

**Osram
valve**

EVERY RADIO-MAN'S
POCKET REFERENCE

GUIDE

and book of

CIRCUITS



electron Tube Data sheets

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INTRODUCTION.

The **OSRAM VALVE GUIDE** again meets a demand for concise technical information in handy pocket form on all types of OSRAM Valves for broadcast receivers.

FOR THE RADIO SERVICE ENGINEER—the OSRAM VALVE GUIDE contains complete operating data with working voltages, currents, etc., in comprehensive tabulated form, showing at a glance the most usual working conditions for each type of OSRAM Valve, complete reference to pin connections, a handy table of comparative types, and price list.

FOR THE AMATEUR AND THE EXPERIMENTER—in addition to the tabulated technical data complete for each type, the OSRAM VALVE GUIDE contains a comprehensive series of working circuit diagrams—each diagram approved by circuit engineers, and full values of components included.

FOR THE USER OF A COMMERCIAL BROADCAST RECEIVER—the OSRAM VALVE GUIDE contains a tabulated description of each type of OSRAM Valve normally used for broadcast sets, with its list price and a useful table of comparative types showing where an OSRAM Valve can be used.

For reference purposes the OSRAM VALVE GUIDE now contains tables showing types of valves fitted as standard to G.E.C. Radio Receivers, so that replacements in these receivers can readily be effected.

Further information regarding any type of OSRAM Valve, characteristic curves, etc., available on request to: The OSRAM Valve Technical Department, The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2.

SECTION I

TABULATED TECHNICAL DATA

The following pages describe in tabulated form the characteristics and operating data for all current types of OSRAM Broadcast Receiving Valves covering the following sections :

2-volt Battery Valves.

A.C. Mains Valves (Indirectly Heated).

Power Valves.

The International Octal base Range, including D.C.-A.C. and Car Radio Valves.

Rectifiers.

Valves for special purposes.

For easy distinction the types listed are shown as follows :

Valves in most popular demand, and including new valves, printed in BOLD type.

Valves normally required only for replacement purposes in older type sets, printed in LIGHT.

OSRAM VALVES FOR

Type.	Description.	Type of Base.	Base. See Page	Met. or Plain.	Filament Current.	Mutual Conductance m.a./v.	Max. Anode Volts.
S.23	Screen Grid	4 pin	30	M, P.	0.1	1.1	150
S.24	Screen Grid	4 pin	30	M, P.	0.15	1.4	150
VS.24	Variable-Mu Screen Grid	4 pin	30	M, P.	0.15	1.5	150
VP.21	Variable-Mu Screen Pentode Detector	7 pin	30	M	0.1	1.1	150
W.21 KTW.21	Variable Mu H.F. Pentode or Tetrode	4 or 7 pin	30	M	0.1	1.4	150
Z.21	Straight H.F. Pentode	4 or 7 pin	30	M, P.	0.1	1.7	150

2-VOLT BATTERY SETS

Max. Screen Volts.	Working Anode Volts.	Working Screen Volts.	Grid Bias Volts.	Average Anode Current m.a.	Average Screen Current m.a.	Optimum Load (Ohms.)	Price.
70	120 to 150	70	0 -1.5	2.8 1.3	0.8 0.6	— —	9/-
70	120 to 150	70	0 -1.5	3.2 1.4	1.0 0.8	—	11/-
75	120 to 150	75	0 -9	4.5 negligible	0.5	—	9/-
60	120 to 150	60	0 -9	2.8 negligible	0.7	100,000	9/-
150	120 to 150	120	0 -9	3.6 negligible	1.2	100,000	9/-
150	120 to 150	90 60	-0.5 -0.5	1.7 0.7	0.6 0.3	100,000	9/-

OSRAM VALVES FOR

Type.	Description.	Type of Base.	Base. See Page.	Met. or Plain.	Filament Current	Amplification Factor.	Impedance at Grid Volts 0 (Ohms.)	Mutual Conductance m.a./v.
HL.2	Triode	4 pin	—	M, P.	0.1	27	18,000	1.5
L.21	Triode	4 pin	—	P.	0.1	16	8,900	1.8
HD.22	Double-diode-Triode	5 pin	30	M, P.	0.2	27	18,000	1.5
HD.23	Double-diode-Triode	5 pin	30	M, P.	0.1	40	28,600	1.4
FREQUENCY CHANGERS.							Conversion Conductance Micromhos (Approx.)	Max. Anode Volts.
X.22	Heptode	7 pin	31	M, P.	0.15		350	150
X.23	Triode-Hexode ...	7 pin	31	M, P.	0.3		250	150

2-VOLT BATTERY SETS

Max. Anode Volts.	Max. Screen Volts.	Working Anode Volts.	Working Screen Volts.	Grid Bias Volts.	Average Anode Current m.a.	Average Screen Current m.a.	Optimum Load (Ohms.)	Price.
150	—	150 120 100	—	-3 -1.5 -1.5	1.8 2.3 1.2	—	75,000 50,000 50,000	4/9
150	—	150 120 100	—	-6 -4.5 -3	2.2 1.7 1.8	—	40,000 30,000 20,000	4/9
150	—	150 100	—	-3 -1.5	1.8 1.2	—	75,000 50,000	7/6
150	—	150 100	—	-2.0 -1.0	1.15 0.7	—	200,000 158,000	7/6
Screen Volts.	Oscillator Grid Peak Volts.	Max. Oscillator Anode Volts.	As frequency changer max. Anode Volts, Screen Volts 40. Oscillator Anode Volts 40.				Oscillator Anode Current m.a.	Price.
			Grid Bias Volts.	Anode Current m.a.	Screen Current ma.			
70	20	110	0	1.1	2.8	5.5	10/6	
40	10	40	0	0.5	0.9	1.1		
60	6	110	-1.5	0.7	1.7	2.1	10/6	

OSRAM VALVES FOR

Type.	Description.	Type of Base	Base See Page	Met. or Plain	Filament Current	Mutual Conductance m.a./v.	Max. Anode Volts.	Max. Screen Volts.
KT2	Output Tetrode ... (Replaces PT2)	5 pin	34	P	0.2	2.5	150	150
Two KT2 valves in Quiescent push pull. (Q.P.P.)								
KT21	Output Tetrode ...	5 pin	34	P	0.3	5.3	150	150
QP.21	Double Pentode for Q.P.P. ...	7 pin	34	P	0.4 ea. half	2.5	150	150
B.21	Double Triode for "Class B" ...	7 pin	—	P	0.2	—	150	—

2-VOLT BATTERY SETS

Working Anode Volts.	Working Screen Volts.	Grid Bias Volts.	Combined Anode and Screen Currents m a.	Optimum Load (Ohms.)	Price.
150 120 100	Average { 150 120 100	-4.5 -3 -3	9.5 6.5 4.3	17,000 12,000 10,000	9/-
150 120	Code V & W 132-139 } X 147 } V & W 106-112 } X 120 }	-7.5 -6.0	(Quiescent) approx. 3.2 2.0	(Anode to anode) 25,000 35,000	
150 to 120	120	-2.5	6.5	19,000	9/-
150 120	150 120	Code V & W -9.8 to -9.5 } X -8.8 } V & W -7.8 to -7.6 } X -7.1 }	(Quiescent) 3.5 2.8	(Anode to anode) 25,000 35,000	12/6
150 120	— —	-6 -4.5	2.2 1.64	12,000 12,000	12/6

OSRAM VALVES FOR A.C. MAINS SETS

Type	Description.	Type of Base.	Base See Page	Met. or Plain.	Heater Volts.	Heater Current (Amps.)	Mutual Conductance m.a./volt	
							At Eg 0	At Eg.-3
MSP.4	Screened Pentode ...	5 or 7 pin	32	M or P	4.0	1.0	4.0	—
VMP4G	Vari-mu Scr. Pentode ...	7 pin	32	M	4.0	1.0	4.0	2.2
W42	Vari-mu Scr. Pentode ...	7 pin	32	P	4.0	0.6	1.7	1.5
KTZ.41	Screened Tetrode ...	7-pin	32	P	4.0	1.5	7.5 at Eg.-2.5 12.0 at Eg.-1.5	

FREQUENCY CHANGERS

Type.	Description.	Type of Base.	Base See Page	Met. or Plain.	Heater Volts.	Heater Current (Amps.)	Max. Anode Volts.	Max. Screen Volts.	Max. Oscil. Anode Volts.
MX.40	Heptode	7 pin	31	M	4.0	1.0	250	100	150
X41	Triode-Hexode ...	7 pin	31	M. P.	4.0	1.2	250	80	150
X42	Heptode	7 pin	31	P	4.0	0.6	250	100	200

(WITH INDIRECTLY HEATED CATHODE & 4-VOLT HEATERS)

Max. Anode Volts	Max. Screen Volts.	As Amplifier under conditions of Max. Anode Volts and Max. Screen Volts.					Price.	
		Approximate Grid Bias Volts.	Bias Resistance (Ohms.)	Average Anode Current (m.a.)	Average Screen Current (m.a.)	Optimum Load (Ohms.)		
250	100	-1.75	400	3.0	1.0	—	10/6	
250	100	-2.0 to -20	150	8.0	5.0	100,000	10/6	
250	125	-3.0 to -40	300	7.5	1.9	100,000	10/6	
250	250	-2.5	244	8.0	2.25	250,000	12/6	
Conversion Conductance Micromhos approx.	Under conditions of Max. Anode Volts, Screen Volts 70, Oscillator Anode Volts 100.						Price.	
	Control Grid Volts.	Bias Resistance Ohms.	Total Cathode Current m.a.	Oscillator Grid Peak Volts.	Conversion Impedance.			
	500	-3	500	5.85	10	500,000 ohms		11/6
	640	-1.5	200	7.6	12	750,000 ohms		11/6
490	-3	300	9.5	25	310,000 ohms	11/6		

