch to the grid end of the first tuning condenser, and the left pole farthest from panel to the grid side of the second tuning condenser, using a flexible resistance. (If a non-flexible resistance is used, connect left pole farthest from panel to one end of resistance, and the other end of the grid side of second tuning condenser.)

"On switching one way the circuit is four valves as before, and switching the other way it becomes a three-valver with a poor copy of the Eckersley Tuner. However, it gives a much reduced volume and freedom from interference on the local, without moving the aerial wire.

"Wishing further success to POPULAR WIRELESS, of which I have been a reader since you published the 'P.W.' Combination Set some years ago.

"Yours faithfully,
Edinburgh. "J. R."

WINDING COIL QUOITS.

S. O. S. (Paisley).—"Re coil quoits, to be used with 'P.J.' coils, will you let me know winding method for both types—i.e. aerial coil and inter-valve? Number of turns, wire used and binding connections (earth, reaction, etc.)."

The beginning of the wire (30 D.S.C.) is fastened to the coil quoit in the usual way, by threading it two or three times through small holes in the coil quoit until it holds fast. (About 6 or 8 in. should be pulled through the hole first, and will be used later for making the connections.)

First coil quoit has no reaction winding, being a plain 150-turn coil, with taps at the 30th and 60th turn from the earth end. So the commencement of the winding should be labelled "Earth," and then 30 turns are neatly wound on. Do not break the wire at this point, but twist a neat loop in it, about 1/4 in. in length,

This loop will be allowed to stick out from the winding, and when its insulation has been scraped off the wire, it enables a crocodile clip to make connection at the 30th turn.

The scraping of the insulation is best left till the coil is made. During the winding you simply make the loop at the 30th turn, and then carry on the winding in the same direction as before.

At the 60th turn another loop must be made, and then 90 more turns must be put on (still winding in the same direction) before the end is fastened off.

This fastening is done by cutting the wire and drawing it through small holes in the coil quoit, exactly as at the start of the winding. And, as before, 8 in. or so should be left with which to make the connections to the coil.

(So that these ends should not get in the way, it is a good plan to wind them round and round a pencil, and then tuck the small coils so made inside the coil quoit, until they are wanted for the wiring.)

Carefully scrape off the insulation of the wire at the tapping points with a knife, and lay the coil aside till it is to be mounted. This is done by fastening it to the baseboard with a couple of screws through a shaped wooden block fitted inside the coil quoit.

(Another method is to lay a wooden strip across the top of the coil quoit, and drive a long screw through the centre of it into the baseboard below.

The Inter-Valve Coil.

The second or inter-valve coil quoit is exactly like the one already described, except for its extra 50 reaction turns. It is made exactly as before, but with this difference:

The 50 reaction turns must go on the coil quoit first, so the commencement of the winding is labelled "Reaction." When 50 turns have been wound on, don't break the wire, but bring out a long loop, and label it "Earth." The rest of the coil is then wound exactly as before, with tappings at its 30th and 60th turns.

All the winding must be done in the same direction, and provided that is done, your coil quoits will be found to be highly efficient in action.

On most "P.W." diagrams in which coil quoit figure, the connections are marked (1), (2), (3) and (E). (E) or "Earth" we have already described; (1) is the connection to the 30 (or 60) tap, whichever gives better results on your set; (2) is the point

TECHNICAL TWISTERS

No. 105.—POWER.

CAN YOU FILL IN THE MISSING LETTERS?

The unit of electrical power is the . . . * . . .

It is the product of and

Thus, a set employing 2-volt valves, and taking a total filament current of .25 ampere would represent an L.T. power of *

If a 100-volt H.T. battery supplied 5 milliamps, the total H.T. power would be *

For convenience a larger unit is commonly used—namely, the kilowatt, which represents watts.

Last week's missing words (in order) were: Solenoid, Cylindrical, Series, Binocular, Solenoid, Screening.

where you finish; and (3) is the beginning of the reaction winding. (You will remember we marked this "reaction" when commencing to wind the second coil quoit.)

Erecting an Aerial.

G. F. G. (Essex).—"Since settling down out here in the country I have altered my ideas about wireless, to which I was quite indifferent when living in London. But being a sixty-four-year-old reader I am young enough to learn, and have become greatly interested in your 'Cosmic.'

"My first step, however, is to get an aerial up, and I find very little is said about this sort

(Continued on page 32.)

PERTRIX TRADE MARK JUNIOR

A NON-SAL-AMMONIAC BATTERY
AT A POPULAR PRICE

Never before has there been a battery so low in price that gives the life or possesses the same capacity as the PERTRIX JUNIOR. Like all Pertrix batteries, the PERTRIX JUNIOR is a non-sal-ammoniac battery. This means it has infinitely longer shelf life, positively longer active life, gives clear reception and has high recuperative powers. At its price there is no other battery to equal the PERTRIX JUNIOR. Get one to-day.

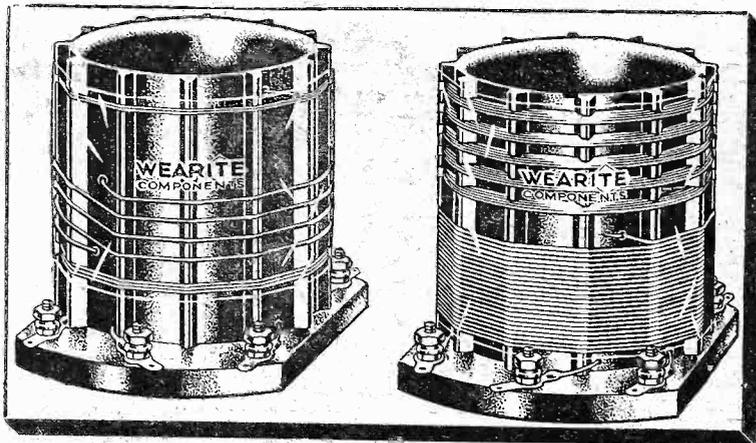
NOW



All the skill and the high quality chemicals that go into the more expensive Pertrix batteries also go into the PERTRIX JUNIOR. Quality has not been sacrificed to price. That is why you get more from a PERTRIX JUNIOR, although you pay no more.

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60 VOLTS
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WEARITE H.F. CHOKE

An efficient choke working from 10 to 2,000 metres without marked resonances.

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WEARITE ON-OFF SWITCH

A single pole self-cleaning push-button action switch of compact design.

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Soundly built holders with spring sockets. Of highest quality bakelite.

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With such an efficient receiver as the "Cosmic" the tuning circuits *must* be above suspicion. Make certain of the performance of your "Cosmic" by using "WEARITE" coils — coils that are backed by a reputation second-to-none.

9/- per pair

or 5/6 for the Dual-range, and 3/6 for the Ultra Short-Wave range.

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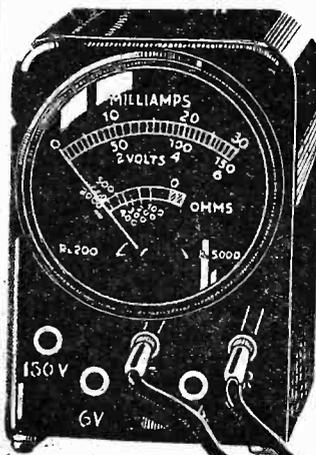
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TRANSFORMERS
COILS
CONDENSERS
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DISTORTION
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Four readings on one dial, precise and clear, including direct measurement of resistance. The 'Universal' is a really scientific instrument within the reach of all. Quickly saves its cost and keeps reception perfect. Fitted with battery for valve and circuit testing. Readings: (1) 0-150 volts for H.T.; (2) 0-6 volts for L.T.; (3) 0-30 milliamps for current; (4) Resistances 0-2,000 ohms. Interesting pamphlet on Set Testing with each instrument - **12/6**

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STANDARD BATTERY CO.
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LONDON

BRITISH MADE



COSMIC QUERIES

Can I use an H.T. mains unit with the "Cosmic"?

CERTAINLY, but in a high-efficiency tri-band set such as the "Cosmic" an H.T. unit of sound design and construction must be used, and a rough hook-up of choke and condenser is not likely to serve satisfactorily. Any cheap H.T. unit can be used, but you can be certain that if the accessory introduces noticeable hum on the ordinary broadcasting waves (as many do) the interference will be markedly worse on the short waves.

The Three Essentials.

However, there are numerous units of sound design available at very reasonable prices, and on test a selected number of these gave uniformly good results with the "Cosmic." There are three essentials you should bear in mind when choosing your model: (1) That the device was designed in strict accordance with the I.E.E. recommendations. (2) That it can provide sufficient current, with about thirty per cent to spare, for the valves you are using. (3) That there is a variable tapping for the detector valve.

When you employ a mains unit it is highly desirable that there should be an output filter in the set on the lines of the one described elsewhere in this issue.

* * *

Can I use a "so-and-so" valve for the Detector stage?

To most queries of this nature the only answer is—you can, but WE do not recommend any other type than that one definitely specified.

The detector stage in the "Cosmic" has more work to do than in most receivers, and the characteristics of the detector valve have a vital bearing on such all-important matters as reaction control.

Smooth reaction is quite essential for the satisfactory reception of short-wave stations, and this can be obtained only by using a valve of the type specified.

* * *

My results are excellent on short and long waves—poor on medium. The moderator condenser controls volume and selectivity on long waves, but seems to have no effect on short waves. On medium waves the results

By G. V. DOWDING, Associate I.E.E.
 We have selected a few of the more generally asked questions concerning "Cosmics" from a very large postbag, and it should be noted that the answers, in many cases, also apply to other types of sets.

are poor at maximum moderator, but very bad at any other setting.

This would point to a disconnection or wrong connection in the moderator circuit. The first thing to do is carefully to check the wiring and to ascertain that the moderator plug is making proper contact with the moderator coil sockets.

A Broken Wire?

The disconnection may be in the coil itself, though this is not very likely. Anyway, it is a definite fault of the above nature and should not take long to trace, providing you go about the job methodically.

But it should be noted that the moving of the moderator coil, as suggested in the "Selectivity and Power" article ("P.W." March 5th), will not cover up a definite fault of this kind. It must be remedied.

I get very good results, but am unable to get full moderator control. The London National is very good with the moderator condenser at minimum, but I feel it could be better. Is this so, or am I expecting too much?

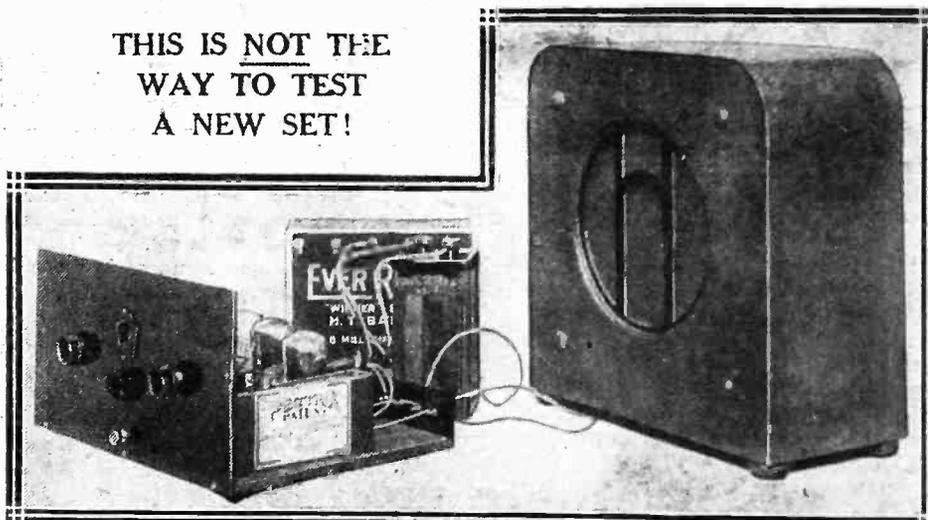
We should think it probably could be much better. You should be able to "run through" the point of greatest volume. That is to say, the turning of the moderator condenser control ought to bring you to a point of greatest loudness, while there is still a further travel of some few degrees during which the volume decreases.

"Tuning Through."

The decrease might be very slight, but so long as it is perceptible against critical listening, you have the satisfaction of knowing you are able to command maximum power. Are you sure you have tried the lowest moderator coil tapping? If so, and you still cannot "tune through," it would seem either that you have abnormally long or high capacity aerial, or that your moderator coil is incorrectly wound. Try reducing its turns. Strip one turn off at a time until, with the lowest tap in use, you are able easily to tune through the London National on the moderator condenser. A

(Continued on next page.)

THIS IS NOT THE WAY TO TEST A NEW SET!



No receiver can operate to the best advantage in such conditions as are illustrated above—untidy battery and speaker wiring, and the loudspeaker placed so that its sound-waves impinge on the unprotected valves.

COSMIC QUERIES

(Continued from previous page.)

wearisome little job—but you will find it worth while, we think. Don't forget that this tuning through will not apply to the long waves.

I only just bring up to full volume the London National and Regional on the central moderator coil tapping. If I want the North Regional I must change the tapping. Surely this is a bad point?

An extremely bad point. But it isn't one against us! Scowl at your moderator condenser, for there is little doubt but that is the culprit.

A capacity of .00075 mfd. is quite ample to provide a full "moderating" effect from below the London National to well above the North Regional, let alone the London Regional.

The Moderator Plug.

I reckon on at least 250-500 metres—which is enough for all ordinary purposes—anyway, the bottom and top fringes are, in such normal circumstances, well on board

Such queries as this one do not arrive from regular readers of "P.W."—for these know that there are two distinct groupings of "Cosmic" coils, each group having its own special numbering.

Coil Numbers.

The reason is that some manufacturers are using existing coil mouldings for "Cosmic" coils. That means cheaper coils for the "Cosmic," so we hope readers will keep for reference that little table which appeared in our February 20th issue.

Obviously, we cannot keep repeating it. However, we believe all coil-makers are now sending out full details for connecting up their various coils.

Can two loudspeakers be used?

Yes—and three or even four if you want to, and can afford to buy the necessary instruments. Join them up in series, i.e. make a chain of them so that the energy from the set runs through each separate speaker in turn.

I will give the connections for three. Join the one terminal of the first loudspeaker to the one terminal of the set, the second terminal of the first speaker to the one terminal of the second speaker, the remaining terminal of the second speaker to the one of

I agree—it is extraordinary. But yours is by no means a unique experience. And similar results have been obtained on other sets than the "Cosmic" as well.

"THE REAL GOODS."

Another Compliment for the "Cosmic"!

March 7th.

The Editor, POPULAR WIRELESS.

Dear Sir,—I feel I must write to compliment those responsible for the production of the "Cosmic III." I have followed the articles with the greatest interest and an ever-growing desire to have a go at what appeared to be the "real goods." Suffice it to say that my "Cosmic" was completed at 10 a.m. on Saturday last, and in a few minutes we were listening to the morning service.

On Sunday evening I logged more European stations than I had believed possible. I am quite raw at the short-wave business, but I picked up a station announcing London Regional news at 12.10 a.m. Sunday morning—at first switch-over to short waves, but no idea where it was.

I am afraid that with Mr. Kelsey I am going to lose some sleep over this set.

Good luck to your journal!

Believe me, Yours faithfully,

Wicken. STANLEY J. GRANFIELD.

In actual fact you are using something of an aerial, even if it is only the piece of wire which runs from the set to a water-pipe, or some of the connecting leads (and the coil) inside the set. And after all, such items will have natural wave-lengths decidedly closer to the wave-lengths of the short-wave stations than a long suspended outdoor aerial which, if it introduces serious damping, may actually be doing more harm than good!

I have no grumbles about my "Cosmic," it brings in scores of stations, but I am wondering whether I ought to be getting the loud hum I do with a "——" mains unit I have just bought.

We should think that much of the hum is quite unnecessary. Of course, there will be a slight hum on the short waves even with a good mains unit—that is quite unavoidable as, among other things, you will be working so close on the edge of reaction all the time.

However, on medium and long waves there need be no hum at all in all ordinary circumstances. Many people do not object to a slight hum when there is no music or speech coming through, so long as it does not make itself apparent during programme items.

But if the hum interferes with, or is easily audible through speech or music, then there is something badly wrong—probably with the unit.

How many stations do you guarantee on the "Cosmic" Three?

"How many miles an hour can you guarantee on this car?" asked the motorist's friend. "Not very many when I'm stuck in a traffic block, but an awful lot when I'm travelling down-hill on a wide straight road," replied the motorist.

No, we won't guarantee even twelve. The number of stations receivable on any set so largely depends upon local conditions and the skill of the operator that it is foolish to be dogmatic.

But we should not be at all surprised if many well-handled "Cosmics" bring in over 100 stations, including short-wavers, under really good conditions! (An indication of such a possibility is provided by the letter from Mr. S. J. Granfield, which is reproduced on this page.)

TRYING TO TELEVISION "TOOTLES"



Three New York ladies and their prize pet dogs formed the subject of a recent Television experiment. But why trouble about the dogs?

for all practical purposes. It should certainly not be necessary to change the moderator coil plug once you have it nicely set.

But if the moderator condenser, though marked .00075 mfd., has, in fact, only, say .0005 mfd. capacity, its control will naturally be somewhat restricted. We do not think there are a lot of sub-capacity moderator condensers in existence, though unfortunately we know there are some, for we've met one or two ourselves!

My "Cosmic" coil terminal numberings do not agree with those shown in your wiring diagram.

the third speaker, and the second terminal of the third speaker to the remaining loudspeaker terminal on the set.

The order of the speakers is quite immaterial—I referred to them as 1st, 2nd and 3rd merely for descriptive purposes. If you intend to have very long loudspeaker leads, a filter output is advisable.

I get several short-wave stations on my "Cosmic" without using an aerial, though I do not hear any stations on medium and long waves unless I connect up my aerial. Is this not extraordinary, as the short-wave stations are hundreds of miles farther away?

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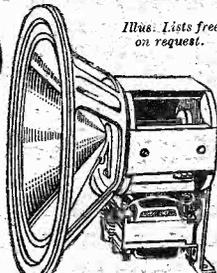
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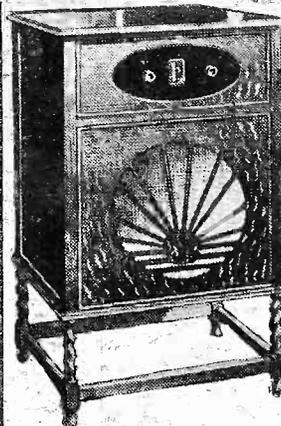


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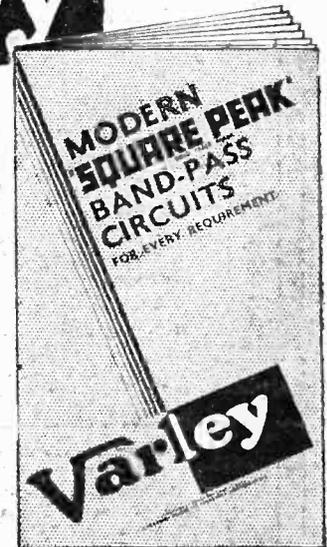
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RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 32.)

dangerous, especially in a short-wave set, how can it be recommended for an adaptor which is used for short waves and short waves only? I do not deny that the adaptors work all right. As a matter of fact, I have had one working to-night, with good results from W 2 X A D (America). But why say spacing is so important and then use a lead which is really three leads in one?"

It certainly does look queer at first sight, L. G. E., but when you examine it closer you will see there is a perfectly good reason for not worrying about the lead to a short-wave adaptor, although it carries three wires at once.

The reason is that all the "short-wave" working takes place in the adaptor itself, and the three wires in the lead from the plug are really just glorified battery leads, passing L.T. and H.T. to the adaptor.

All the tuning, all the reaction, and all the detection takes place in the well-spaced adaptor itself, and a short-wave H.F. choke is inserted in the H.T. lead to the plug which stops any tendencies to wander away from the adaptor proper. Thus there is no H.F.—which it is so important to space properly for—in the leads to the plug.

All the two filament leads do is to carry L.T., and the other lead carries H.T. and the low-frequency, very much the same as the leads in a pair of telephones.

JAMMING ON 300 METRES.

"SHIPS THAT PASS" (Canterbury).—"Can you explain why interference by ships' Morse travels worse in the day than at night? I have frequently noticed this and proved it conclusively when kept indoors recently by a spot of gastric flu. During daylight 300 metres and all round Hilversum's wave was often quite spoilt by messages, and yet later in the evening, when the longer-distance broadcasting stations came in strongly the Morse jamming was no trouble at all. Why?"

The reason that the interference is not heard so powerfully after dark is not that it travels less easily then, but that it tends (like the broadcasting programmes) to travel much better! So much better, in fact, that it would spoil broadcasting in very large areas near the coasts, and therefore it has been agreed that ships shall not use the 300 or the 450-metre wavelength after dark.

That is why you don't hear them!

THE "COSMIC STAR" BLUE PRINT.

F. L. W. (no address).—"I think there is an error in the 'Cosmic Star' blue print. There should be an H.T. negative in place of H.T.

NEXT WEEK

HOW TO BUILD OUR SINGLE-DIAL SUPER

A TALK WITH A DUTCH LISTENER

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positive, joining the L.T. negative. No doubt you have found out before, but I write because it would have an amateur really puzzled."

In an article appearing at the same time as the blue print was given away, we pointed out that Ready Radio, Ltd. had informed us that a number of the blue prints were marked in this way, but the actual wiring was quite O.K. The only difference is that the terminal which is joined to L.T. negative should be marked H.T. "negative" instead of H.T. "positive."

THE LISTENER'S NOTEBOOK

(Continued from page 18.)

will receive a similar one of Moscow. The invitation doesn't stop at postcards, either.

Posters will be equally welcome, and a Soviet poster will be sent in exchange for an English one. This offer comes at an opportune time now that the question of wallpaper is being settled in so many households. Moscow's invitation came after a very interesting talk (in English) on "The Fight of the U.S.S.R. for Independence."

* * *

Musical criticism may not appeal to everyone, but I am certain that Mr. Ernest Newman's talks are popular. What is more, they are not solely for the highbrow. Anyone can understand them. He gave German composers a bit of a dressing-down recently, and many listeners must have enjoyed his outspoken comments on the much-talked-of New Concerto of M. Ravel.

* * *

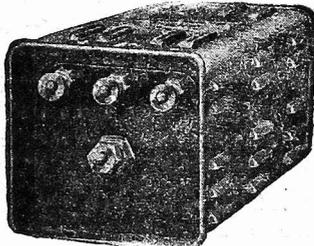
How did you enjoy Jack Hylton's Hour? Great, wasn't it? There's no doubt about the proud position this band occupies among dance bands. It certainly has no equal, in my opinion. I am not certain, however, that he doesn't overdo the staccato stuff, nor am I sure that he is right in playing so many noisy numbers. I noticed this latter feature in a broadcast he gave from Radio Paris a week or so ago. But on that occasion I thought he was catering chiefly for his French audience.

(Continued on next page.)

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THE LISTENER'S NOTEBOOK
(Continued from previous page.)

I have been so outspoken over the presentation of certain plays that I hasten to show that I am always ready to give praise with both hands when it is due. The play which I wish to single out for special distinction is "Ann and Harold." If perfection has ever been reached on the radio in connection with a playlet, this surely is the event. Harold Warrender and Ann Trevor made a wonderful pair. Two such voices, so clear, so charming to the ear, were bound to be a big asset to any producer, but the work of the play by Louis Goodrich was also of a high class.

The noise effects were so skilfully handled, and never allowed to interfere with the dialogue, that I began to wonder whether criticism on this point was at last having some effect. However, on listening to the rest of the new series of Tower of London broadcasts, I soon realised that I had been too optimistic, for the fanfares were more stirring than ever, and even the deep voice of Clinton Baddeley was at times over-awed. The narrator, by the way, was rather mechanical. I should like this duty undertaken by one with a higher and better-pitched tone.

I didn't think the Palladium turn of Teddie Brown and his xylophone reached the standard set by the artistes of the two previous weeks. (I am still chuckling over Wee Georgie Wood's last quest to his newly-discovered step-her: "Then take off my boots!") Teddie Brown is undoubtedly an extremely clever xylophonist, but on the saxophone, or as a singer, he is very ordinary. Moreover, the saxophone is not a solo instrument, out of a dance band, and the London Palladium orchestra is certainly not that.

A FILTER FOR THE "COSMIC"

(Continued from page 16).

This side of the 2-mfd. is also joined up to the L.S. negative terminal. The plate terminal of the third valve holder goes to the unconnected terminal of the 2-mfd., and then on to the nearer terminal of the choke, the other side of which is joined up to the H.T. plus 2 terminal. That leaves the more connection, namely, the one from the L.S. positive terminal to the H.T. negative terminal.

"D.C." Users:

Now, before I close there is one small point concerning the use of the output filter with a D.C. mains unit. Sometimes the positive main is earthed, and in this case the loudspeaker would not be completely isolated from the positive main by the electrolytic condenser.

However, this can be remedied as simply as anything by means of another 2-mfd. electrolytic condenser, and it should be connected between the loudspeaker lead that goes to the loudspeaker positive terminal—rather, what was the positive terminal— and that terminal.

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MIRROR OF THE B.B.C.

(Continued from page 18)

Mr. Payne is also bringing his Band to the studio on the following Wednesday evening to give a half-hour's programme from National transmitters. In other respects the London programme on Easter Monday includes many of the usual week-day features in outside broadcasts and a concert by the Wireless Military Band.

The Ridgeway Parades.

Philip Ridgeway and his "Parade" company are also paying return visits to the studio, first on Easter Monday to entertain National listeners, and on the following night to repeat their programme for London Regional. Mr. Ridgeway still calls his entertainment a "new song and dance show," and doubtless it will be very much on the lines of what we are accustomed to getting from this well-known producer of the light and cheerful kind of programme.

I hear, by the way, that Mr. Ridgeway's recent theatre tour of the country was a great success, and that at Huddersfield his company drew the largest audience ever present at the Theatre Royal during its fifty years' existence.

* * * * *

AND STILL THEY COME!

Some further "Cosmic" Appreciations

* * * * *

The Editor, POPULAR WIRELESS.

Dear Sir,—About a month ago I was seriously thinking of making a new set, and every new set I saw advertised attracted me, including the "Cosmic III"; that is the set I have built.

I am not going to romance about the wonderful things I've received, as I haven't even tried on the short wave, but I had dance music all last Sunday, February 28th, and so far I've been able to get what I wanted with a little patience, and at present I am only using 100-volt H.T. Exide wet battery: I have another 20 volts coming.

Thanking you in anticipation of many hours' entertainment with a "Cosmic."

Westerham, Kent. CHARLES BARKER.

SOUTH AMERICA ON MEDIUM WAVES!

The Editor, POPULAR WIRELESS.

Dear Sir—I have carried out exhaustive tests and experiments with the "Cosmic III Star," and am extremely well pleased with the results.

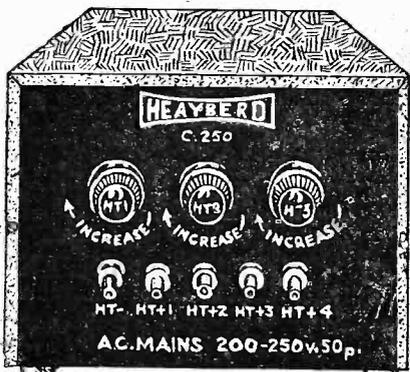
On the medium and long waves the volume and selectivity are exceptionally good. My best piece of reception on these waves is of a South American station with a wave-length a little below Glasgow. On short waves conditions vary considerably. So far I have heard W8XD, W2XAD, W9XAA, W2XAF, PLE, REN, CT1AA, I2RO, and Zecon. These are all on the loudspeaker.

On the amateur bands I have heard W. Dists. 1, 2, 3, 4, 8, and 9; VE Dists. 1 and 4; K4, T1, VS3; and PK, as well as nearly every European country. These will show that the set is all that "P.W." claimed for it.

Yours faithfully,

Muthill, Perthshire. ALEXANDER CROSS.

EDITORIAL NOTE.—The amateurs referred to by Mr. Cross include Costa Rica, Malay Straits, Dutch East Indies, Porto Rico, U.S.A. and Canada (Manitoba), which with W8XK (Pittsburg), W2XAD (Schenectady), W9XAA (Chicago), W2XAF (Schenectady), PLE (Bandong, Java), REN (Russia) and CT1AA ((Lisbon), etc., is a very excellent log.



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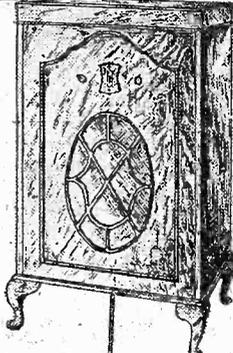
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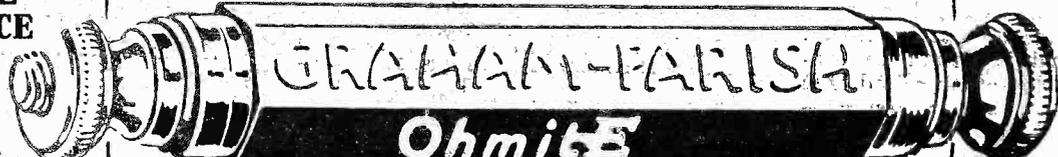
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TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio reception.

