

PERCY HARRIS RADIOGRAM GETS 60 STATIONS

Wireless Magazine

THE BEST

SHILLINGSWORTH IN RADIO

JANUARY 1933

1/4



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with the
HARRIS RADIOGRAM

NEW

YEAR
ISSUE



NEW

TUNING PRINCIPLE
EXPLAINED (PAGE 737)

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

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Remarkable Radio Ideas

AS I write—a fortnight before you read—I look forward to attending the formal opening of the Empire short-wave broadcasting station at Daventry. When these new transmitters come into operation they will put this country right at the head in short-wave broadcasting, and every reader's interest in short-wave affairs and possibilities will be immediately increased.

The station will have been opened and the service long started before this issue of "W.M." is published, but you will welcome Alan Hunter's article in which he explains the scheme on which the new service is based and gives details of wavelengths.

I am asking all my enthusiastic constructor readers to complete the form which I print on page 711. This is not a prize competition—it is simply a scheme designed to test readers' wishes in certain directions.

I want my readers to tell me—freely and without reward—whether they prefer a super-het or the so-called "straight" set; whether they like variable-mu or the ordinary screen-grid valves; whether they want one tuning knob or many; whether they prefer a single output valve or the push-pull arrangement; and, finally, I should like to have some indication of the amount of money they individually are prepared to pay for their sets.

I am particularly happy this month in my chief set—the Harris Ethergram, in the design and construction of which Percy Harris has done extremely well. In his laboratory he picked up no fewer than sixty stations—that is quite good going for a "three"—and his log was subsequently confirmed independently by a member of the "Wireless Magazine" staff. I am presenting this set as a complete battery-operated table radiogram, and am quite sure that it is what thousands of people want for the new year.

You will note the special style wiring diagram reproduced at half scale and the very great care Percy Harris

has taken to make the description of the set intelligible to everybody, whether beginner or enthusiast. I am making an innovation with this set. With every full-size blueprint (obtainable at half price by readers using the coupon printed on page 792) I am sending, free, a scale, marked with the names of stations, for sticking to the condenser scale.

The ensuing year will unfold a number of remarkable ideas in radio. I am in touch with two or three of the more outstanding at the moment. One of them is the iron-cored tuning coil—the Ferrocort—invented by Hans Vogt and explained in this issue by Alfred Schneider, a technician in close touch with the inventor. Technical circles are taking a deep interest in this new coil, and readers may rely upon our keeping them well in touch with the progress of the coil in this country.

You will remember that in October we published details of the Calibrator, a four-valve battery set which has become very popular as the months have passed. In this present issue we are able to present its companion, the A.C. model, which contains only three radio valves (the reduction is made possible by the greater efficiency of mains valves), although there is, as a matter of fact, a fourth valve used only as a mains rectifier. This set, like its predecessor, has a dial calibrated directly in wavelengths.

Are you listening to America nowadays—or ought we to say nowanights? An article in this issue will help you; it is by J. Godchaux Abrahams and explains what American stations can be heard, their wavelengths, and the best times to listen to them. You will bear in mind that it is quite wrong to suppose that the American stations can only be heard on the short waves.

For the rest of the bill of fare this month, just turn over the pages and see for yourselves. I think you will find it to be a good issue.

A very happy New Year to you all!

B. E. J.

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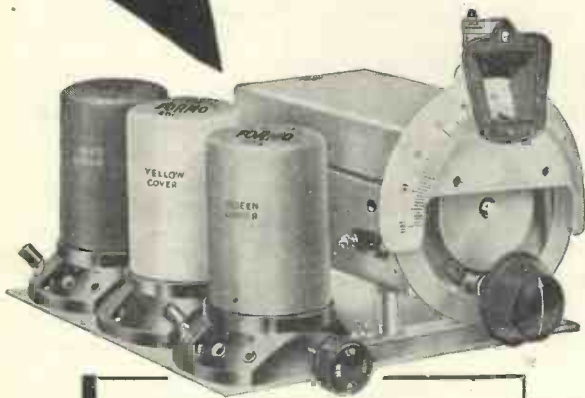
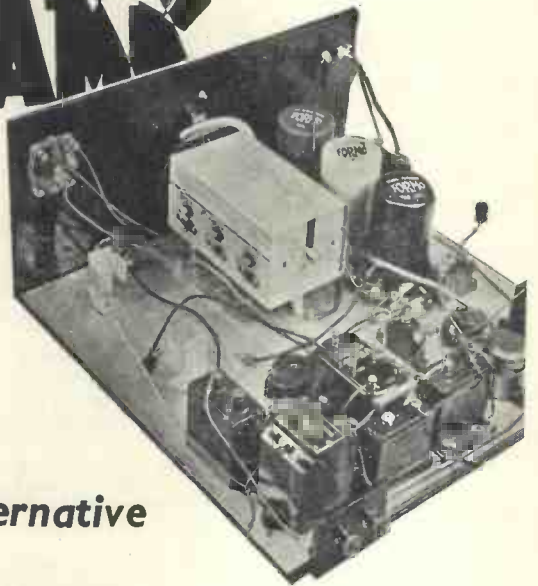
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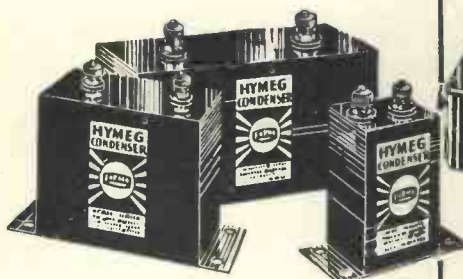
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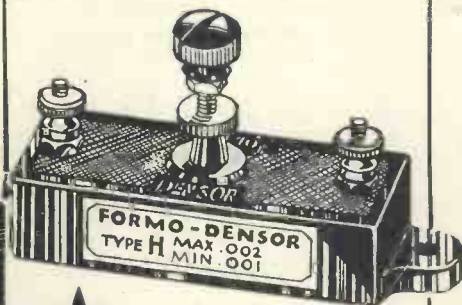


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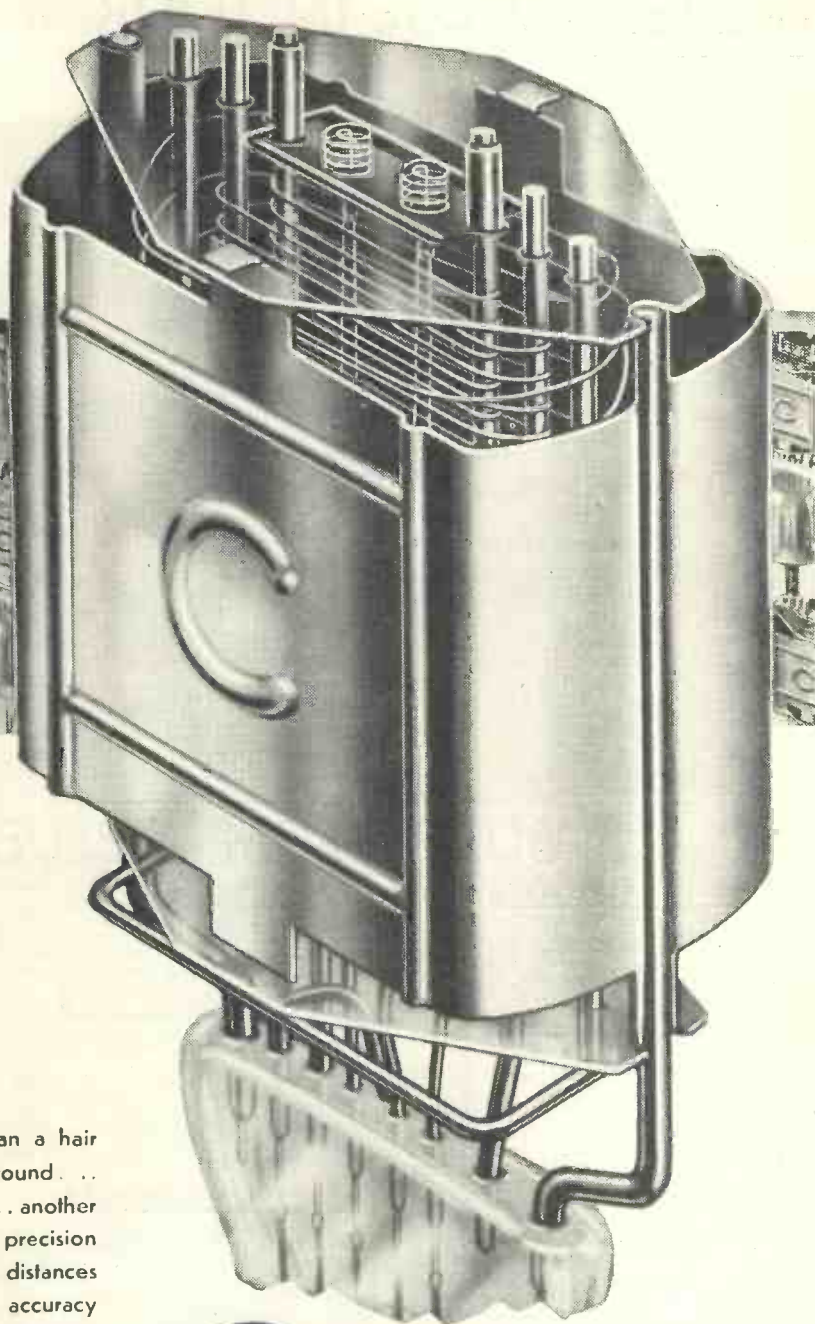
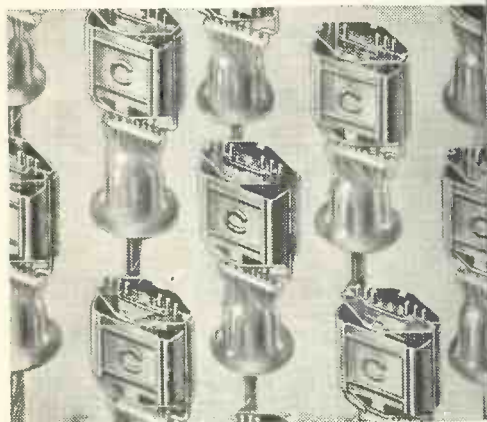
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W.M. Jan. 33.

VALVES TO USE IN YOUR SET

Characteristics of All the Most Important British Types

Make	Type	Impedance	Amplification Factor	Mutual Conductance	Anode Current at 120 volts	Make	Type	Impedance	Amplification Factor	Mutual Conductance	Anode Current at 120 volts	Make	Type	Impedance	Amplification Factor	Mutual Conductance	Anode Current at 120 volts
2-volt Three-electrode Valves						2-volt Variable-mu Valves						6-volt Three-electrode Valves					
Mazda	H210	59,000	47	8	.5	Lissen	SG2V	350,000	—	1.7	—	Mazda	H607	90,000	40	.45	1.0
Lissen	H210	50,000	35	7	1.0	Mazda	S215VM	350,000	700	2.0	—	Mazda	H610	66,000	40	.6	1.0
Cossor	210RC	50,000	40	.8	.5	Mazda	S215B	334,000	700	2.1	—	Lissen	H610	60,000	40	.66	1.0
Osram	H210	50,000	35	0.7	1.0	Cossor	220VSG	110,000	—	1.6	—	Marconi	11610	60,000	40	.66	.35
Six-Sixty	210RC	45,400	50	1.1	1.0	Osram	VS2	—	—	1.25	—	Osram	H610	60,000	40	.66	.35
Lissen	H2	45,000	50	1.1	2.0	Marconi	VS2	—	—	1.25	—	Six-Sixty	6075RC	58,000	42	.7	.5
Mazda	H2	45,000	50	1.1	1.8	Six-Sixty	215VSG	—	—	—	—	Cossor	610RC	50,000	40	.8	.75
Mullard	PM1A	41,600	50	1.2	.75	2-volt Pentode Valves						Mullard	PM5B	49,000	40	.85	.5
Marconi	H2	35,000	35	1.0	1.0	Lissen	PT225	71,000	100	1.4	7.0	Marconi	HL610	30,000	30	1.0	1.0
Osram	H2	35,000	35	1.0	1.0	Six-Sixty	PT225	64,000	80	1.25	10.0	Osram	HL610	30,000	30	1.0	1.0
Six-Sixty	210HF	25,000	19	.75	1.5	Marconi	PT240	55,000	90	1.65	9.0	Lissen	HLD610	21,000	25	1.2	2.5
Osram	HL210	23,000	20	.87	1.5	Lissen	PT240	28,000	64	2.3	12.5	Cossor	610HF	20,000	20	1.0	1.75
Marconi	HL210	23,000	20	.87	1.5	Cossor	220PT	—	—	—	Mazda	HL610	20,000	22	1.1	1.8	
Mullard	PM1HF	22,500	18	.8	1.0	Cossor	220HPT	—	—	—	Marconi	PM5D	20,000	26	1.3	1.0	
Cossor	210HL	22,000	24	1.1	1.75	Marconi	PT2	—	—	—	Six-Sixty	607HF	15,200	17	1.1	2.0	
Lissen	H2	22,000	35	1.8	3.0	Osram	220APen.	—	—	—	Mullard	PM5X	14,700	17.5	1.2	1.6	
Mazda	HL2	21,000	32	1.5	3.6	Mazda	Pen.220	—	—	—	Six-Sixty	610D	9,250	18.5	2.0	2.0	
Lissen	HL210	20,000	20	1.0	2.2	Mullard	PM22A	—	—	—	Mullard	PM6D	9,000	18	2.0	2.0	
Mullard	PM1HL	20,000	28	1.4	1.2	Mullard	PM22A	—	—	—	Lissen	L610	8,000	16	2.0	2.0	
Six-Sixty	210HL	20,000	26	1.3	1.0	Mullard	PM22	—	—	—	Cossor	610LF	7,500	15	2.0	3.4	
Mazda	HL210	18,500	26	1.4	3.0	Osram	PT2	—	—	—	Marconi	L610	7,500	15	2.0	3.0	
Marconi	HL2	18,000	27	1.5	1.0	Six-Sixty	220Pen.	—	—	—	Osram	L610	7,500	15	2.0	3.0	
Osram	HL2	18,000	27	1.5	1.0	4-volt Three-electrode Valves						Mullard	PM6	3,500	8	2.25	7.0
Cossor	210HF	15,800	24	1.5	2.2	Marconi	H410	60,000	40	.66	.5	Cossor	610P	3,500	8	2.28	8.0
Cossor	210D	13,000	15	1.15	2.5	Osram	H410	60,000	40	.66	.35	Marconi	P610	3,500	8	2.28	6.0
Six-Sixty	210LF	12,500	10.6	.85	2.5	Lissen	H410	60,000	40	.66	1.0	Osram	P610	3,500	8	2.28	6.0
Mullard	PM1LF	12,000	11	.9	2.6	Osram	H410	60,000	40	.66	1.0	Six-Sixty	610P	3,400	7.8	2.3	8.0
Osram	L210	12,000	11	.92	2.0	Lissen	H410	60,000	40	.66	1.0	Lissen	P610	3,200	8	2.5	6.0
Marconi	L210	12,000	11	.92	2.0	Six-Sixty	4075RC	58,000	37	.64	.55	Cossor	625P	2,500	7	2.8	13.0
Mullard	PM2DX	12,000	18	1.5	2.0	Mullard	PM3A	55,000	38	.66	.3	Lissen	P625	2,500	7.5	3.0	8.0
Six-Sixty	210D	10,000	18	1.6	2.0	Cossor	410RC	50,000	40	.8	.6	Marconi	P625	2,400	6	2.5	11.0
Cossor	210LF	10,000	14	1.4	3.0	Lissen	HLD410	21,000	25	1.2	2.5	Osram	P625	2,400	6	2.5	11.0
Lissen	L2	10,000	20	2.0	3.0	Marconi	HL410	20,800	25	1.2	1.25	Cossor	610XP	2,000	5	2.5	15.0
Mazda	L2	10,000	19	1.9	3.0	Osram	HL410	20,800	25	1.2	1.25	Six-Sixty	PM25P	1,850	6	3.25	8.0
Marconi	P215	5,000	7	1.4	6.0	Cossor	410HF	20,000	22	1.1	1.0	Marconi	P625A	1,600	3.7	2.3	20.0
Osram	P215	5,000	7	1.4	6.0	Mullard	PM3	13,000	14	1.05	2.0	Osram	P625A	1,600	3.7	2.3	16.0
Six-Sixty	220P	4,800	7.2	1.5	5.0	Six-Sixty	4075HF	12,500	13.5	1.1	3.0	Lissen	P625A	1,500	4.5	3.0	12.0
Mullard	PM2	4,400	7.5	1.7	5.0	Cossor	410LF	10,000	17	1.7	2.5	Six-Sixty	625SPA	1,500	3.9	2.6	20.0
Lissen	P220	4,000	7	1.75	5.0	Lissen	L410	8,500	15	1.8	3.5	Mullard	PM256A	1,400	3.6	2.6	20.0
Cossor	220P	4,000	9	2.25	6.0	Marconi	L410	8,500	15	1.77	3.0	Mazda	P650	1,300	3.5	2.7	30.0
Cossor	215P	4,000	9	2.25	5.0	Osram	L410	8,500	15	1.77	3.0	6-volt Screen-grid Valves					
Cossor	220Pa	4,000	16	4.0	5.5	Mullard	PM4DX	7,500	15	2.0	2.0	Six-Sixty	SS6075SG	210,000	190	.9	—
Marconi	LP2	3,900	15	3.85	6.0	Six-Sixty	410D	7,250	14.5	2.0	4.0	Cossor	610SG	200,000	200	1.0	—
Osram	LP2	3,900	15	3.85	6.0	Marconi	P410	5,000	7.5	1.5	6.0	Mullard	PM16	200,000	200	1.0	—
Mazda	P220	3,700	12.5	3.4	11.0	Osram	P410	5,000	7.5	1.5	6.0	Osram	SM610	200,000	210	1.05	4.0
Six-Sixty	220PA	3,700	13	3.5	6.0	Six-Sixty	410P	4,100	7.8	1.9	7.5	Marconi	SM610	200,000	210	1.05	4.0
Mullard	PM2A	3,600	12.5	3.5	6.5	Cossor	410P	4,000	8	2.0	8.0	6-volt Pentode Valves					
Lissen	LP2	3,500	12.0	3.5	9.0	Mullard	PM4	4,000	8	2.0	7.5	Marconi	PT625	43,000	80	1.85	10.0
Marconi	P240	2,500	4	1.6	12.0	Lissen	P410	4,000	8	2.0	7.0	Osram	PT625	43,000	80	1.85	10.0
Marconi	P2	2,150	7.5	3.5	12.0	Marconi	P425	2,300	4.5	1.95	14.0	Six-Sixty	SS617PP	28,500	54	1.9	15.0
Osram	P2	2,150	7.5	3.5	10.0	Mullard	PM254	2,150	6.5	3.0	9.0	Lissen	PT625	24,000	60	2.5	14.0
Six-Sixty	220SP	2,060	7	3.4	13.5	Six-Sixty	420SP	2,150	6.5	3.0	10.0	Cossor	615PT	—	—	2.0	17.0
Mullard	PM202	2,000	7	3.5	14.0	Marconi	P415	2,080	5.0	2.4	14.0	Mullard	PM26	—	—	2.0	15.0
Mazda	P240	1,900	7	3.7	18.0	Osram	P415	2,080	5	2.4	14.0	A.C. Three-electrode Valves					
Mullard	PM252	1,900	7	3.7	14.0	Cossor	425XP	2,000	7	3.5	13.0	Six-Sixty	4DX.AC	36,000	7.5	2.1	3.0
Six-Sixty	240SP	1,900	6.6	3.5	14.0	Mazda	P425	1,950	3.5	1.8	26.0	Mullard	904V	34,000	75	2.2	1.8
Mazda	P220A	1,850	6.5	3.5	13.0	Lissen	P425	1,500	4.5	3.0	28.0	Cossor	41MRC	19,500	50	2.6	2.7
Lissen	P220A	1,700	6	3.5	12.0	Cossor	415XP	1,500	4.5	3.0	15.0	Cossor	41MH	18,000	72	4.0	2.0
Lissen	PX240	1,500	4.5	3.0	12.0	Osram	PX25	1,265	9.5	7.5	—	Cossor	41MHF	15,400	41	2.8	3.0
Cossor	230XP	1,500	4.5	3.0	15.0	Marconi	4XP	1,200	4.8	4.0	18.0	Six-Sixty	4GP.AC	12,000	36	3.0	4.0
Lissen	P240A	1,000	5.0	5.0	20.0	Osram	PX4	830	5	6.0	35.0	Mullard	354V	12,000	36	3.0	4.0
2-volt Double-grid Valves						4-volt Screen-grid Valves						Six-Sixty	AC/HL	11,700	35	3.0	6.0
Marconi	DG2	3,750	4.5	1.2	—	Cossor	410SG	81,000	800	1.0	—	Lissen	AC/HL	11,700	35	3.0	6.0
Osram	DG2	3,750	4.5	1.2	—	Mullard	PM14	230,000	200	.87	—	Mazda	AC/HL	11,700	35	3.0	5.0
Cossor	210DG	3,400	2.7	.8	—	Six-Sixty	4075SG	220,000	190	.87	3.0	Cossor	41MH	11,500	52	4.5	4.0
Mullard	PM1DG	—	—	.8	—	Lissen	SG410	200,000	180	.9	—	Mazda	AC2HL	11,500	75	6.5	4.5
Six-Sixty	210DG	—	—	.8	—	Marconi	S410	200,000	180	.9	3.5	Marconi	MH4	11,100	40	3.6	4.75
2-volt Screen-grid Valves						4-volt Pentode Valves						Osram	MH4	11,100	40	3.6	4.75
Lissen	SG215	900,000	1,000	1.1	—	Marconi	PT425	50,000	100	2.0	8.0	Osram	MH4	11,100	40	3.6	4.75
Mazda	S215A	727,000	800	1.1	—	Osram	PT425	50,000	100	2.0	8.0	Marconi	MH4	11,100	40	3.6	4.75
Mazda	215SG	455,000	500	1.1	—	Marconi	PT4	50,000	110	2.2	—	Osram	MH4	11,100	40	3.6	4.75
Six-Sixty	218SG	357,000	500	1.4	—	Osram	PT4	42,000	120	2.85	—	Micromesh	HLA1	10,600	80	8.08	6.0
Mullard	PM12A	330,000															



ACCURACY

... meticulous ...
microscopic

MACHINES whirr ... filaments finer than a hair
... nimble fingers work ... grids are wound ...
anodes pressed ... a hundred operations ... another
Cossor Valve is made ... made with the precision
of a watch ... accurate ... microscopic distances
exactly spaced ... meticulous accuracy ... accuracy
that ensures that your Cossor Valve ... wherever
you buy it ... whatever its type ... is the exact
counterpart of the original laboratory-developed design.

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

Please send me, free of charge, a copy of the 40-page Cossor Valve and
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Wireless Book which contains a wealth of interesting
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♥ 1670

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

VALVES TO USE IN YOUR SET — Continued from p. 684

Make	Type	Impedance	Amp.ification Factor	Mutual Conductance	Anode Current at 200 volts	Make	Type	Impedance	Amplification Factor	Mutual Conductance	Anode Current at 200 volts	Make	Type	Impedance	Amplification Factor	Mutual Conductance	Anode Current at 200 volts
A.C. Three-electrode Valves—Continued						A.C. Variable-μ Valves						Filament Current .25 Ampere					
Six-Sixty	SS4PAC	3,170	12	3.8	11.0	Cossor	MSG/HA	209,000	780	2.0	2.1	Marconi	DH	10,800	40	3.7	6.0
Mullard	104V	3,000	12	4.0	17.0	Cossor	MSGLA	200,000	750	3.75	5.2	Osram	DH	10,800	40	3.7	6.0
Osram	ML4	2,860	12	4.2	25.0	Six-Sixty	4YSGAC	—	900	3.5	—	Marconi	DL	2,660	12	4.5	25.0
Marconi	ML4	2,860	12	4.2	25.0	A.C. Pentode Valves						Osram	DL	2,660	12	4.5	25.0
Mullard	AC104	2,850	10	3.5	1.0	Lissen	AC/SGV	300,000	—	—	—	Filament Current .5 Ampere					
Lissen	AC/P	2,800	10	3.6	20.0	Cossor	MVSG	200,000	—	2.5	7.8	Mazda	DC/HL	13,000	35	2.7	3.0
Mazda	AC/P	2,650	10	3.75	13.0	Marconi	VMS4	—	—	2.4	—	Mazda	DC/P	2,220	10	4.5	15.0
Cossor	4IMP	2,500	18.7	7.5	24.0	Mazda	AC/SGVM	—	—	3.0	6.0	D.C. Screen-grid Valves					
Mullard	AC064	2,000	6	3.0	20.0	Mazda	AC/S1VM	—	—	14.0	5.8	Filament Current .1 Ampere					
Cossor	41MXP	1,500	11.2	7.5	40.0	Mullard	VM4V	—	—	—	10.0	Mazda	DC2SG	—	1,200	2.0	4.5
Mazda	AC/P1	1,450	5.4	3.7	20.0	Osram	VMS4	—	—	2.4	—	Filament Current .25 Ampere					
Six-Sixty	HV4/1	1,450	6.3	3.0	18.0	Mullard	VM4V	—	—	—	8.2	Osram	DS	550,000	500	1.1	2.5
Marconi	PX25	1,265	9.5	7.5	—	Osram	DS	540,000	500	1.1	2.5	Marconi	DSB	350,000	1,120	3.2	3.5
Osram	PX25	1,265	9.5	7.5	—	Marconi	DSB	350,000	1,120	3.2	3.5	Filament Current .5 Ampere					
Mullard	O54V	1,250	5	4.0	30.0	D.C. Pentode Valves						Mazda	DSCG	—	1,000	2.75	4.0
Mullard	AC044	1,150	4	3.5	30.0	Marconi	PT4	42,000	120	2.85	32.0	Marconi	VDS	—	—	2.4	—
Micromesh	PAI	1,050	12.6	12.0	35.0	Osram	PT4	42,000	1.0	2.85	32.0	Osram	VDS	—	—	2.4	—
A.C. Double-grid Valves						Marconi	MPT4	33,000	100	3.0	32.0	Filament Current .2 Ampere					
Cossor	41MDG	40,000	10	.25	—	Osram	MPT4	33,000	100	3.0	32.0	Mazda	DC/2Pen.	—	—	12.5	3.0
A.C. Screen-grid Valves						Cossor	MS.Pen.A	—	—	4.0	9.0	Filament Current .25 Ampere					
Six-Sixty	4SGAC	1,000,000	1,000	1.0	1.5	Cossor	MP.Pen.	—	—	4.0	30.0	Marconi	DPT	30,000	90	3.0	40.0
Mullard	S4V	909,000	1,000	1.1	2.5	Mazda	AC/Pen.	—	—	2.5	30.0	Osram	DPT	30,000	90	3.0	40.0
Mazda	AC/SG	630,000	1,700	3.0	4.0	Six-Sixty	SS4Pen.AC	—	—	3.0	—	Filament Current .5 Ampere					
Mazda	ACS2	600,000	3,000	5.0	4.0	Lissen	Pen.4V	—	—	3.0	—	Mazda	DC/2Pen.	—	—	12.5	3.0
Marconi	MS4	500,000	550	1.1	2.5	Mullard	AC/PT	—	—	2.6	28.0	Marconi	DSCG	—	1,000	2.75	4.0
Osram	MS4	500,000	550	1.1	2.5	Cossor	PT41B	—	—	3.0	30.0	Osram	VDS	—	—	2.4	—
Six-Sixty	4XSGAC	485,000	1,600	3.3	—	Mullard	PM24A	—	—	2.25	30.0	D.C. Pentode Valves					
Mullard	S4VA	—	1,000	2.0	4.5	Mullard	PM24B	—	—	2.0	20.0	Filament Current .2 Ampere					
Cossor	41MSG	400,000	1,000	2.5	3.0	Mullard	PM24C	—	—	2.1	30.0	Mazda	DC/2Pen.	—	—	12.5	3.0
Marconi	MS4B	350,000	1,120	3.2	3.5	Mullard	PM24M	—	—	3.0	30.0	Filament Current .25 Ampere					
Osram	MS4B	350,000	1,120	3.2	3.5	Mullard	PM24M	—	—	3.0	30.0	Marconi	DPT	30,000	90	3.0	40.0
Lissen	AC/SG	340,000	1,100	3.25	8.0	D.C. Three-electrode Valves						Osram	DPT	30,000	90	3.0	40.0
Six-Sixty	SS4MMAC	300,000	900	3.0	—	Filament Current .1 Ampere						Filament Current .5 Ampere					
Mullard	S4VB	257,000	750	2.5	9.5	Mazda	DC3HL	11,700	3.0	3.0	5.0	Mazda	DC/2Pen.	—	—	13.5	3.0
						Mazda	DC2P	2,650	10	3.75	15.0						

BUILD FROM A BLUEPRINT!

ONE-VALVE SETS

1s. each, post free

Short-wave One-valver (6d.)	AW327
Easy-to-Build One	AW304
"B.B.C." One	AW344
Portable Short-wave One	AW354

TWO-VALVE SETS

All these 1s. each, post free

Ever-tuned Regional Two (D, Trans)	WM241
Station-finder Two (D, Trans)	WM243
Music-lover's Two (D, Trans)	WM260
New Economy Two (D, Trans)	WM265
Family Two (D, Trans)	WM278
Economy A.C. Two (D, Trans)	WM286
Screen-grid Two (SG, Trans)	WM289
Two for Seven Metres (D, Trans)	WM295
New Style Radiogram (D, Trans)	WM299

THREE-VALVE SETS

All these 1s. each, post free

New Plug-in-Coil Three (D, 2 Trans)	WM270
Transportable Three (SG, D, Trans)	WM271
Multi-Mag Three (D, 2 Trans)	WM288
Percy Harris A.C. Radiogram (D, RC, Trans)	WM294
Prosperity Three for Batteries (SG, D, Pen)	WM296
Prosperity Three for A.C. Mains (SG, D, Pen)	WM297
Prosperity Three for D.C. Mains (SG, D, Pen)	WM298
1933 Economy S.G. Three (SG, D, Trans)	WM306
★Harris Ethergram (SG, D, Trans)	WM308
★A.C. Callibrator (SG, D, Trans)	WM309

Each blueprint shows the position of all components and every wire, and makes construction a simple matter. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine" sets.

New Regional Three (D, RC, Trans)	AW349
World-ranger Short-wave Three (D, RC, Trans)	AW355
Wizard (SG, D, Trans)	AW360
Harris Build-as-you-learn Three	AW366
£2 2s. Family Three (D, 2 Trans)	AW368

FOUR-VALVE SETS

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Economy Radio Gramophone (SG, D, RC, Trans)	WM276
A.C. Quadradyne (2 SG, D, Pen)	WM279
Ideal A.C. Home Super (Super-het)	WM290
Gold Coaster (AC Short-wave)	WM292
Triple-tune Four (2SG, D, Trans)	WM293
Calibrator (SG, D, RC, Trans)	WM300
Table Quad (SG, D, RC, Trans)	WM303

FIVE-VALVE SETS

All these 1s. 6d. each, post free

Regional D.C.5 (SG, D, LF, Push-pull)	WM252
Ideal Home Super (Super-het)	WM280
Easytune 60 (Super-het)	WM284
Easytune 60 on a Frame Aerial (Super-het)	WM301
"W.M." Short-wave Super (Super-het)	WM302
Britain's Super (Super-het)	AW311
A.C. Britain's Super (Super-het)	AW322
Mains section (1/-)	AW322A
James Short-wave Super-het	AW328
Simple Super (Super-het)	AW340

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All these 1s. 6d. each, post free

Super 60 (Super-het)	WM229
A.C. Super 60 (Super-het Radiogram)	WM239
A.C. Super 60 (Super-het Table Model)	WM245
Super 60 (with Weairite Base)	WM249
Super 60 (with Lewcos Base)	WM251
1932 Super 60 (Super-het)	WM269
1932 A.C. Super 60 (Super-het)	WM272
New Century Super (Super-het) with copy of A.W. 4d. post free	AW363
A.C. Century Super (A.C. Super-het)	AW365

SEVEN-VALVE SETS

1s. 6d., post free

Super Senior (Super-het)	WM256
Seventy-seven Super (A.C. Super-het)	WM305

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Super 60 Portable (Super-het)	WM238 1/6
Home and Garden Three (D, RC, Trans)	WM246 1/-
Town and Country Four (SG, D, RC, Trans)	WM282 1/6
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General-purpose Portable (SGD, RC, Trans)	AW351 1/6

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All these 1s. each, post free

Quality Amplifier (D.C.) 1s. 6d.	WM264
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Dual-speaker Amplifier (A.C.)	WM304

MISCELLANEOUS

"W.M." Standard A.C. Unit	WM214 1/-
"W.M." Standard D.C. Unit	WM215 1/-
Super 60 A.C. Unit (for Battery Super 60)	WM248 1/-
Simple Neon Oscillator	WM251 1/-
Plug-in Adaptor	WM267 1/-
Super-het Adaptor	WM268 1/-
A Simple Mains Unit	WM283 1/-
Short-wave Director (wavemeter)	WM285 6d.
Voltage Regulator	WM287 1/-
★A.C. Mains Unit	WM310 1/-

A blueprint of any one set described in this issue can be obtained for half price up to the date indicated on the coupon (which is to be found on the last page. These blueprints are marked with an asterisk (*).

Send, preferably a postal order (stamps over sixpence in value unacceptable), to—

WIRELESS MAGAZINE

BLUEPRINT DEPT.,
58/61 FETTER LANE,
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THE 'BLOCK' PLATE-LESS ACCUMULATOR

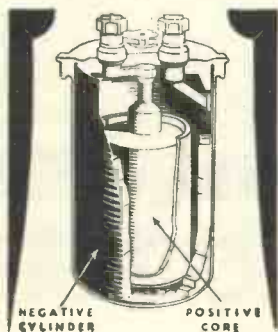


LASTS
TWICE
AS LONG
ON EACH
CHARGE

2v. 80 AMP. HRS. 11/6^D.

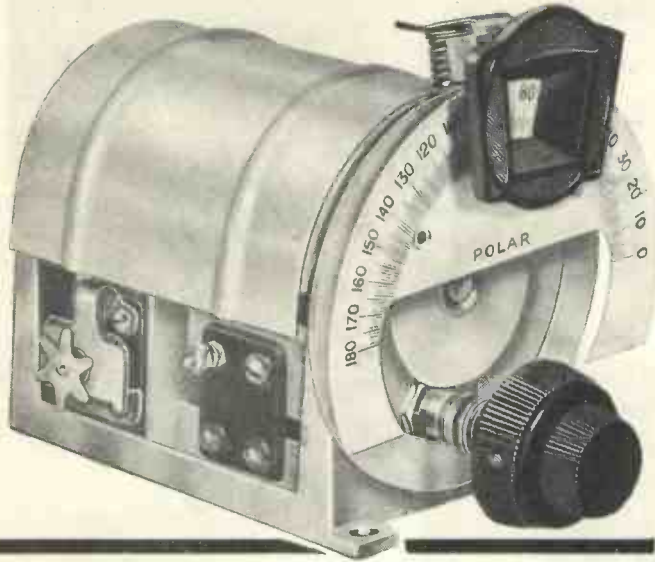
THIS is the power source of a new era—a neat, richly coloured cylinder in place of the admittedly crude, present-day accumulator. It is the independent patent of Mr. Leonard Fuller, M.I.E.E. (whose father and grandfather made world-famous accumulators from the days of Faraday on). Called the Block plate-less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

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



BLOCK BATTERIES LTD ABBEY ROAD BARKING

SELECTIVITY • SELECTIVITY • SELECTIVITY



Ask your dealer for—

POLAR CONDENSERS

No set is really up-to-date and able to meet modern conditions unless it incorporates Ganged Tuning. And no set can be of the highest efficiency unless this tuning is carried out with a Polar "Star" Ganged Condenser. Where a "UNIKNOB" is used, tuning is greatly simplified and, what is more important, there is a marked increase in selectivity.

The "Uniknob" is matched to within $\frac{1}{2}$ of 1% plus or minus 1 mmfd. and rigid die-cast construction maintains this accuracy under all conditions of use. A trimmer of 35 mmfd. in parallel with the front section is operated by a small knob situated concentrically with the tuning knob, allowing the finest adjustments to be easily made.

POLAR "UNIKNOB"

2 x .0005

PRICE INCLUDING COVER **19/6**

Polar Condensers—obtainable from all dealers. Write for catalogue "W.M." which describes the full Polar range.

WINGROVE & ROGERS LTD., 188-9, STRAND, LONDON, W.C.2. POLAR WKS, LIVERPOOL



Tests Prove It

the most suitable for the 1933 Economy S.G. 3

The designers of the Economy 3 used and specified the Pressland Coil exclusively. Their exhaustive tests proved its carefully balanced design to give greater selectivity and maximum magnification without instability. Without break through from short to long waves. A screening box is supplied with each coil and terminals are clearly marked for connection. Suitable for aerial or anode tuning. Write for Free leaflet.

Price at all radio dealers or from the manufacturers, post free.

4/6

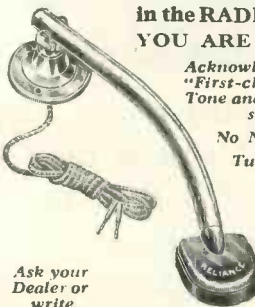
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PRESSLAND (SALES) LTD., 84, Eden Street, Kingston-on-Thames

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FIT A **LIMIT** RELIANCE PICK-UP AND CARRIER in the RADIO-GRAM YOU ARE MAKING



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Acknowledged to be "First-class" in value, Tone and Workmanship

No Needle Screw Turnover Head Arm Incorporates a Rest

15/6 each

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The Pure Gold Film of the Microfu "blows" under overload before the wire has even time to get warm, and guarantees full protection.

Absolutely Reliable. 100% British



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A Present that will be appreciated is a

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It contains 9 Panel Terminals, 2 Spade Terminals, 6 "Master" Plugs; all the component necessary to give perfect A., E., H.T., G.B., L.T., and L.S. contact to any two- or three-valve receiver.

CLIX "S.T. 400" KIT Complete Kit includes 3 Specified G.B. Wander Plugs, 9 Clix, H.T. "Master" Plugs, 11 Clix Panel Terminals. All engraved. Price **4/-**

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CLIX
CHEAPEST PERFECT CONTACT

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

DAVENSET No. 101 Choke Specified for the A.C. "Calibrator"



Illustration shows the DAVENSET Core-Type Transformer

The incorporation of the "DAVENSET" 101 L.F. Choke in the A.C. "Calibrator" is typical of the high reputation Davenset Mains Transformers and Chokes enjoy amongst experts in radio set design.

The homeset constructor will find in them thoroughly reliable and sound equipment of the highest quality and most original design which will make a material contribution to the success of his set.

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FOR YOUR SET THERE IS A CAMCO CABINET



THE CAMCO "GRESHAM"
Here is an entirely new Cabinet that incorporates utility with appearance. Ideal for converting your set into a modern radio-gram. Constructed on sound acoustical lines with room for batteries or eliminators. Includes motor board, baffleboard, shelf, and automatic stay.
Price, finished in selected walnut veneer ... **£6-0-0**

THE CAMCO "POPULAR"
An inexpensive Camco Cabinet that meets the requirements of most listeners. Specially suitable for converting sets into radio-grams. Finished in shaded walnut. Price **75/-**

See these Cabinets among others at our showroom, open 9.15 to 5.45 (Saturday 12.30), and send coupon for free copy of New Camco Cabinet Catalogue.

Post in 4d. envelope
CARRINGTON MANUFACTURING Co., Ltd
Phono: Holborn 8902. Works: S. Croydon

NAME

ADDRESS

S.W.M.



The "POPULAR"

Advertisers like to know whence the business comes—please mention "W.M."

"A definite advance..."



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

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

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

"My conclusions... this new P.M.4 speaker is a definite advance in the permanent magnet class."

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

The revolutionary "MANSFIELD" Moving-Coil Speakers



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

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

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

Whiteley Electrical Radio Co., Ltd., Dept. W.M., Radio Works, Mansfield, Notts. London Office: 109 Kingsway, London, W.C.2. Telephone: Holborn 8714. Irish Free State Distributors: Kelly & Shiel, Ltd., 47 Fleet Street, Dublin.

GUIDE TO THE WORLD'S BROADCASTERS

Specially Compiled for "Wireless Magazine" by JAY COOTE

Berlin *Kilocycles: 42,870*
(Germany)

Metres: 7

Distance from London: Approximately 580 miles.

Standard Time: Central European (Greenwich Mean Time PLUS 1 hour).

Announcer: Man.

Call: "Hier der Ultra Kurzwellensender Berlin" (phon: "Bair-lean auf Sieben meter zwei und Vierzig tauzend acht hundert und siebzig kilohertz.")

Transmissions in speech (s.) and television (t.) are made according to following time schedule: Sundays, G.M.T. 10.30-12.00 (s.). Weekdays, G.M.T. 9.00-10.00 (t.); Mondays and Thursdays, G.M.T. 22.00-23.00 (s.); Tuesdays and Fridays, G.M.T. 10.30-12.00 (s.); Wednesdays and Saturdays, G.M.T. 19.00-20.00 (s.).

W3XAL, BOUNDBROOK *Kilo-cycles: 17,780*
(New Jersey, U.S.A.)

Metres: 16.878

Power: 12 kw.

Distance from London: Approximately 3,050 miles.

Standard Time: G.M.T. LESS 5 hours.

Announcer: Man.

Interval Signal: Three notes.

Call: "W3XAL, Boundbrook, New Jersey, a short-wave station of the National Broadcasting Company of America operating on 17,780 kilocycles." The call is given regularly every fifteen minutes.

Standard Transmissions: G.M.T. 18.00-20.00 daily. Relays programmes from WJZ, Boundbrook; WEAJ, New York; WBZ, Boston, etc.

Also transmits on 49.18 metres from G.M.T. 22.00-06.00 daily.

STE. ASSISE (F.W.) *Kilo-cycles: 12,903*
(Paris, France)

Metres: 23.25

Power: 15 kw.

Distance from London: Approximately 214 miles.

Standard Time: Greenwich Mean Time.

Announcers: Man and woman.

Opening Signal: Morse F (. . —) followed by three notes (A, F, D.) Works public service telephony with Rabat (Morocco), Buenos Aires (Argentine Republic), etc. Also acts as auxiliary channel for relays of Paris programmes to Algiers or Rabat, and for these broadcasts to Paris PTT when required.

CHAPULTEPEC (XDA) *Kilo-cycles: 11,763*
(Mexico)

Metres: 25.5

Power: 20 kw.

Distance from London: Approximately 4,000 miles.

Standard Time: Greenwich Mean Time LESS 6 hours

Announcer: Man

Call: "Estacion XDA" (phon. "Aix-Day-Ah Tehar-pool-tay-peck") Broadcasts a news bulletin in the English language between G.M.T. 20.00-21.00, and again between G.M.T. 01.00-02.30.

FRANKFURT-am-MAIN *Kilocycles: 1,157*
(Germany)

Metres: 259.3

Power: 17 kw.

Distance from London: Approximately 395 miles.

Standard Time: Central European (Greenwich Mean Time PLUS 1 hour).

Announcer: Man.

Interval Signal: Metronome (200 beats per minute); if relaying Stuttgart (Mühlacker) three notes (C, D, G).

Call: "Achtung! Suedwestfunk" When relaying Stuttgart: "Hier Suedfunk."

Main Daily Programme: Similar to that of Leipzig.

Good-night Greetings: "Gute Nacht, meine Damen und Herren," followed by "Deutschlandslid" ("Deutschland ueber Alles").

Relay: Cassel, 246 metres (1,220 kilocycles), .25 kilowatt; also Treves (under construction).

LEIPZIG *Kilocycles: 769.9*
(Germany)

Metres: 389.6

Power: 120 kw.

Distance from London: Approximately 537 miles.

Standard Time: Central European (Greenwich Mean Time PLUS 1 hour).

Announcer: Man.

Language: German only.

Call: "Achtung! Mitteleutschland."

Interval Signal: Metronome (240 beats per minute); occasionally four notes (B flat, A, C, B).

Main Programme: G.M.T. 05.15, physical exercises relayed from Berlin; 05.35, relay of concert from Hamburg; then continuous broadcast throughout day; 18.30, official communications; 19.35, main evening entertainment; 21.10, news, dance music (almost nightly).

Closes down with usual German "Gute Nacht" greetings, followed by "Deutschland ueber Alles."

Relay: Dresden, 318.8 metres (941 kilocycles), .3 kilowatt.

PAREDE (CTIGL) *Kilocycles: 696*
Lisbon (Portugal)

Metres: 431

Power: 1.0 kw.

Distance from London: Approximately 970 miles.

Standard Time: Greenwich Mean Time.

Announcer: Man.

Call: "Radio Parede" (phon. "Par-ay-day"). No interval signal.

Language: Portuguese only.

Transmissions: G.M.T. 21.00-24.00 (not daily), gramophone records, news bulletins, etc. The station is operated by the Radio Club da Costa do Sol and occasionally a short studio concert is broadcast.

VAS, GLACE BAY *Kilocycles: 685*
(Nova Scotia)

Metres: 438

Distance from London: Approximately 2,800 miles.

Standard Time: Greenwich Mean Time LESS 4 hours.

Announcer: Man.

Call: "This is VAS, the Marconi Station of the Atlantic Broadcasting Company, Nova Scotia."

Transmissions: G.M.T. 23.00-03.00, 04.00-04.30, fish prices, information regarding weather, ports, etc.

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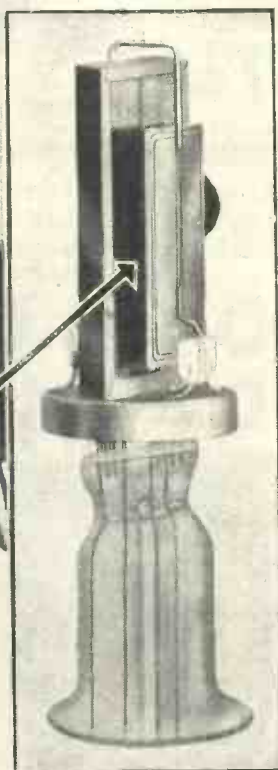
Max. Slope 1.25 m.a./v.

