



# PHILCO

REG. U. S. PAT. OFF.



## Service Bulletin—No. 179-B

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# PHILCO Tubes

AVERAGE CHARACTERISTICS  
BULB SIZES

BASE AND SCHEMATIC  
LAYOUTS

**PHILCO RADIO & TELEVISION CORPORATION**

**PHILADELPHIA - TORONTO - LONDON**

6.3 VOLT SERIES

Type	Description	Use	Base	Bulb	Type of Cathode	Fil. Amps.	Plate Volts	Negative Control Grid Volts	Screen Volts	Plate Current (M.A.)	Screen Current (M.A.)	Mutual Conduct. Micromhos	Plate Resistance Ohms	Amp. Factor	Load for Output Ohms	Power Output Milli-watts									
36	Tetrode	R.F.	5E	ST12C	Heater	.3	135	- 1.5	67.5	3.6	Not over 1/4 Ip	1,050	300,000	315	.....	.....									
							180	- 3.0	90	3.1	1,050	350,000	370	.....	.....										
							250	- 3.0	90	3.4	1,080	750,000	825	.....	.....										
							250†	Approx. 8.0	90	Plate C	current to be adjusted to 0.1 M. A. with no signal.	.....	.....												
37	Triode	Det. Amp.	5A	ST12	Heater	.3	90	- 6.0	...	2.5	.....	800	11,500	9.2	.....	.....									
							135	- 9.0	...	4.1	.....	925	10,000	9.2	.....	.....									
							180	-13.5	...	4.3	.....	900	10,200	9.2	.....	.....									
							250	-18.0	...	7.5	.....	1,100	8,400	9.2	.....	.....									
38	Pentode	Power Amp.	5F	ST12C	Heater	.3	100	- 9.0	100	7.0	1.2	875	140,000	120	15,000	270									
							180	-18.0	180	14.0	2.4	1,050	110,000	120	11,600	1,000									
							250	-25.0	250	22.0	3.8	1,200	100,000	120	10,000	2,500									
							90	- 3.0	90	5.6	Not over 1/4 Ip	960	375,000	360	.....	.....									
39/44	Pentode	R.F.	5F	ST12C	Heater	.3	135	- 3.0	90	5.6	1/4 Ip	980	375,000	530	.....	.....									
							180	- 3.0	90	5.8	1,000	750,000	750	.....	.....										
							250	- 3.0	90	5.8	1,050	1,000,000	1,050	.....	.....										
							250	-10.0	135	12.5	2.0	1,600	94,000	150	10,400	750									
41	Pentode	Power Amp.	6B	ST12	Heater	.4	135	-13.5	180	18.5	3.0	1,850	81,000	150	9,000	1,500									
							180	-18.0	250	32.0	5.5	2,200	68,000	150	7,600	3,400									
							250	-16.5	250	34.0	6.5	2,350	79,000	185	7,000	3,400									
							350	-20	Tied to Plate	33.0	.....	2,300	2,700	6.2	3,000	650									
42	Pentode	Power Amp.	6B	ST14	Heater	.65	250	-16.5	250	34.0	6.5	2,350	79,000	185	7,000	3,400									
							250	-20	Tied to Plate	33.0	.....	2,300	2,700	6.2	3,000	650									
							350	-38.0	.....	21.0	Super Class "A"	.....	.....	.....	8,000	15,000									
							.....	.....	.....	.....	.....	.....	.....	.....	.....	.....									
44	Double Diode Triode	R.F. Det. Amp.	See 39/44 Cha	6C	ST12C	Heater	.3	250	- 2.0	.....	1.0	1,100	91,000	100	Triode Section.	.....									
																	.....	.....	.....	.....	.....	.....	.....	.....	.....
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75	Double Diode Triode	R.F. Det. Amp.	6C	ST12C	Heater	.3	250	- 2.0	.....	1.0	.....	1,100	91,000	100	Triode Section.	.....									
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76	Triode	Det. Amp.	5A	ST12	Heater	.3	250	-13.5	.....	5.0	.45	1,450	9,500	13.8	.....	.....									
																	.....	.....	.....	.....	.....	.....	.....	.....	.....
