GREATER SPEAKER OUTPUT AT VERY LOW COST (SEE PAGE 610)

Wireless Magazine

No 78 JULY, 1931 1/-

BAND-PASS TUNING *With* PLUG-IN COILS

James and Reyner Explain the System
We Show How to Build A Band-pass S·G·Three With Plug-in Coils

Television To-day: A Challenge and A Reply — Arthur R. Burrows
Europe's Radio Problems —
Special Summer Radio Features—
Britain's Radio Research Station—
Secrets of the B.B.C.'s New H.Q

ER 60—AN A.C. TABLE MODEL AND A SUPER-POWER UNI

RANGE THE WORLD with The LEWCOS (Regd)

THIS new LEWCOS achievement—the Super-Het Coil Kit—which has an eight Kilo-Cycle Wave-band separation and consists of one triple wave-band oscillator Coil, two I.F. Coils with "Pigtails" and one I.F. Coil without "Pigtail," marks a new epoch in Radio reception.

Primarily constructed for incorporation in the "Super 60," this Kit can, of course, be fitted with extraordinary ease in any set of similar design and the results will be truly astounding!

This small space is completely inadequate to give even a short description of these wonderful new LEWCOS Coils, but you are invited to write for an illustrated explanatory leaflet R 71.

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which is specified for the TABLE MODEL A.C. "SUPER 60"

Price 50/-

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This is a photograph of the LEWCOS Dual Range Centre-Topped Frame Aerial which is specified for the "Super 60." The Frame is wound with silk-covered Litzendraht wire and the switch and terminals are mounted on the moulded base, thus presenting a neat and handsome appearance. The waveband change is effected by the turn of the knob.

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LEWCOS SPAGHETTI RESISTANCES Regd. are specified for the Table Model A.C. "Super 60."

LEWCOS RADIO PRODUCTS—BETTER RECEPTION

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED CHURCH ROAD, LEYTON, LONDON E.10

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Wireless Magazine

The Best Shillingsworth in Radio

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Research Consultant:
W. JAMES
Assistant Editor:
D. SISSON RELPH

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FOR THE CONSTRUCTOR

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GRAMO-RADIO SECTION

I HAVE the pleasure of presenting in this month's issue an article by my old friend, Arthur Burrows, whom I first met, I remember so well, when he was still with the Marconi Company at a time when broadcasting had just started, but many months before the B.B.C. came into existence.

"UNCLE ARTHUR"

I was about to found "Amateur Wireless" and a mutual friend invited me to meet Arthur Burrows at lunch. I remember how interested and interesting he was and how considerate he was to the idea of the very first paper to appeal on broad lines to wireless amateurs. Everybody remembers, of course, the great success he had as the B.B.C.'s very popular "Uncle Arthur."

To-day he is secretary of the Union Internationale de Radiodiffusion, and at my invitation he contributes to this issue a talk on the solution of Europe's radio problems. He is at the very centre of things and knows full well what those problems are.

I am writing this on a morning of real summer, just the right sort of morning on which to contemplate Alan Hunter's article in this issue on "Summer Radio" and Whitaker-Wilson's on "Listening on the Lawn!" (How that man does like alliteration!) It is going to be a great radio summer. There is no gainsaying that.

TELEVISION TO-DAY

We have a very happy exchange of views this month on television to-day. Our special representative epitomises some arguments put forth at a meeting of the Institute of Electrical Engineers and in reply we have an article by H. J. Barton Chapple (writing on J. L. Baird's behalf) giving the point of view of the only prominent inventor identified with British television.

I would like you to turn to page 583 and see Leslie H. Shepherd's drawing of Broadcasting House—a very clever drawing of the B.B.C.'s new headquarters. What great accommodation will be provided in that new building—wonderful studios all conducing towards wonderful programmes.

A.C. SUPER 60

The chief Super 60 feature of this issue is the constructional article on building an A.C. Super 60 which differs from the apparatus described in last month's issue in its being a table model, easier to build because there is no need to provide accommodation for the gramophone motor and also because, inasmuch as the parts are all on top of the baseboard, there is no sub-baseboard wiring. A pick-up switch is provided, and, of course, in all essential respects this month's version is much the same as last month's radio-gramophone model.

There are minor features as well relating to the Super 60, the most wonderful success this magazine, or any radio magazine, for the like of that, has ever had.

And talking of success, may I just say this: This July issue of WIRELESS MAGAZINE *carries double the number of advertisements carried in our issue of last July. And may I also, with very sincere gratitude, thank all readers, and all advertisers, too, who have offered us their congratulations during the last few months.*

BAND-PASS TUNING

There are many features of which I should like to say a word, but lack of space will prevent my referring to many more of them. However, on the subject of band-pass tuning I must refer to the articles by W. James and J. H. Reyner in this issue. These technicians discuss the possibilities of band-pass tuning and it is quite obvious that the system is essential at the moment if any one station is to be heard free from interference.

Following their articles, we describe how to build a band-pass screen-grid three—the Band-pass Inceptordyne, a worthy successor to the Inceptordyne of eighteen months ago, which readers so much appreciated at the time.

B.E.J.

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NEXT MONTH: LOOK OUT FOR SPECIAL SUMMER FEATURES!

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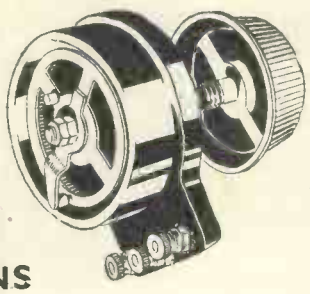

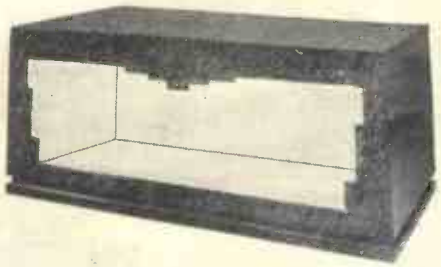

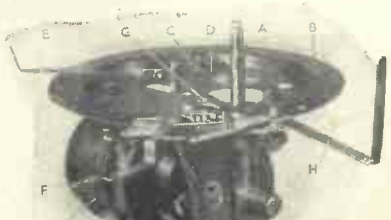

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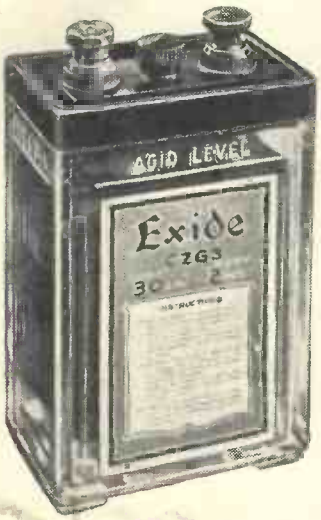

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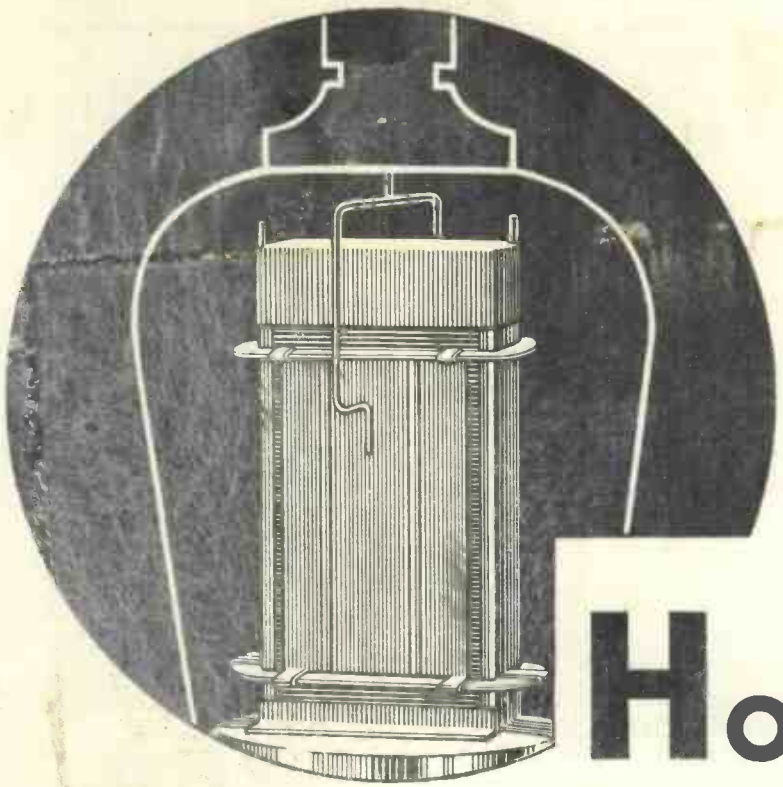
M47

VALVES TO USE IN YOUR SET

Make	Type	Impedance	Amplification Factor	Filament Current	Mutual Conductance	Anode Current at 120 volts	Grid Bias at 100 volts	Grid Bias at 150 volts
Two-volt Three-electrode Valves								
Mazda ..	H210	59,000	47	.1	.8	.5	.5	1.0
Lissen ..	H210	58,000	35	.1	.6	1.1	—	1.5
Cossor ..	210RC	50,000	36	.1	.72	1.5	—	1.5
Tungsram	R208	50,000	35	.1	.7	1.0	—	1.5
Six-Sixty	210RG	45,400	50	.1	1.1	1.0	—	1.5
Mullard	PM1A	41,600	50	.1	1.2	.75	1.5	1.5
Marconi	H2	35,000	35	.1	1.0	.5	—	1.5
Osram ..	H2	35,000	35	.1	1.0	1.0	—	1.5
Six-Sixty	210HF	25,000	19	.1	.75	1.5	—	—
Eta ..	BY2023	23,000	20	.12	.85	1.5	—	—
Tungsram	H210	25,000	25	.1	1.0	2.0	—	—
Mullard	PM1HF	22,500	18	.1	.8	1.0	3.0	4.5
Lissen ..	HL210	21,000	18	.1	.85	2.2	1.5	4.5
Mazda ..	HL210	21,000	26	.1	1.25	3.0	1.5	3.0
Cossor ..	210HF	20,000	22	.1	1.2	1.2	1.5	3.0
Marconi	HL2/c	20,000	22	.1	1.1	1.5	—	—
Osram ..	HL2	20,000	22	.1	1.1	1.5	—	—
Mullard	PM1HL	18,500	28	.1	1.5	1.2	1.5	3.0
Marconi	HL2	18,000	27	.1	1.5	—	—	—
Osram ..	HL2	18,000	27	.1	1.5	—	—	—
Six-Sixty	210HL	17,200	26	.1	1.5	2.0	—	1.5
Eta ..	BY1814	14,000	18	.12	1.3	3.0	—	—
Cossor ..	210Det.	13,000	15	.1	1.15	2.5	—	—
Six-Sixty	210LF	12,500	10.6	.1	.85	3.0	4.5	7.5
Cossor ..	210LF	12,000	10	.1	1.1	3.5	3.0	4.5
Mullard	PM1LF	12,000	11	.1	.9	3.0	4.5	7.5
Six-Sixty	210D	10,600	13.1	.1	1.6	4.0	3.0	4.5
Eta ..	BY2010	10,000	20	.12	2.0	4.0	1.5	3.0
Lissen ..	L210	10,000	10	.1	1.0	3.5	3.0	7.5
Marconi	L2/b	10,000	15.5	.1	1.55	4.0	—	—
Mullard	PM2DX	10,000	17	.1	1.7	2.0	3.0	6.0
Mazda ..	L210	10,000	15.5	.1	1.55	5.0	2.5	4.5
Tungsram	LG210	10,000	10	.1	1.0	4.0	—	—
Six-Sixty	220P	4,800	7.2	.2	1.5	5.0	7.5	12.0
Lissen ..	P220	4,700	7	.2	1.5	5.0	9.0	15.0
Mullard	PM2	4,400	7.5	.2	1.7	4.0	7.5	12.0
Cossor ..	220P	4,000	8	.2	2.0	7.5	4.5	9.0
Cossor ..	215P	4,000	9	.15	2.25	7.5	3.0	7.5
Eta ..	BW1304	4,000	13	.2	3.2	6.0	1.5	4.5
Marconi	LP2/c	4,000	8	.2	2.0	10.0	—	—
Osram ..	LP2	3,900	15	.2	3.85	10.0	—	—
Mazda ..	P220	3,700	12.5	.2	3.4	11.0	3.0	6.0
Six-Sixty	220PA	3,700	13	.2	3.5	10.0	3.0	6.0
Mullard	PM2A	3,600	12.5	.2	3.5	12.0	1.5	4.5
Tungsram	P215	3,300	5	.2	1.5	12.0	—	—
Six-Sixty	230SP	2,750	5.5	.3	2.0	13.0	9.0	15.0
Eta ..	BW303	2,700	3	.32	1.1	11.0	15.0	25.0
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
Tungsram	SP230	2,500	5	.3	2.0	15.0	—	—
Osram ..	P2	2,150	7.5	.2	3.5	15.0	—	—
Lissen ..	PX240	2,000	4	.4	2.0	14.0	12.5	22.5
Eta ..	BW602	1,900	6.5	.32	3.4	12.0	4.5	12.0
Mazda ..	P240	1,900	7	.4	3.7	18.0	6.0	13.5
Mullard	PM252	1,900	7	.4	3.7	14.0	10.5	12.0
Six-Sixty	240SP	1,900	6.6	.4	3.5	16.0	4.5	13.5
Marconi	P2/b	1,850	6.5	.2	3.5	15.0	—	—
Cossor ..	230XP	1,500	4	.3	2.3	18.0	12.5	22.5
Two-volt Screen-grid Valves								
Tungsram	S210	430,000	300	.12	.8	—	—	—
Mazda ..	215SG	400,000	450	.15	1.1	—	1.5	1.5
Cossor ..	215SG	300,000	330	.15	1.1	—	—	—
Eta ..	BY6	300,000	300	.15	1.0	2.5	—	—
Six-Sixty	215SG	220,000	190	.15	.87	2.0	—	—
Mullard	PM12	212,000	200	.15	.94	—	—	—
Cossor ..	220SG	200,000	320	.2	1.6	—	—	1.5
Lissen	SG215	200,000	180	.15	.9	—	—	1.5
Marconi	S215	200,000	170	.15	.85	—	—	—
Osram ..	S22	200,000	350	.2	1.75	—	—	—
Two-volt Pentode Valves								
Lissen ..	PT225	64,000	90	.25	1.4	7.0	3.0	6.0
Six-Sixty	230PP	64,000	80	.3	1.25	10.0	6.0	12.0
Mullard	PM22	62,500	82	.3	1.3	10.0	6.0	12.0
Marconi	PT240	55,000	90	.4	1.65	9.0	6.0	9.0
Osram ..	PT240	55,000	90	.4	1.65	9.0	6.0	9.0
Lissen ..	PT240	22,500	45	.4	2.0	12.5	7.5	10.5
Cossor ..	230PT	20,000	40	.3	2.0	15.0	6.0	7.5
Mazda ..	230Pen.	—	—	.3	1.8	13.0	9.0	9.0
Four-volt Three-electrode Valves								
Cossor ..	410RC	60,000	40	.1	.66	1.0	—	1.5
Marconi	H410	60,000	40	.1	.67	.5	—	1.5
Osram ..	H410	60,000	40	.1	.66	.35	—	1.5
Lissen ..	H410	60,000	40	.1	.66	1.6	—	1.5
Six-Sixty	4075RC	58,000	37	.075	.64	1.35	1.0	1.5
Mullard	PM3A	55,000	38	.075	.66	.3	1.5	1.5
Marconi	HL410	30,000	25	.15	.83	1.0	2.0	3.0
Osram ..	HL410	30,000	25	.1	.83	1.25	1.5	3.0
Lissen ..	HLD410	21,000	25	.1	1.2	2.5	1.5	3.0
Cossor ..	410HF	20,000	20	.1	1.0	1.75	1.5	4.5
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	8,500	15	.1	1.76	3.2	3.0	6.0
Lissen ..	L410	8,500	15	.1	1.8	3.5	1.5	4.5
Marconi	L410	8,500	15	.1	1.76	3.0	2.0	4.5
Osram ..	L410	8,500	15	.1	1.77	3.5	3.0	4.5

Make	Type	Impedance	Amplification Factor	Filament Current	Mutual Conductance	Anode Current at 120 volts	Grid Bias at 100 volts	Grid Bias at 150 volts
Four-volt Three-electrode Valves—Continued								
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
Lissen ..	P410	4,500	9	.1	2.0	5.0	6.0	12.5
Six-Sixty	410P	4,100	7.8	.1	1.9	7.5	7.5	12.0
Cossor ..	410P	4,000	8	.1	2.0	17.5	4.5	9.0
Mullard	PM4	4,000	8	.1	2.0	5.25	7.5	10.5
Marconi	P425	2,300	4.5	.25	1.95	14.0	9.0	16.5
Osram ..	P425	2,300	4.5	.25	1.95	14.0	9.0	16.5
Lissen ..	P425	2,250	4.5	.25	2.8	28.0	12.5	19.5
Cossor ..	415XP	2,000	4	.15	2.0	18.0	12.0	22.5
Cossor ..	425XP	2,000	7	.25	3.5	—	6.0	13.5
Mullard	PM254	2,000	4.2	.18	2.1	10.0	13.5	22.5
Six-Sixty	420SP	2,150	6.5	.2	3.0	15.0	12.0	22.0
Mazda ..	P425	1,950	3.5	.25	1.8	26.0	14.0	26.0
Cossor ..	4XP	1,100	3	.6	2.75	20.0	15.0	30.0
Marconi	PX4	1,050	3.5	.6	3.3	30.0	13.0	23.0
Osram ..	PX4	1,050	3.5	.6	3.3	30.0	13.0	23.0
Four-volt Screen-grid Valves								
Mullard	PM14	230,000	200	.075	.87	—	—	—
Six-Sixty	4075SG	220,000	190	.075	.87	3.0	—	—
Cossor ..	410SG	200,000	200	.1	1.0	—	—	1.5
Marconi	S410	200,000	180	.1	.9	3.5	1.5	1.5
Osram ..	S410	200,000	180	.1	.9	3.5	—	—
Lissen ..	SG410	200,000	180	.1	.9	—	—	1.5
Four-volt Pentode Valves								
Six-Sixty	SS4Pent.	53,000	83	.275	1.55	17.0	10.0	14.0
Marconi	PT425	50,000	100	.25	2.0	8.0	4.7	7.5
Osram ..	PT425	50,000	100	.25	2.0	8.0	4.0	7.5
Mullard	PM24	28,000	62	.15	1.75	16.0	6.0	12.0
Six-Sixty	415PP	27,000	60	.15	2.2	—	8.0	10.5
Mullard	PM24A	25,000	50	.275	2.0	15.0	6.0	21.0
Lissen ..	PT425	22,500	180	.25	2.0	15.0	7.5	10.5
Cossor ..	415PT	20,000	40	.15	2.0	14.0	6.0	9.0
Mazda ..	425Pen.	—	—	.25	2.0	14.0	14.0	14.0
Six-volt Three-electrode Valves								
Mazda ..	H607	90,000	40	.07	.45	1.0	1.8	1.5
Cossor ..	610RC	60,000	50	.1	.8	1.0	—	1.5
Lissen ..	H610	60,000	40	.1	.66	1.0	—	1.5
Marconi	H610	60,000	40	.1	.7	.35	1.5	1.5
Osram ..	H610	60,000	40	.1	.7	.35	—	3.0
Six-Sixty	6075RC	58,000	42	.075	.7	1.1	1.0	1.5
Mullard	PM5B	53,000	40	.075	.75	2.5	1.5	1.5
Marconi	HL610	30,000	30	.1	1.0	1.0	1.5	1.5
Osram ..	HL610	30,000	30	.1	1.0	.9	1.5	3.0
Marconi	LS5B	25,000	20	.8	.8	—	—	—
Osram ..	LS5B	25,000	20	.8	.8	—	—	—
Lissen ..	LHD610	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	—	1.5	3.0
Six-Sixty	6075HF	15,200	17	.075	1.1	2.0	2.0	4.0
Mullard	PM5X	14,700	17.5	.075	1.2	1.0	3.0	4.5
Six-Sixty	D610	9,250	18.5	.1	2.0	3.0	3.0	4.0
Lissen ..	L610	9,000	18	.1	2.0	2.0	3.0	4.5
Mullard	PM6D	9,000	18	.1	2.0	2.0	3.0	4.5
Cossor ..	610LF	7,500	15	.1	2.0	3.4	3.0	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
Marconi	DE5	7,000	7	.25	1.0	3.0	7.5	10.0
Marconi	LS5	6,000	5	.8	.8	—	—	—
Osram ..	LS5	6,000	5	.8	.8	—	—	—
Lissen ..	P610	4,000	8	.1	2.0	6.0	6.0	16.0
Marconi	DE5A	4,000	3.5	.25	.87	9.0	12.0	15.0
Mullard	PM6	3,550	8	.1	2.25	7.0	6.0	9.0
Cossor ..	610P	3,500	8	.1	2.28	8.0	4.5	7.5
Marconi	P610	3,500	8	.1	2.28	6.0	6.0	9.0
Osram ..	P610	3,500	8	.1	2.3	7.0	6.0	9.0
Six-Sixty	610P	3,400	7.8	.1	2.3	8.0	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	6.0	9.0
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 (at 250v.)
Osram ..	P625	2,400	6	.25	2.5	11.0	6.0	12.0
Cossor ..	610XP	2,000	5	.1	2.5	22.0	12.0	22.5
Six-Sixty	625SP	1,780	5.8	.25	3.25	—	—	15.0
Mullard	PM256	1,850	6	.25	3.25	—	9.0	18.0
Marconi	P625A	1,600	3.7	.25	2.3	20.0	13.5	36.0 (at 200v.)
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	25.0	12.0	22.5
Mullard	PM256A	1,400	3.6	.25	2.6	—	—	—
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	—	—	—

(Continued on page 558)



How Cossor ensures longer range and greater selectivity

THE performance of any Screened Grid Receiver is largely determined by the characteristics of its Screened Grid Valve. Unless the inter-electrode capacity of this valve is of a negligible order its effective amplification, i.e., its range will be seriously impaired. And if its curve has no long straight portion prior to the commencement of grid current there is considerable risk of rectification of incoming signals especially if they are of heavy amplitude giving rise to cross modulation with consequent loss of selectivity. In the Cossor Screened Grid Valve inter-electrode capacity has been reduced to the order of .001 micro-microfarads—lower than that of any other S.G. Valve on the market—and, as a result, remarkably high *effective* amplification is obtained. Further, because its curve has a long straight portion before grid current starts due to a unique characteristic, the Cossor S.G. Valve easily handles heavy grid swings without risk of rectification thus preventing cross modulation and ensuring maximum selectivity.

The use of this Valve in your Receiver will result in a marked increase in range and selectivity. Cossor Screened Grid Valves are obtainable from any Wireless Shop in types to suit all 2-, 4- and 6-volt Battery operated and A.C. Mains Receivers.

Get one of our novel Circular Station Charts which give identification details of nearly 50 stations with space for entering your own dial readings. Ask your Dealer for one or write us enclosing 2d. stamp for postage and head your letter "Station Chart W.M."

COSSOR

SCREENED GRID VALVES

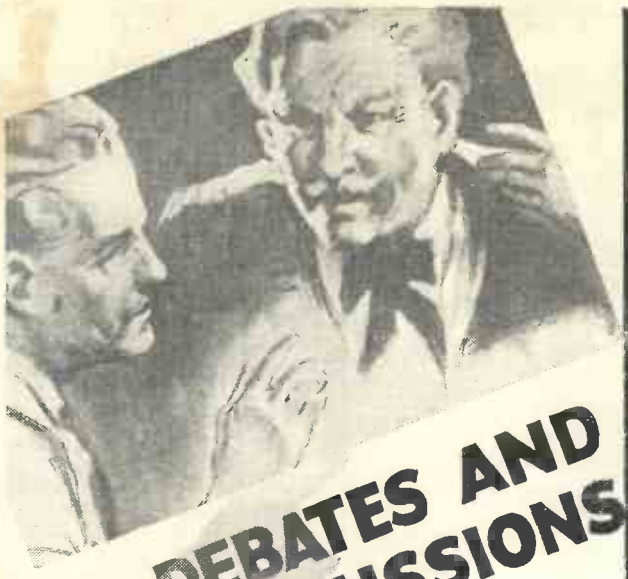
A. C. Cossor Ltd., Highbury Grove, London, N.5.

8380

VALVES TO USE IN YOUR SET—*Continued*

Make	Type	Impedance	Amplification Factor	Filament Current	Mutual Conductance	Anode Current at 120 volts	Grid Bias at 100 volts	Grid Bias at 150 volts
Six-volt Screen-grid Valves								
Six-Sixty	SS6075SG	210,000	190	.075	.9	—	—	—
Cossor ..	610SG	200,000	200	.1	1.0	—	—	1.5
Mullard	PM16	200,000	200	.075	1.0	—	—	—
Osram ..	S610	200,000	210	.1	1.05	4.0	1.5	—
Six-volt Pentode Valves								
Marconi	PT625	43,000	80	.25	1.85	10.0	6.0	15.0 (at 250
Osram ..	PT625	43,000	80	.25	1.85	—	—	—
Six-Sixty	SS617PP	28,500	54	.17	1.9	35.0	8.0	14 0
Mullard	PM26	25,000	50	.17	2.0	—	9.0	15.0
Lissen ..	PT625	24,000	60	.25	2.5	14.0	7.5	15.0
Cossor ..	615PT	20,000	40	.15	.15	14.0	—	—
A.C. Screen-grid Mains Valves								
Six-Sixty	SS4SGAC	1,330,000	1,000	1.0	1.0	1.5	—	—
Mullard	S4V	909,000	1,000	1.0	1.1	—	—	—
Eta ..	DW6	800,000	1,000	1.0	—	—	—	—
Mazda ..	AC/SG	800,000	1,200	1.0	3.0	5.0	.5	.5
Cossor ..	MSG/HA	500,000	1,000	1.0	2.0	2.0	—	—
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	—	—
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
Mullard	S4VB	257,000	900	1.0	3.5	4.0	1.5	1.5
Eta ..	DW2	200,000	240	1.0	—	2.5	—	—
A.C. Three-electrode Mains Valves								
Eta ..	DW4230	23,000	40	1.0	1.75	2.5	—	1.5
Cossor ..	M41RC	20,000	35	1.0	1.75	2.4	1.5	3.0
Tungsram	G150	20,000	10	.5	.5	—	—	—
Tungsram	R150	18,000	25	.5	1.4	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
A.C. Three-electrode Mains Valves—*Continued*								
Six-Sixty	SS4GPAC	14,500	35	1.0	2.4	3.0	—	3.0
Cossor ..	M41HF	14,000	32	1.0	2.3	2.5	1.5	3.0
Tungsram	AR4110	14,000	33	1.0	2.0	1.5	—	—
Mazda ..	AC/HL	13,500	35	1.0	3.0	4.5	1.5	3.0
Mullard	354V	11,700	35	1.0	3.0	2.0	2.0	3.0
Marconi	MHL/4	8,000	20	1.0	2.5	5.0	3.0	6.0 (at 200v.)
Osram ..	MHL/4	8,000	20	1.0	2.5	5.0	3.0	6.0
Tungsram	AG4100	8,000	16	1.0	2.0	5.0	—	—
Cossor ..	M41LF	7,900	15	1.0	1.9	4.5	4.5	6.0
Eta ..	DW1508	7,500	15	1.0	2.0	5.0	3.0	6.0
Six-Sixty	SS4Det. AC	7,000	16	1.0	2.3	7.5	3.5	8.0
Mullard	164V	6,650	16	1.0	2.4	5.0	4.5	6.0
Cossor ..	M41P	5,000	10	1.0	2.0	6.5	4.5	7 5
Eta ..	DW704	4,500	7	1.0	1.5	10.0	6.0	13.5
Tungsram	L190	4,200	10	.9	2.4	8.0	12.0	16 5
Eta ..	DW1003	3,300	10	1.0	3.3	12.5	7.5	13.5
Marconi	ML4	3,000	9	1.0	2.0	9.0	10.0	22.0 (at 200v.)
Osram ..	ML4	3,000	9	1.0	2.0	9.0	10.0	16.0
Six-Sixty	SS4PAC	3,000	10	1.0	3.3	10.0	5.0	8 0
Mullard	AC104	2,850	10	1.0	3.5	—	—	10.0
Mazda ..	AC/P	2,650	10	1.0	3.75	14.0	6.0	12.0
Tungsram	P190	2,500	6	.9	2.4	8.0	—	—
Eta ..	DW702	2,250	7	.23	3.2	18.0	10.0	17.0
Eta ..	DX502	2,100	5	.15	2.4	12.0	4.5	15.0
Cossor ..	M41XP	2,000	4	1.0	2.0	15.0	12.0	19.5
Mazda ..	AC/P1	2,000	5	1.0	2.5	25.0	15.0	25.0
Mullard	AS064	2,000	6	1.0	3.0	15.0	9.0	14.0
Eta ..	DW302	1,800	3.5	1.07	1.95	33.0	—	20.0
Mullard	AC044	1,150	3.4	.7	3.5	17.0	16.5	28.0



DEBATES AND DISCUSSIONS

You hear natural voices over the radio when you use the pure current of the Lissen battery for your H.T. It is the power that keeps speech so clear and natural that you never have to strain to catch words and meaning in a speech or football or sports broadcast.

A TORRENT of PURE SOUND!

Replace your power valve with a Lissen Power Pentode. Then tune in a foreign station. Where before you got a whisper, now you get a torrent of sound. That is the effect this wonderful valve has on any set with one stage L.F. Yet the Lissen Power Pentode Valve takes only 7 milliamps of H.T. current—no more than any ordinary power valve—and imposes no heavier drain upon your batteries than your present valve does.

Change to a Lissen Power Pentode now. No need to alter your receiver at all. Simply plug in the Lissen Power Pentode and get the volume that will please you.

Never again buy an ordinary power valve—buy a Lissen Power Pentode.

N.B.—This is the valve used in the Commercial Lissen 2-valve Receiver and largely accounts for its amazing volume. It gives amazing volume there, and it will do the same for you.

12/6

LISSEN POWER PENTODE

The outstanding purity of the power is put into the Lissen battery and preserved by the secret process which is obtainable only in this battery. Ask firmly next time for Lissen—take no other. 10,000 dealers sell it.

PRICES

60 volt (reads 66) ..	7/11
100 volt (reads 108) ..	12/11
120 volt	15/10
36 volt	4/6
60 volt for Portable Sets	7/11
60 volt (Super Power)..	13/6
99 volt for Portable Sets	12/6
100 volt (Super Power)..	22/-
16 volt Grid Bias ..	2/9
4½ volt Grid Bias ..	10d.
9 volt Grid Bias	1/6
4½ volt Pocket Battery, ea. (4/6 a doz.)	5d.
Single Cell Torch Battery	3½d.

OTHER TYPES AND PRICES:

H.210 R.C. and H.F. ..	5/6
H.L.210 H.F. and Detector ..	5/6
L.210 L.F. Amplifier, 1st Stage	5/6
P.220 Power Valve	7/3
P.X.240. Super Power ..	8/-
S.G.215. Screened Grid ..	12/6

4 and 6 volt types also available.

LISSEN LIMITED, WORPLE ROAD, ISLEWORTH, MIDDLESEX

Factories also at Richmond (Surrey) and Edmonton

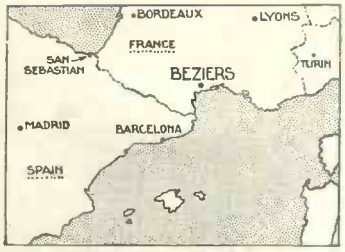
Broadcast Identification Sheets

For the benefit of readers we are publishing each month a series of panels specially compiled for the WIRELESS MAGAZINE by Jay Coote.

In these, readers will find a ready means of identifying foreign stations. To prevent any confusion in a.m. and p.m., the times are given on the Continental twenty-four-hour system. Example: 8 a.m.=8.00; 8 p.m.=20.00.

In the event of alterations in wavelength, power or call, a special panel bearing the alteration will be published at the earliest opportunity.

These identification sheets should be cut out and filed either alphabetically or in order of wavelength as they appear.



573 *miles from London.*

240m.
(1,250 *kc.*)

Power · 1.5 *kw.*

BEZIERS
(*France*)

Standard Time: Greenwich Mean Time (France adopts B.S.T.).

Announcer: Man.

Language: French only.

Call: *Ici Radio Beziers* (phon.: *Bay-zee-aye*).

Interval Signal: Crowing of a cockerel.

Main programme: B.S.T. 17.30, gramophone records, news, talks; 20.30, main evening entertainment. Does not broadcast on Sundays.

Closes down with the interval signal, usual French formula, and *La Marseillaise*.

537 *miles from London.*

259.3m.
(1,157 *kc.*)

Power: 2.3 *kw.* (*temp.*)

LEIPZIG
(*Germany*)

Standard Time: Central European (coincides with **B.S.T.**).

Announcer: Man.

Language: German only.

Call: *Achtung! Hier Mitteldeutschen sender Leipzig und Dresden.*

Interval Signal: Vibraphone (D, F sharp, A, D, E, G, B; pause; E, E, G, A, C sharp, D, A, F sharp, D).

Main Programme: B.S.T. 07.00, relay of Hamburg (Sun.); 08.30 organ recital or sacred service (Sun.); 12.30, concert (Sun.); 20.00 main evening entertainment; 22.00, news; 22.30, dance music until 23.30 (until midnight on Saturday and Sunday).
Closes down with usual German good-night greetings and *Deutschlandslied*.

Relay: Dresden, 318.8 m., 941 kc., 0.3 kw.

525 *miles from London.*

328.2m.
(914 *kc.*)

Power: 1.2 *kw.*

GRENOBLE
P.T.T.
(*France*)

Standard Time: Greenwich Mean Time (France adopts B.S.T.).

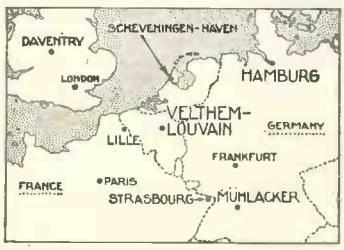
Announcer: Man.

Language: French only.

Opening Call: *Allo! Allo! Ici le poste de radiodiffusion de la region des Alpes a Grenoble*; during intervals in programme, *Ici Grenoble P.T.T.*

Main Programme: B.S.T. 12.40, concert; 17.00, gramophone records; 20.15, main evening entertainment.
Also relays broadcasts from Ecole Supérieure (PTT) Paris, Marseilles and Lyons.

Closes down with usual French formula followed by patriotic song, *Les Allobroges*, and *La Marseillaise*.



200 *miles from London.*

1,071.4m.
(280 *kc.*)

Power: 5 *kw.*

SCHEVENINGEN-HAVEN
(*Holland*)

Standard Time: Amsterdam (20 minutes in advance of G.M.T.).

Announcer: Woman.

Language: Dutch only.

Opening Signal: Chimes, time signal, or morse call followed by hooter.

Opening Call: *Hier de zakelijke omroep te Scheveningen-Haven.* This station is a commercial transmitter and only broadcasts stock exchange quotations, market reports, news bulletins and weather forecasts. *No* wireless entertainments are transmitted.

Operates throughout day from 07.40 until about 18.40 B.S.T.; on Saturdays until 13.20. Does not broadcast on Sundays.

214 *miles from London.*

1,725m.
(174 *kc.*)

Power: 17 *kw.* (*temp.*)

RADIO PARIS
(*France*)

Standard Time: Greenwich Mean Time (France adopts B.S.T.).

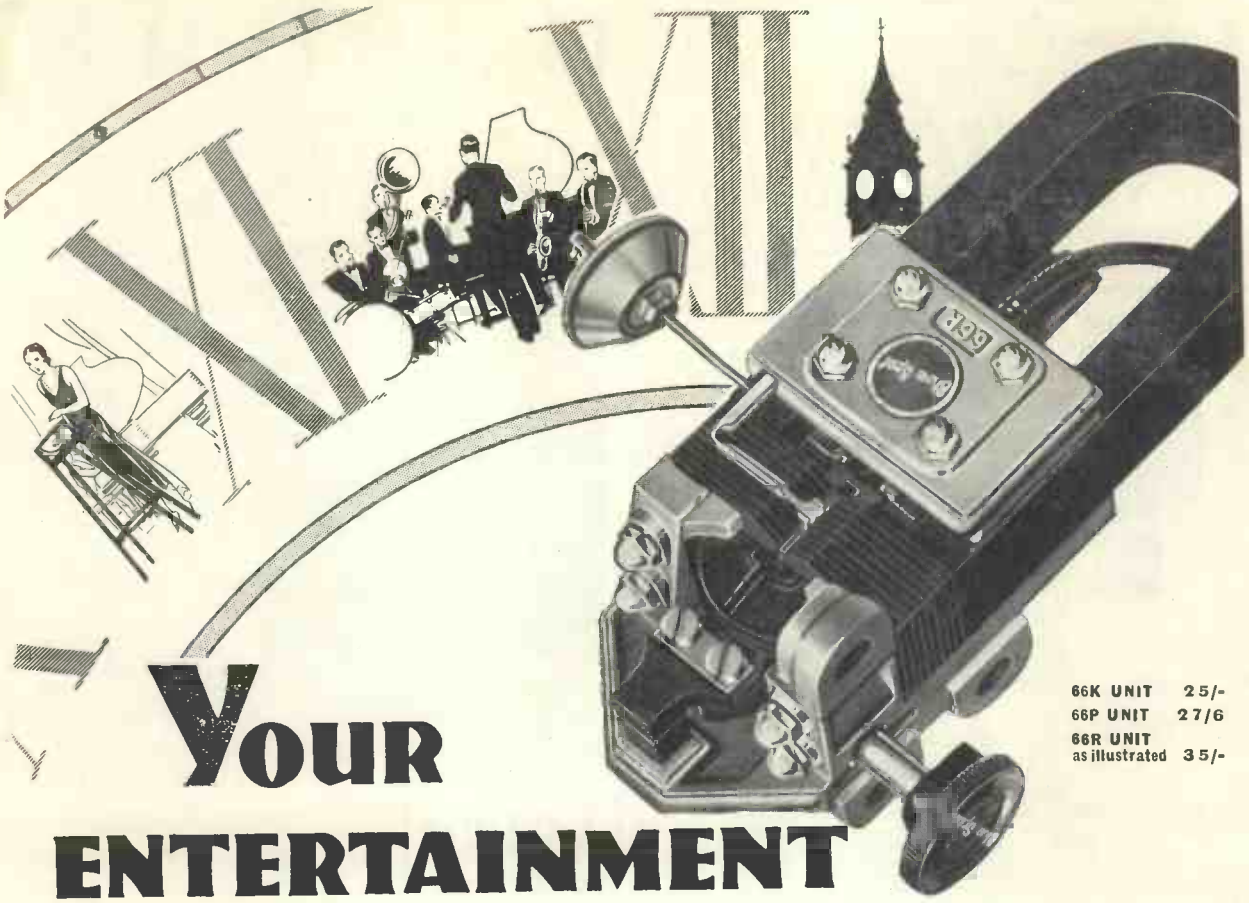
Announcer: Man.

Language: French only.

Call: *Allo! Allo! Ici emissions Radio Paris de la Compagnie Francaise de Radiophonie.*

Opening Signal: Westminster chimes.

Main Programme: B.S.T. 06.45, physical exercises; 07.45, gramophone records; news, physical exercises (Sun.); 12.00, sermon (Sun.), religious music; 12.30, 13.00, 16.00, 18.00, gramophone records; 19.30, Radio Circus (Sun.); 20.00, Variety (Sun.); 20.45, main evening entertainment.
Closes down with good-night greetings (*Bonsoir Mesdames, Bonsoir Mesdemoiselles, Bonsoir Messieurs*), followed by *La Marseillaise*.



66K UNIT 25/-
66P UNIT 27/6
66R UNIT as illustrated 35/-

YOUR ENTERTAINMENT depends on your speaker...

Listeners are critical nowadays—and they are right.

If the glorious possibilities of the new and wonderful world that wireless has opened up to you are to be realised, second bests must be scrapped.

The BLUE SPOT Unit is ahead of all. Its supremacy is everywhere recognised. It will re-create with clearness and purity the messages of speech and music from all over Europe. Go where you will you will find none to beat it.

Particularly in sets, such as the James Super 60, capable of giving very high outputs you will find BLUE SPOT Units indispensable. BLUE SPOT 66R for example will handle any output with ease.

Faultless reproduction—exquisite purity of tone—you cannot ask for more from mortals. Try a BLUE SPOT Unit and you will be no longer critical but satisfied.

BUT THE CHASSIS plays an important part as well

and that is why you must insist on a BLUE SPOT Chassis for a BLUE SPOT Unit. It is made with scientific precision so that its dimensions provide the completest sympathy with the vibrations of the stylus of the unit.

BLUE SPOT MAJOR - 15/-
BLUE SPOT SPECIAL 7/6

THE BRITISH BLUE SPOT COMPANY LTD

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Blue Spot TRADE MARK

WAVELENGTHS OF THE WORLD'S BROADCASTERS

Wave-length	Name of Station	Dial Readings		Country
206	Antwerp...			Belgium
214.2	Warsaw			Poland
216	Radio Conférence Brussels			Belgium
217	Königsberg			Germany
218	Salzburg			Austria
219	Flensburg			Germany
219.9	Fécamp			France
221	Helsinki			Finland
224.5	Cork (IFS)			Irish Free State
227	Cologne			Germany
	Münster			Germany
	Aachen			Germany
230	Malmö			Sweden
232	Kiel			Germany
234	Lodz			Poland
235	Kristianssand			Norway
	Nimes			France
238.5	Bordeaux-Sud-Ouest ...			France
239	Nürnberg			Germany
240	Oporto			Portugal
	Stavanger			Norway
242	Belfast (2BE)			Ireland
244	Basle			Switzerland
244.7	Ghent			Belgium
245	Schaerbeek			Belgium
246	Cassel			Germany
	Linz			Austria
247	Berne			Switzerland
249	Juan-les-Pins			France
250	Prague			Czechoslovakia
253.4	Gleiwitz			Germany
256	Toulouse (PTT) ...			France
257	Hörby			Sweden
259	Barcelona			Spain
259	Leipzig			Germany
261.3	London National ...			Great Britain
263.8	Moravska-Ostrava ...			Czechoslovakia
265	Lille (PTT)			France
266	Valencia (EAJ13) ...			Spain
269.8	Bremen			Germany
272	Rennes			France
276.5	Heilsberg			Germany
279	Bratislava			Czechoslovakia
281	Copenhagen			Denmark
283.6	Magdeburg			Germany
	Stettin			Germany
	Berlin			Germany
283.9	Innsbruck			Austria
285.4	Montpellier			France
287.1	Radio Lyons			France
288.5	Swansea (5SX) ...			Great Britain
	Plymouth (5PY) ...			,, ,,
	Aberdeen			,, ,,
	Edinburgh (2EH) ...			,, ,,
	Dundee (2DE) ...			,, ,,
	Bournemouth (6BM) ...			,, ,,
	Newcastle (5NO) ...			,, ,,
290.5	Lisbon			Portugal
291	Tampere			Finland
291	Viipuri			Finland
293	Kosice			Czechoslovakia
294.1	Limoges			France
296	Tallinn			Estonia
296	Turin			Italy
299	Hilversum			Holland
	Radio Idzerda			Holland
301	North National (testing)			Great Britain
304	Bordeaux (PTT) ...			France
306.9	Falun			Sweden
306	Zagreb (Agram) ...			Yugoslavia
309.9	Cardiff (5WA) ...			Great Britain
312.8	Genoa			Italy
	Cracow			Poland
314	Natan-Vitus			France
317.3	Marseilles (PTT) ...			France
318.8	Dresden			Germany
	Sofia (Rodno Radio) ...			Bulgaria
322	Göteborg			Sweden
325	Breslau			Germany
328.2	Grenoble			France
327.5	Poste Parisien			France
332	Naples			Italy
335	Poznan			Poland
338	Brussels (No. 2) ...			Belgium
342	Brunn			Czechoslovakia
345.2	Strasbourg			France
349	Barcelona (EAJ1) ...			Spain
351.7	Graz			Austria
356.3	London Regional ...			Great Britain
360	Mühlacker			Germany

Wave-length	Name of Station.	Dial Readings.		Country
363.4	Algiers			North Africa
364	Trondelag			Norway
366.1	Frederikstad			Norway
366.9	Seville (EAJ5) ...			Spain
369.4	Wilno			Poland
370	Radio LL (Paris) ...			France
372	Hamburg			Germany
376.4	Glasgow...			Great Britain
381	Lvov			Poland
385	Radio Toulouse ...			France
390	Frankfurt			Germany
394	Bucharest			Roumania
398.9	Midland Regional ...			Great Britain
403.5	Söttens			Switzerland
408	Katowice			Poland
413	Dublin (2RN)			Irish Free State
416	Radio Maroc			North Africa
418	Berlin			Germany
424	Madrid (EAJ7) ...			Spain
426.3	Kharkov			Russia
430.5	Belgrade			Yugoslavia
436	Stockholm			Sweden
441	Rome			Italy
447	Paris (Ecole Sup. PTT)			France
452	Danzig			Danzig
453	Klagenfurt			Austria
	San Sebastian			Spain
453.2	Porsgrund			Norway
456	Bolzano (1BZ)			Italy
459	Beromuenster			Switzerland
465.8	Tartu			Estonia
466	Lyon-la-Doua			France
473	Langenberg			Germany
479.2	North Regional... ...			Great Britain
487	Prague			Czechoslovakia
487	Cesky Brod (testing) ...			Czechoslovakia
493	Bergen			Norway
501	Milan			Italy
509	Brussels (No. 1) ...			Belgium
517	Vienna			Austria
525	Riga			Latvia
533	Munich			Germany
542	Sundsvall			Sweden
550	Budapest			Hungary
559.7	Kaiserslautern			Germany
	Augsberg			Germany
566	Hanover...			Germany
570	Freiburg...			Germany
574.7	Ljubljana			Yugoslavia
587	Hamar			Norway
680	Lausanne			Switzerland
690	Pori			Finland
720	Moscow			Russia
760	Geneva			Switzerland
770	Ostersund			Sweden
800	Kiev			Russia
824	Sverdlovsk			Russia
937.5	Kharkov			Russia
1,000	Leningrad			Russia
1,060	Scheveningen-Haven ...			Holland
1 071	Oslo			Norway
1,103	Moscow Popoff ...			Russia
1,153	Kalundborg			Denmark
1,200	Reykjavik			Iceland
1,216	Istanbul... ...			Turkey
1,229	Boden			Sweden
1,249	Vienna (testing) ...			Austria
1,250	Tunis Kasbah			North Africa
1,304	Moscow			Russia
1,352	Motala			Sweden
1,380	Bakou			Russia
1,411	Warsaw			Poland
1,445.7	Eiffel Tower, Paris ...			France
1,481	Moscow (Kom) ...			Russia
1,538	Ankara			Turkey
1,554.4	Daventry (National)			Great Britain
1,635	Norddeich			Germany
	Zeesen			Germany
1,725	Radio Paris			France
1,796	Lahti			Finland
1,875	Huizen			Holland
1,935	Kaunas			Lithuania

Are you Filing the Broadcast Identification Sheets on page 560?

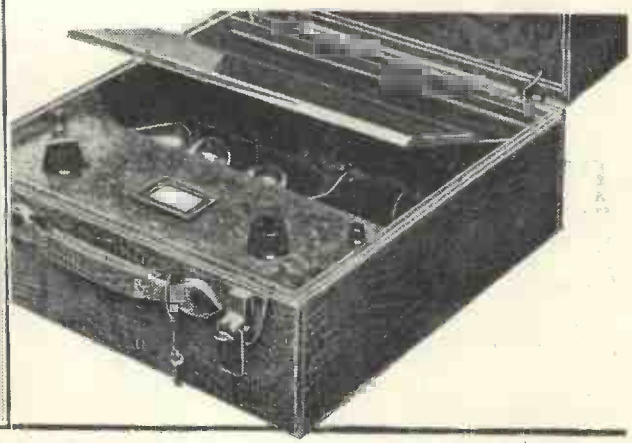
If you change to MAZDA you'll find your set even better!

If you can't get that station you want—**change to Mazda.** If you need a little more selectivity—**change to Mazda.** "Amazing" was the original verdict—and amazing still they are. There is exactly the valve for your purpose in the Mazda range. Ask your dealer for Mazda valves and see that you get them.

A 4-VALVE COMBINATION:

S.G.215	*H.210*	*H.L.210*	*P.220 or P.220a*	
20/-	8/6	8/6	10/6	13/6

MAZDA THE BRITISH VALVES



EDISWAN RADIO PRODUCTS

The Edison Swan Electric Co. Ltd. *155 Charing Cross Road, London, W.C.2*

V.124

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

IN TUNE WITH THE TRADE

FETTER LANE'S Review of Catalogues and Pamphlets

SEND TO US FOR THESE CATALOGUES !

Here we review the newest booklets and folders issued by four well-known firms. 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 ½d. stamp, to "Catalogue Service," WIRELESS MAGAZINE, 58/61 Fetter Lane, E.C.4. *Valid till July 31.*

THE LATEST FROM R.I.

RADIO INSTRUMENTS, LTD., always make a point of keeping up to date in their radio literature, which I greatly appreciate. What I want to emphasise is that by merely making a note on the coupon above, and sending it out through my free catalogue service, you, too, can be kept up to date with regard to the latest products.

To hand is a useful 44-page catalogue which I thoroughly recommend to all set users who are out to improve reception. It deals with all the leading parts in the R.I. range, from the Madrigal complete four-valvers down to the small whatnots, such as resistances and volume controls.

There are one or two new parts which have just been included in this catalogue and I feel sure that you will want to know all the new developments. By the way, a section is devoted to neat and compact high-tension units for A.C. and D.C. mains.

These R.I. units have several advantages and it will pay you to make a study of this section of the catalogue. **197**

◆ ◆ ◆

HOW TO SAVE ON H.T.

FROM Oldham's comes a useful little catalogue which will interest everybody who has not mains available, and so has, in the ordinary way, to rely on dry batteries as a source of high tension. The title, appropriately enough, is "How to Save Money on Your H.T.," and it presents in a very readable way the practical advantages of using accumulators in place of dry batteries.

Provided you have a good charging depot near at hand (for high-tension blocks are not light things to carry about), or if you can arrange for someone to carry them away for periodical recharging, then certainly this is a most economical and clean means of supplying "juice" to a set.

This little book gives a deal of technical information about Oldham accumulators for high-tension work, and if you are dissatisfied with your present method of getting those very necessary volts, then write through my free catalogue service for a copy of this aid-to-economy publication. **198**

◆ ◆ ◆

FROM D.C. TO A.C.

I WANT now to refer to something of rather special interest to people who have direct-current mains on at their houses, but who wish to use mains-driven sets in the most economical way.

It is generally admitted that a direct-current all-mains set is more expensive to operate than the alternating-current version, and there is also the important fact to be borne in mind that eventually all mains supplies will be changed over to the alternating variety and therefore very expensive direct-current apparatus can clearly be considered in the nature of a speculation.

There are, therefore, several special circumstances when it would be a great convenience if D.C. mains could be converted to give an A.C. supply, so that standard A.C. sets could be worked from D.C. mains supply.

I have just received from Wates a most interesting folder describing rotary converters which change the D.C. supply to A.C. at a normal voltage of 220 volts, 50 cycles. The mere mention of the word "converter" is enough, I know, to dismay some people who immediately visualise something in the nature of a local power station. Therefore, I hasten to say that these new Wates converters are quite small in size and cost (even the most expensive model with an output of 120 volts) well under £10. At a slight additional cost the motor can be specially wound for anything from 40 to 250 volts, but, of course, a standard 220-volt model is suitable for all normal A.C. radio apparatus.

I think you should have this folder, which gives very full details. **199**

FOR YOU SET BUILDERS

WE are all of us, at times, in need of some small part, perhaps a switch, a spare coil, or a resistance. For this reason it is a good plan to keep on the work bench catalogues which come from firms who specialise in quality parts.

As an example, here is a most useful folder from Igranic. It deals with coils, transformers, chokes, condensers, handy pre-sets, and a number of other gadgets which are of the kind that are handy in an emergency, or for the improvement of an old set.

Igranic parts are, of course, real quality jobs. The prices, as you know, are reasonable enough, but no attempt is made to cut the thoroughness of manufacture. I am glad to see, too, that certain popular parts are being made in an even wider range.

The power chokes, for instance, which have a standard inductance of 20 henries, are now supplied in various types from the 15-milliampere to the 300-milliampere variety and out of this wide range one is sure to find a choke which is just suited to the need of the moment. I advise you to get this folder. **200**

THE SUPER 60 AT BROOKMAN'S PARK

Members of the "W.M." and Lewcos staffs testing a Super 60, built with Lewcos coils and used with a Lewcos frame aerial, under the shadow of the Brookman's Park transmitters. London Regional was cut out in one degree, and the National received without any trace of interference

C.O.D.
PAY THE POSTMAN—it costs no more—WE PAY ALL CHARGES

CASH
Cash with order—Carriage Paid

H.P.
Strict Privacy Guaranteed on all Easy Payment Orders

SUPER-HET with a PILOT KIT

... the Experts' definite choice

A.C. SUPER SIXTY *(as described in this issue)*

	£	s.	d.
1 Set of super-het coils. Lewcos or Wearite	2	10	0
1 .0001-mfd. fixed condenser, Telsen			6
1 .001-mfd. fixed condenser, Telsen			6
1 .002-mfd. fixed condenser, Telsen			6
1 Ferranti 1x1-mfd. fixed condenser, type C2C		4	6
5 1-mfd. fixed condensers, Formo		12	6
6 2-mfd. fixed condensers, Formo		19	6
2 .0005-mfd. variable condensers, log midline, Cyldon	1	0	0
2 Slow-motion dials, type 2, Astra		10	0
1 Ebonite panel, 21×7, drilled to specification, Peto-Scott		8	9
1 Baseboard, 24¾×13¾		2	0
1 Triple coil base, Peto-Scott		2	9
3 Grid-leak holders, Bulgin		1	6
5 Marked wander plugs, Belling-Lee		1	3
6 5,000-ohm spaghetti resistances, Lewcos		6	0
2 15,000-ohm spaghetti resistances, Lewcos		3	0
3 50,000-ohm spaghetti resistances, Lewcos		4	6
1 .5-megohm grid leak, Telsen		1	0
2 100,000-ohm grid leaks, Lissen		2	0
2 50,000-ohm potentiometers, Sovereign		9	0
1 50,000-ohm potentiometer, Regentstat		9	6
1 Twin-fuse holder with fuses, Bulgin		2	6
3 Grid-bias battery clips, No. 2 type, Bulgin		1	1
1 D.P.D.T. switch, type S62, Bulgin		4	9
1 L.F. transformer, type, AF5, Ferranti	1	10	0
1 Output transformer, type OPM3, Ferranti	1	2	6
Konecterkit; comprising lengths of sleeving, tinned copper wire for connecting, R/C wire, panel brackets, screws, etc.		Gratis	
	£11	10	0

KIT "A" (Less Valves, Cabinet and Frame Aerial)
YOU PAY THE POSTMAN £11.10.0
We pay all C.O.D. Charges.
Trade Supplied
Or EASY WAY—12 monthly payments of 21/2

Recommended Accessories for A.C. SUPER SIXTY

PETO-SCOTT DUAL RANGE FRAME AERIAL, ready wound, with 3-way lead, as specified for original Super 60. In Mahogany (Oak 5/- extra) — Pay the Postman £1.7.6

PETO-SCOTT OAK CABINET. Beautifully French Polished and guaranteed workmanship. — Cash with order £1.7.6

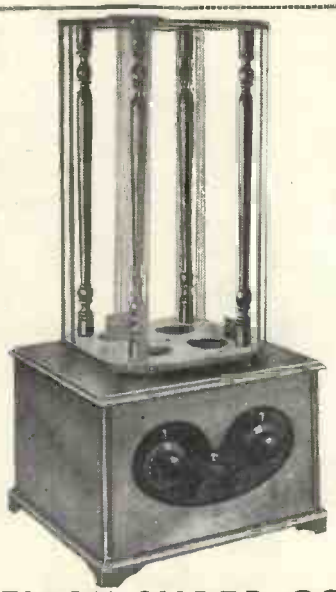
B.T.H. GRAMOPHONE PICK-UP AND TONE ARM. A popular accessory, giving splendid tone. Good volume. — Pay the Postman £2.5.0

SET OF 6 MULLARD VALVES. As specified (2) S4V; (1) S4VA; (2) 354V; (1) AC064 — Pay the Postman £6.1.0

REGENTONE MAINS UNIT. Type S60. Specially designed for Super 60. Supplies H.T. 200 volts; L.T. 4 volts. — Pay the Postman £4.10.0

WEARITE OR LEWCOS SUPER-HET COILS. Set of 4 coils. As used by the designers and included in Pilot Radio Kits. — Pay the Postman £2.10.0

FINISHED INSTRUMENT. Complete in Cabinet, with Frame Aerial, Mains Equipment, and Valves. £29-10-0. £9-10-0 deposit and 11 monthly payments of £2. Royalties included.



