RCA-7586, 8393

MEDIUM-MU TRIODES

Nuvistor Types

For Industrial Applications

RCA Dark Heater | **All-Ceramic-and-Metal Construction**

RCA-7586 and 8393 are medium-mu general-purpose nuvistor triodes, capable of providing high gain with low noise in amplifier service and excellent stability in oscillator applications over a wide range of frequencies extending into the uhf region.

The 7586 and 8393 are identical except for heater ratings and interelectrode capacitance values. Heater ratings for the two types are: type 7586 = 0.135 ampere at 6.3 volts; type 8393 = 0.060 ampere at 13.5 volts.

These types are particularly suitable for use in equipment in which compactness, the ability to withstand severe mechanical shock and vibration, and exceptional uniformity of characteristics are primary requirements. The 7586 and 8393 feature all-ceramic-and-metal construction, a cantilever-supported cylindrical electrode structure, and the RCA Dark Heater for long life and dependable performance.

GENERAL DATA

Electrical:

	7586	8393	
Heater Characteristics and Ratings:			
Voltage (AC or DC)	6.3 ± 0.6	13.5 ± 1.4	volts
Current at center heater voltage	0.135	0.060	amp
Peak heater-cathode voltage:			
Heater negative with respect to cathode	100 max.	100 max.	volts
Heater positive with respect to cathode	100 max.	100 max.	volts
Direct Interelectrode Capacitances (Approx.):			
Grid to plate	2.2	2.4	pf
Input: G to (K,S,H)	4.2	4.4	pf
Output: P to (K,S,H)	1.6	1.6	pf
Cathode to plate	0.26	0.26	pf
Heater to cathode	1.4	1.7	pf

Characteristics, Class A_1 Amplifier:

Plate Supply Voltage	-	-	75	volts
Plate Voltage	26.5	40	-	volts
Grid Supply Voltage	0	0	0	volts
Cathode Resistor	-	-	100	ohms
Grid Resistor	0.5	0.5	-	megohm
Amplification Factor	31	35	35	
Plate Resistance (Approx.)	4400	3000	3000	ohms
Transconductance	7000	11500	11500	μmhos
Plate Current	2.8	7.5	10.5	ma
Grid Voltage (Approx.) for plate μa = 10	-	-	-7	volts

Mechanical:

Operating Position	Any
Weight (Approx.)	1.9 grams
Maximum Overall Length	0.800"
Maximum Seated Length	0.625"
Maximum Diameter	0.440"
Envelope	Metal Shell MT4
Dimensional Outline	JEDEC No.4-4
Socket	See SOCKET INFORMATION
Base	Medium Ceramic-Wafer Twelvar 5-Pin (JEDEC No.E5-65)

INDUSTRIAL SERVICE

Maximum Ratings, *Absolute-Maximum Values:*

For operation at any altitude

Plate Supply Voltage	330 max.	volts
Plate Voltage	110 max.	volts
Grid Voltage:		
Negative-bias value	55 max.	volts
Peak-positive value	4 max.	volts
Grid Current	2 max.	ma
Cathode Current	15 max.	ma
Plate Dissipation	1 max.	watt

Maximum Circuit Values:

Grid-Circuit Resistance:[a]		
For fixed-bias operation	0.5 max.	megohm
For cathode-bias operation	1 max.	megohm

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current (7586)	1	0.125	0.145	amp
(8393)	2	0.055	0.065	amp
Direct Interelectrode Capacitances:				
Grid to plate (7586)	3	1.8	2.6	pf
(8393)	3	2.0	2.8	pf
Input: G to (K,S,H) (7586)	3	3.8	4.6	pf
(8393)	3	4.0	4.8	pf
Output: P to (K,S,H)	3	1.4	1.8	pf
Cathode to plate	3	0.20	0.32	pf
Heater to cathode (7586)	3	1.1	1.7	pf
(8393)	3	1.4	2.0	pf
Plate Current (1)	1,2,4	9.0	12.5	ma
Plate Current (2)	1,2,5	-	50	μa
Transconductance (1)	1,2,4	10000	13000	μmhos
Transconductance (2)	4,6,7	9000	-	μmhos

[a] For operation at metal-shell temperature of 150° C. For operation at other metal-shell temperatures, see GRID-CIRCUIT RESISTANCE RATING CHART. Metal-shell temperatures are measured in Zone "A" (See DIMENSIONAL OUTLINE).

