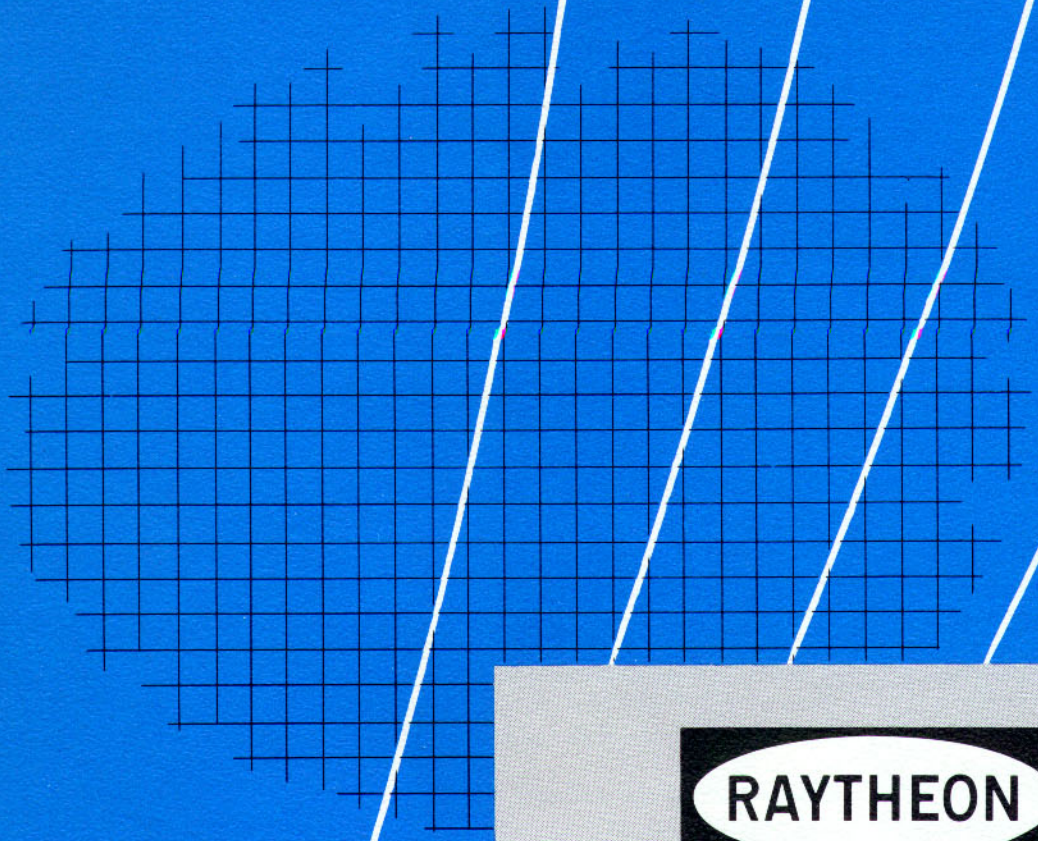
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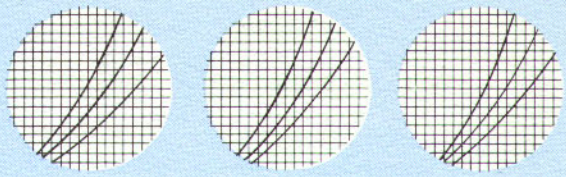


RAYTHEON

INDUSTRIAL AND MILITARY

MINIATURE VACUUM

ELECTRON TUBE CHARACTERISTICS



In 1925 the nucleus of the present Industrial Components Division was formed with the development of the BH tube, the first gas-filled rectifier. This tube made ac-dc radio a reality. The development led to expansions into other receiving tube types and by 1930 Raytheon was a leading producer of receiving tubes. Today over 10,000 people, employed in Raytheon's six electron tube operations, offer over 35 years of electron tube manufacturing experience to Raytheon customers.

Originating in 1939 as the Hearing Aid Tube Department, the present Industrial Components Division is an example of growth and diversification in the manufacture of industrial, military and entertainment electron tubes. From the development of the old BH rectifier in 1925 to the present, many significant Raytheon developments in the area of electron tube design and manufacture have occurred. The first practical subminiature tubes were designed and developed by Raytheon. Primarily intended for hearing aid applications they provide maximum battery life from standard dry cells.

Government tests of the hearing aid tubes led to the first contracts for subminiature tubes for proximity fuses. Tubes developed for this purpose proved so rugged that inoperative failures became very rare. The use of oxide-coated tungsten filaments was one of the many Raytheon developments incorporated in these fuse tubes.

A notable achievement in the industry was the anode laminating techniques that revolutionized magnetron production and helped break the radar bottleneck in World War II. Raytheon was the first to manufacture heater-cathode tube types in subminiature size, a development which has earned the division a reputation for finest quality. Typical applications of these special tubes are those designed specifically for over twenty-five major U.S. missiles where resistance to shock and fatigue, low microphonic rating and high ambient temperature ratings are essential.

Today the Industrial Components Division produces a complete line of receiving tubes including miniature triodes, tetrodes and pentode amplifiers, rectifiers and power tubes. Industrial and military tubes include miniature and subminiature directly-heated twin diodes and indirectly-heated cathode tubes including lightweight low drain triodes and pentodes, cold cathode rectifiers, visual indicators, voltage regulators, thyratrons and cathode ray and storage tubes. The product scope also includes our expanding line of electro-mechanical, electro-optical and electro-chemical components.

The ability to successfully carry out assignments of major importance is typical of Raytheon's history and development. Raytheon, the largest company devoted exclusively to electronics, welcomes assignments in the interest of industry and national security. We are constantly exploring the expanding frontiers inherent in the application of electronic capabilities, especially in the electron tube field. One of the largest application engineering staffs in the electron tube industry is available to assist you.

RAYTHEON

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RAYTHEON MINIATURE VACUUM TUBES FOR INDUSTRIAL, MILITARY AND COMMUNICATIONS APPLICATIONS

Reliable and rugged . . . Raytheon miniature vacuum tubes are manufactured to stringent specifications, designed for top performance under the most adverse operating conditions. Raytheon's years of manufacturing experience and skill provide tubes with advanced electrical and mechanical features: reduced vibration output after shock, tighter limits and greater resistance to shock, fatigue and other environmental factors. In every application you'll find Raytheon miniature tubes fully meet your circuit requirements.

Recommended for New Equipment Design

The following are recommended provided required characteristics are fulfilled.

TYPE	HTR. VOLTS
Twin Diodes	
6X4W	6.3
5726/6AL5W	6.3
Triodes	
5842	6.3
5842WA	6.3
Twin Triodes	
12AT7WA	6.3/12.6
5670	6.3
5687WA	6.3/12.6
5751	6.3/12.6
5755	6.3/12.6
5814A	6.3/12.6
6414	6.3/12.6
6829	6.3/12.6
6922	6.3
7025	6.3/12.6
7044	6.3/12.6
Pentodes	
6AH6WA	6.3
6AN5WA	6.3
5654/6AK5W	6.3
5725/6AS6W	6.3
5847	6.3
6485	6.3
6688	6.3
Twin Pentode	
6939	6.3/12.6
Twin Tetrode	
5656	6.3

KEY TO BASE AND ENVELOPE CONNECTION DIAGRAMS

Diagrams show terminals viewed from the base or filament end of the type

BC = Base Sleeve
BS = Base Shell
F = Filament
F_M = Filament Mid-Tap
F_R = Filament Return
G = Grid
H = Heater
H_M = Heater Mid-Tap
I = Ignitor
IC = Internal Connection — Do Not Use
IS = Internal Shield
K = Cathode
K_R = RF Cathode
KS = Cathode Shield
NC = No Connection
P = Plate (Anode)
P_H = Holding Anode
S = Shell
• = Gas Type

SUBSCRIPTS

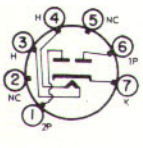
B = Beam Unit
D = Diode Unit
P = Pentode Unit
T = Triode Unit
TR = Tetrode Unit
W = Water Connection

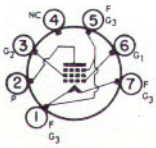
The data contained herein is compiled as a service to the field and is not intended to indicate type availability. Raytheon Company assumes no liability for information or applications derived from this book. Tube data supplied herein is believed to be accurate and reliable.