Price 16/6

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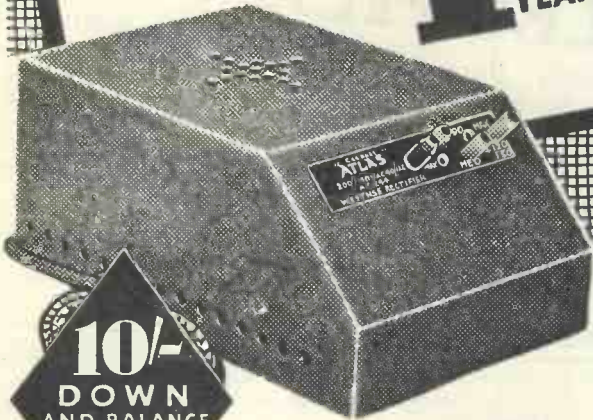
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M.C.34

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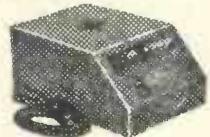
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"SEVENTY-SEVEN SUPER"
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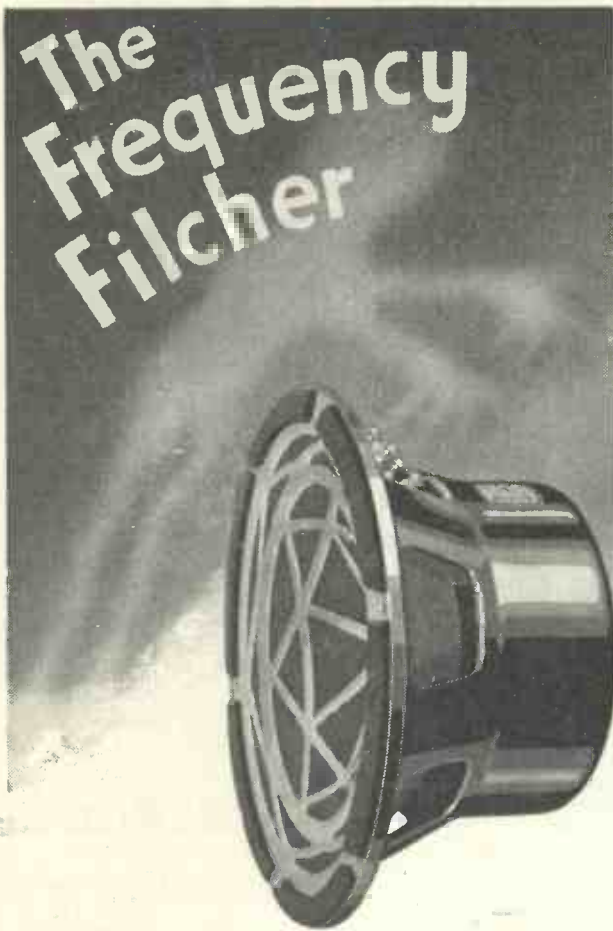
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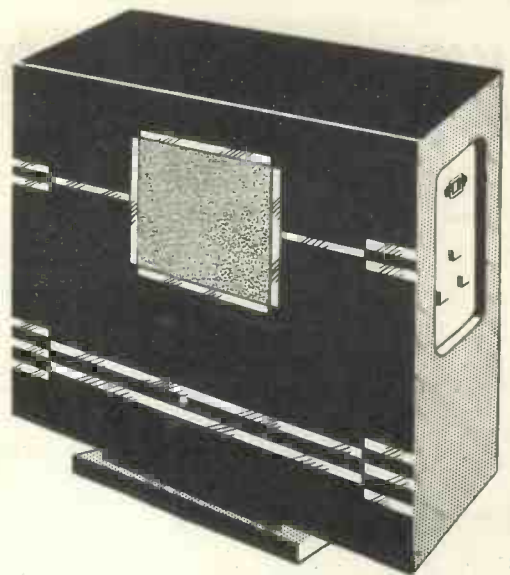
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WORLD'S BROADCAST WAVELENGTHS



Wave-length	Name of Station	Dial Readings	Country	Wave-length	Name of Station	Dial Readings	Country
7	Berlin		Germany	30.4	Lawrenceville (N.J.) WQN		United States
7.75	B.B.C. transmissions		Great Britain	30.43	Madrid EAQ		Spain
9.8	Coltano IAG		Italy	30.77	Rocky Point WEL.WNC		United States
9.96	Golfe Aranci		Sardinia	30.9	Rugby GCA		Great Britain
13.92	E. Pittsburgh, W8XK		United States	30.93	Buenos Aires LQA		Argentina
13.97	Daventry (Empire) GSH		Great Britain	31.14	Pragins HBQ		Switzerland
14.12	Rocky Point (N.J.) WQJ		United States	31.25	Lisbon CTIAA		Portugal
14.18	Buenos Aires LSL		Argentina	31.28	Philadelphia		United States
14.47	Buenos Aires LSY		Argentina		Sydney VK2ME		New South Wales
14.60	Malabar PMB		Java	Melbourne VK3ME		Victoria	
14.72	Rugby GAA		Great Britain	31.297	Daventry (Empire) GSC		Great Britain
14.96	Naven, DGX		Germany	31.31	Radio Nations HBL		Switzerland
15.14	Ocean Township (N.J.) WKN		United States	31.35	Springfield WIXAZ		United States
15.20	Ruyssedele ORA		Belgium	31.38	Poznan SRI		Poland
15.48	Prangins HBL		Switzerland	31.38	Zeezen DJA		Germany
15.5	Sydney VK2ME		Australia	31.48	Schenectady W2XAF		United States
	Ste Assise FTM		France	31.51	Skarnleback OXY		Denmark
15.576	Kootwijk PCP		Holland	31.55	Melbourne VK3ME		Victoria
	Rio de Janeiro PPU		Brazil	31.58	Rio de Janeiro PRBA		Brazil
15.61	Lawrenceville (N.J.) WKF		United States	31.545	Daventry (Empire) GSB		Great Britain
15.625	Ruyssedele (Bruges) ORG		Belgium	31.61	Rocky Point WEF		United States
15.63	Cairo SUY		Egypt	31.68	Rocky Point (N.Y.) WEJ		United States
15.86	Rocky Point (N.J.) WQE		United States	31.86	Bandoeng PLV		Java
15.93	Bandoeng PLE		Java	32.26	Rabat		Morocco
16.10	Rugby GBU		Great Britain	33.25	Rugby GBS		Great Britain
16.19	Coltano IAC		Italy	33.59	Rocky Point (N.J.)		United States
16.26	Bogota HKD		Columbia	34.66	Drummondville VE9AP		Canada
16.3	Kootwijk PCK		Holland	34.68	Long Island W2XV		United States
16.36	Lawrenceville (N.J.) WLA		United States	35.05	Deal Beach (N.Y.) WOO		United States
16.54	Rugby GBW		Great Britain	35.55	Rio de Janeiro PRDA		Argentina
16.56	Bandoeng PMC		Java	36	Norddeich		Germany
16.57	Chicago (Ill.) W9XAA		United States	36.88	Baghdad		Iraq
16.66	Rocky Point WAJ		United States	36.92	Bandoeng PLW		Java
16.72	Rocky Point (N.J.) WQB		United States	37.0	San Paolo PY2SP		Brazil
16.81	Malabar PLF		Java	38.07	Tokio J1AA		Japan
16.85	Kootwijk PCV		Holland	38.476	Radio Nations HBP		Switzerland
16.878	Boundbrook W3XAL		United States	38.56	Rio de Janeiro PPB		Brazil
16.88	Daventry (Empire) GSB		Great Britain	39.74	Kootwijk PDM		Holland
47.51	Budapest HAT		Hungary	39.98	Calgary (Alb.) CKS		Canada
18.44	Lawrenceville WLO-WLK		United States	40.3	Tscheng-Ju XGD		China
18.56	Rugby GBX		Great Britain	40.4	Radio Nations HBQ		Switzerland
18.75	New Brunswick (N.J.) WKQ		United States	40.54	Warsaw SPIAX		Poland
19.36	Kemikawa (Tokio) J1AA		Japan	41.6	New York WEN		United States
19.56	Schenectady W2XAD		United States	41.7	Las Palmas EAR58		Canary Isles
19.67	New York W2XE		United States	43.11	Singapore VSIAB		Sts. Settlements
19.68	Pontoise FYA		France	43.11	Rocky Point (N.J.) WEO		United States
19.72	Saxenburg W8XK		United States	43.3	Rocky Point WEZ		United States
19.737	Zeezen DIB		Germany	43.75	Paris (Vitus) F8LH		France
19.815	Daventry (Empire) GSF		Great Britain	43.86	Stuhlweissenburg		Hungary
19.84	Rome (Vatican) HVJ		Italy	44.51	Rocky Point (N.Y.) WEJ		United States
19.9	Heredia T14NRH		Costa Rica	45	Constantine FM8KR		Tunis
19.95	Moscow		U.S.S.R.	45.11	Coltano IAC		Italy
20.0	Drummondville CGA		Canada	45.38	Moscow REN		U.S.S.R.
20.23	Rocky Point (N.J.) WKU		United States	45.6	Bucharest		Roumania
20.49	Deal (N.J.) WND		United States	46.67	Moscow		U.S.S.R.
20.5	Chapultepec XDA		Mexico	46.69	London (Ont.) VE9BY		Canada
20.56	Lawrenceville WMN		United States	46.73	Boundbrook W3XL		United States
21.44	Rugby GBA		Great Britain	48	Minsk RW62		U.S.S.R.
21.53	Rocky Point (N.J.) WIK		United States	48.2	Casablanca CN8MC		Morocco
21.83	Drummondville CGA		Canada	48.35	Rome 2RO		Italy
21.92	Stuhlweissenburg HAT		Hungary	48.9	Bogota HKC		Colombia
22.26	Rocky Point (N.Y.) WAJ		United States	48.86	Winnipeg VE9CL		Canada
22.35	New York WHR		United States	49.0	Saxenburg (Pa.) W8XK		United States
22.42	Nauen DGI		Germany	49.10	Bombay VUB		Br. India
22.58	Drummondville CGA		Canada	49.18	Calcutta VUC		Br. India
23.28	Radio Maroc (Rabat)		Morocco	49.2	Boundbrook W3XAL		United States
23.45	Coltano IAC		Italy	49.22	Johannesburg ZTJ		Sth Africa
23.7	Drummondville VE9AP		Canada	49.34	Bowmanville VE9GW		Canada
23.858	Rabat		Morocco	49.4	Chicago W9XAA		United States
24.9	Kootwijk PDV		Holland	49.43	Vienna UOR2		Austria
25.20	Pontoise FYA		France	49.5	Vancouver VE9CS		British Columbia
25.27	East Pittsburgh (Pa) W8XK		United States	49.5	Nairobi VQ7LO		Kenya Colony
25.284	Daventry (Empire) GSE		Great Britain	49.586	Philadelphia W3XAU		United States
25.34	Chicago (Ill.) W9XAA		United States	49.59	Havana CMCI		Cuba
25.4	Bowmanville VE9GW		Canada	49.67	Daventry (Empire) GSA		Great Britain
	Rome 2RO		Italy	49.59	Halifax VE9GX		Nova Scotia
25.5	Chapultepec XDA		Mexico	49.67	Miami Beach W4XB		United States
25.53	Chelmsford GSD		Great Britain	49.83	Chicago W9XF		United States
25.532	Daventry (Empire) GSD		Great Britain	49.96	Drummondville VE9DR		Canada
25.6	Pontoise FYA		France	50	Bucharest		Roumania
	Winnipeg VE9JR		Canada	50.1	Moscow RV59		U.S.S.R.
25.7	Rio de Janeiro PPO/PSN		Brazil	50.26	Eindhoven		Holland
26.83	Funchal CT3AQ		Madeira	51	Rome (Vatican) HVJ		Italy
27.3	Wellington ZLW		New Zealand	51.7	St. Denis		Reunion
27.55	Rugby GBP		Great Britain	51.7	Tananarive FIUI		Madagascar
28.28	Rocky Point (N.J.) WEA		United States	54.52	New York W2XBH		United States
28.5	Sydney VK2ME		New South Wales	57.03	Rocky Point WQN		United States
28.98	Buenos Aires LSX		Argentina Repub.	58	Prague OK1MPT		Czechoslovakia
29.16	Königswusterhausen DIQ		Germany	58.3	Bandoeng PMY		Java
29.84	Abul Zabal (Cairo) SUV		Egypt	60.3	Rugby GBC G6RX		Great Britain
30	Belgrade		Yugoslavia	62.5	Long Island (N.J.) W2XV		United States
				62.56	London (Ont.) VE9BY		Canada

(Continued on page 696)

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BROADCAST WAVELENGTHS

Continued from page 694

Wave-length	Name of Station	Dial Readings	Country	Wave-length	Name of Station	Dial Readings	Country
63.12	Deal Beach (N.J.) WOO		United States	365.7	Frederikstaad		Norway
67.11	Bagdad YID		Iraq	366.1	Seville		Spain
67.65	Doeberitz DFK		Germany		Helsinki		Finland
70.17	Rocky Point (N.J.) WIR		United States	368.1	Bolzano		Italy
70.2	Khabarovsk RV15		U.S.S.R.		Kharkov		U.S.S.R.
76.0	Paris 8PCR		France	369.3	Radio LL, Paris		France
79.5	Salisbury ZEA		South Africa	372	Hamburg		Germany
81.45	Utrecht		Holland	376.4	Scottish Regional		Great Britain
88.3	Rugby G6RX		Great Britain	378	Moscow Regional		U.S.S.R.
92.31	Doeberitz		Germany	380.7	Lvov		Poland
206	Antwerp		Belgium	385	Radio Toulouse		France
207	Plymouth (shortly)		Great Britain	385	Stalino		U.S.S.R.
207.3	Franchimont		Belgium	388.5	Archangel		U.S.S.R.
209.7	Magyazovar		Hungary	389.6	Leipzig		Germany
211.3	Newcastle		Great Britain	394	Bucharest		Roumania
214.2	Warsaw (No. 2)		Poland	398.9	Midland Regional		Great Britain
214.3	Aberdeen		Great Britain	403	Sottens		Switzerland
215.6	Brussels (Conference)		Belgium	408	Katowice		Poland
217	Königsberg		Germany	411	Madrid (EAJ5)		Spain
218	Salzburg		Austria		Athlone		Irish Free State
219.4	Béziers		France	413	Dublin		Irish Free State
224	Cork		Irish Free State	416	Radio Maroc		North Africa
225.2	Fécamp		France	419	Berlin		Germany
227.4	Flensburg		Germany	423.4	Madrid (Esplan)		Spain
230.3	Radio Wallonia		Belgium	424.2	Madrid EAJ7		Spain
230.6	Malmö		Sweden	430.4	Belgrade		Yugoslavia
232.2	Kiel		Germany	435.4	Stockholm		Sweden
233.4	Lodz		Poland	441.2	Rome		Italy
236	Kristiansand		Norway	447.1	Paris PTT		France
237.9	Nîmes		France		Danzig		Danzig
238.1	Bordeaux-Sud-Ouest		France	450	Odessa		U.S.S.R.
239	Nürnberg		Germany	453.2	Klagenfurt		Austria
239	Binche		Belgium		Porsgrund		Norway
240.6	Stavanger		Norway	456.6	San Sebastian		Spain
241.3	Liège Experimental		Belgium	459.4	Beromuenster		Switzerland
243.1	Belfast		Ireland	465.8	Tartu		Estonia
244.1	Basle		Switzerland		Lyons PTT		France
	Radio Schaarbeek		Belgium	472.4	Langenberg		Germany
245.9	Linz		Austria	476	Sebastopol		U.S.S.R.
	Berne		Switzerland	480	North Regional		Great Britain
247.7	Trieste		Italy	488.6	Prague		Czechoslovakia
249	Prague (No. 2)		Czechoslovakia	496.1	Trondheim		Norway
249.8	Juan-les-Pins		France	500.8	Florence		Italy
253.4	Gleiwitz		Germany	502.4	Nini Novgorod		U.S.S.R.
254.4	Barcelona EAJ15		Spain	508.5	Astrakhan		U.S.S.R.
255	Toulouse PTT		France	509	Brussels No. 1		Belgium
256.7	Hörby		Sweden	518	Vienna		Austria
259.3	Frankfurt		Germany	525.4	Riga		Latvia
261.6	London National		Great Britain	527	Palermo		Italy
263.8	Moravska Ostrava		Czechoslovakia	533	Munich		Germany
265.4	Lille		France	542	Sundsvall		Sweden
266.8	Valencia		Spain	550	Budapest		Hungary
267.9	Bremen		Germany	559.7	Kaiserslautern		Germany
269.4	Bari		Italy		Augsberg		Germany
271.3	Rennes		France	563	Wilno		Poland
271.9	Cointe-Liege		Belgium	566	Hanover		Germany
273.6	Turin		Italy	571.2	Freiburg		Germany
276.5	Heilsberg		Germany	571.2	Grenoble		France
279.3	Bratislava		Czechoslovakia	574.7	Ljubiana		Yugoslavia
281	Copenhagen		Denmark	675	Oua		U.S.S.R.
282.2	Lisbon CT1AA		Portugal	678.7	Lausanne		Switzerland
	Berlin		Germany	720	Moscow PTT		U.S.S.R.
283	Magdeburg		Germany	748	Ostersund		Sweden
	Stettin		Germany	759.5	Geneva		Switzerland
285.1	Radio Lyons		France	824.2	Sverdlovsk		U.S.S.R.
286	Montpellier		France	840	Budapest (2)		Hungary
	Bournemouth		Great Britain	882	Saratov		U.S.S.R.
288.5	Scottish National		Great Britain	900	Leningrad		U.S.S.R.
	Plymouth		Great Britain	937.5	Kharkov		U.S.S.R.
	Swansea		Great Britain	967.7	Alma Ata		U.S.S.R.
291	Viipuri		Finland	1,000	Moscow (Old Kom)		U.S.S.R.
	Tampere		Finland	1,035	Kiev		U.S.S.R.
293	Kosice		Czechoslovakia		Tiflis		U.S.S.R.
293.7	Limoges PTT		France	1,071.4	Scheveningen-Haven		Holland
296.1	Hilversum		Holland	1,083	Oslo		Norway
298.8	Tallinn		Estonia	1,107	Minsk		U.S.S.R.
301.5	North National		Great Britain	1,116	Moscow (Popoff)		U.S.S.R.
304.9	Bordeaux PTT		France	1,153.8	Kalundborg		Denmark
306.8	Zagreb		Yugoslavia	1,171.5	Taschkent		U.S.S.R.
307.1	Falun		Sweden	1,190	Luxemburg		Luxemburg
309.9	Cardiff		Great Britain		Reykjavik		Iceland
312.8	Genoa		Italy	1,200	Istanbul		Turkey
	Cracow		Poland	1,229.5	Boden		Sweden
315	Marseilles		France	1,258	Vienna (tests)		Austria
318.8	Naples		Italy	1,260	Novosibirsk		U.S.S.R.
	Sofia		Bulgaria	1,304	Moscow		U.S.S.R.
319.7	Dresden		Germany	1,348	Motala		Sweden
321.9	Göteborg		Sweden	1,380	Novosibirsk		U.S.S.R.
325	Breslau		Germany	1,411.8	Warsaw		Poland
328.2	Poste Parisien		France	1,445.7	Paris (Eiffel Tower)		France
331.4	Milan		Italy	1,481	Moscow (RV1)		U.S.S.R.
334.8	Poznan		Poland	1,538	Ankara		Turkey
338.2	Brussels (No. 2)		Belgium	1,554.4	Daventry National		Great Britain
342.1	Brno		Czechoslovakia	1,600	Irkutsk		U.S.S.R.
345.2	Strasbourg		France	1,635	Königswusterhausen		Germany
348.8	Barcelona EAJ1		Spain	1,725	Radio Paris		France
351	Leningrad		U.S.S.R.	1,796	Lahti		Finland
352.1	Graz		Austria	1,875	Huizen		Holland
355.8	London Regional		Great Britain	1,935	Kaunas		Lithuania
360.5	Möhlacker		Germany	2,625	Königswusterhausen		Germany
363.3	Algiers		North Africa	2,650	Eiffel Tower		France
365.5	Bergen		Norway	2,900	Königswusterhausen		Germany

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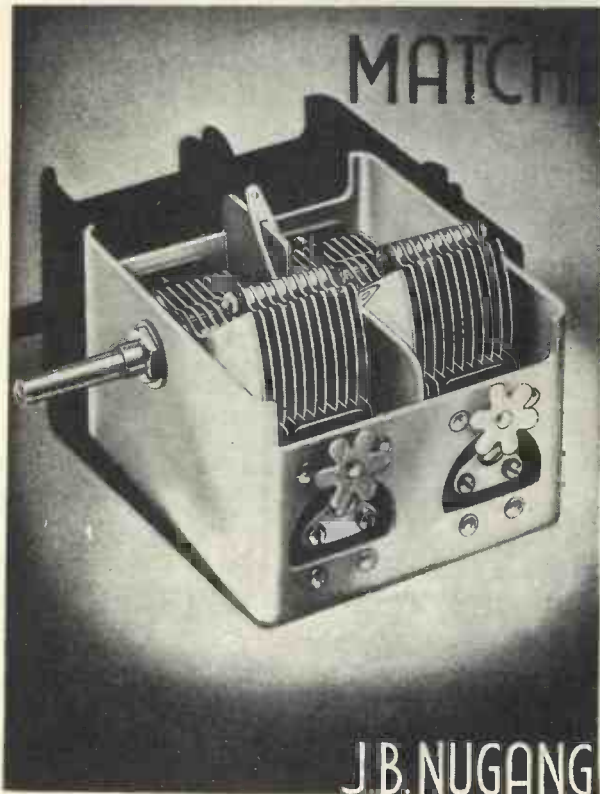
"GOLTONE" SUPER H.F. CHOKE
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PRECISION INSTRUMENTS

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You will get prompt replies by mentioning "Wireless Magazine"

MATCHED TO WITHIN 1/2 of 1%

— HALF A MICRO-MICROFARAD

A rigid chassis that is all one piece—not merely a framework bolted together. A one-piece chassis so strong that there can never be the slightest distortion in use this is the chassis of the J. B. NUGANG.

Trimmers to each stage inside the chassis are operated by external starwheels. Vanes wide spaced and of heavy gauge. Special rotor bearings ensure permanent accuracy and give remarkably free movement. Capacity .0005.

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4-gang	28/-	4-gang 31/-



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CHRISTMAS 1932-3-42



GIVE your set a lasting gift this Christmas. Convert it to an A.C. mains set and give it a rectifier that will provide an unending and steady high-tension supply; one that will enable your set to give of its best throughout its whole life

GIVE IT **A**

WESTINGHOUSE
METAL RECTIFIER

You will then enjoy better reception and reproduction now and for many years to come. Full details of Westinghouse Metal Rectifiers—the only rectifiers to remove the worry of periodical renewal—are contained in "THE ALL-METAL WAY, 1933."

THE WESTINGHOUSE BRAKE & SAXBY SIGNAL CO., LTD., 82 York Road, King's Cross, London, N.1

POST THIS COUPON TO-DAY!
WESTINGHOUSE PUBLICITY,
82 York Road, King's Cross, London, N.1

Please send me "The All-Metal Way, 1933," containing full particulars of Westinghouse Metal Rectifiers, and telling me how to convert my existing set to METAL rectification.
Name.....
Address.....
W.M.I.33

In Tune with the Trade

FETTER LANE'S Review of Catalogues

SEND TO US FOR THESE CATALOGUES!

Here we review the newest booklets and folders issued by two manufacturers. If you want copies of either or both them just cut out this coupon and send it to us. We will see that you get all the literature you desire. Just indicate the numbers (seen at the end of each paragraph) of the catalogues you want below.

My name and address are:—

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

A PLATE-LESS ACCUMULATOR

IF you haven't yet heard of the new Block idea, then be prepared for a surprise. It is, in brief, the introduction of a plate-less accumulator, much lighter, capacity for capacity, than an ordinary battery. The plates are dispensed with in

rather a novel fashion. The cylinder of the battery itself (these Block batteries are not the usual rectangular shape) is the negative electrode, and the positive electrode is the central core. It is claimed that this special Block construction gives twice the life per charge.

The Block people have many other technical advantages claimed for this novel type of battery, and I think that if you are in any way dissatisfied with your present "juice" supply you should write, through my free catalogue service, for details of the Block construction.

The price is very reasonable, the 2 volt 80-ampere hour size costing 11s. 6d. So there's no question of being called to pay a "fancy" price for what is undoubtedly a sound accumulator development. **297**

Make a note that the February "Wireless Magazine" will be published on Friday, January 20.

BURTON!

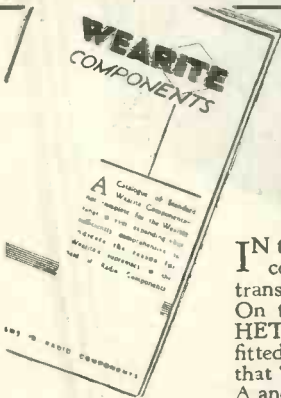
BURTON, that delightfully refreshing name, has a special radio significance, as is proved by a folder that has just arrived on my desk! The folder is one of those catalogues in miniature which give the salient points of the main components and kits in the range, and in the Burton range there are some things of outstanding interest.

If you don't believe me, get a free copy of this folder for yourself. It is useful for hanging on the wall of the radio den for handy reference. You'll find in it everything from switches to complete kits for set builders—including some kits for fine three-valvers.

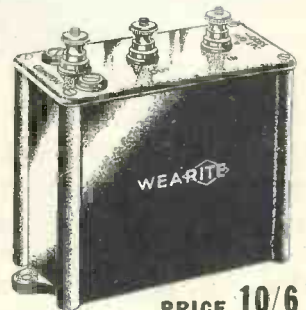
It is in the range of small parts such as valveholders, switches and variable condensers that the name of Burton has won its radio fame, and I must say that I am very impressed with the workmanship of these parts as shown by the illustrated folder.

298

FROM THE BOOK THAT SET DESIGNERS CONSULT

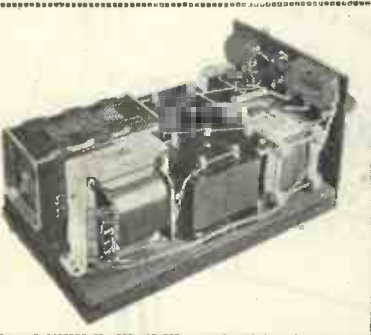


IN the new Wearite Booklet M.11 the set designer finds a veritable component "inquire within" for every possible need is met—transformers, chokes, resistances, volume controls, switches, etc. On the right is just one item from this book—the WEARITE HETERODYNE FILTER UNIT—a component which, easily fitted to any set, cuts out those disturbing heterodyne whistles and that "mush" which mar faithful reproduction. Made in two types, A and B, to cut off at 3,500 and 5,000 cycles respectively, it provides the means to interference-free reception and with the minimum loss of high notes. Price 10s. 6d. Get your copy of this book—the M.11—before you start any set—write now.



PRICE 10/6

THE WEARITE HETERODYNE FILTER UNIT



THE WEARITE H.T.8 MAINS TRANSFORMER IS SPECIFIED FOR THIS H.T. AND L.T. UNIT

The designer of this H.T. and L.T. Unit consulted the Wearite Book and found the Wearite H.T.8 Mains Transformer—the ideal for his requirements. Follow his lead—use only the H.T.8. Price 22/6.

The WEARITE H.T.8 MAINS TRANSFORMER PRICE **22/6**



A good set needs a good earth and the best is the NO TOOL type as illustrated, PRICE 3/6

WEARITE

WRIGHT & WEARE LTD, 740 High Road, Tottenham. Phone: Tottenham 3847-8-9

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GABINET DUPLEX
FOUR PORTABLE**

(Type C.)

This Set is contained in an exceptionally handsome Walnut Cabinet and mounted on a ball-bearing turntable.

A high efficiency four-valve circuit is employed, double gang tuned to indicate on the Duplex Scale. An Automatic Grid Bias dispenses with a Grid Bias Battery. The Duplex Scale is an unique McMichael feature which makes for extreme simplicity and certainty of operation. The receiver is entirely self-contained, with internal frame aerial. Complete and ready for working.

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(Including valves and royalties)



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RADIO**

A reputation such as attaches to the name McMichael is neither lightly gained nor lightly held. Only by adherence to the finest traditions of craftsmanship, the meticulous attention to details, and an unflinching regard for the virtue of quality, could McMichael's have attained their present proud position. Every McMichael Radio Instrument can be depended upon worthily to uphold the name it bears.

H.M. THE KING USES
McMICHAEL RECEIVERS

Ask at any high-class Radio Store for a demonstration of these outstanding receivers or any of our other models, and details of our special "Deferred Payments on Hire Purchase Terms" system, if desired, or call at our London Showrooms, 179 Strand, W.C.2.

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Telegrams: Radiether, Slough.

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179, STRAND, W.C.2 (Tel. Temple Bar 6988)

**THE McMICHAEL
DUPLEX FOUR MAINS
TRANSPORTABLE**

(For Alternating Current Only)

Within a handsome Walnut Cabinet of modern design, the set is entirely self-contained. The circuit employed is similar to that of the Duplex Four Battery Models, except for the "mains" adaptation. Indicating on the Duplex Scale, this circuit gives maximum range and selectivity. Contained in the receiver is a Moving-Coil Loud-speaker, the reproduction from which is quite exceptional—no less than sheer delight. Provision is made for gramophone pick-up, and 'speakers.

Price 21 Gns.

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ALL BRITISH —built at our Works at Slough, and embodying the experience of twelve years' successful Radio Manufacture.

THE

**ON - OFF
SWITCH**

for the

**SEVENTY
SEVEN
SUPER**

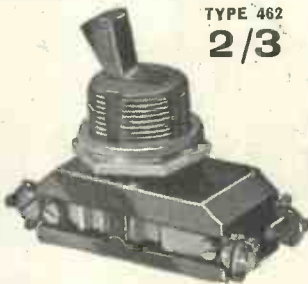
and the

"W.M. A.C. MAINS UNIT"

GEO. BECKER, LTD., Ampere Works,
Wembley, Middx. Telephone: Wembley 3737.

TYPE 462

2/3



(M.C. 7)



**SPECIFIED
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ETHERGRAM"**

"Smithcraft" cabinets are again specified in an important receiver design—sure testimony to the high standard of craftsmanship which put Smithcraft in the forefront.

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● The Resistances Specified for the
A.C. "CALIBRATOR"

ERIE
**GRID-LEAKS and
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MADE IN
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Confidently Recommended



Write for Leaflet

As half the constructor's troubles are due to unstable grid leaks and resistances—let ERIE carry the load. They are guaranteed in every respect. Safe, silent, stable, and impervious to humidity fluctuations, they will solve one of your biggest problems as they have solved the similar problems of the leading radio manufacturers.

ERIE Resistors carry an unqualified Guarantee against breakdown.

All values, one, two, three, and five watts. 50 ohms to 4 megohms. Tag identified and Colour Coded.

PRICE

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in all values

LOOK FOR **Mr. Ohms**
The sign of ERIE Resistors

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Telephone: Gerrard 7291

The Gift

that gives confidence
to the giver and
perfect reception to
the receiver.

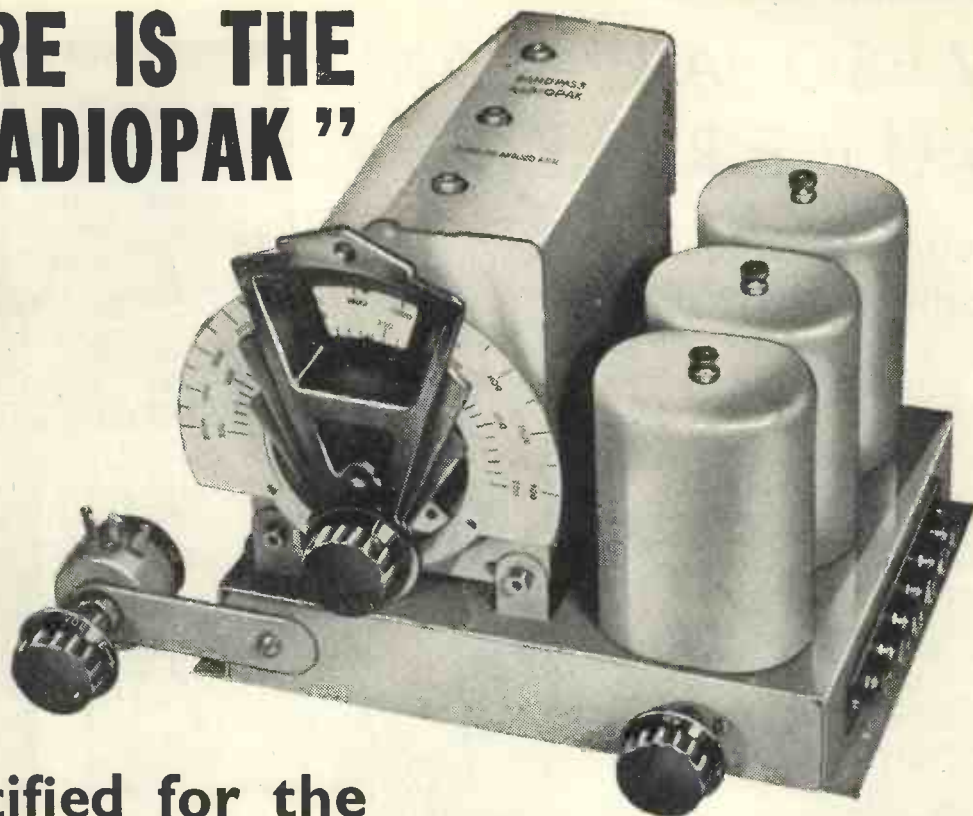
PERTRIX
TRADE MARK
DRY BATTERIES
& ACCUMULATORS



Britannia Batteries Ltd., 233
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Telephone: Temple Bar 7971
(5 lines). Works: Redditch
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Leeds and Newcastle.

Advertisers take more interest when you mention "Wireless Magazine"

HERE IS THE "RADIOPAK"



specified for the "A.C. CALIBRATOR"

THE British Radiophone Band-pass RADIOPAK bids fair to enjoy the same popularity with designers of famous modern sets that British Radiophone Ganged Condensers have enjoyed for so long. The RADIOPAK has been specially produced to bring perfect band-pass tuning within reach of all constructors.

The unit consists of the necessary coils with provision for reaction; the gang condenser with illuminated slow-motion escutcheon and disc drive calibrated in wave-lengths; a wave-

change switch; and a wire-wound volume control complete with on-off Q.M.B. power switch. The switching arrangement is the best yet devised for any radio component, and the combined volume control and switch is one of the famous Radiophone standard types needing no further recommendation. Owing to the high degree of accuracy in the matching of the coils and condensers, this unit REVOLUTIONISES modern set-construction. Write for full descriptive particulars to Department W.M.10.

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TRADE MARK

THE ONLY COMPLETE BAND-PASS TUNER

PRICES

Standard Radiopak with 10,000-ohm vol. control .. . 60/-
Radiopak, as specified for the A.C. Calibrator, type 535A/50,000, with extra knob for Reaction condenser .. 60/6
Radio-gramophone switch with knob 5/-

BRITISH RADIOPHONE 3-GANG CONDENSER TYPE 344C, WITH DISC DRIVE IS ALSO SPECIFIED FOR THE "SEVENTY-SEVEN SUPER."

BRITISH RADIOPHONE, LTD.,
ALDWYCH HOUSE, ALDWYCH,
LONDON, W.C.2

Telephone - - Holborn 6744

When replying to advertisements, please mention "Wireless Magazine"

NEW "SQUARE PEAK" SUPERHET

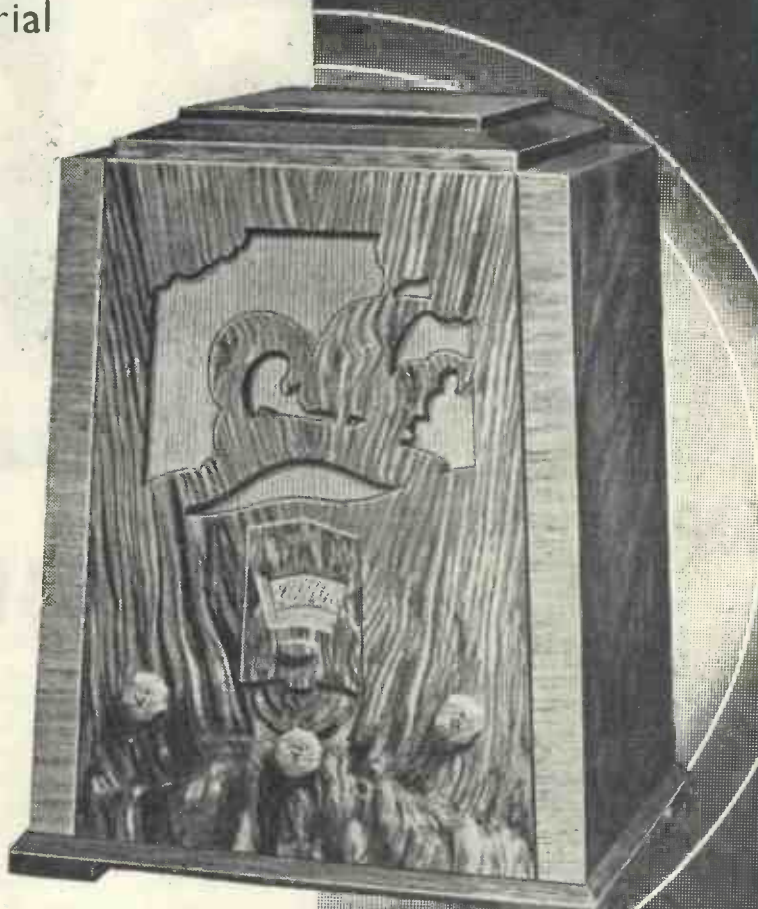
You may use it in *any* room
without external aerial

SELECTIVITY . . . day by day the need grows greater. Secure it in a Varley Superhet.

Knife-edge selectivity, fine quality and single knob control. Station after station clearly heard on the built-in moving-coil speakers. Radio in every room! For the local station just connect the set to any lighting socket and plug in the handy little "portable" aerial supplied.

Write for FREE art booklet and address of nearest dealer. He will gladly demonstrate Varley.

● For use with external aerial or with handy portable aerial supplied. Five valves and rectifier. VARIABLE-MU H.F. AND INTERMEDIATE FREQUENCY STAGES. Six tuned circuits with SINGLE CONTROL TUNING (remaining knobs on front are Volume and Mains Switch). BAND-PASS INTERMEDIATE FREQUENCY COUPLING, giving great selectivity. ILLUMINATED SCALES marked with STATION NAMES as well as wavelengths. SEPARATE SCALES for the two wavebands. Operation of wave-change switch automatically discloses the correct scale (long or medium). TONE-BALANCED L.F. Amplifier. Energised MOVING-COIL SPEAKER. Provision for using an external speaker in place of, or in addition to, the M.C. speaker. SOCKETS FOR GRAMOPHONE PICK-UP. Beautifully finished BURR WALNUT CABINETS. For A.C. supplies only, 200/250 volts, 40/100 cycles (25-cycle models, 1 guinea extra). Available on H.P. TERMS.



CONSOLE

Chassis as Table Model, but with moving-coil speaker of even more powerful type. No external controls on front or sides.

Undistorted Output 2,250 milliwatts. Current Consumption 60 watts. Dimensions 35 in. high by 16 in. deep by 20 in. wide. Model AP44. **35 Gns.**

TABLE MODEL

Easily carried by concealed handle which lies flush with top when not in use.

Undistorted Output, 1,600 milliwatts. Current Consumption, 60 watts. Dimensions, 16½ in. high by 12 in. deep by 13 in. wide. Model AP38. **26 Gns.**

Varley

PROP: OLIVER PELL CONTROL LTD.



Advt. of Oliver Pell Control Ltd., Kingsway House, 103 Kingsway, W.C.2. Telephone: Holborn 5303

Speedy replies result from mentioning "Wireless Magazine"

EMPIRE BROADCASTING

All About the B.B.C.'s Short-wave Service
By ALAN HUNTER

AFTER years of discussion and experiment, the B.B.C. has at last inaugurated an Empire broadcasting service. Two short-wave transmitters of the very latest type have been erected at Daventry, in Northamptonshire. These replace the experimental station known throughout the Empire as G5SW, which has been relaying the Daventry National programme on a wavelength of 25.53 metres.

As a preliminary to the new service the B.B.C. has been sending out from G5SW three special Empire news bulletins at 12.15 p.m., 6.15 p.m., and midnight. These broadcasts, with the relay of the National programme, have been the sole link between the B.B.C. and the various parts of the Empire.

Two Limitations

Two obvious limitations have prevented this service from giving anything like universal satisfaction. We shall need to know about these limitations if we are to understand the *modus operandi* of the new Daventry stations, which have been designed to overcome them.

The first point is that our entertainment period, say from 6 p.m. to 10 p.m., is not the entertainment period of the whole Empire owing to the great differences in time. To take an extreme case, while we are breakfasting the Australians are

returning home to their evening meal.

Even supposing, therefore, that technical means would enable us to stage a gigantic simultaneous broadcast to the whole Empire, more than half of it would not be "at home" to our broadcast visit.

The second point is that the wavelength suitable for long-distance communication between, London and say, Sydney might be quite useless for contact with, say, West Africa. In other words, there is no single wavelength that will simul-

taneously provide the Empire with a reliable signal.

The new Daventry stations, with their arrays of aerials, are designed to overcome, as far as possible, the difficulties of these time and wavelength factors.

Two Hours A Day

At first the aim of the programme builders of the newly constituted Empire Service Department, under the direction of Mr. Cecil Graves, is to give every part of the Empire at least two hours' entertainment at an appropriate period in the evening.

Moreover, the technical ambition is to send out signals that will, during the different entertainment periods of the different parts of the Empire, be received at good strength.

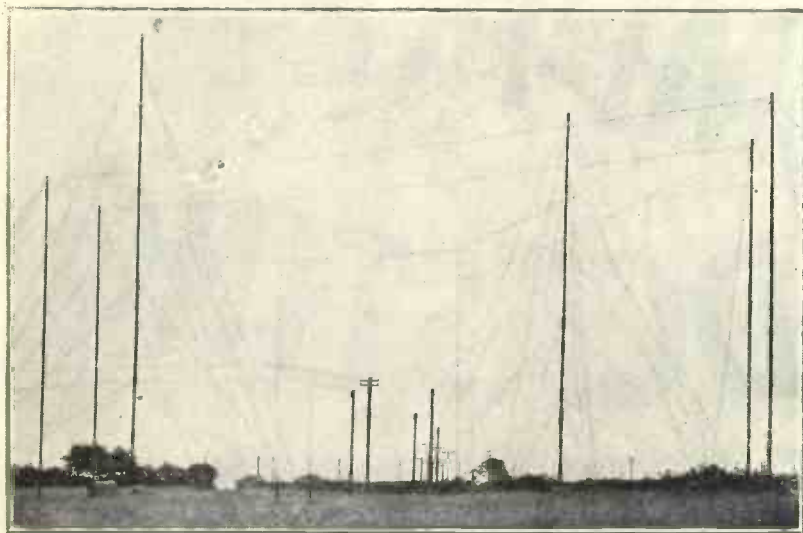
Let us look first at the programme side. As we are catering for an Empire "on which the sun never sets" the aim to provide every part with a two-hour evening programme from the London headquarters means that a "rotational" broadcast practically throughout the twenty-four hours has to be envisaged.

It is not difficult to see that at times in the twenty-four hours there will be a certain amount of overlap between two parts of the Empire. While the programme for one zone is drawing to a close, that for another zone will be due to start.



WORLD-WIDE BROADCASTS
Cecil Graves, director of the B.B.C.'s Empire Service Department, bidding good-bye at Croydon to Malcolm Frost, who is travelling round the world investigating short-wave broadcast possibilities

EMPIRE BROADCASTING—Continued



AERIALS FOR EMPIRE BROADCASTING

This photograph shows the aerial for a broadcasting service to the Australian zone erected by the B.B.C. at Daventry

This accounts for the installation of two short-wave stations at Daventry, to replace the single experimental station at Chelmsford.

Unsuitable Wavelengths

It might be asked why the one station could not be made to serve the two parts of the Empire simultaneously. The answer has already been given—the wavelength that is suitable for one part might be quite unsuitable for another.

It is this problem of differing wavelength requirements that accounts for the erection of no less than seventeen aerials at Daventry.

Get this clear right now: the two stations are necessary to cover two parts of the Empire simultaneously, while the numerous aerials are necessary to give each part of the Empire the best possible signal.

Most Comprehensive System

The B.B.C. can, without exaggeration, claim to have erected the most comprehensive short-wave broadcaster in the world. This being so, all readers will surely like to have a description, however sketchy, of the layout of the plant at Daventry.

The most outstanding feature from a technical point of view, though not, perhaps, from an on-looker's, is the system of aerials.

Here it should be explained that to make the distribution of programmes as simple as possible the Empire has been divided up into five parts or

“zones,” and a directional aerial is provided for each zone.

As a matter of fact there is more than one aerial for each zone. Some zones have as many as three aerials, so that the best wavelength for any particular time and condition can be utilised at a moment's notice.

Although there are many so-called directional aerials at Daventry, it must be remembered that, owing to the wide area to be covered by the beam, as from Daventry to Australia or Canada, the construction differs from that adopted for simple point-to-point beam working.

The beam from the Daventry directionals is broad, which means that reception at the distant point can be enjoyed over a wide area.

Let us look at each zone in turn. Only the big countries are mentioned in these zone areas though, of course, most of the colonies and other parts of the Empire are included in one or other of the zones.

Zone 1.—Australia. A directional aerial with a wavelength of 25.6 metres. There is a very interesting point about this aerial. The radiator and reflector systems are reversible, so that the signals can be sent whichever way round the engineers think best.

Zone 2.—India. Directional aerials to transmit on wavelengths of 17, 25, and 32 metres.

Zone 3.—South Africa. Directional aerials to transmit on wavelengths of 14 and 32 metres.

Zone 4.—West Africa. Directional aerials to transmit on wavelengths of 32 and 48 metres.

Zone 5.—Canada. Directional aerials to transmit on wavelengths of 19, 32, and 48 metres.

These directional, or array aerials as they are sometimes called, consist of a reflecting “curtain” of vertical wires behind a radiating “curtain” of similar elements. Each element consists of a copper wire of about half the wavelength being transmitted.

Call Signs of the Empire Broadcasting Stations

Zone	Metres	Call
1 Australasia	25.5	GSD
2 India	16.9	GSG
	25.3	GSE
3 South Africa	31.3	GSC
	49.6	GSA
4 West Africa	31.5	GSB
	49.6	GSA
5 Canada	31.5	GSB
	49.6	GSA

Long feeder wires run from these aerial arrays through impedance-matching transformers to the transmitting buildings.

There will be “great occasions” when it is desired that the whole Empire shall make a point of listening simultaneously to an event happening in London or any other city connected by landline or wireless link with the Daventry stations.

Six Special Aerials

Then the directional aerials would obviously not do, as only two zones could be covered as there are only two transmitters. To make provision for Empire S.B.'s on the grand scale there are six omnidirectional aerials at Daventry, tuned to such wavelengths as will ensure the world-wide reception of any event in any part of the Empire at any time of the day or night.

It might reasonably be asked why, if these aerials are effective, we should worry over the directional types. The real point is that the directional aerials provide a stronger signal and, therefore, a signal capable of being heard more reliably than

THE B.B.C.'s SHORT-WAVE SERVICE

do the extra omni-directional aerials. The rotational beaming of the signals to the zones as each zone's evening period comes round the clock is the B.B.C.'s impressive plan to give each and every part of the Empire a really good signal.

Standard Telephones Apparatus

There is no need for—nor is there much listener interest to warrant—a lengthy description of the actual station buildings and equipment at Daventry. The whole of the installation work on the array aerials and the short-wave transmitters has been done by Standard Telephones and Cables, Ltd., the apparatus being made at that firm's works at Hendon, near London.

The building housing the two Empire stations is very similarly planned to a B.B.C. regional centre, in that there is a common transmitter switchboard at one end of the hall, with the two groups of transmitter panels fitted up facing one another down the length of the hall.

The two stations have an aerial power of 20 kilowatts each, which, although considered low for normal broadcasting wavelengths, is quite high power for short-wave working, especially when you bear in mind the conservation of energy provided by the beam aerials.

An important part of the station equipment is the quartz-crystal ap-

paratus for maintaining the wave-lengths. Unless absolutely steady signals are sent out, reliable reception will obviously be impossible—hence the very great importance attached to this part of the equipment by the station designers.

At the time of writing the Empire stations are "on the air" day and night testing out before the inauguration of the full service on December 19. Reports are being solicited from all parts of the world, and, judging from those already received, there is no doubt that Daventry will be synonymous with "big noise."

At this early stage in the development of the new service it is obviously impossible to lay down any hard-and-fast rules as to the most suitable apparatus for the reception of the Empire programmes.

Two Methods of Reception

The most one can do is to remind readers, both at home and abroad, that there are two alternative ways open to the distant listener to pick up these Empire programmes. The simplest way is to use a short-wave receiver, or an adaptor connected to an ordinary receiver, thus picking up the Daventry signals direct. For the lonely outposts of Empire and for "individualists" in all zones, this method will commend itself.

There is another way, though, that may be eventually adopted by broad-

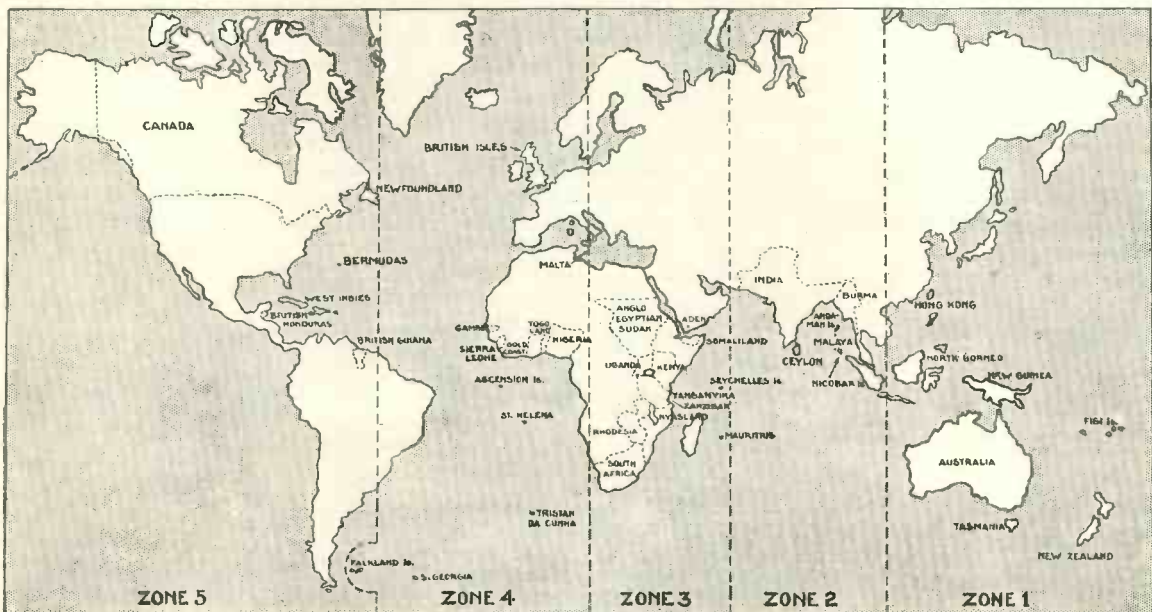
casting organisations in various parts of the Empire. This is the re-broadcasting on the normal medium wavelengths of the short-wave signals picked up by a central receiving station.

Element of Uncertainty

There are great advantages in this method. Although the B.B.C. is choosing the best possible wave-lengths for any given zone at any given time, there is still an element of uncertainty about short-wave reception which a central station would be more able to cope with than could a home installation.

The beaming of the signals will mean more strength at the receiving end, but it will not overcome fading either of the fast or slow variety. Fading, though it cannot be cured at the transmitting end, being a product of the ether condition, can be greatly ameliorated at the receiving end by automatic volume-control circuits and by the use of spaced aerials.

While these devices are outside the scope of the ordinary listener, they should be worth while for some of the Dominion and Colonial broadcasting organisations. Then listeners would derive the maximum benefit from the B.B.C. new Empire service, which seems likely to become the most powerful bond any Empire has ever known.



THE EMPIRE ZONES	Includes about 8,500,000 white people	About 35,000 white people	White population 2,000,000	Covers a white population of 1,500,000	This zone includes a white population of approx. 7,500,000
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Mains Power for Your Set

An A.C. Unit for High and Low Tension. Described by the "W.M." Technical Staff.

THE enthusiasm of the home- constructor for actually making his own apparatus with his own hands is never better demonstrated than with mains units. Now that there are so many units of good quality on the market at reasonable prices it might be thought that no listener would trouble to build up his own battery eliminator.

A Steady Demand

But that is not what happens in practice. There is a steady demand throughout the year for blueprints of "Wireless Magazine" mains units and letters are constantly being received asking for constructional details of A.C. mains gear.

In this article, therefore, we present details of a new A.C. power unit knowing that it will meet the needs of—and that it will be built by—hundreds of keen constructors.

The value of a mains unit where an electric-light supply is available does not need any stressing.

It is well known by now that the cost of getting the high-tension supply from the mains is so small as to be negligible, even when a big set with a large anode-current consumption is concerned.

Anybody with electric light who still uses batteries for the supply of high tension is simply wasting money in most cases.

The particular unit

described and illustrated in these pages is intended to supply anode current to almost any "battery" set. It utilises a Westinghouse metal rectifier of the HT7 type, which is rated to give an output of 28 milliamperes at 200 volts. In practice, of course, this output is not quite reached, because of the voltage drop produced inside the unit itself by the smoothing choke.

Whenever a battery set is operated from a mains unit care has to be taken to see that adequate decoupling is introduced at some convenient point. Many battery receivers are not provided with any decoupling and they are therefore inclined to motor-boat when connected to a mains unit.

In this case there will be no trouble, for ample decoupling for any ordinary set is incorporated in the unit itself, as will be seen from a glance at the circuit diagram below.

Two terminals on the metal

rectifier are connected to the high-tension secondary of the mains transformer. The negative terminal on the rectifier is connected to the zero-voltage terminal on the transformer, while the centre terminal of the rectifier is connected to the 135-volt tapping on the transformer. It is of the utmost importance to see that a voltage of only 135 is applied across the metal rectifier.

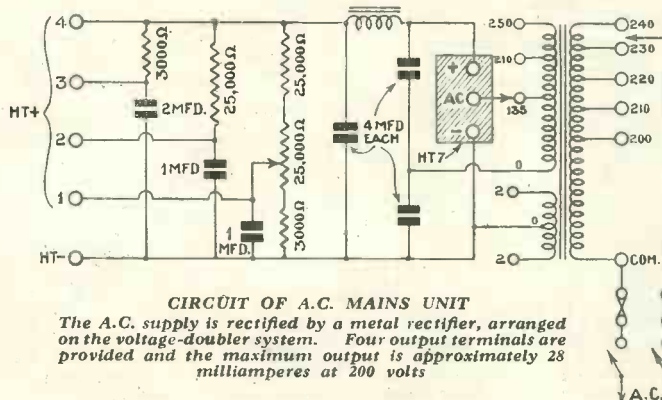
Mains Voltage

It is equally important that the tappings on the primary of the transformer should be adjusted for the voltage of the mains on which the unit is to be used. Tappings are actually provided for 200-, 210-, 220-, 230-, and 240-volt mains of between 40 and 100 cycles in periodicity. If the periodicity of your mains does not fall within these limits then it will be necessary to order a special mains transformer.

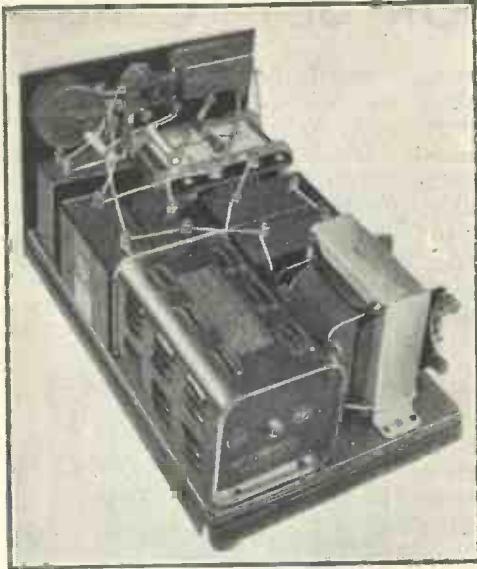
The transformer actually used is provided also with a low-tension secondary. This gives an output of raw A.C. at 4 volts and is centre-tapped for connection to the heaters of A.C. mains valves.

It will thus be seen that this unit can form the basis for an all-electric receiver if so desired.

In order to obtain a high-voltage output, a voltage-doubler circuit is utilised and for this



CIRCUIT OF A.C. MAINS UNIT
The A.C. supply is rectified by a metal rectifier, arranged on the voltage-doubler system. Four output terminals are provided and the maximum output is approximately 28 milliamperes at 200 volts



COMPACT, BUT EASILY MADE

Although particularly compact, this A.C. unit is easily assembled. When using the blueprint to wire up, remember to make the connections in numerical order

purpose two 4-microfarad fixed condensers are connected across the rectifier. It is important that these should be of the type made for working voltages of not less than 400 volts.

A large low-frequency choke with an inductance of 70 henries is used for smoothing. There is, therefore, little chance of any hum being experienced except with the very worst of mains. It is necessary to choose for this position a choke that retains its inductance even when passing currents of the order of 25 milliamperes.

Output Terminals

Four output terminals are provided; these are marked H.T.+4, H.T.+3, H.T.+2 and H.T.+1 respectively. H.T.+4 gives the maximum voltage output—the full voltage of the rectifier, except for the small drop introduced by the smoothing choke. This tapping will be suitable for supplying the larger types of power valve.

H.T.+3 (with the 3,000-ohm decoupling resistance shown) gives 160 volts with a load of 15 milliamperes;

it will therefore also be suitable for running a power valve of moderate consumption. Valves rated at 150 volts maximum high-tension voltage should be connected to this tapping. H.T.+2 will be suitable for running the detector stages and the anodes of the high-frequency valve or valves. With a load of 3 milliamperes (and the 25,000-ohm decoupling resistance shown) it gives a voltage of 125. This, of course, will fall somewhat as the load is increased.

H.T.+1 is for supplying the screens of high-frequency valves. It gives between 15 and 90 volts with the values of resistances indicated in the circuit diagram.

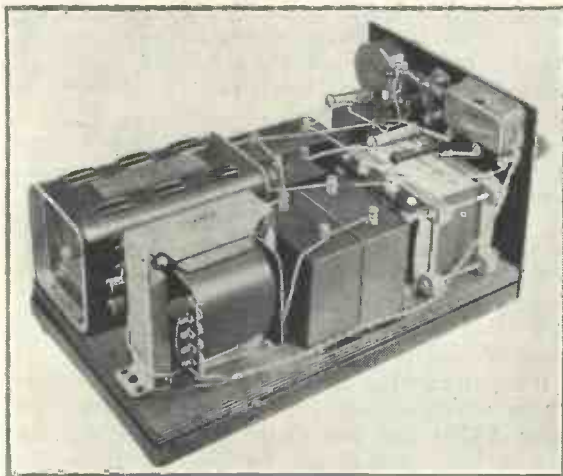
for any reason to use alternative parts to those specified on page 710 care should be taken to see that they are of such sizes that they will fit into the layout without difficulty.

Accumulator Charging

This unit as it stands supplies only high tension and low tension for application to the heaters of A.C. valves. But many people with battery sets will want still to run the filaments from an accumulator and they will therefore want some means of charging the low-tension battery from the electric mains.

A complete accumulator charger can be obtained for quite a reasonable price from Heayberd's. This is illustrated by the photograph on the next page.