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Transconductance Change:				
Difference between Transconductance (1) and Transconductance (2), expressed in per cent of Transconductance (1). . .	-	-	15	%
Reverse Grid Current. . . .	1,2,8	-	0.1	μa
Amplification Factor. . . .	1,2,4	28	42	
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode. . .	1,2,9	-	5	μa
Heater positive with respect to cathode. . .	1,2,9	-	5	μa
Leakage Resistance:				
Between grid and all other electrodes tied together	1,2,10	1000	-	megohms
Between plate and all other electrodes tied together	1,2,11	1000	-	megohms

Note 1: With ac or dc heater volts = 6.3 *(Type 7586)*.

Note 2: With ac or dc heater volts = 13.5 *(Type 8393)*.

Note 3: Measured in accordance with EIA Standard RS-191-A.

Note 4: With dc plate supply volts = 75, dc grid supply volts = 0, cathode resistor (ohms) = 100, cathode-bypass capacitor (μf) = 1000, and metal shell connected to ground.

Note 5: With dc plate volts = 75, dc grid volts = -7, and metal shell connected to ground.

Note 6: With ac or dc heater volts = 5.7 *(Type 7586)*.

Note 7: With ac or dc heater volts = 12.0 *(Type 8393)*.

Note 8: With dc plate volts = 80, dc grid supply volts = -1.2, grid resistor (megohm) = 0.5, and metal shell connected to ground.

Note 9: With dc heater-cathode volts = 100.

Note 10: With grid 100 volts negative with respect to all other electrodes tied together, and metal shell connected to ground.

Note 11: With plate 300 volts negative with respect to all other electrodes tied together, and metal shell connected to ground.

SPECIAL TESTS

Shock:

Peak Impact Acceleration. . . . 1000 g

This test is performed on a sample lot of tubes to determine the ability of the tube to withstand the specified Peak Impact Acceleration. Tubes are held rigid in each of four positions (X_1, X_2, Y_1, and Y_2) in a Navy Type, High-Impact (Flyweight) Shock Machine, and, with tube electrode voltages applied, are subjected to 20 blows (5 in each position) at the specified Peak Impact Acceleration.

At the end of this test, tubes are criticized for Shorts and Continuity, Change in Transconductance (1), Reverse Grid Current, Heater-Cathode Leakage Current, and Variable-Frequency Vibration.

Fatigue Vibration:

Peak Vibrational Acceleration . 2.5 max. g

This test is performed on a sample lot of tubes to determine the ability of the tube to withstand the specified Peak Vibrational Acceleration. Tubes are held rigid, supplied with center heater voltage only, and subjected for 48 hours to 2.5 g Peak Vibrational Acceleration at 60 cycles per second in the X_1 position.

At the end of this test, tubes are criticized for Shorts and Continuity, Change in Transconductance (1), Reverse Grid Current, Heater-Cathode Leakage Current, and Variable-Frequency Vibration.

Variable-Frequency Vibration:

This test is performed on a sample lot of tubes operated under the conditions specified in CHARACTERISTICS RANGE VALUES for Transconductance (1), with the addition of a plate-load resistor of 2000 ohms. During operation, tube is vibrated in the X_1 position through the frequency range of 3000 to 15000 cycles per second with a constant vibrational acceleration of 1 g. During the test, tube must not show an rms output voltage across the plate-load resistor in excess of:

25 millivolts over the frequency range of 3000 to 6000 cps

500 millivolts over the frequency range of 6000 to 15000 cps

Post-Impact and Post-Fatigue Vibration limits:

35 millivolts over the frequency range of 3000 to 6000 cps

700 millivolts over the frequency range of 6000 to 15000 cps

Low-Pressure Voltage Breakdown:

This test is performed on a sample lot of tubes to determine the ability of the tube to withstand high-altitude (low-air-pressure) conditions. Tubes are operated with 250 rms volts applied between the plate and all other electrodes and metal shell connected together. The tubes must not break down or show evidence of corona when subjected to air pressure equivalent to an altitude of 100,000 feet (8.0 ± 0.5 mm Hg).

