

A PERCY HARRIS PORTABLE

WITH
NEW
CIRCUIT

Wireless Magazine

THE BEST

SHILLINGSWORTH IN RADIO

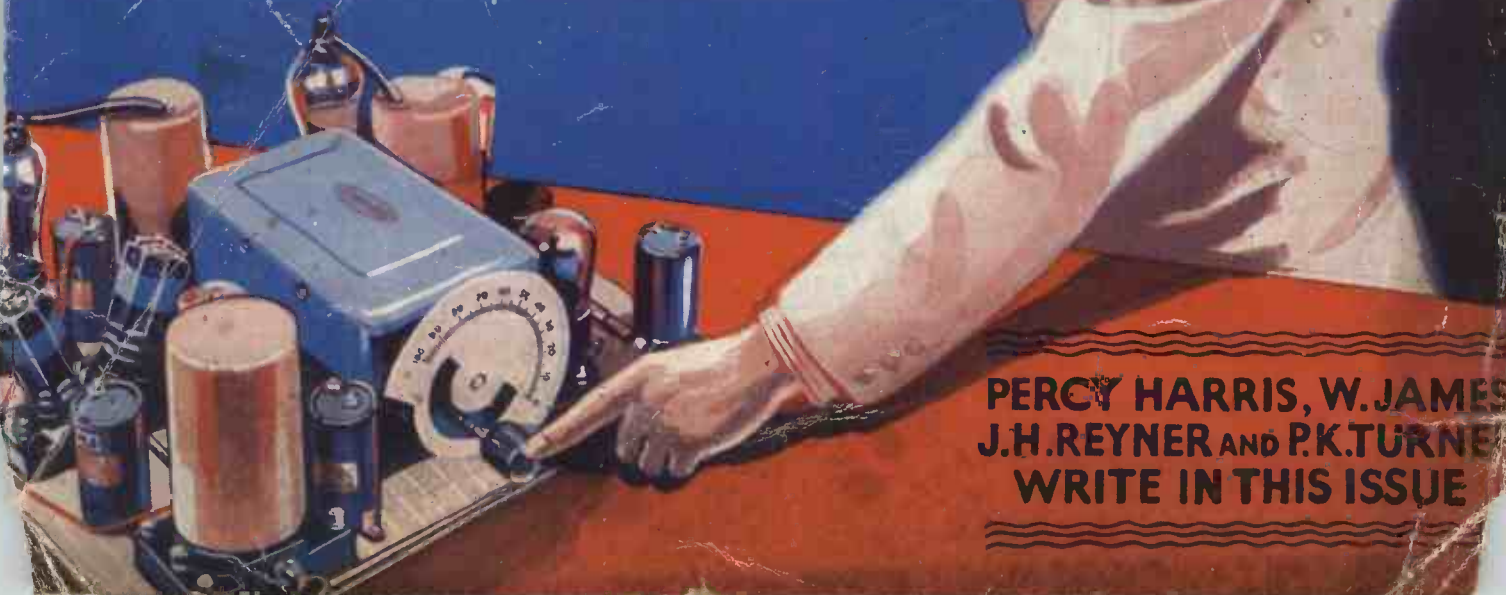
MAY 1932

1/-

The Easytune 60

EASY to Build
EASY to Operate
EASY on Your Pocket

ONLY ONE KNOB
FOR TUNING



PERCY HARRIS, W. JAMES
J. H. REYNER AND P. K. TURNER
WRITE IN THIS ISSUE



even simple simon could tune this—



- it's the
"EASYTUNE 60"
BUT only
LEWCOS COILS
 Make it possible

Experts of the "LEWCOS" and "WIRELESS MAGAZINE" technical staffs have co-operated to produce the set of the year—a set which is exceptional because of its inherent simplicity and super selectivity—the "EASYTUNE 60."

Used in the construction of a new set, or the renovation of an old one, Lewcos Coils command ungrudging admiration because of their selectivity and the beauty of tone they produce.

1. The Lewcos I.F. Transformer, Reference I.F.T.P. Price 10/6.
2. The Lewcos L.F. Transformer, Reference L.F.T.S. Price 10/-.
3. The Lewcos I.F. Transformer, Reference I.F.T.P. Price 10/6.
4. The Lewcos Band Pass Filter, Reference B.P.F./G. Price 12/-.
5. The Lewcos Twin Oscillator Coil, Reference T.O.S./G. Price 8/6.



LEWCOS RADIO PRODUCTS FOR BETTER RECEPTION

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED CHURCH ROAD, LEYTON, LONDON E.10
 SEE PAGE 379 OF THIS ISSUE

Editor:

BERNARD E. JONES

Technical Editor:

J. H. REYNER,
B.Sc. (Hons.), A.M.I.E.E.

Wireless Magazine

The Best Shillingworth in Radio

Vol. XV :: MAY, 1932 :: No. 88

Research Consultant:

W. JAMES

Assistant Editor:

D. SISSON RELPH

Published by BERNARD JONES PUBLICATIONS, LTD., publishers of "Wireless Magazine" and "Amateur Wireless." Editorial and Advertisement Offices: 48-51 Fetter Lane, London, E.C.4. Telephone: City 3733, 3744. Telegrams: "Beejapee, Fleet, London." Subscriptions: Great Britain and abroad, 15s. 6d. a year, post free (Canada only, 13s. 6d.). Contributions are invited and will be promptly considered. Next issue published on Friday, May 20.

The Editor's Chat

TWO or three highly interesting and very different sets; articles presenting technical information in a popular, but authoritative, way; and a number of general features charmingly interesting and thought-compelling—this is the fare I have for you this month.

Would you mind turning straight away to the article on the Easytune 60? This set is obviously in the direct line of descent from W. James' famous Super 60 of last year. It is a one-dial super-het, built on a theoretically perfect system, its secret being a special condenser with the plates so shaped as to give satisfactory ganging throughout the medium and the long wavebands.

Many months have been consumed in its design; many snags were met and had to be overcome; it is a set of which we are proud; with one valve less than the Super 60, it will do all that set did, and do it better and more easily; it will give all the stations you fancy and give them clear-cut and without mush. It is easy to build and, as we say on our cover (I like the cover, by the way, do you?), it is easy on your pocket.

Godchaux Abrahams, during a short test, received seventy-five stations on the Easytune 60 simply by turning one knob.

A very different set in appearance and design is the Town-and-country Four, the first set built for Wireless Magazine by Percy W. Harris. It has many points of novelty.

Many portables are extremely difficult to construct because of the confined space into which the components are packed and the awkwardness of the general arrangement, but Percy Harris has succeeded in producing a portable which is amazingly easy to build, the cabinet being so made that it can be taken apart in a few seconds so that different parts of the constructional work can be tackled independently. There is a novel touch in the circuit.

The name of the set will suggest to you that it is quite wrong to suppose that the use of a portable is restricted to those comparatively rare occasions when you feel inclined to put it on a car and take it into the country. The Town-and-country Four is definitely offered as a home set possessing the advantage that it can be carried about quite easily from room to room.

P. K. Turner offers further notes this month on his A-P-A system and in addition gives readers the A-P-A Radio Unit. This and the unit described last month form in combination a first-class radio gramophone run from A.C. mains and give the highest quality reproduction obtainable by modern methods.

Explanatory articles we have in plenty this month. W. James reviews various types of coils and discusses their efficiency and their use for different purposes; J. H. Reyner explains how hum arises in a mains receiver and how to diagnose the cause. It is an article that has been wanted.

And then, for the very beginner, we have W. Oliver's "Bird's-eye View of Broadcasting," a charming dialogue which tells in easy manner the practical story of broadcasting, from microphone to loud-speaker.

Scottish readers will be grateful for the information contained in our article describing what will be the effect of the new Scottish regional station, the new B.B.C. transmitter near Falkirk that will soon be working. The bringing into operation of this new station will have a happy effect throughout Scotland, where there has long been complaint of the inability of the ordinary listener to bring in a satisfactory programme.

Alan Hunter in an article on "Empire Programmes" gives early news of a scheme on foot by which first-class programmes originated in the London studios will be "bottled" and sent to distant parts of the British Empire for re-broadcasting.

B. E. J.

FOR THE CONSTRUCTOR

	PAGE
THE EASYTUNE 60: INTRODUCTION. By the "W.M." Technical Staff ..	387
DESIGNING A ONE-KNOB SUPER-HET ..	388
WHY I LIKE THE EASYTUNE 60. By J. Godchaux Abrahams ..	390
BUILDING THE EASYTUNE 60 ..	392
OPERATING THE EASYTUNE 60 ..	394
THE A-P-A RADIO UNIT. By P. K. Turner, M.I.E.E. ..	404
FURTHER NOTES ON THE A-P-A. By P. K. Turner, M.I.E.E. ..	422
THE TOWN-AND-COUNTRY FOUR. By Percy W. Harris, M.Inst.Rad.E. ..	437
A SIMPLE MAINS UNIT. By the "W.M." Technical Staff ..	470

GRAMO-RADIO SECTION

SETTING YOUR PICK-UP. By P. K. Turner, M.I.E.E. ..	427
FEATHERWEIGHT EXPERIMENTS ..	431
RECORDING HUMOUR. By Whitaker-Wilson ..	432
CHOOSING YOUR RECORDS. By Whitaker-Wilson and Chopstick ..	434

TECHNICAL FEATURES

VALVES TO USE IN YOUR SET ..	372
------------------------------	-----

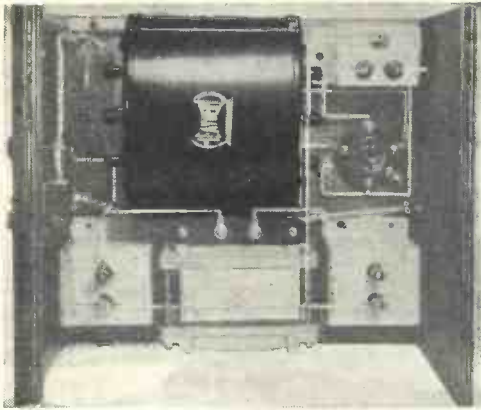
Contents

	PAGE
OUR TESTS OF NEW APPARATUS ..	400
IN MY LAB ARMCHAIR. By Percy W. Harris, M.Inst.Rad.E. ..	401
COUNTING WITH THE "ELECTRIC EYE." By Dr. Alfred Gradenwitz ..	414
TRACKING HUM IN A MAINS RECEIVER. By J. H. Reyner, B.Sc., A.M.I.E.E. ..	415
A BIRD'S-EYE VIEW OF BROADCASTING. By W. Oliver ..	419
RADIO IN REVIEW. By Morton Barr ..	424
WE TEST BEFORE YOU BUY: INTRODUCTION ..	447
BLUE SPOT ALL-MAINS FOUR-VALVER ..	448
LOTUS LANDMARK THREE (KIT SET) ..	449
AERODYNE SHORT-WAVE ADAPTOR ..	450
COLUMBIA RADIO GRAMOPHONE MODEL 602 ..	451
KOLSTER BRANDES KOBRA THREE ..	452
SECRETS OF GOOD TUNING. By W. JAMES ..	455
DESIGN DATA SHEETS. By J. H. Reyner, B.Sc., A.M.I.E.E. ..	476

GENERAL ARTICLES

	PAGE
WORLD'S BROADCAST STATIONS ..	376
GUIDE TO THE WORLD'S BROADCASTERS. By Jay Coote ..	380
IN TUNE WITH THE TRADE. By Fetter Lane ..	382
NEWS OF THE SHORT WAVES ..	396
THE WIRELESS ZOO: THE IRRITATOR: VERSE ..	396
EMPIRE PROGRAMMES. By Alan Hunter ..	397
THE SEVEN AGES OF A WIRELESS FAN: VERSE ..	398
BROADCASTERS WE ALL KNOW! ..	411
THE POETRY OF RADIO ..	411
RADIO-RELAY SERVICES. By Kenneth Ulyett ..	412
COMMUNITY LISTENING ..	418
THE CONSOLATION: VERSE ..	418
TALKING PICTURES IN THE HOME. By D. Sisson Relph ..	425
IN RUSSIA AND DENMARK ..	426
IN THE ALPS ..	443
"SCOTTISH REGIONAL TESTING." By Alan Hunter ..	446
RADIO MEDLEY. By BM/PRESS ..	453
MUSIC OF THE MONTH. By T. F. Henn ..	457
ON THE CREST OF THE WAVES. By Jay Coote ..	462
A FREE HAND FOR HENRY HALL. By Our Special Commissioner ..	466
STORIES OF THE OPERAS: DON GIOVANNI ..	468
SYNCHRONISED ELECTRIC CLOCKS ..	474
BLUEPRINT AND INFORMATION COUPONS ..	480
INDEX TO ADVERTISERS ..	480

NEXT MONTH: DETAILS OF AN OUTSTANDING THREE-VALVER.



"W.M." H.T. UNIT TRANSFORMER

Because they wanted the *best*, the "W.M." technical experts have once again chosen a Heayberd component—this time the 709 Mains Transformer for their H.T. Unit.

709 TRANSFORMER FOR VALVE RECTIFICATION

250+250 v. 2+2 v.
50 ma. 1 amp.

PRICE **28/-**
POST NOW



I enclose 3d. stamps for complete lists, with circuit diagrams, of the latest Heayberd Transformers, etc.

M.....

Address.....

MONARCH OF THE MAINS.

10, FINSBURY ST., LONDON, E.C.2

One minute from Moorgate-Und. Sta.

W.M.5

Preserve your
copies of the
"WIRELESS MAGAZINE"

THE ideal way of keeping your copies of the "Wireless Magazine" is to have them bound into volumes, each with its appropriate index, in the handsome grey-tinted stiff covers which are obtainable, at 2/6 each (inclusive of the index for each volume of six copies), plus postage, 3d. from the publishers.

BERNARD JONES PUBLICATIONS LIMITED,
58-61 Fetter Lane, London, E.C.4

When you build your
"IDEAL HOME SUPER" - - - fit the

Why be content with anything but the very finest reception from a set like the 'Ideal Home Super'? This set was designed with components selected to blend with one another and the Smith Accumulator was found to give extremely satisfactory results. Extra robust plates and container, non-interchangeable terminals, large vents and a sturdy carrier ensure the utmost efficiency and convenience in use.

Remember — the Smith RGCII. PRICE
Full details of all our accumulators in List "W.M." **14'6**

SMITH'S
RADIO ACCUMULATORS

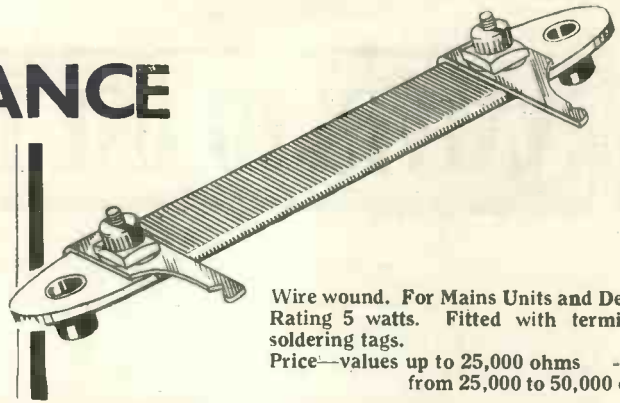
S. SMITH & SONS (Motor Accessories) LTD., CRICKLEWOOD, LONDON, N.W.2

**RECOMMENDED
ACCUMULATOR!**



When you send your order don't forget to say you "saw it in the 'W.M.'"

COLVERN STRIP RESISTANCE



Wire wound. For Mains Units and Decoupling. Rating 5 watts. Fitted with terminals and soldering tags. Price—values up to 25,000 ohms - - 1/9 from 25,000 to 50,000 ohms. 2/3

VARIABLE COLVERSTAT

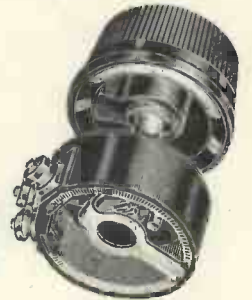
Wire wound. For Voltage regulation and Volume Control.



Type ST10. Rating 10 watts. Standard values 500 to 50,000 ohms. 5/6.



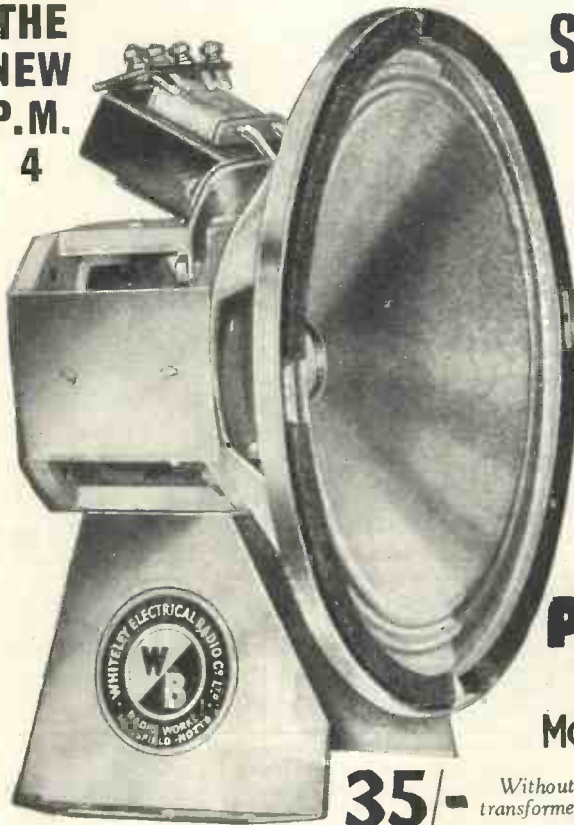
Type ST5. Rating 5 watts. Standard Values 250 to 25,000 ohms. 5/3.



Type MT. Rating 3 watts. Standard values 25 to 10,000 ohms. 4/6.

COLVERN LIMITED - - MAWNEYS ROAD, ROMFORD, ESSEX

THE NEW P.M. 4



SEVEN VALVEHOLDERS

are SPECIFIED in the "Wireless Magazine" "EASYTUNE 60"

Made by the makers of the world famous W.B. Permanent Magnet Moving Coil Speakers. Write NOW for complete illustrated lists including the astonishing new model P.M.4. It gives brilliant, true moving-coil reproduction from ANY 2-, 3- or multi-valve set. Cobalt - steel magnet guaranteed for five years.



4 or 5-Pin miniature Valveholder for above baseboard mounting. All contacts are clear of the base

4-pin 6d. 5-pin 8d.

PERMANENT MAGNET Moving Coil Speaker

35/- Without transformer 42/- Complete with special output transformer mounted on top

Very handsome cabinets available at low prices

Whiteley Electrical Radio Co., Ltd., Nottingham Road, Mansfield, Notts.

Irish Free State Distributors: Kelly & Shiel, Ltd., 47, Fleet Street, Dublin

There is news in the "Wireless Magazine" advertisements



VALVES TO USE IN YOUR SET

Characteristics of All the Most Important British Types

Make	Type	Impedance	Amplification Factor	Filament Current	Mutual Conductance	Anode Current at 120 volts	Grid Bias at 100 volts	Grid Bias at 150 volts
2-volt Three-electrode Valves								
Mazda ..	H210	59,000	47	.1	.8	.5	.5	1.0
Lissen ..	H210	50,000	35	.1	.7	1.1	1.1	1.5
Lissen ..	H2	50,000	45	.1	.9	2.0	1.0	1.5
Cossor ..	210RC	50,000	40	.1	.8	.5	1.5	1.5
Six-Sixty	210RC	45,400	50	.1	1.0	1.0	1.5	1.5
Mullard..	PM1A	41,600	50	.1	1.2	.75	1.5	1.5
Marconi ..	H2	35,000	35	.1	1.0	1.0	—	1.5
Osram ..	H2	35,000	35	.1	1.0	1.0	—	1.5
Six-Sixty	210HF	25,000	19	.1	.75	1.0	—	1.5
Cossor ..	PM1HF	22,500	18	.1	.8	1.0	1.5	3.0
Lissen ..	210HF	22,000	32	.1	1.1	.75	1.5	3.0
Mazda ..	HL2	21,000	32	.1	1.5	3.0	—	1.5
Lissen ..	HL210	20,000	20	.1	1.0	2.2	1.5	4.5
Mazda ..	HL210	18,500	26	.1	1.4	3.0	1.5	3.0
Marconi ..	HL2	18,000	27	.1	1.5	1.0	1.5	3.0
Osram ..	HL2	18,000	27	.1	1.5	1.0	1.5	3.0
Six-Sixty	210HL	17,200	26	.1	1.5	1.0	1.5	3.0
Cossor ..	210HF	15,800	24	.1	1.5	2.25	1.5	3.0
Mullard..	PM1HL	14,000	28	.1	2.0	1.2	1.5	3.0
Cossor ..	210Det	13,000	15	.1	1.15	2.5	1.5	3.0
Six-Sixty	210LF	12,500	10.6	.1	.85	2.5	4.5	7.5
Mullard..	PM1LF	12,000	11	.1	.9	2.6	4.5	7.5
Six-Sixty	210D	10,600	17	.1	1.6	2.0	3.0	7.5
Cossor ..	210LF	10,000	14	.1	1.4	3.0	3.0	4.5
Lissen ..	L210	10,000	12	.1	1.2	3.0	3.0	7.5
Lissen ..	L2	10,000	20	.1	2.0	3.0	1.5	3.0
Marconi ..	L2/B	10,000	15.5	.1	1.55	4.0	1.5	3.0
Mullard..	PM2DX	10,000	17	.1	1.7	2.0	3.0	6.0
Mazda ..	L210	10,000	17	.1	1.7	5.0	2.5	4.5
Mazda ..	L2	10,000	19	.1	1.9	3.0	—	3.0
Six-Sixty	220P	4,800	7.2	.2	1.5	5.0	7.5	12.0
Mullard..	PM2	4,400	7.5	.2	1.5	5.0	7.5	12.0
Lissen ..	P220	4,000	7	.2	1.75	5.0	7.5	15.0
Cossor ..	220P	4,000	8	.2	2.0	6.0	4.5	9.0
Cossor ..	215P	4,000	9	.15	2.25	5.0	4.5	7.5
Cossor ..	220Pa	4,000	16	.2	4.0	5.5	3.0	4.5
Marconi ..	LP2	3,900	15	.2	3.85	6.0	3.0	4.5
Osram ..	LP2	3,900	15	.2	3.85	6.0	3.0	4.5
Mazda ..	P220	3,700	12.5	.2	3.4	11.0	3.0	6.0
Six-Sixty	220PA	3,700	13	.2	3.5	6.0	3.0	6.0
Mullard..	PM2A	3,600	12.5	.2	3.5	6.5	3.0	6.0
Lissen ..	LP2	3,500	12.0	.2	3.4	8.0	6.0	7.0
Marconi ..	P240	2,500	4	.4	1.6	12.0	15.0	24.0
Osram ..	P240	2,500	4	.4	1.6	11.0	16.0	24.0
Marconi ..	P2	2,150	7.5	.2	3.5	12.0	6.0	10.5
Osram ..	P2	2,150	7.5	.2	3.5	10.0	7.5	10.5
Six-Sixty	220SP	2,060	7	.2	3.4	13.5	7.5	15.0
Mullard..	PM202	2,000	7.0	.2	3.5	14.0	7.5	15.0
Mazda ..	P240	1,900	7	.4	3.7	18.0	6.0	13.5
Mullard..	PM252	1,900	7	.4	3.7	14.0	6.0	12.0
Six-Sixty	240SP	1,900	6.6	.4	3.5	14.0	6.0	13.5
Mazda ..	P220A	1,850	6.5	.2	3.5	13.0	9.0	15.0
Marconi ..	P2/B	1,850	6.5	.2	3.5	15.0	—	—
Lissen ..	PX240	1,800	4	.4	2.5	14.0	12.5	22.5
Cossor ..	230XP	1,500	4.5	.3	3.0	15.0	10.5	18.0
Lissen ..	P220A	1,700	6.0	.2	3.5	12.0	9.0	15.0
Lissen ..	P240A	1,000	5.0	.4	5.0	20.0	15.0	20.0

Make	Type	Impedance	Amplification Factor	Filament Current	Mutual Conductance	Anode Current at 120 volts	Grid Bias at 100 volts	Grid Bias at 150 volts
2-volt Double-grid Valves								
Marconi ..	DG2	3,750	4.5	.2	1.2	—	—	—
Osram ..	DG2	3,750	4.5	.2	1.2	—	—	—
Cossor ..	210DG	3,400	2.7	.1	.8	—	—	—
Six-Sixty	210DG	—	—	.1	.8	—	—	—
Mullard..	PM1DG	—	—	.1	.8	—	—	—

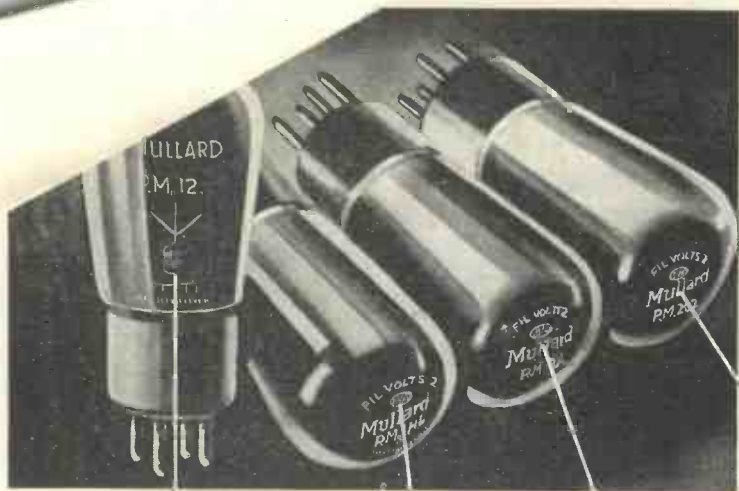
Make	Type	Impedance	Amplification Factor	Filament Current	Mutual Conductance	Anode Current at 120 volts	Grid Bias at 100 volts	Grid Bias at 150 volts
2-volt Screen-grid Valves								
Mazda ..	215SG	400,000	450	.15	1.1	—	—	—
Marconi ..	S215B	333,000	500	.15	1.5	2.0	—	—
Cossor ..	215SG	300,000	330	.15	1.1	1.25	.9	.9
Lissen ..	SC215	300,000	300	.15	1.0	—	—	1.5
Six-Sixty	215SG	220,000	190	.15	.87	2.0	—	—
Cossor ..	220SG	200,000	320	.2	1.6	1.5	.9	.9
Osram ..	S22	200,000	350	.2	1.75	3.0	—	—
Marconi ..	S22	200,000	350	.2	1.75	2.5	.9	1.5
Marconi ..	S21	200,000	220	.1	1.1	3.0	.5	.9
Osram ..	S21	200,000	220	.1	1.1	3.0	—	—
Mullard..	PM12	180,000	200	.15	1.1	—	—	—
Mazda ..	S215A	—	800	.15	1.1	—	—	—

Make	Type	Impedance	Amplification Factor	Filament Current	Mutual Conductance	Anode Current at 120 volts	Grid Bias at 100 volts	Grid Bias at 150 volts
2-volt Variable-mu Screen-grid Valve								
Cossor ..	220VSG	110,000	—	.2	1.6	—	—	—

Make	Type	Impedance	Amplification Factor	Filament Current	Mutual Conductance	Anode Current at 120 volts	Grid Bias at 100 volts	Grid Bias at 150 volts
2-volt Pentode Valves								
Lissen ..	PT225	64,000	80	.25	1.4	7.0	3.0	6.0
Six-Sixty	230PP	64,000	90	.3	1.25	10.0	6.0	12.0
Mullard..	PM22	—	—	.3	1.3	12.0	6.0	10.0
Marconi ..	PT240	55,000	90	.4	1.65	9.0	6.0	9.0
Lissen ..	PT240	22,500	45	.4	2.25	12.5	7.5	10.5
Lissen ..	PT220A	22,500	45	.2	2.5	15.0	7.5	9.0
Cossor ..	230PT	—	—	.3	2.0	13.0	15.0	15.0
Mazda ..	220Pen.	—	—	.2	2.5	—	—	—
Mazda ..	220A Pen.	—	—	.2	2.5	—	—	—
Cossor ..	230HPT	—	—	.3	1.8	6.5	7.5	7.5
Osram ..	PT2	—	—	.2	2.5	5.0	3.0	4.5
Marconi ..	PT2	—	—	.2	2.5	5.0	3.0	4.5
Mazda ..	Pen.230	—	—	.3	1.5	—	—	—

Make	Type	Impedance	Amplification Factor	Filament Current	Mutual Conductance	Anode Current at 120 volts	Grid Bias at 100 volts	Grid Bias at 150 volts
4-volt Three-electrode Valves								
Marconi ..	H410	60,000	40	.1	.66	.5	—	1.5
Osram ..	H410	60,000	40	.1	.66	.35	—	1.5
Six-Sixty	4075RC	58,000	37	.075	.64	.55	1.0	1.5
Mullard..	PM3A	55,000	38	.075	.66	.3	1.5	1.5
Cossor ..	410RC	50,000	40	.1	.8	.6	1.5	1.5
Lissen ..	H410	40,000	36	.1	.9	1.6	1.0	1.5
Marconi ..	HL410	30,000	25	.1	.83	1.0	2.0	3.0
Lissen ..	HLD410	21,000	25	.1	1.2	2.5	1.5	3.0
Osram ..	HL410	20,800	25	.1	1.2	1.25	1.5	3.0
Cossor ..	410HF	20,000	22	.1	1.1	1.0	1.5	3.0
Mullard..	PM3	13,000	14	.075	1.05	2.0	3.0	6.0
Six-Sixty	4075HF	12,500	13.5	.075	1.1	3.0	3.0	4.5
Cossor ..	410LF	10,000	17	.1	1.7	2.5	1.5	4.5
Lissen ..	L410	8,500	15	.1	1.8	3.5	1.5	4.5
Marconi ..	L410	8,500	15	.1	1.77	3.0	2.0	4.5
Osram ..	L410	8,500	15	.1	1.77	3.5	3.0	4.5
Mullard..	PM4DX	7,500	15	.1	2.0	2.0	3.0	6.0
Six-Sixty	410D	7,250	14.5	.1	2.0	4.0	3.0	6.0
Marconi ..	P410	5,000	7.5	.1	1.5	6.0	6.0	10.5
Osram ..	P410	5,000	7.5	.1	1.5	6.0	6.0	10.5
Six-Sixty	410P	4,100	7.8	.1	1.9	7.5	7.5	12.0
Cossor ..	410P	4,000	8	.1	2.0	8.0	4.5	9.0
Mullard..	PM4	4,000	8	.1	2.0	7.5	5.0	8.0
Lissen ..	P410	4,000	8	.1	2.0	7.0	6.0	9.0
Marconi ..	P254	2,300	4.5	.25	1.95	14.0	9.0	16.5
Mullard..	PM254	2,150	6.5	.2	3.0	9.0	9.0	15.0
Six-Sixty	420SP	2,150	6.5	.2	3.0	10.0	8.0	15.0
Marconi ..	P415	2,080	5.0	.15	2.4	14.0	9.0	16.5
Osram ..	P415	2,080	5	.15	2.4	14.0	9.0	16.5
Cossor ..	425XP	2,000	7	.25	3.5	13.0	6.0	12.0
Mazda ..	P425	1,950	3.5	.25	1.8	26.0	14.0	26.0
Lissen ..	P425	1,600	4.5	.25	2.8	28.0	12.0	20.0
Cossor ..	415XP	1,500	4.5	.15	3.0	15.0	9.0	18.0
Cossor ..	4XP	1,200	4.8	.6	4.0	35.0	9.0	35
Marconi ..	PX4	830	5	1.0	6.0	35.0	12.0	200 v., 16.0
Osram ..	PX4	830	5	1.0	6.0	35.0	12.0	16.0

Make	Type	Impedance	Amplification Factor	Filament Current	Mutual Conductance	Anode Current at 120 volts	Grid Bias at 100 volts	Grid Bias at 150 volts
4-volt Screen-grid Valves								
Mullard..	PM14	230,000	200	.075	.87	—	—	—
Six-Sixty	4075SG	220,000	190	.075	.87	3.		



AN EVER GROWING PUBLIC USES MULLARD 2 VOLT VALVES

It is a public which grows because of a definite reason. It grows because Mullard 2-volt valves are Master Valves, valves which give supreme satisfaction. Fit them in your receiver, and note the improved reception.

FIL. VOLTS 2
 BVA
 PROTECTED BY PATENTS
Mullard
P.M.12
 MAX ANODE VOLTS 150
 CV

SCREENED GRID
H.F. AMPLIFIER
PRICE 16/6

FIL. VOLTS 2
 BVA
 PROTECTED BY PATENTS
Mullard
P.M.1HL
 MAX ANODE VOLTS 150
 CV

DETECTOR
PRICE 7/-

FIL. VOLTS 2
 BVA
 PROTECTED BY PATENTS
Mullard
P.M.2A
 MAX ANODE VOLTS 150
 CV

POWER VALVE
PRICE 8/9

FIL. VOLTS 2
 BVA
 PROTECTED BY PATENTS
Mullard
P.M.202
 MAX ANODE VOLTS 150
 CV

SUPER POWER
VALVE
PRICE 12/-

Mullard

THE · MASTER · VALVE

Advt. The Mullard Wireless Services Co., Ltd., Mullard House, Charing Cross Road, London, W.C.2

Arks

Advertisers like to know you "saw it in the 'Wireless Magazine'"

VALVES TO USE IN YOUR SET—Continued from page 372

4-volt Pentode Valves—Continued

Make	Type	Impedance	Amplification Factor	Filament Current	Wattage Consumption	Anode Current at 120 volts	Grid Bias at 100 volts	Grid Bias at 150 volts
Six-Sixty	415PP	27,000	60	.15	2.2	15.0	6.0	10.5
Six-Sixty	SS/Pen.SP	—	—	.275	2.0	—	—	—
Mullard..	PM24A	25,000	50	.275	2.0	15.0	6.0	21.0
Cossor ..	415PT	—	—	.15	2.0	13.0	15.0	15.0
Mazda ..	425Pen.	—	—	.25	2.0	14.0	—	—
Mullard..	PM24C	—	—	1.0	3.0	—	—	—

6-volt Three-electrode Valves

Make	Type	Impedance	Amplification Factor	Filament Current	Wattage Consumption	Anode Current at 120 volts	Grid Bias at 100 volts	Grid Bias at 150 volts
Mazda ..	H607	90,000	40	.07	.45	1.0	.8	1.5
Mazda ..	H610	66,000	40	.1	.6	1.0	—	—
Marconi	H610	60,000	40	.1	.66	.35	1.5	1.5
Osram ..	H610	60,000	40	.1	.7	.35	—	3.0
Six-Sixty	6075RC	58,000	42	.075	.7	.5	1.0	1.5
Cossor ..	610RC	50,000	40	.1	.8	.75	—	1.5
Mullard..	PM5B	49,000	40	.075	.85	.5	1.5	1.5
Lissen ..	H610	40,000	36	.1	.9	1.0	1.0	1.5
Marconi	HL610	30,000	30	.1	1.0	1.0	1.5	1.5
Osram ..	HL610	30,000	30	.1	1.0	1.0	1.5	1.5
Osram ..	LS5B	25,000	20	.8	.8	—	—	—
Lissen ..	HLD610	21,000	25	.1	1.2	2.5	1.5	3.0
Cossor ..	610HF	20,000	20	.1	1.0	1.75	1.5	3.0
Mazda ..	HL610	20,000	20	.07	1.0	1.8	1.5	3.0
Mullard..	PM5D	20,000	26	.075	1.3	1.0	1.5	3.0
Six-Sixty	607HF	15,200	17	.075	1.1	2.0	2.0	4.0
Mullard..	PM5X	14,700	17.5	.075	1.2	1.6	3.0	4.5
Six-Sixty	610D	9,250	18.5	.1	2.0	2.0	3.0	4.0
Mullard..	PM6D	9,000	18	.1	2.0	2.0	3.0	4.5
Lissen ..	L610	8,000	16	.1	2.0	2.0	3.0	4.5
Cossor ..	610LF	7,500	15	.1	2.0	3.4	1.5	4.5
Marconi	L610	7,500	15	.1	2.0	3.0	2.0	4.0
Osram ..	L610	7,500	15	.1	2.0	3.5	1.5	4.5
Osram ..	LS5	6,000	5	.8	.8	—	—	—
Mullard..	PM6	3,550	8	.1	2.25	7.0	6.0	9.0
Cossor ..	610P	3,500	8	.1	2.28	8.0	3.0	7.5
Marconi	P610	3,500	8	.1	2.28	6.0	6.0	9.0
Osram ..	P610	3,500	8	.1	2.28	7.0	6.0	9.0
Six-Sixty	610P	3,400	7.8	.1	2.3	8.0	6.0	9.0
Lissen ..	P610	3,200	8	.1	2.5	6.0	6.0	9.0
Marconi	LS5A	2,750	2.5	.8	.9	—	—	—
Osram ..	LS5A	2,750	2.5	.8	.9	—	—	—
Cossor ..	625P	2,500	7	.25	2.8	13.0	3.0	12.0
Lissen ..	P625	2,500	7.5	.25	3.0	8.0	7.5	12.0
Mazda ..	P625B	2,500	7	.25	2.8	11.0	6.0	12.0
Marconi	P625	2,400	6	.25	2.5	11.0	6.0	24.0
Osram ..	P625	2,400	6	.25	2.5	11.0	6.0	12.0
Cossor ..	610XP	2,000	5	.1	2.5	15.0	7.5	15.0
Mullard..	PM256	1,850	6	.25	3.25	8.0	9.0	27.0
Six-Sixty	625SP	1,780	5.8	.25	3.25	8.0	10.0	15.0
Marconi	P625A	1,600	3.7	.25	2.3	20.0	13.5	36.0
Mazda ..	P625A	1,600	4	.25	2.5	27.0	10.0	20.0
Osram ..	P625A	1,600	3.7	.25	2.3	16.0	13.5	24.0
Lissen ..	P625A	1,500	4.5	.25	3.0	12.0	13.5	24.0
Six-Sixty	625SPA	1,500	3.9	.25	2.6	20.0	12.0	22.5
Cossor ..	620T	1,400	3.2	2.0	2.3	—	—	—
Mullard..	PM256A	1,400	3.6	.25	2.6	20.0	12.0	33.0
Marconi	LS6A	1,300	3.0	2.0	2.3	—	—	—
Mazda ..	P650	1,300	3.5	.5	2.7	30.0	12.0	25.0
Osram ..	LS6A	1,300	3.0	2.0	2.3	—	—	—
Marconi	DA60	835	2.5	4.0	3.0	—	—	—
Osram ..	DA60	835	2.5	4.0	3.0	—	—	—

6-volt Screen-grid Valves

Make	Type	Impedance	Amplification Factor	Filament Current	Wattage Consumption	Anode Current at 120 volts	Grid Bias at 100 volts	Grid Bias at 150 volts
Six-Sixty	SS6075SG	210,000	190	.075	.9	—	—	—
Cossor ..	610SC	200,000	200	.1	1.0	—	1.5	1.5
Mullard..	PM16	200,000	200	.075	1.0	—	—	—
Osram ..	S610	200,000	210	.1	1.05	4.0	1.5	—
Marconi	S610	200,000	210	.1	1.05	4.0	1.5	—

6-volt Pentode Valves

Make	Type	Impedance	Amplification Factor	Filament Current	Wattage Consumption	Anode Current at 120 volts	Grid Bias at 100 volts	Grid Bias at 150 volts
Marconi	PT625	42,000	80	.25	1.85	10.0	6.0	15.0
Osram ..	PT625	42,000	80	.25	1.85	10.0	6.0	10.5
Six-Sixty	SS617PP	28,500	54	.17	1.9	15.0	8.0	14.0
Mullard..	PM26	—	—	.17	2.0	15.0	9.0	15.0
Lissen ..	PT625	24,000	60	.25	2.5	14.0	7.5	10.0
Cossor ..	615PT	—	—	.15	2.0	17.0	6.9	7.5

A.C. Three-electrode Valves

Make	Type	Impedance	Amplification Factor	Filament Current	Wattage Consumption	Anode Current at 120 volts	Grid Bias at 100 volts	Grid Bias at 150 volts
Mullard..	904V	21,000	75	1.0	3.6	3.0	.75	1.0
Cossor ..	41MRC	19,500	50	1.0	2.6	2.0	—	1.5
Cossor ..	41MH	18,000	72	1.0	4.0	2.0	1.0	1.5
Six-Sixty	4DX.AC	17,700	85	1.0	4.8	3.0	1.0	1.5

A.C. Three-electrode Valves—Continued

Make	Type	Impedance	Amplification Factor	Filament Current	Wattage Consumption	Anode Current at 120 volts	Grid Bias at 100 volts	Grid Bias at 150 volts
Cossor ..	41MHF	14,500	41	1.0	2.8	2.5	—	2.0
Mazda ..	AC/HL	13,500	35	1.0	3.0	4.5	1.5	3.0
Six-Sixty	4GP.AC	12,000	36	1.0	3.0	2.0	2.0	3.0
Lissen ..	AC/HL	11,700	35	1.0	3.0	5.0	1.5	3.0
Cossor ..	41MHL	11,500	52	1.0	4.5	3.0	1.2	2.0
Mazda ..	AC2HL	11,500	75	1.0	6.5	3.0	—	1.5
Marconi	MH4	11,100	40	1.0	3.6	4.0	1.5	3.0
Osram ..	MH4	11,100	40	1.0	3.6	4.0	1.5	3.0
Mullard..	354V	10,000	35	1.0	3.5	2.0	2.0	3.0
Marconi	MHL/4	8,000	20	1.0	2.5	5.0	3.0	6.0
Osram ..	MHL4	8,000	20	1.0	2.5	5.0	3.0	6.0
Cossor ..	41MLF	7,900	15	1.0	1.9	4.5	4.5	6.0
Six-Sixty	4L.AC	7,500	15	1.0	2.0	6.0	3.0	4.5
Mullard..	164V	4,850	16	1.0	3.3	5.0	4.5	6.5
Six-Sixty	SS4PAC	3,000	10	1.0	3.3	10.0	5.9	8.0
Mazda ..	PP3/425	2,900	2.9	1.25	1.0	—	—	100
Osram ..	ML4	2,860	12	1.0	4.2	12.0	5.0	8.0
Mullard..	104V	2,850	10	1.0	3.5	11.0	5.0	8.5
Marconi	ML4	2,800	12	1.0	2.5	13.0	4.0	6.0
Mazda ..	AC/P	2,650	10	1.0	3.75	14.0	6.0	12.0
Cossor ..	41MP	2,500	18.7	1.0	7.5	10.0	3.0	6.0
Mullard..	AC064	2,000	6	1.0	3.0	15.0	9.0	14.0
Cossor ..	41MXP	1,500	11.2	1.0	7.5	23.0	6.0	9.0
Mazda ..	PP5/400	1,500	9	2.0	6.0	—	—	32.0
Mazda ..	AC/P1	1,450	5.4	1.0	3.7	—	—	—
Six-Sixty	HV4/1	1,450	6.3	1.0	3.0	15.0	9.0	14.0
Mullard..	AC044	1,150	4	.7	3.5	17.0	14.0	23.0

A.C. Double-grid Valve

Make	Type	Impedance	Amplification Factor	Filament Current	Wattage Consumption	Anode Current at 120 volts	Grid Bias at 100 volts	Grid Bias at 150 volts
Cossor ..	41MDG	40,000	10	1.0	.25	—	—	—

A.C. Screen-grid Valves

Make	Type	Impedance	Amplification Factor	Filament Current	Wattage Consumption	Anode Current at 120 volts	Grid Bias at 100 volts	Grid Bias at 150 volts
Six-Sixty	4SGAC	1,000,000	1,000	1.0	1.0	1.5	—	—
Mullard..	SV4	909,000	1,000	1.0	1.1	—	—	—
Mazda ..	AC/SG	800,000	1,200	1.0	3.0	5.0	.5	.5
Mazda ..	ACS2	600,000	3,000	1.0	5.0	—	—	—
Cossor ..	MSG/HA	500,000	1,000	1.0	2.0	2.0	1.5	1.5
Marconi	MS4	500,000	550	1.0	1.1	2.2	1.5	1.5
Osram ..	MS4	500,000	550	1.0	1.1	2.2	—	—
Six-Sixty	4XSGAC	485,000	1,600	1.0	3.3	—	—	—
Six-Sixty	4YSGAC	—	900	1.0	3.5	—	—	—
Mullard..	S4VA	430,000	1,500	1.0	3.5	1.7	—	—
Cossor ..	41MSG	400,000	1,000	1.0	2.5	2.0	—	1.5
Marconi	MS4B	350,000	1,120	1.0	3.2	3.2	1.0	1.0
Osram ..	MS4B	350,000	1,120	1.0	3.2	3.2	1.0	1.0
Six-Sixty	SS4MMAC	300,000	900	—	3.0	—	4.0	—
Mullard..	S4VB	257,000	900	1.0	3.5	4.0	1.5	1.5
Cossor ..	MSG/LA	200,000	200	1.0	3.75	4.5	—	1.5

A.C. Pentode Valves

Make	Type	Impedance	Amplification Factor	Filament Current	Wattage Consumption	Anode Current at 120 volts	Grid Bias at 100 volts	Grid Bias at 150 volts
Osram ..	PT4	50,000	110	1.0	2.2	—	—	—
Marconi	MPT4	33,000	100	1.0	3.0	—	—	—
Osram ..	MPT4	33,000	100	1.0	3.0	—	—	—
Six-Sixty	SS4PAC	—	—	1.0	3.0	—	—	—
Cossor ..	MS/Pen.A	—	—	1.0	4.0	9.0	2.5	2.5
Mazda ..	AC/Pen.	—	—	1.0	2.5	—	—	—

D.C. Three-electrode Valves

Make	Type	Impedance	Amplification Factor	Filament Current	Wattage Consumption	Anode Current at 120 volts	Grid Bias at 100 volts	Grid Bias at 150 volts
Mazda ..	DC/HL	13,000	35	.5	2.7	—	—	—
Marconi	DH	10,800	40	.25	3.7	—	—	—
Osram ..	DI1	10,800	40	.25	3.7	—	—	2.0
Mazda ..	DC3HL	10,000	37	.1	3.7	—	—	—
Marconi	DL	2,660	12	.25	4.3	—	—	—
Osram ..	DL	2,660	12	.25	4.3	10.0	4.0	7.0
Mazda ..	DCP	2,220	10	.5	4.5	—	—	—
Mazda ..	DC2P	2,220	10	.1	4.5	—	—	—

D.C. Screen-grid Valves

Make	Type	Impedance	Amplification Factor	Filament Current	Wattage Consumption	Anode Current at 120 volts	Grid Bias at 100 volts	Grid Bias at 150 volts
Marconi	DS	450,000	500	.25	1.1	—	—	—
Osram ..	DS	450,000	500	.25	1.1	—	—	3.0
Osram ..	DSB	350,000	1,120	.25	3.2	—	—	1.5
Marconi	DSB	350,000	1,120	.25	3.2	—	—	—
Mazda ..	DCSG	—	1,000	.5	2.75			

The "EASYTUNE 60" Made Possible by LEWCOS

The Lewcos Band Pass Filter, Reference B.P.F/G. PRICE 12/-
This is specified for the "Easytune 60."

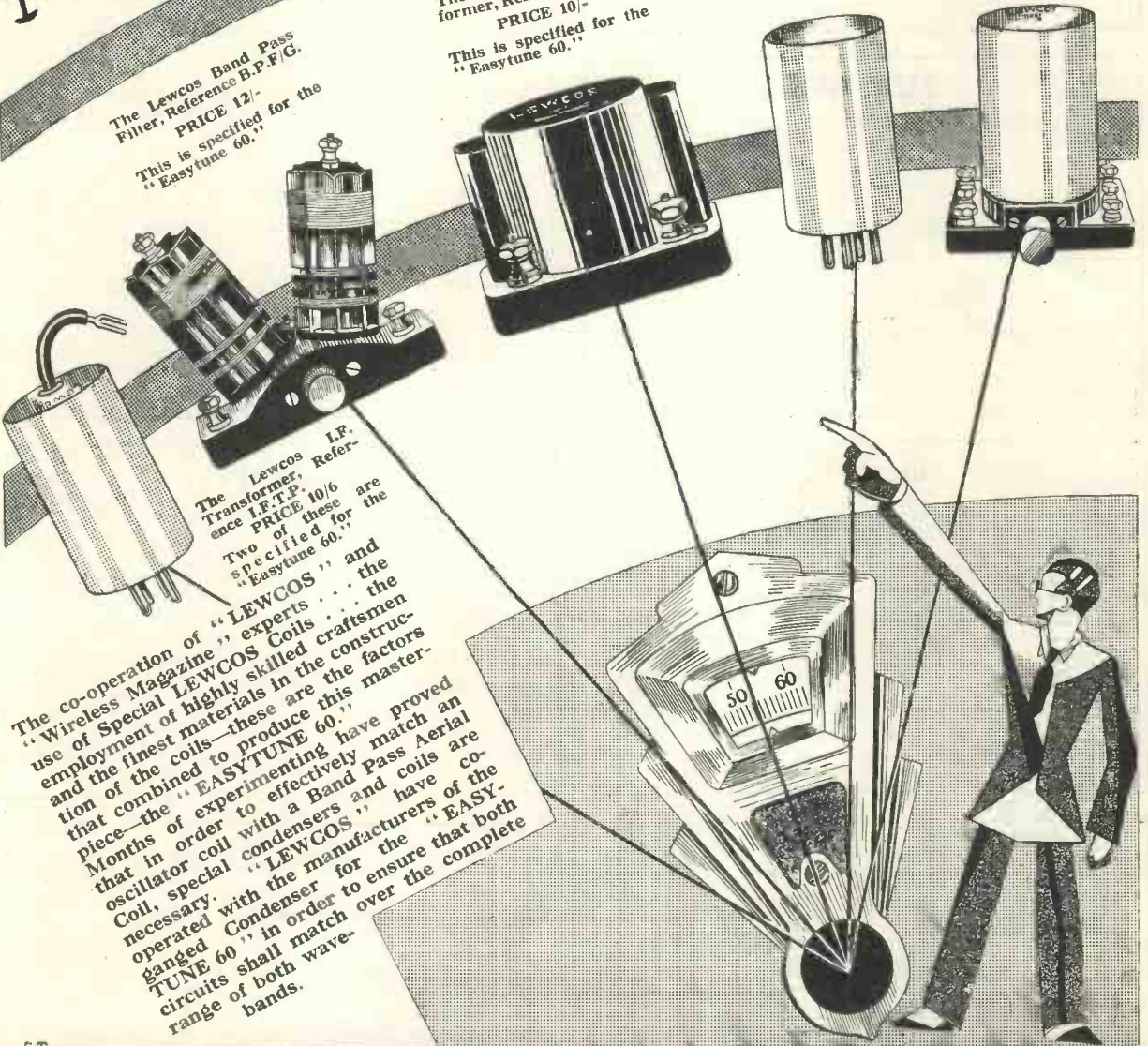
The Lewcos L.F. Transformer, Reference L.F.T.6 PRICE 10/-
This is specified for the "Easytune 60."

The Lewcos I.F. Transformer, Reference I.F.T. PRICE 10/6

The Lewcos Twin Oscillator Coll, Reference T.O.S/G. PRICE 8/6
This is specified for the "Easytune 60."

The Lewcos I.F. Transformer, Reference I.F.T.5 PRICE 10/6
Two of these are specified for the "Easytune 60."

The co-operation of "LEWCOS" and "Wireless Magazine" experts... the employment of highly skilled craftsmen and the finest materials in the construction of the coils—these are the factors that combined to produce this masterpiece—the "EASYTUNE 60".
Months of experimenting have proved that in order to effectively match an oscillator coil with a Band Pass Aerial Coil, special "LEWCOS" coils are necessary.
operated with the manufacturers of the ganged Condenser for the "EASY-TUNE 60" in order to ensure that both circuits shall match over the complete range of both wavebands.



LEWCOS RADIO PRODUCTS FOR BETTER RECEPTION
THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED, CHURCH ROAD, LEYTON, LONDON, E.10.

SEE INSIDE FRONT COVER

When you send your order don't forget to say you "saw it in the 'W.M.'"

GUIDE TO THE WORLD'S BROADCASTERS

Specially Compiled for "Wireless Magazine" by JAY COOTE

19.68
25.20
25.63 } Metres

RADIO COLONIAL (FYA) **15,244**
(Pontoise, Paris) **11,900**
11,705 } Kilo-cycles

Distance from London: Approximately 217 miles.
Standard Time: Greenwich Mean Time (France adopts B.S.T.).
Announcer: Man.
Call: "Allo! Allo! Ici Radio Colonial, Paris."
Standard Transmissions: G.M.T. 13.00-16.00 (19.68 metres); 16.30-19.30 (25.20 metres); 21.00-24.00 (25.63 metres).
G.M.T. 13.45; 18.55; 21.45, news bulletin in English; at other times talks, market reports or relays of concert from Ecole Supérieure, Paris (PTT).
Closes down with usual French formula followed by "La Marseillaise."

31.35 Metres
Power:
1 Kw.

POZNAN (SRI) **9,570**
(Poland) **Kilocycles**

Distance from London: Approximately 728 miles.
Standard Time: Central European (coincides with B.S.T.).
Announcer: Man (if own broadcast); woman (if relay of Poznan main station or other Polish transmitter).
Call: "Rhalo! Rhalo! Radjo Poznanskie."
Interval Signal: Metronome.
Announcements made in Polish, French, German and English.
Closes down as other Polish stations, such as Warsaw (q.v.).
Times of Transmission: G.M.T. 18.00 to 19.45 (Sun.); 18.45 to 22.00 (Tues.); 18.30 to 24.00 (Thurs.). Gramophone records or relay of entertainment from Poznan or other Polish transmitter.

32.26 Metres
Power:
6 Kw.

RADIO MAROC **9,300**
(Rabat) **Kilocycles**

Distance from London: Approximately 1,260 miles.
Standard Time: Greenwich Mean Time (Morocco does not adopt Summer Time when change over takes place in Europe).
Announcer: Man.
Call: "Allo! Allo! Ici la station de radiodiffusion de l'office Chérifien de Radio Maroc"; between items: "Ici Radio Maroc."
Interval Signal: Metronome (60 beats per minute).
Standard Transmissions: Relays programmes from Radio Maroc (Rabat) every Sunday evening from 20.00 G.M.T.
(Note: The Radio Maroc programmes are also relayed through CN8MC (Casablanca) on 48 metres (6,250 kilocycles) every Monday between 20.00 and 21.00 G.M.T. and on Tuesdays between 12.00 and 13.00, and again from 20.00 and 21.00).
Closes down with usual French "Bonsoir" followed by "La Marseillaise."

41.6 Metres
Power:
.5 Kw.

TENERIFE (EAR58) **7,211**
(Canary Isles) **Kilocycles**

Distance from London: Approximately 1,750 miles.
Standard Time: Greenwich Mean Time less 1 hour.
Announcer: Man.
Interval Signal: None. All announcements in Spanish and English.
Call: "This is Radio Station Las Palmas and Grand Canary."
Times of Transmission: G.M.T. 20.00 to 23.00 (Sats.; Sun.).
Gramophone records and speech tests.

253.1 Metres
Power:
5 Kw.

GLEIWITZ **1,185**
(Germany) **Kilocycles**

Distance from London: Approximately 820 miles.
Standard Time: Central European (coincides with B.S.T.).
Announcer: Man.
Opening Call: "Achtung! Achtung! Hier Schlesische Funkstunde Breslau und Gleiwitz."
Interval Signal: Metronome (200 beats per minute).
Main Daily Programmes: Relays from Breslau. G.M.T. 05.30, physical exercises, concert; 06.00, concert relayed from liner at Hamburg (Sun.); 08.50, carillon, R.C. sacred service (Sun.) 11.15, concert, then continuous broadcast until 18.30, concert; 19.00, main evening entertainment. Frequently relays programmes from Leipzig and Frankfurt-am-Main.
Closes down with the words "Meine Damen und Herren. Wir beschliessen unsere heutige Sendung mit dem Deutschlandslie." (Ladies and gentlemen, we close our to-day's broadcast with the National Anthem, which is then played) followed by "Breslau und Gleiwitz wuen schen ihnen eine recht gute Nacht. Vergessen Sie nicht Ihre Antennen zu erden. Gute Nacht."

272 Metres
Power:
1.3 Kw.

RENNES (PTT) **1,103**
(France) **Kilocycles**

Distance from London: Approximately 240 miles.
Standard Time: Greenwich Mean Time (France adopts B.S.T.).
Announcer: Man.
Call: "Allo! Allo! Ici la station de Rennes du réseau de radiodiffusion de l'Etat Français"; between items: "Ici Rennes P.T.T."
Opening and Closing Signal: Short melody (gramophone record).
Main Daily Programme: G.M.T. 12.00, relays Paris P.T.T. (Sun.); gramophone records; 14.00 and 16.30 relay of concerts from Paris; 18.15, news bulletin; 19.30, English lesson (Tues.); 20.30 relays Paris PTT or own concert; if latter at 20.45.
Closes down with usual French good-night greetings followed by local melody (from La Dérobée de Guingamp) and "La Marseillaise."

273.7 Metres
Power:
7 Kw.

TURIN (1TO) **1,096**
(Italy) **Kilocycles**

Distance from London: Approximately 578 miles.
Standard Time: Central European (coincides with B.S.T.).
Announcer: Woman.
Opening Signal: A carillon of bells: E, G sharp, F sharp, B, E, G sharp, F sharp, repeated *ad lib.*
Call (phon): "Eh-yah Rah-dee-owe Tor-ee-no" (if own broadcast); "Rah-dee-owe Nord Ee-tar-lee-ya (when S.B. with Milan, Trieste, etc.)."
Interval Signal: The song of the nightingale (gramophone record).
Main Daily Programme: G.M.T. 07.15, news; 08.40, news bulletin; carillon and relay of High Mass from San Giusto Cathedral, Trieste (Sun.); 10.30, concert; 12.00, time signal and concert; 15.45, gramophone records or concert; 16.40, dance music; 20.00, main evening entertainment, concert, play or relay of operatic performance from the Regio (Turin), Scala (Milan) or Carlo Felice (Genoa); 22.00, news dance music (Sat.).
Closes down with the words: "Signori e Signore, Buona Notti" (Ladies and gentlemen, good night), followed by Fascisti hymn ("Giovinezza") and Royal Italian Anthem ("Marcia Reale").

385 Metres
Power:
60 Kw.

RADIO TOULOUSE **779**
(France) **Kilocycles**

Distance from London: Approximately 556 miles.
Standard Time: Greenwich Mean Time (France adopts B.S.T.).
Announcer: Man.
Opening Signal: Bells (irr.).
Call: "Allo! Allo! Ici Radio Toulouse, émissions de la radiophonie du Midi"; between items "Ici Radio Toulouse."
Interval Signal: Gong (about 50 beats per minute).
Main Daily Programme: G.M.T. 12.30, R.C. sacred service (Sun.); 13.00 concert; 13.45, Protestant sacred service (Sun.); Bélin transmission of photographs; 17.00 (Sun.); 17.30, dance music, then continuous transmission throughout the day until midnight. Mostly broadcasts of gramophone records with publicity items between numbers.
Closes down with usual French formula followed by local patriotic march: "La Toulousaine"; on some evenings "La Marseillaise" is played.



HERE IS MR. P. K. TURNER'S SPECIFICATION for his A-P-A Radio Unit

-T.C.C. of course

FIXED CONDENSERS

- 1 T.C.C. .0001 mfd.
Type 34.
- 1 T.C.C. .03 mfd.
Type 25A (mica)
- 2 T.C.C. .5 mfd.
Type 50.
- 2 T.C.C. 1 mfd.
Type 50.
- 1 T.C.C. 1 mfd.
Type 65.
- 1 T.C.C. 2 mfd.
Type 65.

¶ This specification tells its own story—yet again a high authority in quality reproduction of sound has exclusively specified T.C.C. Let his decision be your guide—insist on "the condenser in the green case" for your A-P-A Radio Unit.

T.C.C.

ALL-BRITISH
CONDENSERS

The Telegraph Condenser Co.,
Limited
Wales Farm Road, N. Acton, W.3

159

a battery for every need ---



Careful discrimination in the choice of a Battery should extend not only to the make but also to the capacity. Decide first on one of unquestionable reputation, such as the C.A.V., and then give consideration to the type that will give the longest life and the most complete satisfaction.

The benefit of our experience may be valuable to you. Send us details of your receiver and we will assist you in the choice of one best suited to your requirements.

Have you tried the C.A.V. H.T. Dry Battery yet?

Free

DEPT. 14

FREE, A USEFUL BOOK ON
THE MAINTENANCE OF C.A.V.
H.T. D.L.T. ACCUMULATORS
AND HOW THESE CAN BE
CHARGED AT HOME FROM D.C. MAINS.
A POST-CARD WILL BRING YOU A COPY.

C·A·Vandervell Ltd.
WELL STREET,
BIRMINGHAM.

Speedy replies result from mentioning "Wireless Magazine"

In Tune with the Trade

BY
FETTER LANE

SEND TO US FOR THESE CATALOGUES!

Here we review the newest booklets and folders issued by three manufacturers. If you want copies of any or all of them just cut out this coupon and send it to us. We will see that you get all the literature you desire.

Just indicate the numbers (seen at the end of each paragraph) of the catalogues you want below.

My name and address are:—

Send this coupon in an unsealed envelope, bearing 1/2 d. stamp, to "Catalogue Service," WIRELESS MAGAZINE, 58/61 Fetter Lane, E.C.4. Valid till May 31

WHY NOT A NEW MOTOR?

A LITTLE snag with many otherwise excellent radiograms which I have come across is that the gramophone-motor drive simply will not stand up at constant speed on heavy loads. The result is that loud organ records and other noise producers wobble off the true note, owing to the extra load put on the motor drive.

If you suspect this fault in your radiogram outfit then don't harbour it for a moment. Drop a line at once through my free catalogue service for the new Garrard gramophone-motor pri list.

