Dieter’s

Nixie Tube Data Archive

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Thank you!

Document in this file	Raytheon Catalogue SP-7649-360-20M - Dated 1961
Display devices in this document	6476, 6802, 6879, 6909, 6910, 7155, 7978, 6476A, GC10/4B, GS10C/S, Z303C, Z502S

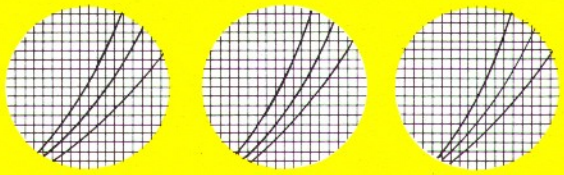
File created by Dieter Waechter
www.tube-tester.com

RAYTHEON

INDUSTRIAL AND MILITARY

GAS and VAPOR

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.

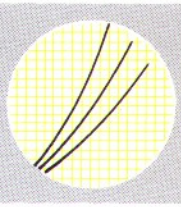
A notable achievement in the industry was the anode laminating techniques that revolutionized magnetron production and helped break the radar bottleneck in World War II. Raytheon was the first to manufacture heater-cathode tube types in subminiature size, a development which has earned the division a 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

RAYTHEON GAS AND VAPOR TUBES FOR INDUSTRIAL, MILITARY AND COMMUNICATIONS APPLICATIONS



A broad line is readily available, based on Raytheon's extensive experience in fine gas tube manufacture. Complete coverage of Voltage Regulator and Voltage Reference Tubes, Cold Cathode Rectifiers, Corona VR Tubes, Radiation Detectors, Thyratrons, Decade Counters and Light Indicators is offered, including many subminiature types. Select Raytheon Gas and Vapor Tubes, first for quality and dependability — ideal for critical applications!

Types Recommended for New Equipment Designs

Voltage Regulator and Reference Tubes

OA2WA	Regulator
OB2WA	Regulator
5651WA	Reference
CK1038*	Regulator
CK1055*	Regulator
CK1061*	Regulator
5783WA*	Reference
5787WA*	Regulator
6213*	Reference
6437*	Regulator
6438*	Regulator
6542*	Regulator

Rectifiers

CK1047
5517
6174
6763
CK1058
6436
6659

Thyratrons

2050A
5727/2D21W
CK1050A*
CK1054*
CK1057*
5643*

Decade Counters

6476
6476A
6802
6909
6910

Radiation Counter Tubes

CK1020
CK1021
CK1026
CK1049

* Subminiature

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

VOLTAGE REGULATOR AND VOLTAGE REFERENCE TUBES

RECTIFIERS

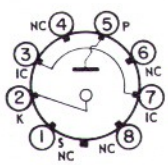
VOLTAGE REGULATOR AND VOLTAGE REFERENCE TUBES

Description			Construction				
						Maximum Dimensions	
Tube Number	Class	Typical Application	Bulb	Base	Basing†	Length	Diameter
0A2	Gas Diode	Voltage Regulator	T5½	Min. 7 Pin	5BO	2⅝"	¾"
0A2WA	Gas Diode	Voltage Regulator	T5½	Min. 7 Pin	5BO	2⅝"	¾"
0A3A	Gas Diode	Voltage Regulator	T9	Octal — 6 Pins	4AJ	4⅛"	1⁹⁄₁₆"
0B2	Gas Diode	Voltage Regulator	T5½	Min. 7 Pin	5BO	2⅝"	¾"
0B2WA	Gas Diode	Voltage Regulator	T5½	Min. 7 Pin	5BO	2⅝"	¾"
0B3A	Gas Diode	Voltage Regulator	T9	Octal — 6 Pins	4AJ	4⅛"	1⁹⁄₁₆"
0C2	Gas Diode	Voltage Regulator	T5½	Min. 7 Pin	5BO	2⅝"	¾"
0C3A	Gas Diode	Voltage Regulator	T9	Small Shell Octal — 6 Pins	4AJ	4⅛"	1⁹⁄₁₆"
0C3W	Gas Diode	Voltage Regulator	T9	Special Octal — 6 Pins	4AJ	4⅛"	1.57"
0D3A	Gas Diode	Voltage Regulator	T9	Small Shell Octal — 6 Pins	4AJ	4⅛"	1⁹⁄₁₆"
0D3W	Gas Diode	Voltage Regulator	T9	Special Octal — 6 Pins	4AJ	4⅛"	1.57"
CK1022	Gas Diode	Voltage Regulator	T5½	Min. 7 Pin	7EX	2¹¹⁄₁₆"	¾"
5651	Gas Diode	Voltage Reference	T5½	Min. 7 Pin	5BO	2⅛"	¾"
5651WA	Gas Diode	Voltage Reference	T5½	Min. 7 Pin	5BO	2⅛"	¾"
5962	Gas Diode	Voltage Regulator	T5½	Min. 7 Pin	7EX	2¹¹⁄₁₆"	¾"
6073	Use 0A2WA						
6074	Use 0B2WA						
6626/0A2WA	Gas Diode	Voltage Regulator	T5½	Min. 7 Pin	5BO	2⅝"	¾"
6627/0B2WA	Gas Diode	Voltage Regulator	T5½	Min. 7 Pin	5BO	2⅝"	¾"