By Dr. J. H. T. ROBERTS, F. Inst.P.

Operating Skill.

A GOOD deal is said about tone and quality of reproduction as being dependent on the components used in the set, the layout of the circuit, and various other matters connected with the receiver. These, of course, are very important and, if there is any inherent defect in the set, it is obvious that no amount of operating skill will entirely overcome it. But at the same time, I think bad quality is much more due to bad operation of the receiver than to defects of the instrument itself.

The most flagrant example of this, of course, is the misuse or excessive use of reaction. It very often happens that a set will, in proper hands, give excellent quality of reproduction, but in the hands of an unskilled or careless user give just the opposite.

Relying on Reaction.

I do not think it is necessary to say much about the use of reaction, because in these days everyone knows that reaction is to be regarded as a sort of medicine, only to be used sparingly and not to be relied upon as a regular thing. When listening for distant or weak stations you will generally have to use some reaction, and you are very apt to get in the habit of relying upon the reaction and using far too much of it when receiving local or fairly strong stations.

Remember that even quite a small amount of reaction, or perhaps I should say of unnecessary reaction, will have the effect of cutting down the higher notes and also probably of sharpening up the tuning and making the set still more difficult to control. It is almost an axiom nowadays that if you have to rely upon a large amount of reaction to get the desired signal strength, especially on nearby stations, there must be something wrong with the set or with the operation of it.

If it is the operation that is wrong it is most probably the tuning, but at the same time you should take a careful look over the coils to make sure that there is no undue loss there, and also be certain that losses are not occurring due to high resistances in the aerial circuit.

Controlling Volume.

As regards the tuning, this also is one of the most fruitful sources of distortion many listeners making a bad habit of using the tuning for the purposes of volume control. Strictly speaking, a set should be accurately tuned always and any variations, either in quality or quantity, which you want to make should be carried out independently of the tuning.

In other words, the tuning control should be used for tuning and nothing else. If the set is particularly selective—as most sets are in these days—the distortion brought about by improper tuning of the main circuits will be all the greater.

(Continued on next page.)

AIR-GAPS ELIMINATE LEAKAGE

IN the old type H.T. accumulators, electrical leakage is inevitable—moisture settles on their unbroken tops, forming a film which provides a direct connection between the positive and negative terminals. And serious waste is the result. But in the Lively 'O' Accumulator, each cell is separated by an air-gap—air is a most effective insulator—thus electrical cell-to-cell leakage is definitely eliminated. There is no 'falling off' in voltage due to leakage—no self-discharge—no waste. The Lively 'O' gives pure, smooth current in abundance—just what your Set needs. Your Dealer stocks the Lively 'O.'



Above you see how the current can creep along the smooth unbroken top of the old-type H.T. Accumulator. Compare with it the separate air-spaced cells of the Lively 'O' (right). Note also that additional means are now provided for using ordinary wander plugs for tappings.



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TECHNICAL NOTES

(Continued from previous page.)

It follows from this that the more sharply the set tunes the more important it is to have fine control of the tuning, which means that a slow-motion dial is absolutely essential for the main tuning. Some people say that fine control is not necessary for reaction, but, personally, I prefer to have coarse and fine adjustments, even for the reaction control.

If you find that the fine control is not necessary in any particular case, you are not bound to use it.

With a selective band-pass or super-het arrangement it is especially important to get accurate tuning, otherwise you will run into sideband distortion, of which we hear so much lately.

Sidebands.

Perhaps a few words on this cutting-off of sidebands may not be out of place. When the tuning circuit is of very low resistance and the tuning correspondingly sharp, the high notes, as I mentioned above, are very liable to be cut off if there is any error or inaccuracy in the tuning.

The reason for this is that when the circuit is adjusted for a particular frequency it receives not only that frequency, which is the fundamental frequency of the station which we are picking up, but also a number of other frequencies close to the fundamental frequency. Now if the tuning circuit picks out any particular frequency very sharply, there is a tendency for these adjacent frequencies to be cut off and this tendency is greater the sharper the tuning.

The consequence is that if the sidebands are unduly sacrificed the reproduction is distorted and the speech becomes less clear, or "crisp," as it is sometimes called, and other sounds, such as music, become emphasised in the lower frequencies. I should perhaps add, for the benefit of more advanced readers, that there has been a good deal of controversy recently on the precise theory of sidebands and their influence upon quality and selectivity.

Some people have gone so far as to deny the existence of sidebands altogether. This controversy, however, may be regarded—at any rate so far as the amateur is concerned—as rather a theoretical matter concerned more with the method by which the result is produced than with the actual result itself. Whether we subscribe to the sideband theory or not, there is no doubt that in actual practice we get the results indicated above, and to avoid distortion we have to take the precautions indicated.

Quality and Selectivity.

Selectivity and good quality do not in the ordinary way run together. They are to be regarded, in fact, as rather opposing factors and in the result we must generally be content with some sort of a compromise.

To get good quality as well as good selectivity it is really necessary to have a number of tuning circuits. If only a limited number of tuning circuits can be used, these individual circuits must not be made unduly selective if we are aiming at good quality.

It is generally considered that at least three tuning circuits should be used if good selectivity is wanted without loss of quality. Most ordinary sets with any pretensions to selectivity have at least two tuning circuits,

whilst on the other hand, for good selectivity and good quality, many people go to the length of using as many as four tuned circuits.

One of the objections urged against the ordinary three-valve set having a single stage of H.F. amplification is that with only two tuned circuits, good quality must to a large extent be sacrificed to selectivity.

Band-Pass Tuning.

I should say that by means of the popular system known as band-pass tuning, the number of tuning circuits can be increased without an extra valve, so that this aids in selectivity without loss of quality. The essence of the band-pass tuning arrangement is the use of two loosely-coupled circuits prior to the first valve, and this has the advantage that it avoids, at any rate to a large extent, the suppression of the sidebands which, as I indicated above, are so important for preserving faithfulness and quality in the reproduction.

There is such a cry for selectivity these days that often people are tempted to overdo things and to go out for a degree of selectivity which is far in excess of what is required in the conditions. You will see from the above that all the time you are increasing the selectivity of the set you are laying up trouble for yourself with quality.

Therefore, pay particular regard to the conditions in which your set has to be operated and do not sacrifice quality which you want, for extra selectivity, which you may not want. In this connection, it is often a good plan to use the pre-set condenser in the aerial lead, which I mentioned a little time back.

The Output Circuit.

Whilst on the subject of operating the set for best quality, I should not forget to mention the use of an output filter circuit, but as I have said something about this particular subject once or twice lately in these Notes, there is no need to go into it again just now. But that does not mean it is not a very important factor in the whole outfit if you are looking for quality.

The tapped output transformer, which I mentioned recently, is also a very great help in matching up the speaker with the output of the set.

Loudspeaker Extension Leads.

There is one point, however, which I have not mentioned, and that is the earthing of the loudspeaker leads. If you are using long leads and find that these have a detrimental effect on quality you might try earthing one of the speaker leads (when using an output transformer).

Sometimes you will find the earthing connections indicated on the instrument itself. Note, however, that this applies to transformer output. With a choke output arrangement generally one lead is connected to H.T. plus or L.T. minus, and this point should be noted with an all-mains set, especially if you are using long loudspeaker leads.

H.F. Control.

Volume control is a very necessary feature in these days, and no set can be regarded as complete without it. To reduce strength on the H.F. side a rheostat in the negative lead of the screen-grid valve is useful.

(Continued on next page.)

TECHNICAL NOTES

(Continued from previous page.)

Remember not to put this in the filament circuit of the detector. By the way, if you are using a pick-up, obviously the control of the H.F. valve is no use when the pick-up is working. In such a case you will need a volume control on the low-frequency side.

The reaction control, as I think I have already indicated, should not be used for the purpose of a volume control in the ordinary sense.

You will notice that whilst a rheostat can be fitted quite easily in the case of a battery-driven set, it cannot be used with an all-mains receiver, so that so far as control of H.F. volume is concerned the rheostat is in this case out of the question; a pre-set condenser in the aerial lead will, however, generally meet the case.

Sensitivity of Pick-ups.

Although we hear so much about sensitive pick-ups, we do not always realise that a good deal of distortion is caused by the output from the pick-up being actually too great and overloading the grid of the first valve.

One obvious way to overcome this is to connect a potentiometer between the pick-up and the grid circuit of the first amplifying valve so as to act as a volume control on the pick-up.

Also, if the output of the pick-up is too great, the first valve in the amplifier should be given a suitable negative bias, the amount of which you can easily find out by actual trial.

Grid Damping.

There are a good many amateurs who still have a leaning to anode-bend detection, notwithstanding that the ordinary grid-leak detector arrangement can now be operated in such a way as to involve really very little distortion indeed. One reason for the continued popularity of the anode-bend detection system is that, since the grid is negatively biased, so that there is no grid current flowing through the tuning coil in the grid circuit of the detector, the damping of the grid is avoided.

Better Selectivity.

The effect of this is to improve selectivity and, as most of my readers know perfectly well, this may in some cases make all the difference to the ability of the set to cut out a particular station.

When using the anode-bend detector a fairly high impedance should be used in the anode circuit. Incidentally, if the resistance feed method is used, it is often quite satisfactory to use an L.F. transformer of only comparatively low primary impedance, operating with an anode-bend detector.



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SPECIFIED FOR THE "COSMIC" THREE STAR

The only Ebonite guaranteed never to spoil your set by discolouring.

Black, Mahogany or Walnut finishes with an amazing mirror polish. Easy to cut and drill and costing only 4/6 for 7" x 18" panel.

Ask your dealer or write to us for list. Any panel size cut. Cash or C.O.D. by return.

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PONDERS END, MIDDLESEX

PERMCOI

PLEASE be sure to mention "Popular Wireless" when communicating with Advertisers. Thanks!

"P.W.'s"

SPECIAL PROGRAMME FROM "ESTACAO RADIO CT1AA"

(Continued from page 7.)

metres to-morrow night, because, after all, this is primarily a "Cosmic" test. But we do not want you to infer from that that there is anything exclusive about it!

On the contrary, we extend a cordial invitation to every one to participate, for apart from the general interest necessarily associated with a programme such as this, the opportunity of hearing Captain Eckersley is much too good to be missed!

Where to Find Him.

Remember, the wave-length is 42.9 metres, which for "Cosmic" owners will be between about 160 and 170 degrees, and the time is ten "pip-emma" precisely! And we shall be glad to hear how you get on.

Now, there is just one thing to which I want to refer by way of conclusion, and that is concerning the special record of Captain Eckersley which has been made by the H.M.V. people for the occasion of our Lisbon broadcast.

Naturally, it's rather a valuable record, because it is the only record of Captain Eckersley that is available, and, of course, even this one will not be on sale to the general public.

Well, I have been having a chat with the Technical Editor as to what is to be done with this original record when the broadcast is over, and he has put forward the excellent suggestion that it might be handed on to one of you fellows autographed by Captain Eckersley as a sort of historical souvenir.

Then, of course, the problem arises as to who is to have the record, for much as we should like to break it into thousands of little bits, that is hardly a practical way out of the difficulty!

So I think the best way of settling it is to get everybody who is interested to send in a fifty-word description of what you think of the Lisbon broadcast idea. The record will be given to the reader who sends in what, in our opinion, is the best effort.

"Write on a Postcard."

And, in order to give everybody a chance, I'm not going to confine this offer only to those who participate in the broadcast. It is open to every reader of "P.W." who submits an entry, and let me hasten to add that efforts will not be judged on literary ability.

Just write on a postcard your own personal views, whether humorous or otherwise, of our special broadcast idea, and send it along to me at Tallis House, Tallis Street, E.C.4, so as to reach me not later than the first post on Thursday, March 24th, and, as I anticipate that rather more than a few of you will be keen to get this record, I'm going to ask you to limit your description to fifty words! To give you plenty of latitude, perhaps we had better make it not less than thirty, and not more than fifty words. So now it's up to you!

Don't forget the address: G. T. Kelsey, Tallis House, Tallis St., London, E.C.4.

When did you last examine your "EARTH"?

SATURATE it NOW



the CONDUCTIVITY

Chemical

A Good Aerial is spoilt with a Bad Earth—

So do Not Neglect Yours

for ONE SHILLING

SENSITIVITY
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within 24 hrs.

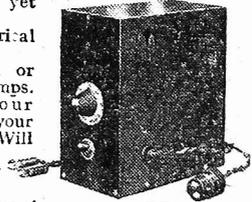
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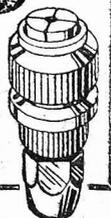
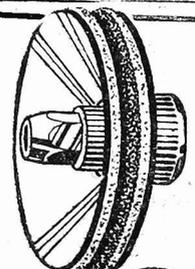
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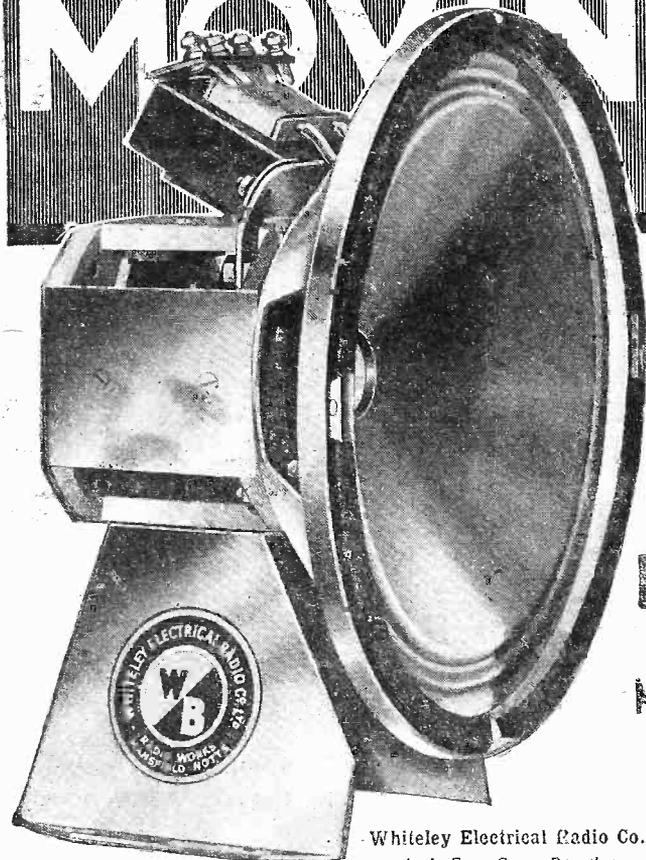
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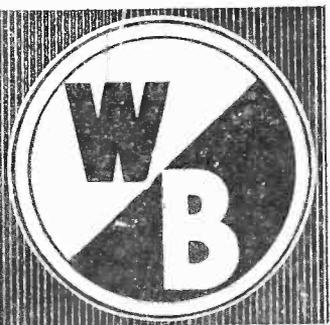


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35/- Without Transformer

42/- Complete with output transformer mounted on top.

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P.M.4



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Between SHOTS—

they all take a look at **FILM PICTORIAL**. Here is Nora Swinburne, who, like everybody else, can't resist the attraction of this new super paper of the films.

FILM PICTORIAL is printed entirely in photogravure, with special pages in **COLOUR**. There is all the news of the stars and of forthcoming films. There are exclusive photographs and studio gossip. There are . . . but we can't mention them all.

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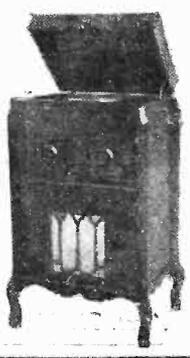
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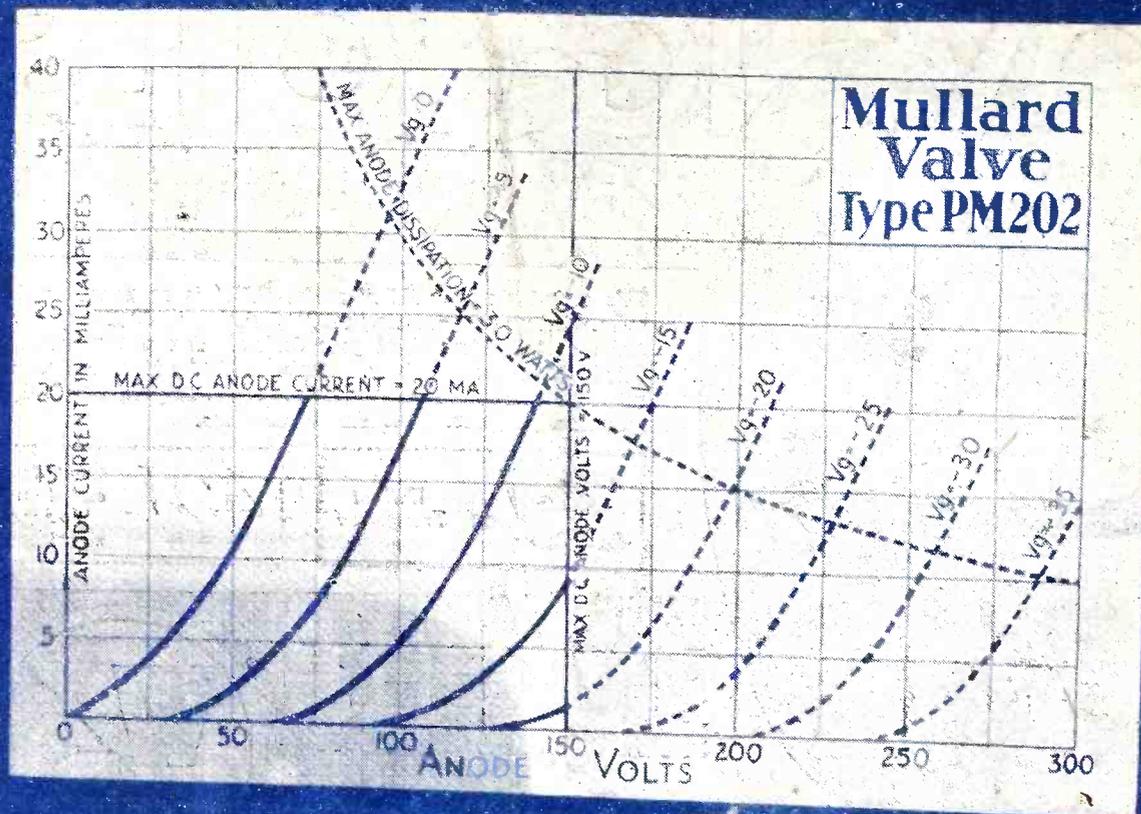
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SIZES: 3' 3" HIGH 22" WIDE 19" DEEP
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**P.M.
202**

**SUPER POWER OUTPUT
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A super power valve consuming a filament current of only 0.2 amp. It is designed for use as an output valve in battery operated receivers where considerable volume is required and where the available signals are greater than can be handled without distortion by a valve of the power class.

OPERATING DATA

Max. Filament Voltage 2.0 volts
 Filament Current - 0.2 amp.
 Max. Anode Voltage - 150 volts

CHARACTERISTICS

(At Anode Volts 100: Grid Volts Zero)
 Anode Impedance 2,000 ohms
 Amplification Factor - 7.0
 Mutual Conductance 3.5 mA.v.

MADE IN ENGLAND

PM202 Mullard
THE MASTER VALVE

Advt. The Mullard Wireless Service Co., Ltd., Mullard House, Charing Cross Road, London, W.C.2.

ARKS

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HOW THE "P.W." RECORD WAS MADE (See Page 45)

Popular Wireless

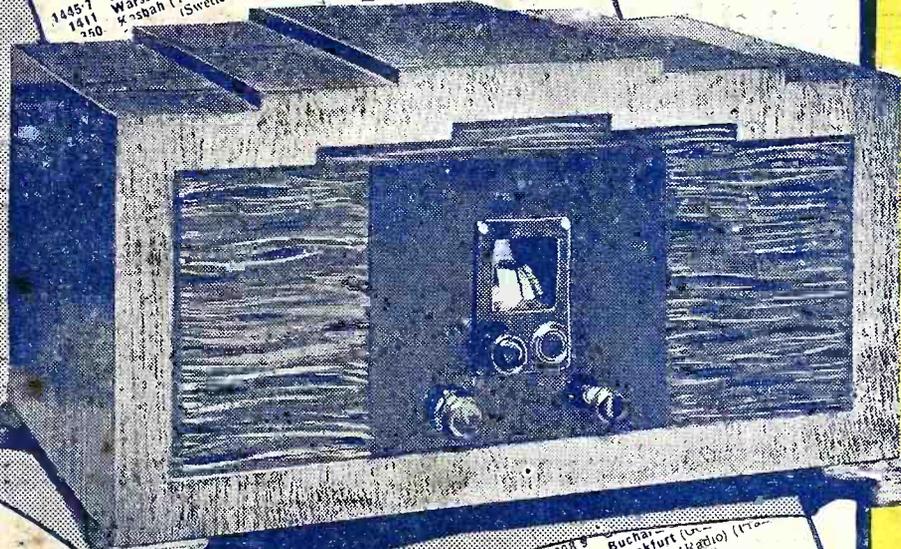
Every Thursday
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No. 512. Vol. XXI.

INCORPORATING "WIRELESS"

March 26th, 1932.

OUR "SINGLE-DIAL SUPER" DESCRIBED INSIDE



ALSO THIS WEEK :

THE EPILOGUE MYSTERY

Some new facts about this Sunday programme feature.

REGARDING OVERLOADING

A practical article concerning one of the most common causes of distortion.

TEACHING TELEVISION TECHNIQUE

CAPT. ECKERSLEY'S QUERY CORNER

NOTES FROM THE NORTH

A contribution from Our Northern Correspondent of especial interest to North of England and Scottish readers.

A TALK WITH A DUTCH LISTENER

This is not an imaginary interview, but a real-life glimpse of home radio in the land of dykes and windmills.

READY RADIO

A reader's log:

S. America; Costa Rica; Porto Rico; Malay Straits; U.S.A.; Java; Canada; Dutch E. Indies; in addition to nearly every European country. For Kit prices see page 63.

COSMIC STAR

(Advt.)

HAVE YOU SEEN IT? THE APRIL NUMBER OF THE WIRELESS CONSTRUCTOR

NOW ON SALE. PRICE 6d. OBTAINABLE EVERYWHERE

Commencing in the April number of "The Wireless Constructor" is a magnificent new feature entitled

FROM MY ARMCHAIR

In this—the first of a unique series of articles—the great radio expert talks interestingly and intimately about the radio tendencies of to-day.

*Delightfully Informal
and Informative!*



—By John
Scott-Taggart

In addition to his new series, "From My Armchair," Mr. Scott-Taggart contributes a vital article:

"IS BAND-PASSING A CRAZE?"

and also constructional details for
**GRAMOPHONE
MUSIC ON
YOUR S.T.300.**
and other striking features.

An unusually comprehensive list of how-to-make articles is a very strong feature of the April "Wireless Constructor," and among the items are

THE UNI-AMP

An extremely handy dual-circuit single-valve amplifier.

REMOTE CONTROL

Full details for making a simple "switch-at-a-distance" unit.

FITTING A PENTODE

An easily constructed "filter" for using a pentode to the best advantage.

ALSO IN THE APRIL "CONSTRUCTOR"

THE S.T.300 FOR A.C. MAINS

By John Scott-Taggart

MAKING RADIO READABLE
ROUND THE DIALS
FIVE-CHANNEL TELEVISION

PUSH-PULL DETECTION
THE MONTH ON SHORT WAVES
CHOOSING A LOUDSPEAKER
ON THE GRID, ETC., ETC.

WITH PICK-UP AND SPEAKER
QUEER QUERIES
A PRACTICAL MAN'S CORNER

THE WIRELESS CONSTRUCTOR

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REMEMBER COLVERN SINGLE DIAL SUPER-HET
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Therefore, specify Colvern coils Type SDS,
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Colvern Coils were exclusively specified for
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Set of 3 coils (mounted on aluminium base)
37/6 per set.

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Mawneys Road, Romford, Essex

COSSOR

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MICA BRIDGE—

THE development of the Cossor Mica Bridge system of construction has permitted the attainment of a much higher standard of valve efficiency. Under this method of construction the elements of every Cossor Valve are rigidly held in permanent alignment. All possibility of variation is eliminated thus ensuring life-long consistency and efficiency. By fitting Cossor Valves to your present Receivers a considerable improvement in performance can be effected at small cost.

COSSOR VALVES FOR THE "P.W." SET DESCRIBED IN THIS ISSUE

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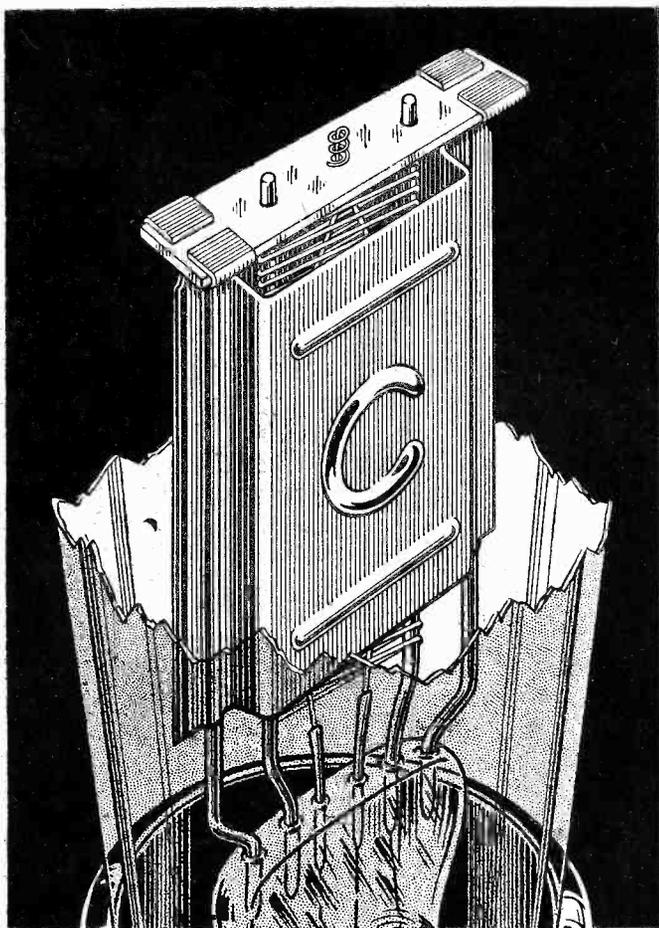
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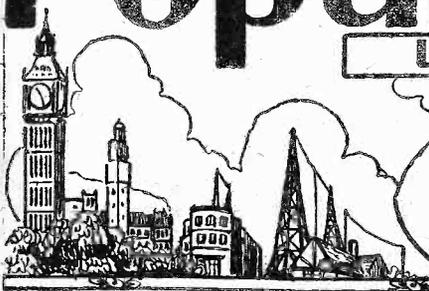
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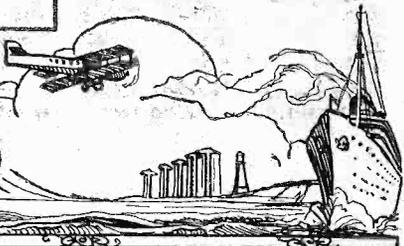
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Popular Wireless

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MASSSES AND MASSSES
 RADIO ISLAM
 LINDYS BABY
 THANKS, LADS!

RADIO NOTES & NEWS

CRUELTY TO SHARKS
 SCHOOL LESSONS
 SHANGHAI HEROES
 WHO IS A. J. ALAN?

This Early Easter.

OWING to the vagaries of the moon, Easter this year falls earlier than it has done for about twenty-five years, I believe. So early, in fact, that the Easter Eggs won't be laid!

What the chances of the usual outdoor junketings are I dread to think, but I am not banking on a "picnic-and-portable" holiday. Seems to me that (miracles apart) this Easter was designed by Nature to be a fine opportunity for busy men to have a long orgy of "Cosmic."

By the way, I wish some of those ultra-short-wave magicians would find a wave which would destroy a two-ton dump of sodden leaves—my Easter problem!

Masses and Masses.

THOUGHTS of the Easter festival urge me to point out a curious example of how some so-called "Radio critics" give themselves away. One of them recently said, in reference to the B.B.C.'s production of Delius's "A Mass of Life," "this work is considered by some to rank with the great Masses of Bach and Beethoven." He must have invented this, for the idea of comparing this work to, say, Beethoven's "Missa Solemnis" is ludicrous.