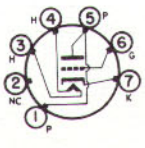
RAYTHEON MINIATURE VACUUM TUBES

DESCRIPTION			CONSTRUCTION						ABSOLUTE MAX. RATINGS	
Type Number	Classification by Construction	Typical Application	Bulb	Outline Drawing[1]	Button Base	E.I.A. Basing	Maximum Dimensions Length	Maximum Dimensions Dia.	Plate Dissipation P_p Watts	Screen Dissipation P_{g_2} Watts
1R5WA	Heptode	Pentagrid Converter	T5½	5-2	7-Pin	7AT	2⅛"	¾"	0.1[4]	0.19[4,8]
1T4WA	Remote Cutoff Pentode	RF-IF Amplifier	T5½	5-2	7-Pin	6AR	2⅛"	¾"	0.4[4]	0.15[4]
1U4WA	Sharp Cutoff Pentode	RF-AF Amplifier	T5½	5-2	7-Pin	6AR	2⅛"	¾"	0.17[4]	0.05[4]
1U5WA	Sharp Cutoff Diode-Pentode	Audio Amplifier and Detector	T5½	5-2	7-Pin	6BW	2⅛"	¾"	0.13[4]	0.035[4]
2C51	Medium Mu Twin Triode[2]	Amp./Osc.	T6½	6-1	7-Pin	8CJ	1¾"	⅞"	1.6	
6AG5WA	See 6186									
6AJ5	Sharp Cutoff Pentode	RF Voltage Amp.	T5½	5-1	9-Pin	7BD	1¾"	¾"	1.85	0.55
6AH6WA	Sharp Cutoff Pentode	IF Amplifier	T5½	5-2	7-Pin	7BK	2⅛"	¾"	3.3[4]	0.45[4]
6AK5WA	See 5654									
6AK5WB	Sharp Cutoff Pentode	RF Amplifier	T5½	5-1	7-Pin	7BD	1¾"	¾"	1.65	0.55
6AL5W	See 5726									
6AN5	Pentode	RF/Video Power Amplifier	T5½	5-2	7-Pin	7BD	2⅛"	¾"	4.6	1.55
6AN5WA	Pentode	RF/Video Power Amplifier	T5½	5-2	7-Pin	7BD	2⅛"	¾"	4.6[4]	1.55[4]
6AQ5W	See 6005									
6AR6WA	See 6098									
6AS6	Sharp Cutoff Pentode	Mixer; Gated Amplifier	T5½	5-1	7-Pin	7CM	1¾"	¾"	1.85	0.85
6AS6W	See 5725									
6AU6WA	Sharp Cutoff Pentode	RF Amplifier	T5½	5-2	7-Pin	7BK	2⅛"	¾"	3.3	0.7
6AU6WB	Sharp Cutoff Pentode	RF Amplifier	T5½	5-2	7-Pin	7BK	2⅛"	¾"	3.1[4]	0.7[4]
6BA6W	See 5749									
6C4	Medium Mu Triode	HF Amp./Osc.	T5½	5-2	7-Pin	6BG	2⅛"	¾"	3.8	
6C4W	Medium Mu Triode	HF Amp./Osc.	T5½	5-1	7-Pin	6BG	1¾"	¾"	3.8	
6C4W4	Medium Mu Triode	HF Amp./Osc.	T5½	5-2	7-Pin	6BG	2⅛"	¾"	3.4	
6J4	Triode	Grounded Grid Amplifier	T5½	5-2	7-Pin	7BQ	2⅛"	¾"	2.5	
6J4WA	Triode	Grounded Grid Amplifier	T5½	5-2	7-Pin	7BQ	2⅛"	¾"	2.25[4]	
6J6W	Medium Mu Twin Triode[2]	UHF Oscillator	T5½	5-2	7-Pin	7BF	2⅛"	¾"	1.6	
6J6WA	Medium Mu Twin Triode[2]	UHF Oscillator	T5½	5-2	7-Pin	7BF	2⅛"	¾"	1.1[4]	
6Q4/EC80	High Mu Triode	Grounded Grid Amplifier/Mixer	T6½	6-2	9-Pin	9S	2 3/16"	⅞"	4	
6R4/EC81	Low Mu Triode	UHF Oscillator	T6½	6-2	9-Pin	9R	2 3/16"	⅞"	5	
6X4W	Twin Diode	Full Wave Rectifier	T5½	5-3	7-Pin	5BS	2⅝"	¾"		
6X4WA	Twin Diode	Full Wave Rectifier	T5½	5-3	7-Pin	5BS	2⅝"	¾"		
12AT7WA	High Mu Twin Triode[2]	RF Amplifier/ Oscillator	T6½	6-2	9-Pin	9A	2 3/16"	⅞"	2.5[4]	
12AT7WB	High Mu Twin Triode[2]	RF Amplifier/ Oscillator	T6½	6-2	9-Pin	9A	2 3/16"	⅞"	2.5[4]	
12AU7WA	See 6189/12AU7WA									
12AX7WA	High Mu Twin Triode[2]	Voltage Ampl./ Phase Inverter	T6½	6-2	9-Pin	9A	2 3/16"	⅞"	1.0[4]	
26A6	Remote Cutoff Pentode	RF Amplifier	T5½	5-2	7-Pin	7BK	2⅛"	¾"	0.3	0.15
26C6	Twin Diode/Medium Mu Triode	Detector Amplifier	T5½	5-2	7-Pin	7BT	2⅛"	¾"	0.3	
26D6	Heptode	Pentagrid Converter	T5½	5-2	7-Pin	7CH	2⅛"	¾"	1.1	1.1[8]
26Z5W	Twin Diode	Full Wave Rectifier/ Voltage Doubler	T6½	6-2	9-Pin	9BS	2 3/16"	⅞"		
E81L/6686	See 6686									
E83F/6689	See 6689									
E88CC/6922	See 6922									
E90CC	See 5920									
E91H/6687	See 6687									

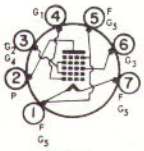
Note 1: Refers to Jedec Publication JO-G2-2.
Note 2: Per Section Values.
Note 3: Approximate.
Note 4: Design Maximum.
Note 5: With Shield.
Note 6: Tie G_3 to negative terminal of cathode resistor.
Note 7: Grounded grid capacitance.
Note 8: Grids 2 and 4 tied together.
Note 9: 7.5 Watts maximum — combined.
Note 10: Common cathode resistance.
Note 11: 4.0 Watts maximum — combined.
Note 12: Maximum Signal.
Note 13: 8 Watts maximum — combined.