FIRST SUPER 60

(Battery operated)
As designed by Mr. W. James and described in "Wireless Magazine"

PILOT KIT "A"
(Less Valves, Cabinet and Frame)
YOU PAY THE POSTMAN £6-0-0
We pay all C.O.D. Charges
Or Easy Way—12 monthly payments of 11/-

Cabinet, handsomely French Polished, Oak or Mahogany, and as illustrated, **17/6**
CASH WITH ORDER

Set of 6 valves, Mullard as specified. Sent C.O.D. Pay the Postman - - £3-16-0

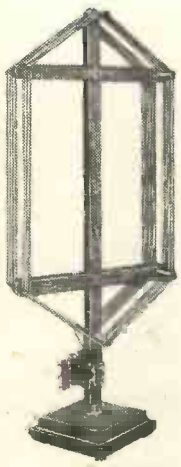
FINISHED INSTRUMENT
Super 60, including valves (less battery) £13-10-0
Royalties Extra - - - £1-10-0

SUPER 60 PORTABLE

As described in "W.M."

KIT "A" (Less Valves, Cabinet and Frame)
YOU PAY THE POSTMAN £6-0-0
We pay all C.O.D. Charges
Or Easy Way—12 monthly payments of 11/-
Trade Supplied

PETO-SCOTT FOR FRAME AERIALS



SUPER 60 FRAME AERIAL
Chosen by Mr. James for the wonderful Super 60. With polished mahogany top, base and spindles, ebonite spacing washers, turned centre bearing and bush, wavechange plugs and ready wound. Complete **27/6. Sent C.O.D. Pay the Postman.**
Kit for above, packed flat for home assembly 17/6. Sent C.O.D. Pay the Postman.

CENTURY FRAME AERIAL
As illustrated. Ready wound with 3-way aerial lead and as specified for the Century Super described in "Amateur Wireless." The only Frame Aerial with wavechange switch and base for 20/-. Complete £1. Sent C.O.D. Pay the Postman.

LEWCOS FRAME AERIAL
Suitable for the Century Super. Designed with centre-tapped windings, three-way aerial lead. Fitted with base and rotates through 180 degrees. **Complete £1.12.6. Sent C.O.D. Pay the Postman.**

WEARITE FRAME AERIAL
With centre-tapped windings and provided with the necessary 3 terminals for connection to set. Wavechange effected by means of switch at the base. Swings through 180°. Litzendraht windings. **Complete 42/-. Sent C.O.D. Pay the Postman.**

TRADE NOTE
Peto-Scott Frame Aerials and other Super Het Equipment are available to the trade. Terms upon application.

EXPRESS ORDER FORM

To PETO-SCOTT CO. LTD.
Please send me C.O.D., H.P., or CASH:

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for which I enclose **Cash / H.P. Deposit**
£ s. d.

Name .....

Address .....

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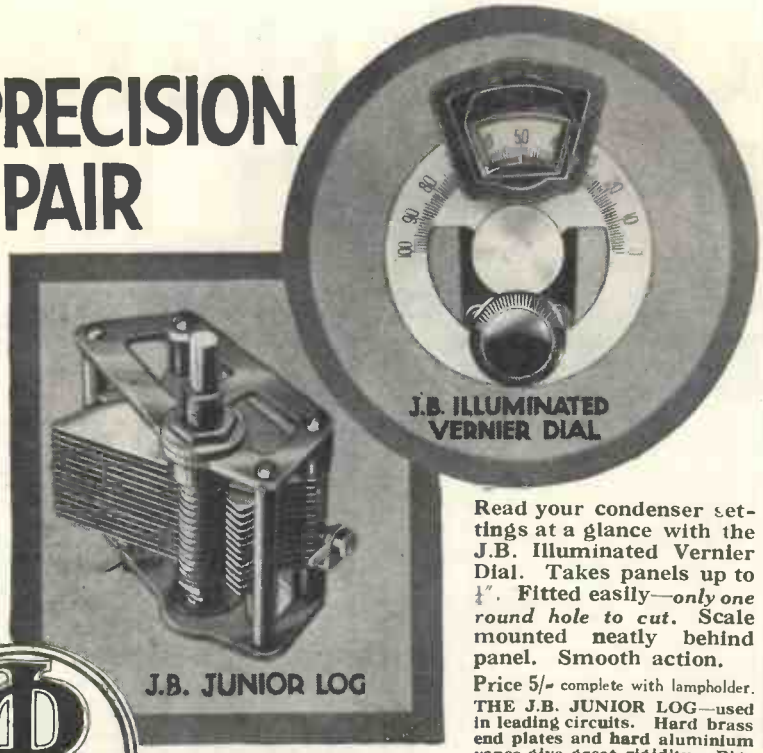
W.M. 7/1931

PETO-SCOTT Co. LTD.

77 CITY ROAD, LONDON, E.C.1: *Clerkenwell* 9406; **62 HIGH HOLBORN, LONDON, W.C.1:** *Chancery* 8266; MANCHESTER: 33 WHITELOW ROAD, CHORLTON-CUM-HARDY. *Phone: Chorlton-cum-Hardy* 2028; NEWCASTLE, STAFFS: 7 ALBANY ROAD. *Phone:* 67190

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

A PRECISION PAIR



Read your condenser settings at a glance with the J.B. Illuminated Vernier Dial. Takes panels up to ¼". Fitted easily—*only one round hole to cut.* Scale mounted neatly behind panel. Smooth action.

Price 5/- complete with lampholder.

THE J.B. JUNIOR LOG—used in leading circuits. Hard brass end plates and hard aluminium vanes give great rigidity. Pig-tail to rotor.

.0005, 7/-; .0003, 6/9; .00025, 6/6; .00015, 6/6.

4" J.B. Bakelite Dials: Black 1/6 extra, Mahogany 2/- extra.

PRECISION INSTRUMENTS

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

SUNNY DAYS ARE HERE AGAIN!

Now build your Portable in the 'RIVERSIDE' Cabinet.

CAMCO Cabinet Works

Chosen by Mr. James for the "Super 60"

You want your portable this Summer to be attractive in appearance, yet strong and sturdy for constant handling. You cannot do better than build it in the Camco "Riverside" Cabinet. It is covered in handsome blue leatherette of good quality, and supplied with inner frame, baseboard, and polished wood panel, 14 in. × 6 ⅜ in. Only 45/- complete.

Send Coupon for free Catalogue to CARRINGTON Mfg. Co. Ltd., 24, Hatton Garden, LONDON, E.C.1 (*Phone: Holb. 8202*) (*Works: S.Croydon*)

Name .....

Address .....

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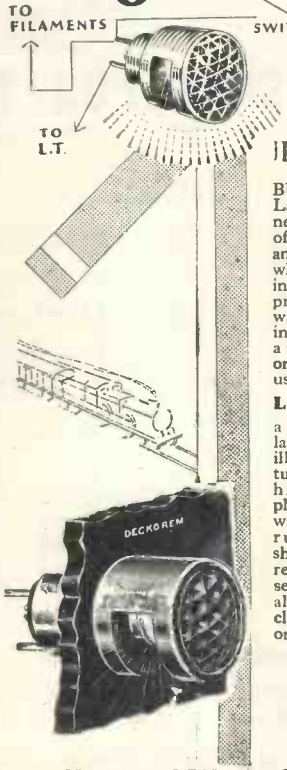
The Signal Lamp



AND PANEL ILLUMINATOR

BULGIN Signal Lamps use only a negligible amount of current (.006 amp. to be precise) while their warning ruby glow prevents current wastage by warning the owner that a set has been left on. A particularly useful type is

LAMP No. D3

a combined signal lamp and panel illuminator. The tubular reflector is highly nickel plated and fitted with a facetted cut ruby lens. It shows a brilliant red light when the set is switched on, also shedding a clear white light on the panel.

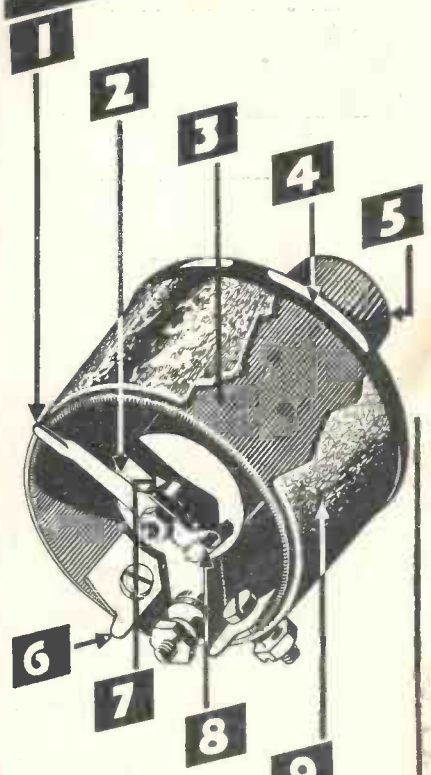
PRICE 2/9

Many other styles of lamps are listed in our 60pp. catalogue and manual. Enclose 2d. for postage.

A. F. BULGIN & CO. LTD.,

9, 10, 11, CURSITOR ST., CHANCERY LANE, LONDON, E.C.4
'Phones: Holborn 1072 and 2072.

NEW



WIRE WOUND WATMEL POTENTIOMETER

1—Contact finger. Phosphor-Bronze.
2—Large contact plate.
3—Wire Wound Former.
N.B.—The resistance is Wire, *not* compound with wire contacts.
4—Engraved Bakelite front plate.
5—Polished pointer-knob.
6—Stops at end of wiring.
7—Insulating bush to insulate spindle from panel.
8—Back self-cleaning contacts.
9—Bakelite case—protects winding.
10—One-hole fixing—Brass bearing bush resulting in perfect bearing.

ANY RESISTANCE UP TO 50,000 OHMS **5/6**

This is the latest Watmel product—Every part is made from the finest materials—Watmel Components get the best out of any set.

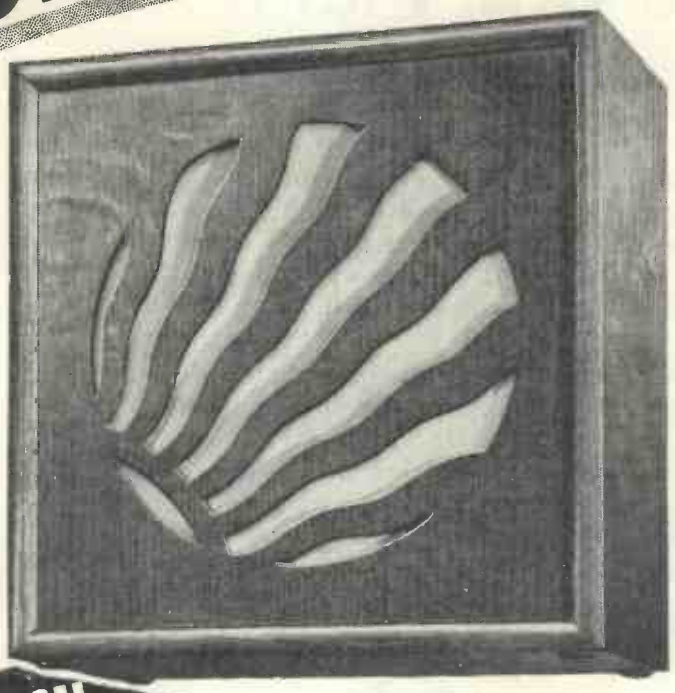
Ask your dealer for particulars, or write direct to us.

Watmel

WATMEL WIRELESS CO., LTD.,
Imperial Works, High Street, Edgware.
(W.C.31)

STARTLING NEW ORMOND VALUES!

The NEW ORMOND LOUDSPEAKER



Handsomely designed in figured Oak, this new loud-speaker is a worthy addition to the Ormond range.

It incorporates the new Ormond No. 3 Loud-speaker Unit with a cone of specially selected material, and is provided with an adjustment at the back.

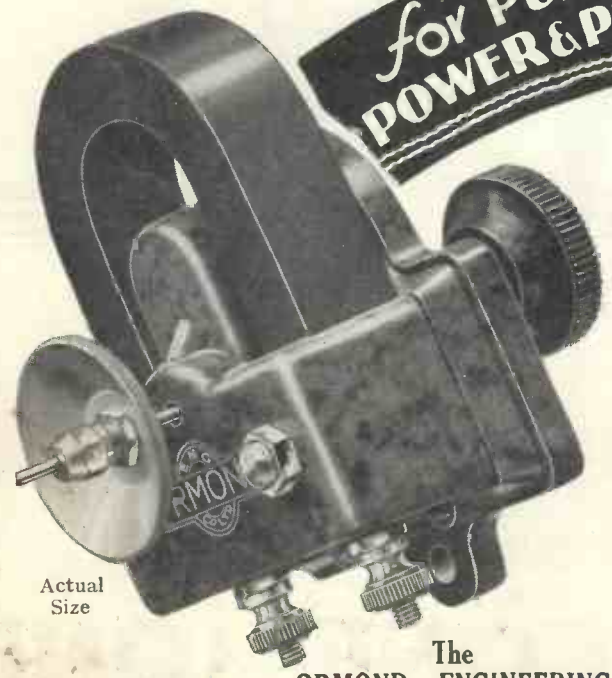
The reproduction obtained is of the highest quality, and at the low price of 22/6 the value offered is truly amazing.

22/6

Size: Height 11¼ in. Width 11¼ In.
Depth 5½ in. Cat. No. R/470.

For PUNCH POWER & PURITY

The ORMOND No 3 LOUDSPEAKER UNIT



Actual Size

Examine this new Ormond Loud-speaker Unit and you will be amazed that an instrument of such quality and fine workmanship can be produced at the astoundingly low price of 8/6. Extremely sensitive, it responds evenly over a wide range of frequencies, and will give faithful reproduction and long service.

A Cobalt Magnet is incorporated and the working parts are enclosed in a beautifully-finished bakelite cover of Walnut colour. It is easily mounted in a cabinet or chassis, only two screws being required.

8/6

An adjustment is fitted in a readily accessible position

Cat. No. R/463

MAINTAINING ORMOND FINE QUALITY & PERFORMANCE

ORMOND ENGINEERING COMPANY LTD.

Registered Trade Mark

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Telephone: Clerkenwell 5334-5-6 & 9344-5-6
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Speedy replies result from mentioning "Wireless Magazine"

How to Convert your "Super Sixty" to A.C. Mains

GREATER RANGE — MORE POWER — IDEAL FOR A MOVING COIL SPEAKER

You can easily convert your "Super Sixty" to a trouble-free A.C. set — banish both high and low tension batteries — and at the same time noticeably improve both range and power!

Marconiphone have prepared complete instructions showing how simply this can be done; the modified circuit is remarkably sensitive and free from mains hum. Its performance has been tested and fully approved by W.M. technical experts.

Send for Details To-day!

First and Foremost — G. Marconi — Name in Radio

Why not a Moving Coil?

This conversion is of particular value to moving coil enthusiasts; it provides for a P.625 output valve operated under optimum conditions — ideal for good moving coil volume. For very best results the new Marconiphone Permanent Magnet speakers Models 131 (cabinet) or 91 (unit) are strongly recommended.

All that you need!

« The Unit

Marconiphone Model A.M.7 A.C., H.T. and L.T. unit forms the basis of the conversion. This unit provides a generous supply of high-tension current at voltages up to 250, together with 4 volts for the first five valves and 6 volts for the super power output valve. It has a neat pressed steel case and complies entirely with the regulations of the I.E.E.

« The Valves

The special Marconi A.C. valves are :—

Oscillator	MHL.4
First Det.	MH.4
I.F. stages	2-MS.4
Second Det.	MH.4
Output	P.625

These are considerably more efficient than the original battery types.

MARCONIPHONE

ADVERTISEMENT OF THE MARCONIPHONE COMPANY LIMITED, 210, TOTTENHAM COURT ROAD, LONDON, W.1

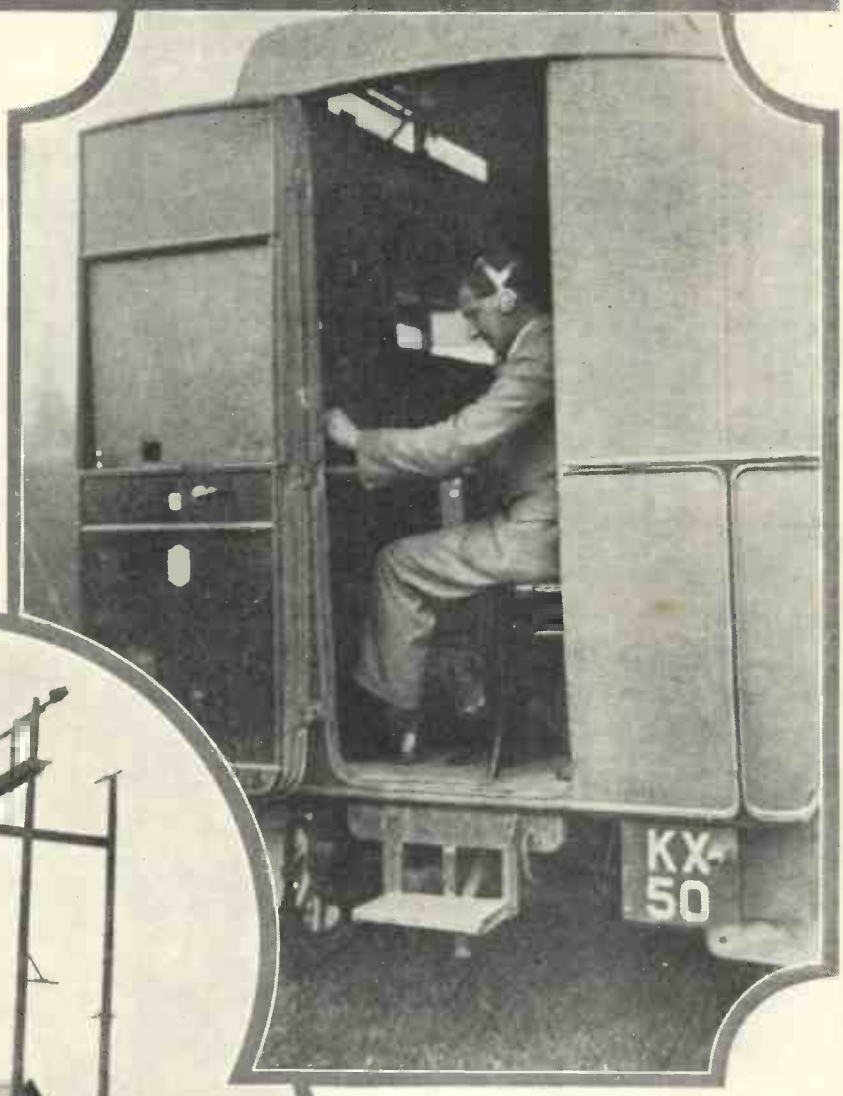
Britain's Radio Research Station

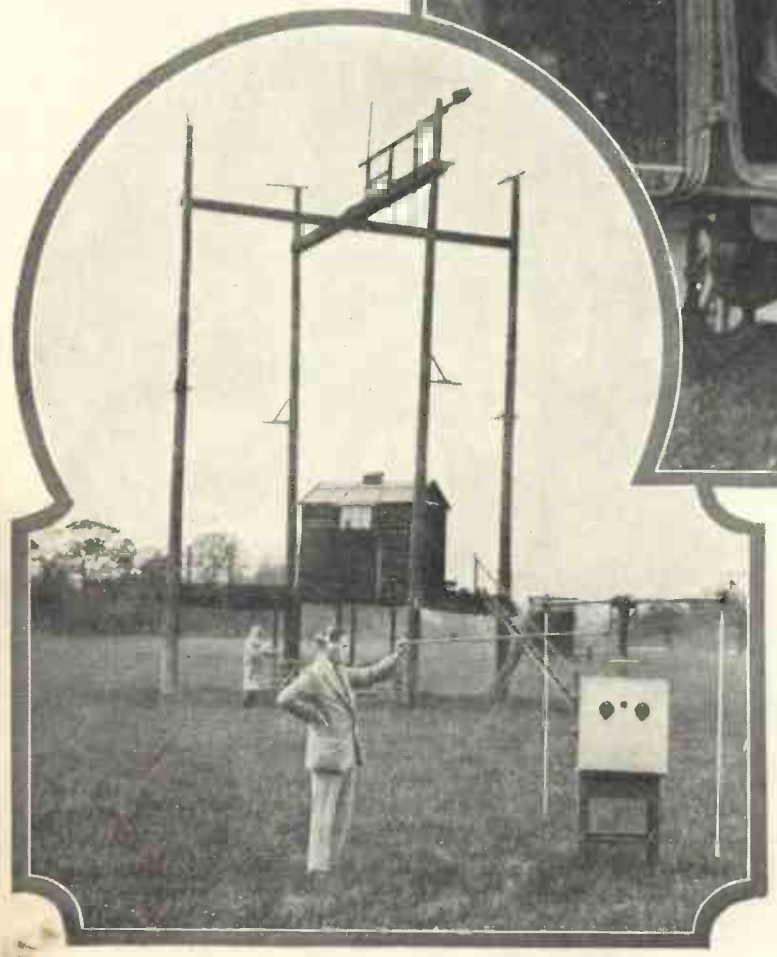
EXCLUSIVE "W.M." PHOTOGRAPHS

THESE pictures, exclusive to WIRELESS MAGAZINE, *show the apparatus used for locating electrical storms within a radius of one or two thousand miles from the Radio Research Station (at Slough) of the Department of Scientific and Industrial Research.*

The apparatus consists essentially of a very sensitive radio direction-finder, which indicates visually the position of the electrical discharge sending out the atmospherics.

A secondary station with a similar installation is situated at Leuchars, in Scotland, and is connected by land line with Slough, thus enabling cross-bearings of the interference to be taken. By this means the position of the interference can be ascertained very accurately.





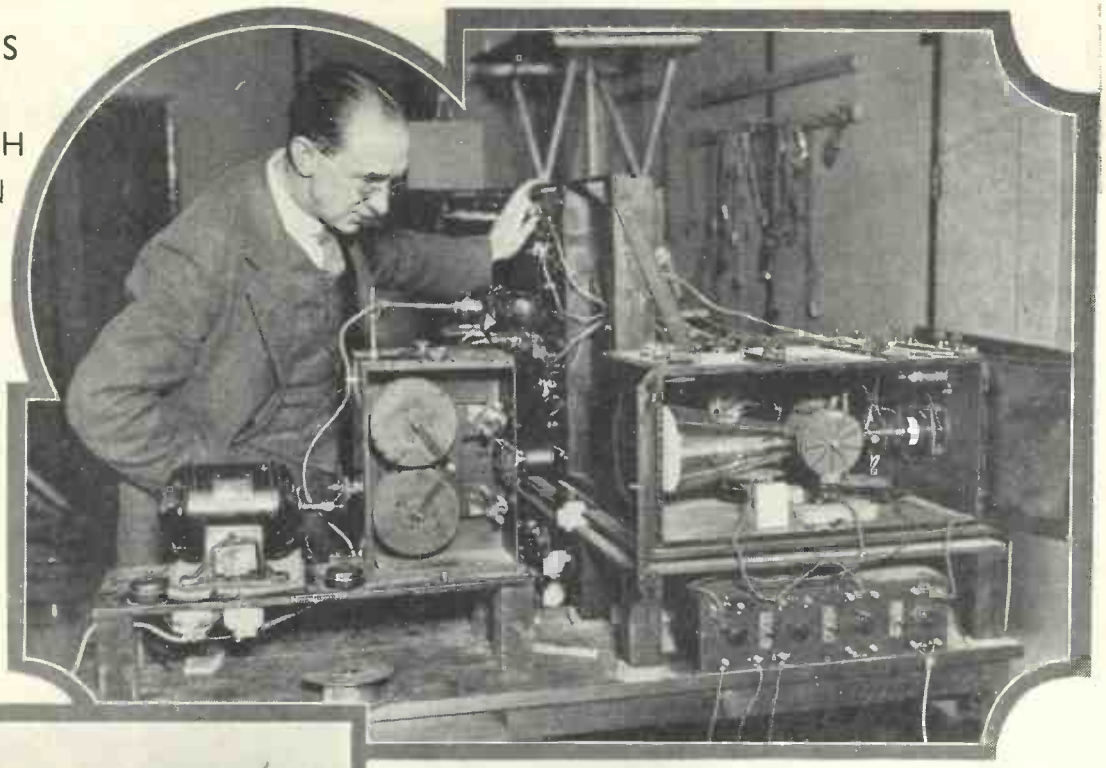
(Top).—Here you see the interior view of one of the travelling radio laboratories. The operator is seen measuring the strength of a 5-metre signal.

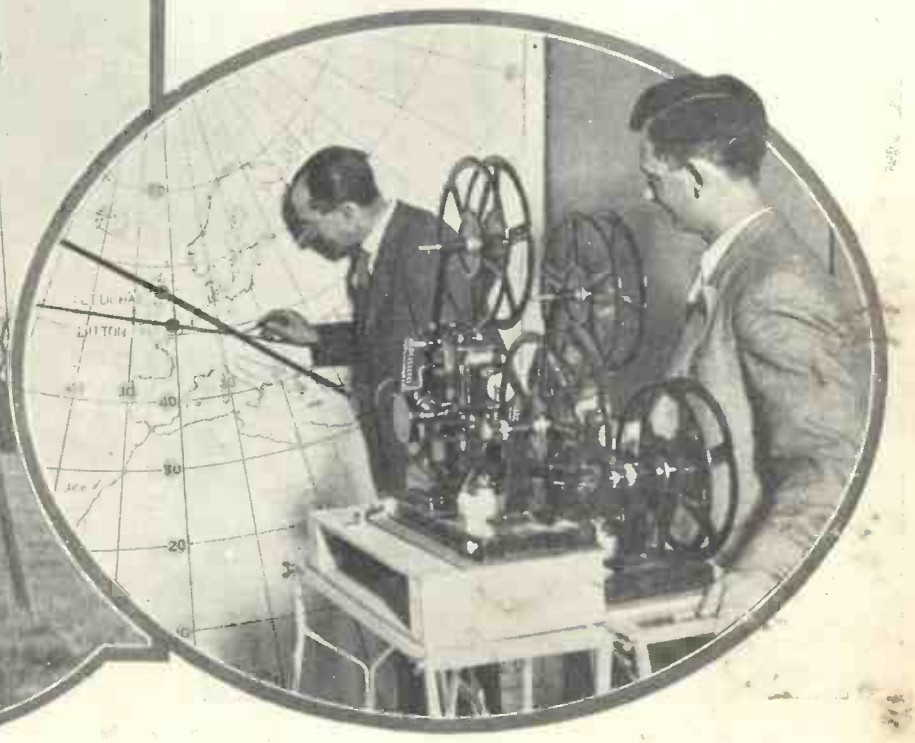
(Bottom).—This picture shows the direction-finding aerials on which atmospherics are received. The signals produced are amplified by two exactly similar amplifiers, each capable of magnifying the signal half a million times and, finally, are applied to a cathode-ray oscillograph.

In turn the signals are reproduced on a screen from which they are photographed by means of a cinematograph camera.

BRITAIN'S RADIO RESEARCH STATION (*Cont.*)

These Photos Are Exclusive to "W.M."



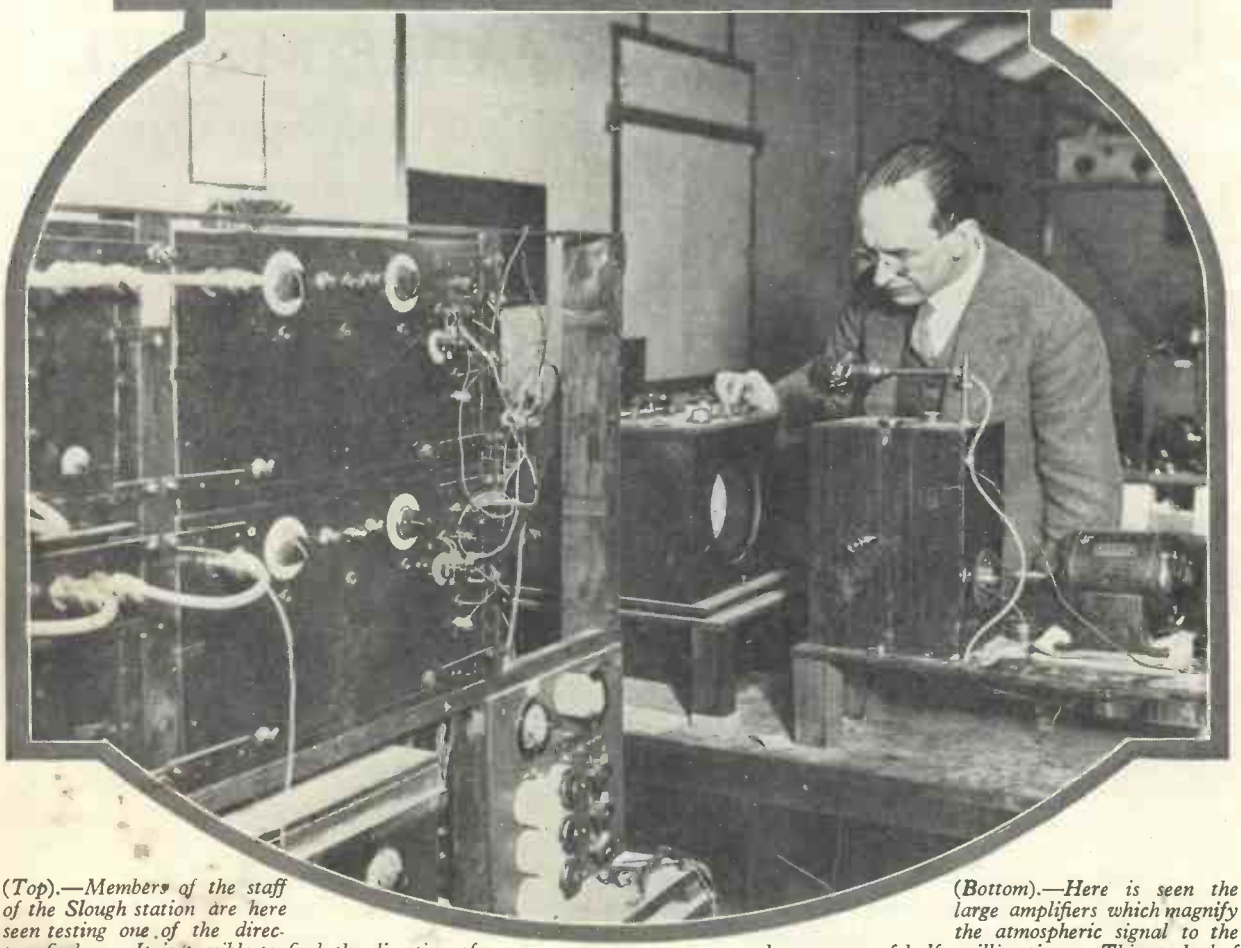


(Top).—Part of the intricate apparatus used for finding the position of thunderstorms. On the right of the picture is seen the cathode-ray oscillograph. This is shaped like a small cylinder, which gradually widens out into a cone, the end of which is covered with sensitive fluorescent material acting as a screen. The atmospherics are converted by the oscillograph into straight-line flashes, which are photographed by the camera seen on the left.

(Below).—Projecting the film on to a map. By means of cross bearings from the Scottish station, which is accurately synchronised with the Slough station, the position of the interference can be found.

(Left.)—A five-year-old "antique," which was used for measuring the resistance of the earth to wireless waves.

(*Top*).—*Members of the staff of the Slough station are here seen testing one of the direction finders. It is possible to find the direction of the source of interference accurately within one degree using this very sensitive apparatus.*



(*Bottom*).—*Here is seen the large amplifiers which magnify the atmospheric signal to the huge extent of half a million times. This method of storm tracking is entirely British and more research work on these lines has been done in this country than anywhere else.*

The A.C. SUPER 60

A SIMPLE TABLE MODEL

AN EXCLUSIVE "WIRELESS MAGAZINE" DESIGN BY W. JAMES

THE A.C. Super 60 radio gramophone described in the June issue was designed for those who wanted a fairly large and relatively expensive set. With its electric gramophone motor, moving-coil loud-speaker, and fine wireless receiver, the equipment is first class throughout.

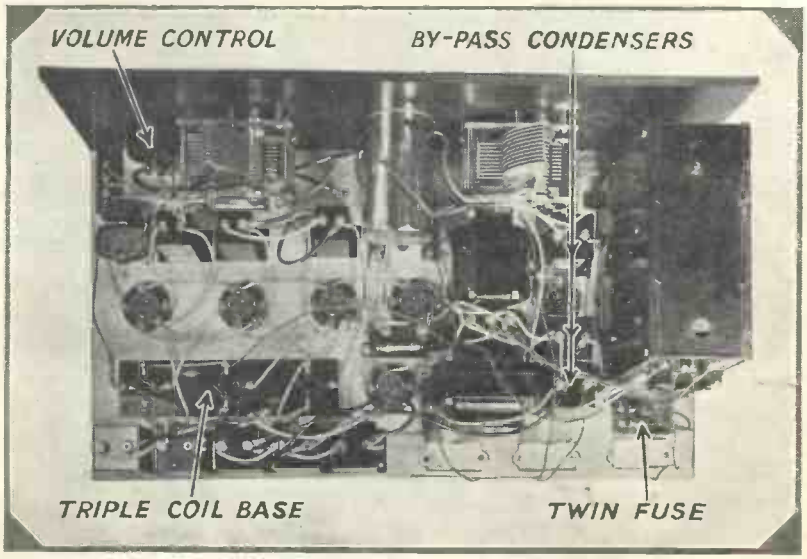
And now inquiries have been received for a more compact design of the set itself. I have, therefore, rebuilt the receiver portion to form a table model.

There is a switch for connecting the wireless side or a pick-up; in fact the circuit of the set is exactly as that of the larger model described last month. It uses three screen-grid valves, as before, a detector and power valve, with a separate oscillator.

I have not used valve screens, as I understand that valves having metallised bulbs will be available and when they are used metal screens are not needed. As a matter of fact, but little signal strength is lost when ordinary valves are used, but in order to obtain the maximum amplification, screening should be used.

Without screens the set goes into oscillation a little earlier when the volume control is adjusted, but the results are satisfactory enough.

A screen-grid valve is used as the first detector, as before, the bias being fixed and the working point being adjusted by altering the voltage on the screen. This control is easily effected, the potentiometer being adjusted whilst listening to a weak signal and is not at all critical.



ALL COMPONENTS ON TOP OF BASEBOARD

As no space has to be left for a gramophone motor, all the components are fixed on top of the baseboard, thus greatly facilitating the wiring

If you have a milliammeter to connect into the anode circuit of the first valve the best working voltages are easily found, setting the anode current at a low value with the oscillator off. The thing to remember is that the valve is worked as an anode-bend detector.

Current Changes

If you connect the oscillator now, you will note that the anode current of the first valve has increased and as the tuning of the oscillator is varied so you will notice that the current changes.

When a strong signal is tuned in the current will again vary a little. Much can be learned by watching the needle of the meter connected to the first detector.

The general layout is from one side of the baseboard to the other, with the mains unit fastened at one end. This is not only a good arrangement from the point of view of following out the circuit, but helps the wiring and reduces troubles which might occur through stray couplings.

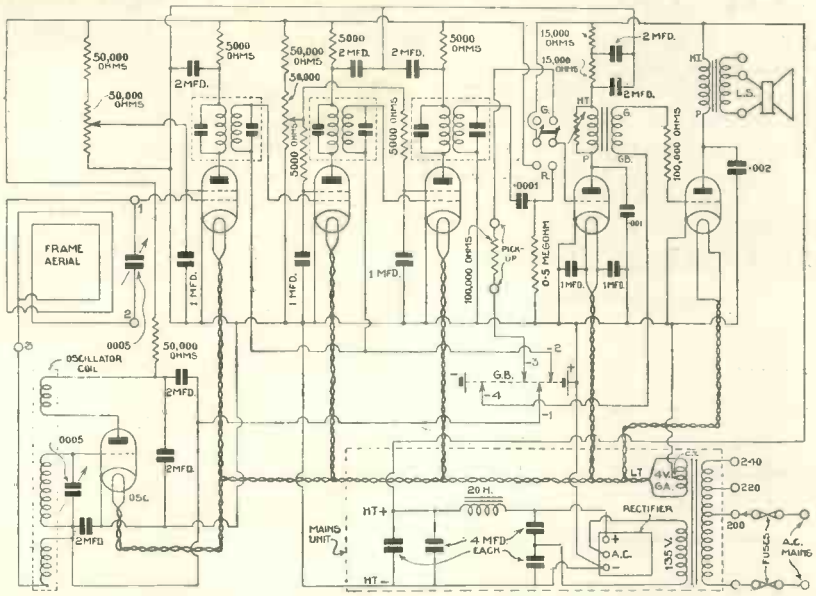
Complete Decoupling

Very complete decoupling is employed in the circuit, the various circuits being well isolated where this is at all necessary by large condensers and suitable resistances.

The resistances used are of the flexible pattern and are, therefore, easily wired into the circuit. Where they are not of sufficient length to reach between terminals on parts to be connected a nut and bolt must be used with a length of wire, the joint being covered with insulating tape. This is not a very tidy job, but still is satisfactory and the wiring can be made presentable enough with a little care.

The cathodes of the indirectly-heated valves are connected together and taken to the centre point of the heater transformer. A direct connection of this sort avoids a lot of difficulties. Valve hiss appears to be much lower when all the cathodes are connected in this way and the circuit appears to be generally more stable.

If we had used automatic bias, by connecting a resistance in each cathode with a separate resistance for the power valve, there would not be quite the same stability and freedom from noise that there is with battery grid bias. Automatic bias is fairly easily fitted and works well, but naturally must be arranged to suit the valves used and to be operative over the range of the volume control.



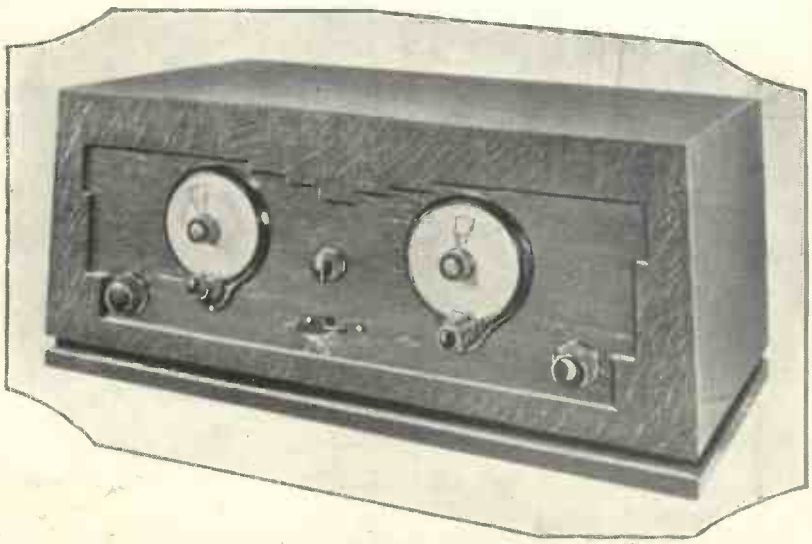
THE MOST MODERN A.C. SIX-VALVE SUPER-HET CIRCUIT

This circuit is almost identical with that employed for the radio-gramophone model of the A.C. Super 60. The components used are almost identical also

Actually there are three 9-volt batteries arranged on the baseboard, being joined in series. All the valves excepting the detector are biased negatively. The grid circuit of the detector when receiving wireless signals has a grid leak of .5 megohm between the grid and cathode.

When the switch is placed in the gramophone position there is bias through the .1-megohm grid leak and pick-up to the grid of what was the second detector and the oscillator, and the three screen-grid valves are disconnected from the high tension. The heaters remain connected and so the voltage of the supply to the heaters remains uniform for gramophone and radio.

The pick-up may be left connected, as it is not in circuit when the switch is in the radio position. With the grid leak connected in the pick-up circuit it does not matter much whether the pick-up itself is joined to the set or not from the point of view



A HANDSOME CABINET SPECIALLY DESIGNED FOR THIS SET

This cabinet has been specially designed for the table model of the A.C. Super 60. Note its attractive modern appearance

THE A.C. SUPER 60 (TABLE MODEL)—Cont.

of safety, as the bias will be applied to the valve through the grid leak when the switch is put in the gramophone position. This grid leak, of 100,000 ohms, hardly affects the tone, but it does avoid the hum or noise which is usually introduced when long leads are used between the pick-up and the grid of the valve.

Double Decoupling

Double decoupling to the detector is used as before, this being advisable to remove completely feedback and, therefore, any tendency for distortion from this cause.

Quality and Volume Control

With the low-frequency volume control connected across the primary of the transformer we have not only a control of volume, but of quality within limits.

There is a .001-microfarad fixed condenser across the anode circuit of the detector, and this may be expected to weaken the higher notes a little when the control is set at maximum. But when the resistance is reduced in order to lower the amount of the low-frequency magnification, the higher notes are less affected, as the shunting effect of the condenser is proportionately reduced.

It is necessary to make a small bracket for the screen-grid resistance to the first valve. This can be of aluminium and when a Regentstat is used the two small holes provided for fixing should be used with a clearance hole for the central bush. If this is not arranged, the bracket will have the voltage of the sliding contact, and while this does not matter it is as well to avoid this connection.

For the frame-aerial connections a piece of ebonite with three terminals is needed.

The parts should first be fitted to the front panel. Then screw the panel to the baseboard and arrange the parts on it. Be sure they clear the parts fitted to the panel. Then the panel should be removed. It should not be in position until the wiring of the baseboard is completed.

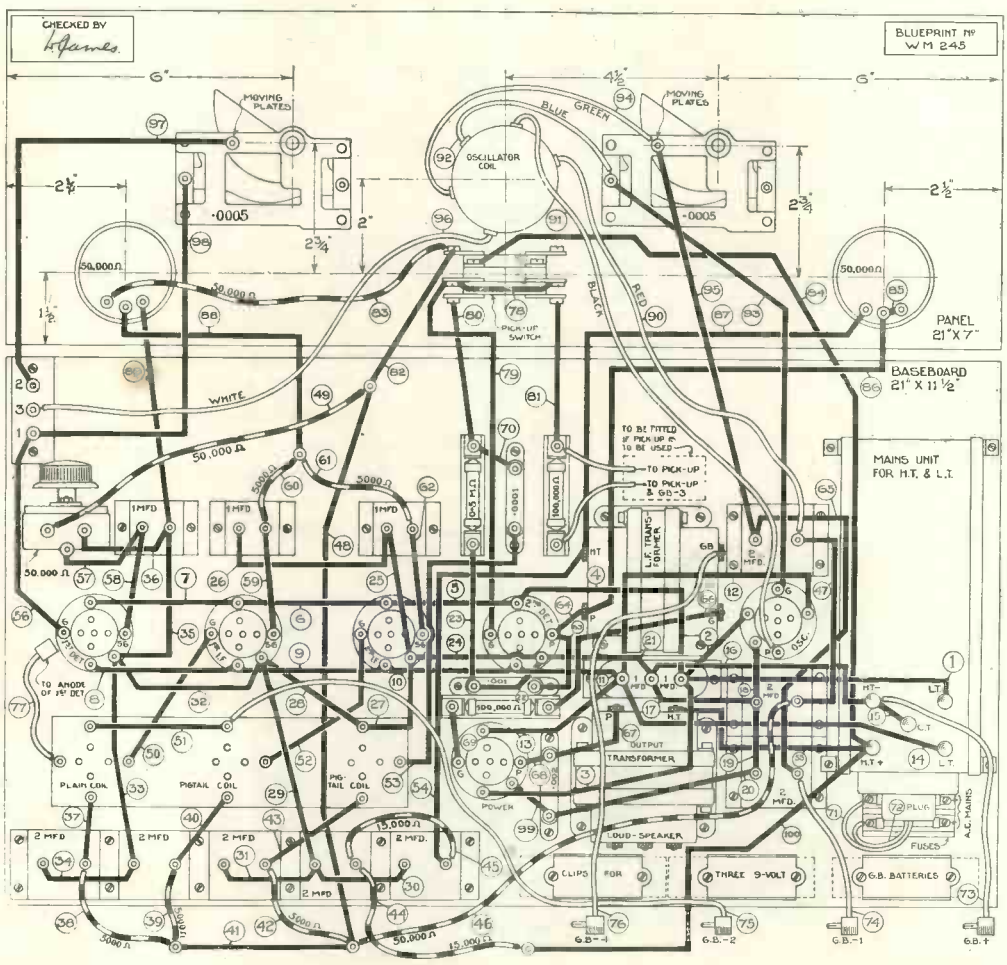
Best Wiring Sequence

First wire the heaters of the valves, using thick wire. Then the cathodes can be wired and the high- and low-frequency circuits.

Switch Connections

Before the panel is fitted it is necessary to connect the wires to the switch. Afterwards they can be wired to the rest of the parts. The wiring is quite easy if carried through carefully but it is not necessary to be too fussy over this.

Do not overlook the flexible wire



LAYOUT AND WIRING GUIDE

This diagram is quarter-scale, but if desired a full-scale blueprint can be obtained for half price (that is, 9d., post free) if the coupon to be found on page 664 is used by July 31. Ask for No. W.M. 245.

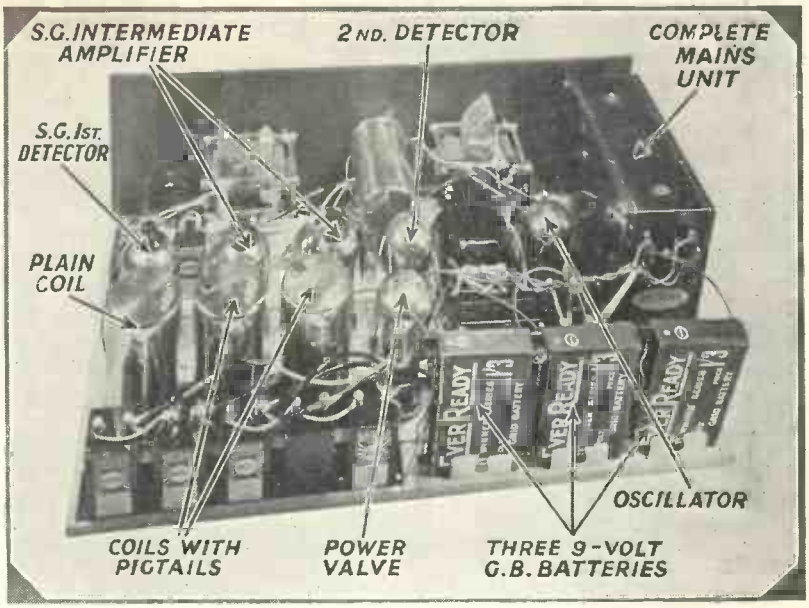
In this table model it will be noted that all the parts are fixed to the top of the baseboard and there is no sub-baseboard wiring. The set is therefore easier to wire than is the radio-gramophone model described last month.

When wiring the set connect the leads in the numerical order indicated by the numbers against each wire. Thick wire should be used for the heater circuits as these leads have to carry a current of 6 amperes.

A switch is provided on the panel for putting a pick-up in circuit when required.

THE FINAL ASSEMBLY

On the right is a back view of the completed set with the valves and special super-het coils in position. Metal-coated valves should be used



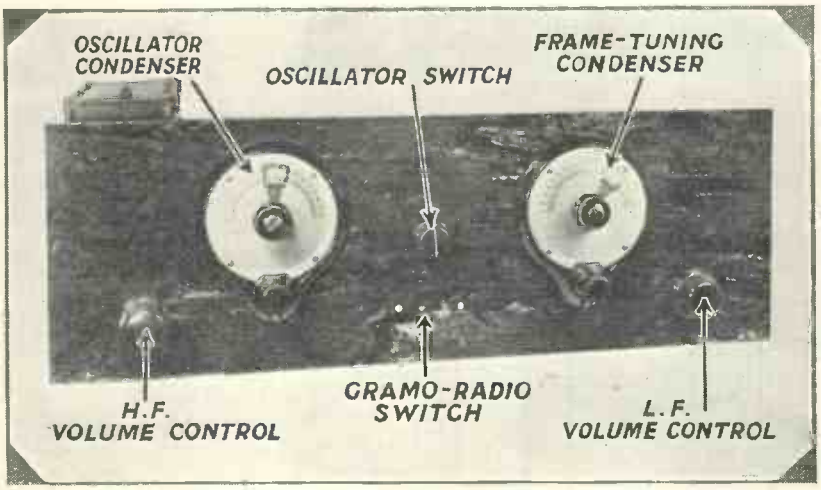
to the anode of the first screen-grid valve; this should be a plain insulated wire. If you used a wire having a metal cover, as is often used with screen-grid valves, the tuning might be thrown out.

Mains Unit

The mains unit is fitted with marked terminals. There are three for the heater circuit and cathodes. These are most easily joined to the 1+1-microfarad condenser, which is wired to the heaters and the cathodes. A wire is taken from the negative high-tension terminal to the centre-tap terminal and the positive high-tension wires from the set are joined to the positive terminal.

The unit provides heating current of 6 amperes at 4 volts and high tension of about 30 milli-amperes at 200 volts. In the unit is a rectifier and smoothing chokes and condensers, so the output is direct current without ripple.

There is a voltage change-over plug on the unit. This has one socket which is common, and the other two sockets are marked 200/220 and 230/250. The brass contact should be placed in the socket marked with the voltage nearest that of the supply and the two parts of the socket be bolted together again.



PANEL CONTROLS

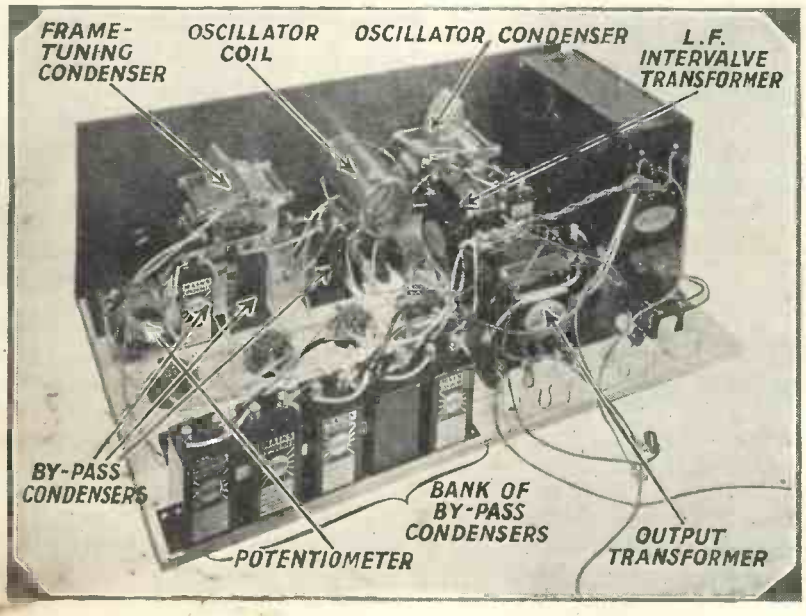
It will be seen from the above photograph that the layout of the panel is exactly the same as that of the radio-gramophone model

Fuses

Short leads are used between the fuses and the voltage change-over plug and the mains leads are connected to the other ends of the fuses.

In a set of this type I like to use a directly-heated output valve and the one recommended is the Mullard AC064. This takes a current of about 20 milli-amperes when the bias is 21 volts, but a little greater bias may be tried here.

For the second detector and



ACCESSIBLE LAYOUT

The photograph on the left shows the simple and straightforward arrangement of the parts. The construction of the set is not at all difficult

THE A.C. SUPER 60 (TABLE MODEL)—Cont.

COMPONENTS NEEDED FOR THE A.C. SUPER 60 TABLE MODEL

COILS
1—Set of 4 Lewcos super-het coils, £2 10s. (or Wearite).

CONDENSERS, FIXED
1—T.C.C. .0001-microfarad, upright type, 1s. 6d. (or Magnum, Dubilier).
1—T.C.C. .001-microfarad, upright type, 1s 10d. (or Magnum, Dubilier).
1—T.C.C. .002-microfarad, upright type, 1s. 10d. (or Magnum, Dubilier).
1—Ferranti 1+1-microfarad, type C2c, 4s. 6d.
3—Formo 1-microfarad, 7s. 6d. (or T.C.C., Dubilier).
8—Formo 2-microfarad, £1 6s. (or Ferranti, T.C.C.).

CONDENSERS, VARIABLE
2—Cyldon .0005-microfarad, log mid-line type, £1 (or Astra, Igranic).

DIALS, SLOW-MOTION
2—Astra, type 2, 10s.

EBONITE
1—Becol, 21 in. by 7 in. panel, 8s. 11d. (or Red Triangle, Lissen).

HOLDER, COIL
1—Peto-Scott triple coil base, 2s. 9d. (or Wearite, Readi-Rad).

HOLDERS, GRID-LEAK
3—Readi-Rad, 1s. 6d. (or Bulgin, Lissen).

HOLDERS, VALVE
6—Telsen 5-pin, 4s. (or W.B., Lotus).

MAINS UNIT
1—Regentone, type S60, £4 10s.

PLUGS
5—Belling-Lee wander plugs, marked: G.B.+, G.B.—1, G.B.—2, G.B.—3, G.B.—4. 1s. 3d. (or Clix, Eelex).

RESISTANCES, FIXED
5—Lewcos 5,000-ohm flexible type, 5s. (or Magnum, Bulgin, Readi-Rad).
2—Lewcos 15,000-ohm flexible type, 3s. (or Magnum, Bulgin, Readi-Rad).
3—Lewcos 50,000-ohm flexible type, 4s. 6d. (or Magnum, Bulgin, Readi-Rad).
1—Lissen .5-megohm grid leak, 1s.
2—Lissen 100,000-ohm grid leaks, 2s.

RESISTANCES, VARIABLE
2—Magnum 50,000-ohm potentiometers, 15s. (or Sovereign, Rotorohm).
1—Regentstat 50,000-ohm potentiometer, 9s. 6d (or Sovereign, Rotorohm).