No matter whether you want a small, compact and low-priced single-spring motor, or one of these hyper universal electric outfits, beloved of the true radiogram "fan," you will find it there. **258**

THAT NEW BATTERY

IT is about this time of year, after your "juice box" has withstood the ravages of winter and the heavy radio listening work of spring, that a new battery seems needed.

If your low-tension supply has been working overtime on the Sunday programmes (pardon my being unduly optimistic) then get the new C.A.V. catalogue. This will help you in your choice.

It deals with accumulators of all kinds for high and low tension.

A section of this book is also devoted to C.A.V. dry high-tension

batteries, so if you are running short of high tension, too, you will be all the more interested. **259**

ATTENDING TO DETAILS

A FUNNY thing—to me it is one of the fascinations—of wireless is that although you may successfully make up a good, big set, you may come a cropper for a while over some little detail such as a faulty battery connection or an ill-fitting wander plug.

The more experience you have in set building, the more you will realise that it pays in the long run to have good connectors. That is why I recommend for your attention a list sent me by J. J. Eastick & Sons, dealing with Eelex plugs and sockets, terminals, connectors, testing prods, switches, battery cords and dozens of other items of the same ilk.

The prices of these standardised connectors, of which inter-changeability is an extremely convenient feature, are of the matter of pence only. **260**

Just Out!

The New
SIEMENS

"Cadet"

FULL O'POWER
BATTERIES
BRITISH MADE THROUGHOUT



UP
to FULL O'POWER
Quality
DOWN
to "Ordinary
Battery" prices

60 Volts	5/6	120 Volts	11/-
99 "	9/-	9 "	GB. 1/-
108 "	10/-	16 1/2 "	GB. 1/9

THESE PRICES DO NOT APPLY IN THE IRISH FREE STATE

Get one—the improvement in "reception" will astonish you—and they... LAST

The "Evening Standard" says—

"The Portadyne CHALLENGER—has amazing range—reproduction is rich—volume is impressive—selectivity is razor-edge sharp."



In these glowing terms the Wireless Editor of the "Evening Standard" praises the Portadyne CHALLENGER. This All-British Receiver is the finest value in the radio world to-day. It is completely self contained—speaker, aerial, batteries and extra large capacity accumulator all housed in the handsome figured walnut cabinet. The Portadyne CHALLENGER is fitted with the unique Instantaneous Tuning Device which gets your station in 3 seconds. Get to know more about this quality Receiver. Write for full details to-day.

Portadyne
CHALLENGER
S.G.4 TRANSPORTABLE



£12 : 17 : 6

or 12 monthly payments of 24/6

Complete with valves and batteries.

Please send me full details of the Portadyne Challenger—

Name

Address

W.M.

Just to remind you
that when Mr. P. K. Turner wants "A" quality
he chooses **PARMEKO**

Chokes & Transformers

In this issue Mr. P. K. Turner returns to his "A" quality Power Amplifier, in which, as we pointed out in March, the two Chokes and the Mains Transformer are PARMEKO. It is a fact which you can notice for yourself, that time and again when performance is the consideration, PARMEKO components are chosen. Naturally, they cost a little more than some others, but it is money well spent if you are at all critical. Here are the details of the Chokes and Transformer mentioned in Mr. P. K. Turner's specification: Low Frequency Choke, 60 henries 30 m/A, price £1 7s. 6d.; Low Frequency Choke, 30 henries 50 m/A, price £1 7s. 6d.; Mains Transformer, Primary 200/230/250 volts 50 cycles, Secondary 350 volts 150 m/A, 125 volts 100 m/A, 4 volts C.T. 2 amps., 4 volts C.T. 4 amps., price £2 15s.

Ask your dealer about PARMEKO apparatus, or write for price list of Transformers, Chokes, etc., to—

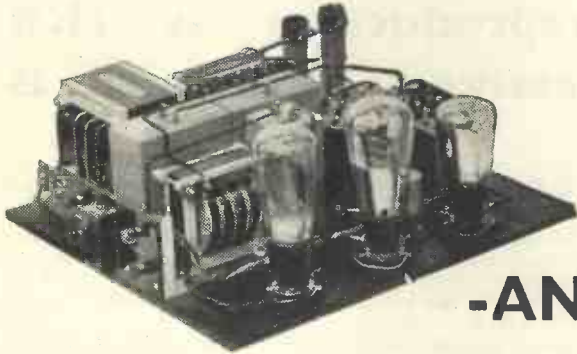
PARTRIDGE & MEE LTD.,
LEICESTER & 74, New Oxford St., London, W.C.1

'Phone : Aylestone 487

'Phone : Museum 5070

Speedy replies result from mentioning "Wireless Magazine"

NEW! 25 WATT ALL-PURPOSE AMPLIFIER at £14.10.0 LESS VALVES



Developed by the PARMEKO Research Department in Kit form, to meet the demand for a first-class Amplifier at a moderate price for use with one or two M.C. speakers at full volume. Just the thing for large rooms, dance halls, restaurants, etc. Can be connected direct to the gramophone pick-up as well as to a detector. The components are all designed or chosen specially for this circuit. Reproduction is of a very high order. Special precautions have been taken to stop oscillation and feed-back, and there is a volume control across the input. The Kit is absolutely complete, with double-pole Mains fuses, all terminals, screws, baseboard, wire, theoretical diagram and full size working blueprint of arrangement and connections.

Ask your dealer for full details, or write for new Price List.



PARTRIDGE & MEE LTD., Leicester, and 74, New Oxford St., W.C.1.
 Td. AYLESTONE 487 Td. MUSEUM 5070

POPULAR

For many reasons besides price

The J.B. "POPULAR" LOG CONDENSER—a typical J.B. product in its sound design, high electrical efficiency, and thorough finish.

Two models—plain or slow-motion—with rigid brass frames, vanes of extra heavy gauge brass, and end-plates highly finished in nickel-plate. High-grade ebonite insulation.

The slow-motion model has a ratio of 35 to 1 and is smooth, silent, and sure in action.



PRICES

SLOW-MOTION TYPE, as illustrated, with 3-in. dial and knob.

.0005, 8/6 .0003, 8/3
 .00025, 8/- .00015, 8/-

PLAIN TYPE (without dials).

.0005, 6/- .0003, 5/9
 .00025, 5/6 .00015, 5/6
 4-in. dial, 1/6 extra.

Write for Illustrated Catalogue.



PRECISION INSTRUMENTS

Advertisement of Jackson Bros., 72 St. Thomas' Street, London, S.E. 1. Telephone: Hop. 1837



PICK-UP

CARRIER & VOLUME CONTROL

Crisp and Clear Reproduction with delightful balance of Treble and Bass

Pick-up, Carrier, with Volume Control	32/6
Pick-up, Carrier, without Volume Control	30/-
Pick-up only	21/-
Specialty Designed Carrier only for featherweighting	15/6

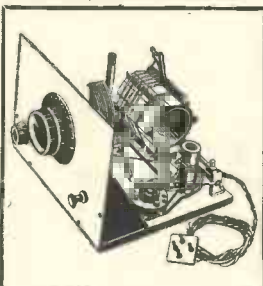
Recommended by Noel Bonavia-Hunt, Esq., M.A., in last issue of this Magazine

LIMIT RADIO, Ltd., 15/29 Windsor St., N.1

YOUR OLD COMPONENTS

are worth money. Sort out the spare radio parts you no longer require and advertise them in the "Miscellaneous Columns" of AMATEUR WIRELESS. You will be surprised how quickly they will be snapped up. Your announcement will cost you 3d. a word. Send your list of parts, together with your name, address and remittance, to:

"Small Advertisement" Dept.,
AMATEUR WIRELESS
 52-61 Fetter Lane, London, E.C.4.



GET THE SHORT WAVES ON YOUR A.C. SET WITH THE PILOT SUPER HET SHORT WAVE ADAPTOR

the genuine Super Het Short Wave Adaptor designed by Mr. G. T. Kelsey, the famous Short Wave expert.

PETO-SCOTT CO., LTD., 77, CITY ROAD, LONDON, E.C.1
 Telephone: Clerkenwell 9406-7-8. AND AT 62 HIGH HOLBORN, LONDON, W.C.1. Telephone: Chancery 8266.

No alterations necessary to your present set. Simply plug-in to cover 16-52 metres. Complete with instructions and booklet on short wave tuning

CASH or C.O.D. 44/6

or 10/- down and 7 monthly payments of 5/6.

Plug-in Coil for 40-120 metres, if desired - - - 4/6 extra.

Speedy replies result from mentioning "Wireless Magazine"

“ *Much Better than any moving coil I have tested* ”

An Extract from a test Report on the

MoToR PERMANENT MAGNET
**MOVING COIL
SPEAKER**

Everyone who hears this Speaker proclaims it a masterpiece.



The Radio Editor of a well-known newspaper writes:—

“I must congratulate you on producing a P.M. moving-coil speaker with such a high degree of sensitivity, the reproduction of speech was much better than any moving coil I have tested, regardless of price, and I have had a wide experience of this class of speaker. I shall certainly purchase one for my own use, and I might add that it was the only speaker I have tested that made me dissatisfied with my own.”

The BROADCASTER says:—

“High sensitivity and crisp quality are the features of the Tekade British-made MoToR P.M. Moving-Coil Speaker.”

Hear this Speaker yourself—you'll want it!

British Made

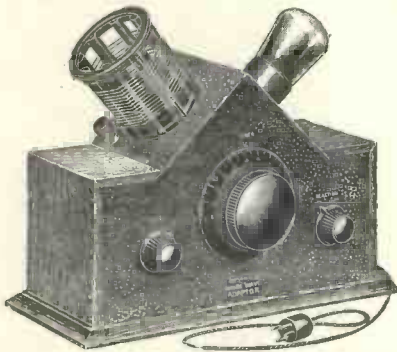
DIMENSIONS:
Overall Diameter 10 3/4"
Depth 5"
Cone Diameter 8"
TRANSFORMER:
Power Type:—3 tappings;
25:1, 20:1, 15:1. Pen-
tode Type; 30:1

PRICE
Including
Transformer

70/-

If you have any difficulty in obtaining a demonstration, write for fully descriptive pamphlet, sent post free

TEKADE RADIO & ELECTRIC Ltd.
147 Farringdon Road, London, E.C.1



**SHORT WAVES on A.C.
MAINS or BATTERY SETS**

An entirely new design of amazing efficiency

This Adaptor enables you to enjoy Short Wave Reception whether your set is A.C. Mains or Battery Operated. It is supplied complete with one special Short Wave Coil 40/80 metres, Cord and Plug. No extras whatsoever are required. Can be attached to your set in a few seconds. Write now for full particulars and our free trial offer.

Price complete **39/6**
Extra coil if required
18/40 metres **3/-**

We specialize in the "Economy Radiogram," "Town & Country Four" and all "Wireless Magazine" Sets. Ready wired and tested.

Comprehensive lists on application

**MAGNUM
FADER**
*Specified for the
"Economy Radiogram."*
Price **10/-**

MAGNUM

300 to 1,000 ohms, 9s.
2,000 to 10,000 ohms,
1/-
15,000 to 100,000
ohms, 1/6
150,000 ohms, 2/6

**SPAGHETTI
RESISTANCES**

Set of 5 Magnum Spaghetti Resistances as specified for the "IDEAL HOME SUPER" 7/-
Set of 8 Magnum Spaghetti Resistances for the "A.C. QUADRADYNE" 11/-

BURNE-JONES & CO., LTD.

"MAGNUM" HOUSE, 296 BOROUGH HIGH STREET, LONDON, S.E.1
Telephone: Hop 6257 and 6258
Scottish Agent - - Mr. Ross Wallace, 54 Gordon Street, Glasgow, C.1

Better service results from mentioning "Wireless Magazine" when writing to advertisers

CHRISTOPHER STONE'S NEW BOOKLET [★]

"How to Choose a Radio-gramophone"

Specially and exclusively written at the request of the Columbia Graphophone Company. Not a reprint, but a new and original production. In this, Christopher Stone, familiar to every listener, gives you the full benefit of his vast experience of radio and electrical gramophone reproduction; traces the development of the radio-gramophone; discusses frankly all the points of a reliable instrument; and, in his friendliest style, helps you to a complete understanding of "this modern miracle."

Columbia RADIO-GRAPHOPHONE



MODEL 602

£2 14s. monthly

(deposit £3.9.6 and 12 payments
of £2.14.0)

*Model 602 is the only floor console of its
type at the price.*

A single knob turns the tuning scale, marked in station wavelengths. Ultra selective 3 valve circuit (2 screened grid), band pass tuning; moving coil speaker, electric gramophone motor, for A.C. or D.C. Mains.

32 gns.



★ Free
COPY
FOR YOU

- ★ Please send me a free copy of Mr. Stone's Booklet.
- ★ I should like to hear Model..... playing in my home without cost or obligation to myself.
- ★ Cross cut if not required.

NAME

ADDRESS

Cut this out and post in an unsealed envelope bearing a ½d. stamp to Columbia, 104c Clerkenwell Road, London, E.C.1.

Mention of the "Wireless Magazine" will ensure prompt attention

The Easytune 60



By the "Wireless Magazine" Technical Staff

OUR aim in producing the easytune 60 can be summed up in a few words—it was to make a set as good as the Super 60, but with only one knob for tuning.

That this object has been achieved with complete success will be evident from the independent report that appears on page 390. J. Godchaux Abrahams, during the course of a couple of evenings, was able to receive over seventy stations from all over Europe. For a set with only one tuning knob this is a remarkable achievement and one that will be appreciated by all radio enthusiasts.

Set in a Thousand

The Super 60 created more interest than any other constructor set put out last year. We believe that the Easytune 60 will be equally as successful during 1932. It is a set in a thousand—easy to build; easy to operate; and easy on your pocket.

Although in its final form the Easytune 60 is the essence of simplicity it must not be imagined that it "fell" together. The preliminary tests have been spread over a period of three months and the final good results have only been possible through close co-operation between the "Wireless Magazine" Technical Staff and the makers of the special coils and gang condenser used.

There are many difficulties in the production of a one-knob super-het. There is the initial difficulty of designing a condenser that will give the proper correction throughout the medium and long wavebands; after that there is the need for designing coils that can accurately be matched to a standard in production.

These problems have been solved in the Easytune 60 and there is no reason why those who construct it should not repeat the good results obtained with the original "Wireless Magazine" laboratory models.

THE SET IN BRIEF

The Easytune 60 is very simple to build. All the parts are assembled on the base-board; there is no panel.

The Easytune 60 is amazingly simple to operate. It is a true one-knob set. Apart from the tuning knob there are only two other controls. One is the wave-change switch and the other is a combined on-off switch and volume control.

The Easytune 60 is easy on your pocket. The cost of construction is only just over £9, with valves but without batteries and other accessories.

The Easytune 60 uses a straightforward super-het circuit that has no tricks in it.

One important point we must stress. Although the set incorporates a three-gang condenser, none of the troubles usually associated with ganging are encountered with the Easytune 60. Only two of the trimming condensers have to be adjusted—those give the proper characteristic to the input band-pass tuning circuit.

Table Radiogram

Next month we shall show how to convert the Easytune 60 into a table radio gramophone—something quite new in the way of home-constructor designs and one that will appeal to thousands of listeners. This conversion will not entail any structural alterations to the receiver, the construction of which can be started at once.

With the exception of the three-gang condenser and the band-pass and oscillator coils all the parts used in the Easytune 60 are of standard design. Many readers will therefore be able to incorporate components they already have on hand. In that case the cost of construction will be reduced to the minimum.

One thing is certain. All who build the Easytune 60 will have one of the best and certainly the simplest one-knob super-het that has yet been produced!

Designing A One-knob Super

Crowning Achievement of Many Months' Research

It is only as the result of close co-operation between the "Wireless Magazine" Technical Staff and a large number of technicians that the production of the Easytune 60 has been possible. These notes reveal how the set was evolved from numerous experimental designs. At last a really efficient one-knob super-het has been achieved

THE Easytune 60 has only been made possible by months of careful research and co-operation between many different people. Some months ago we could have published details of a one-knob super-het that was reasonably good; but "reasonably good" is not good enough for "Wireless Magazine" and publication was held up until we were assured that the set was perfect in every detail.

Super-het Principle

It is well known how the super-het works; that must be understood before the difficulties of producing a "one-knobber" can be appreciated. For the benefit of newcomers to radio it is as well that we should run over the principle of the super-het in brief.

Incoming oscillations or signals

are mixed with locally produced oscillations so that a signal of a particular frequency is produced; in the case of "Wireless Magazine" super-hets this frequency is 126 kilocycles. It is important to realise that *signals of any wavelength* are converted to this frequency.

The 126-kilocycle signal is then amplified by one or more stages of high-frequency amplification. This amplified signal is then detected and magnified at low frequency just like an ordinary signal in a straight set.

The minimum number of tuned circuits for a super-het is two. The aerial circuit must be tuned and the oscillator must also be adjusted to produce the constant frequency difference of 126 kilocycles. The problem in producing a one-knob super-het is to use only one condenser for tuning these circuits.

The real trouble is that the difference in setting between the aerial condenser and the oscillator condenser does not remain constant throughout the entire wave range. For instance, if the difference were 2 degrees at 250 metres it might be 5 degrees at 500 metres.

The solution of this trouble is to design a condenser with the plates so shaped that the proper correction is automatically obtained for every wavelength. This part of the problem has been solved by the produc-

tion of the Radiophone super-het condenser.

The next step was to obtain coils for aerial and oscillator tuning that would have the right characteristics to work with the special super-het condenser. This part of the work was undertaken by the Lewcos laboratories.

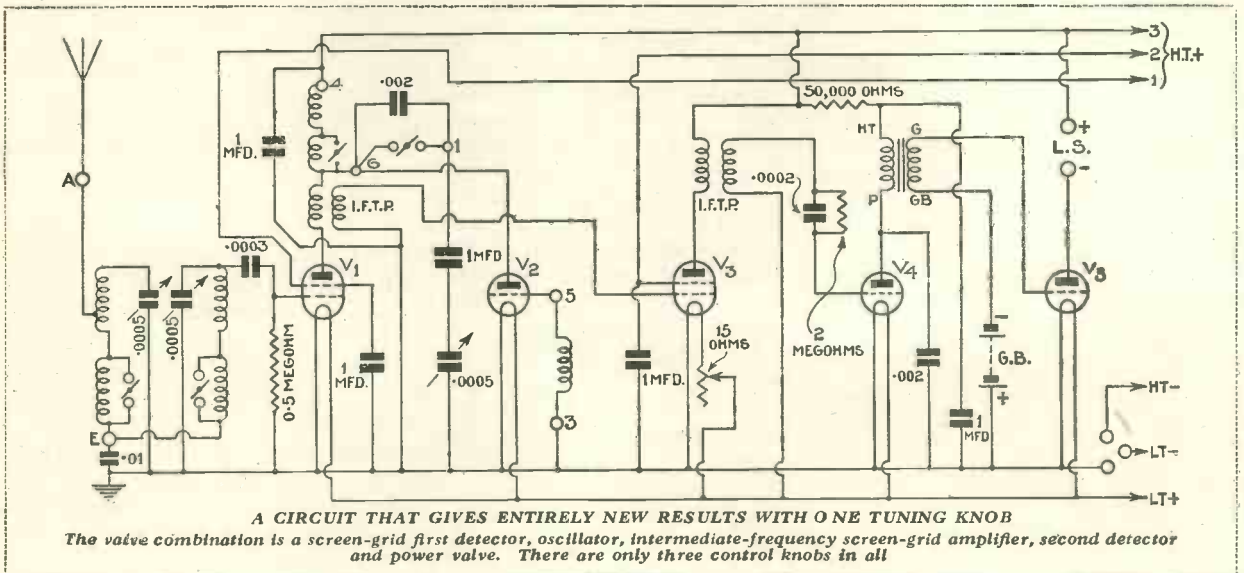
Practical Solution

The combination of the "Wireless Magazine" Technical Staff and the Radiophone and Lewcos technicians has resulted in the solution of the one-knob problem in a form that can be taken advantage of by every home constructor.

For the sake of getting good selectivity in the aerial circuit it was decided to use a tuner of the band-pass type. This meant a three-gang condenser, for there are the two circuits of the band-pass tuner to adjust as well as the oscillator circuit. Only the oscillator-tuning portion of the gang condenser has specially shaped vanes, of course.

Special Band-pass Unit

Unfortunately it was not found possible to make the standard Lewcos band-pass tuner gang up with the oscillator coil and a modified type had to be produced. This point is mentioned because otherwise some constructors might think that they



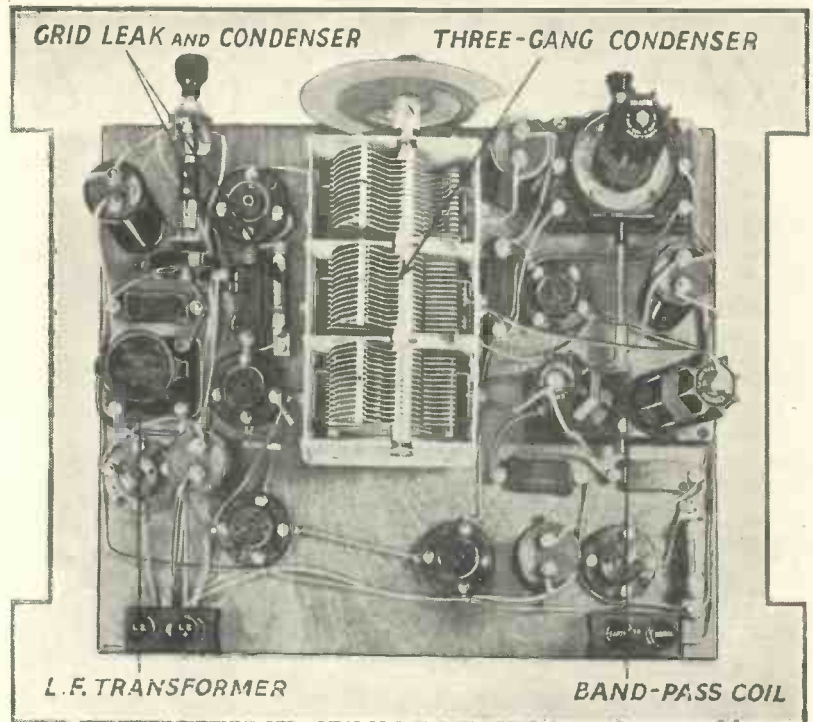
could use the standard Lewcos band-pass coil. This is not the case and a special band-pass coil and oscillator must be used in the Easytune 60.

Experimental Troubles

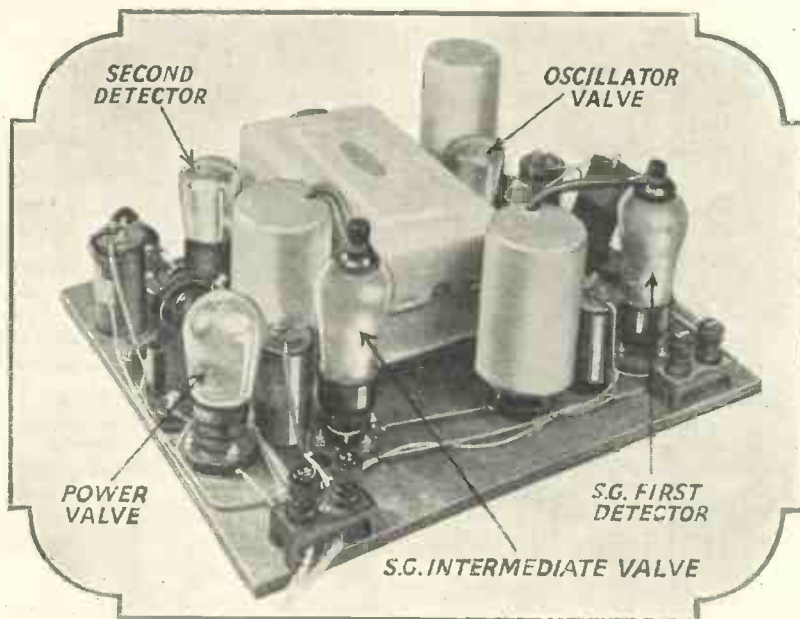
We may let our readers into a secret by saying that our original intention was to produce a four-valve set. This would have had a combined first detector and oscillator. Many experiments were tried with this object in view, but it was found impossible to get correct ganging over the entire range of broadcast wavelengths when this arrangement was used.

Reluctantly, therefore, we were obliged to add a valve to the combination, so that now the first detector and oscillator are separate. Actually this is not a great disadvantage for all technicians are agreed that the separate oscillator gives better results than the autodyne arrangement.

With the improved efficiency of modern valves and the increase in power of many foreign stations it was thought that one stage of intermediate-frequency amplification would



CLEAN AND STRAIGHTFORWARD LAYOUT
 This photograph shows a plan view of the Easytune 60. Note that none of the parts is at all cramped and everything is quite accessible. The covers have been removed from the gang condenser and the oscillator coil



A SET THAT ANY BEGINNER CAN BUILD WITHOUT DIFFICULTY
 So simple is the construction of the Easytune 60 that even beginners can undertake it with every confidence of successful results. A full-size blueprint is available for 9d., post free

sity for an on-off switch and a volume control, for the strength of many stations is too great for ordinary listening in the home. This problem was solved by using one of the Wearite combined on-off switches and rheostats.

Some people would prefer to control volume by altering the voltage applied to the screening grid of the intermediate-frequency amplifying valve. We preferred to use a rheostat in the filament circuit because it has the advantage of being cheap and giving no trouble.

Slight Time Lag

It has only one disadvantage; with some valves there is a time lag due to the change in temperature of the valve filament. We do not think that any operator of the set will find this time lag particularly objectionable, however.

The final circuit is reproduced on the opposite page. Decoupling has been reduced to the minimum consistent with stability of operation. Tests show that the set is quite stable even when the high-tension supply is obtained from a mains unit.

That, in brief, is the story of the Easytune 60. It only remains for the reader to prove for himself that the one-knob super-het problem has been successfully solved!

give sufficiently strong signals for the set to be a source of real entertainment.

In this supposition we were not disappointed. With one valve less than the Super 60 the Easytune 60 gives results just as good in the way of signal strength and range.

As it stands the Easytune 60 is a

powerful receiver with low battery consumption, which means that the running costs are very reasonable.

Apart from one-knob tuning, we also decided that the subsidiary controls should be few in number. A wave-change switch obviously could not be dispensed with.

We were then left with the neces-

Why I Like the Easytune 60

Special Test Report by J. GODCHAUX ABRAHAM'S

Besides being thoroughly tested by the "Wireless Magazine" Technical Staff, the Easytune 60 has also passed through the hands of an independent expert, whose comments are reproduced here. During two evenings he had no difficulty in picking up more than seventy different stations from all over Europe.

WHEN the Editor of "Wireless Magazine" asked me to test the latest receiver and mentioned in connection with its name the number "60" my interest was at once aroused.

Over Seventy Stations

The Super 60 for some time has been one of my favourite sets. It was a winner; from the results I have obtained at one sitting I can state with full confidence that the Easytune 60 will prove a worthy successor.

The log I append herewith totals over seventy stations, yet I have no doubt that had I retained the set in my possession a few more nights there would have been no difficulty in adding many more transmissions to this list.

The Easytune 60 fully deserves its name as I cannot recall having at any time handled a super-het receiver with which tuning has been made so easy.

Just look at the front panel—one of the simplest I have yet seen; a dial, a combined on-off switch and volume control, and one knob to pull out or to push in according to whether you require medium or long waves!

All you have to do is to concentrate all your attention on the condenser dial.

Yet, with all its simplicity, the Easytune 60 possesses remarkable selectivity—you may confirm this statement by one glance at the log—and although only five valves are used any transmission of reasonable power can be received at good loud-speaker strength.

Recourse must be made to the volume control when dealing with high-power broadcasts such as those emanating from Radio Paris, Königswusterhausen, Daventry National, Moscow, Warsaw, Brussels, Prague, London, Rome, Mühlacker, and so on, if you are listening in an average-sized room.

If you turn the condenser dial slowly you glide in and out of the carrier waves with the assurance that no other adjustment is called for and the transmission is properly tuned in with a minimum amount of trouble.

To all intents and purposes the Easytune 60 is foolproof; it can be successfully handled by the merest tyro, whilst giving the expert all the

advantages of a more complicated receiving instrument.

The selectivity of the circuit is very good; I found no difficulty in separating Königswusterhausen from Daventry National although the new Radio-Paris deviating from its wavelength in its trial stages proved a nuisance at times.

An Unusual Feat

In the same way, and with equal facility, I secured undistorted reception of Graz or Mühlacker when London Regional was on the air—a feat I cannot often accomplish in my home in the North-West of London with many more expensive receivers.

Again, there was ample separation between Langenberg or Prague and North Regional, as also between Sottens and North National. These stations were absolutely clear of each other.

Brno was received at good strength without interference from Radio Strasbourg.

Excellent Results

In the present congested state of the medium waveband, if a variety of programmes is desired at one sitting, a super-het circuit is a necessity; the Easytune 60 did all that was required of it and I was able to hear broadcasts from many transmitters hedged in by unpleasantly close neighbours.

A Two Nights' Log with the Easytune 60

LONG-WAVE STATIONS

Metres	Station	Dial Reading
833	Heston Airport	13
900	Croydon Airport	19
937.5	Kharkov (fair)	21.5
1,000	Leningrad	27
1,083	Oslo	34
1,153	Kalundborg	39
1,348	Motala	54
1,411	Warsaw	58
1,445.7	Eiffel Tower	61
1,481	Moscow, Old Komintern (fair)	63
1,554	Daventry National	70
1,635	Königswusterhausen	74
1,724	Radio Paris	86
1,875	Hilversum (Huizen transmitter)	93

Except where otherwise stated, all the above were received at full loud-speaker strength and no difficulty was experienced in separating Königswusterhausen from either Daventry National or Radio Paris.

MEDIUM-WAVE STATIONS

Metres	Station	Dial Reading
239	Nurnberg	1
247.7	Trieste	3.5
253	Gleitwitz	6.5
255	Toulouse PTT (fair)	7
257	Horby	8
259	Leipzig (fair)	8.5

261.3	London National	9
263	Moravska-Ostrava	10
265.4	Lille (fair)	11
272	Rennes PTT	13
274.2	Turin	14
276.5	Heilsberg	14.5
279	Bratislava	15.5
281	Copenhagen (fair)	16.5
298.8	Huizen (Hilversum transmitter)	22
301.5	North National	23
304	Bordeaux-Lafayette	24
312.8	Genoa	27
312.8	Cracow (when Genoa not working)	27.25
322	Goteborg	30
325	Breslau (fair)	31.25
328.2	Poste Parisien (testing)	32
328.2	Grenoble PTT (fair when Poste Parisien not testing)	32.25
332	Naples (faint)	34
338	Brussels No. 2	36
342	Brno	37.5
345	Radio Strasbourg	38
349	Barcelona EAJ (when Strasbourg silent)	38.5
352	Graz (clear of London)	39.5
356.3	London Regional	40.5
360	Mühlacker (clear of London)	43
363.4	Algiers (fair)	44.5
372	Hamburg	48.5
381	Lvov	50
385	Radio Toulouse	51

390	Frankfort	52.5
394	Bucharest (faint on loud-speaker; strong on headphones)	53.5
398.9	Midland Regional	54.5
403	Sottens	57
408	Katowice (fair on loud-speaker)	58.5
413	Dublin (faint)	59.5
416	Radio Maroc, Rabat (fair)	60.5
418	Berlin-Witzleben (faint)	61
424.3	Madrid EAJ7 (faint)	63
	Moscow Stalin, (full loud-speaker strength after midnight)	63.25
436	Stockholm	66
441	Rome	68
447.1	Paris PTT (faint to fair)	69.5
459	Beromuenster	73
466	Lyons PTT (fair)	74.5
473	Langenberg	76
479	North Regional	78
487	Prague	81.5
501	Florence (tests)	84.5
509	Brussels No. 1	86
517	Vienna	87.5
525	Palermo (faint, good on headphones)	89
533	Munich (fair)	91
542	Sundsvall (fair)	94
550	Budapest	98

Except where otherwise stated, transmissions were received at good loud-speaker strength.

J. GODCHAUX ABRAHAM'S.

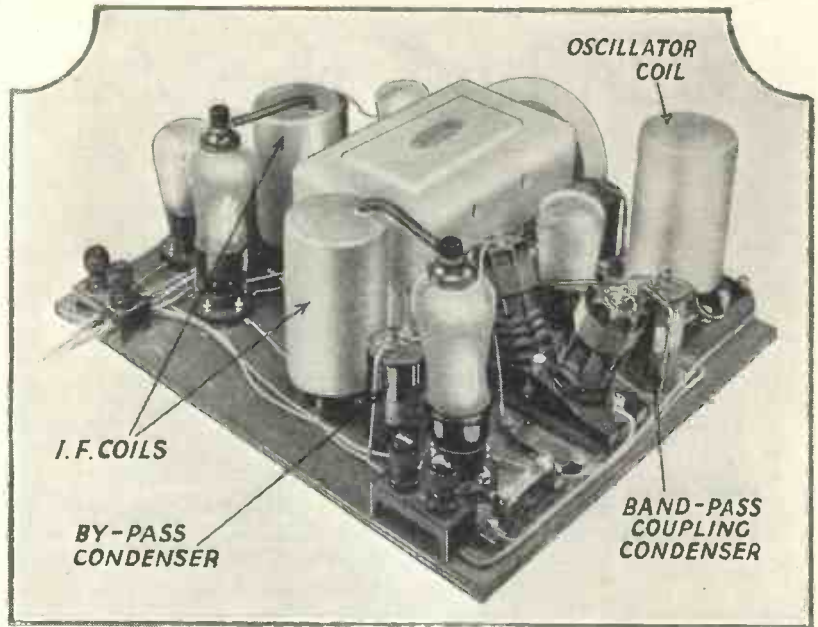
March 13-14, 1932.

If full advantage is to be taken of the selective properties of this receiver it would be wise to see that the aerial in use is not too long; in fact, it should be on the short side. Some of the more distant transmissions were logged whilst using as an aerial a rubber-covered cable which did not exceed 25 ft. in length, including the lead-in.

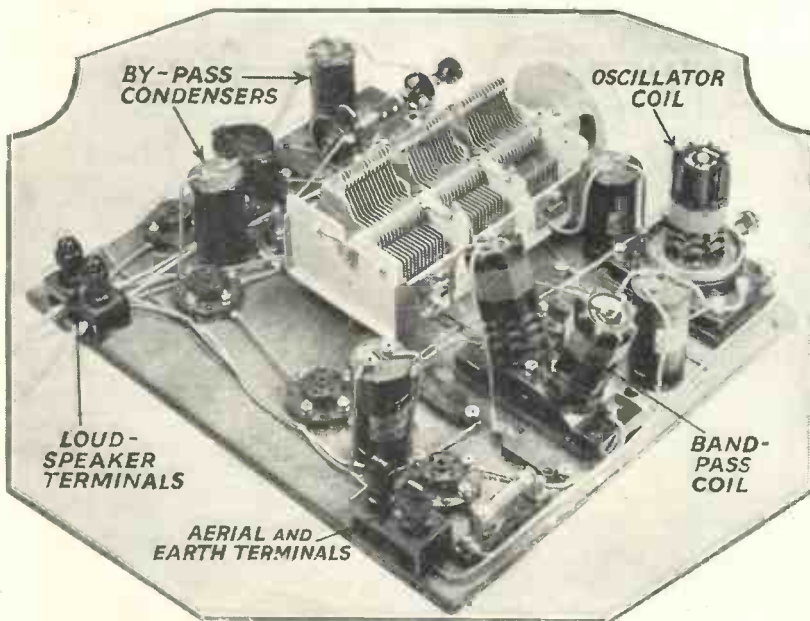
On An Indoor Aerial

On an indoor aerial consisting of about 15 ft. of ordinary cotton-covered electric bell wire slung across the room good results were also obtained; for the reception of local transmissions and for broadcasts of some of the higher-powered stations no better aerial was needed.

The Easytune 60 was used in conjunction with a standard loud-speaker; its output was quite adequate for a fair-sized room. At the outset it was fed by ordinary high-



CAREFUL DESIGN THE SECRET OF SUCCESS
The excellent results obtained with the Easytune 60 are due to many months research and co-operation between the "W.M." Technical Staff and the makers of the special coils and gang condenser



ALL READY FOR SEARCHING THE ETHER
Here is the Easytune 60 completely assembled and ready for use. Next month we shall explain how to convert the set into a table radio gramophone—something new in home-constructor designs

assurance that the tuning is correct.

Finally, the range covered by the coils is a liberal one. On the first degree of the dial Nürnberg was obtained and, immediately above it, Trieste. Below these two stations there are no worth-while transmitters. On the other hand, at the top of the medium waveband Budapest simply roared in.

Choice of Programmes

As you will see, an exceptionally good number of broadcasts on the higher wavelengths was received at excellent loud-speaker strength and I would have no hesitation in saying that on any night the possessor of the Easytune 60 may rely for a certainty on a choice of from twenty-five to thirty different broadcasts. Such a choice should give all the variety one may wish for in radio programmes.

What Everybody Wants

The average radio fan is constantly on the look out for a receiver which embodies such necessary qualities as selectivity, sensitivity, and good reproduction; in addition it must be inexpensive to construct, its upkeep must be economical and its controls so simplified that it does not require an expert to get the best out of it.

Here is an up-to-date receiver which will answer these requirements. And that is why I like the Easytune 60.

tension batteries; later, as a test, I used a D.C. mains unit with a view to the supply of a higher voltage. The receiver responded well to this treatment, and with careful and judicious adjustment of grid-bias voltage I obtained reception at full volume of some of the weaker transmissions. The quality of the production was highly satisfactory.

The Easytune 60 should prove an excellent household receiver; it lacks all the complications of the average

set and can be handled by any member of the family, however limited his or her knowledge of a wireless instrument may be.

It has been reduced to the "pull the knob out and turn the dial to 84" stage without any further instructions being needed for its use in the absence of its owner. If you once log the condenser-dial reading of a transmission, be it of home or foreign origin, you can return to it time after time with the full

Building the Easytune 60

Construction Reduced to the Simplest Procedure

The construction of the Easytune 60 has been reduced to such a degree of simplicity that there is little to be said on this score. These notes are mostly concerned with remarks about the components used. The "key" components are the special gang condenser and the band-pass and oscillator coils designed to match up with it.

SO simple is the construction of the Easytune 60 that we find it difficult to write anything about it! It will be evident from the photographs that appear in these pages that no part of the layout is at all cramped and that every component is quite accessible.

No Panel Needed

No panel is needed so the constructor is saved the trouble of having to mark out and drill a piece of ebonite. All the components are fixed directly to the baseboard, as will be clear from the half-scale layout diagram that appears on the opposite page.

This half-scale plan will be sufficient for many constructors, but those who desire one can obtain a full-size blueprint for half price, that is 9d. post free, if the coupon on the last page is used by May 31. Ask for No. WM284 and address your application to "Wireless Magazine" Blueprint Dept., 58-61 Fetter Lane, London, E.C.4.

Numbered Leads

As is usual with all "Wireless Magazine" blueprints, each connecting lead is numbered separately in the best order of assembly. When all the parts have been firmly fixed in position, therefore, the constructor has only to put the leads in position in the order indicated by the numbers.

By this means it is impossible to make a mistake in the wiring. Each number on the wiring diagram or blueprint should be crossed through with a pencil as soon as the corresponding connection has been made.

No soldering is necessary for every component is provided with terminals for making connections.

No cabinet is shown for the set because next month we shall describe how to convert the Easytune 60 into a table radio gramophone. This is something new so far as the home constructor is concerned and will undoubtedly attract considerable attention.

This radio-gramophone cabinet is being made specially for "Wireless Magazine" by Smith's Cabinets, Ltd., and full details will be disclosed in the June issue of "Wireless Magazine."

Some readers may desire to use the Easytune 60 in a cabinet they already have. There is no objection to this provided the layout is not altered in any way. The layout shown in these pages has been arrived

list of parts can be used in the Easytune 60. These coils have been designed to match up with the Radiophone condenser and if any other types are used the set will not gang up.

Special Gang Condenser

Another special part that has no possible alternative is the three-gang condenser. As already explained, this has specially shaped vanes in one section to give the correct oscillator matching throughout the long and medium waveband.

The remainder of the parts used in the set are standard and any alternatives of equivalent value and quality can be utilised. There is nothing unusual about the two band-pass intermediate filters, except that they are both provided with pigtail connections. Any standard 126-

COMPONENTS NEEDED FOR THE EASYTUNE 60

COILS

- 1—Set of Lewcos super-het coils comprising band-pass filter, type BPF/G, 12s.; oscillator, type TOS/G, 8s. 6d.; two intermediate band-pass filters, with pigtails, type IFTP, £1 1s.

CONDENSERS, FIXED

- 1—Dubilier .0002-microfarad, type 670, 1s. (or T.C.C., Telsen).
1—Dubilier .0003-microfarad, type 670, 1s. (or T.C.C., Telsen).
2—Dubilier .002-microfarad, type 670, 2s. 6d. (or T.C.C., Telsen).
1—Dubilier .01-microfarad, type 670 (or T.C.C.).
5—Dubilier 1-microfarad, paper type, 13s. 9d. (or T.C.C., Peak).

CONDENSERS, VARIABLE

- 1—British Radiophone .0005-microfarad three-gang super-het type with cover and disc drive, £1 15s.

GRID-LEAK HOLDERS

- 2—Radi-Rad, 1s. (or Bulgin, Telsen).

HOLDERS, VALVE

- 7—W.B. four-pin, miniature type, 4s. 8d. (or Lotus, Clix).

PLUGS AND TERMINALS

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

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

RESISTANCES, FIXED

- 1—Bulgin 50,000-ohm spaghetti, 1s. 9d. (or Magnum, Lewcos).
1—Edison Bell 5-megohm grid leak, 6d. (or Lissen, Telsen).
1—Edison Bell 2-megohm grid leak, 6d. (or Lissen, Telsen).

RESISTANCE (VARIABLE) AND SWITCH

- 1—Wearite 15-ohm rheostat combined with three-point switch, types Q4 and G23, 3s. 6d.

SUNDRIES

- Tinned-copper wire for connecting (Lewcos).
Length of oiled-cotton sleeving.
Lengths of rubber-covered flex (Lewcos).
2—Belling-Lee terminal blocks, 1s. 4d. (or Sovereign, Junit).

TRANSFORMER, LOW-FREQUENCY

- 1—Lewcos type LFT6, 10s. (or Ferranti AF8, R.I. Hypermite).

ACCESSORIES

BATTERIES

- 2—Ever-Ready 60-volt, type HP60, £1 10s.
2—Ever-Ready 9-volt grid-bias, Winner type, 2s.
1—Ever-Ready 2-volt accumulator, type 2127, 13s. 6d.

LOUD-SPEAKER

- 1—R. & A. cabinet cone, type 40, £2 (or Amplion, W.B.).

VALVES

- (v₁) 2—Osram S22, £1 13s. (or Marconi S22)
(v₂) 1—Marconi I2/b, 7s.
(v₃) 1—Osram HL2, 7s. (or Marconi HL2)
(v₄) 1—Osram P2, 12s. (or Marconi P2)

at after many hours of patient research and if it is altered at all the results may be badly affected. To repeat the original "Wireless Magazine" results, keep to the published layout!

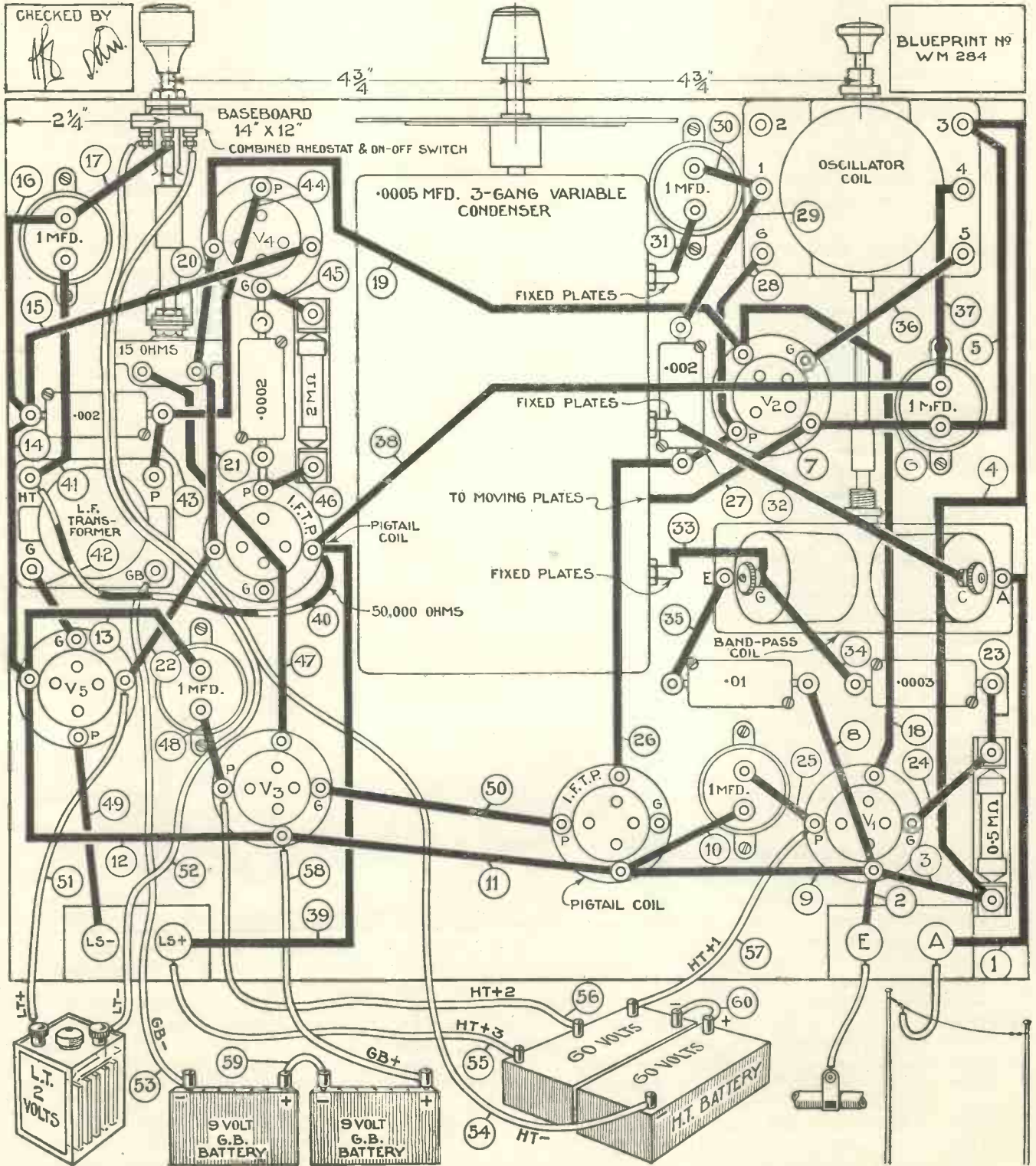
Constructors must be quite clear that only the particular band-pass and oscillator coils specified in the

kilocycle filters can be used.

The Easytune 60 is rather sensitive as regards valves and only those types recommended should be employed. This is particularly the case with the two screen-grid valves; in the Easytune 60 the type specified is very much more efficient than any models and should be used.

Half-scale Layout and Wiring Plan

If desired a full-size blueprint can be obtained for half price (that is, 9d., post free) if the coupon on the last page is used by May 31. Ask for No. WM284 when ordering from the "Wireless Magazine" Blueprint Dept.



Each connecting lead is numbered separately in the best and most convenient order of assembly. It is convenient to connect up with wire covered with lengths of oiled-cotton sleeving

Operating the Easytune 60

No Ganging Troubles and Only One Knob to Tune

Once the preliminary adjustments have been made to the trimmers on the three-gang condenser used in the Easytune 60 there is only the main tuning dial to operate to bring in scores of foreign stations on the loud-speaker. The actual ganging of the set is very simple and will take only a few minutes.

CONSTRUCTORS of the Easytune 60 will be anxious to put it through its paces as soon as possible; they will be able to do so a few minutes after the last connection has been completed.

Pigtail Connections

When the valves have been inserted in their holders, place the two intermediate coils in position, making sure to connect the pigtail connections to the anode terminals of the two screen-grid valves.

The connections to the low-tension accumulator and grid-bias battery will be obvious; in the case of the latter apply the bias recommended by the makers of the power valve.

There are three high-tension supply leads. That marked H.T.+1 supplies the screening grid of the first detector and should be inserted in a tapping on one of the 60-volt batteries to give a voltage of between 60 and 80 volts. The best value will vary somewhat with different valves.

Other Tappings

The lead marked H.T.+2 supplies the screening grid of the intermediate-frequency amplifying valve, and should also be tried in tappings between 60 and 80 volts. H.T.+3 supplies the anodes of all five valves and should be plugged into the 120-volt tap.

Having roughly adjusted the battery voltages, connect the aerial, earth and loud-speaker. The set is then ready for use.

To switch it on, pull out the knob on the right; this operates the on-off switch. On the left is the wave-change switch; this is pulled

out for medium-wave reception and pushed in for long-wave working.

The first thing is to adjust the trimmers on the three-gang condenser; once they are set properly they will not have to be touched again.

Start with the trimmer at the back of the set and unscrew it. Then screw the middle trimmer right up.

The trimmer nearest the front of the set (that associated with the oscillator-tuning portion of the condenser) should be nearly, but not quite, screwed up.

Adjust the set for the medium waves and turn the knob of the on-off switch (after having pulled it out, remember, to switch on) to the right for maximum volume and turn the main tuning dial until a known station is picked up at reasonable strength.

The dial reading should approximate to that shown for the

This should be so adjusted that there is no double-hump effect and the proper band-pass "spread" is obtained. If necessary also adjust the second trimmer until the right effect is obtained.

If the oscillator trimmer is adjusted as explained the readings for all the stations received should conform with the readings indicated on the tuning charts (for medium and long waves) opposite.

Band-pass Trimming

There is no need to alter the oscillator trimmer when going from medium to long waves, but during the preliminary adjustments the band-pass trimmers should be set on both wavebands.

It will be understood from this explanation that the ganging of the set presents no difficulties. Once the trimmers are adjusted there is no need to touch them further, and the set should bring in all the stations shown on the tuning curves by the operation of the main tuning dial.

To reduce volume, turn the knob of the on-off switch to the left. Whatever the position



ONLY ONE KNOB TO TUNE—THREE CONTROLS IN ALL

As this photograph shows, the Easytune 60 has only three controls. There is only one tuning knob, the other two controls being the wave-change switch and a combined on-off switch and volume control

particular station on the tuning chart opposite. Now adjust the front trimmer until the reading for the station coincides exactly with the reading indicated on the chart.

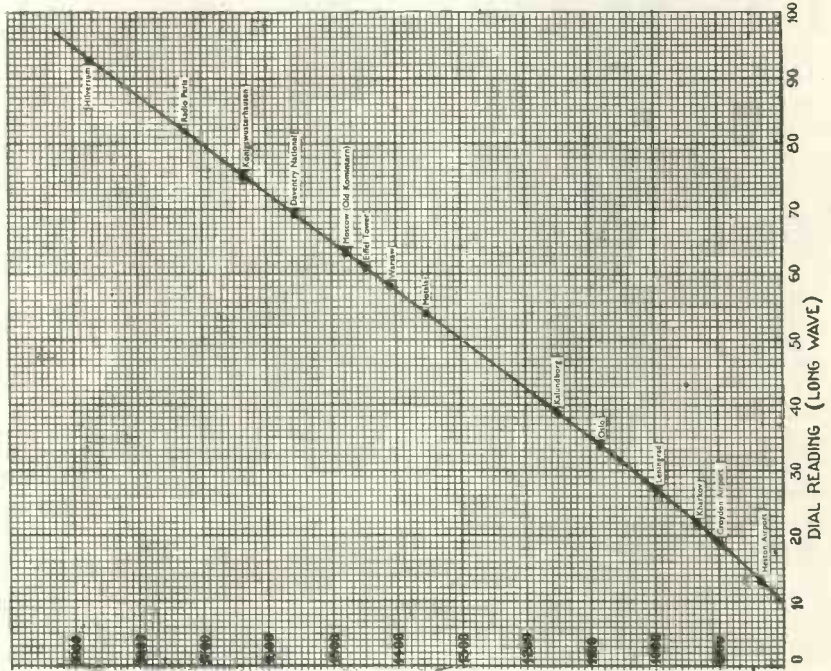
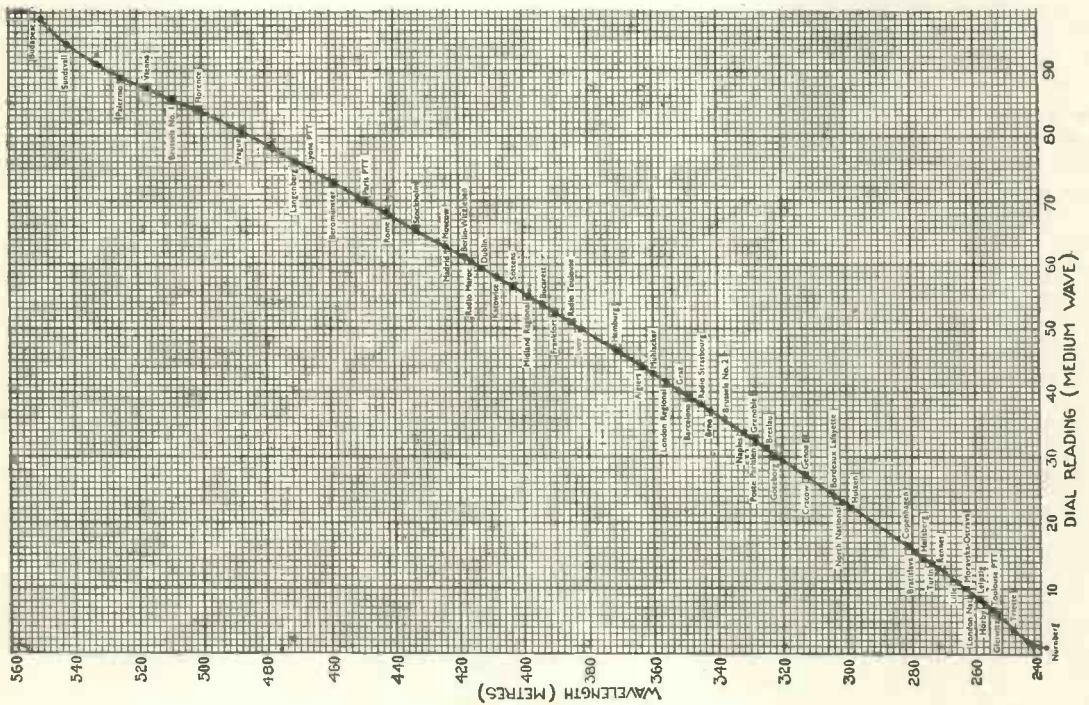
The next thing is to adjust the band-pass circuit; this can usually be done by turning the knob of the trimmer at the back of the set.

of this knob for controlling volume, the set is switched off by pushing it in. The intermediate valve will be switched right off if the knob is turned right round to the left.

Sounds almost too simple to be true, doesn't it? But just build the Easytune 60 and see for yourself!

Medium- and Long-wave Tuning Charts for the Easytune 60

These tuning curves (medium waves on the right and long waves below) have been prepared from the test log compiled by J. Godchaux Abrams and reproduced on page 390. When the Easytune 60 is first put into operation the trimmer on the oscillator section of the three-gang condenser (that is the trimmer nearest the front of the set) should be adjusted so that the dial reading for the stations received coincide with those shown by the curves. There will then be no difficulty about identifying the foreign stations picked up on the Easytune 60 are given for more than seventy stations received on the Easytune 60 are given by these curves; it will be noted how remarkably straight they are.



News of the Short Waves

I HAVE just seen some details of an extremely interesting type of short-wave receiver or, rather, an ultra-short wave receiver. The receiving system is actually in duplicate, with two separate tuners and two separate amplifying systems combined in one unit.

Speech and Television

One receiver system is for the reception of ordinary broadcast speech and music, whilst the other outfit is for the reception of television signals. The two tuning units are placed in line and one dial controls the tuning condensers of both units.

The two tuning units are set beforehand to a definite separation of so many kilocycles and, with a number of sound and television stations working each with the same number of kilocycles separating each transmitter, a speech and music transmission is tuned in on the one tuner, whilst the appropriate television transmission automatically comes through on the other tuner.

Such a receiving system may come into use here on the short waves in the distant future and if one particular waveband was set aside for sound transmissions and another for television transmissions, and if each individual station was separated from its companion television station by a definite frequency, then such a system would have a practical use.

Perhaps some day we shall have a system of this type working on the ultra-short waves for the local reception of sight and sound programmes.

Mains Set

It is sometimes an extremely difficult business to obtain satisfactory reception from a short-wave receiver operated from a mains supply. A number of receivers have been made to give very excellent results when used in this manner, certainly, but, as a general rule, the operation is by no means easy.

So much depends on the nature of the mains supply and even if the receiver itself is satisfactory, results will be very poor if the mains supply is not good. Just recently, I came across an instance where a perfectly

good short-wave receiver was being used in conjunction with a D.C. mains unit, the filaments of the valves being run off the usual accumulator.

The mains in this instance were known to be particularly "raw" but, surprisingly enough, at the first test the receiver appeared to be functioning perfectly normally, the amount of hum was not objectionable and there were no "line" noises.

However, after the receiver had been in use for some time, it was discovered to have the very annoying habit of suddenly bursting into oscillation for no apparent cause. At other times, it would have the reverse effect—that is, when a weak station had been tuned in and the receiver had been adjusted to the edge of oscillation, the signal would suddenly fade away and it was found that, on turning the reaction dial, the receiver was very far from the oscillating point, instead of just on the edge, according to the original adjustment.

Now, the receiver did not show this curious effect when used on batteries and it only occurred when it was connected to the mains unit. Finally, the effect was traced to the fact that the D.C. mains supply varied in voltage very considerably at times.

A short-wave receiver, unless it be of the super-het variety, is usually operated on the very edge of the oscillating point in order to obtain

the greatest sensitivity. When the receiver is operated with the reaction control even a small distance "out," it is in a very insensitive condition and is practically useless for short-wave reception.

At the same time, also, the amount of reaction required to produce a given amount of feedback effect will depend on the value of the high tension applied to the detector plate (as well as on other factors, of course).

Therefore, naturally, if the high-tension supply is constantly varying so will the degree of oscillation. Minute changes or fluctuations are, of course, smoothed out by the eliminator equipment, but this will not account for a semi-permanent drop of voltage. 'Tis a problem!

Thirty U.S. Stations

Reverting back to television and short waves, it is interesting to note that television interest in the U.S. runs so high that at the present time there are no less than thirty stations licensed for television transmissions on the short waves.

The stations range in frequency from 1,600 to 80,000 kilocycles. Some of these stations are used in conjunction with sound stations operating on other frequencies and others just transmit merely the television programme without the addition of sound.

Mander Barnett.

THE WIRELESS ZOO

(The Irritator)

*The Irritator makes us sigh,
She is a type of butterfly
Who talks of Wireless through her hat:
"The dinky glass thing, what is that?
A valve? I'll fix it, only see!
Oh dear! I've smashed it! Naughty me!
This coil of wire? I've tangled it,
Only a teeny, weeny bit!"
She flits about and spoils our Set,
We only wish we had a net!*

LESLIE M. OYLER.



A CENTRE OF AUSTRALIAN RADIO ACTIVITIES

This is not one station, but many. The location is near Sydney. There are aeriels and transmitters for the VK2ME experimental short-wave station, for ship-to-shore working, for the police department, for commercial work, and for ordinary broadcasting

WHILE the B.B.C. is getting ready to transmit a 24-hour programme and news service to "the Empire on which the sun never sets"—via the short-wave link—another scheme is rapidly approaching completion whereby the many medium-wave stations throughout the Empire can be provided with first-class programmes originated in studios in London.

"Bottled" Items

Colonial Radio Programmes, Ltd., is out to record good programmes, featuring artists well known to English listeners, and to distribute these "bottled" programmes to the many broadcasting stations so sorely in need of suitable material in the many out-of-the-way parts of the Empire.

As Mr. Malcolm Frost, the young and enthusiastic head of the new organisation, pointed out to me during a recent chat, there is no question of a clash of interests between Colonial Radio Programmes, Ltd., and the B.B.C. with its Empire short-wave stations.

While it is true that the opening of the new Daventry station will undoubtedly extend the use of short-wave apparatus, there must be many more sets available for medium-wave reception of whatever meagre local service is provided than for the

problematical reception of the far-distant B.B.C. transmissions.

The big trouble at the moment with these Colonial stations is lack of revenue. This handicap forces the station managers to resort to gramophone records for the major part of the broadcast entertainment. The gramophone companies are not too well disposed to this extensive use of records; in fact, definite prohibition has already been threatened or carried out in some quarters.

Even with a satisfactory revenue these colonial stations would still be up against the lack of artists. So what with lack of revenue, lack of

The great problem of all the medium-wave broadcast stations operating throughout the "Empire on which the sun never sets" is to get good programmes. There is, naturally, a dearth of artists in the distant corners of the earth and expense is another important item. In this article is explained an ambitious scheme for making high-class programmes in England, recording them, and then sending the records to the Colonies and Dominions

artists, and antagonism from the recording companies, the outlook has certainly not been too good for many of the colonial broadcasters.

Now Mr. Malcolm Frost wants to change all that. He is busy recording vaudeville shows, plays, book criticisms, and, in fact, every phase of all that is best in British broadcasting. He has already fixed up contracts with most of the colonies, and by the time this is read the first recorded programmes will have been broadcast.

Complete in Every Detail

I have heard one of these programmes, and I must say that, listening to the loud-speaker reproducing the gramophone recording, it was hard to tell that the programme was not actually taking place in a London-station studio. You see, it is not just an ordinary record, but one complete in every detail with broadcast studio presentation.

It was easy to tell that the announcer on this record was one of the young men of Savoy Hill. Then there was one of the Hulbert Brothers, and other radio favourites to complete the illusion.