OSRAM VALVES FOR A.C. MAINS SETS

Type.	Description.	Type of Base.	Base. See Page	Met. or Plain.	Heater Volts.	Heater Current (Amps.)	Amplification Factor.
MH.4	Triode	5 pin	30	M or P	4.0	1.0	40
MHL.4	Triode	5 pin	30	M or P	4.0	1.0	20
MH.41	Triode	5 pin	30	M or P	4.0	1.0	80
H.42	Triode	7 pin	31	P	4.0	0.6	100
D.41	Double diode ...	5 pin	30	M or P	4.0	0.3	—
MHD.4	Double-diode-Triode	7 pin	32	M or P	4.0	1.0	40
DH.42	Double-diode-Triode ...	7 pin	32	P	4.0	0.6	70

(WITH INDIRECTLY HEATED CATHODE & 4-VOLT HEATERS)

Impedance (Ohms.)	Mutual Conduct- ance. m.a./v.	Max. Anode Volts.	As Amplifier under conditions of Max. Anode Volts.				Price.
			Approximate Grid Bias Volts.	Bias Resistance (Ohms.)	Average Anode Current m.s.	Optimum Load (Ohms.)	
11,000	3.6	250	-4	800	5.0	50,000	7/6
8,000	2.5	250	-8	1,000	7.6	20,000	7/6
13,300	6.0	250	-2.5	700	3.6	30,000	9/6
66,000	1.7	250	-2	2,000	1.0	200,000	7/6
—	—	—	—	—	—	500,000	5/6
18,200	2.2	250	-4	1,000	4.2	30,000	9/6
58,000	1.2	250	-3	2,700	1.1	200,000	9/6

OSRAM VALVES FOR A.C. MAINS SETS

Type.	Description	Type of Base.	Base. See Page	Heater Volts.	Heater Current Amps.	Max. Anode Volts.	Max. Screen Volts.
ML.4	Triode	5 pin	30	4.0	1.0	250	—
MKT.4	Output Tetrode (Replaces MPT.4)	5 or 7 pin	32	4.0	1.0	250	200
KT.41	Output Tetrode (Replaces N.41)	7 pin	32	4.0	2.0	250	250
KT.42	Output Tetrode (Replaces N.42)	7 pin	32	4.0	1.0	250	250
D.N.41	Double-diode-Pentode ...	7 pin	31	4.0	2.3	250	250

(WITH INDIRECTLY HEATED CATHODE & 4-VOLT HEATERS)

Mutual Conductance m.a./volt.	Under conditions of Max. Anode Volts and Max. Screen Volts.					Price.
	Approx. Grid Bias Volts.	Bias Resistance Ohms.	Average Anode Current (m.a.)	Average Screen Current (m.a.)	Optimum Load Ohms.	
4.2	- 14	700	20	—	7,000	10/-
3.0	- 11	300	32.0	5.0	8,000	10/6
10.0	- 4.4	90	40.0	10.0	5,400	10/6
2.5	- 16.5	420	34.0	5.5	7,000	10/6
10.0	- 5	120	32.0	8.0	5,400	12/6

OSRAM MAINS VALVES

Type.	Description.	Nearest American Counterpart.	Heater Volts.	Heater Current (amps.)	Conversion Conductance Micromhos approx.	Max. Anode Volts.	Max. Screen Volts.	Max. Oscil. Anode Volts.
Frequency Changers.								
X63	Heptode	6A8G	6.3	0.3	500	250	100	175
X64	Hexode (for use with separate osc.)	6L7G	6.3	0.3	310	250	150	—
X65	Triode-Hexode	—	6.3	0.3	225	250	100	175

Type.	Description.	Nearest American Counterpart.	Heater Volts.	Heater Current (Amps.)	Mutual Conductance m.a./v.	Max. Anode Volts.	Max. Screen Volts.
KTW63	Variable Mu H.F. Tetrode	6K7G 6U7G	6.3	0.3	1.5	250	100
KTZ63	Straight H.F. Tetrode	6J7G	6.3	0.3	1.225	250	125

(INDIRECTLY HEATED, AND WITH OCTAL BASES).

Under conditions Anode Volts 250, Screen Volts 100, Oscillator Anode Volts 175					Price.
Total Cathode Current m.a.	Control Grid Volts.	Oscillator Grid Peak Volts.	Bias Resistance Ohms.	Conversion Impedance.	
9.0	-3	25	500	0.3 megohm	11/6
11.6	-6	18 with -15v.D.C.	520	1.0 megohm	10/6
11.0	-3	10	300	2.5 megohms	11/6
In Amplifier.					Price.
Approximate Grid Bias Volts.	Bias Resistance (Ohms).	Average Anode Current (m.a.)	Average Screen Current (m.a.)	Optimum Load (Ohms.)	
-3 to -40	320	7.6	1.9	250,000	10/6
-3	1200	2.0	0.5	250,000	10/6

Counterpart 6G5) see page 29.

OSRAM MAINS VALVES

Type.	Description.	Nearest American Counterpart.	Heater Volts.	Heater Current (Amps.)	Amplification Factor.	Impedance (Ohms.)	Mutual Conductance m.a./v.
KTZ.63	Tetrode connected externally as Triode	6J7G	6.3	0.3	—	10,500	2.0
H.63	Triode	6F5G	6.3	0.3	100	66,000	1.5
D.63	Double diode ...	6H6G	6.3	0.3	—	—	—
DH.63	Double diode Triode	6Q7G	6.3	0.3	70	58,000	1.2
L.63	Triode	6J5G	6.3	0.3	20	7,700	2.6

For Rectifiers **U50, U52, U31**

(INDIRECTLY HEATED, AND WITH OCTAL BASES)

In Amplifier.							Price.
Anode Volts.	Screen Volts.	Approximate Grid Bias Volts.	Bias Resistance (Ohms.)	Average Anode Current (m.a.)	Average Screen Current (m.a.)	Optimum Load (Ohms.)	
250	G ₂ G ₃ strapped to anode	-8	1,000	8.0	—	30,000	10/6
250	—	-2.0	2,000	1.0	—	250,000	7/6
—	—	—	—	—	—	—	5/6
250	—	-3.0	3,000	0.6	—	250,000	9/6
250	—	-8	900	9.0	—	20,000	7/6

(see pages 24, 25).

OSRAM MAINS VALVES

Type.	Description.	Nearest American Counterpart.	Heater Volts.	Heater Current (Amps.)	Amplification Factor.	Impedance (Ohms.)	Mutual Conductance m.a./v.
KT.63	Output Tetrode ...	6F6G	6.3	0.7	—	—	2.5
	connected externally as Triode				7.7	3,200	2.4
KT.66	Output Tetrode ...	6L6G	6.3	1.27	—	—	6.3
	(aligned grids) connected externally as Triode				8	1,450	5.5
KT.32	Output Tetrode ...	25L6G	26	0.3	—	—	9.0
	(For low H.T. voltage) connected externally as Triode				7.0	1,000	7.0
KT.33	Output Tetrode (D.C./A.C.)	—	26	0.3	—	—	10.0

For Rectifier use U50, U52 or U31

(INDIRECTLY HEATED, AND WITH OCTAL BASES)

In Amplifier.							Price.
Anode Volts.	Screen Volts.	Approximate Grid Bias Volts.	Bias Resistance (Ohms.)	Average Anode Current (m.a.)	Average Screen Current (m.a.)	Optimum Load (Ohms.)	
250	250 strapped to anode	-16.5	450	32	6	7,000	10/6
250		-20	650	30	—	4,500	
250	250 strapped to anode	-16	190	80	6	2,200	15/-
400		-38	600	62.5	—	4,500	
(suitable for Anode volts 400 max. Screen 300 max. in Class A-B Push Pull).							
110	110	-7	150	50	3.5	2,000	12/-
250 175	strapped to anode		650†	40†	—	5,000*	
		-27	450†	38†	—	5,000*	
200	200	-13.2	188	60	10	3,000	12/-

(see pages 24, 25).

*Anode to anode for two valves in push pull.

†Each valve separately.

OSRAM VALVES FOR

Type.	Description.	Type of Base.	Filament Volts.	Filament Current Amps.	Impedance (Ohms).	Mutual Conductance (m.a./v.)	Max. Anode Volts.	Max. Screen Volts.
PX.4	Triode 12 watt ...	4 pin	4.0	1.0	830	6.0	300	—
PX.25	Triode 25 watt ...	4 pin	4.0	2.0	1,265	7.5	400	—
PX.25A	Triode 25 watt ...	4 pin	4.0	2.0	580	6.9	400	—
DA.30	Triode 30 watt ...	4 pin	4.0	2.0	580	6.9	500	—
DA.100	Triode 100 watt ...	Special	6.0	2.7	1,410	3.9	1,000	—
KT.32	DC./AC. Output Tetrode* (for Low Voltage H.T.)	"Octal"	26.0	0.3	—	9.0	135 80	135 80
KT.33	DC./AC. Output Tetrode*	"Octal"	26.0	0.3	—	9.0	175	175
KT.66	Aligned Grid Power Tetrode* ...	"Octal"	6.3	1.27	—	6.3	250 400	250 300

* Indirectly Heated Cathode.