SUNDRIES
Tinned-copper wire for connecting.
1—Bulgin twin fuse, 2s. 6d.
Lengths of Sistoflex sleeving.
3—Ever-Ready 9-volt grid-bias batteries, 3s. 9d. (or Lissen, Drydex).
3—Bulgin grid-bias battery clips, type No. 2, 1s. 1½d.
Length of rubber-covered wire.

SWITCH
1—Bulgin double-pole double-throw, type S62, 4s. 9d.

TRANSFORMER, L.F.
1—Ferranti, type AF5, £1 10s. (or R.I., Varley).

TRANSFORMER, OUTPUT
1—Ferranti, type OPM5, £1 2s. 6d.

ACCESSORIES

CABINET
1—Kabilok (special design), £1 12s. 6d.

FRAME AERIAL
1—Dual-range frame aerial (Lewcos, Peto-Scott, Readi-Rad or Wearite).

LOUD-SPEAKER
1—W.B. permanent-magnet moving-coil, £6 6s. (or Edison Bell, Parmeko).

PICK-UP
1—B.T.H. with tone arm, £2 5s. (or Edison Bell, Limit).

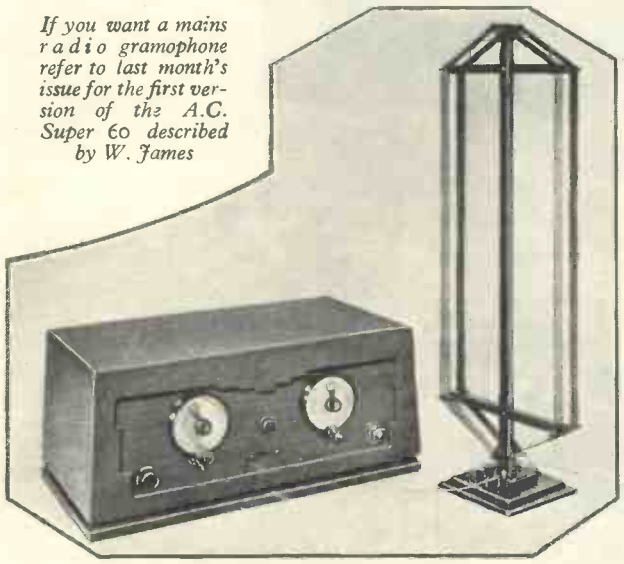
VALVES
1—Mullard S4VA, £1 5s (or Mazda AC/SG, Cossor 41MSG).
2—Mullard S4V, £2 10s. (or Mazda AC/SG, Cossor MSG/HA).
2—Mullard 354V, £1 10s. (or Mazda AC/HL, Cossor M41/HF).
1—Mullard AC064, 16s. (or Mazda AC/P1.

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

oscillator stages valves of the moderate-impedance type should be used, such as the Mazda AC/HL, Cossor M41HF, Marconi MHL/4, and Mullard 354V.

In the first detector position, the first screen-grid stage in the set, fit a Mullard S4VA. This valve has rated values of 430,000 ohms with a slope of 3.5. Other suitable valves are the Cossor 41MSG and the Mazda AC/SG. In the two amplifying stages I have used Mullard S4V screen-grid valves. These valves have a slope of 1.1 and provide ample magnification.

If you want a mains radio gramophone refer to last month's issue for the first version of the A.C. Super 60 described by W. James



ALL READY FOR RECEPTION

This photograph shows the completed set ready for receiving scores of stations from all over Europe

When other valves having greater slopes are used the maximum possible magnification to be obtained is no greater and the screen-grid volume-control resistance must be adjusted more carefully. I have tried the Mazda AC/SG valves, for example, and the results are quite satisfactory.

The grid bias must be arranged to suit the valves, but generally a bias of negative 1.5 or 3 volts is suitable for the first detector, 1.5 for the two screen-grid amplifying valves, and 3 volts for the pick-up. With Mazda AC/SG valves the bias should be —3 volts.

If the total current exceeds 30 milliamperes the voltage will not be quite 200, but this does not matter and the high-tension unit is not harmed in any way.

A good frame aerial should be used with a super-heterodyne set, so that the tuning of the input circuit is as sharp as possible. Interference is reduced when the frame tuning is sharp and the directional effects are more pronounced.

There is an output transformer in the set for low-resistance loud-speakers. A suitable type should be fitted if the loud-speaker to be used has a high resistance or a choke-filter output filter could be connected in the usual way if this is preferred to a 1/1 ratio transformer. Personally, I would use the filter circuit, with a 20-henry choke and a 2-microfarad condenser.

Short Leads for the Frame Aerial

Connect the frame aerial with fairly short leads to the set and notice that the centre tap is the middle terminal on the connecting strip.

In certain districts there seems to be much more high-frequency current in the mains. If noises are heard or the tuning of the local station seems not quite normal, the experiment should be tried of connecting a mica condenser of, say, .001 microfarad between each main and the centre tap of the heater winding.

These condensers will by-pass high-frequency currents, but are usually not necessary and so have not been included in the set described. Low-voltage condensers should not be used, as here we are dealing with alternating current.

The tuning of the set is a little sharper than that of the battery type Super 60. Naturally the magnification is also greater. With the controls provided the set can be handled easily enough; the volume from records and the general tone is very good.

A LISTENER'S LOG

By JAY COOTE

WITH the increasing number of European transmitters on the air at one and the same time, it is inevitable that coincidences in the choice of musical compositions must take place. Recently on two separate dates such incidents gave rise to an involuntary race in the ether, much to the amusement of listeners who, by chance, had tuned-in to the two competing studios.

Beaten by Three Minutes!

Budapest broadcast a piano concerto by Liszt; the orchestra was a hundred and fifty bars ahead when Prague struck up with the same work. Although handicapped at the starting post, the Czech made a good run, but notwithstanding an accelerated *tempo*, was beaten by the Hungarian, by three full minutes.

During the same week both Stockholm and Rome entered the lists with a performance of Verdi's opera, *Aida*. It was a give-and-take race until the final act, when the fiery Italian, putting on a spurt, won the match by roughly a hundred bars.

To add variety to the radio entertainments might I suggest a simultaneous broadcast of the *Overture to William Tell*, the 8 p.m. time signal to act as a starting pistol shot? No entries should be barred and with, say, two hundred runners in the arena interesting results would be obtained.

The Geneva bureau might even be asked to organise a series of preliminary eliminating contests, to be followed by the usual official laps, semi-finals, and finals. But I offer no prize to the winner!

◆ ◆ ◆

American Exchanges

The coming autumn and winter months should bring us a regular interchange of wireless entertainments with the United States. Germany and Italy have already concluded agreements with the N.B.C., of New York, for an exchange of programmes at fixed intervals and I now learn that Radio Paris is endeavouring to develop a similar scheme for France.

From this side of the Atlantic talks by well-known politicians, or celebrities in the worlds of science and literature have been frequently relayed over the short waves to America, but from the United States the B.B.C. has only broadcast at rare intervals.

Transatlantic wireless-telephony channels permit such an exchange to be made satisfactorily and with the added co-operation of Germany, Italy and France in the near future, we should be brought in closer touch with the broadcast entertainments of our American cousins. It is hardly likely that much will be attempted in this way before the autumn.

◆ ◆ ◆

Königswusterhausen with 75 kilowatts in the aerial is proving a valuable asset to the distant listener, inasmuch as on some days, apart from its long series of educational talks, it relays the best wireless programmes broadcast by Berlin and the German provincial cities.

Helpful Policy

Such a policy is very helpful for, with the overcrowding of the ether, it is not always possible to tune in to or hold an individual transmitter. A powerful alternative channel such as offered by Königswusterhausen proves a boon to the possessor of anything less than a super-selective receiver.

Germany is steadily forging ahead with the construction of its super-power stations; following Langenberg, another 75-kilowatter, we shall see a similar station erected at Pegau for Leipzig and I am told that a suitable site has now been found for the new Hamburg giant.

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A newcomer to the ether is Wilno (22 kilowatts) on 244.1 metres (1,229 kilocycles), a channel which for some time has been exclusively reserved to Cracow. The latter must share a wavelength temporarily with Genoa, but as the Italian is steadily searching for another position in the broadcast band, it is possible that by now the Pole may have been left with a comfortable seat.

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Paris radio fans are very worried, for since broadcasting came into being they are continually called upon to invent new words in the French language. As a matter of fact, "invent" is incorrect, for in most instances they have been content to adopt a literal translation of the foreign term.

That Loud-speaker!

Take, for instance, our clumsy word, *loud-speaker*. It seems that by now we should have been able to coin something more distinctive for this perfected instrument. The German terms it *Lautsprecher*; the Dutchman, *luidspreker*; the Italian, *alto parlante*; and the Frenchman, *un haut-parleur*.

But when it came to a designation of the studio M.C., the Parisian was stumped. It was all very well calling the announcer *le speaker*—and not a French word at that—but what was to be done when a woman usurped this title? Hence the discussion in the French radio press.

Speakerinne was suggested and just as quickly turned down; *annonciatrice* was immediately side-tracked; *parleuse* or *diseuse* was misleading, and *telephoniste* inappropriate. Finally, after considerable correspondence and heated arguments, the word *microphoniste* was judged to be the least offensive, but they are not yet satisfied.

◆ ◆ ◆

Radio-Belgique as a transmitter has not been dismantled, although the Brussels broadcasts are radiated through the Velthem twin-transmitter.

The old 1½-kilowatt plant has been retained as a stand-by and comes into action every Sunday morning at 6 a.m. B.S.T.

Pigeon Fanciers

Bear in mind that the Belgians are ardent pigeon fanciers, expecially in the Walloon part of the country and "homers" despatched by rail or car on the previous day are released every Sabbath morn from many provincial centres, as well as from more distant places.

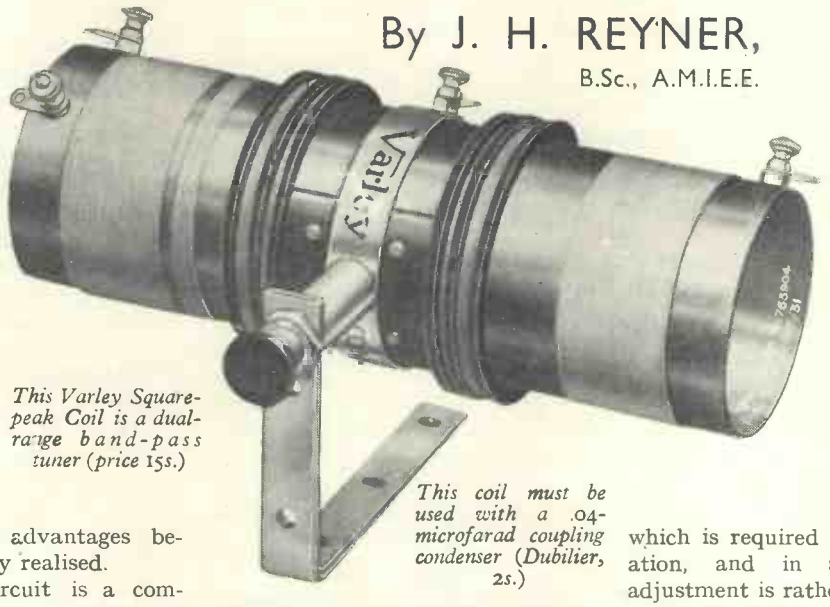
Hourly, the Brussels station puts out news bulletins regarding arrivals and between broadcasts whiles away the time with gramophone records.

Wireless Magazine, July, 1931

Has the Band-pass Tuner Arrived?

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

ANY new development takes a certain time to gain the confidence of the public. When a reasonable period of probation has elapsed, however, the idea, if satisfactory, is taken up to an increasing extent. This is the case with the band-pass tuner, which is becoming more and more popular as its undoubted advantages become more generally realised.



This Varley Square-peak Coil is a dual-range band-pass tuner (price 15s.)

This coil must be used with a .04-microfarad coupling condenser (Dubilier, 2s.)

A band-pass circuit is a combination of two tuning circuits loosely coupled together. The energy received from the aerial is filtered by the first circuit, the normal tuning operation tending to select the required station and to eliminate any interfering transmissions. The energy is then handed over to the second circuit, where a similar process takes place.

Reversing the Order

In the aerial circuit the interfering station may produce a signal as strong or even several times stronger than the station required. The first tuning circuit tends to reverse the order of affairs by magnifying the desired signal to a much greater extent than the unwanted signal.

It may not, however, be sufficiently successful in doing this, and if the signal were applied direct to the valve at this point considerable interference would be heard.

This is the usual case. In a band-pass filter the second circuit receives energy not from the aerial, but from the first circuit, where a measure of selection has already taken place. In its turn it continues this process of amplifying the desired signal and supressing the interference, with the result that the voltage applied to the grid is considerably freer from interference.

This is the basic principle of the band-pass tuner.

Both tuning condensers are usually mounted on a common spindle, so that the control is as simple as an ordinary tuning circuit. A secondary advantage of this form of tuner is that, owing to an interaction which takes place between the circuits, the top of the resonance curve is somewhat flattened instead of being a sharp peak, and this tends to give better quality of reproduction, with crisp reception of the upper frequencies.

The early forms of band-pass circuit were made up by using two independent coils. There is, indeed, in this issue a set in which plug-in coils are employed for the purpose, I believe for the first time.

Such an arrangement suffers slightly from several inherent disadvantages, the most important being that the coils must be accurately matched for best results, and coil makers have not yet arrived at that desirable state of affairs for which I pleaded some time ago, when any coil of a particular make could be relied upon to have a given inductance within a few per cent.

The second disadvantage of the use of two coils is that they must be very carefully placed relative to one another so that the coupling between them is confined to that which is required for correct operation, and in some cases this adjustment is rather critical.

Clearly, it is a better plan to produce a band-pass tuner in which the necessary inductances are incorporated on the same chassis or housing. The relative positions can then be correctly fixed, while there is no reason why the price should not be considerably less than that of two individual coils.

The new Varley Square-peak Coil is undoubtedly a step in the right direction. This contains two long-wave and two short-wave coils mounted on the same former and so related that the coupling between them is of the correct direction and strength.

Mixed Coupling

This particular coil is designed to employ a mixed coupling, partly magnetic and partly capacitative, an external fixed condenser being used for the latter purpose. The magnetic coupling, of course, is obtained by the interaction of the coils.

This coil is capable of giving very desirable tuning characteristics. The signal strength obtained is in the neighbourhood of 70 per cent. of an ordinary coil, so that the serious drop in the voltage, which is so often

found in a band-pass tuner, has been overcome, while the resonance curve is very steep sided, cutting off interfering stations in a surprising manner.

The dial spread of the London stations at Elstree with a full outdoor aerial is only about 15 degrees with a band-pass filter of this kind, even when used in a detector set, and less in a set with high-frequency amplification.

This selectivity is partly due to the fact that two tuning circuits are in operation, but also in large degree to the avoidance of cross-modulation and detector overloading.

Constant Band-width

The mixed coupling used in the Varley coil has the advantage that the band-width is approximately constant at any part of the scale between 200 and 2,000 metres, but the delightfully sharp tuning and freedom from interference is a characteristic of any band-pass set, and there will undoubtedly be a number of band-pass tuners on the market by next season.

If such good results are obtainable with a band-pass tuner, why is it that more general use is not made of the device? On the face of it it would seem worth while to scrap one's existing coils and replace them with a band-pass tuner, particularly if this only costs a matter of 10s. to 15s.

Unfortunately this is not the full extent of the cost. In addition to the tuner itself, we must use a double condenser, since there are two circuits to tune. The two condensers, of course, are mounted on the same spindle, so that there is only one control to operate, but the fact remains that the ordinary tuning condenser must be replaced with a double one.

Even so the cost, on the face of it, should not be excessive, for it is possible to obtain a reasonably good condenser for five to six shillings and one might reasonably expect to obtain a double condenser for not much more than ten shillings. Yet an examination of manufacturers' catalogues shows that this is far from being the case.

Duals Not Listed

One exception is the Formo condenser used in the band-pass set already referred to, but in the majority of cases double condensers are not listed. The only alternative is the twin-gang condenser, which is a much more expensive proposition. A price of anything from thirty to fifty shillings is demanded for a two-gang condenser as a general rule, while such double condensers as are available are priced around the twenty-shilling mark. There can be no doubt that this lack of suitable components is holding back the development of the band-pass tuner.

The requirements are simple. All that is necessary is a double .0005-microfarad condenser. The two sets of moving plates are mounted on the same spindle, and no individual adjustment is necessary. Nor is any trimming adjustment essential, so that the component comprises two simple condensers carried on a common spindle and mounted in an extra long chassis. The only essential is that the capacities of the two halves shall be equal (within a small tolerance) at all parts of the scale.

An effective capacity screen should be placed in the two condensers, in contact with the moving plates (and, therefore, with the frame), and this must extend at least 1½ in. beyond the framework, so that the screening is really effective.

This article will be of value to all who are interested in radio development, for it is certain that the band-pass tuner will come into universal use soon. Up to now its progress has been restricted because of difficulties of manufacture, but at least one well-known firm is tackling the problem from the right angle. A band-pass set with plug-in coils is described in this issue.

It is sometimes advantageous to continue the screen along the back of the condenser, in preference to allowing the screen to project, since this facilitates construction and has the same effect.

It has been stated that the use of trimming adjustments are not necessary. This may seem a somewhat surprising remark, but if we are to produce a really low-priced article it is necessary to look ahead. Possibly the present system of using two separate coils may necessitate a trimming adjustment.

If the out-of-balance is at all large, the results cannot be satisfactory, because the trimming will not hold over the whole scale. Where the coils are already reasonably matched it is usually possible to obtain all the trimming necessary by using a pre-set condenser in the aerial lead.

The tendency, however, is undoubtedly towards popularising band-pass tuners, and it should not be beyond the wit of coil designers to see that their tuners do not require trimming adjustments. The best thing is to design the tuner to work on a small aerial. Then if it is used on a large aerial the insertion of a pre-set condenser will bring the circuits into tune and no further trimming will be necessary.

Omit the Trimmer

Therefore, let us take the step boldly of omitting trimmers on our condensers and designing our coils to fulfil the conditions.

In fact, more co-operation between the coil manufacturers and the condenser makers would be advantageous. A condenser value of .0005 microfarad has become standardised, although in certain cases a value of .0003 microfarad is employed. This being the case, one might reasonably expect to find all standard coils of substantially the same inductance. Think how desirable it would be if one could know that two entirely different makes of coil could be used in the same set, one in the high-frequency stage and one in the detector stage, and that the tuning dials would read approximately together. It might even be practicable to put in a gang control.

Those readers who have any experience of coils will appreciate the impracticability of such a suggestion. There is no sort of uniformity among our coils, and if we are now going to introduce band-pass tuners we shall have confusion worse confounded.

Increased Value

The value of a band-pass tuner is materially increased if it will match reasonably with existing high-frequency transformers, and I would suggest to coil manufacturers that in their productions for the forthcoming season they should endeavour to get together not only among themselves, but with condenser makers, and arrive at some uniformity.

The band-pass tuner is undoubtedly coming, and its advent will be hastened by the introduction of cheap reliable double condensers. That is the position. Let us hope that by next season it will have been met.

Wireless Magazine, July 1931

Better Programmes from Bigger Studios!

Secrets of the B.B.C.'s New Headquarters

The question as to whether the new Broadcasting House will provide better programmes for listeners is here discussed in this interesting review of the new B.B.C. premises by Kenneth Ullyett.

WILL the new B.B.C. headquarters, now rapidly springing up in Portland Place, London, result in better programmes so far as listeners are concerned? Or will this new building, which admittedly is destined to be among London's finest architecture, be merely a convenience for the staff of the B.B.C. without benefit to listeners?

Paying the Piper

That is the question which listeners all over the country are wondering about, because as they have to pay the piper they want to know what tune they are being compelled to call by the B.B.C.'s policy in scrapping Savoy Hill. I am in a position to answer this question after paying a visit recently to Broadcasting House and having discussed the plans with the B.B.C.'s civil engineer, Mr. M. T. Tudsbery, A.M.I.C.E.

The building is the design of Lieut.-Col. G. Val Myer, F.R.I.B.A., who is working in conjunction with Mr. Tudsbery.

The position is rather a curious one. Col. Val Myer is the architect to a syndicate which is building Broadcasting House for the B.B.C., and Mr. Tudsbery is, of course, making it his business to see that the building conforms with present B.B.C. requirements. Therefore, one might naturally expect that the first result would be better programmes because of the better studio facilities available.

Complete Ownership

The financial arrangement is such, however, that the B.B.C. *must* lease the building for a term of years, or, alternatively, it can take over complete ownership of Broadcasting House.

Thus, you see, Broadcasting House is designed specially for broadcasting and not only just for immediate requirements. We might reasonably expect it to be entirely suited to programme distribution and so productive of better programmes than are possible from overcrowded Savoy Hill.

I have seen Mr. Tudsbery's own plans of each floor of Broadcasting House and matters are now at the advanced stage when everybody in Savoy Hill knows just where his or her quarters will be in the building. It is quite obvious, after studying the new headquarters, that if we do not get better programmes owing to the improved facilities at Broadcasting House, it will be the fault of the staff and not of the building in which it works.

There are twenty studios in Broadcasting House as against the ten in London at present. Of these latter ten only nine are in Savoy Hill, the tenth being the converted riverside warehouse. In Savoy Hill at present studio No. 1 has the largest floor area, but that is not very much to write home about. No. 7 is the double-decker with the best echo acoustics, but the concert-hall studio in Broadcasting House will be half as large again.

With the possible exception of the talks studio at Savoy Hill, there is no room which one can definitely say is allocated to any special purpose. Broadcasts, rehearsals and auditions have to be arranged in any studio which is free at the moment and it is easy to see that this does not make for the best microphone performances. Also, there is the trouble that the studio folk are not kept to themselves in Savoy Hill, the offices, studios, effects rooms and engineering sanctums being arranged in a curious miscellany which is the result of Savoy Hill having been formed in the early days out of a block of flats, a Turkish bath and a hardware store.

Now, as a contrast, turn with me to Broadcasting House. Quite half of the information which has been published elsewhere regarding this new building has been based on guesswork and is largely wrong. *This is the first description to be published in a technical paper of the exact arrangement of the studios in the new building.*

In the Main Door

As one goes in the main door at the corner of the building there are stairs leading both up and down and immediately facing the entrance are two lifts. If you are going up to see any of the administrative staff then you will choose one of these lifts.

If you are an artiste, or are going to the broadcasting section for any reason, then you will pass through doors leading to the "Artistes' Foyer," and choose one of a pair of lifts at the back. Once you have passed this door you are in the artistes' section and the only way out is by means of emergency doors on each floor which, of course, will only be used in case of fire or some such crisis.

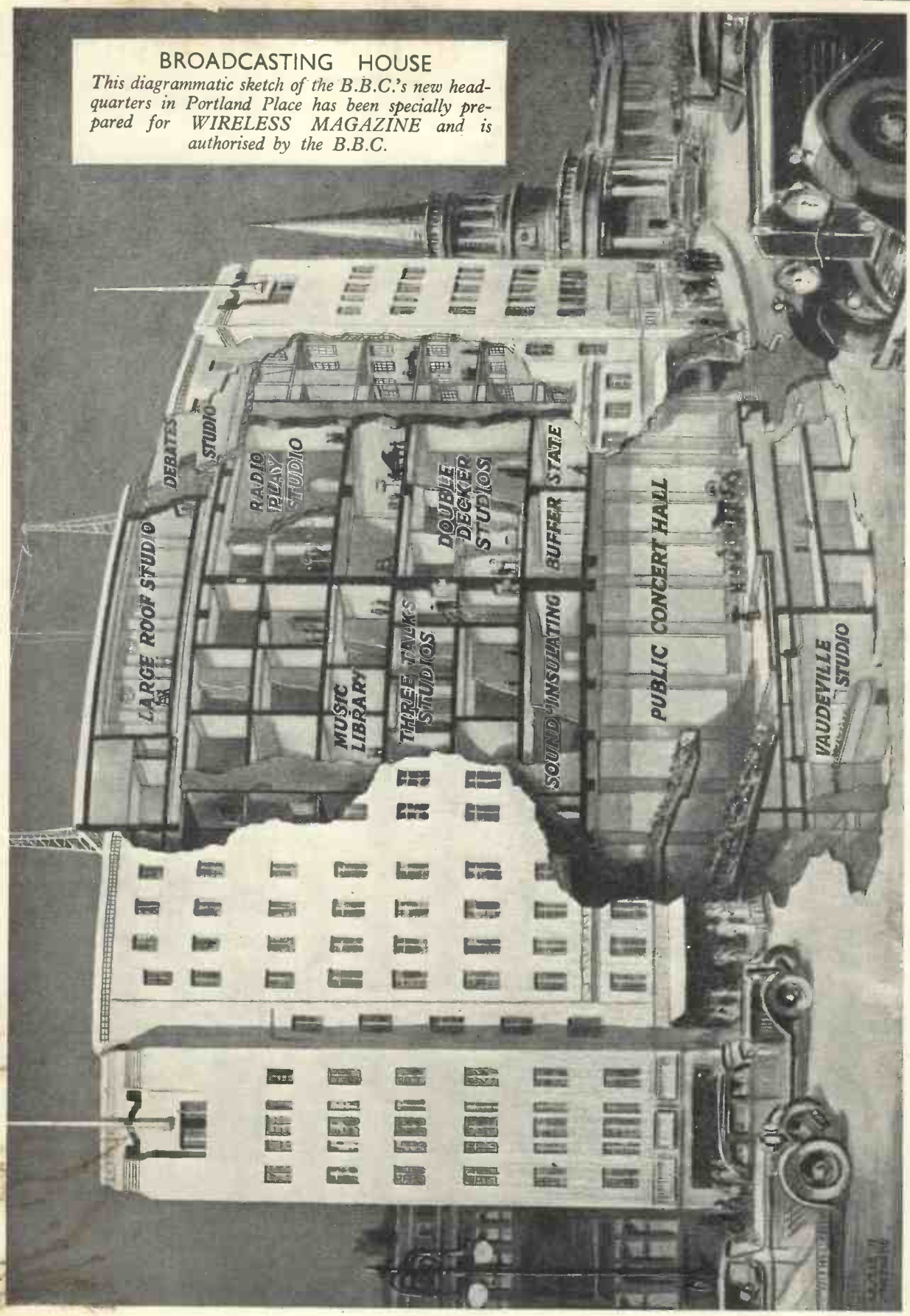
Office Arrangements

The offices have already, I think, been dealt with enough elsewhere. The main offices are in the corner of the building, the big Council Chamber being above the entrance hall and Sir John Reith's suite of offices above this again. Let us, instead, go downstairs (for the lifts are not yet installed) and see first the concert hall and the studios in the basement.

(*Continued on page* 584)

BROADCASTING HOUSE

This diagrammatic sketch of the B.B.C.'s new headquarters in Portland Place has been specially prepared for WIRELESS MAGAZINE and is authorised by the B.B.C.



BETTER PROGRAMMES—Continued

All previous plans have shown the concert hall as being entirely contained within the tower; this is wrong. This big studio extends to the North, beyond the confines of the tower, so that at the gallery end the hall abuts on the adjoining property. This big studio is certainly going to make for better orchestral broadcasts.

Sloped Floor

There is only one gallery, but when the seats are installed the effect will be as if there were two galleries, for the floor at the public end of the studio is sloped up so that people in the back seats can have a good view of the orchestra and conductor. On the ground floor a small rest room (and bar?) are being installed!

In this concert hall the B.B.C. hopes to possess for the first time an organ which is worth broadcasting. There is space underneath the stage for a man to walk in, in a crouched position, and a piano lift is being fitted so that, as in cinema practice, the piano can be dropped out of view when it is not needed.

The public does not go in at the main entrance to reach the concert hall, but generally will use the doors at the north-west corner of the building. When the concert hall is finished it will be a fine place.

Let us go down to the next floor. There are two studios in the sub-basement which have galleries. This is real news. All previous plans have only shown one galleried studio below pavement level, apart from the concert hall. The studio with the gallery immediately below the gallery end of the big concert hall is to be used for vaudeville broadcasts and there will be a small stage. The galleries of both these studios are on this floor, that is immediately below the main hall, and one has to go down to the sub-basement to reach the floors of these studios. There are listening cabinets adjoining the two studios and a waiting-room. Between the two galleried studios is a silence cabinet.

"Buffer State"

That is all of interest below ground in the tower itself, so we struggle up the concrete stairs to the "buffer state" above the concert hall.

There are no studios on this floor, partly because there might be sound leakage up from the concert hall; so on this floor we have the offices and B.B.C. Publications Department, a band room and store room.

The two floors above the "buffer state" are most interesting and are yet another proof that we shall get a more efficient broadcasting service on account of Broadcasting House.

At the north-east corner of the tower is a double-decker studio approximately the same size as studio No. 7 at Savoy Hill and in front of it three studios side by side, which will be used by the Talks Department. Each of these little studios is fitted with a silence cabinet and, I understand, the internal fittings will be specially arranged so that broadcast speakers could not possibly wish to be in better circumstances before the microphone.

Then we come to a corridor approximately in the middle of the tower and on one side of this is a large waiting-room and on the other a small double-height studio. On the next floor are the two special news studios, a play library and registry store.

Between the news studios is a triangular-shaped silence cabinet with glass windows leading into both the news rooms. Thus, while the news bulletin is actually being broadcast, a messenger can come from the corridor into the triangular silence cabinet and can pass late news through these little windows to the announcers, without even a break in the programme.

The music library is above these two special floors and takes up half of an entire floor in the tower. Special filing arrangements are to be used here so that records and sheet music can be stored and referred to in the most convenient way. The two floors above the library are full of studios—eight of them in fact—and one is a double-decker of about the same dimensions as the double-decker three floors below near the talks studios. An entirely separate flight of stairs connects these two floors, as their studios comprise the dramatic suite.

Listening Cabinets

There are two triangular listening cabinets, arranged in the same way as that for the news studios. Spacious waiting-rooms for the artistes are also found here. Everything will be done to put artistes at their ease before facing the microphone and that goes a long way towards getting the finest of broadcasts. Savoy Hill can teach many business firms something in the matter of magnificent reception, but there is a dearth of studio waiting-rooms; this will be remedied at Broadcasting House.

At the very top of the tower are two studios, one a huge room having twice the floor area of No. 1 studio at Savoy Hill and being itself about one-third the size of the concert hall in the basement. This studio also has exceptional height, although it can hardly be termed a double-decker and it has round windows which can be seen by passers-by in Portland Place. A listening cabinet adjoins this and separates it from a very small room which has been definitely designed for radio debates. This room is actually not in the tower, but "spreads over" a little towards the big end of the building removed from the entrance.

Outside the Tower

All the offices, the effects-rooms and the small rooms housing miscellaneous radio gear, microphone amplifiers and so on, are located outside the tower and on the various floors of the building.

I think that with a total of twenty studios, including numerous double-deckers, three galleried studios, two special news studios, three special talks studios and with the convenient arrangement of the whole building, we are bound to get better broadcasts from Broadcasting House.

Under My Aerial

HALYARD'S Chat on the Month's Topics
Illustrated by GLOSSOP

Summer Clubs

YEARS ago I used to belong to a wireless club, which met once a week during the winter and suspended its activities during the summer. Now, I feel as if I should like to join

Belong to a wireless firm

a club which did exactly the opposite.

What a boon a summer club would be to many of us! It would get us out into the open air in the very best part of the year and give us the opportunity of taking part in co-operative work of the most fascinating type.

Why not get your wireless friends to form a club this summer? You could very quickly make up an attractive programme of activities. For your first event you might arrange for each member to put his portable set through its paces at some supposed "dead spot" in the neighbourhood and then compare results over a cup of tea in the afternoon, or over bread and cheese and something to drink in the evening.

If you had an amateur transmitter in your club, you could arrange a delightful direction-finding or hunt-the-oscillator test.

Yes, indeed, the more I think of it, the more I like the idea of a summer club.

Why doesn't some enterprising holiday place start a summer club and so attract wireless enthusiasts for the holidays? Come to Aerial-ville and wireless!

What a great time we should have if we all got together, and what talking there would be! I should certainly bring George. He would be invaluable.

A Fine Question

Are you any good at arithmetic? Here's a question for you if you are. Divide £1,110 between 1,433 people. Done it? What's your answer to the nearest penny, no discount allowed for quick work?

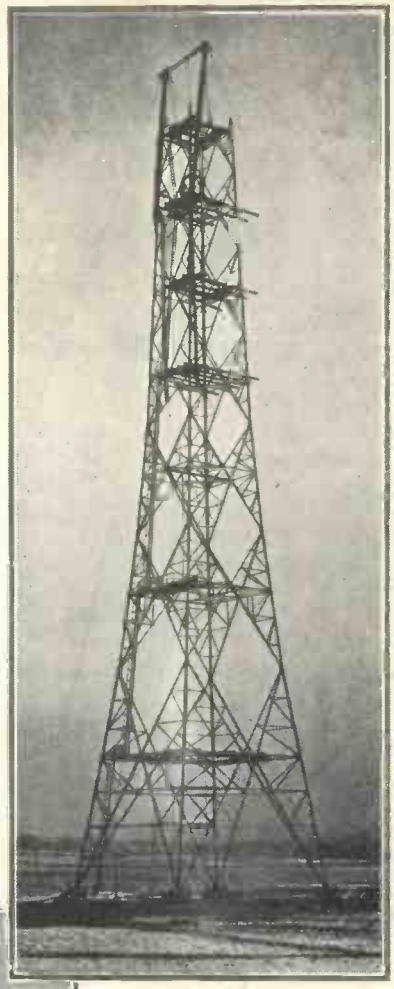
Fifteen shillings and sixpence. Right. I get that answer, too. But what is it all about? Well, it so happens that, in doing that little bit of simple arithmetic, you have found the average fine inflicted on the 1,433 wireless pirates convicted during the last financial year.

Do you think it is enough? I rather wonder if it is, when I remember that all of us openly and willingly part with our ten shillings annually. Still, I would rather pay my ten shillings than run the risk of being convicted as a pirate.

Speaking of pirates reminds me of the latest news about the pirate vans. You know I always take a special interest in them, and I suppose I shall continue to do so until I have the good luck to see one somewhere.

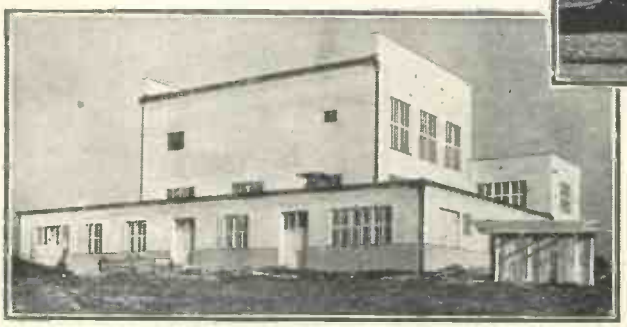
The news was that the new vans were to be made plainer and less recognisable. I wonder what that means? George thinks the idea must be to make the aerials look like luggage carriers and carry a few dummy portmanteaus on them.

The new vans were to be made plainer



ANOTHER SUPER-POWER STATION

One of the masts and the buildings of the new station going up at Liblice. It will broadcast on Prague's wavelength of 487 metres with a power of 120 kilowatts. The masts are about 500 ft. high



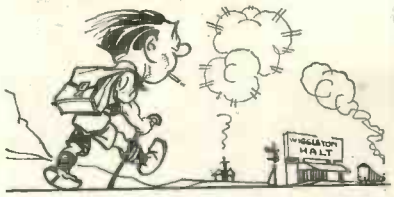
Getting America

How is it that there has always been, and that there still is, a very special kind of thrill in picking up an American station? You can get all kinds of foreign stations these days on the different wavelength bands, but none of them seem to excite the listener as much as the American stations.

I had an excellent example of this myself one night last week. Having wound a new short-wave coil, I was trying it in my adaptable three-valve set (detector followed by two low-frequency amplifying valves), chiefly with a view to finding the wavelength range.

For about an hour I had been going up and down the scale of the con-

UNDER MY AERIAL—Continued



I came across another station

denser and I had listened quite casually to English, French, and German stations.

Suddenly I came across another station and, as I tuned it in, I had a most wonderful thrill as I heard an American voice say in unmistakable and characteristic fashion, "Is that so?" I spent the rest of the evening trying for that American station and I caught it many times, only to lose it before I could identify it.

Strange, isn't it, how this old thrill for American stations persists? I wonder if a similar kind of thrill for English stations still persists in America.

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The Difference

"These mains problems are a dreadful nuisance, George," I said to my technical adviser as I joined him in my garden last night.

"Forget them and admire the beauty of the evening," said George.

"But I can't," I replied. "I want to get on with my work, and I am

Give your dealer a lesson

held up over the mains transformer. This isn't the first time I have been held up over a mains transformer, you know"

"And if you will persist in ordering such things without advice, it won't be the last time either," said George.

"But I did ask your advice over this particular one and I acted accordingly."

"Did you order accordingly?"

"Yes, George."

"Then everything is O.K."

"No, it isn't. I distinctly ordered a 250-vo't 50-cycle transformer. When the transformer arrived it was marked 250 volts 30 cycles. I don't know whether to risk using it or not."

"What you want to do is to give your dealer a lesson in making figures. He must have made a bad '5' in his order, and the manufacturer must have taken it for a '3'."

"Can I safely use a 30-cycle transformer on a 50-cycle supply, George?"

"Oh, yes."

"Then what is the difference between a 30-cycle primary and a 50-cycle primary in a mains transformer, George?"

"Ten bob."

"Ten bob. I don't understand you, George."

"You will when you get the bill."

And I did. It came this morning.

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Important Details

In my constructional work of the past month I seem to have had an unusual amount of trouble over those small, but important details of a component which either make or mar it.

To take a case in point, a defective terminal connection on a high-frequency choke. I had no end of bother with one of my receivers until I found the fault. One end of the wire of the choke winding had been soldered to a lug at the base of a terminal. This lug had turned, no doubt when I had screwed the terminal head down securely, and the end of the winding had broken off. How much better it would have been if that lug had been firmly secured in position.

Other troubles I have had lately have been with terminals on valve holders. These have developed with me an annoying habit of working loose, and there is only one way to tighten them, that is to take the holder off the baseboard and screw the terminal shaft up from underneath.

One thing I have had to set off against these troubles has been the slotted terminal heads of a resistance holder. I had mounted a resistance in its holder in such a position that I could not reach the heads of the

I could not reach the heads

two terminals with my pliers. I was puzzled for a little while to know what to do.

Then I noticed that the heads were slotted to take a screwdriver. With my screwdriver I was easily able to turn the heads and screw them down hard and fast.

You learn the importance of these little details in constructional work, but you do not always remember the lessons you have learnt when you buy new components. At least, I don't.

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Summer Conditions

Now that we have got well into the

Those nasty crackling noises

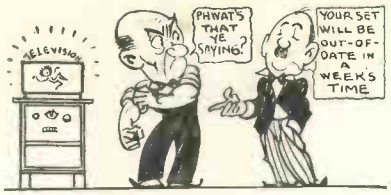
summer wireless season once again, I suppose you can say quite definitely which distant stations are lost to you until the winter. A rather more interesting and unusual point, however, is this: which distant stations are to you exclusively summer stations? In other words, which distant stations do you hear only in the summer months?

If you have kept anything of a record of your reception during the winter, you should be able to tell at once whether a station is new to you and whether it is likely to prove to be a summer station only.

There are several theoretical reasons why it should be possible for us to hear certain distant stations only in the summer months. The shifting of the Heaviside layer upwards is one reason. Another possible reason is the clearing of the atmosphere by heavy thunderstorm rain. Sometimes, after heavy rain in summer, you get reception conditions which compare very favourably with the best winter conditions.

I asked George if he had any summer stations only on his list, and he replied that he had one, and one only, and that he had had that one every summer since he had been a wireless man. For once in a while I was able to keep up with George. He referred, of course, to X's—those nasty crackling noises.

HALYARD ON THE MONTH'S TOPICS



Most unwise to prophesy in wireless

Old Sets

We all know how hard it is to keep our sets up to date, don't we? Sometimes we have to shut our ears most deliberately to those newcomers to the ranks of local listeners who tell us that they wonder how we can go on using that old set when it is so easy to make an "Up-to-the-minute Four," as they have done.

The B.B.C. seems to be in something of the same kind of position regarding 5XX. All over the country criticism of this transmitter is taking the form of comparison of the new regional transmitters with the old 5XX transmitter, very much to the disadvantage of the latter.

Many listeners in the north had never heard the good quality of a modern transmitter until Slaithwaite started its test transmissions. Previously such listeners had been dependent on 5XX, and poor old 5XX has come to be looked upon as a back number now in many northern districts.

Possibly it is the same with the B.B.C. as it is with us, a mere matter of expense. Modernising an old receiver is to us a matter of a few pounds, perhaps. Modernising an old transmitter is to the B.B.C. a matter of a few thousands of pounds.

It is most unwise to prophesy in wireless, but I don't mind risking the opinion that, when the B.B.C. engineers do modernise the old 5XX transmitter, the present modern regional transmitters will be made to look small for a while.

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The North Speaks

From the very first number the WIRELESS MAGAZINE has had many friends in the north of England, and it is a special pleasure to me to congratulate them on their possession of a regional station all of their own, so to speak. Already North Regional has made a great reputation as a transmitter. It now remains for the North Regional station to establish an equally great reputation for the programmes it transmits.

How are our northern friends going to see to it that the station takes the opportunity presented to it of speaking for the north and of putting northern ideals before the rest of the country?

Although I cannot claim to be a northerner myself, I know the north well enough to realise that that part of England has its own special ideals, special customs, special music, special folklore, and special dialects. Possibly the north also has its own special form of humour.

To mention one of these special things, the music of the north; is there any other part of the country which can produce better choirs or better brass bands? The more I think of it, the more I can see that the north has many special things to offer to us through its new regional station.

We shall listen to those northern programmes, no doubt, but I am certain of one thing, and that is that the north will listen to the north and that it will not care very much whether the rest of the country listens to it or not.

Great reputation as a transmitter

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Buy British

"Buy British and shop in the village." Rather a neat little slogan, isn't it? Let me tell you what caused it to come to my mind and then perhaps you will appreciate its significance.

During the Whitsuntide holidays I paid a visit to a remote country village in the new northern regional area. An old friend of mine in this village had bought for himself a magnificent eight-valve receiver of American make. When I first saw the set I naturally wanted to hear it, but my friend told me one of the valves had gone and so the set was out of action.

"Buy British and shop in the village"

"However," he said, "if you would like a twenty-mile motor ride, we'll go and buy a new valve."

I accepted the offer and we took a delightful motor journey twenty miles there and twenty miles back, through the most lovely scenery to and from the city where American valves were to be purchased. The new valve brought the set into action and it was splendid.

Think of it, though, forty miles to obtain a new valve! I could not help remarking that such a set was an expensive luxury. As there was a little wireless shop in the village where British valves could be bought, I made up my little slogan for the benefit of my friend. It is rather neat, isn't it?

RADIO AT THE VATICAN

THE Vatican radio station is now being put to use, and there is no fear that it will be a white elephant. The first occasion of general broadcasting, apart from experimental transmissions, was when the announcement was made in various languages of the commemoration of the famous encyclical of Leo XII on social problems and the organisation of the huge international pilgrimage to Rome in honour of the event.

The broadcast announcement was made in Latin, Italian, English, French, German, Spanish, Serbian, Croat, Dutch, Slovak, Hungarian, Portuguese and Polish.

There is one particular, at any rate, in which the Vatican radio station is unique, and that is the great number of languages in which official announcements can be made when desired. It is calculated that the presence of so many foreign prelates, priests and seminarists in Rome make it possible for the Vatican station to broadcast in at least twenty languages, including some Asiatic tongues.

It is announced that a "talking newspaper" or broadcast of news items of a scientific character will begin soon from Vatican City station under the auspices of the Pontifical Academy of Sciences. F. P.

We Test Before You Buy

JUST THE THING FOR THE HOUSEWIFE

A good portable is a boon to the lonely housewife—one is never quite alone when listening to a broadcast programme. This photo shows a Marconiphone set

AT this time of the year many set buyers turn their attention to portables. The idea of taking a radio on a picnic party, or to provide incidental music at the tennis court, has obvious attractions. Unfortunately, most portables on the market have necessarily limited output.

For one thing the size of the loud-speaker unit included in such sets is usually quite small. The more important reason for the limited volume of portables can be traced to the small size of the high-tension battery.

Even good quality portables can afford to use only a small power valve, such as a P215 type, otherwise the self-contained high-tension battery is run down at an excessive rate.

The trouble about portables worked out of doors is that volume *can* be increased, but only at the expense of quality. There is nothing worse than a small power valve badly overloaded and working a small balanced-armature cone loud-speaker in the open air.

So before actually buying a portable for the specific purpose of providing open-air radio entertainment we strongly advise readers to hear the set outside the store and not within the confines of its walls.

Paradoxically enough, the best portables are not portable, because they include heavy triple-capacity high-tension batteries or apparatus to provide high-tension current from the electric-light supply. Heavy batteries provide the only possible means of running a moderately large power valve unless the mains are utilised.

The popularity of the small high-tension battery eliminator fitted in place of the standard-capacity high-tension battery in many portables has led to a certain misconception, for it is often thought that extra volume can be obtained from a portable using one of these 120-volt mains units, whereas actually the advantage of the mains unit lies in its consistency rather than in any increased power from the output valve.

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Some deterioration in the performance of commercial battery sets may be experienced during the hot summer months through no fault of the makers. We are thinking of the way in which the high-tension battery is sometimes left in such a position that it is exposed to the direct rays of the sun, which tend to dry up the electrolyte inside the battery and so bring it to a premature end.

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The falling off in the strength of distant stations during the summer is to a large extent unavoidable, but it occurs to us that many set buyers with three-valvers will be using excessively short aerials, erected during the winter months to cope with urgent selectivity needs. Those who wish to increase the sensitivity of their sets during the summer months might try the experiment of a longer aerial wire.

The increased pick-up effect of the longer aerial wire will be of service in maintaining the strength of the more powerful foreign stations, at a time when the need for selectivity is not so great owing to the complete fading out of much winter-time interference.

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Many set buyers who have installed new sets during the winter will have been too busy receiving broadcasting stations to worry much about the two terminals on the back of the set marked "gramophone pick-up." For an outlay of £2 or £3 it is possible to convert the three- or four-valver into an excellent gramophone amplifier, especially if the set is worked from the mains.

In this way the loss of entertainment from foreign stations that are difficult or impossible to receive during the summer can be compensated by the reproduction of gramophone records.

FERRANTI METAL CONSOLE

Maker : Ferranti, Ltd.

Price : £29 8s. It must be remembered that this price includes a high-grade moving-coil loud-speaker of the permanent-magnet type. In fact, everything is included in this price except the aerial and earth.

Power Supply : A.C. mains. These may be between 200 and 250 volts and the periodicity may be from 40 to 100 cycles. By the addition of the Ferranti P11 transformer, price £2 2s. 6d., the set may be worked from supplies around 100 volts. No corresponding model for D.C. mains is available, nor is there a Ferranti three-valver for battery operation.

Power Consumption : This set is very inexpensive to run, the electricity consumption being less than that of a single 30-watt lamp.

Valve Combination : There are three receiving valves in this set. The first is a screened-grid high-frequency amplifier, the second is a high-magnification detector and the third is a super-power output valve, capable of passing on to the loud-speaker about 900 milliwatts undistorted power.

Controls : Considerable attention has been paid by the makers to ease of control. This does not mean that the number of controls has been reduced to the absolute minimum, but that each control included is at once easy to understand and non-critical to handle.

Undoubtedly the most outstanding control on this set is for tuning. Behind a neat escutcheon plate at the top of the set is an illuminated dial calibrated in medium and long wavelengths. There are also degree divisions between these calibrations.

To avoid confusion in reading these calibrations the makers have arranged a very clever wave-change switch device. When the centre knob is switched for medium-wave reception, the long waves are covered up and when the long waves are being read off, the medium waves are covered up.

To tune the set, two knobs are provided, one on each side of the wave-change switch. The right-hand knob operates the gang condenser of the two tuning circuits as well as the illuminated dial. The left-hand knob is a tuning trimmer. Tests show that many stations can be received simply by turning the main tuning knob control and ignoring the auxiliary control. In other words, tuning is more or less a one-knob affair.

We have not yet exhausted the controls of the Ferranti Metal Console for on the extreme left is a volume control knob, which is actually a variable condenser in the aerial lead. On the extreme right is the reaction control. This is rather out of the ordinary, because in one direction reverse reaction can be applied, so as to flatten the tuning to improve quality in the reception of powerful or nearby stations.

From notes made at the time of our tests, we are able to say that operation of the Ferranti set controls is delightfully convenient. The volume control really does reduce the local stations to moderate volume requirements and the reaction control is certainly better than the average, both in smoothness and ability to build up the strength of the more distant stations received.

As for the wave-change switch device, that has to be tried to be appreciated. We must congratulate the makers on their introduction of this real aid to simple operation. The wave-length calibrations are from 200 to 550 metres in steps of 50 metres on the medium waves and from 1,000 to 2,000 metres in steps of 200 metres on the long waves. We found these calibrations sufficiently accurate to enable us to locate distant stations whose wave-lengths were known.

Sensitivity: Tested with our 60-ft. aerial, the Ferranti Metal Console brought in a very good selection of the more powerful foreign stations, with a quality seldom obtainable from a three-valver.

Due to the calibrations, we had no difficulty in logging twenty-six foreign stations on the medium waves in as many minutes. We got the impression that the set is better on the medium waves than on the long, though for the reader's guidance we must say that six long-wave stations were logged at ample volume.

Selectivity : As the makers take care to point out, great selectivity in a three-valver must entail some loss of high notes. The aim in designing this set has been to reproduce moderately strong stations at very good musical quality without appreciable loss of high notes. But knowing the average set-user's craving for distant-station reception, the makers have provided, in the volume control, a ready means of making the Ferranti Metal Console as selective as any other three-valver provided with two tuned circuits.

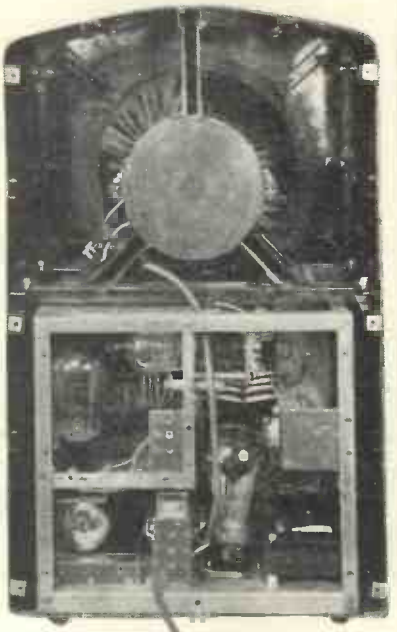
We found that by setting the volume control to its half-way position the selectivity was such that Midland Regional on 398 metres could be received quite clear of London on 356 metres. Similarly, Hilversum on 298 metres was clear of London. On the long waves, Eiffel Tower and Radio Paris were clear of Daventry 5XX, although the intervening Zeesen naturally suffered from interference.

Quality : Undoubtedly the best feature of this well-designed set is the quality of the reproduction. It is definitely better than any other three-valver yet tested. Indeed, the well-balanced tone was found distinctly soothing after so much artificial bass and reedy top-note reproduction as rendered by less well planned instruments.

We consider the makers' outlook in striving after good quality from a small number of stations rather than the reception of dozens of stations of indifferent quality is fully justified and will be followed by others.

Appearance : The shape and finish of this Ferranti Metal Console is fairly described as neat and dignified.

Summary : Designed throughout to give good quality reproduction in the reception of powerful or deeply modulated broadcasting signals, the Ferranti Metal Console is an ideal self-contained installation for fastidious listeners who gain more pleasure from good quality than extensive logging.



COMPACT DESIGN

Note the permanent-magnet moving coil loud-speaker mounted at the top

PLEASING APPEARANCE

The set can be obtained in either black, brown or grey rexine finish. It is completely self-contained except for aerial and earth

VOLTRON HORNET TWO-VALVER (KIT SET)

SMALL AND COMPACT

Interior view of the Hornet two-valver. The compactness of the set can be gauged by comparison with the valves

Maker: Voltron Electric, Ltd.

Price: £1 9s. 6d. This is, of course, for the bare kit and does not include the necessary two valves, nor the batteries. If standard valves are used, the detector will cost 8s. 6d. and a small power valve 10s. 6d. A slightly larger power valve, such as the P2, would cost 13s. 6d. We should like to emphasise the importance of choosing a pair of good valves in a set of this kind. Success depends very largely upon the choice of valves and upon an adequate power supply.

These remarks are in no way intended to belittle the importance of the set design, but are offered in the hope that the several good points of the Hornet two-valver may be achieved by the purchaser in the only possible way—with good accessories.

Power Supply: Batteries are used for this set and are externally connected by means of a neat multi-way cable coming from the back of the set. The size of the high-tension battery needed for this Voltron set depends almost entirely upon the power valve selected.

For example, if a Mullard PM2 type of power valve is used, taking only 5 or 6 milliamperes at 120 volts, the standard-capacity high-tension battery will provide economical service. But if the user wants equally good quality only with greater volume, thereby necessitating a larger power valve such as the Mazda P220A, a double-capacity battery should be used, because the total anode current at 120 volts will certainly exceed 7 milliamperes, which is about the maximum economical rate of discharge for the standard battery.

Power Consumption: We tested this set with the P220A type of power valve and the total anode-current consumption was 12 milliamperes, quite within the capabilities of a double-capacity high-tension battery. The filament current consumption was .3 ampere, so a 30-ampere-hour accumulator would give nearly one hundred hours service per charge. For normal use the PM2 type of power valve was found quite satisfactory.

Valve Combination: As one would expect in a simple two-valver, the valve combination of this Hornet model consists of a leaky-grid detector and a transformer-coupled power valve. In considering the valve combination, the question of using a pentode output valve may arise.

This is, in fact, just the sort of valve combination where a pentode shows to good advantage, providing just that little extra amplification needed when receiving all but the very close at hand broadcasting stations. We can recommend a pentode valve with this set, but only if the user is prepared to install double- or treble-capacity batteries.

From a combination consisting of a detector and a transformer-coupled power valve, one is justified in expecting good loud-speaker reproduction within the service area of B.B.C. broadcasting stations. Such results can be obtained only with an external aerial and unless conditions are particularly favourable it is advisable to erect an outside aerial and to make the earth as efficient as possible. Thus provided, the Hornet two-valver will more than justify its valve combination. Under very favourable conditions the set will not only receive the local station but a selection of foreigners as well.

SIMPLE TUNING CONTROLS

The clearly-marked controls of this midget receiver make tuning an easy matter for the family

Controls: For such an inexpensive set the controls on the Hornet two-valver are particularly neat and easy to understand. The front of the set is clearly engraved for the different controls. There are two similar sized knobs on the left and right for tuning and reaction respectively. These knobs actuate dials engraved in degrees from 0 to 50. Such open scales are highly desirable in a set designed for the reception of only a few stations.

At first sight, the use of a degree-divided dial for the reaction control may seem a little unnecessary. But experience shows that non-technical set users often exceed the permissible application of reaction and tune in stations with the set in partial oscillation.

By providing the non-technical members of the family with the settings for both tuning and reaction condensers for the stations within range, one avoids the possibility of overdoing the reaction.

Below the two main controls are mounted two switch knobs. The left-hand switch is for wave changing. It is pulled out for medium waves by short-circuiting the long-wave winding. The right-hand switch is in the filament circuit and serves to switch the set on and off.

Of the controls, we can say from tests that tuning and reaction are quite smooth.

Selectivity: The ability to separate the two Brookman's Park stations with our standard 60-ft. aerial twenty miles distant was very marked during tests of the Hornet set. The dual-range tuning coil has obviously been designed to cope with the reception and separation of B.B.C. regional stations.