Delius's "Mass" is a musical setting of passages from Nietzsche's "Also Sprach Zarathustra," an anti-Christian book glorifying the "superman" and deriding the meek and humble. As well one might compare the "Gotterdamernung" with "The Messiah."

Radio-Islam.

FROM the Cross to the Crescent! Hereby be it known that, uniquely in the history of Islam, the Koran has been relayed from the famous mosque of St. Sophia at Istanbul. This innovation is the work of Mustapha Kemal—and I hope that the faithful approve of it, as well as of his other job of replacing the Arabic Koran in

some mosques by a Turkish translation.

Truly it is a long step from the shoulder-blades of sheep, on which (we are told) Mahomet wrote the Koran, to the modern microphone.

Lindy's Augustus Charles.

IN common with all normal people, I hope that before these lines are published the son and heir of the redoubtable Col. Lindbergh will have been restored to his parents, safe and sound. Thanks to

radio and the Press, almost the whole population of the U.S.A. has been looking for the baby.

Apropos of American crime, what is there behind the announcement that the guard of three policemen, which have been kept at the grave of Edison day and night, is to be continued? Putting two and two together, one gathers that the "non-assimilated" elements of the mighty American nation don't "hold much stock" in their national celebrities.

CURBING CRIME IN NEW YORK



New York's Flying Squad is kept informed of the moment-by-moment moves of criminals by this new police broadcasting station. A message radiated from this source is simultaneously picked up by over 400 police centres, moving or fixed, in different parts of the city and suburbs.

Press versus Radio.

MY controversy with a 'P.W.' Californian reader about the efficacy of radio advertising seems to have taken a new turn by the announcement that the Pepsodent Company, who suspended their press advertising in favour of radio, have returned to the aforesaid press, with a national campaign. I understand that their advertising manager refused to commit himself to the statement that radio advertising is more effective than newspaper or magazine advertising. Looks as if Pepsodent's "hae their doots."

There's a Moral.

I CAN now supplement my report that the home radio construction game in the U.S.A. is practically dead, with the news that this, having been brought to pass by the manufacturers of ready-made sets, has in its turn produced diminishing interest in radio.

They say that radio exhibitions were much more crowded in the "hook-up" days than they are now. Naturally! A living hobby must have nourishment and air.

Thanks, Lads!

MY second appeal for support of Mr. Rendle's efforts to build up a system of sub-stations in connection with his short-wave laboratory and club at Bromley met with
 (Continued on next page.)

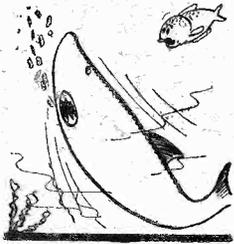
NEWS—VIEWS—AND INTERVIEWS (Continued)

a most gratifying response. He tells me that your letters were so nice that it was really hard for him to have to turn down some of you because of the unsuitability of the localities in question.

He is very grateful to all who wrote—and I am proud of you. No more applications just now, please. I hope that Mr. Rendle will let us know something more of his organisation and its results.

Cruelty to Sharks.

AFTER pecuniary problems the greatest modern conundrum is—how to dispose of old safety razor blades. I know of one man—a rich 'un—who waits till he has about a thousand and then takes a trip to Gibraltar and dumps them in the Bay of Biscay. But that's cruelty to sharks and divers! One way is to wrap them up and leave them in a



railway carriage. But they would only be sold by auction and resold to you by Cohen! Mr. Steanson, of Newcastle, has put 63 of 'em "in abeyance" by using 'em as condenser vanes in a one-valver! Coward! He has only put off the day of reckoning, because he'll have to scrap that set and build a "Cosmic" shortly!

B.B.C. Sets the Fashion.

IT looks as though England, besides having the "Mother of Parliaments," is going to be the mother of national broadcasting organisations, too. In Australia it has been decided to transfer the control of broadcasting programmes to a Commission which eventually is to have powers like those of the B.B.C.

In Canada, where the Canadian Radio League has been demanding an improvement in broadcasting, the Government is to consider the question, now that the Privy Council has confirmed that the Government has authority to control radio all over the Dominion.

Is It Irritating?

WHILST on the subject of licences I may pause to remark that a Wellingborough man has made a jolly good suggestion, namely, that wireless licences should be affixed in metal holders to house doors. The Post Office has turned the suggestion down (though the L.C.C. permits the scheme as regards motor vehicles), on the grounds that



many listeners would regard the requirement as unnecessary and irritating. As if we don't find the Income Tax irritating—and a thousand other things which we have to do in order to comply with the Law!

Back to the Gee-Gees.

AGENTLEMAN who signs himself "A Fellow Who Knows," and addresses his epistle to "The Professor," warns us that, "You are doing harm to Mother earth, things won't last for ever." He alleges that exhausts from motors and machines generally, and even cigarette smoke, are "taking all the goodness out of the air, earth and sea." We think that the Smoke Abatement Society would be glad to hear from him!

"Killed" by Kindness.

WE are used so much nowadays to hearing how radio has "killed" the theatre, fire orchestra and so on, that it is enlightening to hear that Philip Ridgeway's "Parade" Company, who have

Where to see "P.W." Sets.

An Important Announcement.

Our readers will be interested to learn that we have been able to make arrangements for the famous "Cosmic" Receiver to be demonstrated at leading radio retail shops throughout the country. Thanks to the co-operation of many retailers—who thus become officially recognised exhibitors of leading "P.W." sets, as well as the "Cosmic" in particular—"P.W." readers in the majority of the towns in this country will soon be in a position to examine actual "P.W." sets, and to have them demonstrated locally.

In an early issue we shall begin publication of a series of lists of names and addresses of those retailers who have agreed to co-operate in this scheme—a scheme which will not only enhance the popularity of the "Cosmic" but which will in many ways greatly assist "P.W." readers generally.

Any retailer desiring to exhibit a "Popular Wireless" "Cosmic" set—whether purchased through a wholesaler, or built up from parts as specified in the description of the set published in "Popular Wireless"—may apply to the Editor to be placed on our official list.

Look out for the first list of retailers' names in an early issue of "P.W."

been touring the provinces, following their last broadcast about last Christmas, have been an enormous success. At the Theatre Royal, Huddersfield, they broke all record by fetching in the largest audiences ever seen there in the last half a century.

Shanghai Radio Station.

ALTHOUGH the Chen-ju radio station near Shanghai was only slightly injured during the recent fighting, the facts are that the control lines connecting the actual transmitting plant with the operating office in the heart of Shanghai were broken by shell and bomb fire, and were repaired by the engineers under fire.

Chen-ju is a great commercial station owned by the Chinese; it was built by

Americans, and communicates with San Francisco. I have read a report from a man on the spot and am bound to say that the Chinese operators carried on the service during 72 hours of heck, like heroes.

Radio Rules Remote Robots.

THAT'S a whale of a headline, eh? While chattering of inventors I must not overlook Mr. C. Keeling, of Buckhurst Hill, who claims to be able to control by radio a fleet of aeroplanes or ships. His controlling signals cannot be jammed, either.

I confess that I enjoy the stories about gold manufacture much more, because I don't believe that ships on the sea or in the air will ever be able to dispense with a trained, human, thinking being, for the reason that the "elements" don't keep to the rules.

I don't know what Mr. Keeling has got hold of, but I do know that the navigating and handling of ships needs men of skill, experience, courage and endurance. Man cannot make anything greater than himself.



Receiver Testing.

IT is not generally known that the National Physical Laboratory has developed a very elaborate section for testing "broadcast" receivers, consisting chiefly of a model transmitter in a screened metal room. By means of this and subsidiary apparatus the selectivity, sensitivity and audio-frequency fidelity of receivers can be determined.

Readers will doubtless be pleased to know that we are installing two screened, sound-proof and acoustically adjustable cabinets at Tallis House for special receiver tests similar to but not quite so precise as those made at the N. Phy. L.

Who Is A. J. Alan?

WE all love to receive confirmation of our judgments, don't us? And in that "Ariel" is as human as the best of you. Hence, I may be pardoned for pointing out that the "Sunday Chronicle" has been trying to pierce the veil obscuring the identity of A. J. Alan. It failed, but managed to get

the B.B.C. to admit that he holds a responsible position in the Foreign Office. Very good! In "P.W." for August 15th, 1931, whilst discussing this question, I said, "I plump for the Foreign Office or the Treasury." And it is to be remarked that I had no information save that A. J. is a Civil Servant! It's a "bull" for "P.W."!

ARIEL.





HOW THE "COSMIC" RECORD WAS MADE

Those who listened on 42.9 metres last Friday to the "Cosmic" broadcast from CT1AA heard a particularly interesting test record of a speech by Capt. Eckersley given for the special benefit of "P.W." readers. Here is an "eye witness" account of the making of that historic record.

By K. D. ROGERS.

A FEW minutes before noon on a dull, uninviting sort of day a few weeks ago, four figures approached an ordinary-looking house in the north-west of London.

A Famous Firm

No. 3, Abbey Road is the postal designation of that house, which in reality is not by any means ordinary, as one realises as one comes within reading distance of the large shining brass plate on the post by the gateless drive.

The plate gives no detailed description of the building; it merely and tersely remarks: "The Gramophone Co., Ltd."

But behind that plate lies a world of romance that can only but dimly be realised by those who have not passed the portals of "No. 3." For this building is, in fact, the latest recording studios of that giant gramophone combine that is known the world over as "H.M.V."

And when I say the latest, I mean in conception of design as well as the mere date of their acquisition. The largest studio is capable of seating an orchestra of some 300 players, and an audience, or chorus, of about 1,000. It is, in fact, the very last word in recording halls, with its adjustable echo device, its lofty spaciousness and acoustically perfect walls.

But I am digressing from our story.

On an Important Mission

Towards this place, I say, and through its doors went the four figures. They carried no musical instruments nor music cases; in fact, they bore not the slightest appearance that they had anything to do with the gramophone industry, or with recording in particular.

And yet the reason of their visit to this mecca of the arts where world-famous artistes in every branch of music continually congregate was to make a special gramophone record that was destined to leave an indelible mark on radio history.

The record is the special short-wave test record that was broadcast from the studios of CT1AA, at Lisbon, on March 18th, at 10.35 p.m., G.M.T. It is a record that is unique, for it enabled thousands of POPULAR WIRELESS readers who have built the famous "Cosmic" all-wave receiver not only to test their sets on a definite transmission, but at the same time to listen to a really intimate

chat by that perfect microphone personality, Captain P. P. Eckersley.

The cat is out of the bag, and you will have guessed who one, at least, of the four, was. Besides "P. P. E." were Mr. Kelsey, "P.W.'s" short-wave expert, the "P.W." photographer, and myself.

On arrival at the studio which was to be used for this recording (it was the large

studio I have just described) a series of voice tests were made. These consisted of a brief run-over by the recording engineers of the strengths of Captain Eckersley's and Mr. Kelsey's voices.

A few words were said by each so that the distances from the microphone could be fixed before the actual recording trial began. The record was to be a double one, Mr. Kelsey saying a few words in introduction to Captain Eckersley.

Accurate Timing

In recording, the main consideration is time. The talk, or musical item, has to be timed just right so that the disc is properly filled, without the recording being carried too near the centre of the disc.

As the "P.W." record was to be a twelve-incher, the time allotted was between four and four and a half minutes. So the

"DOES MY VOICE LOOK LIKE THAT?"

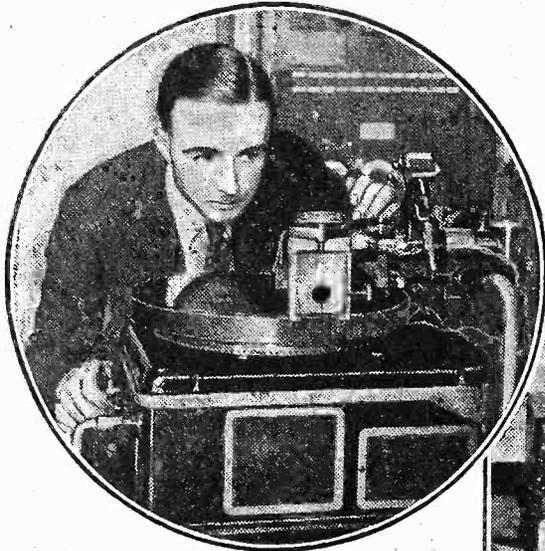


In the heading you see Capt. P. P. Eckersley and Mr. Kelsey in action before the recording microphone at the H.M.V. Studios. In the illustration immediately above, Capt. Eckersley is seen examining the wax "blank" that holds his voice, after the recording has taken place. Note the very high polish.

(Continued on page 47)

STAGE BY STAGE

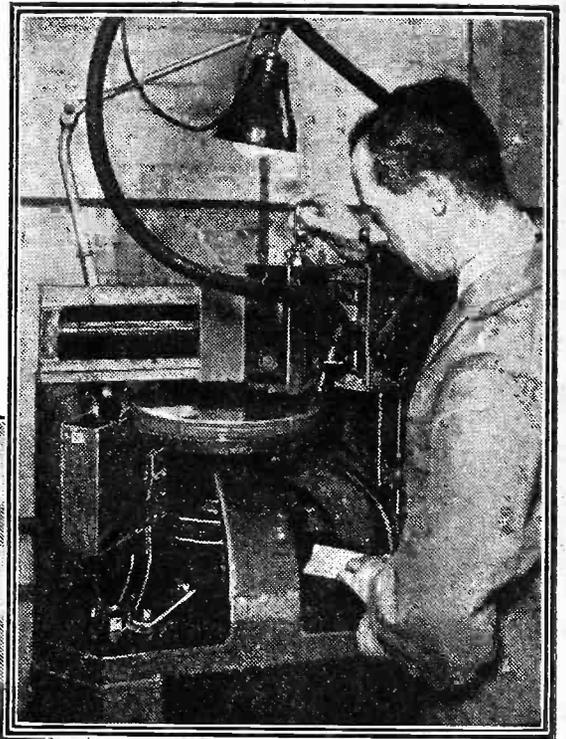
Behind the scenes during the making of the "Cosmic" special test record.



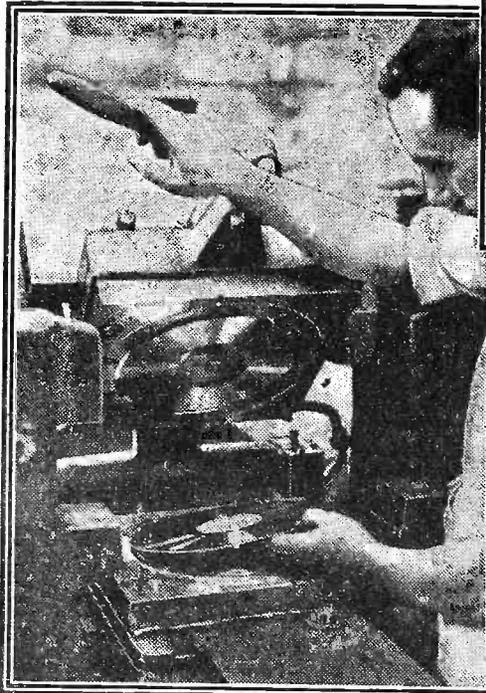
In the above photograph we see the H.M.V. recording engineer setting the cutter on the wax blank before switching on the red light to signal the commencement of the actual recording. This process follows the one illustrated on the extreme right—the polishing of the wax blank prior to recording on it. A very high polish is essential.

III

The photographs on this page show the various processes through which the "Cosmic" record had to pass before emerging as a 12-inch H.M.V. disc, similar in type and appearance to those you all know so well. From the actual recording a record goes through a surprisingly large number of steps before it is ready for issue to the public.



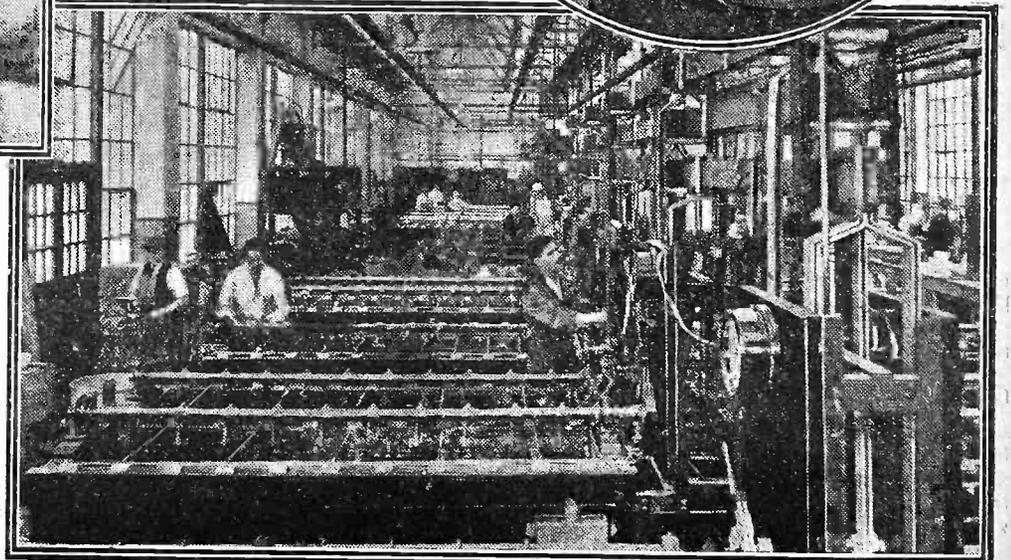
After the recording has been satisfactorily accomplished the wax holding the precious words or music is sent to the factory, where it is carefully covered with graphite to enable a copper-plated "negative" or master to be made. This dusting process is shown below.



In the photograph shown above the final stages are being reached, for the "plastic biscuit" is being placed in the press ready for the stamping of the record. Innumerable copies can thus be made. Note the two stamping dies with the labels already placed in their centres. A few seconds later the record itself (as shown on the left) is ready to be removed from the press, trimmed, carefully examined and packed off for dispatch.



After the wax has been dusted with graphite it is hung for something like 15 or 16 hours in an electroplating bath. Thus is a copper negative made, from which the "Cosmic" record is stamped. In normal cases, however, further positives and then more negatives are made. This photograph (right) gives a good impression of the plating-room of a modern gramophone company, with the many rows of plating baths each holding a large consignment of "waxes."



HOW THE "COSMIC" RECORD WAS MADE.

(Continued from page 45.)

next test was one of time as well as quality recording. And the result was afterwards played through by means of a moving-coil loudspeaker from the wax impression.

Two such tests were made so that the final record should be above reproach, and when the O.K. was given for the last run.

The Starting Signal.

Standing before the microphone Captain Eckersley and Mr. Kelsey awaited the buzzer signal for silence. Suddenly it came, and in a silence that could be felt they awaited the red light that signals "begin recording."

While they were busy before the microphone, however, let us peep inside that mysterious room of which we can see a glimpse through the small glass window close to the microphone, below the red light.

Two tall panels with their amplifying valves and controls stand at opposite ends of the room, a small, close-atmosphered

itself rests the thick wax "blank" on which the voices are to be "fixed."

Stop watch in hand, the engineer follows the course of the chat on a loudspeaker at his side. There is no need for silence in this room, for it is insulated from the studio by the latter's sound-proof walls.

Nearing the End.

At 4.25 minutes he reaches out his hand and the red light in the studio goes out. Nearly time. Eckersley wishes his future hearers, yourselves, farewell, and the recording is over.

There is no chance of hearing that record over, the wax impression has been made and would be damaged by a "play through," so it is labelled "Special, POPULAR WIRELESS," and carefully packed off to Hayes to go through the intricate processes that every record has to undergo before it emerges as a beautifully polished black disc.

At Hayes that wax impression is taken into a draught-proof cubicle and a skilled artisan carefully dusts very fine graphite powder all over it, and into the grooves.

When this is completed, the record is taken and hung for many hours in an electroplating bath, where a comparatively thick coating of copper is deposited on it. After the allotted time the record is removed

stamping rooms and placed on one of the machines.

A chunk of the soft black "bisquit" of which the final record is made, is placed on the press. The "P.W." master is brought down on to it, at the same time steam is run through to heat the master, and then the press is cooled, and then opened.

The record has yet to be trimmed, of course, but otherwise it is complete, with its white label ready in place, and when it has been burnished up it will be ready for use.

In appearance it is exactly like any other twelve-inch H.M.V. record, but it contains the voices of two of the members of "P.W.'s" staff, and as I said before, it is ready to mark a red-letter day in the history of short-wave reception.

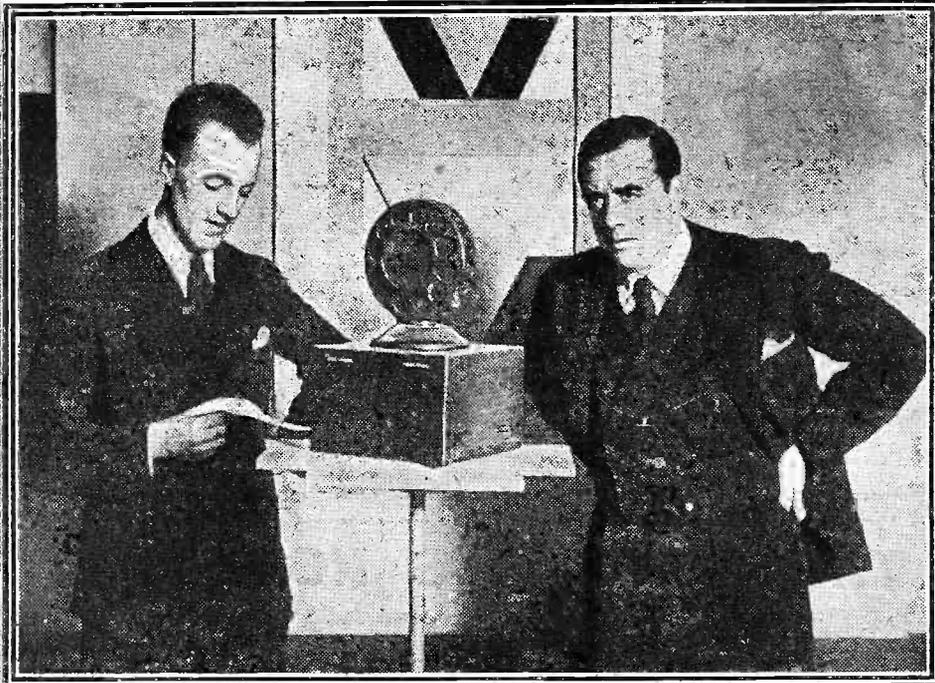
Why Not Win It?

Such is, in brief, the history of the actual making of the special "Cosmic" test record, made possible through the kind co-operation of The Gramophone Co., who placed their recording studios and staff at our disposal in order that our test should be a complete success.

The record cannot, of course, be purchased by the public, and at the present time it is on the high seas en route back from Lisbon, whence its broadcast on March 18th on 42.9 metres enabled thousands of listeners all over the world to hear our Chief Consultant speaking to all home constructors and amateurs a special message of vital interest to them all.

In due course, this historic record, autographed by Capt. Eckersley, will find its way to the home of the fortunate "P.W." reader who wins the contest described in our last issue.

"HULLO CQ. THIS IS CTIAA CALLING!"



Here are the two gentlemen during the process of recording. Behind Mr. Kelsey, and to his left, is the small sound-proof window through which the recording engineers can watch the proceedings, hearing the whole business on a loudspeaker in the next room.

chamber that is kept to a fairly high temperature in homage to the wax discs that are used in recording.

By the panel at one end (near the little window through which he can see what is happening in the studio) sits the recording engineer with the revolving turntable and the highly sensitive sapphire cutter.

Constant Speed Essential.

A slowly-falling weight, after the fashion of the mechanism of the grandfather clock, supplies the driving force for the rotation of the turntable, a rotation that must not vary a fraction in its speed, and on the table

and the wax interior of the copper shell (for the back of the wax will not have been dusted with graphite, and therefore not plated) will be removed, and the copper "master" will be ready for polishing and nickel-plating.

At this stage the process through which the POPULAR WIRELESS record goes differs from that of the record that is sold to the public, for the latter must be sold in thousands.

So the making of the many matrices (impressions from the copper master), and from these of the stamping dies (used to stamp the commercial discs) is not required, and the master is taken to the

"SHORT WAVES"

THE NEW CRITICS.

Labourer (sitting by kitchen fire, listening to wireless): The pizzicato for the double basses in the coda seems to me to want body, Alf.—"Punch."

"Radio without reaction. Set which cannot be made to howl," runs a headline. Who wants it to, anyway?

SOUNDS LIKE THE DEVIL?

"... and two stages of IMP DANCE coupled audio," concludes an advertisement in an American magazine.

It's more than imps that have been dancing around in our set lately.

SOME USEFUL HINTS.

When using a crystal set, it is always best to connect the aerial and earth—this procedure greatly facilitates the art of tuning-in.

Never listen-in while it is lightning; the results may be "shocking."

A better way to amplify your crystal set than by adding one valve is by adding two.

We jinglers greet you, potent, tireless, Encyclopaedic lord of wireless, Who proffer to a listening nation Pronouncements on pronunciation.

To satisfy the Muses' agent "Pageant" must yield the palm to "pageant."

Score may be "scon" or "scone," but doff That clumsy "l" and grants us "goff."

But give to us the fullest credence, And precedence (v.l. precedence) Nor circumscribe by your decree Our orthoepic liberty.

—"Punch."

THE MIRROR OF THE B.B.C.

By O.H.M.

ACCOMMODATION AT BROADCASTING HOUSE

MADRID AND AFTER—THE LICENCE REVENUE CONTROVERSY—
THE BIG MOVE—GOOD-BYE TO SAVOY HILL—Etc., Etc.

STATEMENTS that the B.B.C. staff is in a state of revolt about accommodation at Broadcasting House should not be taken seriously.

It is true that on the whole the offices in the new building are not as spacious or indeed as comfortable as the offices at Savoy Hill or in any of the three or four other buildings occupied by the B.B.C. But, as is right and proper, the new building is designed primarily for studios; whereas the old buildings were adapted in rough-and-ready fashion, and did not serve the main purpose of broadcasting.

Even so, however, the offices in Langham Place are quite adequate for their purpose. Of course, there are bound to be complaints about any move from any one place to any other place, if those concerned happen to be British. But I would venture to say with assurance that those members of the staff of the B.B.C. who are really interested in the progress of broadcasting are glad to think that the service to listeners is first and foremost at Broadcasting House.

Madrid and After.

The Conference at Madrid in September should be important to broadcasting. It is the quinquennial session of wireless administrations, that is, of the Post Offices or other official government authorities, assuming the responsibility for the control and distribution of ether channels, but administrations have been notoriously reluctant to do anything about broadcasting; they are much more concerned with the other wireless services—naval, military, and commercial.

Those who are in a position to speak with authority do not believe that Madrid will yield anything of substantial help to broadcasting. There may be an attack on the B.B.C. for not making full use of the wave-lengths it at present devotes to the Regional Scheme. I profoundly hope that Mr. S. W. Phillips, the able policy spokesman of the British Post Office, will insist on at least retaining for broadcasting in this country the frequencies already allotted.

If the status quo in this respect is established with some assurance of continuity, the British Broadcasting System will be able to assume its final form without further delay.

The Licence Revenue Controversy.

Lady Snowden's suggestion the other day that sixpence of the wireless receiving licence money should be reserved as a subsidy for opera has revived the controversy about the distribution of the two million pounds odd which the British Public pays annually for the right to operate wireless receiving sets. I gather that the B.B.C. now gets only 4s. 11d. of the 10s., the balance going to the Post Office for collection, and to the Treasury for revenue.

The Big Move.

Preparations for the big move from Savoy Hill to Broadcasting House are now

practically complete and by Whitsun very few, if any, of the staff will find their duties take them to the Strand. As I have already stated, the change-over will be carried out in stages, but even so, a certain amount of inconvenience is inevitable.

This will, however, be trifling compared with what might have happened had not the administrative officials so carefully planned ahead and provided for the thousands of contingencies inseparable from so big a task.

Good-Bye to Savoy Hill.

The final broadcasts from Savoy Hill are arranged for Saturday, May 14th. One

item on the programme will attempt to portray some of the many phases of broadcasting which the studios at Savoy Hill have witnessed during the eventful years since the B.B.C. first occupied them.