During my audition I also heard a talk on the modern novel by J. B. Priestley, and I understand other eminent literary folk have made records specially for Empire con-

EMPIRE PROGRAMMES—Continued

sumption through the medium of records.

Special Cue Sheet

At present ordinary 12-in. records are being used, but even so there appears to be no difficulty in achieving an illusion of absolute continuity. The station manager is provided with a cue sheet, so that he can fade in one record just as another is finished. This was done for my benefit, and it was quite impossible to tell where one record ended and the next began.

Another way of maintaining the illusion that the recorded pro-

gramme is actually taking place in the local studio is the fading in of local announcements, which can, with a microphone, be super-imposed on a suitable soft background of music.

Mr. Frost was quite candid about the whole business. He explained that his organisation was primarily concerned with selling recorded programmes. If colonial subscribers of the scheme liked to make profit from advertisements linked with the recorded programmes that was their business.

It was while producing shows in a New York studio that Mr. Frost

first came across this idea of "electrical transcription" of studio programmes. He found that many of the distant broadcasting stations, too far away from New York to take a programme by landline, were being fed with first-class programmes by means of records sent to them through the normal postal channels.

Admirable Scheme

Immediately it occurred to Mr. Frost that such a scheme would be admirably suited to the many out-of-the-way stations in the different colonies that go to make up the British Empire.

Followed a trip pretty well round the world, interviewing the various governments. And the sequel is Colonial Radio Programmes, Ltd., with Malcolm Frost as managing director, and Paul England, the well-known producer, as the head of the artistic side of the enterprise.

As Mr. England emphasised to me, the possibilities of the production side of the scheme are unlimited. The very best artists in the country can be secured, since the cost of each programme will be shared by the many stations that subsequently take the recording for local broadcast. Another important economic point is that artists are prepared to appear in the recording studios during the morning and afternoon for considerably lower fees than in the evening.

Should you tune-in some of the Colonial short-wave stations within the next week or so, do not be surprised to hear what seems to be a concert from the London studio. Really it will be one of the first of the recorded programmes.

Australia and Kenya

Such stations as VK2ME, the short-wave Melbourne station on 31.55 metres, and Nairobi, Kenya, on 49.5 metres will probably be among the first to transmit these programmes.

It is too early to forecast the extent of the service these recorded programmes will offer to stations in need of programme material, but as I write contracts are being fixed up with many stations "Wireless Magazine" readers habitually pick up.

For example, the records dealing with literary criticisms, by such eminent folk as J. B. Priestley, John

THE SEVEN AGES OF A WIRELESS FAN

(With apologies to Wm. Shakespeare)

*All the world's a stage,
From which we get our wireless programmes.
We have our "crystals" and our super-hets,
And one man in his time buys many parts,
His progress being seven stages. At first the crystal,
Straining its utmost to receive the news.
And then a humble one-valve set, with battery
And shining precious valve, giving the programmes
At good headphone strength. Next a three-valver,
Most popular of sets, with screen-grid valve
And possibly a pentode. Then a short-waver,
Full of H.F. and tricky as the deuce
If stray capacities aren't carefully avoided,
But for long-distance work
Having no equal. And then the super-het,
With two detectors and an I.F. stage,
Marvellously selective and bringing in
'Most any foreign station worthy to be heard.
And so he buys his parts. The sixth stage shifts
Into a gorgeous radiogram,
With polished cabinet and moving coil,
Its grammo motor working from the mains
Saving the winding of the older types,
And probably, if you WILL have the best,
An automatic record-changer. Last stage of all
That ends this strange eventful history
Is programmes from a relay-service speaker-plug,
Sans coils, sans chokes. sans valves, sans everything !*

L. PITCHFORD.

HOW THEY WILL BE MADE IN ENGLAND

Buchan, and Hugh Walpole, are to be broadcast by that very popular little French station, Fécamp, on a wavelength of 222 metres.

Later it is probable that the high-power Irish station now being erected at Athlone will make use of programmes recorded in London. Actually, there is no limit to the possibilities of distributing the home product to the hundreds of stations scattered throughout the world.

World-wide Programmes

Another point to bear in mind is that all the recording may not necessarily be confined to London performances. Later it is hoped that records will be made in different parts of the Empire, sent to London in matrix form, and then distributed to whichever subscribers want them.

By this means the uncertainty of landline and radio-telephone links between the constituent parts of the Empire could be replaced by the certainty of locally transmitted records of whatever outstanding events might be deemed of Empire-wide interest.

When you think of the B.B.C.'s



MAKING PROGRAMMES FOR EMPIRE BROADCASTING

Here are Mr. Malcolm Frost, the Carlyle Cousins, and Paul England making a record for Empire broadcasting. The records will be sent from England by post and transmitted from Colonial and Dominion stations all over the world



THE COLONIAL RADIO ORCHESTRA

This orchestra has been got together specially for the making of records for Empire broadcasting. It is conducted by George Scott-Wood

Empire stations, with their need for programme material for maintaining the 24-hour service, it does not need much imagination to see that the organisation now going ahead with recorded programmes might be of great service to the B.B.C.

It is certain that the B.B.C. will make a considerable use of "bottled" programme material for the Empire

broadcasts, and already it has been decided that, for musical programmes at least, the wax-disc system of recording shall be used.

For all such recorded broadcasting there would be obvious advantages in the much-discussed long-playing record. Experiments by the technical section of Colonial Radio Programmes, Ltd., have led to the

development of a slow-running recording and reproducing motor mechanism that seems likely to solve the problem of good quality records that will play for half an hour.

Such a record would be much easier to mail to the outposts of Empire than a batch of short-playing records.

Lastly, I should mention that, but for the activities of Mr. Frost, contracts might by now have been placed by the sorely pressed colonial stations with American broadcasting interests.

In British Hands

Fortunately, the service is now in British hands, so that the dismal history of the film industry, which has so lamentably failed to give the Empire pictures of British sentiment, owing to the supremacy of American film distribution, will not be repeated in so far as Colonial Radio Programmes, Ltd. can supply excellent programmes at a reasonable price.

Our colonial kinsmen will not only buy British, but "hear British," as rendered in London studios.

TESTS OF NEW APPARATUS

Motor Moving-coil Loud-speaker :: Clix Chassis-mounting Valve Holder
Magnum Paper-dielectric Variable Condenser



WELL MADE AND SENSITIVE
This Motor loud-speaker is provided with a three-ratio output transformer for matching up with the power valve

MOTOR LOUD-SPEAKER

APPARATUS: Permanent-magnet moving-coil loud-speaker.
PRICE: £3 10s., with multi-ratio transformer.
MAKERS: Tekade Radio and Electric, Ltd.

A GOOD permanent-magnet moving-coil loud-speaker which we have tested this month is that made by Tekade Radio and Electric, Ltd., and known as the Motor loud-speaker.

The diaphragm is of paper, 8 in. in diameter, being suspended from the chassis by means of a sectionalised leather surround. The moving coil itself is approximately 1 in. in diameter and is of the low-resistance type.

The input transformer can be obtained with three ratios for matching up to all normal types of power valve, or as a single-ratio pentode type.

On test the loud-speaker gave very good results indeed on both speech and music; in fact, it compared very favourably with our standard mains-energised model. As regards sensitivity it was well up to standard, and it will give good results with any small receiver employing a normal type of power valve.

At the same time the power handling capacity was good and no signs of distress were noticed with 3 or 4 watts input.

CLIX VALVE HOLDER

APPARATUS: Chassis-mounting valve holder.
PRICE: Four-pin, 8d.; five-pin, 9d.
MAKERS: Lectro Linx, Ltd.

WE are reviewing this month one of the Clix chassis-mounting valve holders, which is made by Lectro Linx, Ltd., the makers of the well-known Clix terminals and other accessories.

The chassis type of construction, already very popular with manufacturers, is becoming so with amateurs, and this valve holder is well worth consideration. It is constructed from a disc of high-grade paxolin on which the brass sockets are mounted. These sockets are of an improved turned type and a very good contact with the valve pins is obtained. They are provided with terminals for connection, a good point from the amateur's point of view.

Crescent-shaped slots have been formed around the anode and grid pins in order to allow the sockets to centre themselves with the valve pins, thus creating a floating effect. This holder is well made and is easy to mount, a hole approximately 1 in. in diameter being required.

The holder is obtainable in the four- or five-pin type, the retail prices being 8d. and 9d. respectively.



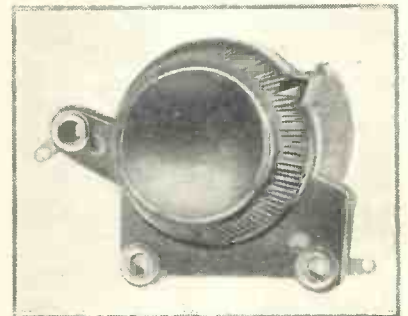
HOLDER FOR CHASSIS MOUNTING
This photograph shows the simple construction of the Clix chassis-mounting valve holder, made in four- and five-pin types

MAGNUM VARIABLE CONDENSER

APPARATUS: .0005-microfarad paper-dielectric variable condenser.
PRICE: 2s. 6d.
MAKERS: Burne-Jones & Co., Ltd.

CONSIDERABLE ingenuity has been expended lately in the production of small paper-dielectric condensers, and the Magnum condenser on which we are reporting this month is a typical example.

The condenser is of the logarithmic type, shaped plates being used to give the necessary graduated variation of capacity. The fixed-plate



NEAT REACTION CONDENSER
The new Magnum Paper-dielectric variable condenser—especially suitable for reaction control

assembly is housed between paxolin end plates, which also carry the bearing for the moving plates.

These are assembled on the spindle in the usual manner, and are tied at the tips to a small lever fixed to the spindle. Contact to the spindle is by a spring of phosphor-bronze wire.

The capacity of the condenser was .00049 microfarad maximum, the minimum being .00003 microfarad, which is quite a low figure and gives a good capacity range.

As is usual with this class of condenser, the high-frequency resistance is appreciable. On the sample tested it was approximately 10 ohms at 400 metres. This value, while distinctly more than that of an air condenser, is quite good for a component having a bakelised-paper dielectric.

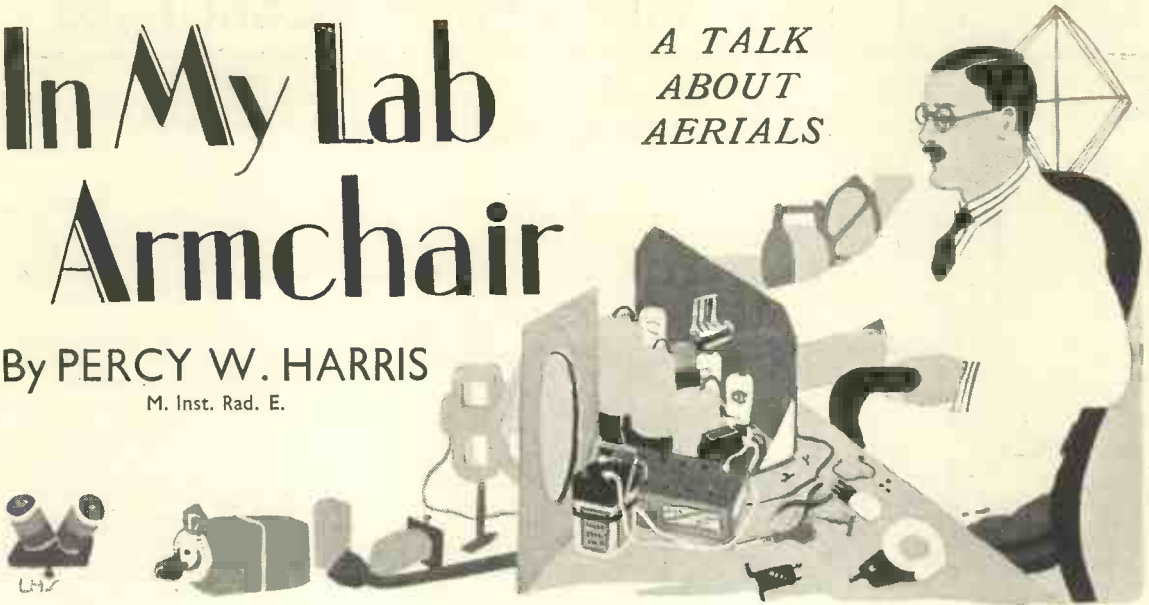
The movement is smooth and easy, and the condenser should have several useful applications.

In My Lab Armchair

By PERCY W. HARRIS

M. Inst. Rad. E.

A TALK
ABOUT
AERIALS



ONE of the guy ropes of my aerial having broken, thus precipitating the wire, insulators, and all on the lawn, I recently took the opportunity of overhauling the antenna system. This work reminds me of several things I have found out about aerials in the last few years.

For some reason or other, listeners as a whole seem to pay far more attention to fitting a heavy insulated lead-in tube than to looking after the far more important matter of insulation of the aerial extremity.

If you think for a moment, you will realise that the farther away you get from the earth, the higher the potential with which you have to deal.

Roughly speaking, we can say that at the extremity of the aerial it is all voltage and that the point where the wire enters the earth it is all current.

As the whole object of our insulation is to prevent the minute pick-up leaking away to earth, the maximum insulation should obviously be placed at the point of highest potential.

Single-wire Aerial

This will be clearer after an examination of Fig. 1, where we have a simple single-wire L-type aerial joined to a mast at one end of the garden and to a chimney at the other, the insulators c and d being provided to prevent leakage.

Between b and a I have drawn a simple coil and condenser representing the receiving set and, as our

valve is applied between b and a, the insulation of all portions above b is very important.

The first possible source of leakage is at the lead-in insulator where the voltage, however, is fairly low. When we reach the chimney at c, though, the voltage will be much higher and at d is at its maximum. Yet, in spite of this, one often sees most elaborate and heavy insulators used at b, while any old thing seems to do at c and d.

Trouble with Soot

Furthermore, as c is near a chimney, it often becomes covered with soot, and as soot is largely carbon, which in itself is a conductor, it is not surprising that people often get much worse results than they expect with this type of support.

The aerial insulators at c and d should be inspected at regular intervals and should be kept clean and, what is more, they should be of a type which has a long leakage path.

This is the more important when the mast, as is frequently the case, is of metal (being earthed, of course). As a matter of fact, a thin ebonite or porcelain tube passed through the wooden window frame is perfectly satisfactory at b, porcelain being, to my mind, the better, as it deteriorates far less from exposure and, being glazed, is very easily kept clean.

Furthermore, being white, one can see when it is clean!

In Fig. 2 are shown three arrangements of a twin-wire aerial which illustrate an interesting and much

neglected point. In Fig. 2a, we see two aerial insulators at A and B serving to insulate the wires from the spreader, guy wires, and masts.

In Fig. 2b, we see the same type of aerial, but in this case there is one insulator A, which also insulates both wires from the mast. The point which is rarely realised is that the insulation arrangement of Fig. 2b is just half the cost and twice the efficiency of the arrangement Fig. 2a!

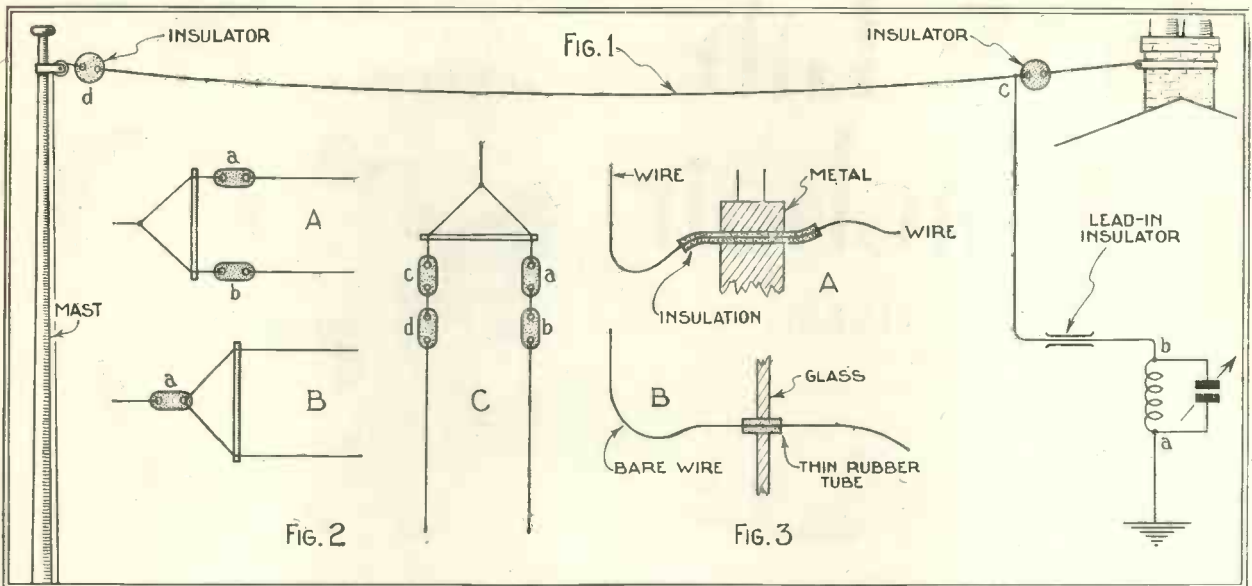
Now in the arrangement of Fig. 2a the two insulators are in parallel and, as you know, two resistances in parallel (for aerial insulators are, of course, extremely high resistances—as near infinity as we can get) have just half the resistance of one of them (presuming both are equal), so that if we give the insulating value of the arbitrary figure of 2, then two in parallel give a total insulating value of 1.

In Fig. 2b, where one insulator is used, the insulation value is 2, or twice as good as the arrangement in Fig. 2a.

Series and Parallel

Actually, if we are bound to use insulators in each wire to give the same insulating value in Fig. 2c as we have in Fig. 2b, we must use no less than four units. Let A, B, C, and D in Fig. 2c each have insulating values of 2. A and B are in series, so that the total insulation value there is 4, and the same applies to c and d. We thus have two insulators of 4 giving a parallel total insulation of 2, which is exactly the same as that in Fig. 2b!

IN MY LAB ARMCHAIR—Continued



SOME TYPICAL AERIAL AND LEAD-IN ARRANGEMENTS

Fig. 1.—Simple single-wire L-type aerial. Fig. 2.—Three arrangements of a twin-wire aerial. Fig. 3.—Two methods of insulating a lead-in

As far as insulators are concerned, I have found glass (such as the Pyrex pattern) or porcelain rod the most satisfactory, as they have a long leakage surface and are practically self-cleaning in the rain. The egg type are stronger, but have a small leakage surface and several should be used in series.

Ebonite rod and a number of the moulded products are only satisfactory when new. The surface soon disintegrates, besides giving trouble with soot and dirt, which is very difficult to remove even by rubbing, and just stays on through the heaviest rain.

Multi-wire Aerials

I doubt whether there is much advantage in these days from the twin- or multi-wire aerial for receiving. Measurements I made a few years ago indicated that while slightly better results are obtained, they are not worth the additional expense in wire and insulators, etc., and such aerials are difficult to erect so as to look tidy.

There is little to choose between the single-wire L and the single-wire T type of aerial and, contrary to the generally accepted traditions, the directional effect of the L type, in which the length of the horizontal wire is not greatly different from that of the vertical, is negligible in all receiving conditions for broadcasting.

It is also unimportant to arrange

the two halves of the T to be of equal length for the ordinary broadcast aerial, for this point is only of importance when the natural frequency of the aerial is close to that of the wavelength one desires to receive, which is rarely the case with ordinary receiver aerials, and the wavelengths adopted nowadays.

In short-wave reception, of course, conditions are different.

I was consulted the other day by a friend with regard to his particular method of leading-in and, as he was well acquainted with the point I referred to at the beginning of this chat (about the small voltage on the lead-in insulator), he asked me whether it would be sufficient to pass a well-insulated wire between the window frame and the sill, shutting the window frame down on to it.

This would have been satisfactory if the window frame and sill had not been of metal, but as he was using one of the modern window frames of all-metal construction, the scheme in his case would be bad.

However good the insulation, if it were thin it would act as the dielectric of a relatively large condenser, and thus he would lose some of the energy to earth.

By far the best scheme, if you can manage it, is to get your glazier to drill a hole through the window pane and pass the wire through this. The wire can be bare, for the glass is an excellent insulator, with a wide leakage surface, but in order that the

wire shall not shake about in the hole, a piece of rubber tube should be slipped over at the point where the wire passes through the glass. This will serve the double purpose of preventing rattle and making a water-tight joint, if the tube is chosen of the right thickness.

It is important in such cases, however, to avoid possibility of strain on the glass. For this reason, the strain of the aerial should be taken by an insulator connected to some point near, so that when the aerial sways in the wind no strain will be placed upon the window glass.

Insulation Snags

Insulation is one of the most fascinating studies in radio and as the effects of high frequencies are often quite different from those of the low, many electrical engineers well acquainted with ordinary electrical phenomena have been gravely misled when taking up wireless.

Take, for example, the case of ebonite; it is one of the finest electrical insulators and quite a small thickness will give a resistance of practically infinity for direct current and low-frequency alternating current.

Tested at high frequencies it will show some of the very best results obtainable provided (and this is very important) that it does not form the dielectric of a condenser handling a lot of power.

In transmitting stations, such as

EXCLUSIVE FEATURE BY PERCY HARRIS

those of the B.B.C. and the British Post Office, insulation has to be most carefully chosen and arranged, particularly if the insulators are so placed that they are in a strong electrostatic field.

High-power Work

In high-power transmitting stations it has been found impossible to use ebonite and such substances in some positions for, after a comparatively short run, the ebonite softens, melts, and actually bursts into flame, due to the tremendous stresses set up in it, with the generation of heat.

Certain kinds of kiln-dried wood are found to be much preferable and a tremendous amount of research had to be done—and is still being done—on insulating materials for this purpose.

Many substances, while perfectly satisfactory for direct-current insulation and low-frequency alternating currents, become hopelessly unsuitable at high frequencies such as we use in radio. This is the reason why several years ago a number of very bad variable condensers were marketed. They looked good, were mechanically well made, and seemed to be adequately insulated, but the design was such that the insulators used between the fixed plates and moving-vane spindles to keep them apart were placed in a position where the electrostatic field was concentrated, while the material used was totally unsuitable for high-frequency insulation.

Nowadays, condensers—I mean good ones—are designed so that the strongest concentration of field is through air and in those places where a solid di-electric has to be used the field passing through it is weak and the material well chosen.

Ebonite, as a matter of fact, stands very high indeed on the list of materials suitable for receiving apparatus and several kinds of special porcelain are also very good indeed.

Ebonite has many advantages and a number of disadvantages. It deteriorates very badly on exposure

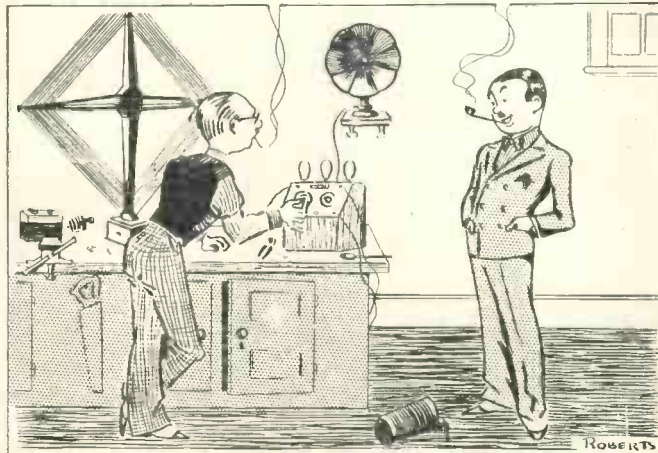
to sunlight and certain atmospheres, losing colour (which does not matter electrically, of course) and its insulating properties (which is most important).

It also withstands heat badly, with a tendency to warp and, as you have probably found, when trying to solder on to any screw which is fixed in ebonite, the heat will loosen it and you will have to tighten the nuts again. This is very noticeable if you try to solder wires or leads on to the terminals mounted on an ebonite terminal strip.

Bakelite, which is very widely used to-day, is also an excellent substance, and while it is not so good as ebonite from some electrical standpoints, it is very much better mechanically and can stand exposure to air and light excellently.

One of its great advantages is the facility with which it can be moulded. It is not generally realised that but for bakelite and the possibility of moulding components cheaply, our wireless parts would be very much dearer than they are to-day.

If you lift the lid of the modern



AN AERIAL HINT FOR SCOTSMEN!

"And what is the difference between an indoor and an outdoor aerial?"
"Oh, about 10s. a year!"

wireless receiver you will find bakelite everywhere—valve holders, terminal blocks, transformer cases, switch parts, grid-leak holders, fixed-condenser cases, valve caps—in fact, it is so common in use that you scarcely notice its existence!

It takes its name from an American named Baker, the inventor. I notice that even the box from which I have just taken a cigarette is entirely moulded from mottled brown bakelite.

By the way, every now and again some ingenious home-constructor conceives the idea of using old gramophone records for mounting parts, being under the impression that such records are made of ebonite. Ebonite is a rubber compound containing sulphur, but gramophone records have neither rubber nor sulphur in them.

Making the Material

The actual material used by gramophone companies varies somewhat, but in the main all records are made from a mixture of lamp black, certain mineral earths, and shellac, with one or two other materials added to give strength. The most important component is the shellac (either natural or synthetic).

I remember some time ago seeing the material for records being mixed in a large factory; here they used flock made from old rags, lamp black, a very fine white powder known as baryta, and, of course, the shellac already referred to.

This material was all mixed together in great rotary mixers and emerged looking for all the world like the flocculent soot that you find inside the chimney. The mixture was then subjected to heat, which caused the shellac component to melt, the whole then forming a kind of thick black paste, which was rolled out in great sheets, the sheets being marked with lines to facilitate easy breaking up.

As soon as the sheets were flat, they cooled, and the material became brittle. It was next broken up into squares, packed into trucks, and sent into the pressing rooms, where further heat melted the material so that it could be "squelched" out a record.

This is rather running away from the subject of wireless, although we all have our radio gramophones in these days. Most old records make quite good insulators, but the material is such that it should not be used in places where there is any concentration of field and where high-frequency losses can be set up that would mean inefficiency.



Here P. K. TURNER, M.I.E.E., describes the construction of a radio unit to work in combination with his A-P-A. The two together form a very efficient radio gramophone that gives the highest quality that can be obtained by modern methods. See also page 422 of this issue

A general discussion of the points that arose, and how they led to the circuit finally adopted

IN "Wireless Magazine" for December last I tried to define some modern standards of quality, of which the best, "A quality," had to fulfil the following requirements:

Effective frequency range, 40 to 10,000 cycles.

D.C. power in last valve, 25 watts.

Distortion maximum, 5 per cent.

In the March issue I followed this by describing a power amplifier, which I called the A-P-A, to fulfil these requirements, provided it is used with a good enough loud-speaker, and is properly coupled to a set of equal quality.

The next task, then, is to consider the design of such a set.

Starting Point

Now in designing a set there are certain data from which one must start: they are:—

- (1) The output required.
- (2) The range required for distant stations.
- (3) The source of the necessary low-tension and high-tension supplies.

But, curiously enough, the first point to be considered in a good-quality set is not one of these—except perhaps (3); it is the requirements and performance of the detector.

Any type of detector which is

required to rectify with negligible distortion calls for a certain minimum high-frequency input; and for most it is also essential that the input shall not exceed a certain maximum. And this is the starting point of the design.

Now among modern detectors, one stands out as giving practically undistorted rectification together with economy and convenience in use: that is the grid rectifier. But its input requirements are stringent. For the very best results it must be supplied with a mean carrier voltage which lies within quite narrow limits; and then its

When we have tuned in a station, we adjust the radio control to give exactly the right input to the detector, which we judge by the drop in current read on the meter; and then we set the audio control to give just what loudness we want.

Of course, if we are making an effort for simplicity and economy, we can compromise. We can pick a detector which allows a fair range between its maximum and minimum inputs for linear rectification, use a radio control only, and try to arrange the amount of audio magnification so that the greatest and least loudness required are given by inputs within these limits. But in a set specially designed for quality it is best to have the two controls.

Short or Long Range?

The next point is the range of the set, or in other words the amount of high-frequency amplification, if any. As far as my experience goes, all the mains valves likely to make good detectors call for a carrier of between .5 and 2 volts to give the best results. With usual circuits and a fair to good aerial, this can be got without high-frequency valves up to 20 to 30 miles from one of the new regional stations.

Though such a set, designed definitely for purely short-range work, is probably the ideal type, it is usually found more amusing to have at any rate some power of getting more distant stations. If we put in one high-frequency stage, we shall probably get an effective magnification of 100 to 150 from it;

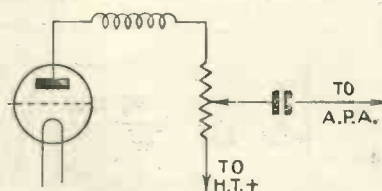


Fig. 1.—Resistance-coupled transformer

output (for a given modulation percentage) is fixed.

These facts—that the detector is to have a constant input and will give constant output for full modulation—have to be reconciled with the other facts; that the signal strength in the aerial is not under our control, and that the loudness wanted is not always the same. Thus we get to the point I have been leading up to: for A quality, a set should have two "volume" controls, and a meter in the detector-anode circuit.

and this should give us a daylight range of say 80 to 120 miles from a regional transmitter.

Now we know that at longer ranges and for distant reception at night, no amount of further amplification can be depended on to give a completely reliable service free from fading, interference, and so on. So I have decided that the first set of my design for "Wireless Magazine" shall be of the medium-range type.

Reaction

It may be expected to give first-class reception from the nearest regional station with little or no reaction, by day or night; and after dark to get twenty or so foreigners for amusement. Note this last. *"A quality" results can never be guaranteed from really distant stations.*

You will note from the last paragraph that I propose to put reaction on this set, and I suppose unless I explain why there are sure to be letters stating that reaction and A quality are incompatible.

This, of course, is nonsense, though I have often heard it said by those who ought to know better. If the coils of a set are of too low a high-frequency resistance, its tuning will be too sharp, and it will not give A quality. Now the effect of reaction is to lower the apparent resistance of some of the coils; and if they are already as low as is safe, the quality will be spoilt.

But if (as usual) the coils are of fairly high resistance—allowing for the damping effect of the valves connected to them—then reaction can be used to bring their resistance down. For example, suppose that it is known that the quality is not spoilt by a 10-ohm coil before the detector. Then it doesn't matter a bit whether we use an actual 10-ohm coil and no reaction, or a 30-ohm coil with enough reaction to bring its effective resistance down to 10 ohms.

Selectivity

Further, the reaction is very useful occasionally to push the range and selectivity a bit at the cost of quality. It is a case of half a loaf or no bread: most people, I think, will be glad on special occasions to get some special station which would otherwise be beyond their reach, even if it can't be received perfectly.

Next, as to the necessary com-

promise between quality and selectivity. With ordinary circuits it is useless to try and get a weak station with a strong one on a near channel, unless we are prepared to sacrifice the high notes. On the other hand, with so many powerful stations on the medium waveband, one cannot make the set as flat-tuned as one would like.

To my mind, the best compromise for a medium-range set such as this is to use three tuned circuits, and as the selection of wanted from unwanted signals should always be done as early as possible, we use two of these as a "band-pass filter" before the screened valve. But as nearly all the ready-made filters pass too narrow a band for A quality, we insert an extra condenser to widen it somewhat.

This has another advantage. The "mixed coupling" type of filter which is used nowadays is designed to give equal band width at both ends of the wave range. Putting in the extra condenser tends to throw it out of balance, so as to

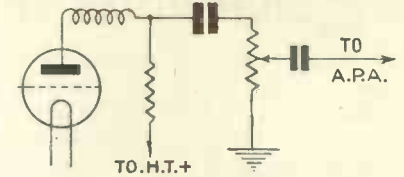


Fig. 2.—The use of two resistances

have provided for it; and I believe that the high output power will be found to give quite a new idea of what good records can do under the best conditions.

So far, then, we have decided that our set shall be a high-frequency, detector outfit, with a "band-pass" aerial circuit; and that it shall have both radio and audio volume controls. What form shall these last take?

The radio control is fairly simple, for at the present moment the variable- μ valve is by far the best for mains sets. So we will use one, and control its grid bias. But the audio control is not so simple.

If we have a resistance-coupled first low-frequency valve it is easy, of course. But this set is designed to work into the A-P-A, and the output of the detector, at its maximum, is enough to feed the A-P-A direct, without an intermediate low-frequency stage. We might resistance-couple the transformer (which itself is, of course, in the A-P-A), and use a volume control as the resistance, as in Fig. 1.

Audio Volume Control

But we should almost certainly get a noisy control, owing to the change in D.C. volts on the coupling condenser as we move the slider. This could be got over by using two resistances, as in Fig. 2, but we should find another trouble. If the high-tension feed resistance is high, there will only be a small detector current, and we shan't get enough undistorted output; if low, the net coupling resistance (that of both resistors in parallel) will be low, and we shall get poor efficiency and again not enough output.

Finally I decided on Fig. 3. The high tension is fed through a high-inductance choke, to give high impedance with low D.C. loss; and then we get good efficiency and large enough output.

But there is another point. With Fig. 3, as we vary the slider from

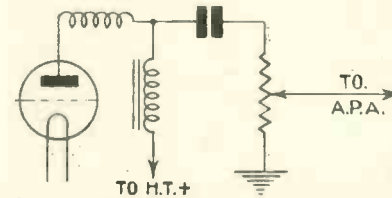


Fig. 3.—High-inductance choke coupling

give sharper tuning at the short-wave end of the scale. It thus tends to compensate for the effect of the intervalve coupling coil, which gives greatest selectivity at the long-wave end.

One more point. This set has been designed as a "radio-gram," to play from records when desired. I should like to make it clear right away that it must not be expected to give A quality from records. No record now on the market is capable of giving this quality. But A quality or not, so many people find pleasure in record music that I

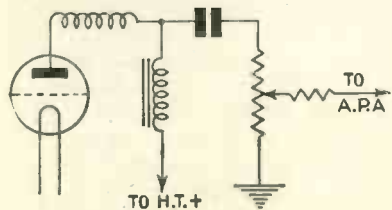


Fig. 4.—Addition of a series resistance

DESIGNING THE A-P-A RADIO UNIT—Cont.

top to bottom, the equivalent resistance *looking back from the transformer* varies. With the slider at the top, it is that of the potentiometer and the valve in parallel; with the control at zero it is nothing. Now this won't do.

Fidelity

The right frequency response curve of the transformer depends on this resistance being approximately correct. We get this by adding the series resistance shown in Fig. 4. After working out various combinations, I found the following one: If the valve is 10,000 ohms, the potentiometer 25,000, and the series resistance 5,000, then the working resistance of the lct, from the transformer's point of view, is 12,000 ohms with the slider at the top.

It rises to a maximum of 13,000 with the slider at .7, drops to 12,000 again with the slider at .4, falls to 9,000 with the slider at .2, and of course to 5,000 with the control at zero. So over the most important range, say from quarter to full output, the variation is unimportant; and moreover the amount—10,000 to 13,000 ohms—is just about right for the A-P-A.

We are now in a position to draw the schematic diagram, which is as shown opposite. In the main, it is quite ordinary; but there are just a few special points.

The pre-set condenser C_2 may not be necessary. Its object is to get better ganging and selectivity if the set is to be used on a very large aerial, or quite near a strong station, in which circumstances it should be unscrewed somewhat. Otherwise it can be screwed up tight, or can be omitted and the aerial lead be taken direct to the coil.

Choosing the Valves

The dotted lines round the coils show what is included in the coil assembly as purchased: the condenser C_3 , at the bottom of the second coil, is the extra condenser (.03 microfarad) to give a larger bandwidth, as already explained.

At this stage one must consider the valves, for the values of the resistors depend on them. For

the high-frequency valve we have the choice of two types: the Osram VMS4, specially good for stability and smoothness of control; and the Cossor MVSG, with higher maximum amplification.

I have put in the resistors specified for the latter, but I find that either may be used as preferred. The resistors R_2 to R_3 are quite ordinary except for R_4 , of which more will be said later. When the set is finally completed, it may be found that with the radio control turned

falling to about 7.5 milliamperes when the carrier is at its best strength for linear detection.

Under these conditions the valve is highly efficient: the carrier input is about .85 volt amplitude, and the effective output in the load is about 15 volts for 100 per cent. modulation.

Switching

The pick-up switch S_1 is in this set actually combined with the radio control R_4 , so that to turn over to gramophone all one has to do is to reduce the radio volume control to zero. This is convenient, and also avoids any chance of getting faint radio signals when working with records—a thing which sometimes happens if the high-frequency valve is left working at full power. It will be noted that when on radio the leak R_7 is connected direct to the cathode, for rectification; but that on "gram" this valve is self-biased by the resistor R_8 .

R_9 , the audio control (which also controls gramophone loudness), has the main switch combined with it, so that the whole set and the A-P-A are switched off by bringing this to zero.

One point before going on to think about actual construction. Since the design of the A-P-A was published I have had many requests for "my circuit" to use with it. Some readers seemed to expect that I have some special secret for getting A quality, and they may be disappointed by the ordinariness of this set. So I should just like to emphasise the point that fine quality does not come by such "secrets."

Getting Good Quality

It is just a matter of watching every point where loss of quality may occur, and stopping the leaks. If in this set I dropped the extra coupling condenser C_3 , or made the grid condenser C_3 much too large, or made the leak R_7 2 megohms, or did other similar things, I should in each case get a hardly noticeable loss.

If I did *all* these things at once, the losses would add up till they made a bad set instead of a good one. The real secrets of good quality are common sense, experience, and care in details.



THE COMPLETE A-P-A RADIO GRAMPHONE
This outfit gives the best quality that can be obtained by modern methods. It employs the very latest in up-to-date technique. The A-P-A was fully described in the March issue

right up, the screened valve oscillates (due, of course, to the absence of screening).

If this seems an annoyance, it can be cured quite easily by raising the resistance R_5 from 300 ohms as given to 500 or even 1,000 ohms.

For the detector, it will be remembered that we want a valve of about 10,000 ohms impedance. I have taken special detector curves of various valves likely to be suitable, and the best for this set is the Cossor 41MHL, which should therefore be used. Different samples will, of course, vary among themselves, but most of them take about 9 milliamperes in the absence of signals,

Building the A-P-A Radio Unit

This set is very easy to wire and assemble if the work is done in the right order: so follow the instructions exactly

IN putting into practical form the design which has been described in the preceding pages we immediately came up against an important point for decision. Should we ask for special components, as we had to do once or twice in the A-P-A, or should we make do with those on the market?

Standard Components

I decided on the latter alternative. There are plenty of good components, and to have special ones made would very likely involve annoying delays in delivery. This means that the set is not in every way as pretty and convenient as it might have been made with special parts; but at any rate the parts should be easy to get, which is probably more important.

The reader may be a little surprised that, although the baseboard is a large one (owing to the necessary space for the turntable, etc.), many of the parts of the set are fitted rather close together. This, of

course, is with the object of keeping the high-frequency leads reasonably short. Even so, some of them are longer than they should really be.

But one or two special points made it quite a tricky matter to get just the right arrangement of components. For example, as the gram-radio switch is part of the radio control R_4 , and since the lead from the valve to the switch *must* be short, the detector had to be near the front panel.

Again, the reaction condenser had to be near the third coil, and the coil near the detector. At the same time, the front panel had to be reasonably symmetrical, and the meter handy to the tuning and radio control knobs.

All such points are fairly well met by the actual arrangement adopted, which should not be altered.

There is, however, one big alternative. As described, the set forms a fine-looking self-contained outfit; but this, though good to look at, is not essential. In fact for a long time I myself had a similar equipment as a "four-piece" job. The set was in a flat cabinet on a table, the A-P-A under the table, and the loud-speaker in a 4-ft. baffle hung on the wall above: a separate gramophone turntable was

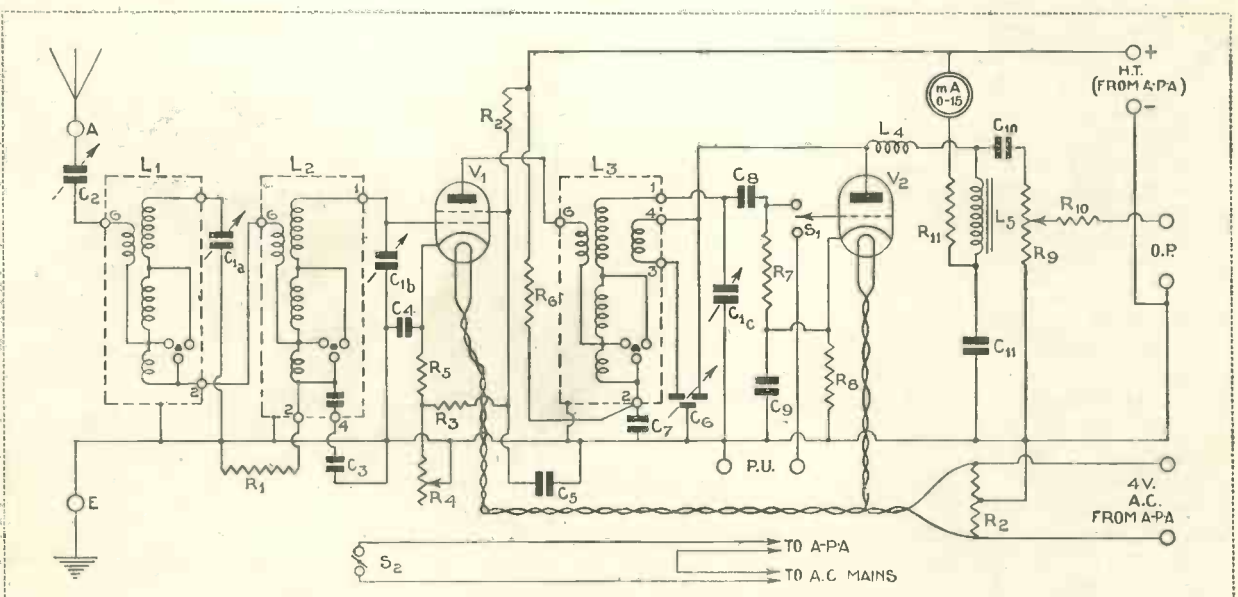
used when required for records.

Owing to the large size of the baffle and the complete absence of cabinet resonance, the results were even better than with my present self-contained unit; but it was not, of course, nearly so neat, convenient, or easy to keep clean.

Actual Construction

However, this will not affect the building of the set itself, which I now proceed to describe. As mentioned above, the layout given has been adopted for definite reasons, and should not be departed from. It will also be found far simpler to do the work of assembly and wiring in the exact order which follows. If this is done, the work will be found quite simple and easy; but if tackled in the wrong order it may be found difficult to get to some of the terminals, etc.

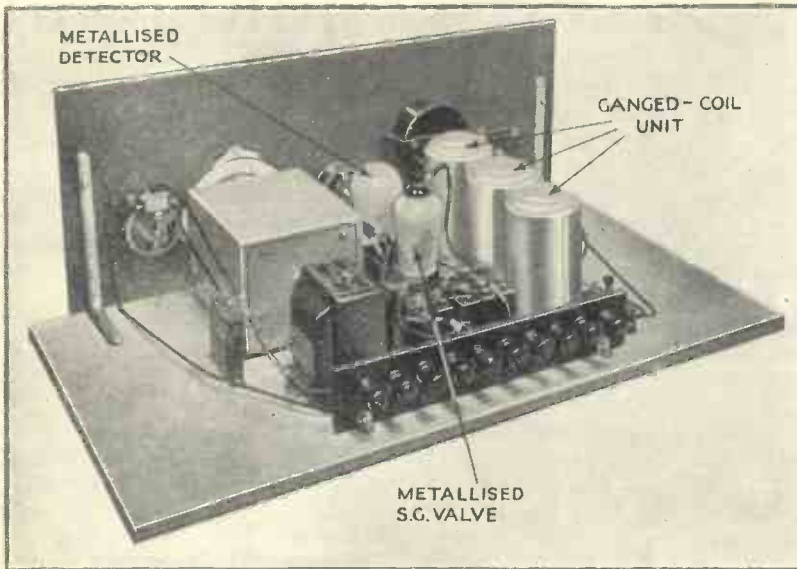
The first job is to mark out and drill the panel. Mark it out on the back, keeping some soft paper on the bench under it to prevent scratching. Mark out only the centre-points of the holes, except for the shaped hole for the tuning-dial escutcheon, which should be traced out from the makers' template. The holes for the screws holding the brackets are *not* marked.



CIRCUIT OF THE RADIO UNIT TO WORK IN CONJUNCTION WITH THE A-P-A

This radio unit, which takes its power supply from the A-P-A, employs a screen-grid valve and a linear grid detector. The aerial tuner is of the band-pass type

BUILDING THE A-P-A RADIO UNIT—Cont.



READY FOR CONNECTION TO THE A-P-A
Here you see the radio unit for use with the A-P-A completely wired up and ready for use. The two in combination form a high-quality radio gramophone

When all the holes have been marked, set to work with a small drill—about No. 50—and (still keeping the panel on its protecting paper) drill through all centres, and also through the four corners of the shaped escutcheon hole. Take care that these last holes are just *inside* the lines, not on them.

Now turn the panel over, and drill the holes out to their proper sizes from the front of the panel. Three holes, the $\frac{3}{4}$ in. and the special one for the condenser drive and the $2\frac{1}{8}$ in. hole for the meter, will require special treatment. Mark them out again on the front of the panel, using the small drill holes as a guide, and taking the utmost care to avoid scratching the panel. They must be made by a series of drill holes followed by filing, or—as I prefer myself—with a fretsaw.

Assembling the Parts

The object of drilling the panel in this particular way is to avoid the drill breaking up the front surface as it comes through from the back: by making a tiny pilot hole first and then putting the full-size drill through from the front, we avoid this trouble.

Put the panel against the base, getting both truly central, and mark through the screw holes; make holes in the edge of the base in line with the marks, but not *on* them: the holes must be just half-way down the thickness of the base—see

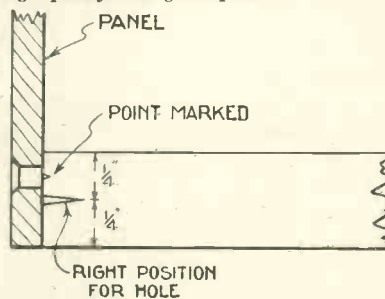


Fig. 1.—Marking and piercing the edge of the base for the panel holding screws. When fully assembled, the panel projects $\frac{1}{8}$ in. below the base

Fig. 1. This is done so that when properly assembled the panel comes $\frac{1}{8}$ in. below the base, and so prevents trouble if the baseboard is not dead flat, or if any component screws project below it a little.

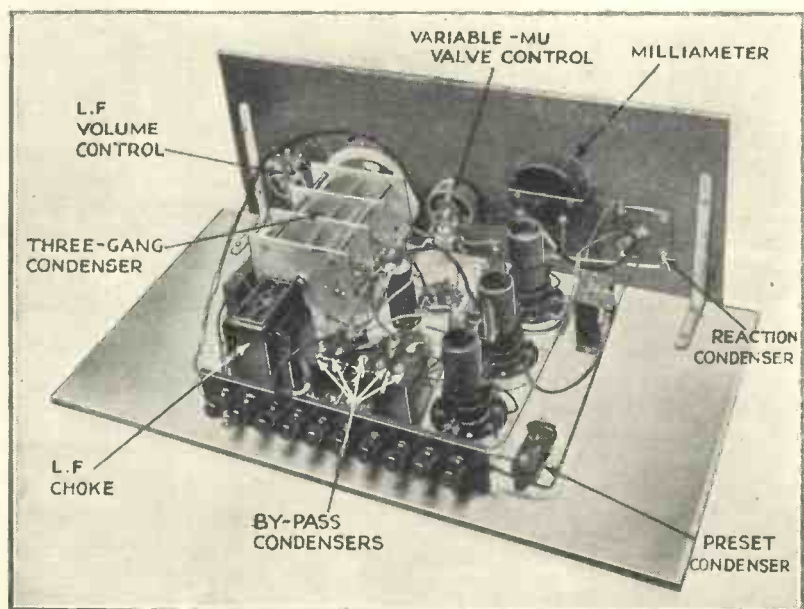
The rear edge of the baseboard is kept up in the same way by a round-headed screw in each corner, screwed in from below upwards. When the set is put into the cabinet these two screws are adjusted so that the base rests steady and the panel is truly flush with the front.

Screw the panel and base together, and fit the brackets. Screw these to the baseboard first, and then mark off the panel holes, treating these in the same way as those already dealt with.

Coils and Gang Condenser

Now put down the coils and the gang condenser and fit their knobs, shifting them about slightly until both are accurately in line with their holes, as judged by the feel of their controls. Mark off the holes for their holding-down screws. Don't forget that the front edge of the coil assembly base must be $1\frac{1}{2}$ in. from the panel, to allow room for the meter. Screw them down and check so that their controls are still free all over their range of movement.

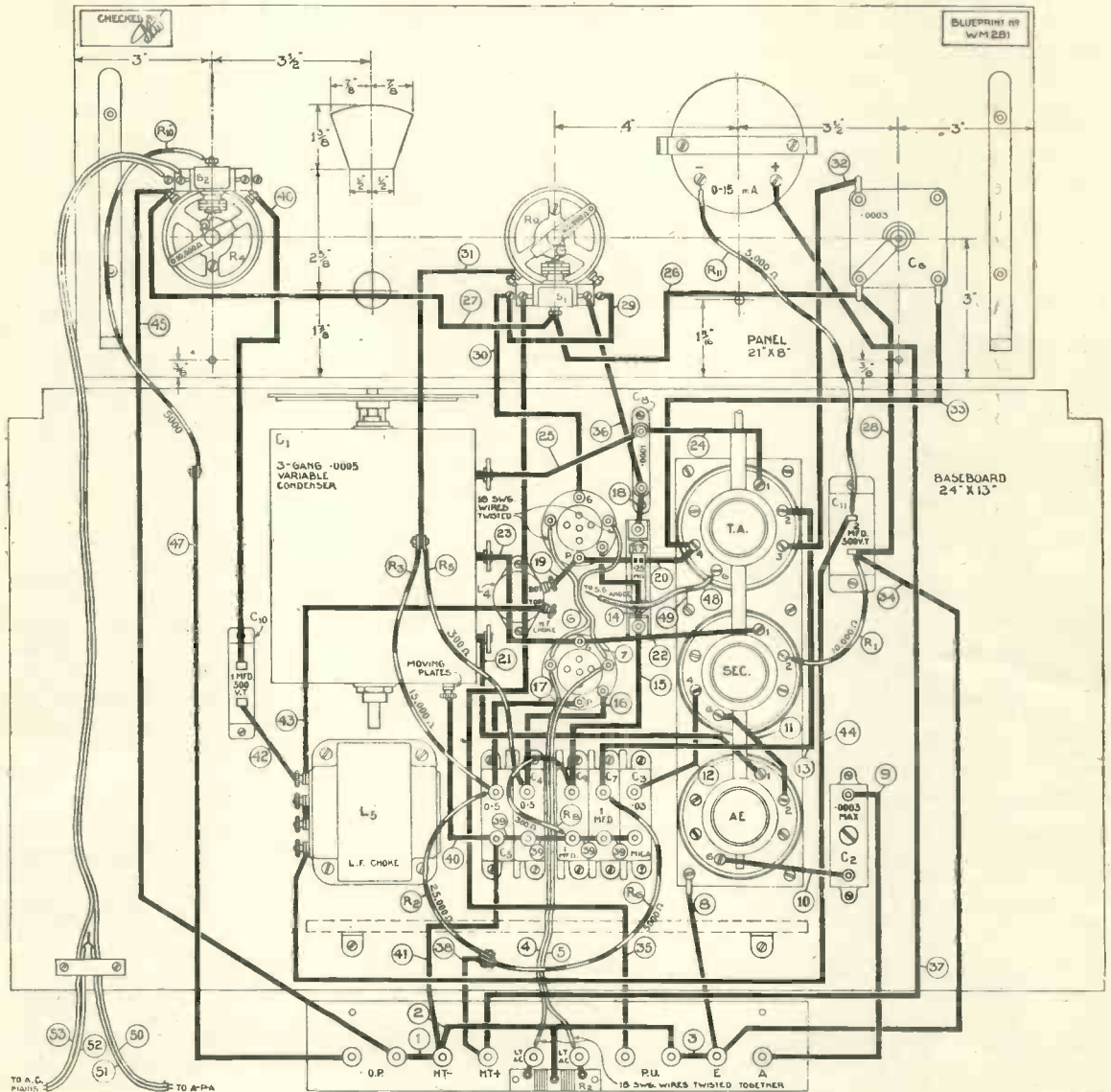
Then take off the panel (with its



ANOTHER VIEW OF THE A-P-A RADIO UNIT

This additional view of the unit shows the simple and straightforward nature of the construction. Only two valves are needed

DESIGNED BY P. K. TURNER, M.I.E.E.



QUARTER-SCALE LAYOUT AND WIRING DIAGRAM OF THE A-P-A RADIO UNIT

A full-size blueprint can be obtained for half price (that is, 6d., post free) if the coupon on the last page of this issue is used by May 31. Ask for No. WM281

brackets) and put it on one side. Put all the components down in their proper places on the base, and mark round them in pencil. Remove them, and also the coil assembly and condenser, so that the assembly and wiring can be done in comfort. Fit the reaction condenser, meter, and volume controls to the panel, seeing that the tags of the condenser and switches are clean and will take solder easily.

When this has been done we are ready to start on the baseboard. The first job is to assemble the

terminal strip, and wire up the connecting links 1, 2, and 3, and the centre-tap resistance. It is best to first solder three short lengths of wire to the three tags of the latter, and then bend them so that it can be connected in.

Screw down the completed terminal strip, the five by-pass condensers, and the valve holders (mind you get the condensers in the right order, and leave a gap between C_5 and C_4 for the heater wires). These last (leads 4, 5, 6 and 7) are the next job. Each pair should be

twisted up; and in arranging the longer pair, for the detector, remember to run them so as to leave room for the high-frequency choke L_4 . Next screw down the coil assembly, and wire up leads 8 to 12. Fit one end of a 5,000 ohm resistor (R_6) to the front terminal of condenser C_7 , and wire up lead 13.

Then fix the leak holder and the .0001-microfarad condenser C_8 , after which wire up leads 14 and 15, and fit a 300-ohm resistor (R_8) across condenser C_9 . Then attach one end of the other 300-ohm

BUILDING THE A-P-A RADIO UNIT — Cont.

resistor (R_2) to the front terminal of condenser C_4 , and wire lead 16. In the same way fit one end of the 25,000-ohm resistor *and* of the 15,000-ohm one (R_2 and R_3) to the front terminal of C_5 , and wire up lead 17. This completes the connections to this block of condensers (except for their common earth, which comes later) and it should be noted that these leads,

scissors. The neatest way is to drill a $\frac{5}{16}$ in. hole just clear of the end of the slot (see Fig. 2) and trim with snips.

Wire up leads 21 to 25. These should be kept clear of others as far as possible, as they are all at high (radio-frequency) potential. Note that lead 22 should be taken out of the coil shield through the slot opposite No. 5 terminal. Also

Wiring the Panel

Now turn to the panel. Wire up leads 26 and 27, seeing that the latter is clear of the condenser drive when panel and base come together. When cutting lead 26, allow enough extra length to form lead 28, which should project 4 in. straight out from the panel. Put the link 29 on the switch s_1 , and to it solder lead 30, allowing the free end to project $2\frac{1}{2}$ in. And fit the panel end of lead 31, leaving 4 in. to project.

Carefully bring panel and base together, seeing that the free wires 28, 30 and 31 go more or less in their proper places; and fix the two together firmly. Connect up the free end of lead 30. Put $4\frac{1}{2}$ in. of sleeving over lead 31, make an eye in the free end, and put a short 4 B.A. screw through this and the free ends of the 300-ohm and 15,000-ohm resistors R_3 and R_5 (already attached to condensers C_4 and C_5). Put a nut on, screw up tight, and wrap with insulating tape to avoid risk of it touching the condenser cover or valve. The joint should come just about over the high-frequency choke.

Next wire up leads 32 and 33. Remember that 32 goes to the plates that are "in" when the reaction control is at maximum. Lead 33 should be taken out of the coil shield through the slot opposite terminal No. 5.

Remainder of Wiring

Screw down the 2-microfarad condenser C_{11} , wire up lead 34, and join up the free end of 28. Also connect the 10,000-ohm resistor R_1 to terminal No. 2 of the second coil, and connect its other end to this same condenser. Then wire the pick-up lead 35, the short lead 36 and the long high-tension lead 37. At the same time join the free ends of the 5,000 and 25,000-ohm resistors, R_2 and R_6 , to the high-tension positive terminal by the short lead 38.

Now return to the by-pass condensers. Connect up *all* their back tags by the lead 39, and extend this (as 40) to the gang condenser. Then wire up the short link 41 connecting this wire to earth.

It is now time to fit the iron-core
(Continued on page 474).

COMPONENTS NEEDED FOR THE A-P-A RADIO UNIT

CHOKE, HIGH FREQUENCY

(L_4) 1—Varley Multi-cellular Junior, type BP2, 3s. 6d.

CHOKE, LOW FREQUENCY

(L_5) 1—Varley high-inductance, type DP10, 18s. 6d.

COILS

($M_1, 2, 3$) 1—Varley Square Peak canned-coil unit, type BP13, £1 17s.

CONDENSERS, FIXED

(C_1) 1—T.C.C. .0001-microfarad, type 34, 1s. 6d.

(C_2) 1—T.C.C. .03-microfarad, type 25A, 4s. 6d.

(C_3) 2—T.C.C. .5-microfarad, type 50, 5s. 2d.

(C_4) 2—T.C.C. 1-microfarad, type 50, 5s. 8d.

(C_5) 1—T.C.C. 1-microfarad, type 65, 2s. 3d.

(C_6) 1—T.C.C. 2-microfarad, type 65, 3s.

CONDENSERS, VARIABLE

(C_7) 1—Utility .0005-microfarad three-gang, type W306/3, with disc drive, £1 10s.

(C_8) 1—Utility .0003-microfarad differential-reaction, type W308, 2s. 6d.

(C_9) 1—Formo pre-set .0003-microfarad max., type J, 1s. 6d.

SUNDRIES

1—Wearite 21-in. by 8-in. paxolin panel, oak finish, 10s. 6d. (or Standard Insulators).

HOLDER, GRID-LEAK

1—Readi-Rad, 6d.

HOLDERS, VALVE

2—Bulgin five-pin, type VH5, 1s. 9d.

METER

1—Ferranti 0-15 panel-mounting milliammeter, type F2, £1 15s.

RESISTANCES, FIXED

(R_1) 1—Varley 40-ohm centre-tapped, type EP75, 1s. 6d.

($R_2, 6$) 2—Lewcos 300-ohm spaghetti, 1s. 6d.

($R_3, 10, 11$) 3—Lewcos 5,000-ohm spaghetti, 3s.

(R_4) 1—Lewcos 10,000-ohm spaghetti, 1s.

(R_5) 1—Lewcos 15,000-ohm spaghetti, 1s. 6d.

(R_7) 1—Lewcos 25,000-ohm spaghetti, 1s. 6d.

(R_8) 1—Dubilier .25-megohm grid leak, 1s. 9d.

SUNDRIES

Tinned copper wire for connecting (Lewcos)

Lengths of oiled-cotton sleeving

Length of rubber-covered flex

1—Pair Bulgin panel brackets, type PB3, 1s. 6d.

1—Bulgin duplex needle cup, 2s. 6d.

1—Ebonite terminal strip 11-in. by 2 in.

SWITCHES AND POTENTIOMETERS

(S_1) 1—Bulgin 10,000-ohm potentiometer combined with 1-S81 switch, 8s.

(S_2) 1—Bulgin 25,000-ohm potentiometer combined with 1-S81 switch, 8s.

TERMINALS

10—Belling Lee terminals, marked: H.T. + H.T.—, Output (2), L.T.A.C. (2), Pick-up (2), Aerial, Earth, 5s.

ACCESSORIES

CABINET

1—Osborne radio-gramophone, model 218 in oak, assembled and polished, £5 10s.

GRAMOPHONE MOTOR

1—G.E.C. A.C. induction type D.M. 328, £4 15s.

VALVES

1—Cossor MVSG, 10s.

1—Cossor MHL, 13s. 6d.

12 to 17, should be kept near the base, out of the way.

Wire up the short link, 18, on the grid-leak holder. Then screw down the high-frequency choke L_4 , and wire 19 and 20, which will actually be one continuous lead. It goes, of course, to the *bottom* tag of the choke, and needs care at the coil end. It is connected to terminal 4 of the coil, not No. 3 as shown in the Varley leaflet. Don't do up the screw tight, as there is another lead to go on it later.

Now screw down the gang condenser. You will note that the slots in the cover, to admit the leads, allow very little room; and if the terminals (which are rather fragile) are bent down at all, there is a risk of short-circuit across the trimmer. This is dangerous, as the front condenser has the high tension across it. So lengthen the slots, with file, shears, or heavy

see, by trying it, that lead 25 does not foul the switch on the radio volume control when the panel is in place. It should be below the switch, not between it and the valve, or it will be in the way later.

One more point: be sure that at the condenser end of leads 21, 23 and 25, the sleeving comes right up to the "eye" on the wire, as otherwise there may be a short when the condenser cover is fitted.

