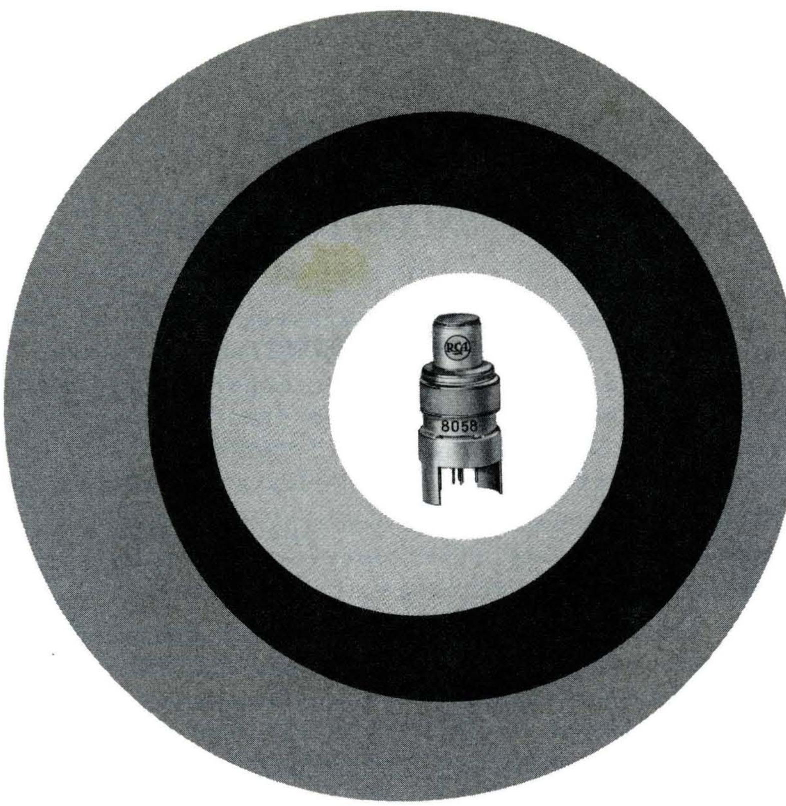


nuvistor
RCA 8058
HIGH-MU TRIODE

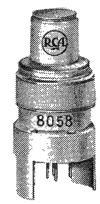
double-ended type for industrial applications

RCA RADIO CORPORATION OF AMERICA ELECTRON TUBE DIVISION, HARRISON, N. J.

RCA-8058

HIGH-MU NUVISTOR TRIODE

RCA-8058 is a double-ended, high-mu nuvistor triode of the heater-cathode type, designed for use in cathode-drive amplifier service up to 1200 Mc in a wide variety of applications. The 8058 is especially useful in industrial equipment where compactness, low drain, exceptional uniformity of characteristics, and the ability to withstand severe mechanical shock and vibration are primary design requirements.



Actual Size

The 8058 is capable of providing high gain with low noise in cathode-drive rf-amplifier service, and excellent stability as an oscillator over a wide range of frequencies.

The 8058 features very high transconductance and a high transconductance-to-plate current ratio (12400 micromhos at a plate current of 10 milliamperes and a plate-supply voltage of 110 volts). In addition, the double-ended construction of this nuvistor provides a high degree of isolation between the input and output circuits.

The 8058 is particularly suitable for cathode-drive applications because the peripheral lugs used for indexing are also used as the connections to the grid. Furthermore, three base-pin connections for the cathode reduce lead inductance and provide flexibility in circuit layout.

General Features

The 8058 has an all metal-and-ceramic envelope provided with two peripheral lugs of unequal width to facilitate insertion in a socket. It is less than one inch long, only 0.440" in diameter, and weighs approximately 2.2 grams. The 8058 features (1) a very rugged structure of unique design, (2) double-ended construction, (3) a 6.3-volt low-wattage heater and a specially designed cathode to assure very low heater-cathode leakage, (4) high transconductance at low plate current, (5) high input impedance, (6) high perveance, and (7) the ability to operate at full ratings at any altitude.