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77	Pentode	R.F. Det. Amp.	6F	ST12C	Heater	.3	250	- 3.0	100	2.3	.6	1,300	1,500,000	1,500	.....	.....									
																	.....	.....	.....	.....	.....	.....	.....	.....	.....
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78	Pentode	R.F. Det. Amp.	6F	ST12C	Heater	.3	180	- 3.0	75	4.0	1.0	1,110	1,000,000	1,100	.....	.....									
																	.....	.....	.....	.....	.....	.....	.....	.....	.....
																	.....	.....	.....	.....	.....	.....	.....	.....	.....
																	.....	.....	.....	.....	.....	.....	.....	.....	.....
79	Double Triode	Power Amp.	6H	ST12C	Heater	.6	180	0.0	.....	7.5	Class B	Operation	.....	.....	.....	.....									
																	.....	.....	.....	.....	.....	.....	.....	.....	.....
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85	Double Diode Triode	R.F. Det. Amp.	6G	ST12C	Heater	.3	250	-20.0	.....	8.0	.....	1,100	7,500	8.3	7,000	5,500†									
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89	Double Triode	Power Amp.	6F	ST12C	Heater	.4	160	-20.0	160T	17.0	.....	1,425	3,300	4.7	7,000	300									
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																	.....	.....	.....	.....	.....	.....	.....	.....	.....
6A4/LA	Pentode	Power Amp.	5B	ST14	Filament	.3	135	- 9.0	135	14.0	2.5	1,900	52,600	100	9,500	700									
																	.....	.....	.....	.....	.....	.....	.....	.....	.....
																	.....	.....	.....	.....	.....	.....	.....	.....	.....
																	.....	.....	.....	.....	.....	.....	.....	.....	.....
6A7	Heptode	Converter	7C	ST12C	Heater	.3	250	- 3.0	100	3.5	2.2	520C	360,000	283	.....	.....									
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																	.....	.....	.....	.....	.....	.....	.....	.....	.....
																	.....	.....	.....	.....	.....	.....	.....	.....	.....
6B7	Double Diode Pentode	R.F. or I.F.	7D	ST12C	Heater	.3	180	- 3.0	75	3.4	0.9	840	1,000,000	840	.....	.....									
																	.....	.....	.....	.....	.....	.....	.....	.....	.....
																	.....	.....	.....	.....	.....	.....	.....	.....	.....
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6C6	Pentode	A.F. R.F. Det.	6F	ST12C	Heater	.3	250	- 3.0	100	2.0	0.5	1,275	1,500,000	1,500	.....	.....									
																	.....	.....	.....	.....	.....	.....	.....	.....	.....
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6D6	Pentode	R.F. Det. Amp.	6F	ST12C	Heater	.3	250	- 3.0	100	8.2	2.0	1,600	800,000	1,280	.....	.....									
																	.....	.....	.....	.....	.....	.....	.....	.....	.....
																	.....	.....	.....	.....	.....	.....	.....	.....	.....
																	.....	.....	.....	.....	.....	.....	.....	.....	.....
6F7	Pentode Triode	R.F. Det. Osc.	7E	ST12C	Heater	.3	250	- 3.0	100	6.5	1.5	1,100	850,000	900	Pentode Section.	.....									
																	.....	.....	.....	.....	.....	.....	.....	.....	.....
																	.....	.....	.....	.....	.....	.....	.....	.....	.....
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2.5 VOLT SERIES