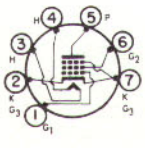

5BS

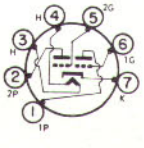

6AR

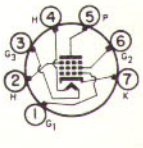

6BG


6BW


7AT


7BD


7BF

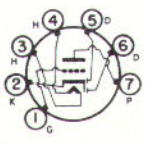

7BK

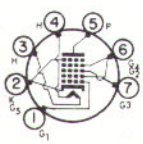
TYPICAL OPERATING CHARACTERISTICS

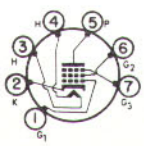
Capacitance pf Without Shield			Cathode			Plate		Grid #1		Grid #2		Grid #3		Amplification Factor	Transconductance	Plate Resistance	Load Resistance	Output	Type
C in	C out	C gp	Type	V	A	V	mA	V	mA	V	mA	V	mA	Mu	Sm μmhos	r_p ohms	R_L ohms	P_o Watts	Number
G_3-ALL 5.8	P-ALL 6.25	G_3-P 0.45 max.	Fil.	1.25	0.05	90	0.90	0		45[8]		0			Conversion 235				1R5WA
3.85	6.5	0.02 max.[5]	Fil.	1.25	0.05	90	3.5	0		67.5	1.4				900	0.5meg[3]			1T4WA
3.6[5]	6.6[5]	0.02 max.[5]	Fil.	1.25	0.05	90	1.6	0		90	0.45				900				1U4WA
			Fil.	1.25	0.05	67.5	1.6	0		67.5	0.40	AC Amplification (Ep=6.5 Vac min[22]			650	Diode Emission (with Eb=10Vdc)=0.5mAdc min.			1U5WA
2.2	1.0		Htr.	6.3	0.300	150	8.2	R_K=240Ω						35	5 500	6.5K[3]			2C51
																			6AG5WA
4.1	2.0	.02 max.	Htr.	6.3	0.175	28	3.0	R_K=200Ω		28	1.2				2,750	90K			6AJ5
10[5]	4.5[5]	.035 max.[5]	Htr.	6.3	0.45	300	10	R_K=160Ω		150	2.5	0			9,000	.5meg			**6AH6WA**
																			6AK5WA
4.0[5]	2.85[5]	.02 max.[5]	Htr.	6.3	0.175	120	7.5	−2.0		120	2.5				5,000	.34meg			6AK5WB
																			6AL5W
9.0[5]	4.8[5]	.075 max.[5]	Htr.	6.3	0.45	120	35	R_K=125Ω		120	12				8,000	12.5K[3]	2.5K	1.3[3]	6AN5
9.0[5]	5.5[5]	.075 max.[5]	Htr.	6.3	0.45	120	33	R_K=125Ω		120	11				8,500	12.5K	2.5K	1.25	**6AN5WA**
																			6AQ5W
																			6AR6WA
4.0[5]	3.0[5]	0.02 max.[5]	Htr.	6.3	0.175	120	3.6 5.2	−2		120	4.8 3.5	−3 0			1,850 3,200	0.11meg[3]			6AS6
																			6AS6W
6.0	4.9	0.0035 max.	Htr.	6.3	0.3	250	10.6	R_K=68Ω		150	4.3	Note 6			5,200	1.0meg[3]			6AU6WA
6.0	4.9	0.0035 max.	Htr.	6.3	0.3	250	10.6	R_K=68Ω		150	4.3	Note 6			5,200	1.0meg[3]			6AU6WB
																			6BA6W
1.8	1.3	2.0 max.	Htr.	6.3	0.15	250	10.5	−8.5						17	2,200	7.7K			6C4
1.7	1.1	2.25 max.	Htr.	6.3	0.15	150 250	11.8 10.5	0 −8.5						19.5 17.0	3,300 2,200	5.9K 7.7K			6C4W
1.8	1.3	2.0 max.	Htr.	6.3	0.15	250	10.5	−8.5						17.0	2,200	7.7K			6C4W4
5.5[5,7]	4.0[5,7]	P-K[5,7] .24 max.	Htr.	6.3	0.40	150	14.5	R_K=100Ω						55	12,000	4.6K[3]			6J4
7.5[5,7]	5.0 max.[5,7]	P-K[5,7] .2 max.	Htr.	6.3	0.40	150	13.5	R_K=100Ω						52.5	11,000	4.8K[3]			6J4WA
2.0	Sec.1=.45 Sec.2=.4	1.8 max.	Htr.	6.3	0.45	100	8.5	R_K=50Ω[10]						39	5,650	6.9K			6J6W
2.1	Sec.1=.45 Sec.2=.4	1.6 max.	Htr.	6.3	0.45	100	9.0	R_K=50Ω[10]						38	6,000	6.3K[3]			6J6WA
5.1	0.08 max.	3.4	Htr.	6.3	0.48	250	15	−1.5						80	12,000	6.7K[3]			6Q4/EC80
1.8	0.7	1.6	Htr.	6.3	0.2	120 150	20 30	−2						16	4,000 5,500	4K 2.9K			6R4/EC81
			Htr.	6.3	0.6	max peak inverse plate voltage = 1375v; max peak plate current (per plate) = 230 ma; max dc output current = 75 mA; average tube drop = 22 volts													**6X4W**
			Htr.	6.3	0.6	max peak inverse plate voltage = 1375v; max peak plate current (per plate) = 230 ma; max dc output current = 75 ma; average tube drop = 22 volts													6X4WA
2.5	Sec.1=.45 Sec.2=.38	1.9 max.	Htr.	6.3 12.6	0.30 0.15	250	10	R_K=200Ω						60	5,500	10.9K			**12AT7WA**
2.5	Sec.1=.45 Sec.2=.38	1.9 max.	Htr.	6.3 12.6	0.30 0.15	250	10	R_K=200Ω						60	5,500	10.9K			12AT7WB
																			12AU7WA
1.6	Sec.1=.46 Sec.2=.34	2.1 max.	Htr.	6.3 12.6	0.30 0.15	250	1.2	−2						100	1,650	66.7K[3]			12AX7WA
5.5[5]	5.0[5]	.004 max.[5]	Htr.	26.5	0.07	26.5	1.7	0		26.5	0.65	0			1,950	250K[3]			26A6
2.0[5]	1.0[5]	2.3 max.[5]	Htr.	26.5	0.07	26.5	1.1	0		Diode Plate Voltage=0				16	1,100	Diode Emission (with Eb=10Vdc)=0.8mAdc min.			26C6
G_3-ALL 7.5[5]	P-ALL 14.0[5]	G_3-P 0.3 max.[5]	Htr.	26.5	0.07	26.5	0.45	0		26.5	1.6	−0.5			Conversion 270				26D6
			Htr.	26.5	0.20	max peak inverse plate voltage = 1375v; max peak plate current (per plate) = 300 mA; max dc ouput current (per section) = 55 mA													26Z5W
																			E81L/6686
																			E83F/6689
																			E88CC/6922
																			E90CC
																			E91H/6687

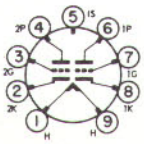
Note 14: Design center maximum values.
Note 15: 10% distortion level.
Note 16: 7.0 Watts maximum — combined.
Note 17: 3.6 Watts maximum — combined.
Note 18: Class AB_1, push-pull operation.
Note 19: Class C telegraphy — intermittent operation.
Note 20: Plate current condition: E_{bb}=180 Vdc; E_{c_1}=E_{c_3}=0; E_{c_2}=150 Vdc; R_K=78 ohms.
Note 21: Class C telegraphy — continuous operation.
Note 22: E_{bb}=E_{c_2}=45 Vdc; R_{g_2}=2.0 meg.; R_{g_1}=10 meg.; R_p=0.5 meg.; E_{sig}=0.2 Vac; 0.1 μf between G_2 and —F.
Types in bold face are Raytheon Preferred Types for new circuit designs.

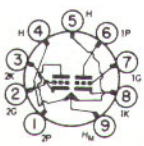

7BQ

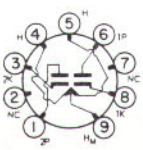

7BT

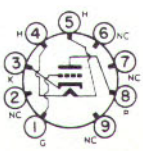

7CH

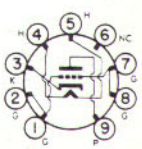

7CM


8CJ


9A


9BS

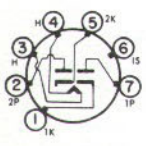

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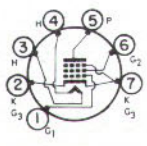