POWER AMPLIFICATION

As Class "A" Power Amplifier.					Optimum Load.		Power Output.		Price.
Average Anode Current (m.a.)	Average Screen Current (m.a.)	Approx. Grid Bias Volts.	Bias Resistance (Ohms). A.C. Filament Heating.	Max. Anode Dissipation (Watts).	For Single Valve (Ohms).	Anode-to-Anode for pair in push-pull (Ohms).	Single.	Pair.	
50	—	-42	900	15	4,000	8,000	3.5	8	9/6
62.5	—	-33	530	25	3,200	6,400	6	12	20/-
62.5	—	-102	1,630	25	4,500	2,800†	7	32	25/-
60.0	—	-130	2,150	30	4,000	4,000†	9	45	25/-
100	—	-149	1,490	100	6,700	8,000†	30	100/200	168/-
75 44	5.0 4.0	-7.6 -4.5	95 95	10	1,300 1,600	2,500 3,000	3.5 1.2	7.5 2.5	12/-
57	10.0	-11.0	160	10	2,500	6,000	4.5	9.0	12/-
80 120‡	6 5‡	-16 -27	190 400	22.5 —	2,200 —	4,000 5,700	7.25 —	17.0 32.0	15/-

† Fixed Bias Condition (Low Impedance Loading). ‡ Two Valves in push pull. Total "No Load" currents.

OSRAM RECTIFYING

Type.	Description.	Type of Rectification.	Type of Base.	Base. See Page	Filament or Heater Volts.	Filament or Heater Current (amps.)
U.10	Directly Heated ...	Full Wave ...	4 pin	—	4.0	1.0
U.12	Directly Heated ...	Full Wave ...	4 pin	—	4.0	2.5
U.14	Directly Heated ...	Full Wave ...	4 pin	—	4.0	2.5
U.18	Directly Heated ...	Full Wave ...	4 pin	—	4.0	3.75
MU.12	Indirectly Heated ...	Full Wave ...	4 pin	—	4.0	2.5
MU.14	Indirectly Heated ...	Full Wave ...	4 pin	—	4.0	2.5
U.31	Indirectly Heated ...	Half Wave ...	" Octal "	34	26.0	0.8
U.50	Directly Heated ...	Full Wave ...	" Octal "	34	5.0	2.0
U.52	Directly Heated ...	Full Wave ...	" Octal "	34	5.0	3.0
GU.5	Mercury Vapour ...	Half Wave ...	4 pin	—	4.0	3.0

VALVES

Max. Anode Volts R.M.S.	Max. D.C. Output Volts at Max. Current.	Max. D.C. Output Current (milliamps.)	D.C. Output at Half Current (Volts).	D.C. Output at Half Current (milliamps).	Price.
250	260	60	300	30	9/-
350	325	120	380	60	9/-
500	540	120	620	60	9/-
500	520	250	600	120	15/-
350	340	120	410	60	9/-
500	540	120	600	60	9/-
250 200 110	280 206 73	100 100 100	320 245 106	50 50 50	9/-
350	325	120	380	60	9/-
500	500	250	565	150	15/-
1500	1270	250*	1300	125*	25/-

* With delayed switching of anode volts

OSRAM SPECIAL TYPES

Type.	Description.	Type of Base.	Filament Volts	Filament Current Amps.	Ampln. Factor	Im- pedance Ohms.
A.537	Triode for microphone amplifiers	Small side contact	4.0	0.4	15.5	10,000
KTZ.41	Screened Tetrode	7 pin	4.0	1.5	—	1 megohm
HA.1	Low Capacity Triode (" Acorn ") ...	—	4.0	0.25	20	11 800
ZA.1	Low Capacity Pentode (" Acorn ") ...	—	4.0	0.25	—	—
N.43	Output Pentode for Television amplifiers	7 pin	4.0	2.0	—	—
D.42	Diode (half wave indirectly heated) ...	4 pin*	4.0	0.6	—	—
U.16	Rectifier for Cathode Ray Tubes ...	4 pin	2.0	1.0	Rectified Current Anode Volts	
U.17	Rectifier for Cathode Ray Tube Circuits	4 pin	4.0	1.0	Rectified Current Anode Volts	
GT.1B	Gasfilled Relay (Argon filled)	5 pin	4.0	1.35	—	—
GT.1C	Gasfilled Relay (Argon filled)	5 pin	4.0	1.3	—	—

*Special connections.

(FOR MICROPHONE AMPLIFIERS, TELEVISION, Etc.)

Mutual Conductance m.a./volt	Anode Volts. Max.	Screen Volts.	Grid Bias Volts.	Anode Current m.a.	Optimum Load Resistance Ohms.	Price.
1.55	150 50	—	-6 -2	3.3 1.0	20,000 50,000	50/-
12.0 at Eg -1.5	250	250	-2.5	8.0	250,000	12/6
1.7	180	—	-6.5	4.5	—	50/-
1.1	250	100	-2.2	2.0	—	60/-
10.0	250	250	-4.5	40.0	5,400	25/-
—	—	—	—	—	500,000	10/-
(Smoothed with 0.25 mfd. condenser) 5.0 m.a. max. (RMS.) 5,000 max.						20/-
(Smoothed with 1.0 mfd. condenser) 30.0 m.a. max. (RMS.) 2,500 max.						20/-
—	120 max. (peak)	—	—	2.0 m.a. av.	—	20/-
—	500 max. (peak)	—	—	0.8 amp. av.	—	25/-

OSRAM "MIDGET" AMPLIFYING VALVES.

For deaf-aid amplifiers, etc. Very economical in H.T. and L.T. current, and of small size.

Type.	Description.	Filament.		Amplification Factor.	Mutual Conductance.	Price.
		Volts.	Current.			
S.12	Screened Tetrode ...	2.0	0.06	—	0.7	17/6
H.12	Triode, high impedance	2.0	0.06	26	1.2	15/-
L.12	Triode, low impedance	2.0	0.06	4.8	0.8	15/-

Above fitted with miniature 4-pin base.

OSRAM BARRETTERS (CURRENT REGULATORS)

OSRAM Barretter Type.	Mean Current Rating (amps.)	Voltage Range.	Type of Base.	Price.
251	0.25	100-180	4 pin	12/6
301	0.3	138-221	E.S. cap	8/6
302	0.3	112-195	E.S. cap	8/6
303	0.3	86-129	E.S. cap	8/6
304	0.3	95-165	E.S. cap	8/6
202	0.2	120-200	4-pin base	8/6

TUNERAY INDICATORS.

The **S.E.C.** TUNERAY (Type **Y.63**) is a tuning indicator of the electron ray type. It is intended to give sensitive indication of correct tuning and owing to being electronically operated, it is positive and instantaneous in action. For suitable circuit, see page 46. Fitted with Octal base, and 6.3 volt heater. Price, each, 8/6

Type **Y.64** Similar, but suitable for operation down to 90 volts. Price, each, 8/6

OSRAM PILOT OR DIAL BULBS.

	List Price.
For 2 volt Battery Receivers 3.5v .15 amp. Coil Filament 12 m/m Round bulb (approximately .1 amp. on 2 volt) 	each. 3d.
For A.C. Receivers off 4 volt transformers 6.2v .3 amp. Coil Filament 15 m/m Round bulb (approximately .2 amp. on 4v.) 	4d.
For " Universal " Receivers.	
In series with .2 amp. valves 6.2v .3 amp. Coil Filament 15 m/m round bulb	4d.
In series with .3 amp. valves 6.5v (S type) .3 amp. Coil filament 12 m/m round bulb 	4d.
These two types are also available in tubular bulbs 	6d.

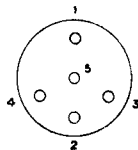
Used under the above conditions a satisfactory life will be obtained.

Particulars of other ratings on application.

Valve Type	Pin Number					Top Cap
	1	2	3	4	5	
S.23 S.24 VS.24	G ₂	G _c	F	F	—	A
W.21 Z.21	G ₂	G _c	F G ₃ M	F	—	A
W.22	G ₂	A	F G ₃ M	F	—	G _c
HD.22 HD.23	A	D ₁	F M	F	D ₂	G _c
KT.2 KT.21	A	G _c	F	F	G ₂	—
MH.4 MHL.4 ML.4 MH.41	A	G _c	H	H	G ₂	—
D.41	D ₁	D ₂	H	H	C	—
D.42	A	C	H	H	—	—

Key :

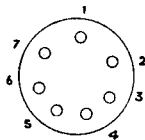
- F Filament
- H Heater
- C Cathode
- G_c Control Grid
- G₂ Screen Grid
- G₃ Suppressor Grid
- M Metallising
- D₁ AVC Diode
- D₂ Signal Diode
- A Anode



View from underside of base.
4 and 5-pin base.

Valve Type	Pin Number							Top Cap
	1	2	3	4	5	6	7	
MX.40 } X.42 } X.30 } X.32 }	Ao	Go	Gs	H	H	C (M)	A	Gc
X.21 } X.22 }	Ao	Go	Gs	F	F	M	A	Gc
X.23	Ao	Go	Gs	F	F	M	A	Gc
X.41 } X.31 }	Ao	Go	Gs	H	H	C (M)	A	Gc
H.30 } H.42 }	M	—	—	H	H	C	A	Gc
DN.41	Dr	A	D2	H	H	C	Gs	Gc
U.30	H centre	Ar	Cr	H	H	C2	A2	—

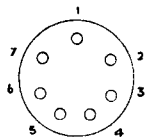
Key: F Filament
H Heater
C Cathode
Gc Control Grid
Go Oscillator Grid
Gs Screen Grid
A Anode
Ao Oscillator Anode
M Metallising
D Diode Anode



View from underside of base.
7-pin base.

Valve Type	Pin Number							Top Cap
	1	2	3	4	5	6	7	
VMP 4 VMP.4G MSP.4 MSP.41 KTZ.41 W.30 W.31	M	Gc	Ge omitted in tet- rodes	H	H	C	Gs	A
VP.21	M	Gc	Ge	F	F	—	Gs	A
W.42	—	A	Ge	H	H	C	Gs	Gc
MHD.4 DH.42 DH.30	D1	M	D2	H	H	C	A	Gc
MPT.4 MKT.4 N.41 KT.41 N.42 KT.42 N.30G KT.30	—	Gc	Gs	H	H	C (Ge)	A	—
N.43	—	—	Gs	H	H	C (Ge)	A	Gc
N.31 KT.31	H centre	—	Gs	H	H	C (Ge)	A	Gc

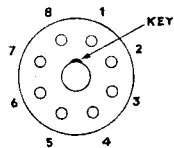
- Key :
- F Filament
 - H Heater
 - C Cathode
 - A Anode
 - Gc Control Grid
 - Gs Screen Grid
 - Ge Suppressor Grid
 - M Metallising
 - D Diode Anode



View from underside of base.
7-pin base.