Shorts and Continuity:

This test is performed on a sample lot of tubes from each production run. Tubes are subjected to the Thyratron-Type Shorts Test described in MIL-E-1D, Amendment 2, Paragraph 4.7.7, except that tapping is done by hand with a soft rubber tapper (Specification for this tapper will be supplied upon request). The areas of acceptance and rejection for this test are shown in the accompanying graph, SHORTS-TEST ACCEPTANCE LIMITS. Tubes are criticized for permanent or temporary shorts and open circuits

Heater-Cycling Life:

Intermittent Operation. . . . 2000 cycles

This test is performed on a sample lot of tubes under the following conditions: heater volts = 8.5 *(Type 7586)* or 18.0 *(Type 8393)* cycled one minute on and 2 minutes off; heater 180 volts negative with respect to cathode; grid, plate, and metal shell connected to ground.

At the end of this test, tubes are criticized for Open Heaters, Heater-Cathode Shorts, Open Cathode Circuits, and Heater-Cathode Leakage current.

Early-Hour Stability Life (20 hours):

This test is performed on a sample lot of tubes from each production run to assure that tubes are properly stabilized. Tubes are operated at center heater voltage and maximum rated plate dissipation.

Tubes are criticized at 2 hours and 20 hours for per cent change in Transconductance (1). A tube is rejected if its Transconductance (1) after 2 or 20 hours of operation has changed more than 10 per cent from the 0-hour value.

Survival-Rate Life (100 hours):

This test is performed on a sample lot of tubes to assure a minimum of early-hour inoperatives. Tubes are operated with center heater voltage cycled 100 minutes on and 20 minutes off, and maximum rated plate dissipation.

Tubes are criticized at 100 hours for Shorts and Continuity, Transconductance (1), and Reverse Grid Current. Tubes must then show Transconductance (1) of not less than 8300 micromhos and Reverse Grid Current no greater than 0.2 microampere.

Intermittent Conduction Life (1000 hours):

This test is performed on a sample lot of tubes from each production run to assure the high quality of individual tubes and to prevent epidemic failures due to excessive changes in tube characteristics. Tubes are operated with center heater voltage cycled 110 minutes on and 10 minutes off, and maximum rated plate dissipation, at a shell temperature of 150° C.

Tubes are criticized at 500 and 1000 hours for Inoperatives,[b] Reverse Grid Current, Heater-Cathode Leakage Current, and Leakage Resistance. In addition, a tube is rejected if its Transconductance (1) after 500 hours has changed more than 20 per cent or after 1000 hours has changed more than 25 per cent from the 0-hour value. The average change in Transconductance (1) of the lot from the 0-hour value must not exceed 15 per cent at 500 hours and 20 per cent at 1000 hours.

Standby Life (1000 hours):

This test is performed on a sample lot of tubes from each production run. Tubes are operated with only the center heater voltage applied.

At 500 and 1000 hours the tubes are criticized for Leakage Resistance, Reverse Grid Current, the change in Transconductance (1) of individual tubes from the 0-hour values, and for cathode interface resistance greater than 25 ohms. Interface resistance is measured by Method B of ASTM specification F300-61T.

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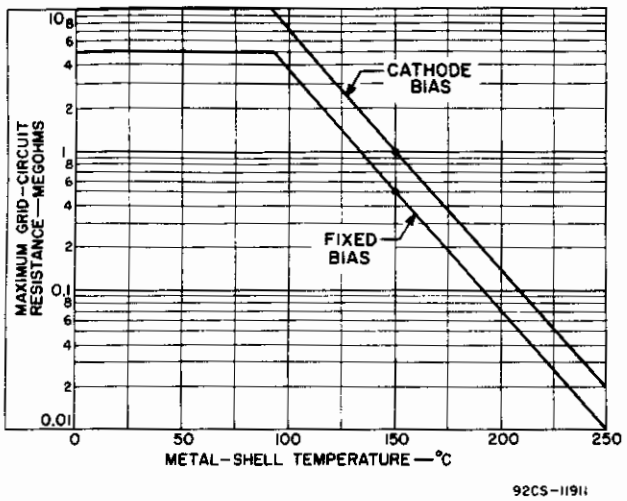
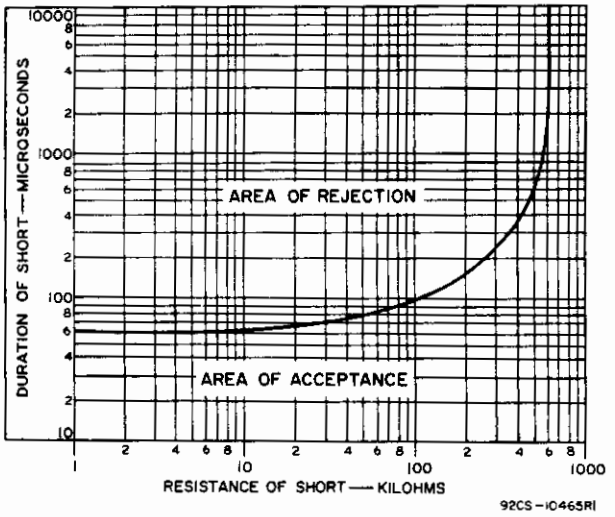
[b] An inoperative is defined as a tube having a discontinuity, permanent short, or air leak.