9S

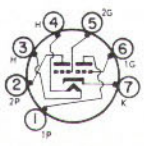
RAYTHEON MINIATURE VACUUM TUBES

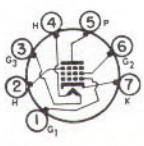
DESCRIPTION			CONSTRUCTION						ABSOLUTE MAX RATINGS	
Type Number	Classification by Construction	Typical Application	Bulb	Outline Drawing[1]	Button Base	E.I.A. Basing	Maximum Dimensions Length	Maximum Dimensions Dia.	Plate Dissipation P_p Watts	Screen Dissipation P_{g_2} Watts
E92CC	Twin Triode[2]	Computers	T5½	5-3	7-Pin	7BF	2⅝"	¾"	2.0	
E180F/6688	See 6688									
404A (WE)	See 5847									
407A (WE)	Medium Mu Twin Triode[2]	Amplifier/ Oscillator/Mixer	T6½	6-1	9-Pin	Fig. 1	1¾"	⅞"	1.6	
408A	See 6028									
417A (WE)	See 5842									
1217	Dual Control Heptode	Computers	T5½	5-3	7-Pin	7CH	2⅝"	¾"	1.0	
5654	Sharp Cutoff Pentode	RF Amplifier	T5½	5-1	7-Pin	7BD	1¾"	¾"	1.65	0.55
5654/6AK5W	Sharp Cutoff Pentode	RF Amplifier	T5½	5-1	7-Pin	7BD	1¾"	¾"	1.5[4]	0.5[4]
5654/6AK5W/6096	Sharp Cutoff Pentode	RF Amplifier	T5½	5-1	7-Pin	7BD	1¾"	¾"	1.65	0.55
5656	Twin Tetrode[2]	RF Power Amplifier	T6½	6-2	9-Pin	9F	2 3/16"	⅞"	3.0	1.5
5670	Medium Mu Twin Triode[2]	HF Amplifier	T6½	6-1	9-Pin	8CJ	1¾"	⅞"	1.4[4]	
5670WA	Medium Mu Twin Triode[2]	HF Amplifier	T6½	6-1	9-Pin	8CJ	1¾"	⅞"	1.65	
5686	Beam Pentode	RF-AF Power Amp.	T6½	6-2	9-Pin	9G	2 3/16"	⅞"	8.25	3.3
5687	Medium Mu Twin Triode[2]	Voltage Amplifier	T6½	6-2	9-Pin	9H	2 3/16"	⅞"	4.2[9]	
5687WA	Medium Mu Twin Triode[2]	Voltage Amplifier	T6½	6-2	9-Pin	9H	2 3/16"	⅞"	4.2[9]	
5725/6AS6W	Sharp Cutoff Pentode	Gated Amp./Mixers	T5½	5-1	7-Pin	7CM	1¾"	¾"	1.5[4]	0.5[4]
5726	High Perveance Twin Diode	Detector/Clipper	T5½	5-1	7-Pin	6BT	1¾"	¾"		
5726/6AL5W	High Perveance Twin Diode	Detector/Clipper	T5½	5-1	7-Pin	6BT	1¾"	¾"		
5726/6AL5W/6097	High Perveance Twin Diode	Detector/Clipper	T5½	5-1	7-Pin	6BT	1¾"	¾"		
5749	Remote Cutoff Pentode	RF Amplifier	T5½	5-2	7-Pin	7BK	2⅛"	¾"	3.0[4]	0.6[4]
5749/6BA6W	Remote Cutoff Pentode	RF Amplifier	T5½	5-2	7-Pin	7BK	2⅛"	¾"	3.1[4]	0.7[4]
5750/6BE6W	Heptode	Pentagrid Converter	T5½	5-2	7-Pin	7CH	2⅛"	¾"	1.2[4]	1.2[8]
5751	High Mu Twin Triode[2]	Voltage Amplifier	T6½	6-2	9-Pin	9A	2 3/16"	⅞"	0.8[4]	
5751WA	High Mu Twin Triode[2]	Voltage Amplifier	T6½	6-2	9-Pin	9A	2 3/16"	⅞"	0.8	
5755	Twin Triode[2]	DC Amplifier	T6½	6-2	9-Pin	9J	2 3/16"	⅞"	1.0	
5763	Beam Pentode	RF Osc.-Power Amp.	T6½	6-3	9-Pin	9K	2⅝"	⅞"	12.0	2.0
5814A	Medium Mu Twin Triode[2]	Amp./Osc. Multivibrator	T6½	6-2	9-Pin	9A	2 3/16"	⅞"	3.0	
5814WA	Medium Mu Twin Triode[2]	Amp./Osc. Multivibrator	T6½	6-2	9-Pin	9A	2 3/16"	⅞"	3.0	
5842	Medium Mu Twin Triode	Grounded Grid Amplifier	T6½	6-1	9-Pin	9V	1¾"	⅞"	4.5	
5842WA	Medium Mu Triode	Grounded Grid Amplifier	T6½	6-1	9-Pin	9V	1¾"	⅞"	4.5	
5844	Medium Twin Triode[2]	Computers	T5½	5-2	7-Pin	7BF	2⅛"	¾"	1.0	
5847	Sharp Cutoff Pentode	RF-IF Amplifier	T6½	6-1	9-Pin	9X	1¾"	⅞"	3.3	0.85
5915	Heptode	Pentagrid Converter	T5½	5-2	7-Pin	7CH	2⅛"	¾"	1.0	1.0[8]

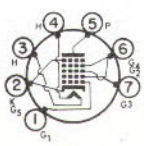
Note 1: Refers to Jedec Publication JO-G2-2.
Note 2: Per Section Values.
Note 3: Approximate.
Note 4: Design Maximum.
Note 5: With Shield.
Note 6: Tie G_3 to negative terminal of cathode resistor.
Note 7: Grounded grid capacitance.
Note 8: Grids 2 and 4 tied together.
Note 9: 7.5 Watts maximum — combined.
Note 10: Common cathode resistance.
Note 11: 4.0 Watts maximum — combined.
Note 12: Maximum Signal.
Note 13: 8 Watts maximum — combined.