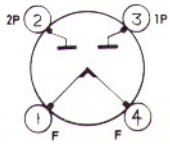
RECTIFIERS

Description			Construction				
						Maximum Dimensions	
Tube Number	Class	Typical Application	Bulb	Base	Basing†	Length	Diameter
0Z4	Gas Filled Dual Diode	Full Wave Rectifier	MT-8	Octal — 5 Pins	4R	2⅝"	1⁵⁄₁₆"
0Z4A/1003	Gas Filled Dual Diode	Full Wave Rectifier	MT-8	Small Wafer Octal — 5 Pins	4R	2⅝"	1⁵⁄₁₆"
0Z4G	Gas Filled Dual Diode	Full Wave Rectifier	T-7	Dwarf Shell Octal	4R	2⅝"	1.062"
CK1005	Gas Filled Dual Diode	Full Wave Rectifier	MT-8	Small Wafer Octal	5AQ	2⅝"	1⁵⁄₁₆"
CK1006	Gas Filled Dual Diode	Full Wave Rectifier	ST14	Medium 4 Pin	4C	4¹¹⁄₁₆"	1¹³⁄₁₆"
CK1007	Gas Filled Dual Diode	Full Wave Rectifier	MT-8	Small Wafer Octal — 5 Pins	5Q	2⅝"	1⁵⁄₁₆"
CK1024	Gas Filled Dual Diode	Full Wave Rectifier	MT-8	Small Wafer Octal — 5 Pins	4R	2⅝"	1⁵⁄₁₆"
CK1047 (Cut Pin 6763)	Gas Diode	Half Wave Rectifier	T5½	Min. 7 Pin	Fig. 1	2.08"	¾"
5517 (CK1013)	Gas Diode■	Half Wave Rectifier	T5½	Min. 7 Pin	5BU	2¼"	¾"
6174	Gas Filled Dual Diode■	Half Wave Rectifier	T5½	Min. 7 Pin	5BU	2¼"	¾"
6763	Gas Filled Dual Diode	Half Wave Rectifier	T5½	Min. 7 Pin	Fig. 1	2¼"	¾"

Key to Symbols: ■With starter electrode.
*Tube may be used as a cold cathode rectifier on ac-dc lines having 100 to 130 volts provided that the filament is heated to start the tube.
†E.I.A. designations. Where none exists Raytheon uses figure no.



4AJ



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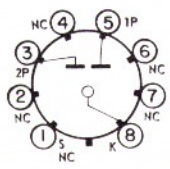
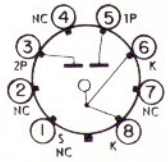
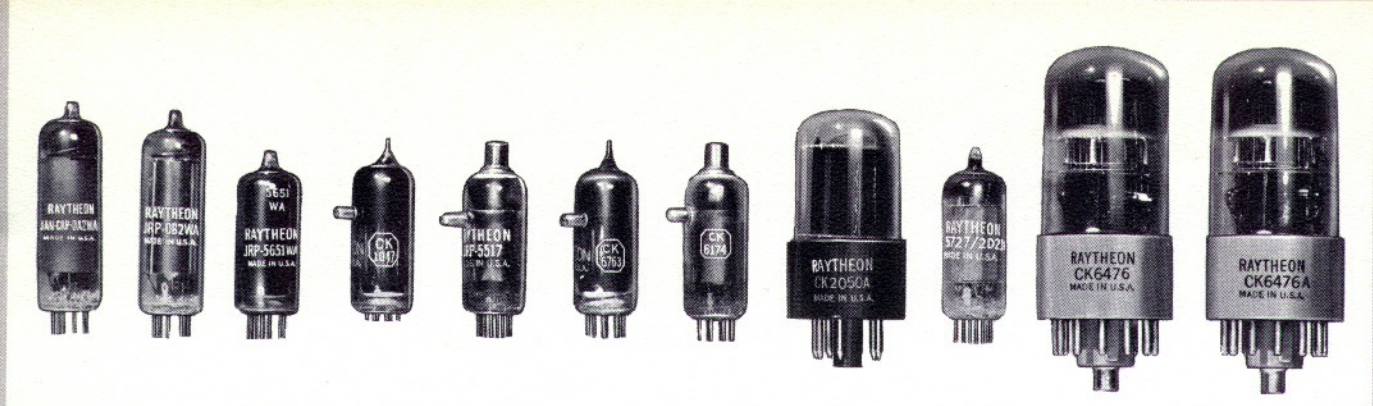