It will obviously not be at all difficult to connect this up to the set with a switch so that when the



ANOTHER VIEW OF THE UNIT

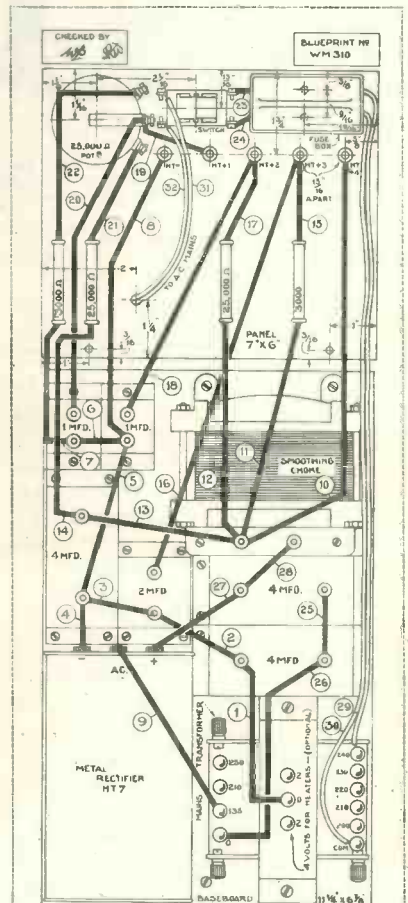
This unit gives supplies of high tension and of low tension for running A.C. mains valves if desired

It will therefore be seen that almost any set can be supplied with high tension from this unit.

The construction is quite straightforward and will be clear from a glance at the quarter-scale layout and wiring diagram reproduced on this page. If desired, a full-size blueprint can be obtained for half price (that is, 6d., post free) if the coupon on the last page of the issue is used by January 31.

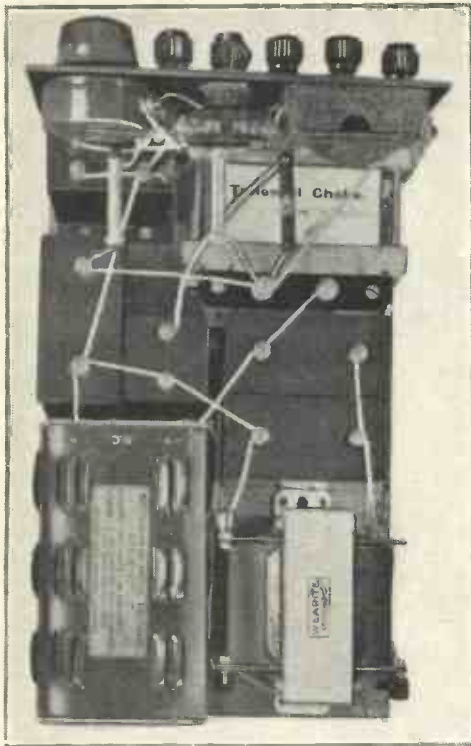
Ask for No. WM310, and address your application to "Wireless Magazine" Blueprint Department, 58-61 Fetter Lane, London, E.C.4.

It will be appreciated from the photographs that the layout of the unit is compact and that there is no waste of space. Should it be desired



LAYOUT AND WIRING DIAGRAM
If desired, a full-size blueprint can be obtained for half price (that is, 6d., post free), if the coupon on the last page of the issue is used by January 31. Ask for No. WM310

MAINS POWER FOR YOUR SET—Cont.



SPECIAL PLAN VIEW

A photographic plan view of the A.C. mains unit. It is particularly compact, but is not at all difficult to build. A full-size blue-print can be obtained for 6d.

receiver is done with the accumulator can be put on charge.

It should be remembered, however, that the battery will need "topping up" occasionally. The level of the electrolyte should be kept up to the mark on the case by the addition of distilled water as often as may be necessary. In the winter the evaporation will be very slow, but during the summer months topping-up will be required more frequently.

Metal Case

This mains unit is provided with a metal protecting case. The mains plug should never be inserted in the mains socket until the unit has been screwed into the case. If for any reason it is desired to remove the unit from the case, the mains supply should be completely disconnected. If this procedure is observed there will be no danger of shocks. In some cases readers may desire to change the values of the decoupling resistances connected in series with H.T.+3 and H.T.+2. It should be remembered that for every milliamper

flowing through a resistance of 1,000 ohms there will be a drop of 1 volt. In other words, if a current of 10 milliamperes is taken from H.T.+3 there will be a drop in voltage of 3×10 ; in other words, the voltage will be dropped by 30 volts.

Care should be taken when connecting the unit to a set for the first time to make certain that the total anode-current consumption of the valves to be supplied does not exceed the maximum output that can be safely taken from the mains unit.

The operator should look up the valve curves (or the tables that appear in the front of every issue of "Wireless Magazine") and find the anode current taken by each valve at the anode voltage at which it is to be run.

The total anode-current consumption can then be found without difficulty. If the current required is too great for the metal rectifier the anode voltages should be reduced until the current consumption comes down to a value that is within the capabilities of the unit.

If the unit is to be used as the basis for an all-electric set (that is, one using A.C. mains valves) the low-tension terminals should be connected to the heaters; which are, of course, in turn connected in parallel as is the case with battery-valve filaments. The centre-tap of the low-tension winding is already con-

nected to high-tension negative, so that this connection need not be made in the set itself.

It should also be realised that if this unit is to be used as the basis for designing an all-electric receiver no decoupling will be needed in the set itself. It has already been



ACCUMULATOR CHARGER

This Heayberd accumulator charger makes a good companion unit to go with the high-tension unit described in these pages. Its output is .5 ampere

pointed out that ample decoupling for all ordinary purposes is incorporated in the mains unit.

In order to save money some constructors may be tempted to use the unit without the metal case. This course is most dangerous, however, and one that we urge should be avoided at all costs.

Although the voltages handled by the unit are not large, there is quite enough "juice" to give anybody a nasty shock unless the apparatus is protected—and an earthed metal case is the best protection of all!

COMPONENTS NEEDED FOR MAINS POWER UNIT

CHOKE, LOW-FREQUENCY

1—Tunewell, type S70/50, £1.

CONDENSERS, FIXED

2—Formo 1-microfarad, 5s.
1—Formo 2-microfarad, 3s. 3d.
3—Formo 4-microfarad, 16s. 6d.

FUSE

1—Belling-Lee twin fuseholder and fuses, 2s. 6d. (or Bulgin).

METAL RECTIFIER

1—Vestinghouse, type HT7, 17s. 6d.

RESISTANCES, FIXED

2—B.A.T. 3,000-ohm, 1-watt type, 1s. 9d. (or Erie, Dubilier).
2—B.A.T. 25,000-ohm, 1-watt type, 1s. 9d. (or Erie, Dubilier).

RESISTANCE, VARIABLE

1—Colverstat 25,000-ohm, type ST5c, 5s. 3d. (or Lissen, Lewcos).

SCREENED BOX

1—Heayberd 7 in. by 11½ in. by 6½ in., 12s. 6d.

SUNDRIES

Tinned-copper wire for connecting (Lewcos).
Lengths of insulated sleeving (Lewcos).
Length of rubber-covered flex (Lewcos).
1—Wooden baseboard 6½ in. by 11¼ in.

SWITCH

1—Becker on-off, type 402, 2s. 3½d.

TERMINALS

5—Belling-Lee, type B, marked: H.T.+4, H.T.+3, H.T.+2, H.T.+1, H.T.—, 2s. 6d. (or Clix, Eelex).

TRANSFORMER, MAINS

1—Wearite, type HT8, £1 2s. 6d.

ACCESSORIES

ACCUMULATOR CHARGER

1—Heayberd, type AO2, £1 15s.

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

What Kind of Set Do You Want?

Everybody knows what would be their ideal radio set; "Wireless Magazine" wants to know what is your ideal receiver. You are invited to complete this form and send it (in an unsealed envelope bearing a ½d. stamp) to: Ideal Set, "Wireless Magazine," 58-61 Fetter Lane, London, E.C.4. No prizes are offered, but readers will be helping themselves and "Wireless Magazine" by supplying the information asked for below as soon as possible

How will the set be operated: from batteries (B), alternating-current (A.C.) or direct-current (D.C.) mains? (Indicate B, A.C., or D.C.)	Do you want the set to incorporate reaction? (Indicate Yes or No.)
If from A.C. mains, do you prefer a metal rectifier (M) to a valve rectifier (V)? (Indicate M or V)	Do you like a milliammeter in the detector (D) or output circuit (O)? (Indicate D, O, or No.)
What type of cabinet: table (T), pedestal (P), upright portable (UP), or suitcase portable (SP)? (Indicate T, P, UP, or SP.)	Do you want an intermediate stage of low-frequency amplification between the detector and the power stage? (Indicate Yes or No.)
Is the set to have a self-contained loud-speaker? (Indicate Yes or No.)	Is the low-frequency amplifier to be transformer-coupled (T), resistance-coupled (R), or a combination of both (C)? (Indicate T, R, or C.)
In the case of a table battery set, are the batteries to be contained in the cabinet? (Indicate Yes or No.)	Do you want to incorporate a tone control? (Indicate Yes or No.)
Is the set to be a straight radio receiver (SR), to have provision for the use of a pick-up (PU), or to be a complete radio gramophone (RG)? (Indicate SR, PU, or RG.)	What type of output stage: three-electrode (T), pentode (P), or push-pull (PP)? (Indicate T, P, or PP.)
Is your object to get the greatest possible number of stations (N) or really good quality from a few stations (Q)? (Indicate N or Q.)	What is to be the maximum high-tension voltage?
What will be the distance, in miles, of the set from the nearest broadcasting station?	What is to be the maximum anode-current consumption?
Do you want the set to get short-wave stations as well as medium- and long-wave transmissions? (Indicate Yes or No.)	In the case of a battery set, will you get the high-tension from a mains unit? (Indicate Yes or No.)
Do you prefer a super-het to a "straight" set? (Indicate Yes or No.)	What type of loud-speaker will you use: moving-iron or balanced armature (BA), moving coil (MC), or electrostatic (E)? (Indicate BA, MC, or E.)
What is to be the total number of valves?	In the case of a moving-coil loud-speaker, is it to be of the permanent-magnet (PM), or energised (E) type? (Indicate PM or E.)
If not a super-het, do you want one or two stages of high-frequency amplification or none?	Do you want to incorporate dual compensated loud-speakers? (Indicate Yes or No.)
If a super-het, how many intermediate-frequency stages do you want?	Do you want terminals for connecting an additional loud-speaker? (Indicate Yes or No.)
Do you want the super-het to have a preliminary stage of high-frequency amplification? (Indicate Yes or No.)	Do you want to use an external open aerial (E), external frame aerial (F), or self-contained frame aerial (S)? (Indicate E, F, or S.)
Do you want to use ordinary screen-grid (SG) or variable- μ (VM) valves? (Indicate SG or VM.)	In the case of a set with self-contained aerial, do you want provision for an external aerial and earth? (Indicate Yes or No.)
What type of coupling: tuned grid (TG), tuned anode (TA), or high-frequency transformer (HFT)? (Indicate TG, TA, or HFT.)	In the case of a mains set, is a mains aerial desired? (Indicate Yes or No.)
Do you want one-knob tuning control? (Indicate Yes or No.)	How much (approximately) are you prepared to spend on the complete assembly?
Is the tuning dial to be calibrated in degrees (D), wavelengths (W), or names of stations (S)? (Indicate D, W, or S.)	Reader's name and address (for reference only and not for publication).
What type of detector do you prefer: three-electrode leaky-grid (LG), anode-bend (AB), diode (D), or screen-grid (SG)? (Indicate LG, AB, D, or SG.)	

On the Crest of the Waves

Radio News from All the World :: By J. GODCHAUX ABRAHAMS

BELGIUM

FOR some time past experiments have been carried out by the short-wave station at Ruysselede (Bruges) with a view to establishing a public wireless-telephony service with Leopoldville (Congo). Tests in speech and music may be heard almost daily between 10 and 11 a.m. G.M.T. on 19.3 metres; at 11 p.m. the night wave of 42.1 metres is used.

FRANCE

Following a protest lodged by German listeners in regard to the number of military marches incorporated in the studio programmes, a Paris wireless journal points out that the same accusation may be made against the French studios. "Les Allobroges," an old patriotic song, is regularly used by Grenoble and PTT, Toulouse. "Sambre et Meuse," a march widely used by regiments, is broadcast almost daily by Poste Parisien and Ecole Supérieure (Paris) opens its transmissions with a fanfare of trumpets played by the Republican Guard.

GERMANY

At Betzenhausen, about one and a half miles to the north-west of Freiburg-im-Breisgau, a new 5-kilowatt transmitter is being erected to replace the small plant now used for the relay of the Stuttgart programmes. When completed, the station will work on a wavelength of 259.3 metres (1,157 kilocycles), common to Frankfurt-am-Main, Cassel, and later, Treves. It will be ready to operate in the early spring.

The new 60-kilowatt station erected at Erdinger Moos, which is destined to take over the duties of the present Munich transmitter, is now testing daily on 532.9 metres (563 kilocycles). Built to the order of the Bavarian authorities, in common with other German stations it is so planned that, should occasion arise, its power can be doubled at short notice.

GRAND DUCHY OF LUXEMBOURG

Contrary to reports published to the effect that the Dutch A.V.R.O. broadcasting association would be willing to lease Radio Luxembourg for its Sunday transmissions, it is stated in Holland that as long as the new transmitter is not permitted to work on the higher portion of the medium waveband there would be no advantage resulting from such a measure. Moreover, difficulty would be found in obtaining a suitable landline to connect the Luxembourg station with the Hilversum studio, and the cost of the hire of such a station would be too high for a private company to use it purely for entertainment purposes.

HOLLAND

Steps are to be taken to increase the power of the Huizen transmitter to 20 kilowatts. The expenses for the conversion of the plant will be covered by the broadcasting associations using that station.

ITALY

A complete net of pupinised cables for the broadcasting stations is being laid down in Italy and within the next few months all studios will be linked up into one system, thus permitting a free interchange of programmes from such distant points as, say, Bolzano and Palermo. In addition, three international cables link up Turin, Modena and Paris; Milan and Vienna (and an extension through the latter) connects up with the German system.

The first transmitter to operate on a wavelength of 60 centimetres is being installed at the Vatican (Rome) for communication with the Papal Palace at Cassel Gandolfo. It can be used for either telegraphy or telephony.

JUGOSLAVIA

In October, 1932, Ljubljana celebrated the fourth anniversary of its installation; its studio is under the

direct control of two priests. Although a large number of the transmissions are locally organised, the station on some nights relays entertainments from Belgrade and Zagreb. In view of the interference by Freiburg-im-Breisgau, Hamar and Grenoble, the wavelength has been temporarily changed to 575 metres (522 kilocycles).

ROUMANIA

Listeners in Bucharest have protested against the power of the Leipzig broadcasts which, in view of the wavelength used, interferes with the reception of the local programmes. The Roumanian Broadcasting Company is appealing to Geneva for the allotment of a channel with greater separation from the German transmission.

RUSSIA

The U.S.S.R. stations generally, but Moscow in particular, in their talks in foreign languages have adopted a more sober tone, and now limit these lectures to descriptions of living conditions in Russia and to an explanation of the Five-year Plan. During the period December-March, these talks will be broadcast from Moscow (Trades Unions) on 1,304 and 50 metres in French and English between 8 and 9 p.m.; they are followed by similar lectures in Swedish, Magyar, and Spanish. The studio holds the record for its multi-lingual broadcasts as, in addition to the above, transmissions are also made in German, Dutch and Czech.

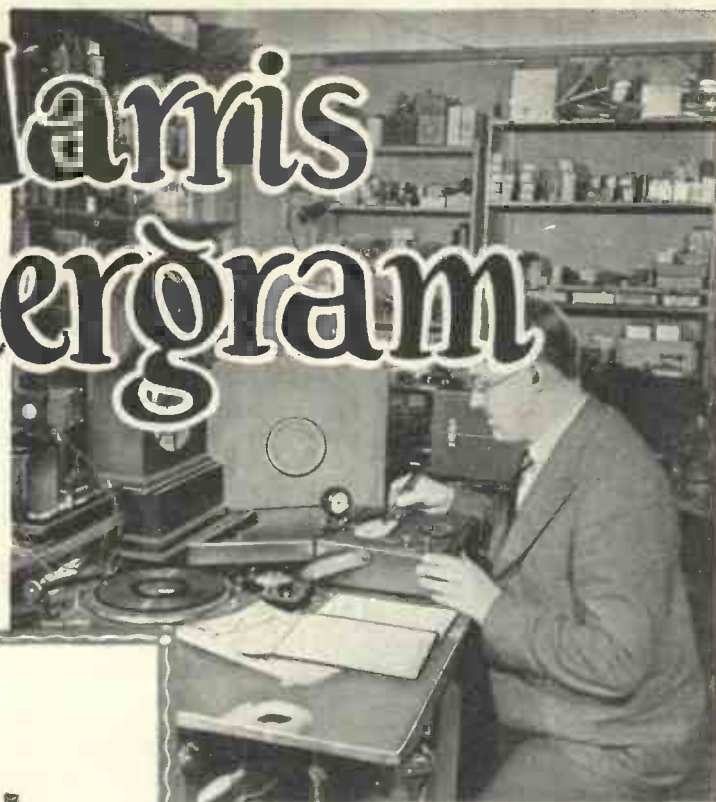
SWITZERLAND

Anticipating the erection of the Monte Ceneri broadcasting station, the Swiss authorities have already built a studio at Lugano. It will take part in the special international concert to be broadcast on March 3 through Beromuenster and Söttens. Other programmes will be provided by Berne, Basle, Zurich, Geneva, and Lausanne.

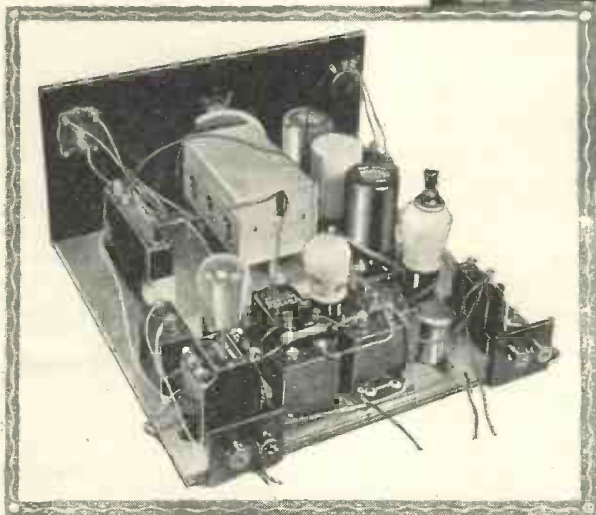
The Harris Ethergram

By
PERCY W.
HARRIS

M.Inst.Rad.E.



Percy W. Harris at work in his laboratory



EVERYBODY is interested in three-valve sets, which are by far the most useful radio outfits for present-day conditions when they incorporate a good stage of high-frequency amplification. But this set, which has been specially designed for "Wireless Magazine" by Percy W. Harris, is more than a plain three-valve receiver—it is a complete radio gramophone housed in an attractive table cabinet.

A real attempt has been made to overcome the usual ganging troubles by utilising a set of coils that are actually matched up in the factory with the gang condenser with which they are to be finally used. So accurate is the ganging that we have been able to prepare a special scale marked with the names of stations so that the operator can tune directly to any particular programme he desires without having to look up wavelengths lists.

Apart from a very fine performance in the way of radio reception—sixty stations have been received in two different localities in London—the Harris Ethergram gives all the advantages of a good-quality gramophone amplifier. Here is the ideal three-valver for 1933!

Special Features of the Set

A variable-mu screen-grid valve gives great high-frequency amplification and an easy control of volume.

The pentode output valve is matched to the moving-coil loud-speaker by means of a tapped choke so that correct matching is obtained. This gives full volume and the best quality.

A tone control is provided so that individual preferences in the way of tone can be met at will.

A special scale calibrated with the actual names of stations will be given with each full-size blueprint of the set. By this means the operator can tune in to stations directly by name, without the need for looking up dial readings or lists of wavelengths.

The layout of the set is particularly clean and there are no snags in the construction.

A half-scale layout and wiring diagram is included in these pages. All the connecting leads are numbered in the best and most convenient order of assembly.

Sixty stations were received by the designer in his laboratory; this log was subsequently confirmed independently by a member of the "Wireless Magazine" staff—a fine performance for a "three."

Building the Ethergram

Even the beginner will have no difficulty in understanding these explanatory notes by the designer of the Ethergram. The set is quite straightforward to build and we recommend it without reservation—a glance at the special test report on page 722 should convince even the most sceptical!

THERE are strong reasons why the three-valver remains one of the greatest favourites with listeners. Using modern valves and modern circuits, both range and selectivity of a high order are obtainable, while as to current consumption, particularly when a modern pentode is used, it comes well within the range of a medium-priced high-tension battery.

Use of the Mains

Of course, where mains are available, high-tension consumption does not matter, but it must always be remembered (although the trade seem to have forgotten it) that the majority of homes in this country have no such mains.

The Ethergram is, then, a battery radio gramophone, designed after much thought and experiment to give those qualities most desired at the present time—high selectivity, big range, and first-class tone quality, coupled with economy of operation and maximum simplicity of control.

Selectivity has been my special study for a number of years, and I would suggest that you will find it very helpful, when considering receiver circuits, to remember that the selectivity of a set is governed largely by the number of tuned circuits through which the signal passes.

Two Circuits Needed

A detector with two low-frequency stages, coupled to the aerial by a single tight-coupled tuned circuit, is far too flat for present conditions. By using a very loose aerial coupling and a fairly critical reaction, a reasonably high degree of selectivity can be obtained (save in swamp

areas), but for modern conditions a minimum of two tuned circuits is really required.

Quite a number of three-valve sets have only two such circuits—one in the first grid circuit connected to the screen-grid valve, and the other in the grid circuit of the detector.

If the aerial is loosely coupled to the first tuned circuit this arrangement gives very good selectivity, and the fact that a large number of "detector and two low-frequency" circuits have only one tuned circuit, while "screen-grid, detector and low-frequency" sets always have at least two, has led many people to suppose that it is the screen-grid valve which gives the selectivity.

You can disabuse your mind of this idea at once—the screen-grid valve has no bearing on the subject. It is just a question of the number of tuned circuits used. If you use two tuned circuits in front of the detector in a "detector and two low-frequency" set you will get admirable selectivity, as I showed in the A.C. radio gramophone, details of which were published in "Wireless Magazine" for August.

For a long time I have been turning over in my mind the construction of a screen-grid set of particularly high selectivity, combined with good quality, but did not put the design into execution because I could not find just the kind of parts I required for my plan.

It is a comparatively simple matter to work out a selective receiver using a multiplicity of tuned controls, but such a set is often unwieldy to make and inoperative save in skilled hands.

If the circuits are ganged, then matching and ganging problems enter into it.

As many designs with ganged condensers lose heavily in efficiency due to inadequate matching and ganging, I made up my mind I would wait until I could find just what I needed.

My requirements were, so far as the circuit was concerned, a properly designed and screened band-pass arrangement preceding a screen-grid valve (which should be of the variable-mu variety) and a soundly

designed coil, completely screened from the first two coils, in the detector-grid circuit.

At the same time a good three-gang condenser was required with adequate trimmers and, if possible, arrangements should be made *at the factory* to match up the coils and condensers accurately. Furthermore the price of such a device must be reasonable. Fortunately at the Radio Show two manufacturers produced the right scheme.

Drastic Tests

In this set I have chosen the Formo assembly, consisting of a three-gang condenser and three coils mounted on a single baseplate with terminals arranged all ready to wire up. As this device proved very successful on rather drastic tests for ganging and matching, I decided it would solve my main problem, so I set to work to build the design round it.

The circuit in its theoretical form you will see on page 718; it consists, as I have indicated above, of a tuned circuit coupled to the aerial through a compression condenser, this first tuned circuit being in turn coupled to a second one by a .01-microfarad condenser at the lower end.

The second tuned circuit is connected to the grid and filament of the variable-mu screen-grid valve, provision for varying the magnification being made by the potentiometer which is mounted as a volume control in a suitable position on the panel.

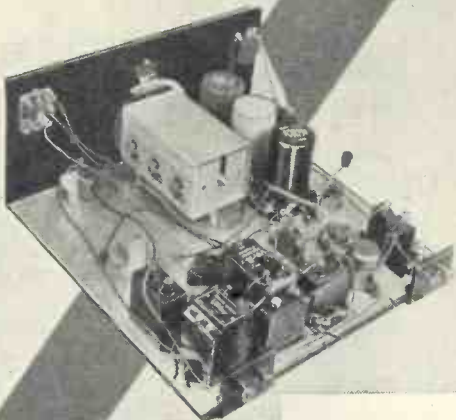
In the anode circuit of the screen-grid valve is a carefully-screened choke. I do not suggest alternatives to this, by the way, as the particular choke chosen works admirably in this set. If you substitute for it another make you must do so at your own risk as a design of this kind has been worked out *as a whole*.

"Interlocked Design"

I am not suggesting that all other makes of radio-frequency choke are not good—it is just a question of what may be termed an "interlocked" design. The variations of voltage set up across this choke are applied through a .0001-microfarad coupling condenser to a tuned circuit

(Continued on page 716)

ROAM THE ETHER IN 1933 WITH THE HARRIS ETHERGRAM!



(Above).—A view of the Harris Ethergram which clearly shows the neat arrangement of the parts, which are all quite accessible



(Right).—The set housed in the Smith table radio-gramophone cabinet. The batteries are arranged on a shelf behind the moving-coil loud-speaker, while the set itself is placed at the bottom of the case



A plan view of the set showing the disposition of the parts. The coils and three-gang condenser are supplied as a complete assembly on a metal baseplate

(Below).—Trying out the Harris Ethergram, a sixty-station three-valve combination with finely controllable selectivity



Do not overlook the half-scale wiring Diagram on pages 716 and 717

THE HARRIS ETHERGRAM—Continued

connected to the detector valve. Notice here that there is an adjustable tapping for coupling to the detector circuit. In practice it will be found that when the plug is joined to tapping No. 2 the best overall results will be obtained.

In the anode circuit of the detector valve will be found the differential reaction condenser and a radio-frequency choke connected to the primary of a Varley Rectatone transformer. This is one of several excellent transformers now available enabling the tone quality to be varied at will.

Differential Reaction Condenser

As it happens, the characteristic of this transformer without modification admirably suits the rest of the set, so for radio work I would suggest that the knob of the tone-control resistance connected to the Rectatone is kept at the position of minimum correction.

The actual variation of tone possible by means of this resistance will generally be confined to the reproduction of gramophone records.

The output side of this transformer is connected to a pentode valve, which gives high magnification with a very reasonable high-tension consumption. In order that the loud-speaker and pentode may be properly matched as to impedance, in the output circuit of this valve there is included a tapped pentode choke. Adequate decoupling is provided where necessary, as shown.

Thus you will see that the theoretical circuit is to a large extent conventional. I am no advocate of "trick" circuits in which variations are introduced just as variations, without adequate reason.

I am only interested in designs based on sound engineering principles, and I am particularly interested in giving you good, well-tryed, practical

applications of these circuits, for it is in the practical expression and the actual layout that the virtues of a particular design are usually found.

It is generally possible to tell from the look of a receiver whether it has been made by a relatively unskilled mechanic from a theoretical diagram or whether it has been worked out by a practical designer on the laboratory bench.

Interesting Points in Layout and Design

There are many interesting points in layout and design in the present receiver, and few have given me such pleasure in their development.

Let me introduce to you first of all a particularly simple method of obtaining stability and linking up a number of parts at a uniform potential. Commercial manufacturers who have adequate facilities have now practically standardised metal chassis, for the two reasons that they are mechanically strong and, being conductive, provide a plane of uniform potential to which various parts can be connected, thus making for stability.

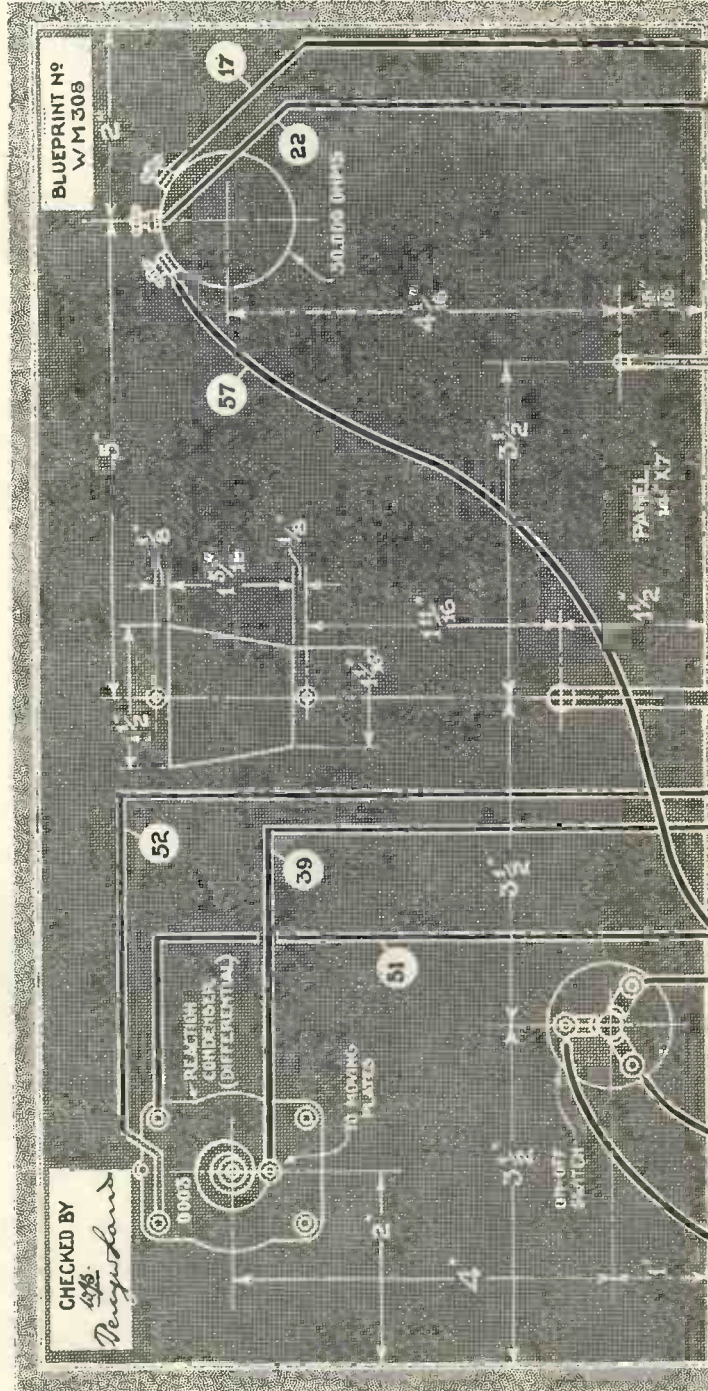
The home constructor finds it difficult to work on a metal chassis unless he has it already drilled for him (which incidentally removes much of the pleasure of building a set), and it has been the custom in a number of our designs to cover the baseboard with a sheet of metal foil.

Another Method of Screening

There is, however, a method which I have been using in my laboratory very successfully for some time and which I am now introducing into this design. This is to cover the baseboard with a sheet of material known as Konductite, which consists of a sheet of stout paper on to which is glued a very thin sheet of aluminium foil.

Half-Scale Layout and Diagram

On this page appears the panel layout; the baseboard layout is reproduced below.



Aluminium is a high conducting metal, and the thin foil is quite good enough for the purpose for which we require it. This material, the foil being glued to paper, can be very easily handled and cut with scissors just like ordinary paper.

Beginning Construction

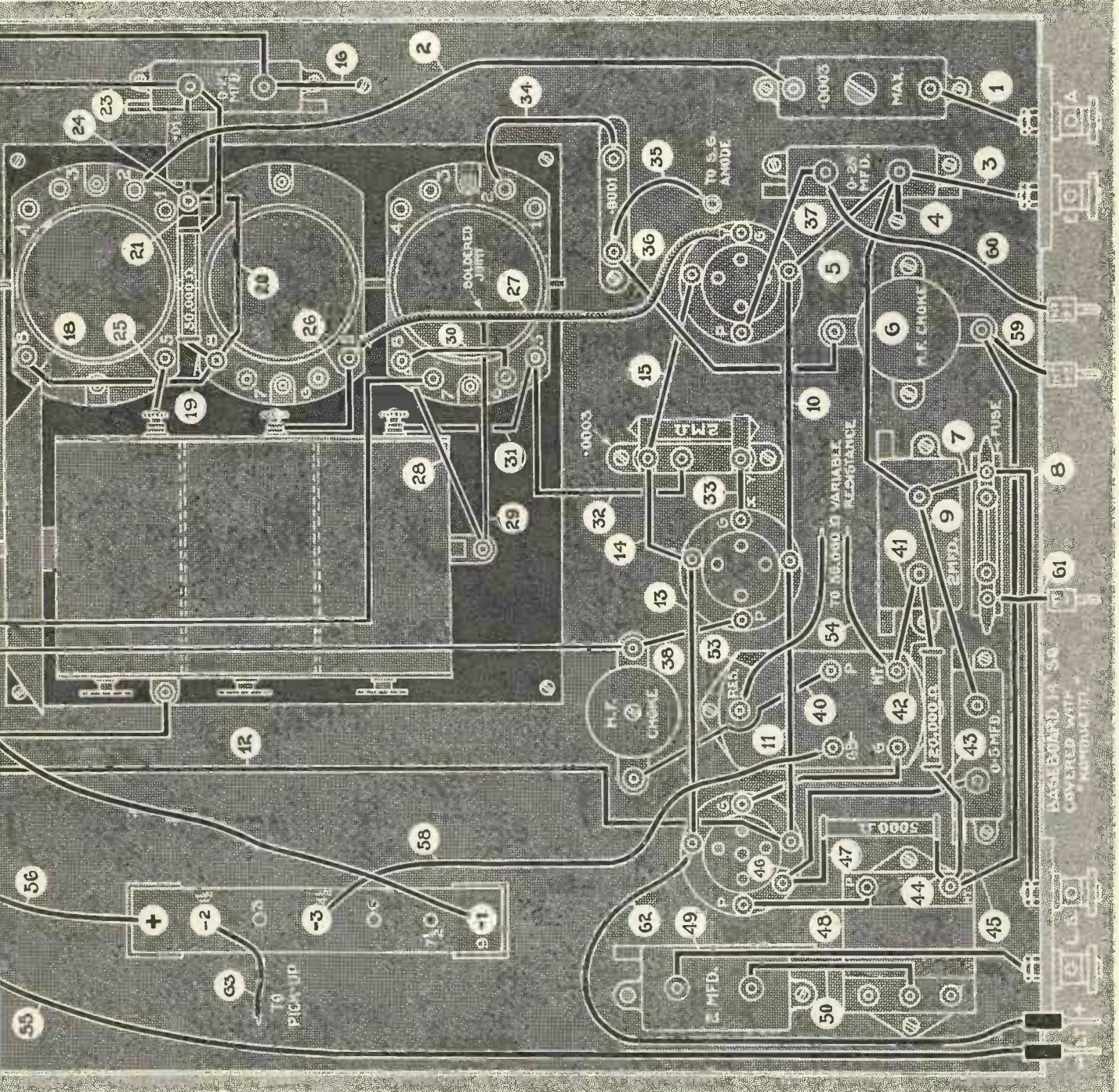
To begin our actual construction we take a baseboard measuring 14 in. square and attach a sheet of **Konductite** to this baseboard with any suitable adhesive (I use **Seccotine**). The paper is then neatly trimmed and we assemble the parts as shown.

The **Formo** condenser-and-coil assembly has supplied with it a drilling template for the panel so as to enable the bevelled window to be fitted, but the assembly itself is screwed to the baseboard and the panel has not to support anything mechanically.

Stick to the Layout

Notice particularly how the various parts are arranged and adhere strictly to this arrangement. Do not succumb to the

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 January 31. Ask for No. W/M808 and address your application to "Wireless Magazine" Blueprint Dept., 58/61 Fetter Lane, London, E.C.4. Note that all the leads are numbered in the best order of assembly. With each blueprint will be supplied a free station scale (see reproduction on page 721) for fixing to the variable condenser



THE HARRIS ETHERGRAM—Continued

temptation to modify the layout in order to suit a particular panel, base-board or cabinet. In this direction success does *not* lie!

Very many hours were spent in determining the exact shape, length and disposition of the leads in the high-frequency end of this set, so adhere very strictly to the design at this part too!

Question of Stability

As the condenser and coils are shielded it might be imagined that this alone would give sufficient stability, but it must be remembered that we are dealing in this set with very high-gain valves and we have to be careful.

When the first bench assembly was finished and the set switched on it worked admirably over most of the scale, but was unstable from about 15 degrees down to zero on each waveband. Careful tests showed that the instability was purely in the screen-grid portion of the set.

Ultimately it was traced down to coupling on to the grid lead of the screen-grid valve and was completely cured by taking this lead from the coil to the grid terminal of the valve holder through an insulated tube covered on the outside with metal braid, this braid being earthed.

The set then became completely stable and the only effect of the braid was to add a little to the capacity between grid and filament of the screen-grid valve.

Extra "Trimming"

As we have already a large capacity in the tuning circuit it was only necessary to alter the trimmer on the second condenser in order to compensate for this as the additional capacity is simply in parallel. Only a short length of this braided tubing is required and as it is a standard product for screening radio-gramophone pick-up leads it is quite easily obtainable.

Do not attempt to put similar screening on the anode lead of the screen-grid valve. There are a number of technical reasons why you should not do this and in any case it is entirely unnecessary.

The set can be operated at any part of the tuning scale, even as low as one or two degrees on either waveband, with the volume control turned full on without the slightest instability and, in addition to this, the greatly enhanced magnification given by reaction in the detector circuit can be used up to the limit without any backlash or overlap.

It is this careful layout of the high-frequency end, enabling the high magnification of the screen-grid valve to be used in conjunction with the greatly enhanced sensitivity of the detector circuit, which makes this set so amazingly sensitive and selective.

The panel, as you will notice, is a standard 14 in. by 7 in. size and the whole assembly is so made that those who do not wish to build a radio

Actually on the blueprint (a copy of which can be obtained for half price, by the way, if application is made by January 31) the set is shown without the wiring for a pick-up. If you just want a straight radio receiver, then wire up exactly as shown.

Pick-up Connections

Should you want to build the complete radio-gramophone assembly, as many of you will no doubt, omit the lead numbered 33 and take the points X and Y to the gramo-radio switch as indicated in the diagram on page 720.

Only four terminals are used—those for aerial and earth and loud-speaker—as the batteries are included within the cabinet and flexible leads go from the various points without the intervention of terminals.

So much, then, for the constructional work, which I think you will find is particularly simple. Now for the adjustment and the "tuning up" of the set after you have completed the constructional work.

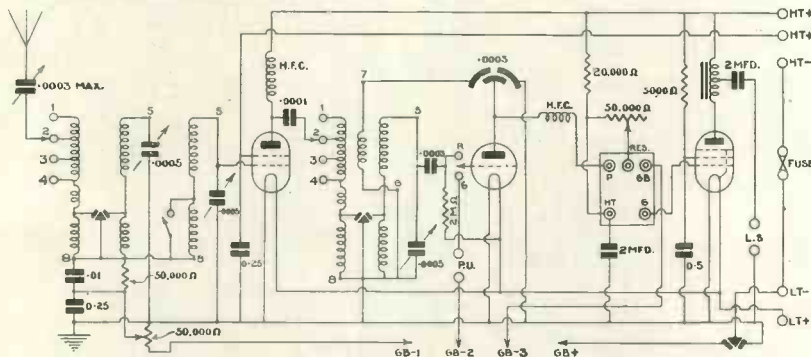
The operating controls of this set are, of course, the tuning knob, which controls all three circuits; the reaction knob (on the right) which in accordance with normal practice is made to increase reaction as it is turned in a clockwise direction; the wave-change

switch, which changes from the medium to the long wave and back again through a quarter of a turn only; and the volume control, which should only be used when the strength without reaction is too great and when the set gives signs of overloading on strong signals.

Using the Volume Control

It operates by reducing the magnification given by the screen-grid valve and is normally kept at the "full on" position, which is as far as it will go in a clockwise direction.

(Continued on page 720.)



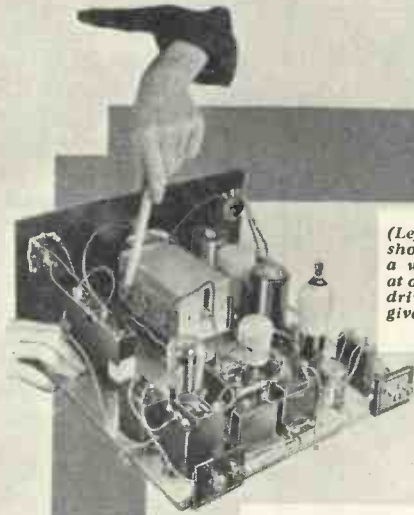
A STRAIGHTFORWARD CIRCUIT WITHOUT ANY "TRICKS"

Much of the success of the Harris Ethergram is due to the fact that the circuit is quite straightforward. It comprises a screen-grid variable-mu stage, a detector and a pentode output valve

gramophone can use the set in a conventional cabinet. When used in a radio-gramophone cabinet it is slid into the base as shown, with the loud-speaker placed just above it and the batteries on a shelf behind the loud-speaker.

A pair of leads then goes from the grid circuit of the detector valve up to a radio-gramophone switch, which is placed on the board supporting the turntable, and another pair of leads goes up from the Rectatone transformer to the tone-control resistance (or potentiometer) which is also placed on that board.

EXCELLENT QUALITY WHEN USED AS A
RADIO GRAMOPHONE!



(Left).—The trimmers should be adjusted with a wooden stick shaped at one end like a screw-driver. Ganging will not give any trouble even to the beginner

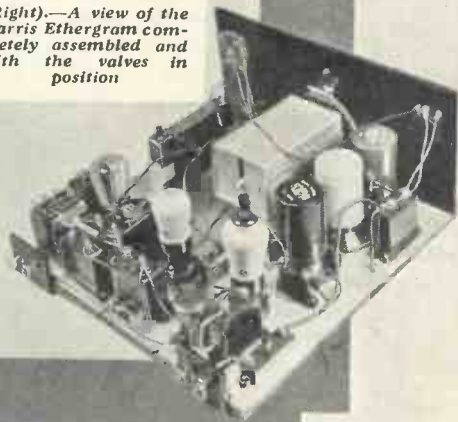


(Right).—Putting the Harris Ethergram through its paces as an electrical gramophone. A tone control is provided



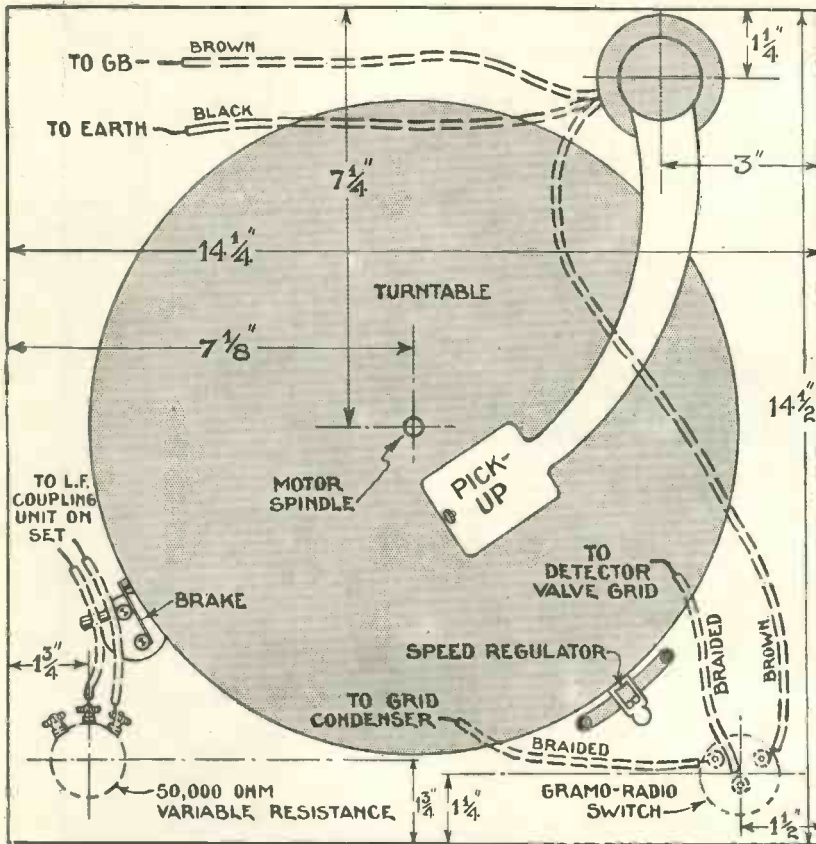
(Left).—Top of motor-board, showing the position of the pick-up. The connections are indicated on page 720

(Right).—A view of the Harris Ethergram completely assembled and with the valves in position



A free station-calibrated scale will be given with every blueprint

THE HARRIS ETHERGRAM—Continued



LAYOUT OF THE MOTORBOARD FOR THE HARRIS ETHERGRAM

This diagram shows the position of the pick-up, grammo-radio switch and tone-control resistance. The method of connecting these parts to the set is explained in the article

There is, of course, also the usual on-and-off switch at the bottom right-hand side of the panel.

The compression condenser which is attached to the baseboard near the aerial terminal serves to control aerial coupling, while the wander plug on the first coil (the green one) also has the same effect.

If at any time the tuning is not sharp enough one can slightly unscrew the compression condenser or alternatively plug in a lower hole on the green coil. Normally it will be found thoroughly satisfactory to keep the compression condenser screwed right down and the wander-plug in hole No. 2 of the green coil.

Anode Tapping

If you examine the theoretical circuit you will see that the anode of the screen-grid valve goes through a .0001-microfarad fixed condenser to a suitable tapping point on the detector-grid coil. Four tapping points are provided, numbered respectively 1, 2, 3, 4 on the blue coil.

Here again selectivity can be

adjusted by altering the coupling, but I would suggest that you always use the plug in socket No. 2.

Start off, then, with the compression condenser screwed right down, the wander plugs in socket 2 of the green coil and in socket 2 of the blue coil, the volume control turned full over to the right or fully clockwise, and the reaction condenser fully anti-clockwise.

In the first socket you will have a variable- μ screen-grid valve of the battery type, an HL type of valve in the detector socket, and in the output a low-consumption pentode. I recommend a 120-volt high-tension battery with the H.T.+1 plug in about 80 (or whatever other value is recommended for the screening grid by the makers of the particular valve) and, of course, H.T.+2 in 120.

The set works perfectly satisfactorily with any good mains unit, and if you are using it with such a device do not exceed 150 volts for H.T.+2.

Grid bias is so arranged that the positive wander plug goes to the switch (and thence to L.T.— when

the switch is closed), while the wander plug connected to the potentiometer goes into maximum or 9 volts. The wander plug connected to the grid bias of the Rectatone goes into a socket corresponding with the grid bias recommended for your maximum anode voltage by the makers of the pentode.

With everything switched on, first of all try the reaction condenser to see that it makes the set oscillate. You need have no fear of causing interference as the oscillation is purely in the detector circuit and does not get into the aerial.

Trimming the Set

If this is satisfactory turn all three dial wheels connected to the trimming condensers in a clockwise direction as far as they will go without forcing and then unscrew each of them by an equal amount—about one turn. Next turn the tuning condenser until you hear any station (not necessarily your local).

If the first station you hear is very loud turn the volume-control knob in an anti-clockwise direction until you have reduced the strength reasonably. It is essential, however, that you should set the tuning condenser at a maximum tuning position and reduce the volume *only* on the volume control.

Then, with the set dead in tune, slowly turn the trimmer wheel on the second condenser (the middle one) one way or the other till you get the maximum strength on that particular station.

Next re-tune slightly (if necessary) on the tuning knob and then make a similar adjustment of the third condenser (that at the rear) until you get maximum signals.

Final Adjustments

A further slight re-tuning if necessary, and perhaps a touch again one way or the other on the second condenser, and your set should be ganged for this station.

Do not touch the first trimmer at the moment. What you have been doing is to adjust the second and third circuits to the first and there is no point whatever in touching the first condenser just now.

Now with or without the aid of reaction you should be able to pick up a large number of stations on either waveband, and when you have "got the hang" of the set test out

Getting Stations with the Harris Ethergram

Sixty stations were received on the Ethergram by Percy W. Harris in his Wimbledon laboratory. His log was confirmed independently by a member of the "Wireless Magazine" staff at Brockley. With the aid of the instructions given in these pages no constructor of the Harris Ethergram should have any difficulty in repeating these excellent results—or of improving on them!

"THIS is the best battery three-valver I have designed. I am going to build an equivalent A.C. model for my own use at home." This is what Percy Harris said when he handed over his new set for test. I have never seen him so enthusiastic over a set before.

"W.M." Station Finder

He produced a copy of the "Wireless Magazine" Station Finder (given free with the October, 1932, issue of "Wireless Magazine") on which he had logged sixty stations. Fifty-seven stations had been positively identified.

Such a bold claim for a battery three-valver does, I admit, seem startling, but my tests have proved that this set is "the goods." The selectivity is startling; the set does bring in dozens of stations; the background is silent, and tuning is simplicity itself.

Independent Test

The set was tested twenty miles from Brookman's Park, using an outdoor aerial, with the specified valves and loud-speaker. The tests were made on the set chassis only. Although the Varley Rectatone transformer is a tone-control gadget, I made no use of its tonal capabilities.

As a straightforward low-frequency transformer, the quality was really splendid. Plenty of volume and no undue emphasis of any particular band of frequencies made listening very enjoyable.

The long waveband was tried first

on a Sunday evening; conditions were quite good. Huizen at the top end of the dial was easily discovered at splendid strength and entirely free from interference from Radio Paris. Radio Paris, a shade farther down, was heard at fine strength.

Next came Zeesen (Königswusterhausen as it is sometimes called). Here there was just a faint back-

hour broadcasting area weather reports.

Such results for the long waves are good, and as most of these stations can be heard at any time of the day, the Harris Ethergram certainly provides a high entertainment value on the long waveband.

Next I turned to the medium waveband. I "ran over" the dial twice, once when the London transmitters were working and again when they were silent. It was here that my best impressions of the set's capabilities were formed.

With the Locals Working

When the local stations were working I easily managed to pick up about twenty stations in addition to the locals at full loud-speaker strength and sufficiently free from heterodyne whistles and other noises to give real entertainment.

Rome, Stockholm, Langenberg, Leipzig, Poste Parisien, Breslau and Hilversum are examples of the type of stations which gave reproduction almost as good as the two local stations.

The lower-power stations—Grenoble, Berlin, Lodz, Poznan and Genoa are examples—were easily logged, but I cannot say that they were heard at full strength and free of interference.

Even so, they are stations that can be heard and they do provide that fascination for the amateur who takes delight in spending hours searching round the dial and logging every station he can.

A Good German Station

When London Regional and National were not working, stations around their wavelength were picked up very easily. Take Mühlacker, as an example. This big German



CONTROLS OF THE HARRIS ETHERGRAM
The two knobs in the top left-hand and right-hand corners are for controlling volume and reaction respectively. Along the bottom of the panel are the wave-change switch, the main tuning knob, and the on-off switch. The gramo-radio switch and the tone control are mounted on the motorboard, the gramophone volume control forming part of the pick-up

ground of interference from Daventry National, but nothing to speak of. The strength of Zeesen was hardly full. Daventry, of course, was a reliable and very strong signal.

All the other long-wave stations on Percy Harris's log were heard at reasonable strength and practically free from morse or other interference. In addition, Croydon and Heston were logged. The latter station can be heard throughout the day at thirty minutes past the

came through every bit as loud as London Regional and at fine quality.

Selectivity on the medium wave-band was found to be decidedly above the average for a screen-grid three-valver. This degree of selectivity can best be described as being nearly super-het type, except round that place on the dial where the local stations came in.

Local-station Spread

The local stations only spread two or three degrees either side of their maximum readings and adjacent high-power stations—Breslau and Poste Parisien, for example—could easily be separated.

On the intervalve and aerial band-pass coils there are tapings numbered from 1 to 4 to vary the degree of selectivity. No. 1, the most sensitive and least selective, gave an adequate degree of selectivity for my purposes.

You will notice from the list of stations that Fécamp was heard at a reading of 10 degrees on the dial. From this we can safely assume that listeners in the Newcastle and Aberdeen areas will have no difficulty in tuning down to their local stations.

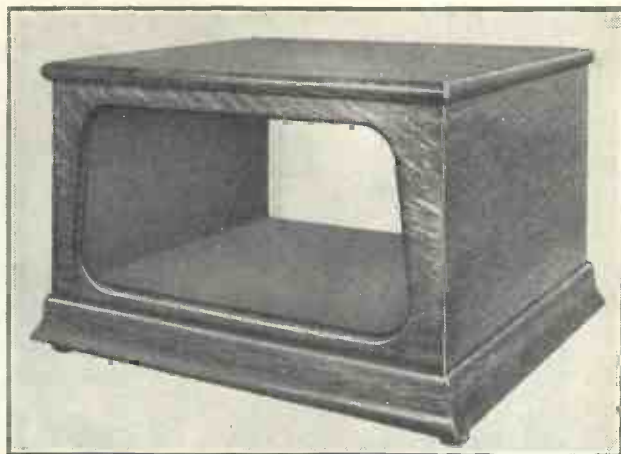
It should be noted, by the way, that I adjusted the first trimmer on the set so that my dial readings corresponded with those obtained by Percy Harris during his test. That accounts for the fact that only one set of dial readings is given in the log that appears below for both the Wimbledon and the Brockley tests.