Type	Description	Use	Base	Bulb	Type of Cathode	Fil. Amps.	Plate Volts	Negative Control Grid Volts	Screen Volts	Plate Current (M.A.)	Screen Current (M.A.)	Mutual Conduct. Micromhos	Plate Resistance Ohms	Amp. Factor	Load for Output Ohms	Power Output Milli-watts
24A	Tetrode	R.F. Det.	5E	ST14C	Heater	1.75	250	3.0	90	4.1	Not over 1/4 Ip	1,100	600,000	660	.....	.....
							250†	Approx. 5.0	20 to 45	Plate C	current to be adjusted to 0.1 M. A. with no input signal.	.....	.....	.....	.....	
							.....	.....	.....	.....	.....	.....	.....	.....	.....	
							.....	.....	.....	.....	.....	.....	.....	.....	.....	
27	Triode	A.F. Amp.	5A	ST12	Heater	1.75	90	6.0	.....	0.5	.....	500	2,000,000	1,000	.....	.....
							180	13.5	.....	2.7	.....	820	11,000	9.0	.....	.....
							250	21.0	.....	5.0	.....	1,000	9,000	9.0	.....	.....
							250	Approx. 21.0	.....	5.2	.....	975	9,950	9.0	.....	.....
27	Triode	Detector	5A	ST12	Heater	1.75	250	-30 Ap.	.....	.....	.....	.....	.....	.....	.....	.....
							.....	.....	.....	.....	.....	.....	.....	.....	.....	
							.....	.....	.....	.....	.....	.....	.....	.....	.....	
							.....	.....	.....	.....	.....	.....	.....	.....	.....	
35/51	Super Control Tetrode	R.F.	5E	ST14C	Heater	1.75	180	3.0	90	6.3	Not over 1/4 Ip	1,020	300,000	805	.....	.....
							250	3.0	90	6.5	1,125	400,000	450	.....	.....	
							250	1.0	45-67.5	0.5	.....	2,000,000	.....	.....	.....	
							.....	.....	.....	.....	.....	.....	.....	.....	.....	
45	Triode	A.F. Power Amp.	4D	ST14	Filament	1.5	180	31.5	.....	31.0	.....	2,125	1,650	3.5	2,700	830
							250	50.0	.....	34.0	.....	2,175	1,610	3.5	3,900	1,600
							275	56.0	.....	36.0	.....	2,050	1,700	3.5	4,600	2,000
							250	33.0	.....	22.0	.....	2,350	2,380	5.6	6,400	1,250
46	Tetrode	Power Amp.	5C	ST16	Filament	1.75	250	33.0	.....	22.0	.....	2,350	2,380	5.6	6,400	1,250
							300	0.0	Connect to Plate	4.0	Class B Operat'n	.....	.....	.....	5,200*	16,000†
							400	0.0	Connect to Grid	6.0	Class B Operat'n	.....	.....	.....	5,800*	20,000†
							.....	.....	Connect to Grid	.....	.....	.....	.....	.....	.....	.....
47	Pentode	Power Amp.	5B	ST14	Filament	..	250	16.5	250	31.0	.....	2,500	60,000	150	7,000	2,700
							.....	.....	.....	.....	.....	.....	.....	.....	.....	
							.....	.....	.....	.....	.....	.....	.....	.....	.....	
							.....	.....	.....	.....	.....	.....	.....	.....	.....	
51	Super Control Double Triode															