4R



5AQ



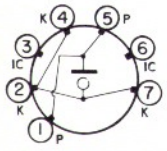
Typical Operating Characteristics

Emitter Type	Emitter V	Emitter A	Minimum Supply Voltage	Maximum Starting Volt. Dark	Maximum Starting Volt. Light	Current Min. mA	Current Max. mA	Tube Drop Min. V	Tube Drop Max. V	Maximum Regulation V	Operating Voltage Approx.	Tube Number
Cold			185		180	5	30	142 @ 5 mA	165 @ 30 mA	6.0	150	0A2
Cold			165	165	165	5	30	144 @ 5+30 mA	153 @ 5+30 mA	5.0	150	**0A2WA**
Cold			105		105	5	40	70 @ 5 mA	81 @ 40 mA	6.5	75	0A3A
Cold			133		127	5	30	105 @ 5 mA	112 @ 30 mA	3.5	108	0B2
Cold			130	130	130	5	30	105 @ 5+30 mA	111 @ 5+30 mA	2.5	108	**0B2WA**
Cold			130		125	5	30	80 @ 5 mA	100 @ 30 mA	6.0	90	0B3A
Cold			145	145	115	5	30	68 @ 5 mA	83 @ 30 mA	4.5	75	0C2
Cold			133		127	5	40	105 @ 5 mA	112 @ 40 mA	4.0	105	0C3A
Cold			133		127	5	40	105 @ 5 mA	112 @ 40 mA	4.0	105	0C3W
Cold			185		180	5	40	145 @ 5 mA	162 @ 40 mA	5.5	150	0D3A
Cold			185		180	5	40	145 @ 5 mA	162 @ 40 mA	5.5	150	0D3W
Cold			1100		1100	.005	.055	980 @ 5 μA	1025 @ 55 μA	20	1000	CK1022
Cold			115		115	1.5	3.5	82 @ 1.5 mA	92 @ 3.5 mA	3.0	82-92	5651
Cold			115	115	115	1.5	3.5	82 @ 1.5+3.5 mA	88 @ $\frac{1.5}{3.5}$ mA	2.0	82-88	**5651WA**
Cold			750		730	.005	.055	690 @ 25±2 μA	710 @ 25±2 μA	15	700	5962
												6073
												6074
Cold			165	165	165	5	30	144 @ 5 mA	153 @ 30 mA	5.0	150	6626/0A2WA
Cold			130	130	130	5	30	105 @ 5 mA	111 @ 30 mA	2.5	108	6627/0B2WA

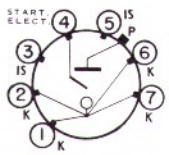
Typical Operating Characteristics

Emitter Type	Emitter V	Emitter A	Max. Peak Inverse Volt. v	Max. Peak Plate Current Steady State ma	Max. D.C. Output Current mAdc	Average Tube Drop	Tube Number
Cold			880	270	90	24	0Z4
Cold			880	330	110	24	0Z4A/1003
Cold			880	270	90	24	0Z4G
Fil.	4.0	.08	450	230	77	20	CK1005
	6.3	.1	450	230	77	20	
Fil.*	11.0	.125	450	230	77	20	
Fil.	0	0	1800	660	220	15	CK1006
	1.75	2.0	1800	660	220		
Fil.	0	0	1080	360	120	24	CK1007
	1.0	1.2	1080	360	120		
Cold			1000	480	175	24	CK1024
Cold			2800	100	12	85	**CK1047** (Cut Pin 6763)
Cold			2800	100	12	100	**5517 (CK1013)**
Cold			2800	30	3.0	100	**6174**
Cold			2800	100	12	85	**6763**

Types in boldface are Raytheon Preferred Types for new circuit designs.



5BO



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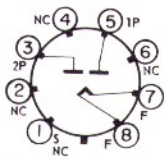

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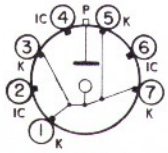


7EX

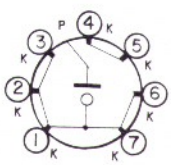


FIG. 1

RAYTHEON

THYRATRONS
DECADE COUNTERS
RADIATION COUNTER (GEIGER-MUELLER) TUBES

THYRATRONS

Description			Construction				
Tube Number	Class	Typical Application	Bulb	Base	Basing†	Maximum Dimensions Length	Diameter
2D21	Gas Tetrode	Relay Service	T5½	Min. 7 Pin	7BN	2⅛"	¾"
2050	Gas Tetrode	Relay Service	ST12	Small Shell Octal — 8 Pins	6BS	4⅛"	1 9/16"
2050A	Gas Tetrode	Relay Service	T9	Intermediate Shell Octal — 6 Pins	6BS	3 1/16"	1 9/32"
2050W	Gas Tetrode	Relay Service	T9	Small Shell Octal — 8 Pins	6BS	4.130"	1.57"
5696	Gas Tetrode	Relay Service	T5½	Min. 7 Pin	7BN	1¾"	¾"
5727/2D21W	Gas Tetrode	Relay Service	T5½	Min. 7 Pin	7BN	2⅛"	¾"