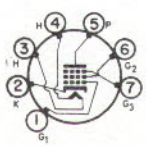

6BT

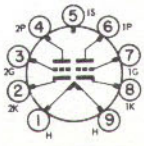

7BD

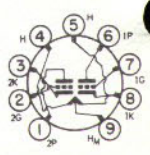

7BF


7BK


7CH


7CM

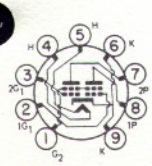

8CJ

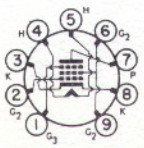

9A

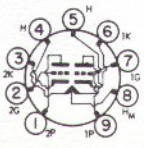
TYPICAL OPERATING CHARACTERISTICS

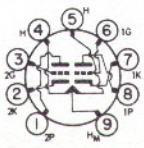
Capacitance pf Without Shield			Cathode			Plate		Grid #1		Grid #2		Grid #3		Amplification Factor	Transconductance	Plate Resistance	Load Resistance	Output	Type
C in	C out	C gp	Type	V	A	V	mA	V	mA	V	mA	V	mA	Mu	Sm μmhos	r_p ohms	R_L ohms	P_O Watts	Number
3.1	Sec.1=.38 Sec.2=.32	Sec.1=2.1 Sec.2=2.2	Htr.	6.3	0.40	150	8.5	−1.75						45	6,000	7.5K			E92CC
																			E180F/6688
																			404A (WE)
2.25	1.0	1.3	Htr.	20 40	0.10 0.05	150	8.2	R_K=240Ω						35	5,500	6.4K			407A (WE)
																			408A
																			417A (WE)
G_1-ALL=5.4 G_3-ALL=6.9	P-ALL 7.6	G_1-P=.08 max. G_3-P=.35 max.	Htr.	6.3	0.30	67.5	7.3 2.0	0		67.5[8]	8.5 11.8	0 −4			2,400(G_1) 1,700(G_3)				1217
4.0[5]	2.85[5]	.02 max.[5]	Htr.	6.3	0.175	120	7.5	−2.0		120	2.5				5,000	0.34meg			5654
4.0[5]	2.85[5]	.02 max.[5]	Htr.	6.3	0.175	120	7.5	−2.0		120	2.5				5.000	0.34meg			5654/6AK5W
4.0[5]	2.85[5]	.02 max.[5]	Htr.	6.3	0.175	120	7.5	−2.0		120	2.5				5.000	0.34meg			5654/6AK5W/6096
3.6	1.5	0.06 max.	Htr.	6.3	0.40	150	15.5	−2.0		120	2.7				5,800	60K[3]			5656
2.2	1.0	1.4 max.	Htr.	6.3	0.35	150	8.2	R_K=240Ω						35	5,500	6.4K[3]			5670
2.2	1.0	1.4 max.	Htr.	6.3	0.35	150	8.2	R_K=240Ω						35	5.500	6.4K[3]			5670WA
6.4	4.0	0.11 max.	Htr.	6.3	0.35	250	27	−12.5		250	3.0				3,100		9K	2.7	5686
4.0	Sec.1=.6 Sec.2=.5	4.0	Htr.	6.3 12.6	0.90 0.45	120 180 250	36 23 12	−2.0 −7.0 −12.5						18 17 16	11,500 8,500 5.400	1.56K[3] 2K[3] 3K[3]			5687
4.0	Sec.1=.65 Sec.2=.5	4.0	Htr.	6.3 12.6	0.88 0.44	120	36	−2.0						18.5	11,500	1.6K[3]			5687WA
4.0[5]	3.0[5]	0.02 max.[5]	Htr.	6.3	0.175	120	5.2	−2.0		120	3.5	0			3,200	150K			5725/6AS6W
K-ALL 3.9[5]	P-ALL 3.2[5]	P-P 0.026 max.[5]	Htr.	6.3	0.300	max peak inverse plate voltage = 360v; max peak plate current (per plate) = 60 ma; max dc output current (per section) = 10 mA; tube voltage drop = 10v @ 60 mA													5726
K-ALL 3.9[5]	P-ALL 3.2[5]	P-P 0.026 max.[5]	Htr.	6.3	0.300	max peak inverse plate voltage = 360v; max peak plate current (per plate) = 60 ma; max dc output current (per section) = 10 mA; tube voltage drop = 10v @ 60 mA													5726/6AL5W
K-ALL 3.9[5]	P-ALL 3.2[5]	P-P 0.026 max.[5]	Htr.	6.3	0.300	max peak inverse plate voltage = 360v; max peak plate current (per plate) = 60 ma; max dc output current (per section) = 10 mA; tube voltage drop = 10v @ 60 mA													5726/6AL5W/6097
5.5	5.0	0.0035 max.	Htr.	6.3	0.300	100 250	10.8 11.0	R_K=68Ω		100	4.4 4.2	0			4,300 4,400	.25meg[3] 1.0meg[3]			5749
5.5	5 0	0.0035 max.	Htr.	6.3	0.300	250	11.0	R_K=68Ω		100	4.2	0			4,400	1.0meg			5749/6BA6W
G_3-ALL 7.1	P-ALL 7.6	G_3-P 0.22 max.	Htr.	6.3	0.300	250	2.5	0		100	7.6[8]	−1.5			Conversion 500	1.0meg[3]			5750/6BE6W
1.4	Sec.1=.46 Sec.2=.36	1.7 max.	Htr.	6.3 12.6	0.350 0.175	250	1.0	−3.0						70	1,200	58K			5751
1.4	Sec.1=.46 Sec.2=.36	1.7 max.	Htr.	6.3 12.6	0.350 0.175	100 250	0.8 1.0	−1.0 −3.0						70	1,200	58K			5751WA
1.55	Sec.1=.78 Sec.2=.60	1.4	Htr.	6.3 12.6	0.360 0.180	110 180	0.15 2.2	−0.95 0	10^{-6}					70	500 1,500	0.14meg			5755
9.5	4.5	0.3 max.	Htr.	6.3	0.750	250	45	−7.5		250	5	0			7,000				5763
1.6	Sec.1=.5 Sec.2=.4	1.8 max.	Htr.	6.3 12.6	0.350 0.175	100 250	11.8 10.5	0 −8.5						19.5 17	3,100 2,200	6.25K[3] 7.7K[3]			5814A
1.6	Sec.1=.5 Sec.2=.4	1.8 max.	Htr.	6.3 12.6	0.350 0.175	100 250	11.8 10.5	0 −8.5						19.5 17	3,100 2,200	6.25K[3] 7.7K[3]			5814WA
9.0[7]	1.8[7]	P-K + H 0.55 max.[7]	Htr.	6.3	0.300	130 150	27 25	+9.0 R_K=360Ω R_K=60Ω						43	27,000 25,000	1.6K 1.7K			5842
9.0[7]	1.75[7]	P-K + H 0.55 max.[7]	Htr.	6.3	0.300	150	23	R_K=60Ω						45	25,000	1.8K			5842WA
2.6	Sec.1=.5 Sec.2=.4	2.6	Htr.	6.3	0.300	100	4.8	R_K=470Ω[10]						28	3,700	7.55K			5844
7.2[5]	3.15[5]	.05 max.[5]	Htr.	6.3	0.3	150 160	13.5	R_K=110Ω +8.5 R_K=600Ω		150 160	4				13,000	200K			5847
G_3-ALL 6.9	P-ALL 7.6	G_3-P 0.35 max.	Htr.	6.3	0.30	E_{bb}= 150	5.8	E_{cc1}= 0		$E_{cc2\perp4}$ =75	9[8]	E_{cc3}= 0				R_P=20K			5915

Note 14: Design center maximum values.
Note 15: 10% distortion level.
Note 16: 7.0 Watts maximum — combined.
Note 17: 3.6 Watts maximum — combined.
Note 18: Class AB_1, push-pull operation.
Note 19: Class C telegraphy — intermittent operation.
Note 20: Plate current condition: E_{bb}=180 Vdc; E_{cc1}=E_{cc3}=0; E_{cc2}=150 Vdc; R_K=78 ohms.
Note 21: Class C telegraphy — continuous operation.
Note 22: E_{bb}=E_{cc2}=45 Vdc; R_{g2}=2.0 meg.; R_{g1}=10 meg.; R_p=0.5 meg.; $E_{sig.}$=0.2 Vac; 0.1 μf between G_2 and —F.
Types in bold face are Raytheon Preferred Types for new circuit designs.


9F

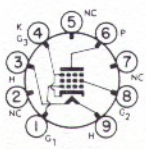

9G

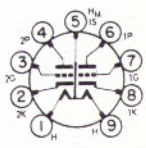

9H


9J


9K

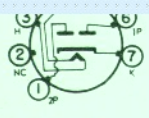

9V


9X

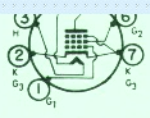

FIG. 1

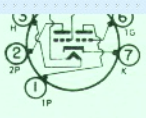
RAYTHEON MINIATURE VACUUM TUBES

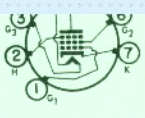
DESCRIPTION			CONSTRUCTION						ABSOLUTE MAX. RATINGS	
Type Number	Classification by Construction	Typical Application	Bulb	Outline Drawing[1]	Button Base	E.I.A. Basing	Maximum Dimensions Length	Maximum Dimensions Dia.	Plate Dissipation P_p Watts	Screen Dissipation P_{g_2} Watts
5920/E90CC	Medium Mu Twin Triode[2]	Computers	T5½	—	7-Pin	7BF	2 41/64"	¾"	2.0	
5963	Medium Mu Twin Triode[2]	Computers	T6½	6-2	9-Pin	9A	2 3/16"	⅞"	2.5	
5964	Medium Mu Twin Triode[2]	Computers	T5½	5-2	7-Pin	7BF	2 1/8"	¾"	1.5	
5965	Medium Mu Twin Triode[2]	Computers	T6½	6-2	9-Pin	9A	2 3/16"	⅞"	2.2[11]	
6005	Beam Pentode	AF Power Amplifier	T5½	5-3	7-Pin	7BZ	2 5/8"	¾"	11.0[4]	2.2[4]
6005/6AQ5W	Beam Pentode	AF Power Amplifier	T5½	5-3	7-Pin	7BZ	2 5/8"	¾"	11.0[4]	2.2[4]
6028	Sharp Cutoff Pentode	UHF Amplifier	T5½	5-1	7-Pin	7BD	1 3/4"	¾"	1.7[14]	0.5[14]
6072A	High Mu Twin Triode[2]	Small Signal Low Noise Amplifier	T6½	6-2	9-Pin	9A	2 3/16"	⅞"	1.65	
6099	Medium Mu Twin Triode[2]	RF Amplifier	T5½	5-2	7-Pin	7BF	2 1/8"	¾"	1.6	
6101	Medium Mu Twin Triode[2]	RF Amplifier	T5½	5-2	7-Pin	7BF	2 1/8"	¾"	0.85	
6101/6J6WA	Medium Mu Twin Triode[2]	RF Amplifier	T5½	5-2	7-Pin	7BF	2 1/8"	¾"	1.6	
6136	Sharp Cutoff Pentode	RF-IF Amplifier	T5½	5-2	7-Pin	7BK	2 1/8"	¾"	3.1[4]	0.7[4]
6186	Sharp Cutoff Pentode	RF-IF Amplifier	T5½	5-2	7-Pin	7BD	2 1/8"	¾"	2.5	0.55
6186/6AG5WA	Sharp Cutoff Pentode	RF-IF Amplifier	T5½	5-2	7-Pin	7BD	2 1/8"	¾"	2.5	0.55
6189/12AU7WA	Medium Mu Twin Triode[2]	AF Amplifier	T6½	6-2	9-Pin	9A	2 3/16"	⅞"	2.7[4]	
6197	Power Pentode	On-Off Control	T6½	6-3	9-Pin	9BV	2 5/8"	⅞"	7.5	2.5
6201	High Mu Twin Triode[2]	VHF Amplifier & Converter	T6½	6-2	9-Pin	9A	2 3/16"	⅞"	2.75	
6202	Twin Diode	F W Power Rect.	T5½	5-3	7-Pin	5BS	2 5/8"	¾"		
6203	Twin Diode	F W Power Rect.	T6½	6-3	9-Pin	9CD	2 5/8"	⅞"		
6211	Medium Mu Twin Triode[2]	Computers	T6½	6-2	9-Pin	9A	2 3/16"	⅞"	1.3[4]	
6216	Beam Pentode	Power Amplifier	T6½	6-3	9-Pin	9CE	2 5/8"	⅞"	10.0	2.0
6265	Sharp Cutoff Pentode	Wide Band HF Amplifier	T5½	5-2	7-Pin	7CM	2 1/8"	¾"	2.0[14]	0.5[14]
6350	Medium Mu Twin Triode[2]	Computers	T6½	6-3	9-Pin	9CZ	2 5/8"	⅞"	4.0[16]	
6360	Twin Tetrode[2]	Amplifier/ Oscillator	T6½	6-4	9-Pin	Fig. 2	2 1/8"	¾"	5.0[21]	1.0[21]
6386	Medium Mu Twin Triode[2]	Cascode RF Amp.	T6½	6-1	9-Pin	8CJ	1 3/4"	⅞"	1.5[14]	
6414	Medium Mu Twin Triode[2]	Computers	T6½	6-3						