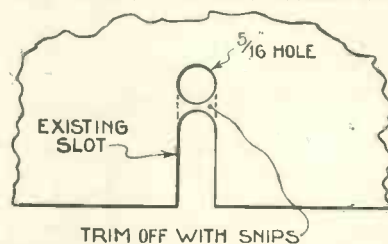
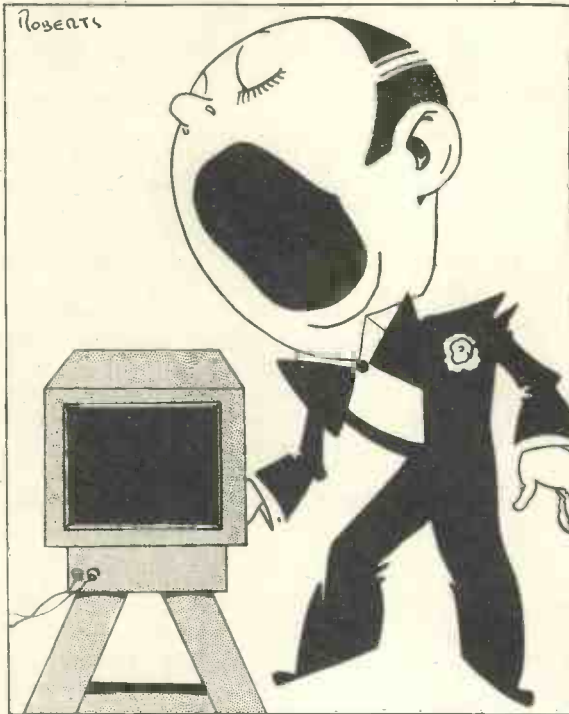


Fig. 2—The slots in the condenser cover should be extended to give more room for the connections

Broadcasters *We All Know!*



The Jazz Singer sings songs composed by the Yanks (Maybe one day he'll join the "Buy British" ranks). He craves to go back to old Alabamy 'Cause by some "Iusus naturae" he has a black mammy!



The Classic Pianist plays Handel and Bach Or perhaps an arrangement of "Lo, Gentle Lark." The worst crime in the world, in his estimation, Is that horrible something that's called "Sin-copation."

The Poetry of Radio

I'll make a set—a nice super-het,
And I'll let you help me make it.
And when it's all done we'll have lots of fun,
And nothing shall ever break it.
Until I decide that I will provide
One that's more up-to-date.
And we'll scrap the lot—build something
so hot
That the speaker'll be found in the
grate.

WHICH, if I may say so, is an epitome of wireless. This constant rebuilding of sets, this perpetual indication from so-called friends of obsolescence, this cursed modernity—well, who can blame me for bursting into poetry about it? Yes, even poetry like that—such as Keats never wrote. So pathetic, so simple, so terse.

To continue. Have you never felt that thrill of divine rapture which flows through you when your first home-made set really works? Don't you want to chant a lay about it? I do. I have. Thus :

ON A RECEIVER'S FIRST HOWL

Little set, nestling on your table,
What have you done to me?
What is this rapture, this delight,
This exalted ecstasy?
Whence cometh this exquisite feeling?
Why doth gaiety lurk?
Because after weeks of frantic fiddling,
I've got the darn thing to work!

That, I flatter me, is Milton or somebody at his best. Only more so. Could you thus express yourself? I thought not, and the reader who expressed gratitude to Providence will get his licence cancelled.

Then, when you have got over—I mean, duly appreciated that, you will, I feel, agree with the following, penned

TO A RECALCITRANT LOUD-SPEAKER

Ah! Miserable moving coil—
Your doom is fast approaching!
Ah! Unbeautiful baffle—
On reproduction poaching:
You wretched set of speaker parts
You hopeless despoilers of tone!

You beastly, appalling squalky mess—
I'm going to build a cone.

Trenchant, isn't it? Raw. Very raw. Thank you—I thought you'd agree. Force, you know, and moving.

And now, as your appetites are so obviously whetted, read this heart-stirring epic:

**EXCELSIOR,
OR THE LAST OF THE L.T.**
The glow of the filament's fading fast.
Excelsior.
Vaudeville to come—will the dashed thing
last?
Excelsior.
Has father brought the spare one home?
Isn't it enough to make anyone foam?
How on earth does he think that the
set'll get Rome?
Er—Excelsior.

That is, at least, as modern as the latest set. And the way I brought in the only two correct rhymes to "home" is ingenious, don't you think?
W.M.G.

Radio-relay Services

Landline relays of broadcast programmes are now spreading over the country and at present these are being pioneered by private concerns. There are definite moves by big combines to secure control of all the systems and the possibilities of this monopoly are dealt with by KENNETH ULLYETT

IN all probability there is in your town a radio-relay service. If you are not a member of this then probably you do not appreciate that for a small fee you can be connected by landline with a high-power quality amplifier through which B.B.C. and occasional Continental programmes are relayed.

In brief, the scheme has the advantage that no wireless gear has to be purchased, as the loud-speaker at each house is loaned by the radio-relay authorities.

There is, of course, no upkeep expense, as with a privately-owned set, and no technical knowledge is needed to get programmes through the relay service.

The main disadvantage, without going too far into the facts, is that listeners on the landline circuit have to take what is given them. Some circuits are providing a two-line arrangement giving an alternative programme, but this is not general.

Special Post Office Licence

These relay services work under special licence from the Post Office. Many of the services tune to Radio Paris on Sundays and give the sponsored gramophone-record programmes in place of the B.B.C. fare. Certain services put gramophone music on the lines when the local programmes are not, in the opinion of the operator at the central station, of sufficient general interest.

There have been cases in the past where a microphone has been switched on to the lines and local publicity has been given. There were abuses of this and the relay services are now generally restricted to the dissemina-

tion only of material which is broadcast. The relay system is not only extending in districts where radio reception is normally difficult. Seaside towns are going in largely for radio relays, Brighton, Hull, Ramsgate, Clacton, and so on, all having relay stations, while at Swindon there are four relay centres.

At present, in spite of the rapid growth of the service, a monopoly either of technical interests or of programme officials would not be important. Any monopoly would be under strict Post Office control and although the broadcast programmes of any station could be relayed there would still be the same rigorous control of the relay of original material.

The monopoly would be under the control of the listener, who could discontinue the service if he did not like the programmes given. While the radio-relay idea is still young, there is no danger.

The dissatisfaction of even only 25 per cent. of listeners, and the resulting cancellation of their contracts, would be sufficient to control the policy of any landline monopoly.

If the relay system spreads, though, a monopoly may become a danger.

The four relay exchanges operating in Swindon are all under the control of one concern. There is no disadvantage in this. The relay centres are widely spaced to ensure good reproduction at all points on the landline circuit.

As about two thousand houses, an average of ten thousand listeners, are supplied by these four stations alone, it is obvious that if ever such a service were to fall into the hands of a party with an axe to grind, a great deal of harm could be done. These exchanges are run by the Broadcast Relay Service, Ltd., a concern which has a vast experience in

landline relaying and which is strictly impartial.

Were it otherwise, listeners on the relay landlines might be complaining of a monopoly!

The G.E.C. and the Standard Cable concerns are taking a great interest in the landline business and, although there are only rumours existing at present, it is known that financial interests are at work to secure control of many of the existing relay systems. The promise has been made that when such an amalgamation comes about listeners on the relay system will get more than one programme.

Four Programmes

It is suggested that subscribers may have as many as four programmes from which to choose, but it is difficult to see how this can be effected without putting up the cost of the service beyond that of running an ordinary wireless set.

I have taken up these various points with an official of Broadcast Relay Service, Ltd., and he says: "The service at Swindon was started under the direction of the pioneer company, Broadcast Relay Service, Ltd., Clacton, two years ago. We found that there was a real demand for the service from two classes of



SHEFFIELD'S RADIO-RELAY STATION

A view of the Sheffield relay station, which sends out broadcast programmes over a landline. This was the first station of the kind to be opened in England

people, both the richer class of a very anti-technical disposition, and the poorer class who wanted good wireless of loud-speaker strength, but could not afford a receiver. During the last two years that we have been operating we have wired nearly 2,000 houses, and although there are sets available at exactly the same price as the relay service, we find that there is a definite public which prefers its wireless by wire rather than by means of a set.

Factors of Success

"The real factors which make the service such a success are the constant attention to the service and the subscribers' requests; also, the absence of any capital outlay and heavy depreciation. Needless to say, the service itself when used in conjunction with a good loud-speaker is good.

"We have four exchanges operating in Swindon, and the service shows no signs of diminishing in popularity.

"The most popular programmes, from my experience in Hull, Ramsgate, Clacton, and Swindon, I would set out in the following order :

- 1.—Outside broadcasts of important events and speeches.
- 2.—Vaudeville.
- 3.—Gramophone-record recitals.
- 4.—Jack Payne and the B.B.C. Dance Orchestra (that was before Henry Hall started broadcasting).
- 5.—The children's hour and the morning service.
- 6.—Good concerts.
- 7.—Talks.
- 8.—Light music.

Literary discussions and all educational matter are simply not on the list of popularity at all.

Personal Opinions

"Of course, one has to remember that the subscribers to a relay service do not, for the most part, consist of people who have strong personal opinions about programmes; they would rather let someone else choose their programme for them than have the worry of it themselves. The relay service is in use continuously in most houses where it is installed—that is one of its great advantages over its competitor, the cheap battery set.

"The housewife switches it on first thing in the morning and likes the cheerful company with the loud-

speaker going on all day long, but this practice is not always popular with the neighbours.

"In most towns where a good relay service is available, subscribers number anything from 10 per cent. to 20 per cent. of the householders, and have even reached 25 per cent. and 30 per cent. in some cases. When one bears in mind that in these towns wireless sets of every type and price have been available under all conditions of hire purchase, etc., for the last ten years, and yet these people definitely choose to have their wireless by means of a relay service, it is idle to discuss whether they are of service to the community.

"The wireless relay service forms a new industry which fulfils a public demand and nothing can eventually stop its development. I have been associated with the development for over three years and the prospects now are better than ever in the past."

These opinions, coming from a man who has organised so many relay services, are obviously of more value than the comments of those who have probably never been offered the facilities of a radio-relay service.

The cost of a relay service varies, of course, according to districts, and to the number of loud-speakers in use. An average figure is 1s. 6d. a week, which compares favourably with the upkeep cost of a battery-driven set.

At present there are sixteen towns with a relay service and, as at Swindon, there is, in some cases, more than one centre in each district disseminating programmes. Newcastle-on-Tyne, Wallasey, Ramsgate, Lancaster, Oxford, Nottingham, Rochdale, and Rotherham are other towns with an efficient wireless service and a combine proposes starting up a service in fourteen further towns.

It is estimated that there are 15,000 subscribers to receiving stations operated by the Standard Radio

Relay Services and its associated companies.

Strangely enough, opposition to a monopoly of the radio-relay services and to the possible misuse of the programmes has risen from an unexpected quarter.

Newspaper Proprietors

There is a distinct understanding between the Newspaper Proprietors Association and the newsagencies that the B.B.C. shall not broadcast paid advertising. The N.P.A., a powerful Press body, discourages advertisements in newspaper columns that recommend readers to listen to the Radio Paris programmes. The N.P.A., in its anxiety to preclude



THE RELAY EXCHANGE AT WOOD GREEN
The first relay station to distribute alternative programmes to London subscribers. This receiver uses a total of twenty-two valves

Press and B.B.C. competition, dislikes the radio-relay service possibility of selecting the broadcast publicity items.

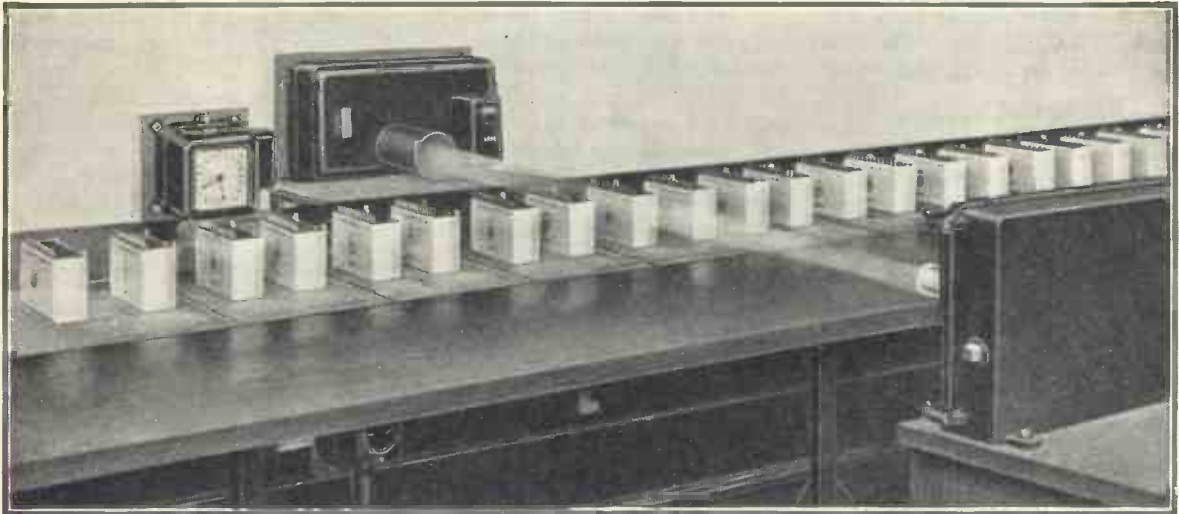
Many of the radio-relay services are tied down to the relaying of B.B.C. programmes only, and the N.P.A. is out to discourage the dissemination of spoken advertising on the relay lines, whether from Radio Paris or any other source. It is felt, frankly, that this would interfere with the advertising drawing power of national newspapers.

Concerted Opposition

For this reason, and others just as potent, the monopoly of relay services will not have so much chance of becoming a danger as might happen were there no concerted opposition.

COUNTING WITH THE "ELECTRIC EYE"

How A Photoelectric Cell Is Made to Work An Automatic High-speed Counter :: By Dr. Alfred Gradenwitz



COUNTING CONDENSERS WITH THE "ELECTRIC EYE"

Here you see a batch of fixed condensers passing in front of a high-speed counter which makes use of a photoelectric cell

A BATCH of fixed condensers, having just left the testing department and, previous to their being packed, passing muster in front of a self-acting photoelectric high-speed counter. That is what is represented above.

High-speed Relay

The counter comprises a lamp, photoelectric cell and amplifier controlling a high-speed relay able to perform up to twenty impulses per second.

The energy derived from the alternating-current mains is stepped down to the voltage required for heating the valves and converted by a rectifying valve, a voltage divider being used to fix the voltage on the photoelectric cell, the negative grid bias and the anode voltage of the valve.

The apparatus can also be operated from direct-current mains or from storage batteries. Its mode of working is as follows:

Current from the Cell

As long as the light beams from the lamp are striking the photoelectric cell unimpeded, a current is set up by the cell, acting upon the grid potential and anode current of the amplifying valve. The alternations of the

anode current thus produced control the high-speed relay.

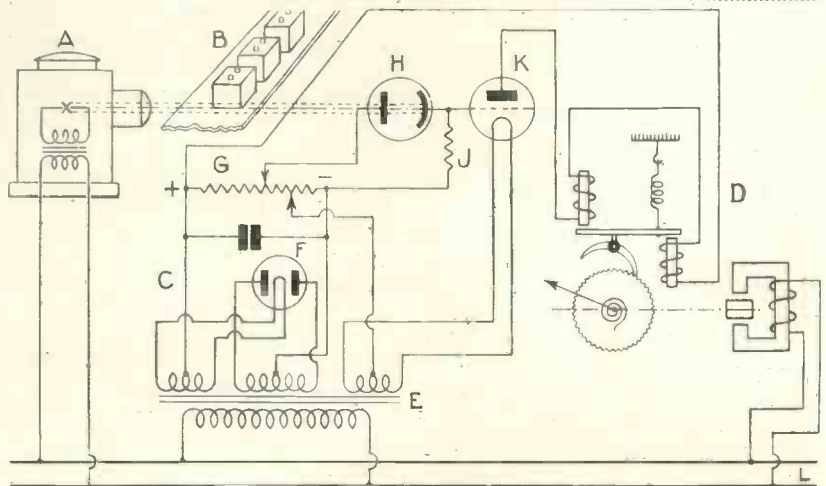
In order to secure a perfect stopping effect a screen comprising a small diaphragm is installed close to the photoelectric cell, thus projecting the shadow of passing objects as neatly as possible upon the latter and eliminating any disturbing light effect.

This device readily performs up to 1,200 counting operations per minute, its current consumption

from the mains being negligible.

Circuit Employed

In Fig. 1, A is the point-shaped lamp, B the belt conveyor, C the photoelectric amplifier, D the high-speed relay, E the mains transformer, F the rectifying valve, G the voltage divider, H the photoelectric cell, J the grid-leak resistance, K the amplifying valve, and L the alternating-current mains.



CIRCUIT OF THE PHOTOCELL COUNTER

Fig. 1.—A simple one-valve amplifier only is needed to actuate the automatic counter, which is worked by changes in current produced by objects passing in front of the photoelectric cell

TRACKING HUM

In a Mains Receiver

By J. H. REYNER B.S. AM.I.E.E

HUM in an A.C. receiver is an irritating by-product which is sometimes difficult to eliminate. Many otherwise excellent receivers are spoilt through an undue preponderance of mains hum and this is liable to be very annoying.

The tracking of the source of the hum follows fairly well defined rules, as does most fault testing, and the cure is, therefore, principally a matter of finding what form the hum is taking and then looking for the exact cause. The cure is then usually a fairly simple matter.

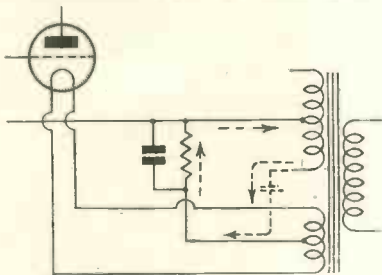


Fig. 1.—How hum is caused by capacity between transformer windings

CHECKING SMOOTHING

Hum due to inadequate smoothing is not of frequent occurrence. The simplest way of checking the smoothing is to connect an extra 4-microfarad condenser in parallel with the reservoir condenser (sometimes incorrectly called the load condenser) and then with each of the smoothing condensers in turn. If at any point a marked reduction in the hum is obtained then this circuit is not sufficiently smoothed.

There may be a small reduction in hum but, if it is only just appreciable, the principal source of the trouble is elsewhere and no further time need be wasted. A condenser larger than 4 microfarads should not be used for this test.

LOUD-SPEAKER HUM

On this question of inadequate smoothing mention should be made of the loud-speaker itself. With moving-coil loud-speakers one has a variety of circuits in which the energy for the field winding is obtained from the mains circuit in some manner.

One way is to generate more voltage than is required for the set, and to connect the loud-speaker in series with the main high-tension feed. The inductance of the field winding may thus be made to give additional smoothing, but it is not by any means a hum-free arrangement.

It is often necessary to dispense with the smoothing action of the field winding and to connect a 4-microfarad condenser across it. This, of course, cuts out any choking action which the field winding may have had, but at the same time it usually cuts out a good deal of the hum.

The other alternative is to use a parallel connection, arranging the loud-speaker winding across the high-tension circuit, which must, of course, be sufficiently generously designed to supply the extra current.

With the modern rectifier this is quite an easy proposition, but further hum is likely to be developed by this means, and in this case it is

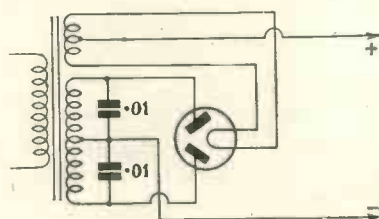


Fig. 2.—Two .01-microfarad condensers across the secondary of a mains transformer will by-pass high-frequency currents

rather more difficult to cure. I have found it necessary in some instances to connect as much as 8 microfarads across the field winding.

INDUCTION

We will assume, however, that the ordinary smoothing is not intro-

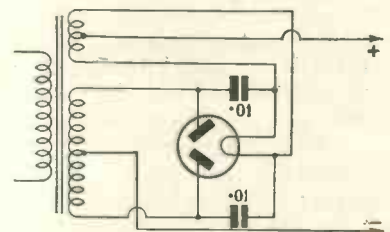


Fig. 3.—Another method of by-passing high-frequency currents

ducing hum. The next source of trouble to investigate is direct induction. This is due to interaction between the mains transformer and either the smoothing chokes or the low-frequency transformer, if any.

There is a certain stray magnetic field surrounding the mains transformer, and this induces voltages of the hum frequency into any components situated in a favourable position for picking up such induction.

If the pick-up is on a smoothing choke then obviously the voltage which the filter circuit is supposed to eliminate is partially re-introduced into the system. If induction of this sort is suspected the smoothing choke should be connected in circuit with flexible leads. It may then be rotated in various planes in order to see if the hum becomes less in any one particular position.

If this is so, the position of the choke must be suitably altered either by rotating it into the position of minimum hum or by moving it farther away.

TRACKING HUM—Continued



ANTI-INTERFERENCE UNIT

A Blue Spot device to eliminate disturbances from the mains. It is inserted in the main supply leads. The price is 10s. 6d.

A more fruitful source of hum is induction on to the low-frequency transformer. This is checked in exactly the same way by connecting the transformer in circuit with flexible leads, and rotating it until a position of minimum hum is found. If there is a marked change then direct induction is certainly taking place, and by finding a position where the hum is least this form of hum may be completely eliminated.

It may be remarked in passing that the position of minimum hum may not necessarily be the position of no induction. It is often found if the circuit is analysed that for least hum one goes a little beyond the zero induction position and introduces a back hum voltage which tends to cancel out residual hum voltages in other portions of the receiver.

POOR MAINS TRANSFORMERS

Induction hum of this sort is more troublesome with a small mains transformer which has not been sufficiently generously designed. In such cases the iron circuit is saturated and there is a large leakage field. Moreover, due to the saturation in the iron circuit, the wave form of the secondary voltage is not pure, but contains sharp peaks, making the smoothing of the rectified current much more difficult.

Another place where this trouble may occur is in the heater winding. I once had a set which would not respond to any ordinary treatment, yet which had a very unpleasant residual hum. It was not until I used an entirely separate transformer for supplying the current to the

heaters of the valves that I was able to obtain silence.

The fact was that the transformer was much too small for the job and was being hopelessly overloaded. The wave form on the 4-volt heaters was, therefore, very peaky, and the cathodes were not able to maintain a sufficiently uniform temperature. There was also a certain amount of dissymmetry in the wave form which was introducing electrostatic effects, which also gave rise to hum.

CENTRE-TAPPING

Hum on the heaters may sometimes arise from an imperfect centre-tap on the winding. If this is suspected the connections to the centre-tap of the heater winding should be removed and connected to the slider of a potentiometer across the whole 4-volt winding. The position of this slider should then be varied around the centre point until the position

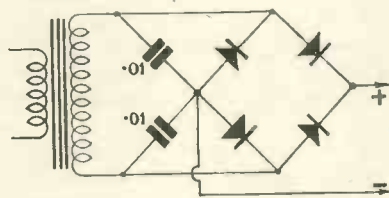
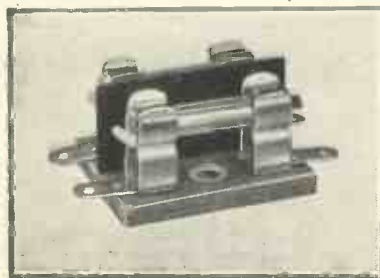


Fig. 4.—By-passing arrangement for use with a metal rectifier

of minimum hum is obtained. The potentiometer in use must not have a resistance of more than 20 or 30 ohms, as otherwise this method actually introduces hum instead of curing it.

CAPACITY EFFECTS

An obscure form of hum sometimes arises from too large a capacity between the windings of the transformer. Fig. 1 illustrates this point. Due to the capacity between the



FUSE FOR A MAINS SET

A twin fuse for a mains set made by Sifam. Every mains receiver should have a fuse of this type

high-tension winding and the heater winding a small capacity current will flow as is indicated by the arrows, and this will pass through the grid-bias resistance for this last valve, inducing a hum voltage into the circuit.

I have also found cases where high-frequency voltages were handed on from the primary or the secondary to the heater winding, giving rise to unpleasant modulation hum. The difficulty was overcome when a transformer having a sectionalised winding was used.

MODULATION HUM

This leads to the question of modulation hum generally, which is one of the most troublesome forms of hum. The set is found to be quite silent when used on gramophone, or when no station is tuned in, but as soon as a station is received a nasty background of hum appears, which may, in severe cases, be so unpleasant as to spoil the reception entirely.

This hum may be due to insufficient smoothing on the screen of the high-frequency valve or on the grid-bias circuit. It may also be due to the ordinary inductive type of condenser in these positions, and replacing these condensers with non-inductive types will sometimes cure the trouble.

If the trouble is only noticed on a strong station, then there is a possibility that the valve is cross-modulating and the remedy is to reduce the input or use a different type of valve. Both these effects, however, are of comparatively infrequent occurrence, the more usual cause of the trouble being high-frequency energy in the mains themselves.

HIGH-FREQUENCY CURRENTS

It is particularly obtained when the earthed pole of the mains is badly "tied down." One lead of the mains supply must be connected to earth by law, but this earth connection is made through a resistance of 20 or 30 ohms in some cases.

While this is quite satisfactory from the point of view of safety to the public it is not by any means satisfactory from the point of view of a radio set.

In such cases there is a distinct difference of potential between the

AN ARTICLE BY J. H. REYNER, B.Sc.

earthed pole of the mains and the earth of the receiver, and if there is any high-frequency energy on the mains, as there nearly always is, very severe modulation hum will result.

One cure for the trouble is to connect a small condenser between either side of the mains and the earth point on the receiver. In some cases this value need only be quite small,

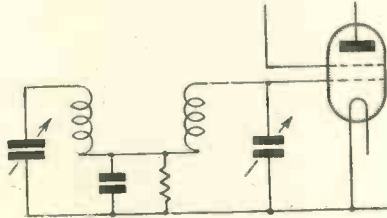


Fig. 5.—Band-pass circuit with too high a value of grid leak may give hum

while in other cases it may be necessary to use as much as .01 microfarad. This value will be found to cure the most severe troubles.

It should be remembered, however, that if this condenser is connected to the live side of the mains (and this depends entirely upon the manner in which the plug is inserted into the socket) there is a voltage existing between the earth side of the condenser and the actual earth point on the receiver.

On disconnecting the condenser from earth, therefore, there will be a distinct spark, and if one catches hold of the terminal in one hand and the earth point of the receiver in the other a distinct shock may be obtained.

If the value of the condenser does not exceed .01 microfarad this shock is not more than about 50 volts on a 250-volt main, and it is more unpleasant than dangerous, but if a larger value than this is used a very healthy shock can be obtained, and this practice is not recommended. If possible a still smaller value than .01 microfarad should be used.

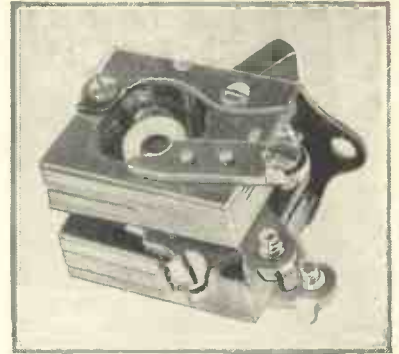
SELF-OSCILLATION

Another method of curing the difficulty is one which is also effective in curing a form of self-oscillation

often obtained with valve rectifiers of the double-wave variety. Fig. 2 shows such a circuit and the connection of two .01-microfarad condensers across the two halves of the high-tension secondary winding will not only check any self-oscillation at a high frequency, but will also by-pass any high-frequency energy introduced from the mains themselves.

Another method of achieving the same result is that shown in Fig. 3, where a .01-microfarad condenser is connected from one or both of the anodes of the rectifier to filament. In this case, however, the condenser used must be capable of withstanding twice the normal high-tension secondary voltage (that is, the full voltage across the outers) as in the event of a short-circuit from anode to filament on one side of the rectifier valve the whole voltage will be applied across the other condenser.

In the case of metal rectifiers a simple condenser of .01 microfarad across the secondary of the winding of the transformer is usually sufficient to filter out any high-frequency currents which may have been drawn from the mains, or alternatively the arrangement used



SWITCH FOR A MAINS SET

Every mains set should have a double-pole switch. This is a type marketed by A. F. Bulgin & Co., Ltd.

The use of a screening can over the valve, or alternatively of a metallised valve, is often helpful in eliminating the trouble.

Induction hum on the detector valve and to some extent induction hum generally may be detected by a somewhat high-pitched quality, in distinction to the rather lower-pitched hum due to insufficient smoothing.

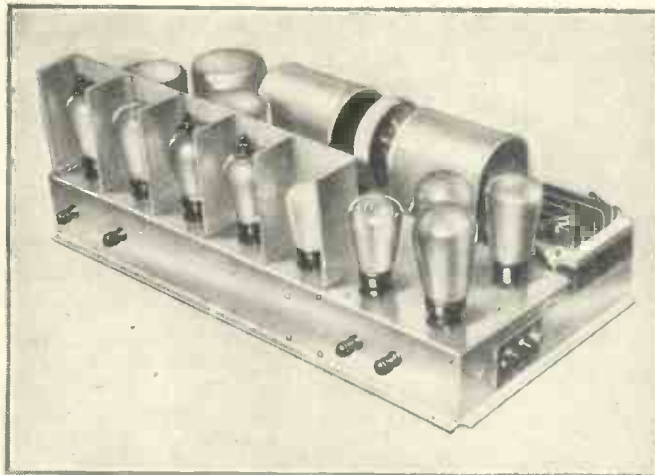
Reference should be made in conclusion to pick-up on long leads associated with the detector valve or the first low-frequency valve in an amplifier used for gramophone reproduction.

Devices which present a high impedance at a hum frequency should be avoided if possible. A pick-up having a high internal resistance, for example, will cause hum if it is connected through a long length of lead.

Twisted or lead-covered leads will often minimise the trouble, but there are so many possible difficulties here that no detailed reference can be made in the present article.

To some extent the same avoidance of high resistances must be observed in the high-frequency circuits. A very awkward form of modulation hum experienced recently was found to be due to a resistance of 1 megohm in the grid circuit of a high-frequency valve.

The circuit was of a band-pass type, in which the grid circuit was isolated. (Fig. 5).



A WELL-SHIELDED MAINS RECEIVER CHASSIS

A view of the nine-valve supersonic chassis made by the R.G.D. people. Note the compact nature of the design

in Fig. 4 may be employed if any difficulty still persists.

DETECTOR INDUCTION

The detector valve is very prone to pick up hum and it should therefore be kept well away from the mains apparatus, and particularly clear of the rectifying valve, if such is used.

Community Listening

Why Not Public "Libraries" of Broadcasting?

EVERY listener knows how eagerly any friends or relatives who do not happen to have sets of their own will troop in to share the amenities of the loud-speaker whenever any special broadcast is in progress!

Special Occasions

This shows that many of the people who, for various reasons, do not possess receivers would welcome any opportunity of listening in comfort to a "community" loud-speaker on the occasion of specially interesting broadcasts, or, in fact, whenever there is anything "on the air" that particularly appeals to them.

In view of the likelihood of public listening facilities being accorded quite an enthusiastic welcome in

many places, it seems rather strange that so little has been attempted in this direction.

Although there are millions of wireless enthusiasts in this country who have sets of their own and listen to them regularly, there are still more who have no sets and who, presumably, do not listen to wireless programmes at all, except when they avail themselves of opportunities of hearing items on their friends' and relatives' sets.

Among this host of non-listeners there must be many who would gladly pay a small admittance fee to any public "listening hall" where a really first-class receiving set and loud-speaker was installed. Such an enterprise might easily prove a really paying proposition.

One of the greatest advantages of

broadcasting, of course, has always been that it is among the very few entertainments that one can enjoy in one's own home without the bother and expense of turning out to some place of amusement.

But, on the other hand, there is a certain element of loneliness about solitary listening. Many people would probably prefer to enjoy the wireless programme in company with other listeners of similar tastes.

Public Rooms

To those who cannot afford to run sets of their own, or who do not want to listen often enough to make the purchase of a set worth while, public listening rooms, run somewhat on the lines of a public library, should make a strong appeal.

In country districts especially, perhaps, these facilities might be expected to meet with a warm welcome. The cost of establishing and maintaining a public listening room would be small compared with that of, say, a cinema, theatre, concert hall or library.

The chief items in the initial outlay, presumably, would be connected with the purchase of suitable wireless receiving equipment, seating accommodation, etc. The running expenses would be chiefly those of maintaining the receiving set in correct working order, lighting, heating and renting the premises.

Question of Copyright

Of course, one of the chief obstacles in the way of public listening facilities would be that of copyright restrictions. The existing regulations regarding the copyright of news bulletins, sports results, election results, etc., would presumably preclude the diffusion of these items by loud-speakers in public listening rooms.

However, this difficulty might easily be surmounted by some suitable arrangement if the idea of community listening "caught on" sufficiently widely.

Norman Hurst.

THE CONSOLATION

(After Tennyson)

*Home he brought his wireless set:
She remarked, "I never swoon,
But I shall, to my regret,
Be a wireless 'widow' soon."*

*Then he praised it soft and low,
Lauded both the cell and choke,
Placed his valves all in a row,
Yet she neither moved nor spoke.*

*Next he showed her paxolin,
New transformers, too, which stepped
Down the voltage. Then tuned-in,
Yet she neither moved nor wept.*

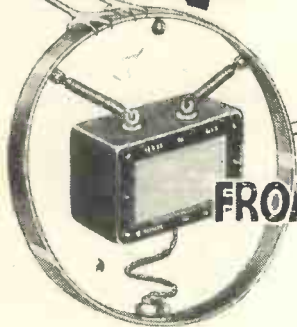
*So they listened for awhile,
Till, at mention of a hat,
Like the sunshine came her smile,
For she heard a fashion chat!*

LESLIE M. OYLER.



A BIRD'S-EYE VIEW OF BROADCASTING

By W. OLIVER



FROM MICROPHONE

TO LOUDSPEAKER



"I WISH," said April, "that you'd explain to me how wireless works."

"Well!" I laughed. "That's rather a big order, to say the least of it! However, I'll try to give you a sort of bird's-eye view of broadcasting, if you like."

"Do, please, but remember that most technicalities are double Dutch to me!"

In the Studio

"Right—I'll try not to be unduly technical," I promised. "Well, we start with the broadcasting studio, in which there is a microphone. You know what a 'mike' does?"

"I suppose it converts sound into electricity," said April.

"Very broadly speaking, yes," I replied. "But that idea is rather misleading if you take it too literally. You see, a microphone doesn't really do conjuring tricks like changing one thing into another!"

"Well, what *does* it do, then?" April demanded.

"It merely enables sound waves, impinging on its diaphragm, to control an electric current, thereby making the current vary in sympathy with the sound. Or, in other words, the 'mike' interprets sound in terms of a varying electric current."

"I see!" exclaimed April. "Then the microphone current becomes a sort of

electrical equivalent of the sound?"

"That's just what I meant. The microphone current is then passed to amplifiers and other apparatus of that sort, and eventually a very much magnified version of it is sent over a special landline or telephone cable from the studio premises to the actual transmitting station, which may be many miles, or even hundreds of miles, away."

"And what happens," asked April, "at the transmitting station?"

"The most marvellous part of the whole broadcasting process, perhaps, but also the most difficult to understand. However, I'll try to explain the essential points as simply as possible."

"Before a broadcast programme is due to commence, the transmitter is

switched on and it produces a powerful high-frequency current which is applied to the transmitting aerial. As this current pulsates through the aerial system, it sets up wireless waves, which are radiated outwards into space in all directions. This uniform, unmodulated emission is called the carrier wave, and it produces no sound from your receiving set, except perhaps a faint hum."

Microphone Currents

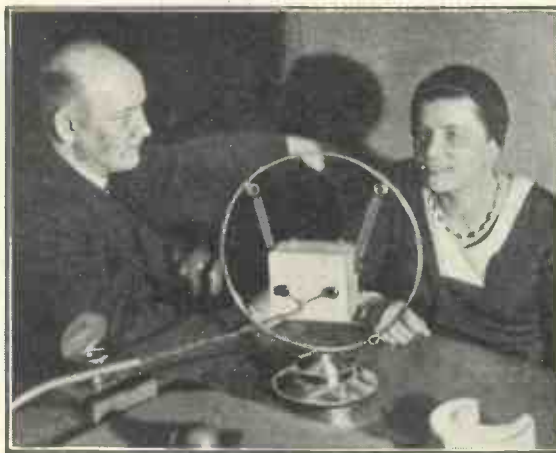
"But what about the microphone current representing the sounds in the studio?" April interjected.

"I'm just coming to that," I replied. "When the magnified version of the microphone current arrives at the transmitter, it is made to control the high-frequency current that is setting up wireless waves. In this way the carrier wave is modulated, or made to vary in sympathy with the sounds that reach the microphone."

"So that the modulated carrier wave becomes a sort of radio equivalent of the original sounds?" suggested April.

"That's the idea!" I agreed. "So, you see, the whole gigantic mechanism of the transmitting system is controlled, as it were, by the comparatively tiny sounds that set the microphone diaphragm in vibration."

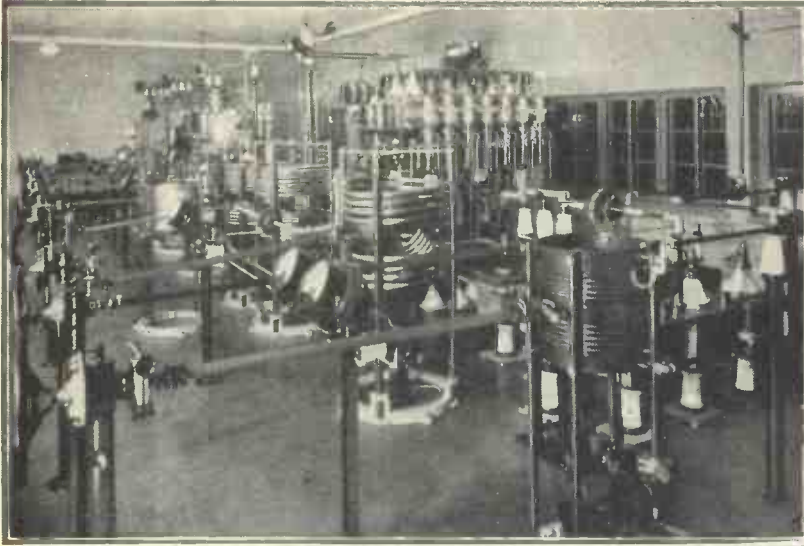
"How wonderful!"



THE FIRST STEP IN BROADCASTING

Here you see Elli Beinhorn, the German twenty-one-year-old pilot who flew from Germany to the Cape, at the Hamburg studio. The microphone is of the Reisz type

BIRD'S-EYE VIEW OF BROADCASTING—Cont.



A TYPICAL BROADCAST TRANSMITTER
This fine photograph gives some idea of the amount of apparatus used in a broadcast transmitter. This is part of the gear used at the Oslo station

"It is. The microphone, you see, forms the link between sound waves and a low-frequency current. That, in turn, controls a high-frequency current which sets up wireless waves, and these waves, fleeing through space with the speed of light, form an invisible link between the transmitting aerial and listeners' receiving aeri-als."

At the Receiving End

"What happens when the signals reach the receiving aerial?" asked April.

"They set up tiny high-frequency currents, similar to those in the transmitting aerial at the broadcasting station, but infinitely feebler. The rest of the process will be easier to understand if we follow it with the

help of an actual receiving set. Take a peep inside this set of mine, April."

I lifted the lid of my own set, a typical three-valver of the S.G.-detector-L.F. type, and April, dutifully bowing her shingled head over the interior of the cabinet, gazed in non-technical bewilderment at the "works."

"You see that first valve—the one with a little black terminal on the top of the glass bulb? Well, that's called a screen-grid valve, and it acts as a high-frequency amplifier. In other words, it boosts up the feeble high-frequency signal currents from the aerial, passing on a greatly magnified replica of them to the next valve," I explained.

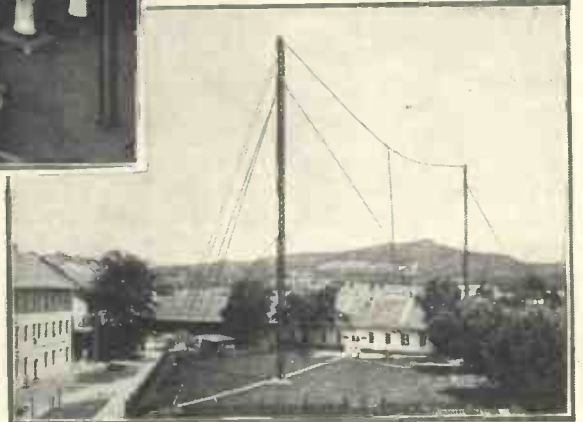
"And what does the next valve do about it?" April wanted to know.

"The next valve, called the detector, takes the high-frequency currents, which won't work headphones or a loud-speaker, and interprets them as low-frequency impulses which will work headphones

or a loud-speaker. The detector valve also amplifies the signals to some extent at low frequency.

"But they are still too weak, probably, to work a loud-speaker properly and so they are passed on to the third valve, which is called a power valve or output valve. This acts as a low-frequency amplifier, and passes on good, strong signals to the loud-speaker.

"This loud-speaker that I have here," I went on, "is what is called a balanced-armature cone type. As



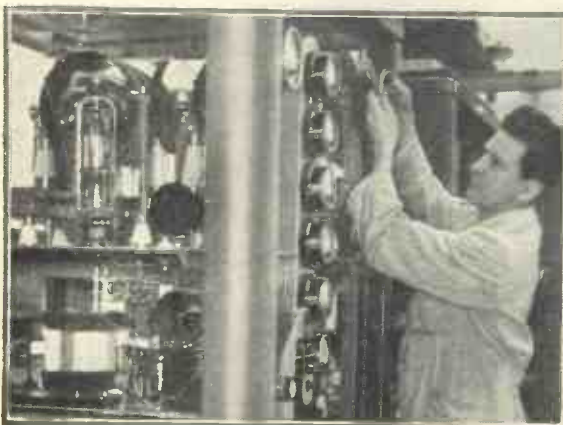
HOW PROGRAMMES ARE RADIATED
A fine view of the aerial system used at Klagenfurt. This station works on 453 metres and relays the programmes sent out from Vienna

the varying signal currents pass round the windings inside the loud-speaker unit, they exert a varying magnetic pull on a piece of metal called the armature. The movements of the armature are communicated to a driving rod, which is attached to the cone diaphragm and makes it vibrate backwards and forwards, thereby setting up sound waves in the air."

"I suppose that, if the set and loud-speaker are efficient enough, the sounds reproduced by the loud-speaker are almost exactly identical to the original ones that were picked up by the 'mike' in the studio?"

Summing Up

"That's right," I agreed. "Now, let's try to sum up the whole process in a nutshell to help you remember it easily. Sound is interpreted first as a low-frequency current, then as a high-frequency current, and finally as a modulated carrier wave radiated from the transmitting aerial. At the receiving end, the process is reversed. The modulated carrier wave is interpreted as a high-



A NEW HIGH-POWER TRANSMITTER
The first of the seven stages to be used at Germany's most powerful broadcasting station, now being built near Leipzig. Its power will be 120 kilowatts

FROM MICROPHONE TO LOUD-SPEAKER

frequency current, then as a low-frequency current, and finally as a reproduction of the original sound."

"So far," said April, "you haven't explained how you select one particular station and tune it in without interference from the hundreds of other stations that are working at the same time."

Wavelengths and Tuning

"Well, each station, as you know, is allotted a given wavelength on which to work. The transmitter is then tuned so that the waves radiated by the aerial are of the allotted length. In order to hear that particular station at maximum strength, your set must be tuned so that it responds as much as possible to waves of the length used by the station you want and as little as possible to any other wavelengths. That's quite clear, isn't it?"

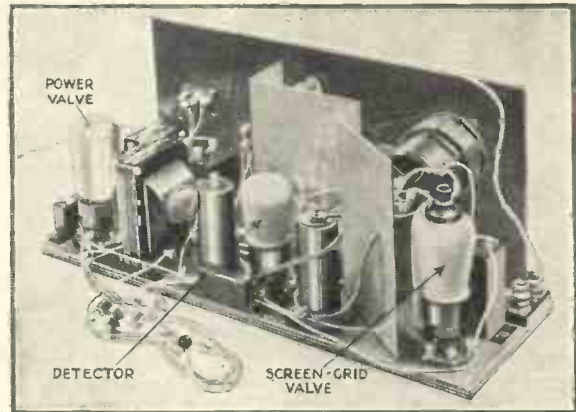
"Quite," said April. "But how is the set tuned?"

the moveable plates of the variable condenser, gradually shifting them into mesh with the fixed plates. As the plates move towards their maximum setting they gradually increase the wavelength from 200 metres up to, say, 600 metres.

"That tuning range of 200 to 600 metres covers the wavelengths of all the medium-wave stations, such as

the London National, London Regional, Midland Regional, Toulouse, Rome, Vienna, and so on.

"If I want to receive over a range of longer wavelengths with this same variable condenser, I have to use a larger coil. The tuning range repre-



A TYPICAL THREE-VALVE BROADCAST RECEIVER
This view of the *Transportable Three*, recently described in "Wireless Magazine," shows clearly the screen-grid, detector, and power valves

one afternoon! What do you say to a spot of music from the London Regional?" I suggested.

"Carried unanimously!" exclaimed April. "Snap on that switch!"

I did so, and instantly the room was filled with the tuneful strains of an orchestra.

"There," I said to April, "is the outcome of all the wonderful processes that we have been tracing in our bird's-eye view of broadcasting. And when you remember that this strong, clear reception we are enjoying is dependent on every link in the whole complicated chain, from microphone to loud-speaker, working without a hitch, you will realise how marvellous broadcasting really is."



BROADCAST RECEPTION IN THE STREET

A crowd in the Piazza di St. Pietro, Rome, listening to the Pope's message on the occasion of the tenth anniversary of his coronation

"Take another peep inside my set while I try to explain. You see that coil? Well, that particular coil by itself tunes the aerial circuit of the set to a wavelength of about 200 metres. Connected across the coil is a variable condenser, which is controlled by this dial on the panel of the set.

"As you rotate the dial from its minimum setting—that is, 0 degrees—to its maximum setting, which may be 100 or 180 degrees according to the type of dial used, it rotates

sent by the dial readings of 0 to 100 or 180 degrees may then be, say, 1,000 to 2,000 metres. This covers the long-wave stations, such as Daventry National, Radio Paris, and so on.

"Well, I think we've had enough technicalities for



LISTENING TO RADIO IN THE HOME

A Spanish family listening to the drawing of numbers in one of the big Spanish national sweepstakes. Note the compact nature of the receiver

FURTHER NOTES ON THE A-P-A

In these notes P. K. Turner, M.I.E.E., discusses a number of points raised by readers interested in the A-P-A, which was fully described in the March issue of "Wireless Magazine." On page 404 of this issue P. K. Turner describes the construction of a radio set to precede the A-P-A. The two in combination give the best radio reception that can be obtained.

THE publication in "Wireless Magazine" for March of my power amplifier, the A-P-A, has brought a sheaf of inquiries to me. Most of them are on points of detail, minor modifications, etc., of personal interest only. But one or two raise larger questions, and seem interesting enough to be answered here, so that other readers can see the replies.

Push-pull

A. J. B. writes from the Midlands. He is keenly disappointed because the A-P-A isn't "push-pull" —more so in view of my article on "economy push-pull" in the February "W.M." And he goes on to specify in detail just what sort of push-pull power amplifier he would like to see.

Well, Mr. A. J. B., your letter calls for reply on *two* points. One of them, of course, is the push-pull question. But the other you haven't thought of. If you know enough to give a detailed specification of just what you want, why don't you design it?

After all, the only good reason for following in detail a printed design is that you don't feel confident to design for yourself. And if that is so, you must be content to take the word of the designer as to what is best. But if you know enough to want something different and possibly better, then build it!

Now as to the point about push-pull. What are the advantages of this system, which might lead us to use it? First, less distortion; second, less "feedback" or interaction with earlier stages; third, efficiency. We will look at these more closely.

Harmonics first. There are two rather different types of triode valve that we might use for power work: first, the "high voltage," such as the LS5, LS6a, DO24, etc., working on 400 volts or more; and second, the "low voltage," such as the AC044, PX4, and so on, which are specially designed to absorb large power—10 watts or so—at 200-250 volts.

In the effort to make them work at these low voltages, the makers have to sacrifice, to a certain extent, other desirable features, and one result can be seen on comparing the curves. In a perfect valve, all the curves would be exactly alike, just displaced more and more to one side, and they

all the time, gradually getting worse and worse.

The latter type is particularly suited to push-pull working, which gives a great increase of undistorted output; but if we have enough voltage to use the former type, push-pull gives only a small improvement.

As to interaction or feedback through the high-tension supply; this is a most important advantage of push-pull. But it happens to cut no ice here, for the high-tension supply is not used for earlier stages at all.

Matching Troubles

As to efficiency, push-pull gives a great improvement if the valves are used at their bottom bend, as explained in my February article. But that calls for close matching, and is not really well suited to mains supply. If I had designed the A-P-A for push-pull, it would have been more costly, more troublesome

to build and maintain, and, in unskilled hands *there would probably be LESS undistorted output.*

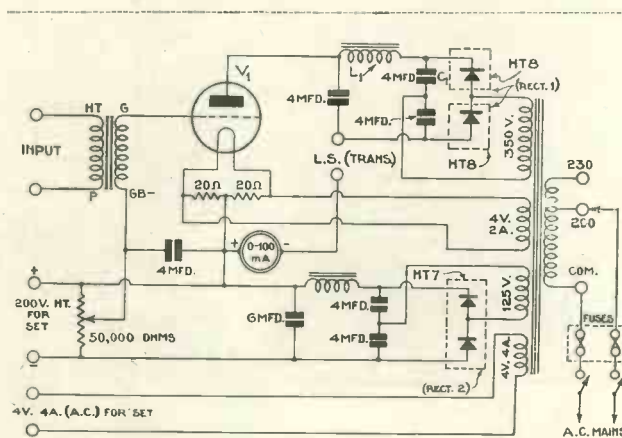
One last word to A. J. B. He asked for independent bias on his proposed two push-pull valves; but it is not correct to think that two valves that don't match can always be made to work in push-pull by just giving them independent bias. Very often they can't. Push-pull is very useful in its proper place, but not in the A-P-A.

Next comes A. C., who is sound engineer in charge of a well-known cinema. He criticises the arrangement

of resistors described on page 215 for matching the input of the A-P-A to the output of a receiver. He has two objections.

Overloading the Set

First, he says, it will give a hump in the response curve. Second, he says that most sets already overload on the local station, and so will feed the A-P-A with an input already



CIRCUIT OF THE A-P-A (A-QUALITY POWER AMPLIFIER)

This power-amplifier unit was fully described in the March issue of "Wireless Magazine." Full-size constructional blueprints can be obtained for 1s. each, post free. Ask for No. WM275

would be evenly spaced.

The high-voltage valves as a rule come much nearer to this ideal than the low-voltage; the latter tend to be crowded at low currents. If in each case we gradually increase the grid swing, the high-voltage type gives comparatively little distortion till it is definitely overloaded, when there is a rapid increase. But the low-voltage type tends to give some distortion

distorted. And he suggests feeding it with a special stage consisting of two semi-power valves in push-pull.

Volume Control

I'm surprised at you, A. C. ! You've gone right off the rails about the distortion. The A-P-A calls for quite a small input, so that even a well-designed detector stage will fill it full up. If the local station overloads the set, then the A-P-A will probably be connected to the detector or an intermediate low-frequency stage and not to the output of the set.

Bear in mind that with 20 volts swing on the transformer primary the A-P-A will make more noise than most people can stand ! If the set has no proper volume control on the high-frequency side to avoid overloading on the local station, then the user should fit one, or use a smaller aerial.

Response Curve

Now as to that hump. Here A. C. is quite right. I said in my description that the resistance of the input circuit should not be too far from 10,000 ohms; and I very carefully chose this value, for with it the AF3 transformer gives a nice little "hump": that is, between, say, 5,000 and 9,000 cycles the response curve rises gradually to about 10 per cent. above normal, and then falls again.

This helps nicely to correct for the high-note loss which is almost certain to occur in any radio receiver, while for records it does no harm, as there is nothing there anyway.

I thought that out quite carefully.

COMPONENTS NEEDED FOR THE A-P-A

CHOKES, LOW-FREQUENCY

- 1—Parmeko 30-henry at 50 milliamperes, £1 7s. 6d.
- 1—Parmeko 60-henry at 30 milliamperes, £1 7s. 6d.

CONDENSERS, FIXED

- 3—T.C.C. 4-microfarad (500-volt test), type 64, 18s.
- 2—T.C.C. 4-microfarad (1,000-volt test), type 95, £1 5s.
- 1—T.C.C. 4-microfarad (1,500-volt test), type 105, 10s.
- 1—T.C.C. 6-microfarad (500-volt test), type 64, 8s. 6d.

EBONITE

- 1—Red Triangle 16 in. by 8 in. panel, 8s. (or Becol, Permcot).

FUSE

- 1—Belling-Lee twin fuse, 2s. 6d.

HOLDER, VALVE

- 1—Bulgin four-pin, type VH4, 9d.

METER

- 1—Ferranti 0 to 100 milliammeter, panel-mounting type 29F, £1 15s.

METAL RECTIFIERS

- 1—Westinghouse type HT7, 17s. 6d.
- 2—Westinghouse type HT8, £2 2s.

PLUGS AND SOCKETS

- 1—Bulgin baseboard-mounting mains plug and socket, type P12, 3s.
- 1—Bulgin flush-mounting plug and socket, type P20, 2s. 9d.

RESISTANCE, FIXED

- 1—Varley 40-ohm centre-tapped, type CP75, 1s. 6d.

RESISTANCE, VARIABLE

- 1—Varley 50,000-ohm power potentiometer, type CP06, 10s. 6d.

SUNDRIES

- Tinned-copper wire for connecting (Lewcos).
- Lengths of oiled-cotton sleeving (Lewcos).
- 1—Wooden baseboard, 19½ in. by 14 in. by ¾ in.

SWITCH

- 1—Bulgin mains on-off, type S50, 3s. 6d.

TERMINALS

- 6—Belling-Lee, type B, marked: Input (2), L.T.A.C. (2), H.T.+, H.T.—, 3s.

TRANSFORMER, LOW-FREQUENCY

- 1—Ferranti, type AF3, £1 5s.

TRANSFORMER, MAINS

- 1—Parmeko to specification, £2 15s.

VALVE

- 1—Mullard DO24, £1 10s.

But, of course, A. C. may definitely prefer to do away with the "hump"; but as he knows enough to expect it he will know as well as I do the quite easy way to abolish it!

Lastly, B. P., who's a Lancashire lad. He's very upset at the possibility of the valve being left without bias if there is a bad contact on the 50,000-ohm potentiometer which controls it. He proposes putting a

dentally taken right up to the positive end?

I don't believe B. P. is really Lancashire. He must come from further north—no one but a Scot would be so very cautious. After all, B. P., the grid-bias control is not out on the panel of the set itself for the children to play with; the whole A-P-A is supposed to be put away safely.



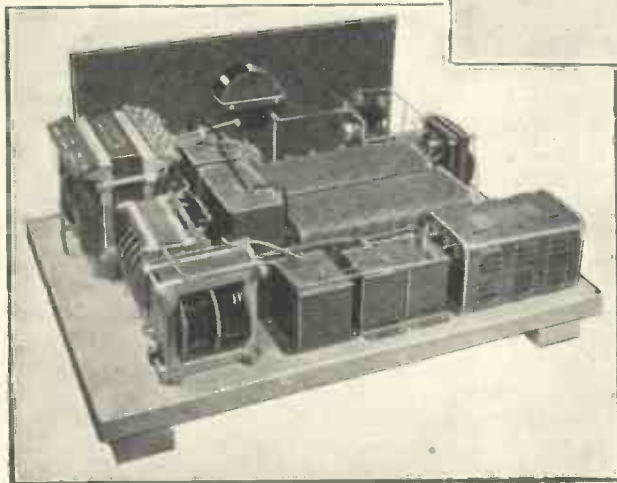
ALL READY FOR USE

The A-P-A gives a tremendous output, absolutely undistorted. It is the "last word" for those who want the very best reproduction

2 - microfarad condenser between the slider and high-tension negative to hold the grid negative for a moment if this did happen. Also, can he make provision to avoid over-running if the slider is acci-

I don't think you need bother about the condenser—though it will do no harm. But if you really fear your family's fingers taking off all the bias, put a 10,000-ohm resistor at the positive end of the potentiometer. That is (see the layout on page 214), take lead No. 15 direct from the 4-microfarad condenser to the meter, not to the potentiometer, and then in place of lead No. 16 put a 10,000-ohm spaghetti resistor. That will give you a minimum bias of 33 volts.

The bias control should not be touched from one month's end to another—perhaps one adjustment as the valve ages, and a re-set when the valve has died and another is fitted. And for the very reasons you mention, a very solidly built component was selected for the job.



NOT CHEAP—BUT IT DELIVERS THE GOODS !

Great undistorted output cannot be obtained for nothing, but for those who can afford it the A-P-A is the ideal power stage for a modern receiver

RADIO *in* REVIEW

THERE is, at the moment, a noticeable swing of the pendulum in favour of the detector-low-frequency type of receiver in which selectivity is secured by smoothly controlled reaction and without the use of high-frequency amplification. For one thing this saves the cost of screen-grid valves which, in spite of the recent reduction in price, are still dear enough.

But many short-wave workers have never abandoned the simple back-coupled detector. Of course, in the early days a certain amount of skill was necessary to maintain reaction smoothly at the threshold point, with just the right amount of grid bias.

Amazing Sensitivity

But one can get amazing sensitivity and selectivity when this kind of circuit is handled in the right way.

Listeners with experience of the early type of back-coupled broadcast receiver—using either a swinging coil or the Reinartz capacity control—may remember how they had to readjust reaction at practically every fresh setting of the tuning dial. It is very different nowadays, thanks largely to the use of the differential condenser, which gives a remarkably smooth control over the whole tuning range.

Interelectrode Coupling

The trouble with the ordinary capacity control, such as in the Reinartz circuit, is that when the condenser is set to minimum so as to reduce reaction, the small series capacity in the plate circuit increases its impedance to such an extent that heavy high-frequency voltage "swings" occur on the plate and force their way through the valve itself on to the grid.

In other words, as direct reaction through the outside circuit is cut down, the interelectrode capacity coupling inside the valve increases.

What is gained on the swings is lost on the roundabouts, so to speak, and it becomes very difficult to prevent self-oscillation, particularly on the shorter wavelengths.

By MORTON BARR

The advantage of the differential condenser, on the other hand, is that when the vanes which control reaction are at a minimum, the supplementary vanes are naturally at a maximum, and open up a shunt circuit across the plate and filament of the valve. This provides a low-impedance path for high-frequency currents, so that no large variations in voltage can build up to cause capacity coupling inside the valve.

There are, of course, other points which have to be taken into consideration in any circuit designed to maintain an absolutely constant degree of reaction at all settings on the tuning dial, but the differential condenser goes a long way towards perfection.

There is a good deal in common between wireless and the "pictures" as two universal means of recreation, and perhaps even more by way of contrast, since one appeals solely to the ear and the other mainly to the eye.

Although the cinema is some years senior to broadcasting, it is a debatable point which of the two has made the more rapid progress since its inception.

Due credit must, of course, be given to the talking film as being the first to succeed in engaging the attention of both sight and hearing simultaneously. When television becomes a practical proposition it will at least place broadcasting on an equal footing in this respect. In fact it may do more, since wireless has the advantage of serving a wider audience at a lower cost.

On the other hand, the size of the cinema screen remains the same as it was thirty years ago, and the actors are still projected on a flat surface instead of moving in three dimensions as on the natural stage.

The stereoscopic cinema will no doubt be perfected in the course of time, and with it we may expect a system of sound projection in which the voice will move with the speaker instead of coming from the

same fixed point in space as at present.

Experiments have in fact already been carried out in stereophonic broadcast transmission with the object of giving a definite sense of direction to the brass, wood, and string instruments in an orchestra.

The method adopted is to transmit the programme simultaneously on two different wavelengths with a slight phase-displacement, so as to reproduce the effect of hearing with both ears instead of one. The incoming signals must, of course, be rectified in a "dual" receiver and reproduced in separate loudspeakers.

Gain in "Vividness"

There is a striking gain both in the quality and "vividness" of stereophonic music, but under present conditions there is no room in the ether for double transmissions of this kind.

Among the exhibits at the recent British Industries Fair was a new twelve-inch gramophone record which is capable of playing for no less than eighteen minutes.

Constant Needle Speed

It is based on a system of recording in which the speed of the needle relatively to the disc is kept constant from beginning to end. In the ordinary type of record the surface speed varies from about forty-eight inches a second on the outside tracks to roughly fifteen inches at the centre.

Since the lower speed must be sufficient to give proper reproduction the higher speed is absurdly high, and involves unnecessary waste. By reducing the traverse speed to a uniform rate of fifteen inches, the amount of speech or music that can be stored up on a twelve-inch record is more than quadrupled.

Of course the new record must be driven at a variable instead of a constant angular velocity. The necessary graduation of the motor speed is effected by a special governor device which is controlled by the movement of the tonearm.

*A New
System That
Gives Good
Results*



WITH THIS OUTFIT YOU CAN REPRODUCE TALKIES IN YOUR OWN HOME

This photograph shows the complete Talkatome system for the reproduction of sound films. The sound-on-disc method is employed, the turntable being synchronised with a motor-driven projector

DURING the past two years we have seen the radio set linked up with the gramophone to give a wide range of entertainment. It is pretty generally agreed by those who try to anticipate future developments that the next step will be to combine the radio gramophone with a cinema projector, so that talking films can be reproduced in the home.

Nobody will deny that there are tremendous possibilities in this direction and it is interesting to see exactly how far we still have to go.

Technical Difficulties

There are, of course, serious technical difficulties when it comes to producing the desired results at a reasonable price. But a start is being made and those who can afford it can to-day buy an outfit for the reproduction of really good talking films in their own houses.

One of the most satisfactory systems I have yet seen is that developed by Talkatome, Ltd., of Wells Street, Jermyn Street, London, S.W.1. Their system has been developed by Humfrey Andrewes, B.Sc., and is now in the production stage.

As has been pointed out in previ-

ous issues of "Wireless Magazine," there are very great difficulties in using the sound-on-film method for home talkies. In fact, the cost of production is so high as to be almost prohibitive. So we have to fall back on the sound-on-disc method.