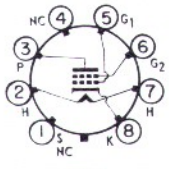
DECADE COUNTERS

Description			Construction				
Tube Number	Class	Typical Application	Bulb	Base	Basing†	Maximum Dimensions Length	Diameter
GC10/4B	Use 6802						
GS10C/S	Use 6476						
Z303C	Use 6802						
Z502S	Use 6476						
6476	Decade Counter	Counting, Timing, etc.	T11	Modified Duo — Decal	Fig. 2	3.785"	1.466"
6476A	Decade Counter	Counting, Timing, etc.	T11	Modified Duo — Decal	Fig. 2	3.785"	1.466"
6802	Decade Counter	Counting, Timing, etc.	T9	Intermediate Shell Octal	Fig. 3	3.2"	1.28"
6879	Decade Counter	Counting, Timing, etc.	T5½	Min. 7 Pin	Fig. 4	2⅛"	¾"
6909	Decade Counter	Counting, Timing, etc.	T9	Intermediate Shell Octal	Fig. 3	3.2"	1.28"
6910	Decade Counter	Counting, Timing, etc.	T11	Modified Duo — Decal	Fig. 2	3.8"	1.5"
7155	Decade Counter	Counting, Timing, etc.	T5½	Min. 7 Pin	Fig. 4	2⅛"	¾"
7978	Decade Counter	Counting, Timing, etc.	T9	13 Pin	Fig. 17	2.313"	1.16"

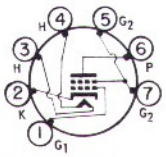
RADIATION COUNTER (GEIGER-MUELLER) TUBES

Description			Construction				
Tube Number	Class	Typical Application	Bulb	Base	Basing†	Maximum Dimensions Length	Diameter
CK1020	Radiation Counter	Detecting Radiation	T5½	3 Pin Special	Fig. 5	6"	¾"
CK1021	Radiation Counter	Detecting Radiation	T5	3 Pin Special	Fig. 5	5¼"	21/32"
CK1026	Radiation Counter	Detecting Radiation	T5½	None — 1 Pin	Fig. 6	3"	¾"
CK1049	Radiation Counter	Detecting Radiation	T5½	None — 1 Pin	Fig. 6	5¾"	¾"

Key to Symbols: ■With starter electrode.
*Tube may be used as a cold cathode rectifier on ac-dc lines having 100 to 130 volts provided that the filament is heated to start the tube.
†E.I.A. designations. Where none exists Raytheon uses figure no.



6BS



7BN

TYPES 6476 and 6910

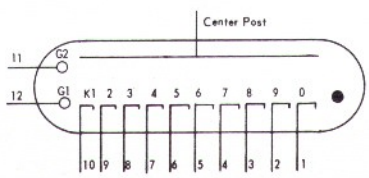


FIG. 2

TYPES 6902 and 6909

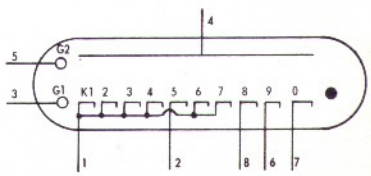
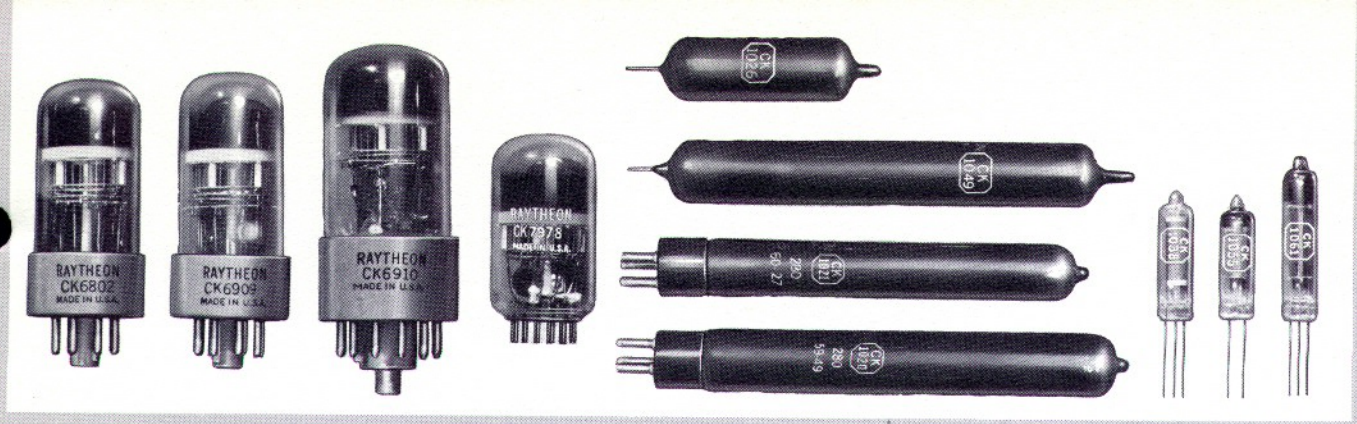