The London National was at its maximum at 15 degrees but had disappeared again at 10 and 20 degrees. London Regional was at its maximum at 26 degrees and had disappeared at 22 and 30 degrees. It will be seen, therefore, that a clearly defined silent space was recorded between the limits of audibility of the two local stations.

Sensitivity: On the medium waves we got Midland Regional at 31 degrees. This station came in at quite fair loud-speaker strength, indicating that, with careful manipulation of the reaction control, half a dozen or so foreign stations could be successfully logged. As a matter of fact on the long waves we got Radio Paris at 44 degrees and Eiffel Tower at 35 degrees. These were in addition to Daventry 5 X X at 38 degrees.

GECOPHONE D.C. FOUR-VALVER

Maker: General Electric Co., Ltd.

Price: £25, complete with valves.

Power Supply: D.C. mains. This set is suitable only for electric supplies of the direct-current type. By means of a special arrangement of tappings on a terminal board underneath the set it is possible to adapt the set for all supply voltages between 195 volts and 250 volts.

Power Consumption: For a D.C.-mains-operated set, the running costs of this model are unusually low. The makers state that the consumption is 60 watts at 220 volts, providing sixteen hours running for the cost of one unit of electricity.

Valve Combination: As this is a D.C. mains set, with a series resistance in each filament lead, it is absolutely essential to use the specified Osram valves. There are altogether four valves, two for high-frequency amplification, a detector and a super-power pentode output valve. To insert these valves we had to lift the lid of the set and remove the screening covers. On lifting the lid the mains are automatically disconnected from the interior of the set. This is a very useful and commendable safety device.

The use of two stages of high-frequency amplification has made possible the inclusion of three separate tuned circuits. This aspect of the valve combination leads one to expect considerable selectivity. And the fact that the output valve is a super-power pentode implies an ability to work a large moving-coil loud-speaker to full capacity.

Controls: Although there are three separate tuned circuits in this set, tuning is done by means of a single knob, thanks to the inclusion of a three-gang tuning condenser. The knob actuating the gang condenser also rotates the dial indicator, which is the only fitting on the front of the set, all the control knobs being at the right- or left-hand ends of the cabinet.

At the left-hand side are the three main control knobs. One is the tuning control, another is the wave-range switch, providing medium and long waves, and the remaining knob is for volume control. At the right-hand side of the set is a knob for reaction and a mains on-off switch. At the back of the cabinet are sockets for the loud-speaker and aerial and earth leads.

This Gecophone set is notable for its ease of control. Half an hour's handling of the set convinced us that the operation is really delightful. Probably the tuning is the best feature of control. The dial is calibrated in medium and long waves respectively, from 250 to 550 metres and 1,000 to 2,000 metres. The dial is also divided into 100 degrees.

Control of volume is done by means of a condenser in the aerial circuit. The strength of powerful stations can be greatly reduced by this control, but not to the point of inaudibility. As is usual with a series condenser volume control, it acts also as a selectivity control.

The set's selectivity begins to be affected when this control knob is set at its mid-way position. In addition to enabling the swamping effect of powerful local stations to be reduced, this combined volume and selectivity control was found extremely useful in obtaining complete clearance between certain adjacent high-power foreign stations.

All the controls work with extraordinary smoothness. The wave-change switch has a precision all too rare in the sets we generally have on test.

SAFETY FIRST

The D.C. mains supply is automatically cut off from the set when the lid is raised

Selectivity: As already mentioned, the inherent selectivity of this set is of a high order, due to the three tuned circuits. Our tests were carried out some twenty miles from Brookman's Park with a 60-ft. indoor aerial.

With reaction at zero and the volume control at its halfway position, the selectivity was certainly remarkable.

The London National was tuned in at its maximum at 18 degrees, corresponding very nearly to the 261-metre calibration. Complete elimination of this very powerful local station was recorded at 16 and 21 degrees, a total spread of only 5 degrees.

The swamping effect of the London Regional was also limited in a remarkable way to only four degrees. Thus it came in at 53 degrees at maximum strength and had completely disappeared at 51 and 55 degrees.

Perhaps the most exemplary aspect of the selectivity of this set is that it is just as good on the long waves. Thus Daventry 5XX was tuned in at 72 degrees and tuned out again at 70 and 74 degrees.

Because of this very unusual long-wave selectivity we were able to get Zeesen quite clear of Daventry's signals.

Another good point about the selectivity of this set is that it is not achieved at the expense of quality. There appears to be no audible cutting off of the high notes, although possibly the pentode valve compensates for whatever slight loss is actually incurred.

Sensitivity: There is no limit to the number of stations receivable on this set. During the late evening we obtained no less than thirty stations on the medium waves, all at excellent strength and quality. The accuracy of the calibrations and the ease of tuning should certainly enable every user of this set to obtain a host of foreign stations as alternatives to the locals.

Quality: The pentode valve is corrected so that the quality suffers from none of the high-note "peakiness" associated with early pentode practice. In fact there is a crispness about the reproduction very pleasing when compared with the so-called mellow tone delivered by many less well-designed sets.

ATTRACTIVE WOODEN CABINET

All the controls of this Gecophone set are mounted on the sides of the walnut cabinet

Alan Hunter on SUMMER RADIO

IF I start this article by telling readers how to take the loud-speaker into the garden—in order to enjoy summer radio—I shall not be merely asking for trouble, but getting it! For if there *is* a blot on the bright escutcheon of radio, it is the raucous loud-speaker pouring forth its over-loaded unmelodious cacophony from over the garden wall.

Vastly Pleasing

While registering a protest against such a violation of the serene seclusion of my humble acres, I must admit that there is something vastly pleasing about out-of-doors radio melody, provided it is melody and not a miserable travesty.

Many readers will undoubtedly be sitting out in the garden this summer, literally tied to their hobby by a length of twin flex. Before attempting to extend the loud-speaker leads into the garden readers are advised to see that the set has an output filter system fitted between the power valve and the loud-speaker.

Many sets are sold and made without such filters and ill-effects are not noticed when only a few feet of loud-speaker wire are needed. The extension of the wire to, perhaps, 100 ft. tends to produce instability and loss of high notes.

The loss of high notes is partly due to the by-passing effect of the capacity formed by the two leads and earth. This loss cannot, of course, be made up by the use of an output transformer or filter, unless it so happens that the transformer or choke has a rising characteristic, which would, of course, compensate to some extent for the high-note loss of the extension capacity.

In some public-address systems, where very long loud-speaker leads are needed, the capacity effect of the leads is sometimes overcome by the use of two transformers. A step-down transformer is fitted to the output of a set, with extension leads connected to the secondary; at the remote end the leads are taken to the primary of a step-up transformer, and the secondary goes to the loud-speaker. By this means the capacity effect of the leads is greatly minimised.

The amateur might care to try the effect of raising the extension leads from the ground. Sometimes the reduction in the capacity effects brought about by this means noticeably reduces the high-note loss.

Output Circuit

The use of an output circuit will divert the direct current of the anode supply of the power valve from the loud-speaker winding and only the low-frequency oscillations will be carried along the extension wire.

Often when a loud-speaker is taken into the open air its tone sounds thin and cracked, due to the fact that it is no longer assisted by the sound reflections and reinforcements of the four walls of the room.

The best advice one can offer is to increase the capabilities of the power valve—by an increase in anode volts and grid bias—so that more undistorted power can be handed on to the loud-speaker.

Too many listeners—especially those with portables—make the mistake of overloading their puny power valves. The resulting increase in noise, as distinct from good reproduction, is the cause of much justifiable acrimony among otherwise friendly neighbours!

Irresistible Temptation

Generally, the portable type of set is fitted with only a small power valve, simply because only a small power supply can be contained—and borne!—in the portable cabinet. These sets are designed for moderate volume, but the temptation to get more than moderate volume is almost irresistible when portables are taken from their accustomed resting place indoors to a "place in the sun."

Turning now to quite a different aspect of summer radio—what of foreign stations? A lot has been written—perhaps I have been guilty myself in this respect—about the difference in this year's foreign station reception and the reception, or lack of it, that has characterised previous summers.

Well, I suppose the high-power stations do to some extent offset their inevitable attenuation over long distances.

And the fact that, in daylight, the Heaviside layer does not reflect wireless waves, but allows them to pass into space, must mean that distant stations strong enough to reach the set before being completely attenuated are reproduced without the fading experienced when a reflected ray is also being received.

Recent Tests

I have recently made some tests to determine the summer-time reception possibilities of certain distant stations. But as this article is written before May is out I cannot say whether the stations that passed these tests with flying colours will be worth while in July.

Using a four-valve all-electric set I have obtained very passable daylight reception from Brussels No. 1, 509 metres; Langenberg, 473 metres; Strasbourg, 345 metres; Brussels No. 2, 338 metres; Bordeaux, 304 metres; and Hilversum, 298 metres. The early-morning concerts from Hilversum and Langenberg are especially worth hearing.

If a general fading out on the medium waves is inevitable during the hot summer evenings, there are always the long-wave stations to keep us in touch with most countries of Europe.

Only atmospherics will mar otherwise perfectly reliable long-distance reception on the upper band of broadcasting wavelengths.

We can keep in touch with Holland through Huizen on 1,875 metres; with France through Radio Paris and Eiffel Tower, on 1,725 metres and 1,445 metres respectively; with the Soviet through Moscow Trades Union on 1,304 metres; with Poland through Warsaw on 1,411 metres; with Sweden through Motala on 1,352 metres; with Denmark through Kalundborg on 1,153 metres; and with Norway through Oslo on 1,071 metres.

Long-wave Reliability

Every good three-valver should, with an average aerial, pick up most of these on the loud-speaker during the summer months. In fact it is in the summer that the unfailing reliability of the long waves as compared with the medium waves is conclusively proved. So if the set is not up to scratch on its 1,000-to-2,000 metre waveband make it so for the summer.

UP-TO-DATE RHYMES

THESE nursery rhymes are still as they were. My recent effort to modernise them by issuing a revised version has not been over-successful. Royalties, so far, total 2d.

Such persistent adherence to ancient tradition (I refer to the rhymes) is a very sad thing indeed, because how can our children know anything of The Big Things in Life if their nursery poetry is so decadent? I mean, "Pussies in the Well" teaches them nothing about the screened-grid valve, does it?

So once again I append copious extracts from my book. And if I give you any more, you needn't buy the darned thing, because you'll have had the lot. Please don't make me do that—my wife will be annoyed. She's depending on the royalties for a new evening frock.

Here, then is "Hey diddle diddle" as it should be :

Hey diddle, diddle,
The grid's in the middle—
'Twixt fil-ament and plate.
Father'll play fun
If he finds you've gone
And reversed their usual state.

That, I think, is an improvement. I think. Anyway, hasten on to :

Hickory dickory dock,
The mouse ran up the clock.
The clock pipped ten,
And the time-signal men
Have never got over the shock.

Yes, much better. No, I will not allow the Editor to give you my address. I am much too modest, really. Now memorise this :

There was a little man
And he had a little set,
With an aerial and a nice little earth, earth, earth.
But a licence he had not
(He said that he forgot),
From a magistrate he realised its worth, worth, worth.

That'll show these pirates, and be an awful warning to their children. The person who said "awful" is right will hear further about it.

There is still that inane verse, "Marjorie Daw" to be dealt with. Thus :

See, saw, Mister Daw,
You shall have a new speaker.
When Margie's not there, it'll help you to bear
Her absence, although it is weaker.

Well, yes, perhaps it was. The last line, for instance. Just a little—never mind. Read about Mary :

Mary had a little bias
For her H.T., you know.
And every night when she went out,
Her H.T. was sure to go.

I would point out that H.T., in this case, means Horatio Tomkins.

Continuing, there is —— (Not!—Ed.)

All right. Er—you won't forget about the royalties and the wife's new frock and that, will you?

W. M. G.

SUPER POWER from your SUPER 60

This article by ERNEST KANN will interest all who have built the battery-model Super 60. It explains how to add a super-power A.C. output valve with the minimum of alteration. The scheme outlined has the approval of W. James, and is recommended as a good compromise for those who want something between the battery model and the complete mains version.

READERS of WIRELESS MAGAZINE will be unanimous in congratulating W. James on the birth of his latest offspring, the Super 60. To design a receiver of such exceptional range and selectivity, and yet to keep the cost of its components within a limit of £12, is a well-nigh incredible thing even for Mr. James, who has long accustomed us to expect from him the apparently impossible, to have achieved.

For Battery Users

Mr. James has earned the special gratitude of the many enthusiastic constructors who are restricted to the use of "dry" batteries for their high-tension supply.

That very consideration, however, has compelled Mr. James to incorporate in his design an extremely modest output stage, and it is probable that the fortunate minority who have the unlimited power of A.C. mains at their disposal will look upon that last stage, after all that precedes it, as an anticlimax, for its undistorted output is at the most 150 milliwatts.

Minimum Alteration

The present writer has not endeavoured to make an all-mains receiver of the Super 60. The arrangements about to be described demand only high tension from the mains, and *involve the minimum of alteration to the receiver* in order that it may be readily restorable to its pristine form whenever it is required for use in places where A.C. mains are not available.

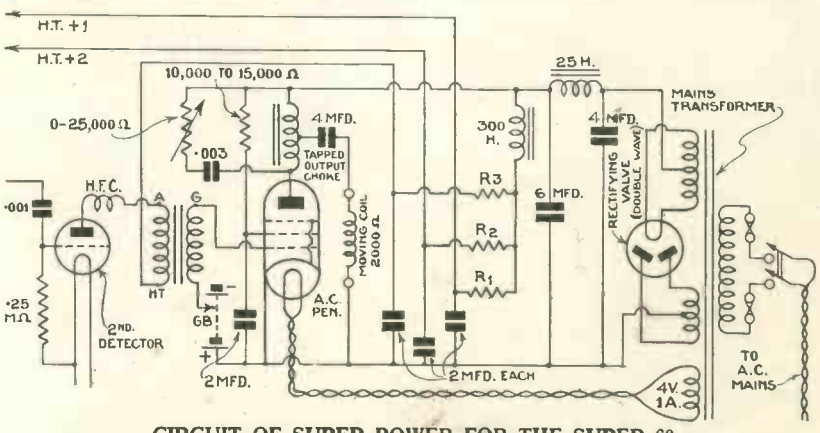
At the same time, since the cost of the original receiver is so remarkably low, the writer has felt justified in "spreading" himself a little as regards expenditure. Even so, the total cost will not be prohibitively high for many readers, especially if they will bear in mind that it will provide them with an A.C. unit which will serve with but little modification for such mains receivers as they may wish to build later on. And now to business.

Our first task is to choose the output valve. Now, the output from the second detector is designed to work into a Mullard PM2, which, at the recommended 120 volts on the anode, requires a grid bias of about —9 volts; therefore, wishing as we do to alter the receiver no more than is strictly necessary, we must look for a valve which, taking as nearly as may be the same grid swing, will give the greatest power output.

Remarkable Valve

By a most lucky dispensation, one of the most remarkable output valves yet put on the market happens to be exactly right for our purpose; the Mazda AC/Pen, which when biased to its optimum of only —10 volts, with 250 volts on the anode and 200 volts on the priming grid, gives out no less than 1,500 milliwatts of undistorted output; that is *at least ten times as much* as the power mentioned above.

This performance on so small an input makes the AC/Pen not, indeed, the most powerful output valve procurable, but certainly the most efficient, and enables us to get almost "LS5a" volume without having recourse to an extra stage of low-frequency amplification nor to



CIRCUIT OF SUPER POWER FOR THE SUPER 60

This diagram shows the arrangement of the mains unit and the special output circuit for the A.C. pentode

dangerously high anode voltages.

In designing an appropriate mains unit we must first take stock of the required output. The average consumption of the AC/Pen is 30 milliamperes for the anode and 5 milliamperes for the priming grid, whilst the preceding stages will be taking 10 milliamperes more or less between them; so we shall not be far wrong if we legislate for 50 milliamperes at 250 volts.

Valve Rectification

As this is rather too much for the HT1 Westinghouse rectifier, which in other respects would have been convenient, we will employ full-wave rectification by valve. The Marconi U5, the Philips 506K, or the Mazda UU120/250 look about right for the job, but the leading valve makers issue charts of curves which will enable you not only to choose an appropriate valve, but to read off, against D.C. volts output at a given milliamperage, the required A.C. (R.M.S.) input, which you will need to know when you come to specify the high-tension secondary winding for your mains transformer.

When consulting these curves, do not forget that they do not allow for the voltage absorbed by smoothing chokes. This loss with a current of 50 milliamperes may be anything between 5 and 25 volts, assuming the D.C. resistance of a good 25-henry choke to lie between 100 and 500 ohms, and you would therefore have to read the curve at some point between 255 and 275 volts D.C., according to the particular choke you are going to use.

Besides the high-tension secondary, three secondary low-tension windings should be ordered; the first to suit the filament of the selected rectifying valve, the second 4 volts 1 ampere for the heater of the AC/Pen, the third 4 volts 3 amperes.

A Little Foresight

The last mentioned is not used for our present purpose, but the far-seeing reader will include it, as it costs very little extra and will make the transformer suitable for feeding such all-mains receivers as he may desire to build in the future.

The cost of this eliminator, allowing for best components throughout, does not exceed £7 10s., unless a Ferranti safety-box (£1 10s.) is desired—a sensible precaution where there are children.

You will find in the circuit diagram nothing unusual except perhaps the arrangement of the two chokes. The output stage is smoothed by a single choke, whose inductance on a 50-milliampere load need not be better than 20 or 25 henries, but whose D.C. resistance should be low in order not to absorb excessive volts.

In this connection it may be mentioned that the Rich & Bundy choke type E104 has a D.C. resistance of only 90 ohms, and thus will cause a drop of no more than 4½ volts. The Partridge & Mee choke type 2 (280 ohms) is also very fine.

A second choke gives special smoothing to the preceding stages by virtue of its enormous inductance (300 henries nominal) of 200 henries on 10 milliampere load. Its resistance is necessarily high (3,000 ohms) and will absorb about 30 volts in the present instance, but that does not matter in the least, for we have 100 volts or so to throw away here, and can afford to be generous. Chokes of this kind have only recently come into regular production and you can choose between Varley and R.I.

Many semi-knowledgeable people will tell you that the pentode gives thin and high-pitched reproduction. If they are not merely repeating what they have heard from others, but are speaking from personal experience, an inspection of their receivers will probably reveal that they are treating the pentode exactly as if it were a small triode power valve, even to the extent of connecting the loud-speaker directly in its anode circuit.

This is grossly wrong, especially in the case of moving-iron loud-speakers, for the impedance of these, as is well known, rises rapidly in sympathy with rising frequency, and since it is a tendency of the pentode to deliver a uniform *current* at all frequencies, enormously high *voltages* will be caused across the loud-speaker on high notes, to the detriment both of the reproduction and of the durability of the apparatus concerned.

Therefore, the AC/Pen, in common with other pentodes, requires a carefully balanced output circuit, and for details of this the reader is invited to refer to Mr. James' concise but adequate article on page 186 of the March WIRELESS MAGAZINE ("Getting the Best from a Pentode"). Even if the recommendations there given be followed, as they ought to be, the pentode must not be expected to achieve the impossible by delivering

A MAINS PENTODE

This is the Mazda Ac/Pen valve, suitable for the Super 60 when adapted for mains working

a true bass *through a moving-iron loud speaker*, which is dumb below 150 cycles or thereabouts.

Mr. James' low-consumption output stage was not intended for a moving-coil loud-speaker, and he was therefore quite justified in designing it, in the interests of economy, with no regard for the retention of a true bass, which the moving-iron instrument would in any case be incapable of reproducing.

Moving-coil Instruments

It is, however, reasonable to assume that a moving-coil loud-speaker will be used by most listeners, who will have been keen enough to equip themselves with the powerful output stage which is the subject of the present article.

A good moving-coil reproducer will deliver true bass to the listener provided it be fed with it, and in order to ensure this it will be advisable to substitute for the specified Ferranti AF8 transformer, which is quite good enough for a moving-iron reproducer, an AF5 of the same make; the wonderful inductance of

SUPER POWER *from* YOUR SUPER 60—Cont.

the latter will give the bass a fighting chance.

In the interests of the finest reproduction the experimenter may like to try the effect of a valve of somewhat lower A.C. resistance in the second detector position, giving it the full 150 anode volts in conjunction with a grid leak and condenser of 250,000 ohms and .0001 microfarad respectively.

The Mazda L210 and the Mullard PM2DX look the most promising for this purpose, but in view of the higher anode current passed by each of these valves it will be advisable to use with them the intervalve transformer made by Partridge & Mee, which maintains a working inductance of 75 henries even with 15 milliamperes in its primary.

The second detector stage arranged on these lines will give virtually distortionless rectification without the added complication of resistance feeding the transformer; it involves no alteration to the wiring, and the superior characteristics of the transformer are well worth its extra cost.

Matching the Loud-speaker

The matching of a loud-speaker to the pentode is more critical than with a triode, but is quite simple. For this purpose the AC/Pen must be assumed to have an A.C. resistance of 4,000 ohms and the centre-tapped choke, with the tone-controlling device recommended by Mr. James, will suit the average moving-iron loud-speaker or a high-resistance moving-coil instrument of 2,000 ohms, such as the makers of Epoch speakers are always ready to supply.

If the reader already has a low-impedance loud-speaker, or has set his heart on one of the many makes of speaker which are available only with low-impedance speech coils, then a step-down transformer will be required, and the tone-correcting components must be placed across its primary. The proper ratio for the step-down transformer for the AC/Pen is found by dividing 8,000 by the impedance in ohms of the speech coil, and taking the square root of this quotient.

As regards the variable resistance-cum-condenser tone-compensator, it is suggested that, with the superior frequency-to-impedance character of the moving-coil loud-speaker, values of respectively 25,000 ohms maximum and .003 microfarad will suffice.

If it is found that with the second detector stage modified in the manner described the AC/Pen overloads on a strong signal (for remember that its grid-swing is small), a post-detector volume-control may be fitted in the conventional manner. This control will be useful, too, in quite another way.

The Super 60, if only by virtue of its frame aerial, will be built by many flat-dwellers, whose neighbours will perhaps not suffer gladly great volume at all times, and by means of the *post-detector* volume control, it will be possible to restrict to a constant moderate level the AC/Pen's great power output, whilst still keeping at maximum the *pre-detector* volume control already incorporated in the receiver, and thus maintaining the remarkable distance-getting properties for which the Super 60 is so noteworthy.

Volume and Quality

The writer hopes that his plans for an output worthy of the Super 60 may be appreciated, carried out and found satisfactory by all who wish to add to that fine receiver the great volume combined with faithful reproduction which the realistic reception of well-transmitted orchestral music demands.

In his humble opinion, not the least attractive feature of his suggestions is that *they may be applied (assuming the presence of A.C. mains) to almost any receiver fitted with a single small stage of low-frequency amplification*, so that by their adoption many a modest three-valver may be brought up to a really impressive standard of performance.

RECOMMENDED COMPONENTS FOR SUPER-POWER OUTPUT

CHOKES, LOW-FREQUENCY
1—Rich & Bundy 25-henry, type E104, £1 5s. (or Parmeko type 2).
1—Varley 300-henry type EP16, £1 5s. (or R.I.).
1—Savage tapped output, 18s. 6d.

CONDENSERS, FIXED
1—Dubilier 4-microfarad, type LSB, 8s. 6d. (or T.C.C., Hydra).
1—Dubilier 6-microfarad, type LSB, 12s. (or T.C.C., Hydra).

TRANSFORMER, LOW-FREQUENCY
1—Ferranti AF5, £1 10s. (for 20,000-ohm valve).

or
1—Parmeko, £1 15s. (for 10,000-ohm valve).

TRANSFORMER, MAINS
1—Special model (Claude Lyons, Parmeko, or Rich and Bundy).

LOUD-SPEAKER
1—Epoch Domino with 2,000-ohm coil, £6 15s.

VALVES
1—Mazda L210, 8s. 6d. (or Mullard PM2DX).
1—Mazda AC/PEN, £1 7s. 6d.
1—Mazda UU120/250, £1 2s. 6d. (or Marconi U5, Philips 506K).

SUNDRIES
1—Ferranti safety box, £1 10s.

MORE SUPER 60 QUESTIONS

Answered by W. JAMES

Can I use 2-microfarad condensers in the set instead of the 1-microfarad as I have several on hand?

Yes, of course. Condensers of 1 microfarad are all that is necessary, but 2-microfarad condensers may be used without affecting the results in any way.

What about a push-pull stage?

A push-pull output stage may be used if you fancy this type of output circuit with small battery power valves. The current taken by the set will remain within the economical discharge rate of the largest of batteries.

Increase the voltage of the detector so as to fully load the output stage with the least distortion. With a mains unit having a moderate output, the push-pull stage will be worth having.

The volume will, of course, be greater from many stations than when the single small output valve is used.

Should I fit grid bias to the screen-grid valves as I have about 150 volts of high-tension available?

Yes. A dry cell of .9 volt may be connected to the grid-circuit return wires of the two screened-grid stages. These wires now connect to the negative side of the low-tension battery. Use separate grid-bias batteries to avoid trouble. The results will be a little better for the addition of the bias as suggested.

The Other Side of Sponsored Programmes

Several Continental stations which are very well heard in this country are now giving programmes provided by advertisers' money, and here some novel aspects of this way of providing broadcast material are discussed by Kenneth Ullyett.

THERE is a great deal of glib talk at the moment about a new possibility of the B.B.C. devoting part of its programme time to material paid for by advertisers, and not by listeners' licence money.

Many of these rumours are started by people who have some commercial interest in the provision of sponsored programmes for other stations. Rumours have been going round ever since sponsored programmes came from the Irish transmitter, but so far as the B.B.C. is concerned they are still only rumours.

What people are apt to overlook is the fact that broadcasting is an expensive business, and that even the biggest business concerns to-day cannot afford to spend advertising money in directions which are not absolutely profitable.

There are three things that one must consider as an off-set to the belief that sponsored programmes are bound to come in this country because they will be more popular than state-provided programmes.

Value for Money

The first of these is value for money. If an advertiser finds he gets more response to his newspaper advertising than he does to his radio advertising, then he will not continue to broadcast just for the fun of the thing.

The second point is newspaper competition. The big newspapers have large financial resources, and it is an open secret that they would not take kindly to sponsored programmes if the radio advertising came in direct opposition to their own interests.

A third point is a legal or, rather, political one, and raises the question as to whether, unless the B.B.C.'s charter is considerably altered, it will ever be possible for outside interests to provide programmes through the medium of the B.B.C.

The first point, advertising value for money, is not one which concerns listeners and is one which even the advertisers can settle only by putting the matter to test and carrying on sponsored programmes for five years or so, taking account of the return for the advertising revenue. If, at the end of that time, they found that radio advertising did not pay, then we should have, of course, to return to full state control. Listeners would certainly suffer while these transitions took place.

Advertisers Satisfied

As marketing conditions and public opinion are so different in America, one cannot use American broadcasting as a guide to the sort of value an advertiser might expect to get from radio publicity in this country. All that one can say is that at present the various concerns who use Radio Paris, Radio Toulouse, Luxembourg, and so on, seem very satisfied, and listeners are, too, especially on Sundays, when these sponsored programmes provide very agreeable light fare!

The question of newspaper opposition is a bogey which I hope the advertising interests will not consider if and when the opportunity for sponsored programmes occurs.

The newspapers may take hope from the fact that out of 146 firms regularly using American broadcasting stations for advertising purposes, it has been ascertained that eighty-five are big users of newspaper advertising space. As a matter of interest, sixty-seven of these firms also devote a large proportion of their newspaper advertising to announcements relating to the radio programmes.

If, as the advertising men would have us believe, good advertising increases trade, then the use of radio as a publicity medium would be a help to general prosperity.

I do not think that the third point, namely the extent of the B.B.C. charter, need affect the issue, because even at present there is one clause which would allow the B.B.C. to give sponsored programmes if it wanted to do so.

Ronnie Hart, conductor of Ciro's Club Band, is a frequent broadcaster

Clause 3 in the Royal Charter says: "The Corporation must not, without consent in writing of the Postmaster General, receive money or any valuable consideration from any person in respect of the transmission of messages by means of the stations or any of them."

Final Decision

You see, therefore, that the final decision rests with the Postmaster General and even as things stand at present he could be moved to give his consent.

There are a number of provisos following Clause 3 which pave the way to an immediate application of the scheme of sponsored programmes, and although most people think that the Royal Charter expressly forbids advertisers' programmes and gives the right of broadcasting entirely to the B.B.C., it does not, in point of fact, make so rigid a limit.

Solving Europe's Radio Problems

By ARTHUR R. BURROWS ("UNCLE ARTHUR")

ON THE TECHNICAL SIDE

M. Raymond Braillard, President of the Technical Commission of the Union, and director of the Brussels control station

THE "Union Internationale de Radiodiffusion" or, as some of our bright young critics would misterm it, the "Union of Radio Confusion," has been in existence now for exactly six years. Its membership, which consists exclusively of authorised broadcasting associations, is responsible for the programmes received (and, I hope, enjoyed) by over one hundred millions of persons. This membership extends to all the continents.

Departure from London

Well do I remember its foundation in the spring of 1925. My departure from London to take up the appointment of director of the executive office of the Union, at Geneva, was heralded in one case by a newspaper heading extending across an entire page: "Uncle Arthur, Policeman of Europe"—an unfortunate beginning, for the newspaper in question reached some of the countries with which I hoped to work amicably before I had the opportunity of proving that my work was not that of policeman, but of intermediary in time of trouble.

National Jealousy

All countries in those days, as now also, were jealous of their sovereignty and at that time they were less experienced in co-operating in international efforts than they are to-day.

It was a Sunday morning when I arrived in Geneva. The sunlight, reflected from the clear waters of the lake, was positively blinding to my unaccustomed eyes. Next morning I began a search for headquarters and for nucleus staff, the latter task being made difficult by reason of the necessity for dissuading competent persons to abandon their dreams of a position in the League Secretariat.

THE PRESIDENT

Admiral Carpendale, President of the Union Internationale de Radiodiffusion, is also Controller of the British Broadcasting Corporation

No sooner installed in the offices which were to be our headquarters for the first three years than I received a visit from a plain-clothes member of the Geneva police force wishing to know something of my proposed activities and my fitness in any case to direct them.

One is to remember that the Republic of Geneva has been through centuries the sanctuary of political and religious reformers, both desirable and undesirable, and that naturally for some time after the war, when the political situation was still disturbed, the authorities were a little anxious regarding all new comers. We succeeded, however, in convincing the "gendarmerie" of our bona fides and have proved ourselves to be law-abiding guests of the Republic and Canton of Geneva.

Our next visitor was a corpulent gentleman who had the impression that we were a weight-reducing establishment, he having mistaken "radiophonie" for "radiothérapie."

Our First Task

Our first task was to discover how many broadcasting organisations were in existence and all possible details regarding their transmitters and their methods of working in general. Looking backwards, it is surprising how little was known six years ago, even by those most intimately associated with broadcasting, concerning the activities of fellow organisations in other countries. Within a few weeks, by a system of questionnaires, we were able to obtain a fair perspective of what was really happening in Europe.

The International Union of Broadcasters, which was a conception of Sir John Reith, Director General of the B.B.C. (although it must be admitted that a meeting was held in Geneva in 1924 at which a number of persons, representing a variety of interests, discussed internationally a number of wireless problems) had in 1925 amongst its most urgent problems the avoidance of mutual interferences between transmitting stations and the question of securing more equitable demands by certain agents of musical and literary works for the right to broadcast these works.

Mutual Interference

One of our difficulties in these first days in dealing with the question of mutual interferences between stations was the extreme sensitiveness of certain stations to comments received from distant listeners.

It appeared as if a single letter from an enthusiast on the other side of Europe, stating that he had difficulty in obtaining perfect reception (owing perhaps to morse signals from some other service) was sufficient to provoke a change in wavelength.

There were stations which zig-zagged about in the ether like the track of a lightning flash.

After some weeks of endeavouring to manœuvre the existing stations into positions theoretically safe in respect to mutual interferences, it became evident that a concerted study would have to be made, both of the present and future situation.

Midnight Research

From this study, which included a considerable amount of practical research around the witching hours of midnight, there arose the now historic plan of Geneva, the value of which, I venture to suggest, has never been fully appreciated for, despite the fact that unforeseen developments both in the number and the power of broadcasting stations made it necessary to produce other plans at later dates, the Geneva plan remains the real foundation of the system of repartition at present in service.

It had been my good fortune to be present in Geneva, both in 1920 and 1921, at the first and second Assemblies of the League of Nations and to witness there the laying of the first stones in the creation of the greatest international effort the world has yet seen.

What I there saw helped me considerably in my belief in the ultimate success of our own efforts. The marked change in attitude amongst delegates in the first two years of the League's existence had a parallel amongst the broadcasters.

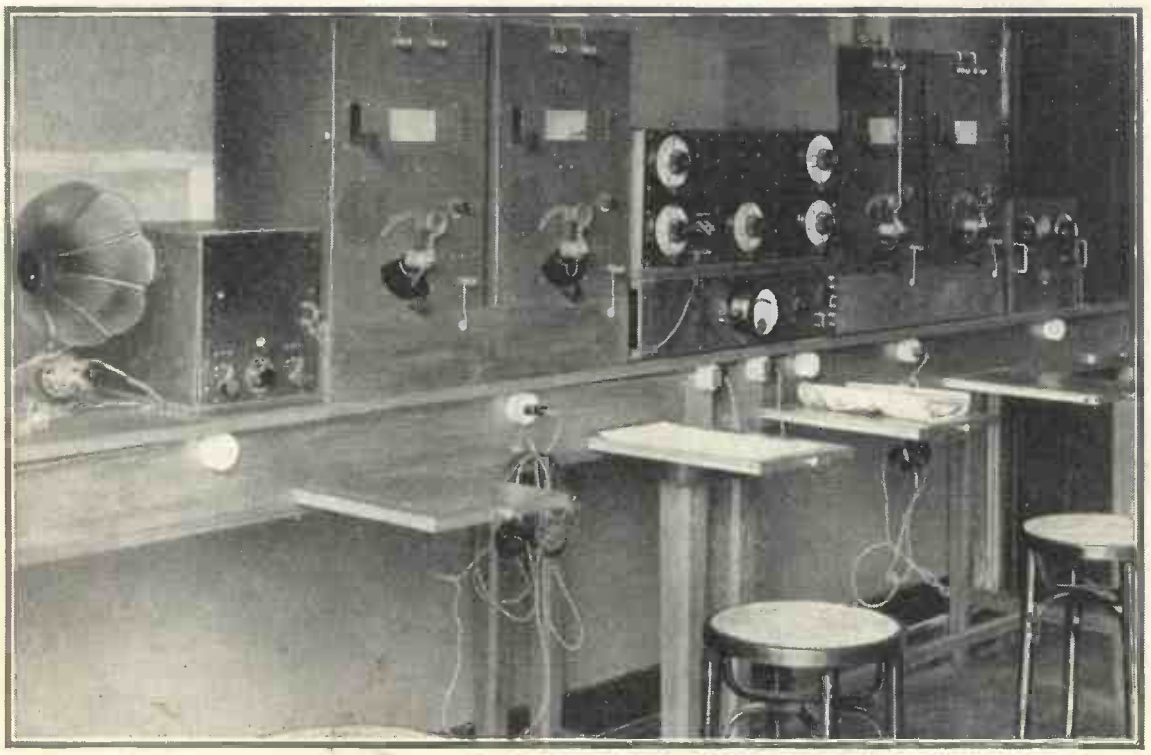
Whilst at the first meeting there was a tendency for the representative of each country to present a purely national view-point rather than to discuss international collaboration, this tendency very soon disappeared and although to-day the delegates naturally seek to obtain for their own national broadcasting organisations all the advantages possible, nevertheless they always have in mind the international situation generally and do not press claims which are impracticable from an international view point.

These delegates, who, in the first days, were entire strangers linked together only by a common occupation are, at the end of six years, personal friends ready to give immediate and sympathetic consideration to demands coming from any part of Europe.

THE SECRETARY

Arthur R. Burrows, Secretary of the U.I.R., who is still known as "Uncle Arthur" to thousands of listeners

The work of the Union in the avoidance of mutual interferences has been arduous, and increases rather than diminishes in extent. The importance of broadcasting is now more fully realised than it was six years ago and



WHERE WAVELENGTHS ARE CHECKED BY THE INTERNATIONAL RADIO UNION

The listening station of the U.I.R. at Brussels, under the direction of M. Raymond Braillard. Note the magnifying glasses to ensure accurate wavemeter readings

SOLVING EUROPE'S RADIO PROBLEMS—Cont.

BRITISH DELEGATES AT A MEETING OF THE INTERNATIONAL UNION

Among the forty-four delegates present at the fifth anniversary meeting were (1) *Noel Ashbridge, now Chief Engineer of the B.B.C.,* (2) *Major C. F. Atkinson, Foreign Director of the B.B.C.,* (3) *Admiral Carpendale, Controller of the B.B.C.,* (4) *Capt. P. P. Eckersley, and* (5) *Arthur R. Burrows, Secretary of the U.I.R.*

for this reason greater attention is being paid in many countries to the necessity for the wireless programmes being available for the poorest members of the population.

Experience has shown that the stations which gave a measure of satisfaction in 1925 were really totally inadequate in power for a democratic service. The listening public, too, who in the early days found a certain fascination in listening to musical sounds coming from a distance—even though they were enveloped by catcalls and other discordant noises—have now become—and rightly so—much more critical, and require not only a relatively perfect reproduction of the original performance, but an uninterrupted one.

To meet these more exacting demands, the broadcasters have found it necessary to increase the power of their stations. In the development of this practice some rather disconcerting discoveries are being made. It is being found that these high-power stations do not behave in practice as they should according to theory.

Natural Conditions

Wireless experts have long since realised that the behaviour of a wireless station is determined in some measure by various natural conditions, some of which are not easily discoverable or amenable to measurement. The part played by this factor was not of serious international importance—so long as the broadcasting stations were small in power and limited in their radius of action—but with the development of high-power stations the unknown elements are having greater play.

It seems certain that the policy of higher power must be accompanied by one of fewer stations—which policy has been advocated by the B.B.C. for three or four years; but the problem is how to develop this policy with a minimum of inconvenience both nationally and internationally, as I remarked in the middle of April when broadcasting on international problems.

Street Traffic Blocks

In England, one can compare the present situation with the traffic blocks now so common in those of our great streets where there has been insufficient time to widen the principal thoroughfares in order to accommodate the increasing traffic.

It is useless to hinder this traffic in its development; equally hopeless is it to talk of destroying immediately all the buildings which face the streets in which the traffic congestion is happening. The readjustment must take place slowly and only after most careful research.

An earthquake, of course, would probably facilitate the desired improvement and some form of earthquake in technical wireless progress may be on the way—but I feel that salvation must come by a slower process.

In the meantime the International Broadcasting Union will do all within its power to obtain for broadcasting, in the international wireless conventions, the most favourable possible conditions.

The next opportunity for championing the case of broadcasting in a World Conference will occur at Madrid in the autumn of 1932, and already our technicians and jurists have spent many days (and nights) examining the possibilities and in making proposals which, by their reasonableness, are likely to receive consideration.

This does not mean that the cases of interferences in Europe, which are exercising the attention of broadcasters and listeners alike, will remain as they are for another eighteen months or longer. Actually, other steps are being taken which it is hoped will wipe out these particular troubles.

Nevertheless, the broadcasting situation cannot be dealt with piecemeal; it is essential to establish definite scientific principles and adhere to these so long as the technique remains as it does.

Research Laboratory

The work of the International Broadcasting Union, however, is not by any means confined to technical problems, though it is true that these latter have necessitated the institution at Brussels of an observation post and research laboratory engaged constantly in their solution. There are many other questions, of an artistic and legal character, equally demand-

EXCLUSIVE TO "WIRELESS MAGAZINE"

ing solution on an international basis.

One of these, which appears to have direct interest for listeners in all countries, is that of identification signals, and it is astonishing how few people appear capable of adopting a reasonable perspective in this matter.

Frequent Repetitions

The listener in Ruritania, paying nothing whatever towards the cost of producing and transmitting the European programmes, appears to think that he is entitled to a frequent repetition, for his sole personal benefit, of an announcement which will enable him to identify the station on which he has incidentally stumbled.

He does not seem to realise that in order to meet his needs there would have to be repetitions of a character probably most irritating to the listeners in the locality of their respective transmitters.

We have had brought to our notice in the last few years some exceedingly ingenious proposals for the establishment of identification signals, but rarely do the authors of these proposals realise that the majority of listeners to broadcast programmes are very ordinary folks who do not wish to engage themselves in some mathematical gymnastics, nor to spend their evenings for some time to come consulting code-books, alongside which a logarithmic table is a simple thing.

I am sure that for many the learning of the Japanese language would be easier than the working out of identification calls according to some of the plans which have been put forward.

The Union has been studying the question of identification signals for some time past. While no definite system has been developed, it has probably performed good service for the listeners by obtaining a definite agreement upon the unsuitability, to a democratic public service, of some of the warmly advocated proposals.

Perhaps the most definite results of international co-operations, so far as the listener is concerned, are those being obtained by the Union in the field of international relays. Our Union had the good fortune to come into existence about the time when the telephonic administrations of Europe were preparing their plan for the reconstruction of the European long-distance circuits, notably by substituting underground cables for the existing aerial lines which are so exposed to the weather and the possibilities of breakdown.

The Union's technicians gave to the International Telephone Committee an indication of the future needs of broadcasting, and in most of the new long-distance telephone circuits being constructed to-day the requirements of broadcasting are being taken into account.

The latest example is a new telephone cable traversing practically the whole of Switzerland, which will not only give almost perfect facilities for the exchange of programmes within Switzerland itself, but will provide new opportunities for good relays between countries adjacent to Switzerland.

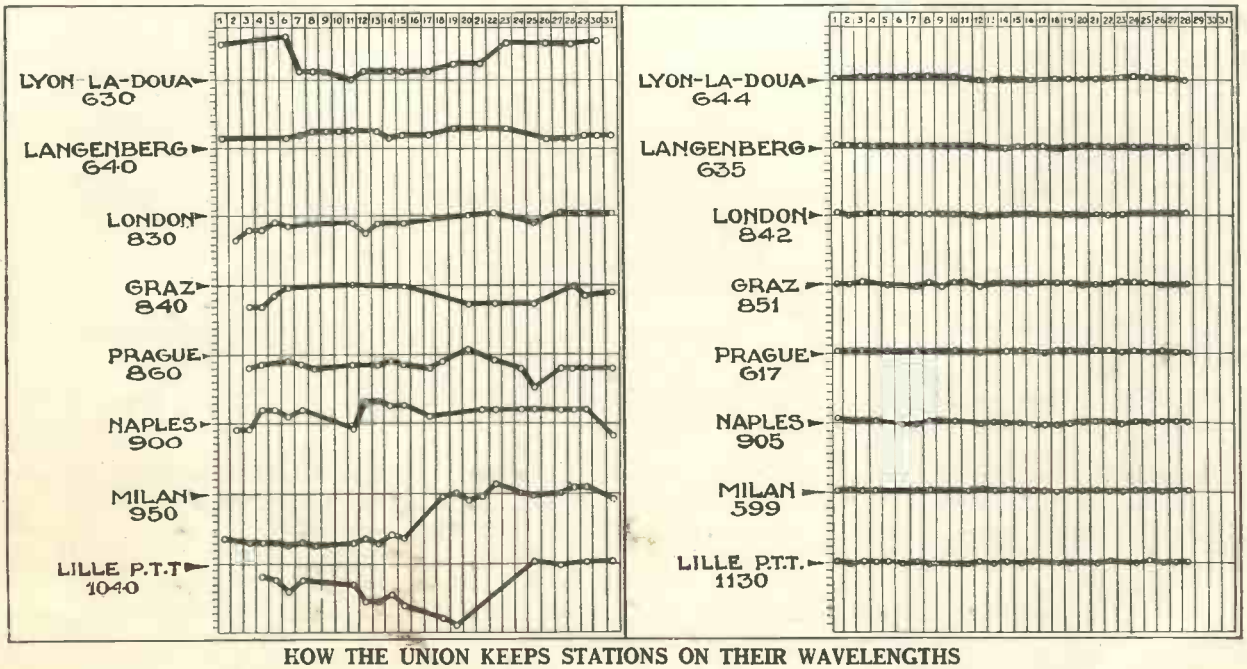
Distant Relays

The time is not far distant when Great Britain will be able to receive from the most distant European countries taking an active part in broadcasting musical programmes almost as perfect technically as if they had been produced in the heart of London.

It is not my intention to elaborate here the possibilities which such long-distance relays afford for bringing about a better understanding between the listeners of different countries.

I am sure these relays will stimulate travel and that not only will the continent of Europe be more freely visited by listeners from the United Kingdom, but that Great Britain itself, which is all too little known by the masses on the Continent, will become a place of an ever-increasing pilgrimage.

Behind the scenes, in our office at Geneva, a number of things are happening quietly all of which are aimed



HOW THE UNION KEEPS STATIONS ON THEIR WAVELENGTHS

The left-hand set of graphs shows how erratic were the wavelengths of many stations in October, 1927. The right-hand graphs show the steady transmissions of January, 1930.

SOLVING EUROPE'S RADIO PROBLEMS—Continued

at giving to the listeners of the world an ever-improved service. No new radio drama is written or performed without adequate details of its character, and its demands from the point of view of studio technique, being circulated amongst the members of the Union in all countries.

Stimulating Interest

These details are now being given also to the dramatic authors in various countries so as to stimulate their interest in the special needs of the radio technique.

Every few weeks, also, lists are distributed through the membership of the Union of new long-distance relays, so that the programme directors of each country may obtain inspiration therefrom. Each month there are circulated statistical tables showing the percentage composition of the programmes in each country.

In addition to this regular exchange of information, there is constantly being circulated new data upon the construction of studios, the development of radio laws and new means for combating the troubles experienced by listeners from preventible electrical noises.

There are sixty international organisations to-day having their headquarters in Geneva, most of which are directly concerned with the creation of a happier state of affairs for the masses than has existed in the past. In no one of these organisations is there, I am sure, a keener determination to serve the public than in that of the International Broadcasting Union.

I am sure, too, that by now the "policeman of Europe" is a well-proven myth!

THE LEAKY GRID

MUCH correspondence has had, of necessity, to be held over again this month. However, by destroying what I feel I do not wish to answer and making a selection of the rest, I am able to get off fairly lightly.

So many questions have been asked recently about Bach and his cantatas that I am devoting my Leakage this month to them entirely.

Essie, Southport.—Why was I not *named* after Bach? I think the question a trifle personal, but I should like to point out that I *was* named after Bach. On looking up a chapter I have written on him in my new book, I find that he was named on, or about, March 21, 1685. I assure you, Essie, that I was named considerably after that, and therefore *was* named after Bach.—Q.E.D.

James, Newport, Mon.—I have read your letter with deep feelings of sympathy. You tell me how difficult it is for you to understand all the words, especially in the choral fugues. I see you want to know what a choral fugue is. *It is a musical representation of the effect of an ordinary street-fight, in which everybody shouts the same epithets, only at different pitches.* Bach was very good at writing those sorts of choruses.

Winnie, of Winchester, sends the following:—

There was an old josser named Bach,
Who wrote some Cantarts for a lark;
He knew that the Wireless
Would be utterly tireless,
And relay the whole lot from the "Park."
But no Bach will be barked for ten weeks,
We are rid of those howlings and squeaks;
But if we are fussy,
They'll give us Debussy
Or one of the new-fangled freaks.

There is more, but I think it would be unwise in the interests of the B.B.C. to publish it. One has to be careful.

You will have all noticed the disgraceful remarks which appeared under the heading of an article last month called *"Ten Sundays without Bach!"* I rang up my solicitor immediately upon reading the scandalous reference to myself in an advance copy which came into the office a day or two before actual publication.

Unfortunately, I found he agreed with the heading. Thus I have been forced to conclude that it is more dignified to ignore the whole matter.

W.-W.

In Japan

THE Japan Radio Broadcasting Associations, a private corporation under government control with exclusive right to make radio broadcasts in Japan, has concluded an agreement for exclusive interchange of international programmes with the United States through the National Broadcasting Company.

The proposal for an agreement for exclusive co-operation was submitted to the Japan Associations by the National Broadcasting Company in March and adopted after some slight changes.

Additional Stations

The Japan Broadcasting Associations, organised four years ago under government control, plans additional stations at Fukuoka and Kokura, in the southern island of Kyushu, within the next eighteen months, and at Aomori, in Northern Honshu Island and Kyoto in Central Honshu, within a year.

The Associations now operate three large stations: JOAK, Tokio; JOBK, Osaka; and JOCK, Nagoya. Smaller stations are in Sendai, Hiroshima, Kumamoto, Shizuoka, Nagano, Okayama, Sapporo and Kanazawa. The organisation has the exclusive right to radio broadcasting in the empire proper and charges a fee of one yen a month to all holders of receiving sets. There are about 700,000 subscribers and the number is increasing.

The organisation is based on the general plan of the British Broadcasting Corporation. Kenzoiwahara, former head of the Shibaura Iron Works, is president.

Advertising Programmes

Advertising programmes are not allowed and the income of the organisation is solely from subscribers. The company is a non-profit making concern and its president and directors serve without pay. Income now amounts to about £70,000 a year, which is used to pay off debts contracted when the company was started and to cover running expenses, including those of the employees, artistes, research workers, etc.

F. P.

AN EXPERIMENTER'S FIVE-VALVER

By Leslie W. Orton (President of the Anglo-American Radio Society)

A REMARKABLE ultra short-wave set, a good local and DX medium- and long-wave set, and an astounding amplifier for use with a gramophone, is indicated in the accompanying circuit diagram.

You will see that it employs a neutralised screened-grid valve, an arrangement for varying the bias on the detector valve, automatic grid bias for the two push-pull valves, and a pick-up.

Detector Grid Bias

The grid-bias arrangement used for varying the potential on the detector grid is arranged as follows: A 9-volt bias battery is employed and, by the simple process of fixing a wander plug on the end of the detector grid leak which would normally go to one of the filament pins, either positive or negative bias may be supplied to the grid.

You will find that 1.5 volts positive is preferable for searching on long and short waves, 3 volts negative for gramophone work, and 6 volts negative for anode bend.

As before mentioned, the two P650 power valves used in the push-pull stage have their grid bias supplied automatically. This is done by arranging a resistance lamp in the high-tension negative lead and using the resulting voltage drop to supply the necessary grid bias.

This arrangement makes it important to see that the eliminator supplies slightly above the maximum anode voltage of the set *plus* the correct bias voltage.

A large moving-coil loud-speaker is used with the set, which works direct from the mains and employs a dry rectifier. There is a resistance in the pot winding circuit from across which the screened-grid valve obtains its filament current.

The eliminator which supplies the high tension for the set is capable of giving 260 volts (smoothed). Due to the drop of 60 volts for grid bias, the available voltage is 200 volts, this being just correct for the power valves. A potential divider is placed across the output so that lower voltages may be obtained.

The eliminator should be shielded so as to prevent anyone accidentally touching some live part of the equipment.

The baseboard upon which the set is mounted is 2 ft. square. The eliminator is placed on the far left-hand corner (looking from front) and covers an area of about 9 in. by 17 in. The rectifying valve, potential divider, and some of the smoothing condensers are not counted within this area, which is shielded.

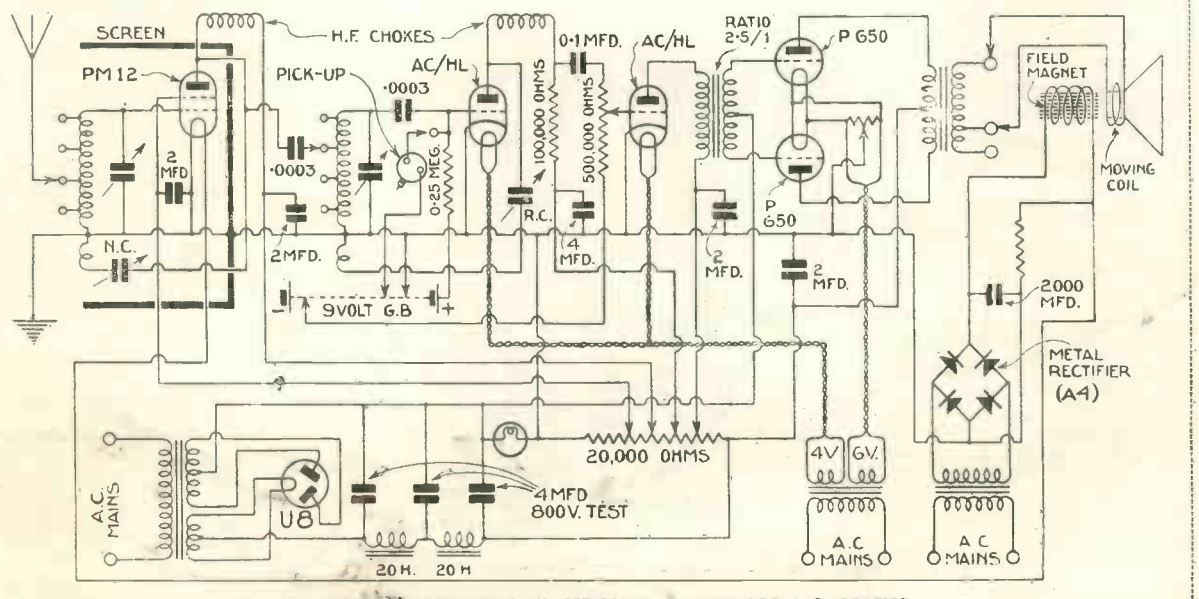
I employ a U8 valve for the rectifier, but a U5 may be employed if care is taken not to overload as regards output.

The whole of the right side of the baseboard is occupied by the first low-frequency and push-pull stage, whilst the rest of it is occupied by the detector and screened-grid stage. Interchangeable coils are employed, so that it is an easy matter to change over from long to medium and from medium to short waves.

DX Qualities

To show the DX qualities of the set the following will interest readers. On medium waves I have received Uruguay (Montevideo), WBBC, WGY, WGP, WPG, WTIC, WBZ, WJZ, WSM, WMC, KGO, etc. WBBC, WMC, WTIC, and WIOD came in at good strength on the loud-speaker, WMC and WBBC reaching terrific strength at times.

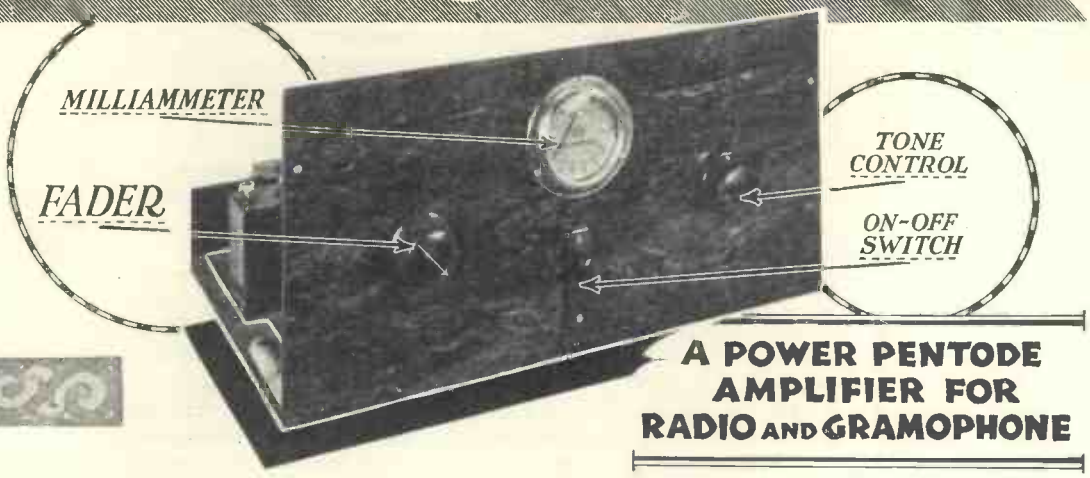
On the short waves results are nearly as remarkable.