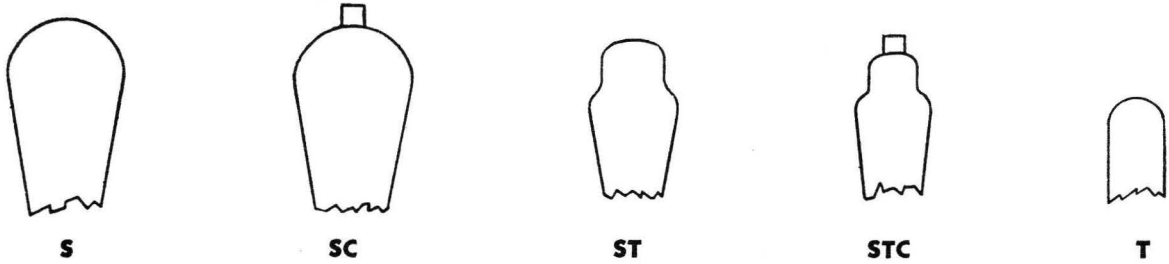
**2.0 VOLT SERIES**

Type	Description	Use	Base	Bulb	Type of Cathode	Fil. Amps.	Plate Volts	Negative Control Grid Volts	Screen Volts	Plate Current (M.A.)	Screen Current (M.A.)	Mutual Conduct. Micromhos	Plate Resistance Ohms	Amp. Factor	Load for Output Ohms	Power Output Milli-watts
1A6	Heptode	Converter	6L	ST12C	Filament	0.06	180	3.0	67.5	1.3	1.8	300C	750,000	Anode Anode	Grid 135	Volts Max. 2.0M.A.
1C6	Heptode	Converter	6L	ST12C	Filament	0.12	180	3.0	67.5	1.5	2.0	325C	750,000	....	....	....
15	Pentode	Det. Osc.	5E	ST12C	Heater	0.22	135	1.5	67.5	1.85	.25	750	800,000	600	....	....
19	Double Triode	Power Amp.	6C	ST12	Filament	0.26	135	0.0	...	27.0	....	Class B Operation	....	....	10,000*	2,100
30	Triode	Det. Amp.	4D	ST12	Filament	0.06	90 135 180	4.5 9.0 13.5	.... .... ....	2.5 3.0 3.1	.... .... ....	850 900 900	11,000 10,300 10,300	9.3 9.3 9.3	.... .... ....	.... .... ....
31	Triode	Power Amp.	4D	ST12	Filament	0.13	135 180	22.5 30.0	.... ....	8.0 12.3	.... ....	925 1,050	4,100 3,600	3.8 3.8	7,000 5,700	185 375
32	Tetrode	R.F.	4K	ST14C	Filament	0.06	135 180	3.0 3.0	67.5 67.5	1.7 1.7	Not over 1/2 Ip	640 650	950,000 1,200,000	610 780	.... ....	.... ....
33	Pentode	Power Amp.	5B	ST14	Filament	0.26	135 180	13.5 18.0	135.0 180.0	14.5 22.0	3.0 5.0	1,450 1,700	50,000 55,000	70 90	7,000 6,000	700 1,400
34	Super Control Pentode	R. F.	4M	ST14C	Filament	0.06	135 180	3.0 3.0	67.5 67.5	2.0 2.8	.... ....	600 620	600,000 1,000,000	360 620	.... ....	.... ....

\*Plate to plate load.  
C—Conversion Conductance.