FIG. 3



Typical Operating Characteristics								
Emitter			Max. Peak Inverse Volt. *v*	Max. Peak Cathode Current *ma*	Max. Average Cathode Current *mA*	Peak Forward Plate Voltage	Approx. Plate Voltage Drop *Volts*	Tube Number
Type	V	A						
Heater	6.3	0.6	1300	500	100	650	8	2D21
Heater	6.3	0.6	1300	1000	100	650	8	2050
Heater	6.3	0.6	1300	1000	100	650	8	**2050A**
Heater	6.3	0.6	1300	1000	100	650	8	2050W
Heater	6.3	.150	500	100	25	500	10	5696
Heater	6.3	.600	1300	500	100	650	8	**5727/2D21W**

Typical Operating Characteristics										Absolute Maximum Ratings					
Emitter			Min. D.C. Supply Voltage *Vdc*	Anode Resistor *Megohms*	Nominal Tube Drop *Volts*	Max. Cathode Resistor *Ohms*	Minimum Reset *μsec* Pulse Width	Min. Guide Bias *Vdc*	Min. Transfer Voltage *Vdc*	Total Anode Current		Voltage Between Electrodes (Excluding Anode)	Supply Voltage (Anode to Cathode) Minimum *Volts*	Input Freq. Cycles Per Second	Tube Number
Type	V	A								Min. *mA*	Max. *mA*				
															GC10/4B
															GS10C/S
															Z303C
															Z502S
Cold			350	.82	187	150K	50	+35	35	.3	.6	140	350	0-5000	**6476**
Cold			350	.82	187	150K	50	+35	35	.3	.6	200	350	0-5000	**6476A**
Cold			350	.82	187	150K	50	+35	35	.3	.6	140	350	0-5000	**6802**
Cold			350	.82	187	150K	50	+35	35	.3	.6	140	350	0-5000	6879
Cold			400	.27	235	50K	4	+45	35	.6	.8	140	400	0-100K	**6909**
Cold			400	.27	235	50K	4	+45	35	.6	.8	140	400	0-100K	**6910**
Cold			400	.27	235	50K	4	+45	35	.6	.8	140	400	0-100K	7155
Cold			350	.82	187	150K	50	+35	35	.3	.6	200	350	0-5000	**7978**

Typical Operating Characteristics										
Operating Voltage *Vdc*	Plateau Length *Vdc*	Relative Plateau Slope *Per 100V*	Geiger Threshold Max. *Vdc*	Typical Background Unshielded Counts/Min.	Ambient Temperature Range *°C*	Thin Wall Nominal *mg/sq. cm.*	Efficiency % *Min.*	Life Counts	Radiation Detected	Quench Gas	Tube Number
900	150	3%	850	60	−40 to +55	35	90	10^8	Beta, Gamma	Organic	**CK1020**
900	150	3%	850	60	−40 to +55	35	90	10^8	Beta, Gamma	Organic	**CK1021**
900	200 Min.	20%	800	60	−55 to +75	175		$>10^{10}$	Gamma	Halogen	**CK1026**
900	200 Min.	20%	800	150	−55 to +75	35		$>10^{10}$	Beta, Gamma	Halogen	**CK1049**

Types in boldface are Raytheon Preferred Types for new circuit designs.

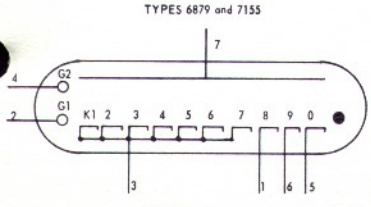


FIG. 4

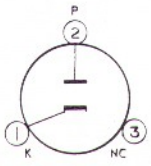


FIG. 5

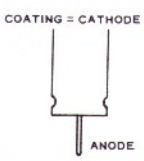


FIG. 6

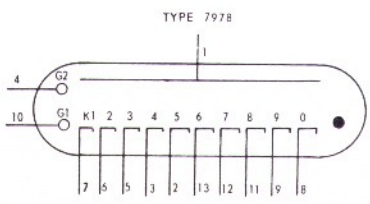


FIG. 17

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SUBMINIATURE VOLTAGE REGULATOR AND VOLTAGE REFERENCE TUBES
SUBMINIATURE RECTIFIERS
SUBMINIATURE THYRATRONS