EXPERIMENTAL FIVE-VALVE CIRCUIT RUN FROM A.C. MAINS

This circuit diagram is only in skeleton form and all the values are not indicated. It will be sufficient guide for advanced experimenters, however

THE D.C. "FADER"



A POWER PENTODE AMPLIFIER FOR RADIO AND GRAMOPHONE

WITH this amplifier it is possible to change over from a radio set to a pick-up, or from one pick-up to another, by the turn of a single knob, no connections being changed at all. The key to this feature, which is of outstanding convenience to the operator, is a special type of potentiometer volume control to which two inputs can be applied. It is possible literally to "fade out" one circuit and bring in another; hence the name of the unit.

Battery for Low-tension Supply

Although called the D.C. "Fader" it should be understood that only the high-tension supply is taken from the mains; the valve filaments are supplied in the ordinary way from a low-tension accumulator.

This unit will be a boon to all who have direct-current electric-light supplies, for it can be used with equal success either as a super-power amplifier for a radio set or for the electrical reproduction of gramophone records; for the latter purpose the unit is complete as illustrated in these pages.

In order to give a large power output, and at the same time restrict the number of amplifying stages, a power pentode is used in the output stage. This is capable of giving more than one watt (1,000 milliwatts) undistorted A.C. output. It is therefore particularly suitable for all purposes where considerable volume is required.

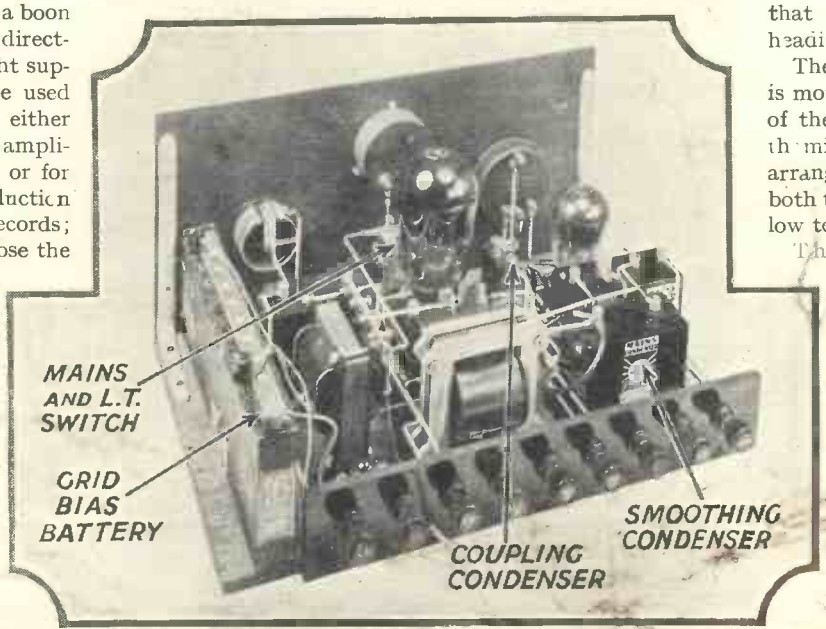
Distortionless Amplification

Whilst only the best components have been used in the construction of the D.C. "Fader," it will be seen that the cost is not unduly high for the type of instrument. It must also be remembered that distortionless amplification can only be obtained by the use of components with better characteristics than those normally used in very cheap all-round receivers.

The operation of the amplifier is particularly simple and once it has been installed it can be worked whenever required by even the youngest member of the family. All the controls are clearly indicated in the photograph that forms part of the heading to this article.

The main on-off switch is mounted in the middle of the panel, underneath the milliammeter, and is so arranged that it controls both the high-tension and low tension supplies.

The knob marked "Fader" on the left-hand side of the panel controls the input, and also the volume. When turned as far as possible to the left the first pair of input terminals is brought into circuit. In this position the full volume is obtained from whatever apparatus is connected to



A LARGE PENTODE FOR GREAT UNDISTORTED OUTPUT

The output stage of this amplifier is a 6-volt pentode that gives more than one watt A.C. output

the first pair of input terminals on the receiver.

The volume is decreased gradually as the knob is turned to the right, until the slider reaches its centre position, at which point no sound is heard. As the knob is turned from the mid-point towards the extreme right-hand position the second pair of input terminals is brought into circuit, the volume being gradually increased until the extreme right-hand position is reached.

Any two pieces of apparatus (such as a radio set and a pick-up, two pick-ups, or even two radio sets) can be kept permanently connected to the two pairs of input terminals, the change-over from one to the other being made automatically by the movement of the "fader" knob.

How the "Fader" Is Arranged

The circuit arrangement will be clear from the diagram below. It will be seen that the special "fader" potentiometer consists of two 500,000-ohm windings in series, with a tapping taken to the centre point: thus there are four connecting points altogether, these being numbered 1, 2, 3, and 4 on both the circuit and wiring diagrams.

One pair of input terminals is connected across the points 1 and 4, the second pair being connected across 3 and 4. The slider is marked 2.

In the grid circuit of the first valve is a 50,000-ohm fixed resistance to stop the passage of high-frequency currents.

Reducing Mains Voltage

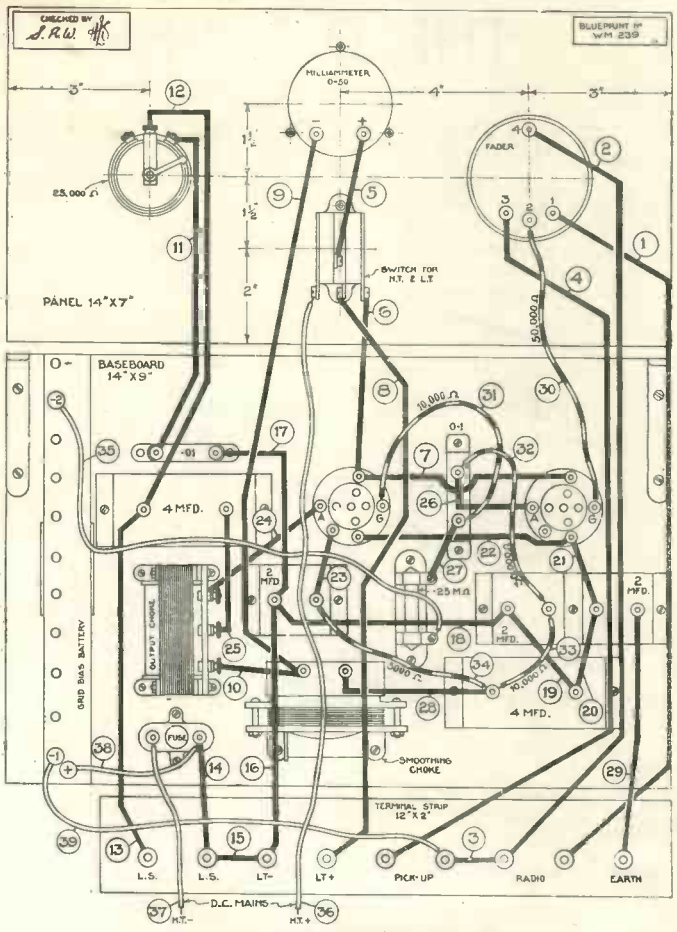
In order to reduce the mains voltage to a suitable value for application to the anode of the first valve, a resistance of 40,000 ohms is included in the circuit. This is actually made up of a 30,000-ohm resistance in series with a 10,000-ohm resistance, a 2-microfarad by-pass condenser being connected between the mid-point of these and to low-tension negative in order to prevent low-frequency oscillation, or motor-boating as it is more frequently called.

The coupling between the first valve and the pentode is of the resistance-capacity type, the 30,000-ohm resistance already referred to acting as an anode resistance. The coupling condenser has a capacity of .1 microfarad and a grid leak of .25 megohm (250,000 ohms) is employed. In the grid circuit of the pentode valve a 10,000-ohm fixed resistance is inserted to act as an additional "stopper" of stray high-frequency currents.

The anode of the pentode valve is taken to the positive side of the D.C. mains through the output choke and thus practically the full mains voltage is utilised.

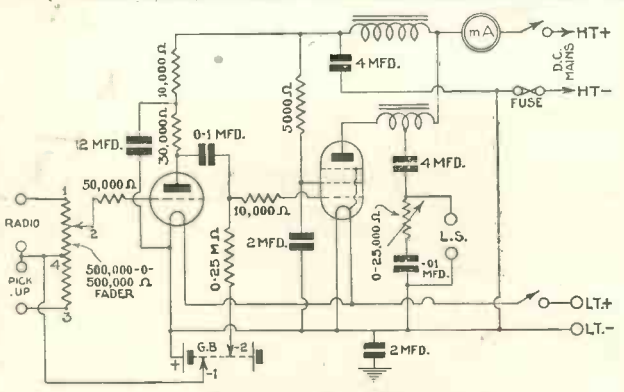
The anode supply for the first valve is smoothed by means of a low-frequency choke and a 4-microfarad condenser. The auxiliary grid of the pentode is also supplied with smoothed current, through a 5,000-ohm fixed resistance in conjunction with a 2-microfarad by-pass condenser.

In order to match up the pentode with an ordinary high-resistance loudspeaker a centre-tapped output choke is utilised. In conjunction with this there is a 4-microfarad condenser.



LAYOUT AND WIRING GUIDE

This is a quarter-scale reproduction. 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 July 31. Ask for No. WM239



MANY CIRCUIT REFINEMENTS

A very complete system of decoupling is incorporated and there is no possibility of motor-boating with this amplifier

Tone Control

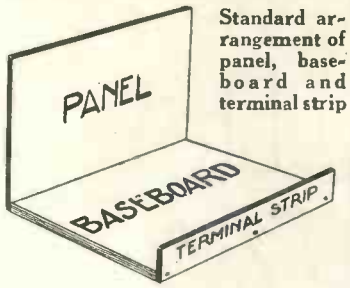
Directly across the loudspeaker terminals two tone-control elements are connected. These consist of a .01-microfarad fixed condenser in series with a 25,000-ohm variable resistance. The latter is mounted on the right-hand side of the panel and is marked "Tone Control" in the heading photograph.

One most important point that should not be overlooked is that *the amplifier must on no account be earthed direct.* It happens in some cases that the positive mains lead is already earthed and if the negative side of the

THE D.C. "FADER"—Continued

PANELS AND BASEBOARDS

EBONITE panels are obtainable in several standard sizes, the thickness, however, is fixed at $\frac{3}{16}$ in. or $\frac{1}{4}$ in., depending on the make. Various surface finishes are supplied such as black polished, grained black polished, black matt finished, mahogany polished, etc.



Standard arrangement of panel, baseboard and terminal strip

Aluminium panels with polished and various imitation wood finishes are also obtainable. The thickness of these varies from $\frac{1}{16}$ in. to $\frac{3}{32}$ in. Where using a metal panel in a set great care must be taken that any components which should be insulated from earth in the circuit are provided with ebonite bushings.

The standard sizes in ebonite panels are as follows: 7 in. by 14 in., 7 in. by 18 in., 7 in. by 21 in., 8 in. by 12 in., 8 in. by 16 in., 8 in. by 20 in., 8 in. by 24 in., 8 in. by 30 in., and 9 in. by 6 in. It should be noted that a few intermediate sizes other than the above are listed by some firms.

No standard sizes are kept to in the case of baseboards as this depends on the type of set under construction and the cabinet into which it is finally to be fitted. The thickness of baseboards, however, is now generally accepted as $\frac{3}{8}$ in., and except in the case of very large sets this thickness is found quite satisfactory in practice.

Ebonite terminal strips and terminal mounting blocks of various shapes and sizes are now marketed. In the case of the strips these are manufactured $1\frac{1}{2}$ in and 2 in. wide in various lengths, and in some cases ready drilled for terminals.

The terminal mounting blocks are of moulded insulating material and are arranged to take a pair of terminals. The blocks may be fitted so that the terminals are in either a vertical or a horizontal position. *A. P.*

amplifier is also earthed, the mains would be short-circuited. If an earth connection is required it must be made through a 2-microfarad condenser, as indicated in the circuit diagram.

A milliammeter is included in the positive mains lead so that the total anode current taken by the two valves can be seen at a glance, while the amplifier is in operation. When everything is adjusted properly the milliammeter reading will remain constant, but if overloading occurs the milliammeter pointer will flicker. This indicates that the grid bias needs readjusting or that the input voltage must be reduced by means of the volume control.

Quality of Reproduction

Many people have the impression that the reproduction from a pentode is inclined to be high pitched, but this is not true in the case of this amplifier at any rate. The values used in the resistance-capacity coupling ensure that the low notes are well amplified and the use of a centre-tapped output choke helps to retain the strength of the low notes in the output circuit.

Moreover, the special tone control also considerably improves the overall efficiency of the amplifier. It is specially useful in cutting out high-pitched mush which may be heard sometimes when the amplifier is connected to a radio receiver. A great advantage of this form of tone control is that it has no appreciable effect on the volume.

With an amplifier of this type it is desirable to use a really good loud-speaker, otherwise the finer points of design are wasted. We recommend a good moving-coil instrument, but if this is of the low-resistance type a suitable output transformer must be incorporated. The primary of the transformer is connected directly across the loud-speaker terminals and the tone control is used as if a high-resistance loud-speaker were in circuit without any step-down transformer.

Simple Construction

The neat design of the amplifier will be clear from the photographs reproduced in these pages. Although reasonably compact, the construction is quite straightforward and can be undertaken without any difficulty.

All the essential details are included in these pages, but those who desire one can obtain a full-size blueprint for half price (that is, 6d., post free), if the blueprint coupon to be found on the last page of this issue is used by July 31. Ask for No. WM239 and address your inquiry to Blueprint Department, WIRELESS MAGAZINE, 58-61 Fetter Lane, London, E.C.4.

Wiring Up the Unit

A quarter-scale layout and wiring diagram appears on page 605. From this it will be seen that not only is the position of every component clearly indicated, but that each wire is numbered. When everything is screwed firmly in position wiring up should be carried out in the numerical order indicated. If this is done carefully the leads will fall in position in the most convenient order and, moreover, there is no chance of making a mistake.

COMPONENTS NEEDED FOR THE D.C. "FADER"

CHOKES, LOW-FREQUENCY
1—Igranic, type C30, 15s. 6d. (or Varley, Lewcos).
1—R.I. Pentomite, type DY24, £1 1s.

CONDENSERS, FIXED
1—T.C.C. .01-microfarad, type 33, 3s. (or Dubilier).
1—T.C.C. .1-microfarad, type 25A, 8s. (or Dubilier, Hydra).
3—Formo 2-microfarad, 9s. 9d. (or T.C.C., Dubilier).
2—Formo 4-microfarad, 400-volt working, 11s. (or T.C.C., Dubilier).

EBONITE
1—Becol 14 in. by 7 in. panel, 4s. 6d. (or Red Triangle, Lissen).
1—Terminal strip, 12 in. by 2 in.

HOLDER, GRID-LEAK
1—Bulgin, type G6, 9d. (or Lissen, Dubilier).

HOLDERS, VALVE
2—W.B. 5-pin type, 2s. 6d. (or Lotus, Benjamin).

METER
1—Sifam 0-50 milliammeter, £1 5s. (or Ferranti, Weston).

PLUGS AND TERMINALS
3—Belling-Lee wander plugs, marked: G.B.+, G.B.−1, G.B.−2, 9d. (or Clix, Eelex).
9—Belling-Lee terminals, large type, marked: L.T.+, L.T.−, Pick-up (2), L.S. (2), Earth and two plain, 4s. 6d. (or Clix, Eelex).

RESISTANCES, FIXED
1—Lewcos 5,000-ohm, flexible type, 1s. (or Bulgin, Magnum).
2—Lewcos 10,000-ohm, flexible type, 2s. (or Bulgin, Magnum).
1—Lewcos 30,000-ohm, flexible type, 1s. 6d. (or Bulgin, Magnum).
1—Lewcos 50,000-ohm, flexible type, 1s. 6d. (or Bulgin, Magnum).
1—Dubilier .25-megohm, 1s. 9d. (or Lissen).

RESISTANCES, VARIABLE
1—Colverstat 25,000-ohm potentiometer, 5s. 6d. (or Sovereign, Rotorohm).
1—Magnum Dissolver, 10s. (or Centralab).

SUNDRIES
Glazite insulated wire for connecting.
1—Pair of Bulgin panel brackets (or Peto-Scott, Lissen).
1—Bulgin fuse-lamp and holder, 1s. 3d.

SWITCH
1—Bulgin double-pole changeover, type S63, 3s. 9d.

VALVES
1—Osram L610, 8s. 6d. (or Marconi L610, Mullard PM6D).
1—Osram PT625, £1 7s. 6d. (or Marconi PT625).

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

A POWER AMPLIFIER for RADIO or RECORDS

In this connection, however, it should be noted that five of the wires (namely, the leads numbered 30, 31, 32, 33, and 34) are actually flexible resistances.

Suitable Mains

It will be realised, of course, that this unit is only suitable for use on direct-current mains with a potential of 200 volts or more. Mains with a potential of 100 or 120 volts are of no use and beginners should be careful to notice that the amplifier cannot be used with alternating-current (A.C.) supplies.

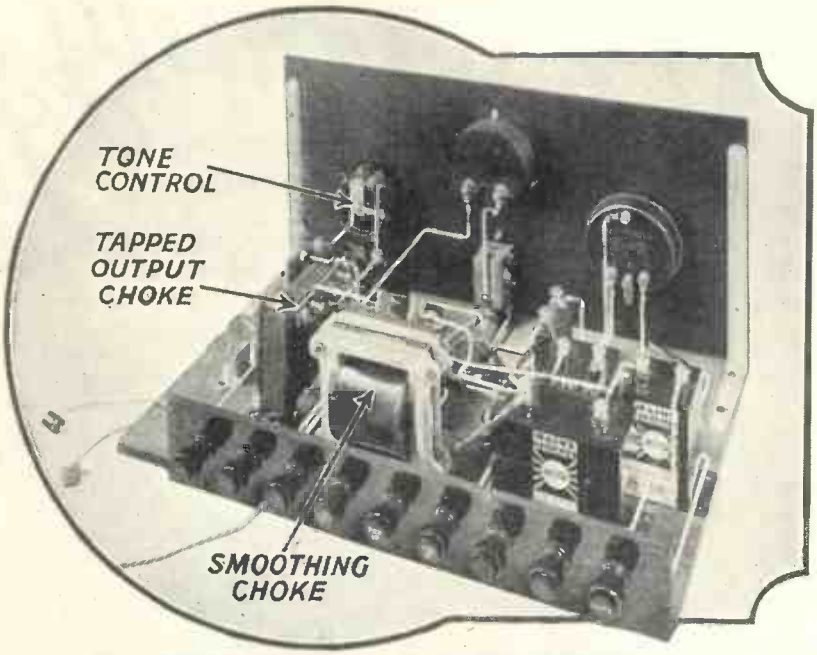
In order to get the full benefit from the design it is almost essential to use 6-volt valves as 2-volt pentodes do not give sufficient output for really good volume. Apart from the question of filament voltage, the choice of valves for the D.C. "Fader" does not present any great difficulty.

The first valve should be of medium impedance, that is of the order of 8,000 to 15,000 ohms, with a magnification factor in the neighbourhood of 15. If the valve characteristics do not fall within these groups then the first anode resistance must be changed or poor magnification will result.

Different Values

There is a choice between only two makes as regards the pentode. This does not mean that other makes of valves are inferior, but simply that the values of components in the circuit would have to be changed considerably.

When the amplifier is first put into use great care should be taken in the adjustment of grid-bias values, for it is essential that the pentode should not be overrun or its life will be considerably shortened. The milliammeter is a great convenience in this respect for it enables the operator to see at a glance whether the set is being used under proper conditions.



EVERY COMPONENT IS OF HIGH QUALITY

Only the best parts have been used in the construction of this unit—distortionless reproduction is the result

There is only one other point that need be mentioned. As shown the smoothing choke is in the positive mains lead, but in some cases it may be found that there is less hum when the choke is changed over to the negative mains lead. Normally, however, there will be no need to make this alteration.

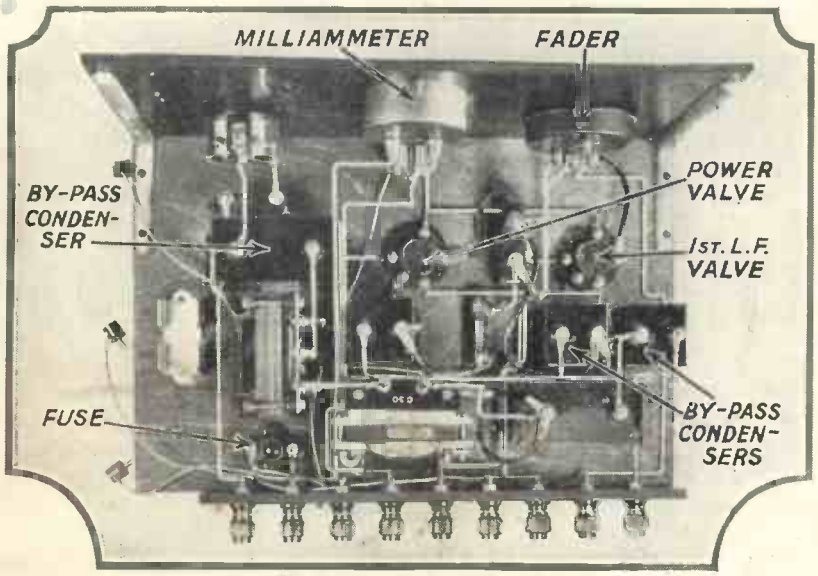
Preceding Radio Stage

This unit will, of course, appeal particularly to those who already have a radio set, but which does not give all the output desired. It is not a difficult matter to design a high-frequency and detector stage to precede the amplifier and a large number of constructors no doubt will do this.

For those who are not very experienced in radio work, however, something more definite is needed so in an early issue of WIRELESS MAGAZINE we shall describe the construction of a complete four-valve receiver taking its high tension from direct-current mains.

Binowave Coils

This set will use the well-known Binowave coils on the high-frequency side in conjunction with a screen-grid valve. The low-frequency side will be substantially that of the D.C. "Fader", but a transformer coupling will be substituted for the resistance-capacity system.



GREAT POWER—BUT EASY TO BUILD

This plan view shows how straightforward is the layout and wiring of this D.C. amplifier

Listening on the Lawn!

By Whitaker-Wilson,
THE "W.M." MUSIC CRITIC

I SEE that my friend Alan Hunter has been giving you instructions on the gentle art of annoying your neighbours by extending your wireless into your garden. I admire his pluck for suggesting any such thing;

AN ACCORDIANIST—
Joseph Frese, the Belgian artiste, who has broadcast in England

I shall admire yours still more if you dare to do it.

Of course, it is all very well if your garden is "old-world"; I am not quite sure what the term means, but I know it to be the thing to have an old-world garden. If you are going to use a loud-speaker in it to any extent, it may be as well to invest in a few yards of barbed-wire in case of invasion.

Disturbance!

Listening to Liszt on the lawn (your lawn) is all very well so long as the fellow next door is tuned-in to the same station; he may not be, which you will find a trifle disturbing, especially if he makes Mozart moan 'mid the midges.

Talking of midges, I can offer you some technical advice on them. The exposed parts of my anatomy have always been an excellent receiving set for well-amplified bites. They are usually relayed all over my ankles, in fact, everywhere except the comparatively small area covered by my sock-suspenders.

The best way—I believe the only way—of dealing effectively with hostile aircraft of this description is to purchase an ounce of Epsom salts and dissolve it in a small quantity of water. By dabbing the solution on to your component parts, allowing it to dry (which it will do in a moment or two), you become salt and therefore unpalatable.

I watched the finals of a tennis tournament last summer on the midgiest court in Europe, and although the midges were broadcasting an excellent programme I was the only person present unable to tune-in. It is worth knowing.

To return to the problem of producing wireless concerts on your lawn. If you are on speaking terms with your neighbours, not having borrowed the lawn-mower more than four times during the season, you may come to some satisfactory arrangement about the programmes (wireless, not midge), but it is manifestly unwise to try the effect of a vaudeville and a symphony concert at the same time from two adjacent gardens.

I know that counterpoint is the study of producing one melody against another, but there is a certain unwisdom in trying to improvise a composition in the style of Arnold Bax at his deadliest. There is also the danger of your neighbour on the *other* side having an accident with his hose-pipe.

These small matters have to be thought out before you set about carrying Alan Hunter's suggestions into effect.

And yet, there is a very great effect, under ideal conditions, to be obtained from music in the open. Do not, however, begin with a piano recital. Pianos have a bad effect in the open air; frequently they sound out of tune. If you happen to wish to listen to a piano outside the house, see to it that your loud-speaker is quite near to you; then the effect will probably be more satisfactory.

Singers in the Open

Singers, especially if accompanied by an orchestra, should produce an admirable effect in the open. This is strange really, because it is a well-known fact that singing in the open air is not only difficult, but is none too good for the voice.

I remember a professional singer telling me of a performance of the concert version of *Merrie England* in

— AN ACTOR —
Oscar Asche, the actor, author and producer, has also broadcast

which she sang lead; she explained that the performance was given in a delightful garden on a pleasant summer evening. A southern wall was used as a background and everything seemed ideal.

Unfortunately, however, the wind

blew, quite gently, but very steadily *towards* the performers with the dire result that the audience scarcely heard anything of the voices, the soloists especially.

The obvious lesson is to see to it that the loud-speaker backs to the wind and does not face it.

Nothing in music sounds so well out of doors as a string quartet. There is something about the quality of four string instruments, played well together and with perfect tone, that suits such surroundings.

I sincerely suggest you take an early opportunity of hearing a chamber-music concert under these conditions. Seriously speaking—very seriously—there is something to be extracted from the mental effects of good music heard in pleasant surroundings such as a beautiful garden affords.

A Garden Sleeper

I am a very keen garden sleeper. For years I have made a practice of sleeping outside in the hot weather. Have you ever realised what a wonderful sense of solemnity there is in the garden at night-time? Have you ever remained awake in a hammock or on a camp bed in a garden of stars and night-scents? Have you listened to strange sounds for none of which can you account in any way?

What it is that goes on in a herbaceous border I have never been able to make out, but my fattest peonies always seem to have something to say to the precocious young poppies that have probably only cast their husks during the late afternoon.

I have often wondered who gave the Plough its name, for I should be really sorry to attempt to plough anything at the perilous angle at which it appears in the northern sky. By morning it has fallen into the sea somewhere, seemingly, yet it is there again the following night.

On Holiday

The point of all this is that to spend a night under the stars is to be on holiday until the morning, when one is entertained by the shadows on the lawn in the early eastern sunlight which seems to send them all the wrong way.

Such a holiday, to the receptive intellect, is complete rest and re-creation.

Another thought. The Proms are coming on very soon. I hope to make up my hammock really early one night when it is perfectly still and possibly moonlight. I shall stretch my limbs in complete ease and listen to a symphony. I shall not mind in the least whose, so long as it is not ultra-modern. I suggest you do the same.

After you have heard the music and have thought of the heat in the Prom at Queen's Hall—and it *can* be hot there on a summer night—you will find that the equally-hot restaurant at which you lunched—seemingly years ago—will appeal to you as being in another world altogether.

The rubbish you read in the evening paper as you travelled in a crowded compartment of your train, or in that stuffy tube, will appear to belong to the past. The day's work will seem very far behind and you will cast no thought for the morrow.

Music is the result of high thoughts—at least, the right kind is—surely there is something aesthetically pleasurable to be extracted from it in artistic surroundings? No surroundings are more artistic, and therefore more fitted, than those of Nature.

As you hear the applause in Queen's Hall you will be strangely lacking in receptivity if you do not experience a sense of aloofness from the world in general; the very fact that you realise that there *is* a crowd in the Hall is sufficient to make you conscious of your good fortune in being away from it.

Outdoor Dancing

Obviously, there is another use for wireless under these conditions—for dancing in the open. I have not made much of it, though I consider it a delightful exercise, and a very delightful way of spending part of a summer evening.

My thoughts have turned from the ridiculous to something tolerably near the sublime in the other picture—that of listening to a promenade concert under such ideal conditions.

I most certainly intend to do it this summer, when feasible, and to continue my good habit of sleeping in the open. If you try it, you will find it very restful.

CARPE DIEM

(After Shakespeare)

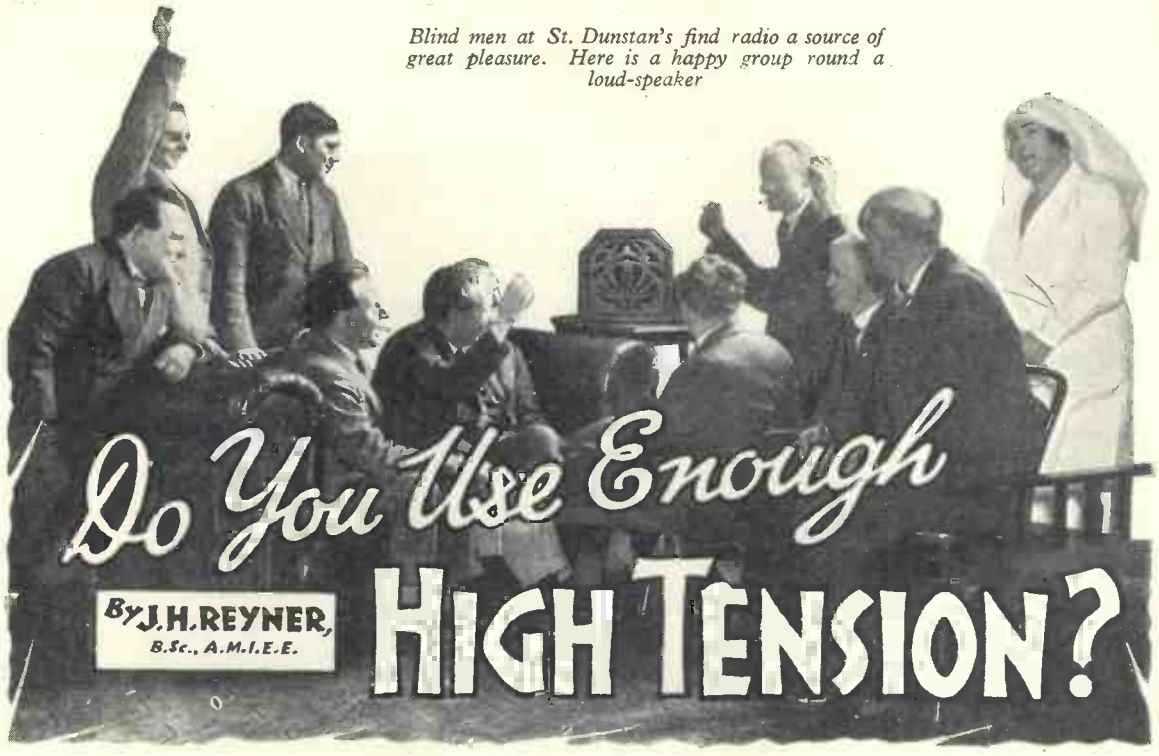
O Mistress mine, where are you straying?
O stay and hear your true-love's playing
That can broadcast high and low;
Stay at home then, pretty sweeting,
Eve brings the announcer's greeting—
Every listener doth know.

Ere your dinner, also after,
Programmes cater both for laughter
Loving folk and grave. Be sure
There will be good fare and plenty—
Come and listen, sweet and twenty,
Tuneless wireless will enaure!

LESLIE M. OYLER.

— AND A CONDUCTOR

Ernest Ansermet presided over the Queen's Hall Symphony Concerts



Blind men at St. Dunstan's find radio a source of great pleasure. Here is a happy group round a loud-speaker

Do You Use Enough HIGH TENSION?

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

THE practice of supplying high-tension batteries in 100- or 108-volt sizes has led to a very general use of this value of anode potential, at any rate for smaller sets. True, most users are aware that their valves are rated to stand more than 100 volts on the anode, but the very considerable benefit which can arise from so doing is not appreciated anything like as well as it should be.

On the earlier stages of a receiver 100 volts is usually sufficient to give good results, and no very marked improvement is likely to result if the value is increased to, say, 150 volts.

The characteristics of a screen-grid valve at 100 volts are quite reasonably good and, indeed, the use of a higher voltage often introduces complications. We cannot, therefore, submit a very strong case for the use of more voltage on the high-frequency stages.

Detector Stage

In the detector stage the voltage to be applied to the valve depends upon the grid swing which it has to handle. A value of 20 to 40 volts is quite sufficient when one is only dealing with small signal strength, but in these days of increasing power a signal of several volts is easily applied to the detector.

To cope with such conditions the voltage actually on the anode of the detector should be at least 75 and preferably more. This rules out resistance coupling if one is only using 100 volts and it imposes a somewhat serious limitation on the use of a parallel-feed system unless a choke feed is used instead of the customary resistance.

Greater Latitude

As far as the detector is concerned, therefore, we can say that, although careful design enables satisfactory results to be obtained with only 100 volts total high tension, matters would be facilitated and we should have greater latitude if a greater voltage were available.

So we reach the output stage. What is the condition here? It is quite different from that in the preceding stages, for there is a very strong case for the use of higher values of high-tension voltage. The object of the last valve in the receiver is to supply *power* to the loud-speaker.

A diaphragm has to move backwards and forwards and shift a column of air, which means work. Therefore, we must examine the last stage in the receiver from this point of view, rather than that of pure amplification.

What we desire, of course, is to get the greatest amount of work done for the smallest input volts to the grid, always subject, of course, to the proviso that the power delivered to the loud-speaker must be undistorted, or, at any rate, must not have more than 5 per cent. distortion, which practical experience shows is tolerable.

Now power is the product of volts and amperes. In an output valve we have a slightly complex system to consider, in that the power drawn from the high-tension battery is not all useful in operating the loud-speaker.

The valve takes a certain steady current from the battery, say 10 milliamperes. This multiplied by the voltage in the battery, say 100 volts, gives us 1 watt. It does not follow, however, that we are going to supply 1 watt to the loud-speaker. Particularly with a low anode voltage we shall only utilise about one-sixth of this power, so that the efficiency of the output stage is something like 15 per cent.

Suppose we increase the high-tension voltage to 150 volts. The anode current taken by the valve will, of course, increase to perhaps 15 milliamperes. The battery is now supplying 22½ watts. Even assuming that we have the same efficiency as before, that is about 15 per cent., we shall be obtaining double the power output to our loud-speaker.

Increased Efficiency

It happens that the more we increase the anode voltage the more efficient does the valve become and we should probably find that our

efficiency had risen to something in the neighbourhood of 25 per cent. Even this is not very good, but it is a distinct improvement over the previous case, so that at the expenditure of a little more power from the high-tension battery we have obtained distinctly more output from the loud speaker.

"Let us get down to brass tacks," I hear you say. "How much more power output shall we get?" This is a matter which is quite easily calculated, and the calculations can be checked by actual measurement if desired.

Simple Mathematics

The power output from a valve can be shown to depend upon $E^{\frac{5}{2}}$, E being the anode voltage. This is a mathematical expression which means that the power increases more rapidly than the square (which we write as E^2), but not quite as rapidly as the cube (E^3).

If we double the voltage, then if the power output obeys a square law, we shall obtain four times the power, while if it obeys a cube law we shall obtain eight times the power. Actually we obtain something intermediate between these two, the value being 5.7.

This formula is based on one rather important assumption, namely that in every case the full grid swing is applied to the valve. This means that if we increase the anode voltage we must adjust the grid bias to the correct value and then we must increase the input to the valve so as to load up the valve fully.

Increased Power

If we just increase the anode voltage to the valve, we shall obtain a distinct increase in the power output, but not as much as if we readjust the grid bias so that the valve can operate under its proper conditions. This proviso, of course, is common sense, but it is necessary to refer to it in order to avoid any misunderstanding.

Let us now assume that we are working with 100 volts high tension and that we increase the anode voltage to 150. The first thing we do is to increase the grid bias by an approximately similar amount, so that the first benefit we have obtained is that we can handle nearly 50 per cent. more grid swing without overloading.

This in itself is an advantage, being of more value than is generally realised, for a grid swing of even a good 2-volt power valve on a small voltage like 100 volts is seriously limited.

Consider the Mazda P240 valve, which at 150 volts on the anode will handle a grid swing of 13½ volts (peak). At 100 volts on the anode it will handle between 9 and 10 volts, and this is a very small grid swing for a peak value. It means that the normal voltage (expressed in R.M.S. value) allowing for overload must not be more than about half this value, and the output to the loud-speaker would only be about 125 milliwatts.

A loud-speaker which was limited to such a low power would be considered as having no punch whatever. At least 200 milliwatts are required for ordinary purposes, while 300 or 400 milliwatts are the more usual as a maximum output. (It must be remembered that all the time we are dealing with maximum values.)

The increase in anode voltage from 100 to 150, therefore, has at once improved the capabilities of the loud-speaker stage as far as grid swing is concerned. What is the effect on the maximum undistorted power output which can be obtained?

Undistorted Output

Applying our formula we find that the power output is increased 2.8 times. Consequently, we can now obtain an undistorted power output in the neighbourhood of 350 milliwatts, which as we have seen is a comfortable value for ordinary reception.

The significant point, however, is that increasing the anode voltage by a mere 50 per cent. has increased the power output nearly three times, and these are figures which must make every user of 100 volts think very seriously.

Even an increase of 10 per cent. in the anode voltage will cause a 27 per cent. increase in the power output, and a gain of 10 per cent. can be obtained by such a simple expedient as a choke or transformer output.

The windings of the loud-speaker have a high resistance which cause a voltage drop of 20 or 30 volts in some cases. Do not forget that all our calculations so far have been based on the voltage actually on the anode of the valve, and this is always something less than the high-tension voltage.

Actual Voltage

If we have, say 120 volts and are applying this through an ordinary loud-speaker, it is quite possible that the voltage actually at the valve will be less than 100. This may be overcome by using a choke output or a transformer, the latter having the advantage that the impedance may be matched, and since the resistance of such devices is much less than that of the loud-speaker, usually six to eight times as small, it is quite easy to make up an extra ten or fifteen volts on the anode of the valve itself.

As we have seen this will give more than 25 per cent. increase in the power output from the valve.

The moral, therefore, is, use a choke or transformer output at any rate. It will give you 25 per cent. more punch from your set without altering your battery. If you feel disposed to pay a little more for your pleasure, increase your high-tension voltage to the maximum permitted by the makers. Maintenance will cost you a little more, but you will be amply repaid because your set will behave in an altogether different manner.

THE INVITATION FOUR

RESULTS with the Invitation Four (WIRELESS MAGAZINE, *July*, 1930), *are reported on by a reader in the Federated Malay States* :—

On the normal waveband the local station, working on 325 metres and situate about four miles away from my house, comes in very well and loud. With the same coils I can tune in Bangkok. On the higher waveband coils I can tune-in a station the speech of which is not clear due to atmospherics. I believe the station to be Colombo.

On the short waves I can tune-in several stations. Manila on about 48 metres comes in at good strength. Saigon is delightful both from a standpoint of strength and the music they put out.

"It is it," says a Birmingham constructor of the Invitation Four. Unfortunately the particular type of tuning coil used is no longer manufactured :—

The Invitation Four is it, and I think there is hardly a station that I cannot get on the loud-speaker from 1,961 metres to 80 metres. After that I cannot get any reaction and body-capacity is very bad.

There is plenty of volume and selectivity. I am using an eight-pole Blue Spot loud-speaker. I may add that the set has been religiously put together as you specified.

I should have written you ere this to tell you how good it is, only I have been waiting to see what letters you received about its performance in other peoples' hands.

All my friends tell me it is the best set they have yet heard.

Mrs. Buggins Talks

A Character Study of Mabel Constanduros

By WATSON LYLE

MRS. BUGGINS TAKES A WALK

Here you see Mabel Constanduros taking a walk with two Cockney friends—in search of more local colour for the entertainment of listeners perhaps?

I KEPT my appointment for 2.30 p.m. promptly for a talk with Mrs. Buggins at her flat in town. She had been lunching with friends, but arrived soon after me, apologetic, and characteristically feminine.

As soon as she spoke I knew that, in accent at least, Miss Constanduros and Mrs. Buggins are two different people. I had heard they were, but rumour is proverbially a lying jade.

A Motherly Soul

Every listener knows the pure, unvarnished Cockney of Em'ly Buggins, that motherly soul perpetually torn between the worries of her family and her social aspirations. Quite unlike it is the low, pleasant voice, speaking excellent English, of this woman who is at once her creator and impersonator.

She is rather below the middle height, rounded as to figure, with small feet, and small, plump, well-kept hands, displaying rings on the fingers of both. Her face is very interesting, and intelligent, its habitual expression earnest and reflective; and there is a hint of pathos in the hazel-brown eyes in repose.

Humour quickly lights them up, of course, and their expression can change, with startling suddenness, as I discovered when I happened to mention a well-known actress, one of my friends, whose personality it seems she particularly dislikes, and the sound of whose name brought a sombre glint of detestation into those eyes that, but the instant before, had radiated good humour.

Beneath a fur coat with large, high collar in the prevailing mode, she wore a black dress, to which light, blue-grey stockings were an effective contrast, her shoes and hat being black. She seated herself on a low settee near me, evidently thankful to be indoors, and out of the bustle and wet of the London streets.

"How do you manage that wonderfully realistic Cockney accent when your own voice isn't in the least like it?" I asked.

"When I was a child we lived in Walworth where, naturally, I heard Cockney spoken all around me. As children we amused ourselves imitating the speech, so that it comes quite easily to me."

"Supposing," I asked, "I write about our conversation—or, at least, your part in it—in Cockney, will you mind?"

"Certainly not," she smiled back, taking a header into the congenial waters of her foster-tongue, with alacrity, "thet won't 'arf be a knock-out, nyver, tho' I sez it as shouldn't."

"Are the Buggins family sketched from life?"

"No—leastways, not hexactly. Thet is, I mean t'sey, exceptin', p'raps, pore ole granma. She's *rather* like a deaf ole lidy as we used t'know. Haggravatin' ole thing, she were, too! Used ter ride rough-shod—well, now, rough-shod were too mild for the likes ov 'er! More like a Nimmysith 'ammer a-treadin' on people's pet corns—over everythink, *hand* every body.

"Stop at nuthin' to get wot she wanted, she didn't, nyver! Artful, too—artful has a waggon-load ov monkeys. Thet's *'er*!

Round Walworth

"But, th' others—Father (Bert), Alfie, Emma, and Em'ly (Mrs. Buggins) you'd find their sort round Walworth any dey. 'Father' had to be a silent corrector, in the manner ov speakin', until I met Michael Hogan, three years since. Now, ov course, 'father' 'as a real, speakin' part in *hall* my sketches. 'E 'as bin a real 'elp t'me, 'as Michael Hogan.

"Don't you think," she asked, looking at me in a challenging way, as if she expected me to flatly contradict the opinion she was about to launch, "'as 'ow it is from the collaberation of a man and a woman that the best work comes?"

"History scarcely bears that out,

does it?" I replied. "There was Shakespeare, for instance . . . "

"Oh! I don't mean work like *'is*," she hastened to qualify her generalisation. "He was a geenyhas. Thet aint wot *I* mean."

"In any case," I murmured, propitiatingly, "he may have talked over his plays with someone. The Dark Lady of the Sonnets! As we know, he had plenty of friends."

She smiled broadly, then continued earnestly.

"But don't you find as 'ow it 'elps your work if you can talk abaht it with somebody?"

Quiet Preferred

"I am afraid I don't. In my studio at home I'm thankful to say I can be absolutely undisturbed all day if need be."

"Thet must be a grite 'elp." Her expression became a baffling mixture of wistfulness and envy. "I'd like that when I'm actually writin' my sketches, but I never gits it. Offen as not ther's allus somebody or other a-talkin' hat me fit t'mike yer 'ead ache. Like as not young Emma an grandma'll start jawrin' at each huther.

"Nah! What *I* mean is, t'be able to talk yer hideas hoverwiv someone. Michael 'Ogan is very 'elpful for that. As I sez, 'e supplies the framework, if y'git my meanin', and *I* supplies the bricks and mortar (the dialogue) for many of the Buggins sketches. They want a lot ov writin' an' rewritin' to polish 'em hup, fit for broardcarstin', or the 'alls."

"You type them, I suppose?"

"Nah! Nuthin' ov thet sort for Em'ly Buggins, *thenk you*! I writes 'em all; in pencil, offen. Ginerally, I gits dawhn on th' floor, puts the writin' block on a chair, comfortable-like before the fire this cold weather, an' off I starts. I did 'ave a typewriter, but I didn't nyver seem to mike no 'eadway wiv it, no'ow."

When They Started

"Exactly how long ago is it since you introduced the Bugginses to an amused public?"

"Five and a 'arf years, last Febriary. But, as I've told you, my sisters, an' brothers an' I used t'git lots o' fun through apin' Cockney. I nyver thort nuthin' much abaht it. They was always at pynes to tell Em'ly as 'ow she were a hordinary kid. I nyver took no pynes to do nuthin' wiv the power, or gift."

"Gift," I interposed.

"Or whatever y'calls hit, till somebody said they thort as 'ow it would sound amusin' like on the broardcarstin'. I *was* s'prised to find the hideas, *and* the speech wellin' hup within me, has you might sey. Made me kind ov frightened at first, it did."

"How did you feel after your first broadcast?"

"*Feel*? Shockin'—an' thet's puttin' it mild! Went strite 'ome an' cried me 'eart out. Thet strung hup, an' nervous, I were, not 'arf! At times yet I'm a bit shaky before a broadcast. But once you're started it's all plyne sailin'."

"What about the silent and sound films?"

"Michael 'Ogan an' me did a sketch for the picturs but it 'ad a haccident, an' went an' got burned, it did. 'Ag an' Bert' it were called."

"Why 'Ag'?"

"Why, indeed! Nah, don't you think as 'ow Ag's just about the ugliest nime goin'? Thet's 'ow I fixed it. She were not a nice correcter, Ag, she were'nt, nyver."

"And what about the legitimate stage?"

"There yer talkin'! But it would 'ave to be a comedienne. Nobody would believe anythin' else ov me wiv a nose like mine. (Her nose is distinctly *retroussé*). 'Ave y'ever noticed as 'ow comedienne's noses is always my sort? I'd just love a serious part.

"You mightn't think it, but b'lieve me, or b'lieve me not, Em'ly Buggins ain't 'arf 'ot stuff on the pathetic stop. I've slipped it acrost 'em nah an' then, t'see ow it took, an' I've made folks cry, I 'ave."

So it may be that we shall see Missis Buggins or, rather, Miss Constanduros, change her coat, figuratively speaking, into that of a tragedienne. But one, selfishly perhaps, hopes not.

Clean Humour

The world can ill spare a creator of genuine clean humour; and in her art as creator, and impersonator, of Cockney types on a very human level, Miss Constanduros has contrived all her effects without stooping to the use of the doubtful allusion or—what is more objectionable—the unclean innuendo.

As I rose to go she picked up a photo from a side table, the photo of a laughing-faced boy, and handed it to me.

"This is my boy about whom I've been telling you to-day apart from our press talk. We're great friends. He's just fourteen and a half. He is at school, at Malvern, now. I miss him dreadfully."

While she spoke her face became sad and overcast, and she sighed as she replaced the photo on the table. Here, above all else, was the mother-spirit, the connecting link, more, the close bond, one felt, between Em'ly Buggins and Mabel Constanduros.

"THE BUGGINS" IN HIDING

Mabel Constanduros and Michael Hogan (Mr. Buggins) preparing their lines for the Command Performance in a quiet Sussex garden

Now—the Ultimate Goal!

A Challenge to Designers

By H. T. BARNETT, M.I.E.E.

I LIVE in Old Portsmouth, on the ancient salient close to the sea and the Camber, in the neighbourhood of scores of buildings hallowed by historical association with the great and the good.

The group of towns incorporated with the city constitute a brighter and more accessible metropolis even than London; all the delights of the Solent and of Nectis are near my door; there is the perpetual cheeriness of naval, military, and aircraft movements, BUT there is one great drawback common in part to all coastal towns and undoubtedly here reaching maximum intensity: terrible interferences with radio reception.

A Thousand Trams

In the first place there are trams (probably a thousand of them) flashing and sputtering within three miles of one's aerial. There are horrible fluxes from tram feeders, producing static discharges to electric-light cable sheathing and, perhaps, to other bodies; there is a huge naval transmitting station for Admiralty radio; there are naval and military radio instructional stations nearly always at work; ships are continually moving in and out of harbour and passing in a stream in the Solent, busily signalling all the time.

All the morse signals seem to be entirely untuned and come in with a roar, no matter what station one may be tuned-in to.

Every lightning flash all over the world seems to be working in conspiracy with the Heaviside layer to cause a reflex into this little flat place in front of the coastal hills!

Now I am accustomed to obtaining my music from records, music of an entirely unadulterated nature, so that when I try to get it by radio and its beauty is marred by machine-gun fire, by explosions, by noises such as might emanate from a cartridge factory on fire, and by strongly emphasised morse messages, grave, gay, and facetious, my nerves go completely to pieces.

I have had a good many trials of wireless sets of one kind and another to see if there might be any that could be used under our local conditions.

Undoubtedly the worst were those ordinary circuit sets (not super-hets) having one or two screened-grid high-frequency stages. The best was a low-frequency three-valve set. None of them would have been bearable to my ears.

A.C. Super 60

In April I went to see and hear a Super 60 A.C. set, adapted by an amateur from the wonderful James battery model described in "W.M."

The house was situated several hundred yards from a tram *terminus* on the outskirts of the city and the set was used in conjunction with a highly-directional frame aerial and a powerful moving-coil loud-speaker.

The results were wonderful, certainly, for as its clever young designer turned the tuning drums almost coincidently station after station came rushing in, each one completely separated from its neighbour and free from heterodyne.

Even 5XX, Koenigswusterhausen, and Radio Paris stood the test.

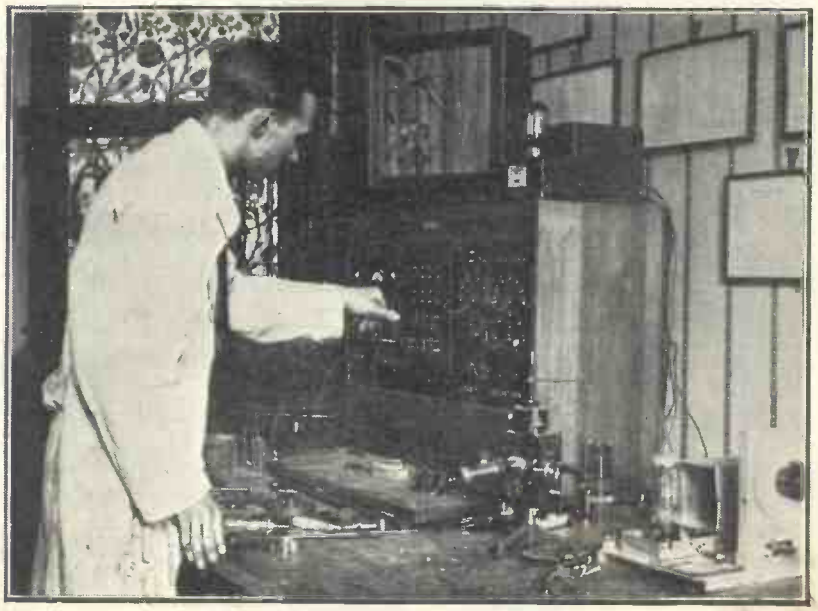
But notwithstanding the distance from the trams and in spite of the highly-directional quality of the frame aerial, the moment any carrier wave was tuned in, then the interference noises were dreadful.

Silent Background

Between stations, no matter how the drums might be correlated, there was a background of dead silence, except for morse, but the moment any carrier wave was in tune, at once the merry machine-gun fire and explosions began.

Morse, even of the far-away magpie kind, was very troublesome indeed. The best station to read was 5XX, reception becoming progressively worse with the shortening of the wavelengths.

Now I am wondering if there was any mistake made in the design or



IN AN INVENTOR'S LABORATORY

One of Manfred von Ardenne's assistants at work on a tone generator for measuring low requencies. Manfred von Ardenne is a well-known German research worker

construction of this set; I certainly do not want one like it. Can any designer produce a power-driven set that will give an output comparable with that obtainable from a record and *working in Portsmouth?* A set to separate perfectly 5XX, Koenigswusterhausen, and Radio Paris?

Should such a result ever be achieved, I am confident a thousand orders might be booked in this city and in many coastal towns almost similarly situated.

Go Ahead!

I say, go ahead designers, do not be satisfied with a set that will give nice results on the top of Hindhead, but peg away until you have produced something that will separate the carrier wave from unwanted disturbances. That is the last goal for you to win—the James Super 60 will do everything else.

I am not a radio engineer myself, not even an amateur, but I have noticed that all low-frequency valve sets here give the least unsatisfactory results.

I remember that a year or so ago a great expert said, "What you cannot get with three good low-frequency valves is not worth having." I wonder if there is any special quality inherent in low-frequency reception that renders it less concentrative of untuned disturbances, less liable to drag untuned waves out of the ether and synchronise them with the carrier wave, than is the case with high-frequency reception?

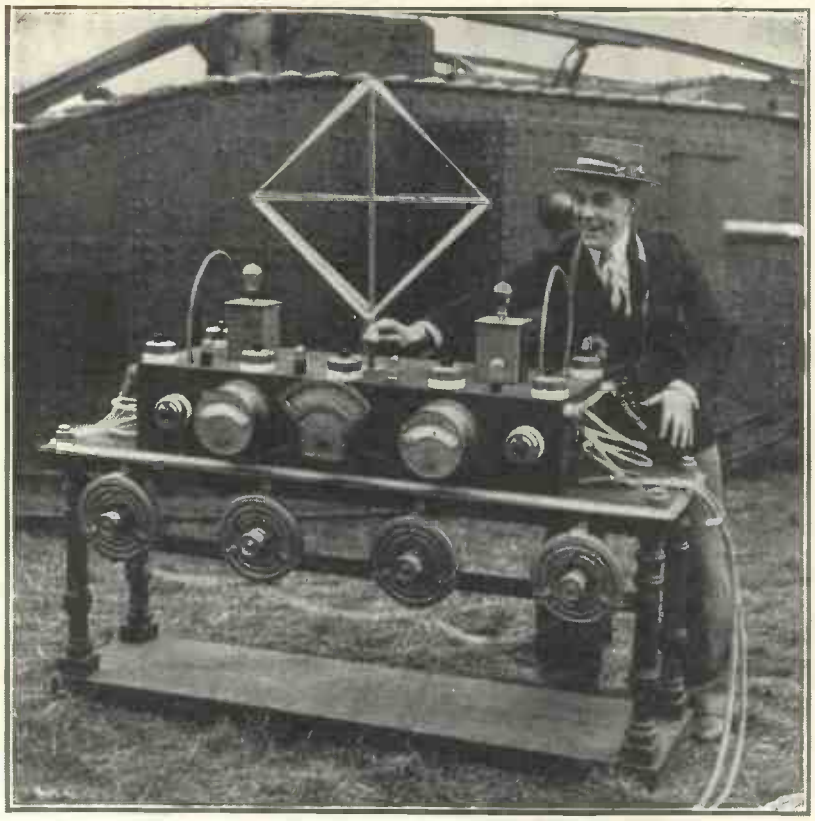
Or is the explanation merely that the magnification of such sets is too small (they certainly are weak to give anything but the predominant wavelength)?