In this case we have a film and a separate record with the sound accompaniment on it. The crux of the problem of combining the two to give talking-picture reproduction is to couple them together in such a way that perfect synchronisation is obtained.

Various methods of coupling have been evolved, the most satisfactory being a flexible drive from a motor-driven cinema projector to the turntable that carries the record. That is the method used in the Talkatome system.

Provided the film and disc are in synchronism at the start, they will remain in step throughout the run, for the disc is actually driven by the projector. If the latter were for any reason to run fast or slow, the disc would revolve faster or slower in proportion and the synchronisation remains constant.

The method of getting the film and record in synchronism before start-

ing is very simple. The film is run through the gate of the projector until the word "Start" appears on the screen. The pick-up is then placed on the record in such a position that the needle falls opposite an arrow head marked on the centre of the disc. If the machine is then started up, the film and the disc will run in perfect synchronism.

Excellent Results

I have seen a demonstration of the Talkatome system and was very favourably impressed. The sounds from the loud-speaker coincided exactly with the movements of the speakers' lips. Each record and film lasts for about fifteen minutes and the synchronisation remains perfect throughout that time.

The complete Talkatome outfit is illustrated in the photograph that forms the heading to this article. On the extreme right is the cinema projector, which takes the standard 16-millimetre stock used by amateurs. Next is the "playing desk." This includes a turntable arranged to take a 16-in. diameter record and a Varley pick-up; there are also volume and tone controls.

On the left is a two-valve amplifier,

The Next Step in Home Entertainment!

TALKING PICTURES IN THE HOME—Cont.



THE SYNCHRONISED TURNTABLE

The flexible coupling seen on the right is linked up with the projector, which thus drives the turntable at the right speed to give synchronisation between film and disc

run from A.C. mains. This incorporates a Mullard 904V valve working into a Mullard DO25. (Of course, any equivalent amplifier can be used.) During the demonstration I attended, this amplifier was working a Rola moving-coil loud-speaker.

In the top left-hand corner of the illustration can be seen the screen, which has a loud-speaker behind it.

A special feature of the Talkatome system is that it can be used in conjunction with any standard projector on the market. Those who already have home-cinema equipment can, therefore, convert it for reproducing talking pictures at the minimum of expense.

Question of Cost

Naturally, as home-talkie equipment of this type has only just reached the production stage, the cost is not low. The price of the complete equipment illustrated here is in the neighbourhood of £100, but those who already have a motor-driven projector, with a screen and a suitable amplifier and loud-speaker, can get a Talkatome synchronised turntable at a cost of 25 guineas.

The discs on which the sound is recorded are similar to those used for full-size professional films. They

are one-sided

discs, 16 in. in diameter, and run at 33½ revolutions a minute. They are played from the inside towards the outer periphery. It is all very well having a satisfactory reproducing system; of equal importance is the possession of films and discs to reproduce. Part of the Talkatome system is a library service of 400-ft. reels of safety film that can be hired.

The cost of this service works out at 5s. per film per night. At the present moment twenty-six films are available from the library and more will be added each month. Most of the films provided are copies of real professional films reduced from 35-millimetre to 16-millimetre stock.

Some of the artists you can see and hear in your own home through the Talkatome are Carl Brisson, Mimi

Crawford, Gwen Farrar, Seymour Hicks, Laddie Cliff, Betty Chester, Davy Burnaby, Phyllis Monkman, and Melville Gideon.

I was particularly interested in one of the films shown at the demonstration I attended. It was of Niagara Falls and was taken by Mr. Percy W. Harris during his recent stay in the United States. The quality of this film was comparable with the results obtained by professionals. The running commentary was written by Mr. Harris and spoken by Mr. Andrewes.

Keen Film Fan

Perhaps I should explain that Mr. Percy Harris has no financial interest in the Talkatome Company. He is a keen amateur film fan and Mr. Andrewes was his assistant while he was in America. The reason for the inclusion of this Niagara film in the Talkatome library is therefore obvious.

One of the other films demonstrated was *In an Old-world Garden*, with Paul England and Mimi Crawford. This was originally an R.C.A. recording and I had seen it before as a full-size film. The Talkatome reproduction fell very little short of the original reproduction; indeed, I was pleasantly surprised at the whole demonstration.

Provided the initial price of the apparatus can be brought down and a good supply of interesting films circulated through the library service, there seems to be a great future for home talkies.

In Russia and Denmark

THERE are at present fifty-five broadcasting stations in daily operation in the Soviet Union and every month additions are being made to this list. As no official statistics have been lately published, it is difficult to compute the number of listeners in that country, but as the system of central radio clubs and communal centres has been widely developed, it is conservatively estimated that the programmes are heard by over twenty million people. The Moscow Central station now runs three orchestras of respectively eighty, thirty-six, and twenty-four musicians.

THERE is a likelihood that broadcasts from Kalundborg may be suspended in the near future. On several occasions Denmark has lodged complaints regarding the insufficient frequency separation existing between its high-power transmitter and that of Oslo. As an alternative proposal to the closing down of Kalundborg it is suggested that a 60-kilowatt station could be erected on some site south of the Danish capital. It is stated that if the scheme is adopted an application will be made to the Geneva bureau in order to secure a longer wavelength.

Wireless Magazine GRAMO RADIO SECTION

A SPECIAL SECTION FOR THOSE INTERESTED IN THE ELECTRICAL REPRODUCTION OF RECORDS :: REVIEWS OF THE LATEST RECORD RELEASES ARE A REGULAR FEATURE

Setting Your Pick-up

The real reason for setting the pick-up at an angle to the tonearm seems still to be a mystery to some grammo-radio enthusiasts, so here is an explanation of the matter by
P. K. TURNER, M.I.E.E.

FROM time to time I have seen articles on the correct setting of tonearms and pick-ups; but they don't seem to have made the matter really clear, for only a few weeks ago I had to explain to an old acquaintance (who has been keen on gramophone work for years) that he has still not found out how a pick-up should be set. And there may be others; so here goes for a description of (1) why a pick-up should be set at a certain angle depending on the length of the tonearm, and (2) how to do it in practice.

Question of Angles

First of all, as I shall be talking about angles a lot, let me explain that what I have to say has nothing to do with the "needle angle," which is the angle between needle and record *seen in side view*, as in Fig. 1. I shall be talking about "pick-up angle" or "offset angle." Modern tonearms are bent, or else the pick-

up is set askew on them, and the angle as seen in Fig. 2 between the line from pivot to needle and the line of the needle itself, *seen in plan view*, is the offset angle.

Why is there an offset angle? To reduce record wear by keeping the needle as nearly as possible in

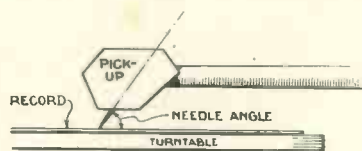


Fig. 1.—When speaking of "angle," the author is dealing, NOT with the "needle angle" shown here, but—(see Fig. 2)

the line of the record groove. How does offsetting the pick-up do this? That is where my old acquaintance had fallen down.

He argued like this: If we had a tonearm which did not swing about a pivot, but gave the pick-up a true parallel motion, conditions would



TESTING A NINE-VALVE SUPER-HET

Here you see Paul Robeson, the well-known actor and singer, testing the controls of the H.M.V. nine-valve super-het radio gramophone. It incorporates an automatic record-changer

be as in Fig. 3. The needle point would travel straight along a radius of the record, from R to S, and if the needle were set in the true line of the groove at R (that is, R T), it would be so all over the record and there would be no tracking error.

Effect of Pivot

But, he went on, in practice the tonearm is usually pivoted, and conditions are as in Fig. 4 (note that I have drawn the tonearm absurdly short here and in Fig. 5 to exaggerate the errors and make things more obvious).

At some point x on the record the tracking is correct. But at the start the line of the needle is to the left of the line of the groove—that is R P is to the left of R T—and at the end there is right-hand error—S P is to the right of S U.

This error can't be helped, and the best things to do are (1) place the pivot so that the left-hand error

SETTING YOUR PICK-UP—Continued

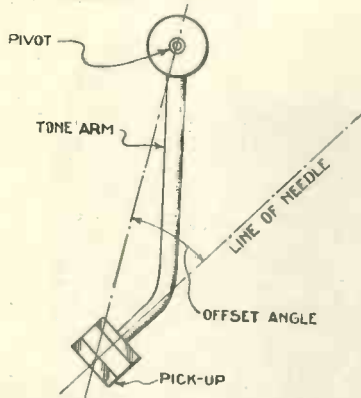


Fig. 2.—The "offset angle" is shown in this sketch

at the start equals the right-hand error at the end; and (2) make the tonearm as long as possible, which diminishes the error. The actual maximum error is nearly 14 degrees of angle for an 8-in. tonearm, and $9\frac{1}{2}$ degrees for a 12-in. one.

Now where he went wrong was in saying that this error can't be helped. He still had the idea that the pick-up should work from the outside to the inside of the record along *one radius* RC as near as might be. But there is no need to do so, and by *not* doing so we can get much less tracking error.

Tracking Error

The tracking error in Fig. 4 arises from the fact that the line of the groove (RT, SU) is the same, or rather parallel, at the start and the end, whereas the line of the needle has changed; it has swung from PR to PS.

Now see Fig. 5. If we start on the radius CR, but end on a different radius CS, the line of the groove changes from RT to SU; it swings through an angle which is also the angle at the record centre between the two radii, that is the angle between CR and CS. If we are cunning enough to arrange matters so

the beginning and end of the record.

Two questions at once arise: (1) How can we so arrange matters in practice? and (2), even if we do get no error at the beginning and end of a record, what about the middle?

Now as to (1), this is simply a matter of geometry. I don't pro-

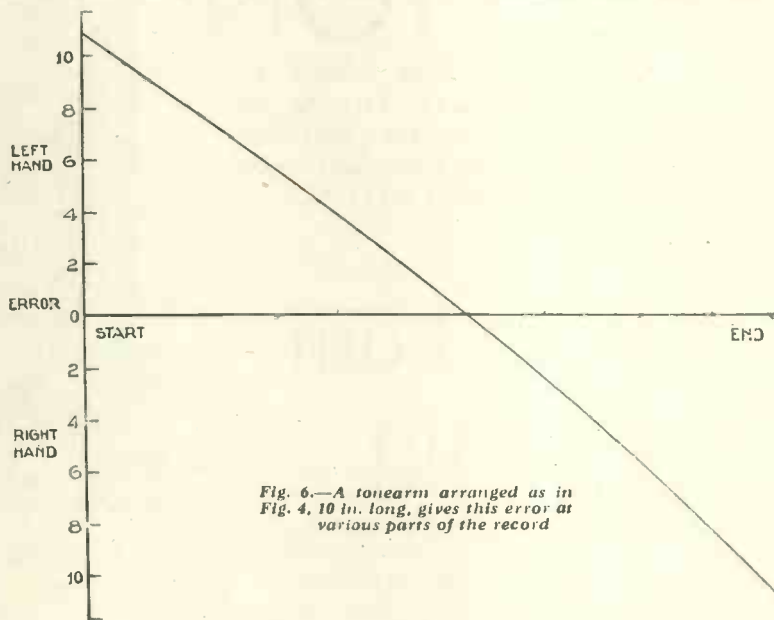


Fig. 6.—A tonearm arranged as in Fig. 4, 10 in. long, gives this error at various parts of the record

that the angle between CR and CS equals the angle of swing of the needle, that is the angle between PR and PS, then if the pick-up is set askew on the tonearm so that the needle lies in the line RT when its point is at R, then it will also lie in SU when its point is at S, and there will be no tracking error at

pose to show how it is worked out; it will be a nice lesson in applied Euclid for younger readers! But later on I will give practical rules which make it quite simple.

As to (2), there is more to be said. In the case of Fig. 4, there was a left-hand error at the start and a right-hand one at the end.

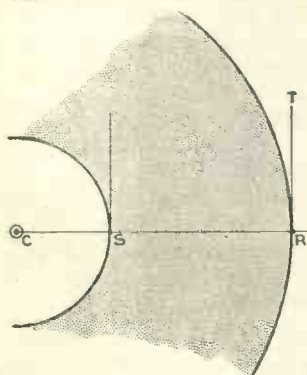


Fig. 3.—With a parallel-motion pick-up there would be neither offset angle nor tracking error if the needle is set in the line RT

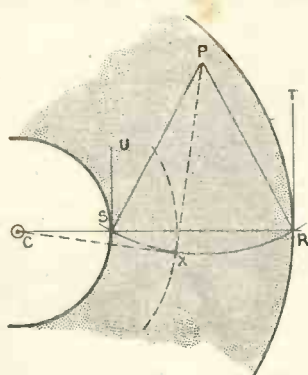


Fig. 4.—In practice, if the needle begins and ends on the same radius RC, there is a large left-hand error at the start, and a right-hand error at the finish: the tracking is correct only at X

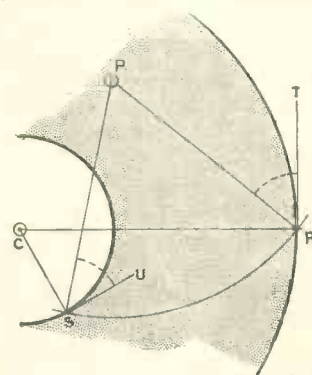


Fig. 5.—By arranging to start and finish on different radii CR, CS, the tracking may be made perfect at beginning and end

AN ARTICLE BY P. K. TURNER, M.I.E.E.

If we draw a curve of error, it looks like Fig. 6. Now when we use the arrangement of Fig. 5, it can be proved that if we set the pick-up so that there is no error at the start and the finish, there is an error everywhere else, and that it is always a right-hand error—the offset angle, if set correctly for the extremes, is too great for the middle part, as shown in Fig. 7.

The maximum error is much smaller than in Fig. 4; it is 4 degrees for an 8-in. tonearm and $2\frac{1}{2}$ -in. for a 12-in. one. But the error can be



Fig. 7.—Compare this with Fig. 6: it is to the same scale, and shows the error for a 10-in. tonearm arranged as in Fig. 5

justed the offset angle correctly, and all we have to decide is the correct position for the pivot.

It is obvious that there is only one dimension that can matter, and that is the distance between the

any other packing of thickness equal to the height from the turntable board to the upper surface of a record ready for playing.

Pivot Distance

Put this on a flat surface, and set down the tonearm and pick-up so that the needle is on the packing and the pivot on the flat surface, as in Fig. 9; and then measure the distance from the point of the needle to the centre line of the pivot, keeping the measure horizontal (t in Fig. 9).

The correct "pivot distance," that is from pivot to turntable spindle, is always less than the tonearm length, and the difference is 7 divided by t —for example, if the tonearm measures $9\frac{1}{2}$ in., the difference is $7/9\frac{1}{2}$ or .74 in. or $\frac{3}{4}$ in.



Fig. 8.—By slightly altering the offset angle the error is reduced still further—to 2 degrees for a 10-in. tonearm

still further reduced. For suppose, instead of setting the pick-up to be correct at the beginning and end, we turn it round a little so as to give a slight left-hand error there. Then we shall get a result like Fig. 8, with left-hand error at start and end, and right-hand error in the middle, and the maximum error will be smaller still.

If we adjust for equal left-hand and right-hand errors the maximum will be 2 degrees for an 8-in. tonearm and $1\frac{1}{4}$ for a 12-in. one. But this is not quite the best thing to do; for the largest left-hand error only occurs for a few turns at the start and finish of the record, while the right-hand error is almost as large for quite a long time in the middle. So it pays to adjust so that the biggest left-hand error is rather bigger than the biggest right-hand error.

Smallest Value

There is just one setting which gives the smallest possible value of the product: error \times time it lasts; and that is the one for which I am going to give practical instructions.

The problem crops up in two forms. First there is the case of a pick-up bought complete with tonearm, the latter not being adjustable. In this case we have to assume that the makers have ad-

justed the offset angle correctly, and I have found an approximate and simple formula that gives this with greater accuracy than most people can work to (about 1/100 in.).

But before using it we must find

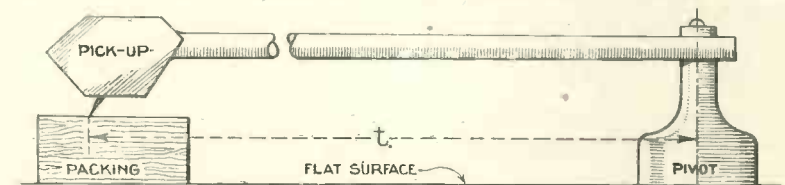


Fig. 9.—Finding the effective length (T) of the tonearm. The packing must be equal to the height of the surface of a record above your motor-board

the tonearm length. This is not so easy as it sounds, for we want the effective length; the horizontal distance between needle-point and centre-line of pivot. The best way to get this is to find a bit of wood or

to within 1/100; so the pivot centre must be $9\frac{1}{2}$ less $\frac{3}{4}$, or $8\frac{3}{4}$ in. from the centre of the main spindle.

Two Adjustments

Now for the more difficult problem. Suppose we have a pick-up and tonearm, and that the latter is adjustable. It will certainly have two adjustments, for offset angle and needle angle, and it may have a third, for length.

First we must choose the length. Up to 12 in., the longer the better, if there is room on the turntable board to fix the pivot at the right distance; but there is not much gain in going beyond 10 in.

Get a piece of packing as before, but this time make sure that it is a

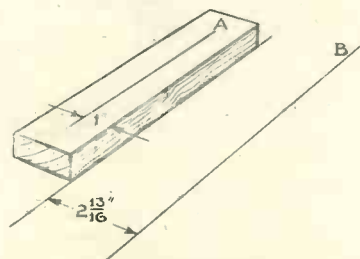


Fig. 10.—The arrangement for setting the offset angle, as described in the text

SETTING YOUR PICK-UP—Continued

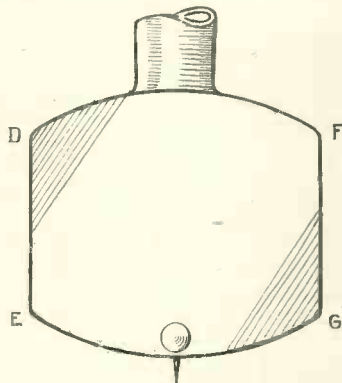


Fig. 12.—If it is hard to take a sight along the line of the needle, see if your pick-up has edges such as DE, FG, parallel to it, or across it at right angles

flat board with one edge straight and square; it should be 2 in. or more wide and 8 in. or so long. Of course, it may be a thin board, brought up to the right height by anything available.

Draw a line along it, exactly 1 in. from the square edge. Put a sheet of paper on the flat surface—table or bench—and rule two lines exactly $2\frac{11}{16}$ in. apart, and about a foot long. Put down the packing so that the straight edge of the board lies exactly on one of the two lines. The arrangement should be as in Fig. 10; and the two lines now seen (A and B) should be exactly $3\frac{11}{16}$ in. apart.

Clamp or screw down the packing, or get a patient friend to hold it down firmly. If the offset-angle adjustment of the tonearm has a locking screw, slack it off till the setting can be shifted fairly easily, and then set it as follows. (See Fig. 11).

Method of Setting

Put the pivot down on the flat surface so that its centre lies on line B, and screw or hold it down firmly. Have a needle in the pick-up. "Wangle" the adjustment till with the needle point on line A, the line of the needle lies exactly along the line. You may find it awkward to get a "sight" and find when this is done; but

there are usually one or two edges of the pick-up that are in line with or exactly across the line of the needle, and you may be able to draw a sighting line alongside or across A.

For example, suppose the pick-up has parallel sides DE, FG (Fig. 12) in plan view, and they are 2 in. apart, with the needle in the centre; then draw a line 1 in. beyond line A in Fig. 10, and sight the side F G along this line. Fig. 11 shows the general idea.

However you manage to get your "sight," it is a remarkable fact that this simple method gets the offset angle right to about $\frac{1}{2}$ degree, for least error during least time, for records of 12 in.

But when making the adjustment, remember to set the needle angle right, looking from the side of the pick-up; for altering this afterwards may upset the adjustment of the tracking.

When you are quite sure you have the setting right, tighten up

the adjustments, and before moving anything measure the effective length of the tonearm as already described; you can then work out as before the correct pivot distance, and the whole thing is done. The maximum error is as follows (on a 12-in. record):

Tonearm length (inches), 8, 9, 10, 11, 12.

Maximum error (degrees), $2\frac{1}{2}$, $2\frac{1}{4}$, 2 , $1\frac{3}{4}$, $1\frac{3}{8}$.

and 2 degrees or less is quite negligible in its effects.

Note for Experienced Readers

The above offset angle is calculated to give the best results over a 12-in. record playing down to $4\frac{1}{2}$ -in. inside groove. Any reader who likes to set for any other record sizes can quite easily work it out: as follows:

Let R be the outside and r the inside radius.

(1) Find the average, which is $\frac{R+r}{2}$, and call it X .

2

(2) Find the geometric mean, which is the square root of $R \times r$, and call it Y .

(3) Find $X - Y$, and call it Z .

(4) Find $X + \frac{Z}{3}$ and set

the lines A and B in Fig. 10 to this distance apart instead of the $3\frac{11}{16}$ in. given above.

Eight-inch Record

For example, many of the cheaper 8-in. records play down to about 3 in. inside, so $R = 4$, $r = 1\frac{1}{2}$, and if most of your playing is done on these it may be worth while to set as follows:

(1) $X = \frac{1}{2} (4 + 1\frac{1}{2}) = 2.75$ in.

(2) $Y = \sqrt{6} = 2.45$ in.

(3) $Z = X - Y = .3$ in.

(4) $X + \frac{Z}{3} = 2.75 + .1 = 2.85$ in., instead of $3\frac{11}{16}$ in. as above.

But, of course, on the occasions when larger records are played, the errors will be greater with this setting than they would have been with the one given in the article.

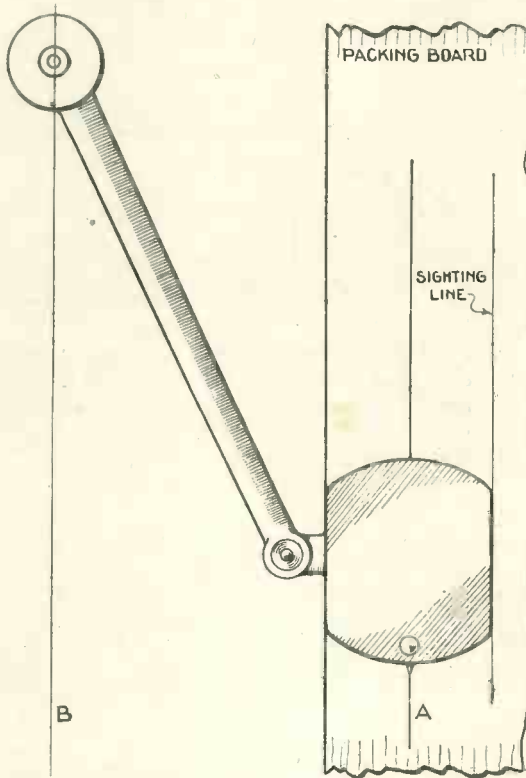


Fig. 11.—Setting the offset angle. Sighting lines can be drawn parallel to or across the line A to correspond with any such straight edges of the pick-up as shown in Fig. 12

Featherweight Experiments

More Comments from "W.M." Readers

To the Editor, "Wireless Magazine."

SIR,—I have followed Captain Barnett's articles on featherweighting with great interest and I should like to give my experiences.

In the first place, my outfit and cabinet is free-lance in design, and, with the exception of Captain Barnett's featherweighting ideas, both the radio and the gramophone are my own specification.

All-electric Set

It is all-electric, comprising Cossor A.C. valves, Westinghouse rectification, Parmeko chokes, Ferranti A.F.5 transformer, "W.M." linen-diaphragm loud-speaker with Blue Spot 66R unit, Parmeko choke output, B.T.H. Golden Disc motor, and Marconiphone pick-up.

Like Mr. Gemmell, I found the Marconi pick-up weighed 5.25 oz. on the needle and on the back of the pick-up I have a brass door knob filled with lead (weight 1 lb.) and this is bolted through a $\frac{3}{8}$ -in. conduit (which matches the pick-up arm) distance piece.

By experiment I arrived at $8\frac{1}{2}$ in. from the centre of pick-up head to fulcrum pin and $2\frac{1}{4}$ in. from centre of door knob to fulcrum pin; this gives 1.01 oz. on the needle, by spring balance not quite 1.25 oz.

I found, however, that when approaching the centre of a record, owing to the pick-up having to work the auto-stop fitted to the Golden Disc motor, several grooves were repeated and after considerable experiment, reducing friction on the auto-stop and removing the little brass side washers on the fulcrum pin, I can now play *any record* (8 in. to 12 in.) without a falter and the auto-stop functions when the blank groove is reached.

Making the Floor Tremble

I get full reproduction and ample bass; with an organ record I can literally make the floor tremble.

I only use the last two valves (41MLF and 425XP) on the "gramo" and even so for comfortable hearing I have to turn the volume control down.

I have had a "jury" to listen

with and without the counterweight and they are unanimous about the merits of featherweighting—and so am I.

I should like to say that, compared with the Perophone weights, the door knob and distance piece give my pick-up a very pleasing and finished appearance.

I am very pleased to think I am saving wear on my records.

The man I am now watching is Mr. P. K. Turner and his A-quality amplifiers.

Ernest H. Arrowsmith.

Mexbro, nr. Rotherham.

SIR,—I have followed with interest the articles on featherweighting, especially that by W. James and its subsequent criticism by H. E. Gauss.

In the March issue of "W.M." Mr. Gauss stated that his results were misrepresented and the validity of his research procedure questioned by W. James, when the latter said that curves may or may not be of value.

From this it would appear to me that the gentlemen concerned are arguing at cross purposes, and that Mr. Gauss has missed the point of W. James' article in the previous issue. Mr. Gauss thinks in terms of commercial sets, whereas Mr. James is more concerned with possible improvements in home-constructed sets.

In the first case it is necessary to draw curves of each component, since such curves are undoubtedly the best indication of the performance of the component, but, if we are connecting a pick-up to an existing set, of which the nature of the amplification curve is unknown, then the curve of the pick-up itself is useless, since, if we experiment with the pick-up to improve the nature of its response curve, it is possible that we may remove a peak which counterbalances a depression in the amplifier.

It is generally recognised that a rise in the response curve of a pick-up, as the frequency falls

below 200 cycles, is desirable, and this is due to the fact that the output obtained from gramophone records falls at this frequency.

Ideal State

The ideal state of affairs would be if all the components had "straight-line characteristics," and all experiments in this direction are to be encouraged, but, with present records and components, the response curve of a pick-up gives little indication of its performance in practice.

The pick-up which I use is a B.T.H. Senior, and upon reducing the weight on the needle (soft-tone), I found a definite decrease in surface noise, and no apparent change in the quality.

It also appeared to me that, as I reduced the needle thrust, the volume became greater, and then gradually decreased as I continued decreasing the weight on the needle. To shed further light on this matter, I tried weighting the pick-up instead of featherweighting it, and found that the surface noise again increased with the applied weight, and that both quality and volume began to fall off.

From this I would draw the following conclusions:—

- 1.—The surface noise increases with weight on needle.
- 2.—That the weight applied to the needle, within a certain range, does not affect the quality of reproduction, but that quality suffers if we go above or below this range.
- 3.—That there is one definite weight which gives a maximum volume.

Best Combination

In my own case, I found that the best combination of the above three was given when I reduced the weight slightly below that given by the counterbalance spring incorporated, and I now get less surface noise and greater output from my pick-up than I previously did, without any change in quality.

I also expect my records to last a little longer.

T. Melone.

Glasgow.

Recording Humour

In this article WHITAKER-WILSON asks whether the recording of humour is fundamentally unsound. You may not agree with the views he expresses, but his remarks will provide food for thought. Not enough criticism is brought to bear, he suggests, on so-called humorous records before they are issued

MY desk is strewn with back numbers of "Wireless Magazine." Not only my desk; my grand piano has at least a dozen copies on it, all opened at the page whereon appears what the Editor, in a moment of ecstasy, has labelled *Humorous Records*.

When I look at what I have written in those columns I begin to doubt whether the valve which controls my sense of humour has been working all these months, and yet I recall an instance when the Editor himself paid me a visit in the gramophone room when I was reviewing one of these records.

No Response

I remember he asked me where he was to laugh. I pointed out the funny lines to him as they occurred, but I am sorry to say he did not respond to them.

Various members of the "Wireless Magazine" staff have at times looked in on me and I have given them similar instructions, but without result. Hence all the insulting remarks I have made about these discs.

Glancing through what I have said, I have come to the conclusion that there are four main kinds of humorous records :

First, there are the few masterpieces by comedians who really know their job.

Secondly, there are those that rely on *trench* humour with plenty of Army slang; sometimes Army language.

Thirdly, there are those which mainly depend upon noise and a general sense of rowdyism.

Fourthly, there are those which I have discarded as being so utterly vulgar as to be valueless.

I might add that there has been a small fifth section of records issued (more or less privately) in which every other sentence has a meaning that would, in the ordinary course of events, be a matter for the Home Office to make decisions on.

Humour is always a debatable matter, and usually a very uncertain quantity; realising this, I have always tried to keep an open mind when criticising these so-called comic records.

There is, after all, a limit to what can be said in a review, and I have felt it rather outside my province as a record critic to say something like this:

"Well, I think it absolute rubbish; I consider the comedian a first-class imbecile and the firm that issued the record, ditto; if you can laugh at it there must be something wrong with your mentality."

That is what I have felt like writing down often enough; but, as I say, there is a limit to what I may write. So that the office of critic where amusing or humorous

records are concerned is not altogether an easy one to fulfil; neither do I pretend that I have discharged my duties particularly well.

I can only say I have done my best to try to keep my criticisms fair and reasonable.

I now ask the question: "Is the recording of humour fundamentally unsound?"

Personal Experience

It is one that I find none too easy to answer. The only way I can see of dealing with it is to ask you if you have ever had similar experiences to my own. Have you not chanced to hear a really humorous record, probably by one of the best-established comedians, and have decided to buy it because you have felt sure that those at home would appreciate it?

You have bought it and, in due course, have laughed over it with them. The first time you were visited by friends you have played it for their benefit. They also have enjoyed it. You yourself, however, have by now heard it probably four or five times. You know where the best lines occur, and consequently have laughed more in sympathy with the newcomers than from any other cause.

If that record *still* amuses you, I think you can write it down as a success, and you may be certain that it must be selling in thousands. All the same, you have not really tested it thoroughly; you have not heard it several times *when alone*.

Rolling in Mirth

If you can roll about in your mirth after the seventh or eighth hearing in solitude you must indeed be fortunate and, I imagine, a trifle easy to please.

Personally, I have never heard a record that stood any test of that sort; it may be that there is something wrong with me. On the other hand, I have heard humorous broadcasts which left me with a strong desire to have it all over again. I can honestly say I do like being amused and made to laugh.



A BROADCAST COMEDIAN

An impression of G. S. Melvin, whom you may have heard broadcasting

The only reasonable conclusion that I can come to is that the gramophone firms, in a very broad sense, do certainly serve us well by issuing humorous records of a high standard, but that immediately they allow that standard to drop they are working on an unsound basis.

Poor humour is out of the question altogether; I go further than that by giving it as my honest opinion that records containing a *single weak line* should be rejected, if only on the grounds that the line will irritate rather than amuse the third or fourth time it is heard.

In Sympathy

A very good proof of this, to my way of thinking, was given when the first of those laughing records was issued. I *think* it was called "The Laughing Curate," but there were so many directly after it that I cannot be certain which I actually heard first. I remember that I laughed a good deal *in sympathy* over the first one, but when I was forced to review laughing trombones, clarinets, 'cellos, and the like, I became nervous lest some firm would record a laughing orchestra.

It looks from what I have said here that to buy a humorous record is a bad investment. Broadly speaking, I think it is, and yet I am bound to confess I do like anything that is brilliant in the way of humour. It seems to me to point one way only; *the standard is not high enough.*

It is a very sad fact that there are not more than a round dozen comedians in England who are really brilliant and *consistently* brilliant; at least, if there *are* more I never hear them either broadcast or recorded.

An Editor's Opinion

I lunched the other day with the editor of a very well-known journal. We fell to discussing this very point of humour and I mentioned the name of an equally well-known humorous writer, saying how his last contribution to the editor's journal had amused me.

"Yes," he said. "It was very clever. There will be another one in a week or two." I then said something about wondering how the humorist could go on, keep-

ing his work so high in standard.

"That is just the point," was the reply. "*He doesn't.* I assure you that, good as he is, that man sends me reams of material I cannot use because it is not good enough. *I only use one in ten.*"

I think the gramophone companies cannot be nearly so selective as my friend the editor. I may be wrong, of course, but I feel that the judges they employ—I imagine somebody must be directly responsible—are not critical enough.

I know that, if I were asked for records of this character for output, I should require a manuscript of

over this department of their output; *anything* has done up till now, with a few—a *very* few exceptions.

Humour is such a perishable commodity. Before a pianist plays one of Chopin's *études* in public he has probably played it in private a thousand times. As he has progressed in his rendering of it fresh beauties have come before him. He sees much more in it now than he did originally; it has never become stale because it is a work of imperishable art.

It is not so with humour; one does not see more but *less* in a joke each time it is repeated. So that



PORTABLE GRAMOPHONES ARE SO USEFUL

Every listener will find a portable gramophone a good stand-by for use when his receiver is temporarily out of working order. This photograph shows the latest H.M.V. model

the entire dialogue for study together with a copy of both words and music of any song that was to be included.

I should mark what I considered to be weaknesses and ask for a further opportunity to review when the marks had been attended to. Then, and not till then, should I ask the comedian to give me his rendition of it, and I should expect to be made to laugh.

That, in my view, is the least that ought to happen before any humorous record is allowed to pass. I feel that enough trouble has not been taken by the various firms

any attempt to make permanent what is transient by nature is a somewhat hazardous proceeding; it stands practically condemned from the very beginning.

To record humour is fundamentally unsound in principle; of that I am certain. On the other hand, it is possible to give much pleasure by issuing records that are really entertaining, but unless far greater criticism is brought to bear upon the contents of these discs long before they reach the actual record stage not much headway is likely to be made. We cannot be expected to laugh at everything.

Choosing Your Records

Here are reviews of the latest record releases by WHITAKER-WILSON, the "W.M." Music Critic. Read them carefully before buying your next batch of records. Outstanding records are indicated by an asterisk (*) against the title

SACRED MUSIC



Florence Austral

(a) Alleluia, (b) Vesper Hymn, H.M.V. E593

Florence Austral, sop., 4s. I am not as pleased with this as I thought I should be. She sounds *scratchy*. I am disappointed as I have a great admiration for her voice. The actual singing is excellent, of course. Ask to hear it and forget what I have said; you may hold a different opinion.

(a) Angels Ever Bright and Fair, (b) How Lovely Are Thy Dwellings, Master Dennis Diehl, 2s. 6d. H.M.V. B4071



Master Dennis Diehl

This is quite good. I say it that way because boys' voices do not, as a rule, record well. This is worth having. Ask to hear it.

★(a) Easter Morning, (b) Easter Evening, Choir of St. Margaret's, Westminster, 2s. 6d. H.M.V. B4090

This must be recommended on account of the excellent singing. The same psalm-pointing is used as we have become accustomed to in the Epilogue. The whole "programme" on both sides is well arranged. I certainly recommend it.

★Easter Service, (d.s.) St. Mary-le-Bow, Cheap-side, 1s. 6d. BRDCST 3164A
I think this will appeal to lovers of such things. It has

a decidedly ecclesiastical atmosphere about it, the psalm especially. It really is church music.

(a) Fight the Good Fight, (b) Through All the Changing Scenes of Life, Full Choir of St. Mary-le-Bow, 1s. BRDCST 819B

These are well rendered, and I can recommend them to anyone who wants either hymn. I do not think there is anything I can add to that remark.

(a) I Know That My Redeemer Liveth, (b) He Shall Feed His Flock, Frank Nichols, 1s. 6d. BRDCST 3165B

Rather too slow in tempo to be really attractive. Sorry, but I cannot honestly recommend anything imperfectly performed, especially when it is oratorio. If you speed it up you will have it in a sharp key which will, of course, spoil it.

(a) Jesu, Lover of My Soul, (b) Jesus Christ is Risen To-day, St. George's Chapel Choir, 2s. 6d. COL DB749

The tone of the boys is very attractive in both. I think it a mistake to back an Easter hymn with a Mid-Victorian effusion like (a). Why not another Easter hymn?

Sacred Memories, (d.s.), Westminster Choir, 4s. H.M.V. C2370

Rather a strange mixture. *O Rest in the Lord* and *Is not His word like a fire* is mixed up, or rather followed by, *With Verdure Clad*. It may appeal to many, of course; I confess I cannot admire it very greatly.

GRAND OPERA

Everyone's Favourites from Grand Opera, (d.s.), Grand Opera Company, 1s. 6d. BRDCST 3166B

This is well produced; it is the type of record of which I personally approve because I think it serves to stimulate an interest in opera. Apart from any personal view of that kind I can recommend the disc as being worth hearing musically.

CLASSICAL ORCHESTRAL MUSIC

★Di Ballo—Overture, (d.s.), London Symphony Orch., 4s. H.M.V. C2308

This is *light orchestral*. Let me make that clear. Sargent is the conductor. It is beautiful melodious music to which most people should respond. Try one side of it; I think you will want to hear the other.

Stradella—Overture, (d.s.), Bournemouth Municipal Orch., 4s. COL DX326

By von Flotow. The recording is better than the playing, to my way of thinking. The Bournemouth Orchestra always sounds to me hard and unsympathetic. It is so in this record. I cannot say I really like it.

★Symphony No. 2 in B minor, (d.s.), London Symphony Orch., 6s. H.M.V. DB1556, DB1557, DB1558.

This is worth having! Amazing recording and such a lovely symphony! There are three complete records of it at 6s. a time. *Very* cheap at the price! Albert Coates is the conductor.

ORGAN MUSIC

(a) Love's Old Sweet Song, (b) Perfect Day, Harry Davidson, 1s. 6d. WIN 5463

Two old stagers on a good trembly cinema organ. I should imagine it will be a best-



Harry Davidson

seller for it has all the qualities so generally admired.

PIANO SOLOS

★(a) Echoes of Vienna, (b) Voices of Spring, Ania Dorfmann, 4s. COL DX328

Quite an outstanding piano record. Her playing has a



Ania Dorfmann

rare intelligence about it. Very nice, light works, too! Certainly ask for it.

LIGHT ORCHESTRAL MUSIC

★(a) Blue Forget-me-not, (b) Play Gypsy, Hungarian Gypsy Band, 2s. 6d. H.M.V. B4082

I consider this very attractive. You will know what to

expect from the band's name. It is very well done and has some originality about it.

(a) Kisses in the Dark, (b) Old Vienna Moon, De Groot, David Bor, Reginald Kilbey, 2s. 6d. H.M.V. 4092

A very good De Groot record. (a) is an attractive piece of light orchestral music; I like the other equally well. Certainly to be recommended.

(a) My Dream, (w) (b) Rose Mousse, (w) Bohemians, 2s. 6d. COL DB746

Two very good waltzes of the Viennese type—not necessarily for dancing to. The record makes charming light orchestral music.

MILITARY BAND MUSIC

★Caliph of Bagdad—Overture, (d.s.), B.B.C. Wireless Military Band, 2s. 6d. COL DB744

This is outstanding in many ways and is worth including in the starred list. For one thing the resonance in the Central Hall, Westminster, lends an atmosphere that I found came as a surprise to me. The playing and the recording are generally good, and I think everyone likes the work.

LIGHT SONGS AND BALLADS

(a) Blind Boy, (b) Mother Machree, Master Leslie Walmsley, 1s. BRDCST 818A

Strangely enough, I have never heard a boy's voice after a microphone has touched it that is the better for the experience. I am quite sure this is an attractive voice—but, honestly, I am not a bit pleased with the result. On the other hand, it may appeal to others. You can do worse than ask to hear it.

(a) Christ in Flanders, (b) Ginchy Road, Peter Dawson, 2s. 6d. H.M.V. B4089

This is a very good record. Peter Dawson's voice is always worth hearing; here it is shown to great advantage. The songs are attractive to anyone except those who have no use for anything beyond jazz.

★(a) Cuban Love Song, (b) Home, Leslie and Melach-rino, 1s. BRDCST 817B

I like both sides of this. The singers are expressive and the music quite attractive. Good recording, also. I thoroughly recommend it.

★(a) Dreaming of a Fair Night, (b) Dreaming of Your Love, Marcel Wittrisch, ten., and the Comedy Harmonists, 2s. 6d. H.M.V. B3995

This is attractive in many ways. The voices are well blended. I consider it—of its kind—one of the most attractive records of the year. I recommend it unreservedly.

REVIEWS BY WHITAKER-WILSON

- (a) **Farmer's Boy**, (b) **Sarey**, Albert Richardson, 2s. 6d.
ZONO 6060

The voice is not perfect for recording, but his diction is perfect. Not a word is missed. The songs are indeed attractive. Ask to hear it.

- (a) **Goodnight, Little Girl, Good night**, (b) **Starlight Serenade**, Les Allen, 2s. 6d.
ZONO 6066

Not a great voice by any means, but his style suits the type of song he sings. Of the two he sings here I prefer the second. The accompanist is quite effective.

- ★ **Helen—Vocal Gems**, (d.s.), Columbia Light Opera Company, 4s. COL DX331

This is worth having for the good singing. A little blasting in the chorus mars one or two passages, but there is nothing seriously wrong and the soloists are good.

- (a) **Home**, (b) **My Song**, Raymond Allen with Orch., 1s. 6d. WIN 5455

A pleasant voice. I like (b) as a song also. It is very attractively written.

- (a) **If I Might Only Come To You**, (b) **Maire, My Girl**, John Thorne, bar., with Orch., 1s. 6d.
BRDCST 3167A

A good voice. The first of these songs does not appeal to me musically very much, but the second is, of course, well established. John Thorne ought to record regularly; he comes through well.

- (a) **I'm Sorry, Dear**, (b) **That's Why Darkies Were Born**, John Macklin with Orch., 1s. 6d. WIN 5459

Not too impressed with either song. He is better than his literature, in my opinion.

- (a) **In the Cumberland Mountains**, (b) **Missouri Valley**, Bud and Joe Billings, 2s. 6d.
ZONO 6063

Very good duettists. I can think of better blending in others who do this sort of thing, but there is nothing much wrong with these two. The music you will know already.

- ★(a) **I've got "It"**, (b) **One Little Quarrel**, Gracie Howard, com., 1s. 6d.
BRDCST 3161A

I think admirers of Miss Howard's particular form of art should get this without delay. It is very characteristic of her.

- ★(a) **La Marsellaise**, (b) **Le Reve Passe**, Georges Thill and Chorus, 2s. 6d.
COL DB745

This is very martial in character. The voice is so good that I must recommend it on that account. I consider it one of the best vocal records Columbia have recently produced.

- ★ **La Poupee** (d.s.), Savoy Light Opera Singers and Players, 2s. WIN 5457

This is quite outstanding and the record of the work itself is acceptable. The baritone is better in tone than the soprano, but both are above the average light opera singer. In duet they are quite effective.

- (a) **Let Me Be Your Side Track**, (b) **Rodgers' Puzzle Record**, Jimmy Rodgers, 2s. 6d.
ZONO 6056

Quite an amusing novelty record; one side of it has three tracks. He has an amusing and strangely attractive way of delivering his songs. He *delivers* them rather than sings them, somehow. And he can yodel with anyone!

- (a) **Love's Garden of Roses**, (b) **Roses of Picardy**, Hubert Eisdell with Orch., 2s. 6d.
COL DB751

An Eisdell record is always worth having even when he sings stale ballads. I do not dislike either of these songs,



Hubert Eisdell

both of which improve with an orchestral accompaniment, but I think *he* is wasted on them. Still, this record is worth hearing, at all events.

- ★(a) **Put Your Little Arms Around Me**, (b) **You Try Somebody Else**, Peggy Cochran and Patrick York, 1s. 6d. BRDCST 3158A

Two good recording voices here. You will know both songs. You can buy this on my recommendation; you will like the singing.

- (a) **Rebel**, (b) **Son O'Mine**, Denis Noble, Bar., 2s. 6d.
COL DB750

Son O'Mine is one of those songs that never palls; that is saying a great deal for it.



Denis Noble

I suggest you get this edition of it, for Denis Noble sings it delightfully. A very good record.

- ★(a) **Rosary**, (b) **Trees**, Roma Johnson, Con., with Male Quartet, Organ and Orch., 1s. 6d. BRDCST 3159B

Very well orchestrated. I am a bit tired of (a) but *Trees* attractively me considerably. I think this is worth hearing. The singing is very effective in places.

- (a) **Savoy Irish Medley**, (b) **Savoy Welsh Medley**, New Mayfair Orch., 2s. 6d.
H.M.V. B4023

Contains such as: *Minstrel Boy, Off in the Stilly Night*; and *Men of Harlech, All through the night* on the other side. Very well produced.

- ★(a) **Serenata** (No. 1), (b) **Speak to me of Love**, Ferranchini's Hawaiian Band, 1s. 6d.
BRDCST 3160B

This is a very good band. The singing also is all it should be. It is mainly in duet (male voice). Ask to hear it.

- (a) **Song of Songs**, (b) **Trees**, Derek Oldham, 2s. 6d.
H.M.V. B4091

His voice is very suitable for recording and his diction is also good. The works you *should* know quite well. Both are well accompanied by an orchestra. Ask to hear this.

- (a) **To Be Worthy of You**, (b) **You Try Somebody Else**, Elsie Carlisle, 2s. 6d.
ZONO 6069

This is what you expect from Miss Carlisle, who has a very distinctive style. All I need say regarding either side of this record is that it is very characteristic of her.

- ★ **Violet Loraine — Medley** (d.s.), Violet Loraine, Com., 4s. H.M.V. C2257

This is an astonishingly good production. Miss Loraine has



Violet Loraine

a definite microphone way with her. Ask to hear it. I imagine you will take a copy home with you!

NOVELTY RECORDS

- (a) **Back Your Fancy** (Fowler), (b) **Punter's Lament**, Ray Noble and his New Mayfair Orch., 2s. 6d.
H.M.V. B4085

(a) is a six-tracker which seems to begin the same whatever you do to it. It is rather amusing. (b) is very well known and has appropriate reference to the other side.

- ★(a) **He Forgot to Come Back**, (b) **Home**, Gracie Fields, 2s. 6d. H.M.V. B4101

I don't wonder, if Gracie sang like that to him! Hers is the voice of the century. This is extremely amusing. You *must* have it.

- ★ **He Played His Ukulele as the Ship Went Down** (d.s.), George Buck and The Roysterers, 1s. 6d.
WIN 5471

A very good novelty fox-trot record. It is well sung and vigorously played. Quite a good edition of a very jolly number!

- (a) **Scotch Hot**, (b) **Two of Irish Rudy Starita with Orch.**, 1s. 6d. WIN 5465

A good novelty record. Rudy plays bells, which record very well. I am not too struck with any of it, but I think a good many people will not despise



Rudy Starita

it, particularly if their nationality suits the occasion.

HUMOROUS RECORDS

- Archie Makes a Nuisance of Himself in the Recording Studio** (d.s.), Archie Glen, Com., 1s. BRDCST 816A

Fairly funny; at least that is how it appeals to me. The dialogue is not too good. However, ask to hear it.

- (a) **Mocking Bird Went "Cuckoo"**, (b) **When I Met Obadiah's Mother**, Jenny Howard with Orch., 1s. 6d.
WIN 5461

The strangest voice on three continents! But she has a decided way with her. Her top E flat amuses me intensely. A person to see and hear at the same time, I should imagine. Ask to hear it.

- ★ **Smash and Grab Raid** (d.s.), Haver and Lee, 2s. 6d.
COL DB747

Very good indeed. I was greatly amused at the witty dialogue. I hope Columbia will issue some more of these argumentative souls; they are very clever.

DANCE MUSIC

- ★(a) **All of Me** (slow f.), (b) **Sweetheart** (slow f.), Manhattan Melody Makers, 1s. 6d. BRDCST 3162B

Two good slow fox-trots—both well sung and produced generally. I recommend this for dancing.

- ★(a) **All of Me** (f.), (b) **I'm for You a Hundred Per Cent** (slow f.), Savoy Hotel Orpheans.
COL CB419

Quite an outstanding record. The tone of the band is particularly pleasing. (a) is a very attractive tune.

- ★(a) **All of Me** (f.), (b) **Just Friends** (f), Ambrose and his Orch., 2s. 6d.
H.M.V. B6138

As most of his records are, this is perfect for dancing. I can hardly say more, can I?

CHOOSING YOUR RECORDS—Continued

(a) *As Time Goes By* (slow f.), (b) *Just Friends* (f.), Savoy Hotel Orpheans, 2s. 6d.

COL CB418

A very good dance issue. Both works are rhythmically played and I recommend this disc for its good recording.

(a) *Blue of the Night* (f.), Waring's Pennsylvanians, (b) *Who's Your Little Who-zis?* (f.), Victor Arden, Phil Ohman and Their Orch., 2s. 6d.

H.M.V. B6149

Quite a good record. I have heard H.M.V. productions I like better, but this has much to recommend it—the rhythm for one thing.

★(a) *Blues in My Heart* (slow f.), (b) *It's Great to be in Love* (f.), Ray Noble and his New Mayfair Orch., 2s. 6d.

H.M.V. B6147

I think this is worth starrng because this slow fox-trot is so attractive and so well played. Far above the average dance record, in my opinion.

★(a) *Dance of the Little Dutch Dolls* (f.), (b) *There's a Blue Note in my Love Song* (f.), Paul Whiteman and his Orch., 2s. 6d.

H.M.V. B6135

This is certainly worth having. (b) is especially attractive. Splendid recording as well!

(a) *Down on the Farm* (f.), (b) *Freddy the Freshman* (f.), Gene Kardos and his Orch., 2s. 6d.

H.M.V. B6136

The first is a very jolly fox-trot and very useful as a finish to a dance. I should imagine that it will prove to be very popular.

★(a) *Gettin' Sentimental* (f.), (b) *My Good-bye to You* (f.), Paul Whiteman and his Orch., 2s. 6d.

H.M.V. B6148

This is certainly worth having. There is a very distinct atmosphere about it. Very attractive; ask for it.

(a) *Hold My Hand* (f.), (b) *Mona Lisa* (f.), Jock McDermott and His Band, 1s. 6d.

WIN 5458

This is vigorously recorded and therefore useful for dancing. Both fox-trots are quick, in fact at the same pace.

(a) *I Was True* (slow f.), (b) *Save the Last Dance for Me* (w.), Lew Sylva and his Band, 1s.

BRDCST 821A

The waltz appeals to me very much; the slow fox-trot is not amiss either. I think this can be recommended for dancing purposes.

(a) *'Neath the Spell of Monte Carlo* (tango), (b) *Way With Every Sailor* (f.), Manhattan Melodymakers, 1s. 6d.

BRDCST 3163B

The tango is the more attractive of the two. If you want a good tango, heavily recorded for dance purposes, this disc is worth having for this side alone.

(a) *Now That You're Gone* (f.), (b) *When the Rest of the Crowd Comes Home* (w.), Ambrose and his Orch., 2s. 6d.

H.M.V. B6151

The waltz is specially attractive and very well played.

The melody is rather well-built. I do not care quite so much for the fox-trot, but both works are worth hearing. There is a little resonance—very pleasant!

(a) *Who's Your Little Who-zis* (f.), Knickerbockers, (b) *You Rascal, You* (f.), Jack Teagarden and his Orch., 2s. 6d.

COL CB424

Quite good but not so good as some recent Columbia dance records. I can recommend it for dancing, but I am not too struck, candidly, with the orchestra.

ADDITIONAL RECORDS REVIEWED by CHOPSTICK

LIGHT SONGS

(a) *Home*, (b) *Whistling Waltz*, Sam Browne, with Orch., 1s.

RAD 1601

This record should prove to be a good seller. Sam Browne—I expect most of you know—is the vocalist in Ambrose's Band,



Sam Browne

which broadcasts on Saturday nights. Both tunes are red-hot favourites and are well recorded. I enjoyed it immensely.

(a) *Songs Made Famous by Vi Loraine and George Robey*, (b) *Songs Made Famous by Clarlee Mayne, Soloists, Chorus and Orch.*, 1s.

BRDCST 824A

Many old favourites served up in excellent style. *If You Were the Only Girl in the World*, *Joshua*, and *Let the Great Big World Keep Turning* are specimens of the contents. It is a record that all middle-aged folk will enjoy. I recommend it.

(a) *Yodelling Chinaman*, (b) *Yodelling Joe, the Milkman*, George Van Dusen, 1s.

BRDCST 823

If you decide to buy this record be prepared for disappointment. Both tunes reminded me of a second-rate turn at a second-rate music hall. I could not understand one word of what Mr. Dusen sang and I do not admire his yodelling. I am sure people in Switzerland would hate it.

HUMOROUS RECORDS

More Scenes of Domestic Bliss, (d.s.), Billy Caryll and Hilda Mundy, 1s. 6d.

BRDCST 3168A

Probably my sense of humour is rather dull, but I cannot understand any sane person wanting to hear this record more than once.

Sandy, the Convict (d.s.), Sandy Powell, Com., 1s.

BRDCST 822A

Sandy finds gaol a comfortable place, except for the inconvenience caused by a fellow inmate tuning-in foreign stations after midnight. It is not screamingly funny, but nevertheless it is cheap for a shilling.

CINEMA ORGAN

Popular Potpourri (d.s.), Beaufort Cinema Organ, Birmingham, 1s.

BRDCST 825

Reginald New has produced just the thing for cinema organ fans. His selection includes *I Apologise*, *To-day I Feel so Happy*, and *Close Your Eyes*. The choruses of these numbers are sung by a good vocalist.

DANCE MUSIC

(a) *By the Fireside*, (b) *One More Kiss*, Blue Jays, 1s.

RAD 1602

(a) was composed by Ray Noble, of *Good Night, Sweetheart* fame. I have heard better versions than this. The one big disadvantage of buying a shilling record is that nearly every band plays too quickly. This is not a good record.

★(a) *Fire in My Heart* (slow.) (b) *Hilltop Heaven* (f.), Jack Harris and His Grosvenor House Band, 1s. 6d.

BRDCST 3170

If you buy records for dancing purposes, this is an ideal disc. This band always keeps splendid time and its playing is of a high standard. Harris' discs can always be relied upon. This one is no exception.

★(a) *Flame of Desire*, (b) *Good-night, Little Girl, Good-night*, Riviera Dance Band, 1s.

RAD 1603

(a) is played with a vivacious spirit that makes one want to dance. There is some good saxophone playing in (b). The Riviera Band's rendering of both these popular numbers is straightforward and tuneful; but don't let that stop you from buying the record. It is one of

the best shilling dance discs of the month.

(a) *Good-night, Little Girl, Good-night* (f.), (b) *I'm Sorry, Dear* (slow f.), Jock McDermott's Dance Band, 1s.

BRDCST 827B

The xylophonist of this band knows his job. His playing on (a) is excellent. (b) is a little too fast for a slow fox-trot. This band is playing at the Covent Garden Opera House dances and broadcasts occasionally. It is well suited for dancing.

(a) *Granny's Photo Album*, (b) *My Mystery Girl*, Sid Phillips and his Melodians, 1s.

RAD 1600

I admire the excellent saxophone playing on (b). I recommend this record on this point alone. *My Mystery Girl* is one of the best tunes of the day. I am sure you will like it.

★(a) *If I Have to Go On Without You* (slow f.), (b) *My Bluebird's Back Again* (f.), Jack Harris and His Grosvenor House Band, 1s. 6d.

BRDCST 3171A

An excellent recording. I admire the clear-cut tones of the saxophone players. The vocal chorus on (b) is sung with a syncopated piano accompaniment and is quite effective. I enjoyed this disc.

★(a) *In the Jailhouse Now*, (b) *Open Up Dem Pearly Gates*, Blue Mountaineers, 1s. 6d.

BRDCST 3169

One of the best records I have heard. Similar to the universal favourite, *Eleven More Months and Ten More Days*, this record will appeal to all lovers of "American noises." The trumpet and saxophone squeals in (b) are very clever. Buy it on my recommendation.

(a) *Mona Lisa* (quick-step), (b) *You Try Somebody Else* (slow f.), Lew Sylva and his Band, 1s.

BRDCST 828

(a) is a splendid version of the popular hit from *Dow Bells*, the musical comedy at the London Hippodrome. Definitely (b) is too fast for slow fox-trotting. I like the variations and effects in this band's playing. The recording could be better.

(a) *Now's the Time to Fall in Love* (f.), (b) *Under the Spell of the Waltz* (w.), Jock McDermott's Dance Band, 1s.

BRDCST 826A

The modern waltz is a slow dance, but seldom does one find slow waltz tunes on records. In my opinion (b) is played too quickly. This is not an outstanding record by any means.

ABBREVIATIONS USED IN THESE PAGES

bar ..	baritone	IMP ..	IMPERIAL
BRDCST ..	BROADCAST	orch. ..	orchestra
COL ..	COLUMBIA	RAD ..	RADIO
com. ..	comedian	sop. ..	soprano
con. ..	contralto	ten. ..	tenor
d.s. ..	double-sided	w. ..	waltz
f. ..	fox-trot	WIN ..	WINNER
H.M.V.	HIS MASTER'S VOICE	ZONO ..	ZONOPHONE

(a) and (b) indicate the titles of each side of a record.

The Town-and-Country Four



A PORTABLE BY PERCY HARRIS M.INSTR.ADE.

FOR some time I have been working in my laboratory on a new portable receiver—new in every sense of the word, in circuit, design and make-up.

My aim has been to make a portable set more compact than has previously been the case, with first-class quality instead of the rumbling burble that is so often looked upon as characteristic of portables, and with adequate sensitivity to give a number of programmes at really good quality without resorting to the last limits of reaction.

Something Achieved

In the Town-and-country Portable I am satisfied that I have achieved something new in this way.

It will pick up a number of nearby and distant transmissions at real programme quality on both wavebands.

Its main charm, however, lies in its simplicity and high quality for, having only one tuning dial and a volume control, the most unskilled member of the household can easily pick up several programmes after about five minutes practice with the set.

Constructional work, too, has

followed novel lines. In many portables it is necessary to carry out the constructional work under great difficulties owing to the necessity of packing everything into a small space. While in the Town-and-country Portable the space occupied by the components is exceptionally small, the design is such that it is no more difficult to build than an ordinary baseboard set.

For example, when the cabinet is received it is taken apart in a few seconds, so that the various portions of the constructional work can be tackled independently.

The frame is wound on an outer former; the components are mounted on a small baseboard and panel in the conventional way; the loud-speaker is mounted on a baffle provided by simply screwing one board on to another; and, when

finished the various parts slide together in the simplest fashion, giving a complete portable set which is both handsome and efficient.

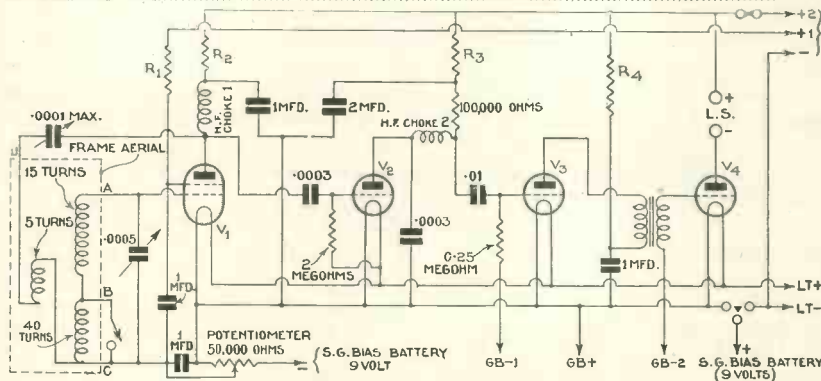
Finally, the batteries are slid into place, a few wander plugs inserted into the correct holes, and the set can be switched on.

New Circuit

The circuit, too, is quite new. Here we have a new method of reaction control. Four valves are used, the first being a variable- μ screen-grid valve, aperiodically coupled by a choke to the detector valve, which is followed by a tried and trusted combination of one resistance- and one transformer-coupled valve to the loud-speaker.

The reaction winding, instead of being connected to the detector valve, is connected to the plate of the variable- μ screen-grid valve and owing to the high amplification given by this valve the reaction condenser is made very small.

Actually a compression condenser with a .0001-microfarad maximum capacity is used, set at a very low-capacity position, and once the set is made to oscillate by adjusting this condenser it



A NEW CIRCUIT FOR A NEW PORTABLE
The Town-and-country Four uses an untuned screen-grid stage, leaky-grid detector, resistance-coupled low-frequency stage, and a transformer-coupled power valve

THE TOWN-AND-COUNTRY FOUR—Cont.



WINDING THE FRAME AERIAL

Mr. Percy Harris winding the frame for his portable. Full instructions are given in this article, which should be carefully followed. Both medium and long-wave windings are of stranded wire.

is taken off oscillation and the reaction controlled by a potentiometer which actually varies the magnification given by the valve.

Obviously, if with a certain degree of magnification the set is in oscillation a reduction of the magnification itself will bring it off oscillation. This forms not only a very smooth reaction control, but an excellent volume control for local station signals.

One Tuning Condenser

The method of coupling aperiodically gives only one tuning condenser, which simplifies both the construction of the set and its operation.

Low-frequency stability, which is essential for good quality and which is rarely found in a portable, has been obtained by the most careful decoupling and this accounts for the number of fixed condensers which you will see.

As some amount of reaction is almost continually used in a portable set with a small frame, a transformer has been chosen which has a rising characteristic, this compensating to some extent for the loss of high-note

reproduction which occurs when a feebly damped circuit is used. In a word quality has been built into this set by overall design. An important point, too, is the use of 27/40 stranded wire for all frame windings.

A wide choice of components is available for this receiver and a word or two is necessary with regard to the coupling choke used between the high-frequency valve and the detector. A number of different chokes are sold nowadays, many being designed for screen-grid coupling, using the tuned circuit in the grid of the detector valve. The use of this tuned circuit, which is virtually in parallel with the choke, has to be borne in mind when designing such chokes, but in the case of the Town-and-country Portable there is no such tuned circuit.