If you make a similar adjustment when you first "trim up" the Harris Ethergram you should have no difficulty in picking up the stations included in the log. Of course, during the course of a week or so you will be able to extend the log considerably.

I understand that with every blueprint of the set will be given a free

station-calibrated scale for sticking to the variable condenser. With this you will be able to tune in to stations directly by name.

Percy Harris, I think, has reason to be proud and enthusiastic about his new set. I agree with him that it is one of the best battery three-valvers I have had the pleasure to put through its paces. You will be amazed at the results.—T. F. Henn.



PLAIN TABLE CABINET
A special Pickett cabinet for the Harris Ethergram. This will appeal to those who do not wish to make a complete radio gramophone

Log of Sixty Stations Received on the Harris Ethergram

LONG WAVEBAND

Station	Degrees
Leningrad	15.5
Oslo	21
Kalundborg	27
Motala	43
Warsaw	47
Eiffel Tower	50
Daventry National	59
Königswusterhausen	66
Radio Paris	75
Huizen	88
Kaunas	93

MEDIUM WAVEBAND

Station	Degrees
Fécamp	10
Lodz	11.5
Nürnberg	13
Belfast	14.5

Station	Degrees	Station	Degrees
Trieste	15.5	Scottish Regional	46
Gleiwitz	17.5	Toulouse	48
Frankfurt-am-Main	18	Leipzig	49.5
London National	19	Bucharest	50
Bari	20.5	Midland Regional	52
Turin	21.5	Söttens	53
Heilsberg	22	Katowice	55
Bratislava	22.5	Dublin	56
Scottish National	24.5	Berlin	57
Hilversum	26	Madrid	58.5
North National	27	Stockholm	62
Bordeaux-Lafayette	28	Rome	64
Genoa	29	Paris	65.5
Göteborg	31.5	Beromuenster	69
Breslau	32.5	Langenberg	73
Poste Parisien	33.5	North Regional	75
Milan	34	Prague	78
Poznan	37	Florence	81.5
Brussels No. 2	38	Brussels No. 1	83.5
Barcelona	38.5	Vienna	86
London Regional	40	Riga	88
Mühlacker	41	Budapest	95.5
Hamburg	44.5	German Relay	97

All the above stations were heard at good loud-speaker strength by Percy W. Harris in his Wimbledon laboratory and the log was confirmed by a member of the "Wireless Magazine" staff at Brockley



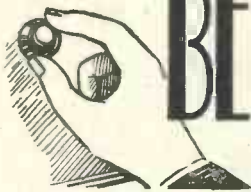
Is This The
Ideal Programme?



HULLO— Almost—EVERYBODY!

The caricatures published on these pages are taken from the topical feature "Personalities in the Programmes" by SLADE which appears weekly in "Amateur Wireless." Many of the sketches have also been reproduced in Continental radio journals. Since the early days of broadcasting SLADE has specialised in caricaturing microphone personalities exclusively for "Wireless Magazine" and "Amateur Wireless"

SHOULD A TONE CONTROL BE A STANDARD FITTING?



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

During the past few months quite a lot has been heard about tone control. Many listeners must be wondering whether it is really worth while. In this article J. H. REYNER discusses the effects of tone control and explains the advantages of including such a control in a modern receiver

MANY of the sets in this season's show incorporated a tone control, and there is no doubt that the system is gaining in popularity.

There are two methods of controlling tone. One of these is to operate on the loud-speaker by providing an excess of the upper and lower frequencies and then cutting out either or both according to the preference of the user.

This method has come to the fore lately owing to the improvements made in loud-speaker design, and most of the tone controls fitted on commercial sets are of this type.

The second method is to vary the amplification of the receiver itself. This is particularly useful in making up for deficiencies in the tuning or amplifying circuits.

The Multitone transformer was the first device of this type marketed for use by the general public, and there have been several other components of a somewhat similar character introduced within the last few months.

The two methods must be considered separately although they inter-link with one another. Let

us assume first that we have an amplifier that gives us faithful reproduction from 50 to 5,000 cycles.

Theoretically the frequency register should extend above this figure, but in practice there are few people able to appreciate the difference between reproduction extending to 5,000 cycles and super-reproduction which includes frequencies of 8,000 to 10,000 cycles.

For one thing many people cannot hear a note of 8,000 cycles frequency. For another the vibrations at the extreme top of the frequency scale are principally harmonics of relatively short duration, and are only used in transient effects.

No modern loud-speaker will give a satisfactory reproduction of transients, so that until we have solved this problem it is of little use worrying much about these extreme upper frequencies.

well-known curve, which many readers will have seen before, reproduced in Fig. 1.

This shows the smallest air pressure required to produce audible sound at different frequencies, and it will be observed that at 64 cycles per second the ear is only 1/1,000th as sensitive as at 2,000 cycles.

Bass and Volume

Many readers will have noticed that an amplifier and loud-speaker may give quite good reproduction with ample bass as long as the volume is loud, but if the strength is cut down, the bass seems to disappear.

This is because the intensity of the bass frequencies has fallen below the critical value shown in Fig. 1, and the ear does not hear them.

Consequently if the balance of tone is to be maintained, it is necessary to apply more energy to the loud-speaker in the bass register, this being increasingly necessary as we reduce the frequency.

A rather similar effect occurs in the treble, so that increased radiation is necessary here as well. In fact, what we really require is a loud-speaker having greater radiation of sound at the two ends of the scale than it has in the middle.

We can do this by suitable design of the loud-speaker, in other words by providing resonances at both these points.

Fig. 2 illustrates a typical response curve taken recently in my laboratories of a loud-speaker which is provided with the two resonances in question.

It will be clear, however, that this is not sufficient to compensate for the deficiencies of the ear, added

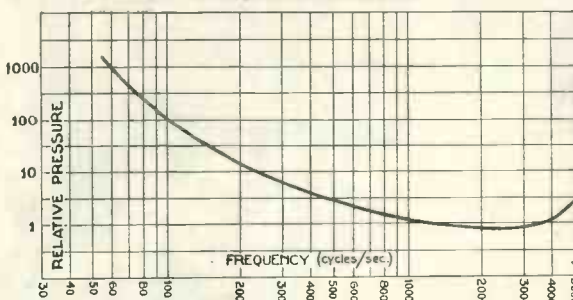


Fig. 1.—Sound pressures necessary to produce same apparent volume to normal ear

Given an amplifier, therefore, having these characteristics, we now require a loud-speaker capable of reproducing the results satisfactorily.

At first sight it seems that this would require a uniform radiation of sound at all frequencies, but this is not so because the ear is not uniformly sensitive. There is a

to which is the fact that different people's hearing is not the same. In order to make the reproduction really pleasant the individual user should be able to control the response of his loud-speaker, and this can be done quite simply by means of a tone control.

Reference to the curve of Fig. 1 will show that the ordinary ear is more deficient in the bass than in the treble. Therefore the tone control principally required is one which will accentuate the bass.

Cutting Off Treble

The simplest way of doing this is to cut off the treble, always assuming that we have sufficient power at our disposal. Cutting off the top (or any part of the reproduction) will result in a drop in the apparent strength.

If, however, we cut down the top to a certain extent and then supply more power to the loud-speaker so that we bring the strength back to its original level, we are now where we were before, but the bass is distinctly more prominent.

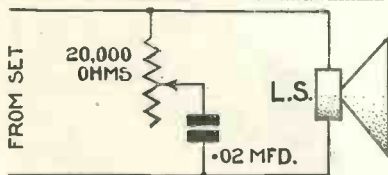


Fig. 3.—Simple tone-control circuit

The simplest form of tone control, therefore, is an arrangement such as that shown in Fig. 3, consisting of a condenser in series with a variable resistance connected across the loud-speaker. If the variable resistance is at its maximum, very little current will flow through the condenser, and the loud-speaker behaves normally.

At the other extreme, if we cut the resistance all out we have the condenser shunted straight across the loud-speaker, and all the upper frequencies will go through the condenser in preference to the loud-speaker windings.

At low frequencies the impedance of the condenser will be high compared with the loud-speaker, so that no appreciable shunting takes place and therefore we get a gradual cut-off of upper notes.

By adjusting the value of the resistance we can arrange that this cut-off is

just as severe as we require, and the quality can be adjusted to suit the individual listener.

It must be emphasised, however, that for this to be successful the loud-speaker itself must have a response reasonably similar to that shown in Fig. 2. The bass response must be there, although it need not be so marked as in the example shown. Otherwise the application of the tone control will be ineffective.

Consider, for example, the response curve shown in Fig. 4. This loud-speaker has neither top nor bottom. The tone control, therefore, will have no effect until it is nearly at the maximum cut-off position.

Here it will start to cut off the middle frequencies, and will only result in the quality sounding thin and lifeless. There will be no accentuation in the bass because there was no bass there in the first place.

Tone controls are sometimes made to accentuate the upper frequencies, but these have little practical application if the amplifier is a good one, because the average ear is quite sensitive to frequencies as high as 5,000 to 6,000 cycles. In many cases, however, the amplifier itself tends to cut off the upper frequencies.

This may be in the low-frequency stage or it may be in the tuning circuits, particularly with the modern multi-tuned set or super-het receiver.

The more satisfactory solution here, however, is to use one of the compensating transformers mentioned earlier in the article. These transformers give an increased amplification in the treble to com-

pensate for the sideband cut-off in the tuning circuits, so that the net effect is that of the level characteristic which we assumed at the outset.

We can, of course, carry this

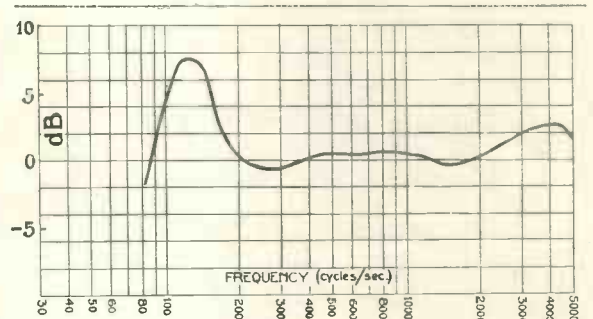


Fig. 2.—Typical response curve of good loud-speaker

procedure a little further and compensate for a poor loud-speaker, such as that shown in Fig. 4, but the better plan is to start with a loud-speaker capable of reproducing all the required frequencies equally well.

It is then possible to apply a tone control to bring up the bass, which is what the average user needs.

Incidentally, the increasing use of pentode output valves falls into line with this scheme, because a pentode tends to accentuate the upper frequencies, and it is customary to provide a compensating circuit of a type shown in Fig. 3 as a matter of course.

Variable Control

It is only necessary to continue this one step further in order to obtain a variable tone control.

When the question of loud-speaker reproduction is viewed in this light, the use of some form of response curve becomes desirable in making a choice of a suitable loud-speaker. While the taking of reliable response curves is a matter of difficulty, it is fairly easy to indicate the approximate frequency range of a particular loud-speaker and to decide whether it is of the type of Fig. 2 or of Fig. 4.

In addition, it does give an indication of the relative sensitivity, and experiments have been in progress for some time with a view to determining whether such response curves would be of use to "Wireless Magazine" readers.

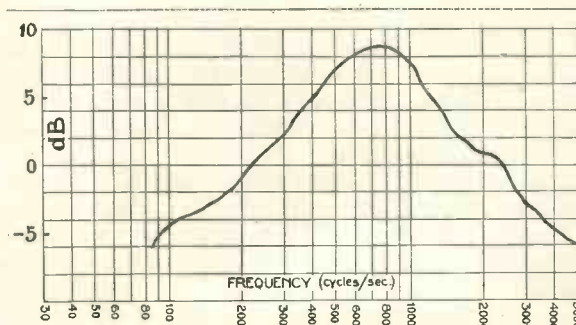


Fig. 4.—Response curve of poor loud-speaker

What We Want to Hear in 1933

By Whitaker-Wilson

THIS time last year we were in what are now referred to as the "old days at Savoy Hill." The year 1932 will, therefore, go down to history as one in which great changes were wrought at the B.B.C.; but change of residence, of course, means no more than that. It is change of effect that counts.

Very few listeners will deny that broadcasting has improved in every shape and form since the B.B.C.

listening by asking "What's on the wireless to-night?" Nobody ever knows what is on—at least, they never do in my house.

Often when I have turned for information I have noticed cases of bad alternating. I suppose most of us have accused the B.B.C. of bad alternating when we have found two things going on at the same time and happened to wish to hear both.

Even so, there is something to be said against alternating an all-star vaudeville with, for example, a relay or a production of a musical comedy. People who like one of these generally like the other.

The only saving grace of a situation like this is that very often the musical comedy is broadcast later in the week in the opposite programme. I have argued with more than one listener that these "twice-weekly" shows are good.

It may be irritating to find yourself confronted with a show you have already heard; on the other hand, if you have missed the first performance you are glad enough of the second. Sometimes you may listen a second time because you enjoyed it the first. So that is as long as it is broad.

I hope the B.B.C. will continue to repeat performances in this way. The idea was a happy one. On the other hand, I urge that alternating should be very definite where possible. To oppose a play with a lecture or a talk is no better than to give listeners the choice between a symphony concert and a broadcast of chamber music.

Since broadcasting has been effected from Portland Place, radio drama has undoubtedly come into its own. The more I listen to wireless plays, the more I feel sure they should be written specially for the microphone and *not* adapted from theatre versions.

I have made a close study of writing for the microphone during the past few months and have come to the conclusion that the two techniques have very little in common. The fact that what you write in your theatre play is for people who can be seen, and the fact that what you write in your microphone play is for people who cannot be seen—well, need I say any more? That is the difference!



IMPERSONATOR AND MIMIC

Florence Desmond is a well-known impersonator and mimic who frequently broadcasts



A POPULAR BROADCASTER

One of the most popular of regular broadcasters is Paul England

went to live in Portland Place. Personally, I think there is no comparison between broadcasting now and broadcasting in the old days of Savoy Hill.

Changes have been made and experiments tried in almost every department of broadcasting. Some of us would like to see further changes still, but there is not much to be said for suggestions that are not practicable.

Most of us begin our evening's

Moreover, by designedly separating theatre plays from microphone plays, the B.B.C. will help the theatres and at the same time make it clear to listeners that they must not expect to have West End productions brought into their own drawing-rooms. Personally, I look forward to a great development in radio drama during 1933.

Programme-making is a psychological activity at the best of times. I have thought—and often

said in critical notes—that the B.B.C. loses a great opportunity of a personal touch with listeners *late in the evening*, in the summer especially.

A Good Singer ?

I am not one of those enthusiasts who listens to dance music until Big Ben tells me I ought to have been in bed an hour ago. I fancy I am not alone in that.

I should, however, appreciate something more to my taste at 10.15 p.m. I feel that—even if it were only twice a week—some good singer should come to the microphone and sing something worth hearing. Not necessarily difficult to understand where the average man is concerned, *but good music*.

Summer programmes are a problem, in any event. It is probably true to say that the listening is halved during the long evenings. If something *with a good personal touch about it* were broadcast at the hour I have suggested, and made a feature throughout the summer, I think people would respond and listen.

Suggestion for 1933

I remember hearing a delightful short recital of Chopin one evening, seated in a deck chair in the garden. The personal touch, though, will be necessary; an ordinary broadcast of somebody's quintet is not the same thing. I offer the suggestion for the summer of 1933.

The summer, however, is not here yet. There will be some cold and foggy nights before any of us listen to Chopin under the stars. Undoubtedly the winter evenings are the evenings for the listener.

Turning to the lighter side first, what of the vaudevilles? Echo answers, "What of them?" I am afraid, in some instances. Everybody is saying "Aren't the vaudevilles awful?"—at least, that is what they are saying to me.

I doubt whether any of the press critics have said ruder things about the vaudevilles than I have. I sincerely hope not, anyhow! All the same,

I should not be honest if I did not say that I do think every attempt has been made to pull them into shape. There has been a fairly recent change in their management and I must say frankly I feel the change has brought about an improvement in many ways.

My quarrel is not with the management so much as with the artists themselves. Whether the B.B.C. has intimated that the average intelligence of the listening public is lamentably negligible, or whether the artists have formed an idea that anything is good enough, I am not prepared to say.

There it is, whichever way you look at it; the type of humour broadcast in many of the vaudevilles is almost beneath contempt.

As I am not here criticising any particular performance, I can hardly mention names; it would not be fair. For all that, and even though I can only speak very generally, I must say I have been amazed that so many well-known comedians have been content to broadcast poor material.

I can call to mind three or four really well-known artists who have either relied on repetitions of some successful turns of their earlier days, or who have seemingly relied on their popularity and risked sending "any old thing" through. It is a poor policy.

To elaborate the point. If Adrian Boult makes a bad mistake in con-



YOU HAVE HEARD THIS PAIR
Bill and Elsie Newell frequently take part in vaudeville broadcasts

ducting (say, a Beethoven symphony), nine out of every ten listeners will miss the fact. That is obvious; we are not all musicians. If he gets wiggled for it by the critics—well, I daresay he knows how to take it.

That is the position in the higher forms of art. A great singer can sing out of tune and "get away with it," so far as the general public is concerned simply because not every one of us has an acute ear.

When it comes to vaudeville and a comedian broadcasts a poor turn, *everybody* notices it and letters by the dozen reach Broadcasting House in protest.

Therefore, it seems only the commonest of common sense to suggest that comedians—however well known and popular—shall be told plainly that they must not let the B.B.C. down—for that is what it comes to.

I should like the vaudeville department to be ruthless in dealing with all matter to be broadcast.

The present method of making up a vaudeville programme would seem to be this: two or three good people are selected and asked to



THE FAMOUS COCKNEY COMEDIENNE
Mabel Constanduros is stopped in the street by a newspaper seller, who wants to give her a hot tip for the 2.30 race!

WHAT WE WANT TO HEAR—Cont.

appear. As they cannot be expected to fill up an hour between them, others far less capable are also asked to give a turn. Consequently, every vaudeville is patchy.

You know as well as I do that people have been grumbling because they have to sit through so much

reliable broadcaster has come on.

The older method of putting down a few names in the programmes—and broadcasting them in any but the advertised order—has been another source of complaint. One has to listen all the time in order not to miss the few items worth hearing.

I feel that while the vaudevilles are so patchy, it would be better to give the precise moment at which the various artists appear; then we can please ourselves what we do about the other kind.

Piano-accordions, banjos, xylophones, and other inventions of the devil do not interest everybody. As things are, we get landed with them whether we like it or not.

I have devoted the main part of this article to vaudeville because I feel it to be so important in the general public sense. Personally, I do not mind if I never hear another.

Were I not a radio critic, I should rarely listen to anything except serious music and good plays. That is not the point, however. *The B.B.C. can never get away from the fact that the vaudevilles earn the daily bread in terms of licences.*

I am certain that the licences would soon reach the ten-million figure if broadcast drama and broadcast humour were really attractive. The drama has improved so much recently that I, for my part, look forward with every confidence that radio plays will be a great attraction before 1933 is very far advanced. I only wish I could think the same about broadcast humour.

Surely the trouble lies in the fact that the intelligence of the listening public is underrated by vaudeville artists? The public in these days laughs at anything worth laughing at. It does not laugh at anything merely silly.

Val Gielgud and I were discussing radio productions the other day, and he told me he was definitely of opinion that broad humour—the knock-about comedian humour, he meant—is no good to wireless, whether in vaudeville or otherwise.

Radio Audiences

His view is one I have held for a long time. The wireless audience cannot accurately be described as the largest in the world. It is a mistake to suggest that if you broadcast you play to a mighty audience. You do nothing of the kind. You often play to one solitary being sitting in his own drawing-room.

In the aggregate it is true, but it is a fact that your real audience may be counted in ones and twos. The sort of humour that makes you laugh at a theatre with a thousand other people to laugh with you is *not* the sort of humour that convulses you when you are alone. You need a *delicate* humour to do that.

Improvement Needed

It is obvious that broadcast humour needs raising several degrees. If the vaudeville department will insist on *clever* humour only, we shall probably improve our vaudeville programmes in 1933.

The higher forms of broadcasting are reaching a perfection which is as surprising as it is satisfying. It is the *popular* form that has not come up to standard. If a high standard in the popular forms of broadcasting be reached by the end of this year the B.B.C. need have no recriminations next Christmas. In the meantime — a Happy New Year to it!



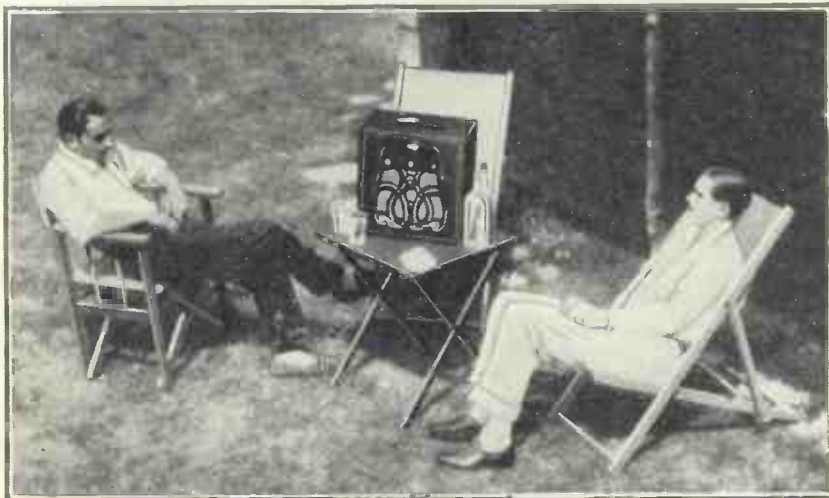
IN VAUDEVILLE
Another popular pair of vaudeville artists
—Payne and Hilliard

“tripe” in order to enjoy one or two good turns.

The only conclusion I can arrive at is that there are not enough good comedians to go round. Yet surely there must be some good ones we never hear broadcast. What about the music-halls in the great provincial cities of England? There *must* be some in the first grade!

The non-stop variety programmes, at the time of writing, are anything but a success. I have heard three and have been disappointed. An air of forced gaiety seems to have pervaded all of them.

The only point about them that has commended itself to me has been that they have been timed. This, at least, gives us a chance of switching off until 8.20 or 8.45 p.m. when, for a few minutes, some



SOMETHING TO LOOK FORWARD TO!
Whitaker-Wilson suggests that something with a personal touch should be broadcast at about 10.15 p.m. during the summer evenings. Here are two listeners enjoying the programme with a Marconiphone portable

WE TEST BEFORE YOU BUY

Free Gift

LAST month "Wireless Magazine" published a special set-buyer's supplement, which made an immediate appeal to thousands of new readers.

The supplement itself helped the newcomers to choose a satisfactory type of set, but we went a step further and offered—free and post free—to every purchaser of a new set mentioned in the supplement a copy of that well-known 2s. 6d. book, "The How and Why of Radio," which gives in concise and easily understood form a complete explanation of the working of a modern receiver.

Offer Still Open

This offer still stands, but in order to qualify for a free copy of "The How and Why of Radio" readers must complete the form to be found on page 560 of the December issue.



MODERN APPEARANCE

This is the Murphy Transportable four-valver for battery operation, which has recently been reduced in price. Note the unusual layout of the controls on the top of the cabinet

The following conditions should be noted:—

- (1) Only one copy of "The How and Why of Radio" will be presented to any reader.
- (2) The form on page 560 of the December issue *must* be completed and sent to: Set Selection Bureau, "Wireless Magazine," 58/61 Fetter Lane, London, E.C.4.
- (3) The offer holds good only

if the set bought was mentioned on pages 4, 6, 8, 10, 12, 14, and 16 of the set-buyer's supplement. This condition will be strictly observed.

(4) The new set must have been bought *after* the publication of the December issue of "Wireless Magazine," that is on or after November 23, 1932.

(5) In each case the dealer's name and address and the exact date of purchase must be supplied to us so that we can verify if we wish to do so.

(6) In each case the Editor's



A FINE H.M.V. RADIOGRAM

This handsome receiver is the H.M.V. super-het radio gramophone in a special walnut cabinet. An automatic record-changer is incorporated in this receiver

decision must be accepted as final and legally binding.

A limited number of copies of the December issue is obtainable from the Publisher, "Wireless Magazine," 58/61 Fetter Lane, London, E.C.4, at 1s. 3d. each, post free.

* * *

Buying a new set? If you live near a regional centre and you want a lot of foreign stations you will need a selective set, such as a super-het costing around £25. If you are prepared to sacrifice some of the foreigners a simpler set will do quite well, such as a three-valver

FREE ADVICE TO PROSPECTIVE SET BUYERS

To take advantage of this service it is necessary only to mention (1) the maximum price and whether this is for a complete installation or the bare set; (2) where the set will be used; (3) what particular stations are desired; (4) whether a self-contained set with or without aerial, or an ordinary set with external accessories, is preferred; and (5), in the case of mains-driven sets, whether the mains are A.C. or D.C.

A stamped-addressed envelope for reply is the only expense. Address your inquiry to Set Selection Bureau, "Wireless Magazine," 58-61 Fetter Lane, E.C.4. There is no need to send any coupon, but it is essential to give the information detailed above on one side of the paper only. Tell your friends about this useful service.

costing around £16. These are, of course, for mains operation.

Living far from a regional centre will imply that you are outside the service area of a regional station. For this reason a moderately selective set might fill the bill, but as you will need a reserve of power owing to your remoteness, you come back to the same type of set as above, that is a super-het or at least a powerful straight set with at least two stages of high-frequency amplification.

The most easily-served set buyers are those about twenty miles from a regional. These listeners, who form a large proportion of our correspondents, will obtain very good all-round results with a three-valver. If ease of control is specially desired a larger set, such as a four-valver or a super-het, is an advantage for those in this category.

Record Reproduction

Most of the sets on the market are fitted with certain arrangements that escape the non-technical listener. For example, gramophone pick-up terminals are fitted almost as a standard, enabling the low-frequency portion of the set to be used as a gramophone amplifier by the external connection of a pick-up.

R.I. Madrigal Three



VERY ARTISTIC APPEARANCE

The cabinet design of the R.I. Madrigal is to be commended. Note the combined on-off, wave-change, and gram-radio switch beneath the main tuning control



THE CHASSIS LAYOUT

This interior view shows how the components are arranged on the metal chassis. The mains transformer is on the extreme right. The loud-speaker is a Rola permanent-magnet type

EVER since the firm of R.I. has been making radio sets, and that is now a good many years, we have expected good quality of reproduction to be placed before all other considerations.

The Madrigal three-valver we have been testing delightfully lives up to this R.I. standard, not only in the reproduction, but in the workmanship throughout the carefully-assembled metal chassis.

One of the Best Examples

We have in this new three-valve set one of the best examples of the table model. The cabinet is just large enough to do justice to the ample bass-note output of the self-contained moving-coil loud-speaker and yet is compact enough to be carried from one room to another should any such transportation be desired.

This is not an entirely self-contained set because to get the best from it you need an external aerial and an earth. There is, for flat dwellers and others who cannot or will not put up an outside aerial, a simple yet effective internal aerial.

If you make use of this the local stations come in at full blast, even without an earth wire. Thanks to the very complete nature of the smoothing in the power supply there is no appreciable mains hum *even when the earth is left off.*

In fact we should like to make a point of this set's completely smoothed supply. Seldom have we tested a set so silent in its background. Even when the set is not tuned to a station you have to put your ear close to the loud-speaker to hear that the power is indeed coming from the mains.

This entire absence of mains hum is in itself very satisfactory, but you must not overlook the fact that the resulting "clean" background also

helps to give realistic reproduction.

There is nothing startling about the circuit, which is a straight three-valve sequence with screen-grid, detector and pentode valves, a mains rectifier feeding all three valves with anode current from the A.C. supply.

There are two tuned circuits, controlled by a two-gang condenser, which has a trimmer super-imposed on the main knob.

Other controls have been carefully considered with a view to giving the

operator sufficient flexibility to cope with modern conditions and at the same time keeping the general "feel" of the control knobs essentially simple.

There is a separate input volume control, which, when used correctly with the reaction control, gives a good degree of selective tuning for the foreigners.

There is a well-designed combination knob for the wave-change switching, mains on-off, and gramophone pick-up. This four-position switch is one of the best we have come across, and does its many jobs silently and without fuss.

The large, open tuning scale, marked in medium wavelengths from 220 to 560 in steps of 20 metres, and in long wavelengths from 900 to 2,000 metres in steps of 100 metres, is brilliantly lighted when the set is in action.

Delightful Tone from Internal Loud-speaker

The mains-voltage panel is fully protected by a neat metal plate. No provision is made for an external loud-speaker. The internal loud-speaker is a permanent magnet model and has a delightful tone. Reproduction has as much top as ether conditions will permit, and is a little more brilliant than with most sets of this type.

Selectivity is up to standard for two tuned circuits, but depends to a large extent on the setting of the volume control. There is no sensation of local-station spread when the volume control is half-way down. At this setting twenty foreigners came in on a 60-ft. aerial.

With this type of set it is important to make proper use of the input volume control, as we were again reminded when trying out the Madrigal. Granted a certain adeptness in using the volume and reaction controls, every listener should be able to obtain satisfactory results on this set.

BRIEF SPECIFICATION

MAKERS: Radio Instruments, Ltd.

PRICE: £17 17s.

VALVE COMBINATION: Screen-grid (Mazda AC/SG), detector (Mazda AC/HL), pentode output (Mazda AC/Pen), and valve rectifier (Mazda UU60/250).

POWER SUPPLY: A.C. mains.

TYPE: Table-cabinet set with self-contained loud-speaker and optional internal aerial.

REMARKS: Gives fine quality of reproduction.

H.M.V. Super-het Radiogram Model 532

HOW are we to report on this gigantic instrument? Obviously it is outside the normal run of radio gramophones and will, from the purchasing point of view, interest a relatively small section of our readers.

If we say the quality is very good how does this definition square up to a similar appraisal of, say, a three-valve table model? If we say the range is very great, how much greater, you may ask, is the range of this instrument than of, say, a table five-valve super-het?

Difficult questions to answer!

Here we have de luxe radio carried to the uttermost conclusion. Range is literally limited only by conditions. Certainly there is not a station in Europe that, at some time or another, would not come through on this super-het instrument.

Quality? Certainly above the average even for a pedestal model. The very large walnut cabinet imparts to the reproduction a sonority that simply cannot be obtained on sets whose small cabinets limit the baffle area.

Turn up the volume when listening to radio or records and with this H.M.V. "ten" you get a majestic output that has to be heard to be believed.

Enough Volume for a Small Hall

The two PX4 power valves between them give an undistorted output of nearly 5 watts. This represents very much more volume than would normally be wanted in the home. It is enough for a small hall, in fact.

An important feature is the tone control, which works on radio and gramophone. It cuts down the top notes. This means that needle scratch can be eliminated from records, while heterodyne and other forms of ether vexations are cut down on the radio side.

The controls are mounted on the motorboard, underneath the weighted lid of the cabinet. Tuning is by one knob. This control works a dual-calibrated scale. The wave-change switching is so arranged that when on the medium waves only the part of the scale marked in medium wavelengths is lit up.

On switching over to the gramophone side, the dial light comes on under the word "Gram" on the scale and the wavelength calibrations are in darkness.

Apart from the tuning knob, there is the knob

NUTSHELL SPECIFICATION

MAKERS: The Gramophone Co., Ltd.
PRICE: £84.

VALVE COMBINATION: Six-valve super-het circuit with separate three-valve power amplifier and mains-valve rectifier. Push-pull output valves (PX4).

POWER SUPPLY: A.C. mains, from 100 to 260 volts.

TYPE: De-luxe radio gramophone with automatic record-changing mechanism. Needs short external aerial and earth.

REMARKS: An exceptionally powerful set for the connoisseur.

working the control switch, a knob for the tone control and a knob working a local-distance switch. These are the radio controls.

The volume control, working of course, on radio and records, is sensibly mounted on the front of the cabinet so that variations can be obtained without lifting the lid.

On the gramophone reproducing side, this instrument is luxuriously equipped. There is the well-known automatic record-changing

mechanism, with many detailed improvements. A very good point is that the entire mechanism can, if desired, be switched out of circuit, so that records can be played in the usual way on special occasions.

Playing Eight Records Automatically

There is a switch that enables a record to be repeated indefinitely and this switch can also be set so that the automatic mechanism comes into action for eight 10-inch or eight 12-inch records. The third position gives the independent action just mentioned.

With an aerial consisting of a yard of flex, we logged over thirty stations at full strength on the loud-speaker. With a short indoor aerial, all stations came in at such volume that we had to revert to the "local" position of the local-distance switch for several stations more than 500 miles away!

The super-het circuit works without any trace of instability or second-channel interference. No doubt the variable-mu valves account for some of this performance and for the fine control of the sensitivity.

This instrument is thoroughly recommended to listeners who can install it in a room large enough to do it justice.



AN EXCELLENT INSTRUMENT

All the controls of the H.M.V. radiogram are on the motorboard, except for the volume control, which is seen just above the loud-speaker fret. The appearance is really dignified



THE INTERNAL ARRANGEMENT

The radio receiver is seen on the left of the cabinet (mounted vertically) and the power amplifier is fixed to the bottom. The design has been well thought out

Ekco Super-het Consolette Model SH25

HERE we have a super-het that gets over all the usual snags of its type. This new Ekco set has one-knob tuning and it is simpler to get stations on this than with most "straight" sets.

Just turn the knob for tuning and, as the pointer traverses the giant tuning scale, marked in stations, programmes come rolling in at full strength on the loud-speaker.

If they are too strong, a touch on the volume control brings them down. If the locals are being received you flick a switch and the overall amplification is cut down so that full-strength reproduction can be obtained without reducing the volume control to its minimum.

Switch to Reduce Interference

Should the station you are listening to be troubled with excessive background or a heterodyne whistle, you just flick another little switch and the top-note response is reduced—and so is the interference.

Baldly stated, that is what you can do on this new super-het. The more you operate it, the more you appreciate its excellent points. We are impressed with the fact that, though the overall amplification is so great

SPECIFICATION IN BRIEF

MAKERS: E. K. Cole, Ltd.
PRICE: £25 4s.

VALVE COMBINATION: Super-het sequence: first detector (Cossor MSG/LA), oscillator valve (Mullard 354V), intermediate-frequency amplifier valve (Mullard VM4V or Cossor MVSG), second detector (Mazda AC/HL or Mullard 354V), and pentode output (Mullard PM24M, Cossor PT41, or Marconi PT4).

POWER SUPPLY: A.C. or D.C. mains (A.C. model tested).

TYPE: Table-cabinet set in bakelite case, with self-contained moving-coil loud-speaker and optional internal aerial.

REMARKS: Gives satisfactory quality with very selective tuning.

ducer. A feature is the metal rectifier for the mains supply.

Around the periphery of the loud-speaker opening is the famous Ekco station indicator. We admit that at first we doubted the wisdom of this, seeing that stations are apt to move so inconsequentially about the waveband. A first-hand experience of the system justifies the makers in fitting this dial, provided, of course, that a new one is available should drastic wavelength alterations be made.

Moreover, they have had the good sense to mark wavelengths at suitable positions, so that though Leipzig and Frankfurt have already "done a swop," you can find them by reference to their wavelengths.

There are about fifty stations marked on the medium-wave section of the station indicator. *We got them all in less than an hour.* Every one was at full strength. And—this is the marvel—all were clear of interference.

The London stations were cut out completely for the reception of the foreigners adjacent to them in wavelength. Such tricky neighbours as Poste Parisien, Milan, and Breslau came through without a trace of interference—a really good performance, this.

On the long waves, the selectivity is not quite so good, but there is no difficulty in getting all stations worth hearing. Königswusterhausen had a "twitter" from Daventry, but was otherwise clear.

The quality is above the average for a super-het and, if use is made of the tone control, there will be no complaints. A large volume output can be obtained without distortion. This makes the set especially suitable for repro-

duction of gramophone records, for which provision is made, as with all modern receivers.

Easy for the Novice to Operate

The set is very easy to operate and the absolute novice would easily be able to get all the stations marked on the station indicator.

In our opinion, this is one of the most successful of the season's super-het sets. We warmly recommend it to station hunters, as well as to those who like good quality and easy control.



VERY EASY TO TUNE

The station dial fitted to the Ekco super-het makes tuning an easy matter for the beginner. Every well-known station is marked. The cabinet is made of bakelite



A WELL-DESIGNED CHASSIS

On the left is seen the mains-voltage adjustment panel and the metal rectifier. The loud-speaker is of the energised moving-coil type. Note the ample screening provided

that even weak foreigners are brought in at overloading strength, the background is not objectionable.

This is, in our opinion, a great achievement, and rather surprising in view of the fact that there is no high-frequency valve in front of the first detector. The results will appeal to the non-technical man on ordinary listener standards, but the set has an added appeal to the seasoned amateur who appreciates the difficulties the designers of this set have overcome.

The five-valve chassis takes up the lower part of the bakelite case, and in the top is the moving-coil repro-

Macnamara Golden Voice Receiver

IT was a happy idea to call this a "golden-voice" set because, as our extensive tests have clearly proved, the reproduction from the Macnamara three-valver is pleasing above the average.

The designers have achieved that rare blending of tone colours that goes to make music mellow without being woolly, and speech clear without being strident.

In other words, we think this set is deserving of its name. For a table model, with the obvious limitations in baffle area, the bass-note output is exceptionally well marked.

Probably, as the makers say, the results have been obtained by a careful choice of cabinet to go with the moving-coil loud-speaker.

By the way, speaking of the cabinet reminds us that this set is marketed with a choice of a de-luxe walnut model, which we actually tried, or a plain unpolished cabinet at three guineas less.

The idea is good. Many listeners like the look of a chassis and would buy it to put in an existing cabinet were it not for the fact that usually the much-desired chassis is available only in a cabinet that would be too costly to throw away.

Then, again, there must be many listeners who, having limited means, want to be sure of good radio results, and are prepared to sacrifice appearance to that end.

Well, this Macnamara set is a good straight three-valve combination for A.C. mains; the fourth valve is the rectifier. All four valves are mounted on what must be the best-finished chassis on the market. It is chromium-plated throughout!

Remarkable Response with Plenty of Punch

The chassis takes up the lower part of the cabinet and the top part takes the moving-coil loud-speaker, which is of the mains-energised type, and gives, as tests show, a remarkable response with plenty of punch.

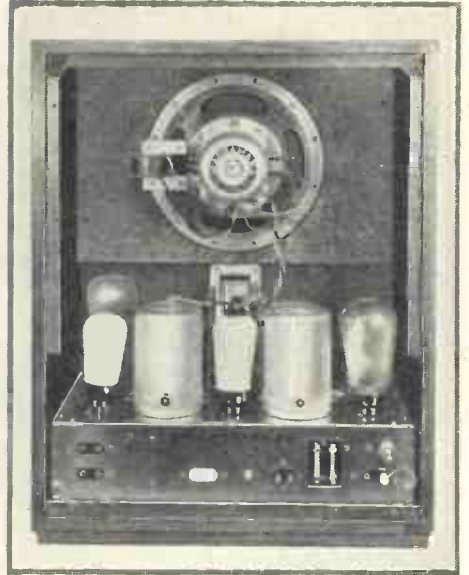
The back of the chassis is notable for the inclusion of every possible gadget you can think of, including extra loud-speaker sockets, pick-up sockets, mains aerial, fuses for the mains, a hum-adjuster for noisy mains, and a very simple plug-and-socket system for the mains-voltage adjustment.

An unusual point is the fixing of the mains on-off switch at the back of the set.

The front of the cabinet is very attractive, with the loud-speaker fret



A HANDSOME CABINET
The walnut cabinet of the Golden Voice set is of tasteful modern design. The tuning scale is calibrated in metres. An unpolished cabinet is also available



INSIDE THE CABINET
An interior photograph. All the components are underneath the metal chassis, except the coils and valves. The on-off switch is at the top-right corner of the metal chassis

at the top and the controls neatly arranged below. There is a very efficient tuning system, consisting of a two-gang condenser with a trimmer knob on top of the main knob to vary the fixed plates of the aerial-tuning section, thus keeping the condenser in gang all round the dial.

Subsidiary Controls of Real Value

The subsidiary controls are just what are needed to get the most from the circuit. There is a separate reaction control and another knob for volume. Actually the volume is controlled by a series aerial condenser, and at the maximum setting the condenser is shorted, thus giving a direct aerial coupling.

By a correct adjustment of the reaction and volume controls, this set gave remarkable selective tuning, in spite of the fact that there are only two tuned circuits.

The London stations spread only a little on each side of their wavelength settings. Eighteen kilocycles away from them foreigners could be picked up at loud-speaker strength.

We were impressed with the strength of foreigners on the mains aerial. There is very little mains hum with this set, even without the earth.

We should say that this is an ideal set for the novice, since without any trouble at least twenty stations could always be brought in. With more expert control, meaning a nice balancing of the reaction and volume controls, the set will give still better results.

The reception of foreign stations on the mains aerial was remarkably free from background noises. No doubt this is partly due to the good smoothing of the power supply from the A.C. Mains.

BRIEF DETAILS OF THE SET

MAKERS: Telsen Electric Co., Ltd.

PRICE: £15 15s. in walnut cabinet, or £12 12s. in plain unpolished cabinet.

VALVE COMBINATION: Screen-grid (Mazda ACS2), detector (Mazda AC2HL), pentode output (Mazda AC/Pen), and mains rectifier (Mazda UU120/350).

POWER SUPPLY: A.C. mains.

TYPE: Table-cabinet set with self-contained loud-speaker.

REMARKS: Gives very sweet tone and gets many stations easily.

Eddystone 7-metre Converter Kit Set



THE KIT ASSEMBLED

A photograph showing the Eddystone converter ready for use. On the right can be seen the special aerial-coupling condenser, and on the left the unit for controlling the intermediate frequency

WE have recently built up and tried out, so far as conditions would permit, the Eddystone unit designed for the reception of ultra-short-wave signals around 7 metres.

This unit works on the super-het system. It can therefore be used only with sets having one or more stages of high-frequency amplification.

Though designed for such very short wavelengths this unit has quite a conventional circuit arrangement. The specially developed feature of the unit is the coupling device between the unit and the aerial terminal of the set.

A screened tuned circuit is employed in the anode circuit of the unit's valve. This is made variable by means of a small condenser knob on the top of the coupling unit's case. The wavelength range covered by the unit is 240 to 500 metres, to which waveband the set must be tuned to give the intermediate frequency in the super-het working.

The tuning and reaction circuits of the one-valve follow general practice, but the tuning and reaction condensers used are simply delightful in operation.

Long extension handles are fitted to both these controls and the tuning is done with one of the finest slow-motion dials we have ever handled.

The assembly of the unit is quite simple. The 7-metre tuning coil with reaction winding is mounted directly

on the terminals of the tuning condenser.

In action the unit behaves just as well as if normal wavelengths were being tuned in. We were able to get on to an amateur at Baldock, the test position being Letchworth, Herts.

BRIEF SPECIFICATION

MAKERS: Stratton & Co., Ltd.

PRICE: £2 11s. for the complete kit of parts.

VALVE COMBINATION: Oscillator-detector, worked with the valves in the broadcast set.

POWER SUPPLY: Batteries of the existing set or, if a mains set, a 60-volt high-tension battery and a 2-volt accumulator are needed.

TYPE: Short-wave converter unit—suitable for connection to sets with one or more high-frequency stages.

REMARKS: A very interesting unit of special interest to short-wave enthusiasts.

Any good low-impedance valve seems to work well in this unit.

We found the best position for the intermediate-unit wavelength adjustment was around 240 metres.

One important point is that the aerial length must not exceed 20 ft. or the unit valve will not oscillate.

Ferranti Clock Super-het

FULL details and a test report of the Ferranti standard super-het consolette were published in the September issue of "Wireless Magazine." Recently a new model incorporating a synchronous electric clock and station dial has been put on the market; this deserves special mention.

The synchronous electric clock is fitted in the centre of the loud-speaker grille. It maintains accurate time and is so arranged that it runs continuously irrespective of whether

the set is switched on or not, that is, providing the mains attachment is plugged into the wall socket. On test, we found that the readings on



A FINE JOB

A front view of the Ferranti clock model super-het. The cabinet is made of solid walnut. There will be no excuse for missing favourite programmes with a clock fitted in the loud-speaker fret

the station dial were extremely accurate.

The dial is illuminated by a beam of light from behind; this falls on the station name, which the listener chooses by rotating the tuning knob.

No change has been made in the design of the set chassis and on test we found that the results were similar to those we obtained with the standard model. At night we logged almost every station worth hearing. Selectivity was so good that on the medium waveband Mühlacker was absolutely clear of London Regional and on the long waveband Königswusterhausen was just clear of Daventry National.

Circuit for Modern Conditions

The circuit has been designed to meet the most rigid modern conditions. An initial stage of high-frequency amplification prevents interference with other receivers, variable-mu valves provide good volume control and band-pass coupling gives selectivity without loss of quality.

Just under the clock there is a little knob which controls the tone. This is a very useful gadget when listening to foreign stations which have a little "mush" or heterodyne whistle, spoiling reception. When the tone control was in circuit background noises were almost negligible.

BRIEF DETAILS OF THE SET

MAKER: Ferranti, Ltd.

PRICE: £26 5s.

VALVE COMBINATION: High-frequency (Osram VMS4), oscillator (Ferranti D4), first detector (Osram VMS4), intermediate high-frequency amplifier (Osram VMS4), second detector (Ferranti D4), power output (Ferranti P4), and valve rectifier (Ferranti R5).

POWER SUPPLY: A.C. mains only, 200 to 250 volts, and special models for other voltages.

POWER CONSUMPTION: 55 watts.

TYPE: Self-contained table set needing only an external aerial and earth to complete installation.

REMARKS: Best value in A.C. super-hets on the market. A synchronous electric clock is incorporated on the front of the cabinet.

THE NEW IRON-CORED TUNING COILS

The New Ferrocart Coils Explained by ALFRED SCHNEIDER

IN the October issue of "Wireless Magazine" W. James gave an interesting survey on modern tuning-coil practice. We learned from his article that the goodness of a coil depends upon its size, small coils having greater losses and less selectivity than large ones, and came to the conclusion that, from a practical point of view, in spite of their higher losses, small coils are to be preferred, being easier to shield and more conveniently fitted.

New Type of Coil

This is perfectly correct in regard to the air coils hitherto exclusively used. However, in this connection it will be interesting to give a description of a new type of coil which, though being small and possessing all the advantages of small coils, does not show the usual drawbacks as it has the same or even a greater "goodness" and smaller losses than the best large air coils hitherto used.

Lower losses mean increased selectivity, which is the most important property of a modern receiver.

Use of Magnetic Core

The great efficiency and the small size of these new coils is due to the use of a magnetic core. All radio-frequency coils so far used have been air-core coils, without any magnetic core. It is obvious that a magnetic core (as used in low-frequency transformers) would greatly increase the efficiency, but hitherto there was no material in existence which was suitable for use in high-frequency coils.

This is because high-frequency currents induce very considerable eddy currents in any conductive material; so naturally they do also in the magnetic core if it consists of conductive material.

All known magnetic materials, such as iron and iron alloys, are good

electric conductors simultaneously; therefore enormous eddy-current losses would occur in such an iron core, increasing the losses of the coil instead of reducing them.

The problem, therefore, was to create a material with good magnetic properties but of a non-conductive nature.

Such a material has been invented by the well-known talking-picture inventor associated with the Tri-

Ergon sound-film group, Hans Vogt. He takes very small particles of a material of high-grade magnetic properties which are insulated from each other by a special insulating process.

Insulated Particles

These insulated particles are distributed in a thin layer on a paper strip and a number of paper strips so prepared are pressed together so as to obtain either a plate or a roll. Thus a material is obtained which is something intermediate between cardboard and iron (*ferrum*); it is therefore called "Ferrocart."

This "Ferrocart" is electrically non-conductive, so that eddy currents cannot occur, and due to the iron particles contained in it it can be used as a magnetic core for high-frequency coils.

Applying a Ferrocart core to a tuning coil, you note two things: Firstly, the inductance of the coil is increased considerably or, in other words, you require less wire for producing a certain inductance, thus reducing the copper losses.

Close Screening

Secondly, you can screen this coil with a very small distance between coil and cover without any detrimental effect on the inductance or the losses of the coil. This is due to the fact that the magnetic flux is concentrated by the magnetic core, so that no leakage flux exists to cause losses in the screening box.

Fig. 1 shows a comparison between a good air-core coil and a Ferrocart coil. Both are shown screened and unscreened. The difference in size is considerable, although the inductance is the same and the losses of the Ferrocart coil are lower, as can be seen from the comparative diagrams shown in the same figure.

Fig. 2 gives a further comparison

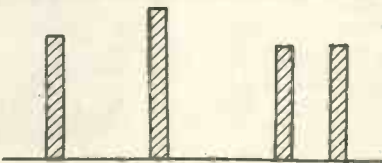


Fig. 1.—Cylindrical air-cored coil (on the left) and coil with Ferrocart core, both of the same inductance. Both are shown screened and unscreened. The losses are illustrated by the diagram below each coil

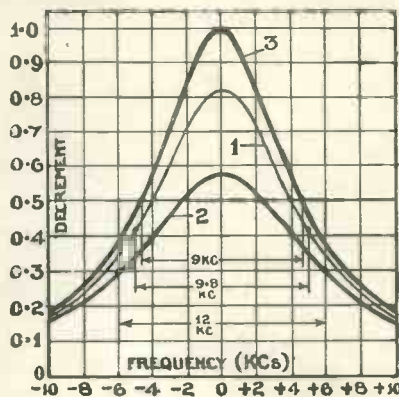


Fig. 1a.—Resonance curves of the coils shown in Fig. 1. Curve 1 for an unscreened air coil; curve 2 is a screened air coil; and curve 3 for a Ferrocart coil, screened or unscreened

NEW IRON-CORED COILS—Cont.

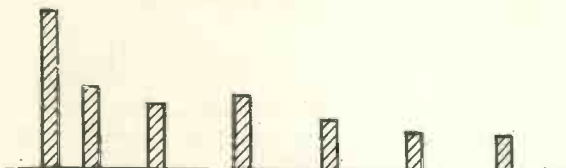
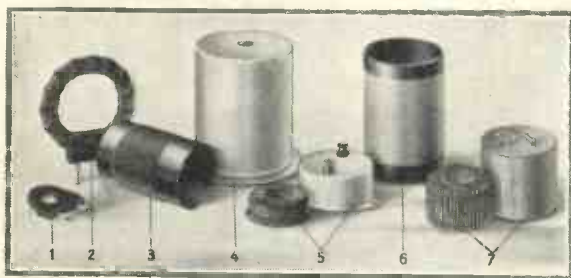


Fig. 2.—Various types of air coils compared with Ferrocort coils (Nos. 5 and 7). The inductance of all the coils is the same: The losses are quite different, though, as shown by the diagrams below the coils

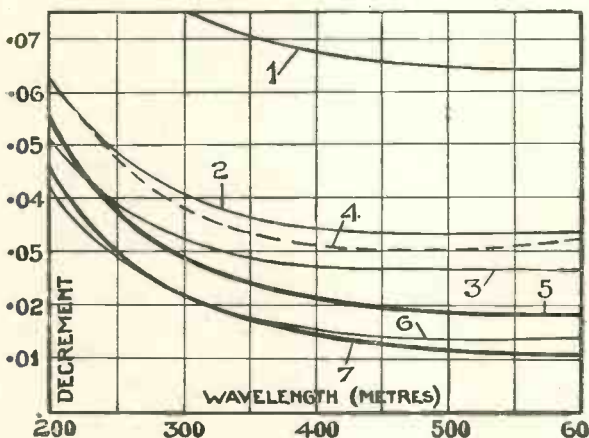


Fig. 4a.—Curves of the damping decrements of the coils illustrated in Fig. 2

between air coils of all shapes and Ferrocort coils. Coil 5 and 7 are Ferrocort coils. The losses at 400 metres wavelength are again shown in the diagram. Note that the Ferrocort coils 5 and 7 have the same losses whether screened or not screened, while the losses of the others are seriously affected by screening.

For Transmitters

Fig. 3 shows two giant coils for a transmitting station of 1.5 millihenries inductance, the left one with Ferrocort core and the right one with air core. It must be added that the Ferrocort coil can easily be screened, while the air coil cannot conveniently be screened because of the great size.

Hitherto the standard Ferrocort coils have been of toroidal shape, but the newest ones have a form

similar to the other one and the price also is much lower.

Fig. 6 shows a number of Ferrocort radio components and Ferrocort plates, rolls and stampings. It may be added that Ferrocort can be easily worked, that is, cut, sawn and stamped. Single parts can be pressed together by means of heat.

The manufacture of such Ferrocort coils in this country has been started already, so that they will be available on the English market

similar to a shrouded transformer. A coil of the latter form is shown in Fig. 4 alongside an air coil of the same inductance and losses.

The Ferrocort material can be applied not only to tuning coils, but also to chokes, coupling coils, reaction coils, band-pass filters, etc. A high quality selection circuit with air core is shown in Fig. 5, compared with a rejector and selection circuit, with a Ferrocort core, of similar characteristics. The Ferrocort coil is much smaller

for home-constructors and set makers ere long.

As a matter of course, a definite judgment on the new coils cannot be given before practice has proved their usefulness in every respect. It can be anticipated, however, from the experiences so far gained that coils with Ferrocort cores will mean a revolution in the practical design of radio receivers.