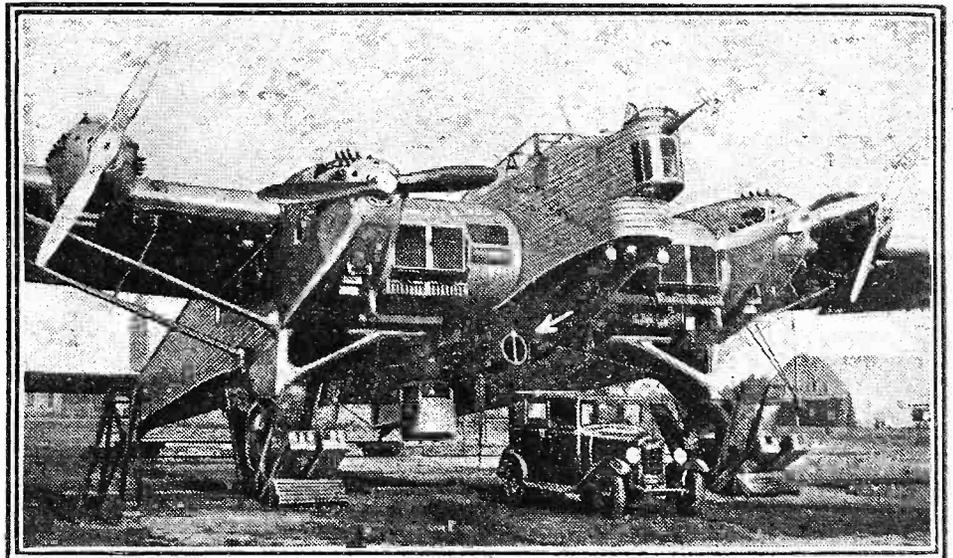
Mr. Lance Sieveking, who is responsible for devising this programme, has already spent much time to ensure it being truly representative of the people—speakers, singers, actors, musicians—whose work before the microphone has contributed to the building of British broadcasting as the best in the world.

The New Studios.

But before Savoy Hill closes down we shall be hearing programmes given in the new studios at Broadcasting House.

This must be so, not only because of the spreadover period of the move, but to ensure that the new conditions are tried out, and that when Savoy Hill is finally vacated the B.B.C. will really have finished with a building that has imparted an atmosphere of culture into millions of homes throughout Great Britain.

NO WONDER THE GENEVA CONFERENCE IS ANXIOUS!



This formidable engine of war is an all-metal French bombing plane, fitted with the latest radio and other equipment to render it really effective. Note the aerial, indicated by an arrow just above the car in the foreground.

THE LISTENER'S NOTEBOOK

A rapid review of some of the recent radio programmes.

EVER since the days of John Henry there has always been some special favourite with what one might call "The Man-in-the-Street Listener." It would be interesting to see the result of a popular vote, and I am certain the Sisters Elsie and Doris Waters would be high up, if not top of, the list. Their voices are ideal, and their repertoire is pleasing and varied. A recent imitation of Flotsam and Jetsam was exceptionally clever. It recalled the days when all London used to talk of Cissy Loftus and Marie Dainton.

And here, by the way, is a suggestion. Why not a series of old music and old singers on the lines recently carried out by Tom Clare, with drawing-room entertainers of the Corny Grain type. The elderly, and even middle-aged, lovers of the old-time music hall would revel in good

impersonations of such ideal favourites as Charles Godfrey, Herbert Campbell and Dan Leno.

The success of old hands, like Gus Elen, Charles Coborn, and many other veterans still with us, in the last few seasons, proves that stirring up of old-time memories affords pleasure to thousands.

That Musical Programme.

After suffering for about a quarter of an hour the other night, while the musical plans for the next fortnight or so were run through, I wondered more than ever that time could be wasted over the matter, while it was being seriously contemplated whether the theatre was worth even three hours a year. That the bare details were not of the slightest interest to even one

(Continued on page 78.)

ON THE OTHER SIDE A TALK WITH A DUTCH LISTENER



Hilversum, Huizen and the short-wave station PCJ are so often heard by British listeners that this account of what a Dutchman thinks of them makes uncommonly interesting reading.

MY Dutch wireless pal is an official on the staff of the short-waver PCJ, at Hilversum, now temporarily closed while they are fitting new plant.

I warned him that I wanted to cross-question him about Dutch broadcasting, for the benefit of British readers, and started the ball rolling by mentioning the Hilversum-Huizen mix-up.

"Well," he said, "our trouble is that in Holland there is everlasting fierce discussion between religious bodies.

Powerful Religious Bodies.

"There are several newspapers provided for various Catholic and Protestant authorities, and there are powerful unions which, in a way, correspond to your trade unions. The result is that when broadcasting came along, all the parties tried to get microphone publicity, and the three societies having enough money to carry on a regular broadcasting schedule were the non-partisan association called Avro, the Socialist organisation Vara, and the special branch of the Catholic organisation formed when broadcasting started and called, in English, the 'Catholic Broadcasting Organisation.'"

"Do they make much difference?" I enquired.

"Why, of course!" he explained. "It

is difficult for you to understand why Dutchmen get so enthusiastic about these unions, but in the newspapers and in daily life they play such a big part that the fierce struggle of each to get adequate time in the broadcast programmes is quite understandable to us."

"And how does it work out?"

"Hilversum and Huizen are the two chief stations, the other station which you may hear on 1,071 metres, Scheveningen-Haven,

is a Government station like Rugby. Kootwijk is now testing on the broadcast band.

"There is even yet no definite settlement about Hilversum and Huizen, as to which station shall broadcast the programmes of any particular party, but the present arrangement is that the non-partisan association and the Socialists broadcast from Hilversum, while Huizen broadcasts under the auspices of the Catholic Broadcasting Organisation.

"The three bodies went carefully into this and made an arrangement between themselves to allot the programme time according to the number of members belonging to each. At present there are about ten thousand paying members of the

allotments and wave-length changes."

"And news?" I enquired. "We often hear news bulletins in progress at Dutch stations. Where does the news come from?"

"Hilversum and Huizen get their news from the big Vas Diaz agency in Amsterdam. There is a tape machine in one of the station offices, and bulletins are sent by hand before the late-night broadcasts.

The News Bulletins.

"There used to be trouble because some of the small newspapers in country districts run as a side-line by one of the Catholic or Socialist organisations used the news from the broadcast bulletins, often without even giving an acknowledgement. The Vas Diaz, and not Hilversum, had to take action. They did take action, and now these papers subscribe to the Vas Diaz direct!"

"What about the licence question?" I enquired.

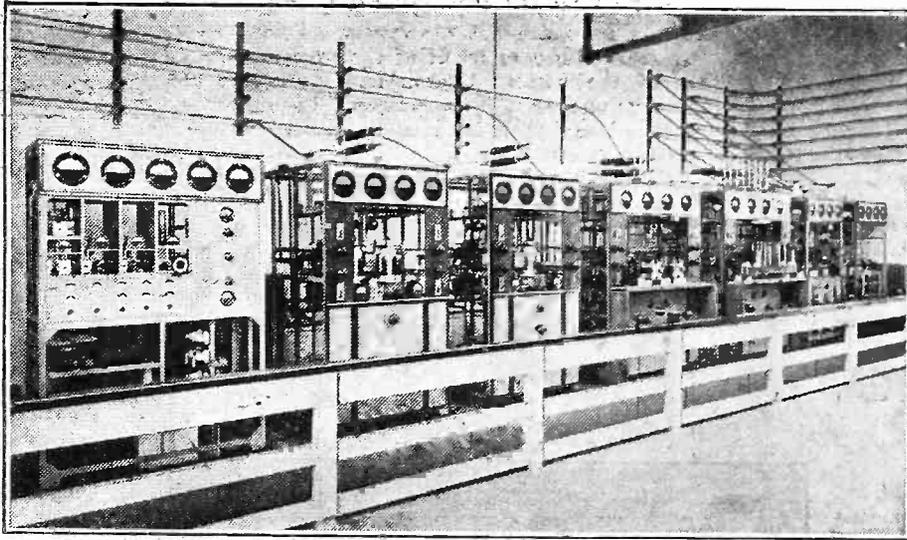
"We haven't had any bother so far," it was explained to me, "because the paying members of the Avro, Vara and other societies provide more than enough money for broadcasting; but there is a standing scheme down for discussion which would bring about a licensing system very similar to your own, and the Radiograad would act like your British Broadcasting concern, and take the listeners' licence money. But the scheme is still

standing, and is hardly likely to come up for discussion until the funds of the workers' societies run low!"

"Can you give me any tips identifying the programmes from Hilversum and Huizen?" I asked. "The announcements always seem so long, and after the first 'hier Hilversum,' or 'hier Huizen,' as the case may be, the rest is only a blur."

"It's not easy to explain things to anyone
(Continued on next page.)

HOLLAND'S LONG-WAVE STATION AT HUIZEN



This is the gear that produces the programme radiated on 1,875 metres from the Huizen station. The wave-length is crystal-controlled, the actual quartz crystal being incorporated in the first panel on the left.

Avro non-partisan association."

"Do they settle these things themselves," I asked, "or is there a central body which decides it by law?"

The "Suggestions" Department.

"Not by law," he said, "but there is a kind of central body known as the Radiograad. The chairman of this is an official of the Postal Department. The Radiograad makes suggestions for programme

SHORT-WAVE REACTION

A useful "differential" tip.

IT is well known by now that a differential reaction condenser is of very great value on the medium and long wave-lengths, but readers will have noticed that these designers are hardly ever used in receivers designed exclusively for short waves.

There are two reasons which account for this: First we find that the double action, which is the special feature of differential condensers, tends to make reaction control on short waves rather

sudden, thus creating the need for slow-motion adjustment. Secondly, oscillation on wave-lengths below about 19 metres becomes difficult to obtain, owing to the by-passing effect of the extra set of fixed vanes and their associated wiring.

Fortunately, however, the addition of a simple two-pole "on-off" switch to your set can give you the choice of either differential reaction for long waves or the older plain type for short.

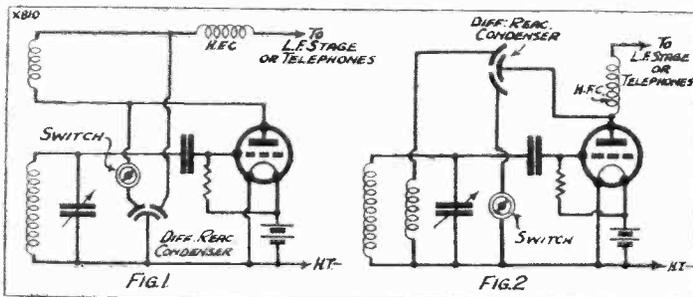
Mounted on the Baseboard.

In order to keep the panel as "clean" as possible, it is desirable to mount this switch in a convenient position on the baseboard or, better still, to gang it with some existing switch.

Connections are easily altered; just break the lead from the differential condenser's extra set of fixed vanes (those with which the moving vanes intermesh when reaction is at zero) and join the two ends to the switch. The accompanying diagrams make this clear. Keep these leads as short as possible and well spaced.

For long waves the switch should be "on," when reaction will be differential as before.

HOW THE SIMPLE SWITCHING IS FITTED



As shown here, the place for the switch depends on the type of circuit used.

MORE "COSMIC" SUCCESSES

Some letters from "P.W." readers.

ANOTHER SATISFIED OWNER
"CANNOT SPEAK TOO HIGHLY OF IT."

The Editor, POPULAR WIRELESS.
Dear Sir,—As a reader of "P.W." no doubt you will be pleased to learn that I have made up a "Cosmic III" as advertised, and I cannot speak too highly of it. I think it is the best three-valve set that I have heard, and so easy to build; it is simplicity itself by following the instructions, as everything is so plain and straightforward, thanks to "P.W." engineers. It is the first set that I have built, and when I had finished and switched on I was more than surprised to get the signal straight away, which goes to prove how perfect the engineers have got their circuit, and considering the price, I do not think there is a set to touch it.

Thinking all that are concerned with such a genuine set,

I remain,
Yours truly,

J. NASH.

98 Heatherside Road,
West Ewell,
Surrey.

"THE BEST YET!"
AN EXPERT'S TRIBUTE TO "THE COSMIC."

The Editor, POPULAR WIRELESS.
Dear Sir,—I cannot too highly praise your "Cosmic" Receiver. It is the best I have tested out as yet. I have been a regular reader of your wonderfully instructive book, "P.W.", since the first publication, and am even now using your "Magic" III, which I find good on DX work.

Wishing you every success, and thanking you for the help I have received from your publications,

I am,

Yours very faithfully,

W. J. BLIZZARD,
Wireless Specialist,

Warrington House,
Thornbury, near Bristol.

who doesn't understand Dutch properly," he said, making a sly dig at my rather German pronunciation of his language! "But, anyway, the name of the association giving the concert is always announced immediately following the 'hier Huizen,' or whatever it is. For instance, there is the Katholieke Radio Omroep, the Nederlandsche Christelijke Radio Vereeniging, the Vrijzinnige Protestantsche—"

But I called for a halt!

Abbreviations Often Used.

"Never mind," he said, "these societies all have their abbreviations, and the abbreviations are generally given between items. The Katholieke society, for example, is cut down to K.R.O., and you will often hear the K.R.O., A.V.R.O., and V.A.R.A. abbreviations broadcast during short programme intervals."

"Is it true," I asked, after thinking about these announcements, "that the Dutch stations are the only ones from which the announcers bid you sleep well?"

"Depends how you look at it," said my friend, amused. "We have a phrase 'Goeden avond, wel te rusten,' which really means 'Good-night, sleep well.' But it's so colloquial that I don't think our announcers would claim any merit for bidding the world sleep well."

"When you hear the man at Hilversum say: 'Ik wensch U Goeden avond,' and so on, 'wel te rusten,' he is only saying 'Good-night' in a rather old-world but—to us—quite ordinary fashion."

"I suppose," I pressed, "that all these religious societies result in your Sunday programmes being a bit dull?"

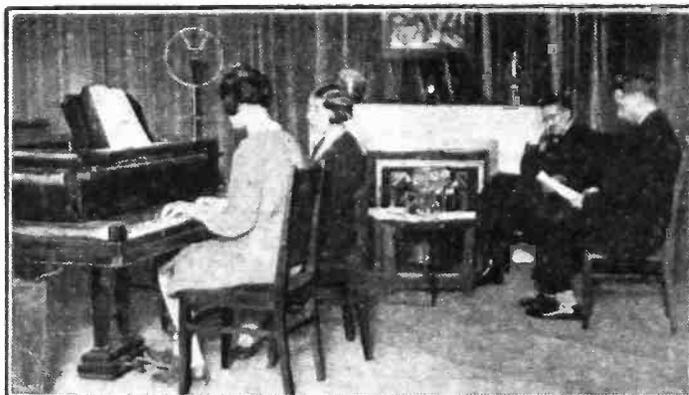
A TALK WITH A DUTCH LISTENER

(Continued from previous page.)

"Not a bit of it," he countered. "The programmes are not of a very religious nature. The only result of the squeezing in of the various Church and Workers' associations to the programmes of one station is that there are some extraordinary programme timings."

For instance, on Sundays, Hilversum is almost invariably working by eight o'clock in the morning, and the Vara put out a programme until just before ten o'clock. This Vara session usually consists of physical culture talks, football notes, gardening talks and gramophone records—the sort of thing, you see, that would appeal to the average working man.

ONE OF THE HILVERSUM STUDIOS



This studio at Hilversum has been the source of many fine musical programmes enjoyed by listeners in this country.

"Then, as a rule, the Liberal Protestant people have their session. They sponsor a service from Amsterdam and an organ recital is generally given in this part of the programme."

"After this the Avro people take over and their concert continues until the end of the afternoon. They give ordinary orchestral concerts. The Vara give radio plays and orchestral concerts very similar to those of the Avro, and their session is usually next."

Sunday Programmes.

"On some occasions the Avro people have a further session at the end of the evening and carry the programme on until just before midnight. Generally speaking, the only strictly religious part is the service given by the Protestant Association in the morning."

"On Sundays Huizen is always the more religiously inclined because of its sponsoring by the Christian Radio Society (N.C.R.O.) and the K.R.O. Huizen generally gives a Church service in the late afternoon, about the same time as your B.B.C. service, but we hear the B.B.C. services later because of the difference in your Greenwich Mean Time and our Amsterdam time."

"By the way, Huizen has an Epilogue, usually just before ten-thirty on Sunday evenings, which is a copy of your Epilogue. It might interest British listeners to hear this, which they will generally do before the British Epilogue comes on at the end of the Sunday programme."

ED. NOTE: The next article in this interesting series will be "A Talk with a Czech Listener."

TEACHING TELEVISION



TECHNIQUE

By J. F. CORRIGAN.

The Radio Colleges of Italy are world-famous for their thorough training, and now they have turned their attention to Television. Here is an article describing their methods and the different types of apparatus used.

ITALY is a land of radio colleges and technical schools. There is a radio faculty in nearly every town of any size and importance.

Marconi himself, you may perhaps remember, in his youthful days attended lectures at one of the technical schools, and probably it was during a lecture-demonstration that his attention was turned for the first time towards the subject of Hertz's then recent experiments with electro-magnetic waves.

How They Start.

Italian technical schools stress the subject of radio much more than similar institutions in England do. In fact, in many Italian towns you find an entire technical college devoted to nothing else but the teaching of radio science in all its branches. These schools and colleges take in youths from the age of sixteen upwards.

Some aspirants to a radio career are trained to be radio operators in the various branches of the Italian Navy. Other individuals, after having acquired their radio knowledge and technique, drift to other lands, notably to America, and become radio or telephone engineers in the big electrical concerns of that country, whilst a smaller number of graduated students of these Italian radio colleges settle down to a life of technical teaching, experimenting and consulting.

There is, you see, nothing quite like an Italian radio college in this country. The *Scuole Radiotecniche Italiane*, of Milan, is one of the largest and the oldest of these Italian radio colleges. For years it has imparted sound radio instruction to a variety of students, both young and old.

Many eminent Italian radio and telephone engineers have passed through its courses of study and have entered upon successful careers as a result of their training at this school.

The First Courses.

The Milan *Scuole Radiotecniche Italiane* has now tackled television. It approached the task very tentatively at first on account of the very uncertain basis upon which the new science of electrical and radio vision was placed. Now, however, after more than a year's work on the subject, the *Scuole* has instituted definite courses in television for

the benefit of anyone who cares to undertake them.

It is, I believe, the first radio faculty in the world to place the infant science of television on its curriculum, despite the fact that in America there are no fewer than five stations broadcasting television pictures daily.

But the authorities of this Milan radio college are not only concerned with television in its ordinary form. They have for some time been conducting experiments upon the radio transmission of cinema films, a task which is also being undertaken by the Baird Company, the American Telegraph and Telephone Company, and the Bell Telephone Laboratories of New York.

There is likely to be a good future in this new application of radio science. Essentially, so far as present-day practice has

evolved, the feat of transmitting cinema films by means of radio vision is as follows.

A film passes through the usual cinema projector in the normal manner. The light from the luminant of the projector, after passing through the film and then through the projection lens, is made to impinge upon an auxiliary lens which projects a miniature replica of the picture upon the televisor proper. Details of this televising device are, at the present time, being held more or less secret.

Cinema Relays.

The receiver operates in virtue of photo-electric cells and mechanisms, and it virtually recombines each separate picture of the cinema film as it comes through from the distant transmitter. Each recombined picture is then projected upon a screen, with, it is said, a very high degree of efficiency as regards detail.

The radio-cinema, controlled from a distant master-projector, is, therefore, likely to materialise in actual practice within a few years, for the problems concerned in the transmitting of radio pictures from a flat surface, such as a cinema film, are less formidable than those involved in the televising of a scene "from life."

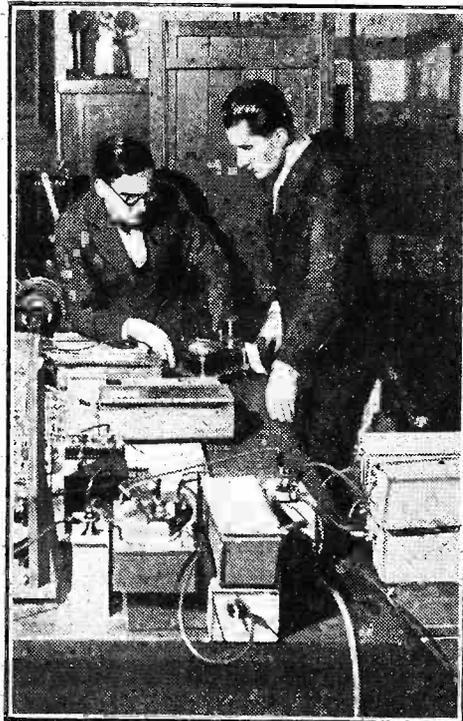
To come back, however, to television in the normally accepted sense of the term. The *Scuole Radiotecniche Italiane* at Milan is equipped with all the well-known television apparatus, particularly the Baird and the Jenkins receivers.

They Make Their Own.

It has, one understands, devised many television modifications of its own, particularly in the direction of enabling several individuals to view the televised picture at the one time. Some form of optical projection is, of course, implied in this statement.

If you take up a television course at this Milan institute you must, of course, be equipped beforehand with a reasonable knowledge of the fundamentals of wireless science, both in theory and in practice. Then you begin your television studies by going thoroughly into the properties of photo-electric cells. Indeed, you even go so far as to make a photo-electric cell for yourself before the school initiates you into modern television practice.

LEARNING ALL ABOUT IT



Students at work in the Television Laboratory of one of Italy's training colleges.

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found—?

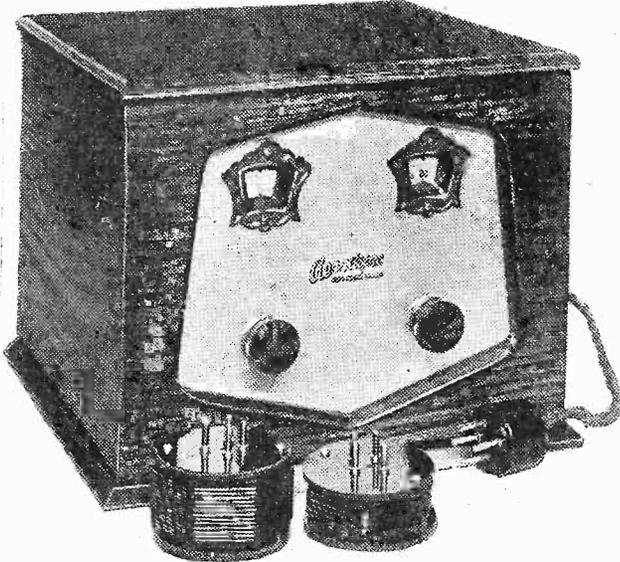


SHORT WAVES FOR ALL.

THE success of the short-wave adaptor idea, due to Mr. G. T. Kelsey of the "P.W." Technical Staff, is most gratifying, and every year sees it reaching new heights of popularity.

And one of the best features of the whole thing is that, so far, commercial adaptors have been uniformly good, and the "junk" merchant seems to have ignored this oppor-

THE "AERODYNE" ADAPTOR



The Short-Wave Adaptor made by Messrs. Hustler, Simpson and Webb.

tunity of plying his ignoble and inexpert hand.

The latest commercial model is due to Messrs. Hustler, Simpson & Webb, who have not only maintained the general standard, but actually risen above it with a unit that is first class in every way.

They call it the "Aerodyne," and it is sold, built up and ready for use, at the most reasonable price of 35s., including a handsome oak cabinet and two coil units covering 15-50 and 50-100 metres respectively.

It is a most attractive instrument both in appearance and operation.

There is an excellent slow-motion movement for tuning, and there is also slow-motion reaction—an invaluable aid to easy short-wave work.

For the benefit of new readers—and we seem to have many thousands such these days—it should be mentioned that the object of an adaptor of the nature of the "Aerodyne" is to transform an ordinary

set into a short-waver. You remove the set's detector valve and use this in the unit and then insert a plug, which is connected to the unit, in the set's detector valve holder.

The tuning controls on the receiver are ignored and the station searching is carried out entirely on the adaptor, for the set acts merely as an L.F. amplifier.

It is, of course, a completely practical scheme, and just as good results are obtainable as when a special short-wave receiver is used.

We obtained first-rate results with the "Aerodyne," and can thoroughly recommend it to our readers. We feel we can claim to know a good short-wave adaptor almost at sight, and had we not thoroughly tested the "Aerodyne" we would still have had little hesitation in giving it a most favourable report.

AN INTERESTING INSTRUMENT.

There is now available a leaflet describing the Climax 22 guineas all-electric radiogramophone—an instrument having many points of interest.

LOEWE RESISTANCES.

I have recently received a brochure in which the Loewe High Vacuum Resistances are detailed. The case for these inexpensive British-made components is excellently presented.

INEXPENSIVE H.T.

H.T. at a fraction over a penny per volt! That is what radio enthusiasts are offered by Pertrix with their new Junior H.T. batteries. And being Pertrix it is a safe bet that it will be good H.T.!

A RECTIFIER FOR INSTRUMENTS.

The Westinghouse people have recently published a brochure describing The Westinghouse Metal Rectifier For Electrical Measuring Instruments. It is an intensely interesting and informative booklet.

A USEFUL DEVICE.

One of the essential features of the "Cosmic" is the novel moderator system, whereby greater aerial circuit flexibility is achieved than would otherwise be possible.

That constructors were quick to realise the advantages of the idea is made clear not only by the great success achieved by the "Cosmic" set itself, but by the fact that there has been a large independent demand for Moderator coils.

In this connection it should be noted that

a long, illustrated article will shortly appear in "P.W." describing how the Moderator idea can be applied to various kinds of receivers other than "Cosmics," and it will be shown how it is often possible to improve both selectivity and power by this means to very attractive extents.

A Moderator outfit costs only at the most 5s., and there are numerous uses for it, as will be explained.

The Moderator Coil retails complete at 2s. 6d., and you can see exactly what it is

PLEASE NOTE.

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 of 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.

by examining the photo of the Ready Radio version on this page.

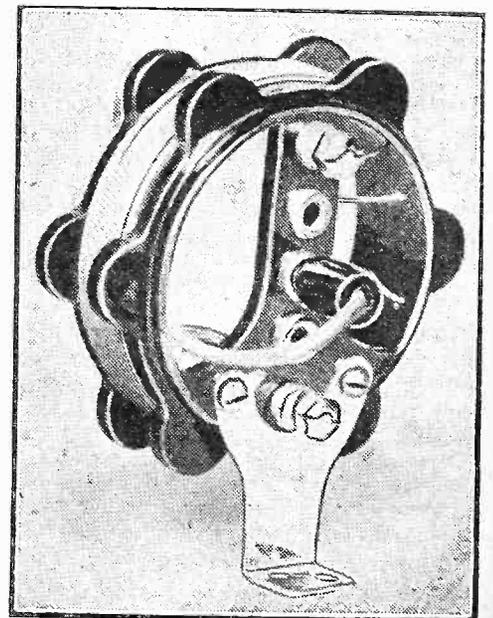
It is a neat, compact coil unit having scientifically arranged tapping points. And this Ready Radio model is exceptionally well made.

The former comprises a fine bakelite moulding—one of the most advanced small mouldings I have ever seen—and the finish is first class in every way.

The little flex lead is soundly anchored and the plug fits smoothly and efficiently into the sockets. And the mounting foot is rigidly bolted into position.

There is no need for me to predict big sales for it; it is achieving these already, I believe.

THE READIRAD MODERATOR COIL



This is a particularly attractive little component, and is well-made and highly finished.

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.

Using a Metal Baseboard.

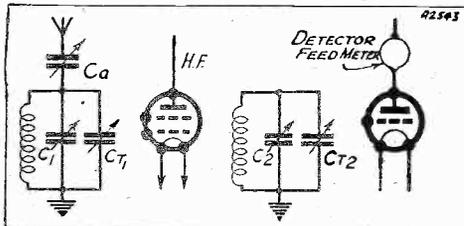
G. B. (Worthing).—"In the case of a set requiring a metal chassis or a metal-covered baseboard, is it in order to take the metal covering the whole length of the baseboard, even if the set is an all-mains one, and this baseboard is common to both set and eliminator portion? Or should only the set portion employ a metal baseboard?"

It'll be perfectly all right to take the metal right along and make one common metal earth throughout the set. What do you fear? Induction from the mains transformer? The metal won't make any difference to that.

Adjusting Trimmers.

T. J. (Exeter).—"I have just made an H.F., det. and L.F. set with the condensers tuning the aerial and H.F. circuits ganged. I have some difficulty in adjusting the trimmers on the two sections of the ganged condenser.

TO HELP IN TRIMMING



This sketch shows the controls and illustrates the methods of adjusting trimmers for best results.

Are there any simple 'rules of thumb' to follow when adjusting these trimmers?"

The skeleton schematic diagram which I have drawn may help you to understand the following instructions:

First understand that C_a must be reasonably small. C_a with the aerial is in parallel with C_1 and CT_1 . So make CT_1 as small as possible.

Now tune in a station roughly. If you have a detector feed meter this should, if you are using leaky grid detection, go down. Make it go well down, even though quality is foul.

Now adjust CT_2 until the detector feed goes still farther down. When you have got a minimum reading by adjusting CT_2 the two circuits are properly in tune.

But over a range of wavelengths C_1 and C_2 may not keep exactly in step. But now C_a will act as a trimmer and should always be moved a little bit to bring the detector feed to a minimum.

Note.—(1) If you have not got a detector-feed meter loudness of signal is some guide, but a poor one.