Ideal Mains Sets

If the former supposition is anything other than nonsense, then it would seem possible that the ideal mains set for non-interference might comprise, for example, merely a plurality of indirectly-heated pentode valves in series and having a band-pass filter circuit; the first pentode functioning as a detector and the last as a power valve.

Or might a somewhat similar set comprise a screened-grid valve as detector, then a series of pentodes, followed by a Mazda P or the P1 for the power stage?

Do not consider for a moment the cost of such a set, please, if you see the least chance of producing it; the result would be precious beyond rubies.



IS THIS WHAT CAPT. BARNETT WANTS?

This fearsome looking array of gadgets is a film producer's idea of what a radio set should be. Needless to say, the film in which it appeared was a comedy

FOR SUMMER DAYS

THOSE who are attracted by the idea of a completely self-contained receiver—whether it be mainly for use indoors or out in the open—cannot do better than look into the advantages offered by W. James' Super 60 Portable.

This set, which is fully described in the May issue of WIRELESS MAGAZINE, has proved a very great success, and hundreds have been constructed.

One very great advantage of the Super 60 Portable is that, although it is a six-valve super-het with screened-grid intermediate stages, the high-tension consumption is only of the order of 12 milliamperes. The set is therefore as economical to run as most four-valve commercial portables and, of course, the results obtained are far ahead of the ordinary manufacturers' product.

The cost of all the parts for the Super 60 Portable, that is complete with valves, batteries, cabinet and loud-speaker, is approximately £15 and at this figure the set is quite unapproachable in its field.

Readers may be reminded that the circuit of the Super 60 Portable is identical with that of the original Super 60; no other indication of its tremendous range and power is necessary, for by now every constructor knows the capabilities of that famous set, the popularity which is almost without parallel in the history of radio construction.

New readers will be glad to know that a limited number of copies of the May issue of WIRELESS MAGAZINE, containing every detail necessary for the construction of the Super 60 Portable, can be obtained from the publisher at 1s. 3d. each, post free. Full-size blueprints (No. WM238) are also available at 1s. 6d. each.

Unsurpassed Performance

Construction is well within the capabilities even of the beginner and the result is a receiver unsurpassed for performance, general utility and low maintenance cost—and that irrespective of price. No other receiver can beat the modern super-het circuit incorporated in the Super 60 Portable. Why not start building one now in time for the holidays?

RADIO IN REVIEW

By MORTON BARR

DURING the summer months radio flourishes best out of doors so that we may shortly expect to see the portable set again in high favour for *al fresco* dancing and at picnic parties. There seems, however, to be one aspect of outdoor wireless that has not yet received the same attention here as on the other side of the Atlantic, where the motor-car set is already in general use.

Motor-car Sets

Of course, the chief difficulty is to cut out interference from the magneto system so that reception can take place whilst the car is actually running. In other words, it is necessary to prevent the high-tension circuits from radiating interference noise into the set.

Most of the interference comes from the sparking plugs, the distributor and the commutator brushes. The American designer overcomes this by inserting resistance units on the secondary side of the induction-coil so as to make the circuits aperiodic.

In addition he shunts 1-microfarad condensers across the points where actual sparking occurs, so as to absorb the high-frequency energy locally and prevent it from getting into the set.

By eliminating radiation trouble at the source in this way, it is possible to install a receiver and to use it on the road with practically the same freedom from interference as at home. Before long British car manufacturers may take the matter in hand themselves and advertise a static-free model designed to allow broadcast reception "as you go".

"Cutting Out" Noise

Unfortunately the problem of "man-made static" is by no means confined to the motor-car set. Many listeners suffer badly from the same kind of interference in the comparative seclusion of their own homes. It may come from a vacuum cleaner or high-frequency electrical apparatus next door, or from a noisy dynamo or motor several hundred yards away.

In nearly every case it is possible to "abate the nuisance" by taking certain precautions, if only the owner of the offending apparatus can be persuaded to adopt them.

For instance, a noisy 20-h.p. motor can be silenced by inserting two 2-microfarad condensers in series across the brushes and connecting the mid point between the two condensers both to ground and to an earthing-point on the frame of the machine. For larger motors it is necessary to insert inductance coils in series with the condensers.

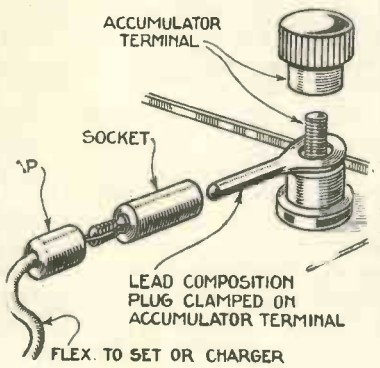
In general, interference from any "sparking" appliance can be eliminated by inserting an inductance coil in each lead and a shunt-condenser to earth.

Unfortunately the real difficulty is to persuade the users of electrical apparatus to make use of these safeguards. There are, at present, no legal powers to compel them to do so, though the time may come when Parliament will take steps to enforce peace and quietness in the ether.

German listeners have already formed a large organisation to combat deliberate interference with broadcast reception. Five thousand voluntary "interference sleuths" have been enrolled up and down the country, and any listener who finds himself troubled with "man-made static" promptly notifies the nearest broadcast station. They in turn send out the local interference squad, who have methods of their own for locating the offender.

Although they have no actual legal powers the "sleuths" are able to exercise such moral persuasion—backed by the whole of their organisation—that in practically every case a cure is promptly effected.

AN ACCUMULATOR CONNECTOR



A useful connector made by Clix that can be kept permanently fixed to the low-tension battery. All the metal parts are covered with lead to prevent corrosion, and the act of connecting or disconnecting the leads takes only a moment

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A Famous Discovery

A hundred years ago Michael Faraday showed, for the first time, the true relation between magnetism and electricity. It is said that Thales of Miletus—one of the seven wise men of ancient Greece—knew that when amber was rubbed it would attract light particles of certain substances. In fact, the word electricity is derived from the Greek word for amber. Similarly Pliny knew and wrote of the magnetic properties of lodestone.

But it took another 2,000 years for Faraday to prove that magnetism and electricity were simply different aspects of one and the same thing. He showed first that an electric current could be produced by rotating a coil of wire in a magnetic field and, secondly, that a piece of iron could be magnetised by placing it inside a coil carrying an electric current.

These discoveries paved the way to the construction of the dynamo and electric motor and so laid the foundation of modern electric engineering. Incidentally Faraday's work gave Clerk-Maxwell the clue to the electromagnetic ether and led him to prophesy the existence of those wireless waves used in broadcasting.

Faraday Relics

The Institute of Electrical Engineers, in association with the Royal Institution, are organising an exhibition to be held in September at the Albert Hall of the actual apparatus used by Faraday a century ago. It is intended to include a collection of original manuscripts and personal relics.

These exhibits should have more than a passing interest for wireless enthusiasts, because in a sense they represent the first steps taken along the path to broadcasting.

A RADIO FAN'S CAUSERIE CONDUCTED BY BM/PRESS

Fixing Templates

LAST month I mentioned the need for templates to facilitate the fixing of certain components. I cited the case of a well-known gramophone motor that has up to now been supplied without a template and which is not at all easy to fix.

Now, I am glad to say that the distributors of this product have taken the hint and supply a well-drawn fixing template with each model sent out.

Here is one instance, at any rate, where criticism has had the desired effect. I shall be glad to hear from WIRELESS MAGAZINE readers who have run up against similar points.

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Super 60 Aerial

Those readers who are in a hurry to get their Super 60's going when they have not finished the construction or are awaiting the delivery of a frame aerial may care to try a dodge successfully carried out by a friend of mine.

He phoned me up in great excitement the other evening and said that he had got fifty medium-wave stations on his set using only a centre-tapped plug-in coil as the aerial.

I suggested that he should put 8 or 10 ft. of wire on each end of the coil, arranged as a miniature aerial and earth lead. This he tried out with very successful results, for the range of the set was materially increased.

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Cheaper Radio

There are indications of considerable reductions in the prices of components made in this country. This is good news, for hitherto only foreign-made parts have been available at really low prices. In most cases British-made apparatus of the same type has always been more expensive.

Let me give some examples of some of the new prices of British-made parts. There is a loud-speaker unit for 8s. 6d. and a cabinet model for £1 2s. 6d. Spaghetti resistances are 7d. up to 2,500 ohms and then 9d. up to 20,000 ohms. A well-known make of four-pin valve holder has been reduced from 1s. to 6d. (8d. for the five-pin type).

All values of grid leaks can be obtained for 9d. each and fixed condensers up to .002 microfarad are priced at 6d. A quite good high-frequency choke is available at 2s.

All we want now is a reduction in the price of "ring" valves. If I am not mistaken a price reduction is just about due.

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Record Robots

Up in the WIRELESS MAGAZINE laboratory the other day I saw several members of the staff watching with interest an automatic record changer.

There was a magazine containing records just above the turntable and when the machine was switched on (it is electrically driven, of course) the first record dropped down and the pick-up moved over to the edge of the turntable, where it halted and descended vertically so that the needle fell into the first groove.

I was very much impressed by the

Fixing Templates :: Improvised Super 60 Aerial :: Cheaper Parts for Constructors :: Automatic Record Changer :: Army and Navy Radio Gear :: New-style Cabinets :: £100 A Year Mains Experiences :: Flexible Gramophone Records

RADIO MEDLEY—Continued

steady nature of the movement. The pick-up came to rest gently and did not crash down on to the record as one might expect.

When the end of the record was reached the pick-up was lifted from the record and the arm swung right outside the range of the turntable so that the second record fell into position unimpeded.

There is only one thing that will stop gramo-radio enthusiasts from using one of these gadgets—I understand the price is in the neighbourhood of 30 guineas!

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Service Gear

Nowadays we are growing so accustomed to the appearance of home-constructed radio sets that it is something of a surprise to see the sort of gear that is being used in the Army and Navy.

I hope I am not giving away any State secrets when I say that I saw a number of interesting service transmitters and receivers in course of construction at the R.I. works the other day.

The most striking thing about this Government gear is, as it has always been, the robust nature of the construction. The sets I saw really did look as if they would stand a good deal of knocking about under service conditions.

My guide was Mr. J. Joseph, the life and soul of all R.I. activities. I was interested to learn that he was at one time in partnership with Mr. Handley Page, the aircraft designer.

◆ ◆ ◆

New-style Cabinets

Radio cabinet makers have some pleasant surprises for us during the autumn, if photographs of some advance models shown me by a manufacturer the other day are anything to go by—and I believe they are in this case.

The tendency of the new designs seems to be to abolish the ebonite panel entirely and rely on the wooden front of the cabinet to supply the necessary insulation.

On the whole, I think that constructors rather distrust wood panels, but I have never been able to understand the objection to them. From time to time a number of set manufacturers have put out receivers with the controls mounted on wood instead of ebonite; I have yet to learn that this practice results in any loss of efficiency.

◆ ◆ ◆

Costly Experience

"As one who has spent over £100 a year during the last three years experimenting with A.C. mains I append my conclusions; possibly they may be of advantage to others who cannot afford so much in the search for perfection."

Such is the beginning of a letter I have received from Paisley, which is signed simply "5,000 Ohms." I think I cannot do better than quote the points raised in detail for many of them will be of considerable interest to my readers.

Better than Batteries

"An A.C. mains set can be definitely better than a battery set and need have no hum and no more electrical interference," says "5,000 Ohms," "provided:—

"1.—The mains transformer must be good, preferably with sectioned windings. On connecting it to the mains, either with no load or on load, transformer hum should be inaudible except through an aid to the deaf. The bolts binding the transformer should be of heavy-gauge steel so that they can be severely tightened.

Question of Rectifier

"2.—Metal rectifiers are to be excluded.

"3.—The valve rectifier chosen in conjunction with the transformer secondary voltage should have a surplus to permit of plenty of resistance smoothing and decoupling.

"4.—Directly-heated output valves using 1 ampere or less filament current should always be used in push-pull; if a single output valve is used it should be indirectly heated.

"5.—All my remarks so far and those following apply when a moving-coil loud-speaker with a 40- to 8,000-cycle response is used. If you are content with an average unit some conclusions can be omitted.

"6.—All grid-bias resistances should be decoupled. If under 20 volts bias, the decoupling resistances should be of the vacuum type as the graphite type can give trouble through injury from high voltages gathering on the by-pass condenser. If over 20 volts bias, the decoupling resistances should be wire wound, and screened if they are near any iron-cored objects.

Earthing Iron Cores

"7.—All iron cores should be earthed or mounted and bolted on an earthed metal screen.

"8.—Two .0005-microfarad mica condensers (good) should be connected across the mains and the centre point taken to the earthed screening. On the majority of A.C. mains the set is better with this than with an orthodox earth.

"9.—Modulation hum, if No. 8 has been attended to, is cured by the usual .01-microfarad buffer condensers from anodes to filament of the rectifier.

"10.—With a loud-speaker of good upper response, valve hiss is sometimes apparent when two or more indirectly-heated screen-grid valves are used, or sometimes it is observed with a pentode output; a scratch filter with two adjustments, one for radio and one for gramophone, is the cure.

Super-het Trouble

"11.—I am nearly beat at present trying to cure hum from an A.C. super-het due to the oscillator valve. The best solution I have so far is plenty of high-frequency amplification before the first detector."

In the main I agree with my correspondent, but I should very much like to know the reason for his objection to metal rectifiers. Personally, I have never had any trouble with them and I know of dozens of other people who get good service from them.

◆ ◆ ◆

Flexible Records

Some months ago I mentioned that I had received a batch of flexible records from the Goodson people. These had the appearance of white ivorine, the chief advantage being that they were light and less bulky than ordinary records.

I have now received a batch of similar records from the same firm, but the new ones are called Lido records and are quite black. I imagine that they will be more popular among gramophone users, for they look much more like orthodox pressings. BM/PRESS

Super 60 News

SIMPLE A.C. CONVERSION :: TRIPLE COIL BASES

ALL owners of battery-model Super 60's will be interested in an A.C. conversion scheme developed by the Marconiphone Co., Ltd.

Their method of converting the original set for operation from alternating-current mains is to replace the battery valves with a set of mains valves and the batteries with a mains unit that supplies all the necessary power. Grid bias is obtained from a battery in the ordinary way.

The alterations necessary to the receiver itself are few in number and are easily accomplished with the aid of the instructions prepared by the Marconiphone people. The four-pin valve holders are replaced by the five-pin type and the additional wiring for the cathode circuits put in position.

Valves for A.C. Mains Working

Two or three preliminary adjustments to the mains unit make it suitable for use with a set of Marconi A.C. valves, the types used being : (1) oscillator, MHL4, (2) first detector, MH4, (3) I.F. stages, two MS4's, (4) second detector, MH4, and (5) output, P625.

Up to 250 volts high tension can be obtained from the mains unit, which incorporates a U5 valve rectifier. The unit also gives an output of 4 volts raw A.C. for running the heaters of the first five indirectly-heated valves and an output of 6 volts for the final super-power valve, of the ordinary battery type.

The battery set converted in this way for A.C. mains operation is particularly stable in action. We heard the set working into a Marconiphone model 131 permanent - magnet moving-coil loud-speaker, and were very favourably impressed with the results. There was no background noise and no mains hum was perceptible a yard from the loud-speaker.

A.C. INSTEAD OF BATTERY VALVES

The Super 60 battery model equipped with a set of Marconi A.C. valves for mains operation

As can be seen from the photographs on this page, the complete outfit is particularly neat in appearance, the mains unit being housed in a pressed-steel case.

There is no doubt that this method of adapting the original Super 60 for A.C. mains operation will appeal to a large number of WIRELESS MAGAZINE readers. The additional cost is £6 5s. for the mains unit and £5 8s. 6d. for a set of valves.

Further details of the method of conversion can be obtained by those interested direct from the Marconiphone Co. Ltd.

CONVERTED FOR A.C. MAINS OPERATION

Here you see the Super 60 arranged for A.C. mains operation in conjunction with a Marconiphone AM7 unit

* * *

Several firms are now making triple coil bases for mounting the three intermediate-frequency transformers used in the Super 60. The first to appear was that made by Peto-Scott, which sells at 2s. 9d. Now Wearite sell a similar base at 2s. 9d., H. and B. at 2s., Lewcos at 2s. 6d., and Ready Radio at 2s. 9d. (Notes regarding a new dual-range frame aerial by Ready Radio appear on page 634.)

Prospective constructors of the Super 60 will also be interested in a base with eight valve holders made by Wearite. Five of these are for the valves (the oscillator valve is mounted in a separate holder in the ordinary way) and the other three are for the I.F. coils.

Connections between the various sockets are wired up underneath and a clip is provided for the grid leak associated with the second detector valve. The price is 7s.

Band-pass Tuning with Plug-in Coils

AN INTRODUCTION TO THE BAND-PASS INCEPTORDYNE

BY W. JAMES

THE first essential in any band-pass circuit is accurate tuning over the whole range. We have in the pair of tuned circuits capacity and inductance, and they naturally have resistance as well.

The inductance in each circuit is nearly enough for our purpose, confined to the pair of coils, but while the capacity is mainly in the tuning condensers, there are other material capacities.

Aerial-circuit Capacities

Thus in the aerial circuit we have the capacity due to the aerial and in the secondary circuit the capacity of the valve and its holder. There are other stray capacities as well, but they are usually not so important. Let us consider the aerial circuit first.

The aerial is connected to a point on the tuning coil, so the effective capacity introduced into the circuit is less than the actual capacity of the aerial.

This effective capacity is less as the tapping point is taken nearer the earth end of the coil. Besides this, there is a pre-set condenser in the aerial wire to the set. The nett result in the aerial circuit is that the capacity added by the aerial is not very great and it can be altered readily enough by adjusting the pre-set condenser.

In the secondary circuit the chief capacity, apart from that of the tuning condenser, is due to the valve and its holder. With a screen-grid valve the capacity is relatively constant, not altering with tuning.

The position with regard to capacities, then, is this, that in addition to the tuning condensers we have in one circuit extra capacity because of the aerial circuit and in the other circuit we have the valve and its holder.

Now the capacity of different aerials varies considerably, such as from .0001 to .0003 microfarad, but the pre-set condenser, being included in the aerial lead, reduces the effective capacity. This is still further reduced so far as the tuned circuit is concerned by the tap on the coil.

Obviously, then, given coils of equal values and tuning condensers of equal capacities all over the scale, we can balance the circuits by making the rest of the capacities in the two circuits equal.

A well-known actor and monologist, A. Bromley-Davenport

This is effected easily enough by setting the pre-set condenser to reduce the capacity of the tuned aerial circuit to that of the secondary circuit.

There is a further point here, though, which must be watched. The signal strength depends partly upon the point at which the aerial is joined to the aerial coil, and also upon the value of the pre-set condenser. Too weak a coupling may well be obtained, and so it becomes necessary to increase the coupling by raising the value of the pre-set condenser or by tapping further up the coil, that is, away from the earth end.

But when this is carried out the effective capacity added to the circuit is increased and so further capacity must be added to the secondary circuit. This may be effected with a trimming condenser.

Thus the circuits may easily be balanced and be arranged to provide good signal strength. We have assumed that the tuning condensers gang accurately over the whole range, and if they do not good tuning is not possible. This also applies to the coils. They must have equal inductances and so it is usual for matched coils to be used. Tests have shown, however, that carefully chosen plug-in coils are satisfactory, but it cannot be too clearly emphasised that the circuits must tune accurately together or broad tuning and loss in strength will result.

We now come to the resistances of the circuits. With low-resistance coils and low-loss tuning condensers exact tuning is a matter of difficulty and, further, the resonance curves would be not very suitable.

Best Circuits

Circuits having moderately high values of resistance are best from all points of view, and in choosing plug-in coils we are safe in this direction.

We have to tune over two wave-bands. It is, therefore, necessary so to arrange the circuits that when the tuning is made correct on one wave-band it is also correct on the other when coils are changed. We do not wish to have to alter tuning capacities, but merely to alter the coils.

If the pairs of coils are suitably chosen, there will be no trouble in this direction. The band-pass characteristics of two tuned circuits coupled together depend upon the resistances of the circuits and the degree of the

coupling. Usually, if the coupling is set to provide good tuning at, say, a middle frequency in the tuning range, the tuning is a little too sharp at lower frequencies and a bit too broad at higher frequencies.

As the resistance of circuits varies with frequency, however, it is not possible to say to what extent the variation occurs and it is possible that the results are satisfactory from a practical point of view in a simple set with a fixed coupling determined by experiment. You merely shift one of the coils relative to the other until the most satisfactory results are obtained.

Better Tuning

The two circuits provide far better tuning than a single circuit by itself, and when the double circuit is fitted before the first valve in a set the full advantage of it is obtained.

In the case of a set having a screen-grid stage the selectivity is improved by the coupling between the screen-grid valve and detector, thus further adding to the sharpness of tuning. But the chief charm of a coupled circuit between the aerial and the first valve is the reduction of interference and also the avoidance of a form of distortion which can be very trying.

That plug-in coils can be used is all to the good, since they are fairly cheap.

MORE RADIO TELEPHONES

IT is estimated that within the next three months it will be possible for telephone subscribers in Buenos Aires to converse with two more South American countries. Work is now rapidly approaching completion, as a result of which the services of Bogota and Rio de Janeiro will be brought into direct touch with local circuits.

Two new wireless-telephone transmitting stations and two for receiving are now in construction at Bogota and Santiago, Chile, respectively, and equipment for a new circuit is being installed in the stations at Hurlingham, Buenos Aires, and Plantanos.

By a combination of these two facilities with existing international wireless and land-line connections, not only will five South American countries be able to speak with others, but Colombia will be relieved of its present telephone isolation, and the facilities for Rio de Janeiro for conversing with other countries greatly expanded.

The whole programme adds materially to the present outstanding importance of Buenos Aires as an international communications centre.

The sending and receiving stations under construction in Rio de Janeiro by the Companhia Radio International de Brazil are being prepared to work with those of the Compania Internacional de Radio (Argentina) in Buenos Aires and the Compania Internacional de Radio (Espana) in Madrid, as well as to provide direct service with the United States.

South American countries will thus be able to speak with Rio de Janeiro via Buenos Aires, European countries via Madrid, and Canada, Cuba and Mexico, as well as the United States, via New York.

Working Soon

In Santiago the Compania Internacional de Radio S.A. (Chile) has nearly finished the installation of a transmitting station at Lagranja and a receiving station at Pudahuel. The work has progressed so far that it is planned to begin working direct with Madrid sometime this summer.

This will relieve the transandine land-line of the traffic between Chile and Europe, although communications between Chile and North America will be routed via Buenos Aires.

This will also provide a possible alternative method of telephonic connections between the Pacific and Atlantic coasts of South America in the event of a temporary interruption of the Santiago-Buenos-Aires line due to storms in the Cordillera or the Pampa.

A set of sending and receiving stations has been authorised for installation in Lima to connect the subscribers of the Compania Peruana de Telefonos, Limitada, with those of the Compania de Telefonos de Chile (formerly the Chile Telephone Company), and this will, in turn, make it possible for the subscribers in Lima to talk with Argentina and Uruguay.

Service to New York

All America Cables, Inc., is erecting wireless stations in Bogota which will be able to connect with those in Santiago de Chile as well as to give service to New York.

Thus a connection to the south will be established between the Colombian capital and subscribers in Chile, Argentina, and Uruguay by means of the facilities described; while by the introduction of another wireless telephone circuit it is expected that conversations may be held from Bogota to Rio de Janeiro or to Europe via Buenos Aires.

F.P.

LISTENERS' FORUM

SOUTH AFRICAN PROGRAMMES

To the Editor, WIRELESS MAGAZINE

SIR,—I notice, in your issue of WIRELESS MAGAZINE dated March, 1931, a letter headed "Not Up to Standard," and making a statement that our programmes are not up to the standard of other countries.

Here and now I wish to contradict this, as we have some of the finest talent in the world, both vocal and instrumental.

To begin with we have the Cape Town Orchestra, also the Durban Municipal Orchestra. We have programmes from these orchestras every evening, interspersed with the finest vocal items as well as lectures and talks of an interesting and instructive nature.

A. C. MOODIE.

Queenstown, South Africa.

OLD SAILING SHIPS AS TRANSMITTERS

SIR,—As a retired shipmaster who now indulges in wireless as a hobby might I enquire whether any suggestion has ever been made to convert old hulks and sailing ships into transmitters?

There are a goodly number of these old-time craft moored in United Kingdom ports and along the Mediterranean which, with a touch up, might easily be converted into broadcasting stations.

First of all the masts are timber and, therefore, absolutely free from absorption; then the rigging would enable regular aerial inspection to be made.

Secondly, there is ample accommodation on board to house the entire staff—technical, artistic, literary, dramatic and canteen—permanently; and the state cabin would make an ideal studio, with chart room as control and amplifier rooms.

Thirdly, in point of good earth, the ship's anchor chain would make a good connection.

Fourthly, the hull, being mostly timber built, insulation would be ensured to a maximum. Transmitter equipment might very conveniently be housed in the hold.

Another point; if bearings were found to be not suitable, it would be easy either to sail away or to be towed to better moorings.

From the point of view of rent, rates and taxes and general quiet so essential to broadcast services, the old sailing ship would be ideal. Why not try it?

SHELLBACK, R.N.R.

Kensington, W.

The BAND-PASS INCEPTORDYNE

DESIGNED BY THE "WIRELESS MAGAZINE" TECHNICAL STAFF

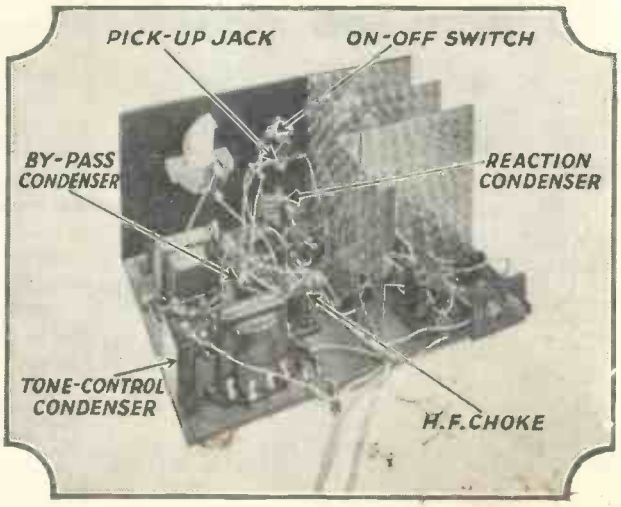
ONE of the most popular features of the original Inceptordyne, first described in WIRELESS MAGAZINE for February, 1930, was the use of two-contact plug-in coils. The remainder of the components were all of an inexpensive type and the result was a cheap but particularly efficient three-valve set on distinctly modern lines, for it included a screen-grid high-frequency stage and a pentode output valve.

Hundreds Giving Satisfactory Service

Hundreds of these receivers were built and have been giving satisfactory service to readers all over the country during the past eighteen months.

But in some areas selectivity of the original set is not as good as could be desired under to-day's congested conditions. For this reason we are presenting here details of a similar type of receiver, but with this difference—that it is very much more selective and therefore more suitable for the reception of high-power stations.

Although this new version of the set still retains the ever-popular type of plug-in coil, it is just as simple and inexpensive as the original. Its great feature is the inclusion of band-pass tuning, and we believe that this is the first design to accomplish a band-pass effect with standard plug-in coils.



IDEAL FOR MODERN CONDITIONS

The construction of this set is well within the capabilities of any listener; even beginners will find it quite straightforward

Explanatory Articles to Read

In this article there is no need for us to go into the technicalities of the band-pass system; J. H. Reyner deals with it on page 580 under the title, "Has the Band-pass Tuner Arrived?" and on page 620 some notes by W. James will be found on the same subject. Here we shall confine ourselves solely to the practical aspect of the matter and the method of operation.

The essence of the band-pass tuner is two separately tuned but coupled circuits, the coupling either being of a magnetic nature or accomplished by means of a condenser.

In this set a magnetic coupling is employed and, as already indicated, both the necessary coils are of the standard plug-in type.

For tuning a band-pass circuit it is usual to use gang control, and in this set a two-gang variable condenser is used for tuning the two coils. For this reason it is most desirable that the two coils in the aerial circuit should be matched, otherwise the tuning of each circuit will not be accurate and poor signals will be the result.

We have arranged with the makers of Atlas coils to supply matched pairs for this set; we also understand that the makers of Lewcos coils are prepared to supply similar matched pairs if required. For the medium waves two No. 60

coils are needed, one being X- or centre-tapped and the other being plain; for the long waves two No. 200 coils will be needed, one of these also being X- or centre-tapped, while the other is a plain coil.

Trying Unmatched Coils

Those who already have a stock of plug-in coils may like to try them before buying these specially matched pairs, but it is unlikely in the ordinary way that unmatched coils will have sufficiently close characteristics to tune properly with the two-gang condenser. We have, however, ourselves had good results with standard Lewcos coils.

The reason for using one X- or centre-tapped coil will be clear from the circuit diagram on this page, where it will be seen that the aerial lead, after passing through a small semi-variable series condenser, is taken to a tapping on the first coil, so that the aerial load is reduced as far as possible.

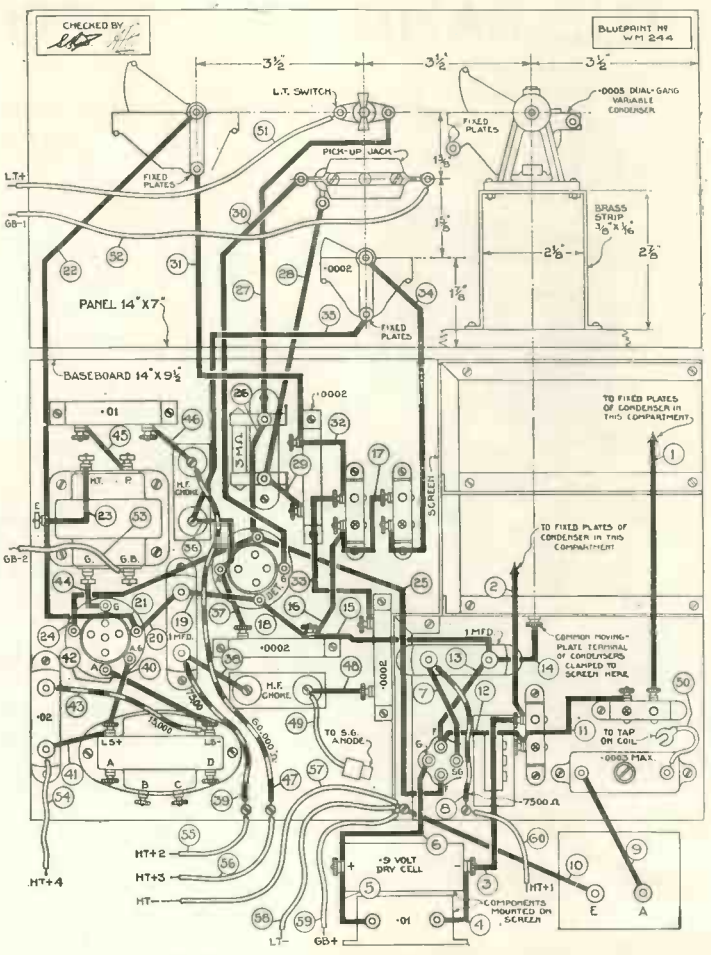
In order to earth the band-pass circuit directly the cell for giving bias to the screen-grid valve is connected directly in the grid lead, a .01-microfarad fixed condenser being placed across it to provide an easy path for high-frequency currents. So much for the aerial circuit.

Tuned-grid Coupling

The coupling between the screen-grid valve and the detector is made by means of a high-frequency choke in conjunction with a tuned grid circuit. It is essential for good results that the choke should be of high inductance and low self capacity. The coupling condenser is .0002 microfarad.

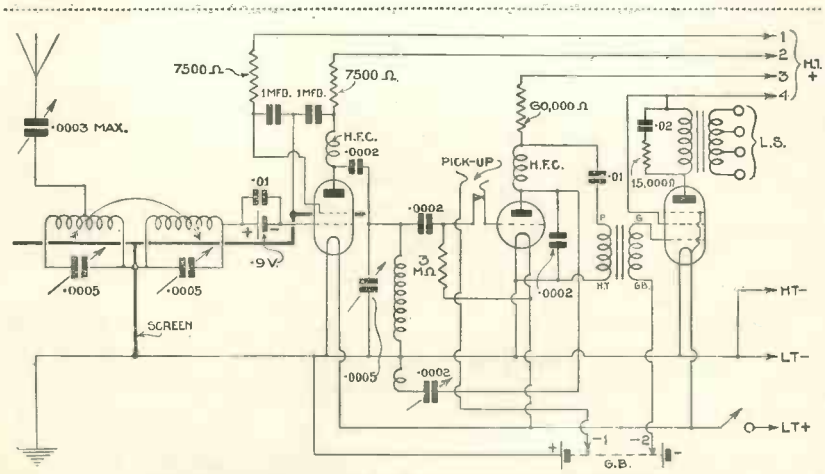
In order to ensure complete stability in operation, both anode and screen-grid circuits of the high-frequency valve are decoupled. For this purpose two 7,500-ohm resistances are used in conjunction with two 1-microfarad fixed condensers.

The tuned-grid circuit is arranged in exactly the same way as an ordinary aerial circuit. A plug-in coil is tuned by a .0005-microfarad variable condenser and reaction is applied on the Reinartz principle, being controlled by a .0002-microfarad variable condenser. Standard values of grid leak and co denser, namely, 3 megohms and .0002 microfarad, are used for the leaky-grid detector.



QUARTER-SCALE LAYOUT AND WIRING DIAGRAM

If desired, a full-scale blueprint can be obtained for half price (that is, 6d., post free) if the coupon on page 664 is used by July 31. Ask for No. WM244



THREE-VALVE CIRCUIT WITH MANY REFINEMENTS

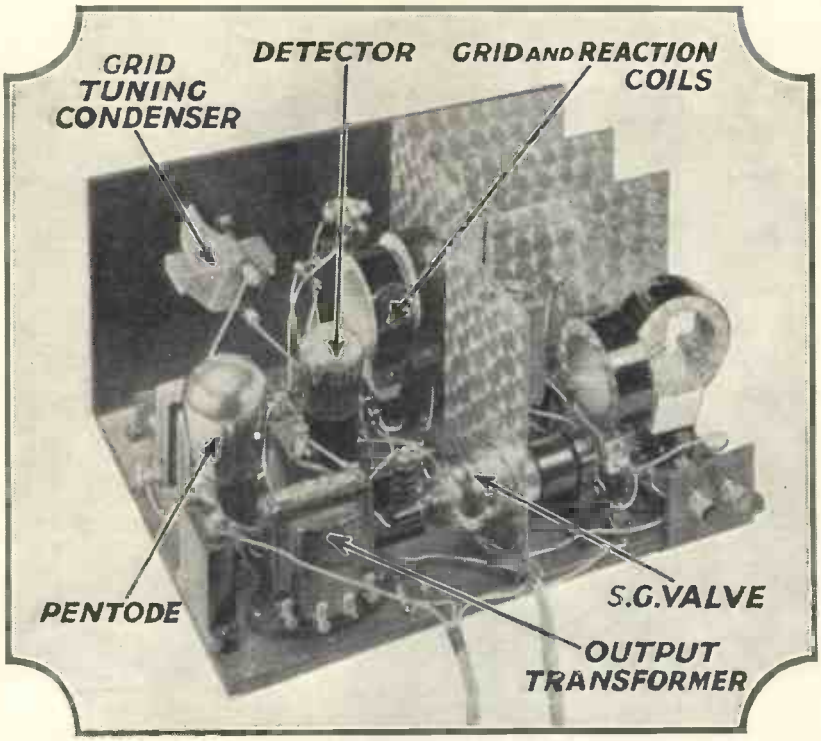
Every modern refinement to ensure stability of operation is included in this band-pass circuit. A screen-grid stage, leaky-grid detector, and a pentode output valve are used

Directly in the grid circuit of the detector valve is a jack for the connection of a gramophone pick-up. The insertion of the plug automatically applies negative bias to the detector grid.

A second high-frequency choke (which need not have such good characteristics as the first one) is placed in the anode circuit of the detector valve, and across the anode and negative side of the filament is a .0002-microfarad fixed by-pass condenser to improve the efficiency of the detector action.

The coupling between the detector and the pentode is accomplished by means of a low-frequency transformer,

THE BAND-PASS INCEPTORDYNE—Cont.



DIFFICULT TO BEAT FOR EFFICIENCY AND CHEAPNESS

The Band-pass Inceptordyne is an ideal receiver for use under modern conditions. It has a high degree of selectivity and gives good quality

and in order that the primary of this shall not be subject to too much anode current, it is fed through a 60,000-ohm resistance in the detector anode circuit. Between this resistance and the transformer primary is a coupling condenser of .01 microfarad.

Output Circuit

It is by now well known that for the best results a loud-speaker should never be connected directly in the anode circuit of the pentode valve. In this set a special output transformer is incorporated. The secondary of this is tapped so that the loud-speaker can be matched up with the valve to give the best reproduction.

Further, to restrict the high-note response, which is always very much greater with a pentode than with any other type of output valve, a fixed tone control is placed across the primary of the output transformer. This takes the form of a 15,000-ohm resistance in series with a .02-microfarad fixed condenser.

The sole purpose of these two parts is to reduce the high-note output and so in effect increase the strength of bass-note reproduction. It is a small refinement well worth the cost to the constructor.

From this brief description of the circuit arrangement it will be appreciated that every possible care has been given to the production of a simple and efficient, yet comparatively inexpensive, three-valve circuit. The Band-pass Inceptordyne follows the best modern practice in every detail and we are confident that it is just the receiver that will meet the needs of hundreds of WIRELESS MAGAZINE readers.

Essential Details

Every essential detail for the construction of the set is included in these pages, but if desired a full-scale layout and wiring guide can be obtained for half price, that is 6d., post free, if the coupon to be found on page 664 is used by July 31. Ask for No. WM244 and address your inquiry to Blueprint Department, WIRELESS MAGAZINE, 58-61 Fetter Lane, London, E.C.4.

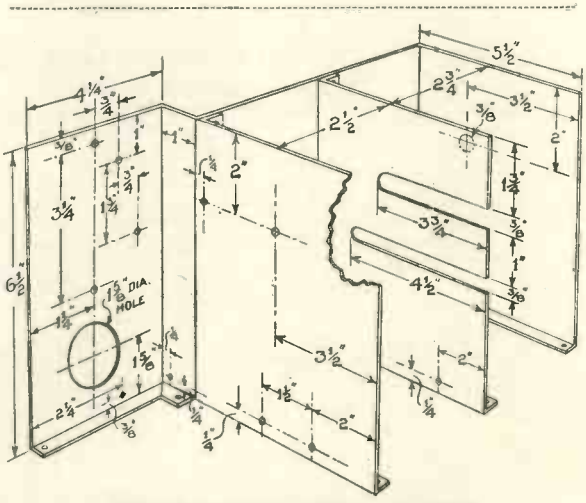
Numbered Connections

Each connecting wire is numbered separately and the leads should be carefully put into position in the numerical order indicated. Before the wiring is started, however, there are two points that should be carefully noted.

In the first place the .9-volt grid cell and its .01-microfarad by-pass condenser (drawn for convenience outside the main lines of the blueprint) should be bolted in position on the aluminium screen as shown in the photograph on page 625.

Coil Holders

Secondly, it should be noted that the holders for the two band-pass coils (seen in the bottom right-hand corner of the layout guide) must be fixed in the exact positions indicated. The circle with a cross inside in each case indicates the projecting plug on the holder.



DETAILS OF THE METAL SCREEN

Much of the efficiency of the set depends upon the efficient screening of the two-gang condenser. The metal can be aluminium or copper

If these holders are not fixed in the exact positions shown a reverse coupling between two coils will result and no band-pass action will be obtained. It should also be noted that the holder for the first coil is held in position by one screw only, so that the coil can be swung round as desired.

The only part of the operation of the Band-pass Inceptordyne that needs any detailed explanation is the adjustment of the band-pass circuit; it is necessary to

USES TWO-CONTACT PLUG-IN COILS

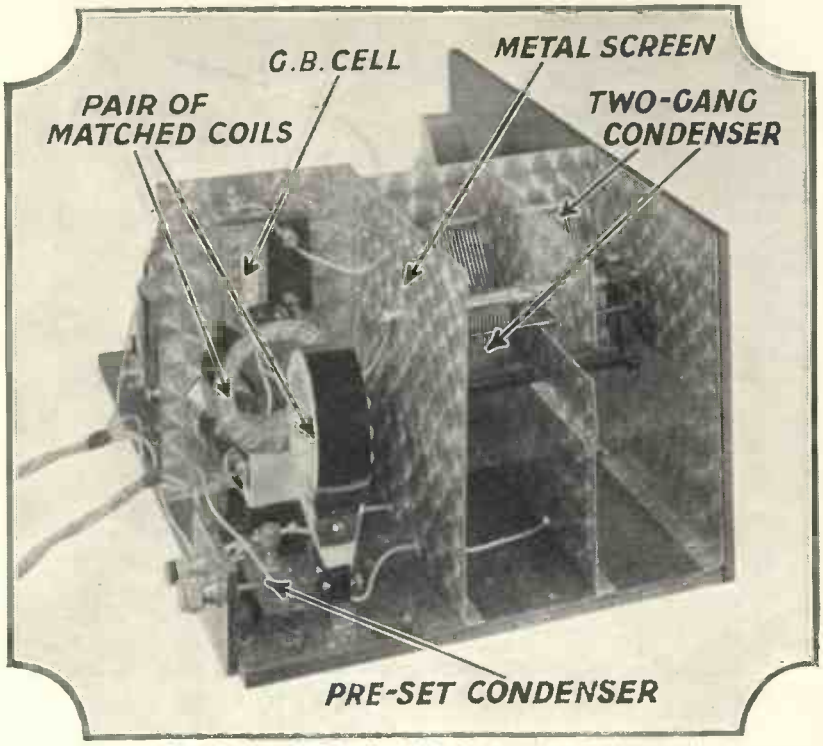
take some trouble over this matter.

When the set is first put into operation see that the two band-pass coils are approximately at right angles. Then tune in a station that is not too loud; at this stage the aerial lead should be tapped on to the centre of the first coil or, in the case of an X-tapped coil, on to the smallest tap. Now adjust the aerial series condenser until the loudest signal is obtained.

"Double-humping"

After this it will be time to check up the band-pass action of the circuit. With the two coils approximately at right angles it will be found that whatever station is tuned in will appear at two places (comparatively close) on the dial. This effect is known as "double-humping," and our problem is to arrange the circuit so that the two humps converge and become one fairly broad hump.

This effect is accomplished by reducing the angle between the two coils. Our experiments show that the proper band-pass effect is produced when the two coils are at an angle of about 65 degrees, but this will vary, of course, with different coils and the best angle must be found by trial in the way explained.



THE BEST PLUG-IN COIL SET YET!

The Band-pass Inceptordyne gets more out of standard plug-in coils than any other three-valve receiver yet designed. Build it and hear for yourself

The final effect to be aimed at is that a station should tune in sharply at full strength, be held at full strength for several degrees on the

TEST REPORT ON THE BAND-PASS INCEPTORDYNE

THIS set has been designed to give true band-pass selectivity by the use of ordinary plug-in coils. In this way the incoming signal is pre-selected before being amplified by the high-frequency stage. There are two plug-in coils for the band-pass tuner and these are simultaneously tuned by means of a two-gang condenser.

For reception of medium-wavelength stations, I used three No. 60 plug-in coils, two for the band-pass positions and the remaining one for the grid-tuning coil. A No. 40 reaction coil was found suitable. For long waves I used three No. 200 plug-in coils.

The layout of the tuning controls is found to be quite easy to understand. There are two tuning controls, that on the left for the two-gang condenser and that on the right for the grid tuning. I was pleased to find that the readings for any given station on these two condenser dials were within a degree or so of each other. This matched tuning is a great help when searching for distant stations.

In addition to the tuning controls, there is a knob for reaction and an on-off switch. The reaction control works smoothly and there is no trace of overlap. That is to say, oscillation is stopped at the same point that it is started.

The gramophone plug on the panel completes the layout. I was interested to find that, when the gramophone plug inserts the pick-up into the detector valve circuit, the high-frequency valve is cut out and grid bias is automatically applied to the detector valve to make it suitable for low-frequency amplification.

Testing the set for selectivity, I was greatly impressed with the elimination of the London Regional. Tuned in on both dials at its maximum strength at 105 degrees, this station was entirely cut out at 103 degrees and 108 degrees. The important difference between this tuning and the usual method was clearly noted. For the London Regional was equally strong over at least two degrees and cut off quite sharply at the two limits of audibility.

That true band-passing was being obtained was clearly demonstrated by a simple test with a valve voltmeter. The two tuning humps characteristic of band-pass tuning could be clearly seen by the two sharp dips of the needle of the valve voltmeter as the tuning dials were turned over the degrees where London Regional was audible.

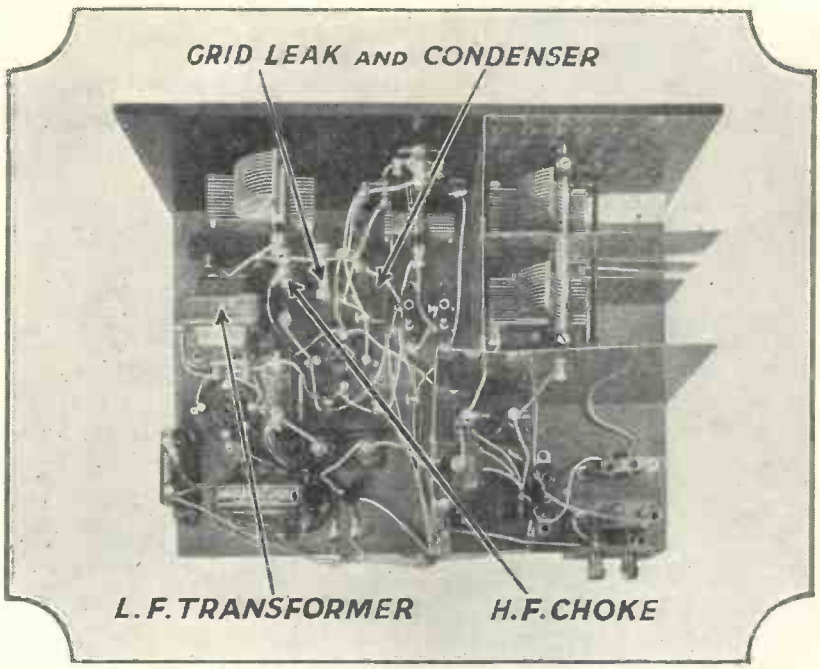
A critical test indicated that the overall volume of sound obtainable from this set is slightly less than that obtained from a standard three-valver. But I feel this is more than offset by the fact that real quality selectivity is delivered. The pentode output valve, which I note is provided with a correcting filter, provides ample top-note response without accentuating any particular high frequencies.

It is quite easy to determine when the set is acting as a true band-pass filter. For this test the band-pass coils are best placed nearly at right angles and then adjustments can be made on the series aerial condenser. When the band-pass effect is in action one should obtain an even volume of sound over practically the entire spread of the two tuning dials.

The object should be to keep the station spread to within two or three degrees and this can be done by loosening the coupling, by adjusting the aerial series condenser.

Altogether, this three-valve plug-in coil set is a distinct advance in design, and for the first time set builders forced or preferring to use simple plug-in coils can obtain the advantages of band-pass selectivity at very low cost. A. S. H.

THE BAND-PASS INCEPTORDYNE—Cont.



COMPACT BUT STRAIGHTFORWARD LAYOUT

Although the design is compact, the parts are not badly crowded together and no difficulty will be experienced in wiring the receiver

dial, and then disappear as sharply as it was originally tuned in. A little experimenting will soon enable the operator to get this effect, which is the true band-pass action.

This set is not particularly critical as regards valves, and most standard types will be found satisfactory in the various stages. Most standard screen-grid valves are suitable, but with some it may be found that the .9-volt grid cell can be omitted without detracting from the efficiency in any way.

Best Detector Valve

The detector should be of the medium-impedance type, that is, between 15,000 and 30,000 ohms. It will be noted that negative bias is automatically applied to this valve when the pick-up plug is inserted in its jack.

The pentode should be chosen with some regard to its anode current requirements, for some valves of this type are a particularly heavy drain on the high-tension battery and will run out ordinary standard-capacity cells in a very short time.

We recommend that whatever valves are ultimately chosen a high-tension battery of at least double capacity, and preferably of triple capacity, should be utilised. Ordinary standard-capacity batteries are a false economy for use with a set of this type and no wise listener will use them.

High-tension Tappings

There are four high-tension tappings on the set and these should be plugged in at various voltages until the best results are obtained: H.T.+1 feeds the screen grid of the high-frequency valve and should be plugged in at about 60 volts; H.T.+2 and H.T.+4, which feed the anodes of the screen-grid and pentode valves respectively, should both be plugged in at about 120 volts; H.T.+3 feeds the anode of the detector valve and should be tried with various voltages, say between 80 and 100 volts.

Proper Pentode Bias

Care should be taken to see that the proper value of grid bias is applied to the pentode (G.B.—2), otherwise the anode current will be excessive and the high-tension battery will not give the service that it should.

PARTS NEEDED FOR THE BAND-PASS INCEPTORDYNE

CHOKES, HIGH-FREQUENCY
2—Watmel type DX3, 12s. (or British General, Watmel).

COILS
1—Atlas No. 40 plug-in, 2s. 6d. (or Lewcos).
1—Atlas No. 60 X-tapped, 5s. 6d. (or Lewcos).
2—Atlas No. 60 matched, 6s. (or Lewcos).
1—Atlas No. 150 plug-in, 3s. 6d. (or Lewcos).
1—Atlas No. 200 centre-tapped, 6s. 6d. (or Lewcos).
2—Atlas No. 200 matched, 9s. (or Lewcos).

CONDENSERS, FIXED
3—Lissen .0002-microfarad, 3s. (or Dubilier, Edison Bell).
2—Lissen .01-microfarad, 4s. (or Dubilier Edison-Bell).
1—Lissen .02-microfarad, Mansbridge type 1s. 9d. (or T.C.C., Dubilier).
2—Lissen 1-microfarad, Mansbridge type, 5s. (or Dubilier, Formo).

CONDENSERS, VARIABLE
1—Formo .0005-microfarad dual gang, type CG2, 14s. 6d.
1—Formo .0005-microfarad, 4s. 6d. (or Jackson, Ormond).
1—Formo .0002-microfarad reaction, 2s. 9d. (or Bulgin, Burton).
1—Sovereign preset, .0003-microfarad maximum, 1s. 6d. (or R.I., Formo).

DIALS, SLOW-MOTION
2—Astra, popular type, 6s. (or Ormond, Utility).

EBONITE
1—Red Triangle 14 in. by 7 in. panel, 6s. 2d. (or Lissen, Trelleborg).

HOLDERS, COIL
4—Lotus two-pin, type CB/70, 2s. 8d. (or Wearite, Lissen).

HOLDER, GRID-LEAK
1—Lissen, type LN160, 6d. (or Bulgin, Wearite).

HOLDERS, VALVE
1—Junit, S.G. type, 1s. 9d. (or Parex, W.B.)
2—Lotus, type VH/31, 2s. (or Wearite, Igranic).

PLUGS AND TERMINALS
8—Clix wander plugs, marked: H.T.+4, H.T.+3, H.T.+2, H.T.+1, H.T.—, G.B.+, G.B.—1, G.B.—2, 1s. 4d. (or Eelex, Belling-Lee).
2—Clix spade terminals, marked: L.T.+, L.T.—, 4d. (or Eelex, Belling-Lee).
2—Belling-Lee terminals, marked: A, E, 6d. (or Eelex, Clix).

RESISTANCES, FIXED
2—Magnum 7,500-ohm, flexible type, 3s. (or Readi-Rad, Bulgin).
1—Magnum 15,000-ohm, flexible type, 1s. 6d. (or Readi-Rad, Bulgin).
1—Magnum 60,000-ohm, flexible type, 2s. (or Readi-Rad, Bulgin).
1—Lissen 3-megohm grid leak, 1s. (or Watmel, Dubilier).

SCREEN
1—Parex to specification, 7s. 6d. (or Peto Scott, Ready-Radio).

SUNDRIES
Tinned copper wire for connecting.
Lengths of Sistoflex sleeving.
Length of rubber-covered flex.
1—Sovereign terminal block, 6d. (or Belling Lee, Junit).
1—Siemens .9-volt S.G. cell, 1s.
1—Lotus jack, type JK/2, 2s. 3d.
1—Lotus plug, type JP/1, 2s.

SWITCH
1—Gripso single pole, marked "On" and "Off," 1s. 6d.

TRANSFORMER, LOW-FREQUENCY
1—Telsen Ace, 5s. 6d. (or R.I., Igranic).

TRANSFORMER, OUTPUT
1—British General multiple ratio, 9s. 6d.

ACCESSORIES

BATTERIES
1—Drydex 120-volt, Green Triangle type, 18s. 6d. (or Ever-Ready, Pertrix).
1—Drydex 9-volt grid-bias, 1s. 9d. (or Ever-Ready, Pertrix).
1—Exide 2-volt accumulator, type CZG3, 11s. 3d. (or Fuller, C.A.V.).

CABINET
1—Pickett table model with 10-in. baseboard, 15s. (or Camco, Lock).

LOUD-SPEAKER
1—Lanchester Junior moving-coil, £2 8s.

VALVES
1—Mazda 215SG, £1 (or Cossor 215SG, Osram S215).
1—Mazda HL210, 8s. 6d. (or Cossor 210HF, Osram HL2).
1—Mazda 230Pen, £1 2s. 6d. (or Cossor 230PT, Osram PT240).

EXPERIMENTAL TELEVISION IN BERLIN

This photograph shows an experimental television receiver being demonstrated in Germany

TELEVISION'S UNSOLVED PROBLEMS

The Institute of Electrical Engineers' Challenge

By a "W.M." Special Representative

I WENT to the Institute of Electrical Engineers in an optimistic frame of mind a few days ago, hoping to get the question of television really weighed up at last. The occasion was a discussion on "Some Technical Problems of Television"—an attractive title promising an interesting evening.

Intriguing Questions

It was certainly that, and many intriguing questions were raised, but considering it all afterwards I could not help feeling that whatever we may be able to do to-day—and all honour to those who have brought us to this stage—we are still groping about in a dimly lit cavern from which many difficult passages radiate into darkness, and we cannot even guess which of these paths will eventually emerge into the light.

The first and greatest problem appeared by general consent to be that of the width of the frequency band necessary for transmitting a picture in sufficient detail for it to be of entertainment value.

A rough estimate of the number of dot elements to give adequate definition of an outdoor scene for a small audience, for example, was 15,000; a simple subject such as a "close-up" of one or two persons would, of course, come over with fewer dots, and to produce a picture comparable to that given in a cinema we should need many more (one estimate was 1,500,000 !)

But taking 15,000 as a basis, and assuming that we need only scan the scene twelve and a half times a second, we require a band of some 94,000 cycles per second ($\frac{1}{2} \times 12\frac{1}{2} \times 15{,}000$—say 100,000), allowing for the speech and music as well.

We were told that scanning at this speed presents little difficulty. The real initial snags are, firstly, the fact that the response of the photocells available tends to fall off above 50,000 cycles and, secondly, that it is difficult to design an amplifier which will not only maintain its step-up as far as 100,000 cycles but will actually have a rising characteristic in order to compensate for the photocell.

As soon as compensation is introduced a phase difference between the low and high frequencies appears, and this may be worse in its effects than the original fault. However, this hurdle is apparently not insurmountable.