GRID-CIRCUIT-RESISTANCE RATING CHART



SHORTS-TEST ACCEPTANCE LIMITS



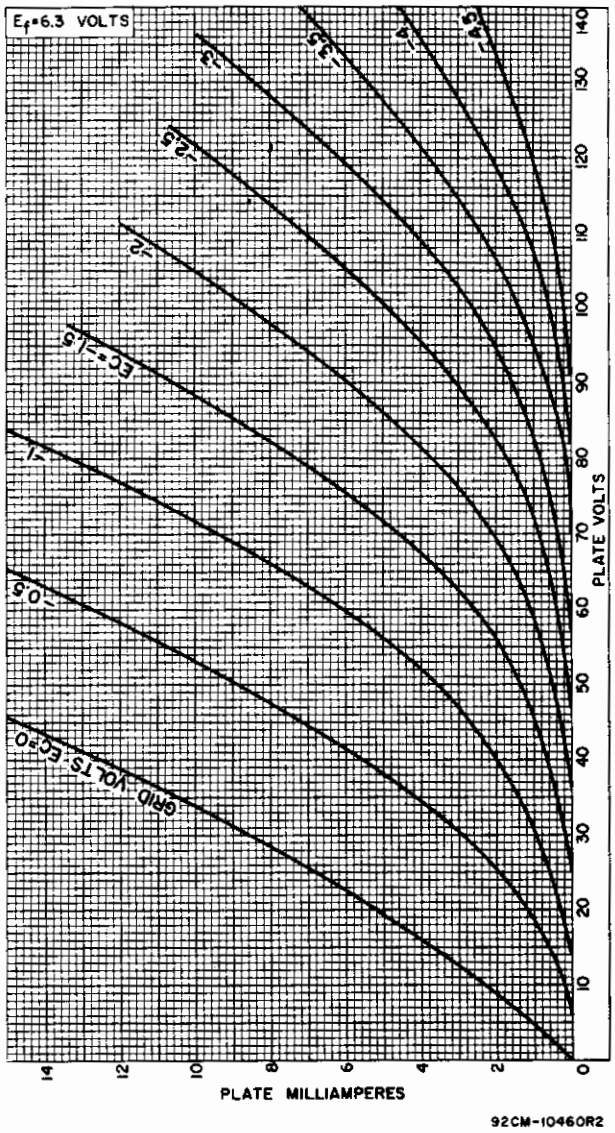
SOCKET INFORMATION

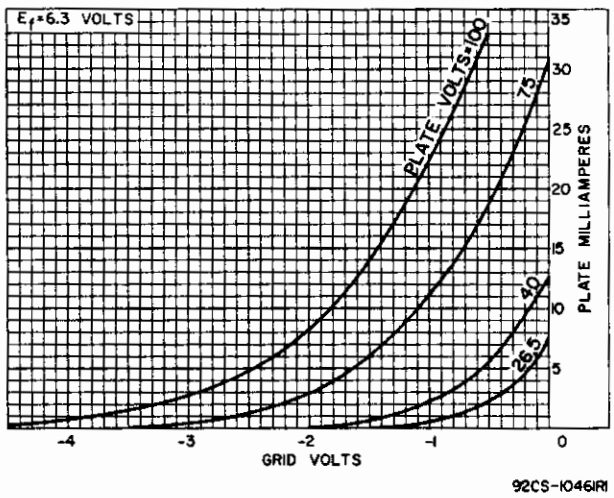
Information about the casting materials, contact materials, and finishes of the sockets listed below and of other available sockets for this nuvistor tube may be obtained from the manufacturers shown on this chart. Nuvistor sockets may also be available from other component manufacturers.