**MISCELLANEOUS SERIES**

Type	Description	Use	Base	Bulb	Type of Cathode	Filament Rating		Plate Volts	Control Grid Volts	Screen Volts	Plate Current (M.A.)	Screen Current (M.A.)	Mutual Conductance Micromhos	Plate Resistance Ohms	Amp. Factor	Load for Output Ohms	Power Output Milli-watts
						Volts	Amps.										
00A	Triode	Det.	4D	S14	Filament	5.0	0.25	45	Grid Return to Fil. Neg.	....	1.5	....	666	30,000	20.0	....	....
01A	Triode	Det. Amp.	4D	ST14	Filament	5.0	0.25	90 135	4.5 9.0	.... ....	2.5 3.0	.... ....	725 800	11,000 10,000	80.0 80.0	.... ....	.... ....
10	Triode	Power Amp.	4A	S17	Filament	7.5	1.25	250 350	22.0 31.0	.... ....	10.0 16.0	.... ....	1,330 1,550	6,000 5,150	8.0 8.0	13,000 11,000	400 900
12A	Triode	Power Amp.	4D	ST14	Filament	5.0	0.25	90 135 180	4.5 9.0 13.5	.... .... ....	5.0 6.2 7.7	.... .... ....	1,600 1,575 1,650	5,000 5,400 5,100	8.5 8.5 8.5	10,200 5,000 9,000	1,000 35 130
14	Tetrode	Det. Amp.	5E	ST14C	Heater	14.0	0.3	See Characteristics of	....	....	....	....	1,800	4,700	8.5	10,650	285
17	Triode	Det. Amp.	5A	ST12	Heater	14.0	0.3	See Characteristics of	....	....	....	....	....	....	....	....	....
18	Pentode	Power Amp.	6B	ST14	Heater	14.0	0.3	250	16.5	250.0	34.0	7.5	2,350	79,000	185.0	7,000	3,400
20	Triode	Power Amp.	4D	T8	Filament	3.3	0.132	90 135	16.5 22.5	.... ....	3.0 6.5	.... ....	415 525	8,000 6,300	3.3 3.3	9,600 6,500	45 110
22	Tetrode	R.F.	4K	ST14C	Filament	3.3	0.132	135 135	1.5 1.5	45.0 67.5	1.7 3.5	Not over 1/2 Ip	375 500	725,000 325,000	270.0 160.0	.... ....	.... ....
26	Triode	Amp.	4D	ST14	Filament	1.5	1.05	90 135 180	7.0 10.0 14.5	.... .... ....	2.9 5.5 6.2	.... .... ....	935 1,100 1,150	8,900 7,600 7,300	8.3 8.3 8.3	.... .... ....	.... .... ....
43	Pentode	Power Amp.	6B	ST14	Heater	25.0	0.3	95 135	15.0 20.0	95.0 135.0	20.0 38.0	6.0 8.0	2,000 2,500	45,000 35,000	90.0 87.0	4,500 2,200	900 2,200
48	Tetrode	Power Amp.	6A	ST16	Heater	30.0	0.40	125	22.5	100.0	52.0	9.0	3,900	11,000	43.0	2,000	3,000
50	Triode	Power Amp.	4D	S21	Filament	7.5	1.25	300 400 450	54.0 63.0 84.0	.... .... ....	35.0 45.0 55.0	.... .... ....	1,900 2,000 2,100	2,000 1,900 1,800	3.8 3.8 3.8	4,600 4,100 3,670	1,600 2,400 3,400
71A	Triode	Power Amp.	4D	ST14	Filament	5.0	0.25	90 135 180	16.5 27.0 40.5	.... .... ....	10.0 17.3 20.0	.... .... ....	1,400 1,650 1,700	2,170 3,000 1,750	3.0 3.0 3.0	3,000 3,000 4,800	125 400 790
X99 V99	Triode	Det. Amp.	4D	T8	Filament	3.3	0.063	90	4.5	....	2.5	....	425	15,500	6.6	15,500	7
182B	Triode	Power Amp.	4E	ST14	Filament	5.0	1.25	250	35.0	....	18.0	....	1,500	3,300	5.0	4,500	1,750
183	Triode	Power Amp.	5A	ST14	Filament	5.0	1.25	250 250	58.0 65.0	.... ....	20.0 26.0	.... ....	1,500 2,000	2,000 1,500	3.0 ....	4,500 ....	2,000 ....
485	Triode	Det. Amp.	4D	ST14	Heater	3.0	1.25	90 120	3.0 4.0	.... ....	5.0 6.0	.... ....	1,150 1,350	10,800 9,300	12.5 ....	.... ....	.... ....



Type	Height	Diameter	Type	Height	Diameter	Type	Height	Diameter
S12	3 5/8"	1 1/8"	S12C	3 1/4"	1 1/8"	ST16	4 1/4"	2 1/8"
S14	4 1/8"	1 1/8"	S14C	4 1/8"	1 1/8"	ST12C	3 1/4"	1 1/8"
S17	4 3/8"	2 1/8"	S21C	6 1/8"	2 1/8"	ST14C	4 1/4"	1 1/8"
S19	5 1/8"	2 1/8"	ST12	3 1/4"	1 1/8"	T8	3 1/8"	1 1/8"
S21	5 1/4"	2 1/8"	ST14	4 1/8"	1 1/8"	T9	3 1/8"	1 1/8"

\*Height of types 57 and 58 ST12C bulb is 4 3/8".

### MISCELLANEOUS PILOT LAMPS

Voltage	Current Amps.	Color of Filament Support Bead	Dimensions		Base	Philco Part No.	Mazda Type No.
			Overall Height	Overall Diam.			
2.0	.06	Pink	1 1/4"	1 1/2"	M. S.	5316	..
2.5	.45	White	1 1/8"	1 1/2"	M. S.	3463	41
3.2	.35	Blue	1 1/8"	1 1/2"	M. S.	34-2047	42
6.3	.15	Brown	1 1/8"	1 1/2"	M. S.	4567	40
6.3	.25	Blue	1 1/8"	1 1/2"	M. S.	6608	46
6.3	.18	White	1 1/8"	1 1/2"	M. S.	34-2031	50
6-8	.54	White	1 1/4"	1 3/4"	M. B.	34-2038	63
6-8	.3 at 7.5 V.	White	1 1/2"	1 1/2"	S. B.	34-2039	55
6-8	.2 at 7.5 V.	White	1 1/8"	1 1/2"	S. B.	34-2040	51