(2) C_a must be small. If it is not, CT_1 must be made as small as possible, and you should add a little condenser in parallel with C_2 and CT_2 .

(3) This all applies to ordinary circuits, as I have shown. With band-pass circuits—well! apply to the makers. I cannot understand how to trim in that case!

Potential Divider and Potentiometer.

W. G. (Blackburn).—"I have noticed that, in a mains unit, a device consisting of a resistance across the source of voltage provided with tappings or a sliding arm is generally called a 'potential divider'."

"In a receiver a similar device, apparently fulfilling the same purpose, is usually called a 'potentiometer'."

"Is there any difference which has escaped my notice, between a 'potential divider' and a 'potentiometer'?"

A potential divider, as its name implies, divides a potential and a potentiometer measures a potential.

The real potentiometer is often made up in the form of a long, straight wire with a sliding contact. This wire becomes a ratio arm of a bridge and you balance out a current and then, knowing the length of wires on either side of the contact you may measure a potential.

People are sloppy and have called any resistance with a sliding contact a "potentiometer" when in fact usually potential divider is the accurate term. I frequently make the mistake myself.

But it's a nice sort of word potentiometer, and potential divider is all clumsy in comparison. If you're a purist don't use it.

Coupling Tuned Circuits by a Resistance.

A. J. W. (Manchester).—"I notice that Captain Eckersley uses resistance coupling for his tuner. I am puzzled as to why it should work, because I have been led to believe that a resistance stops high-frequency currents.

"Surely this is so, otherwise why do designers recommend a resistance to be

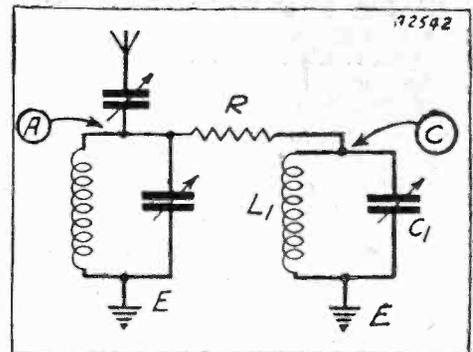
inserted in series with the grid of an L.F. valve to 'stop' H.F.?"

But it does work—and very well, too! Because, of course, high-frequency currents will pass through a resistance just like any other currents. In fact, if you have a pure resistance, then Ohm's Law applies, and the ratio of voltage to current is a constant which we call the high-frequency resistance of the resistance.

Thus in my tuner a voltage appears between A and E when the signal is tuned in. The second tuned circuit L_1-C_1 has a large impedance looked at from C to E. This impedance is hundreds of thousands of ordinary ohms when the circuit is in tune.

It is only tens of thousands of ohms, out of tune.

FOR SELECTIVE TUNING



The circuit arrangement referred to by Captain Eckersley in reply to A. J. W. (Manchester).

So when a signal is tuned in, only a little voltage is dropped along R, the coupling resistance. But when the signal is not in tune with the second circuit, then, this circuit presents a much lower impedance.

Then practically all the voltage is dropped in R, none goes into the valves, and the system is therefore selective. Moreover, of course, the aerial circuit is itself selective, and so you get a double effect.

Metallised Valves.

R. A. (March).—"With the modern types of metallised valves is there a standard method of connecting this covering to earth? I understand that this covering is always taken to the filament pin which is to be joined to L.T. —"

"Would any advantage be gained by taking a lead direct to earth by placing a metal band round the valve?"

No, not if it's already done efficiently. I imagine the earthing as done by the makers is quite efficient enough.

ONLY IN "P.W." can you read Capt. Eckersley's replies to listeners' own problems. AND REMEMBER—Captain Eckersley's technical articles appear only in "POPULAR WIRELESS" and "MODERN WIRELESS"

NOTES FROM THE NORTH

A variety of topics of interest to North of England and Scottish readers, discussed by Our Northern Correspondent.

ALERT listeners in the North have already heard transmissions from Falkirk—engineers' tests. "Public" test transmissions from the new Scottish Regional 50-kilowatt transmitter will start before the end of April, according to the B.B.C. estimate at the moment of writing.

The new station is awaited with great interest, for the existing system of broadcasting in Scotland is years behind the times. In a few short months Scotland will be brought into line with the London, Midland, and Northern Regions.

Is It a Failure?

The Scottish Regional transmission on 376 metres should be a good signal at the Northern end of the North of England (in Cumberland and Northumberland), as well as in Scotland, but I fear that the Scottish National transmitter will have a poor range, through working on 288 metres.

Indeed, the opening of the Scottish transmitters will be a severe test of the merits of the Regional Scheme. It is suggested sometimes that the scheme is a failure (and a costly one). So far as the North is concerned, the Regional Scheme unquestionably fails in these respects:

(1) The North Regional station gives no service to the densely populated Tyne-side area, to Northumberland and Cumberland.

(2) The Scottish Regional station will give no service to the Aberdeen district, and to North Scotland.

Whether the problem of these "neglected" areas will eventually be solved by ultra-short-wave transmitters remains to be seen.

So much for the engineering side. There are critics who shake their heads over the programme outlook as well. The question of the moment is: Will Scotland make good? Mr. Cleghorn Thomson (Scottish Regional Director) and his staff at the Edinburgh, Glasgow and Aberdeen studios are facing a crucial period.

They will provide the backbone of the Scottish Regional programme. Can they silence the critics who declare that Scotland lacks the native talent to support a Regional programme of serious proportions?

Interchange of Programmes.

Of course, the Scottish Regional programme will include a good deal of material relayed from other Regions. How far we have passed from Captain Eckersley's idea when, as Chief Engineer, he planned these dual-programme stations and dreamed of one transmitter relaying the National programme and the other providing a contrast programme produced (at any rate to a very large extent) locally!

What heat was at one time generated over the question of how much home-rule Savoy Hill would permit in each provincial Region! Nowadays the talk is of co-operation betwixt the Regions.

Interchange of programmes is becoming freer. When (as now) the North Regional programme includes contributions from the London, West, and Midland Regions, the standard of the programme may be higher, but there is no denying that it is sapped of some of its Northern character.

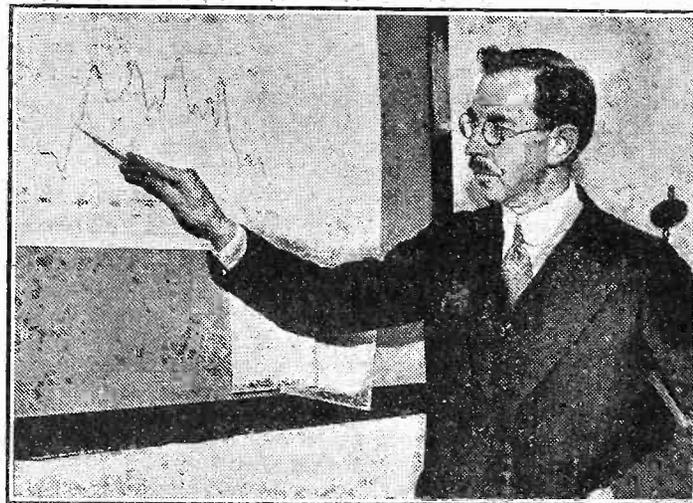
An Altered Outlook.

And not long ago the B.B.C. used to talk such a lot about this programme reflecting the temperament, life, culture, etc., of the North.

The talent of the North has certainly been well exploited in North Regional transmissions. Even vaudeville, the weakest side of Northern activities, has shown distinct signs of life recently. Musically, the winter has been notable for a really fine series of outside symphony and choral concerts, as follows:

Orchestral: Ten Hallé, eight Liverpool

SUN SPOTS AND RADIO RECEPTION



An American scientist checking a graph which records the relationship between the intensity of radio signals and the activity of solar storms. It is claimed that proof is provided that the stronger the storms the weaker are radio signals.

Philharmonic, four Leeds Symphony, and one from Huddersfield Town Hall.

Choral: Two each by Leeds Choral Union and Leeds Philharmonic Society, one each by the North Staffordshire District Choral Society (from Stoke), Huddersfield Choral Union, Sheffield Musical Union, Holme Valley Male Voice Choir, and Huddersfield Glee and Madrigal Society.

This makes a total of 32 first-class concerts, compared with 18 such concerts broadcast (from the old Manchester and Leeds transmitters) during the 1930-31 season. Readers of POPULAR WIRELESS will remember that when, a year ago, the Northern Wireless Orchestra was disbanded, one of the B.B.C.'s excuses was that it would be possible in future to relay a larger number of outside concerts. The B.B.C. has certainly kept its word.

Thirty-two symphony and choral con-

certs do not, however, make anything like a satisfactory substitute for the old orchestra. Looking back on a year's broadcasting without that orchestra, one realises with a shock what a bad blunder its disbandment was.

In outside broadcasting the North Region has maintained its fine reputation, and now Scotland is branching out in a similar direction. Variety turns are to be relayed regularly from the old Theatre Royal, Edinburgh.

An important policy decision regarding radio drama has been taken in the North Region. Hitherto, the B.B.C. has co-operated in towns such as Newcastle-on-Tyne and Leeds with local repertory companies. It is now decided to establish permanent companies of radio players.

Their First Appearance.

The Newcastle Radio Players made their debut in "The Battle of Hexham" (not too good a play) on February 22nd, and the Yorkshire Radio Players, at Leeds, will make their first appearance on April 13th in a dramatised episode from the novel, "Windyriddle."

It argues well for the Yorkshire Radio Players that they will include J. R. Gregson, the actor and author, whose performance in the play "Sar' Alice," produced at Leeds on February 29th, was one of the finest pieces of character acting I have ever heard, whether from London or from provincial studios.

Leeds has also scored a great success with the Yorkshire Mummer's Concert Party. So far they have completely eclipsed their rivals, the Lancashire Mummies, at Manchester.

The newspaper story that the Sheffield transmitter is to be reopened is, of course, rubbish. All the B.B.C. intends to do is to maintain a studio in Sheffield for occasional broadcasts of local talent and talks.

Leeds will remain the main B.B.C.

centre in Yorkshire. Poor progress is being made with the alterations at the new B.B.C. building in Leeds.

It was hoped to move into the new premises by March—but there is still no sign of a move.

No Small Job.

The move is no small job, for, in addition to studios and offices, the Leeds centre includes the landline terminus, through which pass the lines from London to Manchester, to Newcastle, and to Scotland. Complicated switchgear, amplifiers, etc., have to be transferred to the new premises.

There will be no appointment of a programme official for the Sheffield studio. The B.B.C. representative at Leeds is Mr. G. P. Fox, and officials from Manchester frequently visit Yorkshire.

MARCONI 2-VOLT OUTPUT VALVES ARE STRICTLY ECONOMICAL

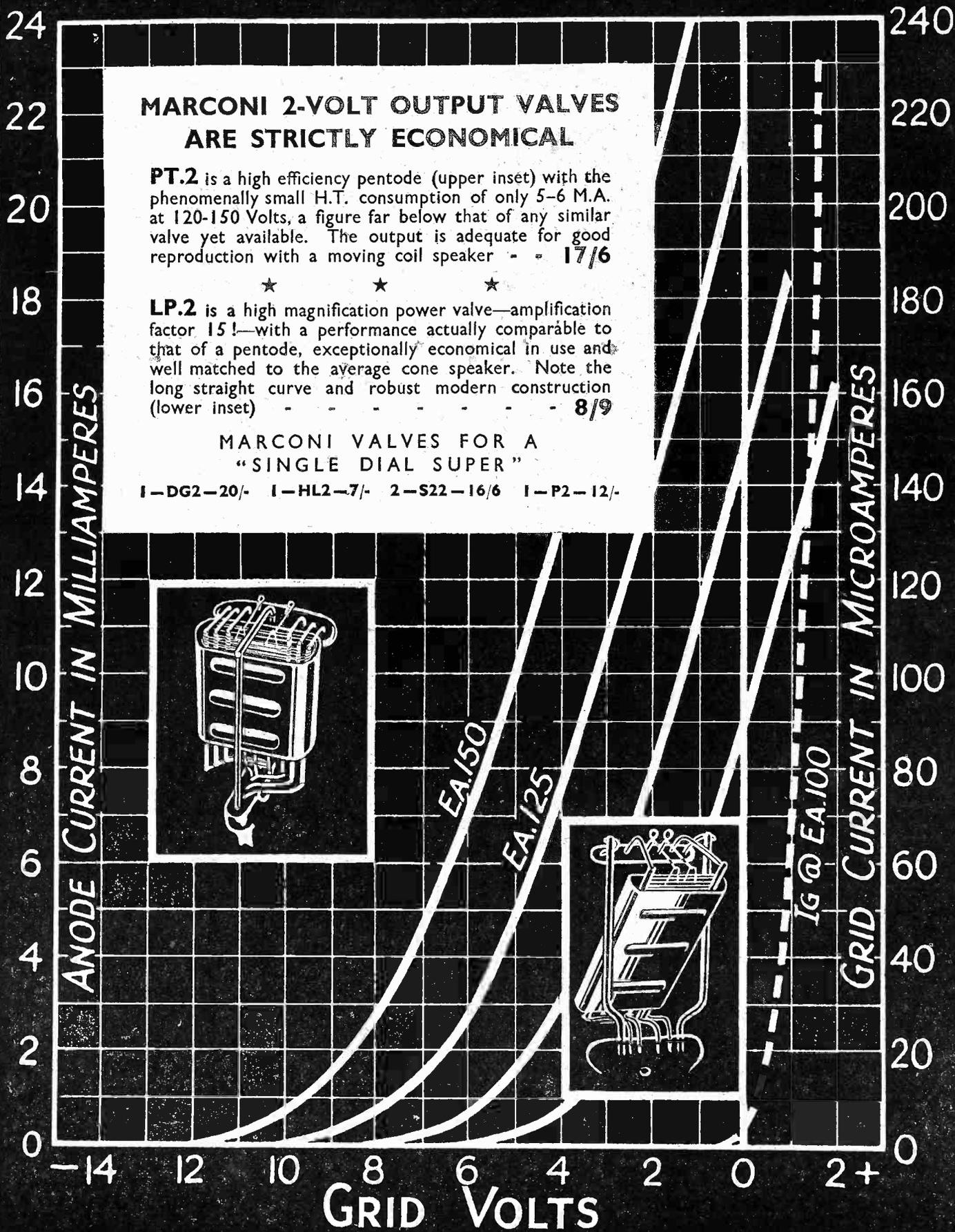
PT.2 is a high efficiency pentode (upper inset) with the phenomenally small H.T. consumption of only 5-6 M.A. at 120-150 Volts, a figure far below that of any similar valve yet available. The output is adequate for good reproduction with a moving coil speaker - - 17/6

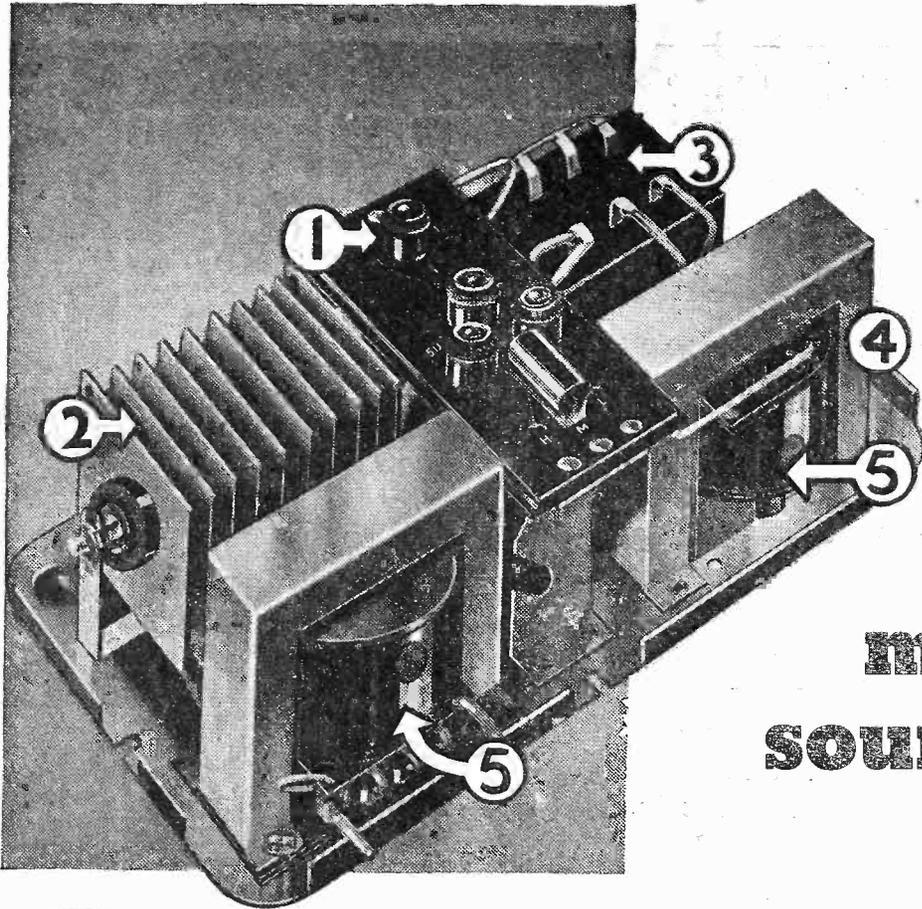
★ ★ ★

LP.2 is a high magnification power valve—amplification factor 15!—with a performance actually comparable to that of a pentode, exceptionally economical in use and well matched to the average cone speaker. Note the long straight curve and robust modern construction (lower inset) - - - - - 8/9

MARCONI VALVES FOR A
"SINGLE DIAL SUPER"

1-DG2-20/- 1-HL2-7/- 2-S22-16/6 1-P2-12/-





The Best, Cheapest, & most Reliable source of power for your set

1 Adjustable tapings giving three voltage ranges with perfect, noiseless contact. Patented plugs and sockets for quick and easy connection of wires.

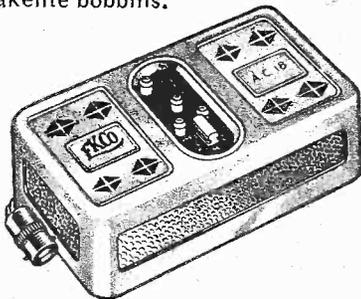
2 Westinghouse Metal Rectification.

3 Condensers tested to 500 volts.

4 All metal parts cadmium plated to prevent rust.

5 Choke and transformer coils wound on moulded bakelite bobbins.

6 Housed in solid drawn steel case, oxidised copper finish. Connecting plugs recessed below surface of case. Size, 9 x 5 x 3 1/4 (K.25 and 25 cycle models 9 1/2 x 5 1/2 x 3 1/4).



The EKCO Unit will give you constant power permanently for a penny a month.

Fit an EKCO Unit in place of your present battery and your battery troubles are ended for ever. Your set will always be at its best because it will always have a constant power supply at full voltage.

No alterations to your set, valves or wiring. Just connect the EKCO Unit in place of your battery, plug in to the electric supply and switch on—that's all. There are EKCO Units which supply H.T., as well as Units which supply H.T. and keep your L.T. Accumulator constantly charged.

Prices from 39/6 or by Easy Payments from 3/8 per month. Post coupon now for full details, or consult your dealer.



To E. K. Cole, Ltd., Dept. A.6,
Ekco Works, Southend-on-Sea.
Please send me particulars of EKCO Power Units.

Name

Address

REGARDING OVERLOADING



EINSTEIN has it that all things are relative. He is a brave man who dares to argue with Einstein, so I have little fear in boldly stating that technical radio knowledge is no exception to the rule. That being the case, a little of it must be a dangerous thing!

There are multitudes of regular listeners who still talk about the number of "lamps" in their sets and whose technical knowledge ends when they have "twiddled the knobs." Bless them! The set manufacturers adore them and since they usually admit they know nothing, they are quite harmless.

The real dangerous class are those who, having built a straight one- or two-valver, and found (usually to their intense amazement) that it actually works, immediately dub themselves experts, and since experts are supposed to be capable of original thought, pass straight on to a self-designed "Super-Super."

Now I am no rabid believer in red tape, but it is always a mystery to me that anyone who has not followed wireless theory and development for some considerable time should even contemplate building an original receiver when there are so many really excellent and proved circuits in existence.

The circuits published by "P.W." for example, are such as to fit the tastes and purse of every constructor. They have been designed and tested by real experts and are guaranteed to give satisfaction. To ignore these and try to break fresh ground is comparable to a motorist who, having learned to drive in two lessons starts to build his own car!

"Nothing But Howls."

But enough of generalities, facts speak louder than words and I really set out to describe one particular instance which I recently came across and which prompted the foregoing thoughts.

A friend rang me up asking if I could spare a few moments to pop over and look at his latest set which seemed would deliver nothing but howls from the loudspeaker. I knew that this was only his second set and so,

By A. R. ALMOND.

A radio expert, who evidently spends much of his spare time "servicing" his friends' wireless sets, describes some of his experiences, and shows how easily many of the troubles encountered could have been avoided had the enthusiasm of his friends been tempered with a little knowledge.

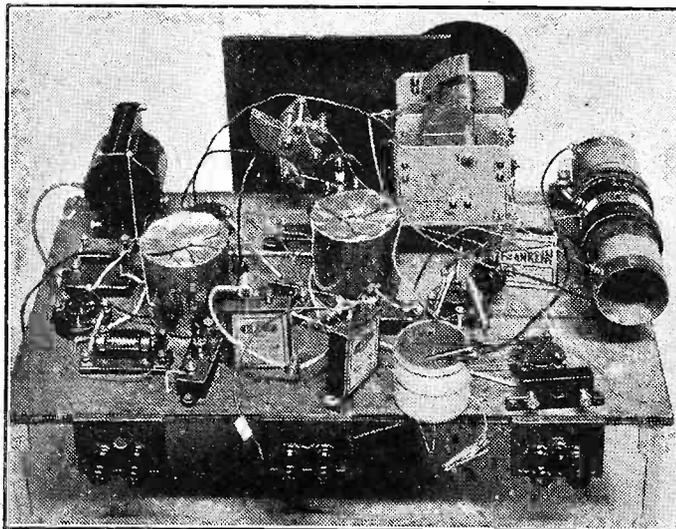
preparing for the worst, I packed up such kit as might prove useful and went.

I found him at the point of condemning every radio manufacturer and technical paper in existence. In his hand he held a 4 lb. hammer and he was casting furtive, but meaning glances from that to his masterpiece which ferociously howled back at him.

"Weird and Wonderful."

The set itself I have no hesitation (and the owner's full permission) in dubbing the World's Worst. Yet it had been conceived as a quality receiver. No expense had been spared in its construction, and the workmanship—from the point of view of wiring and manufacture—was irreproachable.

MERELY AN EXPERIMENT!



This is NOT the way a constructor should hash up one of our circuits! However, this photo is of historic interest, for it shows one of the earliest experimental models of that very successful "P.W." set "S.Q." Star. Note the "home-made" coil screens.

No regular reader of "P.W." would, I am sure, be guilty of the majority of mistakes contained in this Machiavellian Masterpiece, but since they were undoubtedly contained in one so-called Wireless Set, it is sufficient excuse for me to describe them.

It had this weird and wonderful sequence of stages. Leaky grid detector transformer coupled to a small power valve, again transformer coupled to a small power valve, again transformer coupled to a pentode and this again transformer coupled to a super-power valve!

It was intended primarily as a local station quality receiver and to this end a full (and really excellent) 100 foot aerial was used; and this despite the fact that it was under 10 miles from a "Regional" Station.

Yes, you may smile, you experienced amateurs, but put yourselves in the place of a "green-horn." Each stage he had culled from various standard designs. The detector, from a portable; the first L.F. from another portable; the pentode from a 3-valve S.G. and so on. Each admirable in themselves, but together....! My ears are still ringing from the £50 worth of sheer din that cabinet contained.

Obviously, the main trouble was overloading, and it is illuminating to calculate approximately what was the amount.

The detector valve itself was the first culprit, from actual measurements it was found that this was capable of handling about 1 volt on the grid without distortion. In practice, it was actually receiving 2 volts, an overload of 1 volt.

What a Load!

These 2 volts should have been transformed to 20 volts after the first transformer so that the first L.F. valve should have been capable of handling 40 volts grid-swing. The valve used asked for a grid-bias of 6 V., giving a grid-swing of 12 volts. Hence, another 28 volts overload! And so on to the last stage.

Even so, that is not the whole story. The three L.F. transformers were neatly parked about half an inch apart in a dead

(Continued on next page.)

REGARDING OVER-LOADING

(Continued from previous page.)

straight line and on the same axis at the rear of the detector and first L.F. valves, so giving an ideal feed-back system from output to the detector, and an instability which would have compared favourably with that of a straw in a whirlwind.

Various methods had been tried to bring the set "down to earth," and in particular there were a whole string of chokes and resistances in the anode feeds of both the detector and 1st L.F. valves. Indeed, so lavishly had this been done that the actual voltage reaching the plates of these valves was reduced to a mere 15 and 30 volts respectively.

There were many other faults, but I fancy I have said enough to show the hopelessness of the whole combination, though I might add that the set is now giving excellent results—as a straight 2-valver, detector-pentode, whilst the majority of the expensive components rest comfortably but useless in the junk box—an expensive price to pay for experience!

A Matter of Misapplication.

Perhaps this particular case may sound absurd or extravagant to some of my readers. If so, I would remind them that it *was* an actual case and that the same type of mistake is the easiest to make. It is simply the mistake of coupling together totally unsuitable component-circuits in an

endeavour to reap the benefits of the advantages of each.

If one is prepared to look upon the hook-up merely as an experiment, all well and good, if not—then "Please don't do it"—as P.P.E. was wont to remark.

But misapplication is not the prerogative of circuits. Take, for example, this case concerning our old friend Ohm's Law.

A two-valve set was equipped with a new, home-constructed D.C. high-tension unit with the unexpected result that quality deteriorated considerably due to violent overloading.

Neglected Valve Resistance.

A m.a. test on the output valve showed this overloading, but also brought to light a more serious fault; it was only passing a mere pittance of 5 m.a. instead of the rated ration of 22. The substitution of a spare valve brought no relief, thus directing attention to the mains unit itself.

The supply was 210 D.C. and the dropping resistance in series with the output valve was 10,000 ohms. The owner-constructor had calculated the value of this resistance from Ohm's Law and was obviously most apprehensive when I substituted a 5,000-ohm resistance in its place.

This latter had, however, the effect of immediately improving the results beyond measure. I explained that the 10,000-ohm resistance was dropping too much voltage.

I was assured that he had calculated the value of that resistance with the utmost care, only to find that the theoretical value was more than 100 per cent wrong, since the anode current even now was only 16 m.a.

Now this was the manner of his calculation. Ohm's Law states that:

$$C \text{ (amp)} = \frac{E \text{ (volts)}}{R \text{ (ohms)}}$$

The current required is 22 m.a.; voltage is 210. Hence:

$$R = \frac{210 \times 1,000}{22}$$

= 9,500 ohms or 10,000 ohms as the nearest stock size.

At first sight this appears to be sound, but he had forgotten one very important point, namely, that the valve itself is in series with the resistance, and his argument assumes that the whole of the drop of 210 volts takes place across the resistance, which in its turn implies that the potential on the plate of the valve is—zero!

The actual working resistance (*not* impedance) of this particular type of valve, under the conditions stated, is about 6,000 ohms, and obviously such a value cannot be ignored.

In fact, the total resistance of the original circuit was about 16,000 ohms, and it is

across this total resistance that the 210 volts are dropped and, since the voltage drop across the individual resistances is proportional, the actual plate voltage becomes

$$\frac{210 \times 6000}{16,000} = 79 \text{ volts (approx.)}$$

No self-respecting super-power valve will give of its best under these conditions, especially if the grid bias is kept at the value required for a plate voltage of 150.

"MARCONIPHONE MAGIC"



The only human member of the cast of "Marconiphone Magic," presented at Colchester (the remainder being Marconiphone outfits) and the diminutive ushers and door-keepers.

The correct method of calculating dropping resistances is, of course, to apply Ohm's Law to the voltage drop required and not to the total voltage. Thus:

$$R = \frac{\text{Voltage drop required}}{\text{Current}}$$

The above case works out as follows: Voltage drop required = (Mains Voltage —

$$\text{Plate Voltage} = \frac{210}{150} = 60 \text{ Volts.}$$

Then $R = \frac{60}{22} \times 1000 = 2700$; say 2 500.

DETECTION, METERS AND MILLIAMPS

A trio of interesting and useful tips.

Although anode bend rectification was long claimed to be of superior quality to the grid leak, this latter, in the guise of power-grid detection, now definitely holds the field.