Description		Manufacturer or Distributor and Part No.		
Application	Mounting	Cinch Mfg. Co.[c]	Cinch-Jones Sales Division[d] Distributors	Industrial Electronic Hardware Corp.[e]
General Purpose Type	Crimp mounting	133 65 10 001	5NS	MSN 0905-1 MSN 0905-2 MSN 0905-3
		133 65 91 034[f] 133 65 92 025[g]	- -	- -
	Flange mounting	133 65 10 003	5NS-1	-
	Printed Board ("Stand-off")	133 65 10 009	5NS-2	-
Heat-Dissipating Type	Crimp mounting	133 65 10 041	5NS-3	-

[c] 1026 South Homan Avenue, Chicago 24, Illinois.
[d] Cinch-Jones Sales Division of Cinch Mfg. Co.
[e] 109 Prince Street, New York 12, N.Y.
[f] Low rf loss, high temperature TEFLON socket.
[g] Diall. socket for space applications.

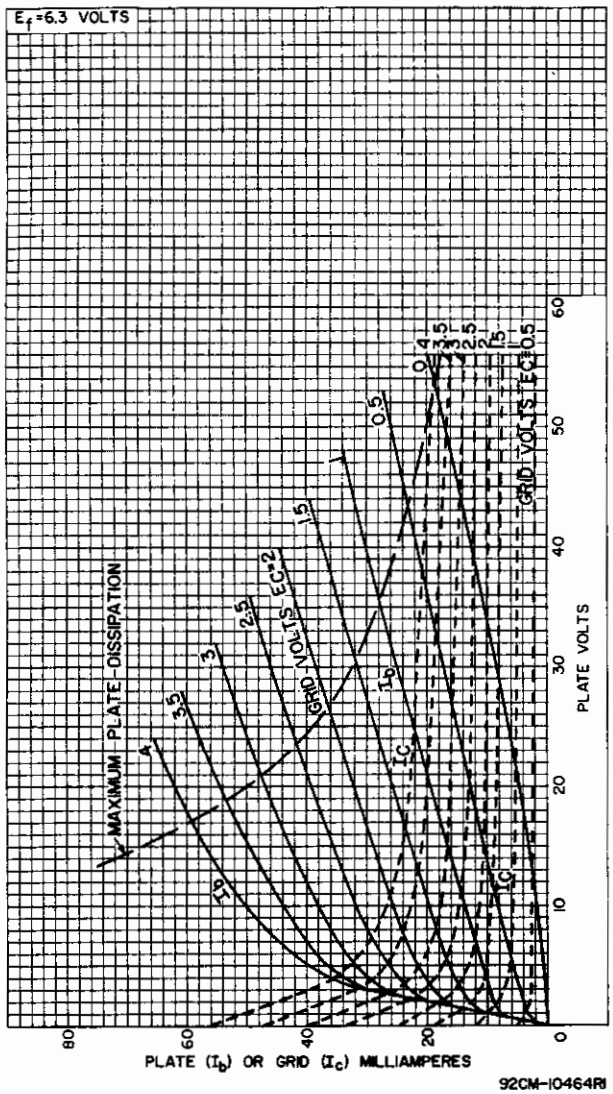
AVERAGE PLATE CHARACTERISTICS

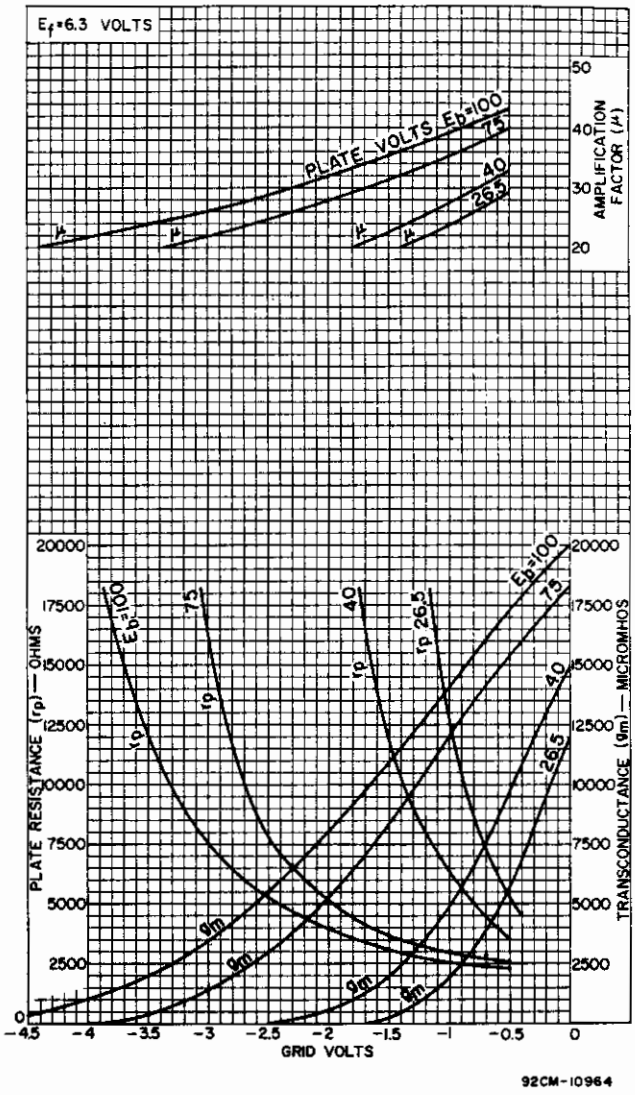




For Type 7586, and for Type 8393 (E_f = 13.5 V).

AVERAGE CHARACTERISTICS

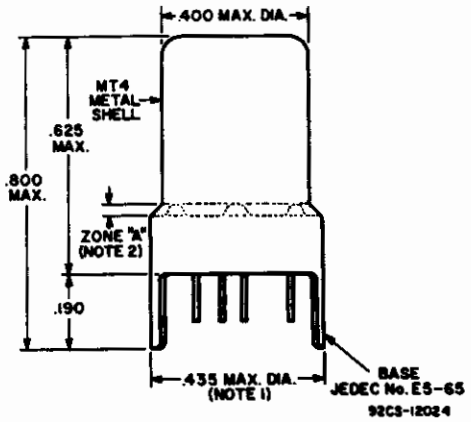