Valve Type	Pin Number								Top Cap.
	1	2	3	4	5	6	7	8	
H.63	—	H	X	A	X	X	H	C	Gc
L.63	—	H	A	X	Gc	X	H	C	—
KTW.63 } KTZ.63 }	—	H	A	Gs	—	X	H	C	Gc
D.63	M	H	D ₂	C ₂	D ₁	X	H	C ₁	—
DH.63	—	H	A	D ₁	D ₂	X	H	C	Gc
X.63	—	H	A	Gs	Go	Ao	H	C	Gc
X.64	—	H	A	Gs	Go	X	H	C	Gc
X.65	—	H	A	Gs	Go	Ao	H	C	Gc

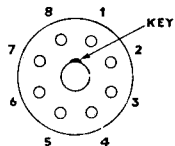
Key : F Filament
H Heater
C Cathode
A Anode
Ao Oscillator Anode
Gc Control Grid
Gs Screen Grid
Go Oscillator Grid
D Diode Anode
X Pin omitted



View from underside of base
"Octal" Base.

Valve Type	Pin Number								Top Cap
	1	2	3	4	5	6	7	8	
KT.63 } KT.66 } KT.32 } KT.33 }	—	H	A	Gs	Gc	X	H	C	—
U.50 } U.52 }	—	F	X	A1	X	A2	X	F	—
U.31	—	H	X	X	A	X	H	C	—
Y.63 } Y.64 }	—	H	A	T	Gc	X	H	C	—

Key : F Filament
H Heater
C Cathode
A Anode
Gc Control Grid
Gs Screen Grid
D Diode Anode
T Target
X Pin omitted



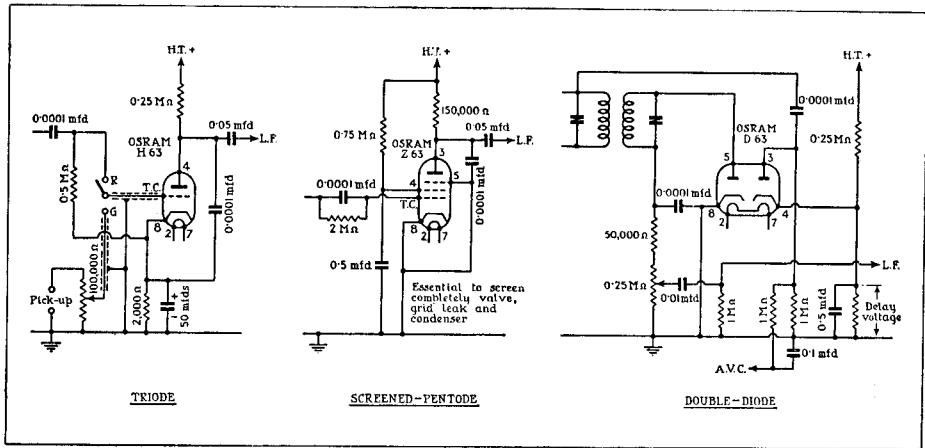
View from underside of base.
"Octal" Base

SECTION II.
TYPICAL CIRCUITS FOR USING

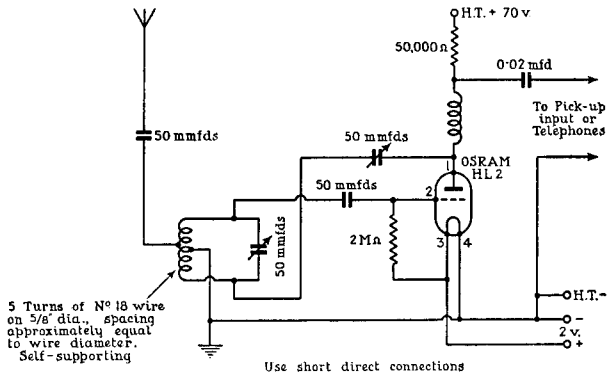
**Osram
Valves**

In the following pages will be found a number of typical circuits illustrating different classes of broadcast receiving valves used in modern sets. *The circuits shown are typical only and given merely to indicate the particular application of each valve. Wiring diagrams cannot be supplied but each circuit shown may be made the basis of practical apparatus.*

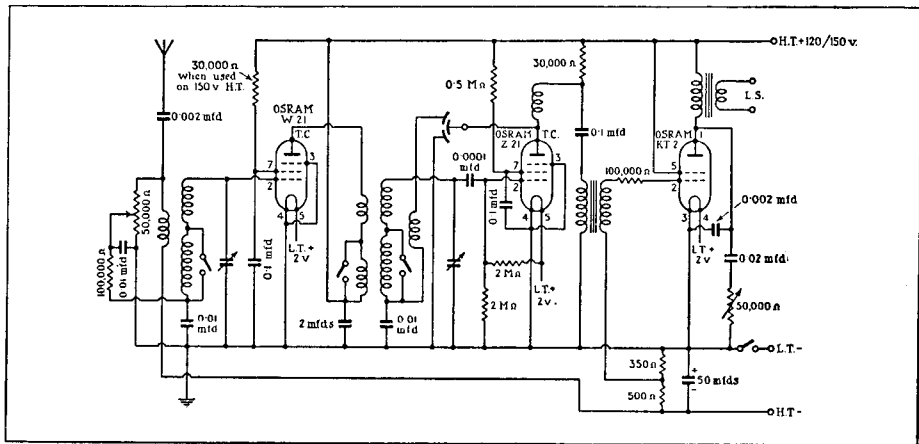
It should be understood that the information given in the following diagrams is of a technical nature only, and does not imply any licence under any patents which may be involved.



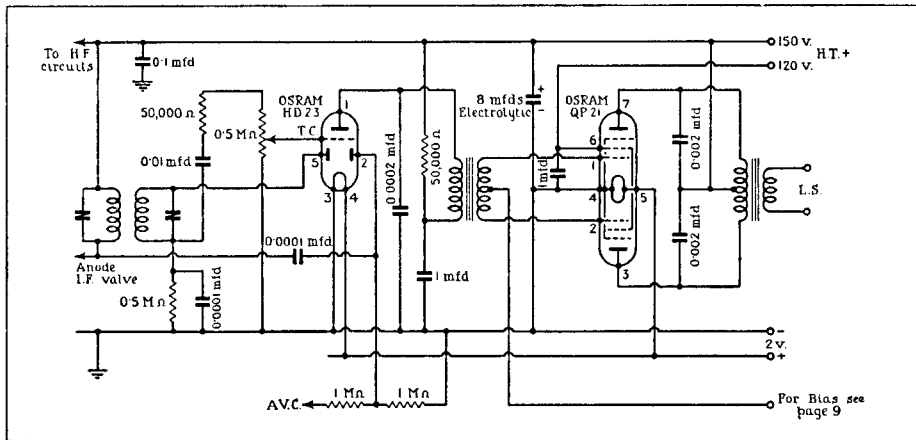
Typical Detector Circuits illustrating the use of OSRAM Triode, Screen Pentode, and Diode Valves.



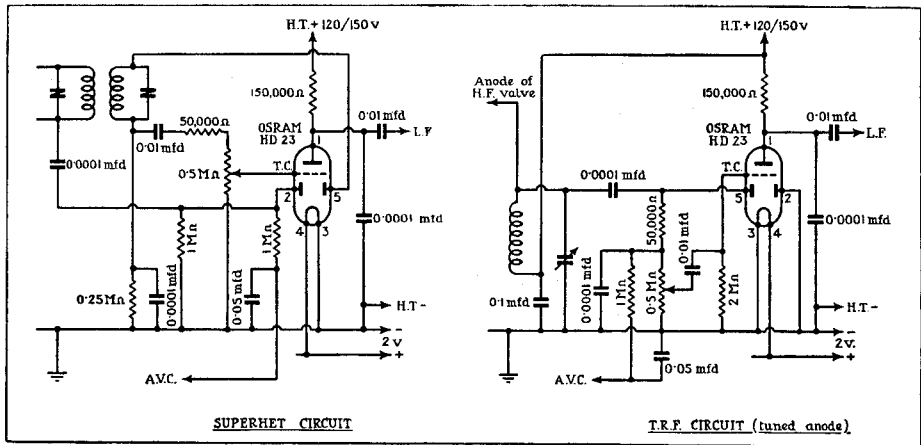
Practical Circuit for Ultra Short (5-7 metre) Receiver.



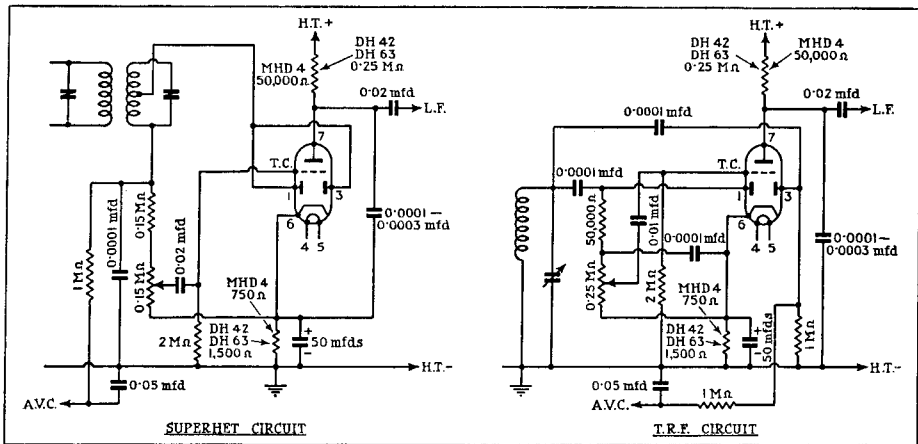
Typical 2-volt Battery 3-valve Receiver, with Pentode Detector and Automatic Grid Bias.