Structural Features

A major feature of the 8058 is its all-ceramic-and-metal construction utilizing a light-weight, cantilever-supported cylindrical electrode structure. This unique type of electrode structure, inherent in the nuvistor design, provides a structure of excellent mechanical stability and extreme ruggedness. All connections are brazed at very high temperatures in a hydrogen atmosphere to eliminate the structural strain and element distortion often caused by welding. The tube is also exhausted and sealed at very high temperatures to eliminate the gases and impurities which are generally present in electron devices processed at low temperatures.

The structure of the 8058 nuvistor triode also permits automatic assembly using parts made to extremely small tolerances, thus assuring exceptional uniformity of characteristics from tube to tube.

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Special Tests and Controls

The 8058 is rigidly controlled during manufacture, and is subjected to rigorous tests for intermittent shorts, 1000-hour life performance, interelectrode leakage, impact shock, variable-frequency vibration, low-pressure breakdown, and heater cycling.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3 ± 10%	volts
Current at 6.3 volts	0.135	amp
Direct Interelectrode Capacitances:		
Cathode-Drive Operation:		
Plate to cathode	0.046 max.	pf
Cathode to grid & shell and heater	6	pf
Plate to grid & shell and heater	1.3	pf
Heater to cathode	1.4	pf

Characteristics, Class A_1 Amplifier:

Plate-Supply Voltage	110	volts
Grid-Supply Voltage	0	volts
Cathode Resistor	47	ohms
Amplification Factor	70	
Plate Resistance (Approx.)	5600	ohms
Transconductance	12400	μmhos
Plate Current	10	ma
Grid Voltage (Approx.) for plate current = 10 μa	-5	volts

Mechanical:

Operating Position	Any
Maximum Over-all Length	0.985"
Maximum Seated Length	0.780"
Maximum Diameter	0.440"
Envelope	Metal and Ceramic Shell
Cap	Small, JEDEC No.C1-44
Base	Medium Ceramic-Wafer Twelvar 5-Pin (JEDEC No.E5-79)

INDUSTRIAL SERVICE

Maximum Ratings, *Absolute-Maximum Values:*

For Operation at Any Altitude

PLATE SUPPLY VOLTAGE	330 max.	volts
PLATE VOLTAGE	150 max.	volts
GRID VOLTAGE:		
Positive bias value	0	volts
Negative bias value	55 max.	volts
PLATE DISSIPATION	1.5 max.	watts
CATHODE CURRENT	15 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts

Maximum Circuit Values:

Grid-Circuit Resistance:[a]		
For fixed-bias operation	0.5 max.	megohm
For cathode-bias operation	1.0 max.	megohm

Typical Operation in Cathode-Drive RF-Amplifier Service:

	At 450 Mc	*At 700 Mc*	*At 1200 Mc*	
Plate Supply Voltage	110	110	110	volts
Cathode Resistor	47	47	47	ohms
Plate Current	10	10	10	ma
Power Gain	16.5	12.5	10.5	db
Bandwidth	6	12	12	Mc
Noise Factor[b]	6.5	9.5	12.2	db

[a] For operation at metal-shell temperatures up to 150° C (See *Dimensional Outline* on Page 9).
[b] Argon Noise Source. Input is tuned for optimum value.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	0.125	0.145	amp
Direct Interelectrode Capacitances:				
Cathode to grid & shell and heater	2	5.0	7.0	pf
Plate to grid & shell and heater	2	1.1	1.5	pf
Heater to cathode	2	1.1	1.7	pf
Plate to cathode	2	-	0.046	pf
Plate Current (1)	1,3	7.8	12.2	ma
Plate Current (2)	1,4	-	50	μa
Transconductance (1)	1,3	10000	14800	μmhos
Transconductance (2)	3,5	8700	-	μmhos
Reverse Grid Current	1,6	-	0.1	μa
Amplification Factor	1,3	54	86	
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,7	-	5	μa
Heater positive with respect to cathode	1,7	-	5	μa
Leakage Resistance:				
Between grid and all other electrodes tied together	1,8	5000	-	megohms
Between plate and all other electrodes tied together	1,9	10000	-	megohms

Note 1: With 6.3 volts ac or dc on heater.