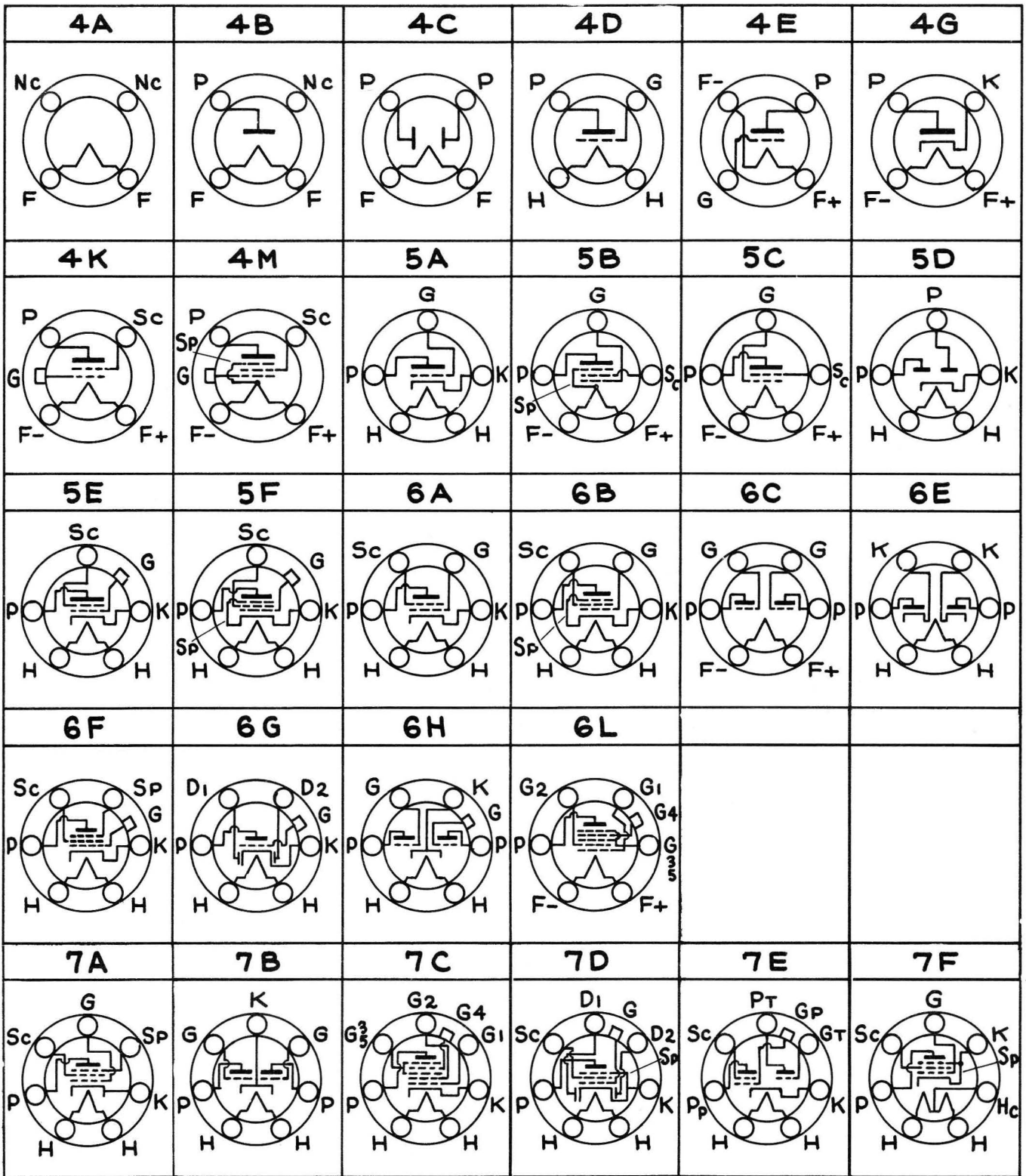
M. S.—Miniature Screw.      M. B.—Medium Bayonet.      S. B.—Small Bayonet.