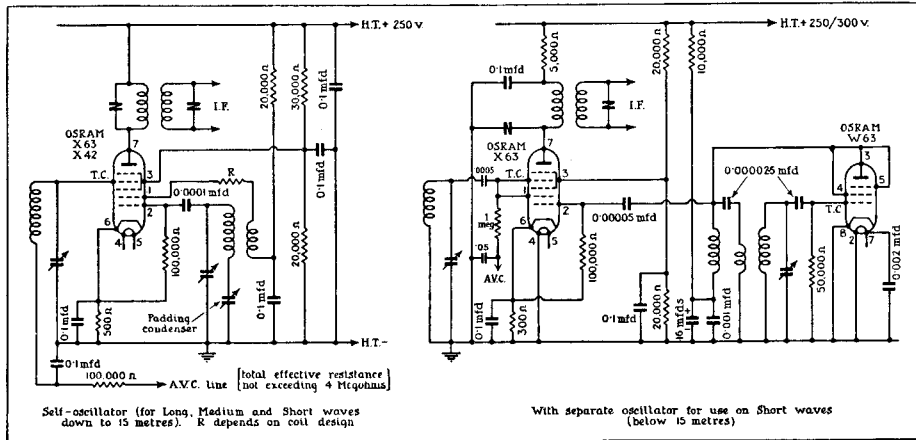
Typical Circuit illustrating OSRAM QP.21 Double Pentode (Q.P.P.) Output, in conjunction with Double-Diode-Triode Detector stage.



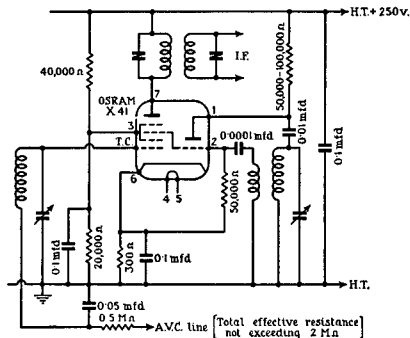
Typical Circuits for OSRAM 2 v. Battery Double-Diode-Triode Valve to provide Detection and A.V.C.



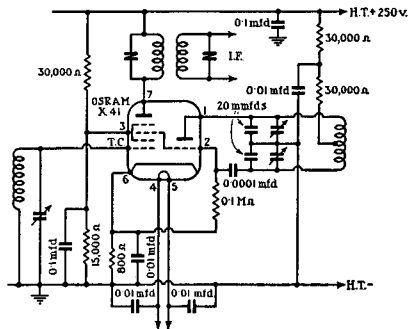
Typical Circuits for OSRAM Indirectly Heated Double-Diode-Triode Valve to provide Detection and A.V.C.



Typical Frequency Changer Circuits illustrating OSRAM X.63 and X.42 Heptode Valves.

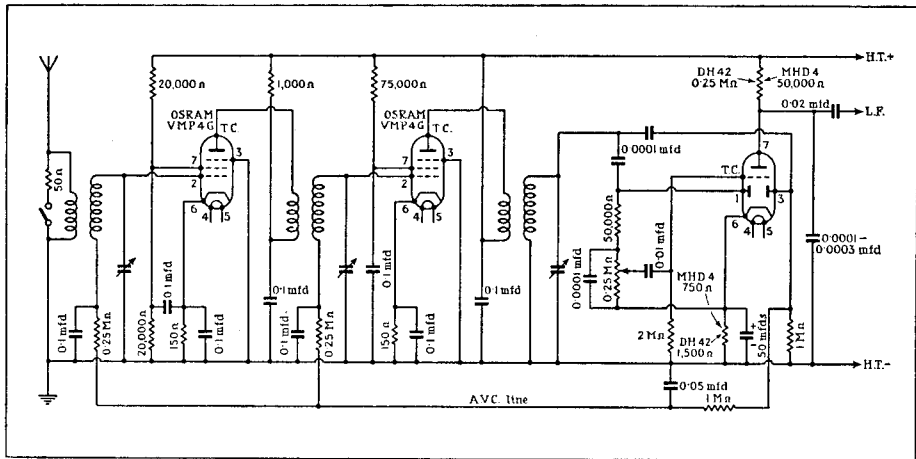


OSRAM X 41 for Long, Medium & Short wave reception (2,000 - 10 metres)

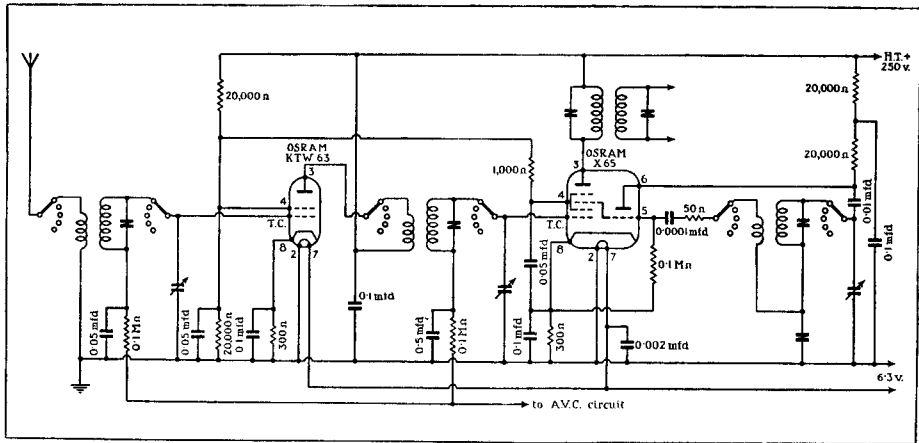


OSRAM X 41 for Ultra Short wave reception (5 - 10 metres)

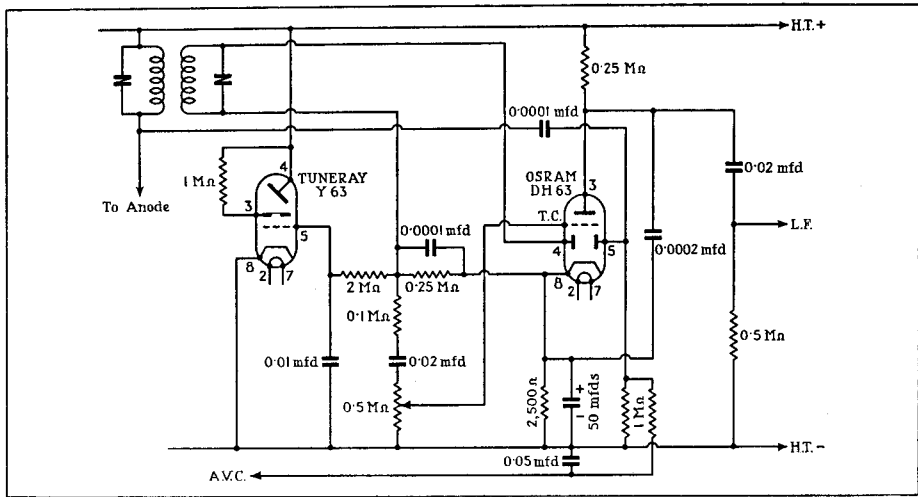
Typical Frequency Changer Circuits illustrating OSRAM Triode-Hexode Valve for Broadcast and short wave and for ultra-short wave reception.



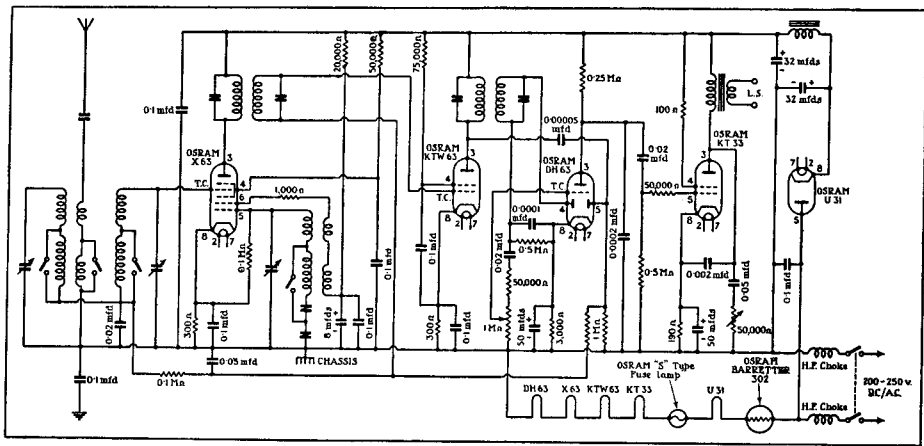
Typical Circuit illustrating the use of A.C. Mains Double Diode Triode in straight T.R.F. Receiver.



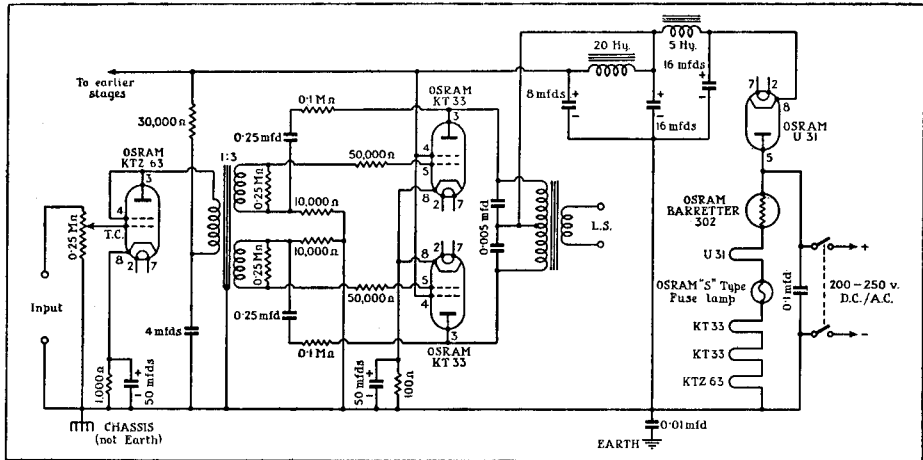
Typical circuit illustrating H.F. and Frequency Changer stages, using X65 Triode-Hexode (suitable for short wave superhet. receiver).