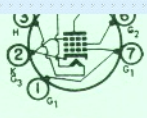

5BS

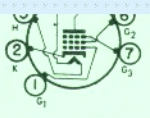

6BT


7BD


7BF


7BK


7BZ

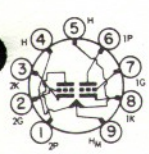

7CM


8CJ

TYPICAL OPERATING CHARACTERISTICS

Capacitance pf Without Shield			Cathode			Plate		Grid #1		Grid #2		Grid #3		Amplification Factor	Transconductance	Plate Resistance	Load Resistance	Output	Type
C in	C out	C gp	Type	V	A	V	mA	V	mA	V	mA	V	mA	Mu	μmhos	r_p ohms	R_L ohms	P_o Watts	Type Number
3.4	Sec.1=.35 Sec.2=.4	2.5	Htr.	6.3	0.40	100	8.5	−2.1						27	6,000	4.5K			5920/E90CC
1.9	Sec.1=.5 Sec.2=.35	1.5	Htr.	6.3 12.6	0.30 0.15	67.5	8.5	0						21	3,200	6.6K			5963
2.1	0.4	1.6 max.	Htr.	6.3	0.45	100	9.5	R_k=50Ω[10]						39	6,000	6.5K			5964
4.0	Sec.1=.5 Sec.2=.36	3.0	Htr.	6.3 12.6	0.450 0.225	150	8.5	−2.0						47	7,000	6.7K			5965
8.3	7.5	0.54	Htr.	6.3	0.45	180 250	29 45	−8.5 −12.5		180 250	3 4.5				3 700 4,100	58K[3] 52K[3]	5.5 5K	2.0[12] 4.5[12]	6005
8.0	8.5	0.8 max.	Htr.	6.3	0.45	180 250	29 45	−8.5 −12.5		180 250	3 4.5				3,700 4,100	58K[3] 52K[3]	5.5 5K	2[12] 4.5[12]	6005/6AQ5W
4.0	2.1	0.03 max.	Htr.	20	0.05	120	7.5	R_k=180Ω		120	2.5				5,000	0.3meg[3]			6028
1.5	Sec.1=0.5 Sec.2=0.38	1.7 max.	Htr.	6.3 12.6	0.350 0.175	250	3.0	−4.0						44	1,750	25K[3]			6072A
2.1	Sec.1=.45 Sec.2=.40	1.8 max.	Htr.	6.3	0.45	100	9	R_k=50Ω[10]						38	6,000	6.3K[3]			6099
2.0	0.4	1.5	Htr.	6.3	0.45	100	8.5	R_k=50Ω[10]						38	6,000	6.3K			6101
2.1	Sec.1=.45 Sec.2=.40	1.5	Htr.	6.3	0.45	100	9	R_k=50Ω[10]						38	6,000	6.3K[3]			6101/6J6WA
6.0	5.0	.0035 max.	Htr.	6.3	0.30	100 250	5 10.6	R_k=150Ω R_k=68Ω		100 150	2.1 4.3	Tie to Cathode			3,900 5,200	0.5meg[3] 1.0meg[3]			6136
6.5	1.8	0.03 max.	Htr.	6.3	0.30	250	7.0	R_k=200Ω		150	2.0				5,000	0.8meg			6186
6.5	1.8	0.03 max.	Htr.	6.3	0.30	250	7.0	R_k=200Ω		150	2.0				5,000	0.8meg			6186/6AG5WA
1.6	Sec.1=.5 Sec.2=.4	1.8 max.	Htr.	6.3 12.6	0.30 0.15	250	10.5	−8.5						17	2,200	7.7K[3]			6189/12AU7WA
11.5	5.0	0.135 max.	Htr.	6.3	0.65	250	30	−3		150	7	0		22 Triode Connected	11,000	90K			6197
2.5	Sec.1=.45 Sec.2=.38	1.6	Htr.	6.3 12.6	0.30 0.15	100 250	3.3 10	R_k=270Ω R_k=200Ω						57 60	4,000 5,500	14.3K[3] 10.9K[3]			6201
			Htr.	6.3	0.60	max peak inverse plate voltage = 1250v; max peak plate current (per plate) = 200 ma; max dc output current (per section) = 285 mA; tube voltage drop = 22 @ I_k = 50 mA dc													6202
			Htr.	6.3	0.90	max peak inverse plate voltage = 1375v; max peak plate current (per plate) = 285 ma; max dc output current (per section) = 285 mA; tube voltage drop = 22v @ I_k = 70 mA dc													6203
2.9	Sec.1=.54 Sec.2=.46	2.6 max.	Htr.	6.3 12.6	0.30 0.15	100	6.6	−2.0						31	4,700	6.5K[3]			6211
13.25	6.7	0.44 max.	Htr.	6.3	1.20	100	75	−3		100	3				12,500	18.5K[3]			6216
5.2	4.4	0.0035 max.	Htr.	6.3	0.175	250	7.4	R_k=100Ω		150	2.9	0			4,600	1meg[3]			6265
3.6	0.6	3.2	Htr.	6.3 12.6	0.60 0.30	150	11	−5.0						18	4,600	3.9K[3]			6350
6.2	2.6	0.1 max.	Htr.	6.3 12.6	0.82 0.41	200	37.5	−15		200									6360
2.0	1.1	1.2	Htr.	6.3	0.35	100	9.6	R_k=200Ω						17	4,000	4.25K			6386
4.0	Sec.1=.47 Sec.2=.38	3.6 max.	Htr.	6.3 12.6	0.450 0.225	180	8.0	−2						42.5	5,550	7.65K			**6414**
9.5	4.5	0.3 max.	Htr.	12.6	0.375	250	45	−7.5		250	5	0			7,000				6417
3.0	Sec.1=0.6 Sec.2=0.5	5.0	Htr.	6.3 12.6	0.60 0.30	250	14.5	R_k=620Ω						20	5,200	3.85K[3]			6463
10.0	2.0	0.03	Htr.	6.3	0.45	300	10	R_k=160Ω		150	2.5			40 Triode Connected	9,000	500K			**6485**
5.4	4.4	0.0035 max.	Htr.	6.3	0.15	250	7.4	R_k=100Ω		150	2.6	0			4,600	1.4meg[3]			6661/6BH6
4.5	5.5	0.0035 max.	Htr.	6.3	0.15	100 250	9.0 9.2	R_k=80Ω		100	3.5 3.3	0			3,650 3,600	250K[3] 1.3meg[3]			6662/6BJ6
K-ALL 3.4	P-ALL 2.5	P-P 0.068 max.	Htr.	6.3	0.30	max peak inverse plate voltage = 275v; max peak plate current (per plate) = 60 ma; max dc output current (per plate) = 10 mA; tube voltage drop = 10v @ I_k = 60 mA per plate													6663/6AL5
8.0	8.5	0.4	Htr.	6.3	0.45	250	45	−12.5		250	4.5				4,100	52K[3]	5K	4.5[12]	6669/6AQ5
11.0	5.5	0.12 max.	Htr.	6.3	0.65	250	30	−3.0		150	7.0	Tie to Cathode			11,000	150K[3]	7.5K	2.8[12]	6677/6CL6

Note 14: Design center maximum values.
Note 15: 10% distortion level.
Note 16: 7.0 Watts maximum — combined.
Note 17: 3.6 Watts maximum — combined.
Note 18: Class AB_1, push-pull operation.
Note 19: Class C telegraphy — intermittent operation.
Note 20: Plate current condition: E_{bb}=180 Vdc; E_{cc_1}=E_{cc_3}=0; E_{cc_2}=150 Vdc; R_K=78 ohms.
Note 21: Class C telegraphy — continuous operation.
Note 22: E_{bb}=E_{cc_2}=45 Vdc; R_{K_2}=2.0 meg.; R_{g_1}=10 meg.; R_p=0.5 meg.; $E_{s_{1g}}$=0.2 Vac; 0.1 μf between G_2 and —F.
Types in bold face are Raytheon Preferred Types for new circuit designs.