For Type 7586, and for Type 8393 (E_f = 13.5 V).

DIMENSIONAL OUTLINE JEDEC No.4-4

Dimensions in Inches

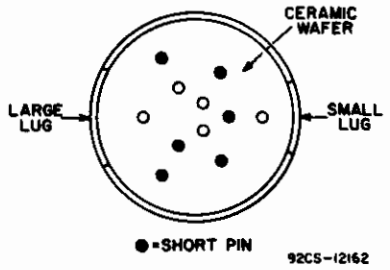


NOTE 1: MAXIMUM OUTSIDE DIAMETER OF 0.440" IS PERMITTED ALONG 0.190" LUG LENGTH.

NOTE 2: METAL-SHELL TEMPERATURE SHOULD BE MEASURED IN ZONE "A".

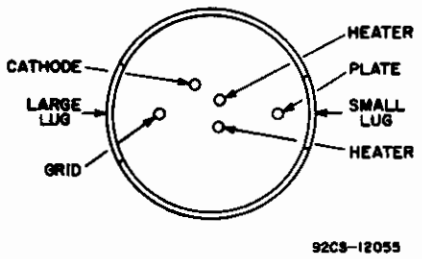
BOTTOM VIEW

Showing Arrangement of All 11 Base Pins



MODIFIED BOTTOM VIEW

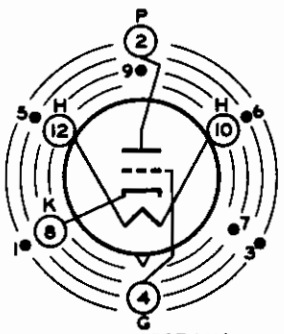
With Element Connections Indicated and Short Pins Not Shown



TERMINAL DIAGRAM

Bottom View

Pin 1§ – Do Not Use
Pin 2 – Plate
Pin 3§ – Do Not Use
Pin 4 – Grid
Pin 5§ – Do Not Use
Pin 6§ – Do Not Use



Pin 7§ – Do Not Use
Pin 8§ – Cathode
Pin 9§ – Do Not Use
Pin 10 – Heater
Pin 11 – Omitted
Pin 12 – Heater

INDEX=LARGE LUG
●=SHORT PIN; IC–DO NOT USE

JEDEC 12AQ

§ Pins 1, 3, 5, 6, 7, and 9 are of a length such that their ends do not touch the socket insertion plane.