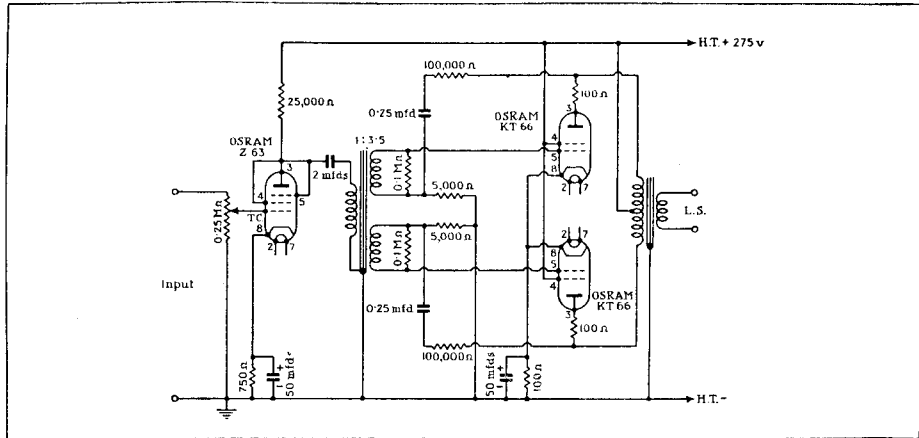
Typical circuit showing "Tuneray" introduced for visual indication of correct tuning.



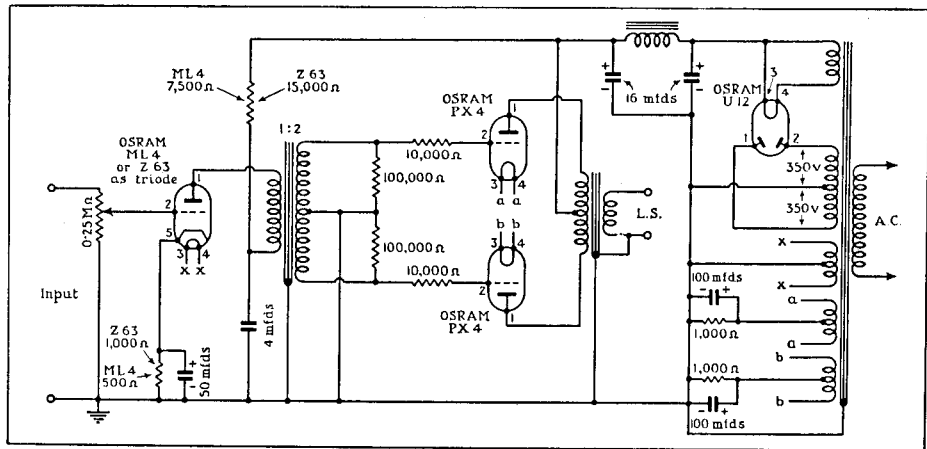
Typical circuit for sensitive D.C./A.C. superheterodyne receiver with A.V.C.



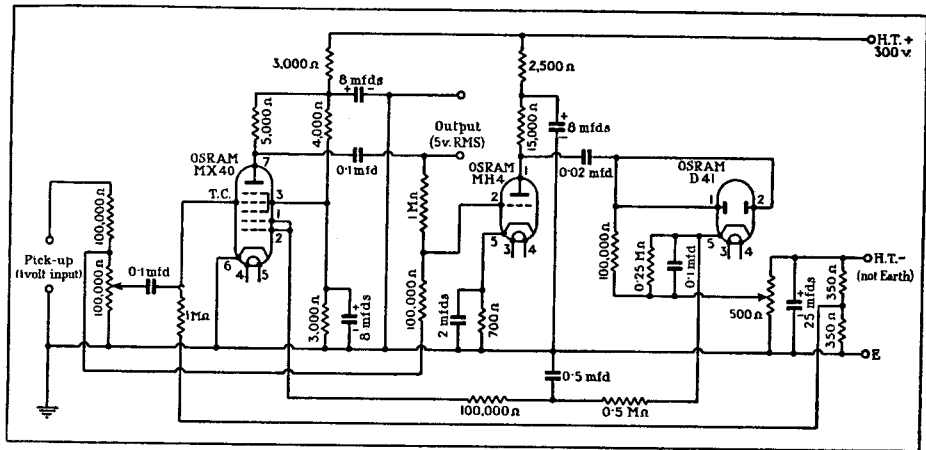
Typical Circuit illustrating Amplifier suitable for D.C./A.C. Mains, using two OSRAM KT. 33 high sensitivity Output Tetrodes in push-pull.



Typical Circuit for two OSRAM KT.66 Output Power Tetrodes in push-pull, with negative feed back.



Typical Circuit illustrating a 6-watt Output " Quality " Amplifier for A.C. Mains using OSRAM Triodes in push-pull.



Typical Circuit illustrating a method of automatic contrast expansion, for use with Electrical Reproduction of Gramophone Records.

OSRAM VALVE TYPES

COMPARATIVE TABLE OF VALVES

2-VOLT VALVES

Mazda	Ever-Ready	Mullard	Osram	Cossor	Ferranti
VP.215	K.50M	VP.2	{ W.21 KTW.21 }	—	—
SP.215	—	SP.2	Z.21	—	—
VP.215	—	VP.2	VP.21	210 VPT	—
S.215B	—	PM.12A	S.24	220.SG	—
S.215A	—	PM.12	S.23	215.SG	—
S.215VM	K.40N	PM.12M	VS.24	220.VS	VS.2
—	—	—	{ X.22 X.21 }	—	VHT.2A
H.210	—	PM.1A	H.210	210.RC	—
HL.2	K.30A	PM.1HL	HL.2	210.HF	—
HL.210	—	PM.1HF	HL.210	210.HL	—
HL.21DD	K.23B	T.DD2	{ HD.22 HD.23 }	—	H.2D
L.210	—	PM.1LF	L.210	210.LF	—
L.2	K.30D	PM.2DX	L.21	215.P	—
P.220	K.30E	PM.2A	LP.2	220.PA	—
P.215	—	PM.2	P.215	215.P	L.2
P.220A	—	PM.202	P.2	220.P	—
PEN.220	K.70B	PM.22A	{ PT.2 KT.2 }	220.PT	—
PEN.231	—	PM.22D	KT.21	—	—
PD.220A	K.33A	PM.2BA	B.21	—	—
QP.240 (9-pin base)	K.77A (9-pin base)	QP.22A (9-pin base)	QP.21 (7-pin base)	—	—

(In many cases characteristics are not exactly equivalent. Types shown have approximately similar characteristics).

A.C. MAINS VALVES (Indirectly Heated)

Mazda	Ever-Ready	Mullard	Osram	Cosmor	Ferranti
AC/VP.1	A.50N	VP.4	VMP.4	MVS/PEN	VPT.4
AC/VP.1	A.50N	VP.4	VMP.4G	MVS/PEN	VPT.4
AC/VP.2	—	—	W.42	—	—
—	A.50A	SP.4	MSP.4	MS/PEN	SPT.4A
—	—	—	WD.40	—	—
AC/SG	—	S.4VB	MS.4B	41.MSG	—
AC/SG	—	S.4V	MS.4	MSG/LA	—
AC/SG.VM	—	VM.4V	VMS.4	MV.SG	—
AC/2SVM	—	—	VMS.4B	—	—
AC/TH1	A.36A	TH.4	X.41	41.STH	—
—	—	—	{X.42 MX.40}	{41.MPG	VHT.4
V.914	A.20B	2D.4A	D.41	DD.4	SD
AC/HL.DD	A.23A	1DD.4	{DH.42 MHD.4}	DDT.	H.4D
—	—	—	H.42	—	—
AC.2HL	A.30B	904.V	MH.41	41.MH	—
AC/HL	A.30D	354.V	MH.4	41.MHF	D4
—	—	164.V	MHL.4	41.MLF	—
AC/P	—	104.V	ML.4	41.MP.	—
AC/PEN	—	PEN4VA	{N.42 KT.42 MPT.4 MKT.4}	MP/PEN	—
AC.2/PEN	A.70C	PEN4VB	{N.41 KT.41}	42MP/Pen	PT.4
AC2/PendD	—	—	DN.41	—	PT.4D
—	—	AT.4	HA.1	—	—
—	—	AP.4	ZA.1	—	—

*(In many cases characteristics are not exactly equivalent.
Types shewn have approximately similar characteristic).*

A.C. MAINS VALVES (Directly Heated)

Mazda	Ever-Ready	Mullard	Osram	Cossor	Ferranti
—	—	PM.24M	PT.4	PT.41	—
PP.3/250	S30C	AC.044	PX.4	4.XP	LP.4
PP.5/400	—	DO.24	PX.25	—	—
—	—	DO.26	PX.25A	—	—
—	—	PM.24D	PT.25	—	—
—	—	PM.24D	PT.25H	—	—
—	—	—	DA.30	—	—
ES.60	—	DO.60	DA.60	—	—
HS 100	—	MZ1/100	DA.100	—	—

*(In many cases characteristics are not exactly equivalent.
Types shown have approximately similar characteristic)*

RECTIFIERS AND UNIVERSAL VALVES

Mazda	Ever-Ready	Mullard	Osram	Cosor	Ferranti
UU.60/250	—	DW.2	U.10	506.BU	—
UU120/350	—	{ DW.3 IW4/350 }	U.12	442.BU	R.4
UU120/500	—	DW.4	U.14	460.BU	R.4A
—	—	—	U.18	—	—
UU.4	A.11B	IW.3	MU.12	—	—
—	—	IW.4	MU.14	—	—
—	—	—	{ X.30 X.32 }	—	VHTS
—	—	—	X.31	—	—
—	—	—	H.30	—	—
—	—	—	W.30	—	—
—	—	—	W.31	—	VPTS
—	—	—	WD.30	—	—
—	—	—	DH.30	—	HSD
—	—	—	{ N30/G KT.30 }	—	PTA
—	—	—	{ N.31 KT.31 }	—	—
—	—	—	U.30	—	—

*(In many cases characteristics are not exactly equivalent.
Types shown have approximately similar characteristic)*

OSRAM VALVES

IN G.E.C. RADIO RECEIVERS.