SUBMINIATURE VOLTAGE REGULATOR AND VOLTAGE REFERENCE TUBES

Tube Number	Class	Typical Application	Bulb	Base	Basing†	Maximum Dimensions	
						Length	Diameter
CK1037	Replaced by 6437						
CK1038	Gas Diode	Voltage Regulator	T3	Flat Press	Fig. 7	1¾"	.400"
CK1039	Replaced by 6438						
CK1055	Gas Diode	Voltage Regulator	T3	Flat Press	Fig. 8	1⅜"	.400"
CK1061	Gas Diode	Voltage Regulator	T3	Flat Press	Fig. 7	2 1/16"	.400"
5644	Gas Diode	Voltage Regulator	T3	8 Lead Button	4CN	2.0"	.400"
5783	Gas Diode	Voltage Reference	T3	Flat Press	Fig. 7	1½"	.400"
5783WA	Gas Diode	Voltage Reference	T3	Flat Press	Fig. 7	1½"	.400"
5787	Gas Diode	Voltage Regulator	T3	Flat Press	Fig. 7	2.0"	.400"
5787WA	Gas Diode	Voltage Regulator	T3	Flat Press	Fig. 7	2.0"	.400"
5841	Gas Diode	Voltage Regulator	T3	Flat Press	Fig. 7	1⅝"	.400"
5950	Gas Diode	Voltage Regulator	T3	Flat Press	Fig. 7	1⅝"	.400"
6119	Gas Diode	Voltage Regulator	T3	Flat Press	Fig. 7	1⅝"	.400"
6143	Gas Diode	Voltage Regulator	T3	Flat Press	Fig. 7	1⅝"	.400"
6213	Gas Diode	Voltage Reference	T3	Flat Press	Fig. 7	1⅜"	.400"
6308	Use 5783WA						
6437	Gas Diode	Voltage Regulator	T3	Flat Press	Fig. 7	1⅝"	.400"
6438	Gas Diode	Voltage Regulator	T3	Flat Press	Fig. 7	1⅝"	.400"
6542	Gas Diode	Voltage Regulator	T3	Flat Press	Fig. 7	2⅛"	.400"
7099	Gas Diode	Voltage Regulator	T2	Flat Press	Fig. 9	1 3/16"	.322"

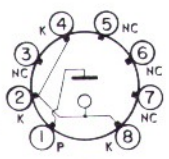
SUBMINIATURE RECTIFIERS

Tube Number	Class	Typical Application	Bulb	Base	Basing†	Maximum Dimensions	
						Length	Diameter
CK1036	Replaced by 6436						
CK1042	Replaced by 6659						
CK1058	Gas Diode	Half Wave Rectifier	T3		Fig. 10	2"	.425"
CK1058A	Gas Diode	Half Wave Rectifier	T3		Fig. 11	2"	.425"
6436	Gas Diode	Half Wave Rectifier	T3	Flat Press	Fig. 12	1¾"	.400"
6659	Gas Diode	Half Wave Rectifier	T3	Flat Press	Fig. 13	2⅛"	.400"

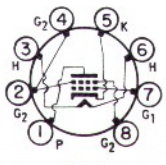
SUBMINIATURE THYRATRONS

Tube Number	Class	Typical Application	Bulb	Base	Basing†	Maximum Dimensions	
						Length	Diameter
RK61	Gas Tetrode	Model Aircraft Control	T4½	Flat Press	Fig. 14	1 13/16"	.55"
CK1050A	Gas Triode	Light Indicator	T2	Flat Press	Fig. 15	1¼"	.315"
CK1054	Gas Triode	Model Aircraft Control	T4½	Flat Press	Fig. 14	1 13/16"	.55"
CK1057	Gas Tetrode	Light Indicator	T2	Flat Press	Fig. 16	1¼"	.315"
5643	Gas Triode	Pulsing or Switching Service	T3	8 Lead Button	8DD	1⅜"	.400"
7323	Use CK1050A						

Key to Symbols: ♦ At 20 μAdc. • At 25 μAdc. †E.I.A. designations. Where none exists Raytheon uses figure no.



4CN



8DD

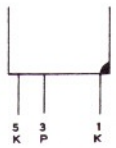


FIG. 7

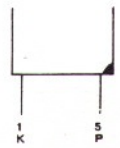


FIG. 8

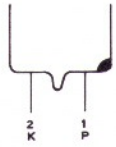


FIG. 9

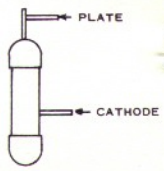
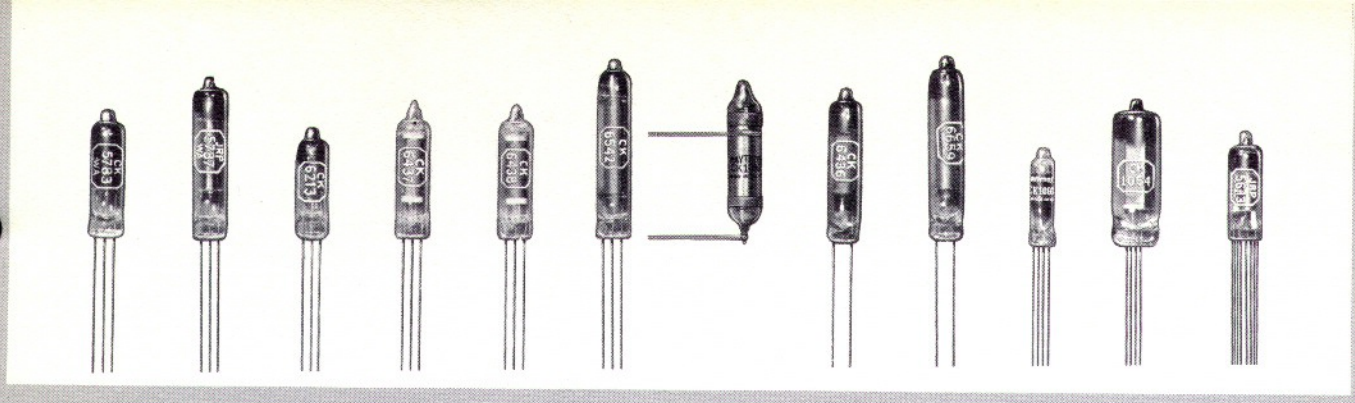