For this reason some chokes designed for screen-grid use are not suitable here, and it is best to select a high-grade choke with a very high inductance and a very small self-capacity.

While not representing all possible and efficient chokes, those mentioned as alternatives have been carefully selected. So far as the second high-frequency choke is concerned (that following the detector valve) any good choke will do here.

Do not forget that it is essential to have a variable- μ screen-grid valve in the high-frequency stage of this set, otherwise the particular form of reaction and volume control will not work satisfactorily.

So far as the detector and two low-frequency stages are concerned, any of the well-known makes will work satisfactorily here.

The loud-speaker unit used has been specially designed for this set but, as many people have a favourite loud-speaker, provision has been made for the use of an external reproducer when required merely by removing two plugs from the internal loud-speaker and plugging in the external loud-speaker in the sockets provided.

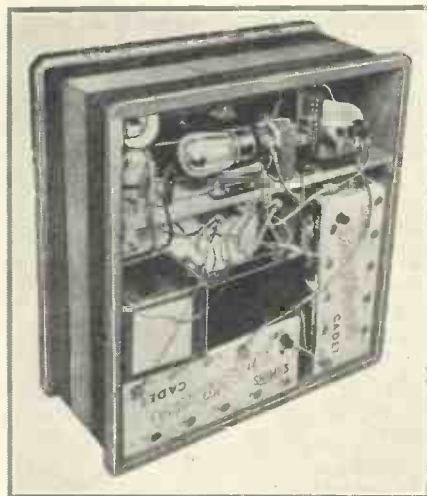
I have taken great pains to reduce all construction to its simplest terms. Instead of having to fix

components into small and almost inaccessible places, wiring up with difficulty, the reader can build everything comfortably "in the open," putting the several main parts together after all the wiring has been completed. Thus it is no more difficult than building the ordinary set on the baseboard.

Parts of Cabinet

When you receive the cabinet you will find that on unlocking the back and lifting it out, an inner portion slides out of the case, leaving a loose baffle board which can also be lifted out. The interior portion, round which the frame has to be wound, has in it a single shelf, which is also removed. All these loose parts should now be set aside until you have wound the frame aeri-als.

The first step in making your frame is to drill two small holes as close as possible to the back edge of the right-hand side looking from the back. Now take your



READY TO PUT IN CASE

The set, with frame aerial and batteries, all ready to be put in its case. Note the compact nature of the assembly.

frame-aerial wire, of which you should have one reel of 100 yd., wind on 15 turns in a clockwise direction looking from the back, the turns being spaced equal to about the thickness of the wire.

As the wire is quite flexible and you can pull it tight as you wind, you will find no difficulty in maintaining the spacing. A simple way to prevent slipping is to stick on to the former before winding one or two strips of ordinary electrician's sticky tape which you can buy from

PERCY HARRIS' FIRST SET FOR "W.M."

Woolworth's or any electrician's shop.

As the wire is wound over this it will stick to it and there will be no difficulty whatever in keeping the turns in position.

After you have wound the 15 turns cut off the wire at about a foot more than the turns have taken, thread it through the two holes and back again, tying it securely. Leave this end loose for the time being.

Next leave a space of about $\frac{1}{4}$ in. and drill two more holes for securing the wire, leaving about a foot at the beginning, and wind on five turns *with the turns touching*. Two more holes should now be drilled and the wire secured, leaving about a foot of free end.

Long-wave Winding

The next step is to wind the long-wave frame and for this you should drill two securing holes, as near as possible to the far end on the right-hand side of the former, looking from the back.

Now, starting at the far end wind on 40 turns with turns touching in an *anti-clockwise direction*, securing through two holes at the finish of the winding as before. You will notice that you wound clockwise for the medium-wave frame from the back, and the long-wave frame is anti-clockwise from the front.

If you think for a moment you will see that by doing this both windings are in the same direction

when joined in series. When all three windings have been made, they can be secured in position by a few dabs of Chatterton's compound or other adhesive to prevent the turns slipping about, if the former should shrink slightly.

I find in winding such frame aerials that the simplest way of securing the wire is to drill two holes about $\frac{1}{2}$ in. apart and to take

wave winding, which is scraped bare for this purpose. This joint is best soldered.

Switch Connection

You can now cut off the end of the medium-wave winding at this point, leaving the free end of the long-wave winding to go across to the switch.

We now have two ends of the



PUTTING THE SET THROUGH ITS PACES

Mr. Percy Harris enjoys a radio interlude with the Town-and-country Four during a week-end run in the country. The set has been thoroughly tested

about 18 in. of the wire at the beginning of the winding, and thread it through one hole into the inside of the former, out through the second hole and in through the first hole again, pulling it tight.

This holds the wire quite securely in position and one can then proceed with the winding. This method of securing was adopted on the frame in question at all points.

If you examine the theoretical circuit diagram you will see that the lower end of the medium-wave winding joins the upper end of the long-wave winding and this point is also taken to the wave-change switch, which is on the right of the set (looking at the front).

This being so, we have next to make the necessary join in the winding and a simple way to do this is to take the end of the medium-wave winding, thread it through the two holes made for the inner end of the long-wave winding (that nearest the medium-wave winding) and, having secured it in this way, to join it to a portion of the long-

reaction winding to deal with. That nearest the medium-wave winding is joined to the end of the long-wave winding which is nearest the front and the other is left free for subsequent attachment to a compression condenser.

Now we come to the loud-speaker. This is supplied ready mounted on a piece of board and is attached quite simply to the back of the baffle. Two flexible wires about a foot long should be attached to the terminals, these being fitted with positive and negative marked plugs, to go into the sockets mounted subsequently on the back of the small shelf on which the various components are fixed.

The loud-speaker, mounted on its baffle with the leads completed, is now set aside.

Panel and Baseboard

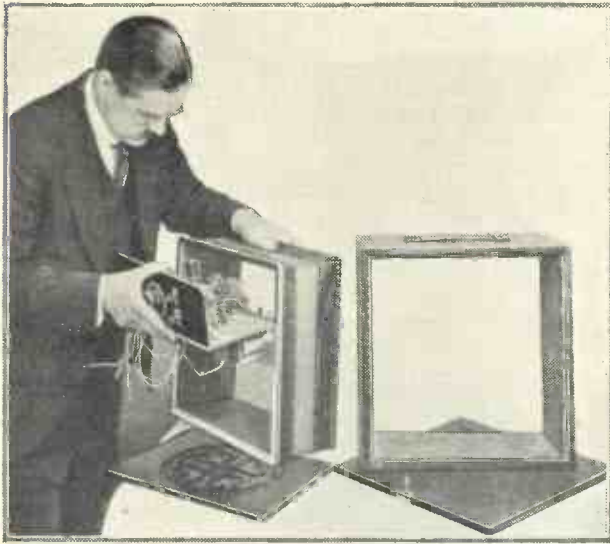
Next we come to what is probably the most interesting part of the construction, that is the assembly and mounting of the various parts on the baseboard and panel. The panel, which measures only $4\frac{1}{2}$ in. by 14 in., is mounted somewhat differently from normal.



ONLY ONE TUNING DIAL

The completed Town-and-country Four is always ready for instant use wherever it may be. Just what you want for the summer months

THE TOWN-AND COUNTRY FOUR—Cont.



ASSEMBLING THE SET READY FOR USE

Although the design is very compact, the assembly is not difficult, for it can be undertaken in easy stages, as this illustration shows. A special loud-speaker assembly has been made for this set

Instead of screwing the lower edge of the panel against the front edge of the baseboard, it is attached by two brackets in such a fashion that its lower edge is level with the top of the baseboard, so that the loud-speaker fret covers the edge of the baseboard.

Carefully attach the brackets to the ends of the baseboard and drill the panel for attachment, but do not attach it to the brackets until you have mounted on it the 50,000-ohm potentiometer, the variable condenser and the two switches.

Do not make any mistake about these switches and their connections. It is customary to use a two-point switch for "on-off" and a three-point for wave-changing, but in this set the case is reversed.

Grid-bias Switching

The two-point switch is used for wave-changing (merely shorting out the long-wave winding) and the three-point as the battery switch for, as we use two grid-bias batteries, and one of them has to be connected across the 50,000-ohm potentiometer, unless we make some provision for switching off this bias battery, as well as the filament battery, it will run down needlessly when the set is not in use.

In any case the current taken from this special grid-bias battery is very small, being of the order of a fifth of a milliampere only, so that

the battery would last a very long time even if the switch were not provided.

So far as mounting the various parts on the baseboard is concerned there is very little to tell, for the work here is obvious from an examination of the photographs and wiring diagram. The unusual positions of the valves are due to the need

for economising space and also, in a measure, to the special layout.

The valve holders are screwed to blocks of wood which are in turn

attached to the baseboard in any convenient way, perhaps the simplest being to pass wood screws through from the underneath or a little brass bracket can be used if desired.

Notice that by placing the screen-grid valve in the position shown, its plate terminal comes just where we want it, near the radio-frequency choke and the compression reaction condenser.

The only parts mounted underneath the baseboard are three of the decoupling condensers, the fuse, and the low-frequency transformer.

Decoupling Arrangements

You will notice there is a considerable amount of decoupling in this set and all of it is important. The decoupling resistances R_2 , R_3 and R_4 are of the spaghetti type and the ends join to the high tension by being brought together and gripped with a screw and a couple of nuts so as to avoid the necessity of a soldered connection here.

At the common point the fuse is

COMPONENTS NEEDED FOR THE TOWN-AND-COUNTRY FOUR

CHOKES, HIGH-FREQUENCY

- (HFC.) 1—R.I. Quad Astatic, type FY2, 3s. 6d. (or Lewcos type MC, Varley).
(HFC.) 1—Readi-Rad standard, 4s. 6d. (or British General, Lewcos type 11).

CONDENSERS, FIXED

- 1—Dubilier .0003-microfarad, type 670, 1s. (or T.C.C., Telsen).
1—Dubilier .0003-microfarad, type 620, 1s. 8d. (or T.C.C., Telsen).
1—Dubilier .01-microfarad, type 670 (or T.C.C.).
4—Dubilier 1-microfarad, type BB, 10s. (or T.C.C., Telsen).
1—Dubilier 2-microfarad, type BB, 3s. 6d. (or T.C.C., Telsen).

CONDENSERS, VARIABLE

- 1—Formo .0005-microfarad, with slow-motion dial, type 10c, 6s. (or Ormond, Jackson).
1—Formo .0001-microfarad max., type F, 1s. 6d. (or Igranic, Lewcos).

EBONITE

- 1—Peto-Scott 14 in. by 4½ in. panel, 2s. 9d. (or Becol, Potter).

FUSE

- 1—Microfuse 100-milliampere, with holder, 1s.

HOLDERS, GRID-LEAK

- 3—Readi-Rad, 1s. 6d. (or Bulgin, Telsen).

HOLDERS, VALVE

- 4—Telsen four-pin, 2s. (or W.B., Lotus).

PLUGS AND SOCKETS

- 2—Clix wood-screw sockets and plugs for loud-speaker, 8d.
10—Clix wander plugs, marked G.B.+ (2), G.B.—, G.B.—1, G.B.—2, H.T.+2, H.T.+1, H.T.+1, H.T.— (2), 1s. 8d. (or Belling-Lee, Ealex).
2—Clix spade terminals, marked L.T.+ , L.T.—, 4d. (or Belling-Lee, Ealex).

RESISTANCES, FIXED

- (R_2 .) 2—Varley 10,000-ohm spaghetti, 1s. 6d. (or Bulgin, Magnum).
(R_3) 1—Varley 30,000-ohm spaghetti, 1s. (or Bulgin, Magnum).

- (R_4) 1—Dubilier 20,000-ohm metallised, 1s.

- 1—Dubilier 100,000-ohm metallised, 1s.
1—Lissen .25-megohm grid leak, 1s. (or Telsen, Watmel).
1—Lissen 2-megohm grid leak, 1s. (or Telsen, Watmel).

RESISTANCE, VARIABLE

- 1—Colvern 50,000-ohm potentiometer, 5s. 6d. (or Wearite, Watmel).

SUNDRIES

- Tinned-copper wire for connecting (Lewcos).
Lengths of oiled-cotton sleeving.
1—Pair of Magnum panel brackets, type No. 2, 1s. 6d.
100 yards Lewcos 27/40 silk-covered wire, 10s. 6d.

SWITCHES

- 1—Bulgin two-point, type S22, 1s. 6d. (or Readi-Rad, Telsen).
1—Bulgin three-point, type S36, 1s. 9d. (or Readi-Rad, Telsen).

TRANSFORMER, LOW-FREQUENCY

- 1—Ferranti AF10, 5s. 6d. (or R.I. Dux, Lotus)

ACCESSORIES

BATTERIES

- 2—Full O'Power 60-volt Cadet, 11s.
2—Full O'Power 9-volt Cadet, 2s.
1—C.A.V. jelly-acid 2-volt accumulator, type 2NS17, 13s. 6d.

CABINET

- 1—Camco Carrier portable, with wooden fittings for set, £1 15s.

LOUD-SPEAKER

- 1—Ormond portable chassis and unit, type R461/2, 15s.

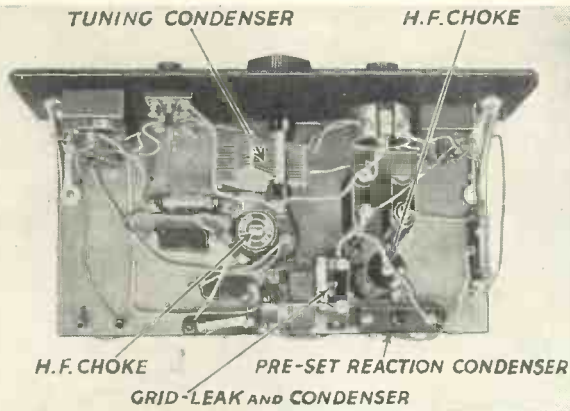
VALVES

- 1—Cossor 220VSG, 16s. 6d.
1—Mullard PM1HF, 7s. (or Cossor 210HL, Six-Sixty 210HF).
1—Mullard PM1LF, 7s. (or Cossor 210LF, Six-Sixty 210LF).
1—Mullard PM2, 8s. 9d. (or Cossor 220P, Six-Sixty 220P).

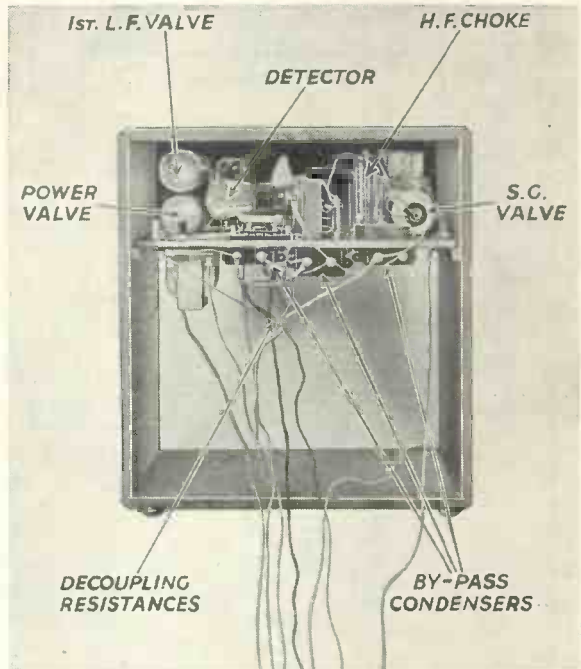
The prices mentioned are those for the parts used in the original set; the prices of alternatives as indicated in the brackets may be either higher or lower

Five Steps in Construction

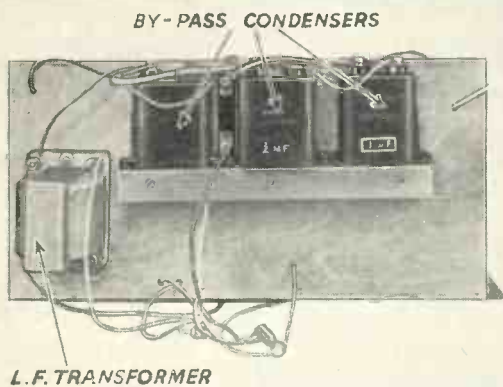
Although the Town-and-country Four is very compact in design, the construction is not at all difficult for it can be undertaken in easy stages. Remember that a full-size blueprint can be obtained for 9d., post free



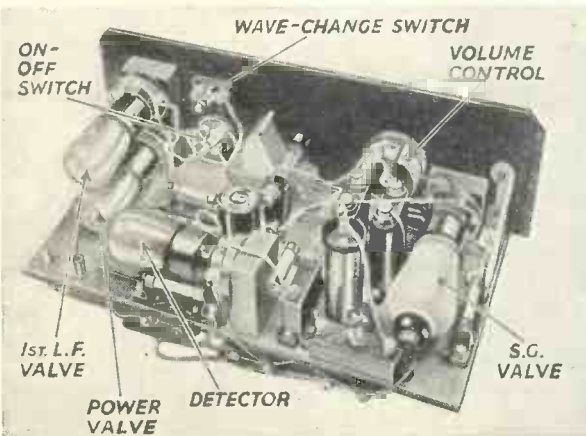
The majority of the components are mounted on a panel and baseboard in the usual way. All four valves are mounted horizontally to save space



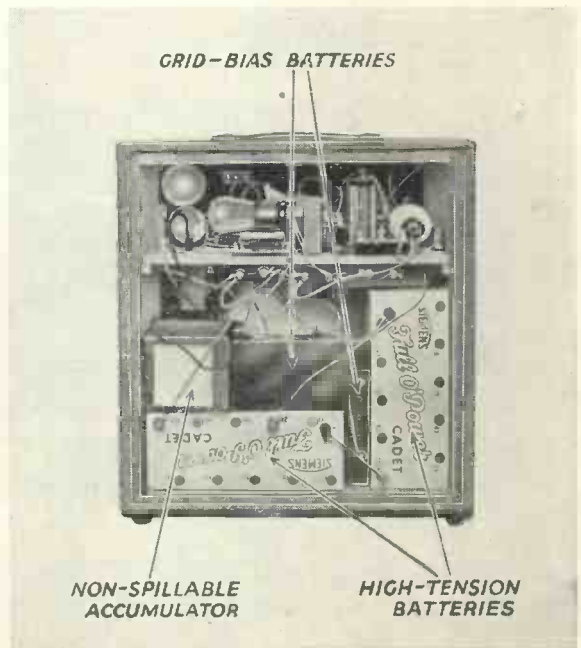
The set placed in the inner framework of the cabinet. The frame aerial is wound round this former, which slips into the outer case of the cabinet. Note from the other photographs in these pages how compact the whole set is—one of the smallest home-constructor portables yet produced



On the underside of the baseboard are fixed three condensers, the fuse, and the low-frequency transformer. They are easily wired up, however



The assembly of the set finished and the valves in position ready for use. Note the loud-speaker sockets at the left of the baseboard



The whole assembly complete in the cabinet. The loud-speaker is supplied on a special baffle board

A COMPLETELY SELF-CONTAINED SET

and once again screw it down a little until the set oscillates.

Once more screw it back so that the set does not oscillate and try it at the top end of the scale, screwing down until the set oscillates again. Having tried this at various portions of the scale you will get the "feel" of this control, which I want you to do before you make your final adjustments.

Clear Idea of Control

You may wonder why I want you to make the set oscillate and then turn it back again, but unless you have got a clear idea of this control you will not be able to make the very best of this set.

Adjust the tuning condenser at about 20 degrees or so once more and adjust the potentiometer about three-quarters of the way round between fully anti-clockwise and fully clockwise.

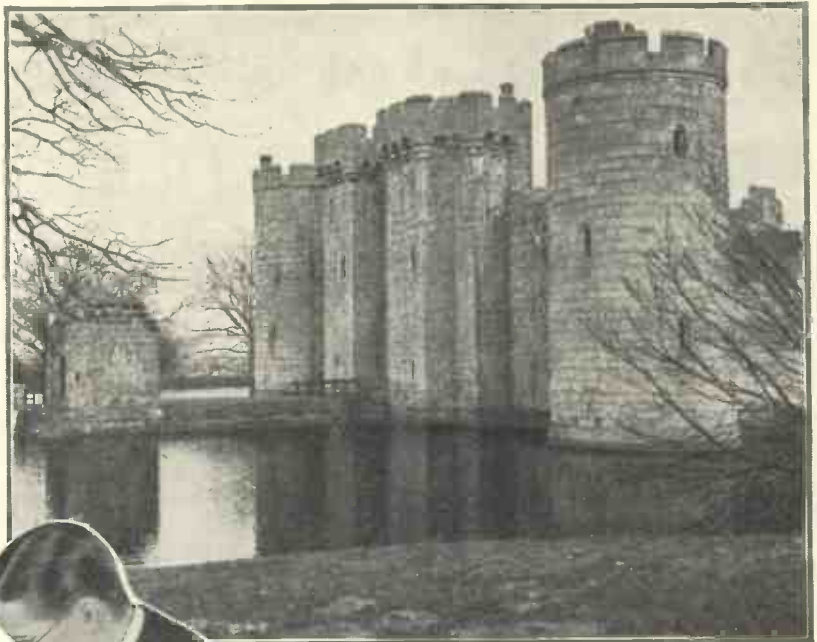
Now use the compression condenser until the set just oscillates and this time stop oscillation by turning the potentiometer in an anti-clockwise direction a few degrees. You should now find that the set is in a very sensitive condition over the whole of the scale and it can be made to oscillate or be kept off oscillation by variation of the potentiometer, which will serve as your external reaction control.

Long-Wave Reception

The reaction winding is so arranged that once the condenser has been set correctly for the medium wave-band it will be correct for the long-wave band, although you may require a little more potentiometer control on this band to make the set oscillate.

The set is sufficiently sensitive to pick up a large number of stations without going to the edge of oscillation.

Tell your friends about this fine Percy Harris portable—it is his first design for "Wireless Magazine" and will be followed by other sets equally good



IN THE SHADOWS OF BODIAM CASTLE

With the Town-and-country Four you will be assured of radio entertainment wherever you may go. It is very simple to build and is, of course, easy to operate

tion—in fact I do not recommend the set to be used right on the edge of oscillation at any time if you want really good quality.

Do not forget, too, when trying out the

set that it is directional and if a station is weak it may be that the frame is at right angles to the line joining you and that station. Try turning the set about before settling down to listen to any particular transmission.

Naturally in a receiver using a small frame, reception will vary not only from place to place, but even from room to room. The tuning positions on both wavebands will be readily found if a calibration chart is started as soon as the set is put into use.

The original Town-and-Country Four, as made by Percy Harris, will be on view in Selfridge's, Somerset Street windows, throughout the currency of this issue of the "Wireless Magazine." If you are in London make a point of seeing it!

In The Alps

FOR some months past experiments have been carried out in Germany and Switzerland with a view to the establishment of small wireless stations in mountainous districts for the purpose of communication with the nearest centres should an emergency arise.

The Bavarian broadcasting authorities took part in these tests and now feature in their daily programmes a special Alpine weather forecast and bulletin with the usual warnings to tourists when conditions are unfavourable or dangerous.

On Short Waves

With the help of short-wave transmissions it is now deemed possible to develop a regular service which would secure immediate assistance in the event of accidents. With the co-operation of the Swiss amateur short-wave experimenters' association, the Swiss Alpine Club has succeeded in securing two-way communication between the well-known Piz-Sol rest hut and the village of Ragaz in the adjoining valley.

Two wavelengths were tried, namely 42 and 84 metres. For this purpose a small portable transmitter and receiver was installed in the hut.

What can I expect from His Master's Voice Radio?



Let the Radio experts tell you—Read below!

HOW DOES THE QUALITY OF REPRODUCTION COMPARE WITH OTHER SETS?

Wireless Magazine says: "This is one of the best sets we have tried this season. Loudspeaker output is extremely well-balanced, top and bass notes coming out with a delightfully natural timbre."

Amateur Wireless: "The quality of reproduction from the self-contained loudspeaker is simply great. The deep bass and the clear-cut treble combine to give a balance of tone not often found in table sets."

And *Wireless World* reports: "The quality of reproduction is well up to the standard expected from an 'His Master's Voice' product, with the output nicely balanced and the bass well in evidence without being overpowering, or obscuring the upper register, the reproduction of which is good."

IS IT SELECTIVE?

Wireless World: "When searching for distant stations, the characteristic sharp cut-off of band-pass tuning was quite evident by the way signals quickly attained maximum intensity and the rapid decline to inaudibility beyond the normal setting. The long wave-band provided eight alternative programmes, all at good volume. Königswusterhausen, between Daventry 5XX and Radio Paris, was not affected by the proximity of these stations, although the last mentioned was exceptionally strong."

And *Amateur Wireless* says: "Selectivity will satisfy most listeners even if they live quite close to the regional centre."

While the *Gramophone* says: "The sensitivity and selectivity are all that can be expected of a set of this calibre; in this respect, indeed, we should rate it well above the average."

IS THE 435 SENSITIVE?

Wireless Magazine says: "Sensitivity is equally good at the top and bottom ends of the tuning scale, Cologne and Budapest were taken as the two extremities, and both came out well."

And *Wireless World*: "Sensitivity is well above the average for a receiver of this type."

IS IT SIMPLE TO OPERATE?

"Control is altogether delightful" says *Amateur Wireless*. "If you are a set buyer who likes simple operation, here is a set that is outstandingly attractive."

Wireless World adds, "Practically every modern feature likely to enhance the performance of the set and simplify its operation has been incorporated."

AND OTHER

OUTSTANDING FEATURES

"Its many technical points," says *Wireless Magazine*, "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."

While *Amateur Wireless* says: "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 . . . I am very much impressed with the meticulous care taken at every point to assure good results," and sums up by describing the instrument as "one of the most outstanding triumphs of the British Radio Industry."



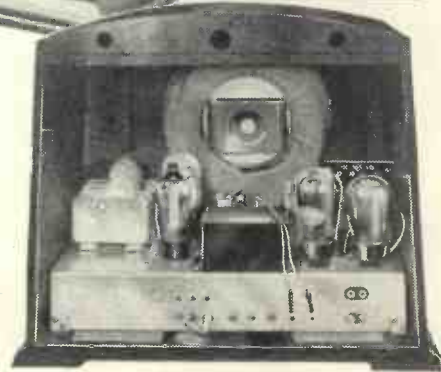
There is news in the "Wireless Magazine" advertisements

THE SET THE EXPERTS RECOMMEND



SPECIFICATION

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.



Note the clean layout of the interior of Model 435. Precision Engineering, not at one point, but at every point.

42/- down and 12 monthly payments of 33/10

Cash Price 20 gns. A.C. or D.C.

His Master's Voice

RADIO Model 435
"True to life"

COUPON

The Gramophone Co., Ltd., 365a Oxford Street, London, W. 1. Please send me full particulars of "His Master's Voice" Radio Set Model 435, and address of my nearest dealer.

Name
Address

Please mention "Wireless Magazine" when corresponding with advertisers

“Scottish Regional Testing”

Further developments are about to take place in the B.B.C.'s "regional" scheme. In these notes ALAN HUNTER explains what will happen when the Scottish Regional station begins operation at Falkirk in a few weeks' time. Scottish listeners should look forward to greatly improved reception in a short time.

SIGNALS from the new regional broadcasting site at Westerglen are, at the time of writing, about to be radiated for engineering tests. Westerglen, readers will recall, is near Falkirk, which is almost midway between Edinburgh and Glasgow, which are forty-five miles apart.

It is at Westerglen that the B.B.C. has recently completed the erection of twin Regional stations on the lines of those at Brookman's Park and Moorside Edge. In fact, the only external difference between Westerglen and the Northern and London regional centres is that the station building for the Scottish Regional is faced with stone to harmonise with local conditions.

Inside are two high-power broadcasting stations, capable of radiating a maximum aerial power, under Copenhagen rating, of 50 kilowatts.

Aerial Arrangement

Apart from the station building there is one other important difference to be noted about Scottish Regional. There are only two masts for the suspension of the two aerials required for Regional and National programme radiation.

The B.B.C. has decided to use the umbrella type of aerial at Westerglen. The early belief that the two masts would suspend a horizontal aerial and two split sections for the other aerial, as used at Daventry for the 5GB and 5XX aerials, has therefore proved to be wrong.

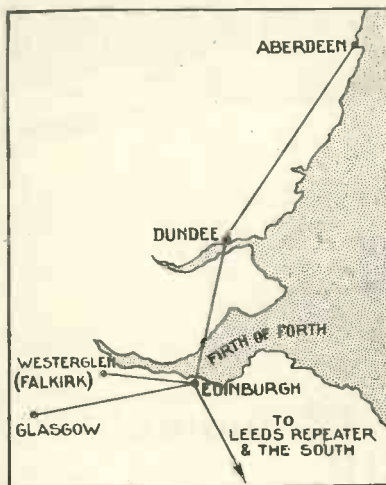
As the regional scheme nears completion the wavelength problem becomes more acute. The opening of Westerglen will emphasise this fact. Scottish Regional, which will be the first to test, will broadcast on the wavelength at present used

by Glasgow, namely 376.4 metres.

When Scottish National starts up at a later date it will take over what is now the National common wavelength, namely 288.5 metres.

This wavelength is at present shared by Newcastle, Swansea, Plymouth, Edinburgh, Bournemouth, Dundee and Aberdeen. The opening of Scottish National will mean the closing down of Glasgow, Edinburgh, and Dundee. Due to their distance from Westerglen it will still be possible for the relays at Swansea, Plymouth, and Bournemouth to continue radiating the National programme on the same wavelength as Scottish National.

But Newcastle and Aberdeen will have to look for other wavelengths, owing to the severe "mush" that would be created if they worked on 288.5 metres with the high-power Scottish National.



NEW SCOTTISH STATION

The main studio for Westerglen will be at Edinburgh, the relay transmitter in that city being closed down. The Glasgow station will be shut, but the studio will remain; the Dundee relay will also close down. Aberdeen will still have a transmitter, and will sometimes radiate original programmes on an international common wavelength

The B.B.C. therefore proposes to put Newcastle on an international common wavelength, around 220 metres. The same fate awaits Aberdeen. Actually, the wavelength change for Newcastle and Aberdeen may be an advantage to listeners in these districts, for it will be possible for both stations to radiate pro-

grammes of local interest as well as acting as National relays when required.

The B.B.C.'s present plans are engineering tests of Scottish Regional during April and public-participation tests early in May. Assuming that all goes well, the Scottish Regional will then be "faded in" and will thus gradually replace Glasgow, which will shut down with Edinburgh and Dundee.

Reorganised Landlines

The opening of Westerglen will mean a reorganisation of the Scottish landline network. Edinburgh will be the key point. Lines will radiate to Falkirk, Glasgow, and Aberdeen via Dundee. For the National programme Edinburgh will be linked with the South by the Leeds repeater station for the National programme.

As this is written a few weeks before the tests begin it is possible to make only a forecast of what is likely to happen. Scottish Regional will undoubtedly be a big success and for the first time listeners in Scotland living anywhere but a very few miles from the present stations will enjoy really good signal strength and, of course, greatly improved quality.

Scottish National on 288.5 metres will undoubtedly give a good signal to listeners in Edinburgh and Glasgow, but, like other B.B.C. National stations, it will not have such a good range as the Regional station on the higher wavelength.

Real Snag

The real snag will only arise when West Regional starts up at Washford Cross in Somerset. For then we shall have two high-power broadcasting stations synchronised on 288.5 metres, since the only remaining wavelengths will be taken up by West Regional on Cardiff's present wavelength and the reconstructed Belfast on its present wavelength.

The B.B.C. hopes that by the time these troubles arise work on the super-power Daventry National station will be in hand, thus holding out a solution to the problem of serving the whole of the country with a National programme.

WE TEST BEFORE YOU BUY

By the "W.M." Set Selection Bureau

"All British Stations . . ."

WHEN stipulating the stations wanted, many set buyers writing to us for advice include the following statement: "I want to get all the British stations and just a few of the foreigners."

There is a fallacy in this request, for it happens that nearly every set will get certain foreign stations much more easily than it will get some of the low-power British stations.

Apart from the Regional stations, such as those at Brookman's Park and Moorside Edge, there are many British stations of extremely low power, such as Bournemouth, Swansea, and Aberdeen.

These work on a common wavelength of 288.5 metres, and unless you are within the service area of any one of them all you will hear when the set is tuned to this wavelength is a very faint signal and a very loud "bubbling" sound, caused by the low-frequency heterodyne set up by the slight frequency differences between the various stations sharing the wavelength.

Even some of the exclusive wavelengths allotted to British stations do not offer signals of programme value very far outside the limited service areas of the stations concerned.

FREE ADVICE TO PROSPECTIVE SET BUYERS

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

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

Thus if you are a London listener the chances are that the Cardiff programme on 309.9 metres will not be heard—even on a big



set—because the power of the Cardiff station is at present only 1 kilowatt.

The fact is that most sets will tune in many more foreigners than home stations. It is misguided patriotism to ask for a set to get all British stations; a set that would perform such a wonderful feat would be so sensitive that not a few but practically every station in Europe would come in.

Ruling Prices

We still get letters asking the impossible—the ether for a five-pound note! Some readers evidently have rather hazy ideas as to what must be paid for any given type of set. Usually such readers hopelessly underestimate the cost and are exceedingly disgruntled when we gently hint that another "fiver" will have to be spent.

Considering the vast amount of pleasure you can get out of a good set and the excruciating agony you can suffer from a cheap "dud," it

seems merely self-protection to be fairly generous when buying a new set.

Here, as a guide, are the outstanding price ranges of the sets now on the market:

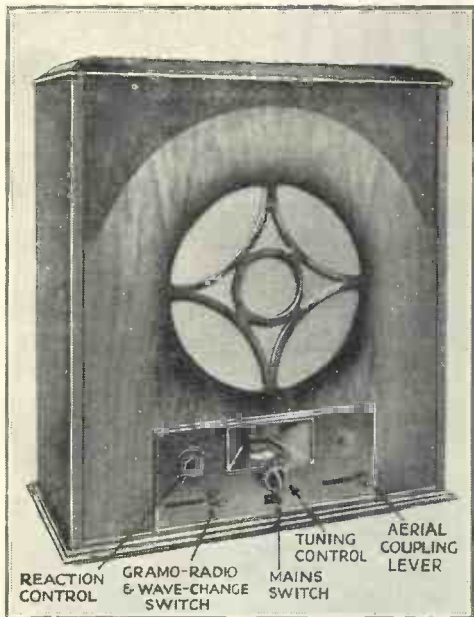
Starting with the cheapest, we have battery-operated two-valvers, with self-contained cone loud-speakers, for £5 and upwards. Next come the three-valve kit sets, ranging from about £7 to £11. These also are for battery operation.

Then we have the three-valve mains-operated consoles, from £15 upwards. Between £15 and £21 will be found the few table-cabinet sets needing external loud-speakers; also battery portables.

After this come the four-valve consoles for mains operation, ranging from about £22 to £30.

Above this price can be quoted most of the radio-gramophones, the most expensive being in the £70 to £80 class, although quite good machines can be obtained for between £30 and £50.

Blue Spot All-mains Four-valver



COMPLETELY SELF-CONTAINED

Only an aerial and earth and A.C. mains supply are needed to complete the installation. A moving-coil loud-speaker is housed in the upper part of the cabinet

THIS is one of the most interesting sets we have tried. It makes novel use of four valves, using a screen-grid type for the first low-frequency stage. The detector is resistance-capacity coupled to this screen-grid valve, and detection is on the anode-bend system.

These circuit details may not greatly interest the set-buyer, but their effect on results certainly will. Although there are only two tuning circuits the selectivity is exceptionally good. And the large amount of low-frequency amplification enables the many stations tuned-in to be heard at great strength on the loud-speaker.

Silent Background

The peculiar arrangement of the valves must largely account for the wonderfully silent background to the reception, which is noticeable even when you are listening to distant stations with the volume control turned full on.

Although the illustrations give most of the essential details about the controls of the set, we should like to emphasise the use of levers instead of knobs for the combined wave-change

and gramo-radio switching on the left, and for the control of aerial coupling on the right.

Tuning is a particularly pleasant operation, partly on account of the well-moulded tuning knob, with its super-imposed trimmer, and partly because the tuning scale, which is illuminated when the set is switched on, is mounted in such a way that the calibrations are very easily read off.

An important feature of the tuning of this set is that wavelengths are covered without a break from 200 to 2,000 metres, the change-over coming at 600 metres.

Another good feature is the aerial-coupling control, which provides a fine variation not only in selectivity, but in volume. All the controls are easy to work. In fact, the outstanding impression on testing the set is that control is exceptionally smooth.

We tested out the set with the mains aerial and with the standard 60-ft. external aerial. Most of the powerful stations came in with the

volume control at the half-way position. The selectivity is surprisingly good for a set with only two tuned circuits.

Selectivity

As expected, the aerial-coupling lever made a great difference to the selectivity. With this control set to give good strength on foreign stations, London National came in at 38 degrees, corresponding to a wavelength calibration of 260 metres. The spread of London was 25 metres, which is quite good for a set with two tuned circuits.

London Regional also came in very close to its wavelength cali-

NUTSHELL SPECIFICATION

MAKER: British Blue Spot Co., Ltd.
PRICE: 20 guineas.

VALVE COMBINATION: Screen-grid high-frequency amplifier (Osram MS4), metallised detector (Mazda AC/HL), screen-grid low-frequency amplifier (Osram MS4), directly-heated power valve (Osram P425), and mains rectifier valve (Philips).
POWER SUPPLY: A.C. mains, for all voltages between 100 and 250.

POWER CONSUMPTION: 34 watts.
TYPE: Table console, with powerful four-valve circuit and self-contained moving-coil loud-speaker. Provision for mains aerial.

REMARKS: Employs a novel circuit giving much better results than would normally be obtained from a set with only one high-frequency stage. Novel controls, all of which work well. Very quiet background.

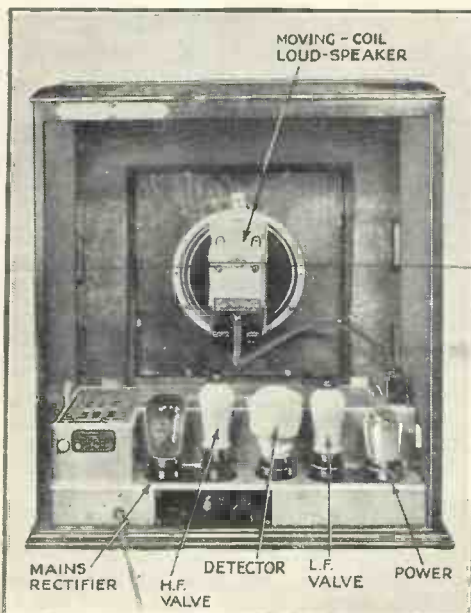
bration, being logged at 59 degrees, just below the 350-metre mark on the scale. This station was cut out at 345 metres and 370 metres, again giving a commendably small spread for such a powerful local.

We noted when logging these and other stations that the trimmer on top of the main tuning knob really is entitled to the name trimmer—it is by no means essential to alter this for every station. Tuning is virtually "one knob."

Reproduction on the self-contained moving-coil reproducer, which is energised from the mains rectifier valve, is well balanced.

Volume up to the considerable limit of the P425 power valve is well under the control of the aerial-coupling lever, and only at the minimum setting is there any suggestion of high-note suppression.

Mains hum, even when using the mains aerial, is very subdued.



UNUSUAL VALVE COMBINATION

Here you see an interior view of the set. You will notice that a metallised screen-grid valve is used in the first low-frequency stage

Lotus Landmark Three (Kit Set)

THIS kit was supplied to us assembled ready for test. We have satisfied ourselves from an examination of the blueprint that the assembly is quite straightforward. Indeed, if the intending constructor follows the point-to-point wiring chart there is little risk of failure.

No soldering is involved, as robust terminals are fitted to all components, which include most of the well-known Lotus parts.

New Dual-range Coil

There is also a new Lotus component, a dual-range coil, working in conjunction with the Lotus rotary switch for medium- and long-wave tuning. This has the usual short-circuited portion for medium-wave reception.

An important advantage of the coil is the inclusion of an aperiodic aerial winding, a section of which is also short-circuited when medium waves are being tuned.

Full control of selectivity is obtained by means of a .00015-microfarad variable condenser in the aerial lead.

This kit set is useful for the recep-

airial-coupling system the locals can be restricted to a fairly small spread on the dial, so as to enable foreign stations to be brought in clear of interference.

Our first test was to measure the total anode-current consumption. As this is 9 milliamperes the Drydex Red Triangle high-tension battery specified should give two or three months' good service.

As a choke-capacity circuit is provided for the power-valve output, no direct current flows through the winding of the loud-speaker. Almost any good loud-speaker can be used with this set.

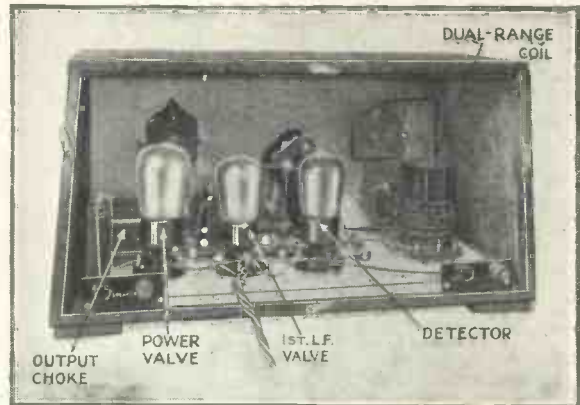
We obtained very pleasing quality using the Amplion AB4 balanced-armature cone. Later a W.B. permanent-magnet loud-speaker was put on, and this also gave very pleasing reproduction, especially at moderate volume.

Tests show that the selectivity depends very much upon the setting of the series aerial condenser. With this condenser all in for maximum volume the London stations were just clear of each other. National came in at 30 degrees and Regional at 58 degrees.

Moving the series aerial condenser towards its minimum

enabled us to restrict the spread of the local stations to 9 degrees. This setting enabled fair strength to be obtained from a good number of foreign stations. Nine were tuned in during a short test.

On the long waves Daventry came in at good strength at 63 degrees. We were impressed with the absence of medium-wave "break-through" when tuning on



SIMPLE TO BUILD
An interior photograph showing the simple design of the set. A choke-filter output is provided for preventing the high-tension current from passing through the windings of the loud-speaker

the long waves. The coil is well designed.

Most of the high-power foreign stations came in quite easily and we had no trouble in separating adjacent stations. For example, Prague at 84 degrees and Langenberg at 78 degrees were quite clear of North Regional at 80 degrees.

Satisfactory Reaction

We noted during tests that the reaction was very satisfactory on the medium waves, in spite of the fact that there is no high-frequency choke in the detector anode circuit.

To some extent this omission is made good by the differential reaction, which provides a constant anode by-pass of high-frequency current.

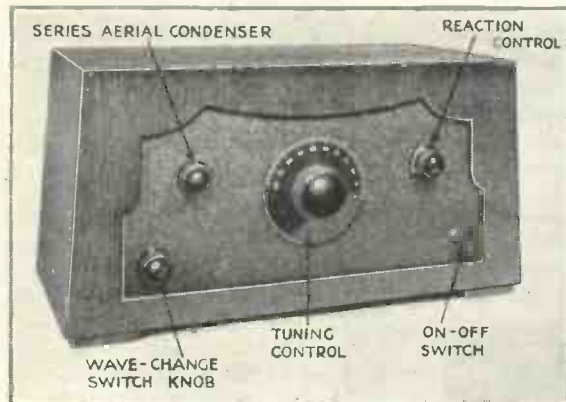
Then again, the high resistance in

NUTSHELL SPECIFICATION

MAKER: Lotus Radio, Ltd.
PRICE: £1 19s. 6d.
VALVE COMBINATION: Detector (Mullard PM1A), resistance-capacity-coupled amplifier (Mullard PM1HL), and output power valve (Mullard PM2A).
POWER SUPPLY: Externally-connected batteries.
POWER CONSUMPTION: 9 milliamperes total anode current.
TYPE: Three-valve kit set, housed in attractive oak cabinet, which is 10s. 6d. extra.
REMARKS: An easily assembled set, giving satisfactory results on medium and long waves. Includes a new Lotus coil, and most of the well-known Lotus components. Fine value.

the anode circuit of the detector tends to act as a barrier to high-frequency current. On the long waves reaction is not so good.

The completed set is attractive in appearance. It can be made more so by using the special Lock cabinet, price 10s. 6d., in solid oak.



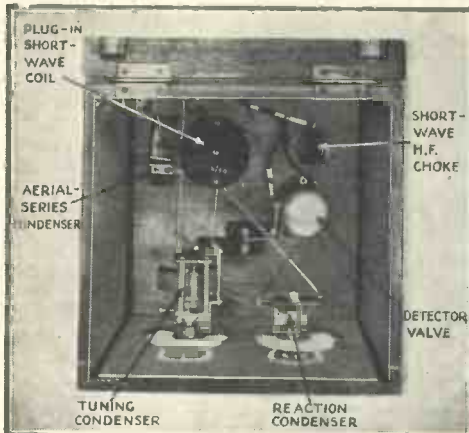
SIMPLE PANEL LAYOUT

There is only one tuning knob on the Lotus Landmark Three. The cabinet, which is of oak, can be obtained at an extra cost of half a guinea

tion of the local stations at full loud-speaker strength. Even when used fairly close to a regional centre of broadcasting it should be quite easy to obtain alternative programmes free from mutual interference.

By a careful manipulation of the differential reaction condenser it is easy to get a good selection of foreign stations on the loud-speaker with this set. Thanks to the flexible

Aerodyne Short-wave Adaptor



UTILISES PLUG-IN COILS
Here you see an interior view of the Aerodyne adaptor. Two plug-in coils enable a wavelength range of from 15 to 100 metres to be covered

ONE of the simplest ways of tuning-in short-wave signals below 100 metres is to fit a converter to the existing broadcast set. There are two types. The Aerodyne unit under review is of the type specially suitable for sets in which the first valve is the detector.

General Principle

The general principle is quite simple, but may not be known to all readers. The detector valve of the existing set is withdrawn and inserted in the short-wave unit valve holder. A valve-holder plug coming from the unit is then inserted in the detector position of the set.

To complete the conversion it is only necessary to remove the aerial and earth leads from the set and connect them to appropriate terminals on the unit.

The unit is, in fact, a single-valve detector arrangement, provided with a short-wave tuning and reaction circuit. The plug going from the unit to the set makes contact with the set's high- and low-tension supplies, through the anode and filament pins. The grid terminal of the plug is left blank, so that its insertion in the set automatically cuts out the normal tuning arrangement of the set.

In its place is connected the short-wave tuning of the unit, since this is connected to the unit detector valve, which obtains its filament

and anode supply from the set.

The Aerodyne Short-wave Adaptor is notable in several ways. It is designed on approved low-loss lines. The tuning and reaction condensers are both provided with excellent slow-motion dials, marked in degrees from 0 to 180. Moreover the condensers are fitted to a metal panel in such a way that the moving plates are well removed from the operator's hand. This makes for precision control, which is very valuable on short waves.

Another very good feature of this unit is the coil system. There are two well-designed short-wave plug-in coils, one tuning from 15 to 40 metres and the other from 40 to 100 metres. These coils are provided with air-spaced grid windings and close-wound reaction windings. Tests show that reaction is easily obtained over the whole wavelength range covered by the coils.

No doubt this smooth oscillation is partly due to the use of a novel type of series aerial condenser. This consists of two metal brackets, the distance between them being readily varied, so as to vary the capacity and hence the aerial coupling.

A good short-wave choke is fitted in the anode circuit of the unit detector valve. The wiring of the grid circuit of this valve is kept

short; indeed, the wiring of the whole unit is a model of good short-wave practice.

During tests we were impressed with the entire absence of "blind spots" during tuning and operation. That is to say the reaction control was very constant over the wavelength range of each coil.

Tested with Two Sets

Tests were made with two sets, one a simple two-valver and the other a more elaborate three-valver. With both these sets the unit behaved admirably, bringing stations around the 30-metre band at great strength. The valve we used in the detector was a Mullard PM1HL.

It is important to remember that this unit requires no additional

BRIEF DETAILS OF THE SET
MAKER: Hustler, Simpson & Webb, Ltd.
PRICE: £1 15s.
VALVE COMBINATION: Detector, as removed from the existing set.
POWER SUPPLY: Batteries of the existing set. No extra drain on the supply.
TYPE: Short-wave converter, enabling a broadcast set to be tuned to wavelengths below 100 metres.
REMARKS: One of the best units of its type. Works very well from 15 to 100 metres, the range of wavelengths being covered by two plug-in coils.

batteries whatsoever, as the detector valve in the unit takes its supply from the existing set.

For those with sets incorporating a stage of high-frequency amplification there is an Aerodyne super-het adaptor which will convert, say, a three-valve broadcast set into a four-valve short-wave super-het sequence.

The general design is similar to the unit described, but additional connections have to be made for the battery supply of the unit valve, which is an extra stage in the super-het model.

A great number of sets now in use can be converted to short waves with one or other of these units. Even mains-operated sets could be adapted with the super-het model, provided the listener is prepared to install the necessary 60-volt high-tension battery and a small two-volt accumulator.



NEAT APPEARANCE

This short-wave adaptor is suitable only for battery-operated receivers. A super-het adaptor is available for sets employing one or more stages of high-frequency amplification

Columbia Radio Gramophone Model 602

THIS is one of the least expensive instruments for radio and record reproduction now on the market. It includes everything except the aerial and earth. The radio circuit makes it suitable for installation in all parts of the country.

There is enough high-frequency amplification in the single stage preceding the detector to enable good loud-speaker signals to be obtained from the home stations. And without undue forcing of reaction it is possible to bring in a large number of foreign stations, many of them being concert alternatives to the locals.

Gramophone Equipment

Still another alternative is to reproduce gramophone records. All equipment is included for this, such as gramophone motor, pick-up, and volume control of the pick-up output, which is applied

simple transformer adjusting screws. The range is from 120 to 240 volts and over.

The inherent selectivity of the circuit permits the use of the full length of aerial, that is 100 ft., but a length between 70 and 100 ft. is suitable. A good earth is essential, not only to gain signal strength, but to eliminate mains hum. A water pipe is quite suitable.

Now for test results. The first point we noted was the good acoustic effect produced by the large oak cabinet. This prevents boom in the bass and enables the full, rich tone of the energised moving-coil loud-speaker to be heard to best advantage.

The quality is not impaired when the volume control is used to cut down the output. Incidentally, volume on both radio and gramophone can be reduced smoothly and without critical setting of the knob to the point of inaudibility.

The gramophone side of the instrument is very satisfactory. Up to the maximum output there is no sign of overloading, and more than enough volume is available, even for dancing.

Needle scratch is almost entirely absent, due to a carefully arranged cut-off in the reproduction of frequencies around the needle-scratch frequency. As proved on

radio, there is enough top-note response to give good definition in spite of the cut-off.

On the radio side the most outstanding aspect of this instrument is the very exceptional selectivity. True, there is band-pass aerial tuning, but this does not



SIMPLE TO OPERATE

All the controls are fitted on the motor board with the exception of the combined volume control and master switch

entirely account for the fact that, twenty miles from Brookman's Park, we were able, with a 70-ft. aerial, to get Mühlacker clear of London Regional.

There is a delightfully silent background during radio reception, due, perhaps, to the use of a screen-grid valve for the detector. The band-pass action is well marked. Stations are easy to find, but fall away sharply on each side of the



EXCELLENT VALUE FOR MONEY

Every modern radio refinement is incorporated in the Columbia model 602. The moving-coil loud-speaker is of the mains-energised type

to the detector stage of the set.

Although the model tested is for A.C. mains, there is an equivalent model available for those with D.C. mains at the same price.

A particularly good point about the model tested is the wide range of supply voltages covered by the

NUTSHELL SPECIFICATION

MAKER: Columbia Graphophone Co., Ltd.

PRICE: 32 guineas.

VALVE COMBINATION: Screen-grid high-frequency amplifier (Mullard 54VB), screen-grid detector (Mullard 54VB), pentode output (Marconi MPT4), and valve rectifier (Mullard DW3).

POWER SUPPLY: A.C. or D.C. mains.

POWER CONSUMPTION: 200 watts.

TYPE: Radio gramophone, model 602, in large oak pedestal cabinet, containing set chassis, energised moving-coil loud-speaker, gramophone accessories, and power supply.

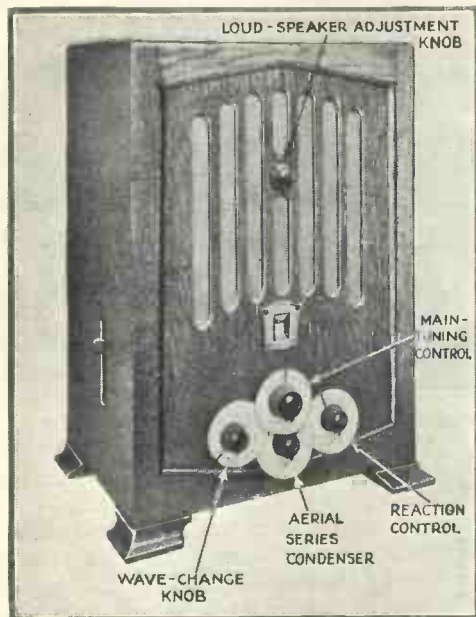
REMARKS: Excellent value for money. Although so cheap the circuit is of advanced design.

well-defined dial spread for each.

The good selectivity is not confined to spectacular elimination of the locals. It was found that adjacent high-power foreigners came in quite clear of each other.

The tuning dial is clearly marked in medium and long waves, and for most stations the marking is accurate. Reaction has rather an exceptional build-up, but does not have to be used to the limit unless overall volume has been cut down to give freedom from inter-station interference.

Kolster Brandes Kobra Three



A MEMORY TEST

An exterior view of the K.B. Kobra. The controls are marked with paper discs which can be torn off when the listener has mastered the art of tuning

HERE is one of the very few self-contained consoles for battery operation. The Kobra is a simple three-valve set with self-contained cone loud-speaker and batteries. The only external is the aerial system.

The big feature of the design is the flexibility of the tuning circuit. By a novel system of inductive coupling the selectivity can be varied over much wider limits than is normally possible.

As a result the Kobra is suitable for use very close to a regional centre of broadcasting, when the fullest use can be made of the loose coupling to give separation between the programmes. On the other hand, the Kobra is suitable for listeners living off the beaten track, those wanting maximum amplification from the three valves without the need for very great selectivity.

Another notable point about the Kobra circuit is the inclusion of automatic grid bias for the two amplifier valves. This is done by inserting resistances in series with the high- and low-tension

battery connections.

The bias voltage is obtained by virtue of the voltage drop produced by the anode current flowing through the resistances. If a pentode valve is wanted in place of the small power valve fitted, these bias resistances can be changed.

The advantage of automatic bias in a battery set is twofold. There is the obvious convenience of doing away with the grid-bias battery. But in addition there is the automatic adjustment of bias as the voltage of the high-tension battery falls.

The fall in voltage results in a decreased anode current, which in turn means a decreased voltage across the resistances; and so the grid-bias voltage falls progressively with the high-tension voltage, thus avoiding the over-biasing that so frequently occurs with sets fitted with separate bias batteries.

A plug-and-socket adjustment is provided near the detector-valve holder, so that either direct or inductive aerial connections for medium and long waves can be obtained.

THE SET IN BRIEF

MAKER: Kolster Brandes, Ltd.

PRICE: £9 17s. 6d.

VALVE COMBINATION: Detector (Cosor 210HL), resistance-capacity coupled amplifier (Mazda HL210), and output-power valve (Mullard PM2A).

POWER SUPPLY: Self-contained batteries, comprising high- and low-tension supplies.

POWER CONSUMPTION: Total anode-current consumption, 6 milliamperes.

TYPE: Battery-operated three-valve console set, self-contained except for aerial and earth.

REMARKS: An ideal set for use near or far from regional broadcast centres. Automatic grid bias reduces maintenance troubles. Well designed and inexpensive.

For our tests we used inductive coupling, and obtained results above the average for this type of set. It was soon made clear that many foreign stations could be tuned-in without interference from the locals.

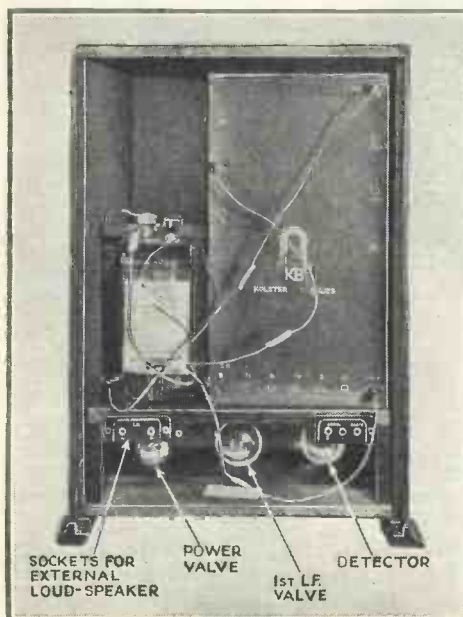
At first, the number of controls may be a little confusing, but you quickly learn to appreciate the boon of selectivity that they enable you to obtain.

London National at 27 degrees had a spread of only 9 degrees, and London Regional was even better, being maximum at 51 degrees and cut out within 8 degrees. We found that a careful setting was required of the coupling lever on the side of the cabinet. Once the correct point has been found the locals are easily eliminated, and, what is equally important, the foreigners then come in at good strength.

We tested the total anode-current consumption, and this was only 6 milliamperes.

In view of the low consumption, the quality of the speech and music is surprisingly good. The cone loud-speaker included is very sensitive, and gives a clear-cut response.

If desired, an external loud-speaker can be connected to the set.



SIMPLE AND NEAT DESIGN

As can be seen from this photograph, simplicity has been the keynote in the design of the set. Provision is made for the use of an exterior loud-speaker

RADIO MEDLEY

* A RADIO FAN'S CAUSERIE CONDUCTED BY BM/PRESS *

*Short-wave Reception :: The Curse of D.C. Mains :: Armstrong "Supers" :: Electrical Interference :: Life of Valves :: Hospital Repair Squads :: Cabinets for Radiograms
Linen Loud-speakers :: Foreign Apparatus*

Short-wave Reception

ALTHOUGH I have never been greatly intrigued by the possibilities of short-wave reception—as far as ordinary broadcasting is concerned I agree with the B.B.C. ideal of an absolutely reliable service at all times—I am glad to see that there is a revival of interest in this direction.

In the future it seems quite certain that short waves will come into general use and the more experience that is gained of them before that time comes the better. There is quite a large number of short-wave adaptors for connection to ordinary sets now on the market and there seems to be a new one every week or so.

I am also glad to note that the "Wireless Magazine" wavelength list now includes short-wave stations; if and when I do listen on the short waves that list will save me a deal of trouble in finding out what station I am receiving!

The Curse of D.C. Mains

I have mentioned before the troubles of those with D.C. supply mains; I know them so well from experience. For one thing, it is a great disadvantage not being able to try out any of the new A.C. sets. Now, thanks to the good offices of the "Wireless Magazine" Technical Staff, I am about to try out one of the M-L converters made by Rotax, Ltd., of Willesden Junction, London, N.W.10.

The model in question is a new one and gives an output of 200 watts at 230 volts, 50 cycles, from almost any D.C. mains. The

complete equipment, which comprises a double-wound rotary transformer, anti-interference unit, starter switch and soundproof cover, costs £25.

I have heard the instrument working in the "W.M." laboratory and was very impressed with it. The mechanical noise was negligible and I hope that, with the anti-interference unit (which is intended to keep high-frequency ripples out of the radio set), it will turn out to be as silent electrically.

Works Any Set

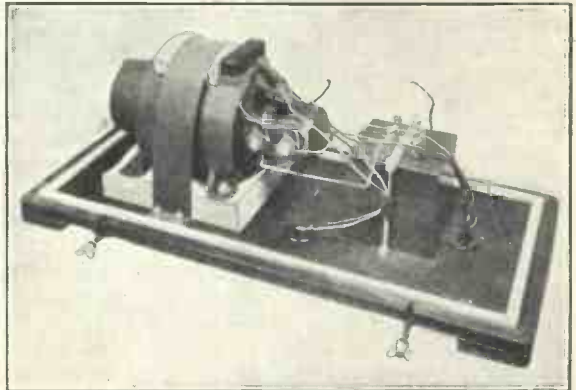
This converter is big enough, of course, to work even the largest radio gramophone, and I hope while I have it in use to try out some of the new A.C. jobs. It is claimed that the regulation is so good that when the machine is operating a radio gramophone there is no appreciable rise in the output voltage if the load of the gramophone motor is thrown off and the radio portion only is employed.

The complete gear is quite large in size and really looks like a small power station. Although it is rated at 200 watts, the input wattage is no more than that consumed by whatever set it is used with. I am glad of that, for my electricity costs me 5d. a unit!

I shall have more to say about this M-L converter next month; I think that it will interest many of my readers who have to work from D.C. supplies.

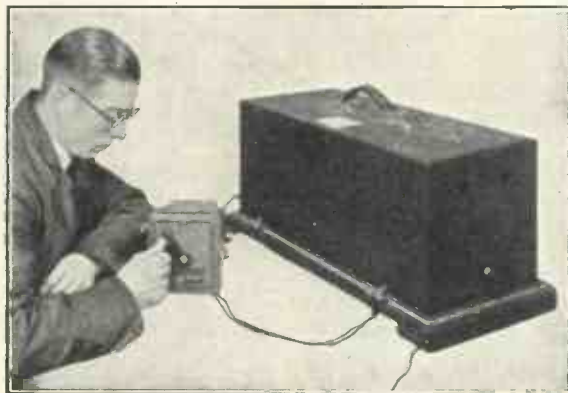
Armstrong "Supers"

Do you remember the popularity



AN A.C. POWER UNIT FOR THOSE WITH D.C. MAINS

This is the new type of M-L converter, which gives an output of 230 volts, 50 cycles, from D.C. mains. The rotary converter is seen on the left, with the anti-interference unit on the right



CLOSED UP READY FOR USE

The M-L converter in its soundproof cover. On the left is seen the special starter switch. With this apparatus it is possible to use any A.C. set or radio gramophone on D.C. supplies

the Armstrong "super" enjoyed some six or seven years ago? Most of us have forgotten all about it and I had not heard of it for a long time until a letter came from Scotland the other day asking if it would be of use for a small portable set.