RECEIVER.	DESCRIPTION.	OSRAM VALVES.
O.M.M.3(Music Magnet)	3-valve kit	S.23 H.210 LP.2 or P.2*
O.M.M.4 "	4-valve kit	} S.23(m) S.23(m) H.210 LP.2 or P.2*
OSRAM 4 "	4-valve kit	
OSRAM 33 "	3-valve kit	
BC 3140 	4-valve A.C. straight	MS.4 MS.4 MH.4 PX.4 U.10
BC 3145 	4-valve D.C. straight	S.24 S.24 H.210 PT.625
BC 3160 	Battery s.w. superhet	(Increase screen resistance to 150,000 ohms). S.24 H.210 VS.24 VS.24 H.210 P.2
BC 3161 	Battery s.w. superhet	(Increase Grid Bias G.C.1 to -3v.) S.24 H.2(m) VS.24 VS.24 H.2(m) KT.2
BC 3235 	Compact Three 	(Shorten valve stands on S.G. valves) MS.4 MH.4 PT.4 U.10
BC 3240 	Table Four 	MS.4 MS.4 MH.4 PT.4 U.10
BC 3335 	Gala 	MS.4B(m) MS.4B(m) PT.4 U.14

(m) indicates metallised valve.

*details of circuit modifications to accommodate altered valve combination available on request.

RECEIVER.	DESCRIPTION.	OSRAM VALVES.
BC 3336	Gala D.C.	DSB(m) DSB(m) DPT (5)
BC 3338	Carnival	MS.4B(m) MS.4B(m) PT.4 U.14
BC 3339	Carnival D.C.	DSB(m) DSB(m) DPT (5)
BC 3340	4-valve A.C. straight	VMS.4(m) MS.4B(m) MS.4B(m) PT.4 U.14
BC 3345	Nomad	DSB(m) DS(m) DSB(m) DPT(5)
BC 3358	A.C. Superhet	MS.4B(m) MH.4(m) VMS.4(m) MS.4B(m) PT.4 U.14
BC 3360	Overseas	MS.4B(m) MH.4 MS.4B(m) MS.4B(m) PT.4 U.12
BC 3436	M.C.3	HL.2 HL.2 P.2
BC 3440/1/2/4/8	A.C. Superhet	MS.4B VMS.4 MS.4B MKT.4(5) U.12
BC 3445/3/9	D.C. Superhet	DSB VDS DSB DPT Barretter 251
BC 3446	Superhet 6	S.24 L.21 VS.24 HL.2 L.21 B.21
BC 3460	Overseas Seven	VMP.4G(m) VMP.4G(m) ML.4 VMP.4G(m) MHD.4 MKT.4 U.12
BC 3466	Battery Overseas Seven	VS.24 LP.2 VS.24 VS.24 HD.22 L.21 B.21
BC 3480/4	Superhet 8	VMS.4(m) VMS.4(m) ML.4 VMP.4G MHD.4 MH4 (uncanistered Catkin) MKT.4 U.14
BC 3520	AC-DC.3	H.30 KT.30 U.30 Barretter 301
BC 3536	Battery Compact 3	HL.2(m) HL.2(m) P2
BC 3540/4/8/3558	Superhet AVC.5	X.30(m) W.30 DH.30 KT.30 MU.14
BC 3545	Superhet DC.5	DSB VDS DSB DPT Barretter 251

(m) indicates metallised valve.

(5) indicates 5-pin and side terminal base.

RECEIVER.	DESCRIPTION.	OSRAM VALVES.
BC 3546	Battery CB.4 ...	VS.24(m) VP.21(m) L.21 B.21
BC 3550/1	Droitwich Super 5 ...	MX.40(m) VMP.4G MHD.4 MKT.4 U.12
BC 3558	Shadow-Band Radiogram	{ X.30(m) W.30 DH.30 KT.30 U.12 MX.40 VMP.4G MHD.4 MKT.4 U.12
BC 3558R		
BC 3566	Superhet AVC.6 ...	VS.24(m) X.21 VS.24(m) HD.22 L.21 B.21
BC 3630/1	A.C. Mains 4 ...	VMS.4(m) MS.4B KT.41 U.12
BC 3636	Battery SG.3 ...	VS.24(m) VP.21(m) KT.2
BC 3440	Superhet AC.4 ...	MX.40(m) VMP.4G(m) DN.41 U.12
BC 3645	Superhet DC-AC.4 ...	X.30(m) W.31(m) D.41(m) N.31 U.30 Barretter 304
BC 3650	Fidelity AC.5 ...	MX.40(m) VMP.4G(m) MHD.4 MKT.4 U.12
BC 3657	Car Radio	W.30 X.30 W.30 DH.30 N.30/Catkin
BC 3658/9	Fidelity Radiogram 5 ...	MX.40(m) VMP.4G MHD.4 MKT.4 U.12
BC 3646	Battery Superhet 4 ...	X.21 VS.24(m) HD.22 QP.21
BC 3730/30L/31	AC.37	VMS.4B(m) VMS.4(m) KT.41 U.12
BC 3736	Battery T.R.F.3 ...	VS.24(m) VP.21(m) KT.2
BC 3740/40L and 3748/48L	A.C. Super 4 ...	X.41(m) VMP.4G(m) D.41(m) KT.41 U.12
Radiogram		
BC 3745	Universal SW.4 ...	X.31(m) W.31(m) D.41(m) KT.31 U.30 Barretter 304
BC 3746	Battery Super 4 ...	X.21(m) VS.24(m) HD.22 QP.21

(m) indicates metallised valve.

RECEIVER.	DESCRIPTION.	OSRAM VALVES.
BC 3750/50L and 3758/58L Radiogram BC 3754/54L ...	Fidelity Short Wave 5 A.C. Transportable 5 (Superhet) ...	X.41(m) W.42 MHD.4 KT.41 U.12 VMP.4G(m) X.41 VMP.4G(m) D.41(m) KT.41 U12
BC 3760/62 ...	A.C. All-Wave 6 (Superhet) ...	W.42 X.41 W.42 DH.42 KT.42 U.12 VMS.4 X.41(m) 2-VMP.4G MHD.4 2-MKT.4 U.14
BC 3780/81/82 ...	Fidelity All-Wave ...	W.21(m) VP.21(m) KT.2
BC 3836 ...	Battery SP.3 (T.R.F.)	X.22(m) W.21(m) HD.22 KT.2
BC 3846 ...	Battery All-Wave 4 (Superhet) ...	X.22(m) W.21(m) HD.22 QP.21
BC 3856 ...	Battery All-Wave Q.P.P.4 ...	VS.24(m) X.21(m) VS.24(m) VS.24(m) HD.22 QP.21
BC 3766 ...	Fidelity All-Wave Battery Receiver ... (Superhet)	KTW.63 KTW.63 KT.63 U.50
BC 3840/40L ...	AC.38 (T.R.F.) ...	X.42 W.42 DH.42 KT.42 U.12
BC 3850/50L ...	A.C. All-Wave 5 (Superhet) ...	VS.24(m) X.22(m) VS.24(m) VS.24(m) HD.22 QP.21
BC 3866 ...	6-volt All-Wave 6 ...	KTW.63 X.41 KTW.63 DH.63 KT.63 U.50 Y.63
BC 3860/60L/68 Radiogram ...	A.C. All-Wave Super 6 (Superhet) ...	

(m) indicates metallised valve.

RECEIVER.	DESCRIPTION.	OSRAM VALVES.
BC 3855/57	Universal All-Wave 5 (Superhet)	X.63 KTW.63 DH.63 KT.30 U.30 Barretter 302
BC 3862/62L	A.C. All-Wave Super 6	KTW.63 X.65 KTW.63 DH.63 KT.63 U.50 Y.63
BC 3865	Universal All-Wave Super 6 (Superhet)	KTW.63 X.31 KTW.63 DH.63 KT.30 U.30 Barretter 304 Y.64
BC 3867		KTW.43 X.65 KTW.63 DH.63 KT.30 U.30 Barretter 304 Y.64
BC 3880/82/88/89 Radiogram	Fidelity All-Wave 8 (Superhet)	VMS.4 X.41(m) VMP.4G(m) VMP.4G(m) MHD.4 2-MKT.4 U.14
BC 3890/90L	A.C. All-Wave Quality 8 (Superhet)	KTW.63 X.41 KTW.63 DH.63 KTW.63 2-PX.4 U.50 Y.63
BC 3892/92L	A.C. All-Wave Quality 8	KTW.63 X.65 KTW.63 DH.63 KTW.63 2-KT.63 U.50 Y.63
BC 3936	Battery 8	W.21(m) Z.21(m) KT.21
BC 3946	Battery All-Wave 4 ...	X.22(m) W.21(m) HD.22 KT.21
BC 3956	Battery Touchtune 5	X.22 W.21(m) HD.22 2-KT.2
BC 3910H, 3918H Radiogram	Fidelity All-Wave Super 10	KTW.63 X.65 KTW.63 KTW.63 DH.63 KTW.63 2-KT.66 U.52 Y.63

(m) indicates metallised valve.