Having scanned and amplified, we come to another barrier, that of the band-width restrictions in the ether. We need 100 kilocycles and are allowed 9 kilocycles ! Of three proposed alternatives, none seems to me to offer a really satisfactory solution.

Multiple Channels

First, we have multiple channels, which means that instead of concentrating our 100 kilocycles on one carrier, we split it up and put so much on each of a number of carriers.

Then we had a suggestion for "multiple modulation," which sounds interesting, but seems hardly feasible.

Thirdly, it was suggested that we should televise on wavelengths of the order of 5 metres or less; this also presents difficulties, and is not very hopeful for long-distance work, but holds considerable possibilities for local transmission.

Mention was made of the Farnsworth (American) system, which claims to compress a 40,000-dot picture (300,000 cycles) into a 7-kilocycle band, but no accurate details were given, the impression being that

TELEVISION TO-DAY—Continued

BAIRD DAYLIGHT TELEVISION
J. L. Baird (centre) supervising an experimental daylight television transmission with his system

the receiver and transmitter must be extremely complicated.

Crux of the Problem

Here, indeed, is the crux of the problem, for even if we do succeed in effecting a sufficient compression to overcome band-width restrictions, this appears to be possible only at the cost of a very complicated and expensive receiver, which is, of course, commercially undesirable.

A secondary suggestion for reducing the wide frequency range is that we should be content with less detail towards the edges of the picture, thus reducing the number of dots required. While this is an excellent suggestion for small pictures, it was pointed out that the centre of interest would not necessarily remain always in the middle of the screen, and that with larger pictures and audiences this would be a serious matter.

Finally, coming to the receiver proper, the question of synchronisation did not seem to be frightening, as there are one or two systems now in use which are fundamentally sound and only need development to reach the required precision; but it appears that we have still to find the ideal illuminants.

At the present moment we have the neon, which is easily controlled, but does not give enough light for more than a very small picture.

Then there is the Kerr cell, used in conjunction with a suitable light source, but here there is a difficulty with attenuation at the higher frequencies above 50,000; however, some of the greatest brains in British radio are experimenting with this cell in connection with a projector for a large picture—I think 6 ft. by 3 ft. was mentioned—so it can be placed amongst the "possibles."

Cathode-ray Tube

Thirdly, there is the cathode-ray tube, which has certain advantages in that it is easily controlled and its fluorescence reduces flicker; this tube can produce quite good pictures about 6 in. square, but to reach practical dimensions the tube will have to be enlarged; furthermore, the present technique is tending to introduce more and more complications into its construction, each development adding to the cost and shortening the life. However, the cathode ray remains another "possible."

Finally, the arc was mentioned; a very brilliant source of light, fairly easily modulated, but having one drawback in that if the variations are pushed beyond about one-quarter of the total brilliancy there is a tendency for complete extinction.

Recognising the Obstacles

A host of minor details were dealt with, but these few points serve to show that it was in all a most interesting discussion; no blinking about the obstacles to be overcome, and a recognition of the fact that we have a long way to go before television can have really universal entertainment value at a cost which will bring it into the market for home consumption—but nevertheless, no doubt that it will get there in the end.

CAUSE AND EFFECT

The Baird Reply

By H. J. Barton Chapple, Wh.Sc., B.Sc., (Hons.), A.C.G.I., D.I.C., A.M.I.E.E.

HAVING been intimately connected with the science of television for some considerable time, frankly I was amazed to find incorrect statements in "Television's Unsolved Problems," brought about mainly by that bugbear, "the dot theory."

"Strip Scanning"

No one will gainsay that television has a difficult furrow to plough, but why strew hypothetical obstacles in the path? The width of the frequency band for large television images complete with intimate detail is certainly an acute problem, but it is beyond my comprehension why so many people attempt to examine the question by quoting a picture-point analogy when "strip scanning" is almost universally used for television purposes.

To show you what I mean, refer to the accompanying illustration, an actual amateur photograph of a television image exactly as it appeared in a Baird Televisor. This was taken in 1928 with an exposure of the order of 6 to 8 seconds.

In order to reproduce this in WIRELESS MAGAZINE I quite realise that it will have to pass through the usual screen or dot process for block making, but even so you can trace the strip effect quite readily.

Obviously you will not watch an image of this character with your eyes a few inches away, any more than you would attempt to criticise an Academy painting, wrought by the artist's brush, by standing up close to it.

Within Nine Kilocycles

I am sure you will be surprised when I tell you that this image was built up within the 9-kilocycle side-band limitation. It will be seen that the dot theory completely falls to the ground, for the light and shade in the image is distributed throughout in the form of a wash drawing or continuous surface.

A CHALLENGE AND A REPLY

Referring to the photograph once more, you will see that during several periods of the light-spot movement, it is exploring an area wholly or almost black and hence no light is reflected back and picked up by the photo-electric cell.

Black and White Squares

Then there are several comparatively long periods of white and synonymous with this there is a relatively large current response from the cells. Then what justification is there for arriving at an artificial figure for the "dot elements" as this assumes the scene scanned is made up of alternate black and white squares similar to the accompanying figure?

Admitted this is the maximum, but rare are the occasions when this maximum is in any way approached.

The photographic illustration based on the dot theory would require a frequency of 70 by 30 by ½ by 12½ = 13,125, this corresponding to 2,100 picture-points, the present Baird standard, so that the practical results which have been demonstrated are sufficient proof that this state of affairs does not obtain.

A TELEVISION IMAGE
An untouched photograph of a picture received on a Baird Televisor

Synonymous with these remarks, let me remind readers of two facts which are nearly always overlooked by critics. These are the tolerance or self-accommodating nature of the human eye and the fact that almost every subject televised undergoes movement.

This whole question of vision persistence makes television, cinematography, etc., possible, and furthermore unconsciously when we look at a scene we "scan it" by allowing our eye to wander over it in much the same manner as a television scanning spot.

With reference to movement, before we have had an opportunity of absorbing all the detail of a televised object or person in one position it has moved to another and thus unconsciously the amount of noticeable detail is less than would be the case for stationary subjects.

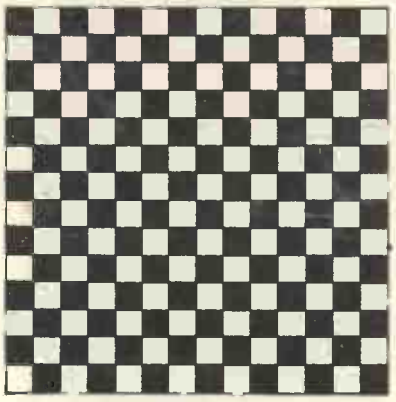
Lastly, although the frequency problem is a great one where television broadcasting is concerned, it is not so for land-line transmissions, that is such as might take place for transmitting television to large cinema screens.

Keep these two aspects distinct whenever a discussion arises and then the issue will not be confused.

Coming now to the schemes propounded to allow for frequency extension (although not to the numbers mentioned) multiple channels are obviously inoperative through broadcasting stations and the same remark applies to multiple modulation.

I quite agree that using the short wavelengths presents difficulties and while this may be possible over restricted areas, for long-distance work the scheme does not seem feasible. At the time of writing I have been unable to unearth any evidence to substantiate the Farnsworth claim.

As the writer suggests, the synchronising problem is not serious and as far as Great Britain is concerned, no special form of automatic device will be needed when the "grid" system comes fully into operation.



THE DOT SYSTEM
This is how some critics analyse a picture for television purposes

The ideal illuminant is definitely a difficult problem. The neon tube, however, even with present samples, is capable of giving enough light to cover a picture 8 in. or so square, with adequate brilliancy, when used in conjunction with a mirror drum and I am convinced that other improvements which are in hand will enable an image to be projected through a disc on to a small screen.

When viewing this aspect of the receiving end, be sure and differentiate between the apparatus which ultimately will find its place in the home and the more costly and complicated affair which will be employed in cinemas and theatres.

The Kerr Cell

It is in this latter category that we can place the Kerr cell—a very promising "possible"—which naturally must be subjected to more research.

The modulated arc, demonstrated for the first time in the Baird laboratories a few months ago, is far and away more brilliant than any other source known, and its development opens up a very promising field for large screen television. There are drawbacks, but these are being investigated and I am not able to disclose what has been done so far.

I have read through carefully Mr. Barton Chapple's article and am in entire agreement with all his remarks.

J. L. Baird

MR. BAIRD'S NOTE OF APPROVAL

THE MONTH'S RADIO MUSIC

"THOSE FOUR CHAPS"

A popular item in vaudeville, this quartet consists of four well-known artistes. They are Claude Hulbert, Paul England, Bobbie Comber and Eddie Childs

IT is natural for most of us to expect a little lighter fare for the summer programmes, but our expectations this season do not appear to have been realised to any great extent. Undoubtedly there has been a slight rearrangement, but hardly enough to justify the term "summer" wireless programmes.

Furthermore, there is far too much serious music and far too little vaudeville in the evening. The midday and afternoon concerts are often far more pleasant to hear than many of those in the evening.

By this grouse we do not mean that the transmission of dance music should be extended, although an occasional half-hour in the middle of the evening would be a welcome change. Actually the programme arrangements appear to have fallen into a rut. Possibly the greatest mistake the compilers are making is the neglect to provide some form of light entertainment late in the evening, say from 10 p.m. till 11 or 11.30 p.m.

No Alternative

At present there is no alternative to the late dance music except on three days of the week, and then only till 10.30 p.m. and occasionally 11 p.m.

A few years ago we used to have orchestral music, and even variety and plays, from 5GB after the second news bulletin, lasting an hour. This, we believe, was merely in the nature of an experiment. However, it is certain that there is a definite demand for an alternative to the late dance music and the B.B.C. might well consider making further experiments in this direction.

Modern Music

A word about modern music. It is very interesting, although little is really enjoyable, but the B.B.C. is decidedly overdoing its performance of late.

It is a branch of music that must appeal to a very small minority of listeners and, therefore, its place is a back seat in the programmes. No doubt there is a small percentage of the listening public who like and enjoy this type of music, but that percentage must be extremely small.

Their wants should be completely satisfied by the relays that will be heard during the Ninth International Festival of Contemporary Music that

Ben Williams, the Welsh tenor, often broadcasts in studio programmes

A frequent broadcaster, Gwen Knight always accompanies her own songs

Burton Harper, baritone, is a well-known broadcaster in the London programmes

A fine baritone, Arthur Cranmer figures prominently in broadcast concerts

takes place at Oxford and London from July 21 to July 28 next.

The B.B.C. is co-operating in this festival and the two concerts held in London at the Queen's Hall are to be broadcast. One of the afternoon concerts held at the New Theatre, Oxford, on July 23, will be repeated during the same evening from the London studio for the benefit of listeners. Technical difficulties prevent a direct relay being made from Oxford during the afternoon.

Composers Unknown to Most Listeners

The programmes consist of works by composers almost unknown to the majority of listeners. The studio concerts will consist of works by Roger Sessions, Josef Koffler, Jean Hure, and Jan Mahlakiewiez. Artistes taking part in the London concert on July 27 and 28 include Elsie Suddaby, soprano, and Parry Jones, tenor, both well known for their broadcast recitals. The conductors will be Adrian Boult and Fitelborg. Works by Dukelsky, Anton Webern, and Gershwin will be heard. Gershwin will be remembered for his famous *Rhapsody in Blue*, which featured in the sound film, *King of Jazz*. The B.B.C. Orchestra will play his popular *An American in Paris* on this occasion.

A good baritone, James Coleman broadcasts mostly from provincial stations

An elocutionist heard from Birmingham, Janet Joyce runs her own school of elocution

Arrangements are now complete for the next "Prom" season, which begins at the Queen's Hall on Saturday, August 8, and continues for eight weeks until October 3. An orchestra of about ninety players will play under Sir Henry Wood. This will be the thirty-seventh season of "Proms," and all of them have been under his direction. The concerts, similar in form to the usual run of "Prom" concerts, will include as usual, a number of first performances and novelties.

Arrangements are well advanced for another season of symphony concerts at the Queen's Hall next winter. It is interesting to note that of the total of twenty-three concerts that will be broadcast, twelve will be conducted by Adrian Boult and five by Sir Henry Wood.

Harry Hemsley, the child impersonator, has been heard in recent vaudeville concerts

Rene Chemet, a brilliant French violinist, often gives well-rendered studio recitals

Dr. Boult is at present on holiday in Italy and is, in all probability, conducting there, although no definite plans were arranged before he went.

Readers will be interested in the fact that arrangements were almost completed for him to conduct at Baku (in Soviet Russia) this June. For some unknown reason the Russian people decided to postpone their concert till August. As rehearsals and musical arrangements of the B.B.C. are practically certain to keep Dr. Boult in London at this time, it is very improbable that he will be able to conduct at Baku.

To Conduct the Albert Coates Orchestra?

He has, however, also received an invitation to visit Moscow and conduct Albert Coates' fine orchestra of 140 musicians. Readers will remember that Albert Coates gave some fine spirited performances with the B.B.C. Orchestra last season. Providing arrangements can be fitted in it is probable that Dr. Boult will visit Moscow before long.

The programmes that are being arranged by the Manchester section and broadcast by the new North Regional station are exceedingly well chosen. May we quote as an example to the Savoy Hill people the programme broadcast on Sunday, May 31, in the evening, at 9.5 p.m. This consisted of an organ recital by Dr. Denis Chapman,

A protégé of Melba, Gertrude Johnson has been heard in the Regional programmes

Constance Pemberton, soprano, sang in a recent ballad concert from London

Barbara Frewing, a gifted contralto, has broadcast recently

A variety artiste, Wyn Richmond has been heard on the National wavelength

THE MONTH'S RADIO MUSIC—Continued

A brilliant pianist, Lucie Sterne is well known for her classical recitals

Helen Olgivie, a fine soprano singer heard often in the National programmes

relayed from the College of Technology, Manchester, and a Max Mayer recital by Dorothy Pearce and John Wills between items.

The organist played well and seldom have we heard a better transmission. This programme—a distinct change from the usual run—may prove to be just the beginning of better programmes in the north. Congratulations to all concerned!

We learn that the Sunday evening concerts heard from No. 10 studio last winter will start again in the autumn. It is doubtful, though, whether the new series will come from that studio, as before. In all probability Broadcasting House will be ready for occupation then and it is likely that the new concert hall studio will be utilised.

The last relay of the grand opera excerpts from Covent Garden will be heard on July 3. This will take the form of the fourth act of *Francesca de Rimini*. These relays have not been very enjoyable to the majority of listeners and appear to be merely a waste of time.

The beautiful choral singing in Elgar's *Dream of Gerontius* showed clearly that Stanford Robinson is training and managing his huge choir in the proper way. Stanford Robinson is one of the old-timers at Savoy Hill, having been with the B.B.C. since its inception. His success is undoubtedly due to his quiet and unassuming personality and the fact that he always sets out to establish friendly relations between himself and the chorus under his control.

Apt Folk-song Improvisations

He is an able musician, being particularly apt at the improvisation of folk songs in a rather different way from the usual run of things. He is to be congratulated on his success.

The B.B.C. is to form another new orchestra. This time it is to provide a suitable combination for vaudeville, variety, and other programmes that need the services of a theatre orchestra. The need for this orchestra has been long overdue and will, we hope, brighten the lighter side of the programmes considerably.

Negotiations are proceeding with the Musicians' Union to arrange suitable remuneration and other details, as must be done in these cases.

Microphone Mysteries Revealed

The writer was recently invited by the B.B.C. to visit Savoy Hill to see and hear at first hand a vaudeville show in the studio. During the hour and a quarter which the show lasted many of those mysterious microphone technicalities were revealed. The visit made one appreciate the difficulties of the vaudeville director in getting hold of suitable artistes for studio vaudeville.

Many of the artistes on this occasion appeared to be suffering from an acute attack of "mike" fright. This appears to be fairly general, judging from past programmes. Apparently the microphone has to be treated in a very gentle manner, for everybody appeared to whisper rather than sing. Probably this accounts for the "woolly" results one gets from the loud-speaker when choruses of dance numbers are being sung.

It was impossible when sitting only a few feet behind the microphone to hear the dance-band conductor sing, although it was apparent that he was doing so. Nevertheless the audience clapped most heartily!

Comedians need a deal of sympathy, for theirs must be the most difficult job of all. Leonard Henry was chief comedian of the evening, and his efforts proved him to be one of the real successes of the microphone. He can be termed a good turn.

Listeners will miss his shows during the summer months, as seaside audiences have claimed his services. He hopes to return to broadcasting after the summer season has ended.

We learn that the famous Roosters' Concert Party are to be heard again on July 1.

T. F. HENN

THE WIRELESS ZOO

The Oscillator is a hound
Hated by everyone around,
  He bays and buzzes at the moon
  At night, and in the afternoon,
When luckless Listeners tune-in,
It is his signal to begin.
  He has attacks, although they pass,
  Of Dampedwavephobia, alas!
And if the public had its way
He'd wear a muzzle every day!

LESLIE M. OYLER

Cecil Dixon, pianist, is perhaps better known as "Aunt Sophy"

An early broadcaster, Margaret Wilkinson, soprano, has sung from London and Cardiff

Valves *for the* Super 60

And Further Notes on the Radio-gramophone Model

By W. James

THE valves recommended for the A.C. Super 60 in the last number were Mullard, but I have tried various other valves and they may be used if care is taken to use the correct grid bias and screen voltages in the case of the screen-grid valves.

In the first detector position, for instance, I have tried a Mazda AC/SG. This valve has a lower impedance than the Mullard S4VA and, worked with the maximum anode and screen voltages, would require more grid bias for anode-bend detection.

S.G. Potentiometer

But in the set a potentiometer for the screen circuit is provided and so the bias may remain at —3 volts and the screen voltage be adjusted to suit this. A value of about 40 volts will be satisfactory, but in practice it is easy enough to set the screen-grid potentiometer, fitted to the baseboard, to a suitable value whilst listening to a signal.

If the potentiometer is a good deal out signals will be weak and, therefore, it should be carefully set. Other screen-grid valves have been tried here and the results are satisfactory when the valves are set to work suitably as anode-bend detectors.

In the next two stages of screen-grid high-frequency, valves of various makes have been tried and there are no difficulties, as the screen-grid potentiometer, mounted on the panel, and the adjustable grid bias, may be set to suit the valves.

Opening the Screens

The Mazda valves do not fit in the holders with the screens in position, so the screens must be opened out a little.

If metal-coated valves are used the screens are not needed, and if you are prepared to sacrifice a little magnification the screens need not be fitted. Careful tests showed that when the screens are used with non-metallised valves the potentiometer may be turned up a little further before the long-wavelength amplifier begins to oscillate, and so I thought it worth while using them.

A FINE OUTFIT

The construction of the A.C. Super 60 (radio-gramophone model) was described in the June issue. A companion table model is dealt with on page 574

Mazda AC/SG valves pass more anode current than the Mullard S4V valves used originally, but the bias may be increased from 1.5 to 3 volts. The average current is then 3 milliamperes for each valve, but this varies with the setting of the potentiometer. On strong signals, when the control is tuned down to reduce the strength, the current is less.

In these notes W. James gives some further details of the set he described in detail last month. He discusses suitable valves and a number of interesting operating points.

In the oscillator position a Mazda AC/HL is suitable, or any other valve of about the same characteristics, namely, 12,000 ohms with an amplification factor of 35. A valve of lower impedance can, as a matter of fact, be used here, as the anode-feed resistance acts to regulate the current.

Second Detector

A similar valve may be used as the second detector, but in the power stage I much prefer a directly-heated valve, such as the Mullard AC064 already recommended. If a Mazda AC/P, an indirectly-heated type valve, is used, the bias must be about 13.5 volts, or 27 volts for an AC/P1.

These two valves have good slopes, and so a little change in the bias makes a fairly considerable difference to the anode current.

The voltage of the output from a mains unit varies with the current. As the current increases so the voltage falls. Exactly 200 volts may, therefore, not be obtained; the voltage may be a little above or below this according to the current. A current a little in excess of 30 milliamperes may be taken without hurting the unit in any way.

Measuring Voltage

If voltages are measured, allowance must be made for the fall in voltage produced by the current taken by the instrument passing through resistance. It is usually better to measure current and all circuits can be tested by connecting a milliammeter and noting the current and how it varies when the grid bias or the potentiometers are adjusted.

There are no exact adjustments to be made, however, even the

VALVES FOR THE A.C. SUPER 60—Cont.

first detector not being critical. If this valve is quite wrongly adjusted, nothing much will be heard, but when turning its screen-grid potentiometer you will notice that there is a good margin over which the signals appear not to change in strength.

Good Frame Needed

A good frame aerial should be used. One that tunes sharply is obviously better than a broadly-tuned frame, as interference is reduced. The directional effect of a sharp-tuning frame is greater.

Actually a small frame is good enough from the point of view of strength, but with a larger frame the strength of signals in comparison with the mush and noise is usually greater.

Automatic grid bias, as it is called, may easily be added by those used to working with A.C. valves. Resistances may be connected in the cathode circuits and be shunted by condensers, as is usual.

It is better, though, to arrange a resistance in a circuit which carries a fairly constant current in order that the bias of the screen-grid valves shall not vary much when the screen voltage is adjusted.

Variation of Grid Bias

The current through the screen-grid valves varies with the screen voltage, and when a resistance is included in the cathodes of the valves the bias also varies. This is not desirable, as grid current may flow, besides which the volume control is not quite as effective as at present arranged.

This is because when the volume control is turned to increase the strength the current increases and so increases the bias as well, which tends to reduce the magnification. As the last valve requires considerable bias, and this is subtracted from the high tension, I doubt the worth of automatic bias in this instance and prefer dry batteries.

Removing the Screens

If bias resistances are included in the cathode circuits and metallised valves are used, the screens should be removed, as there is a chance of the bias resistances being short-circuited.

The set behaves well on the short waves, there being no hum. A number of stations may be received using a small coil and a length of wire as an aerial, as has been described before. The tuning of the oscillator is, of course, sharp compared with that of the aerial circuit, but the slow-motion dials are good enough for the work. Being of the geared type, there is no slip and they are soon got used to.

I have received more stations on this set than on the battery Super 60, but the chief difference is in the volume, as would be expected. The low-frequency side of the set is good and the volume obtainable from the last valve fully loaded is ample for most purposes.

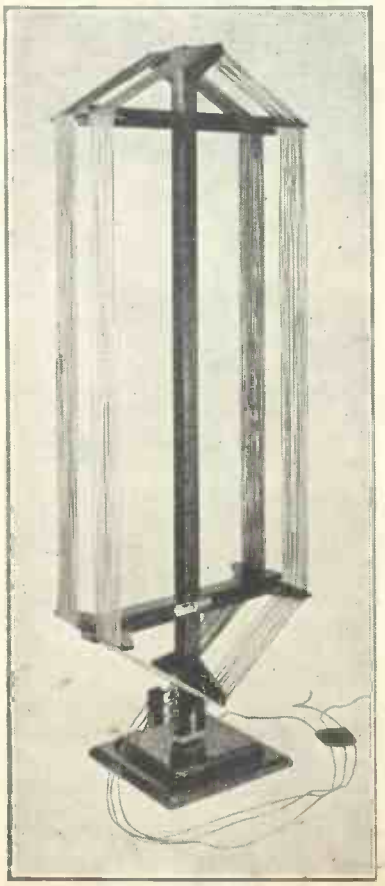
When playing records there is not too much scratch and the bass is well reproduced on a moving-coil loud-speaker. I have had no trouble from hum from the electric motor. Incidentally the characteristics of the pick-up can be varied by altering the grid leak connected across it. As the grid leak is reduced in value the higher notes are cut down, as a rule, so there is a chance here of altering the tone a little.

Volume Control

In the case of a pick-up having a great deal too much strength, a fixed potentiometer having two grid leaks may be used, but there are not many types about. If the higher notes are too strong, a condenser may be joined across the grid leak, but here again this is usually not necessary, but the different pick-ups have widely varying characteristics.

A NEW FRAME AERIAL

ONE of the latest additions to the range of accessories that has been produced by various firms for the James' Super 60 is the Ready Radio dual-range frame aerial shown here. This aerial is suitable for use with either the original battery model or the A.C. versions of the set.



FOR THE SUPER 60

This Ready Radio dual-range frame aerial is priced at £1

Two Sections

This aerial is wound in two sections, one for medium-wave reception and the other for long-wave reception. The gauges of wire used are as recommended by W. James, that is, No. 27/40 gauge for the medium-wave winding and No. 9/40 for the long-wave winding.

Both windings are, of course, centre tapped and can be used separately or be connected in parallel by means of the wave-changing device incorporated. The frame is mounted on a stout wooden base and is arranged to rotate in any required direction.

Our only criticism of this aerial is that it has a rather woolly appearance due to the cotton covering over the stranded wire.

Value for Money

At the price of £1 the Ready Radio dual-range frame aerial is good value for the money and can be recommended to all who are about to build one of the Super 60 receivers. The address of the makers is Ready Radio (R. R., Ltd.), 159 Borough High Street, London Bridge, S.E.1.

By the way, at this address readers can hear a Super 60 in operation during ordinary business hours.

Mullard Valves are specified in the new A.C. Super Sixty

The working of any circuit is ultimately dependent on the valves employed. That is why Mullard Valves are specified in the A.C. Super Sixty, to ensure maximum efficiency. The Mullard range of A.C. mains valves is specially designed to give great amplification, faithful reproduction, silent background and consistent service. The six types for use in the A.C. Super Sixty are :—

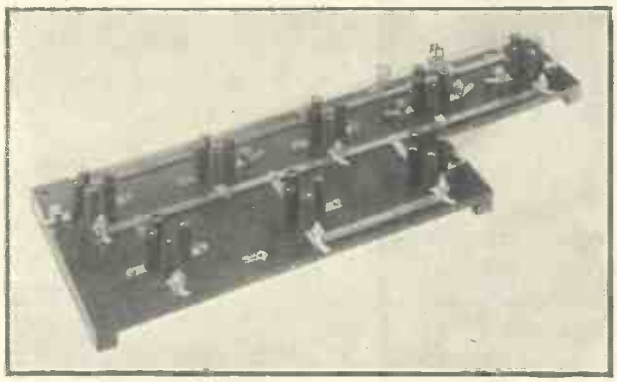
2—S.4VA	**Indirectly-heated screened grid H.F. Amplifiers ... ... Each**	**Price 25/-**
1—S.4V	**Indirectly-heated screened grid H.F. Amplifier ... ...**	**Price 25/-**
2—354V	**Indirectly-heated super detector valves ... ... Each**	**Price 15/-**
1—A.C.064	**Directly-heated output valve ... ...**	**Price 16/-**

Mullard

THE·MASTER·VALVE

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

NEW APPARATUS FOR YOUR USE



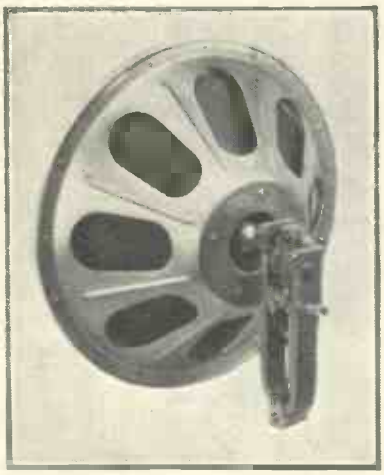
SIMPLIFYING THE SUPER 60

This Wearite "chassis" accommodates all three intermediate coils and five of the valves used in the Super 60. It is partly wired up (see note on page 619)

ALTHOUGH called a "sixty-pole" loud-speaker, the Wufa model illustrated on this page actually has only four poles, but each pole contains fifteen laminations. The movement is of the balanced-armature type, a large horse-shoe magnet being used.

The chassis includes a 15-in. diaphragm. There are six tappings on the winding and provision is made for varying the air gap by means of a robust lever.

On test the Wufa loud-speaker showed up remarkably well and no marked resonances at any part of the scale were noted; if anything, the bass reproduction was slightly better than the reproduction of the higher notes.



THE "SIXTY-POLE" LOUD-SPEAKER

Particularly good is the reproduction obtained from a complete Wufa loud-speaker chassis

The Wufa loud-speaker is distrubuted by M. Lichtenberg, of 4 Great Queen Street, W.C.2. and the price of the complete chassis is £2. The unit alone costs £1 7s. 6d.

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Gramo-radio enthusiasts will be interested in an offer of Collaro double-spring motors being made by Selfridge & Co., Ltd., of Oxford Street, W.2.

These motors (one of which is illustrated below) are complete with a 12-inch turntable, speed regulator and automatic stop. At the price of £1 6s. 6d. they will interest many WIRELESS MAGAZINE readers.

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All Super 60 owners will be interested in an all-glass cabinet that is now available for these sets. As can be seen from the photograph that appears on this page the holes for fixing the tuning controls are already drilled in the front sheet of glass.

Those who take a pride in their neat wiring will find that one of these cabinets enables the set to be displayed to admiring friends with the minimum of trouble.

These cabinets cost £1 15s. and can be obtained from H. & B. Radio Co., of 34 Beak Street, Regent Street, W.1, or Ready Radio (R.R., Ltd.) of 159 Borough High Street, London Bridge, S.E.1.

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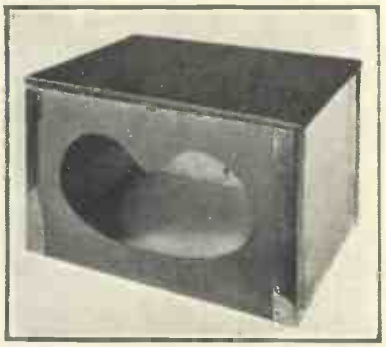
Another interesting Super 60 cabinet is the Byldurone model supplied by J. J. Eastick & Sons, of 118 Bunhill Row, E.C.1. This cabinet is for home assembly, the sides and bottom being fixed to special metal angle pieces that supply the necessary mechanical support.

Angle pieces of nickel plated, oxy-copper or bronze finish are obtainable at 4s. 6d. a set or in oxy-silver finish at 5s. 6d. a set. Plywood for the bottom and sides (⅝ in. thick) can be obtained already cut to any desired size for a few pence.



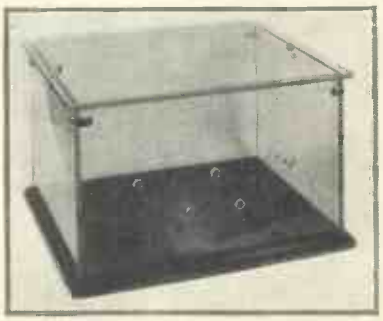
A SUPER 60 CABINET

This photograph shows one of the Byldurone cabinets. One of these can easily be built at home at low cost

A variety of coverings can also be obtained—imitation crocodile, lizard, antique leather, and wood veneer being available. These coverings are easily stuck on the surface of the wood with paste.

The construction of one of these cabinets for a few shillings is well within the capabilities of any handyman and further details can be obtained from the makers.

By the way, if desired, metal-faced plywood can be obtained, the use of this resulting in complete screening of the whole receiver.



SHOW YOUR SUPER 60 OFF!

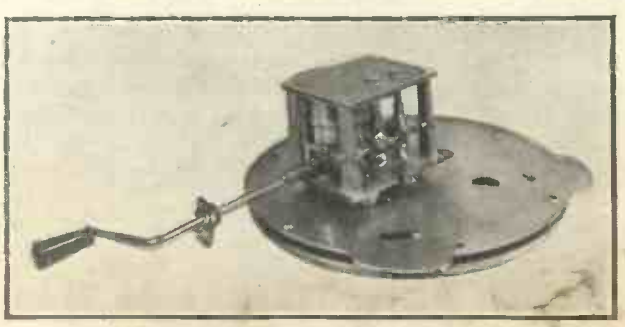
With one of these glass cabinets you will be able to show your Super 60 to admiring friends without any trouble!

◆ ◆ ◆

Substantial reductions have recently been made in the prices of Telsen products. The popular Radiogrand transformer has been reduced from 12s. 6d. to 8s. 6d. and the Ace model is now only 5s.6d.

Fixed condensers in capacities up to .002 microfarad are now 6d. each. The .0003-microfarad type is fitted with grid-leak clips enabling series or parallel connections to be made quickly. Other reductions include four-pin valve holders to 6d., five-pin type to 8d., and grid leaks in all capacities from .25 to 5 megohms to 9d. each.

Several new lines have also been added, including loud-speaker units at 5s.6d., spaghetti resistances and low-frequency chokes and output transformers.



A BARGAIN IN GRAMOPHONE MOTORS

The special Collaro double-spring motor being offered by Selfridge's to gramo-radio enthusiasts

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

Behind the Scenes at Savoy Hill

By Our Special Commissioner

Nina Doria sings in three languages and has been heard from British stations

THE formulation of a definite educational policy in American broadcasting will no doubt result from the visit of Sir John Reith to New York, where his report on B.B.C. experiences in the same connection is being studied closely by the National Advisory Council on Broadcasting in Education.

The Director-General of the B.B.C. pointed out that while by no means all broadcast talks are educational talks, the line of demarcation between ordinary talks and those directly under the auspices of the Central Council for Broadcast Adult Education is not specifically defined.

That is to say, while certain hours are set aside for the Central Council to fill, the Council may, if circumstances warrant, ask for additional microphone time.

Normal Hours for Talks

The normal hours for educational talks on the National wavelength come to a total of two hours a week; on the Daventry long wave, half an hour a week; and on the Regional wavelength, three hours and twenty minutes a week. Thus actually approximately only six hours and a half of programme time out of a total of some two hundred and sixty programme hours for the three stations are earmarked each week for the Central Council.

This information surprised the United States officials, who understood from the many criticisms which had percolated through to America that the B.B.C. spent most of its time in devising more and more subtle expedients for forcing education upon a mass of unwilling listeners.

How the Council Works

Details of the work performed by the Central Council for Broadcast Adult Education, which the Director-General placed before the American National Advisory Council, showed that the Council carries out its work through (1) an Executive Committee, which meets monthly, except during the summer holidays; (2) a Finance and General Purposes Sub-Committee (3) a Programmes and Publications Sub-Committee; and (4) Area Councils.

The latter prepare for the Central Council recommendations and reports regarding adult educational work in various areas, and are engaged in cultivating the reception end of this class of broadcasting. They plan conferences and demonstrations with the help of advisory engineers and suggest directions in which experiments and propaganda may be undertaken.

The Central Council is one of the very active groups working behind the scenes with the object of making broadcasting a lively and powerful force in the social life of the nation; and it has a considerable voice in this important phase of the B.B.C.'s work. It makes recommendations to the B.B.C. for its annual education budget.

While, moreover, it is only indirectly concerned, it recommends subjects and speakers for other talks arranged by the Talks Department and in the "regions." It also suggests other programme items, such as plays.

A good deal of work falls to it in the way of suggestions for broadcasting publications, namely, the planning of aids-to-study pamphlets, the influencing of a general policy for the B.B.C.'s education journal, the recommending of talks for republication in book form and of steps for improving the distribution of publications.

It also recommends and advises as to the appointment and duties of the education staff.

Very similar work is carried out in respect of schools by the Central Council for School Broadcasting, whose powers are exercised under the supreme authority of the B.B.C.

That American educational and broadcasting authorities were moved to call the head of British broadcasting into consultation was perhaps the finest tribute that has yet been paid to the British broadcasting system.

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Quality from 5XX

In 1925 the quality of the transmissions from Daventry 5XX was far superior to anything heard from other B.B.C. stations and this condition continued until the voice of Brookman's Park began to be heard early last year. Since then some doubt has been expressed as to whether 5XX was living up to its reputation or not.

The truth is that listeners' judgment has been rather warped by the improvements elsewhere and as London National, London Regional and Northern Regional transmissions have shown such marked progress, the ear has come to expect a parallel improvement in the case of the older-established transmitter.

It will be nearly two years before alterations can be carried out at the long-wave station which will once again place it in the forefront of British transmitters. Now a twenty-five kilowatt station, Daventry's power may be doubled or quadrupled, as the needs of the future dictate.

Welcomed by Listeners

The reconstruction will be welcomed not only by British listeners, particularly those who may be outside the service area of any of the new regional transmitters, but also by hosts of Continental listeners to whom 5XX is the essence of broadcasting in Great Britain.

It is well known that medium waves are not considered worth while by large sections of the Continental public, because of the considerable

(*Continued on page* 640)

BEHIND THE SCENES AT SAVOY HILL—Cont.

amount of interference from which they suffer; but 5XX is pretty reliable at all times and is still widely "patronised" in France and Germany.

It is in a sense an advertisement for the B.B.C. abroad, although Savoy Hill officials do not admit that such a consideration has any weight with them.

A Grand Climax

However, the regional scheme will not be considered complete until the reconstruction of 5XX comes as a grand climax about the end of next year. Before then, the conversion of Belfast into the Northern Ireland Regional station, with a power of about 10 kilowatts and a service area of fifty miles, will be undertaken.

The construction of the West Regional transmitter will take place concurrently. The B.B.C. engineers will, during the remainder of this year and throughout 1932, be working under high pressure, for problems of interference, like the poor, are with us always; they form no small part of Savoy Hill's duty of providing listeners, not only with good quality from the new transmitters, but with transmissions having a minimum of interference.

◆ ◆ ◆

Short of writing their plays for them, Mr. Val Gielgud, Productions Director at Savoy Hill, has done everything humanly possible to assist would-be authors in the writing of radio drama.

He has prepared a long statement initiating the public into the art of microphone technique. He tells them how to choose their subject, how to invent characters, the difference between casting for the stage and for the studio, how to prepare the script and the proper treatment of scenes which, while they cannot be viewed, must be framed in such a way that the listener can easily visualise them.

This department of broadcasting is constantly undergoing a crucial test; it can no longer be said to be "still in its infancy," and it has to take its stand in the popular judgment without apology or excuse.

The chief handicap is that the Productions Department receives on an average some forty plays a week from people sufficiently interested in broadcasting generally and in radio drama in particular to write original work for the microphone. Of every hundred plays received, perhaps two on an average comply sufficiently with the special conditions for their claims to be seriously considered for production.

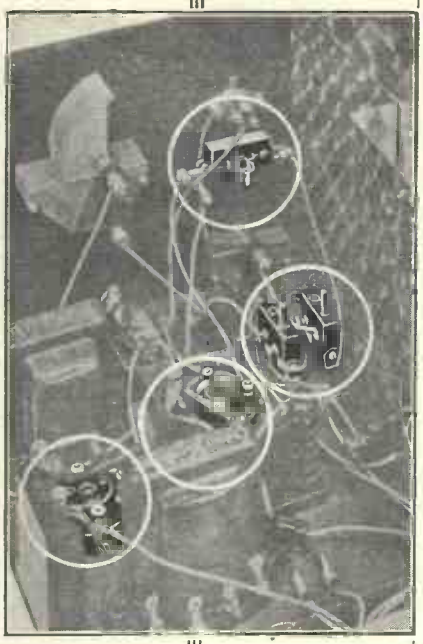
Lack of Knowledge

It is a question of lack of knowledge and if this is the case with the handful who try their 'prentice hands at writing plays, what shall be said of the multitude who merely listen in the expectation of being entertained? To them, at any rate, the B.B.C. looks for some indication of the success of the radio play.

They are supposed to take their microphone drama as seriously as they would a performance on the stage. But one thing that should be made clear is that the B.B.C. recognises a world of difference between the two forms of entertainment; they are complementary rather than competitive.

SPECIFIED & USED IN THE SELECTIVE "BAND-PASS INCEPTORDYNE"

Described in this Number



Far too many receivers of excellent design are spoiled by the inclusion of unsuitable or faulty components. Full efficiency is only secured by using those components the designer has proved the best by experiment.

In the new Band-Pass Inceptordyne, four types of LOTUS Components are actually used and specified by the originator. Be sure to ask your dealer for one LOTUS Jack, type JK/2, Price 2/3; one LOTUS Plug, type JP/1, Price 2/-; two LOTUS Five-pin Valve Holders, type VH/31, Price 10d. each; and four LOTUS Coil Holders, type CB/70, price 8d. each.

If your dealer is unable to supply you, write direct to:—

LOTUS RADIO LTD., MILL LANE, LIVERPOOL

YOU CAN ALWAYS RELY ON

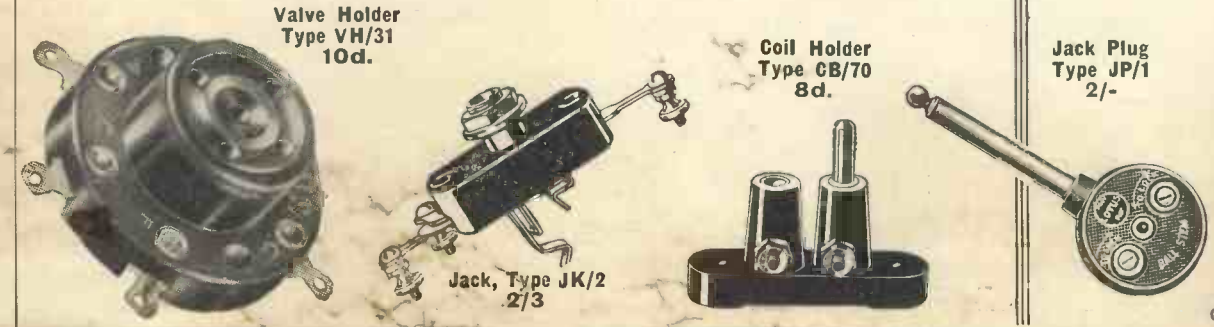
LOTUS COMPONENTS

From the early days of radio LOTUS Components have won an increasing reputation for reliability. While their efficiency and finish make them worthy of the most expensive receivers, modest cost brings them within the reach of every constructor.

The LOTUS range comprises Transformers, Condensers, Dials, Valve Holders, Jacks, Plugs, Switches, Remote Controls, Coils, Coil Holders, etc.

Get a fully illustrated list to-day either from your dealer or from the makers.

LOTUS COMPONENTS



READERS' TESTS OF "W.M." SETS

From the reports that appear below prospective builders of "Wireless Magazine" sets will be able to see what ten different designs accomplish in twenty-five localities. The names of sets are arranged in alphabetical order so that anyone interested in the capabilities of any particular set can easily refer to it. All constructors of "Wireless Magazine" receivers are invited to send reports for the benefit of other readers.

BROOKMAN'S THREE-PLUS-ONE

(April, 1931)

CROSTON (Nr. Preston).—I must say that it is the best four-valve set that I have heard, both for tone and volume. Stations come in on every few degrees of the dial on both the long and medium waves

◆ ◆ ◆

BROOKMAN'S FOUR

(October, 1929)

HULL.—About a year ago I built a Brookman's Four; of all the sets I have heard I do not remember hearing one to compare with it. Some fifty or sixty people who have heard it have remarked on its purity and power . . . It would be a waste of time going through all the stations which have been received, but fifty-three different stations have definitely been logged on more than one occasion, all within two miles of the local (Hull).

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FIVE-POINT FOUR

(November, 1930)

EAST HAM (London).—I have never written to a paper before, but would like you to know of the results obtained with the Five-point Four . . . I have just finished a run round of the stations and have received on the medium band forty-eight stations, two-thirds of them at fine loud-speaker strength. On the long waveband I have received nine stations . . . I have made a few sets, but this one is the best and cheapest yet.

◆ ◆ ◆

FIVE-POINT SHORT-WAVER

(January, 1931)

PENDLETON (Manchester).—On Saturday night last about 11 p.m. I was able to tune-in, at full loud-speaker strength, two American stations on the lower range of coils and hold them for two hours with no difficulty. On the higher range no less than four stations came in at fair loud-speaker strength, though with some fading. I have been on the look-out for a good short-wave set and after trying out a number of circuits I find this, while being the simplest, to be the most satisfactory.

◆ ◆ ◆

PEDLAR PORTABLE THREE

(June, 1930)

HAMMERSMITH (London).—My intention was to have a set which could be carried from room to room to give the two London programmes with good reproduction. Not only have I obtained this, but also have tuned-in several foreigners. Whilst not guaranteeing to tune these in at any time you will see that I have got more than I thought when I set out to construct this remarkable little set: Vienna, Brussels, Langenberg, Rome, Toulouse, Mühlacker, Strasbourg, Bordeaux, and Algiers (only once or twice and very soft).

◆ ◆ ◆

REVELATION FOUR

(July, 1931)

MERTHYR TYDFIL.—The purity of reception, lack of distortion, reasonable consumption of current, its unfailing spotting-a-station, all have helped to its attainment of the best all-round capabilities as against the so-called best and newest on the market to-day or (for a time still) to come. I live to bless the "W.M." master mind who conceived my boon companion for me.

SEARCHER'S FOUR

(May, 1930)

WALLINGTON (Surrey).—Truly a wonderful set, and I have built a few, but this one tops it for purity and volume. It is quite a simple matter to log dozens of stations, many at greater volume than one needs.

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SUPER 60

(March, 1931)

BRISTOL.—I now get about thirty-seven medium-wave stations and four long-wavers. . . . The results now obtained on the stations I am able to get are very good and give me a range of choice, which is very welcome as I have a sneaking fondness for the so-called high-brow music.

CRIEFF.—Concerning the Super 60 receiver, I made up a demonstration model immediately I received the March issue, and the sales of components and coils have been surprising. Reception here on the Super 60 is perfect and it is easily the finest receiver I have yet tested for selectivity and range. Results on the ultra-short band are also amazingly good. [This letter is from a radio dealer.—ED.]

DEAL (Kent).—I have never written to a wireless journal before, but I really must write and say what a wonderful set the Super 60 is. I shall never want another set after this; in fact, I do not think it can be beaten. It is wonderful.

FALMOUTH (Cornwall).—Noticing in your correspondence that readers in Cornwall were rather doubtful of the capabilities of the Super 60 in this district, I send herewith my views, which may be of use to others. I consider that I am very hard to please, but I must confess that at last I am satisfied with my receiver. The number of stations received seems endless and they are tuned-in sharply, the majority are really worth listening to, the exceptions being heterodyned . . . In this district, where conditions are acknowledged to be poor, I consider that the Super 60 is the set.

GLASGOW.—It was so simple to make that I often find myself wondering if I really did make the set, my first attempt at any kind of construction. Stations I never thought I should hear, as well as those I never seemed to get well, come in clear and loud on the loud-speaker, but the best of all, from my point of view, is that it confines our local station to its allotted place on the dial and listening-in is now a real pleasure.

HACKNEY DOWNS (London, E.8).—Have had such enthusiastic praise from a regular reader of WIRELESS MAGAZINE that I feel that I must pass it on. He tells me the Super 60 is a beautiful set and a real treat to listen to, getting forty stations now, and he is sure he will improve upon this when the set is working to *his* full satisfaction.

LEICESTER.—I have made up the Super 60 exactly to specification and you certainly do not exaggerate; its selectivity is uncanny—just a touch and the station is gone.

LETCHWORTH (Herts).—I have had experience for the last seven years with seven- and eight-valve super-hets and as this makes the fifth super-het that I have had, I can say without hesitation that the Super 60 is different from any of the others; in fact, it is really uncanny. . . . Here is my log of stations up to date: Eleven long-wave stations, all identified; sixty-six medium-wave stations, fifty-eight identified; and six short-wave stations, all identified. I also picked up the B.B.C. van while I was searching on 50 metres. He was on the Great West Road and was coming in at tremendous volume.

MANCHESTER.—Until reading the March issue of "W.M." I had never even attempted anything in wireless, but your enthusiasm so appealed to me that I decided to try my hand at building the

(*Continued on page* 644)

READERS' TESTS OF "W.M." SETS—Cont.

Super 60. Although taking considerably more than the three hours mentioned, the completed job was far in excess of my expectations as I have logged every one of the stations mentioned, and a good many others. The selectivity is the wonder of all my friends.

MILE END (London, E.3).—I have just completed Mr. W. James' Super 60 receiver and I hasten to thank Mr. James and congratulate him on what I describe as the most wonderful set ever designed. . . . I can honestly say that there is no other receiver on the market to-day, whether commercial or amateur, that can equal its performance . . . It gives you every station practically worth getting. A marvellous achievement.

RIDDLESDEN (Nr. Keighley).—The quality is much better than my old six-valve set and selectivity is all that could be wished for. I can get more stations than I want; not only excellent quality but free from interference. Slaithwaite goes in and out on one degree and I am only about 20 miles away. It is the best set I have had and by far the cheapest; I am delighted with it.

RUSTINGTON (Sussex).—The results are as near perfection as one can expect at present. . . . On the short waves I think I can get all there is down there. . . . I don't know how many stations I have heard, but it is well over the hundred, as you can get several over each degree with care. . . . Again thanking you for a very fine set, the best yet.

ST. ANNES-ON-SEA (Lancs.).—I have had your Super 60 design in use for some time with very pleasant results.

STOKE MANDEVILLE (Bucks).—I built your Super 60 about a month ago. I consider it an excellent receiver. The selectivity has to be seen (or heard) to be believed, and one can get anywhere in Europe that one wants practically any night and many stations in the day; this also being possible regardless of what high-powered English and foreign stations are on adjacent wavelengths.

SWANSEA.—I herewith give you a few particulars of my first try at touching the inside of a set . . . with an ordinary run round the medium waves I got over fifty stations, all at real loud-speaker strength, never having to turn volume more than one-third on . . . I wish to thank Mr. James for designing a set which has been only a Wireless Fan's Dream until I built it.

TOTTENHAM (London, N.17).—I have made the Super 60 and am writing to say how pleased I am with it. The Super 100 is what I am calling it . . . On the ultra-short waves I was able to get New York and Brazil soon after dark last evening.

◆ ◆ ◆

A.C. SUPER 60

(June, 1931)

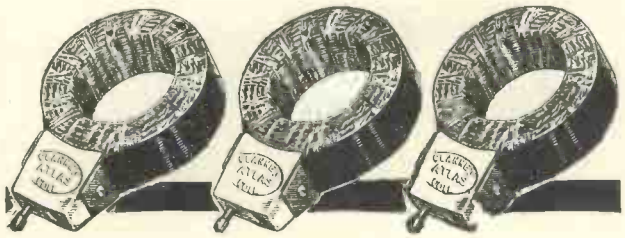
PORTSMOUTH.—I have sent in one report on the Super 60, but it deserves another one. I say Super 60; it should be A.C. Super 60. . . . Stations come in at every turn of the dial, some badly heterodyned, but on the whole practically every one is worth listening to. When Bournemouth was on the interval note the other day I heard a background of some station and a little careful tuning resulted into two stations which I am not far out in saying were Swansea and Plymouth—three stations on the same wavelength. [The set referred to is the reader's own A.C. adaptation of the original design.—ED.]

◆ ◆ ◆

WORLD-WIDE SHORT-WAVER

(January, 1929)

DUNEDIN (New Zealand).—About two years ago I built one of your short-wave sets, the World-wide Short-waver. I obtained fair results from it; sometimes—but seldom—very good ones. However, all last year conditions seemed to be bad and results were not worth anything. Now stations are coming in splendidly. I have never before had 5SW as well as yesterday morning when at about 7.45 a.m. I picked up a violin solo, clear and loud enough for the loud-speaker.



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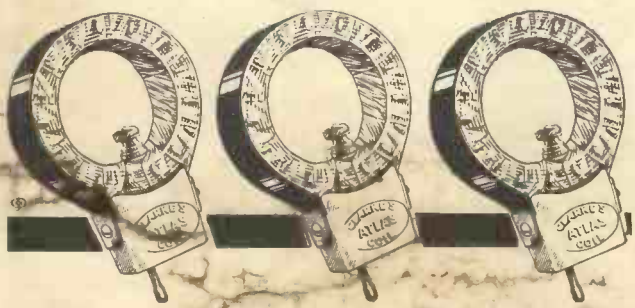

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Choosing Your Records

Here are reviews of the latest 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

Praise the Lord, Ye Heavens Adore Him, Choir of St. Mary-le-Bow, with organ, 1s. **BRDCST 706**

And *O God Our Help.* I think it is only necessary for me to say that both are well done.

Grand Opera and Classical Arias

★**Ardon Gl' Incensi,** Lily Pons, sop., with orch., 8s. 6d. **H.M.V. DB1504**

This is from Act III of Donizetti's *Lucia di Lammermoor.* A very fine voice and two attractive arias. I think this record might be popular. It is a very good example of operatic singing. The orchestra is excellent.

Classical Orchestral Music

★**Merry Wives of Windsor,** New Light Symphony Orch. (d.s.), 4s. 6d. **H.M.V. C1260**

By *Nicolai.* This is very charming melodically and the orchestral effects are so clear that I am inclined to suggest it for students of orchestration. The scoring is the work of a genius.

★**Midsummer Night's Dream,** Op. 21 (Mendelssohn), San Francisco Symphony Orch. (d.s.), 6s. 6d. **H.M.V. D1626-7**

This wonderful overture was quoted by Prout in his book on orchestration throughout the whole work. That means that everything he wanted to illustrate he could find in it. These discs of it are very well worth having —I enjoyed it thoroughly.

★**Sylvia Ballet,** Royal Opera Orch., Covent Garden (d.s.), 4s. 6d. **H.M.V. C1417**

By *Delibes.* I think this is a very good representation of it. I am putting it amongst the classical records, where it rightly belongs, but I recommend it to lovers of light orchestral music which, in reality, it is from the point of view of its simple appeal. An admirable record.

★**Symphony No. 1 in B Flat** (Schumann), Chicago Symphony Orch., 6s. **H.M.V. D1889-92**

This admirable production takes seven sides, the eighth being devoted to Glazounov's *Pas d'Action.*

The symphony is, of course, well known to lovers of good music. These discs are amongst the best I have recently heard by *any* firm, and I warmly recommend them to all Schumann lovers. The Glazounov is a happy idea for the eighth side.

Piano Solos

Alice, Where Art Thou? Sidney Crooke, piano, with orch., 2s. 6d. **ZONO 5879**

I don't know at the moment but I am sorry she is on a record. Sidney plays Chopin's D flat waltz and Mendelssohn's *Bees' Wedding* on the other side. Then the band plays what he has forgotten. He wants lessons, to my way of thinking; his technique is far too lumpy to warrant his playing works that are played by real pianists. If this is the *Bees' Wedding* I should prefer—like Liszt did—the *Spider's Divorce.*

Andante Favori, Benno Moiseivitch, piano (d.s.), 6s. 6d. **H.M.V. D1874**

This originally was a movement in the *Appassionata* sonata but Beethoven thought it too long and took it out, substituting a shorter movement. He subsequently published it by itself. It was always one of his favourites. Moiseivitch plays it beautifully but on a piano that must have been built in 1840 by Bryant and May. H.M.V., what are you thinking about to give him a tin-kettle like that? Sell it, put some money to what you get for it, and *buy a piano!*

★**Dance of the Gnomes,** Professor Egon Petri, piano, 3s. **H.M.V. B3718**

I remember hearing Petri in Manchester twenty-five years ago; his technique seems to have enlarged and become

EGON PETRI

more delicate. Students of piano music should get this record; they will learn something!

Chamber Music

★**Concerto in A Minor** (Grieg), Maurice Cole, with Symphony Orch., 1st, 2nd, and 3rd movements (d.s.), 2s. **BRDCST 5059-61**

I think this particular concerto is an excellent introduction to piano concertos in general. After all, it is not everybody who can appreciate this form of art, but the Grieg concerto is one that should appeal to anybody who is inclined to hear good music of this kind. Maurice Cole makes an excellent job of it and the orchestral accompaniment is outstandingly good. I recommend it to those who may possess other discs of it, because there is some individuality about this rendering.

★**Concerto in A Minor, Op. 54,** 1st movement, Maurice Cole, piano, Metropolitan Symphony Orch. (d.s.), 2s. **BRDCST 5231-2**

Two shillings is very cheap for a concerto as well played as this is. Maurice Cole does not overhit even in the loudest passage. He is one of the few present-day pianists of whom that can honestly be said. I recommend the discs (two) unreservedly.