When this circuit was in vogue it was used for portable sets, I remember. A very good portable using the circuit was demonstrated at a meeting of the Radio Society of Great Britain many years ago and I do not see why it should not be of use today.

I shall be interested to hear from anybody who has tried this and other old circuits—such as the Flewelling

RADIO MEDLEY—Continued

and the Cockaday—with modern valves and components. Most of these circuits were tricky and inclined to be unstable. It is quite likely that with modern parts they would go “up the loop” entirely. Still, some keen experimenters might give them a try-out once again and let us know what happens.

Electrical Interference

In January I referred to a difficult case of electrical interference for which no cure can be found.

Now I hear from Mr. Austin Mills, of Stockport, that he has designed and protected a special compound filter. This is, I gather, connected between the mains and the electric motor of a radio gramophone. It has been tried extensively—from a 15 B.H.P. lift motor down to small violet-ray equipment—with splendid results.

According to Mr. Austin, the cause of much interference is the network of inductance and capacity provided by the mains functioning as an aperiodic distributing aerial for the disturbances and, providing that the aerial of even a battery set is within pick-up distance of these mains, the unwanted signals can be received.

Life of Valves

I often wonder what effect the long life of present-day valves has on the sales of our valve manufacturers. For instance, a correspondent tells me that he still has in use two of the old original horizontal screen-grid valves which he purchased three years ago. “Heaven only knows what their emission is like,” he exclaims, “I haven’t the heart to test them.”

Talking of valve life, isn’t it good news to know that the prices of valves have now been reduced? Many people think the reduction is long overdue, but that is a matter that need not be discussed at this stage. On sets with a large number of valves the saving is worth while. For instance, valves for the Ideal Home Super, described in the April issue of “Wireless Magazine,” cost 8s. 3d. less than they would have done two months ago.

I do not suppose that there will be any further reductions for a long time to come.

Hospital Repair Squads

Since the February issue of “Wireless Magazine” was published I have received only six offers of help from readers in the matter of hospital repair squads. This response is very poor and it is obvious that the idea will have to be dropped for the present, at any rate.

I have heard from several ex-hospital patients. They all agree that something should be done to keep hospital installations in a good state of repair. There is valuable work to be done, but it cannot be undertaken unless sufficient volunteers come forward. So that is that. A pity, isn’t it?

Cabinets for Radiograms

Last month I mentioned an idea I had for a radio-gramophone cabinet with the “gramo” parts fitted in a drawer at the bottom. The advantage is that the drawer could be pulled out when needed and records changed without having to get out of one’s chair.

I am indebted to Mr. Duncan Gladhill, of Sheffield, for letting me know that such an arrangement is at present on the market under the name “Ad-a-gram.” This outfit is said to comprise an electric turntable, pick-up and needle cups contained in a box about 6 in. high on which one can stand a wireless set. The “gram” part pulls out in a drawer.

This sounds an interesting proposition and if this note should be seen by the makers of the instrument I shall be glad if they will send me further details.

Mr. Gladhill continues: “I also agree with your remarks on cabinets, as I have had an enormous amount of trouble squeezing a large set into a small radio-gramophone cabinet. As a matter of fact, I built Everybody’s Radiogram, with a push-pull stage added. The cabinet seemed large enough when I got it, but there was certainly insufficient space between baseboard and motorboard, and the controls had to be grouped in the centre more than should be necessary.

“I certainly think a little extra space each way would cost very little more and make a vast improvement all round.”

I am in entire agreement with these views and hope that manufacturers will bear such points in mind when considering their next season’s models—as I know some of them are doing now.

Linen Loud-speakers

Several correspondents were surprised to learn from my notes of last month that linen-diaphragm loud-speakers are not now being manufactured. Mr. R. P. Jones, of Dulwich, has had one in use for over three years and likes it better than a new inductor model with which he compared it recently.

“In my humble opinion,” he says, “the linen-diaphragm speaker is generally far better than the balanced-armature type and only surpassed by the more expensive moving-coil jobs. But the linen *must* be large to be effective.”

Mr. Jones’ loud-speaker is of the double-diaphragm type, the larger measuring 24 in. by 18 in. and the smaller 10 in. by 8 in.

Another correspondent, Mr. G. W. Part, of Tunbridge Wells, has had an “A.W.” double linen-diaphragm loud-speaker in use for three years. “It has recently been re-covered and I have not yet heard a speaker to come up to it, though I have tried many—yes, moving coils included. I *have* heard more (a little) bass and I have heard rather ‘cleaner’ reproduction, but for general balance, ‘no.’”

Foreign Apparatus

One result of the recent duties on radio apparatus is that several foreign firms are arranging to start production in this country. This is good news for it means that the radio industry will be able to absorb more workers. In this way unemployment will be relieved to some extent.

There is the further advantage that more workers will get experience of radio manufacture. This is important, for many firms find it difficult to find skilled hands. Very often people have to be taken on and trained for several months before they can be trusted on a production job.

BM/PRESS

London, W.C.1.

Secrets of Good Tuning

By W. JAMES

IF we connect a tuning condenser and coil to a detector valve, add an aerial, and tune to the local station, we shall find that the signals are heard when the tuning condenser is moved through several degrees.

It might be found, in fact, that the signals are just heard when the condenser is set at 50 degrees, the strength increasing to the maximum as the condenser is turned to 60 degrees, falling away again until, at 70 degrees, the signals are only faintly heard.

Reason for Spread

Now why is the station heard over 20 degrees of the tuning condenser? There are several reasons.

The first is because of the strength at which the signals are received. For a given position this depends upon the size and goodness of the aerial and earth. Reduce their effectiveness and you lower the strength.

With a short aerial you might find that the signals are heard over only 10 degrees. With a still shorter aerial, the signals might be heard over only 5 degrees.

If, now, when the circuit is fully tuned, the signals are of comfortable loud-speaker strength, one is inclined to feel satisfied and to say that the selectivity is good. This idea of selectivity is all wrong, however. It means that if you try the same set on aerials that are nearly enough alike, but at different distances from the broadcast station, the selectivity varies.

Relative Strength

Actually, owing to the differences in the strengths of the signals received, the station can be heard over various numbers of degrees of the tuning condenser. The selectivity has not altered, but in one case the station may be heard over 5 degrees and in another case over 20 degrees. This is simply a matter of the relative strength at which the station is heard.

This first reason is a pretty obvious

one. The second reason is that the detector, which we are assuming to be of the grid-leak type, absorbs power from the tuned circuit. This in effect broadens the tuning.

If the values used in the detector circuit are modified, the loading effect is varied and this alters the tuning. Thus, if, for example, the condensers C_1 or C_2 , or the value of the grid leak R_1 (Fig. 1), are altered, the loading is changed.

If you take the grid leak from the grid to the negative instead of to the positive side of the low-tension supply, the load is usually reduced and the circuit tunes more sharply.

Should the efficiency of the detector be increased at the same time that the loading is reduced, it is possible that the station will be heard over as many degrees as before. But this does not alter the fact that the selectivity is improved when the load is reduced.

The method of connecting the detector also affects the results, because if, instead of connecting the detector across the tuned circuit as in Fig. 1, it is joined across part, as in Fig. 2, the load is reduced.

Because of this, bigger voltages may be built up with the result that signal strength is not lost, but the selectivity is improved.

If the grid condenser is connected to a point further towards the earth end the loading is again reduced and probably the strength of the signals

applied to the detector valve is reduced as well. A tapping point can, however, be found at which strength is the maximum.

If you tap nearer the earth end than this, the signals weaken, but the selectivity is improved.

The third point to be considered is the connection of the aerial.

Let us connect the aerial to the top of the coil through a pre-set condenser. What happens now is that as the

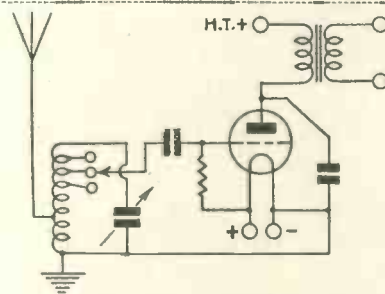


Fig. 2.—Detector connected across part of the tuned circuit, thus reducing the load

capacity of the condenser is reduced, so the strength of the signals across the tuned circuit varies. By experiment you would find a setting for the pre-set condenser for which the signals reached their maximum value.

Matter of Coupling

This is a matter of coupling. There is a further effect due to the load imposed by the aerial and earth. When the coupling is made very weak by reducing the capacity of the pre-set condenser to a small value, the loading is reduced and the selectivity is improved.

At the same time, the strength of the signals is reduced and you gain the impression that the selectivity has been greatly improved. It is true that the signals are heard over fewer degrees, but part of this is because they have been weakened.

A further test is to connect the aerial to various taps on the coil, as in Fig. 3. Normally, starting from the grid end, the strength and selectivity will improve as the tapping

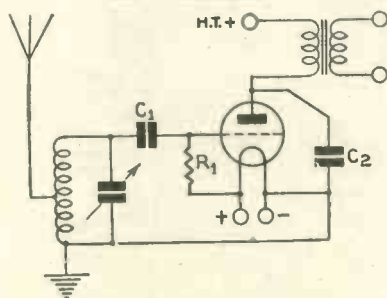


Fig. 1.—Detector connected across whole of the tuned circuit

SECRETS OF GOOD TUNING—Continued

point is moved towards the earth end.

But a position is reached where the selectivity is good and the strength is the maximum. Taking the tapping still further towards the earth end reduces the strength and, as the load-

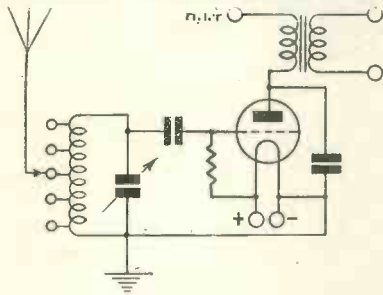


Fig. 3.—Connecting the aerial to various taps on the tuning coil

ing due to the aerial and earth is reduced, so the selectivity is improved.

We have taken a tuned circuit and discussed how the selectivity and the strength can be varied by changing the circuit connections.

Let us leave this for a moment and consider the coil and its tuning condenser. If we have a coil and condenser of bad design, their losses being high, the tuning will be broad and the strength weak.

With a better coil and condenser, both the selectivity and the strength will be improved; provided they are properly used and if we use really low-loss parts and connect them carefully, the tuning will be very good.

Effect of Aerial Load

To explain this matter further, let us look into the simple circuit of Fig. 1. The results obtained from a really good coil and tuning condenser used in this circuit would be very little, if any, better than from a tuned circuit of average efficiency. This is because the load imposed by the detector and that by the aerial is so great that the circuit behaves as though it had large losses.

The tuned circuit must be suitably connected. A good coil is not needed in the circuit of Fig. 1. An average coil is as good as a really low-loss one.

But if now the good coil and condenser are used as shown in Fig. 4, where the aerial is joined to the tap found by experiment to be the best, and the grid condenser is also joined to a tap, the selectivity and the

strength will be superior to that obtained from the coil of average efficiency.

The circuit must always be adapted to the coil and if you take a low-loss coil, joining it in your present set designed for a quite ordinary coil, nothing will be gained.

We could go through the tuning circuits of a set and examine each in turn, pointing out what modifications must be made in order to obtain the best from coils having different efficiencies.

In the case of aerial coils we may tap the coil or use a primary winding. Experiments will show the best position for the tap or the right size for the primary and, as in many things, several factors must be considered.

You will not find a tap that results in the strength being the maximum for all wavelengths over the tuning range and the same tap will not be the best from the point of view of selectivity at all points. But a point can be found which is the most useful.

When a grid circuit, such as the grid circuit of a screen-grid valve, is joined across the tuned circuit, the loading introduced is small and is usually negligible. With a leaky-grid detector the loading introduced is pretty considerable. Those are the points that must be remembered.

Considered by itself, the selectivity of a tuned circuit depends upon the goodness of the coil and its tuning condenser.

In order to improve the tuning, a coupled circuit is often used. When the coils are connected in a certain way they form what is usually called a band-pass tuner. The coupling may be magnetic, capacitive, or a mixture of the two, and the idea is that the tuning shall be broad enough to pass a band of frequencies, say 5 kilocycles, each side of the carrier frequency, without much loss. A

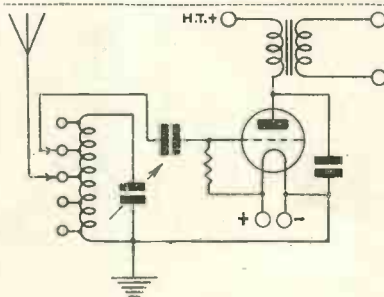


Fig. 4.—Selecting circuit in which the aerial and the grid circuit are fastened to taps on the coil

two-gang tuning condenser is used for tuning the two circuits (Fig. 5).

Experience shows that the band-pass tuner, when properly used, has defects. In the first place, the tuning curve may not be symmetrical owing to the way the circuit is arranged and to the values of the parts. You might, for example, receive frequencies about 5 kilocycles above the carrier at much greater strength than the carrier. This might lead to bad interference.

Width of Tuning Curve

Secondly, the width of the tuning curve, if measured at various places over the range, usually varies considerably.

Thirdly, relatively poor coils must be used in order that jumps shall be avoided and, finally, for easy ganging, efficient coils cannot be used.

The combined result is that the band-pass tuner, while useful enough

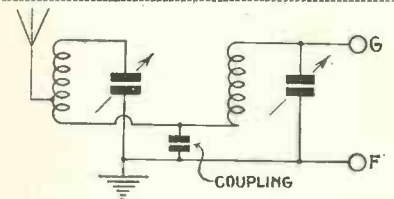


Fig. 5.—Simple two-circuit band-pass filter

in many instances, cannot provide as good selectivity or as much signal strength from a given aerial as a pair of efficient coils coupled to the correct degree and separately tuned.

With many band-pass filters, mush and whistles are heard. With a pair of good coils these interferences are cut out. But it is doubtful if gang tuning can be used.

The point is often made that the high audio-frequencies are weakened when good coils are used. Too much is made of this. Ever since broadcasting began we have corrected the tone as far as possible.

There are many ways of doing this. When ordinary tuning coils are used, selectivity varies over the range and so an adjustable corrector should be used.

Briefly, then, with good coils, not ganged, loosely coupled if necessary, and with the usual reaction, enough selectivity is obtainable. In any case, the usual band-pass tuner puts up a poor show in comparison with such an arrangement.

Music of the Month

By T. F. HENN

NO record of broadcast music would be complete unless mention was made of the special concerts for British listeners which are broadcast every Sunday from Radio Paris.

It is no use slanging the B.B.C.'s Sunday programmes because their idea of public taste is years behind the times for whatever I might say would not make the slightest impression on those responsible for the British arrangements.

Heard Well All Over the Country

I do think, however, that it is the duty of a broadcast critic to draw attention to the concerts sponsored by the various record companies from Radio Paris. The power of Radio Paris has been raised considerably and there is no reason why this station should not be heard at good signal strength over the whole of the country.

BM/PRESS was telling me recently, for instance, that he took a portable set away with him last Easter to Devon and found in the West Country that Radio Paris was a

Gus Elen (right), the veteran music-hall comedian, who recently made his first appearance before the microphone



A brilliant violinist, Alfredo Campoli gave his first recital at the Wigmore Hall when only fourteen. He broadcast on April 13



The Dorian Trio, who were heard recently. Enid Lewis, Eluned Leyshon, violinist, and Pauline Taylor, cellist

much stronger signal than Daventry National.

The sponsored concerts contain a lot of repetition of items, but I do not think you will find this a dull point. It is quite interesting to compare different singers and bands rendering the same item.

Guide to Recitals

The sponsors of these concerts are never the same for a month on end, but as a guide, here is the latest list available at the time of going to press:—

Time	Sponsors of Concert
1.0 p.m.	Vocalion.
1.30 p.m.	Imperial.
2.0 p.m.	Decca.
3.0 p.m.	Edison Bell.
3.30 p.m.	Warner Brunswick.
5.30 p.m.	Gaumont British (with orchestra).
9.30 p.m.	Filmophone.

Until recently I had been of the opinion that the performances of the Wireless Military Band were not up to the standard. Their playing always seemed dull and lifeless, and their choice of items left a deal to be desired.

MUSIC OF THE MONTH—Continued



H. Vincent Collier recently gave a sonata recital. He is organist of the Astoria Cinema, in the West End of London

Now, however, I have noticed a definite improvement in the band. The tone of the heavier instruments seems rounder and, to put it bluntly, the band sounds like it never sounded before—that is, like a real band.

The last time I was at Savoy Hill I asked the officials concerned the reason for the improvement. I was told that the band had moved to No. 8A studio at Broadcasting House, which has been especially designed for the purpose of military-band broadcasting.

Make a point of listening to the next broadcast of the band and see if you can notice the difference.

Sousa Programme

While on the subject of military bands I would like to remind you of the special Sousa programme that is being broadcast on Sunday, May 8. The Band of H.M. Grenadier Guards is coming to the studio—which one nobody knows, but let us hope it will be No. 8A—so we shall be assured of a top-hole performance.

Every listener knows the *Stars and Stripes*, *El Capitan* and the *Washington Post* marches of John Philip Sousa, the famous American band-master, who died recently. Sousa, who toured the whole world with his

own military band, wrote nearly a hundred marches and several comic operas, but the latter were for the most part failures. This will be a concert for everybody to enjoy.

Savoy Hill definitely closes down for the last time on May 14, when a farewell programme is broadcast from 9.40 p.m. until midnight. All the principal events which have taken place in the building since its inception will be included in the programme. Outstanding speeches



A frequent broadcaster, Thea Phillips is noted for her fine operatic performances

by some of the most eminent speakers, including Lord Clarendon, Lord Gainford and the late Sir William Bull, that have been

given from Savoy Hill in the past will be repeated; the first SOS will again be heard.

The music side, I understand, will not be neglected, but at the time of going to press no detailed information is available.

Rumours have been current that Rex Palmer is to return to the microphone to sing "Abide with Me."

As much as the officials would like to include Mr. Palmer in the programme, it is almost a certainty that this event will not be included. Rex Palmer's contract with the

Gramophone Company does not permit him to broadcast.

Let me remind the compilers of this farewell party before it is too late that we shall expect to hear Jack Payne on May 14. It is his band and none other that has done so much to liven up the programmes and they should at all costs, be included.

Not Complete

If they are left out, the programme, in my opinion, might just as well be abandoned because it would not be a complete retrospection of events at Savoy Hill.

There are only two more symphony concerts to be broadcast before the season closes. Both of them will be conducted by Dr. Adrian Boult. The first on April 27 consists of works by modern composers, including Elgar, Debussy and Arthur Bliss.

Musical opinion differs to some extent about the merits of Bliss' works, but nevertheless it is cheerful in character, and that is saying a deal where modern music is concerned. The work of Arthur Bliss chosen will be the first performance of the revised version of the *Colour Symphony*. You may or may not enjoy it. It depends on your musical tastes.

(Continued on page 460)

James Doherty (below), a well-known provincial baritone, has sung from Midland Regional

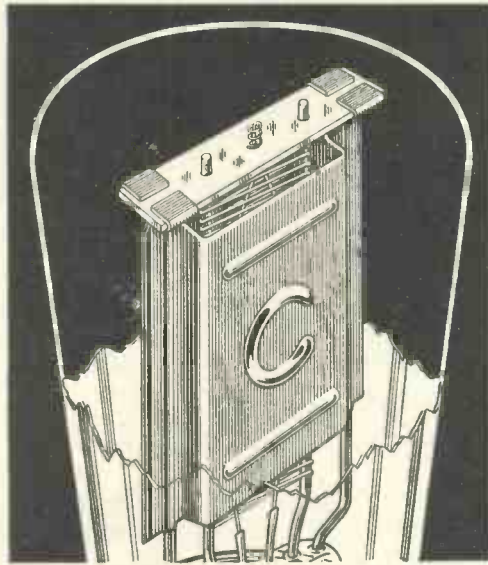


One of the best known of classical pianists, Katharine Goodson has been heard during the last month



COSSOR

EFFICIENCY and CONSISTENCY



NOW COST LESS!

COSSOR VALVES FOR "W.M." SETS

- April "Ideal Home Super" *210 DG, *215 SG,
*210 HL, 210 HL, 220 P.
- April "Family Two" *210 HL, 220P.
- May "A-P-A Radio Unit" *MVSG, 41 MHL
- May "Home Garden Four" *220 VSG,
*210 HL, 210 LF, 220P.
- May "EASYTUNE 60" *220 SG, 210 LF,
*220 SG, *210 HL, 220 P.

* Metallised



A copy of the 72 page Cossor Wireless Book B11 will be sent you free on application to A. C. Cossor Ltd., Melody Dept., Highbury Grove, London, N.5.

HERE is now an additional reason for replacing your out-of-date valves with the appropriate Cossor types—you can do so at less cost. And it is a step well worth taking. The development of the Cossor Mica Bridge system of construction ensures a much higher standard of valve efficiency—improved performance and a re-

markable degree of consistency. Remember that the Mica Bridge permits microscopic accuracy in the assembly of the electrodes which are rigidly secured in permanent alignment. Variation is impossible. It follows therefore that every valve is true to type, fulfilling, completely, the function for which it was designed.

ALL THE ADVANTAGES OF MICA BRIDGE CONSTRUCTION FOR A SMALLER OUTLAY

A. C. Cossor Ltd., Highbury Grove, London, N. 5. Depots at Eirmingham. Bristol, Glasgow, Leeds, Liverpool, Manchester, Newcastle, Sheffield and Dublin

55 ♡ 147

It helps us if you mention "Wireless Magazine"

MUSIC OF THE MONTH—Continued from page 458



One of the best of Midland pianists, Phyllis Beasley often broadcasts from B.B.C. provincial stations

A real musical treat will be heard on May 4 when the main item of the evening will be Beethoven's "Ninth," or, as it is better known, the *Choral Symphony*. The artists taking part are Isobel Baillie, Muriel Brunskill, Walter Widdop, Horace Stevens, the National Chorus and the B.B.C. Symphony Orchestra under the direction of Adrian Boult.

There is a peculiar story attached to the first performance of this symphony. Beethoven sold a manuscript of the symphony to the Philharmonic Society of London with sole performing rights for eighteen months. The manuscript, which is now in the British Museum, was autographed with the words: "Expressively written for the society."

Naturally, the Philharmonic Society expected they would be the first performers of a remarkable new work and they must have had a nasty shock when, long before their announced first performance, the *Choral Symphony* was performed in

Vienna with a dedication to the King of Prussia.

Who was responsible for the twist?

The introduction of a new B.B.C. dance band is surely as important an event as the introduction of a new symphony orchestra. From what I know of the ordinary listener's likes and dislikes, the recent change from Jack Payne to Henry Hall and company is likely to raise more interest than the introduction of a new orchestra of another type.

Considering Henry Hall's band is quite young, the performances it is giving must be considered fairly satisfactory, but it is still miles away from being anything like a perfect combination for its particular sphere of entertainment.

My first and foremost grouse is that there is no "pep" in the band. Lack of "pep" can, I suppose, be put down to the fact that there is no sousaphone—the big tube arrangement which the player has twisted around him and which comes out to a big flare above his head—and there



No introduction is needed for Hubert Eisdell. He is one of the best of broadcast tenors and is well known on the concert platform

Secondly, I should like to know what made the "selection committee" choose the present vocalist of the band. He is a perfect example of the crooner, fifty per cent. of whose words no listener can hear. Luckily, the B.B.C. are cutting down the

proportion of vocal items to less than one half of the numbers played and are also engaging special outside vocalists to buck up the proceedings. They need it!

One very interesting sidelight on this new orchestra is that a certain Salvation Army band which is appearing at Worthing this summer have added to their bills that they are the band who found Henry Hall. Henry Hall was a

trumpeter in this band when quite young.

Henry Hall's band has made two records for Columbia and both are worth having, not as examples of perfect dance music, but as examples of how a band should be arranged before the microphone. The B.B.C. has still a deal to learn.



Maria Basilides, the famous Continental soprano, who recently gave a recital. She featured the songs of Haydn and Bartok



A fine pianist who has played all over the Continent and under every great conductor, Clifford Curzon

are few heavy brass instruments in the band.

The experts—who know—say that if we were to listen to Henry Hall's sweet music for three months on end we should hate the Payne and Hylton style to which we are accustomed to hear so often at present.

EVERYTHING **The G.E.C.** ELECTRICAL

The
G.E.C.
your guarantee

NEW "VARIABLE M.U." OSRAM VMS4

(FOR A.C. MAINS)

SOLVES SELECTIVITY AND VOLUME CONTROL PROBLEMS

INDIRECTLY
HEATED CATHODE

Filament volts 4.0

Filament current
1.0 amps.

Anode volts 200 max.

Screen grid volts
60 max.

Mutual Conductance
at grid -0.5 volt
1.1 ma/volts

at grid -40 volts
0.005 ma/volt



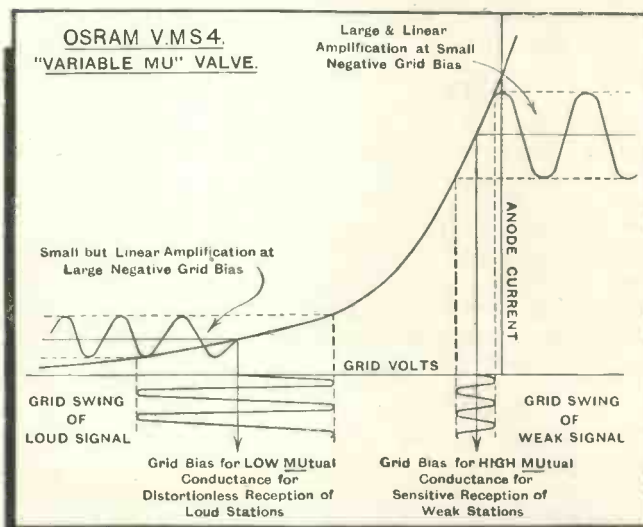
REDUCED PRICE 19/-

The FIRST Indirectly Heated A.C. Valve (The KLI) was an Osram Valve.

The FIRST Screen Grid Valve (The S625) was an Osram Valve.

The FIRST Variable "m.u." Indirectly Heated Screen Grid Valve (The VMS4) is an Osram Valve.

OSRAM VALVES always lead in technical advance and *Absolute Reliability*.



Osram Valves

SOLD BY ALL
WIRELESS
DEALERS

MADE IN ENGLAND

On the Crest of the Waves

RADIO NEWS FROM ALL EUROPE : : By JAY COOTE

According to the latest statistics issued by the Union Internationale de Radiodiffusion (Geneva) Europe possesses 260 active broadcasting stations, of which thirty-eight are rated at 50 kilowatts and over. Of the total 4,157 kilowatts radiated simultaneously, Great Britain is represented by 478, as against Russia 1,073, Germany 675, and France 322 kilowatts.

ALBANIA

Contrary to reports published in the Continental press, Albania will not possess a broadcasting station, as its government, owing to lack of funds, has declared its inability to foot the bill!

AUSTRIA

UOR2, the 120-watt short-wave relay of Vienna, now carries out regular transmissions on 49.4 metres (6,072 kilocycles) every Tuesday and Thursday between 16.30 and 18.00 and between 19.00 and 21.00 G.M.T. Announcements of items are given in German, French, and English. Special transmissions are sometimes made on Sundays at 18.00 G.M.T.

FRANCE

The original Radiolo of Radio-Paris (Mons. Marcel Laporte), who for some time has been acting as announcer at Nice-Juan-les-Pins, has been specially engaged to fulfil similar duties at the new Poste Parisien station near Paris.

The 60-kilowatt high-power transmitter provided by the Ferrié Plan for the Paris Ecole Supérieure des Postes et Télégraphes will be erected at Villebon-sur-Yvette between Palaiseau and Longjumeau, at a distance of some twelve miles from the French capital.

In view of its close association with the Pathé Film Company, Radio Vitus (Paris) has adopted the crowing of a "rooster" as an opening signal, but to separate items in the programme still occasionally uses two notes (F sharp, D sharp). As PTT

Paris had already declared its intention of identifying itself to its listeners in this manner, it has now been compelled to seek another bird.

With a view to advertising the attractions of the French seaside and inland watering resorts, it has been suggested in Paris that the broadcasting stations should devote fifteen minutes twice weekly to publicity transmissions destined to listeners in neighbouring countries. Radio Lille has been selected for Great Britain, Strasbourg for Germany, Marseilles and Lyons for Italy, and Bordeaux-Lafayette for Spain.

Although the construction of the new Toulouse high-power transmitter is nearing completion, up to the present no authority has been obtained from the State to bring it into operation. It is now reported that the Paris daily newspaper, *L'Intransigeant*, has secured a controlling interest in the Radiophonie du Midi, and that through its influence the necessary permission may be obtained without delay. It is expected that the new St. Agnan station will take the air towards the end of May.

GERMANY

On March 1 last, Germany registered over four million licensed listeners. Although a number of free permits are granted to the blind, war invalids and unemployed persons, no reduction of the tax has taken place, which remains at 2 marks (normally 2s.) monthly.

In view of the recent increase in power of the Langenberg transmitter, the German authorities have closed down the Cologne, Aachen, and Münster relay stations, but have retained the studios in their respective cities. There is a possibility that the smaller plants may be transferred to other parts of the Rhineland, such as Siegen, Coblenz or Bingen, where the Langenberg transmissions are not so well received.

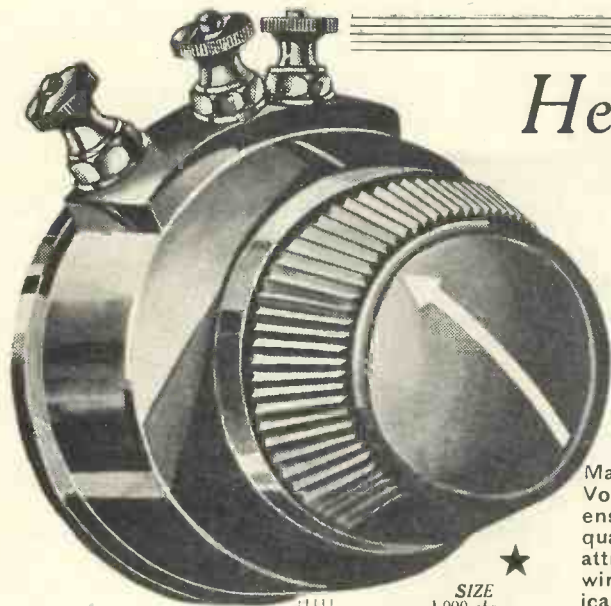
They would still work on a common wavelength.

The official time signals (Onogo system) which until March 1 were broadcast through all German stations are now solely transmitted through Nauen (18,130 metres); Norddeich (26,455 metres); Koenigswusterhausen (1,634.9 metres) and Zeesen (31,381 metres). The signals are given out twice daily, namely at 11.55 a.m. and 11.55 p.m. G.M.T. For the convenience of German listeners the broadcasting studios verbally announce the time, three times daily, at 6.0 a.m., 11.0 a.m., and 9.0 p.m. G.M.T. The exact hour is given by the stroke of a gong.

Although in its early tests the new Breslau 75-kilowatt station will use an ordinary aerial, experiments are to be carried out later with a vertical aerial slung downwards from the mast. Should the test prove successful a similar method will be adopted for the Munich transmitter. The Leipzig high-power station now nearing completion will be capable of radiating up to 150 kilowatts; it is hoped to have it ready by June. The old plant will then be dismantled and re-erected at Trier (Treves) to act as a relay for the Frankfurt - am - Main transmitter, with which it will work on a common wavelength. The German authorities are still studying the question of erecting a 5-kilowatt transmitter at Freiburg-in-Breslau to use the same channel; this would prove an interesting experiment inasmuch as in technical circles the opinion has been expressed that stations on common wavelengths should not exceed a power of 1 kilowatt.

ICELAND

Although usually advertised as working on a common wavelength with Istanbul (1,200 metres), Reykjavik (Iceland) for test purposes
(Continued on page 464)



Here's a WIRE-WOUND VOLUME CONTROL

for every type of modern set

Make sure you specify IGRANIC when you buy a Wire-Wound Volume Control. Note these exceptional points: Smooth contact ensuring silent operation. Resistance wire wound on high-quality insulating former. Moulded Bakelite case, neat and attractive, to protect winding from mechanical damage. Definite travel stops. Single-hole fixing and two insulating washers supplied for mounting resistance on metal panel. Pointer control knob. Igranic workmanship. Igranic perfection. What more!



IGRANIC ELECTRIC CO., LTD.,
149 QUEEN VICTORIA STREET, LONDON

5/6
all sizes

★

SIZE	
1,000	ohms
2,500	"
5,000	"
10,000	"
25,000	"
50,000	"
CURRENT	
CARRYING	
CAPACITY	
55	milliamps
35	"
25	"
18	"
11	"
8	"

★ Write for descriptive leaflet No. J.1173



Specified for the "EASYTUNE 60"

and available in Chassis form for incorporation in your own Cabinet, or complete in Cabinet.

CHASSIS
16/6

COMPLETE IN CABINET
40/-

The designer of the Wireless Magazine "Easy-tune 60" has selected the R. & A. 'Type 40' Reproducer for use with this receiver simply and solely because it reproduces speech and music with such amazing realism. Notwithstanding its superb performance, the R. & A. 'Type 40' is not highly priced. On the contrary it is the finest value for money in the field of moving iron speakers.

Your radio dealer can supply.

Illustrated Descriptive
Leaflet Free on request

REPRODUCERS & AMPLIFIERS Ltd.,
FREDERICK ST., WOLVERHAMPTON.



"CARRIER"
IS THE ONLY
CABINET
SPECIFIED BY
Percy W. Harris

FOR THE "TOWN AND COUNTRY FOUR"

As well as being strong and well built, the Camco "Carrier" is as good-looking as you could wish for. Complete with additions as specified. In Oak 35/-, Mahogany 39/-. Order now and be sure to send coupon for the Camco 24-page Catalogue.

CARRINGTON
MFG. Co., Ltd.
Showrooms:
24, Hatton Garden,
London, E.C.1.
Phone: HOL. 8202.
Works: S. CROYDON

NAME

ADDRESS

W.M.13

Every CAMCO Cabinet bears the CAMCO Seal

Better service results from mentioning "Wireless Magazine" when writing to advertisers

ON THE CREST OF THE WAVES—Continued from page 462

broadcasts midday concerts on 1,174 metres.

ITALY

Microphones and loud-speakers have been installed in the Basilica of St. Peters (Rome) for the broadcasting of all Papal ceremonies. On several occasions His Holiness the Pope has delivered addresses which have also been relayed to the short-wave station erected in the Vatican.

For the further development of her broadcasting system, Italy has decided to inaugurate a lottery as the income derived from publicity and from the licence tax paid by 200,000 listeners has resulted in a serious deficit. The first prize offered in this new radio lottery is a motor-car.

Owing to a rearrangement of wavelengths, a transmission which is often thought to emanate from the Milan station is that of Florence (Firenze), now broadcasting on 500.8 metres with a power of 20 kilowatts. This studio relays the programmes of the Nord Italia group, which includes Milan, Turin, Trieste, and Genoa. Florence will later take a portion of its wireless entertainments from Rome and Naples, and as soon as the new studio is completed will also broadcast its own programmes. Milan now works on 331.3 metres.

LATVIA

There is a likelihood that the 198-metre channel will be solely used in future for the Riga broadcasts; it is the lowest wavelength used by a European studio. The power of the transmitter is to be raised to 25 kilowatts.

MOROCCO

Radio Maroc (Rabat) has raised the power of its transmitter to 6 kilowatts (aerial) and now broadcasts daily from 12.30 to 2 p.m.; 4.0 to 5 p.m.; and again from 11.30 p.m. until midnight. On Sundays the concerts are relayed during the day on 23.39 metres and at night on 32.26 metres. Although the feature is not always advertised in its programmes, Radio Maroc carries out almost nightly a relay of European broadcasts, providing conditions are favourable. These, as a rule, may be heard after 10 p.m., following the

news bulletin. As an interval signal the studio still retains the beat of a metronome; the instrument possesses a peculiarly metallic sound which enables it to be distinguished from metronomes used by other European stations.

PORTUGAL

In addition to the high-power transmitter to be erected in 1933 at Barcarena, in the neighbourhood of Lisbon, the Portuguese authorities propose to install a relay station at Oporto and also a 12-kilowatt short-wave transmitter to broadcast the capital programmes for the benefit of their nationals in oversea countries.

RUSSIA

In a recent broadcast from Moscow it was officially stated that the power of the Stalin transmitter now working on 424.3 metres would be increased to 300 kilowatts in the course of the year.

A complete reorganisation of the Soviet broadcasting system is to take place this year and transmissions from all Soviet stations are to be controlled from the capital. In future, propaganda talks will be put out simultaneously through Moscow (T.U.) on 1,304 metres, Old Komin-tern (1,481 metres), Stalin (424.3 metres), and Leningrad (1,000 metres). Several new 100-kilowatt

transmitters are to be erected on the "Western Front," in Siberia, in the Ural district, and in the Crimean peninsula. As an interval signal the Moscow stations are now using a gramophone record depicting the noise of machinery in action as a symbol of the industrial activity brought about by the Five Year Plan.

SPAIN

The Republican Government of Spain intends to take over and reorganise the broadcasting stations in that country. The plan formulated calls for a 75-kilowatt station at Madrid, one of 20 kilowatts at Barcelona, and 10-kilowatt stations at Valencia and Seville. Smaller relays are to be opened at Vigo, Bilbao, Valladolid, Saragossa, Corunna, Malaga and Murcia.

SWITZERLAND

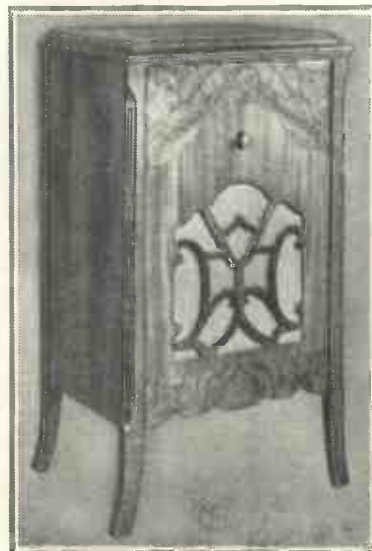
The 15-kilowatt transmitter to be installed on the Monte Ceneri, near Lugano (Switzerland), will be of British manufacture. Work on the buildings to house the plant has been started. Although a definite wavelength has not yet been fixed it is expected that either 680 or 720 metres will be chosen as both wavelengths are deemed favourable for the district. The station will be operated by the Ente Autonomo per la Radiodiffusione nella Svizzera Italiana. As the programmes are destined to the southern part of the country, all entertainments will be transmitted in the Italian language.

UNITED STATES

The WABC (Columbia) network, which held the record as the largest nightly "hook-up," has now become the longest by its inclusion of KGMB, Honolulu. The complete network involves 15,766 miles and links up seventy-eight stations. Of this area, 13,538 miles are represented by landlines within the United States and 2,228 miles by wireless link to the mid-Pacific.

YUGOSLAVIA

It is reported from Belgrade that authority has now been obtained for the erection of a 6-kilowatt transmitter to replace the smaller Rodno Radio station operating at Belgrade (Yugoslavia) on 430 metres.



AN ELECTRIC GRAMOPHONE

The new Polyvox electric gramophone, priced at £21, makes use of a Microbox and a moving coil loud-speaker. There is no radio equipment in the outfit. The power consumption is .5 ampere from a 10 volt accumulator

PILOT AUTHOR'S KITS

Exact to Specification

Parts supplied for all "W.M." sets either as complete kits or separately. Cash or C.O.D. If order over 10/- sent carriage or C.O.D. charges paid. Send details of your requirements for quotation by return of post. IMMEDIATE DELIVERY—C.O.D.—CASH—H.P.

EASYTUNE 60

Described in this month's issue

KIT-BITS

Selected C.O.D. lines. You pay the postman, we pay the charges, orders over 10/-

Set of 4 Lewcos Super-het Coils as specified with band-pass filter £2 1 6

Lewcos L.F. Transformer type L.F.T.6 10/0

British Radiophone .0005 mfd. 3 gang super-het type condenser with cover and disc drive £1 15 0

10 Dubilier fixed condensers as specified £1 3 0

Set of 5 Valves (2) Osram S.22 ; (1) Marconi L2/B ; (1) Osram HL2 ; (1) Osram P2 £2 19 0

Kit "A" Author's Kit less Valves and Cabinet.

CASH or C.O.D. **£6 7 10**

Or 12 monthly payments of 11/9

Kit "B"—Author's Kit, with specified Valves.

CASH or C.O.D. **£9 6 10**

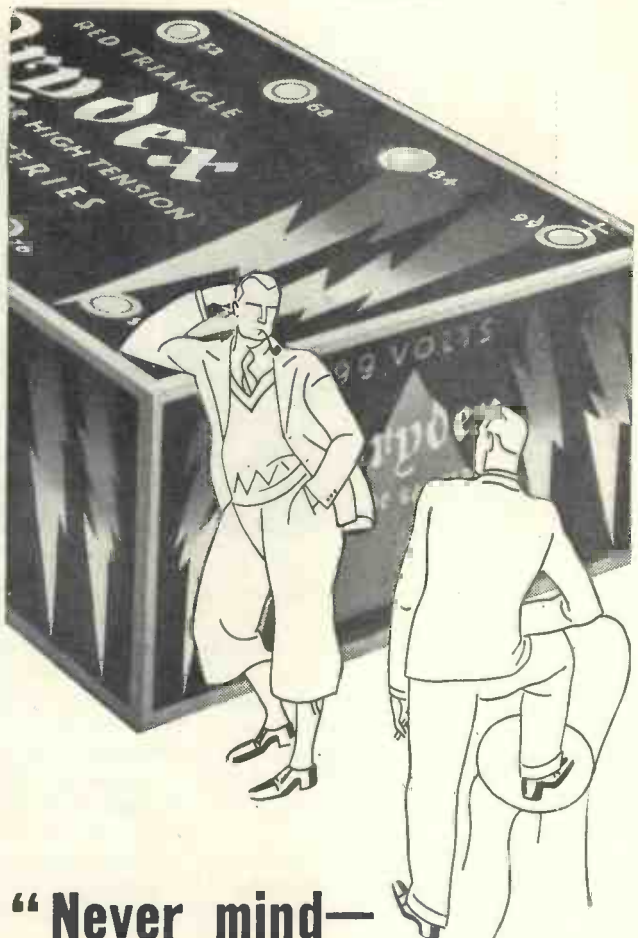
Or 12 monthly payments of 17/1

RECOMMENDED ACCESSORIES

R. & A. cabinet cone speaker type 40 £2 0 0

1 Drydex 120-v. H.T. battery triple capacity, Orange Triangle £1 4 0

1 Exide 2-v. L.T. accumulator C.Z.3 11/-



"Never mind—
come in and hear it
on my set. I've just
put in a new

Drydex

THE Exide DRY BATTERY

Made entirely in England, employing British Labour and 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.

Exide Batteries, Exide Works, Clifton Junction, near Manchester. Branches at London, Manchester, Birmingham, Bristol, Glasgow, Dublin and Belfast.

Dx 66

TOWN AND COUNTRY FOUR

Described in this month's issue

KIT-BITS

Selected C.O.D. lines, you pay the postman we pay post charges orders over 10/-

SET OF 4 VALVES (1) Cossor 22v. S.G. ; (1) Mullard P.M. I.H.F. ; (1) Mullard P.M.I. L.F. (1) Mullard P.M.2 £1/19/3

8 Dubilier Fixed Condensers as specified 18/2

100 Yards Lewcos 27/40 Silk-covered Frame Aerial Wire, 10/6

Camco Carrier Portable, with wooden fittings for set, £1/15/-

Ormond Portable Chassis and Unit, type R461/2 15/-

FERRANTI L.F. transformer, type A.F.10 5/6

Kit "A" Author's Kit, less Valves, Cabinet, and Speaker.

CASH or C.O.D. **£3 17 10**

Or 12 monthly payments of 7/1.

Kit "B" Author's Kit with valves less cabinet and speaker. Cash or C.O.D. £5 17 1

Or 12 monthly payments of 10/9

Kit "G" Author's Kit complete valves, cabinet and speaker. Cash or C.O.D. £7 12 1

Or 12 monthly payments of 14/-

RECOMMENDED ACCESSORIES

1 Drydex 120-v. H.T. battery Red Triangle 11/-

1 Exide 2-v. L.T. accumulator type C.Z.1 11/-

Ormond portable chassis and unit type R.461/2 15/-

Any parts supplied separately. If order value of 10/- sent carriage paid, C.O.D. post charges paid.

PETO-SCOTT CO. LTD.

77, CITY RD., LONDON, E.C.1. Telephones:—Clerkenwell 9406-7-8. 62 HIGH HOLBORN, LONDON, W.C.1 Chancery 8266.

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

EASYTUNE 60 KIT A/B
TOWN AND COUNTRY FOUR KIT A/B/C

for which I enclose £ s. d. Cash/H.P. Deposit

NAME

ADDRESS

W.M. 5/32



THE B.B.C. DANCE ORCHESTRA—CONDUCTED BY HENRY HALL

What do you think of Henry Hall's broadcasts? This article explains that the B.B.C. are giving him an entirely free hand for the time being

THE B.B.C. decided, when engaging Mr. Henry Hall to form and take charge of its dance orchestra, to study closely the early criticisms of the new combination, but not to be influenced by them, nor to take any immediate action upon them.

Until June, at any rate, Henry Hall will have a free hand and will be able to work out his ideas for broadcast dance music unimpeded by an avalanche of suggestions of a more or less tentative character, which might be a hindrance rather than a help.

No Great Change

The main points for listeners to remember whenever they hear the dance orchestra on the air is that it is not intended to introduce any revolutionary change in the treatment of dance music.

Its keynote is flexibility, enabling Mr. Hall to adapt the orchestra to new ideas so that it can play in styles ranging from "sweet" to "hot", as featured in some of the best American bands.

In general, however, the quiet, rhythmic style is aimed at, as listeners will no doubt already have observed. A wealth of instrumental solos for the normal dance programmes—every member of the orchestra being a soloist—will necessitate special orchestrations on a large scale, in contradistinction to the "thick" scoring favoured by most dance bands at present.

Here the co-operation of music publishers will be welcomed.

It is almost superfluous to stress the fact that what is known as song-plugging for commercial advantage will be scrupulously avoided. Attention will be paid to the works of comparatively unknown British composers and if these are suitable they will be given a place in the dance programmes.

Musical comedy and revue numbers, many of them by British composers, are also to receive more attention from broadcasting.

It might be stated, however, that nationality alone will not decide the suitability or otherwise of British tunes. Henry Hall is giving what, in his judgment, are the best tunes, British and foreign, regardless of nationality; but as the selection will be decided on the merits of the tunes alone and not on commercial conditions, British-composed tunes should constitute a good proportion of the orchestra's output.

The B.B.C. Dance Orchestra is not likely, for a very long time, at all events, to be allowed to accept outside engagements, including stage work. The different kind of

technique which is required for the latter work does not assist an orchestra from the broadcasting point of view.

Jack Payne and his band built up their knowledge from a wide experience and Payne brought a natural aptitude for showmanship into activity whenever he appeared on the halls, readapting himself marvellously to the needs of the studio when he had to revert to the microphone.

Jack Payne's Versatility

It was this versatility which accounted for his popularity in both directions; but it took him some time to arrive at that stage.

Once again rumours have been rife about the impending resignation of Sir John Reith, the Director-General of the B.B.C. And once again such rumours can be discounted.

Sir John has no present intention of surrendering the supreme position in British broadcasting, which carries with it perhaps greater prestige than any other professional occupation in the country. It is from that, more than the financial aspect, that the D.-G. regards his career.

Two or three plums have been placed within his reach since the old broadcasting company became the British Broadcasting Corporation. They have been of the order of £10,000-a-year jobs and most distinguished men might have been pardoned for thinking first of them—

(Continued on page 468)

NEXT MONTH

Look out for full details of a new and more than usually efficient three-valver that uses a new type of dual-range tuning coil.

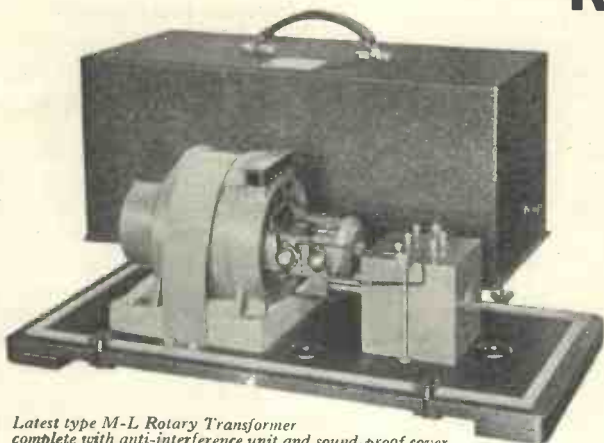
The June issue of "Wireless Magazine" will also have a full complement of its usual fine features. Make sure of getting your copy on Friday, May 20!

For D.C. to A.C.
and all Power Supply problems

USE
ROTARY



TRANSFORMERS



Latest type M-L Rotary Transformer complete with anti-interference unit and sound-proof cover.

D.C. to A.C. Rotary Transformers for operating A.C. Receivers and Radio-Gramophones from D.C. supplies. They are electrically and mechanically silent in operation and can be supplied complete with an anti-interference unit and sound-proof cover (as illustrated). Input : 12 to 220 v. D.C. Output : Up to 200 watts at 230 v. 50 c.

Also D.C. to D.C. Types for supplying H.T. Current to large Public Address Amplifiers, etc. Input : 12 to 220 v. D.C. Output : 300 v. to 1,000 v., etc. Solve your power supply problems with an M-L Machine; there are

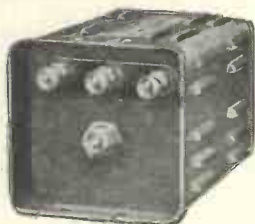
MODELS FOR EVERY REQUIREMENT.

Get full details immediately, Post Free, from ROTAX LTD., RADIO DEPT. 7, WILLESDEN, LONDON, N.W.10.

WESTINGHOUSE

A CONSTANT H.T. SUPPLY

H.T. 6
METAL
REC-
TIFIER



OUT-
PUT
175 v.
25 mA.

Price 15/-

Your radio set demands current—ample, steady, and silent. Without it, reception and reproduction are bound to suffer. Give it what it wants by using an eliminator incorporating

THE WESTINGHOUSE METAL RECTIFIER
which ensures a permanent and adequate H.T. supply.

All the best eliminators are fitted with Westinghouse Metal Rectifiers. Our booklet, "The All-Metal Way," contains full particulars, together with circuits and details for building eliminators. The attached coupon and 3d. in stamps will bring you a copy.

.....COUPON.....

WESTINGHOUSE PUBLICITY, 82 York Road, King's Cross, London, N.1.

Please send me a copy of your booklet, "The All-Metal Way," for which I enclose 3d. in stamps.

NAME

ADDRESS

W.M., 5-32.

The WESTINGHOUSE BRAKE & SAXBY SIGNAL Co.Ld.
82, YORK Rd., KING'S CROSS, LONDON, N.1

PEAK CONDENSERS

SPECIFIED FOR H.T. UNIT (See page 470).

1 .1+ .1 mfd. -
2 4 " 1,500 Volt
D.C. Test



1,500 Volts D.C. Test.
• 1 mfd. - - 1/10
• 1 mfd. - - 2/8
• 2 mfd. - - 3/9
• 4 mfd. - - 6/9

1,000 Volts A.C. Test.
1+.1 2/6
1, 2 and 4 mfd. supplied with Terminals at same prices.

BRYCE MAINS TRANSFORMERS

SPECIFIED FOR
H.T. UNIT

(See page 470).

TYPE.—SUPER A.B. 250

Primary tapped for 200 volts to 250 volts supply at 40 to 60 cycles. Secondary windings centre tapped. Gives 80 milliamperes output at 250 volts and 1 ampere at 4 volts. Generous size iron core. Aluminium end plates.



PRICE
26/-

WILBURN & CO.,
23, BRIDE LANE,
LONDON, E.C.4.
Cent. 6994.

W. ANDREW BRYCE & CO.,
54 Dawson St.,
BURY, Lancs.
Bury 1251

Stories of the Operas.

DON GIOVANNI

(Mozart)

CHARACTERS

DON PEDRO, the Commandant	Bass
DONNA ANNA, his daughter	Soprano
DON OTTAVIO, her betrothed	Tenor
DON GIOVANNI	Baritone
LEPORELLO, his servant	Bass
DONNA ELVIRA	Soprano
ZERLINA	Soprano
MASETTO, betrothed to Zerlina	Tenor

ACT I

The garden of Don Pedro's house in Seville. Don Giovanni has hidden in the house, from which he emerges followed by Donna Anna, furious at his advances to her. The Commandant follows, draws his sword on Don Giovanni and is fatally wounded.

During the duel Donna Anna has fetched her betrothed, Don Ottavio. She is in despair at her father's death. Donna Elvira, a deserted love of Don Giovanni, appears; Don Giovanni sends Leporello to explain why he has deserted her.

The scene changes to Don Giovanni's palace. Zerlina and Masetto dance with some peasants. Don Giovanni and Leporello join this group. Don admires Zerlina and orders Leporello to invite all but Zerlina into his chateau. He is alone with Zerlina, but Elvira appears and warns her.

Don orders preparations for a festival in his palace. Anna, Elvira, and Ottavio arrive, masked; they have come to avenge Don Pedro's death. There is dancing. Before Don Giovanni leads Zerlina to an adjoining room, Leporello diverts the jealous Masetto's attention by dancing with him, but he breaks away in a rage. Leporello goes to warn his master just as a shriek is heard from Zerlina.

Don Giovanni rushes out, sword in hand, with poor Leporello, whom he accuses of what he is himself guilty, a ruse which fails.

ACT II

Masetto gets a thrashing from Don Giovanni, who passes through a churchyard and meets Leporello. They see a statue erected to Don Pedro. Don laughs at it and asks it to supper in the palace. To the terror of Leporello the statue answers "Yes." Don is quite undisturbed, and orders preparations for a great feast. Donna Elvira still loves Don Giovanni.

A loud shriek is heard and Don Giovanni sends Leporello to see what it is about. He returns, trembling: it is the big man of stone. The statue enters and announces that it has accepted the invitation. Don, quite undisturbed, orders supper to be served.

"Desist," exclaims the statue. "Don Giovanni, you will sup with me." Don agrees and the statue grasps his hand. "Repent," he says. Don is defiant. A fiery pit opens and fiends seize him, still unrepentant, dragging him down.

WHITAKER-WILSON.

HENRY HALL—Continued from page 466

selves if such offers had come their way.

But not so the Director-General of the B.B.C. He still has his mind set upon increasing the power and influence of the machine which he created and, given a continuance of health and strength, plus comparative freedom from the trammels of officialdom—complete freedom would be too much to expect from the present-day bureaucracy—he will take broadcasting development a good deal further than it has yet gone.

His loyalty and patriotism are beyond all dispute, and the very advanced opinion has been expressed in certain quarters that if he were to become the Mussolini of the ether, it might not be a bad thing for Great Britain's future.

A return of music broadcasts during the last six months discount the accusation that the B.B.C. Music Department's activities are misdirected into ramming the serious into the ears of listeners.

Percentages

Out of a total of 1,946 hours of broadcast music, only 4.5 per cent. was of the serious kind, 3.1 per cent. was chamber music, and .7 per cent. was opera. Programmes of light and dance music scored heavily. The amount of the former was 258 hours, or 13.3 per cent., and of the latter 219 hours, or 11.2 per cent.

Sixty hours and a half of chamber music seems to be magnified in the minds of listeners; but while one still occasionally hears a gibe at this department of broadcast entertainment, a significant change is undoubtedly taking place in the public taste and an increasing number of listeners tolerate, if they do not actually appreciate, this kind of music transmission.

A factor which the critic would no doubt bid Savoy Hill take into consideration is the more recent facility provided for objectors of being able to switch over to the alternative wavelength.

But the B.B.C. relies to a considerable extent on the judgment of experts and on the wide talent of its instrumentalists and with these proofs under its hand is able to state that the increasing interest in every type of music broadcast is an

encouraging sign that the nation is becoming a nation of music-lovers.

Since the B.B.C. started its work the number of complaints received by the technical section relating to all kinds of interference showed a great preponderance in respect of oscillation.

Electrical Interference

Such was the situation up to last year, when the majority figure swung round rather violently to electrical interference, while the number of complaints about oscillation appeared to be diminishing with the growth of technical knowledge.

This later phase of the interference problem has been handled energetically by the B.B.C. and the Post Office, and among the greatest achievements have been the steps taken to reduce the interference caused by trolley buses.

Broadcasting has been of itself, perhaps, the chief instrument of propaganda in the efforts towards eliminating electrical interference. The officials of various organisations whose apparatus has been the responsible cause of trouble are themselves in most cases listeners.

For the rest they are coming to regard the fact that four and a half million people are licensed listeners as an indication that broadcasting will be within the province of every household sooner or later, and therefore any inconvenience caused to householders may have unforeseen repercussions on their own business.

Taking the Long View

The people who have charge of electrical power supplies are thus taking the long view, which is also the sympathetic view, and are showing a tendency to discard their defence of a year or so ago, which was that as they were serving the public convenience and broadcasting was not so vital an element in the social service, the public convenience was paramount.

As differences of opinion are becoming reconciled, the will to arrive at an amicable understanding over interference with broadcasting grows stronger, and the B.B.C. hopes, with good reason, that interference problems will eventually become a thing of the past.

ANOTHER SPECIFICATION!



in the A-P-A RADIO UNIT

"Square Peak" Canned Coils (prov. pat.) . . . giving a peak separation and band width of 10 kilocycles constant over BOTH wavebands . . . completely screened. Each coil individually tested, measured and matched to within 1 per cent. Rotary switches with self-cleaning gold-silver alloy contacts. Switch control insulated between coils.

For the A-P-A Radio Unit you need the 3-Gang Coil-unit with aluminium baseplate, Type BP13 37/-

"Square Peak" Canned Coils are also supplied singly or in various combinations.

Also specified in the above :

Varley H.F. Choke, Type BP.2. 3/6
Varley L.F. Choke, Type DP.16 18/6



Advertisement by Oliver Pell Control Ltd., Kingsway House, 103, Kingsway, London, W.C.2.



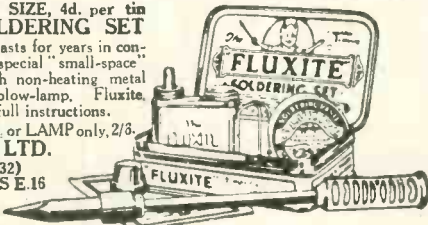
"We're Fluxite and Solder, The reliable pair, Famous for Soldering—Known everywhere! So don't dabble with wireless And mess up your set. Let US join the connections—Then PERFECTION you'll get!"

See that Fluxite and Solder are always by you—in the house, garage, workshop—anywhere where simple, speedy, soldering is needed. They cost so little, but will make scores of everyday articles last years longer! For Pots, Pans, Silver, and Brassware; RADIO; odd jobs in the garage—there's always something useful for Fluxite and Solder to do. **ANOTHER USE FOR FLUXITE** All Hardware and Ironmongery Stores sell Fluxite in tins, 8d., 1/4 and 2/8. Hardening Tools and Case Hardening. Ask for Leaflet on improved method.

NEW "JUNIOR" SIZE, 4d. per tin FLUXITE SOLDERING SET

Simple to use and lasts for years in constant use. Contains special "small-space" soldering iron with non-heating metal handle; pocket blow-lamp. Fluxite Solder, etc.; and full instructions. COMPLETE, 7/6. or LAMP only, 2/8.

FLUXITE, LTD.
(Dept. 332)
ROTHERHAM, S.E.16



ALL MECHANICS WILL HAVE

FLUXITE

IT SIMPLIFIES ALL SOLDERING

This OSBORN CABINET SPECIFIED FOR THE WIRELESS MAGAZINE A-P-A RADIO UNIT



Model No. 218

A Queen Anne Radio or Radio Gramophone Cabinet, 3 ft. 10 in. high, 2 ft. 2 in. wide, 1 ft 6 in. deep. Size of baffle board behind fret, 24 in. by 24 in. Metallic fabric for fret front included. Opening at top and back. Cabinet takes panel 2 ft. by 9 in., or smaller. Complete with motor board.

PRICES :

Machined ready to Assemble : Oak, £3 10s.; Mahogany, £3 15s.; Walnut, £4 10s. Assembled ready to polish : Oak, £4 10s.; Mahogany, £4 15s.; Walnut, £5 10s. Assembled and polished : Oak, £5 10s.; Mahogany, £6 5s.; Walnut, £7 5s.

All Models Carriage Paid

CHAS. A. OSBORN

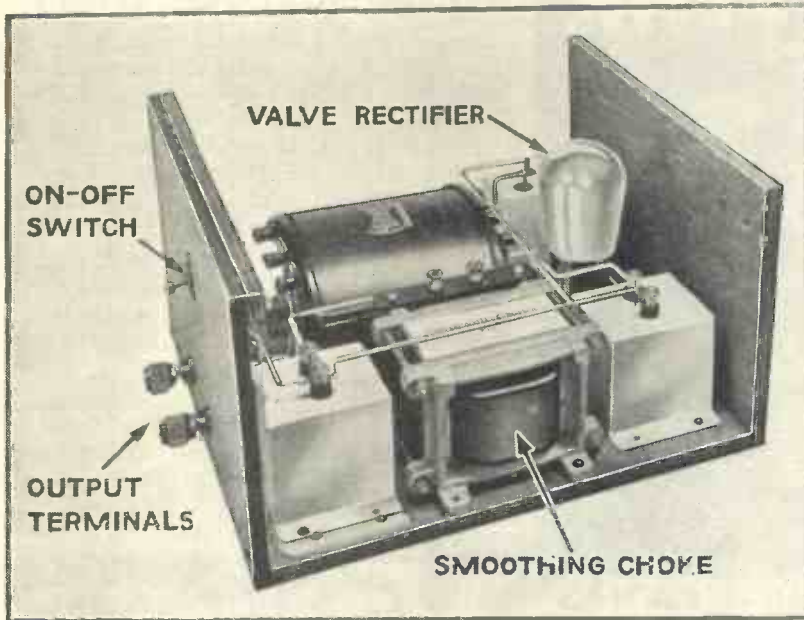
DEPT. W.M., The Regent Works, Arlington Street, London, N.1.
Tel.: Clerkenwell 5095. And at 21, ESSEX ROAD, ISLINGTON, N.1. (1 min. from the Agricultural Hall)
Telephone: Clerkenwell 5684.