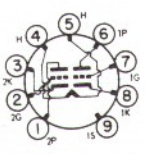
9A



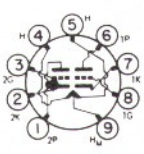
9BV



9CD



9CE



9CZ



9K

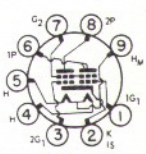
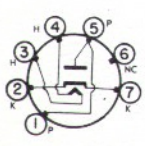


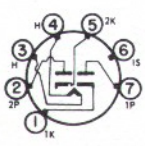
FIG. 2

RAYTHEON MINIATURE VACUUM TUBES

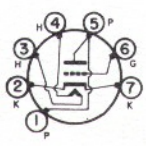
DESCRIPTION			CONSTRUCTION						ABSOLUTE MAX. RATINGS	
Type Number	Classification by Construction	Typical Application	Bulb	Outline Drawing[1]	Button Base	E.I.A. Basing	Maximum Dimensions Length	Maximum Dimensions Dia.	Plate Dissipation P_p Watts	Screen Dissipation P_{g_2} Watts
6678/6U8	Medium Mu Triode Sharp Cutoff Pentode	Combined Oscillator and Mixer	T6½	6-2	9-Pin	9AE	2 3/16"	7/8"	3.0 3.0	0.55
6679/12AT7	High Mu Twin Triode[2]	Grounded Grid Amplifier	T6½	6-2	9-Pin	9A	2 3/16"	7/8"		
6680/12AU7	Medium Mu Twin Triode[2]	AF Amplifier/Phase Inverter	T6½	6-2	9-Pin	9A	2 3/16"	7/8"		
6681/12AX7	High Mu Twin Triode[2]	Voltage Amplifier/ Phase Inverter	T6½	6-2	9-Pin	9A	2 3/16"	7/8"	1.1[4]	
6687	Dual Control Heptode	Gated Amplifier in Computers	T5½	—	7-Pin	7CH	2 3/8"	3/4"	1.0	1.0[8]
6688	Sharp Cutoff Pentode	Wide Band Amplifier	T6½	6-1	9-Pin	9EQ	1 3/4"	7/8"	2.7[4]	0.6[4]
6688A	Sharp Cutoff Pentode	Wide Band Amplifier	T6½	6-1	9-Pin	9EQ	1 3/4"	7/8"	3.0	0.9
6689	Sharp Cutoff Pentode	Wide Band Amplifier	T6½	6-3	9-Pin	9BK	2 5/8"	7/8"	2.1	0.35
6829	Medium Mu Twin Triode[2]	Computers	T6½	6-3	9-Pin	9A	2 5/8"	7/8"	2.2[4,11]	
6887	Twin Diode	Computers	T5½	5-1	7-Pin	6BT	1 5/8"	3/4"		
6919	High Perveance Twin Diode	Computers	T5½	5-1	7-Pin	6BT	1 3/4"	3/4"		
6922	Medium Mu Twin Triode[2]	Cascode RF Amplifier	T6½	6-2	9-Pin	9DE	2 3/16"	7/8"	1.65	
6939	Twin Pentode[2]	UHF Power Ampl./ Freq. Multiplier	T6½	6-3	9-Pin	Fig. 3	2 5/8"	7/8"	3.75[19]	1.75[19]
6955	Medium Mu Twin Triode[2]	Pulse Circuits/ Blocking Osc.	T6½	6-2	9-Pin	9A	2 3/16"	7/8"	2.75[14]	
7025	High Mu Twin Triode[2]	Voltage Amplifier/ Phase Inverter	T6½	6-2	9-Pin	9A	2 3/16"	7/8"	1.0[4]	
7044	Medium Mu Twin Triode[2]	Computers	T6½	6-3	9-Pin	9H	2 5/8"	7/8"	4.5[13]	
7054	Pentode	RF/AF Power Amp. Mobile Equipment	T6½	6-3	9-Pin	9GK	2 5/8"	7/8"	5.0	
7055	High Perveance Twin Diode	Detector/Rectifier/ Mobile Equipment	T6½	5-1	7-Pin	6BT	1 3/4"	3/4"		
7056	Sharp Cutoff Pentode	Mobile Equipment	T5½	5-2	7-Pin	7CM	2 1/8"	3/4"	2.0	
7057	Medium Mu Twin Triode[2]	Mobile Equipment	T6½	6-2	9-Pin	9AJ	2 3/16"	7/8"	2.2	
7058	High Mu Twin Triode[2]	Mobile Equipment	T6½	6-2	9-Pin	9EP	2 3/16"	7/8"	1.0	
7059	Medium Mu Triode Sharp Cutoff Pentode	Mobile Equipment	T6½	6-2	9-Pin	9AE	2 3/16"	7/8"	2.5 2.8	
7060	Medium Mu Triode Sharp Cutoff Pentode	Mobile Equipment	T6½	6-2	9-Pin	9DA	2 3/16"	7/8"	2.5 3.0	1.1
7061	Beam Pentode	Power Amplifier	T6½	6-3	9-Pin	9EU	2 5/8"	7/8"	9.0	
7062	Separate Cathode Twin Triode[2]	Computers	T6½	6-3	9-Pin	9A	2 5/8"	7/8"	2.0	
7119/E182CC	Medium Mu Twin Triode[2]	Computers	T6½	6-3	9-Pin	9H	2 5/8"	7/8"	4.5[13]	
9001	Pentode	UHF Detector Amp.	T5½	5-1	7-Pin	7BD	1 3/4"	3/4"	0.55	0.11
9002	Triode	UHF Detector/ Ampl./Oscillator	T5½		7-Pin	7BS	1 13/16"	3/4"	1.8	
9003	Remote Cutoff Pentode	UHF Amplifier	T5½	5-1	7-Pin	7BD	1 3/4"	3/4"	1.8	0.33
9006	Diode	UHF Amplifier	T5½	5-1	7-Pin	6BH	1 3/4"	3/4"		

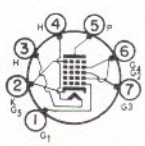
Note 1: Refers to Jedec Publication JO-G2-2.
Note 2: Per Section Values.
Note 3: Approximate.
Note 4: Design Maximum.
Note 5: With Shield.
Note 6: Tie G_3 to negative terminal of cathode resistor.
Note 7: Grounded grid capacitance.
Note 8: Grids 2 and 4 tied together.
Note 9: 7.5 Watts maximum — combined.
Note 10: Common cathode resistance.
Note 11: 4.0 Watts maximum — combined.
Note 12: Maximum Signal.
Note 13: 8 Watts maximum — combined.