Efficiency and Compactness

We may expect that quite new constructional shapes of components will result so that there is a chance for home constructors and set makers to rearrange the structure of their receivers fundamentally, and to increase further the efficiency and compactness of sets.

[EDITOR'S NOTE.—Readers will be interested to know that Colvern, Ltd., of Romford, Essex, have secured the exclusive rights to



Fig. 3.—Coils for a transmitter; on the right is an air coil, while on the left is a Ferrocort coil with the same electrical characteristics. The latter can easily be screened

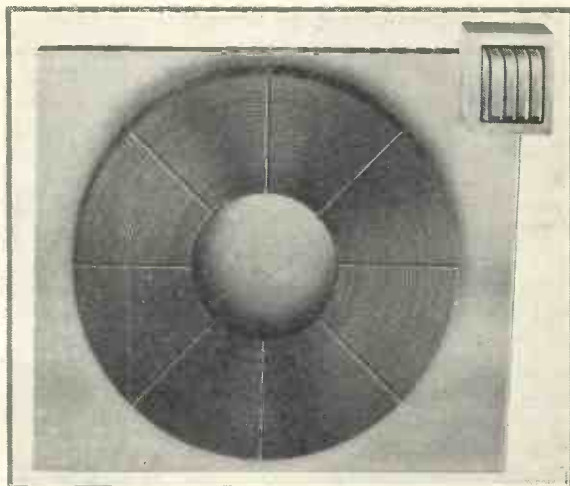


Fig. 4.—A comparison in size between an air-core coil and a shrouded Ferrocort coil with the same inductance and losses

THE FERROCART PRINCIPLE

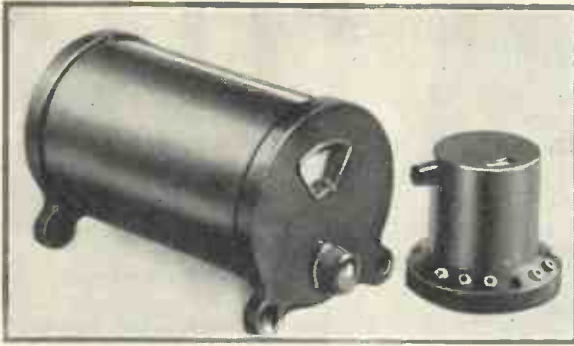


Fig. 5.—On the left is a good selector coil with an air core; on the right is a similar coil but with a Ferrocart core

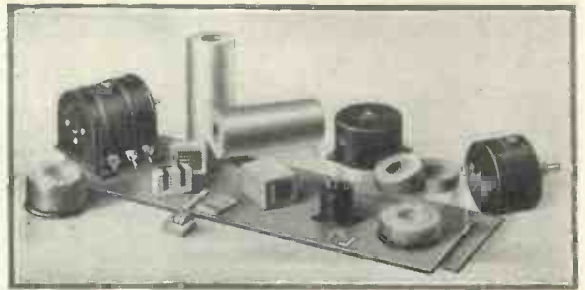


Fig. 6.—Radio components making use of Ferrocart cores and some of the Ferrocart raw material. Colvern, Ltd., who have the exclusive rights to manufacture in this country, are at present engaged in development work

manufacture Ferrocart coils in this country. They are now engaged on intensive research work in this direction, because certain alterations are needed to make the coils suitable for the British market.

For instance, it is necessary to

develop dual-range tuners with integral switches, whereas all the coils illustrated in this article are of the single-range type without any switching.

The announcement of the new coils has intrigued radio technicians,

and the production models will be tested with more than usual interest as soon as they appear on the market. Readers of "Wireless Magazine" will be kept informed of the progress of Ferrocart coils in this country as soon as definite information is available.]

Notes from Here and There

A NEW permanent-magnet moving-coil loud-speaker, known as type 95, is now being marketed by the Marconiphone Co., Ltd.; the coil has an impedance of 10 ohms at 800 cycles and the D.C. resistance is 7.5 ohms.

We learn that the City Accumulator Co., of 7 Angel Court, London, W.C.2, have taken additional showroom accommodation on the ground and first floors at 4 Surrey Street, Strand, W.C.2.

The price of the Loewe Varitone loud-speaker, of which a report was published on page 548 of the November "Wireless Magazine," is £1 19s. 6d. and not £2 2s. as stated in the report.

Electric Clocks

Attractive clock cases to match up with different receivers are being made by the Junit Manufacturing Co., Ltd., of Steele Road, Acton Lane, W.4, for their synchronous electric clocks. For instance, a model to match up with the cabinet of the Pye K receiver costs £2 2s.; models are also available for such sets as Lotus, Ultra, etc.

From the Radio Resistor Co., of 1 Golden Square, Piccadilly, W.1, we have received a copy of a four-page folder giving details of Erie grid leaks and resistors. This folder gives details of colour coding for resistances, although all Erie resistors are identified also by a label bearing the value marked out in figures.

Every mains enthusiast and amateur electrician should have a copy of the attractive 92-page catalogue issued by M.K. Electric, Ltd., of Wakefield Street, Edmonton, N.18. One of the most interesting of the gadgets described is a fuse plug. Even though the radio set is provided with a fuse, one of these special plugs is an advantage.

Ferranti's super-het receiver was voted by a large majority to be "the best value-for-money set" at the Manchester Radio Exhibition in a special ballot organised by the *Manchester Evening Chronicle*. Miss Ann Penn, the well-known impersonator, afterwards presented Mr. V. Z. de Ferranti, managing director of the company, with a silver trophy on behalf of the *Manchester Evening Chronicle*.

A new valve-testing appliance, known as the AvoDapter, is described in a folder received from the Automatic Coil Winder and Electrical Equipment Co., Ltd., of Winder House, Douglas Street, S.W.1, makers of the well-known Avometer.

Seven Wise Maxims

1. Install your loud-speaker in the largest room of the house; it is perhaps all to the good if the apartment contains heavy carpets, curtains and hangings.

2. Try placing the loud-speaker in different corners of the room; one of these will be found the best for all-round production.

3. See that the room is not too brilliantly lighted; a soft dim light will do much to increase your enjoyment of radio plays.

4. Don't attempt to read a book if the rest of the family wishes to listen to a concert; you can neither read or listen to music in these circumstances.

No Twiddling!

5. Adjust the dials of the receiver correctly to the wavelength of the transmission at the outset, then make a rule that nobody shall twiddle the condensers during the broadcast.

6. If you are asked to tune-in to other broadcasts do so cheerily and willingly, but when you have found one listen to a complete item, if it is music.

7. Don't chop and change about every few minutes; nothing will annoy your audience more than bits and pieces.

Jay Coote.



LISTEN FOR THIS STATION ON THE SHORT WAVES!

A general view of the main transmitting gear at the privately-owned station CT1AA at Lisbon, Portugal. This station is well heard in the British Isles

DURING the last few years Portugal has enjoyed programmes from several low-power private transmitters spread over the country, the most important of which is CT1AA. This station, which works on a wavelength of 31.25 metres, began its regular transmissions early in 1924. It is well received in this country.

This station has one unique feature. It is entirely supported by its owner, Senhor Abilio Nunes Dos Santos, who has spent some £10,000 in the transmitting gear, and who always keeps his station abreast of the latest developments.

No Advertising

One of Senhor Santos' rules is that no advertising matter shall be broadcast. Although the owner manages a chain of shops in Portugal, no advertisement for them has ever



STUDIO FOR TALKS AND GRAMOPHONE RECITALS
Studio No. 1 at station CT1AA, used for talks and gramophone-record recitals. It has been visited by many high Portuguese officials. The gramophone equipment was specially made by Western Electric

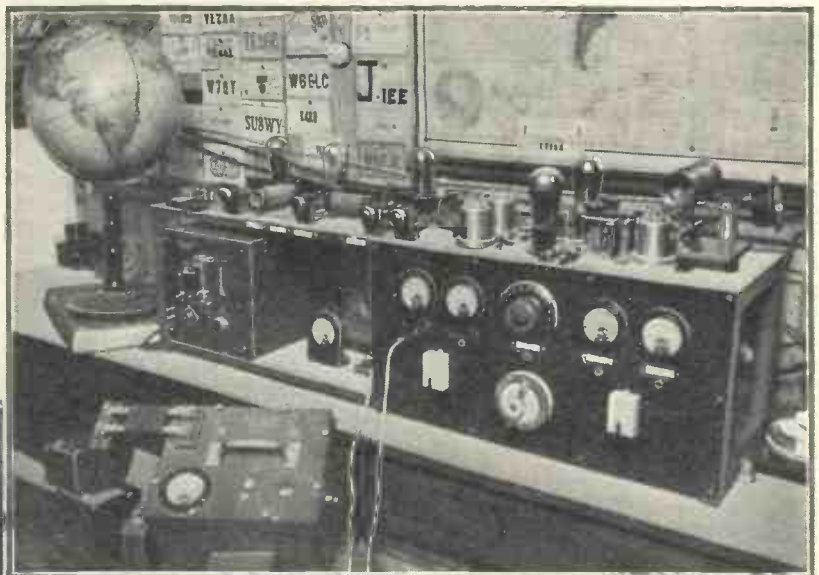
CT1AA

A special description and illustrations of the privately-owned short-wave station at Lisbon, Portugal, which works under

been broadcast from the station.

Cabinet ministers and high Portuguese officials have spoken through CT1AA's microphone and in recognition of his services to Portuguese broadcasting Senhor Santos has been decorated with the Merito Industrial by the Portuguese government.

The transmitter and studios are situated in the most exclusive residential quarters of Lisbon. The studios and transmitters are about half a mile apart and great difficulty was experienced in connecting them. Finally, after a considerable amount of experimenting, an aerial cable (shielded to earth) was installed.



CRYSTAL-CONTROLLED TELEGRAPHY TRANSMITTER
This telegraphy transmitter, which forms part of the station CT1AA at Lisbon, works on a wavelength of 21.28 metres. The power in the aerial is 18 watts. Note the many reception cards fixed to the wall

Two studios are employed by CT1AA, Studio No. 1 for talks, gramophone recitals, and instrumental solos, and No. 2, which will accommodate an orchestra of twenty-five musicians, for orchestral and concerts of a similar nature. The gramophone reproducing apparatus installed in No. 1 studio was specially designed by Western Electric and is enclosed in glass cases to prevent unwanted vibrations being picked up.

The original wavelength of the station was 42.9 metres, but this has since been changed, after a period

CALLING!"

the call sign CT1AA. It transmits musical programmes and also has two telegraphy transmitters working on 21.28 metres

of testing on lower wavelengths, to 31.25 metres, where the station now appears to have finally settled down.

The call sign is "CT1AA, Radio Colonial, Lisbon, Portugal." Short-wave listeners should have no trouble in picking up this station on Thursdays and Fridays from 10 p.m. onwards, as announcements are made in English, Spanish, French, and, of course, Portuguese.

The station has received some 4,500 letters from distant parts of the world, including California and South America, reporting excellent reception.

Push-pull Type of Transmitting Circuit

The transmitting circuit of CT1AA is a modern tuned-plate tuned-grid push-pull type which has proved easy to tune and operate. This system also permits the anodes of the transmitting valves to be fed at full voltage without developing undue heat or giving rise to abrupt changes in current consumption.

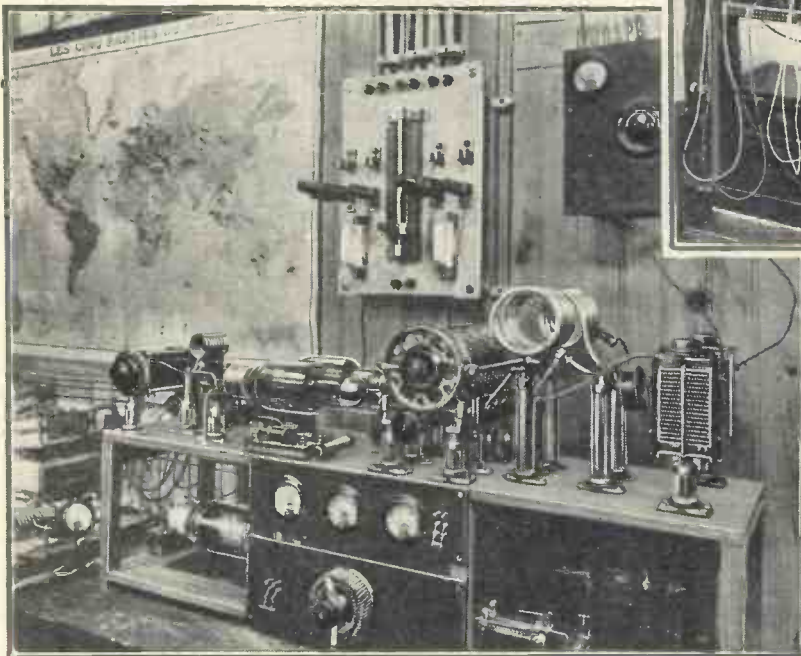
A bank of Philips TA4/1,500 transmitting valves is used, the modulation being effected by three 1.5-kilowatt valves in parallel. A huge 18-volt accumulator with a capacity of



THE MAIN STUDIO AT CT1AA, LISBON
Main studio at the station CT1AA at Lisbon. This station is owned by Senhor Abilio Nunes Dos Santos, who runs it entirely at his own expense



A VIEW OF THE CONTROL ROOM
The control room at CT1AA. Note the line amplifier on the left. The studios are about half a mile distant from the transmitter



THE SECOND TELEGRAPHY TRANSMITTER AT CT1AA
A view of the second set of telegraphy gear used at CT1AA. This works on 21.28 metres with a power of 500 watts in the aerial

800 ampere-hours is used for filament heating.

The mains supply voltage (110 volts A.C.), which feeds the transmitter, is raised to 11,000 volts through a transformer, oil insulated, and after being rectified, filtered and smoothed, is applied to the anodes at a pressure of 5,500 volts steady D.C. CT1AA also operates two low-power transmitters, both on 21.28 metres, one rated at 500 watts and the other at 18 watts.

L. L. Rego.

Radio in Review

The Christmas Tribute : : New High-frequency Coils
The Modern Super-het : : A New Valve

AT this period of the year one has to face the onset of Christmas and the New Year, and the perennial problem of selecting suitable presents for those who have in one way or other established a vested interest on one's purse and/or affections, as the case may be.

It is not an easy matter to choose gifts which are both welcome and useful, but there is a wider variety of the right sort to be found in any decent wireless shop than in any other quarter I know.

Pleasures of Wireless

Times are rather difficult for all of us just now, but the Christmas spirit demands an extra generous gesture. What could give more pleasure than a wireless set, particularly if it brings the amenities of broadcasting to a household for the first time? Or a mains-driven set to those who have not yet successfully solved the battery problem?

We cannot all afford to go so far, but on a smaller scale a new high-tension battery or a spare valve is always a welcome gift, whilst for the home constructor there is an endless variety of new components and gadgets which can be depended upon to freshen up the performance of an existing set, and give it a new lease of life.

Sound Conceit!

Finally, there's nothing like a good milliammeter to give the budding enthusiast a sound conceit of himself. In return he will probably come along one day to "vet" your own set and point out a thing or two you may—or may not—be interested to know about it.

The use of high-frequency coils filled with a powdered-iron core promises to set a new fashion in set construction.

In the first place they are much more compact than the standard type, and require no screening, thus saving valuable space. In the second place they have a "selectivity" characteristic which compares

By MORTON BARR

favourably with a high-grade low-resistance coil wound with Litz wire, that is to say, with the best type of high-frequency coil now available.

The core used is not, of course, solid—or even laminated—metal, otherwise the coils would not handle high-frequency currents without loss. Actually it is made of very finely-powdered iron, which can only be prepared by a special chemical process involving the reduction of iron oxide by a stream of hydrogen gas.

The deposited metal is so fine in grain that it would ignite spontaneously if openly exposed to the air. Accordingly it is first mixed with heavy oil to form a paste, which is then laid on a thick paper backing. The coated paper is finally rolled up to form the core.

In the paste each particle of iron is insulated from its neighbour by a thin layer of oil, so that eddy-currents cannot flow and any ohmic loss due to this cause is prevented. At the same time the presence of the iron creates a heavier magnetic flux than an open air core, so that a given inductance can be produced with fewer turns of wire.

In other words the proportion of resistance to inductance is lower than usual, and the selectivity correspondingly higher.

This type of high-frequency coil has already proved successful in America. In fact, an ingenious scheme of "permeability tuning" based upon its use was described in this section of "Wireless Magazine" last March.

A feature of the new Ferrocart coils is that they are wound toroidally, the coils being lapped around a ring-shaped, instead of a cylindrical, core. This confines the magnetic field to a closed circuit, and prevents it from spreading outwards through the air.

One advantage of the up-to-date super-het, as compared with the

earlier editions, is the small number of valves in circuit. Nowadays four or five is the standard number, and they give far better results than the nine or ten stages formerly used.

The explanation lies, of course, in the superior characteristics of the modern valve, particularly as regards amplification factor.

The use of a screen-grid input valve not only solves the old problem of re-radiation—because it effectively "divorces" the aerial from the locally-generated oscillations—it also gives greater amplification than two of the old-timers.

S.G. and Pentode "Mixers"

Some designers are now using screen-grid or pentode valves for the local oscillator or "mixer," so that this valve also takes an active part in amplifying the signals. The result is that only one intermediate-frequency stage is necessary, instead of the two or three that used to be standard practice.

The present method of using a heated filament to produce the electron stream inside a valve has certain disadvantages, and various alternatives have been suggested from time to time, including the use of photo-sensitive cathodes which will liberate electrons by the action of light.

"Filamentless" Valve

Although the ideal of a "cold" emitter is still in the far-distant future, it is interesting to note a new type of "filamentless" valve which is now being developed in Germany.

The idea is to utilise the high-tension supply to provide the electron stream as well as the plate voltage, thereby avoiding the necessity for a separate low-tension supply.

The high-tension voltage is applied across a pair of electrodes—separated by a narrow gap—so as to produce a sustained glow discharge, which then acts in the same way as a heated filament. The method is at present only applicable to valves which contain a proportion of free gas.

DANCE MUSIC

Getting It Across!

IN an all too tiny office on the fifth floor of Broadcasting House, overlooking Langham Place, Henry Hall directs the B.B.C. Dance Orchestra. Down in the Outside Broadcasts Department is the O.B. director, who controls the technical end of the popular dance-music broadcasts from the Savoy, the Carlton, Dorchester House, the Monseigneur and even the Tower Ballroom, Blackpool.

London, you see, is the key point of all dance-music broadcasts.

Famous Seven Years Ago

Henry Hall, as you may remember, made himself famous in 1926 with the Gleneagles Hotel Dance Band broadcasts; and later from the Adelphi at Liverpool and the Midland Hotel at Manchester.

Last week I had a long chat with him about broadcasting. He was as cheerful as ever. It seemed like

old times, for I was the first Londoner to interview him when he came down from Manchester to Broadcasting House—when he had no home in London, no proper office at the B.B.C., no B.B.C. Dance Orchestra, and only 700 applications for the new jobs!

He is only thirty-three (or is it thirty-four by now?), and has had an amazing career. He went to Trinity College, Cambridge, and afterwards to the Guildhall School of Music. The one thing he used to hate was syncopated music and when in his 'teens he longed to conduct classical concerts; and did so.

Little Scope After the War

The war started and he gave up his musical career when only eighteen years old. Little wonder is it, therefore, that when he came back again to post-war England, he found that there was little scope for an enthusiastic but inexperienced conductor of classical concerts.

After a little while we find him as a dance-band pianist and then as the leader of one of the L.M.S. hotel bands. Another year or so and he has risen rapidly up the ladder of fame and is the musical director of all the L.M.S. hotels.

Come behind the scenes of broadcast dance music with KENNETH ULLYETT and learn how the leading dance orchestras get their music across the ether!

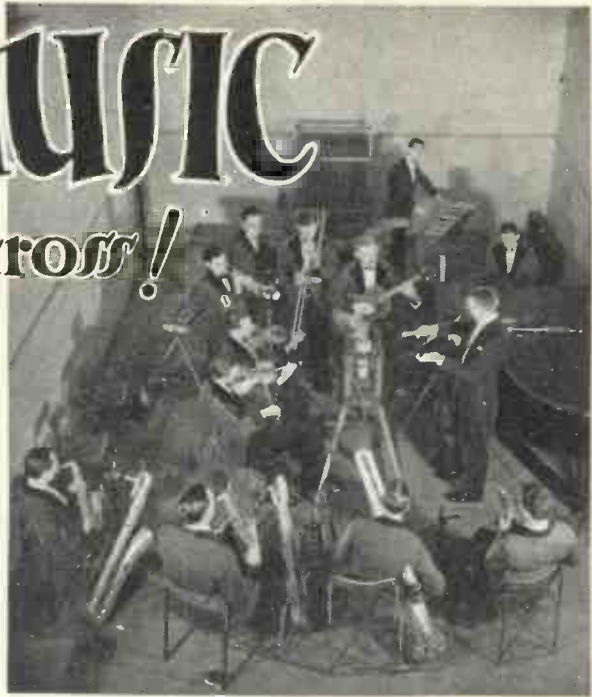
It is in 1926 that he first comes "on the air." He is a leading personality of the L.M.S. hotel chain. He is an artistic director for the hotels and rumour links his name in a romantic fashion with big names and with success with a capital "S."

He comes down one spring afternoon to the B.B.C. to discuss his broadcasting arrangements in connection with the Midland Hotel, Manchester, and finds himself offered a contract of quite a different kind—to be the director of the new B.B.C. Dance Orchestra.

The rest of the story you know.

Now Henry Hall and the B.B.C. Dance Orchestra are working regularly every day from 10 o'clock in the morning till late in the evening. Often they do not leave Broadcasting House until the early hours of the morning, when Henry Hall is giving a late night broadcast.

The average is eleven hours a day, which cuts out any notion of sax-blowing being a cushy job, even if a lucrative one.



HENRY HALL IN STUDIO 3A

Studio 3a is a double-decker. This photograph of Henry Hall and the B.B.C. Dance Orchestra was taken from the window of the small listening room

There are things to learn, too. The present library of the B.B.C. Dance Orchestra is 450 tunes. Some of these take the best part of a day to rehearse. Each number is specially scored for the B.B.C. Dance

Orchestra and the professional arrangements issued as standard for all popular tunes are altered for the B.B.C. combination by the leading music arrangers in the country.

The B.B.C. Dance Orchestra style is distinctive. Henry specialises in "sweet" music. All the new tunes are scored to suit his ideas. *Each special orchestration of a tune costs about ten guineas, so that there is approximately £5,000 tied up in the orchestration alone of the Dance Orchestra's present library.*

A Rumour Denied

There is a rumour going the rounds that now that Dickie Matthews, the young oboe player, has left the B.B.C. Dance Orchestra and that A. Williams, a new trumpet player, has been introduced, special arrangements are not necessary for the B.B.C. Band. Henry Hall denies this vehemently.

People seem to think that special arrangements were only necessary

DANCE MUSIC—Continued

because of previous unusual ideas, such as the introduction of a solo oboe player. This is quite wrong, for all standard orchestrations include—as well as parts for the violins, horns, clarionets, second violins, saxophones and so on—a part for the oboe.

Songs from Amateurs

Special orchestration is expensive, no matter whether the tune is a professional one or one sent into the B.B.C. by an amateur. Every day Henry Hall and his manager, Mr. Hodges, are inundated with new songs from amateurs. It is estimated that only about one in five hundred of these is good enough for consideration.

Good tunes picked in this way are sent out to one of the arrangers, who re-writes it and orchestrates it for the B.B.C. band. Henry Hall risks between £10 and £20 on each tune in this way, including overhead expenses and the orchestration fees, so that all the amateur song writer receives is the pleasure of hearing his number broadcast.

But, of course—and this is the vital point—all the leading song publishers will be willing to handle the number if it is a good one and if Henry has thought fit to broadcast it.

Big money is to be found in song writing. Irving Berlin's "All Alone" brought him about £19,000. Amateurs are misled by these huge figures and some of the "easy-money" attempts which reach Henry Hall are pitiful for the lack of knowledge which they show of the conventional machinery of the music publishing trade.

As the average dance-music enthusiast is interested more in listening to the B.B.C. broadcasts than to adding to Henry Hall's repertoire, let me take you behind the scenes of the B.B.C. Dance Orchestra broadcasts.

Henry Hall uses studio 3a, which was originally intended for the

Children's Hour broadcasts and which is yet incomplete. This is the studio which was among the first to be utilised when Broadcasting House was built and in which the engineers tried the experiment of having a glass wall.

Strangely enough it is a room very similar in shape to the old studio 7 at Savoy Hill, from which Jack Payne used to broadcast.

It is a double decker and is about 20 ft. high. It is 35 ft. long and 15 ft. wide, so you see there is not over-much room for the members of the dance orchestra.

Studio 3a has its own silence cabinet and a listening room upstairs so that Henry can retire to this soundproof cabinet and, looking down through a large glass panel, can see the orchestra rehearsing while he listens in on one of the baffle loud-speakers in the listening room.

The dance-band studio is on the same floor as the so-called "religious" studio and is at the side of the talks studio, from which famous speakers broadcast to America via the Transatlantic tele-

Edison Bell microphone, beloved of Jack Payne, was tried. This is non-directional and was stood in about the centre of the dance orchestra. The vocalist could address it in any direction. Now Henry has again favoured a directional microphone. This time it is the new R.C.A. condenser "mike."

All the rehearsing is done in 3a. The gramophone recording (which takes up two or three mornings a week) is done in the big studio block in St. John's Wood, and all the administrative work is done in Henry's own fifth-floor office. He says that he now gives 48 per cent. British tunes, 6 to 7 per cent. Continental tunes, and the rest American.

Another Rumour

Roger Eckersley, the programme director, takes a keen interest in the Dance Orchestra and rumour has it that Eckersley, under a *nome-de-plume*, is the composer of tunes which Henry often broadcasts.

And now, as a change, look at the leading outside-broadcasts bands.

We are at the moment in the middle of big changes. Roy Fox, after a protracted period of illness, has formed a new combination at the Café Anglais, and Lew Stone is carrying on from the Monseigneur.

The Monseigneur is a difficult place, architecturally, from which to broadcast. Roy Fox had two special platforms built to keep the dancers away from the microphone.

When Lew Stone took over he had a new platform built. Maurice Winnick, who broadcasts from the Carlton, experienced the same trouble. Catcalls and

cheers were heard above the music until a special platform was put up.

Will Jack Hylton ever settle down to regular B.B.C. broadcasting, and will Jack Payne make a regular "come-back"? These are questions which all dance-music enthusiasts are asking.

It is an open secret that Jack

THE "SAX-BLOWERS" HARD AT WORK!



Four of Henry Hall's saxophone players have a little rehearsal. They often work eleven hours a day all told—not such an easy time!

phone. Studio 3a will probably be Henry Hall's home for another month or so. Television transmissions are still being made from the basement studio which he previously used.

The B.B.C. Dance Orchestra started off with a condenser microphone on a baffle. Then the old

Hylton finds it much more profitable to tour this country and Europe, making flying visits to all kinds of Continental places, than to settle down to a regular concert.

Jay Whidden, who was previously very well known in this country, used to broadcast from the Carlton, where he was paid £100 a week as musical director. This may seem a great deal of money but it is easily put to shame by the giant fees secured by the ever-popular Hylton.

£400 a Week

Fees of the order of £400 a week can be secured by top-class artists who tour the vaudeville theatres in this country alone. Jack Payne still finds it more profitable to tour the vaudeville circuits than to link up again with broadcasting—even Continental broadcasting.

His recent visit to Broadcasting House was all too brief. Listeners want more than just one half hour broadcast in three months.

While the N.B.C. and Columbia liaison men from America are in this country looking out for "stars" there is a big reason why dance-band leaders should not tie themselves down to B.B.C. broadcasting.

It is well-known that both Jack Hylton and Jack Payne were paid about £1,000 for their American broadcasts (sent via Rugby to the U.S., and not heard in this country) and it is hardly possible for these sums to be secured while a dance-band leader is under a B.B.C. contract.

Broadcast dance-band money has gone up by leaps and bounds since the 1924 days when Sydney Firman and the London Radio Dance Band provided the official B.B.C. dance music. It took a cash offer of £8,000 and a promise of immense royalties to get Jack Payne away from the B.B.C.

Big Money for the Best

As with most broadcast items, the B.B.C. has to spend big money to get the best.

When Jack Hylton and Ambrose have given studio broadcasts they have for amicable reasons agreed to accept fees to cover only the bare expenses. Four-figure fees would have to be paid for regular studio broadcasts and that is why, for instance, the Ambrose combination is only heard once a week from an outside hotel.

Stories of the Operas

La Traviata

(The Frail One)

(VERDI)

CHARACTERS

ALFREDO, Violetta's Lover..... Tenor
GIORGIO, his Father..... Baritone
GASTONE DE LETORIERES..... Tenor
BARON DAUPHOL, Alfredo's Rival... Bass
MARQUIS D'OBIGNY..... Bass
GIUSEPPE, Violetta's servant..... Tenor
VIOLETTA, a Courtesan..... Soprano
FLORA, her friend..... Mezzo-Soprano
ANNINA, Violetta's confidante..... Soprano
DR. GRENVIL..... Bass
Time: Louis XIV. Place: Paris.

ACT I

A salon in Violetta's house. Violetta is conversing with Dr. Grenvil and friends. Others, including the Baron, arrive. Flora enters on the arm of the Marquis. This is a house-party, a revel. Gaston and Alfredo arrive. Gaston tells Violetta that Alfredo loves her. Although touched by his devotion, she treats the matter lightly. She is a consumptive. Evidences of the frailty of her health are manifest from the beginning.

Music is heard from an adjoining room and the guests move off. Violetta is seized with a fit of coughing and sinks on a divan to recover. Alfredo remains with her. A love scene concludes the act.

ACT II

A salon in a country house near Paris. Violetta has left her society life in Paris for Alfredo, with whom she is living. Alfredo learns from Annina that the expenses of this house are greater than Violetta thought. She has been selling her jewels. He leaves for Paris to raise money to reimburse her. After he

has gone Violetta gets a note from her friend Flora, inviting her to stay with her. She smiles at the idea of returning to her old life. Giorgio, Alfredo's father, is announced. He begs her to leave Alfredo, saying his career is threatened by their conduct. She makes the sacrifice, even though she knows it will injure her health. Giorgio retires.

Violetta writes a note to Flora accepting her invitation. She then writes to Alfredo saying she intends to return to her former life and she will look to his rival, Baron Dauphol, to maintain her. Alfredo enters and she conceals the letter. He tells her his father may be coming to beg her to leave him. She goes, pretending it is because she does not wish to be present at the interview. Alfredo is alone.

Violetta's letter is handed to him. As he reads it his father comes in. Giorgio tries to console him. Alfredo reads Flora's invitation. The scene changes to a brilliant salon in Flora's palace. Alfredo is winning at cards. The Baron and Violetta enter. The Baron stakes against Alfredo, who wins. Later Violetta begs Alfredo to leave. Alfredo, in front of them all, curses Violetta, who faints.

ACT III

Violetta's bedroom. Violetta is dying. She learns that Alfredo knows of her sacrifice. He arrives later—too late. La Traviata is dead.

WHITAKER-WILSON.

Radio in Kenya Colony

KENYA COLONY possesses a white population of roughly 15,000 souls and for its entertainment broadcast transmissions are carried out daily, simultaneously on 350 metres and 49.5 metres. To defray the expense of this service listeners pay £2 10s. per annum.

The transmitter is actually situated at Kabete, some eleven miles from Nairobi, and is housed in the same building as the telegraphy plant used for commercial purposes. It is connected by cable to a small studio in the capital.

The transmissions are carried out between 4.30 and 7.30 p.m. G.M.T. (Nairobi local time is three hours in advance of Greenwich Mean Time).

They consist of a children's hour on Mondays, Wednesdays, and Fridays; news bulletins and gramophone records. For special concerts local talent is occasionally available. On Saturdays dance music is broadcast.

Whenever possible the time signal and chimes of Big Ben are relayed and, if occasion offers, running commentaries on sporting events are broadcast.

With the new Imperial Scheme, by which Colonial and other stations will be able to broadcast records specially made in Great Britain for their benefit, such studios as Nairobi will be shortly capable of offering to their listeners a better and more varied programme J. G. A.

The Set on Test

Apart from the Radiopak, the only part that is in any sense out of the ordinary is the low-frequency transformer, which is of the latest parallel-feed type, with the necessary coupling components included in the case with the winding.

Ample decoupling is provided at the necessary points, and it will be found that the set is quite stable in operation and, what is perhaps even more important in the case of a mains receiver, it is quite free from mains hum.

Sensitivity and Selectivity

As for its sensitivity and selectivity, these qualities can be gauged from the special test report that appears on this page.

All the power needed for running the three valves is obtained from the electric mains, which must, of course, be of the A.C. variety. (Beginners should note that the set is not suitable for operation from D.C. mains). Unless specially ordered for any other frequency, the mains transformer will be wound for 50-cycle mains.

All the necessary grid bias—that is, for the grid of the variable-mu valve, for the “detector” when used as a gramophone amplifier, and for the pentode—is supplied automatically through resistances connected in the cathode leads.

There are no batteries of any kind, and the cost of running the set from the mains is so small that it will make no appreciable difference to the electric-light bill.

That is one of the great advantages of using a mains set—the running costs are so low that anybody can afford to have a really big output valve, which has the advantage not only of giving fine volume, but also excellent quality of reproduction, for the set is never being “pushed.”

No Unnecessary Frills

There is no need for us here to go into minute details about the circuit. Nothing that is not essential for good reception has been included; on the other hand, nothing that is necessary for the best quality of reproduction has been omitted.

For those who want an easier operated A.C. set—remember the dial is calibrated directly in wavelengths—the A.C. Calibrator can be recommended without reservation.

Actually, for the benefit of those who desire to use a loud-speaker

TWO of the outstanding points noted during my test of the A.C. Calibrator were the excellent quality—brilliant without being hard—and the fact that mains hum was so small as to be barely noticeable.

The set was first tried out in the late evening when most of the foreign stations had shut down. London's Regional and National and North Regional were heard at good strength. Madrid and Cardiff were heard at reasonable strength in this preliminary excursion round the dial. Fécamp was a very strong signal.

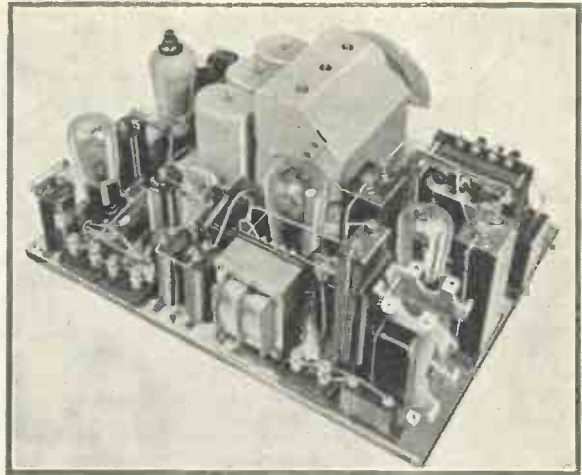
The set was next put on test between 8 and 9 a.m. in the morning. Hilversum

was a fine signal on the medium waveband. Leipzig, Langenberg, and two or three other signals were also heard, although the signal strength was not so great. On the long waveband Radio Paris, Huizen, and Zeesen came in at splendid strength. There was slight interference between Radio Paris and Zeesen.

So much for “out-of-hours” tests. The main test was made on

an outdoor aerial 70 ft. long in South London during a whole evening. I decided to run round the medium waveband and pick out stations which could be listened to with minimum interference and good strength—in other words, fit for entertainment purposes.

These stations will be found at the end of this report. In addition



COMPACT, BUT QUITE STRAIGHTFORWARD

For its type, the A.C. Calibrator is a particularly neat job, and its construction will present no difficulties even to the beginner if a full-size blueprint is used

to these stations many others were heard, of course; these will meet the wants of the “knob-twiddler.” Many of them were at splendid strength but, because they were spoilt by heterodyne whistles, I cannot put them in the “music lover's” class.

On the long waveband the performance was very satisfactory. I heard a dozen stations altogether.

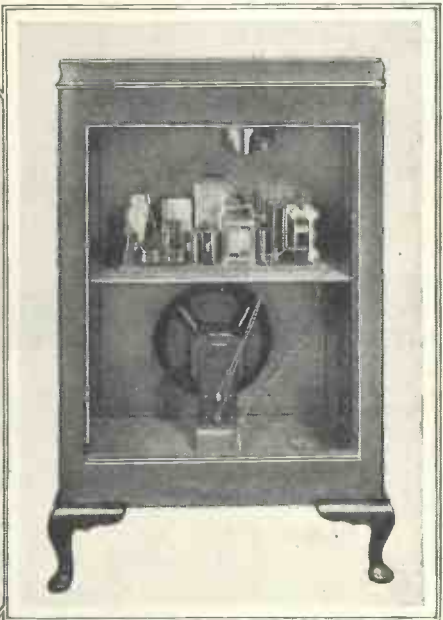
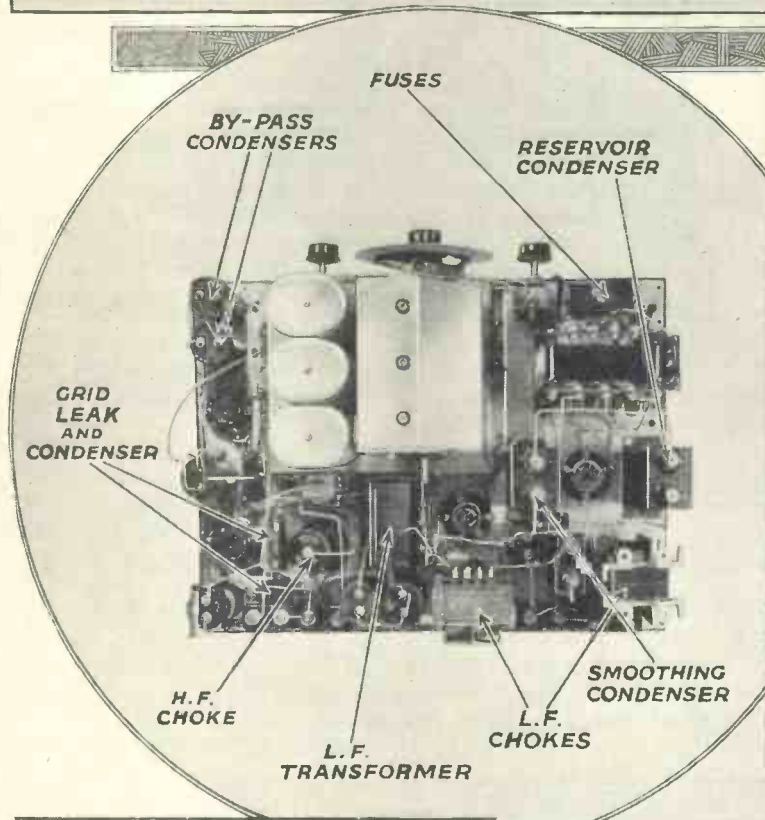
T. F. Henn

SOME OF THE STATIONS RECEIVED

Long Waveband				Station	Metres
Station			Metres	Breslau	325
Warsaw			1,412	Poste Parisien	328
Daventry			1,554	London Regional	355.8
Zeesen			1,635	Scottish Regional	376.4
Radio Paris			1,725	Leipzig	389.6
Huizen			1,875	Midland Regional	398
Medium Waveband				Sottens	403
Station			Metres	Stockholm	435
Fécamp			225	Rome	440
London National			261	Beromuenster	459
Scottish National			288.5	Langenberg	472
Hilversum			296	North Regional	480
North National			301	Prague	488
Goteborg			322	Florence	500
				Brussels No. 1	509

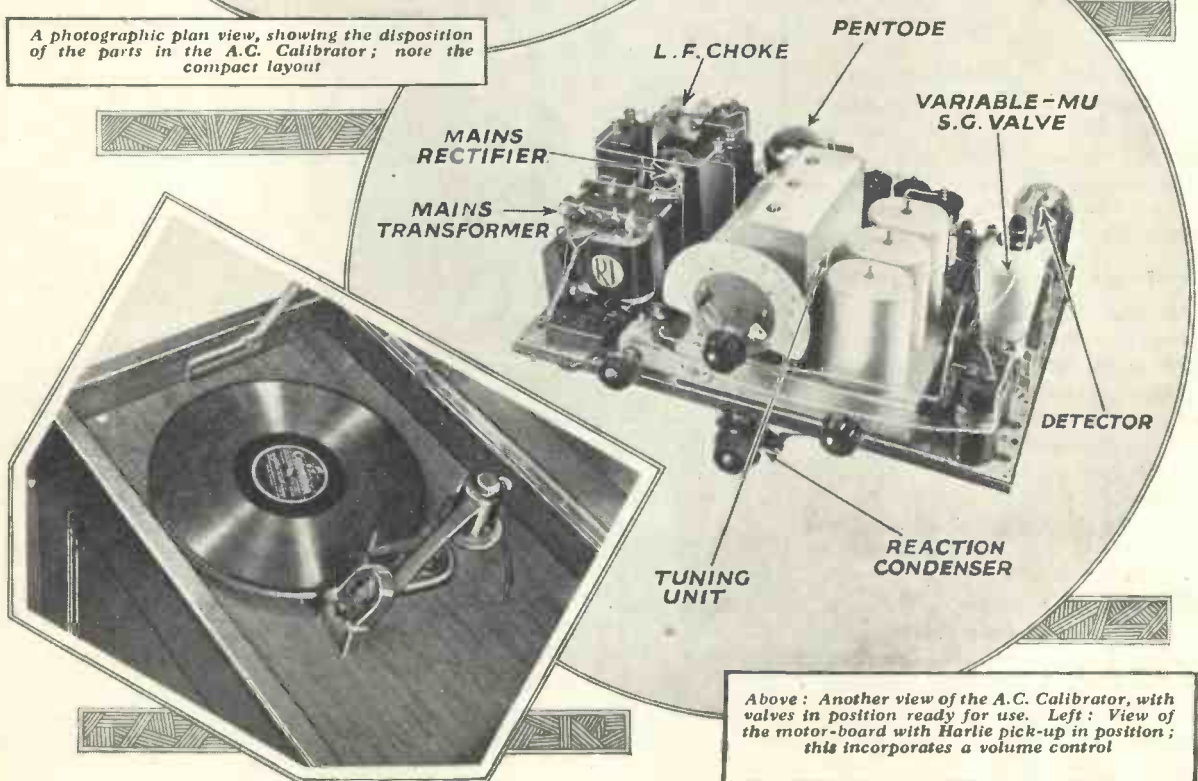
Although over forty stations were heard on the A.C. Calibrator, the above can be relied upon to give real interference-free entertainment

An A.C. Three-valver with A High Degree of Selectivity and Giving Fine Quality of Reproduction



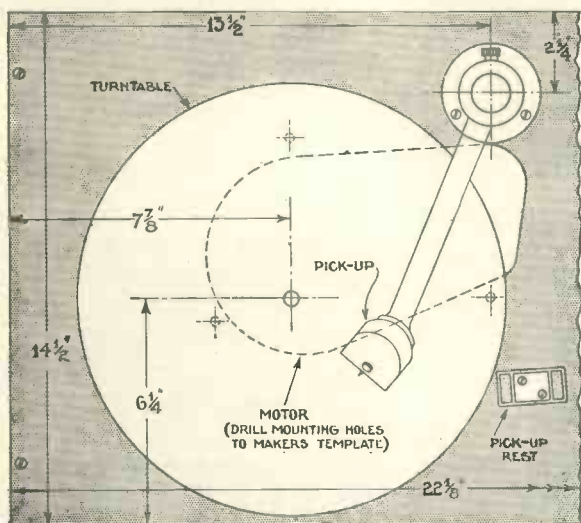
The set in its Stenibac cabinet, with an Ormond moving-coil loud-speaker—a combination that gives fine quality

A photographic plan view, showing the disposition of the parts in the A.C. Calibrator; note the compact layout



Above: Another view of the A.C. Calibrator, with valves in position ready for use. Left: View of the motor-board with Harlie pick-up in position; this incorporates a volume control

THE A.C. CALIBRATOR—Cont.



LAYOUT OF MOTORBOARD

This diagram shows clearly the positions of the electric motor and pick-up with volume control. There is room at the right for needle cups and a station log

blueprint) that each connecting wire bears a number. These numbers indicate the best and most convenient order of making the connections.

Start off with connection No. 1 and, when this has been completed, cross through the corresponding number on the blueprint.

If the set is wired throughout in this way there can be no possibility of making a mistake or of omitting any connection—in other words, the constructor can be quite certain that the set will work as soon as the valves have been inserted in their holders and the mains transformer connected to the electric-light mains.

Position of Reaction Condenser

One point should be specially noted, however, and that is the position of the reaction condenser. This is actually mounted at the front of the set under the baseboard so that when the set is placed in its cabinet the reaction knob appears under the main tuning knob.

As long as this point is borne in mind (it will be quite clear from the photograph that appears on page 749) there will be no confusion.

It will be noticed from the list of parts that no alternative valves are recommended. This does not mean that the set is especially sensitive as regards valves, but if other valves are used different grid-bias voltages

may be needed, and therefore the values of the cathode resistances for obtaining automatic bias will need revision.

If other valves are used the makers should be consulted as to the correct values of bias resistances for inclusion in the circuit.

As soon as the construction of the set has been completed the reader will want to try it out as quickly as possible. But do not forget to make the connection to the anode terminal on the top of the

screen-grid valve before switching on!

There are only four control knobs. On the extreme left is the volume control, which alters the bias applied to the variable- μ valve. Volume will be at its maximum when this knob is turned as far as possible in

control is turned up, the set is automatically switched on.

In the centre of the set is the main tuning knob, with the reaction knob immediately underneath. The knob on the right of the set is for changing the wave range and switching in the pick-up. It has two positions, for the medium and the long waves.

It should be further noted that as the set itself does not incorporate a low-frequency volume control, the pick-up should be of a type that has its own volume control. If this point is observed the set is complete in every detail necessary for the greatest utility.

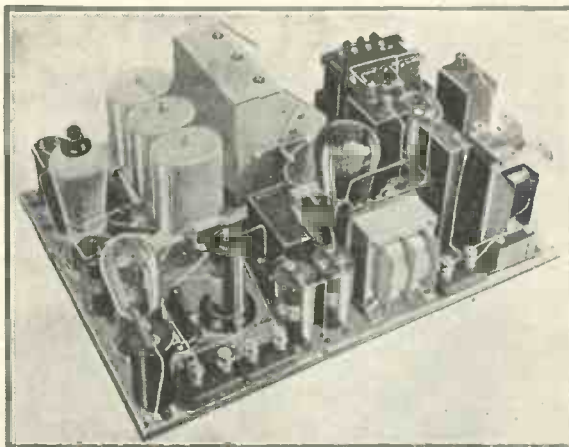
Trimming the Set

When the set is first put into use it should be tuned to the local station and the trimmers should be adjusted to about the half-way positions. Then adjust the back trimmer (that is the one remote from the dial) so that the transmission is tuned in at the correct reading on the dial. If you are in any doubt about the actual wavelength of your local station, look up the list of wavelengths that appears under the title "World's Broadcast Wavelengths," at the beginning of this issue.

When the first trimmer has been adjusted so that the dial reading is correct for a particular station, adjust the other two trimmers for the best volume. If the initial trimming is done on the local transmissions it should be checked up afterwards on a more distant station.

It will be found that there is no difficulty about adjusting the set for good volume.

Remember that



A THREE-VALVER THAT GETS THE STATIONS!
With the A.C. Calibrator you are certain of real entertainment from a score or more of Continental stations. If you are not so particular about quality your log will run to fifty or more transmissions!

a clockwise direction, that is to the right; when the knob is turned to the left the volume will be reduced.

Combined with the volume control is the on-off switch. This is automatically brought into action as the volume control is put in the position of minimum volume; in other words, as soon as the volume

the coils have actually been matched up to a high degree of accuracy with the gang condenser during the course of manufacture.

The trimming carried out by the operator when the set is in use is simply to compensate for the additional circuit capacities that are unavoidable.



A Radio Fan's Causerie: Conducted by BM/PRESS

Royal Interest in Radio

HAVE you noticed how the Royal Family has figured in the radio news of the past few weeks? During November Prince George visited the Kolster Brandes works at Sidcup and also the Pye works at Cambridge. Prince George is reported to be most interested in radio.

Now we have the news that the King himself is to give a broadcast talk on the afternoon of Christmas Day. Even Royalty must indulge in Christmas festivities and everybody will appreciate what it must mean to His Majesty to give up this afternoon—of all afternoons—to talk to the nation by radio.

Many people were disappointed by the cancellation of the Prince of Wales' broadcast from Belfast on the occasion of the opening of the new parliament buildings. I understand that the King's public-address microphone was taken specially to Belfast for the use of the Prince.

And, to crown all that, the Duke of York is reported to be a keen radio constructor!

The Prince's Car

Another matter of interest is that the Prince of Wales' latest car, of which he took delivery only a week or two ago, is equipped for radio reception whilst in motion. The

aerial is concealed in the roof and the only indications of the installation are the control, which is within easy reach of the Prince's seat, and the set itself, which is contained in a box that looks like part of the footrest for the back seats.

By means of the "transitone" system of volume control, weak signals are automatically amplified and strong signals are toned down, so that the overall response is more or less level. In this way the volume remains constant although the car may be passing in and out of bad reception areas.

It is typical of the Prince that he ordered a second loud-speaker for the driver's compartment so that his chauffeur can relieve the monotony of long waits by listening in.

Three New Books

I have been interested to see three new little books on radio that have just been published. The first two are published at 1s. each by W. Foulsham & Co., Ltd.; the titles are "Wireless Really Explained," by P. J. Risdon, F.R.S.A., and "Short-wave Radio Reception," by W. Oliver.

Mr. Oliver's name will be known to many readers through his contributions to "Wireless Magazine." He is a keen listener and his short-wave hints will be of value to many

constructors—and to many prospective overseas listeners on account of the new B.B.C. Empire transmissions.

"Wireless Really Explained" has appeared before; the present edition has been thoroughly revised by Mr. Oliver and will meet the needs of many who are taking an interest in radio for the first time.

The third item is a little 26-page pamphlet entitled "Wireless Wrongs and How to Right Them," published by J. W. Arrowsmith, Ltd., at 6d. If you ever have any trouble with a set that will not work then this little guide will show you how to trace the trouble systematically.

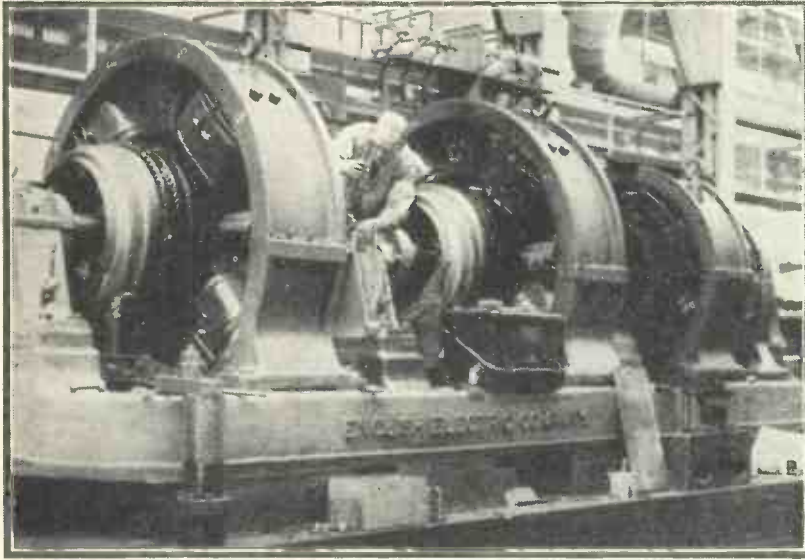
It is very well arranged and should prove a boon to the beginner who does not know very much about his set.

On the Short Waves

You remember the Gold Coaster, the four-valve short-wave set of which details were published in the August issue of "Wireless Magazine"? The original set was sent out to Accra, in the Gold Coast, for a special test.

The other day I ran into Mr. George Hutton, who actually made the tests and who is in England on six months' leave. He told me that he had just had a letter from a friend to whom he has lent the set in his

RADIO MEDLEY—Continued



GENERATOR FOR THE B.B.C. WEST REGIONAL STATION

This large generator was specially made for the B.B.C. regional station at Washford Cross by the English Electric Co., Ltd. The station should be well heard!

absence; this listener had reported that 5SW had come in so well on the loud-speaker that he was able to walk outside the bungalow and hear it 50 yards or so in all directions.

A Battery Needed

When will somebody develop a primary cell that can be sold at a reasonable price and that will be suitable for running several valve

on a primary cell which will produce its own current.

If such a cell were available it would give a tremendous impetus to short-wave broadcasting in out-of-the-way places where at present many prospective listeners are unable to take advantage of the services that are offered because of the impossibility of running a set at all owing to the lack of a suitable power supply.