FIG. 10



Emitter Type	Emitter V	Emitter A	Minimum Supply Voltage	Maximum Starting Voltage Dark	Maximum Starting Voltage Light	Current mA Min.	Current mA Max.	Tube Drop V Min.	Tube Drop V Max.	Maximum Regulation V	Tube Number
											CK1037
Cold			930		930	.005	.125	880 @ 5 μA	925 @ 100 μA	15	**CK1038**
											CK1039
Cold			250	225	200	.075	.300	145	155	4.0	**CK1055**
Cold			150	150	135	5.	25	93	101	2.0	**CK1061**
Cold			175	175	125	5.	25	85	105	5	5644
Cold			140	140	125	1.5	3.5	82	92	3	5783
Cold			140	140	115	1.5	3.5	83	88	3	**5783WA**
Cold			150	150	135	5.	25	95	105	6	5787
Cold			150	150	135	5.	25	95	101	3	**5787WA**
Cold			940	940	940	.002	.050	882♦	918♦	14	5841
Cold			735	735	735	.002	.050	685♦	715♦	15	5950
Cold			2100	2100	2100	.002	.050	1960♦	2040♦	30	6119
Cold			1260	1260	1260	.002	.050	1175•	1225•	18	6143
Cold			200	200	180	1.	2.5	127	134	1	**6213**
											6308
Cold			800	800	800	.005	.100	685	720	15	**6437**
Cold			1400	1400	1400	.005	.100	1175	1245	20	**6438**
Cold			225	225	185	5.	25	142	165	6	**6542**
Cold			225	200	200	.075	.3	152	102	6.5	7099

Emitter Type	Emitter V	Emitter A	Maximum Peak Inverse Voltage v	Maximum Peak Plate Current ma	Maximum D.C. Output Current mA	Average Tube Drop v	Tube Number
							CK1036
							CK1042
Cold			2800	100	12	100	**CK1058**
Cold			2800	100	12	100	CK1058A
Cold			2000	5.0	0.3		**6436**
Cold			2800	40	8	120	**6659**

Emitter Type	Emitter V	Emitter A	Maximum Peak Inverse Voltage v	Maximum Peak Cathode Current ma	Maximum Average Cathode Current mA	Tube Number
Fil	1.4	0.05	Special Applications. Data Available on Request.			RK61
Fil.	1.25	0.25	118	11	3.0	**CK1050A**
Fil.	1.4	0.05	Special Applications. Data Available on Request.			**CK1054**
Cold			123	8	2.0	**CK1057**
Htr.	6.3	0.15	500	100	16	**5643**
						7323

Types in boldface are Raytheon Preferred types for new circuit designs. Ratings are typical operating characteristics.

FIG. 11

FIG. 12

FIG. 13

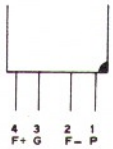


FIG. 14

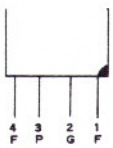


FIG. 15

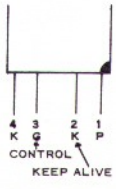


FIG. 16

QUALITY CONTROL AND RELIABILITY

Ever increasing demands for higher reliability in electronic systems mean higher reliability in electron tube design and manufacture. To be reliable an electron tube must be capable of performing a desired function over a specified period of time with a low probability of failure.

Reliability at Raytheon is the outgrowth of sound design, advanced manufacturing techniques, engineering and manufacturing experience, knowledge of customer applications, thorough quality control systems, and continuous improvement. Although the term reliability is relatively new in industry, Raytheon's reputation for reliability in electron tube manufacture comes from over 35 years of electron tube design and manufacturing experience.

Raytheon's approach to consistent reliability is based on the elimination of the source of defects, and by adequate control of the manufacturing process.

A thorough system of control, acceptance and audit inspection is used throughout the manufacture of Raytheon tubes, starting with the incoming material and ending with packaging. Raw materials supplied by Raytheon's numerous vendors are inspected to insure compliance with specifications. Vendor surveillance, certification and a continuous exchange of information insure that only high quality materials are used in our products.