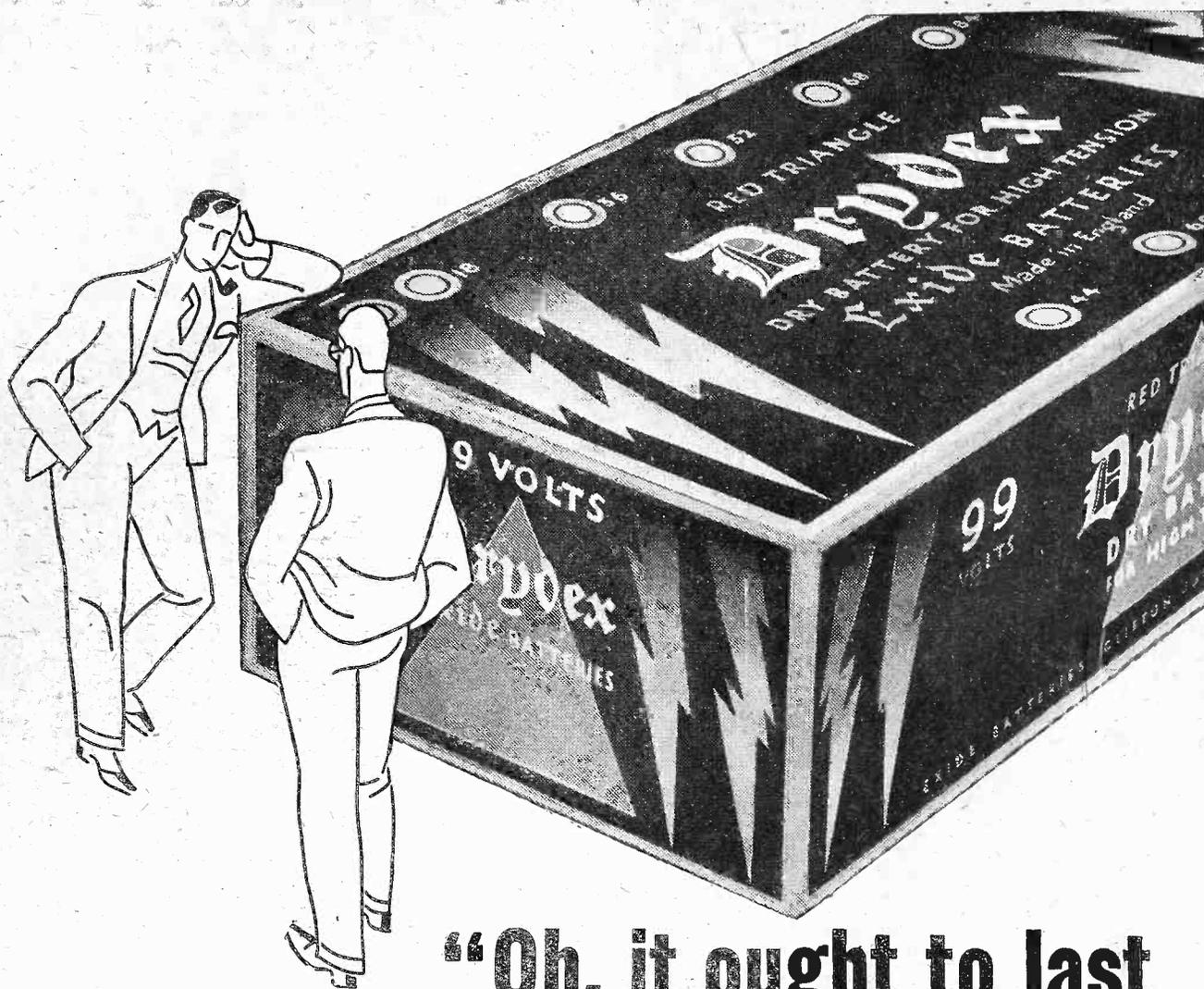
Although the volts scale of a voltmeter may be translated to read milliamps, the instrument usually has a much higher internal resistance than a proper milliammeter.

Among the advantages of regular milliammeter checks of plate current are the facts that such a test will show up a fault in the low-tension supply, in the H.F. supply, in the grid bias to the valves, and in valve emission.

CONCERTS IN THE KITCHEN



Miss Frances Pierce, of Chicago, and the radio set she has built into a kitchen cabinet.



“Oh, it ought to last longer than that!

Why don't you get a

Drydex”

● THE Exide DRY BATTERY

Made entirely in England employing British labour and British capital.

Obtainable everywhere from all good dealers in sizes and types to suit every wireless set. Also for torches, cycle lamps and bells. For wireless Low Tension use Exide 'C' or 'D' Type Batteries.

Mr. A. M., of Perth, writes :—

“I have had one of your Drydex Red Triangle 120 volt batteries in use for five months at an average of six hours a day and I am still getting thirty stations on Loud Speaker. It is amazing the resisting power your batteries seem to have.”

Exide Batteries, Exide Works, Clifton Junction, nr. Manchester. Branches at London, Manchester, Birmingham, Bristol, Glasgow, Dublin & Belfast

It is inevitable that modern receiver design should lead to simplified control, particularly in the case of tuning condensers, where more often than not they are operated by non-technical members of the household. Indeed, it would not be incorrect to say that no up-to-date set, whether home constructed or commercial, can hope to be fully appreciated by non-technical users unless it includes only one main tuning dial, apart from such items as on-off switch and reaction condenser.

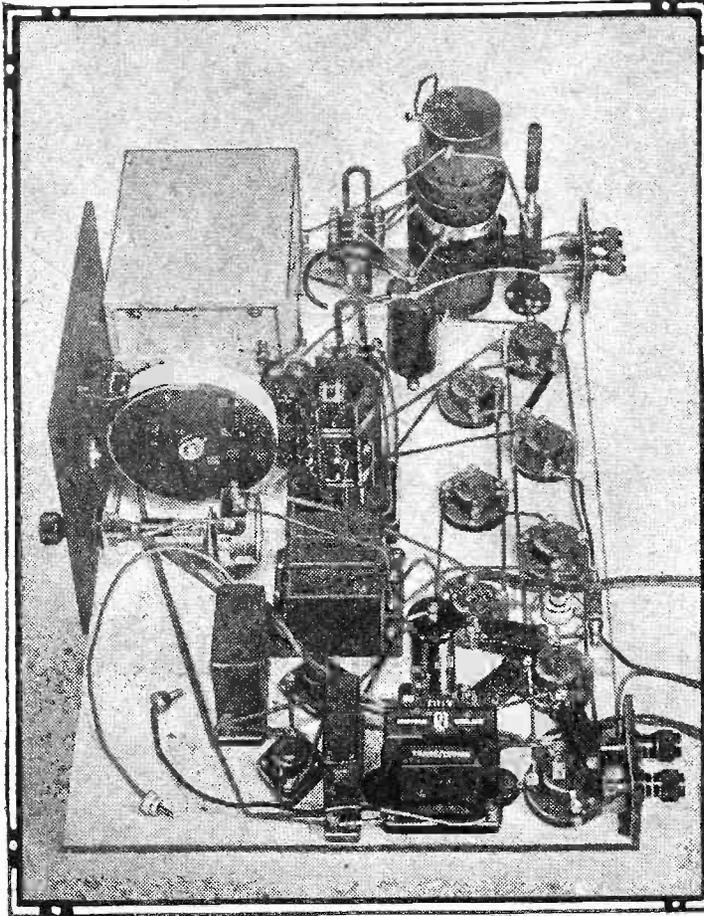
"Gadgets" are all very well for the man who likes them, but it is suggested there

not difficult to manipulate, and include such devices as minimum trimmers on ganged condensers, pre-set condensers for tuned filters or auxiliary tuned circuits, and sometimes small variable inductances for "balancing" tuning coils.

In our Single-Dial Super the ganging of the tuning condensers has been accomplished in the manner described last week. **Simplified Oscillator Circuit.**

Further experiments have been made, resulting in simplifications to the oscillator circuit and leading to practically perfect ganging (and consequently greater sensitivity) over the

STRAIGHTFORWARD POINT-TO-POINT WIRING



This photograph shows the completed receiver with the valves and intermediate transformers removed. Note the special oscillator coupler just to the right of the single drum-type tuning dial. The triple-gang condenser is hidden inside the screening box.

are innumerable potential radio "fans" who have so far studiously avoided radio because it has tended to be more a science than a "pleasure," due to the number of controls to be mastered.

Avoiding Sacrifices.

There is no reason, of course, why refinements in the form of gadgets should not be incorporated in a receiver behind the panel and, if necessary, automatically controlled either electrically or by means of the available controls on the panel.

A radio set which includes simplified control can hardly be classified as an advancement if certain features, such as quality of reproduction or sensitivity, are sacrificed. It therefore becomes obvious that if circuit refinements are to be retained, certain initial adjustments have to be made.

Fortunately, these extra adjustments rarely exceed three or four in number, are

super-het. receiver represents the last word in simplified control, because it is not only capable of successful operation by an unskilled person, but its great sensitivity and ease of operation can lead to surprisingly large "logs" of stations. The set has been tested in many localities, both near to and well away from a powerful local, and in all cases performed most excellently. On medium waves there seems to be a station at every degree of the dial.

Among the many refinements incorporated in the design, the following are probably the most outstanding. First of all, there is the single-dial tuning by means of a triple-gang condenser unit and a drum dial geared 2 to 1.

Easy Station Identification.

The scale 0 to 180 degrees is spread completely around the circumference of the drum, and results in easier identification of

A HIGHLY EFFICIENT SUPER-HET. WITH ALMOST UNLIMITED RANGE, AND WHICH IS AS EASY TO TUNE AS A SINGLE-VALVER.

NOTE THESE POINTS

Single-dial operation.

Pitch control for correction of high notes from speaker and to eliminate heterodyne whistles on certain stations.

Combined on-off switch and volume control.

Ganged waveband switching as subsidiary control. Only three controls on panel.

No soldering and easy to build.

Power-grid detection.

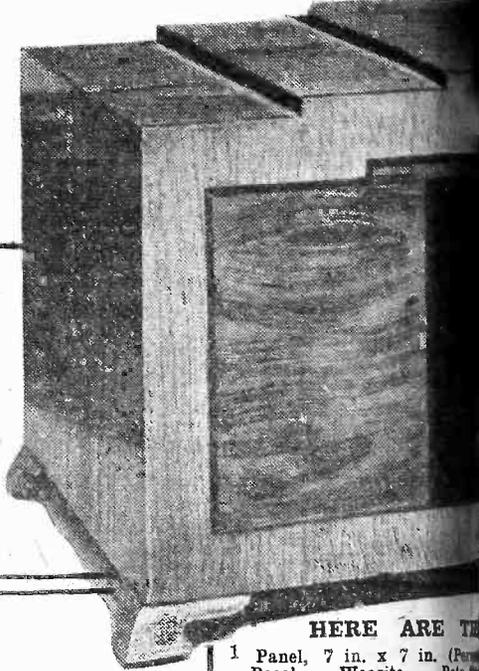
lower part of the medium wave-band.

There is no doubt that this "P.W."

stations. Provision is also made for a dial light, which can be fitted at will. A patented combination on-off switch and wire-wound potentiometer is the next panel control, and operates in a very simple manner.

To switch on the set by completing the filament circuit the knob is pulled out, while volume is controlled by rotating the same knob. Lastly, we have a tone or pitch control, which is simply a miniature variable condenser which controls the higher

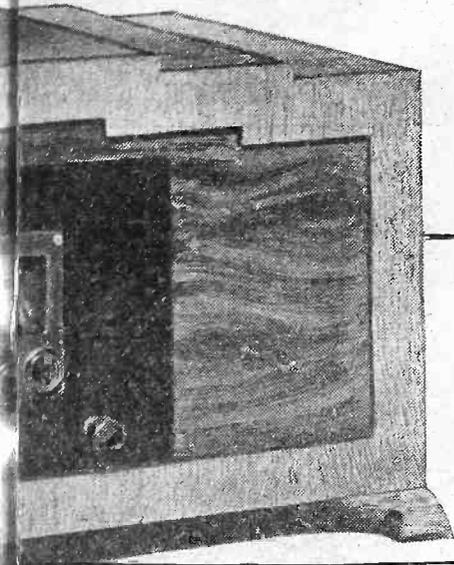
The "P.W." DIAL



HERE ARE THE

- 1 Panel, 7 in. x 7 in. (Peco, Beol, Wearite, Peto-Scott, Ready Radio).
- 1 Cabinet with fret surround panel to take baseboard 12 x 12 in. ("Moreo").
- 1 Triple-gang condenser with minimum trimmers, (Polar Tub.)
- 1 Slow-motion drum drive above (Utility, Polar Tub).
- 1 3/4-in. collar with steel grub screws drilled 1/8 in., and 1 length of diameter brass spindle 2 1/2 long (see text).
- 7 Four-pin valve holders (W.B., Graham Farish, Wearite, Lotus, Lissen, Clix).
- 1 Five-pin valve holder (Lotus).
- 1 L.F. transformer, ratio 1 : 1.34 (R.L. Dux, Graham Farish, Ferranti, Telsen, Lewcos, Sovereign, Formo, Varley).
- 1 Square Peak coil, Extensar (Varley).
- 1 Super-het. H.F. choke (Radio, or Lewcos Type 11, Dual Astatic, Varley, Telsen binocular).
- 1 Oscillator coupler (Golton).
- 4 1-mfd. fixed condensers (Dubilier, T.C.C., Igranite, ranti, Sovereign, Hydra, Lissen, Formo).
- 1 2-mfd. do. (Telsen, etc.).
- 3 0001-mfd. fixed cond. (Dubilier Type 670, T.C.C., Graham Farish, Lissen, Ready Radio, Peto-Scott, ranti).
- 1 .04-mfd. non-inductive cond. (Dubilier, T.C.C., Telsen).
- 1 .25-mfd. non-inductive cond. (Dubilier, etc.).
- 1 .0003-mfd. compression-type condenser (Formo, Polar, Lewcos, Graham Farish, well).
- 1 .0001-mfd. max. compression condenser (Sovereign, Polar).
- 1 .00075 solid-dielectric cond. (Ready Radio, Telsen, Polar).
- 1 Neutralising-type condenser (Dubilier, Peto-Scott).
- 1 3-pole change-over switch rod extended through centre bracket for mounting on baseboard (Wearite I.23).
- 1 1,000-ohm Spaghetti resistor (Lewcos, Varley, Sovereign, Magnum, Tunewell, Graham Farish, Lissen, etc.).

ANGLE- UPER



retical circuit would not be out of place, particularly as there are a number of refinements included which have not been referred to yet.

It will be observed that the receiver makes use of five valves, the first being a bi-grid combining the functions of first detector and oscillator. The second and third valves are of the screened-grid type and act as intermediate frequency amplifying stages; while the fourth is a second detector, operating with power-grid characteristics and generally handling a larger signal grid-swing than an ordinary leaky grid type.

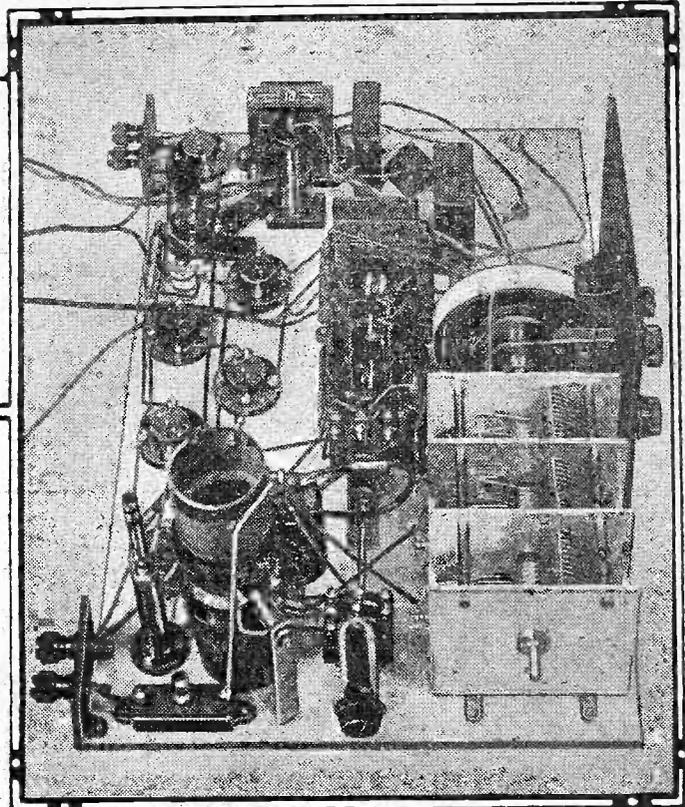
Finally, there is an L.F. stage, fed from a

denser effected a cure at the expense of ganging adjustments for the remainder of the scale.

Eventually it was discovered the effect was brought about by the aerial filter producing two distinct and sharp peaks at the bottom end of the scale. Since there was a deep "trough" between them, and the ganging of the oscillator condenser was found to be maintained in its centre, the result was a complete lack of signals (the trough representing the centre of the band-pass effect, but minimum signals).

Naturally, readjusting the oscillator trimmer allowed this circuit to function on one

A WELL-PLANNED LAYOUT



Here is the aerial end of the set, with the band-pass coil in the foreground. This time the ganged condenser is shown with the screening box cover removed, so that readers may see for themselves how the three separate sections are coupled up together.

◆ ◆ ◆
DESIGNED AND
DESCRIBED BY THE
"P.W." RESEARCH
DEPARTMENT.
◆ ◆ ◆

WHAT YOU NEED.

- 1. do. with mounting bracket, 2 1/2-in. connecting collars, and n. of 3/16th-in. rod (Wearite).
- 2. collar, length of rod and outer knob for above.
- 3. Combined three-pointed switch and 500-ohm potentiometer (Wearite Type G.23).
- 4. Socket base (Colvern).
- 5. 500-ohm wire-wound resistance (Sovereign, or Graham Farish Ohmite).
- 6. 500 do. (Sovereign, or Graham Farish Ohmite).
- 7. Isolated terminals (Belling Lee, Anic, Clix, Bulgin, Ealex).
- 8. meg. grid leak with terminals (holder (Graham Farish Ohmite, Bulger, Telsen, Lissen, Loewe, Anic, Ready Radio, Watmel, Ley).
- 9. 500-ohm non-inductive resistance (Dubilier 1-watt type, Loewe, Graham Farish Ohmite).
- 10. Tube and holder (Bulgin, Belling Lee).
- 11. 8-kc. intermediate-frequency band filters Two with Pigtaily (Loewe, Wearite).
- 12. Plug (Clix, Igranic, Belling Lee, Ealex).
- 13. Whistles, flex, etc.
- 14. Lacoline, Quickwyre, Soldadere, Jifflinx).

ACCESSORIES.

- 1. SPEAKERS.—Celestion, M.V., Amplion, R. & A., Blue Spot, Undy, Graham Farish, W.B., Epoch, Ultra.
- 2. VALVES.—Double-grid valve (Cosram, Tungram, Mullard).
- 3. B.G. valves (Mazda, Marconi, Mullard, Six-Sixty, Osram, Eta, Lissen, Cossor).
- 4. H.L. or det. type (Marconi, Osram, etc.).
- 5. Output valve, such as P2, Osram, etc.).
- 6. BATTERIES.—H.T., 120 to 150 volts triple capacity (Pertrix, Osram, Ready, Magnet, Lissen, Ley).
- 7. Transformer to suit output valve (Eveready, etc.).
- 8. OSCILLATOR.—2-volt (Exide, Osram, Lissen, Pertrix, G.E.C.).
- 9. RESISTANCE UNIT.—To give 25 milliohms at 120 to 150 volts (Hayward, Atlas, Formo, Tannoy, Loewe, R.I., Lotus, Tunewell, Sargentone).

In publishing details of this outstanding receiver, we are confident that it is just the set for which many readers have been waiting. It is remarkably easy to construct, and when finished will bring in station after station by just turning one small knob.

audible frequencies, and not only compensates for the shrillness met with in certain balanced-armature loudspeakers, but also enables heterodyne whistles to be eliminated.

A knob which projects from the side of the cabinet in an unobtrusive manner for actuating the ganged wave-change switches, completes the controls, although in actual fact there are only three, as the latter is a very occasional one. Before proceeding with the constructional hints and tips, an examination of the theo-

parallel feed system and capable of being modified, in view of its simplicity, to suit the constructor's personal requirements and loudspeaker.

Owing to the rotors of the variable tuning condenser being arranged on one common spindle, it has proved necessary to connect the Varley "Square-Peak" coil (Extenser type) in a manner which allowed for the "grounding" of the rotors. In the same way the condenser tuning the oscillator anode coil had to be earthed, and the arrangement may be examined on the theoretical diagram.

A point of considerable interest is the function of the neutralising type of condenser across the band-pass aerial coils, as this tends to give a mixed-filter having besides the two usual factors (mutual coupling and fixed capacity) a third one.

An Interesting Feature.

During later experiments it was noticed that when tuned between 30 and 0 degrees on the medium wave-band the set went "dead" as if the bi-grid valve had ceased to oscillate or was "choked." A milliammeter in the plate circuit dispelled the former idea, and it was noticed that readjusting the trimmer on the oscillator con-

or other of the peaks, but the "N.C." component tended to reduce the trough without apparently widening the peak separation, and brought results back to normal.

None of Those Whistles.

Another lesser but favourable effect of the neutralising condenser (which acts as capacity coupling to the aerial filter) is to increase the sensitivity of the set at the bottom end of the scale and very slightly decrease it at the top end. As stations working on lower wave lengths are usually of smaller power than those higher up the scale, the effect is not unfavourable.

A non-inductive resistance of 1,000 ohms has been joined in series with the oscillator grid of the bi-grid valve to reduce undesirable coupling effects between the two grids and consequently between the tuning coils. If this coupling occurs the effect is equivalent to a heterodyne whistle on each station received. The remainder of the circuit is fairly straightforward and calls for little comment.

(Continued on next page.)

THE "P.W." SINGLE-DIAL SUPER

(Continued from previous page.)

Volume controlling is achieved by reducing the screening-grid volts and the amplification of the S.G. valves. A loss of H.T. milliamps. is prevented by connecting the

negative side of the potentiometer to one pole of the three-point on-off switch.

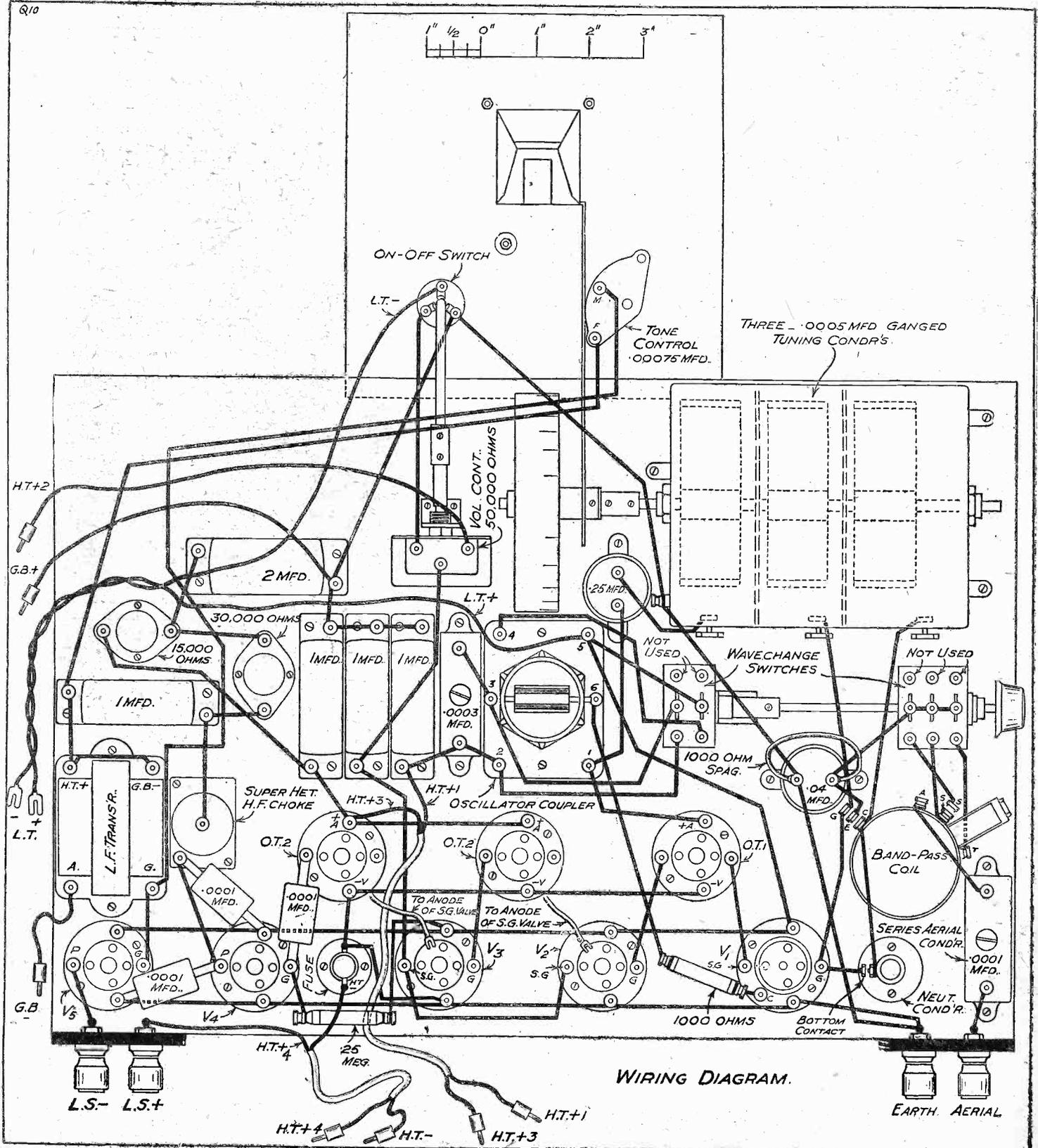
Readers will note further that quite small fixed capacities are used in the anode circuit of the second detector to prevent H.F. currents leaking into the L.F. stage. It was possible to reduce the capacities to .0001 mfd. in each case, as the practical layout prevented any serious leakages or feed-backs.

In consequence of this the receiver gives

excellent high-note reproduction, while the pitch control allows the cut-off frequency to be varied at the discrimination of the operator. With the exception of the oscillator coil unit, which will probably be made by a few firms specialising in coils, the construction of the set hardly calls for comment.

A paper jig for the cutting of the aperture for the drum dial is supplied by the makers, (Continued on page 64.)

WHEN WIRING-UP CAREFULLY FOLLOW THIS COMPREHENSIVE DIAGRAM



This diagram will tell you everything you want to know about the connections. It shows the wiring as it should appear after all the leads have been put on.