### RECTIFIER SERIES

Type	Description	Base	Bulb	Type Cathode	Filament Rating			Maximum Plate Volts Per Plate	Plate Current Milliamps.	Remarks
					Volts	Amps.	Supply			
5Z3	Full Wave	4C	ST16	Filament	5.0	3.0	AC	500	250	With choke input only.
12Z3	Half Wave	4G	ST12	Heater	12.6	0.3	AC or DC	250	60	
25Z5	Full Wave and Voltage Doubler	6E	ST12	Heater	25.0	0.3	AC or DC	125	100	
80	Full Wave	4C	ST14	Filament	5.0	2.0	AC	350 400 550	125 110 135	
81	Half Wave	4B	S19	Filament	7.5	1.25	AC	700	85	
82	Full Wave	4C	ST14	Filament	2.5	3.0	AC	500	125	
83	Full Wave	4C	ST16	Filament	5.0	3.0	AC	500	250	
84	Full Wave	5D	ST12	Heater	6.3	0.5	AC or DC	300	50	
866	Half Wave	???	S19C	Filament	2.5	5.0	AC	7,500	600	
IV	Half Wave	4G	ST12	Heater	9.3	0.3	AC or DC	250	50	

### MISCELLANEOUS BALLAST TUBES

Type	Base	Bulb	For use in Philco Models	Voltage Drop Across Lamp	Ballast Current (Amperes)
2	4A	S17	46	9.0	0.3
3	4A	S17	46E	128.0	0.3
4	4A	S17	47E single speaker	117.0	0.4
5	4A	S17	47E double speaker	117.0	0.46
6	4A	S12	36, 37 and 38	0.6/1.4	0.67
7	4A	S17	248E, 263	176.0	0.3
8	4A	S17	247E	132.0	0.3
9	4A	S17	48	50.0	0.3
1A1	4A	S12	238-38A/123	0.6/1.4	0.5
1C1	4A	S17	34A	0.6/1.4	0.75



BASE ARRANGEMENTS BY TUBE TYPES											
Type	Base	Type	Base	Type	Base	Type	Base	Type	Base	Type	Base
00-A	4D	15	5E	35/51	5E	55	6G	83	4C	2A6	6G
01-A	4D	17	5A	36	5E	56	5A	84	5D	2A7	7C
IV	4G	18	6B	37	5A	57	6F	85	6G	2B7	7D
2	4A	19	6C	38	5F	58	6F	89	6F	5Z3	4C
3	4A	20	4D	39/44	5F	59	7A	182B	4D	6A4	
4	4A	22	4K	41	6B	71A	4D	183	4D	/LA	5B
5	4A	24	5E	42	6B	75	6G	485	5A	6C6	6F
6	4A	26	4D	43	6B	76	5A	V99	4E	6D6	6F
7	4A	27	5A	45	4D	77	6F	X99	4D	6A7	7C
8	4A	30	4D	46	5C	78	6F	1A6	6L	6B7	7D
9	4A	31	4D	47	5B	79	6H	1C1	4A	6F7	7E
10	4A	32	4K	48	6A	80	4C	1C6	6L	12Z3	4G
12A	4D	33	5B	50	4D	81	4B	2A3	4D	12A5	7F
14	5E	34	4M	53	7B	82	4C	2A5	6B	25Z5	6E

TUBE TYPES BY BASE ARRANGEMENTS							
Base	Type	Base	Type	Base	Type	Base	Type
4A	2, 3, 4, 5, 6, 7, 8, 9, 10, 1C1, 1A1	4E	V99	5C	46	6G	89, 6C6, 6D6
4B	81	4G	1V, 12Z3	5D	84	6G	85, 75, 55, 2A6
4C	80, 82, 83, 5Z3	4K	22, 32	5E	14, 15, 24, 35/51, 36	6H	79
4D	00-A, 01-A, 12A, 20, 26, 30, 31, 45, 50, 71A, X99	4M	34	6A	38, 39/44	6L	1A6, 1C6
		5A	17, 37, 56, 76, 485	6B	18, 42, 43, 2A5, 41	7A	59
		5B	33, 47, 6A4/LA	6C	19	7B	53
				6E	25Z5	7C	6A7, 2A7
				6F	57, 58, 77, 78,	7D	2B7, 6B7
						7E	6F7
						7F	12A5