6BH

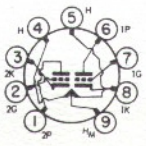

6BT

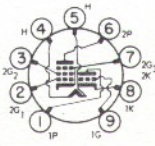

7BD

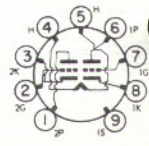

7BS


7CH


7CM


9A

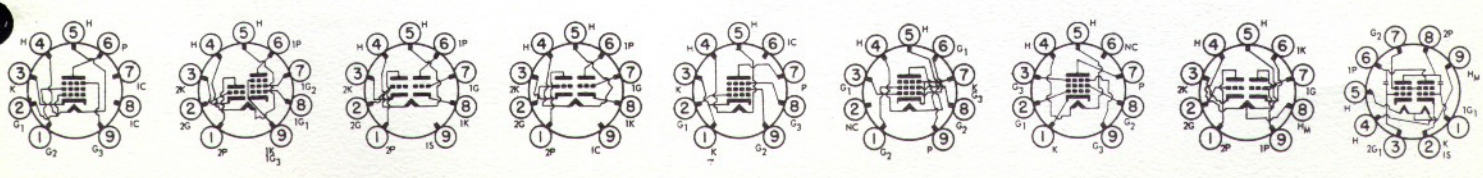

9AE


9AJ

TYPICAL OPERATING CHARACTERISTICS

Capacitance pf Without Shield			Cathode			Plate		Grid #1		Grid #2		Grid #3		Amplification Factor Mu	Transconductance Sm μmhos	Plate Resistance r_p ohms	Load Resistance R_L ohms	Output P_o Watts	Type Number
C in	C out	C gp	Type	V	A	V	mA	V	mA	V	mA	V	mA						
2.5 5.0	3.0 2.6	1.8 0.01 max.	Htr.	6.3	0.45	150 250	18 10	R_K=56Ω R_K=68Ω		110	3.5			40	8,500 5,200	5K[3] 400K[3]			6678/6U8
4.6[7]	1.8[7]	0.2[7]	Htr.	6.3 12.6	0.30 0.15	250	10.0	R_K=200Ω						60	5,500	10.9K[3]			6679/12AT7
1.6	Sec.1=0.4 Sec.2=0.32	1.5	Htr.	6.3 12.6	0.30 0.15	100 250	11.8 10.5	0 −8.5						20 17	3,100 2,200	6.5K[3] 7.7[3]			6680/12AU7
1.6	Sec.1=.46 Sec.2=.34	1.7	Htr.	6.3 12.6	0.30 0.15	100 250	0.5 1.2	−1.0 −2.0						100	1,250 1,600	80K[3] 62.5K[3]			6681/12AX7
(G_3) 7.0	7.9	G_3-P <0.45	Htr.	6.3	0.27	250	3.3		.530	100[8]	6.5	−5			Conversion 450	0.85meg			6687
7.5[5]	3.0[5]	0.03 max.[5]	Htr.	6.3	0.30	190	13.0[20]	+9.0V & R_K=630Ω		160	3.3	0			16,500	90K[3]			6688A
7.5[5]	3.0[5]	0.03 max.[5]	Htr.	6.3	0.30	190	13.0[20]	+9.0V & R_K=630Ω		160	3.3	0			16,500	90K[3]			**6688**
8.5	3.6	0.015 max.	Htr.	6.3	0.30	120 210	8.3	R_K=180Ω	E_{cc2}=120 R_{g2}=5.6K	1.7		0			8,200	.42meg .44meg	10K } A.C. 20K } LOAD	.340[15] .660[15]	6689
4.0	Sec.1=.5 Sec.2=.38	3.6 max.	Htr.	6.3 12.6	0.450 0.225	150	8.5	R_K=220Ω						47	6,700	7K			**6829**
K-ALL 3.5	P-ALL 2.2	P-K 1.4	Htr.	6.3	0.20	max peak inverse plate voltage = 360v; max peak plate current = 30 ma; max dc plate current = 10 ma dc													6887
K-ALL 3.4	P-ALL 2.2	P-P 0.17 max.	Htr.	6.3	0.20	max peak inverse plate voltage = 300v; max peak plate current (per plate) = 30 ma; max dc output current (per section) = 10 mA; tube voltage drop = 1.2v @ 6.0 mA dc													6919
3.3	Sec.1=1.75 Sec.2=1.65	1.6 max.	Htr.	6.3	0.30	E_{bb}= 100Vdc	15.0	E_{cc}= +9Vdc R_K=680Ω						33	12,500	2.64K			**6922**
6.4	1.6	0.2 max.	Htr.	6.3 12.6	0.60 0.30	150	19.25	−3.0		150	4.5			10,500@ E_{c1}/I_b=25 m Adc					**6939**
1.5	Sec.1=0.5 Sec.2=0.4	1.4	Htr.	6.3 12.6	0.350 0.175	100 250	13.0 11.5	0 −8.5						21.3 16.5	3,500 2,350	5.8K[3] 7K[3]			6955
1.6	Sec.1=.46 Sec.2=.34	1.7	Htr.	6.3 12.6	0.30 0.15	100 250	0.5 1.2	−1.0 −2.0						100	1,250 1,600	80K 62.5K			**7025**
4.8	Sec.1=0.65 Sec.2=0.55	6.0	Htr.	6.3 12.6	0.90 0.45	120	36.0	−2.0						21	12,000	1.75K			**7044**
10.2	3.5	0.063	Htr.	12-15	0.275 @E_f= 13.5V	250	19.0	R_K=120Ω		150	3.5	Tie to Cathode			11,500	100K			7054
P-ALL 3.2[5]	K-ALL 3.5[5]	P-P 0.026[5]	Htr.	12-15	0.155 @E_f= 13.5V	max peak inverse plate voltage = 350v; max peak plate current (per plate) = 60 ma; max dc output current (per section) = 10.0 mA; tube voltage drop = 10v @ 60 mA (per plate)													7055
6.5	2.0	0.02 max.	Htr.	12-15	0.15 @E_f= 13.5V	200	9.5	R_K=180Ω		150	2.8	Tie to Cathode			6,200	600K[3]			7056
2.6[5]	1.2[5]	1.2[5]	Htr.	12-15	0.180 @E_f= 13.5V	150	10.0	R_K=220Ω						36	6,800	5.3K			7057
1.6	Sec.1=.46 Sec.2=.34	1.7	Htr.	12-15	0.155 @E_f= 13.5V	250	1.25	−2.0						100	1,650	61K			7058
2.7 5.0	0.4 2.5	1.7 max. 0.01 max.	Htr.	12-15	0.195 @E_f= 13.5V	150 250	18.0 10.0	R_K=56Ω R_K=68Ω		110	3.5			40	8,500 5,200	4.7K[3] 400K[3]			7059
2.4 7.1	0.22 2.5	2.2 0.044	Htr.	12-15	0.280 @E_f= 13.5V	150 200	9.0 15.0	R_K=150Ω R_K=82Ω		125	3.4			40	4,900 7,000	8.2K[3] 150K[3]			7060
8.0	8.5	0.7 max.	Htr.	12-15	0.21 @E_f= 13.5V	200	35.5	−10.0		200	9.0				4,200	60K	5K	3.0[12]	7061
3.5	Sec.1=.5 Sec.2=.45	Sec.1=2.2 Sec.2=2.3	Htr.	6.3 12.6	0.40 0.20	100 150	8.5	−0.8 −1.85						50 46	7,800 6,400	6.9K 7.2K			7062
6.0	Sec.1=1.1 Sec.2=1.0	Sec.1=4.0 Sec.2=4.1	Htr.	6.3 12.6	0.64 0.32	120 150	36 0.2 max.	−2 −14						24	15,000	1.6K			7119/E182CC
3.6	3.0	0.01 max.[5]	Htr.	6.3	0.15	250	2	−3.0		100	.78				1,400	1meg			9001
1.38	1.1	1.6 max.[5]	Htr.	6.3	0.15	250	6.1	−7						26	2,250	11.6K			9002
3.4	3.0	.01 max.[5]	Htr.	6.3	0.15	250	6.65	−3.0		100	2.7				1,850	700K			9003
P-K 1.4	P-H 0.325	H-K 2.7	Htr.	6.3	0.15	max peak anode voltage = 825v; max peak plate current = 16.5 ma; max dc output current = 5.5 mA											45K		9006

Note 14: Design center maximum values.
Note 15: 10% distortion level.
Note 16: 7.0 Watts maximum — combined.
Note 17: 3.6 Watts maximum — combined.
Note 18: Class AB_1, push-pull operation.
Note 19: Class C telegraphy — intermittent operation.
Note 20: Plate current condition: E_{bb}=180 Vdc; E_{cc1}=E_{cc3}=0; E_{cc2}=150 Vdc; R_K=78 ohms.
Note 21: Class C telegraphy — continuous operation.
Note 22: E_{bb}=E_{cc2}=45 Vdc; R_{g2}=2.0 meg.; R_{g1}=10 meg.; R_p=0.5 meg.; $E_{sig.}$=0.2 Vac; 0.1 μf between G_2 and —F.
Types in bold face are Raytheon Preferred Types for new circuit designs.



9BK 9DA 9DE 9EP 9EQ 9EV 9GK 9H

FIG. 3

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