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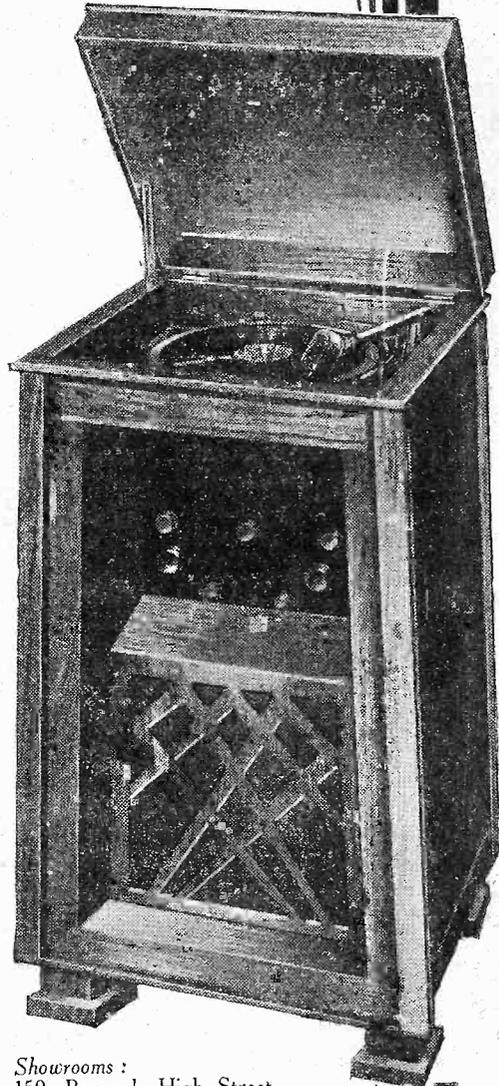
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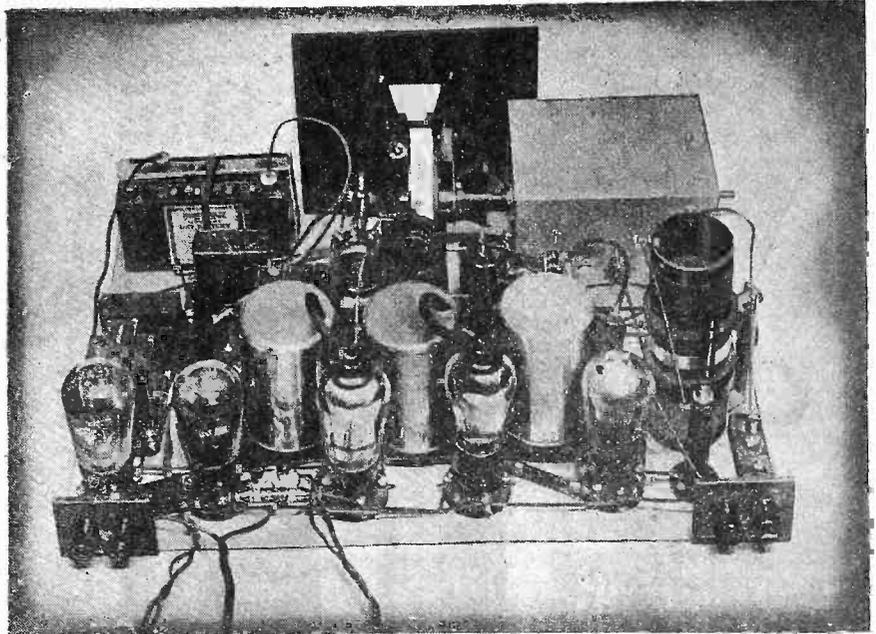
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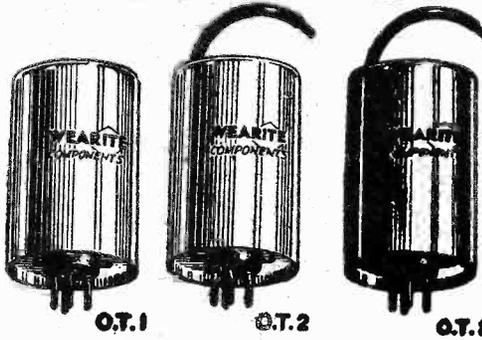
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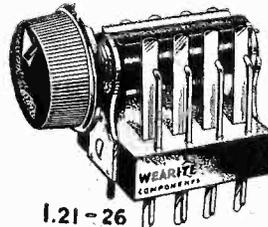
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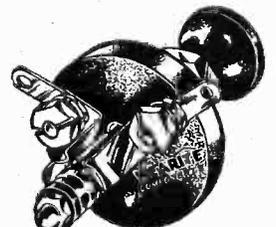
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1.21-26
1.31-36



SPECIALLY ADAPTED WEARITE SWITCHES

Above are illustrated two standard Wearite Switches which have been adapted and specified for the "Single Dial Super."

On the left is the D.P. change-over switch. A 3-pole and 2-pole switch have been mounted on one spindle together with mounting brackets. The price of the complete unit is **9/3**.

On the right is the standard three-point switch. This has been mounted up with a 50,000-ohm Pot'meter as per designer's specification and is available at **6/-** complete.

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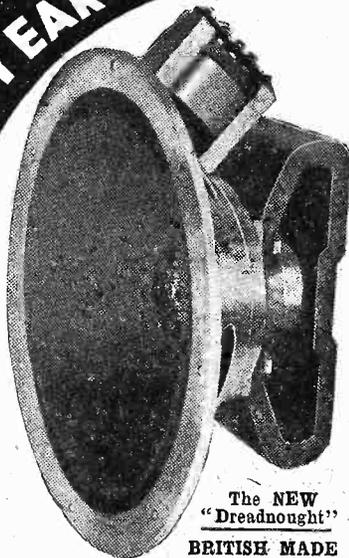
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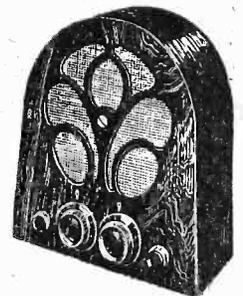
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THE EPILOGUE MYSTERY

New facts concerning the B.B.C.'s 10.30 p.m. Sunday feature are given by A SPECIAL CORRESPONDENT.

NOBODY outside the B.B.C. knows very much about the Epilogue. That only makes it all the more intriguing. For this reason I met with a "blank" in many directions when I tackled friends at the B.B.C. some time ago about the details of the Epilogue and how it is given.

Enhancing the Effect.

"We find," said one of the programme men to me, "that a certain atmosphere of reticence and even of mystery seems to enhance the effect of the Epilogue, and that is why there is always a short gap

STANFORD ROBINSON



Mr. Robinson conducts the Wireless Singers who contribute to the Epilogue.

between it and the end of the main Sunday programme at 10.30 p.m.

"That is why we do not announce the names of the singers who take part. The official attitude here," he said, meaning Broadcasting House, "is that we should keep the whole thing anonymous and we rather deprecate outside inquiries as to the whys and wherefores."

How It Is Done.

Since then I have seen two Epilogues carried out and I really do think that there is no harm in explaining away some of the mystery. Most readers will agree that, as the Epilogue is one of the most acceptable items in the Sunday programme, and judging by the B.B.C. Post Bag, one of the most

popular items of the week, there is no harm in telling how it is done.

Listeners have made many wild guesses at the singers who take part in the hymns and chants. The Wireless Singers who do this comprises two sopranos, two contraltos, two tenors and two basses. The suggestion has frequently been made that the singers in the Epilogue consist of a boy soprano and male alto, tenor and bass, or lady soprano, alto, tenor and bass. Many have suggested that there must be at least a choir of a dozen to give the volume and depth of tone.

Therefore it comes as a surprise to know that there are seldom more than four. The Wireless Singers, from which selections are made for singing at the Epilogue, are conducted by Stanford Robinson, who frequently conducts last-minute rehearsals just before the Epilogue is due to be switched on. There are eight picked singers who, at one time or another, have taken part in everything from simple plantation songs to the "Dream of Gerontius."

The Singers.

The group was started in February, 1927, and three of its members sing in the choir of St. Paul's Cathedral. At the beginning of the organisation the *personnel* included Dorothy Burton, Ethel Williams, Tom Purvis, John Collett, Doris Owens, Gladys Winnill, Stanley Riley and Samuel Dyson. It is generally Stanford Robinson who conducts, but he must not be blamed for the new pointing of the chants!

Some of the best Epilogues are given from the No. 10 studio, in the converted



wharf building, soon, alas, to be vacated. After the Sunday night orchestral broadcasts here, picked members of the B.B.C. orchestra stay behind and play during the Epilogue. The Wireless Singers sing unaccompanied, as a rule.

Valuable Minutes.

Although the No. 10 studio has the largest floor area of all, there is a great deal of work involved in closing down after a big orchestral broadcast, and often there are only a few valuable minutes in which to clear instruments and the conductor's dais away from the front of the suspended microphone, and to get the singers grouped in their proper order.

In No. 10 studio the announcer has a separate little microphone by which he makes announcements during the orchestral broadcasts and it is through this that he reads the Bible passages and poetry. Whichever announcer is on duty at the time takes charge of this section of the Epilogue. Sometimes it is Mr. Hibberd, the chief announcer; sometimes Mr. Grisewood, or one of the other London announcers.

Choosing the Hymns.

There is one official at London whose business it is to arrange the Epilogues for
(Continued on next page.)

THE WIRELESS MILITARY BAND IN "No. 10"



Number Ten studio, in which there is a separate microphone used by the announcer for reading the Bible passages and poetry.

FOR THE CONSTRUCTOR

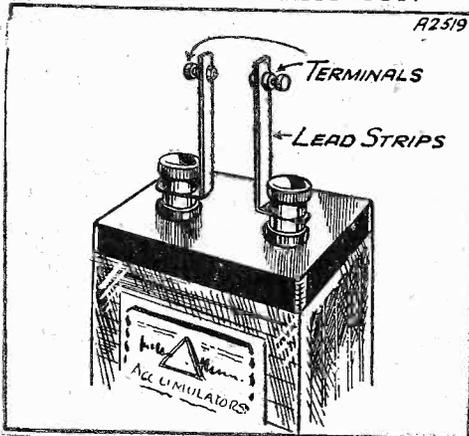
SOME PRACTICAL POINTERS.

ACCUMULATOR CONNECTIONS.

If neglected, the terminals of accumulators soon become a sorry mess, for if acid or vapour reaches the brass, corrosion takes place. This can, of course, be stopped by smearing the terminals liberally with grease or vaseline.

After this has been done it is always a most unpleasant job to make any connections to it. The plan I adopt is to fit extensions to the terminals consisting of heavy bars of lead bent L shape.

STOPPING CORROSION

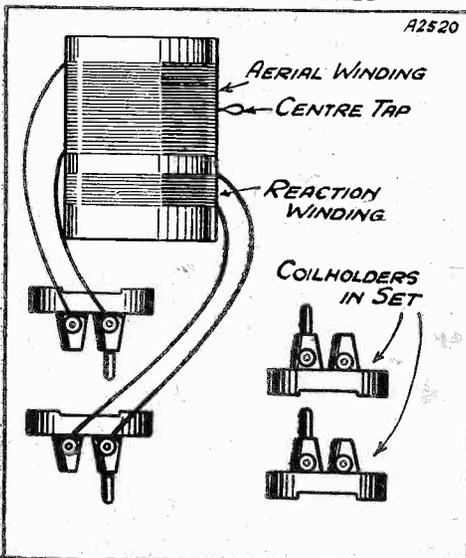


Besides making the accumulator more pleasant to handle, these terminal extensions tend to protect the leads from corrosion.

These are drilled to fit under the existing terminals and they are fitted with terminals at the upper end so that the wires to the set can be attached easily. If a piece of suitable lead is not to hand a short length of lead gaspipe flattened out will answer quite satisfactorily.

These extensions being of lead are not themselves affected by acid, so there is no need to protect them with messy grease at the upper end.

A TUNER TESTER



How you can test out various tuner arrangements on your set is clearly shown above.

COIL VARIATIONS.

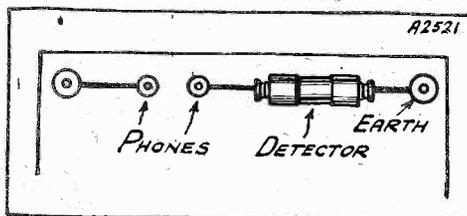
I THINK that many amateurs would be tempted to test out tuning variations but for the fact that they imagine that such variations necessitate the rebuilding of a set. This idea is quite erroneous for, if possessed of a common plug-in coil set, it is quite an easy matter to test out many of the solenoid coil variations.

Presuming that the coil holders are used with an aerial coil, plain or centre-tapped or X type, and the usual reaction coil, then all that is required is a couple of loose coil holders. Wires are now run from the new solenoid coil to these loose coil holders, so that these new wires couple up the set in the normal manner.

The idea is worked out in detail in the sketch. Any aperiodic or auto-transformer effect is made by the usual clip and flex attachment to the aerial terminal.

Even dual coils can be tried out in this manner by the insertion of a suitable switch. The system is so simple and easily adapted that various values and combinations to suit special requirements can be worked out and tested in a very short time.

ALWAYS READY



This simple device transforms a valve set into a crystal receiver.

THE STAND-BY CRYSTAL.

MANY people have a complete crystal set, which can be used independently of the main receiver in an emergency; for instance, when the battery runs down and has to be sent for re-charging.

Others seem just to grin and bear it, and fail to realise how ridiculously easy it is to adapt the commonest type of valve set—say a detector, followed by low frequency amplifier—so that it can be used for the dual purpose.

The tuning part of the circuit is common to both sets, and all that is required is a crystal, preferably of the permanent type, and a pair of 'phones. To connect up, attach one end of the 'phones to the grid condenser (that side joined to tuning condenser) and the other end to one end of the crystal detector. The other end of the detector has now to be attached to the earth terminal. That is all.

If you have been convinced that it is a practical proposition, I would suggest that you incorporate the idea as a permanency on the panel in the manner illustrated in the accompanying sketch. Two telephone terminals are required, one being connected to the aerial terminal, and the other to one end of the crystal detector.

The other side of the crystal detector is wired up to the earth terminal. No switching of any kind is needed, and when the accumulator is sent away for charging, just connect up a pair of headphones. You can tune-in with the aerial tuning condenser, but, of course, the reaction tuning condenser is inoperative under these conditions.

THE EPILOGUE MYSTERY

(Continued from previous page.)

all stations taking the London Epilogue. It must be remembered that certain Regional centres have their own Epilogue. When I asked him how he chooses the hymns and Bible passages, and in what order, he told me that the standard programme form on which he has to work is hymn, Bible reading, chant or hymn, all grouped round some central thought which is chosen as being appropriate to the season, no matter whether it is a Church season or a season of the year.

"When we have selected the Bible reading," he said, "the hymns very frequently choose themselves. We have to avoid clashing with hymns which have already been given in evening broadcast services, though, and as so many outside broadcasts are made from Churches now, it is not easy to prevent overlapping.

Last Minute Decisions.

"It may interest you to know that whereas ordinary programmes are made up two weeks in advance, the Epilogue is seldom prepared until two or three days before it is due. That is one reason why details are never given in print, because there would not be time to get them in the ordinary programme announcements."

"Bible readings are not always given, though, are they?" I asked.

"No," he explained. "Some passages of secular poetry are often more suitable, especially if there is any event of National importance on with which we want to link up the Epilogue. Milton, Shakespeare and George Herbert have formed subjects of the reading. We do not always have hymns, either. An aria from one of the well-known oratorios makes a change and this often strikes a more topical note.

"We know that a good many listeners to the Epilogue are anxious to come up and see how it is done. Almost every week we receive letters asking permission to visit the studios on a Sunday evening. We have a very rigid rule, though, that the Epilogue must be done 'in camera' and the few privileged people who are allowed in the studios to hear the Sunday evening orchestral broadcasts are hustled out before the Epilogue starts.

No Visitors.

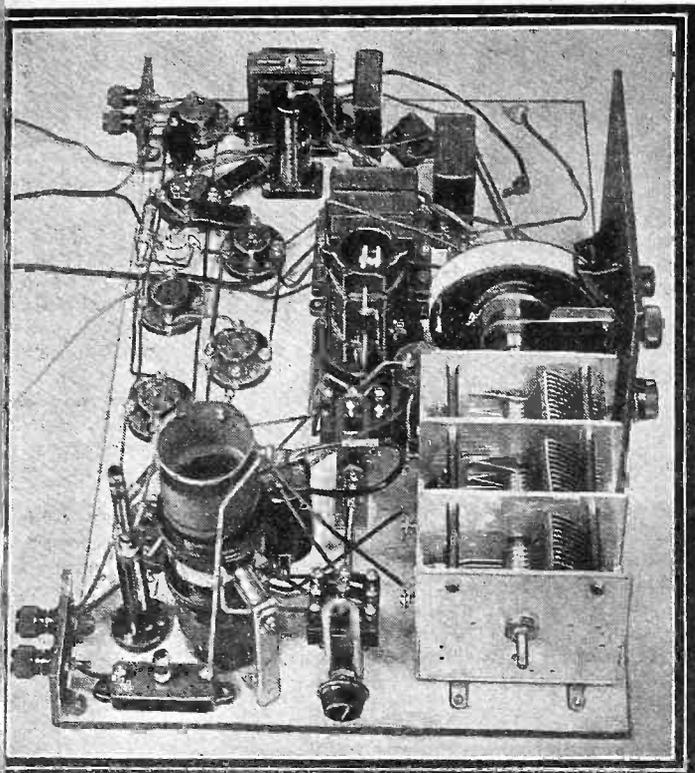
"Apart from this question of policy, which we think it is wise to maintain, there is a little difficulty because studio audiences on Sunday are often members of the general public, not connected with the B.B.C. or with the orchestra.

"It is very difficult for newcomers to the studios to keep quiet all the time, especially after they have sat through a two-hour orchestral programme. The slightest noise would spoil the silent background of the Epilogue and that is why we must maintain our rigid rule of 'no visitors.'"

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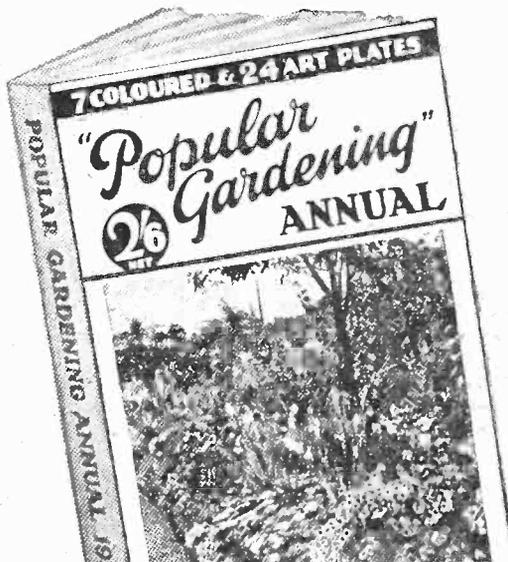
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LONG-DIS-TANCE reception on both high and medium wavebands continues to be very good indeed, not only after dark but also in broad daylight. Naturally, the long-wave stations provide, on the whole, the best reception during daylight, but there are many on the medium band which are usually quite excellent.

The complete absence of atmospherics, which still happily prevails, allows us to make full use of the sensitiveness of our sets, and to get out of them all of the high-frequency amplification of which they are capable. This accounts largely for the goodness of daylight reception.

Long-Wave Listening.

When atmospherics are about one has to use reaction sparingly owing to the extent to which the tightening of the coupling brings up unwanted interference.

With the exception of Motala, who is rather below form, all of the long-wave stations are furnishing first-rate reception. Radio-Paris is still usually free from the heterodyne which was such a nuisance earlier in the year, whilst both Huizen and Warsaw come in with splendid volume and quality.

Zeesen is better now than I have known him for a long time. When, by the way,

JUDGING from the week's correspondence, conditions remain fairly good. There are no new stations on the air, and no spectacular demonstrations from any of the usual places, but reception is just mildly interesting. So, at any rate, readers seem to think.

My old friend, W. H. G., of Settle, has a nice little tilt at me. He says: "What's happened to you lately? Your notes are full of this R.C. Club, and technical hints, etc., have retired to the background. Can it be that your 'Midget' One is perfect?"

A Much Worked "Midget."

Well, W. H. G., I have been using the "Midget" for a longer period than I have managed to stick to any other set, and I have had to make no alterations at all up to the present. Sorry if you would sooner hear about my difficulties and snags—shall I go back to a super-het.?

To come to technicalities, however, for a little, W. H. G. asks me why I never mention "grid-stoppers," and what I think of them. I regard the grid-stopper as a cheap and convenient method of keeping unwanted H.F. out of the L.F. amplifier, but, in my opinion, it doesn't do it early enough. There should be no H.F. getting even as far as the grid of the first L.F. stage if the detector is efficient and well-planned.

As readers will know, I nearly always use throttle-controlled reaction in my sets, and by using a small reaction coil and a

STATIONS WORTH HEARING

Some practical distant-programme notes compiled by a special contributor who nightly searches the ether in order to obtain really up-to-the-minute information for "P.W." readers.

you are searching on the long waves, do not omit to try 1,237 metres—if your set is uncalibrated, the setting will be about midway between those required for Motala and Kalundborg. The station using this wave-length is Vienna Experimental.

So far as I know, he is not yet doing regular programmes, but you will find him quite frequently relaying items from the Vienna station's entertainment. The power that he is using has not yet been stated, but to judge by the strength with which he is received, it must be something considerable.

Those Sputtering Sparks!

On the medium band there has been some recrudescence of the spark interference nuisance between about 220 and 280 metres. So broad is the tuning of the transmitters causing the interference that you cannot get rid of their Morse signals, no matter how selective your set may be over this very wide band of wave-lengths.

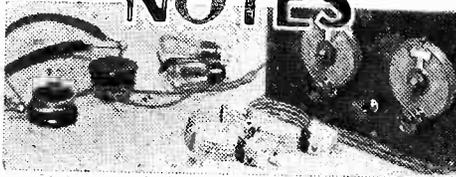
tion of channels, and all will probably be well until either several of the new high-power transmitters come into operation, or some of the smaller stations begin to indulge once more in wave-length wandering.

Some Good Catches.

Readers may have noticed a recent return to form on the part of the 517-metre station which has been coming in night after night at fine loud-speaker strength. Budapest is also very good just now and though he has certain off nights, Brussels No. 1 is generally a station well worth trying for.

Florence is perhaps a little disappointing, but Prague, Langenberg, and Bero-munster all show excellent strength. Rome seems to be fairly reliable at times but he occasionally has a relapse. Stockholm is seldom anything like the transmission that he was a month or two ago, but both Berlin Witzleben and Belgrade are coming in at vastly improved strength.

SHORT-WAVE NOTES



News and views regarding an exciting and fascinating wave-band.

By W. L. S.

correspondingly large reaction condenser I think one can clear all the H.F. off by that path.

A respectable H.F. choke in the plate circuit is, of course, necessary. But I don't think a grid-stopper could possibly help us in a case like this, because there shouldn't be anything for it to stop.

How Many Volts?

Another query—from the same source—is this: Which is best, to use 50 volts of H.T. with the grid return going straight to positive, or 90 volts with a grid-return potentiometer to "tame" the reaction control? This, of course, is rather a poser. My answer would normally be: "Use 90 volts and still don't use a potentiometer—make the reaction control nice and smooth by some other method." But it is not too easy.

For a really efficient short-wave detector circuit I always insist on taking the grid return (or the grid leak) straight to positive. I am convinced that sensitivity goes up. When using a bad set and a "taming" potentiometer one often finds that reaction is not smooth until the slider is right round at the negative end, where sensitivity is definitely bad.

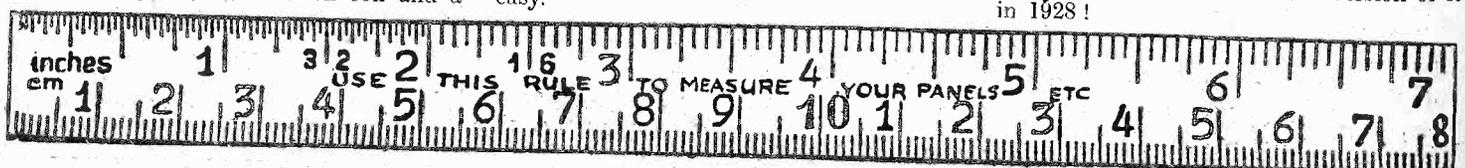
Letters Received.

G. H. (Sheffield) inquires about a telephone communication heard, but it is impossible to place it, since there are about fifty different two-way channels in action nowadays. Likewise, he mentions a broadcasting station that announces in foreign languages, but signs off in English. Sorry, G. H., but unless you have some idea of the wave-lengths I can't help you at all.

E. K. (Yorks) writes to tell me that "the short-wave bug has claimed another victim. Symptoms—absent-mindedness, sleepy eyes, lordly air!"

Sorry about that, E. K. We shall have to see about your "Junior Competition."

Applications for "H. A. C." membership have been received and duly passed from K. C. (Totton), D. D. (Cardiff), P. A. V. (St. Leonards), and A. C. G. (North Walsham). Incidentally, I see that the International Short-Wave Club is suggesting that a "Heard All Continents Club" for its membership would be a novel idea. I fancy we started the "P.W." version of it in 1928!



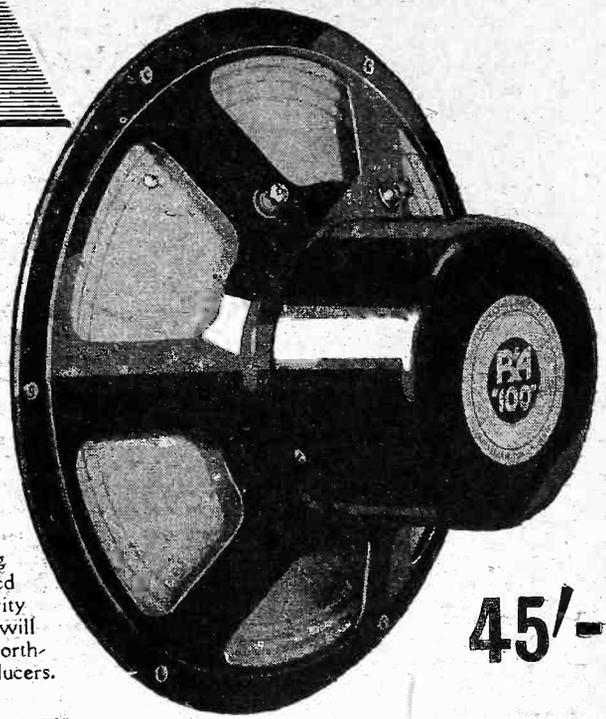
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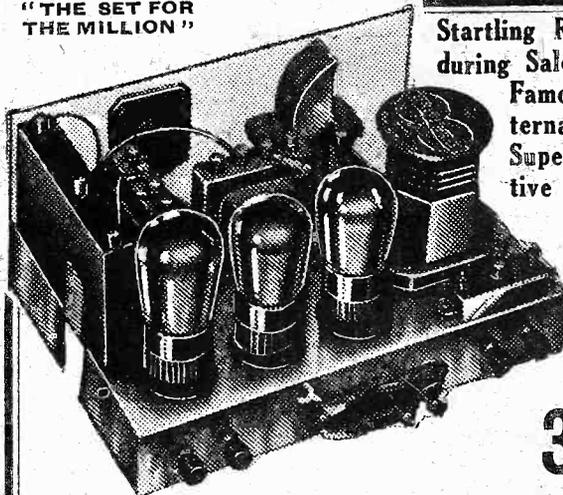
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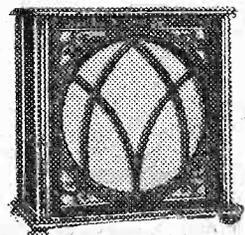
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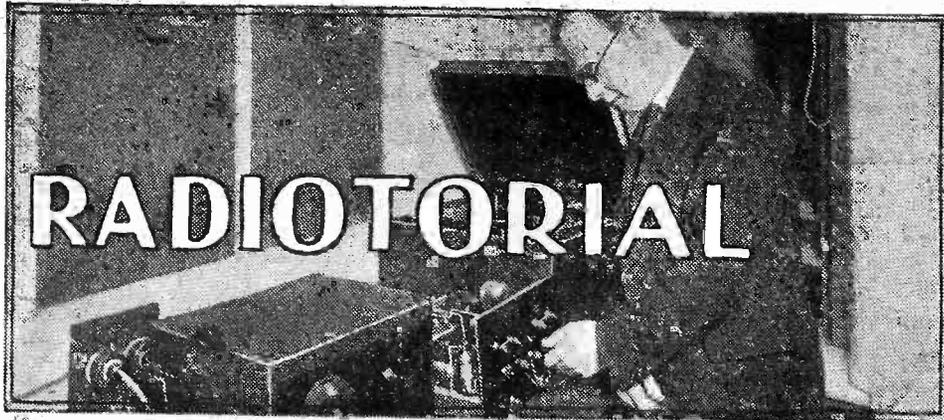
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The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialties 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

A TEST FOR OSCILLATION.

T. L. (Newcastle).—"I seem to be working in the dark as regards medium waves, because I am not sure how to tell when the set is oscillating. Is there a simple way of knowing when this happens?"

The best way is to get to recognise the effect of reaction when no broadcasting is in progress. If you switch on early one morning when there are no stations working, and prop the loudspeaker up close

to your ear so that you can hear exactly what the effect of reaction is, you will soon discover for yourself how to recognise oscillation.

Put the tuning dial, say, half-way round, and concentrate on reaction, bringing this up very, very slowly.

You will notice as you do so that there is a distinct "liveliness" in the loudspeaker, even though no broadcasting is on. Little noises and whispering sounds appear, as reaction is increased, and the set becomes more sensitive.

If you move the reaction very, very slowly you will notice, too, that at a certain place there is a faint but unmistakable change of conditions, very often preceded by a "pop," as the set bursts into oscillation. Immediately this happens the character of the sounds you have been hearing changes slightly, and turns into a sort of rushing noise—not very easy to describe exactly, but very easily recognised if you will take the trouble to listen as we have described.

How to Tell.

There is a good old simple oscillation test, too, and that is the test of the wet finger. To apply this, simply moisten the tip of your finger and tap the grid terminal of the detector valve, listening carefully to the kind of clicks you get as this is done.

Probably you will find that when the reaction is set at its minimum the click will be a well-defined "tap," and it is important to notice what happens when you put your finger on the terminal, and when you take it off.

Now increase reaction a little, and notice that the clicks begin to get louder. If you do the job slowly and thoroughly you will soon notice that when reaction is well advanced but before oscillation actually sets in—that is, before the little plop has taken place, and the rushing sound comes on—you get a sort of "single click" from the terminal when touched.

But as soon as the set is actually oscillating you get a "double click"—that is to say, there is a click when

(Continued on page 74.)

HOW ARE YOUR RESULTS NOW?

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

A postcard 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.