A Record Riddle

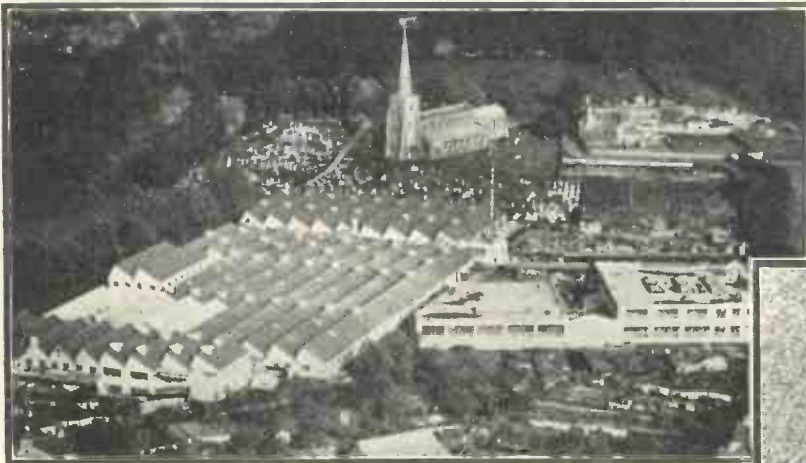
When is a record not a record? That question arises with peculiar force in view of a recent development made by the technical department of the Gramophone Company. They have taken an old acoustic recording of Caruso's, filtered it so that the quality is as good as a present-day electrical record, cut out the original accompaniment, and grafted a new orchestral accompaniment on to Caruso's voice!

Is that really a record of Caruso or is it simply a synthetic voice that sounds like Caruso? In any case there is no question that the new record will meet with great success.

How It Was Done

As many readers will be interested to know just how this new record was made I cannot do better than quote from the official H.M.V. explanation, so here goes:

"The Gramophone Company



A BIRD'S-EYE VIEW OF PYE

This fine aerial photograph shows the huge Pye works at Cambridge, recently visited by Prince George. It has been extended greatly in recent years

That is something like reception! Even if you are not very keen on Empire broadcasting now you would be if you were to talk to anybody like Mr. Hutton; it is his only direct link with the mother country, and is very greatly appreciated. Indeed, there is a tremendous market for our manufacturers to tap if they will only get down to it. Expense is almost no object to these temporary "exiles" who want a link with home.

filaments over a long period? This seems to me to be one of the greatest difficulties in the way of the rapid development of Empire broadcasting.

There are so many places overseas where there is no electric-light supply, and unless you have a mains supply of some kind you cannot even charge accumulators. You therefore have to fall back



PRINCE GEORGE AT K.B.

During November, Prince George also made a visit to the Kolster Brandes works at Sidcup. He is seen here leaving the main offices

A RADIO FAN'S CAUSERIE

have perfected a secret process by means of which they have taken a Caruso record originally made in the early days of horn recording and, after transforming the waves in the wax into minute electric currents, have passed them through filters which correct the deficiencies in the original recording; thus a new wax master was made of the original performance.

"A new orchestral accompaniment was provided after the conductor had played Caruso's original disc over many times and thus become thoroughly acquainted with every inflection of the singer's voice to ensure absolute synchronisation.

"The record was then played through for re-recording, the conductor listening by means of headphones and simultaneously directing his orchestra. Thus the voice of the dead singer, which originally sung in 1903, was wedded with the accompaniment from an orchestra playing in 1932."

A Grid-leak Puzzle

I was surprised the other day to learn from a resistance manufacturer that many constructors think that there is some difference between a 2-megohm anode resistance and a 2-megohm grid leak.

That is why you will see on some leaflets dealing with fixed resistances the words "anode resistances and grid leaks," although in fact there is not the slightest difference between them except for the resistance values.

Funny how some impressions get about, isn't it?

Battery Sets

I wonder if you were as surprised as I was to see how many battery sets there were in the Set-buyer's Supplement in the Christmas number of "Wireless Magazine." In all, close on ninety sets were listed under the heading "Classified Guide to Battery Sets."

But there is still a dearth of really good battery receivers. I have heard of more than one listener who has tried to find a set with push-pull output, for instance, and there are too few sets with two stages of screen-grid amplification. If you want a really good multi-valve set you

will still have to build it from instructions in "Wireless Magazine."

On the whole, this supplement showed that the listener who wants to buy a new receiver has an amazing range from which to make his final choice. There is no question of the popularity of the three-valve set for A.C. operation—if the manufacturers are gauging the public taste correctly!

Bari's New Transmitter

Listeners who pick up the new high-power transmissions from Bari, in Italy, will be interested to know that the equipment was actually made by the Marconi Company at Chelmsford, as were



A FINAL POLISH
Cleaning up the King's microphone, which is kept by Marconiphone exclusively for public-address work when His Majesty speaks

its predecessors at Trieste and Florence.

The unmodulated aerial energy at Bari is 20 kilowatts and the wavelength is adjustable between 250 and 550 metres, the station at present working on 273.73 metres.

This station uses low-power modulation and the frequency response is

substantially flat between 30 and 10,000 cycles. A crystal oscillator with temperature control is used to keep the station exactly on its allotted wavelength.

Other recent orders for Marconi broadcasting stations include installations for the B.B.C. West Regional station near Washford Cross, the Irish Free State, Cape Town, and Buenos Aires.



READY FOR THE PRINCE
Taking the King's special public-address microphone to Belfast for the use of the Prince of Wales—the only other person to use it apart from His Majesty

The Value of Fuse Plugs

There are on the market a number of mains plugs that incorporate fuses. Several people have asked me what is the use of such a device when every mains set is already provided with an internal fuse.

The answer is that if the flexible lead between the mains socket and the set becomes frayed then quite serious damage may be done before the house fuse blows. Of course, the smaller fuse in the set will not be affected if the set is switched off.

I have never had this trouble with a radio set, but I did nearly have a fire recently through the flex on a table lamp being broken and shorting. There was a horrible smell of burning rubber and the cover was burnt right through before the main 5-ampere fuse blew out.

Personally, I think it would be a wise plan for everybody to fit a fuse plug to table lamps and radio sets.

London, W.C.1. BM/PRESS

AMONG THE "DWARF" WAVES

MORTON BARR Discusses Some Important Developments

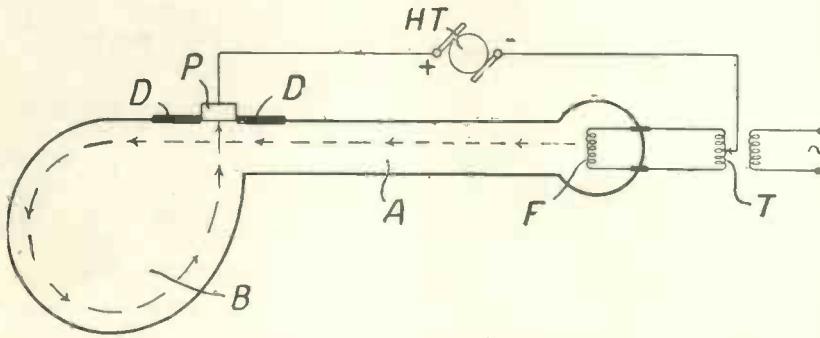
RECENT developments in radio show that great interest is being taken in waves less than a metre long. Two or three years ago it was thought that the limit in short-wave working had been reached with the 15-metre wave used for beam transmission, but since then wireless-

using the capacity coupling between the plate and grid as a means of reaction, but the output is very small—only amounting to a fraction of a watt.

The method is therefore of little practical importance outside the laboratory.

tage swing and so build up oscillating currents of very high frequency.

For instance, where the electron stream leaves the filament, it is urged at high velocity towards the positively charged grid. Some of the electrons are caught on the grid, momentarily reducing its voltage, but the rest pass through the open windings and are carried on by their own velocity towards the plate.



GENERATOR FOR MICRO-WAVES

Special valve oscillator for the production of waves of the order of 30 centimetres. Such very low wavelengths are certain to assume a very great importance in the future. In this particular system electrons from the filament F travel along the narrow tube A, swirl round B, and pass to the plate P

No Positive Potential

But since the plate carries no positive voltage (sometimes in fact it is negatively charged), the electrons are now moving away from a point of high attraction to an area of low or zero attraction.

Their flight is therefore quickly retarded, and almost at once the direction of the stream is reversed and it moves back again towards the grid. Here some electrons are collected, as before, giving the grid another voltage impulse, whilst the rest pass through towards the filament.

As they are now moving away from the strongest centre of attraction, they soon "about turn" again towards the grid. In this way a rapid and sustained to-and-fro movement

telephone messages have been sent across the Channel on 20 centimetres.

And within the last few months Marconi and others have covered still greater distances using wavelengths which are more conveniently measured in inches than in metres.

Not An Easy Problem

It is not easy to use an ordinary back-coupled valve, or to employ usual tuning methods, when producing frequencies of this order.

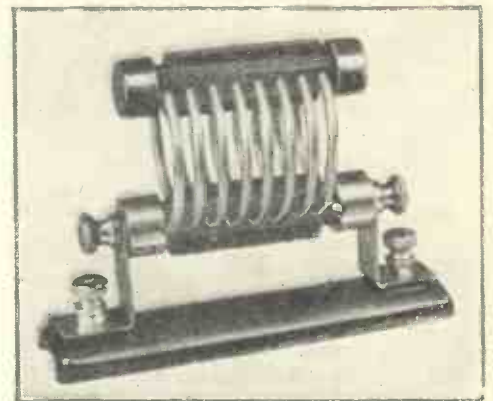
A 30-centimetre wave, for instance, corresponds to a frequency of a thousand million cycles a second, so that the inductance of even a short length of straight wire assumes large proportions, whilst the capacity effect across the electrodes inside the valve has to be taken seriously into account.

Wavelengths just under the metre mark have in fact been produced by

A much larger output of energy on wavelengths of 10 centimetres—or roughly 4 in.—can be obtained by making what appears to be a very simple change in the working conditions of the valve, though in fact it involves a profound difference in the actual operation.

This consists in putting a high positive voltage on the grid instead of on the plate, the latter either being negatively charged or else left at substantially the same potential as the filament.

Under these conditions, the electrons leaving the filament never succeed in reaching the plate, but are kept constantly oscillating to and fro across the grid. Each time they pass the grid they produce a vol-



COIL FOR 7-METRE RECEPTION
A low-loss coil, made by Tunewell Radio, Ltd., for reception on the 7-metre waveband. A simple set for this purpose was described in the September issue of "Wireless Magazine"

s set up, each "reversal" applying a fresh impulse to the grid, which is directly coupled to the transmitting aerial.

The important point is that the action of the electron stream has been quickened. Instead of having to traverse the whole of the distance between the filament and plate before it can impulse the latter, it oscillates over a short path on each side of the grid. By cutting down the time factor in this way, the frequency of the oscillation is increased, or, in other words, the wavelength is shortened.

Radiation System

The oscillations produced are radiated from a short wire aerial inserted across the grid and plate, though in some cases radiation takes place directly from the grid, which is extended outside the bulb for a short distance at each end.

This system of producing micro-waves, particularly the motion of making the electron stream vibrate across a highly positive grid, is usually referred to as the Barkhausen-Kurz method, to distinguish it from circuits using ordinary reaction.

Extra Large Power

Where an extra large power output is required, two valves can be connected in push-pull to the same aerial, the connecting wires being so arranged that they carry out-of-phase currents and therefore do not themselves radiate. By arranging several such aeri- als in parallel (in the same way as in beam transmission), a very powerful stream of short-wave radiations can be produced.

The idea of depending upon the movements of the electron stream inside a valve, rather than upon the "tuning" of an external circuit, opens up many ingenious possibilities in short-wave generation.

For instance, in the valve oscillator shown diagrammatically opposite, the electron stream is made to interrupt itself automatically, and at such a rate as to produce waves of the order of 30 centimetres.

The glass bulb is shaped so that the electron stream from the filament F travels at first along a narrow tube



LEARNING ALL ABOUT BEAM TRANSMITTERS

A group of Arabian students being shown the "feeder" box of a Marconi short-wave beam transmitter so that they will be able to maintain a wireless link throughout the kingdoms of Medjia and Nedj in Arabia

A, as shown by the arrows. At the far end, the tube flares out as shown at B. The plate is inserted at P so that it lies at a tangent to the path of the stream, the high-tension supply being connected from the plate to a centre tapping on the filament transformer T.

The flared part B of the tube is covered internally with a thin coating of metal which is carefully insulated from the plate A by a bushing marked D. The arrangement operates as follows:

As soon as the filament is energised and the high tension applied to the plate, the electron stream starts out

from the filament along the narrow part of the tube. By the time it has reached the positively charged plate its velocity is such as to carry it past the plate and into the flared portion B.

Electrons Curve Back

Here it is in a region which is not positively charged (in fact, a slight negative charge may be given to the metal coating), so that it swirls past the end walls of the bulb B and curves back on itself, as shown by the dotted line, in an effort to reach the plate.

By the time the head of the stream comes opposite to the plate P its momentum is sufficient to break through the oncoming stream, which is accordingly interrupted until all the electrons in front of the point of intersection have been swallowed up by the plate. As soon as this has happened, the electron stream starts to career afresh around the flared bulb, until it again intersects itself, and so causes another momentary interruption.

And so the process goes on indefinitely. Each new impact on the plate sets up a current surge which is fed directly to a short-wave transmitting aerial suitably coupled to the plate.

Great possibilities are opened up by these micro-wave developments.

A Wireless Parody

*Under the greenwood tree
Who listens now with me?
And tunes his wireless set,
A swanky super-het,
(See Shakespeare, 'Tis not Herrick's).
Here we shall find
All to our mind
Save Morse and Atmospherics.
Who doth ambition shun,
Choosing a modest one,
A little crystal set
Good programmes oft doth get
From many far-flung stations.
Here we shall find
All to our mind
Save Morse and Oscillations!*

LESLIE M. OYLER.

The Variable Condenser

This month PERCY W. HARRIS, M.Inst.Rad.E., deals with one of the most important components to be found in any radio receiver—the variable condenser used for tuning. Everybody who wants the best results should read what he has to say

THE variable condenser is a component which has reached such a stage of perfection that the experimenter rarely gives any thought to it. All variable condensers are nowadays assumed to be good and they rarely give mechanical trouble. So far as efficiency is concerned—

who are very wise after the event! Let us consider Fig. 1, which shows the simplest oscillatory circuit with an inductance L and a condenser C . In most cases such a circuit is set up in such a way that the voltages induced across the condenser terminals are applied to grid and filament of a valve.

the day, when there was far too great a tendency to consider a circuit such as this as if it could exist "on its own" and as a consequence a proper sense of proportion was lost.

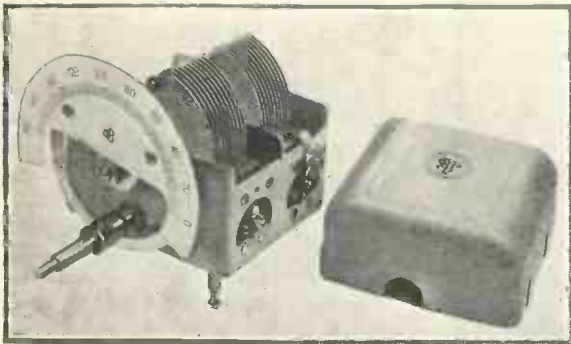
Associated Effects

We cannot deal with a circuit of this kind by itself, and we must consider the effect of associated inductances, couplings, damping introduced by the valve connected to it, and so forth. Incidentally, I well remember carrying out a number of tests at the time for the purpose of finding out the high-frequency losses in the valve holders connected to such a circuit. They were always higher than that of the condenser.

Reverting to the variable condenser, there are quite a number on the market the high-frequency resistance of which is actually higher than that of a good coil used with them, although even these have a relatively low resistance compared with most of the tuning coils in use at the present time.

Interdependence

From this it follows that if we set out to make our coils really good and of low high-frequency resistance, our efforts are wasted unless we choose very good variable condensers, while on the other hand the virtues of a good variable condenser are lost or rather masked with the majority



COMPLETELY SCREENED GANG MODEL

This is the J.B. Unitune two-gang condenser. The metal cover is seen on the right. Note the star wheel for adjusting the trimmer

well, we no longer worry about designing our oscillating circuit so as to have a very low damping and, as I pointed out in an article in "Wireless Magazine" last month,* the efficiency of the modern valve is such that inefficiency in tuned circuits goes unnoticed!

It has not always been so, and I am sorry that inefficiency is again creeping in. Only in ultra short-wave work do we find the faults of many modern variable condensers showing up; in medium- and long-wave circuits the faults are masked by the much greater inefficiency of the coils.

Next Step Forward

Prophecy is rather dangerous, but I am very much inclined to think that one of the next steps forward in radio design will be the re-establishment of an efficiency standard for coils and condensers.

We shall then have the usual glut of articles from highbrow technical writers who never seem to be able to forewarn us of trouble, but

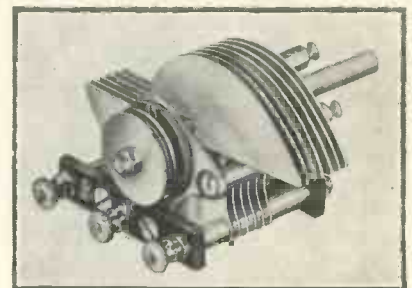
depend, of course, upon the total high-frequency resistance, which will be made up of the resistance of the coils, of the condenser, and what is known as the "radiation resistance," that is the losses by radiation (equivalent to a resistance loss) which can be expressed for convenience in ohms.

The radiation resistance at the frequencies used on the medium and the long wavebands is for such a circuit very small and can be ignored for our purpose at this moment.

If the coil L is well designed its high-frequency resistance can be brought down to 2 or 3 ohms, while the high-frequency resistance of the condenser can be as low as half an ohm over practically all of the scale, although at the bottom end it will rise appreciably, reaching something in the neighbourhood of 2 ohms.

Thus we see that even with the very highest efficiencies most of the high-frequency resistance of the circuit is found in the coil itself.

There was a time, during a period when "low-loss" was the topic of



FOR SHORT-WAVE WORK

A special J.B. condenser for short-wave reception. The vanes are more widely spaced than usual for maximum efficiency

*"New Losses Balance New Gains," page 594 of "Wireless Magazine" for December, 1932.

of tuning coils in use to-day.

What must be looked for in a good variable condenser? What has it to do? The answer to this last question sounds simple—as it really is—but if we are not careful we shall overlook certain important properties.

Capacity Rating

Variable condensers are sold nowadays on a maximum capacity rating. Thus if we say a .0005-microfarad, variable condenser we mean one which has a maximum capacity of .0005 microfarad with the fixed and moving vanes completely intermeshed.

Nothing is usually said, or even suggested, about the *minimum* capacity, which is of increasing importance in view of the extension of the working broadcasting band

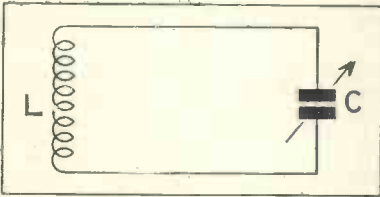


Fig. 1.—Skeleton tuning circuit showing combination of Inductance L with Capacity C

into the shorter wavelengths below 250 metres.

So long as we only tuned to 250-550 metres we could put up with a condenser having a fairly high minimum, but nowadays a low minimum is most important, otherwise our coil and condenser combination, while tuning to the maximum wavelength satisfactorily, will not get down to 200 metres.

Look at all the complaints one gets about a receiver not being able to tune down to the Newcastle wavelength or even to Fécamp.

Correct Maximum

We must look also for a correct *maximum* capacity and in this regard I would like to point out that the well-known and branded makes seldom err in this direction. I have measured hundreds and rarely found any error of importance. Usually they are slightly above .0005 microfarad.

With unbranded and cheap makes, sold in some of the back-street shops, there are very serious errors.

Not long ago a friend of mine brought to me a set built to one of my own designs which, while perfectly satisfactory so far as sharp-

ness of tuning and signal strength was concerned, gave readings which were quite different from those published in my article, and the set would not tune up even so far as the North Regional.

The coils were correct, but a quick glance at the variable condensers suggested to me that probably the trouble was there. I removed them and measured them on a capacity bridge, only to find that the maximum capacity in each case was .00027 microfarad!

Now in this case, as in many others of the kind, it is improbable that the manufacturer really intended the capacity to be so low. It looks an easy matter to design and make a variable condenser, and I am afraid a number of manufacturers merely take an example of a rival maker and copy it to the best of their ability.

In essence a variable condenser consists of a number of metal plates threaded on to a shaft and separated from one another by washers, the whole assembly being tightly gripped by locking nuts.

A second assembly is then made up, also similarly spaced with washers, or by some other method, and the two sets of plates are so mounted that while they are completely insulated from one another they can be made to intermesh by rotating the spindle carrying the moving plates.

The capacity of the condenser is dependent upon the size of the inter-

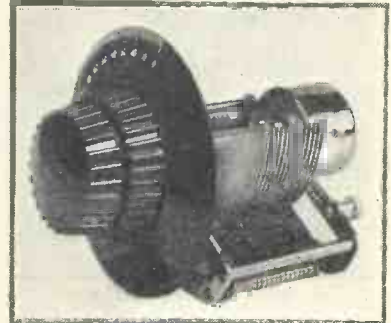


CUT-AWAY END PLATES
This Lotus variable condenser has cut-away end plates to reduce losses

meshed plates *and their spacing*. Double the spacing between the plates and you halve the capacity; similarly, decrease the spacing and you increase the capacity. The inexperienced "copyist" type of maker thinks only of the size and number of the plates and, buying his washers anywhere, may quite likely get a wrong thickness and so increase the spacing between the plates and reduce the total capacity.

This is undoubtedly what had happened in the case I mentioned above.

The minimum capacity of a variable condenser can be greatly affected by its mechanical construction. If the



SLOW-MOTION INSTRUMENT
An Ormond condenser with an integral slow-motion device for fine tuning; a very popular type

plates are so arranged that when they are turned to the minimum position there is no actual inter-leaving at any point it does not follow that there is no capacity between the two terminals of the condenser, for there is what we may call an "end capacity" between the plates.

Difficult to Manufacture

It is comparatively simple to design a variable condenser with a very low minimum capacity, but it may lack compactness and be a difficult manufacturing proposition.

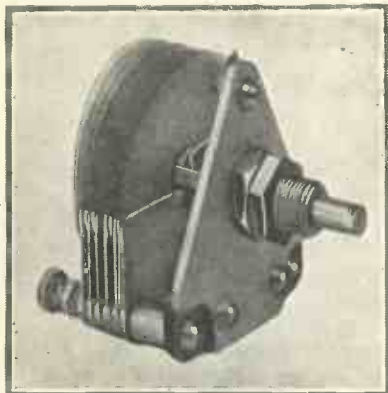
Compactness in a variable condenser is rather a virtue nowadays when receivers are made as small as possible, but if in achieving this compactness we produce a condenser with a high minimum our instrument will be very unsatisfactory in modern circuits.

Capacity Between Conductors

We must also remember that there is capacity not only between the vanes, but between any other conductors connected to the vanes. Furthermore, if there is a solid dielectric material between these conductors (as there is bound to be in every case, otherwise the condenser would not hold together) we shall get a higher capacity for a given spacing than would occur if only air separated the two parts.

For example, if we have two pieces of metal separated by an air space and we then insert in the air space a piece of ebonite packed so as exactly to fill it, the capacity will go

THE VARIABLE CONDENSER—Cont.



SOLID DIELECTRIC

A typical condenser for reaction circuits. This is a Lotus model with solid dielectric to save space

up approximately twice, while if in place of ebonite we introduce mica it may go up as much as six to eight times. Nearly as high a figure will also be given by glass.

We thus see that in our endeavour to get a low minimum of capacity we need to be very careful how the two plates are supported. As capacity is reduced by increasing the spacing between conductors it will pay us in this regard to keep the metal supporting pieces wide apart.

High-frequency Resistance

Assuming that we have the correct maximum capacity and a good low minimum, what else must be looked for? We must reduce the high-frequency resistance as low as possible if we really want efficiency. To do this we must understand where the high-frequency losses can occur.

Obviously there will be very little loss in the plates themselves as these are large pieces of metal connected in parallel, but we can if we are not careful introduce considerable high-frequency resistance at points of contact.

Electrical Contacts

If, for example, aluminium plates are used and these are threaded on a spindle and kept apart by aluminium spacing washers, electrical contact between the plates will occur only at the point of contact between plates and washers, plates and spindle, and washers and spindle.

All the resistances between plates and washers are in series and in a poorly assembled condenser there may be comparatively small contacts between plates and spindle, and washers and spindle.

Aluminium exposed to air immediately gains a transparent surface layer of oxide, which in itself has a fairly high resistance, and unless the plates and washers are screwed very tightly together we get quite considerable losses here.

Furthermore, aluminium cannot be soldered by the ordinary method, so we cannot make sure of good contact by soldering the plates together. However, with proper design and construction, excellent condensers can be made this way.

Far less trouble occurs if we use brass both for plates and washers, while for laboratory condensers, particularly in Germany, both fixed and moving plates have been cut out of the solid! This, of course, means that all our contact troubles are obviated.

A similar result has been obtained, but at much lower cost, by die-casting both fixed and moving plate assemblies. Die-cast condensers have, in fact, grown rapidly in popularity among set manufacturers.

material just at a point where the electrostatic field is highly concentrated.

Now air is a perfect insulator, its dielectric losses being practically zero. Even the best ebonite is poor compared with it, while many of the solid insulating materials, particularly of the moulded variety, compare very unfavourably indeed with ebonite.

Concentration of Field

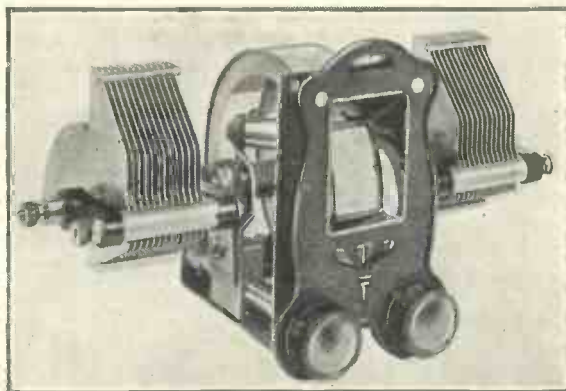
It is quite possible for such a variable condenser to have a high-frequency resistance of 20 or 30 ohms due to the concentration of field through poor quality material.

As an aside, but just to give you an idea of what may happen with a solid dielectric, some years ago when one of the British high-power stations was in an experimental state pure high-grade ebonite was used as a mechanical support of an inductance coil in the transmitting circuit.

When the full transmitting power

was turned on the heat set up in this ebonite was such as to cause it to melt and burst into flame!

All resistance lost in such a case appears as heat although, of course, the current in the receiving circuit of the kind we are discussing is so small as not to make this heat appreciable. The loss is there, however, just the same.



TWO CONDENSERS—SINGLE TUNING DIAL

A Formo dual condenser with a single dial. One knob adjusts both condensers, and the other adjusts one condenser only for trimming

Brass assemblies can be soldered together to give good contact.

A very important source of high-frequency loss is in the solid dielectric material insulating the fixed and moving plates. In early variable condensers it was quite usual to bring out the spindle connected to the moving plates through a metal end plate connected to the fixed plates by a small ring of insulating material either forming the bearing or, in the better grades, carrying the bearing.

Mechanically such condensers are quite strong, but they have the grave defect of placing this solid dielectric

I am very sorry to see in several condensers produced recently that this old and pernicious method of bringing out the connection from one set of plates through a hole in the other set, with only a small insulating washer between them, is being adopted.

Masking Inefficiency

In the modern case we usually have metal end plates connected to the moving vanes, the connection from the fixed plates being brought out through this washer. It is impossible to make a good condenser this way and the manufacturers are

SPECIAL ARTICLE BY PERCY HARRIS

obviously relying upon the high losses in modern coils to mask the inefficiency of their condensers.

If you take any modern high-grade condenser (the Cyldon is typical of the best modern practice) you will find that not only is very little insulating material used, but that the path through the insulating material from one set of electrodes to another is comparatively long.

Weak Field with Small Losses

This means that what field does go through this insulating material is very weak and correspondingly small losses are set up.

So far I have not mentioned anything about the shape of the plates, although this is a very important matter. If we use semi-circular plates in both assemblies and arrange the moving plates in such a way that each degree of the condenser intermeshes an equal amount of plates, then we shall get what is known as a "straight-line capacity" condenser or one in which the capacity increases proportionately with the turning of the dial.

Wrong Method

Although the first variable condensers were all made this way it is an entirely wrong method for tuning, as the wavelength to which a circuit will tune is exactly proportional to the square root of the capacity.

This means in practice that if we try to tune our coil with a straight-line capacity condenser the stations will be all crowded together at the bottom end of the scale and much too widely spaced at the top.

A Better Design

When I first began to design wireless receivers for home construction all of the condensers were of the semi-circular kind, and then after a short time a condenser was introduced having specially shaped plates so that as we got towards the top end of the scale the capacity increased much more rapidly for an equal amount of turning. In this way the stations distributed by wavelengths were much better spaced out.

I thereupon decided that in future I would no longer use any condenser that did not comply with this law, and after some little difficulty I persuaded a second manufacturer to

embark upon the making of such a condenser.

For quite a time there were only two makers and you would be surprised if I were to tell you how much trouble I had in persuading others to take up the type. In time, of course, they all did, but many fought against the new kind for reasons I could never understand!

Now although the straight-line-wavelength condenser was a big improvement we soon realised that equal frequency rather than equal wavelength spacing of stations is desirable and before long the straight-line-frequency condenser was introduced, so that if stations were equally spaced in frequency they would become equally spaced on the dial.

This condenser, however, has rather awkwardly shaped plates and has never attained a wide popularity as, in common with all condensers following a special "law," it will only be "straight-line" if the associated capacities are those for which the condenser is designed.

About 1926 another form of condenser, known as the "log-law," was introduced, giving a distribution of stations on a line about half-way between that given by the straight-line-wavelength and the straight-line-frequency condensers respectively.

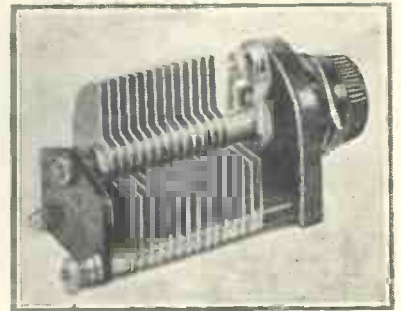
This condenser was designed not so much to give a uniform spacing of stations as to enable unmatched coils to be used with ganged condensers.

The matter is not simple to explain in the space I have available, but it can be said that if one coil in a ganged set was slightly larger than the next the difference in tuning

positions of the two circuits can be compensated by setting the condenser connected to the large coil back a little.

A Good Deal of Interest

I see I am getting to the end of my space and there is still a good deal of interest which could be told about variable condensers! I think, however, I have told you enough to see that you cannot judge whether a variable condenser is a good one or not merely by glancing at it, and that a condenser may be excellent mechanically while poor electrically.



FOR REACTION
A Bulgin air-dielectric condenser for reaction circuits, a most efficient component

The only safe guide, then, is to buy one of the makes which has already established for itself a reputation—a rule which applies just as well in every other make and form of wireless component!

South African Broadcasting

A READER in Cape Province, South Africa, sends us some details of South African broadcasting. Johannesburg, 2TJ, is operating on 49.2 metres (6,097.2 kilocycles) and the usual call is: "Good evening, everybody. This is Johannesburg calling; the Johannesburg station of the African Broadcasting Co., operating on 666.6 kilocycles and 6,097.2 kilocycles, through Pretoria on 1,000 kilocycles, and through Bloemfontein on 588.2 kilocycles."

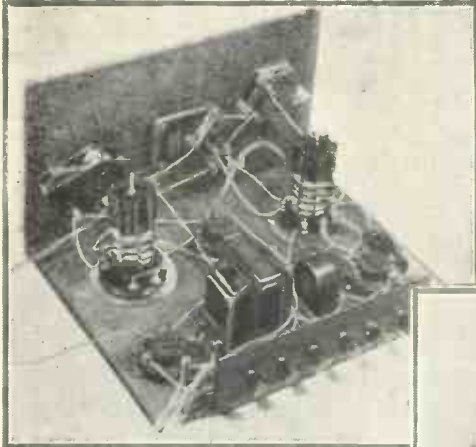
In South African standard time the daily programmes are from 11.00 to 14.00 and from 16.00 to 22.30; on Saturdays from 11.00 to 14.00 and from 16.00 to 23.45; and on Sundays from 15.00 to 17.15 and from 19.15 to 22.00.



A POPULAR "SERIES" CONDENSER
An "aerial series condenser" is used for controlling selectivity in nearly every modern set. This model is the Formo-Densor with solid dielectric

**If You Didn't Build It for Christmas—
Then Build It for the New Year!**

The 1933 Economy S.G.3



SCREENED DUAL-RANGE COILS

Two completely screened coils are used in the 1933 Economy S.G.3, which was fully described in the December issue of "W.M."

"GOOD afternoon, Henry! I'm just looking you up because I want to know how you got on with that little three-valve set I gave you details of. Is it working all right, or did you come up against any snags?"

"Oh, it's fine, thanks, George! Although it is the first set I have ever built, I managed to ferret it out all right. Several of my friends are thinking of building it now that they have been able to hear mine. They were amazed that such a cheap outfit could give reception from so many stations."

A Popular Design

"That's right; the more the merrier. I told you I was sure the set would be popular. Why, as soon as the Christmas Number of 'Wireless Magazine' was published we were inundated with inquiries for blueprints of the 1933 Economy S.G.3—that's the name we eventually gave to your set, you know."

"Yes, George, I saw that. The wife was tickled to death to think that we had been able to build our set from advance details before anybody else. You've no idea how pleased she is with the whole thing."

"But there are one or two things

George, of the "W.M." Technical Staff, has another chat with his friend Henry about the 1933 Economy S.G.3, which was fully described in the December number. The set can be built complete (that is with valves, cabinet, batteries and loud-speaker) for just under five guineas



SIMPLE—BUT A STATION GETTER!

Although it costs only five guineas complete with all accessories, the 1933 Economy S.G.3 is a real station getter and provides plenty of entertainment

I should like to ask you about the wiring, if you have a few minutes to spare. I think I have done it all

right, but I am not quite certain."

"Fire away, by all means. I'm not in a terrific hurry just now. What is it you want to know?"

"Well, just look at this blueprint. The connections numbered 36 and 37 seem to end in mid-air. I looked underneath the coils, but couldn't find anything that looked as if it needed connecting up. I came to the conclusion that these wires just had to be pushed under the metal bases of the coils to make contact."

Earthing the Screens

"That's right, Henry. Those two wires actually 'earth' the screens of the coils so that the set is stable in operation. See, the same applies to the connections numbered 31 and 34. Pieces of fine wire—without any insulation, of course—are twisted round the outside of the metal-braided cable and then connected to the coil screens. In that way the metal casing round the wire is earthed just as the coil

COMPONENTS NEEDED FOR THE 1933 ECONOMY S.G.3

CHOKE, HIGH-FREQUENCY

1—Graham Farish, 2s. (or Lewcos, Telsen).

COILS

2—Pressland dual-range, 9s.

CONDENSERS, FIXED

2—Dubilier .0002-microfarad, type 665, 1s. (or Lissen, Telsen).

CONDENSERS, VARIABLE

2—Telsen .0005-microfarad, type W193, 5s. (or Lissen, Polar).

1—Telsen .0003-microfarad, type W194, 2s. 6d. (or Lissen, Polar).

HOLDERS, VALVE

3—W.B. four-pin, 1s. 6d. (or Lissen, Lotus).

PLUGS AND SOCKETS

7—Ealex wander plugs, marked: H.T.+3, H.T.+2, H.T.+1, H.T.—, G.B.+1, G.B.—1, G.B.—2, 10½d. (or Belling-Lee, Clix).

6—Belling-Lee terminals, type Q, 1s. (or Ealex, Clix).

RESISTANCE, FIXED

1—Claude Lyons 2-megohm grid leak, 10½d. (or Erie, Dubilier).

SUNDRIES

1—Packet Goltone braided cable, 9d.

Lengths of oiled-cotton sleeving (Lewcos).

Tinned-copper wire for connecting (Lewcos).

Length of rubber-covered flex (Lewcos).

SWITCHES

1—Sovereign three-point wave-change, 1s. (or Bulgin, W.B.).

1—Sovereign on-off, 7d. (or Bulgin, W.B.).

TRANSFORMER, LOW-FREQUENCY

1—Telsen Ace, ratio 1 to 5, 5s. 6d. (or Lissen Torex, R.I. Dux).

ACCESSORIES

BATTERIES

1—Ever-Ready 120-volt high-tension, Winner type, 11s. (or Lissen, Siemens).

1—Ever-Ready 9-volt grid-bias, Winner type, 1s. (or Lissen, Siemens).

1—Oldhams 2-volt accumulator, type 025, 5s. 6d. (or C.A.V., Exide).

CABINET

1—Peto-Scott, 10s. 6d.

1—Peto-Scott wood panel, baseboard and terminal strip, 2s. 3d.

LOUD-SPEAKER

1—Lissen plaque, type LN5077, 8s. 6d.

VALVES

1—Mullard PM12, 16s. 6d. (or Cossor 220SG, Mazda 215SG).

1—Mullard PM1HL, 7s. (or Cossor 210HL, Mazda HL2).

1—Mullard PM2A, 8s. 9d. (or Cossor 220PA, Mazda P220).

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

screens are themselves earthed.”
 “Good! That’s what I tried to explain to one of my friends; but, of course, I don’t know enough about it to be absolutely certain. Now that you have told me, I’ll make sure he doesn’t go wrong.”

“I’ve been waiting to hear one criticism, Henry, but as you haven’t mentioned it I will. How do you get on with the tuning knobs — I mean, they haven’t any scales marked in degrees or anything, so how do you know where the stations are?”

Simple Solution

“Ah, that was a bit of a puzzle at first, but I got over it quite simply, as a matter of fact. I cut two semi-circular pieces of paper out and stuck them on the panel just over the tuning knobs. You know those have white arrows on them? Well, when I had tuned in a station and made certain what it was, I just

pencilled the name on the paper opposite the point where the arrow head was. That’s all right, isn’t it?”



NEAT CABINET
 Many readers have admired the appearance of the completed 1933 Economy S.G.3

“Excellent, Henry; just what I was going to suggest if you hadn’t already thought of it! Of course, another way would be to spring an extra three or four shillings and buy two ordinary calibrated dials; it would not be difficult to fix them on to the condenser spindles and they would look a little neater than your home-made scales.”

“I don’t think I shall

ideal in every respect—I don’t anyway. All that really matters is that it works as well as it does—and gets so many stations. But I tell you what I am thinking of doing, and that is to get one of those gadgets you need for playing gramophone records through the wireless.”

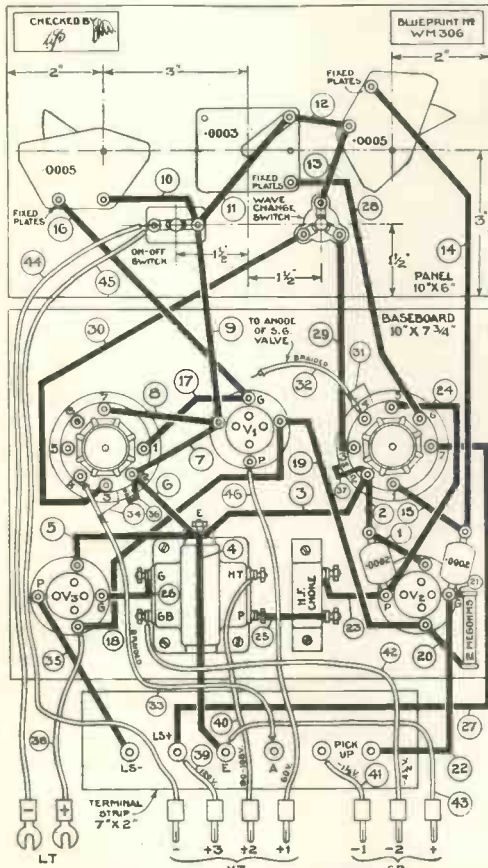
“Hullo, becoming quite a radio fan already, aren’t you? Well, you won’t have much trouble about that. The set already has two pick-up terminals. All you have to do is to connect a pick-up to these and put the records on.”

“Need I get any special kind of pick-up, or will any one do?”

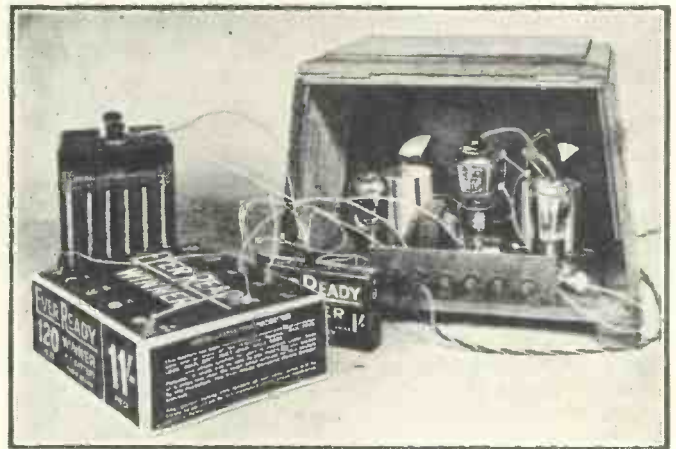
“Not exactly any one. You see, the set hasn’t got a gramophone volume control; so you had better get a pick-up that is provided with its own volume control. I should go along and see what your local dealer has got. Blue Spot make a pick-up with a volume control, and there are the Harlie and the B.T.H. Minor—you won’t have any trouble in getting one.”

Up to Date!

“That will be all right, then, for I saw a second-hand clockwork motor



LAYOUT AND WIRING DIAGRAM
 Full-size blueprints of the set are still available at 1s. each, post free, if application is made to the "W.M." Blueprint Departments. Ask for No. WM306 and address your letter to 58/61 Fetter Lane, London, E.C.4.



WHAT YOU CAN DO FOR FIVE GUINEAS
 Here you see the 1933 Economy S.G.3 connected to the batteries all ready for use. The price of five guineas includes set, valves, batteries, cabinet, and loud-speaker!

trouble about that. You see, with the names of the stations actually written on the paper my wife can tune at once to the programme she wants when I am not about. After all, you can’t expect a five-guinea set to be absolutely

and turntable going in a local junk shop for a few shillings. I think I’ll drop in and get it on the way home to-night. That will have to be a New Year treat for the wife. She likes the gramophone and will feel very up-to-date with an electric one!”



Listen to the New World!

A POWERFUL SUPER-HET FOR USE IN THE CAR

Great interest is being taken in the new H.M.V. portable super-het six-valver, which is battery operated. This receiver has been found ideal for use in a motor car

It is often thought that American stations can only be received with a short-wave set. That is not so, however, and in this article J. GODCHAUX ABRAHAMS tells you when to listen for the New World on your ordinary broadcast set

AT this season of the year listeners who care to devote a little time to the search for distant transmissions in the later hours of the night may find their patience rewarded by the capture of broadcasts from both North and South American cities.

Reception of concerts broadcast on medium wavelengths from the United States this year has been facilitated by the fact that many of the better-known stations are being rebuilt with a view to an increase in power.

This step has been taken in particular by studios associated with the National Broadcasting Company, as it is hoped that the new Rockefeller Centre or Radio City at New York may be completed by August, 1933.

It is true that the change-over of the studios to the new site may only be gradual in order that there may be no necessity to suspend operations, but in the meantime eight new stations of the N.B.C. net will shortly add 297 kilowatts to their total output.

Another Increase

In the same way, the competing concern, the Columbia broadcasting chain, is being increased by some 213 kilowatts. (To-day the combined power of the N.B.C. network has reached 900 kilowatts.)

Moreover, as a favour, the Federal Radio Commission has authorised

the Crosley Radio Corporation to construct an experimental 500-kilowatt transmitter to operate on 428.3 metres (700 kilocycles) in replacement of the WLW, Cincinnati, station.

Stronger Than Any Others

If the hopes of the engineers are realised the signals from this giant broadcaster will prove at least one and one-half times stronger than any other 50-kilowatt station in existence, and they will, no doubt, be picked up in the British Isles.

The possibility of hearing a greater number of U.S.A. programmes direct will be further increased by the fact that the following stations have already stepped up their radiating energy, or are doing so within the next few weeks.

They are WHAS, Louisville (356.2 metres), 25 kilowatts; WCCO, Minneapolis (370.2 metres), 50 kilowatts; WCAU, Philadelphia (256.3 metres), 50 kilowatts; and WBT, Charlotte (277.6 metres), 25 kilowatts.

In addition, eight other studios have also been authorised to put over their programmes at higher power, namely, WSM, Nashville (461.3 metres); WSB, Atlanta (405.2 metres); WOC-WHO, Des Moines (299.8 metres); KPO, San Francisco (440.9 metres); KOA, Denver (361.2 metres); KVO, Tulsa (263 metres) and WAPI, Birmingham, on the

same wavelength, have secured permits to use 25 kilowatts. WOR, Newark (N.J.), on 422.3 metres, may also be rated at 50 kilowatts.

During the past month reports on the reception of Transatlantic broadcasts in the medium waveband have been frequent, and in many instances they were not confined to big stations. WPG, Atlantic City (N.J.), on 272.6 metres, rated only at 5 kilowatts (aerial), and WRVA, Richmond (Va), 270.1 metres, of the same power, figure very prominently in these lists.

Curiously enough, WIOD, Miami Beach (Flo.), on 230.6 metres, and of much lower energy, appears to hold the record, for its transmissions are more frequently heard in the United Kingdom than those of many of its bigger competitors.

Facilitating A Search

In order to facilitate a search, I have prepared a list of the more important United States broadcasting stations; in those cases in which short-wave relays are associated with them full particulars of wavelength, frequency, and times of transmission have been given.

In the same way you will also find a list of main Canadian stations, many of which simultaneously transmit on short waves.

Of the South American studios, there is no doubt that at least three, situated at Buenos Aires, are being

well heard on favourable nights on this side of the Atlantic, although I have seen confirmed reports of reception of such stations as LS9, LR8, LS5, LR9, and LR6.

As you will see from the list of the principal studios, we cannot rely on short-wave intermediaries, as such relays are not carried out sufficiently regularly. Now and again, however, a programme emanating from Radio Splendid is rebroadcast through WABC, New York.

Publicity Items

Although the number of broadcasting stations operating in Buenos Aires, in proportion to the population and to the area covered, is very large, programmes—the actual programmes—are very poor, inasmuch as they are mainly composed of gramophone records interspersed—as is the custom with, say, Radio Toulouse nearer home—with frequently repeated publicity items.

The stations, with the exception of two which are run and operated by the Municipality, are all privately owned, possess no fixed source of income, and consequently are compelled to rely on microphone advertising for revenue.

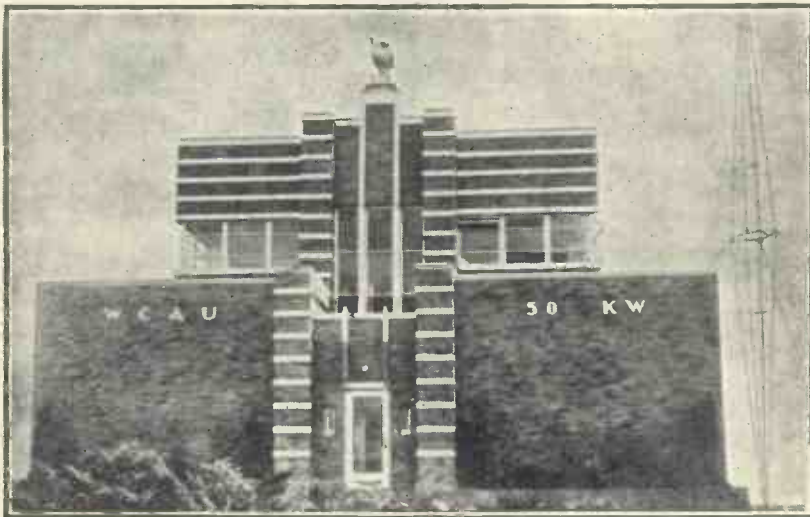
Poor Pay

Now and again, during the day, an hour may be devoted to an orchestral or vocal concert, but, generally speaking, the pay offered to the artists is so small that few musicians of repute are willing to broadcast.

In the case of the United States

studios, although no listening tax is levied and the stations are run by commercial concerns, the annual amount expended on wireless entertainments, and solely derived from sponsors of programmes, reaches very high figures. Such organisations as the National Broadcasting Company and the Columbia Broadcast Company, with their numberless

As a rule, the United States stations do not devote much time to any one particular broadcast; a feature may last from fifteen to thirty minutes. You will notice, however, that the time schedule is strictly adhered to and there are no gaps in the programme. It is also customary to introduce an item with a musical background even whilst the



NOT A RELIGIOUS TEMPLE—BUT A BROADCAST STATION!
The transmitting buildings for the American station WCAU. It is located at Philadelphia and works on 256.3 metres. Why not listen for it?

associated transmitters linked up into three or four separate networks, command big prices.

Experience has proved that the evening hours are more profitable to the advertisers than other periods of the day, and most of the sponsored programmes will be heard between 10 p.m. and 2 a.m. G.M.T.

preliminary announcement is being made.

Moreover, all stations are compelled to give their individual call every fifteen minutes; this is of considerable assistance to the distant listener.

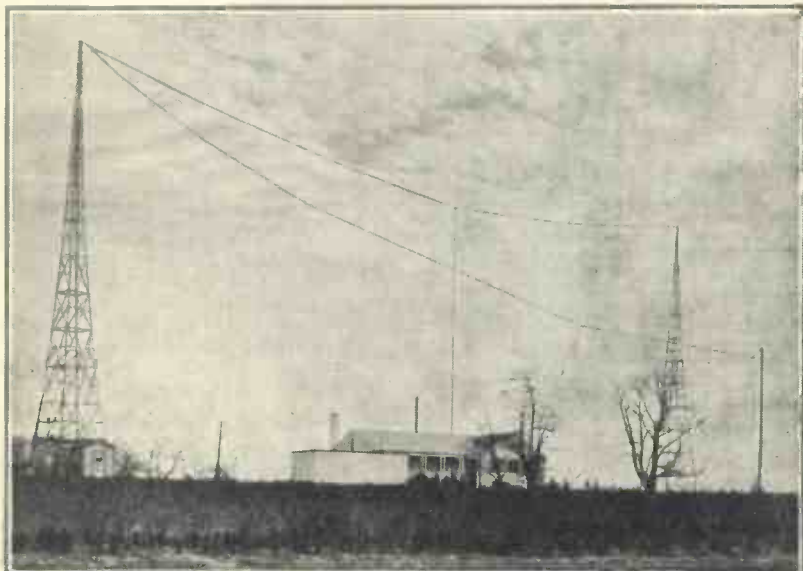
A Curious Point

Another curious point you may observe is that, contrary to our custom by which we are told that such and such a station is calling, the American announcer will inform you that *your* station is so-and-so, as if he were actually replying to a question put to him on the subject. Even announcers themselves are introduced in this manner.

Typical Programme

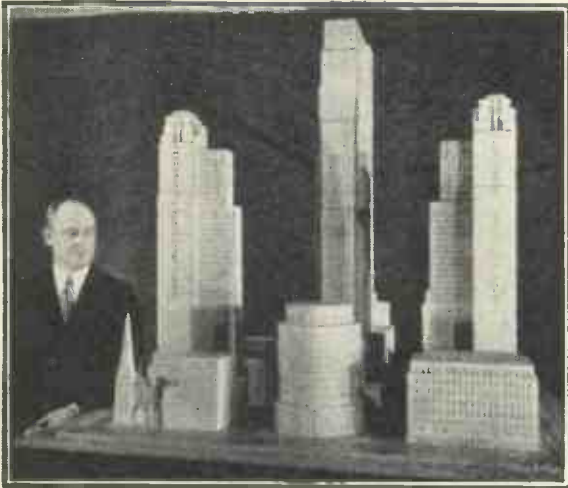
Overleaf I have reprinted a programme typical of many broadcast by such stations as WEAf or WABC (New York), representing respectively the "key" or "main" studios of the National Broadcasting Company's system.

You may, of course, hear the same entertainment through a number of associated transmitters or through their respective short-wave stations:



ONE OF THE BEST-KNOWN AMERICAN STATIONS
A view of the WJZ transmitter at Boundbrook, N.J. It works on 394.5 metres and has a short-wave relay on 16.878 metres; it is frequently heard over here

LISTEN TO THE NEW WORLD!—Cont.



AMERICA'S GIANT RADIO CITY

The building of Radio City, a broadcasting and entertainment centre in New York, is proceeding apace. Here is a scale model of the completed scheme. It is hoped to start operations in August, 1933

A Typical American Programme

(Times have been converted to G.M.T.)

Time	Item
11.45	Physical Exercises
13.00	Hill Billy songs
13.15	Organ Recital
13.30	Inspirational (?) Talk
14.00	Glee Club
14.15	String Trio
14.30	Poetry, Songs, Organ
15.00	Sketch
15.15	Food Talk
15.30	Piano and Song Recital
15.45	Special Artists
16.00	"
16.15	Household Talk
16.30	Band
17.00	Songs
17.15	String Trio
18.00	Market Reports
18.15	Orchestra

01.45	Paul Whiteman's Band
02.00	Concert
02.30	Speeches (relayed)
03.00	Sponsored Programme
03.30	Concert
04.00	Interview
04.15	Orchestra
05.00	Songs
05.30	Orchestra

The "high lights" or special features of these broadcasts are usually given between 19.00 and 23.00 Eastern Standard Time and are, therefore, heard by us between 23.00 G.M.T. and the early morning hours.