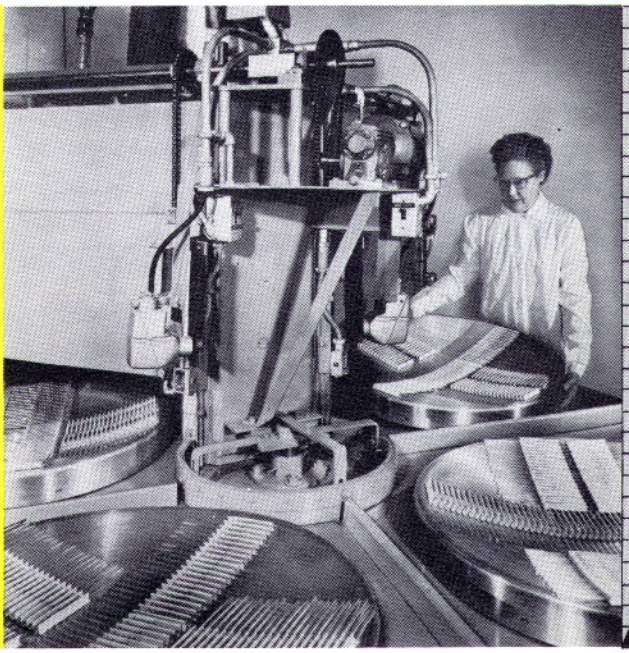
In addition to electrical and microscopic inspection, advanced sampling and charting techniques are used as measures of acceptance. The most modern instruments, such as x-ray analyzers, Instron tensile testers, electronic micrometers, and automatic electrical testing and readout equipments are used to maintain and insure the highest quality product.

Finished tubes not only meet Raytheon's internal inspection procedures but also the applicable Military Specifications. For operating characteristics the tubes must meet an AQL as low as 0.4%, using Mil-Std-105B to determine sample sizes. Operating characteristics tests, visual and mechanical tests are supplemented by environmental and usage tests such as:

Shock Test	Low Pressure Voltage Breakdown Test
Vibration Test	
Heater Cycle Test	Glass Strain Test
Stability Life Test	Normal Life Test
Survival Life Test	High Temperature Life Test
Lead Fatigue Test	

To further improve reliability, Raytheon's Quality Control and Reliability Departments, using the latest statistical techniques, isolate causes of variation so that product development can stimulate new improvements. We are also active participants in industry and government-sponsored groups concerned with improving testing and inspection procedures. Experiments are continuously under way which will not only guarantee the present high reliability of Raytheon tubes but also foster improved reliability in the future.

From raw materials, through manufacture, to the finished product, Raytheon electron tube reliability is continuously monitored to offer the highest quality product for industrial and military electronic applications.



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RAYTHEON INDUSTRIAL COMPONENTS

RAYTHEON FILAMENTARY SUBMINIATURE TUBES — Pioneers . . . from the hearing aid tube of the late '30's through wartime communication tubes. Faithfully serving today in portable communications devices, portable survey meters, electrometers, computers and telephone distance speaking and recording instruments.

RAYTHEON CATHODE SUBMINIATURE TUBES The widest line available, Reliability Plus in every detail of manufacture and operation. Approved for guided missiles, computers, communications, radar, radiation measuring instruments, military and other critical applications.

RAYTHEON MINIATURE TUBES — Reliable and rugged . . . with advanced electrical and mechanical construction features; reduced vibration output after shock, tighter limits and greater resistance to shock, fatigue, and other environmental factors.

RAYTHEON GAS-FILLED TUBES — Complete coverage of Voltage Regulator and Voltage Reference Tubes, Cold Cathode Rectifiers, Corona VR Tubes and Radiation Detectors. Progress continues in the development of Thyratrons, Decade Counters, Light Indicators and Ceramic Tubes.

RAYTHEON ENTERTAINMENT RECEIVING TUBES — Leading manufacturers of radio, television and hi fidelity equipment select Raytheon receiving tubes because of their proven performance records. Whether your equipment calls for amplifier, rectifier or power types, Raytheon research and development assures you of receiving tube types of highest quality and consistent reliable service.

RAYTHEON DISPLAY DEVICES — Over sixty types available — Cathode Ray types for Oscillographs, Radar Indicators, Video Recorders and Flying Spot Scanners. Storage tubes are applicable when retention, scan-conversion or integration of signals is desired.

RAYTHEON CONTROL KNOBS, MECHANICAL COMPONENTS — Superior design features are found in Raytheon's military standard control knobs, variety of jacks, knob and shaft locks, binding posts, fuse and resistor clips, terminal board brackets, captive hardware and pull handles. Components for equipment that deserves the precision engineered look.

RAYTHEON MAGNETOSTRICTION FILTERS — For applications involving narrow-band filter channels. Ideal in vacuum tube and transistor circuits. Selected for size, weight, versatility, selectivity characteristics and permanence in tuning.

RAYTHEON/MACHLETT POWER TUBES — A complete line for industrial, communications and broadcasting applications.

RAYTHEON RAYSISTORS — A new basic circuit component which can turn signals on and off with virtual isolation from switching transients and carriers.

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RAYTHEON PIEZOELECTRIC ACCELEROMETER A general purpose accelerometer designed to accurately measure shock and vibration over wide frequency and acceleration ranges under exacting environmental conditions.

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