RECEIVER.	DESCRIPTION.	OSRAM VALVES.
BC 3940	A.C.5	X.63 KTW.63 DH.63 KT.63 U.50
BC 3950	A.C. All Wave	X.65 KTW.63 DH.63 KT.63 U.50
BC 3960/4/8	A.C. Touch-tune 5	} X.65 KTW.63 DH.63 KT.32 U.31 Barretter 304
BC 3955	D.C./A.C. All Wave 5	
BC 3965/7/9	D.C./A.C. Touchtune 5	} KTW.63 X.65 KTW.63 DH.63 KT.66 U.50 Y.63
BC 3970	A.C. Selectalite 6	
BT 3701	1938 Television Receiver	MSP.41(m) X.41(m) VMP.4G(m) 4-MSP.41 A.748 N.43 D.41 2-GT.1B 4-MH.4† 2-U.17 MU.14
BT 3702	1938 Television and All-Wave	As above, but with addition of valves as for BC.3780
BT 8121/61	1938 Television and All-Wave	VMP.4G X.41 KTW.63 DH.63 KT.63 U.50 Y.63 VMP.4G 2-MSP.41(m) 3-N.43 2-D.42 MS.4B(m) 2-GT.1B 2-KT.66 U.16(½ amp. type) MU.14
BT 8090	Vision Unit	X.41 2-MSP.41 VMP.4G 2-MSP.41 2-D.42 MS.4B 2-GT.1B 2-ML.4 MU.14 U.16

(m) indicates metallised valve.

† carbonised anode type.

OSRAM VALVES—PRICE LIST

Group	Type	Price	Finish M = Metallised P = Plain	Base
2-volt Battery	X.22	10/6	M or P	7
	X.23	10/6	M or P	7
	S.23	9/-	M or P	4
	S.24	11/-	M or P	4
	VS.24	9/-	M or P	4
	W.21	9/-	M	4 & 7
	KTZ.21	9/-	M or P	4 & 7
	Z.21	9/-	M	7
	KTZ.21	9/-	M or P	4
	VP.21	4/9	M or P	5
	HL.2	7/6	M or P	5
	HD.22	7/6	M or P	4
	HD.23	4/9	P	4
	L.21	6/-	P	4
	L.P.2	10/-	P	4
	P.2	9/-	P	5 or 4*
	PT.2	9/-	P	5
	KT.2	12/6	P	7
	KT.21	12/6	P	7
	B.21			
QP.21				
A.C. Mains	MX.40	11/6	M or P	7
	X.41	11/6	M or P	7
	X.41C	12/6	M or P	7
	X.42	11/6	P	7
	MS.4	12/6	M or P	5
	MS.4B	10/6	M or P	5
	MS.4B	10/6	M or P	5
	Catkin			
	VMS.4	10/6	M or P	5
	VMS.4	10/6	M or P	5
	Catkin			
	VMS.4B	10/6	M or P	5
	VMP.4G	10/6	M	7
	VMP.4	12/6	M or P	7 & 5

* with side terminal

A.C.	VMP.4 }	10/6	M	7
Mains	Catkin	10/6	P	7
	W.42	20/-	M	9
	WD.40	10/6	M	7 & 5
	MSP.4	7/6	M or P	5
	MH.4	9/6	M or P	5
	MH.4 }	7/6	M or P	5
	Catkin }	9/6	M or P	5
	MHL.4	7/6	M or P	5
	MH. 41	7/6	P	7
	H.42	9/6	M or P	7
	MHD.4	9/6	P	7
	DH.42	5/6	M or P	5
	D.41	10/-	P	5
	ML.4	10/6	P	7 or 5*
	MPT.4 }	10/6	P	7 or 5*
	MKT.4 }	10/6	P	7
	MPT.4 }	10/6	P	7
	Catkin }	12/6	...	7
	N.41 }	9/6	...	4
	KT.41 }	20/-	...	4
	N.42 }	25/-	...	4
	KT.42 }	45/-	...	5
	DN.41	25/-	...	4
	PX.4	110/-	...	Special
	PX.25	168/-	...	Special
	PX.25A			
	PT.25H			
	DA.30			
	DA.60			
	DA.100			

*with side terminal

Prices apply in Great Britain and Northern Ireland.

OSRAM VALVES—PRICE LIST

(continued).

Group	Type	Price	Finish M=Metallised P=Plain	Base
Octal base Range	X.63	11/6	P	Octal
	X.64	10/6	P	"
	X.65	11/6	P	"
	KTW.63	10/6	P	"
	W.63			
	KTZ.63	10/6	P	"
	Z.63	7/6	P	"
	H.63			
	D.63	5/6	M	"
	DH.63	9/6	P	"
	L.63	7/6	P	"
	KT.63	10/6	P	"
	KT.66	15/-	P	"
	KT.32	12/-	P	"
	KT.33	12/-	P	"
U.50	9/-	...	"	
U.52	15/-	...	"	
U.31	9/-	...	"	
Tuneray Indicators	Y.63	8/6	...	"
	Y.64	8/6	...	"
Universal Range 0.3 amp.	X.32, X.30	15/-	M	7
	X.31	15/-	M	7
	W.30	15/-	M	7
	W.31	12/6	M	7
	WD.30	20/-	M	9
	H.30	12/6	M or P	7
	DH.30	12/6	M or P	7
	D.41	5/6	M or P	5
	N30, N30G	13/6	P	7
	KT.30			
	N.31	13/6	P	7
KT.31				

Rectifiers	U.10 U.12 U.14 U.18 MU.12 MU.14 U.50 U.52 U.31 U.30 GU.1 GU.5	9/- 9/- 9/- 15/- 9/- 9/- 15/- 9/- 9/- 25/- 25/-	...	...	4 4 4 4 4 4 Octal Octal Octal 7 4 4
Current Regulators	Baretter Type " 251 " 202 " 301 " 302 " 303 " 304	12/6 8/6 8/6 8/6 8/6 8/6	...	...	4 4 ES ES ES ES
Special Types for Television, Deaf-aid, Scientific measure-ment, etc.	A.802 A.537 MH.40 N.43 D.42 KTZ.41 MSP.41 U.16 U.17 AcornH.A.1 Acorn.Z.A.1 S.12 H.12 L.12 H.11 L.11 ET.1 A.831	15/- 50/- 50/- 25/- 10/- 12/6 15/- 20/- 20/- 50/- 60/- 17/6 15/- 15/- 15/- 15/- 85/- 10/6	5 Special 5 7 5 7 7 4 4 — — Min. Min. Min. Special Special 4 4

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Prices apply in Great Britain and Northern Ireland.

OSRAM VALVES—PRICE LIST

(continued).

Obsolete types and types supplied to order only.

Group	Type	Finish (M=Metallised) (P=Plain)	Price
2-volt Battery	X.21	M or P	10/6
	V.S.2	M or P	12/6
	V.S.24/K	M or P	12/6
	H.2	M or P	5/6
	H.210	P	5/6
	HL.2/K	M or P	8/6
	HL.210	M or P	6/-
	HD.21	M or P	7/6
	L.210	P	7/-
	DER	P	25/-
P.215	P	7/-	
4-volt Battery	S.410	P	25/-
	H.410	P	20/-
	HL.410	P	15/-
	L.410	P	15/-
	P.410	P	15/-
	P.415	P	25/-
	PT.425	P	25/-
6-volt Battery	S.610	P	40/-
	S.625	P	40/-
	H.610	P	20/-
	HL.610	P	20/-
	L.610	P	20/-
	P.610	P	20/-
	P.625	P	30/-
	P.625A	P	35/-
	PT.625	P	40/-
	DE.5	P	40/-
DE.5B	P	40/-	
DE.5A	P	40/-	

Miscellaneous types	PT.4 LS.6A LS.5 LS.5A LS.5B V.24 DEV DEQ DE.3 QX S.8 D.8 HL.8 U.5 U.8	..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... .....	18/6 40/- 40/- 40/- 40/- 30/- 40/- 40/- 40/- 40/- 50/- 30/- 30/- 35/- 40/-
0.25 amp. D.C. Range	DS DSB VDS VDSB DHD DH DL DPT	M or P M or P M or P M or P M or P M or P P P	17/6 17/6 17/6 17/6 15/6 13/6 14/- 18/6
Gasfilled Relays	GT.1 GT.1A GT.1B GT.1C	..... ..... ..... .....	40/- 60/- 20/- 25/-
Cathode Ray Tube Monitor Types	4051 4081	..... .....	45/- 55/-

Prices apply in Great Britain and Northern Ireland.

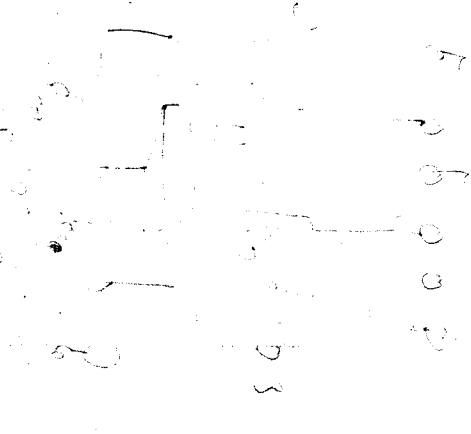
NOTES

1. 3/20/66.

6/24/66

Dear John.

Thanks



Osram valves

A TONIC TO ANY SET

Manufacturers, Wholesale Only

THE GENERAL ELECTRIC CO., LTD.,
Magnet House, Moor Street, BIRMINGHAM.
Telephone: Midland 4421/8 (8 lines). Telegrams: Electricity, Birmingham.

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