The entertainments offered by the Canadian stations are not so lavish

19.15	.. Sketch
19.30	.. Choral Concert
20.00	.. Orchestra
20.30	.. Woman's Review
21.00	.. Orchestra
21.30	.. Thé Dansant
21.45	.. Sketch
22.00	.. Sponsored Programme
22.15	.. "
22.30	.. Interview
22.45	.. Sponsored Programme
23.00	.. Orchestra
23.30	.. Songs
23.45	.. Talk
00.00	.. Interview
00.15	.. Dramatic Sketch
00.30	.. Songs
00.45	.. Sketch
01.00	.. Mystery Drama
01.30	.. Political Talk (relayed)

as those of their immediate neighbours and although the time allotted to the various items is also about fifteen minutes or half an hour, stations such as CKAC and CFCF, Montreal, do not give much prominence to publicity.

CKAC opens up at 09.00 (14.00 G.M.T.) with a special feature; CFCF, as early as 07.30 (12.30 G.M.T.), with a recital by troubadours; the former station including in its daily transmissions a percentage of talks or songs given in the French language.

Toronto Programme

Some privately owned Canadian studios broadcast only in the evening hours. As a rule, the close-down takes place after a news bulletin between 23.15 and 23.30 (G.M.T. 04.00-04.30). Here is a CKGW Toronto programme taken at random:

G.M.T. 22.45, Little Orphan Annie; 23.00, Orchestra; 23.45, Lowell Thomas (Explorer and Journalist); 24.15, Revellers; 01.00, Cities Service Concert Orchestra; 02.00, Joyce Trio; 03.00, The Country Doctor's Advice; 03.15, CTRY broadcast; 03.45, Luigi Romanelli's Orchestra; 04.15, Cesare Sodero and Orchestra; 05.00, Close down.

Finally, apart from XEP, Nuevo Laredo and XEW, Monterey, of which transmissions have been picked up through their short-wave relays, it is seldom that listeners in the British Isles hear broadcasts from Mexico.

Principal New World Stations

Metres	Kilo-cycles	Call	Station	Metres	Kilo-cycles	Call	Station
NORTH AMERICAN STATIONS (United States)							
214.2	1,400	WCGU	Brooklyn (N.Y.) relayed by W2XBH, 54.52 metres.	260.7	1,150	WHAM	Rochester (N.Y.), N.B.C., Blue Net.
230.6	1,300	WIOD	Miami Beach (Florida), N.B.C. Blue Net, relayed by W4XB on 49.67 metres.	270.1	1,110	WRVA	Richmond (Va.).
243.8	1,230	WHAS	Boston (Mass.) Columbia Broadcasting System, relays WABC, New York.	270.1	1,110	WPG	Atlantic City (N.J.), C.B.S.
249.9	1,200	WBHS	Huntsville (Ala.), 50 kw.	275.1	1,090	KMOX	St. Louis (Mi.), C.B.S.
252	1,190	WOA1	San Antonio (Tex.), N.B.C., 50 kw.	280.2	1,070	WTAM	Cleveland (Ohio), N.B.C.; relayed through WJZ, Boundbrook.
256.3	1,170	WCAU*	Philadelphia (Pa.) C.B.S., 50 kw.; relayed by W3XAU, 31.28 metres. G.M.T. 21.00-06.00 (except Thurs. and Fri.); and on 49.5 metres, G.M.T. 14.30-21.00 daily; 14.00-06.00 (Thurs. and Fri.).	282.8	1,060	WTIC	Hartford (Conn.), N.B.C.; relayed through WJZ, Boundbrook.
				293.9	1,020	KWY } KFKX }	Chicago (Ill.), N.B.C. Blue Net.
				302.8	990	WBZ	Boston (Mass.), N.B.C.; Blue (relayed by WIXAZ, 31.35 metres. G.M.T. 11.30-03.00 daily.
				305.9	980	KDKA	East Pittsburgh (Pa.), N.B.C., Blue; relayed by W8XK, 13.92 metres, 40 kw. G.M.T. 11.30-16.00 daily; and on 19.72 metres G.M.T. 11-

WHEN TO LISTEN FOR AMERICA

Metres	Kilo-cycles	Call	Station	Metres	Kilo-cycles	Call	Station
309.1	970	WCFL	30-22.00 daily; and on 25.27 metres. G.M.T. 20.00-02.00 daily and on 48.86 metres, G.M.T. 22.00-04.00. Chicago (Ill.) relayed by W9XAA, 16.57 metres, and on 25.34 metres; and on 49.34 metres, G.M.T. 14.30-03.00 (Wed. and Sat.); 14.30-02.00 (Tues. and Thurs.) 19.00-03.00 (Sun.).	357	840	CKGW } CPRY }	Toronto (Ont.), linked up with National Broadcasting Company of America (N.B.C.) network and occasionally relays WEAJ, New York; WJZ, Boundbrook; and KDKA, East Pittsburgh. Relayed by VE9GW, Bowmanville, on 25.4 metres. Daily G.M.T. 18.00-21.00 (except Sun.), and on 49.22 metres. Daily G.M.T. 22.00-04.00; 17.30-01.00 (Sun.).
344.6	870	WBCN } WENR }	Chicago (Ill.), N.B.C. Blue; relayed through WJZ, Boundbrook. Relayed by W9XF, 49.83 metres, G.M.T. 05.00-07.00; 13.00-17.30; 20.30-23.00 (Sun.); 01.00-06.00 (Mon.); 15.15-16.45; 20.30-24.00 (daily); 13.30-18.00 (Sat.).	385	780	CKY } CNRW }	Winnipeg (Man.) linked up with N.B.C. Relayed by VE9JR on 25.6 metres, G.M.T. 17.45-19.30 (except Sat. and Sun.).
344.6	870	WLS	Chicago (Ill.), N.B.C. Red.	411	730	CKAC } CNRM }	St. Hyacinthe (Que.) linked up with Columbia Broadcasting System of America (C.B.S.).
348.6	860	WABC	New York, main C.B.S. station.	411	730	CFCF	Montreal (Que.) relayed by VE9DR, Drummondville (Que.), on 49.96 metres G.M.T. 01.00-05.00.
361.2	830	KOA*	Denver (Col.), N.B.C. Red.	435	690	CFRE } CNRX }	Toronto (Ont.), linked up with C.B.S.
370.2	810	WCCO*	Minneapolis (Min.), N.B.C.	435	690	CFCN	Calgary (Alta.).
374.8	800	WFAA	Dallas (Tex.), N.B.C.	517	580	CHMA } CKUA }	Edmonton (Alta.).
374.8	800	WBAP	Fort Worth (Tex.), N.B.C.	555.5	540	CKWO	Windsor (Ont.), linked up with C.B.S.
379.5	790	KGO	San Francisco (Cal.).	SOUTH AMERICA			
379.5	790	WGY	Schenectady (N.Y.), N.B.C., relayed by W2XAD, 19.560 metres. Call announced every 15 minutes. Daily G.M.T. 18.00-20.00 (except Sat. and Sun.); 18.00-21.00 (Sat. and Sun.), and on W2XAF, 31.48 metres. Beamed on S. America. G.M.T. 22.15-04.00 (except Sat. and Sun.); 21.00-04.00 (Sat. and Sun.); aerial directed on S. America. Advice of relays of important events not mentioned in programmes is made at 22.15 every day. During the season W2XAF and W2XAD relay sporting broadcasts at about 18.00.	Principal Stations at Buenos Aires (Argentine Republic)			
389.4	770	WBBM	Chicago (Ill.), C.B.S.	215.8	1390	LS9	La Voz del Aire.
394.5	760	WJZ	Boundbrook (N.J.), N.B.C.; relayed by W3XAL, 16.878 metres. Daily G.M.T.: 12.00-20.00 and on 49.18 metres from 22.00 daily.	231.5	1,295	LR7	Radio Patria.
399.8	750	WJR	Detroit (Mich.), N.B.C.	243.9	1,230	LS8	Radio Sarmienito.
405.2	740	WSB*	Atlanta (Gol.), N.B.C.	252.1	1,190	LS2	Radio Prieto.
416.4	720	WGN } WLIB }	Chicago (Ill.), C.B.S.	260.9	1,150	LR8	Cinè Paris.
422.3	710	WOR*	Newark (N.J.).	270.3	1,110	LS5	Estacion Rivadavia.
428.3	700	WLW*	Cincinnati (Ohio), N.B.C. Blue, relayed through WJZ, Boundbrook. Relayed by W8XAL, 49.5 metres, G.M.T. 19.30-21.30 daily.	291.3	1,030	LR9	Radio Fenix.
440.9	680	KPO*	San Francisco (Cal.), N.B.C.	303	990	LR4*	Radio Splendid.
454.3	660	WEAF	New York, N.B.C., main station Red Net, relayed through WGY, Schenectady, and/or WJZ, Boundbrook.	316	949.2	LR3+	Radio Nacional.
461.3	650	WSM*	Nashville (Tenn.).	330	910	LR2	Radio Prieto.
468.5	640	KFI	Los Angeles (Cal.), N.B.C.	345	870	LR6†	La Nacion.
CANADA				361	830	LR5	Radio Excelsior.
291.1	1,030	CNRV	Vancouver (B.C.), occasionally relayed by VE9CS on 49.43 metres.	423	710	LS1	Broadcasting Municipal.
312.3	960	CNRR	Regina (Sas.).	448	669.4	LP4	Radio Portena.
329.5	910	CJGC	London (Ont.) relayed by VE9BY on 34.68 metres, G.M.T. 21.00-22.00 (irreg.) and on 46.67 metres, G.M.T. 02.30-03.30 (Thurs.); 01.00-01.55 (Sat.) 02.00-04.00 (Sun.) and on 62.56 metres, G.M.T. 06.00 (Sun.).	509	590	LP6	Casa America.
STATIONS MARKED * ARE THOSE OF WHICH POWER IS BEING INCREASED AS EXPLAINED IN ARTICLE.				RIO DE JANEIRO (BRAZIL)			
Times of transmission: Generally from G.M.T. 14.00-18.00 and from 21.00-03.00 or 04.00.				400		PRAA	Radio Sociedade de Rio de Janeiro, occasionally relayed by PRAB on 31.58 metres (9,500 kcs.) and PPQ, 25.72 metres (11,660 kcs.)
†Sometimes relayed by LSY, Hurlingham, on 14.47 metres on Sun. (G.M.T. 21.00) and irregularly by LSX on 28.98 metres.				PERU			
‡Occasionally relayed to Paris or Madrid.				380	789	OAX	Lima.
†Sometimes relayed to Paris or Madrid.				MEXICO			
†Sometimes relayed to Paris or Madrid.				214	1,400	XEP	Nuevo Laredo, relayed by X26A on 39.4 metres, G.M.T. 16.00-17.00 (Thurs.)
†Sometimes relayed to Paris or Madrid.				265	1,130	XEH	Monterey.
†Sometimes relayed to Paris or Madrid.				311	965	XED	Reynosa.
†Sometimes relayed to Paris or Madrid.				330	910	XEW	Monterey, relayed on 49.8 metres, G.M.T. 01.00-05.30.
†Sometimes relayed to Paris or Madrid.				408	735	XER	Villa Acuna Coahuilla. (Studios are in U.S.A.).
†Sometimes relayed to Paris or Madrid.				CUBA			
†Sometimes relayed to Paris or Madrid.				411	730	CMK	Havana, relayed by CMCI on 49.5 metres daily, G.M.T. 02.00-04.00.

Radio As Furniture

By WALTER H. CLARK, L.R.I.B.A., F.I.B.D.

Since radio has now entered into the home almost universally, it becomes interesting to consider the place which it is filling, and is likely to fill, in the appointment of the future home

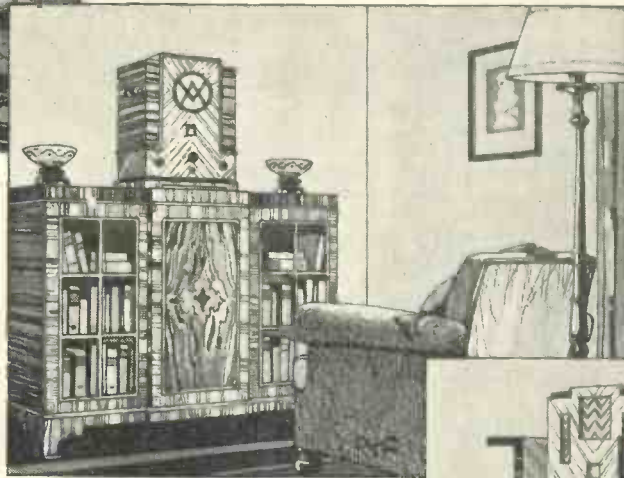


A PERIOD DESIGN

Fig. 1.—The radio cabinet designed to be in keeping with period furniture. Particular attention is not paid to its special function as radio

A FEELING OF MODERNITY

Fig. 2. (right).—The radio cabinet designed to be not out of harmony with the furnishing of the average home. It occupies a position similar in importance to that of a useful ornament such as a clock



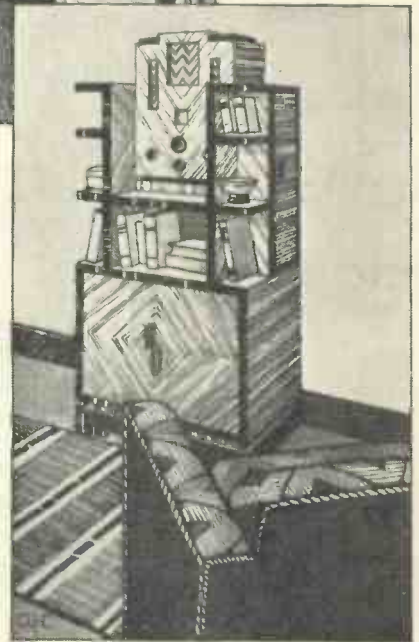
WE have seen how the gramophone has developed from its early form into the radiogram console cabinet which is to-day an important item in our furnishing scheme. Let us approach our subject, however, from the radio rather than from the gramophone side of the question.

In the radio we have, not merely a musical box, but something in the nature of a modern Oracle or, to use a further simile, we find ourselves listening much in the same spirit as did the ancient Greeks and Romans when gathered in the Agora to hear their poets, singers, and philosophers.

Still Closer Contact

Printing was the first broadcast of knowledge and entertainment to the public; radio moves on a further step, making still closer contact between the author and his public.

Radio has happily passed out of the stage when the "box of tricks" was placed in some ignominious position with the loud-speaker perilously poised on mantelpiece or



A COMPLETE UNIT

Fig. 3.—The radio cabinet designed in conjunction with a suitable and useful piece of furniture, the whole forming one complete unit

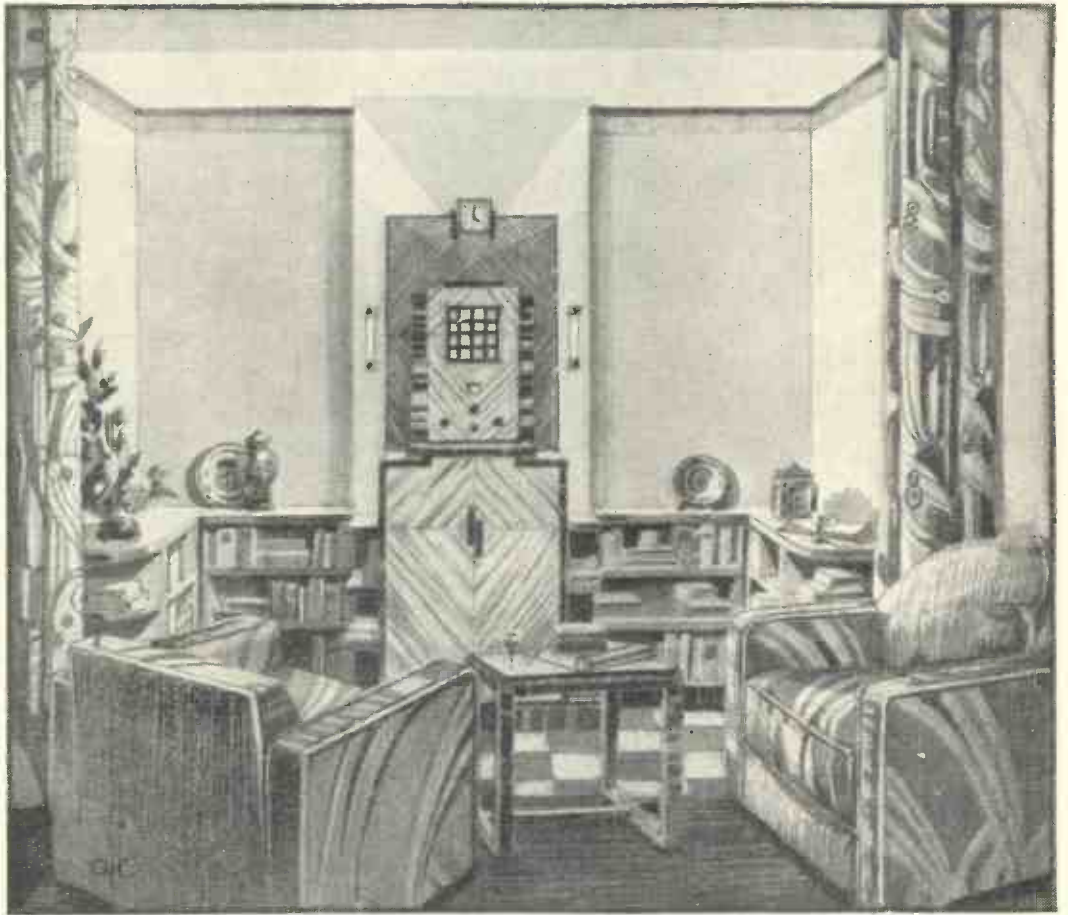
Our first illustration (Fig. 1) makes use of period style as a basis of design. This, however, does not seem to give radio its best chance of self-expression, though as a cabinet it may be pleasing enough.

Fig. 2 picks up a feeling of modernity, but our cabinet finds itself somewhat ill at ease owing to the fact that it has not achieved any certainty of position in the general scheme of things; it is too large a piece to be considered merely as an ornament.

round it, incorporating such treasures as will be in harmony.

Perhaps in the not far-distant future the architect, when planning, will make special provision for the installation of radio in the home, and the manufacturer will offer furniture particularly suitable in character for our purpose. That may seem a startling prophesy, but it is almost certain to come true.

It seems that a new type of room may well be evolved—where we may listen, read, write, or dance. Our



CENTRAL FEATURE OF THE FURNISHING SCHEME

Fig. 4.—The radio treated as a central feature of a furnishing scheme—appearance, convenience, and such matters as acoustics being considered

The third illustration introduces the idea of designing round the cabinet, and producing a useful piece of furniture of character, which holds our radio set much as our bookcase holds our books or our dresser holds china. This is a type of cabinet that would be useful in many homes.

The next illustration (Fig. 4) takes us still a step further. Considering our radio set as a centre, we proceed to form our decorating and furnishing scheme

illustration pictures a radio-library recess which may be closed off from the rest of the apartment by curtains. Practical and æsthetic points may thus be achieved without additional expense if the scheme is originally contemplated.

One well-known firm of manufacturers is already proceeding with designs embracing these views, and they find that their mass-production methods of cabinet making are in no danger of being interfered with.



Ganging the Seventy-seven Super

Here the "Wireless Magazine" Technical Staff gives some further hints regarding that ganging of the Seventy-seven Super, the one-knob super-het radio gramophone for A.C. mains of which full constructional details were given in the December issue

IT was mentioned last month that the oscillator coil used in the Seventy-seven Super had been specially developed by Lewcos. Constructors should be quite clear that the coils needed are a type TOS/GR oscillator and a type BPF/GR band-pass filter. It is of vital importance that coils with the suffix "GR" are ordered.

In order that the tracking of the oscillator section of the three-gang condenser shall keep in step with the two sections used for band-pass tuning a fixed padding condenser of .0025 microfarad is connected in series with the oscillator tuning condenser.

For Long Waves Only

In addition to this, there is another condenser, of .0011 microfarad, between terminals 1 and 6 of the oscillator coil; this is automatically thrown in and out of circuit by the oscillator switch. It is used only for long-wave reception.

Unfortunately in the circuit diagram that appeared on page 622 of the last issue, and in the quarter-scale reproduction of the blueprint that appeared on page 621, these condensers were reversed. The correct arrangement is to place the .0025-microfarad condenser under the figures 59 and 58 on the blueprint, while the .0011-microfarad condenser is placed under the

figures 65 and 63. This is shown clearly in the portion of the blueprint reproduced on this page. All blueprints supplied to readers have had the necessary correction made.

It should be noted that the .0025-microfarad condenser is obtained by using a .002 in parallel

some difficulty regarding the correct ganging of the set. The procedure is really very simple and expert manipulation is *not* required to adjust this set. Rather the reverse is the case, since the ganging of the Seventy-seven Super is considerably easier than with most "straight" sets having a stage of high-frequency amplification.

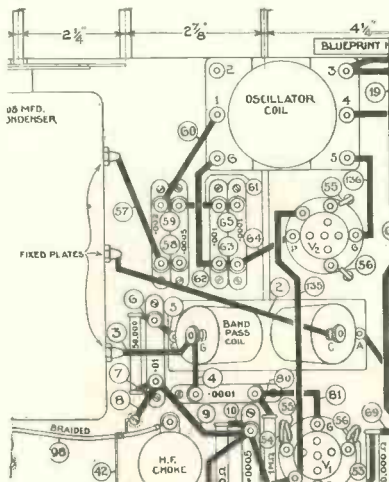
In order to make the procedure quite clear, even to the beginner, we give here the four steps in ganging. If the set is adjusted in the following way it is a simple matter to obtain equal sensitivity over all parts of the two wave ranges :

Sequence for Ganging

1.—Tune to the local station and adjust the trimmer of the oscillator section of the three-gang condenser (that is the front section, nearest the dial) so that the transmission is tuned in at approximately the reading given in the log that appeared on page 627 of the December "Wireless Magazine."

2.—With the volume control turned as far down as possible (consistent with still hearing the transmission faintly), adjust the other trimmers for maximum volume.

3.—Next tune to a more distant station, preferably about 300 metres (if you are in the London district a suitable station is Midland Regional on 398.9 metres) and adjust the



TRACKING CONDENSERS
A portion of the layout diagram showing the correct positions of the .0011- and .0025-microfarad combination tracking condensers. Full-size blueprints are available for 1s. 6d. each, post free

with a .0005, while the .0011 is obtained by using a .001 in parallel with a .0001-microfarad condenser.

A number of readers have written to us because they seem to be in

oscillator trimmer so that the dial reading is exactly that given in the test log on page 627 of the last issue (for Midland Regional the reading is 53 degrees).

4.—After this has been done, the two other trimmers controlling the band-pass circuit are again adjusted for maximum volume with the volume control turned as far down as possible as explained in note 2. If still further accuracy of trimming is desired, a more distant station

can be tuned in, preferably between 250 and 300 metres, and the same procedure carried out.

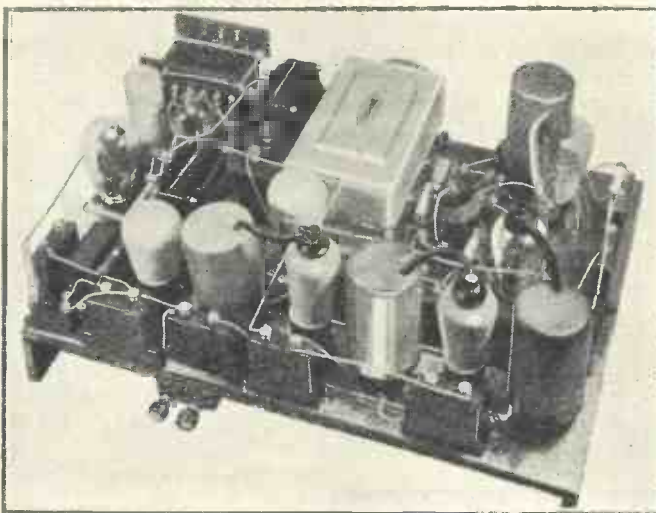
It is not advisable to trim the set when receiving long-wave stations, because tuning is inherently flatter

brackets specified in the list of parts under "Sundries." These are used for mounting the two potentiometers placed on the underside of the baseboard. Two of the brackets are placed near the front edge of



A RADIOGRAM FOR THE CONNOISSEUR

The Seventy-seven Super shown complete in its Osborn cabinet—an absolutely up-to-the-minute mains super-het receiver with amazing selectivity



THE SET YOU WANT IF YOU HAVE A.C. MAINS!

A view of the Seventy-seven Super showing the compact nature of the layout. Although it is a large set, it is not difficult to construct with the aid of a blueprint

on that waveband. By trimming on the medium waveband only, considerably greater accuracy is obtained and the set will automatically be trimmed on the long waves.

There has also been some confusion regarding the use of the four

the set and act as supports for the two expansion spindles attached to the potentiometers.

The other two brackets are used for holding the potentiometers themselves in position. These points should be clear from a glance at the lower photograph on page 623 of the December issue and also from the blueprint.

COMPONENTS NEEDED FOR THE SEVENTY-SEVEN SUPER

CHOKE, HIGH-FREQUENCY

- 1—Lewcos, type MC, 2s. 6d.

CHOKES, LOW-FREQUENCY

- 2—Ferranti, type B1, £2 2s. (or Varley, R.I.).

COILS

- 1—Lewcos bandfilter, type BPF/GR, 12s.
- 1—Lewcos oscillator, type TOS/GR, 8s. 6d.
- 3—Lewcos super-het intermediates with pigtails, type IFTP, £1 11s. 6d. (or Wearite).

CONDENSERS, FIXED

- 1—T.C.C. .00005-microfarad, type 34, 1s. 6d.
- 3—T.C.C. .0001-microfarad, type 34, 4s. 6d. (or Dubilier, Telsen).
- 2—T.C.C. .0005-microfarad, type 34, 3s. (or Dubilier, Telsen).
- 1—T.C.C. .001-microfarad, type 34, 1s. 10d. (or Dubilier, Telsen).
- 1—T.C.C. .002-microfarad, type 34, 1s. 10d. (or Dubilier, Telsen).
- 2—T.C.C. .01-microfarad, type 34, 3s. (or Dubilier).
- 9—T.C.C. 1-microfarad, type 50, £1 5s. 6d. (or Dubilier, Telsen).
- 2—T.C.C. 2-microfarad, type 50, 7s. 8d. (or Dubilier, Telsen).
- 2—T.C.C. 2-microfarad, dry electrolytic 200-volt working, type 561, 6s. (or Dubilier).
- 1—T.C.C. 4-microfarad, 400-volt D.C. working, 8s. 6d. (or Dubilier, Peak).
- 1—T.C.C. 8-microfarad electrolytic, 9s. (or Dubilier).

CONDENSER, VARIABLE

- 1—British Radiophone .0005-microfarad

three-gang with cover and disc drive, type 344C, £1 13s.

HOLDERS, VALVE

- 11—Lissen five-pin, type 593, 13s. 9d. (or W.B., Lotus).

RESISTANCES, FIXED.

- 1—Packet of 18 Eric fixed resistors, 1-watt type, values 400, 500, 600, 750, 5,000, 7,500, 10,000, 20,000 (3), 25,000, 30,000 (2), 50,000 (3) ohms, 5 and 1 megohm, 18s. (or Claude Lyons, Dubilier).

RESISTANCES, VARIABLE

- 1—Multitone graded, 3s. 6d.
- 1—Lewcos 10,000-ohm potentiometer, 3s. (or Wearite, Colvern).

SUNDRIES

- Tinned-copper wire for connecting (Lewcos).
- Lengths of oiled-cotton sleeving (Lewcos).
- Length of shielded cable, 9d. (Goltone).
- Length of rubber-covered flex.
- 1—Baseboard-chassis assembly with 1 3/4-in. by 14-in. sheet of aluminium foil (Peto-Scott).
- 4—Peto-Scott brackets to specification, 1s.
- 2—Utility 10-in. rods and insulated couplers, 4s.

- 1—Belling-Lee twin fuseholder and fuses, 2s. 6d.

SWITCHES

- 1—Tunewell radio-gram, 1s. 9d.
- 1—Becker double-pole on-off, type 462, 2s. 3d.

TERMINALS

- 4—Belling-Lee, type B, marked: Aerial, Earth, Pick-up (2), 2s.

- 2—Belling-Lee terminal blocks, 1s. 4d.

TRANSFORMER, LOW-FREQUENCY

- 1—Multitone, 17s. 6d.

TRANSFORMER, MAINS

- 1—Parmeko, type WMD, £2.

ACCESSORIES

CABINET

- 1—Osborn radio-gramophone, type 234, in mahogany, £6 5s.

LOUD-SPEAKER

- 1—Baker permanent-magnet, standard type, with matched output transformer, £3 10s.

GRAMOPHONE MOTOR

- 1—Garrard No. 201 induction with automatic stop, £4 17s. 6d.

PICK-UP

- 1—B.T.H. minor with volume control, £1 5s.

VALVES

Oscillator

- 1—Mazda AC/HL metallised, 13s. 6d.

First Detector

- 1—Mazda AC/SG metallised, 19s.

Screen-grid Intermediates

- 2—Cossor MVSG metallised, £1 18s.

Diode Detector

- 1—Cossor 41MHL, metallised, 13s. 6d.

First Low-frequency Stage

- 1—Cossor 41MHL, metallised, 13s. 6d.

Peniode Output

- 1—Cossor MP/Pen, £1.

Mains Rectifier

- 1—Cossor 506BU, 12s. 6d.

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.

Radio Music for the New Year

IT is human nature to grumble. No matter how good the programmes are, some fault or another is certain to be found. Many say that the programmes now are terrible, and probably think they are perfectly justified. But has it occurred to you that if you were to have the programmes of a few years back you would grumble still more?

A Little Investigation

The average listener is usually fond of one type of entertainment and thoroughly detests another. I have been doing a little investigation



Every dance-music enthusiast has heard of Paul Whiteman, whose dance orchestra is one of the biggest in America. His band was relayed to British listeners recently

work, the results of which have been surprising. Wandering round the roads at night, eavesdropping outside windows and listening to loud-speakers has given me some useful information concerning the tastes of the majority.

I have made these tours when one programme has been a Queen's Hall symphony concert and the other a vaudeville programme or some other kind of light entertainment. Remember that the big orchestral concerts involve the greatest expense—the B.B.C. Symphony Orchestra costs over £100,000 a year to maintain,

By T. F. HENN

The number of sets tuned to the symphony concert was small compared with the number tuned to the light programme. Relay exchanges which provide alternative programmes in some towns are, I believe, finding the same state of affairs.

The B.B.C. is a little one-sided in its general programme arrangements. Mid-day concerts are almost all of the light-music type, while the evening concerts do definitely favour the highbrows.

The alternative programme system does not relieve the situation as much as it could. However, the listener with highbrow tastes must be considered. My New Year request to the B.B.C. is simply: "Arrange your programmes, still maintaining their high standard, so that light items



One of the earliest of broadcasters, Hilda Bor is a splendid classical pianist. She has been heard from London Regional playing music by Liszt and Chopin

play a more prominent part in the main evening entertainment."

Percy Pitt, one of the best loved men in the musical world, died during November. He was musical director of the B.B.C. before Adrian Boult. No one ever called Percy Pitt "Mister." He was known to the

great men of the musical world as "Percy," and to the musical world at large as "The Maestro."

His greatest work as B.B.C. Musical Director was the arrangement and presentation of the National concerts, first at the Central Hall, Westminster, and later at the Albert Hall. Afterwards these concerts grew into the present B.B.C. Symphony Concerts at Queen's Hall and the concerts at the People's Palace, Mile End.

Opera and Operatic Concerts

Whilst on the B.B.C. staff he made a feature of the presentation of studio operas and operatic concerts. Many listeners will remember the series of operas arranged by Percy Pitt some years ago which were, I believe, relayed from the Parlophone recording studios.

At the time of his death he was busy preparing a new series of popular operatic concerts which is to be given in the New Year.

Percy Pitt was a composer as well as conductor. He was responsible for the incidental music to Sir Herbert Tree's productions, *Richard the Second* and *Flodden Field*, at His Majesty's Theatre. He also wrote



The orchestra relayed from the Pavilion Cinema, Shepherd's Bush, is conducted by Harry Fryer. His choice of music is reputed to fit both pictures and microphone

a symphony for the 1906 Music Festival and a *Ballade for Violin and Orchestra* which he dedicated to Ysaye, the famous Belgian violin virtuoso.

The B.B.C. and listeners generally will miss his great services to broadcast music.

The first season of Christmas Promenade Concerts opens at the Queen's Hall on New Year's Eve, and goes on nightly until January 14. Although I am certain a great majority of listeners hate the very sound of the word "Prom," these concerts are going to appeal to many. Providing the B.B.C. gives some good variety and vaudeville concerts as alternatives, everyone will, or at least should, be well pleased.

Popular Classical Music

In brief, this new season is to be a feast of the best and most popular items in the huge repertoire of classical music. Sir Henry Wood, who already has thirty-eight seasons of summer "Proms" to his credit, is to conduct a section of the B.B.C. Orchestra consisting of ninety players, with Charles Woodhouse as principal violin.

The opening concert will be popular in the best sense of the word. Berlioz's overture, *Le Carnaval Romain*, opens the concert, which includes Moussorgsky's famous song, *The Song of the Flea*, to be rendered by Harold Williams; Liszt's *Wanderer Fantasia* for piano and orchestra, with Soloman as soloist;



A classical singer of importance, Claira Croiza has broadcast recently several recitals of French and Continental songs



A well-known tenor who has given several recitals lately—Herbert Cave. His last broadcast was from London

Scheherazade, Rimsky Korsakov's musical impression of an Arabian Nights story; and the beautiful *Invitation to the Waltz* by Weber. The evening will conclude with the singing and playing of *Auld Lang Syne*. This will be a fine concert.

Composer nights will follow an



Geryl Vernon, known as "The Viennese Nightingale," broadcast during the B.B.C. birthday week. She is widely known on the Continent

arrangement similar to that of the summer "Proms." Both Mondays and Fridays will be devoted to the works of Wagner and Beethoven respectively. In the second half at the first Wagner night, Paul Hindemuth's *Philharmonic Concerto* will receive its first performance in this country.



A famous operatic singer who will be heard during the new Christmas "Proms" at the Queen's Hall—Evelyn Scotney

A Russian concert has been arranged for January 3 in which Tchaikowsky will be represented by his *Symphony No. 5 in E minor* and the *Piano Concerto No. 1 in B flat minor*; the soloist will be Poushinoff.

Handel is one of those unfortunate composers whose works have been neglected to some extent lately. The B.B.C. has arranged a special concert of his works for January 7.

Special Handel Concert

The programme will include choruses from the *Messiah*, the overtures to the *Messiah* and *Samson*, and the *Organ Concerto No. 9 in B flat*. The solo organist will be Thalben Ball. The Sheffield Musical Union with its veteran conductor, Sir Henry Coward, renowned for its singing of Handel, will perform at this concert.

The short season is to have a number of "star" works, chosen apparently for their novelty rather than their musical value. Ravel's *Bolero*, an exciting and noisy composition you should certainly make a point of hearing, is down for performance on January 12. In the same programme five Catalan folk songs will be given their first performance in this country.

A First Performance

Dame Ethel Smyth is to conduct the first London performance of her *Fête Galante* (A Dance Dream) at a miscellaneous concert on January 10.

I have endeavoured to catalogue briefly the most interesting items you

RADIO MUSIC FOR THE NEW YEAR—Cont.

can hear. The orchestra is really splendid, and with such first-rate artists as Albert Sammons, Lamond, Walter Widdop, Arthur de Greef, in addition to others I have mentioned, you will gather that the concerts are going to provide a fortnight of good music properly executed.

Enthusiastic Audience

Whatever your musical tastes, you should make a point of listening to the last "Prom" on January 14. The audience will be very enthusiastic and will shout their applause



The death of Percy Pitt, late musical director of the B.B.C., has robbed broadcasting of one of its greatest workers. He was a great believer in studio operatic performances

after every item. But, remember, they are shouting not so much for what they have heard but as a means of showing their appreciation of one of England's greatest conductors, Sir Henry Wood, a man who has done more to popularise good music than anyone.

An Old Favourite

The last concert will finish with an item that has been included in every last "Prom" for many years, Liszt's *Second Hungarian Rhapsody*.

Quite recently I explained the various sub-divisions of the big B.B.C. Orchestra. I hope you have fully digested the meaning of "The B.B.C. Orchestra, Section C." Now this A-B-C method has spread to the B.B.C. choruses.

Again I will try to explain what it all means. Firstly, the B.B.C. Chorus is not affected by the new classification system. This seems a contradiction. When you hear an announcement to the effect that the B.B.C. Chorus will sing it means that you are about to hear a choir of 260 amateur singers drawn from the ranks of London and district choral and operatic societies.

Any amateur singer, providing he or she can attend the weekly rehearsal in London on Friday evenings, is eligible for membership. If you would like to try your hand at chorus singing write to the Hon. Secretary of the B.B.C. Chorus at Broadcasting House for an audition.

It is the Wireless Chorus, a professional organisation of forty voices, that has been divided into classified sections. Section A is the full chorus consisting of thirteen sopranos, eight contraltos, seven tenors and twelve bass singers. Sections B and C consist of twenty-six and fifteen members respectively, in roughly the same proportions of types of voice.

The Revue Chorus consists of three sopranos and two contraltos, tenors and basses—nine singers in all. The members are drawn from the Wireless Chorus. In addition the Male Voice and Ladies Choir, of fifteen and twelve voices respectively, are obtained from the same source.

By the time these notes are published you will know all about the Christmas programmes. I feel I ought to comment on one programme to be broadcast on Boxing Day. There is a chamber-music concert in the second half of the main evening programme. I wonder who was responsible for this judgment of listeners' tastes?

Henry Hall and his "hotted-up" band are taking a good share in the Christmas week programmes. Since the change in personnel, which I mentioned last month, the performances of the band are certainly much better. In fact their "hot" numbers are really good. But I still think the band needs either another double-bass or a sousaphone to give better balance.

Les Allen, the new vocalist, who was formerly a saxophonist in Howard Jacob's band, is an improvement. His fresh Canadian accent

and remarkably good diction have done wonders in a short time. Val Rosing, the late vocalist, is forming a stage band.

Among the best events in the January programmes is a concert by the Royal Air Force Band on January 7—always a popular item.

Gunther Ramin, the celebrated organist of St. Thomas' Church, Leipzig, is giving a recital from All Saints, Margaret Street, on January 3.

A Listening Hint

Talking of Leipzig reminds me to give a hint on listening. If you get tired of the B.B.C. programmes tune in Leipzig, a big German station just below Midland Regional. Its strength and clarity after dark, and the fact that it can be heard with almost negligible interference, makes it an ideal alternative.

The programmes from this station are well varied, but the chief items are concerts by the Leipzig Symphony Orchestra two or three times a week and very tuneful light music in the late evening. I think you will thoroughly enjoy the fine programmes.


No doubt there are a few listeners who miss the Bach cantata relays on Sunday afternoons. These enthusiasts will be interested to know that the principal German stations relay a Bach cantata from St. Thomas' Church, Leipzig—Bach's own church—every Sunday at 10.30 a.m.



Florence Castelle, pupil of Marchesi, has sung in all the principal concert halls of London and the provinces. She sings in German, French, and Italian

"Wireless Magazine" GRAMO-RADIO SECTION

A Special Section for Those Interested in Radio-gramophone Technique



The Needle and the Record

by P. Wilson M.A.

This is the fourth article of a series. Previous articles appeared in the August, September, and November issues of "Wireless Magazine." Readers are recommended to read these articles if they have not already done so

Here is another article by one of the greatest authorities on gramo-radio matters. By following the advice given in the previous articles of the series you will be assured of obtaining the very best results when you reproduce gramophone records electrically. Many significant features have already been dealt with, and this month Mr. Wilson considers some of the dynamical problems affecting reproduction

SO far in our examination of the various factors which affect the contact between needle and record we have confined attention almost entirely to statical, I might even say geometrical, considerations.

We have not inquired into the effects that are created by the motion of the record or the transmission of vibrations from the groove to the needle.

Significant Features

Yet we have found a number of very significant features, and no doubt at this stage it would be well to summarise the important points that have appeared in the course of the examination.

Before I do so, however, I want to give an important warning. I believe that some of the illustrations

They are so vital, indeed, that many an investigator has been content to rest on his oars at this point in the delusion that there is little more to be discovered. That it is a delusion, however, it is comparatively easy to show.

One can take a pick-up, or a gramophone soundbox, mount them in the ideal fashion as indicated by these statical considerations, take particular care over needles, etc., and yet not only obtain bad reproduction but encounter the most violent record wear as well, just as violent, it seems, as one would get if all the statical rules were disobeyed.

The truth is that there are dynamical considerations connected with the passing on of mechanical vibrations which are, or may be,

I have given furnish conclusive evidence that these statical considerations, as it is convenient to call them, are a *sine qua non* of good reproduction and minimum record wear.

much more important than any of the matters so far discussed.

I have left them out of consideration up to now, partly because they are not quite so easy to grasp and partly because they really concern the adjustment and the design of the pick-up, which is a very large question.

Put shortly, the statical considerations we have been concerned with are as follows:—

(1). The vertical plane in which the needle lies should be as nearly as possible tangential to the groove at all points of the track of the needle across the record. This consideration, which was dealt with fully by P. K. Turner some months ago in these pages, is referred to as "needle-track alignment."

Wrong Spelling!

The word should be spelt "alignment," but the other form has been hallowed by use.

(2). The needle should rest as nearly vertical in the groove as can be managed without the creation of "needle-drag." This needle-drag consists of vibrations in a vertical plane which are quite distinct from

THE NEEDLE AND THE RECORD—Cont.

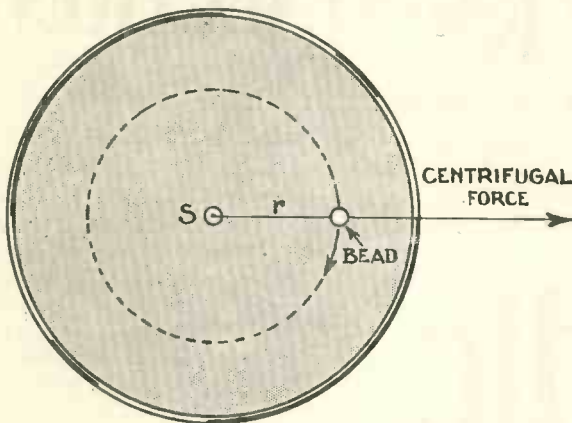


Fig. 1.—A free bead placed on the turntable, so that it can rotate with it, will be acted upon by a centrifugal force tending to throw it off

the transverse vibrations which we want to pass on to the pick-up.

There is, unfortunately, at present no definite rule by which one can determine what is the best needle angle. It depends on the shape of the needle and the shape of groove cross-section as well as on the design of the pick-up.

With modern records, pick-ups and needles, a needle angle of 70 to 75 degrees is not impossible. With the older records 60 degrees or even less was advisable.

Better High Notes

(3). The steeper the needle can be made without risk of needle-drag, the less up-and-down motion there is of the needle point within the groove. This means less attenuation of high notes, accompanied by less surface noise of a raucous kind and, of course, smaller record wear.

(4). Probably the best criterion of the most satisfactory compromise between the rival considerations dealt with at (2) and (3) above is the amount of chatter between needle and groove.

Chatter and Surface Noise

Tangential vibrations due to needle-drag produce chatter; so also does the up-and-down motion of the needle point in the groove, and both increase surface noise without real increase of high notes.

The best needle angle therefore is the one where there is the least

Needle angle and up-and-down motion are factors to be borne in mind, but as there are other important factors not yet discussed, no final conclusion on this point has yet been reached.

(6). In any event, it is folly to use an ordinary steel needle more than once. When a shoulder has formed on the needle, record massacre ensues. The ear gives the first indication of a shoulder by a certain muffling of the tone.

It is well to make oneself familiar with this sign by careful observation and practice.

(7). The design of a permanent gramophone needle which will give minimum wear by virtue of the fact that the business end will fit the groove, will wear very slowly and will be symmetrical about a vertical line, whilst needle-drag will be avoided by the use of a sloping shank, does not appear to be beyond the bounds of possibility now that the groove cross-section has been standardised at approximately a semi-circular shape.

But, as the sergeant-major said, we must "wait for it!"

needle chatter on difficult passages. Dance records are the best for testing this.

This needle chatter, however, should not be confused with that due to faulty gripping of the needle in the needle socket.

(5). To determine the optimum pressure between needle and record is again a matter of compromise.

Now let us come on to the dynamical considerations, as I have called them. So far as I know there is only one untoward effect caused by the rotation of the record itself under the needle point; apart, that is, from the transmission of the musical vibrations from the groove to the record.

At one time it used to be thought, and some people may have the notion still for aught I know, that the record exerted what they called a centrifugal force on the needle, always tending to press it outwards. This is a complete delusion.

They argued from the fact that if one puts a small article, say a small bead, on the rotating turntable it is immediately thrown off. So it is, and there is no doubt that in this case centrifugal force is brought into play.

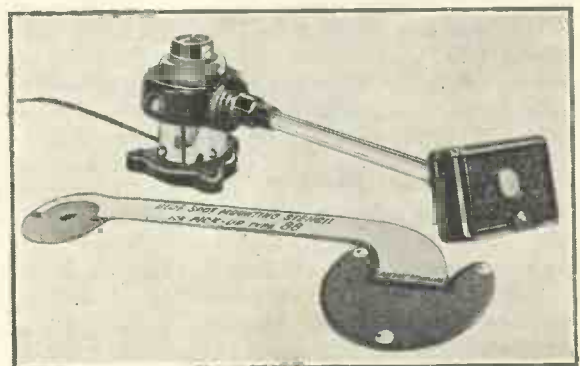
Bead on a Thread

But now thread a string through the bead and place it on the turntable, holding the string taut in the direction, approximately, of the tangent to the groove at the point of contact of the bead. In this case the bead is certainly not thrown off.

Indeed, if the direction of the string is ever so slightly towards the centre of the turntable, the bead will actually be drawn *inwards*.

An examination of the diagrams (Figs. 1, 2 and 3) will probably make this point clear.

The difference between the two cases is that in the former the bead begins to move round with the turntable, whereas in the latter the bead is prevented from doing so.



TRACK ALIGNMENT IS MOST IMPORTANT

Every pick-up must be correctly tracked for the best results and most makers supply a template for this purpose. Here is a typical pick-up with volume control—the Blue Spot

GETTING THE BEST RESULTS

Centrifugal force is only created by angular motion, and if the bead does not move round with the turntable there is no centrifugal force.

The position of the gramophone needle on the record is much the same as that of the tied bead; there is no centrifugal force, but there is an inward drag. The reason for this is easily seen from Fig. 3.

The friction between needle and record exerts a force on the needle point in a direction at right angles to the record radius at the needle point, that is, tangential to the groove.

Forces Analysed

This force is resisted by the refusal of the carrying arm to be elongated, and the effect of this is a force acting in the direction from the needle point to the place where the carrying arm is fixed to the baseboard, that is, to the back pivot of the carrying arm.

But these two forces are not in line, and so cannot completely cancel out. A little consideration will show that the net result is a small force tending to drag the needle-point towards the centre of the turntable.

There can be no doubt that this drag is undesirable since it means that there will always be a side pressure between the needle and the groove, and this cannot but imply record wear and impaired reproduction.

It is significant in this connection that the point of a fibre or other non-metallic needle will readily break down, even on comparatively easy passages, if there is any side pressure.

The amount of the inward drag depends principally upon the setting of the carrying-arm in relation to the turntable.

Drag Increased

It is an easy matter to show that it is increased when the needle-point is made to overlap the spindle, for then the tangent to the groove turns further away from the line joining the needle point to the carrying-arm back pivot.

This is very unfortunate because in order to get the best needle-track alignment we must make the needle-

point overlap the spindle, in some cases by quite considerable amounts.

Is there no way out of this dilemma? We cannot possibly get rid of the inward drag, no matter how we set up our carrying-arm. Can we then neutralise it in some way or other? Fortunately we can and, even more fortunately, the neutralisation is particularly effective at the setting for good alignment.

First of all we should notice that something in the right direction could be accomplished by means of a little friction at the back pivot of the carrying-arm.

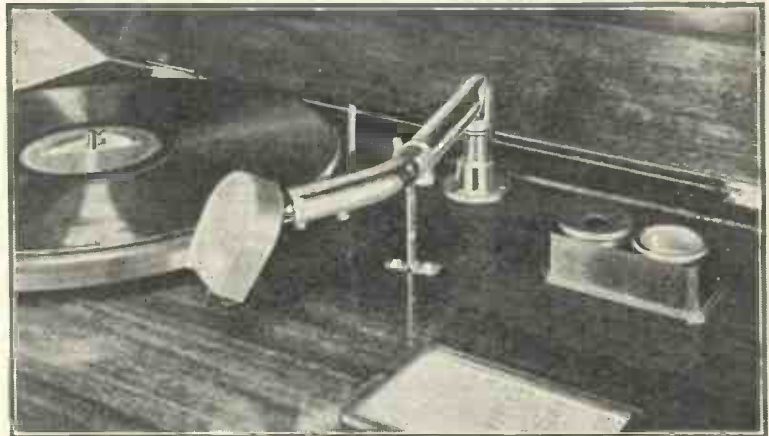
This would tend to oppose the

packed up on the left-hand side in such a manner that the tone-arm, when the needle was not in contact with the record, should have a tendency to swing away from the centre.

Simplest Method

This was the simplest method, but it was often not aesthetically satisfactory since it might mean lifting up the cabinet legs on the left-hand side by as much as $\frac{3}{4}$ in. No one likes to see a piece of furniture on the tilt. There were other methods, but they were a little troublesome.

With pick-up carrying-arms, however, a completely satisfactory



A NEAT MOTOR-BOARD LAYOUT

It will be found a great convenience to provide cups for used and unused needles. The model shown here is the Bulgin Duplex

motion across the record, and one might expect with a little luck to effect complete neutralisation by this means.

But this method is unsatisfactory because, however cunning we may be in our friction device, it will almost inevitably operate in a series of little jerks.

Moreover, a freely moving carrying-arm, though one with considerable inertia, is desirable for reasons which we shall see later on. We must reject this idea, then, and look about for something else.

That something else is simply gravity, and no one can complain that gravity does not act sufficiently smoothly.

In the old days, with gramophones, one used to advise that the gramophone cabinet should be

method can be devised which is also very simple. Incidentally, it has other advantages, which I will explain when I come to discuss the transmission of vibrations.

Use of Rubber

This method is simply to put a piece of rather soft indiarubber between the base of the carrying-arm and the baseboard of the cabinet. The rubber may be anything up to $\frac{3}{8}$ in. thick, though it should be noticed that the insertion of rubber in this way will increase the needle-angle. So don't be too generous!

Holes should be made through the rubber as a clearance for the screws holding down the carrying-arm to the baseboard, and also, if desired, to take the pick-up leads.

THE NEEDLE AND THE RECORD—Cont.

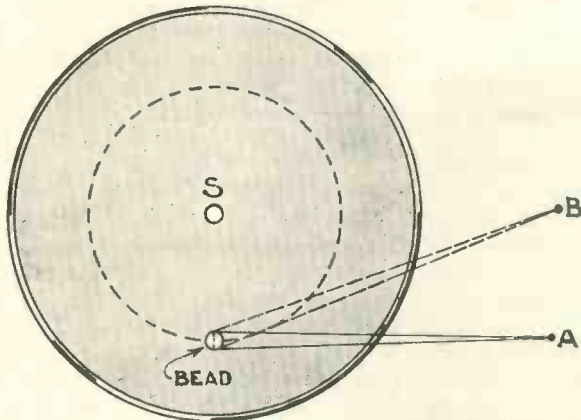


Fig. 2.—A bead held by a string on a rotating turntable in position A will remain steady; held in position B it will be drawn inwards towards the spindle S. In either case, there is no centrifugal force

The correction of the drag is then done by slackening the screws on the left and tightening those on the right, so that the back pivot of the carrying-arm, instead of being quite vertical, is inclined slightly to the right.

The amount of tilt required will be found to be so slight that one cannot tell by eye alone that it is there.

Gauging the Tilt

How then do we find out how much tilt is required? The method is quite simple. I get a 12-in. record which has a good margin of unrecorded surface both on the outside and also inside the run-out groove at the centre of the disc. The turntable is set running and a needle is put into the needle socket in the ordinary way.

I then set the needle on the outer unrecorded space and adjust the screws until the pick-up remains steady without any tendency for inward or outward drag. I then put the needle on to the inner unrecorded surface very gingerly and watch to see if there is any drag there.

Digging Itself In!

It is necessary to be particularly careful here because if there is inward drag the needle may be drawn across the record, past the turntable spindle, and so over to the other side, where it will immediately begin to dig itself in—and goodbye record!

Usually, however, I find there is little or no drag if the carrying-arm is mounted in the correct position to give the minimum tracking error. There is a good mechanical reason for this, but that I will pass over. Fact alone matters.