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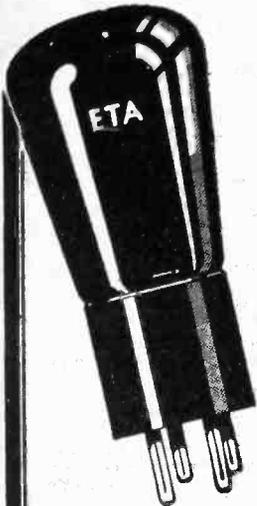
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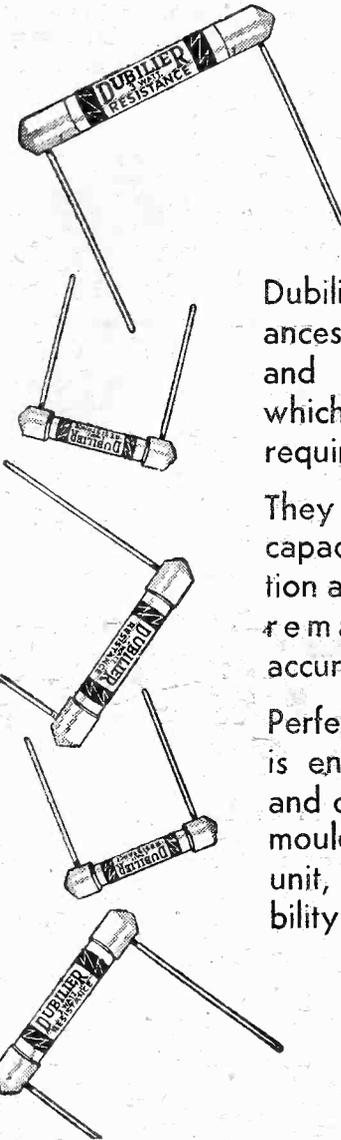
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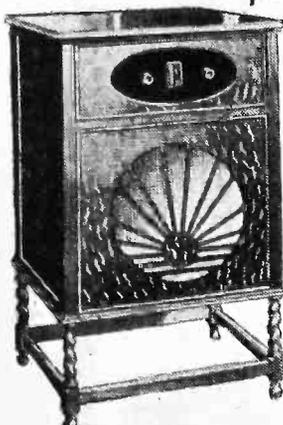
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DUBILIER METALLIZED RESISTANCES

DUBILIER CONDENSER CO. (1925) LTD.
 Ducon Works, Victoria Rd., N. Acton, London, W.3

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 72.)

You put your finger on the terminal, and also when you take it off. This corresponds with stopping and starting oscillation.

Before the set will oscillate the effect is different and you will find the loud clicks only when you put your finger on, and not when you take it off.

You get maximum sensitivity from a set when reaction is well advanced, but not advanced enough to make the set oscillate; and if you practise a little in

YOUR BIT TOWARDS ECONOMY

Have you ever thought how difficult it is for a newsagent to order just the right number of copies of any particular paper each week?

You can make his task much easier if you place a regular order with him. You will not only help him to order correctly and avoid waste, but you will make sure of getting your copy regularly each week.

daylight when no loud station is about (and when you will be interfering with no one else), you will soon get into the habit of automatically adjusting reaction to suit tuning, and be able to tell from the sound of the set which is the best possible setting for the reaction control.

PICTURE TRANSMISSIONS FROM THE VATICAN.

T. T. R. (London, S.E.).—"Could you tell me if the Pope's station at the Vatican now works a picture transmitter, like the British stations and Vienna used to work over a year ago? The reason I ask is that I heard a curious transmission coming apparently from this station, but was unable to hear the announce-

ment. Since then at the same settings I have heard no more of this, but only ordinary broadcasting."

Yes, the Vatican engineers have been experimenting with picture transmissions. It is stated that the apparatus employed is of the Bélin type, developed by the French inventor of that name.

TRANSFORMER CONNECTIONS.

"PUZZLED" (Wavertree, Liverpool).—"I am putting up the 'P.W.' 'Cosmic,' most of the parts for which I have in hand. My transformer, however, is not marked like the one shown.

"The shape is similar, and it has four terminals, the lettering of these, however, is not as on the blue print. One is marked B + and next to that is G. At the other end the next terminal is C - and the last one is A.

"Can I use this kind for the 'Cosmic'?"

The markings are on the American system, and provided the instrument itself is of suitable ratio, etc., it should be quite O.K.

B + is the same as H.T. +, and should be joined to H.T. +2 and L.S. +. G is the same in both transformers. C - is the equivalent of G.B. -, and

should be joined by a flex lead to grid bias 2 plug. The A terminal goes to the plate of the second valve holder.

USING THE ECKERSLEY TUNER.

K. W. (Solihull, Birmingham).—"I do not seem to be able to get the results I should with the Eckersley Tuner. I am sure that the set is good, and I have heard a lot of stations with it, but I do not seem to be able to find them when I want them.

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"My friend suggests I ought to draw up a chart, but I do not want to do this because I find that sometimes the dial readings seem to shift/about, and if I get Prague, for instance, on 95 one night, it may be only 90 the night after.

"It is certainly a very fine set, and I have never had such wonderful reception on the local, but even there I find the tuning quite 'shifty,' and a slight movement of the tuning puts the station right away.

"The letter from Mr. Austin which you published in 'P.W.' makes me very envious, as I feel sure the set has got far more in it than I can get out of it. Could you give me some hints on handling it properly, and explain why the dial readings shift, which seems to me the most puzzling thing.

"Also, should it be so selective, that I can tune out a station by the very slightest movement of one dial, although my aerial is quite a good outdoor one, being about 38 ft. long and nearly 30 ft. high."

Apparently you did not pay much attention to the hints which were given at the time the tuner was

"P.W." PANEL, NO. 64. USING A LOUDSPEAKER.

All nuts, terminals and washers on a loudspeaker should be kept tightened, as if loose they may set up rattles.

"Boomy" results from moving-coil loudspeakers are sometimes due to cabinet resonance, which might be overcome by packing the cabinet's interior surfaces with sound-absorbing material.

For high quality results a large baffle-board is usually better than a cabinet, but it must be quite thick wood— $\frac{1}{2}$ -inch or so.

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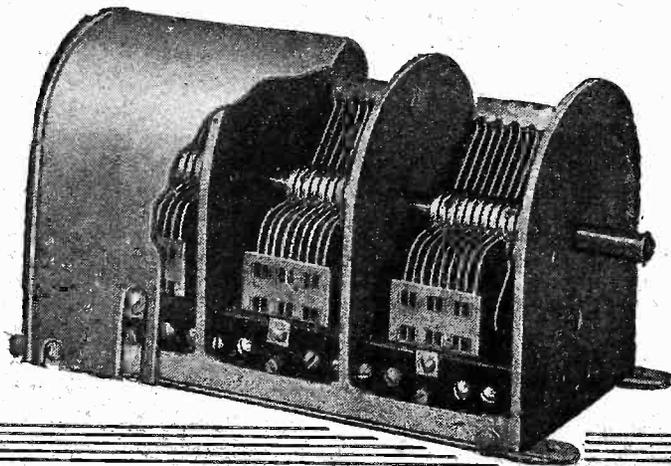
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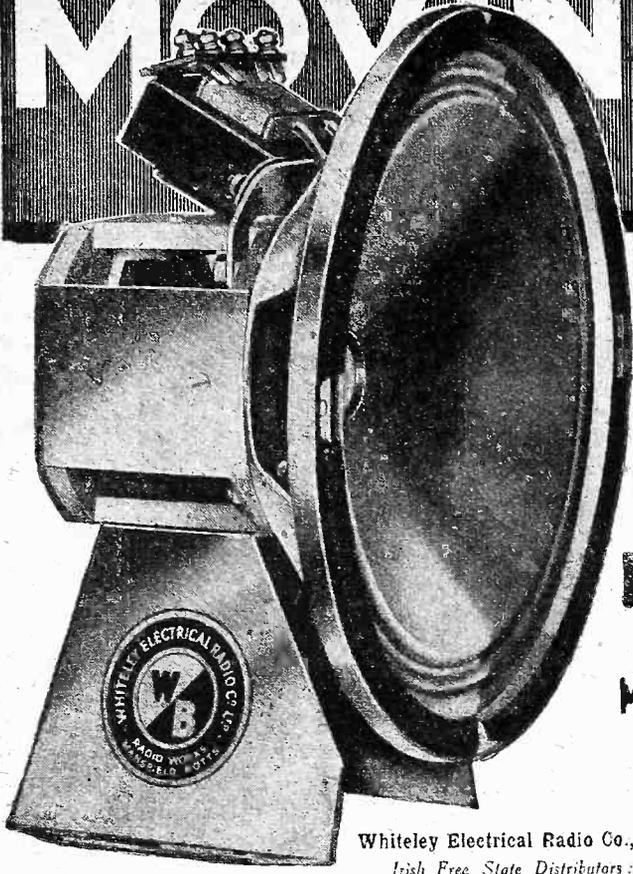
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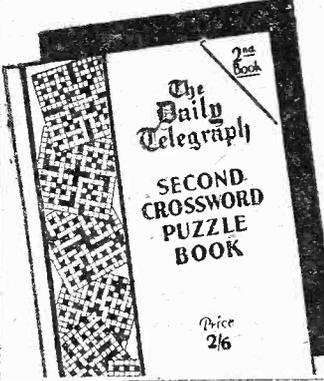
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Wooden panels to fit, with oval aperture, 12 in. by 5½ in., 2/- extra.



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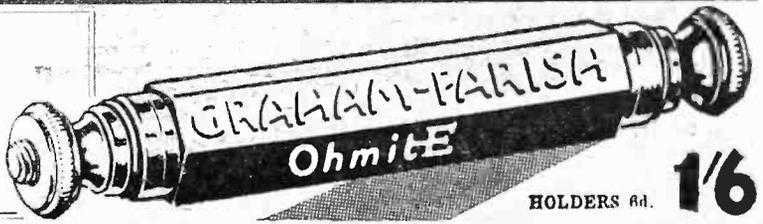
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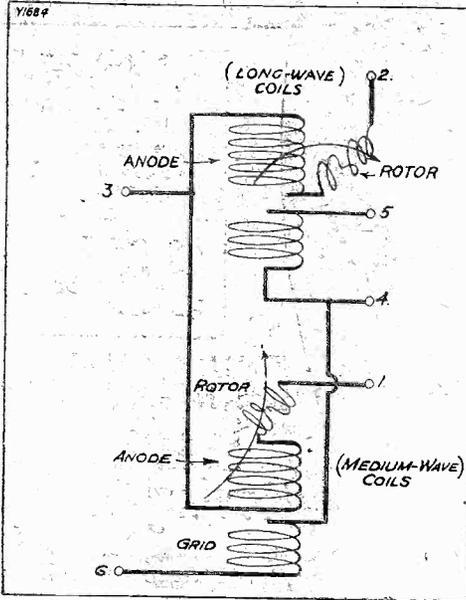
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RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 74.)

Particular note should be made of the fact that it is only on the second dial—that is to say, on the right-hand dial—that the readings will remain constant. The reason for this is that the left-hand tuning dial works in conjunction with the selectivity condenser

THE CIRCUIT



Here you see the theoretical conception of the "Single-Dial Super" Oscillator Unit. Full constructional details are given in the other diagram on this page.

in the aerial, and to get varying degrees of selectivity you necessarily upset the reading already obtained on the condenser in question.

On the right-hand tuning dial the aerial selectivity condenser makes no difference, and therefore you should *always* use this right-hand dial for "logging" your stations, first setting it correctly and then bringing the other in tune with it. When slightly out of tune the station disappears.

How to Search.

The best general recommendation is to search for foreigners with the selectivity condenser almost at maximum. Then move the right-hand dial very slowly, at the same time tuning the left-hand dial readings a little way each side of its fellow.

Thus, the right-hand dial might be set at 94 and be tuned slowly down to 90, while the left-hand dial should be swung slowly round between about 85 and 100 to see if anything can be picked up. When you hear a weak programme set your right-hand dial right first, then "bring up" the left-hand dial until the programme gets suddenly strong, and finally, if necessary, give a final touch to the selectivity condenser in the aerial circuit.

If two stations tend to overlap you will have to turn this latter condenser out a little, to increase selectivity, and immediately you do so you must compensate for that by readjusting the left-hand dial.

You will notice that when the selectivity condenser is increased in capacity, the first tuning condenser has to be slightly decreased to compensate; and vice versa, when you decrease the selectivity condenser the reading on the first tuning dial must be increased.

In both cases the second tuning dial (right-hand) remains unaffected. Thus the idea is to get the second

tuning adjusted as quickly as possible to the correct wavelength. Then leave it alone and juggle with the other two until the required degree of selectivity and strength is obtained.

Remember, too, that when the selectivity condenser is at maximum the strength is also at a maximum, but the selectivity and sharpness of tuning is at a minimum; while if you decrease the capacity of the selectivity condenser you will sharpen up the tuning to a great degree, and it will be quite difficult to pick up a foreign station so sharp is their tuning under these conditions.

Keeping "In Step."

Once you have got the hang of the thing you will soon be able to tell without thinking about it when all the tunings are "in step" with one another; and thus when the set is in its most sensitive condition. It might be a good plan for you to practise when no local station is on until you get the hang of the tuning dials in this way.

What you do is to start with the second tuning dial set almost at its maximum reading, with reaction brought up so that the set is getting near the oscillation point, but not actually oscillating. Then listen carefully to the loudspeaker, not so much to hear any programmes that may be coming in from abroad, as to note the sort of hissing background that the loudspeaker gives when the set comes exactly into tune.

If you are careful you will recognise distinctly the little hissing, breathing sound that denotes that all the circuits are in tune. In this condition the set is amplifying the external noises to its maximum.

This "breathing" or hiss will only occur at the definite dial settings when the circuits are properly "in tune," so you can soon pick up foreigners by working down the dial from the top to the bottom with the second dial, keeping the other dial in this maximum sensitivity condition (what we call "in step" with it).

The Reaction Control.

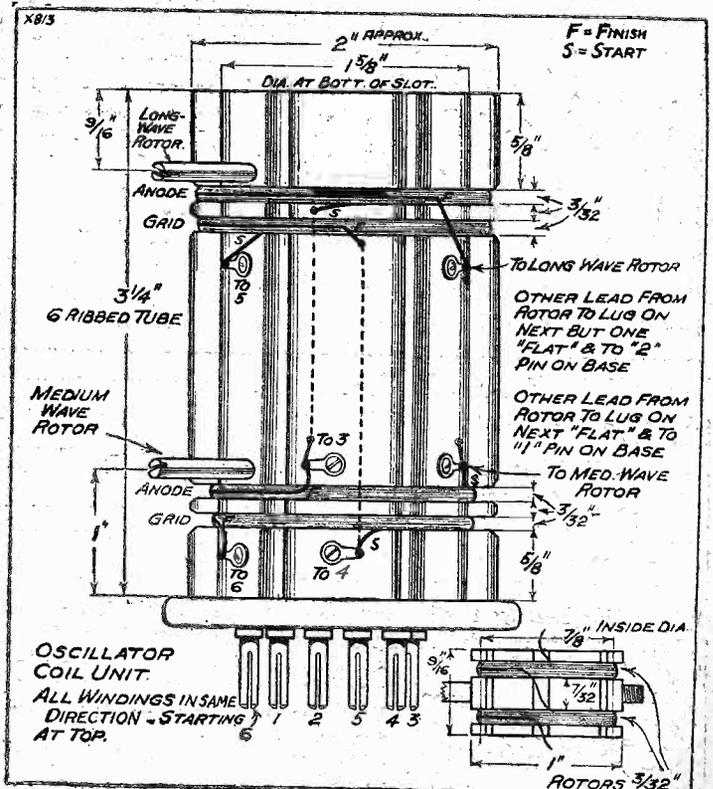
Once you have mastered this trick you have completely solved the problem of tuning in foreigners, for you will find that they fairly tumble in, especially if the reaction is handled judiciously. Too much reaction means whistles and poor reception; too little means that you are not getting all the sensitivity you might. To get correct reaction, turn the reaction dial slowly until the set begins to breathe rather more loudly than when it is in the "in tune" condition. But do not give it so much reaction as to make a little "pop" and soft rushing noise, which indicates that the receiver is actually oscillating.

And, finally, remember that the dial readings on the second dial are reliable, and can be logged for future use. Those on the first dial are dependent on the selectivity adjustment, so they vary a little according to the adjustment of the selectivity condenser.

If you use the second dial as the main tuning dial, moving it half a degree at a time, and keeping the other in step with it, you will find that dozens of

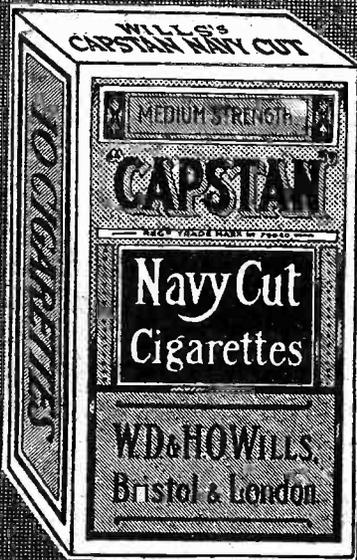
(Continued on next page.)

MAKING THE OSCILLATOR UNIT



This comprehensive diagram gives full details for constructing the "Single-Dial Super" Oscillator Unit. It should be studied in conjunction with the article which appears elsewhere in this issue.

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RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

programmes which formerly eluded you can easily be tuned in.

ABOUT VARIABLE CONDENSERS.

"EXPERIMENTER" (Ipswich).—"I like to try out different circuits, home-made coils, etc., and at the moment I am puzzled about variable condensers. You often see the maximum stated as .0005 mfd., but what is the minimum?"

"I have never seen this and I am anxious to know because of a little problem I am up against with regard to tuning. Perhaps, while you are about it, you can help me with that also."

"The problem is, what is the easiest way of using a coil which will tune down low on the medium waves (to stations below Radio-Normandie and Cork), and also at the same

TECHNICAL TWISTERS

No. 106.—OSCILLATION.

CAN YOU FILL IN THE MISSING LETTERS?

To make a valve oscillate its circuit must be coupled back to its circuit.

This coupling must be both sufficient in degree and correct in to maintain oscillations.

After the oscillations have built up—which is a momentary process—the output of an oscillating valve remains

Last week's missing words (in order) were:

Watt. Amperes, Volts. Half a Watt. Half a Watt. One Thousand.

time cover stations above Budapest, right at the top of the scale over 500 metres? If you can give me some information about this I should be very pleased."

Condensers of the variable type differ a good deal in different makes, but as a general rule the minimum capacity is about one-tenth of the maximum and, therefore, in most makes it is somewhere about .00005 mfd.

Probably the best way to cover the extended wave-band you are contemplating would be to wire up a little .0001 fixed condenser in the tuned circuit, and bring this into action when you wish to cover the stations above 500 metres. It should be wired in parallel with the present tuning condenser, with an on-off switch in one lead.

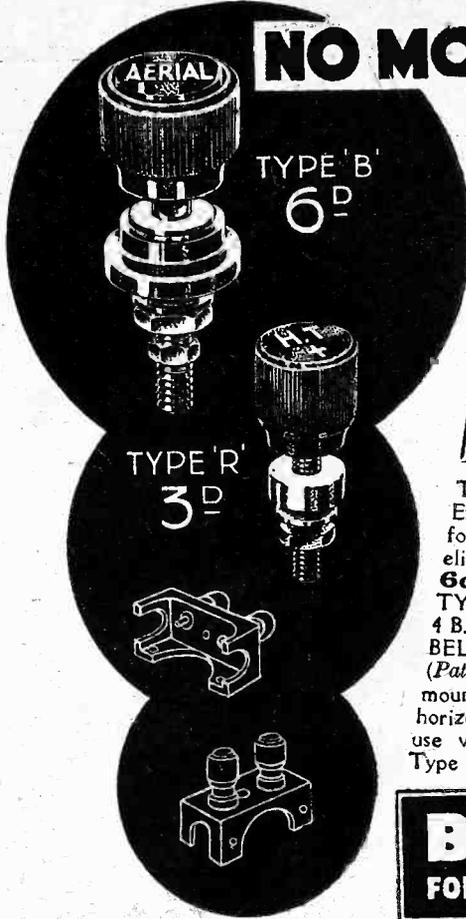
When you switch the extra condenser "off" you tune in from low-wave stations like Cork right up to, say, Budapest, or as far as you can go. Suppose it is Budapest and the reading for this is 96.

Switch in your extra condenser and re-tune for Budapest, which will now be 20° or so lower on the dial. Then you can use the higher readings to find other wavelengths above Budapest.

"P.W." "MISSING LINKS."

Owing to space restrictions the usual "Missing Links" diagram is unavoidably held over this week.

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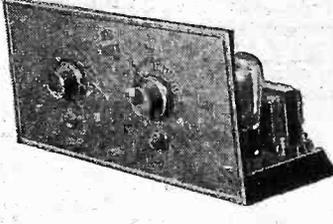
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THE LISTENER'S NOTEBOOK

(Continued from page 48.)

per cent of listeners is certain, and after the way the paper was read one regretted that the idea of setting it to music had not entered the heads of the programme directors!

Ashley Sterne, on the occasion of his first effort as vaudeville critic, was seemingly more intent on being humorous than criticising the alleged humour of the artistes. Later, he admitted he was a poor judge, so perhaps not much heed was taken of his attempt to find fault with some of the turns.

In his criticism he hinted that crooning was not one of his favourite turns; but I agree with him that, if we are to be asked to put up with such, Eddie Collis is the best exponent of this expression of melancholy that could be selected. But please let us have some new songs.

Naturally enough, artistes jumped at the opportunity to poke fun at the new critic, and one must say that it was poor stuff. However, compensation came in the shape of a few topical puns, and even Claude Hulbert weighed in with two about riding in Rotten Row without a hat, and the selling of his stud for old gold.

Some Outstanding Turns.

The new method of introducing the vaudeville turns was, after all, not by any means novel, and Leonard Henry as Silas P. Yapp produced little humour that one had not come across before; in fact, after a time the twang became not only monotonous but irritating. One of the earliest turns happened to be Eric Ross and Ida Williams, cross talkers, who did their best to outdo the announcer's alleged wit. Then a little later came Johnson Clark, the ventriloquist. He was well worth his selection. I fancy we shall hear more of him.

Nancy Lovat was content with some old songs that I have certainly heard better sung.

If Nosmo King and his partner are to hold on to their rather high reputations they must avoid repeating their patter. The partner recites with marked effect, and he might with advantage play a more prominent part in the turn.

Jack's Get-Away.

Did you notice how smartly Jack Payne got away on the occasion of his good-bye performance? It looked as though he was not anxious to give the announcer a chance of being sentimental. He appeared to be as short of breath as usual, but his "boys" played with all their old fire and dash. They should take America by storm.

As a rule there is a stereotyped sound about the hand-clapping that follows a vaudeville turn, but it was evident that the fine baritone voice of Ashmoor Burch made as big an impression in the studio as it did among fireside groups. Mamie Soutter, with her partner, Blake Adams, also hit the popular taste with their patter: but singing is not one of their strong points.

If Sir William Beveridge is keen on increasing the interest in his pet scheme re Family Life and Marriage in particular, he will have to give us brighter discussions than the one he had with Professor Ginsberg. Perhaps the latter's voice handicapped the turn somewhat, but in addition Sir William should become a little less touchy about the way his idea was criticised.

TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio reception.

By Dr. J. H. T. ROBERTS, F. Inst. P.

Band-pass Tuning.

I SAID something about band-pass tuning in these Notes a little time back, and as a number of readers have asked me various points about this, I think perhaps it might be useful to refer to it more fully. Some of these questions relate particularly to the actual method of arranging the coupling for the band-pass tuning.

As you know, the object of band-pass tuning is to gain selectivity without losing quality, and also, as far as possible, without losing volume. In highly selective arrangements, as a rule, there is a great tendency to introduce distortion, owing to the cutting-off of the higher frequencies.

Two Separate Circuits.

It has been known for a very long time that selectivity can be increased by the use of two or more tuned circuits, and a well-known method is to use a tuned aerial circuit followed by an H.F. amplifying valve, this in turn followed by another tuned circuit. This arrangement has merits, but owing to the presence of the amplifying valve following the first tuned circuit, any imperfections in the selectivity provided by the first circuit are emphasised by the valve.

In the arrangement just mentioned, if the two circuits are made sufficiently selective, so as to get fine tuning, it will generally be found that a "peak" will be produced in the resonance curve, so that there will be a great likelihood of distortion being set up.

Preceding the Valve.

Now, band-pass tuning is really a pair of loosely-coupled tuned circuits, but instead of these having a valve amplifier interposed between them, the two circuits are put together and precede the valve. Instead, therefore, of having tuning circuit, valve and tuning circuit, we have the arrangement first, tuning circuit, second tuning circuit, and third the valve, the valve being taken away from the intermediate position, and put after the second tuning circuit. This apparently simple re-arrangement has important effects, however.

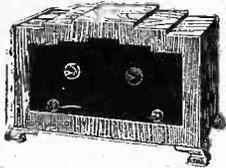
The basis of band-pass tuning is to pick out the desired signal from the unwanted ones before valve amplification. When we have the ordinary arrangement of two tuning circuits, with valve amplifier in between, we get, as I say, a peaked resonance curve.

When, however, we have the band-pass arrangement and the two loosely-coupled tuned circuits followed by the high-frequency amplifier, we get a resonance curve which, although only covering, perhaps, the same amount of dial space, has two peaks side by side and close together, these two peaks corresponding to the separate resonance-points of the two tuned circuits. For practical purposes the two peaks may be regarded as merging or coalescing into one

(Continued on next page.)

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TECHNICAL NOTES

(Continued from previous page.)

which, although it has a slight dimple in the top, is virtually what is called a "flat-topped" curve.

Flat-topped Resonance Curve.

You will see at once the great advantage of this new resonance curve which, as I say, although being roughly of the same dimensions at the base, is much broader at the top. The effect of this broader-topped resonance curve is that the band-pass arrangement covers more of the high frequencies, as it responds more on each side of the fundamental frequency.

The band-pass arrangement, therefore, whilst giving you the necessary selectivity, at the same time retains, owing to the broadness of the top of its resonance curve, those sidebands which are essential for the avoidance of distortion.

As regards the actual arrangement of the two loose-coupled tuned circuits for the band-pass arrangement, one of the simplest methods is to connect the two coils together, each, of course, having its own variable condenser, and to connect a coupling coil between the common point of the two tuning coils and the common point of the two tuning condensers. A variation of this method is to substitute a coupling condenser for the coupling coil.

Mixed Coupling.

These two methods, however, although useful to us in studying the simplest arrangement of the band-pass tuning scheme, are not in practice all that might be desired, and they have now given place to another arrangement, which I will describe in a moment. One of the principal drawbacks of the simple coupling coil or simple coupling condenser for the two tuned circuits is that at different parts of the wave-length range the degree of selectivity will vary.

The band-pass arrangement which is now most popular utilises a mixture of both coupling coil and coupling condenser. We have the two tuned circuits, the two tuning coils, and the two tuning condensers being all in series and the common point of the two coils being connected by means of a coupling condenser to the common point of the two tuning condensers.

Variation With Frequency.

So far, this arrangement is identical with the simple coupling condenser mentioned above. The difference, however, is that whereas there was no definite coupling between the two coils in the former case, in the "mixed coupler" the two coils are arranged so that there is a variable coupling between them.

This arrangement has the advantage that the degree of selectivity, or if you like, the band width of the resonance curve, does not vary very much at different wave-length frequencies over the ordinary scale, and furthermore the selectivity which is obtained does not involve any serious loss of signal strength.

You will see, of course, that two tuning condensers are necessary in the aerial circuit, one of these belonging to each of the two tuned circuits, and although, if desired, these condensers may be operated separately, the actual operation of the

(Continued on next page.)

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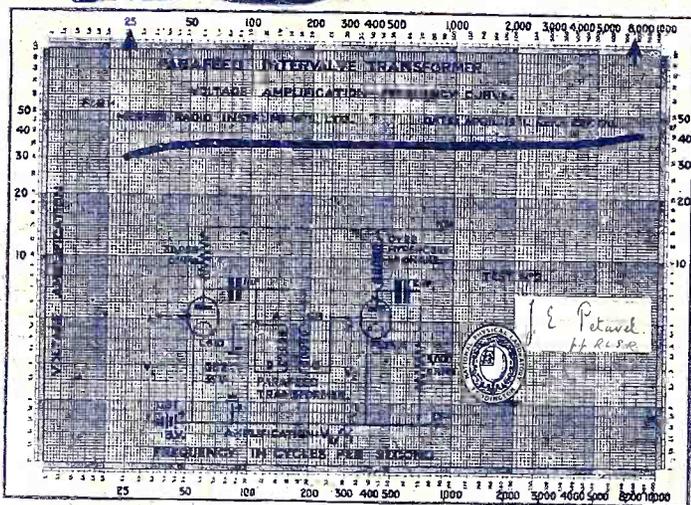
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