Send 3d. in stamps for New 1932 Beautifully Illustrated Catalogue.

"Made by Craftsmen for Particular People"

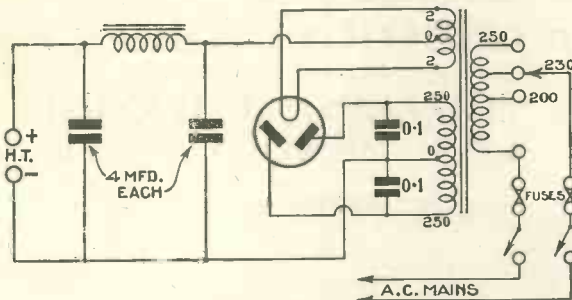
There is news in the "Wireless Magazine" advertisements

A Simple Mains Unit



ENOUGH HIGH TENSION FOR ANY SET

This simple unit gives approximately 220 volts at 60 milliamperes, enough to supply the largest of sets



AMPLE SMOOTHING PROVIDED

The circuit of the unit is quite straightforward and ample smoothing is provided to prevent mains hum

HERE is a design for a simple yet efficient mains unit that takes high tension from A.C. supplies. It has been thoroughly tested by the WIRELESS MAGAZINE Technical Staff and can be recommended for use with almost

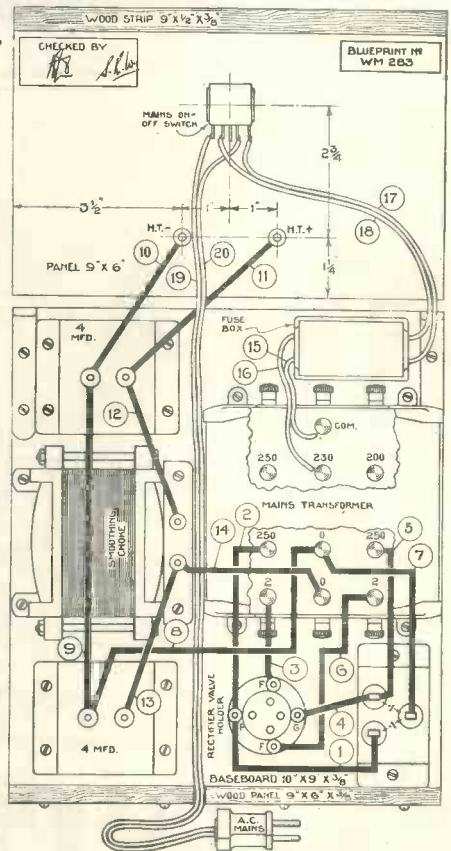
any type of receiver.

The A.C. current is rectified to D.C. by means of a valve and the output is about 220 volts at 60 milliamperes. It will therefore supply the largest types of receiver.

The output is taken from two terminals on the unit, so that if a voltage lower than about 220 volts is required it must be broken down outside the unit before application to the set. If the unit is to be used with a newly-built set it is obviously the best practice to supply the necessary breakdown resistances and by-pass condensers in the set whilst it is being constructed.

As shown here the unit gives no low-tension output, but this can easily be arranged if a mains transformer with an appropriate winding is used. An exactly similar transformer with an additional winding to give 4 volts 4 amperes raw A.C. can be obtained, and this will be suitable for a mains set with from three to five valves.

There is no need to go into any details regarding the construction of the unit. The method of assembly will be quite clear from the photographs and diagrams reproduced in these pages. If desired, a full-size blueprint can be obtained for half price, that is 6d., post free, if the coupon on the last page is used by May 31. Ask for No. WM283, and (Continued on page 472)



LAYOUT AND WIRING DIAGRAM

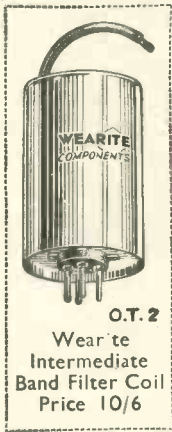
This is reproduced quarter scale. A full-size blueprint can be obtained for half-price, that is 6d., post free, if the coupon on the last page is used. Ask for No. WM283

COMPONENTS NEEDED

- CHOKE, LOW-FREQUENCY**
1—Tunewell, type S20/100, 18s. 6d.
- CONDENSERS, FIXED**
1—Peak 1+1-microfarad, 2s. 6d.
2—Peak 4-microfarad, 1,500-volt D.C. test, 13s. 6d.
- EBONITE**
1—Permcold 9-in. by 6-in. panel, 2s. 5d. (or Becol, Peto-Scott).
- FUSES**
1—Belling-Lee baseboard-mounting twin fusebox and fuses, 2s. 6d.
- HOLDER, VALVE**
1—Lotus, type VH/27, 1s. (or W.B. Bulgin).
- SUNDRIES**
Insulated wire for connecting.
1—Piece of wood 1 1/2 in. by 9 in., for baseboard and frame.
1—Piece of perforated zinc, 21 in. by 10 1/4 in.
Length of twin flex for mains leads.
- SWITCH**
1—Bulgin mains on-off, type S88, 2s. 9d.
- TERMINALS**
2—Belling-Lee, marked H.T., H.T.—, type B, 1s.
- TRANSFORMER, MAINS**
1—Heayberd, type 709, £1 8s. (or Bryce).
- VALVE RECTIFIER**
1—Mazda UU60/250, 12s. 6d.

When you build your "EASYTUNE 60"

use these *WEARITE* parts:—



INTERMEDIATE BAND FILTER COILS
Price 10/6 each
(Type O.T.2. as illustrated.)

COMBINED 15 ohm. Rhe. stat (Q4) and
Three-point switch (G 23)
As specified, Price 3/6

GRID LEAK HOLDER (Type A.1).
Price 6d.

AND FOR THE A.P.A. RADIO UNIT
you will need these too.
PAXOLIN PANEL 21" x 8". Price 10/6

4/- PIN VALVE HOLDERS (Type S.1.)
Price 1/3 each

GRID LEAK HOLDER (Type A.1.)
Price 6d.

Write for special applicable leaflet—and if you have any radio query—send it to our "Switch Section."

WEARITE COMPONENTS

WRIGHT & WEARE LTD., 740, High Rd., Tottenham, N.17.
Telephone—Tottenham 3847/8/9.

182

● A finer
**HAND
finish**

● MODERN
design

● Stronger
CONSTRUCTION



THE "CHESTER SUPER"

Select walnut veneer front, top and sides, hand-carved corners with solid side panels polished a rich two-tone shade walnut, satin finish, with oxidised fittings. Fluted and turned legs, with opening at back of Cabinet. The fret is backed with black and gold silk.

Height, 36 in.; baffle board, 19 in. by 13 in.; width, 22½ in.; set board, 19½ in. by 12 in., depth 17 in. Walnut £5 12s. 6d.; mahogany, £5 7s. 6d.; oak, £5.

Whatever your needs in Cabinets, there is a Smithcraft Cabinet exactly suitable. And—being a Smithcraft—it will be solidly constructed, beautifully polished (by hand) and modern in design. Yet despite craftsmanship that comparison will soon show you to be outstanding, Smithcraft Cabinets are definitely lower in price than even ordinary cabinets. See a Smithcraft against any other make. . . . You'll choose a Smithcraft.

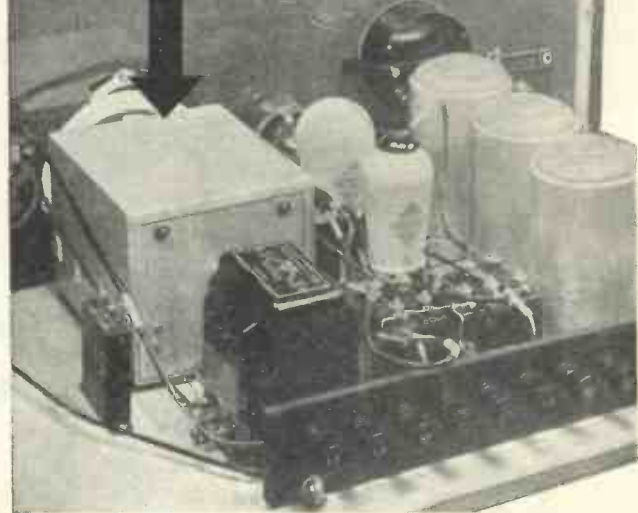
Send for illustrated folder of models (Table and Pedestal, in Oak, Mahogany and Walnut). Prices from £1 15s. to £5 17s. 6d

Smith's Cabinets LTD

19/20 HERTFORD RD., LONDON, N.1.
TELEPHONE: CLISSOLD 3725

A.I QUALITY RECEIVER-

Utility TUNED



Month by month Wireless Magazine designers specify Utility components. For the "A-P-A Radio Unit," which puts quality first, last and all the time, the designers specify components in keeping.

Here are the Utility components chosen by the designers for their outstanding quality.

W 306/3

3-Gang fully screened condenser 30/- with dial

W 308

.005 Differential condenser - 12/6 with knob

From your dealers, or post free from the Manufacturers.

WILKINS & WRIGHT LIMITED.

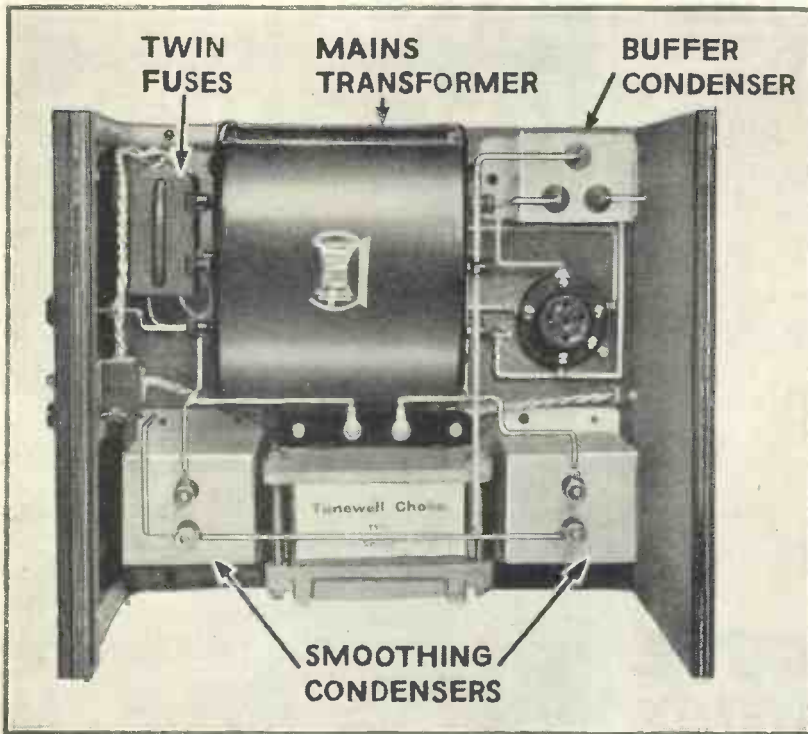
Utility Works, Holyhead Road, Birmingham.

AGENTS.—London: E. R. Morton, Ltd., 22 Barlett's Building, H. B. Corn Circus, E.C.1. Scottish: E. B. Hammond, 113 Vincent Street, Glasgow. Lancashire and Cheshire: J. R. Lister, 83 Old Road, Bockley, Manchester. Westmorland, Cumberland, Durham, Northumberland, Yorkshire, and Derbyshire: H. O. Rawson, Ltd., 100 London Road, Sheffield. Larven & Fraser, Chelsea House, Lansdown Road, East.

Belmont

Advertisers take more interest when you mention "Wireless Magazine"

A SIMPLE MAINS UNIT—Continued from page 470.



CONSTRUCTION WILL TAKE ONLY ABOUT AN HOUR

This plan view shows clearly the disposition of the parts in the mains unit. It can be arranged to give low tension as well as high tension if desired

address your application to Blueprint Department, WIRELESS MAGAZINE, 58/61 Fetter Lane, London, E.C.4.

When the unit has been completed it should be protected by means of a cover. This can conveniently be made of perforated zinc, shaped to fit across the top and over the two open sides. It can be held in position by some tacks inserted along the edge of the baseboard.

Simple Formula

Remember that the value of the necessary voltage-dropping resistances is calculated from the formula

$$R = \frac{E}{C}$$

where R is the resistance in ohms, E the voltage to be dropped and C the current in amperes (multiply by 1,000 to convert milliamperes to amperes).

Any number of breakdown resistances can be connected to the two high-tension output terminals provided that they are calculated according to the above formula.

[Further notes on this point will appear in the next issue.]



QUAD-ASTATIC Choke

Specified for "Wireless Mag." "TOWN AND COUNTRY FOUR" Selected for its efficiency over the entire broadcasting wavelengths and the freedom it gives from resonant losses and blind spots. Its special astatic winding prevents H.F. interference with adjacent components and for parallel-feed purposes it is unrivalled. List No. FY2.

3/6



COMPONENTS are featured in All Principal Circuits

Including Percy Harris' New "TOWN & COUNTRY FOUR"

Efficiency at lowest cost is the dominating influence in circuit design to-day: hence one finds in all principal circuits for 1932 the specification of R.I. productions, because they are designed and built first and foremost for absolute efficiency and reliability irrespective of price, yet they cost no more than ordinary components.

Ask your dealer or us for your copy of the new R.I. catalogue.

"DUX" TRANSFORMER

First selection for "'A.W.' MASCOT" This remarkable Transformer has attained great popularity by unequalled performance in hundreds of thousands of sets. It is the lowest-priced Transformer that is really efficient and gives remarkably good L.F. amplification. Its inductance is 30 henries. Ratio, 1 : 3½ (standard) or 1 : 4½ (auto-connection). List No. DY29.

6/9



MATCHING

makes all the difference to the "TOWN and COUNTRY Four."

All READY RADIO Kits are accurately MATCHED

APPROVED LIST

	£	s.	d.
1 Cabinet to specification	1	15	0
1 R.I. Quad Astatic H.F. Choke		3	6
1 Read-Rad Standard H.F. Choke		4	6
1 T.C.C. .0003-mfd. Fixed Condenser, type 34	1	6	
1 T.C.C. .0003-mfd. Fixed Condenser, type "S"	1	3	
1 T.C.C. .01-mfd. Fixed Condenser, type 40	1	9	
4 T.C.C. 1-mfd. Fixed Condensers, type 50	11	4	
1 T.C.C. 2-mfd. Fixed Condenser, type 50	3	10	
1 Formo .0005-mfd. Variable Condenser, with slow-motion dial	6	0	
1 Formo Pre-set Condenser, type "F"	1	6	
1 Ebonite Panel, 14 by 4½ in., drilled to specification	2	9	
100 Yards Lewcos 27/40 Silk-covered Frame Aerial Wire	10	6	
3 Lewcos 10,000-ohm Spaghetti Resistances	3	0	
1 Read-Rad Fuse and Holder	1	3	
3 Read-Rad Grid-leak Holders	1	6	
1 Dubilier 20,000-ohms Metallised Resistance, 1 watt	1	0	
1 Dubilier 100,000-ohms Metallised Resistance, 1 watt	1	0	
1 Read-Rad .25-megohm Grid Leak	10		
1 Read-Rad 2-megohm Grid Leak	10		
4 Valve Holders	2	0	
2 Clix Wood Screws, Sockets and Plug	8		
8 Belling-Lee Wander Plugs	1	4	
2 Spade Terminals	3		
1 Colvern 50,000-ohm Potentiometer	5	6	
1 Pair of Panel Brackets	10		
1 Read-Rad "On—Off" Switch	10		
1 Read-Rad 3-point Switch	1	6	
1 R.I. Dux Transformer	6	9	
1 Packet of Jiffilinx for wiring	2	6	
Valves as specified	1	19	3
Flex. Screws, etc.	1	3	
	£7	15	6

Any component can be purchased separately.

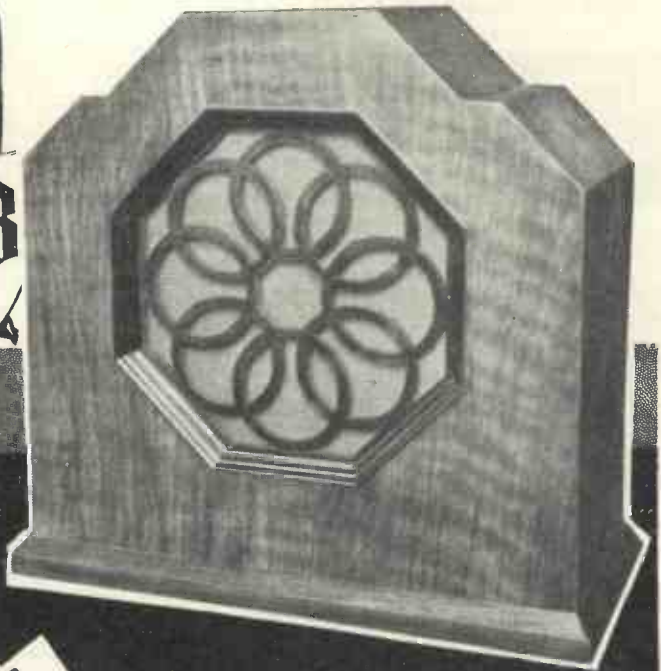
Kit 'A' (less valves and cabinet) **£4.1.3**
OR BY EASY PAYMENTS
7/6 down and 11 monthly payments of 7/6.

Kit 'B' (with valves, less cabinet) **£6.0.6**
OR BY EASY PAYMENTS
11/3 down and 11 monthly payments of 11/3.

Kit 'C' (with valves and cabinet) **£7.15.6**
OR BY EASY PAYMENTS
14/3 down and 11 monthly payments of 14/3.

Ready Radio

Head Offices: Eastnor House, Blackheath, S.E.3
Phone: Lee Green 5678. Grams: Readirad, Blackoil



The

Brown ★ M.C ★

You know in advance that any speaker labelled S. G. Brown is good—S. G. Brown, pioneer and leader of loud-speaker designers, has produced nothing but good speakers, and now we introduce his masterpiece, the Brown M.C.

The Brown M.C. is a permanent magnet moving-coil speaker, sensitive enough for a two-valver, yet capable of handling the output of a power amplifier and withal a quality that will please the most critical listener.

But hear it for yourself—let your dealer demonstrate this wonderful speaker and hear reproduction of a standard as only Brown can create.

The price of the Brown M.C. complete in a beautiful walnut cabinet is **£3.19.6**, **£3.19.6** or without cabinet 50/-.

Two other amazing Brown inventions are the "Microbox" and the "Superseder." If you wish to make efficient use of your gramophone or to have an H.T. supply without mains or batteries, write for full particulars.

S. G. BROWN Limited

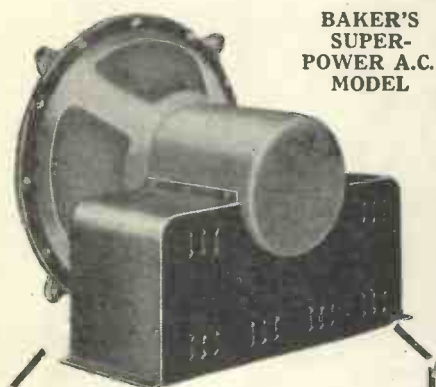
Western Ave., N. Acton, London, W.3. Tel.: Acorn 2211

Belmont

You will get prompt replies by mentioning "Wireless Magazine"

YOUR SET DESERVES

THE BEST SPEAKER YOU CAN BUY



BAKER'S
SUPER-
POWER A.C.
MODEL

A really good Amplifier needs "THE BEST SPEAKER YOU CAN BUY." You cannot do better than choose a BAKER'S SUPER POWER MOVING-COIL SPEAKER for use with the TURNER A-P-A RADIO UNIT AND AMPLIFIER—Discriminating music lovers have become daily more critical in their demand for GENUINE TONE QUALITY. That is why true music-lovers choose a Baker Speaker for unflinching performance every time.

THE SPEAKER WITH EAR APPEAL

Write at once for our
NEW FREE LITERATURE

BAKER'S
'Selhurst'
RADIO

Offices:
89 SELHURST RD., S. NORWOOD, S.E.25
Works and Demonstration Rooms:
42 CHERRY ORCHARD RD., E. CROYDON
Phone: Croydon 1618

A-P-A RADIO UNIT — Continued from page 410

choke L_3 and the 1-microfarad condenser C_{10} : but before screwing down the former, provide it with a link, as shown on its label, to put the two windings in series. Next wire up leads 42, 43 and 44. The end of this last goes to condenser C_{11} , and is also to have attached to it one end of the 5,000-ohm resistor R_{11} , of which the other end goes to the meter (negative side).

Then wire up leads 45 and 46, which call for no comment, and 47. This latter consists of the 5,000-ohm resistor R_{10} , but the resistor will not be long enough, so some inches of ordinary wire and sleeving must be added, preferably at the end nearest the output terminal.

Next comes the fitting of the mains leads, Nos. 48, 49, 50, and 51. These, of course, are of high-voltage twin flex, as used for domestic fittings. Estimate the lengths you will require (1) to the source of supply; (2) to the A-P-A mains input socket. Cut off two lengths, allowing 2 ft. extra length on each.

Knot the two together, 18 in. from one end of each. Unravel the 18-in. ends carefully; cut one lead of each short at 2 in., bare 1 in., join these two and wrap the joint with insulating tape; then twist up the two remaining 18 in. leads. Solder these to the left-hand tags (looking from the back) of the switch on the audio-volume control R_6 .

Fix down the flex to the baseboard near the iron-core choke, by a saddle



THE A-P-A READY FOR USE
Here are the A-P-A and the A-P-A Radio Unit assembled in the cabinet with a Baker Super-power A.C. moving-coil loud-speaker, priced at £9

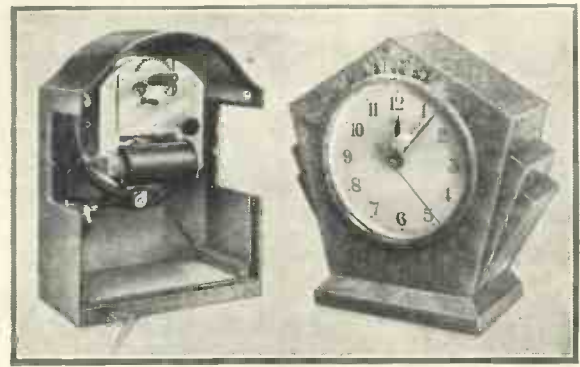
or small wooden cleat, with the knot on the set side of the cleat. Fit the two long ends with their fittings; the A-P-A mains plug on one, and a 2-pin plug or lamp adaptor on the other.

Last of all, fit the lead 52, from terminal No. 6 of the third coil up into the air, for the anode of the screened valve.

[Further notes on the A-P-A Radio Unit will appear next month]

Synchronised Electric Clocks

SINCE we went to press with J. H. Reyner's article on "Electric Clocks" in the April issue of "Wireless Magazine" we have received two samples from Ferranti, Ltd., of Hollinwood.



TWO EXAMPLES FROM THE FERRANTI RANGE

On the right is a model No. 3 Ferranti electric clock for use on a 50-cycle A.C. supply; the price in walnut is £1 10s. On the left is the "works" of the model No. 1, which is also £1 10s. in walnut bakelite. Coloured mouldings are available at £1 11s. 6d. each

These models are illustrated here. Each is provided with a seconds hand. They are the cheapest at present available.

It should be noted that these clocks can only be used on 50-cycle synchronised A.C. mains.

WHAT ELSE?



The "Wireless Magazine" Easy Tune 60 is a *super* set designed to bring in 60 to 70 stations and the only possible condenser is, therefore, the

BRITISH RADIOPHONE GANGED CONDENSER—SUPER-HET TYPE

On independent tests this set secured 75 stations at loud-speaker strength, and, of course, British Radiophone contributed largely to this achievement.

For clean-cut, perfect tuning there is nothing to approach British Radiophone. They bring in the stations one after another and hold them as long as you want. Accuracy is guaranteed to within one thousandth of one degree. At these new reduced prices you can easily afford to have the best, because it is now also the cheapest.

REDUCED PRICES

STANDARD TYPE

- 2-gang Condenser now 15/-
Dustproof Metal Cover now 2/6
- 3-gang Condenser now 25/-
Dustproof Metal Cover now 3/-
- 4-gang Condenser now 30/-
Dustproof Metal Cover now 3/6

SUPER-HET TYPE

- 2-gang Condenser now 17/-
Dustproof Metal Cover now 2/6
- 3-gang Condenser now 27/-
Dustproof Metal Cover now 3/-
- 4-gang Condenser now 32/-
Dustproof Metal Cover now 3/6

Q.M.B. Switches, 3 amps, 250 volts, now 1/3 each.

RADIOPHONE GANGED CONDENSERS

THE BRITISH RADIOPHONE, Ltd., Aldwych House, Aldwych, W.C.2

THE LATEST, PUREST & MOST SELECTIVE



3 VALVE KIT

39'6

Spend a thrilling evening at home building the finest 3-valve Radio Set ever produced—one combining wonderful selectivity and correct tone, easy tuning and low price.

PURE TONE

WONDERFUL SELECTIVITY

BUILT IN ONE NIGHT

Get a Lotus Landmark 3 Kit now, and within a few hours you will be listening to the broadcast entertainment of Europe, as well as the British programmes.

The sealed carton contains all the necessary LOTUS GUARANTEED COMPONENTS, with wire, leads, etc., at the low price of 39s. 6d. complete with full instructions and diagram.

All the tools that are necessary are a screw-driver and pliers. You will be amazed at the beautiful tone with simple tuning. Examine this "King of Kits" at your nearest dealers, and enjoy real radio within a few hours.



LANDMARK ... THREE

POST COUPON NOW

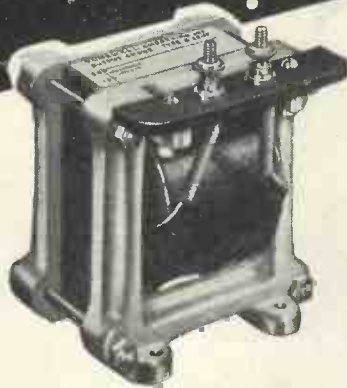
LOTUS RADIO Ltd. · MILL LANE · LIVERPOOL
 Please send me full details of the "Landmark 3."
 Name
 Address.....
 WM 5.

When replying to advertisements, please mention "Wireless Magazine"

TUNEWELL

MAINS COMPONENTS

again prove their superiority!



TUNEWELL CHOKE S 20/100

Specified for the
MAINS UNIT
described in this issue.

Hundreds of requests have been made to the "Wireless Magazine" for a Mains Unit with a maximum output of 50 m/a. The "Wireless Magazine" Experts have specially designed a Unit for this purpose. (Details are on page 470). Again a TUNEWELL Choke is specified. There can be no greater proof of the marked superiority of TUNEWELL products than their consistent choice by "Wireless Magazine" Technicians.

Rely on TUNEWELL products always and you will get the last ounce from your set—at the lowest cost.

TUNEWELL CHOKE S 20/100 18/6

FREE!

Tunewell illustrated Guide to New Super-Radio. Not merely a "catalogue"—it shows how EVERYONE can now have better Radio at less cost. Eight blue-prints of new circuits including Kit Eliminator.

Write to-day for a Free Copy, giving name and address of your nearest radio dealer.

TURNER & CO.

54 Station Rd., London, N. 11

TUNEWELL

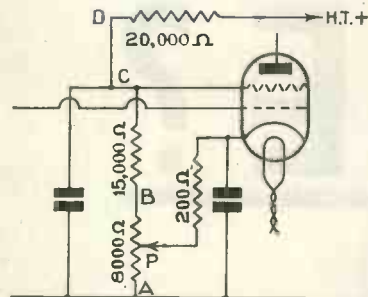
Design Data Sheets

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

"W.M." Design Data

No. 47

SCREEN GRID POTENTIOMETERS



Suitable circuit for variable-mu valve

THE variable-mu screen-grid valve has so many advantages that its use is becoming widespread. With this form of valve the sensitivity can be progressively varied by altering the negative bias on the inner or control grid, the limits with the customary A.C. valve being from -2 to about -40 volts.

For the best operation, however, it is essential that the voltage on the screen of the valve should remain constant. As this voltage is usually fed from some form of potentiometer, this requires a special circuit since the variation of

grid bias causes the anode current to change and this in turn alters the voltage drop on the potentiometer.

A suitable circuit is shown in the figure. The potentiometer for varying the voltage on the control grid is connected in series with the voltage divider employed to supply the voltage on the screening grid. If the grid bias is increased, the slider P moves farther up towards B, the effective high-tension on the screen is decreased by a corresponding amount.

At the same time, the screen current decreases (due to the increased grid bias) so that the voltage drop on CD decreases and the screen voltage tends to rise.

These two effects can be made to balance one another over a wide range of grid bias, keeping the screen voltage sensibly constant. The actual resistances depends on the valve, but suitable values are shown on the diagram.

"W.M." Design Data

No. 48

RESISTANCES, DESIGN OF

THE first consideration in the design of a resistance is that of obtaining the necessary number of ohms. The wire employed must be capable of carrying the current safely and the length of wire is then determined by reference to the table below.

The next consideration is that of accommodating the resistance. For D.C. or really low frequencies the wire may be wound on a tubular former in a simple solenoid, the inductive effect being negligible. A simple winding of this sort is practicable in many cases for grid-bias resistances, since the audio-frequency currents are by-passed through a shunt condenser, and the resistance has only to carry the steady anode current.

Where the resistance carries alternating current, particularly at a high frequency, it is necessary to adopt non-inductive forms of winding. One of the most common is to wind the wire clockwise for one half and then reverse the direction of winding for the remainder. For measurement work still

more stringent precautions are required.

For radio frequencies no spiralling is permissible and resistances must be constructed of short lengths of fine wire stretched between the points in question. Otherwise the high-frequency resistance is not anything like the same as the resistance to direct current.

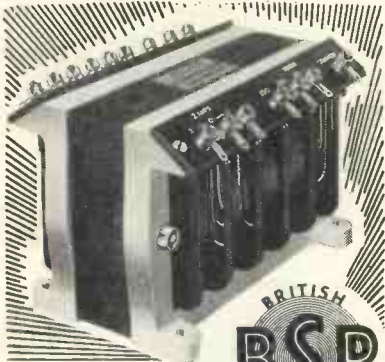
Eureka Resistance Wire

S.W.G.	Ohms per Yard	Safe Current Amperes
20	0.66	2.0
22	1.09	1.3
24	1.77	0.8
26	2.65	0.5
28	3.91	0.35
30	5.58	0.24

S.W.G.	Ohms per Yard	Milli-amperes
32	7.35	180
34	10.1	130
36	14.8	90
38	23.8	60
40	37.2	36
42	53.6	25
44	83.7	16
46	148.8	9

Famous Makers' Offer! **£5 Radio Gram CABINET for 65/-**
7 DAYS' FREE TRIAL
 You save 35/-! A few only at makers' prices. Rich Brown Oak "Master Grand" (as made for Radio Press) carriage paid. A fine Bargain. PHOTOGRAPHS and LISTS FREE.
 *All models from 35/- to £1.
10/- monthly if desired

PIANO TONE
 Patent 8123 improved acoustics yields mellow, rich, full volume that your speaker is really capable of. Makers to: (Radio-Press, B.B.C., 3,000 clientele)
SEND FOR LIST
PICKETTS Piano Tone Cabinets (M.G.) Albion Rd., Buxleyheath, Keat.



Mains Transformers for Valve & Metal Rectifiers

Immune from breakdown and guaranteed for 12 months.

Wireless World Test Report:—
 "Design and workmanship of highest standard... Insulation of an exceedingly high order... exceptionally good regulation... gave a very satisfactory performance indeed."

A Typical B.S.R. Product, notable for immunity from breakdown is shown above. TYPE P5a Pr. 200/220/240 v. 50 cycles. 500.0.500 v. 120 m.a., 2.0.2 v. 5 amp., 2.0.2 v. 5 amp. and 2.0.2 v. 3 amp.
PRICE 55/-

TYPE P2b. Pr: 200/220/240 v. Output 170-200 v. 180 m.a., 2.0.2 v. 4 amps. Gives a rectified output with Westinghouse H.T.8 Metal Rectifier after smoothing of 220 or 280 v. 60 m.a.
PRICE 27/6

Write for List of Mains Transformers, Output Transformers, and Chokes.

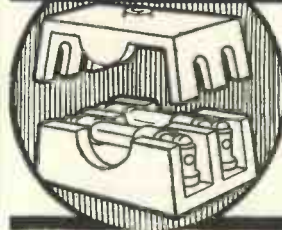
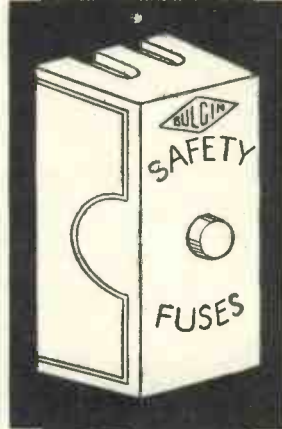
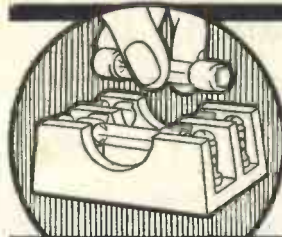
BIRMINGHAM SOUND REPRODUCERS
 40/41 PERRY PARK ROAD,
 BLACKHEATH, BIRMINGHAM

Holdens



Make a Radiogram or Gramophone at quarter price. Order loose kits or sets and assemble them at home, making your own cabinet or box. Get for 3d. our new 64-page catalogue No. 222/1932 with scale drawings and instructions how to make cabinets, gramophones or radiograms, what parts to choose and the lowest prices to 1932. We sell motors from 7/6, tone-arms, soundboxes, 1/6, pick-ups, horns, loudspeakers, radio kits, complete receiving sets, gramophones, radiograms and parts. Also accordions, violins and mandolines.—Established 1903.—The Regent Fittings Co., W.M., 120 Old Street, London E.C.

BUY
Amateur Wireless
 3d. Weekly



...DON'T PUT YOUR HOUSE IN DARKNESS

Have you ever realised that a short circuit inside your mains apparatus may possibly blow the HOUSE LIGHTING FUSES?

The Bulgin Enclosed Twin Fuseholder is designed to prevent this and is placed directly in the mains leads to set or eliminator. The bakelite cover renders it equally suitable for baseboard fitting or external use. All live portions are shielded from accidental contact.

Eliminate all danger by fitting the Bulgin Enclosed Twin Fuseholder—indispensable where the mains are used for radio supply.

List No. **F.14** Fitted with two 1 amp fuses **2/9**
 Complete which only cost 6d. each to replace

Send 2d. postage for 75 pp. Illustrated Catalogue and Manual.

BE ON THE SAFE SIDE & FIT



CARTRIDGE FUSES

A. F. BULGIN & CO., LTD.,
 ABBEY ROAD, BARKING, ESSEX.

Telephones: Grangewood 3266 and 3267.
 London Showrooms: 9, 10, 11 Cursitor St., Chancery Lane, E.C.4
 Telephone: Holborn 2072.

THE ENGRAVED WANDER PLUG
 with the **SPRING GRIP**



Grips every battery socket and stays put even in portables under vibration—the resilient hard-drawn spring wire prongs (not soft brass) ensure exceptional self-adjustment and strength of contact.
 Side entry, with patent loading device—no tools required. The whole flex gripped, copper, rubber end braiding.
 12 permanent indications.

SPECIFIED in the EASYTUNE SUPER 2d. EACH



BELLING-LEE SPADE TERMINAL
 Clips on to terminal stem. Side entry. 2d. Top permanently lettered. Price

6 Belling-Lee Wander Plugs
 6 Belling-Lee Spade Terminals
 2 Belling-Lee "B" Type Terminals

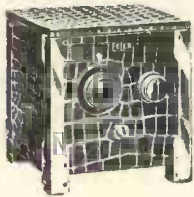
Advt. of Belling & Lee, Ltd.
 Queensway Works, Ponders End, Middlesex

BELLING-LEE
 FOR EVERY RADIO CONNECTION

Advertisers like to know you "saw it in the 'Wireless Magazine'"

EELEX

COMPONENTS AND ACCESSORIES CAN BE USED WITH CONFIDENCE



EELEX SHORT-WAVE CONVERTOR
Get super-het selectivity with your present set. Fit an Eelex Short-wave Converter; it enables stations on the short-wave bands to be received without alteration to your present receiver. Battery Model, with valve, price 60/-; All-Mains, 65/-; and Two-Valve Model, 85/6 (without valves).

EELEX FRAME AERIAL

A frame aerial that can be used with any set. Although originally designed for use with super-het, it is equally effective with or without centre tap. Definite minimum silent point. Price 20/-.



EELEX TESTING PRODS

Don't risk burning out your valves when looking for faults. The Eelex Testing Prods are an insurance policy in themselves. Ball points are fitted for greatest ease in use. Red and black insulated handles. Price 3/6 per pair.

EELEX GRIPS

For identifying wires use Eelex Standard Name Plates with the Eelex Grips. Name Plates, 1d. ea., 9d. doz. Grips, 1d. ea., 6d. doz.



THE 2DM SIDE ENTRY PLUG

This Plug has many uses in the home-constructed set. Supplied in six colours. Type 2DM, side entry. Price 1d. each.

There are years of practical experience behind every product sold under the name EELEX. You are guaranteed perfect satisfaction if you insist on EELEX.

Write for List K.8.

J. J. EASTICK & SONS

Eelex House, 118 Bunhill Row, London, E.C.1.

*Phone: Metropolitan 0314/5/6.

DESIGN DATA SHEETS—Cont. from page 476

"W.M." Design Data

No. 49

DYNAMIC RESISTANCE

THE effective resistance of a tuned circuit depends upon the point of view. The circulating current set up in a resonant circuit by a voltage induced in the coil is limited only by the high-frequency resistance of the coil and the condenser.

The reactance or opposition to the current produced by the inductance is cancelled out by that of the condenser, the two being exactly equal and opposite when the circuit is in resonance, and the current, therefore, rises to a maximum limited only by the high-frequency resistance in the circuit.

Where the voltage is applied across the circuit, however, the conditions are somewhat different. Current flows through the coil in one direction, and through the condenser in the opposite direction at any particular instant, and the total current taken by the circuit is the difference of these two.

When the circuit is tuned to resonance the currents in the coil and condenser are nearly equal and opposite, so that the total current is very small, and the tuned circuit behaves as it were a very high resistance.

This "dynamic" resistance is equal to L/CR , L and C being the inductance and capacity in microhenries and microfarads respectively, and R being the

high-frequency resistance of the circuit.

A typical broadcast coil would have an inductance of 180 microhenries. This would tune to 400 metres with a capacity of .00025 microfarad. The combined resistance of the coil and the condenser would be of the order of 8 ohms, giving a dynamic resistance at this wavelength of 90,000 ohms.

In estimating the effective resistance of a circuit, however, allowance must be made for any additional damping or reaction effect produced by the circuit. For example, a detector valve following a tuned circuit may introduce considerable damping, being equivalent to a resistance of 50,000 ohms, or even less, connected across the circuit.

The effective tuned-circuit resistance is therefore the normal dynamic resistance (90,000 ohms in the case just considered) in parallel with the 50,000 ohms, giving only 32,000 ohms. This value would have to be used in determining the amplification from the preceding valve.

Reaction tends to reduce the effective circuit resistance, and in fact, is a matter somewhat difficult to estimate. It may be taken that the dynamic resistance of a circuit (after allowing for extra damping) may be increased some three or four times by use of reaction.

"W.M." Design Data

No. 50

INDEX

	No.		No.
Aerial Coupling, Optimum ..	26	Mains Fuses	43
Auto-transformers, low-frequency ..	10	Mutual Inductance	22
Band-pass Filters, Reaction on ..	14	Neon-lamp Tester	42
Break-through, Elimination of ..	41	Oscillator, Non-radiating	46
Carrier Hum	16	Output Circuits	1
Coils, Best Shape of	37	" Transformers, Ratio of	45
" plug-in, connection of	5	" Valves, Directly-heated	23
Choke-output Circuits	7	Power Transformers	24
Capacity, measurement of	30	" Primary Cur-	
Condenser Losses	4	rent in	44
" In Parallel and Series	32	Potentiometers for SG valves	48
" Test Voltage of	36	Plug-in Coil Connections	5
Coupling Condenser, Size of	38	Primary Current	44
Decoupling Resistance, Calculation of	13	Rectifiers, Current for	21
Dynamic Resistance	49	Rectifier Meters	27
Electrical Units	31	Resistances	35
Filters, Loud-speaker	18, 19, 33	" Dynamic	49
Frame Aerials	9	" Design of	48
Frequency and Wavelength	40	Resonance, Low-frequency	6, 34
Fusing Currents	17	Saturation	29
Grid Stoppers	20, 39	Screen-grid Potentiometers	47
Hum, Carrier	16	Self-bias, Calculation of	11
Loud-speaker Filters	18, 19, 33	Short-wave Adaptors	15
Low-frequency Auto-transformers ..	10	" Chokes	8
" Resonance	34	Tone Correction	28
" values for	6	Tropadyne Oscillator	2
		Units, Electrical	31
		Volume Control	25
		Winding Data	3
		Wire Data	12

YOU CANNOT GO WRONG IF YOU USE A

FULL-SIZE BLUEPRINT

CRYSTAL SET

6d. post free

1931 Crystal Set AW308

ONE-VALVE SETS

1s. each, post free

Short-wave One-valver (6d.) AW327
 "B.B.C." One AW280
 Easy-to-Build One AW304

TWO-VALVE SETS

All these 1s. each, post free

Five-point Two (D, Trans) WM220
 Aladdin Two (D, Trans) WM231
 Ever-tuned Regional Two (D, Trans) WM241
 Station-finder Two (D, Trans) WM243
 Music-lover's Two (D, Trans) WM260
 New Economy Two (D, Trans) WM265
 Family Two (D, Trans) WM278
 Forty-five Shilling Two (D, Trans) AW250
 Searcher Short-wave 2 (D, Trans) AW259
 Challenge Two (D, Trans) AW261
 Loftin-White 2 (A.C. Set) AW263
 Everybody's All-in 2 (D, Trans) AW273
 Twenty-shilling Two (D, Trans) AW274
 B.B.C. Selective Two (D, Trans) AW292
 The Room-to-Room 2 (D, Trans) AW298
 Big-volume Two (D, Pen) AW309
 Two Star 2 (D, Pen) AW315
 The 25/- Two (D, Trans) AW330
 Ten Station Two (D, Trans) AW336

THREE-VALVE SETS

All these 1s. each, post free

Gramo-radio D.C. Three (SG, D, Trans) WM196
 Concert Three (D, 2 Trans) WM199
 De-luxe Three (D, RC, Trans) WM209
 Five-point Three (SG, D, Trans) WM212
 Falcon Three (AC Set) WM217
 New Brookman's Three (SG, D, Trans) WM218
 Five-point Short-waver (D, 2 Trans) WM223
 Regional Three (SG, D, Trans) WM236
 Band-pass Inceptor-dyne (SG, D, Pen.) WM244
 Ether Marshal (SG, D, Trans) WM247
 Five-Advantage Three (D, RC, Trans) WM257
 Everybody's Radiogram (SG, D, Trans) WM258
 Meridian Short-waver (D, RC, Trans) WM255
 Double Band-pass Three (SG, D, Trans) WM259
 Everybody's Radiogram (with Automatic Grid Bias) WM262
 New Economy Three (SG, D, Trans) WM263
 New Plug-in-Coil Three (D, 2 Trans) WM270
 Transportable Three (SG, D, Trans) WM271
 Square-peak Three (SG, D, Trans) AW293
 Universal Short-wave Three (SG, D, Trans) AW301
 Olympian Three (SG, D, Trans) AW306
 Tonality Three (D, RC, Trans) AW321
 35/- Three-valver (D, 2RC) AW323
 Baby Three (D, RC, Trans) AW324

1932 Ether Searcher (SG, D, Trans) AW325
 World Wide Short-wave Three (D, RC, Trans) AW332
 New Favourite Three (D, RC, Trans) AW334
 Home Lover's All-electric Three (SG, D, Trans) AW335
 P.W.H. Mascot (D, RC, Trans) AW337

FOUR-VALVE SETS

All these 1s. 6d. each, post free

Five-point Four (SG, D, RC, Trans) WM216
 Brookman's Three-Plus-One (SG, D, RC, Trans) WM233
 Ether Rover (SG, D, RC, Trans) WM266
 Quadradyne (2SG, D, Trans) WM273
 Double Band-pass Four (SG, D, RC, Trans) WM274
 Economy Radio Gramophone (SG, D, RC, Trans) WM276
 A.C. Quadradyne (2 SG, D, Pen) WM279
 The Orchestra Four (D, RC, Push-pull) AW167
 All-Europe Four (2HF, D, Trans) AW173
 Stability Four (HF, D, RC, Trans) AW182
 £3 3s. Four (SG, D, RC, Trans) AW303
 £3 3s. Four (Improved Model) AW303A
 Everybody's Radio Gramophone AW310
 Four-star Four (SG, D, RC, Trans) AW318
 The 50/- Four (SG, D, RC, Trans) AW331

FIVE-VALVE SETS

All these 1s. 6d. each, post free

Overseas Five (3SG, D, Trans) WM191
 Regional D.C.5 (SG, D, LF, Push-pull) WM252
 Ideal Home Super (Super-het) WM280
 ★Easytune 60 (Super-het) WM284
 James Quality Five (2SG, D, RC, Trans) AW227
 Britain's Super (Super-het) AW311
 A.C. Britain's Super (Super-het) AW322
 Mains section (1/-) AW322a
 James Short-wave Super-het AW328
 Simple Super (Super-het) AW340

SIX-VALVE SETS

All these 1s. 6d. each, post free

Super 60 (Super-het) WM229
 A.C. Super 60 (Super-het Radiogram) WM239
 A.C. Super 60 (Super-het Table Model) WM245
 Super 60 (with Wearite Base) WM249
 Super 60 (with Lewoc Base) WM251
 1932 Super 60 (Super-het) WM269
 1932 A.C. Super 60 (Super-het) WM272

SEVEN-VALVE SET

1s. 6d., post free

Super Senior (Super-het) WM256

PORTABLE SETS

Pedlar Portable (D, 2 Trans) WM197 1/-
 Super 60 Portable (Super-het) WM238 1/6
 Home and Garden Three (D, RC, Trans) WM246 1/-
 ★Town and Country Four (SG, D, RC, Trans) WM28Z 1/6
 Music Leader (SG, D, RC, Trans) AW203 1/-
 Merry-maker Portable (D, 2 Trans) AW228 1/-
 Sunshine Three (SG : HF, SG : D, Trans) AW235 1/-

AMPLIFIERS

All these 1s. each, post free

Radio-record Amplifier (DC Mains) WM183
 Selecto Amplifier (HF Unit) WM210
 D.C. Fader WM242
 Quality Amplifier (D.C.) 1s. 6d. WM264
 A-P-A (Public Address) WM275
 ★A-P-A Radio Unit (SG, D) WM281
 Economy Gramophone Amplifier WM277
 A.C. Push-pull Amplifier AW291
 Add-on H.F. Screened-grid Unit AW296
 Universal Push-pull Amplifier AW300
 "A.W." Record Player (LF, Push-pull) AW319



A FINE BAND-PASS SET
 One of the most popular "W.M." band-pass sets yet described—the Ether Marshal

MISCELLANEOUS

"W.M." Standard A.C. Unit WM214 1/-
 "W.M." Standard D.C. Unit WM215 1/-
 Loud-speaker Tone Control WM234 -/6
 "W.M." Linen-diaphragm Loud-speaker WM235 1/
 Two-minute Adaptor for Short Waves WM240 1/
 Super 60 A.C. Unit (for Battery Super 60) WM248 1/
 Simple Neon Oscillator WM251 1/
 Plug-in Adaptor WM267 1/
 Super-het Adaptor WM268 1/
 James H.T. and L.T. Charging Unit AW232 1/-
 ★A Simple Mains Unit WM283 1/-
 Simple Battery Eliminator for A.C. Mains AW236 1/-
 Choke Output Unit AW240 1/-
 Simple Tester Unit AW246 -/6
 "A.W." Improved Linen-diaphragm Speaker AW248 1/-
 Handy L.T. and G.B. Unit for A.C. Mains AW254 1/-
 Ohmic Coupled DX Unit AW255 1/-
 Simple Gramophone Amplifier AW257 1/-
 Novel Linen Diaphragm Speaker AW260 1/-
 H.T. Unit for A.C. Mains AW262 1/-
 Gramophone Tone Control AW264 1/-
 H.T. Unit and Trickle Charger for D.C. Mains AW272 1/-
 2-Watt A.C. Amplifier AW283 1/-
 "A.W." Selectivity Unit AW290 6d.
 B.B.C. Official Selectivity Unit AW294 6d.
 A.C. Trickle Charger AW305 1/-
 Amateur's Linen Speaker AW307 1/-
 D.C. H.T. Unit AW312 1/-
 Output Unit for Pentode Sets AW316 1/-
 "A.W." Short-wave Adaptor AW317 1/-
 Short-wave Plug-in Adaptor AW326 -/6
 Super-het Short-wave Adaptor AW329 -/6
 "A.W." Short-wave Adaptor AW339 1/-

Each blueprint shows the position of each component and every wire and makes construction a simple matter. Copies of "Wireless Magazine" and of "Amateur Wireless" containing descriptions of most of these sets can be obtained at 1s. 3d. and 4d., respectively, post free. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine" sets.

A blueprint of any one set described in the current issue of the "Wireless Magazine" can be obtained for half-price up to the date indicated on the coupon (which is always to be found on the last page) if this is sent when application is made. These blueprints are marked with an asterisk (*) in the above list and are printed in bold type. An extension of time will be made in the case of overseas readers.

Send, preferably, a postal order (stamps over sixpence in value unacceptable to)

Wireless Magazine

BLUEPRINT DEPT.,
 58/61 FETTER LANE,
 LONDON, E.C.4

BLUEPRINT COUPON

Valid only until May 31, 1932 (or until June 30, 1932 for overseas readers)

FOR ONE BLUEPRINT ONLY

If you want a full-size blueprint for any ONE of the sets constructionally described in this issue for half price, cut out the above coupon and send it, together with a postal order, to Blueprint Department, WIRELESS MAGAZINE, 58-61 Fetter Lane, London, E.C.4.

This coupon is valid for a blueprint of any ONE only of the following sets at the prices indicated:—

A-P-A RADIO UNIT (page 404), WM281, price 6d., post free.

TOWN-AND-COUNTRY FOUR (page 437), No. WM282, price 9d., post free.

SIMPLE MAINS UNIT (page 470), No. WM283, price 6d., post free.

EASYTUNE 60 (page 387), No. WM284, price 9d., post free.

INFORMATION COUPON

Valid only until May 31, 1932 (or until June 30, 1932 for overseas readers)

If you want to ask any questions, cut out the above coupon and send it, together with a postal order for 1s. and stamped-addressed envelope, to the Information Bureau, WIRELESS MAGAZINE, 58-61 Fetter Lane, London, E.C.4.

Note that not more than two questions may be asked at a time and that queries should be written on one side of the paper only.

Under no circumstances can questions be answered personally or by telephone. All inquiries must be made by letter so that every reader gets exactly the same treatment.

Alterations to blueprints or special designs cannot be undertaken; nor can readers' sets or components be tested.

If you want advice on buying a set, a stamped-addressed envelope only (without coupon or fee) should be sent to the Set Selection Bureau, WIRELESS MAGAZINE, 58-61 Fetter Lane, London, E.C.4.

Look out for the next issue of the "W. M." published on May 20, 1932.

HERE THEY ARE— TANNOY Mains Units make your set all-electric

for **6/-** and 11 payments of 5/5.
Cash £2.19.6

TYPE P.I.

Giving H.T. Supply up to 150v. at 15 m/amps, or 120v. at 20 m/amps with three positive tappings

Other Units suitable for all purposes

Write for Particulars to:
TANNOY PRODUCTS, DALTON ST., W. NORWOOD, S.E.27
Telephone: SREATHAM 0131/2

Sets . . . Sets . . . Sets . . .!

Follow the lead of hundreds of Wireless Magazine readers and get that set constructed or modernised by

RADIO ENGINEERS

It costs only a little more, which is more than outweighed by increased pleasure in reliable reception, a set of first-class workmanship, giving a first-class performance. Write to us NOW!

SCOTT SESSIONS

RADIO ENGINEERS
MUSWELL HILL, LONDON, N.10
Telephone: Tudor 5326.
Contractors to H.M. Office of Works, etc.

INDEX TO ADVERTISERS

	Page
B	
Baker Selhurst Radio	474
Belling & Lee, Ltd.	477
Birmingham Sound Reproducers, Ltd.	477
British Blue Spot Co.	Cover iii
British Radiophone, Ltd.	475
Brown, S. G.	473
Bulgin, A. F., & Co., Ltd.	477
Burne-Jones & Co., Ltd.	385
C	
Carrington Mfg. Co., Ltd.	463
Columbia Graphophone Co.	387
Colvern, Ltd.	371
Cossor, A. C., Ltd.	459
D	
Drvdex	465
Dubilier Condenser Co., Ltd.	377
E	
Eastick, J. J., & Sons	478
Ever Ready	375
F	
Fluxite, Ltd.	469
G	
General Electric Co., Ltd.	461
Gramophone Co., The	444, 445
H	
Heyberd, F. C., & Co.	370
I	
Igranic Electric Co.	463
J	
Jackson Bros.	384
L	
Limit Radio, Ltd.	384
London Electric Wire Co., & Smiths, Ltd.	Cover ii, 379
Lotus Radio, Ltd.	475
M	
Mullard Wireless Service Co., Ltd.	373
O	
Osborn, Chas. A.	469
P	
Partridge & Mee, Ltd.	383, 384
Pertrix, Ltd.	Cover iv
Peto-Scott, Ltd.	384, 465
Pickett Bros.	477
Portadyne	383
R	
Radio Instruments, Ltd.	472
Ready Radio (R.R.), Ltd.	473
Regentone, Ltd.	377
Regent Fittings	477
Reproducers & Amplifiers, Ltd.	463
Rotax, Ltd.	467
S	
Scott Sessions, G., & Co.	480
Smiths (M.A.), Ltd.	370
Smith Cabinets, Ltd.	471
Siemens Bros.	382
T	
Tannoy Products	480
Tekade Radio & Electric	385
Telegraph Condenser Co., Ltd.	381
Tunewell	476
V	
Vandervell, C. A.	381
Varley	469
W	
Westinghouse Brake and Saxby Signal Co., Ltd.	467
Whiteley Electrical Radio, Ltd.	371
Wilburn & Co.	467
Wilkins & Wright, Ltd.	471
Wright & Weaire, Ltd.	471

BELIEVE IT

OR NOT

YOU may think us guilty of exaggeration in saying that BLUE SPOT 100U is the equal of the most expensive Moving-Coil Speakers. Yet, far from being an exaggeration, this is actually an under-statement.

Ask your dealer to let you hear this wonderful inductor type speaker and compare it with Moving-Coil Speakers. You will find that it is every bit as sensitive, that it reproduces bass notes to perfection and *yet gives full value to the remainder of the musical scale.*

100U gives to voices their real personality and to music the fresh crispness and distinctive individuality of the original.

Unlike Moving-Coil Speakers, 100U reproduces perfectly even from very small inputs and is free from distortion. Hear this amazing speaker to-day. Send for illustrated Catalogue No. W.M. 16U.

100D, an attractively designed Cabinet Speaker in fine quality oak, 63/-.

100U 39% COMPLETE MOUNTED TO CHASSIS

REDUCED PRICES OF BLUE SPOT RECEIVERS

- W.400 now reduced to 15 gns.
- W.S.400 now reduced to 17 gns.
- Table Grand . . now reduced to 20 gns.
- Upright Grand now reduced to 22 gns.

For A.C. mains, 100-240 volts. Complete with 5 valves and royalties paid.

HIKE PURCHASE TERMS ARE NOW AVAILABLE FOR ALL BLUE SPOT RECEIVERS.

BRITISH MADE



THE BRITISH BLUE SPOT COMPANY LTD

BLUE SPOT HOUSE · 94/96 ROSOMAN STREET · ROSEBURY AVENUE · LONDON · E C I

Telephone: Clerkenwell 3573. Grams: "Bluospot, Isling, London."
Distributors for Northern England, Scotland and North Wales:—H. C. RAWSON (Sheffield and London), LTD., 100 London Road, Sheffield; 22 St. Mary's Parsonage, Manchester; 183 George Street, Glasgow.

Hutchinson

PERTRIX HIGH TENSION AT 1^d. A VOLT!

Never before has such a good quality battery—and a non-sal-ammoniac one—been sold at so low a price.

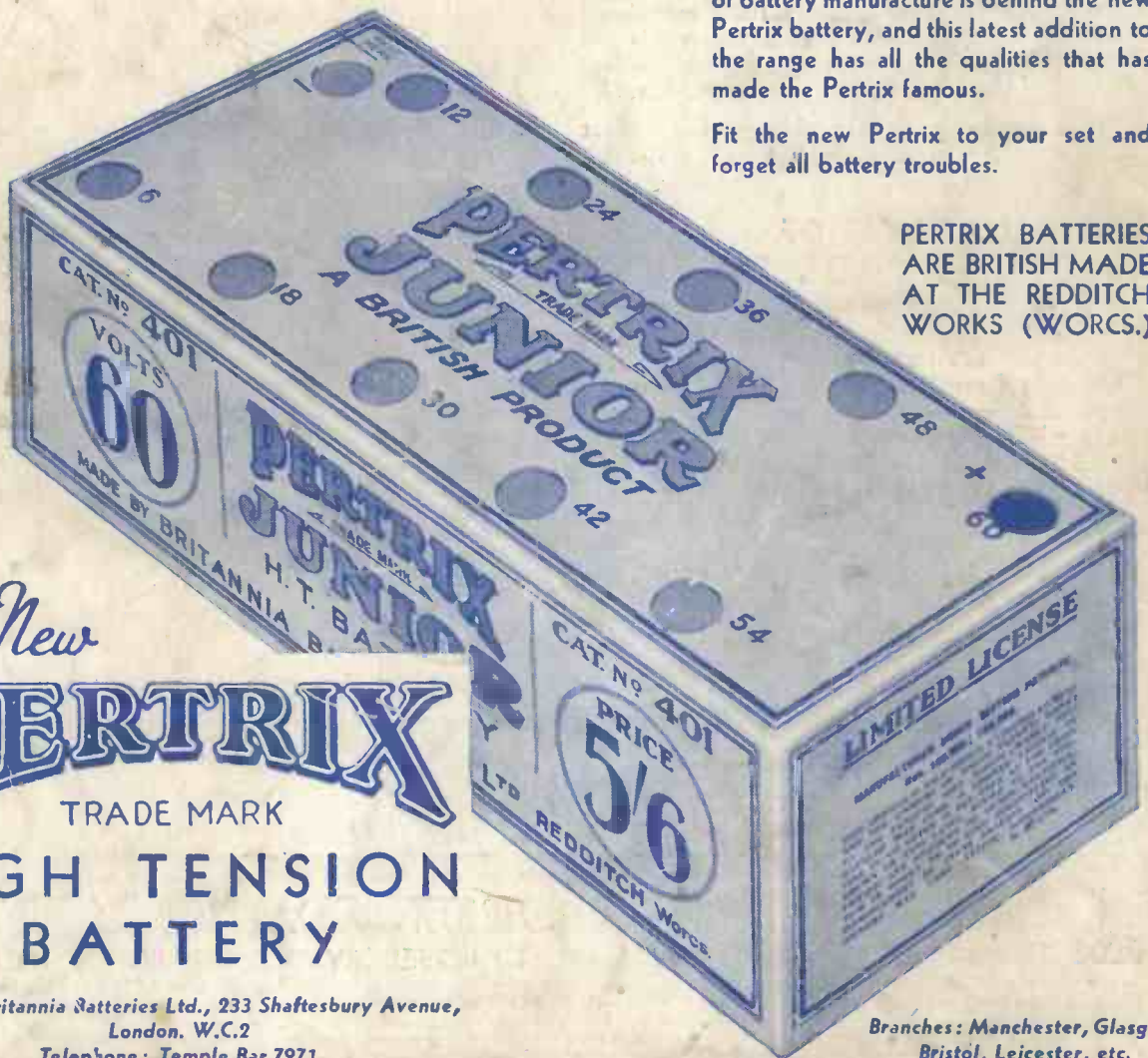
5/6 for the 60 volt—9/- for the 100 volt and 11/- for the 120 volt—just a fraction above 1d. per volt.

THE RESULT OF 40 YEARS OF BATTERY MANUFACTURE

All the experience gained in 40 years of battery manufacture is behind the new Pertrix battery, and this latest addition to the range has all the qualities that has made the Pertrix famous.

Fit the new Pertrix to your set and forget all battery troubles.

PERTRIX BATTERIES ARE BRITISH MADE AT THE REDDITCH WORKS (WORCS.)



The New
PERTRIX
TRADE MARK
HIGH TENSION
BATTERY

Advt. of Britannia Batteries Ltd., 233 Shaftesbury Avenue, London, W.C.2
Telephone: Temple Bar 7971

Branches: Manchester, Glasgow, Bristol, Leicester, etc.

60 VOLTS 5/6 | 100 VOLTS 9/- | 120 VOLTS 11/-