If there is any drag left I re-adjust the screws until it disappears and then check up again

on the outside of the record. One soon gets into the knack of the thing, and it is really quite easy to find an adjustment where there is no drag either at the inside or outside.

And if you happen to have an old single-sided record and try the test on the blank side of that, you will find that when you have effected the neutralisation at both inside and outside you have also done it

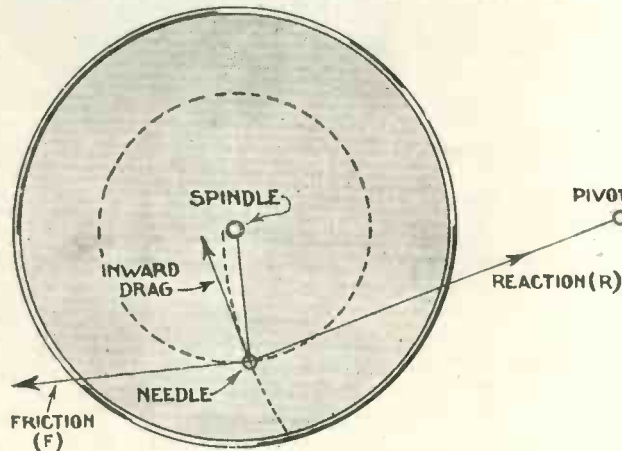


Fig. 3.—Force diagram showing inward drag on needle due to the friction (F) and reaction (R) not being always in line

for all the intermediate points.

In order to facilitate this process of "dynamic levelling," as it has been called, I found it desirable long ago to have three fixing screws, no more, for the base of the carrying-arm arranged at the corners of an equilateral triangle, with No. 1 on the left and Nos. 2 and 3 on the right.

One can then screw up No. 1, but not too tightly, and in the levelling process operate on Nos. 2 and 3 only.

I have laid stress on this matter of dynamic levelling because it is a matter of far more importance than even gramofans realise. It makes a considerable difference with an acoustic gramophone; and with a pick-up the existence of side-pressure between needle and groove has additional disadvantages.

I will explain these more fully later when I come to discuss pick-up characteristics.

Effect of Side Pressure

Briefly, however, the effect of a steady side pressure is precisely analogous to over-biasing a valve. A pick-up has a magneto-mechanical characteristic similar in shape to the anode-current/grid-volts characteristic of a valve.

The best "operating point" is obtained when the armature is magnetically and mechanically in equilibrium when in its central position; side pressure displaces the operating point just as increasing or decreasing the bias does in

the case of a valve.

And now, on looking through what I have written above, I notice that I said that I know of only one untoward effect caused by the rotation of the record. I was wrong. There is another, though it is usually classified as a record defect. I refer to the "swinger," as it is called.

This effect occurs when the record is placed on the turntable in such a way that the centre of the groove circles does not coincide with the axis of rotation of the turntable.

An error of even so little as 1/100 in. here can have some very distressing results.

Choose Sing Your Records

Here are reviews of the latest releases by **WHITAKER-WILSON**, the "W.M." Music Critic. Outstanding records are indicated by an asterisk (*) against the title

SACRED MUSIC

(a) **Christians Awake**, (b) **Hark the Herald Angels Sing**, Royal Choral Society, 2s. 6d. **H.M.V. B4305**

Very well done, particularly the Mendelssohn—I mean "Hark the Herald." If you want these carols really well sung, you cannot do better than buy this edition of them.

(a) **Holy City**, (b) **Star of Bethlehem**, (Adams) Richard Crooks, ten, 6s., **H.M.V. D.B. 1798**

Marvellously sung and produced, but who on earth wants



RICHARD CROOKS

either song? A bit antediluvian, but not yet a classic. Still, if you can stand them, I promise you some fine singing.

Moody and Sankey Favourites (d.s.) Gospel Singers with Organ, 4s. **COL DX416**

A medley of Messrs. Moody and Sankey of the "Count Your Blessings" type. Quite well done, and I heartily recommend it to all who will appreciate it. I am not among the number, but you may be!

(a) **O For a Thousand Tongues to Sing**, (b) **Soldiers of Christ**, Methodist Union Conference, Royal Albert Hall, Sept., 1932, 2s. 6d. **COL DB988**

The recording is a bit heavy in this. The tunes are not the general hymn-book tunes—one is Handel—and the singing is good. I am not too happy about the recording. It "blasts" a bit in places.

(a) **Silent Night, Holy Night**,



HEDDLE NASH

(b) **Sleep, My Saviour, Sleep**, Isobel Baillie, Muriel Brunskill, Heddle Nash and Norman Allin, with String Orch., 2s. 6d. **COL DB976**

An effective quartet. The music is quite pleasantly arranged to suit their voices. I thought I was in for a "dud," but was pleasantly surprised. There is some good bass on both sides. In that sense, the record might be useful for test purposes.

Te Deum Laudamus, (d.s.) sung at the Methodist Union Conference, Royal Albert Hall, Sept., 1932, 4s. **COL DX419**

Ten thousand voices with organ on one record! Fairly good. The setting is a simple one and has some uplift about it. I wish they would not talk about an *infynite* Majesty. Why not pronounce the word correctly—*infinnit*? Otherwise the rendition is good.

CLASSICAL ORCHESTRAL MUSIC

***Children's Overture**, (d.s.), Sir Henry J. Wood conducting the London Philharmonic Orch., 2s. 6d. **COL DB951-952**

This is a very charming work.



SIR HENRY WOOD

I have always liked Roger Quilter's music. I recommend this as a delightful light orchestral record. The kiddies will recognise some of their favourite tunes pleasantly varied.

***Concerto No. 1 in B Flat Minor**, (d.s.), (Tchaikovsky) Arthur Rubenstein and the London Symphony Orch., 6s. **H.M.V. DB1731-4**

This is one of the favourite piano concertos with modern audiences. Rubenstein's reading is not in advance of others I have heard, but it can be taken as being authoritative. I enjoyed the exquisite slow movement particularly. Four discs in all.

***Pomp and Circumstance March, No. 1** in D Major,

No. 2 in A Minor (Elgar), B.B.C. Symphony Orch., 6s. **H.M.V. DB1801**

All good and noble "Promsters" must invest in this. It is one of the most popular orchestral works of later years. Sir Edward Elgar himself is the conductor. The surface of one of

ABBREVIATIONS USED IN THESE PAGES

bar ..	baritone	H.M.V. HIS MASTER'S VOICE
BRUNS..	BRUNSWICK	orch. .. orchestra
COL ..	COLUMBIA	PARLO .. PARLOPHONE
com. ..	comedian	sop. .. soprano
con. ..	contralto	ten. .. tenor
d.s. ..	double-sided	w. .. waltz
f. ..	fox-trot	ZONO .. ZONOPHONE

(a) and (b) indicate the titles of each side of a record.

the sides—I forget which—appealed to me as being extraordinarily fine.

OPERATIC SONGS

***(a) Vesti La Guibba** (Leoncavallo), (b) **M'appari** (Flo-tow), Enrico Caruso, ten., 6s. **H.M.V. DB1802**



ENRICO CARUSO

This is one of the most outstanding records of the year. Buy it! This is the first electrical recording of Caruso's voice. It is taken from an acoustical recording and a new orchestral accompaniment has been added by a new H.M.V. process.

LIGHT ORCHESTRAL MUSIC

(a) **Marcheta**, (b) **You Loving Me**, Albert Sandler and his Orch., 2s. 6d. **COL CB871**

An Albert Sandler record generally recommends itself. Here you will find him just as he is when you hear him on a Sunday evening by wireless. So if that appeals to you, you can take my word for it that the record is worth having.

Medley of Popular Tunes, (d.s.)

John Firman and His Salon Orch., 1s. 6d. **ZONO 6223**

A medley of "O, Listen to the Band" style. I am always indifferent to medleys, but I can honestly say that this one is quite acceptable owing to its being produced so well. John Firman's salon orchestra is a good orchestra, which is more than some salon orchestras are!

"Once Upon a Time"—

Selection (d.s.) New Mayfair Orch., 2s. 6d. **H.M.V. B4323**

There are some good old

favourites here: "Dorothy Dear," "Old Flo," "As Your Hair Grows Whiter," and heaps more I have not heard for long enough. A very good selection!

***Overture "1812" Op. 49** (Tchaikovsky) (d.s.), Leopold Stokowski and the Philadelphia Orch., 6s. **H.M.V. DB1664**

This is always popular. Here it gets a *perfect rendering* on two discs. Every record has the original date on it—1812!

"Snacks in Bars" (d.s.), New Mayfair Orch., 4s. **H.M.V. G2486**

Rather a "snappy" title. You will recognise much of it. It is an orchestral medley in which Wagner gets mixed up with everyone else. Very good, if you like this sort of thing.

What's Yours?—A convivial Medley (d.s.), Debroy Somers Band, 4s. **COL DX385**

A medley: "Tavern in Town," "Simon Cellarer," "King Cole," "Here's a Health," "Brown Jug," "Dead Men" (down among same), "Barley Mow," and a host of other new works. Much band, some chorus. Splendidly produced; excellently recorded.

SONGS AND BALLADS

Harry Lauder Medley (d.s.) Sir Harry Lauder, 6s. **H.M.V. DB4015**

Sir Harry Lauder, in excellent voice, sings you six songs on each side of this record—twelve in all. So you must not miss it. He is just the same as ever!

CHOOSING YOUR RECORDS—Continued

Indian Love Lyrics, (d.s.)
Harold Williams with Orch.,
2s. 6d. COL DB960

These delightful new songs—you cannot possibly have heard them—are sung charmingly by Harold Williams, one of our best baritones. The general production is beyond reproach. I hope Columbia will introduce some more unknown songs. It is nice to have a change from hackneyed numbers.

★(a) **Ma Curly-Headed Baby,**
(b) **Mah Lindy Lou,** Paul Robeson, 2s. 6d.

H.M.V. B4809

A very good specimen of Robeson's voice. I like him so much better in coon songs than in those wretched spirituals. The orchestra plays beautifully in this record. I recommend it fervently, particularly as I have so often condemned his records in the past. Buy this on my recommendation, it is splendid.

Negro Spiritual Medley, (d.s.),
Layton and Johnstone, 4s.

COL DX418

They sing some rather hackneyed items, but sing them in their own inimitable fashion. I think you will hear many of your favourites. The record is worth a trial, at all events.

★(a) **Ninon, (b) Red Lips Unkissed,** Richard Tauber, 4s.

PARLO RO 20206

Both sides excellent. A Tauber record is always worth buying; this is no exception.

Once Upon a Time (d.s.),

Pavement Artists, 1s. 6d.
REGAL MR724

Rather a pleasant little medley of well-known songs of past years. Quite suitable for the season and very well done.

★**Swallows, (d.s.), Gitta Alpar,**
Sop., with orch., 4s.

PARLO RO20202

A very charming light-music record, very well played and superbly recorded. The "effects" in it are singularly arresting and the singer (Gitta Alpar) possesses a beautiful voice. A very good record.

MILITARY BAND MUSIC

"1812" Overture, (d.s.) Grand
Massed Brass Bands, 1s.6d.
REGAL MR718

I don't know what Tchaikovsky would have said to this edition, but it has pleasing points. As a military band record, apart from the overture itself, I consider it a good production.

Poppies For Remembrance,
(d.s.), Foden's Motor Works
Band, 1s. 6d. ZONO 6226

This is a medley, including (on the first side) such songs as *Long Long Trail, Pack Up Your Troubles*, etc.; on the other side it is devoted to hymns like *Abide With Me*. You can form some opinion from that. The band is quite a good one but the singing is distinctly poor. Sorry, but I cannot say anything kinder than that except, perhaps, to say that the recording is up to Zono standard.

NOVELTY RECORDS

A-Hunting We Will Go, (d.s.)
Empire Novelty Band,
1s. 6d. REGAL MR719

As a stirring hunting scene this is really good. It all depends, of course, whether you are interested in such things. The recording is amazingly good. Very good surfaces, these Regal records!

★(a) **Animal Alphabet, (b)**
Noah's Ark, George Baker,
2s. 6d. H.M.V. B4324

A splendid record for the tiny tots. I welcome it as I have always maintained there are not enough kiddies' records. This is a guessing game. Animal noises are made on one side and the children are expected to guess them. The other side gives the answers. Well worth having; the children will love it.

(a) **Bed Time Story, (b) Big Ben's Saying Good-night,**
Singing Twins, 1s. 6d.

REGAL MR 726

The title suggests the type of record. Children—very young ones—will like it. Not a bad idea letting your records tell fairy stories for you! Saves a lot of breath!

Columbia On Parade (No. 2),
(d.s.), 4s. COL DX410

Useful for the children. In a sense it is a skit at the old-fashioned pantomime and yet is quite modern in its outlook. I think we could do with more real childrens' records.

Making a Record, (d.s.), Carson
Robinson and his Pioneers,

1s. 6d. ZONO 6224

This is a scene supposedly in the No. 1 Recording Studio of the Zonophone Company in which some negroes arrive to make a record. I am not sure whether they are intended to be particularly humorous or not. Not, I imagine. The whole scene seems to be an excuse for introducing Carson Robinson and his Pioneers. It is certainly novel and they are very good, but I do not think the result, as a whole, justifies the scene as such.

HUMOROUS RECORDS

★(a) **Christmas Presents, (b)**
Kiddies Go Carolling, Harry Hemsley, 2s. 6d.

PARLO R1363

Quite amusing. Harry Hemsley is always worth hearing. Child-lovers—children themselves, for that matter—will enjoy this. It is quite the best "juvenile" record I have heard recently.

★(a) **Dance of the Cuckoos,**
(b) **He's Dead, But He Won't Lie Down,** Leonard Henry, com., 1s. 6d.

ZONO 4227

Personally, I do not think you can beat Leonard Henry for real humour. His lines would all bear writing down. He is an example of my contention a month or two ago when I suggested that recorded humour may be anything but satisfactory. *Unless the lines are there* no record will stand the acid test of separated performance. (Continued on page 780)



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"His Master's Voice"

"TRUE - TO - LIFE" RADIO

CHOOSING YOUR RECORDS—Cont. from page 778



THREE FAMOUS BRITISH ARTISTS

Left to right, Jack Hulbert, Cicely Courtneidge, and Claude Hulbert. They are all famous for their records, broadcasts, and film work. Their latest records are reviewed in the first column on this page

★(a) Double Damask, (b) I'll Give Her a Ring, Cicely Courtneidge, 2s. 6d.

H.M.V. B4314

Very good, as she always is. The whole cast in these two excellent sketches is really good. A very good humorous story vividly told. Well worth having.

Four Ale Bar Concert, (d.s.), Booby Bill and His Pals, 1s. 6d. REGAL MR732

I think the title is enough to give a good indication of the contents of the record. It is just what I expected. And I was not amused! A good surface wasted!

Gracie's Christmas Party, (d.s.), Gracie Fields and Company, 4s. H.M.V. C2487

Very good. You will find the lady in excellent form and her friends are equally jolly. I think this will have a good sale.

Hulbert Brothers in Chicago, (d.s.), Jack and Claude Hulbert, 2s. 6d.

H.M.V. B4332

Well up to their admirable standard. You will recognise their voices; they sound exactly as they do when they broadcast. They are quite amusing when they come up against some gangsters. I have heard them do it on the wireless. It comes out very well.

★Insubordination, (d.s.), Arthur Prince and "Jim", 4s. COL DX412

Perfect, of course. There is no difference between his records and his broadcasts. All you miss in either is the pleasure of seeing Mr. Prince and the charming "Jim." Well worth having; really funny!

(a) Laughing Bassoon, (b) Laughs and Frills, Charles Jolly and Kaye Connor, 1s. 6d. REGAL MR723

The laughter records are with us again—a bassoon, this time. If you liked the other laughter records, you will like this. That is all I can honestly say.

Mum, Dad, and the Nipper (d.s.), George Buck, Bertha Willmott and Company, 1s. 6d. REGAL MR720

Bad—definitely so. Sorry, but I cannot honestly recommend low-down family quarrels punctuated with sloppy soup. I had no patience to hear the second side, so I do not know how it ended. No, Regal, your records are really good. Give this sort of thing up. I hope you will pardon my frankness!

National Programme, (d.s.), (Broadcasting Burlesque), 4s. H.M.V. C2504

This is a skit at a broadcasting programme. Some of it is quite good. The only point I find to criticise is that it is rather overdone. The humour is quite good in places, but I must warn you that some of it is rather feeble. Still, hear it and judge it for yourself.

★Our Village Pantomime, (d.s.), 4s. H.M.V. C2503

Very funny. Do you remember "Our Village Concert?" This is by the same cast. It is a "scream" in parts. The village

orchestra is appalling as in the other record; this time it accompanies the amateur theatricals. Buy it. I am sure you will enjoy it.

Village Concert, (d.s.), Roosters Concert Party, 4s.

COL DX390

This is typical of the Roosters—vociferous and noisy. Those of you who appreciate the broadcasts by this concert party will like this. Some of the humour is pretty feeble, but there are some amusing lines.

ADDITIONAL RECORDS REVIEWED by CHOPSTICK

LIGHT SONGS

(a) Isn't It Romantic? (b) Love Me To-night, Jeanette Macdonald with orch., 2s. 6d.

H.M.V. B4288

Jeanette Macdonald is Chevalier's leading lady in his new film, *Love Me To-night*. Do not mix this film with *Tell Me To-night*. Both films have some splendid musical numbers; (a) and (b) are from *Love Me To-night*. This is one of those fifty-fifty records, half orchestral and half vocal. Jeanette Macdonald's singing is quite good.

(a) It Was So Beautiful, (b) I Love a Parade, Harry

Richman, ten., 2s. 6d.

COL DB981

There is a definite demand for suitable records to fill in gaps at home dances where records are used. This record is just the type for the job. Both are modern love ballads sung in an emotional way. Richman has a splendid voice, but the recording could be better.

(a) Mimi, (b) Poor Apache, Maurice Chevalier, 2s. 6d.

H.M.V. B4289

This record needs little comment. Maurice Chevalier's style is inimitable; his broken English is very amusing. Of course, his whole personality is infused into the songs, which are from his

new film *Love Me To-night*. This is one of the best Chevalier records I have heard.

(a) Say It Isn't So, (b) Night-fall, Leslie Hutchinson, 2s. 6d. PARLO R1350

Leslie Hutchinson, or "Hutch," as he is better known, is a regular broadcaster and very popular at London cabaret shows. He always plays his own piano accompaniments. "Hutch" has an appealing type of voice, but his remarkable gift of combining his singing and playing is his strong point. Both of these numbers are popular hits at the moment. I thoroughly enjoyed listening to this record.

(a) While We Danced at the Mardi Gras, (b) The Night When Love Was Born. Anona Winn, sop., 1s. 6d.

REGAL MR727

Anona Winn is, of course, a popular broadcaster. Her voice is extremely fresh; there is no "crooning" huskiness. Both tunes are popular dance hits, especially (a), which appears to be one of the season's great favourites. The most outstanding point of the record is the arrangement in (b), where the melody is taken by the saxophone whilst Anona Winn soars into the top notes. The effect is well produced.

PIANO SOLO

★Flirting With Annie Laurie, (d.s.), Patricia Rossborough, 2s. 6d. PARLO R1359

This is an excellent record! Patricia Rossborough, the syncopated pianist, puts some real "pep" into Annie Laurie. The arrangement, which is by George Scott-Wood, is clever, especially where the theme is changed to modern rumba time. Recording is exceptionally good.

CINEMA ORGAN MUSIC

★(a) Big Ben's Saying Good-night, (b) Song of the Bells, Harry Davidson, 1s. 6d.

REGAL MR725

Harry Davidson believes in giving good straight tone without an excess of frills. I am strongly recommending this record because the effects are not too elaborate; the vocal choruses are sung, not "crooned"; and the recording brings out all the delicate points of a fine cinema organ. (b) is written by Jack Hylton.

Round the World in Eight Minutes (d.s.), Sydney Gustard, 4s. H.M.V. C2498

This is a medley of tunes, mostly classical, including "La Paloma," "Blue Danube Waltz," "Liszt's Hungarian Rhapsody No. 2," "Rule Britannia," "Ol' Man River," and similar pieces. I am not enthusiastic. Such works are hardly suitable for cinema-organ music. The playing is rather lifeless. Gustard does not put enough variation in his style.

DANCE RECORDS

(a) He's in the Infirmary Now (f.), (b) I'm Writing a Letter to Heaven, The Blue Lyres, 1s. 6d. ZONO 6205

A splendid record for parties. (a) is a comedy quickstep in which we are told some of the

(Cont. on page 782)

RECOMMENDED DANCE RECORDS FOR YOUR PARTIES

A Great Big Bunch of You (f.), The Clouds Will Soon Roll By (f.), Jack Hylton and His Band.

DECCA K3109

How'm I Doin' (f.), Moon (slow f.), Roy Fox and His Band.

DECCA F3198

I Can't Believe It's You (f.), The Roses are Red, the Violets are Blue (f.), Gene Kardos and His Orchestra.

H.M.V. B6227

I'm In Good Form To-day (f.), And Then? (f.), Jack Bund and His Orchestra.

PARLO R1276

La Flor Del Camino (tango), Caminito (tango), Orquesta Tipica Don Alberto.

BRUNS 1342

Let That Be A Lesson to You (f.), I Don't Blame You (f.), Savoy Orpheans.

COL CB479

Oh, How I Love My Darling (f.), Sweet Little You (f.), Edgar Jackson and His Band.

DECCA F3156

Ooh! That Kiss (f.), You're My Everything (slow f.), Roy Fox and His Band.

DECCA F3099



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T.C.C.

ALL-BRITISH
CONDENSERS

CHOOSING YOUR RECORDS—Contd. from page 780

extraordinary reasons why some people manage to visit infirmaries. Admittedly, the words are nonsense, but the record has all the "pep" needed for party use. (b) is a dreamy type of tune played at correct waltzing time. The Blue Lyres have an excellent "sax" player. The recording brings out the saxophone's mellow tones well.

★(a) *I Guess I'll Have to Change My Plan* (f.), (b) *Let's Put Out the Lights* (f.), Ambrose and His Orch., 2s. 6d.

H.M.V. B6261

Ambrose at the top of his



BERT AMBROSE

form! The saxophone playing in (b) is brilliant and well recorded, too. (b) is one of those catchy tunes that once you have heard it, you cannot get it out of your mind for days. Both are American numbers.

★(a) *How Do You Do, Mister Brown?* (f.), (b) *Confetti* (f.), Jack Bund and His Bravour Dance Band, 2s. 6d.

PARLO R1220

Parlophone's best fox-trot record this month. It is very refreshing to hear a dance band which favours light arrangements and plenty of piano solo work. (a) is too well known to need comment. (b) is best described as a first-rate syncopated piano solo with dance-band accompaniment in quick-step time. If you make a point of hearing this disc, the temptation to buy will, I am sure, be irresistible.

Jug and the Bottle (f.), (d.s.), Ray Noble and his New Mayfair Orch., 2s. 6d.

H.M.V. B6268

This is the second double-sided comedy number this month so apparently some people must buy them. The time of this one is quite good for dancing, but the noise is unbearable. There is not one scrap of melody on either side. A disappointing disc.

(a) *"Let's All Dance the Polka"* (polka), (b) *Marching Along Together* (six-eight), The Blue Lyres, rs. 6d.

ZONO 6204

Dancing the polka is good fun for us moderns, although some may find it too strenuous. This is a good record for those who may be interested. (b) is a fine

tune, but I think it needs a big band to do it justice, "orchestrally" speaking. The Blue Lyres version is suitable for dancing purposes, of course.

(a) *Lotus Flowers* (w.), (b) *Moonlight on the Colorado* (w.), Orchestra Mascotte, 2s. 6d.

PARLO R1349

Here are two delightful tunes suitable for the old-fashioned waltz. Both are freshly presented; guitar, xylophone, and well-sung vocal choruses being the strong points of the orchestration.

Old Moore's Almanac (d.s.), Ray Noble and his New Mayfair Orch., 2s. 6d.

H.M.V. B6269

This is a comedy six-eight



RAY NOBLE

number. I do not care for such things. The record has some

good humorous lines concerning prophecies for 1933. If you care for such records this one—I'll be fair—is well up to Ray Noble's usual standard. His straight dance numbers are usually excellent.

★Paul Jones (d.s.), Ray Noble and his New Mayfair Orch., 4s. H.M.V. C2497

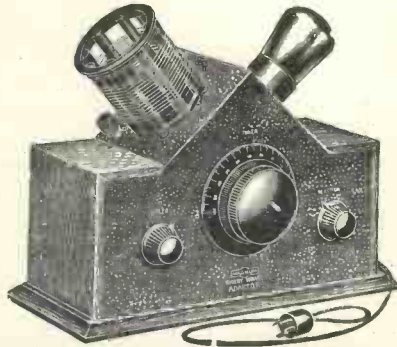
An ideal record for parties! There are all the modern dances, with the usual gallop interludes between each. Ray Noble has managed to change the style of his playing for each dance; a commendable point. The numbers chosen are all well known. *Ooh That Kiss!*, *Mona Lisa*, *Gipsy Moon*, and *The Flies Crawled Up the Window* are examples. A fine production!

★(a) *When You Say "Yes"* (tango), (b) *Good Morning, My Lady, Good Morning, Madame* (w.), Dajos Bela Dance Orch., 2s. 6d.

PARLO R1348

A really outstanding dance record. The tango is beautifully played; the arrangement is unique. Snatches of piano playing, clever whistling, piano-accordion solo, and saxophone solo, all with a fine strong bass background, is the main idea of the orchestration. As a matter of interest, the tune is from the German film, *Madame has Ausgang*. (b) the waltz, has a fine melody. I thoroughly recommend this record to all lovers of good dance music.

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Set Reports from Our Readers

Here we are able to present reports from five enthusiastic readers on five "Wireless Magazine" sets. These reports will be of value to prospective constructors of the sets in question, as they will be able to form a good idea of what performance they can expect in different localities

CALIBRATOR

(October, 1932)

Edinburgh (Scotland).—I have nothing but praise for the set. I found it easy to build and it gives a wonderful performance. I will give one example only of its selectivity. Scottish Regional and Hamburg were almost separated here—a feat which is often wellnigh impossible.

The quality and volume from the Baker permanent-magnet moving-coil loud-speaker are well up to the standard of "Wireless Magazine" sets—indeed very high.

The Calibrator is now in Caithness-shire, near John O'Groats, and, from a report I have received, the set has made listening there worth while. It easily cuts out the high-powered Northern European stations whose strength at night is often terrific.

EASYTUNE 60

(May, 1932)

Belfast (Ireland).—I feel I must write to say how well my Easytune 60 is performing. Results are more than good; they are exceptional. Last night or, rather, at 1.45 this morning, I switched on to see what was doing.

On turning the dial—a single knob is a great help—I got Fécamp very faintly on the loud-speaker. This seemed very unusual. On examining the aerial

lead-in I discovered that it was detached from the lead-in tube and the only aerial on the set was a 3-ft. length of rubber flex. Fécamp is nearly 500 miles away. But that is not all.

On tuning further up the dial I succeeded in getting seven American stations at fair strength—with aerial connected, of course—but atmospherics were so bad that I only managed to identify WJB, New York, on about 400 metres; WGY, 380 metres; and Newark, New Jersey, about 430-440 metres.

The other American stations were heard on 355, 445, 460, and 515 metres. The single-dial tuning is an asset which the rest of the household greatly appreciates.

FIVE-POINT FOUR

(November, 1930)

Deltota (Ceylon).—Thank you for a truly remarkable set! After midnight (Ceylon time) the Five-point Four will bring in over fifteen European stations, including London National, North National, and London Regional, all at moderate loud-speaker strength. Heilsberg, Breslau, Prague, and Mühlacker are best received (all identified with one of your excellent station-finder charts)

and by 1 a.m. are as loud as, if not louder than, the local station, Colombo.

As sensitivity is more important than selectivity out here, I have omitted the pre-set condenser. Adjacent stations are, however, easily separated. I have made two other alterations in the construction of the set.

I have omitted the wave-change switch. Atmospherics are bad out here for long-wave reception, although on a good night some of the long-wave stations come in quite well.

The other alteration is that the first low-frequency valve is transformer coupled instead of resistance coupled, otherwise the layout is exactly as specified. Again many thanks for a wonderful set.

SUPER 50

(March, 1931)

Ratnapura (Ceylon).—I am using a Super 60 with an extra super-power output. Our alternative programme comes from Bombay (10 kilowatts), nearly 900 miles away, but we do not hang out the flags when we get it at R9.

"W.M." SHORT-WAVE SUPER

(November, 1932)

Walthamstow (Essex).—I wish to commend the "W.M." Short-wave Super designed by W. G. Hill. This set is the ninth short-waver I have built, and I am convinced that it is the real "easytune" short-wave set. I have installed it as a regular programme supplier in my home. I did not realise that there were so many languages in the world until I toured on the "W.M." Short-wave Super. The log to date is twenty-three stations, all at good strength. W8XK provides a real good programme from 9 p.m. onwards. It is truly the last word in short-wave sets.



AN IDEAL SET FOR EMPIRE BROADCASTS

This is the "W.M." Short-wave Super, of which a Walthamstow reader has sent us an enthusiastic report. This set is ideal for the B.B.C.'s new Empire transmissions

TESTS OF NEW APPARATUS

Amplion Loud-speaker :: Goltone Coupling Unit :: J.B. Unitune Condenser
Clarion Screen-grid Valve :: Pressland Cop



NEW LOUD-SPEAKER

The Amplion permanent-magnet moving-coil reproducer is very efficient. The magnet weighs 6½ lb.

AMPLION LOUD-SPEAKER

APPARATUS: Permanent-magnet moving-coil loud-speaker, type MC2.

PRICE: £1 19s. 6d.

MAKERS: Amplion (1932), Ltd.

WE have recently tested the Amplion, model MC22, permanent magnet moving-coil reproducer. The loud-speaker is quite conventional in appearance, a very rigid metal cone chassis being employed. A large E-shaped permanent magnet is bolted direct to the back of the chassis.

The magnet is constructed of .5-in. chrome steel and weighs 6.5 lb. The diaphragm is of the one-piece type, the outer edge being turned over to act as a suspension and ribbed to give the necessary flexibility.

The usual web type of centering device is employed, this being fixed in front of the diaphragm and held on to the polepiece. The moving coil is of the low-resistance type, but the necessary multi-ratio transformer is mounted on the loud-speaker chassis. This transformer is suitable for matching up with all types of power and pentode valves.

On test the loud-speaker was mounted behind a 2 ft. 6 in. baffle-

board. The overall reproduction was very pleasant. Besides being very sensitive, the loud-speaker appeared to be capable of handling large inputs to the order of 3 or 4 watts without any sign of distress.

This reproducer certainly merits consideration.

GOLTONE COUPLING UNIT

APPARATUS: High-frequency coupling unit.
Price: 10s. 6d.

MAKER: Ward & Goldstone, Ltd.

AN interesting high-frequency coupling unit which we have tested this month is that marketed under the well-known name of Goltone. This unit comprises a high-frequency choke, a coupling condenser, a 600-ohm decoupling resistance and a by-pass condenser.

A unit such as this may, of course, be used in aperiodic high-frequency amplifiers, but undoubtedly its greatest use will be in circuits employing what is termed "tuned-grid" high-frequency amplification. For this type of amplification a first-class high-frequency choke is essen-

tial if proper operation of the receiver is to be ensured.

In order to verify this point the choke employed in this unit was tested in accordance with our usual practice and was found to have a really excellent performance. As readers will remember, we normally give a curve indicating the performance factor over wavelengths from 200 to 2,000 metres. In this case such a curve would prove of little use as the performance factor is well over 99 per cent. over the whole range.

The choke, resistance and condenser of this unit are mounted in an aluminium screening can, lugs carrying the necessary terminals protruding through insulating bushes. The anode connection is made by means of a spade terminal and screened lead through the top of the can.

UNITUNE GANG CONDENSER

APPARATUS: Two-gang .0005-microfarad variable condenser with cover.

PRICE: 18s. 6d.

MAKER: Jackson Bros., Ltd.

THE name of Jackson Bros. is so well known in connection with condenser design that we were specially interested in their new Unitune two-gang model.

The two sets of fixed vanes of this condenser are built into a metal chassis, being supported and insulated from this by means of bakelised paper supports. The moving vanes are carried on a brass shaft, on one end of which is fixed a slow-motion friction drive, this latter giving a reduction ratio of approximately 7 to 1.

The back section of the condenser is fitted with a trimmer operated by means of a small star wheel fitted to the side of the condenser chassis. The front section is trimmed by means of a small single-vane solid-dielectric condenser operated by means of a shaft passing through

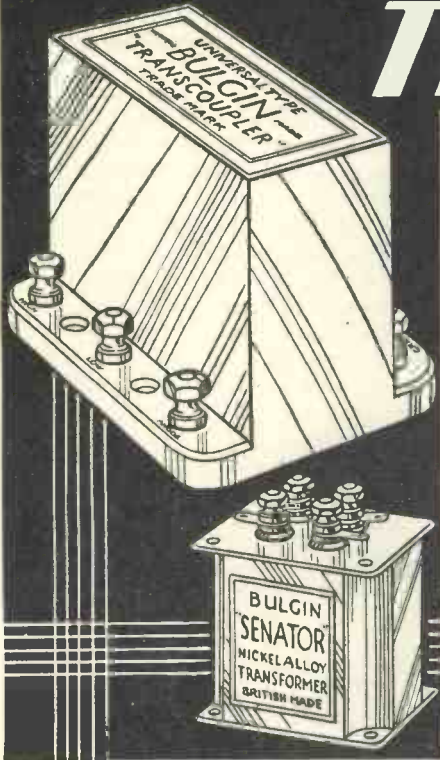
(Continued on page 786)



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TESTS OF NEW APPARATUS—Continued from page 784

the centre of the main driving spindle.

A high-frequency test (at 400 metres) was made on the front section of the condenser, the trimmer having first been set in the minimum position and then in the maximum position. With the trimmer at minimum the resistance was approximately 2.3 ohms, while with the trimmer in the maximum position this value increased to 2.8 ohms.

With both trimmers at the minimum position the two sections of the condenser were matched within 1 per cent., the maximum capacity being 250 micromicrofarads and the minimum approximately 30 micromicrofarads.

(See illustration on page 757.)

CLARION SCREEN-GRID VALVE

APPARATUS: 2-volt screen-grid valve.

PRICE: 12s. 6d.

MAKER: Clarton Radio Valve Co.

WE have tested this month a Clarion SG2 high-frequency amplifying valve. The valve is con-

ventional in appearance, employing a moulded bakelite base and anode cap. The electrode system is just visible through the heavy gettering of the bulb and appears to be quite usual in construction.

The ordinary characteristic curves of the valve were taken. The amplification factor of the valve was found to be 140, the mutual conductance .5 ma/volt and the anode impedance 240,000 ohms. The makers rating for the valve is as follows: Amplification factor 200; mutual conductance .8; and the anode impedance 250,000 ohms.

The valve was also tested in a three-valve receiver and was found to operate satisfactorily.

PRESSLAND COP

APPARATUS: Aerial-control tube.

PRICE: 6-in. size, 2s. 6d.; 9-in., 3s.; 12-in., 3s. 6d.

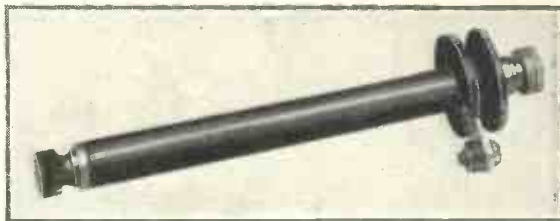
MAKER: Clifford A. Pressland (Sales), Ltd.

THE Pressland Cop is a new version of the well-known lead-in tube made by this firm. It incorporates useful features in addition to its ordinary duties as a lead-in tube.

There is an earth disc mounted concentrically with the metal rod through the middle of the tube, but having a hole slightly larger than the rod so that the two are not in contact. In the event of a lightning discharge the voltage will jump across this gap and be conducted to earth.

The inside terminal of the device

is not in direct contact with the outside terminal, being actually connected to a short length of rod which slides in and out of a metal collar in the end of the tube. This forms an adjustable series condenser.



A USEFUL GADGET

A useful component, the Pressland Cop incorporates an aerial condenser and lightning safety device

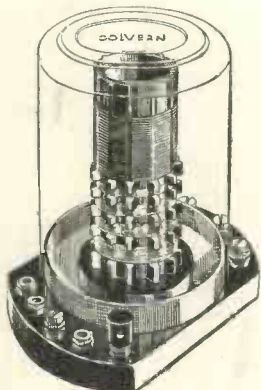
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Type S.T.5C. 25,000 ohms at 5/3 each.



TYPE T.D.

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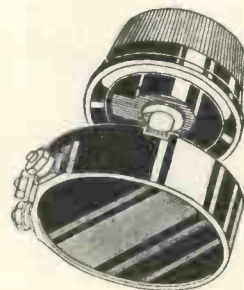
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Advertisers take more interest when you mention "Wireless Magazine"

Notes and Jottings

MAGNAVOX announce a new Magna series of energised moving-coil loud-speakers, which are claimed to have 50 per cent. better sensitivity, to be devoid of undesirable resonances, and to give definitely better quality. These results are due to the lavish use of copper and iron. Details of the new models are contained in leaflet D635, which can be obtained from Magnavox (Great Britain), Ltd., of 89 Kingsway, London, W.C.2.

From Ferranti, Ltd., of Hollinwood, Lancashire, we have received a constructional chart of a battery-operated band-pass four. No complete kit is to be supplied for this set. Copies of the chart can be obtained for 1½d., if "Wireless Magazine" is mentioned.

We are asked by Lotus Radio, Ltd., to make clear that the hire-purchase price of the 20-guinea Long-range 4 is £1 19s. 3d. down and eleven instalments of the same amount, a confusion having occurred in their advertisement on page 563 of the December "Wireless Magazine."

The Rothermel Corporation, Ltd., makers of Sonochorde loud-speakers, ask us to point out to constructors of the Prosperity Three (fully described in "Wireless Magazine" for October last) that model SF6500 should be used when the mains voltage is between 200 and 250 volts, while model SF2500 is for mains of 100 to 190 volts.

Radio sets may now be taken into Italy by British visitors on payment of a licence fee of five lire a month (approximately 1s. 6d.) to the Italian Broadcasting Company. Payment is made through the customs offices at the frontiers.

All that is necessary is the completion of a form, either in advance or at the frontier station, giving the value of the set, the number of valves in it, and a statement whether or not it is fitted with a loud-speaker. The maximum period for which sets

may be used in Italy on these terms is three months.

From Mavox Radio, of 17 Maddox Street, W.1, we have received an interesting folder describing Mavox receivers. Two models are made; the Table Grand Four at £13 13s. and the Table Grand Three at £10 10s.

The price of the Portadyne MC2 battery two-valver, listed on Page Six of last month's Set-buyers' Supplement, should be £6 19s. 6d. instead of £6 9s. 6d.

The British Clarion Co., Ltd., announce that their well-known pick-up, of which the standard model sells at £1 1s., can now be obtained with a volume control for £1 5s. 6d.

Canvas travelling covers for the Marconiphone Super-het Portable (Model 255) can now be obtained at 10s. 6d. each.

From Lectro Linx, Ltd., of 254 Vauxhall Bridge Road, S.W.1, we have received samples of a new insulated socket for metal mounting. The socket sells at 2½d., and is for use with a Clix Master Plug at 1½d.

From Charles Letts & Co. we have received a copy of a wireless diary for 1933 that should be of use to every listener. It contains a great deal of information useful to everybody concerned with radio reception. The price in cloth binding is 1s., and in leather binding 2s. 6d.

The Zetavox model AT receiver is listed at £16 16s., and not £19 19s. as indicated on Page Fourteen of last month's Set-buyers' Supplement.

Fox Industrial, Ltd., are producing a new receiver which will be sold in three different forms—table model, console model, and an all-electric radio gramophone with automatic record-changing device.

Sonochorde Reproducers, Ltd., of 1 Willesden Lane, N.W.6, send us a folder dealing with the range of Sonochorde moving-coil loud-speakers. It is claimed that this range of reproducers is the most complete now available.

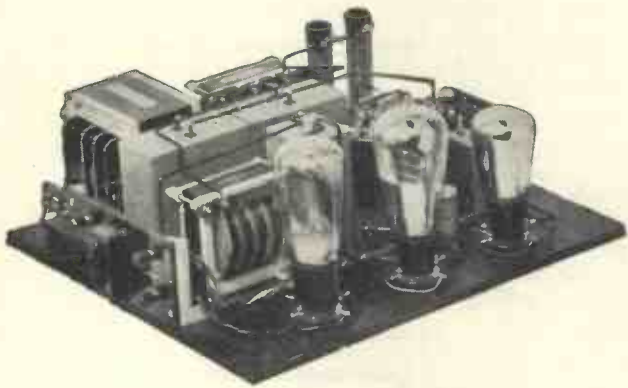
Readers should note that the price of the Atlas type RB2 battery set (£6 10s.) does not include batteries; the price of the RA2 receiver is £10 10s., and a mains aerial is included. These receivers were referred to on Pages Four and Eight of last month's Set-buyers' Supplement respectively.

Those people with D.C. mains who desire to operate A.C. receivers will be interested to learn that the whole range of Rotax rotary transformers made by Rotax, Ltd., has recently been substantially reduced in price. These instruments when connected to a D.C. supply give an output of A.C. suitable for running a radio set or a radio
(Continued on page 790)



NEW PLATE-LESS ACCUMULATOR
One of the new Block accumulators, which is made without any plates. Further details of this battery will be found in this month's "In Tune with the Trade" feature on page 700

PARMEKO



KIT AMPLIFIER.

QUALITY REPRODUCTION

There is a growing tendency amongst the discriminating trade and public for better quality reproduction. The "Parmeko" 25 watt Kit of parts enables you to build your own amplifier from specially selected "Parmeko" components and know that you are going to get the best results.

Sold complete (except Valves) with everything necessary and two full sized blue prints, price £14:10:0.

Please write for further particulars.

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Hand-polished Oak, Mahogany, Walnut. Write for Free Catalogue of Latest Models, Post Free.

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1. Only 2½ in. deep.
2. Sizes 10 in. and 12 in.
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The most remarkable gramophone invention of the age—a gramophone turntable that "goes by itself." In a few minutes you can convert an ordinary gramophone into an automatic gramophone. It takes little longer, following the simple instructions supplied, to convert your present Radio Set into a Super Radio-gram. The total cost is **39/6** only.

It lasts a lifetime with no additional cost. Ask your Dealer for illustrated leaflet and demonstration.

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"We're Fluxite and Solder—the reliable pair; Famous for soldering—known everywhere!"

When fixing up Wireless—there's no need to fret; Just call US to help you—then perfection you'll get!"

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ALL MECHANICS WILL HAVE FLUXITE

IT SIMPLIFIES ALL SOLDERING

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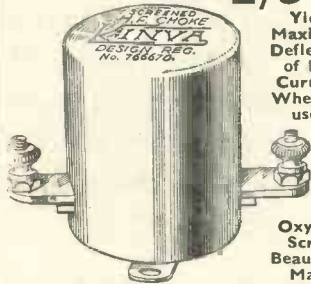
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Oxydised Screen Beautifully Made.

An ideal H.F. choke, for H.F. of detector anode, fieldless, and performance curve not below 95% over its 50-2,000 metres range.

A Choke for exacting conditions.

Send stamp for list of—

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"KINVA" HETERODYNE—WHISTLE FILTERS

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**NOTES AND
JOTTINGS**

(Continued from page 788)

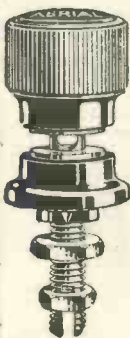
gramophone. They are made in a variety of sizes and there is a model for almost every radio need.

Rotax, Ltd., also make a range of anode converters—machines which, when connected to an accumulator, give a constant supply of high tension. These machines are of considerable utility in places where for any reason dry high-tension batteries cannot be used.

Anode converters as well as rotary transformers have also been reduced in price. Further details can be obtained on application to the makers at Willesden, N.W.10.

Constructors who are interested in making their own mains receivers should look out in next month's issue of "Wireless Magazine"—which will be published on Friday, January 20—for a special article by W. James. In this article he gives particular attention to the use of the new electrolytic condensers. Make a note of the date now!

SPECIFIED
by "Wireless Magazine"
Technical Staff for the
"77 SUPER"



BELLING-LEE "B" TYPE TERMINAL.

Non-rotating name, bakelite insulated, soldering eliminated, anti-twist wedge on collar, highly polished black with white letters.

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Fuses carried on the lid, rendering shocks impossible. Complete with two 1-amp. fuses.

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FOR EVERY RADIO CONNECTION

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We provide personal attention and show even bigger savings on your battery expense. Install the Standard which lasts for years, because it recharges itself when the set is shut down. This PERMANENT saving is enjoyed by thousands of enthusiasts. Ample level current brings in difficult stations without background. Eventual replacements merely a matter of changing cartridges at a few pence each. Such great promise deserves your investigation. DO IT NOW.

STANDARD BOOKLET POST FREE
Popular Type Battery for Ordinary Sets

Any voltage, Model H5, No. 3 size, 12,500 milli-amp. capacity, 126 volts, 84 cells, Price, complete without trays, **5/-** **37/8**

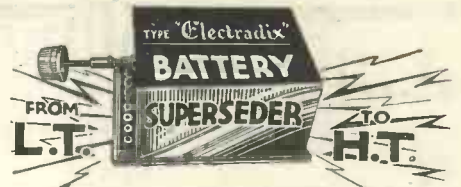
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Tray containers extra if required.

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(Dept. W.M.)

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Tunewell Components are consistently recommended for successful circuits because of their technical efficiency and reliability. Wherever good quality is the keynote, you will find them. The Tunewell L.F. Smoothing choke S.70/50, price 20/-, is specified for the A.C. Mains Unit described in this issue. Use it and other Tunewell components wherever you can—for any circuit—and you will guarantee super-results and save yourself money, too. Send the coupon now for the Tunewell "Guide to Super-Radio," which tells you about the whole range of these famous quality components and includes

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Give long service, improved volume and tone. Very economical. Replacements for Taylex or Standard batteries at low prices; details post free. Also Bargain List, Radio Kits and parts at lowest prices.
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CASH—C.O.D.—or H.P.

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As described in this month's issue

- | | |
|---|----------|
| 1 Sektan H.F. choke, standard type | 4 0 |
| 1 Granic constant inductive L.F. choke, CH2 | 9 6 |
| 1 Davenset L.F. choke, type 101 | 18 6 |
| 1 Dubilier fixed condenser, type 670, .0001 mfd. | 1 0 |
| 1 Dubilier fixed condenser, type 670, .001 mfd. | 1 3 |
| 1 Dubilier fixed condenser, type 610, .005 mfd. | 2 3 |
| 1 Dubilier fixed condenser, centre tapped, BE256 J.mfd. | 8 0 |
| 6 Dubilier fixed condensers, type 9200, 1 mfd. | 16 6 |
| 1 Dubilier 2 mfd. fixed condenser, type 9200 | 3 9 |
| 1 Dubilier 2 mfd. fixed condenser, type LSA, 400 v. D.C. working | 4 6 |
| 2 Dubilier 2 mfd. type LSA 400v. D.C. working, fixed condensers | 16 0 |
| 1 Polar Compax variable condenser, .0005 mfd. | 2 9 |
| 1 British Radiophone knob | 6 6 |
| 1 Bulgin twin fuse, type F9 with fuses | 2 3 |
| 1 Read-Bad grid leak holder | 3 0 |
| 3 Telsen 5-pin valveholders | 3 0 |
| 1 Telsen 4-pin valve holder | 9 9 |
| 5 Erie fixed resistances as specified | 5 0 |
| 1 Lissen 1-megohm grid leak | 6 6 |
| 1 Erie 400-ohm, 1-watt resistance | 1 0 |
| 1 Erie 200-ohm, 1-watt resistance | 1 0 |
| Tinned copper wire, lengths of insulated sleeve, Lengths of rubber-covered flex, shielded cable for pick-up leads, as specified | 3 0 |
| 1 4-volt flash-lamp bulb for dial | 6 6 |
| 1 Peto-Scott baseboard with sheet of aluminium foil (16 in. by 12 in.) ready mounted | 3 6 |
| 1 Peto-Scott bracket for mounting reaction condenser | 6 6 |
| 1 MK fuse plug, type 640 | 2 0 |
| 3 Lissen marked terminal blocks as specified | 8 0 |
| 1 British Radiophone Radiopak | 3 0 0 |
| 1 Bulgin Transcoupler L.F. Transformer, type LF10 | 11 6 |
| 1 R.I. mains transformer, type EY30 | 1 10 0 |
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If you want a full-size blueprint of 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:—

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- A.C. CALIBRATOR (page 746), No. WM309, price 6d., post free.
- A.C. MAINS UNIT (page 708), No. WM.310, price 6d., post free.

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If you want to ask any questions, cut out the above coupon and send it, together with a postal order for 1s. and stamped-addressed envelope, to the Information Bureau, WIRELESS MAGAZINE, 58-61 Fetter Lane, London, E.C.4.

Note that not more than two questions may be asked at a time and that queries should be written on one side of the paper only.

Under no circumstances can questions be answered personally or by telephone. All inquiries must be made by letter so that every reader gets exactly the same treatment.

Alterations to blueprints or special designs cannot be undertaken; nor can readers' sets or components be tested.

If you want advice on buying a set, a stamped-addressed envelope only (without coupon or fee) should be sent to the Set Selection Bureau, WIRELESS MAGAZINE, 58-61 Fetter Lane, London, E.C.4.

Australian Short-wave Transmissions

FOLLOWING are details of the short-wave transmissions made by Melbourne and Sydney, Australia: VK3ME, Melbourne (Vict.) on 31.55 metres. Wednesday, 8 to 9.30 p.m.; Saturday, 8 to 10 p.m. (local time).

VK2ME, Sydney (N.S.W.) on 31.28 metres. January: 4 to 6 p.m.; 8 p.m. to 2 a.m. February: 4 to 6 p.m.; 8 p.m. to 2 a.m. March: 4 to 6 p.m.; 8 p.m. to midnight; 12.30 to 2.30 a.m. April: 4 to 6 p.m.; 8 p.m. to midnight; 12.30 to 2.30 a.m. May: 4 to 6 p.m.; 8 p.m. to midnight; 1.30 to 3.30 a.m. June: 3 to 5 p.m.; 8 p.m. to midnight; 2.30 to 4.30 a.m. July: 3 to 5 p.m.; 7.30 to 11.30 p.m.; 2.30 to 4.30 a.m. August: 3 to 5 p.m.; 7.30 to 11.30 p.m.; 1.30 to 3.30 a.m. September: 3.30 to 5.30 p.m.; 7.30 to 11.30 p.m.; 12.30 to 2.30 a.m. October: 3.30 to 5.30 p.m.; 7.30 to 11.30 p.m.; 12.30 to 2.30 a.m. November: 4 to 6 p.m.; 7.30 to 11.30 p.m.; midnight to 2 a.m. December: 4 to 6 p.m.; 8 p.m. to 2 a.m. (All times are local.)

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Screen name 266

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44R
52/6

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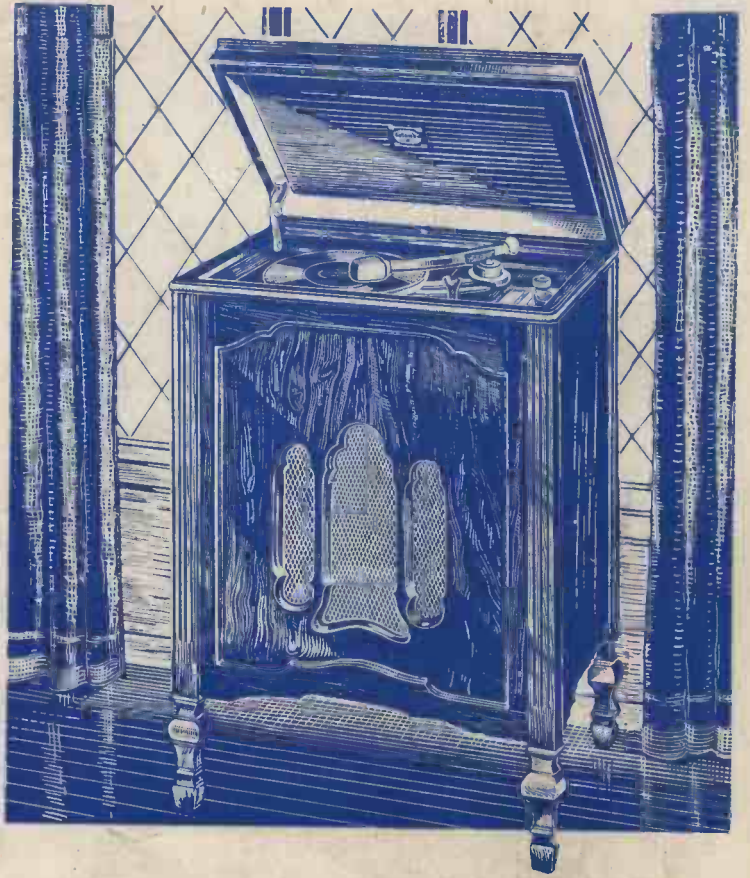
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Distributors for Northern England, Scotland and Wales: H. C. RAWSON (Sheffield and London), Ltd.,
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