Larghetto (Weber), arr. and played by F. Kreisler, 6s. **H.M.V. DA1137**

This, and the *Rosamunde Overture,* of Schubert, are "arrangements," that is, Kreisler has taken works *not* originally written for violin and played them. The result is, of course, good because he does it; I think, however, for recording purposes, he might give us violin works. There are so many that are worth *his* playing, surely!

★**Malagunea,** Laszlo Szentgyorgyi, violin, with piano, 4s. 6d. **H.M.V. C2001**

This is by Sarasate and very nice it is. Laszlo's tone is beautiful; I hope he won't mind my using his Christian name but the other one will cross my fountain pen nib!

Light Orchestral Music

Barcarolle (w.), George Braun's Salon Orch., 1s. 3d. **IMP 2441**

Waldteufel's *Barcarolle* and *Werner Blut* (Strauss) make waltz movements, but not suitable dances for the present day. This is an excellent little record and may be acquired for this purpose of adding to your library of light orchestral music.

★**Capriol,** London Chamber Orch. (d.s.), 3s. 6d. **DEC K576**

This is a very pleasant light orchestral suite which is quite worth hearing. The record has more than the usual amount of bass. Try it on a good electric machine.

★**Coppelia Ballet,** San Francisco Symphony Orch., 6s. 6d. **H.M.V. D1272**

Very charming, with Kreisler's *Viennese Caprice* on the other side. An electrical machine makes an excellent job of the reproduction. I have thoroughly enjoyed hearing it on the powerful machine here.

Famous Waltzes of the Past, Jay Wilbur and his Salon Orch. (d.s.), 1s. 3d. **IMP 2463**

All Alone, Ramona, and others of the period are the features of quite a good disc. It comes under light orchestral music, as the waltzes are not "danceable" in a modern ballroom.

Flowers of the Forest, Bram Martin, violoncello, with orch., 2s. 6d. **ZONO 5872**

Quite a pleasant light music record. Lunch-time type. *An*

BRAM MARTIN

Old Highland Melody, on the other side, is quite worth listening to.

★**From Foreign Lands,** Berlin State Opera Orch., Parts 1, 2, 3, and 4 (2 records) (d.s.), 3s. **H.M.V. B3624-5**

I believe I am right in saying these admirable tone poems were originally written as piano duets. They certainly exist in that form. Moskowski himself was a splendid pianist. I knew him personally and always liked his music. These are excellent. They represent Spain, Hungary, Germany, Italy. Ask to hear them; they are beautifully done.

★**Gypsy Baron** (Strauss), Von Strohn and his Orch. (d.s.), 1s. 3d. **IMP 2440**

I don't remember having heard a record of this before but it makes an astonishingly good one. Thoroughly Viennese, it makes admirable light orchestral music.

Hungarian Rhapsody No. 14, Gandino and his Orch. (d.s.), 1s. 3d. **IMP 2442**

Lizst is rather too much for an ordinary-sized orchestra. This loses a good deal on that account. The recording is not as good as Imperial generally produces. Not a very good record.

Impromptu in A Flat, Gershom Parkington Quintet, 2s. **BRDCST 5234**

By Schubert. Quite an effective arrangement. The other side is a bit hackneyed—it is *Whisper and I Shall Hear.*

★**Indiana Sweetheart,** Albert Sandler and his Orch., 3s. **COL DB475**

And *Tears.* Expertly played. This sort of light music is really welcome. I have every admiration for it.

(*Continued on page* 648)

Technical Talks

Half-wave and Full-wave Rectification

For the operation of a radio set from any A.C. electricity supply, either "half-wave" or "full-wave" rectification may be employed. The first method consists of the use of apparatus which will act as an electrical "sluice gate," allowing the current to flow in one direction only, and stopping its flow when it attempts to reverse. Full-wave rectification is obtained by connecting up a number of these "sluice gate" units to make use of both directions of flow, and converting both alternations into a flow in one direction only.

Generally, full-wave rectification is the better method to use.

Half-wave rectification is used for some of the smallest H.T. Rectifiers, and for grid-bias rectifiers. In these cases, where the current to be dealt with is small, half-wave rectification has the advantage of simplicity and cheapness.

For further technical information see "THE ALL METAL WAY," a copy of which will be sent on request.

CHOOSING YOUR RECORDS—Continued

★**Invitation to the Waltz,** Hastings Municipal Orch. (d.s.), 3s. 6d. **DEC K575**
By Weber. It is very well recorded and quite worth having. 3s. 6d. is not a big price for a 12-incher of this calibre.

★**Merrie England Selection** New Symphony Orch.), 4s. 6d. **H.M.V. C2196**
Everything that one has always admired in German's excellent music to this equally excellent libretto is splendidly played. As a rule one hears it rendered by a small band, particularly if the "show" is an amateur one. This, of course, is an unexpected treat.

★**Minuet,** Gershom Parkington Quintet, 2s. **BRDCST 5233**
By Handel. This is very typical of the Quintet's playing as we know it on the wireless. Quite a good record.

★**Minuet,** New Symphony Orch., 3s. **H.M.V. B3036**
The favourite, by Boccherini. The *Nell Gwyn Dances* appear on the other side. A charming light orchestral record and well worth hearing.

Races of Radioland, New Mayfair Orch. (d.s.), 3s. **H.M.V. B3836**
Very well produced. *Same as We Used to Do, Roamin' thru' the Roses* are two examples. You can guess the rest.

★**Serenade** (R. Strauss), Scala Trio, 1s. 6d. **WIN 5262**
I always recommend any works played by this excellent trio. They provide excellent light orchestral music. Strauss *Serenade* is always worth hearing. They play it admirably.

★**Stand Up and Sing,** Scala Salon Orch. (d.s.), 1s. 6d. **WIN 5268**
Selections. Makes admirable light orchestral music. It is well played and recorded.

Stealing Thro' the Classics, No. 1, Debroy Somer's Band (d.s.), 4s. 6d. **COL DX237**
Why should anybody want to steal through them? This is merely a senseless mixture of Beethoven's *Pathetic* sonata, *The War March of the Priests,* Schubert's *Unfinished Symphony.* Why such things are issued leaves me guessing. I have put it amongst the light orchestral; it really wants a *Distortion Column.*

★**That Tiny Teashop,** International Novelty Quartet, 2s. 6d. **ZONO 5881**
Quite a good piece of light orchestral music. Ask to hear it.

Light Opera & Songs

Ave Maria, Thea Philips, sop., with orch., 2s. **BRDCST 5235**
Schubert—not Bach-Gounod. A little on the stodgy side, but otherwise not amiss. Miss Philips would do well to show the rhythmic properties of her songs. She is not a good Schubertian at the moment.

★**Bathing in the Sunshine,** Albert Whelan, with orch., 1s. 3d. **IMP 2453**

ALBERT WHELAN

There is a verve about Albert Whelan's records that is unmistakable. Both this and *Topsy Turvy Talk* are really excellent.

★**Beware of the Maidens,** Foster Richardson, bass, with orch., 2s. 6d. **ZONO 5852**
Very well sung and a jolly song, too! He sings *Bill-Sticker Joe* on the other side with a pleasant verve.

Black Eyes, and Farewell, My Gypsy Camp, Pola Negri, 3s. **H.M.V. B3820**
She is very beautiful, judging from her pictures, but someone near and dear to her should tell her she will never sing in this world, whatever she may do in the next. This is *appalling!*

★**By a Lazy Country Lane,** Layton and Johnstone, with piano, 3s. **COL DB473**
Another decided success. With *Indiana Sweetheart* as the companion. Ask for it.

★**Chu, Chin, Chow,** Savoy Light Opera Singers and Players (d.s.), 1s. 6d. **WIN L5266**
This is well worth hearing. The whole production is smart and well carried out. Very good singing.

Clockwork Courtship, Gracie Fields, com., with orch., 3s. **H.M.V. B3795**
She begins "tick-tock," taking an octave for each syllable, but she sings out of tune. This ought to be done again with a better vocalist. Miss Fields, with all her personal grace, is not capable of this sort of thing. The song is really good; she wants lessons badly!

★**Come and have a Cuddle on the Common,** Leslie Sarony, with orch., 1s. 3d. **IMP 2468**
Quite good. Also *Lizzie, Come In and Shut That Door,* sung by Albert Whelan, on the other side.

Crying Myself to Sleep, Elsie Carlisle, with piano, 1s. 3d. **IMP 2469**
And *Ten Cents a Dance,* both sung in Miss Carlisle's best

(*Continued on page* 650)

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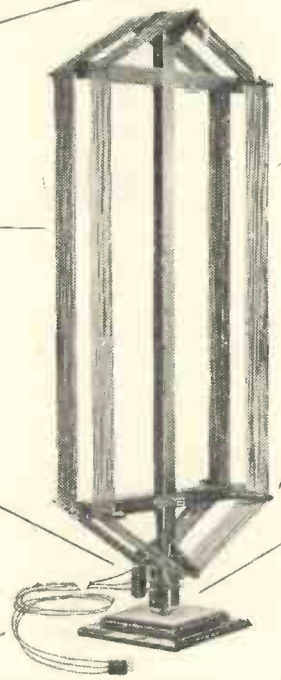

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Now turn to page 655

CHOOSING YOUR RECORDS—Continued

voice. More than that I cannot honestly say.

★**Daddy Wouldn't Buy Me a Bow-wow,** Maestros, with piano, 3s. **COL DB421**

Back in the eighties, apparently. It carries conviction because it is so beautifully rendered by admirable male voices. I enjoyed it thoroughly. *Little Annie Rooney*, on the other side, is also charmingly sung. A very good record.

Deathless Army, Ramond Newell and Company, with orch., etc. (d.s.), 4s. 6d. **COL DX226**

A descriptive ballad of military life. Drilling, bagpipes, noisy chorouses. That is what it all comes to. I can say no more, except that the song of that name is sung by a voice that sounds like playing through a comb.

Echoes of 1914, Army Songs (d.s.), 1s. 3d. **IMP 2464**

It needs no explanation. It *is* what it is, and I wish it were *not*!

★**Good Friends,** Big Four, with orch., 3s. **COL DB488**

And *Darling*. They sing admirably. A very good disc.

Good Old-time Songs, Jerry Hoey and his Band (d.s.), 1s. 6d. **PIC 742**

Specimen: *The Sunshine of Your Smile*. Now you know what you are in for!

I Miss a Little Miss, Roy Smeck's Vitaphone Trio, 2s. **PANACHORD 25011**

A Vitaphone Trio is a bit too much for me, but I was entertained by the "hawy" sound of the melody instrument accompanied by another being plucked. It is very entertaining. Ask to hear it.

I Wasn't Ashamed of You, Mother, Al Benny, with acc., 1s. **BRDCST 705**

A very good disc. Al Benny is improving. Ask to hear this.

★**I'm Alone Because I Love You,** Frank Ferera's Hawaiians, 1s. 3d. **IMP 2462**

Of the twangy type this is really excellent. I am not really keen on the instruments, but they blend admirably with the singer, who is quite good.

If I Hadn't Been Green When I Met You, I Shouldn't be Blue To-day, Billee Lockwood, with piano, 2s. **DEC F2295**

The tune is far in advance of the words, which are rubbish. *Round About the Middle of June*, on the other side, is much more sensible and worth hearing.

★**Indiana Sweetheart,** Billy Scott-Coomber, with orch., 1s. 3d. **IMP 2467**

And *Laughing at the Rain*. His voice is quite good and he takes the trouble to sing. I intend to recommend all light song records in which there is any real singing; I have no use for the others.

Little Things in Life, Lewis James, ten., with orch., 2s. 6d. **ZONO 5858**

A good recording voice. I imagine that a microphone is kind to him! Anyhow, it is a pleasant song, pleasantly sung. The sentiment is a bit childish but quite—as I say—*pleasant*.

Livin' in the Mountains, Frank Marvin and his Guitar, 3s. **BRUNS 1091**

Somewhat "yodelly," but none the worse for that. Marvin's diction would put some of our B.B.C. artistes (highly paid ones, too!) to shame. Ask to hear this.

Love Is Like That, Ruth Etting, com., with acc., 3s. **COL DB440**

The voice might be that of a man; the tune is, of course, well known. I have, candidly, heard better renderings of this, and also of *Ten Cents a Dance*. The recording is perfect.

Love Will Find a Way, Valerie Green, sop., with chorus and orch., 1s. 6d. **BRDCST 3045**

Quite good and rather out of the ordinary. *Bohemia*, on the other side, is equally entertaining. Her voice is not at all bad for recording purposes.

★**Maori Song,** Rotorua Maori Choir of New Zealand (d.s.), 3s. **COL DB461**

Very interesting indeed and well rendered, the soft singing being a commendable feature. These tunes, if genuine, show musical feeling. If you are interested in elementary work of this kind you cannot do better than purchase this excellent disc.

Memories of You, Jack Gordon, with orch., 1s. 3d. **IMP 2452**

Rather silly! I prefer *Hurt* (Scott-Coomber with orchestra) on the other side, but neither makes much impression on me.

Memoryland, London Orch. (d.s.), 2s. 6d. **ZONO 5850**

The title gives it away; it is another collection of hackneyed potboilers; but it is well produced and excellently recorded. *Put Me Amongst the Girls* is a specimen number.

O Can Ye Sew Cushions, Stiles-Allen, sop., with piano, 1s. 6d. **WIN 5261**

Her voice records as well as any soprano I can call to mind at the moment. My only quarrel with her is that she never sings anything worth hearing.

On Wings of Song, Isobel Baillie, sop., with 'cello, organ, and harp, 4s. 6d. **COL DX230**

Not an ideal recording voice; I thought so when I heard her "in the flesh" at Queen's Hall. But she sings well though not always dead in tune. The accompaniment is rather novel (instruments indicated above). Other side: the *Ave Maria* from *Cavalleria Rusticana*.

ISOBEL BAILLIE

Review of Revues, Debroy Somer's Band (d.s.), 4s. 6d. **COL DX227**

It reviews them better than I can review it, for everything I have ever heard, in this line, appears here. So, if you like revue-music, buy this without delay, for it is excellently produced.

Shamrock Land, Cliff Connolly and the Million-Airs, ten., and orch. (d.s.), 2s. **DEC F2288**

This, as the title suggests, is a medley of light songs with an Irish flavour about them. Quite a good record for an idle moment.

★**Shout, for Happiness,** Leslie Sarony, with orch., 1s. 3d. **IMP 2451**

Excellent. So is *Shovel up your Trouble*. How much healthier than rubbish like *The Convict's Rosary*! As though a convict would have any use for a rosary, any way! Leslie Sarony is a tonic. Ask for this.

LESLIE SARONY

Signora, Gandino and his Orch., 1s. 3d. **IMP 2449**

I think this light song has its attractions. The other side is another version of *Drink Brothers, Drink*, which, though quite well done, is now a bit *over* done!

★**Sir Harry Lauder Songs.** Border Singers, with orch. (d.s.), 4s. 6d. **COL DX236**

Nearly all I have ever heard of his. The Border Singers are good and thus the record is worth having.

Songs of Good Cheer, Light Opera, Male Chorus, 4s. 6d. **H.M.V. C2151**

Something to be said in its favour—the title, I mean. *Here's to the Maiden of Bashful Fifteen, Simon the Cellarar*, etc., give an idea of what to expect. Very well done, too!

Three Comrades, Mostyn Thomas, bar., with piano, 4s. 6d. **COL DX234**

A good voice but his diction is faulty. Only one word in five comes through. I do not care for the song because I detest dramatic ballads unless they are better than this. He has a bad accompanist. *Friend*, on the other side, is much the same. Don't take my word; ask to hear it. I want to be fair to it!

Vive La Compagnie, When Jonny Comes Marching Home, Harold Williams and the B.B.C. Male Chorus, 3s. **COL DB464**

And *There's a Tavern*. Good because of the artistes; boring because of the music.

W. H. Squire's Popular Songs, Scala Concert Orch. (d.s.), 1s. 6d. **WIN L5267**

If you want them—most of the best known are here, and well sung at that. The accompaniment is quite a feature of the record.

We Two, Billy Scott-Coomber, with orch., 1s. 3d. **IMP 2454**

Rather a good voice; the song, however, is scarcely worth hearing. Neither is *I'm Alone Because I Love You* much better, to my way of thinking.

We Want Our Beer, Radio Imps, with orch., 1s. 3d. **IMP 2465**

Quite entertaining. There is touch of American about it but not really enough to be definite. Still it is worth hearing.

★**Wedding Bells are Ringing for Sally,** Norman Blair, bar., with orch., 2s. 6d. **ZONO 5853**

This is a good recording voice. His phrasing is good. The song is well known and needs no description. I recommend this for *his* sake; he takes trouble to sing effectively.

★**When You Were My Sweetheart and I was the Kid Next Door,** Maurice Elwin, bar., with orch., 2s. 6d. **ZONO 5877**

Quite well produced. Excellent recording. He sings very well and his records always have

(*Continued on page 652*)

BILLY SCOTT-COOMBER

STILES ALLEN

MAURICE ELWIN

CHOOSING YOUR RECORDS—Continued

individuality about them. That is something in these days!

When Your Hair has Turned to Silver, Harry Carlton, with acc., 1s. **BRDCST 704**
And *Wedding Bells are Ringing for Sally.* Both well done.

Will They Love Me up in Heaven, Maurice Elwin, bar., with orch., 2s. 6d. **ZONO 5861**
This is *tripe.* So is *Convict's Rosary.* Sorry, but I cannot recommend sentimental semi-goody-goody rubbish of this kind. And, after all, what a title! Good heavens, what shall we be expected to endure next!

Pat O'Dell, with orch., 1s. 3d. **IMP 2450**
And *The Convict's Rosary.* Both are of the shop-ballad type; personally I think something a trifle more manly and vigorous is what we need in these days. This is really "tripe."

Wine, Women, and Song (w.), B.B.C. Wireless Chorus, with orch. (d.s.), 3s. **COL DB458**
A vocal waltz. English words by D. Millar Craig; music by Johann Strauss; conductor, Stanford Robinson. All familiar, of course. A very well got-up production, with some really smart singing from the chorus. Ask to hear it.

You'll be Mine in Apple-blossom Time, Jack Gordon, with orch., 1s. 3d. **IMP 2466**
Sentimental, of course, but well enough sung to be pleasant. *Blue Lagoon* is equally well sung on the other side by the same artiste.

★**You're the One I Care For,** Bob and Alf Pearson, with piano, 1s. 6d. **BRDCST 3043**
And *Shout for Happiness.* Both are really excellently done and the recording is perfection. A very good disc, and well worth having.

Military Bands

★**Evolution of Dixie,** H.M. Grenadier Guards (d.s.), 4s. 6d. **COL DX228**
Rather novel. It is thus represented: (*a*) The Creation; (*b*) Dance Aboriginal; (*c*) Minuet; (*d*) Dixie of 1865; (*e*) Waltz, and so on. The Grenadier Guards are excellent, of course. A very entertaining piece of programme music. I consider it outstanding in every way. Ask to hear it; I imagine you will be pleased.

★**In a Monastery Garden,** Band of the Honourable Artillery Company, 1s. 6d. **PIC 741**
Also *In a Persian Market,* both of which make extraordinarily good military band music. I recommend them both as a reasonable adaptation.

On the Quarter Deck, Band of H.M. Scots Guards, 1s. **RAD 1488**
Good as far as it goes—but I hate these effusions. If you chance to pick it up in a shop, ask to hear it and see if you think I am right!

Band of H.M. Welsh Guards, 1s. 6d. **BRDCST 3046**
And *Old Comrades.* Both are excellent military band marches.

★**Sons of the Brave,** Black Diamonds Band, 2s. 6d. **ZONO 5885**
And a march called *Cannon Ball.* Both are excellently played. It is a very good band.

★**Washington Post March,** Melotone Military Band, 2s. **PÁNA 25010**
This is a splendid military band record, with *Stars and Stripes* on the other side. I sincerely recommend it to all who appreciate good military band music.

Spoken Records

Day in the Army, Clarkson Rose and Company, with orch. (d.s.), 2s. 6d. **ZONO 5882**
Not worth hearing and rather vulgar. Far too much bad language in it, apart from the utter lack of humour. *Sheer rubbish!*

★**How I Flew Round the World,** Hon. Mrs. Victor Bruce (d.s.), 4s. 6d. **COL DX238**
This is an extract from matter spoken into a dictaphone first of all. It is very interesting indeed. Her voice is clear and distinct, but her speech not very cultured. However, the disc is well worth having because it is full of life. It comes out in the form of a diary.

London Toc H Birthday Festival, December 6, 1930, Royal Albert Hall, London (d.s.), 4s. 6d. **H.M.V. C2201**
This is a speech by the Rev. P. B. Clayton introducing a message from H.R.H. the Prince of Wales. His delivery is so slow, deliberate, and halting, that it is hard to keep one's attention fixed. Admirers of Toc H and its ideals should, on the other hand, ask to hear this, I cannot pretend to advise. I imagine those who heard the actual speech may like a permanent record of it. I suppose it is issued with that idea in view.

Old Contemptible's Re-union, Bobbie Comber and Company (d.s.), 1s. 6d. **BRDCST 3044**
The second word is applicable to all these appalling creations. Come on, Broadcast! Give up this rubbish. Your recording is too good to waste on it. It's not funny, so it goes amongst the spoken records.

Humorous Records

As Long as It's Dark, Billy

(*Continued on page 654*)

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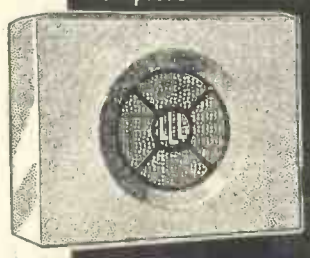

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CHOOSING YOUR RECORDS—Continued

Scott-Coomber, with orch., 2s. **DEC F2258**

This is over-done, but the rendering has a brightness about it which is commendable. *Rainbow* on the other side.

★**Camille,** George Robey, with orch., 1s. 6d. **BRDCST 3041**

Very characteristic; I can almost see his eyebrows move! Ask for it. I hope Robey will give us some more; he is very welcome.

★**I Laughed so Hard I Nearly Died,** Rex Cole Mountaineers, 2s. **PANACHORD 25006**

Some of the instrumentation in this is really amusing and the "nigger" voice is very attractive. I obtained some amusement out of it, and sincerely recommend it. A very good record.

Let's Pretend We're Having a Jolly Good Time, Florrie Forde, 1s. 3d. **IMP 2455**

An *appalling* voice sings a song that misses me altogether. *Maggie Jane* shrieked in the same

FLORRIE FORDE

distressing fashion. I do not admire "*Maggie Jyne, you've been at it agyne*"!

★**Mr. Potter Wanders On,** Gillie Potter, monologue (d.s.), 3s. **COL DB463**

Admirable. It will sell in thousands. Gillie Potter is one of our best comedians. He is refined and cultured and *really* funny. Congratulations to him and Columbia.

Sandy, the Plumber's Mate, Sandy Powell, com. (d.s.), 1s. **BRDCST 703**

Yes—quite good, but Sandy is finding it difficult to keep up the standard. There is a tendency to vulgarity; it is a pity—but I suppose when humour fails, vulgarity is the only resource!

Dance Music

★**Bathing in the Sunshine** (f.), Orpheus Dance Band, 2s. 6d. **ZONO 5865**

A very good specimen of them and of the work they play. *Memories of You,* on the other side, is even better.

★**Betty Co-Ed,** Bob Haring and his Orch., 3s. **BRUNS 1077**

We can't do with plenty of this kind of dance records; there is some good bass in them. This one, I imagine, will reproduce admirably on a really big machine; it would fill a hall.

Between the Devil and the Deep Blue Sea (f.), Jay Wilbur and his Orch., 1s. **IMP 2447**

And *On the Roofs of Paris.* May I never find myself in such a position! All the same, the time of *Between* is good, but that of *On* is not amiss. The singing is the worst part of this otherwise excellent record.

(f.), Rhythmic Eight Orch., 2s. 6d. **ZONO 5883**

An excellent foxtrot with amusing words. I thought someone would evolve a foxtrot with this title! This is excellent.

★**Blue Again** (f.), Milt Shaw and his Detroiters, 2s. **PANACHORD 25003**

This is my introduction to these excellent discs. The recording is remarkable and it seems to me that some trouble has been taken in rehearsal of the work, even though only a foxtrot. The record is worth having; *Three Little Words* is the companion.

Cheerful Little Earful (f.), All Star Californians, 2s. **PANACHORD 25001**

And *Sweet Jennie Lee,* both of which are very well recorded. Panachord may be taking a leading place in dance productions this season. These discs are well worth two shillings.

★**Clockwork Courtship** (f.), Debroy Somers' Band, 3s. **COL CB273**

And the *Wedding of the Three Blind Mice.* Beautifully played and recorded. These Columbia dance records are really admirable. I have listened to a number of them without any sense of boredom. I cannot *always* do that, I assure you!

★**Come and Have a Cuddle on the Common** (f.), Jack Payne and his B.B.C. Dance Orch., 3s. **COL CB275**

A very jolly tune as attractive as the title! Also *Good Friends.* It is well sung and played and the recording is first class.

★**Darling, My Heart Longs to Greet You** (f.), Marek Weber and Orch., 3s. **H.M.V. B5998**

Quite an outstanding dance record—one of the best of this month's batch. The recording is well up to standard, also.

★**Egyptian Ella** (f.), Alan Green and his Band, 1s. 6d. **PIC 753**

Quite attractive with a touch of moralism in the harmonies. One of the best dance tunes of the wider type I have heard.

Girl of a Million Dreams (w.), Jerry Hoey and his Band, 1s. 6d. **PIC 749**

A moderately good tune only. I am not struck with it. I much prefer *Hello, Beautiful,* a foxtrot on the other side, but neither is really outstanding. The bass of this record is a *great* improvement.

ABBREVIATIONS USED IN THESE PAGES

bar.	baritone	IMP	IMPERIAL
BRDCST	BROADCAST	orch.	orchestra
BRUNS	BRUNSWICK	PHONY	PHONYCORD
COL	COLUMBIA	PIC	PICCADILLY
com.	comedian	RAD	RADIO
con.	contralto	sop.	soprano
DEC	DECCA	ten.	tenor
d.s.	double-sided	w.	waltz
f.	fox-trot	WIN	WINNER
H.M.V.	HIS MASTER'S VOICE	ZONO	ZONOPHONE

★**Girl of a Million Dreams** (w.), Sam Nichols' Top Notches, with organ, 1s. 6d. **BRDCST 3050**

A very steady-going waltz with a distinctly catchy melody. The organ spoils it, but until it appears in a better form it must be commended in this, merely for the sake of the build-up of its main themes.

★**Hawaiian Stars are Gleaming** (f.), Jack Payne and his B.B.C. Dance Orch., 3s. **COL CB263**

JACK PAYNE

A slow foxtrot with some delightful writing in it. Jack Payne at his best!

He's Not Worth Your Tears (f.), Bob Reynolds and his Band, 1s. 3d. **IMP 2446**

Voice adenoidal; playing none too rhythmical; recording excellent. That is all I can say about this.

How Come You Do Me Like You Do (f.), Jack Winn and his Dallas Dandies, 2s. **PANACHORD 25008**

The title needs reading once or twice before you quite "get" it. The music is jazz and equally misty. It is worth hearing because of the originality. I was quite entertained with some of the coarser noises.

★**I Bring a Love Song** (f.), Mark Fisher's Orch., 2s. **PANACHORD 25004**

A good orchestra, well balanced. I name this as an outstanding dance record not because of the music (well-known, of course), but for the admirable production.

★**If You Can't Sing, Whistle** (f.), Rhythmic Eight Orch., 2s. 6d. **ZONO 5864**

Unfortunately I can't whistle, so now I don't know what to do, except listen to this excellent combination of singers and players, which I have done with great pleasure. Very effective.

Indiana Sweetheart, Billy Milton, with orch., 2s. **DEC F2293**

I rather like this; it is in waltz rhythm. *Black Rain* is the companion.

★**Laughing at the Rain** (f.), Marius B. Winter and his Dance Orch., 1s. 6d. **BRDCST 3047**

A pleasant *slow* foxtrot, with *Hello, Beautiful!*—a faster movement—as the companion. I like *Laughing at the Rain*; it is distinctly good. Ask to hear it.

Little Things in Life (f.), Hal Swain and his Band, 1s. **BRDCST 709**

And *Shout for Happiness.* Both *well* up to standard.

★**Miss Elizabeth Brown** (f.), Jay Wilbur and his Band, 1s. 3d. **IMP 2461**

An excellent dancing disc, with a good waltz on the other side. There is something very distinctive about the playing that is worth while.

More You Laugh, the Less You Cry, Walter Miller and Harry Hudson's Melody Men, 1s. **RAD 1480**

Very good—and very cheap. Ask to hear it.

My Canary has Circles under His Eyes (f.), Debroy Somers' Band, 3s. **COL CB261**

There seems to be some originality about the titles for these foxtrots. This is not outstanding but it is a useful dance piece. *Hoppa-Ha-Banna* is the intelligent title for the companion, which is a rattling good one step.

Sophie Tucker, with Ted Shapiro and orch., 1s. 6d. **BRDCST 3042**

SOPHIE TUCKER

A typical Sophie Tucker record. Ask for it. *Balcony in Spain* is the companion.

★**My Song of Love,** Rolando and his Blue Salon Orch., 1s. 6d. **WIN 5265**

This is a good waltz tune and is well sung and recorded. *Your Eyes* (f) is the companion. Well worth purchasing.

★**Oh! Rosalita** (f.), Marius B. Winter and his Dance Orch., 2s. **BRDCST 3048**

Here is an attractive slow foxtrot. I am coming round in my views of the slower form of this dance; I feel there is more grace of rhythm. Ask to hear this; it will make an excellent number for lawn dancing.

Sevilla Serenaders, 1s. 3d. **IMP 2458**

Rather a pleasant little work with dance qualities about it. It makes a foxtrot of sorts or, better, some light orchestral music. I like *Spanish* [illegible]

★**On a Little Balcony in Spain** (f.), Hal Swain and

(*Continued on page* 656)

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1 Rezentone mains unit, S60	4	10	0
5 Belling-Lee wander plugs, G.B. type			10
5 Readi-Rad link resistances, 5,000 ohms		5	0
2 Readi-Rad link resistances, 15,000 ohms		2	6
3 Readi-Rad link resistance, 50,000 ohms		5	3
1 Readi-Rad .5 megohm grid leak			10
2 Ediswan 100,000-ohm grid leaks		3	0
2 Sovereign 50,000-ohm potentiometers		9	0
1 Rotorohm 50,000-ohm potentiometer		6	0
1 Bulgin twin fuse holder, F11		2	6
3 Fuller 100 9 grid-bias batteries		4	6
3 Grid-bias clips		1	0
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2 Belling-Lee terminals, L.S.—, L.S.+			6
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his Band, 1s. **BRDCST 710**
And *Lizzie*. A very good disc. Useful for dancing, being rhythmical.

★**Parade of the Minutes** (f.), Jack Payne and his B.B.C. Dance Orch., 3s. **COL CB266**
This is one of the best records of the type of *Fairy on the Clock* I have heard. It ought to be a "best-seller."

★**River, Stay 'Way from my Door** (f.), Jack Hylton and his Orch., 3s. **H.M.V. B6004**
This is an excellent tune and has an unusual lyric. It is also well sung; the singer gives me the idea he *could* sing very well if he let his voice go. I also like *Lonesome Lover* on the other side. An outstanding dance disc.

★(f.), Jack Payne and his B.B.C. Dance Orch., 3s. **COL CB254**
And *Miss Elizabeth Brown*, a quicker foxtrot. Both well up to Jack Payne's high standard. One of the best dance records of the month.

★**Share My Umbrella** (f.), Jack Payne and his B.B.C. Dance Orch., 3s. **COL CB264**
Another great success. *Sunshine and Shadows* is the companion and very attractively rendered. An outstanding dance record.

★**Shout for Happiness** (f.), Blue Jays, 1s. **RAD 1485**
And *Peanut Vendor*. Both *overdone* but very *well* done in this instance. I recommend it.

Someone Like You (w.), Musical Saw, Dick Anderson, with Lawrence Inns and his Band, 1s. 6d. **PIC 748**
Very effectively rendered. The "instrument" is certainly delightfully melodic and records admirably: to be recommended for its novelty.

★**Ten Cents a Dance** (f.), Jack Payne and his B.B.C. Dance Orch., 3s. **COL CB249**
A splendid record; you can safely buy *any* Jack Payne record; this is one of the best I have heard.

★Radio Rhythm Boys, 1s. **RAD 1482**
Very well produced. This is an excellent dance band and the record is useful for dancing purposes.

★**Truly** (f.), Roy Fox and his Band, 2s. **DEC F2292**
This is a taking foxtrot a little on the dreamy side. The voice is adenoidal but not unpleasing.

Under the Roofs of Paris, Ambassador Club Band, 1s. 6d. **WIN 5257**
And *Lady of Spain*. These are both well done, if overdone. Quite a good disc.

Walking Lover's Lane Alone, (w.), Jerry Hoey and his Band, 1s. 6d. **PIC 754**
Fairly attractive, but it will not set a ballroom alight.

Alone and Afraid is the title of rather a vigorous foxtrot (considering its title) to be found on the other side.

★**We Two** (w.), Jack Payne and his B.B.C. Dance Orch., 3s. **COL CB251**
The first chord is almost enough to distinguish a J.P. record. This is excellent. Jack, one word! Train that singer of yours to produce his vowel-tones properly. I hate his "happy to the ennnnnnnd!" (End the word is; let it end there!).

Wedding of the Birds (f.), Lou Gold and his Orch., 1s. 3d. **IMP 2445**
A very effective tune, and quite suitable for dancing (moderate pace), *Baby's Birthday Party* is on the other side; quite good.

★**Wedding of the Three Blind Mice** (f.), Jay Wilbur and his Orch., 1s. 3d. **IMP 2443**
This is really excellent. There are stage noises such as those that are connected with the now-famous Mickey. A very good disc.

★**When Gretchen Yodelled** (f.), G. H. Elliott, 1s. **RAD 1483**
As usual, very good. Elliott never lets you down. Ask for it.

When Kentucky Bids the World "Good Morning" (f.), Red Nichols and his Orch., 3s. **BRUNS 1082**
Mr. Red Nichols has got a "red"

G. H. ELLIOTT

instrument in his band which emits some Soviet sounds; otherwise this record is excellent, the dancing qualities being admirably marked. Other side, *Blue Again*, which is equally well done. I like the modern harmonies in it.

★**When Your Hair has Turned to Silver** (w.), Remo Dance Orch., 1s. 3d. **IMP 2448**
Quite an outstanding dance record, with *You're the One I Care For* on the other side. I can recommend it sincerely.

Owing to lack of space other gramo-radio features are unavoidably held over

AROUND AND ABOUT

WE have been advised by Claude Lyons, Ltd., of 40 Buckingham Gate, London, that a full-size template is now being supplied with each Diehl Aristocrat electric motor.

This motor was specified in the June issue of the WIRELESS MAGAZINE for use in W. James' A.C. Super 60 radio-gramophone model. Readers who obtained motors without a template can obtain one free of charge on application to the makers.

◆ ◆ ◆

Franklin Electric Co., Ltd., the condenser people, have now moved to 150 Charing Cross Road, London, W.C.2.

◆ ◆ ◆

Two interesting new lines have recently been announced by the General Electric Co., Ltd., of Magnet House, Kingsway, W.C.2.

One is a six-valve super-heterodyne receiver claimed to be extremely sensitive, and suitable for use in any part of the world without modification. It is designed for use with an outside aerial and a good earth is recommended. The wavelength range covered is from 13 to 720 metres.

Working from 120-volt batteries, the current consumption, using the specified valves, is approximately 20 to 24 milliamperes; therefore, triple-capacity batteries are essential.

Six sets of coils, covering wavebands from 13 to 100 metres and 200 to 720 metres, are supplied with the set. Those desirous of exploring the 100- to 200-metre band can purchase coils for this purpose at 15s. extra. The cost of the set is £27 10s.

The other new line is a gas-filled photo-cell, type CMGB, having increased sensitivity and improved frequency characteristics over the cæsium cells previously marketed.

◆ ◆ ◆

We have received from the Crypto Electrical Co., Ltd., of Acton Lane, Willesden, N.W.10, a leaflet giving particulars of their converter equipment which enables A.C. all-mains receivers to be operated from D.C. supplies.

The price of the complete equipment varies proportionally with the output required. A converter giving an A.C. output of 200 to 250 volts, 50 watts, costs £13 10s.

◆ ◆ ◆

Ferranti, Ltd., of Hollinwood, Lancashire, are now providing a terminal block with each mains transformer, which enables it to be used on any A.C. mains between 200 and 250 volts and 40 cycles and upwards without having to obtain a transformer for each individual voltage.

The same firm have introduced a range of new output transformers, which include the type OPM5, ratio 1-1, 2-1, 2½-1 and 45-1, and the OPM5c, a push-pull type, having the same ratios, the OPM6 having ratios of 4-1, 6.7-1 and 10-1 and its corresponding push-pull type. The prices of these transformers are the same as previous models.

Readers who are contemplating building an all-mains screen-grid four-valver can obtain a chart giving constructional details of the new Ferranti constructors' four-valver free on request.

◆ ◆ ◆

Those who want blueprints of the D.C. "Fader" should note that the number is No. W.M. 242 and not No. W.M. 239 as indicated in pages 604-607 of this issue.

◆ ◆ ◆

Radio Instruments, Ltd., of Purley Way, Croydon, announce a new low-frequency transformer at 8s. 6d. It is called the Parafeed, but it must be connected through a parallel- or shunt-feed system.

THE BROOKMAN'S FOUR

EXCELLENT results with the Brookman's Four (WIRELESS MAGAZINE, *January*, 1930), *are reported by a reader at Golborne, near Warrington* :—

Enclosed are snaps of the Brookman's Four, which I have built on a panel used for my Inceptor Three. I must congratulate W. James on his fine set. I am sure that he is one of the foremost wireless experts to-day.

His idea of biasing the screen-grid valve has always appealed to me. The general stability of the Brookman's Four is excellent. I had by me an old type Cossor screen-grid valve and decided to build the Brookman's Four. I adapted the other screen-grid valve and the 1930 Binowave Coils and I am more than pleased with the result.

A GOOD SET

Here is the Brookman's Four as made by a Golborne reader

I can receive all the stations logged in the WIRELESS MAGAZINE with 100 to 120 volts high-tension. I am, of course, using an output transformer and a Rangham cone loud-speaker.

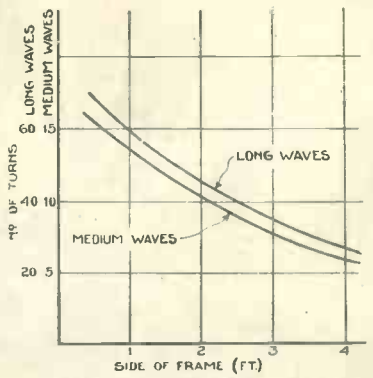
Wishing W. James and the WIRELESS MAGAZINE every success.

DESIGN DATA SHEETS

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

"W.M." Design Data — *No. 9*

FRAME AERIALS



Turns of wire for different sizes of frames

THE design of a frame aerial for ordinary broadcast purposes is principally a matter of determining the correct number of turns. Owing to the large size relative to the ordinary tuning coil, the self-capacity is distinctly higher than normal, being in the neighbourhood of 50 micro-microfarads even with a well-spaced frame. When tuning with a .0005-microfarad condenser, therefore, the inductance values should be 160 and 2,000 microhenries respectively in order to tune up to wavelengths of 550 and 2,000 metres.

Provided the stray capacities due to valve and circuit do not exceed a further 40 micro-microfarads, these values will permit the frame to tune down to 220 and 800 metres respectively.

The number of turns required increases somewhat rapidly as the diameter of the frame is reduced. As a very rough approximation the inductance, for frames up to 3 ft. square, may be taken as $0.1\ N^2D$ microhenries, D being the side of the frame *in inches* and N being the number of turns.

The curve given herewith shows the correct number of turns for frames having inductances of 160 and 2,000 microhenries respectively, in terms of the size of the frame. A square frame is assumed, but if a rectangular frame is required, the area of the frame should be worked out and the square root of this figure determined. This gives the size of an equivalent square frame.

It is preferable to space the wires slightly, the best spacing being $\frac{1}{16}$ in. for a 1-ft. frame, $\frac{1}{8}$ in. for a 2-ft. frame, and $\frac{3}{16}$ in. for a 4-ft. frame. These figures apply to the short-wave windings. The long-wave windings should, strictly speaking, be spaced in exactly the same manner, but this usually occupies too much space.

"W.M." Design Data — *No. 10*

LOW-FREQUENCY AUTO TRANSFORMERS

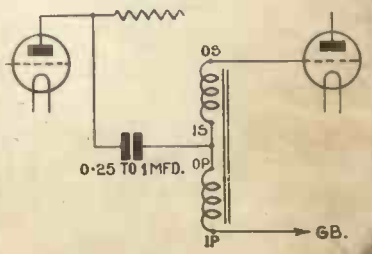
IT is sometimes possible to obtain a greater step-up from a low-frequency transformer by using it as an auto-coupled arrangement. This system is only possible where a parallel feed is adopted, as otherwise the high-tension voltage is applied to the grid of the succeeding valve.

It is not usually practicable to isolate the succeeding valve by means of a condenser and leak as is done at radio frequencies, although this may be done as an alternative to the parallel-feed system if desired. The more usual parallel-feed arrangement, however, possesses the advantage of preventing the anode current of the valve flowing through the primary winding of the transformer, so that additional benefit is obtained on this count.

A suitable auto-coupled arrangement is shown in the diagram herewith. It will be observed that the primary is connected to the bottom end of the secondary winding in such a manner as to form one continuous winding.

The total voltage developed across the grid circuit is thus n+1 times that across the primary (n being the step-up ratio), but n+1 times as great, since the voltage on the primary winding is now added to that on the secondary as far as the grid circuit is concerned. Hence with a 3 : 1 transformer we can obtain an effective step-up of 4 : 1, and so on.

The connections to be adopted can be seen from the diagram attached. OP is joined to IS, and the lead from the parallel feed system is taken to these two. IP goes to grid bias, while OS goes to grid in the ordinary way.



Simple auto-transformer arrangement

The connection assumes that the windings are in the same direction from IP to OS, but this is not always the case, the connections given cannot be considered as invariable. They are correct, however, for the majority of cases.

Get the best from your Set by putting the best into it

PARMEKO APPARATUS is made for the man who knows that it is the attention to every detail that makes all the difference between good and poor reception. We have tried to make it "the best—regardless." All PARMEKO transformers, chokes, eliminators, etc., are designed in our works and made from the finest materials by skilled British workmen. Before passing from our works, every piece of apparatus has to pass the most stringent tests. Ask for PARMEKO and get the best.

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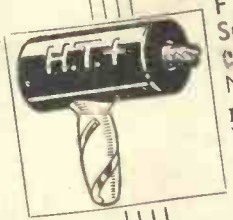

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Perfect condition—exactly as supplied to the "B.B.C.," "Radio-Press" and famous "Radio Engineers," quite new, any model sent ON APPROVAL—free! You may return at OUR expense if you wish to part with it.
A remarkable offer! but we are confident you will be delighted. (Only a few models available).
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(Over 3,000 clientele—Oldest established)

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AMATEUR WIRELESS
58-61 Fetter Lane, London, E.C.

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Screens for all Circuits.

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THE SIMPLEST WAY TO SCREEN YOUR VALVES

The most effective form of screen for high-efficiency Screen-Grid and Detector Valves. Simplifies and cheapens the construction of new receivers—as easy to fit as a valve! Fitted in a moment to existing receivers with marked gain in stability.

The valve lies close to the screen, and its earthed filament or heater pin passes through a lug in the screen base, earthing the screen.

SAY SIX-SIXTY

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

Speedy replies result from mentioning "Wireless Magazine"

DESIGN DATA SHEETS—Cont.

"W.M." Design Data — *No. 11*

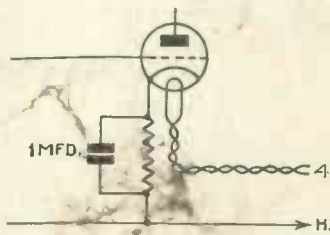
SELF BIAS, CALCULATION OF

SELF bias is almost universally adopted with mains sets to-day owing to the convenience of this arrangement. A typical circuit is shown here with bias as applied to a valve with an independently-heated cathode. The cathode is not connected direct to H.T.– but a resistance is inserted between the two points.

The anode current of the particular valve flowing through this resistance develops a voltage across it which voltage is utilised to provide grid bias on that particular valve.

The method has the advantage that each valve receives its own grid bias independently of the remainder of the circuit, and there is no coupling between the circuits from this source.

The application of the system is not limited to valves with independently-heated cathodes, but may be used with directly-heated valves such as are often employed in the output stage. In such a case the centre point of the heating winding supplying the particular valve is connected to H.T.— through the appropriate resistance.



Circuit for automatic grid bias

It is only desirable that the steady voltage shall produce any voltage across this resistance. If the audio-frequency component of the anode current produces any appreciable voltage there is a liability to set up a reaction effect which will distort the signal. To avoid this a condenser is connected across the resistance. For most practical purposes a 1-microfarad condenser is satisfactory.

The value of the bias resistance is chosen in the following manner. Decide the actual voltage on the anode of the valve and the grid bias at which it is required to work. From the makers' characteristic determine the anode current under these conditions.

Divide the grid voltage by the anode current in milliamperes. This will give the bias resistance in thousands of ohms. If, for example, we require 6 volts bias with a valve taking 4 milliamperes, we shall need a resistance of 1,500 ohms.

"W.M." Design Data — *No. 12*

WIRE DATA

THE figures given in this table will be of use in deciding the size of wire to be employed under different conditions. The table gives first of all the overall diameter of the wire, bare and with enamel and double-silk covering. These are the coverings most usually employed in radio practice.

The next column gives the number of turns per inch of the wire, with the two forms of covering (bare wire is of no interest in this connection). This is useful in coil calculations, but the figures must be taken as approximate, since there are minor variations in the sizes of wire obtained from different manufacturers or even from the same manufacturer.

The figures are, therefore, accurate to about 5 per cent. only.

The final column gives the carrying capacity of the wire in amperes. The usual rating is 1,000 amperes per square inch, but this is very conservative, and the wire will safely carry much more than this. In determining the current-carrying capacity account has to be taken of the surface of the wire and the ratio of surface to area increases as the wire gets smaller, so that the wire is able to radiate heat better, and consequently carry more current.

This has been taken into account in the figures below, the approximate current density lying between 3,000 and 4,000 amperes.

S.W.G.	Diameter			Turns per inch		Current-carrying Capacity
	Bare	Enam.	D.S.C.	Enam.	D.S.C.	
22	.028	.030	.031	33	32	2.5
24	.022	.0236	.025	42	39	1.5
26	.018	.0194	.0205	50	47	1.0
28	.0148	.0160	.017	61	56	0.68
30	.0124	.0134	.0140	72	64	0.48
32	.0108	.0117	.0123	83	75	0.37
34	.0092	.0100	.0107	98	88	0.26
36	.0076	.0083	.0131	[illegible]	101	0.18
38	.0060	.0066	.0085	[illegible]	120	0.11
[illegible]	.0048	.0053	.0073	189	137	0.072

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Regional Crystal Set WM176

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A.C. Two (D.Trans) WM175
Programme Two (D, Trans) WM177
Radio-Record Two (SG, D) WM187
Gleaner Two (D, Trans) WM201
Music Monitor (D, Trans) WM208
Merlin Two (AC Set) (D. Trans) .. WM213
Five-Point Two (D. Trans) WM220
Brookman's A.C. Two (D, Trans) .. WM225
Aladdin Two (D, Trans) WM231
Ever-tuned Regional Two (D, Trans) WM241

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Fanfare Three (D, 2 Trans) WM187
Brookman's Three (SG, D, Trans) .. WM161
Community Three (D, RC, Trans) .. WM164
Brookman's Push-pull Three (HF, D, Trans), 1s. 6d. WM170
Celerity Three (SG, D, Trans) .. WM173
All-nations Three (D2, Trans) WM178
Inceptordyne (SG, D, Pen.) WM179
Brookman's A.C. 3 (SG, D, Trans) 1/6 WM184
Music Marshal (D, 2 Trans) .. WM190
Gramo-Radio D.C.Three (SG, D, Trans) WM196
Concert Three (D, 2 Trans) WM199
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-wave (D, 2 Trans) WM223
Baffle-board Three (D, RC, Trans) .. WM226
Plug-in Coil Three (D, 2 Trans) .. WM232
Regional Three (SG, D, Trans) WM236
Gramo-Radio A.C.3 (SG, D, Trans) .. WM237
★Band-pass Inceptordyne (SG, D, Pen) WM244

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 to be found on page 664) 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.

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Lodestone Four (HF, D, RC, Trans) .. WM193
Searcher's Four (SG, D, RC, Trans) .. WM194
Regional Band Pass Four (SG, D, RC, Trans) WM211
Five-Point Four (SG, D, RC, Trans) WM216
Regional A.C. Four (SG, D, RC, Trans) WM222
Supertone Four (SG, D, Push-pull) . WM227
Brookman's Three-Plus-One (SG, D, RC, Trans) WM233

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Overseas Five (3SG, D, Trans) WM191
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Hyperdyne S.W. Adaptor WM228 1/-
Big H.T Unit for A.C. Mains .. WM230 1/-
Loud-speaker Tone Control .. WM234 -/6
New Linen Diaphragm Loud-speaker WM235 1/-
Two-minute Adaptor for short waves WM240 1/-

Each blueprint shows the position of each component and every wire and makes construction a simple matter. Copies of "Wireless Magazine" containing descriptions of all these sets can be obtained at 1s. 3d., post free. Index letters "W.M." refer to "Wireless Magazine" sets.

Send, preferably, a postal order (stamps over sixpence in value unacceptable) to Wireless Magazine BLUEPRINT DEPT: 58/61 FETTER LANE, LONDON, E.C.4

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26/6

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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 :—*

D.C. "FADER" (page 604), No. WM242, 6d., post free.

A.C. SUPER 60 (Table Model), (page 574), No. WM243, 9d., post free.

BAND-PASS INCEPTORDYNE (page 622), No. WM245, 1s., post free.

INFORMATION COUPON

Valid only until July 31, 1931 (or until August 31, 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 Set Selection Bureau, WIRELESS MAGAZINE, 58–61 Fetter Lane, London, E.C.4.

NEWS from EUROPE

FROM Germany comes the news that Königswusterhausen, the long-wave station, will be operating on an increased power of 75 kilowatts within the next week or so and Langenberg is also reported to be shortly increasing its power to a corresponding amount.

At Rotsurben, near Breslau, a new transmitter is being built which will use a wavelength of 325 metres, as at present used by the Breslau station.

New Milan Station

At a recent joint meeting of the Italian Ministry of Transport and the broadcasting authorities, plans were decided upon for the erection of a new radio station at Milan having a power of 50 to 60 kilowatts. This transmitter is to be ready for service by March, 1932. Florence is to have a 20-kilowatt transmitter ready for use by the end of October of this year.

The power of the present Genoa transmitter is to be increased to 10 kilowatts immediately, while the Bozen transmitter is to increase its power by October 28 next.

From Poland comes the news that a new broadcasting station is being erected at Gdingen which will have power of 12 kilowatts. Improvements are to be made, which, however, must be regarded as temporary, to Radio Maroc. The power is to be increased from 1.2 to 8 kilowatts and at the same time the height of the aerial towers will be increased to about 150 feet.

Plans are already on the way for the erection of a modern transmitter between Rabat and Casablanca, at Meknes, having a power of 15 to 20 kilowatts.

◆ ◆ ◆

Radio Paris is to discontinue all afternoon transmissions. Unlike our British broadcasting system the French authorities have to rely upon the revenue they receive from advertisers to maintain their services. During the past few months this has been insufficient to provide a full service.

Gramophone Records

Radio Paris is not the only station, even the programmes from Radio Toulouse consist primarily of gramophone records on account of lack of adequate finance.

We learn, however, that in spite of these difficulties plans are being matured to give French listeners a more satisfactory broadcasting service.

◆ ◆ ◆

Only recently have Polish and Austrian authorities given permission for the issue of transmitting licences to amateurs in their respective countries. Up to the present twenty-seven have been issued in Poland and fifteen in Austria.

◆ ◆ ◆

The lady announcers of the Italian stations are to be replaced by a male staff. Although the Italian broadcasting authorities have given no reason for the change, it is thought that the shoals of letters addressed to the lady announcers, making all kinds of offers, may have something to do with the ban.

INDEX TO ADVERTISERS

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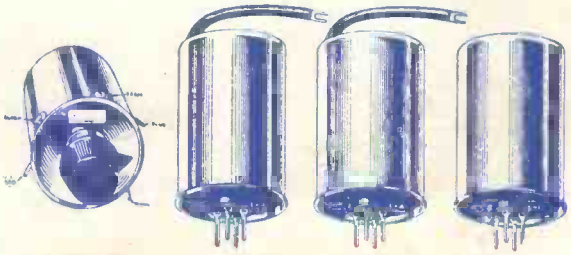
SUPER-HET PARTS

FOR THE "SUPER 60," "CENTURY SUPER," "SUPER 60" PORTABLE, and A.C. "SUPER 60"



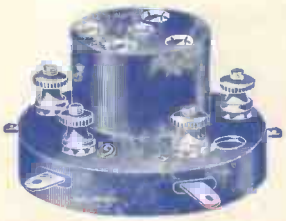
SUPER-HET COILS

The Bandfilters and Oscillator Unit which made the amazing performances of the above sets possible. The kit of coils illustrated here are as specified for super-het receivers. Three OT.1 Bandfilters and 0.2 Oscillator Unit are called for in the portable model, the price in all cases being, per kit of four units, **50/-**

WEARITE COMBINED COIL and VALVE HOLDER CHASSIS

In order to simplify wiring and construction, a special WEARITE Chassis has been evolved or the "Super 60" and "Century Super."
The Chassis replaces all the coil and valve holders with the exception of the oscillator holder. Fifty per cent. of the wiring is already done! Complete with grid-leak clips, the Chassis sells at the competitive price of **7/-**

For those constructors who have adopted different baseboard layouts to those shown in the "Amateur Wireless" and the "Wireless Magazine" Super-hets, a special Three-coil Base on one strip is available at the price of 2/9.



WEARITE A.C. VALVE HOLDER

Suitable for use in the A.C. "Super 60," price 1/3 each. (Please specify S1. A.C. type when ordering.)
A standard solid Valve Holder of the above description, but having four sockets for battery-type valves, is available also at **1/3**

The sockets on these Valve Holders are split in four places and are, therefore, ideal for the new solid pins fitted to modern valves.

WEARITE DUAL-RANGE FRAME AERIAL

One of the most efficient Frame Aerials yet designed. 27/42 Litz. wire is employed for the medium-wave winding and 9/40 Litz. for the long-wave section. Tuning is extremely sharp and a centre tap on the windings makes the frame suitable for any type of super-het or multi-valve S.G. receiver.
Overall height ... 20⅞ inches.
Average width, ... 10½ inches.
Rotary movement, 180 degrees. Price, complete, as shown **42/-**

(Send for Illustrated four-page Folder—free on request.)

WEARITE THREE-POINT SHORTING SWITCH

A simple Switch with a host of potentialities. Originally specified for wave-changing schemes in tuned circuits, the S.23 Switch has now been commissioned for the "Super 60," "Century Super," etc. The third contact allows the H.T. lead to be broken to avoid waste of H.T. current through the 50,000-ohm potentator. Price **1/6**

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