Note 2: Measured in accordance with EIA Standard RS-191-A.

Note 3: With dc plate volts = 110, cathode resistor = 47 ohms, and cathode-bypass capacitor = 1000 μf.

Note 4: With dc plate volts = 110, dc grid volts = -5.

Note 5: With 5.7 volts ac or dc on heater.

Note 6: With dc plate volts = 150, grid supply volts = -1.3, grid resistor = 0.5 megohm.

Note 7: With 100 volts dc applied between heater and cathode.

Note 8: With grid 100 volts negative with respect to all other electrodes tied together.

Note 9: With plate 300 volts negative with respect to all other electrodes tied together.

SPECIAL RATINGS AND PERFORMANCE DATA

Shock Rating:

Impact Acceleration. . . . . 500 max. g

This test is performed on a sample lot of tubes to determine ability of tube to withstand the specified impact acceleration. Tubes are held rigid in four different positions in a Navy Type, High-impact (flyweight) Shock Machine and are subjected to 20 blows at the specified maximum impact acceleration. At the end of this test, tubes are criticized for change in transconductance, reverse grid current, and heater-cathode leakage current, and are then subjected to the Variable-Frequency Vibration Test described later.

Variable-Frequency-Vibration Performance:

This test is performed on a sample lot of tubes from each production run. The tube is 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 a direction perpendicular to the longitudinal axis of the tube through the frequency range from 50 to 15000 cycles per second under the following conditions: a sweep rate of one octave per 30 seconds from 50 to 3000 cps, a 7-second sweep from 3000 to 15000 cps, and a constant vibrational acceleration of 1g. During the test, tube must not show an output voltage in excess of:

35 rms mv over the frequency range from 50 to 3000 cps
80 peak mv over the frequency range from 3000 to 6000 cps
700 peak mv over the frequency range from 6000 to 15000 cps

Low-Pressure Voltage-Breakdown Test:

This test is performed on a sample lot of tubes. In this test tubes are operated with 250 rms volts applied between plate and all other electrodes and will not break down or show evidence of corona when subjected to air pressures equivalent to altitudes of up to 100000 feet.

Heater Cycling:

Cycles of Intermittent Operation . . . . 2000 min. cycles

This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 7.5 cycled one minute on and two minutes off; heater 100 volts negative with respect to cathode; grid, plate, and metal shell (grid) connected to ground. At the end of this test tubes are tested for open heaters, heater-cathode shorts, and heater-cathode leakage current.

Intermittent Shorts:

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, Par. 4.7.7, except that tapping is done by hand with a soft rubber tapper.[c] The Acceptance Curve for this test is shown in Fig. 4. In this test tubes are criticized for permanent or temporary shorts and open circuits.

1000-Hour Conduction Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and guard against epidemic failures due to excessive changes in any of the characteristics indicated below. In this test tubes are operated for 1000 hours at maximum rated plate dissipation with a metal-shell temperature of 150° C and then criticized for inoperatives, reverse grid current, heater-cathode leakage current, and leakage resistance. In addition, the average change in transconductance of the lot from the 0-hour value for Transconductance (1) specified in CHARACTERISTICS RANGE VALUES, must not exceed 15 per cent at 500 hours, and 20 per cent at 1000 hours.

Interelectrode Leakage:

Leakage Resistance between Plate
and All Other Electrodes tied together . . . . 10000 min. megohms

This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 6.3; and plate 300 volts negative with respect to all other electrodes tied together.

Leakage Resistance between Grid
and All Other Electrodes tied together . . . . 5000 min. megohms

This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 6.3; and grid 100 volts negative with respect to all other electrodes tied together.

OPERATING CONSIDERATIONS

The base pins of the 8058 fit the Medium Ceramic-Wafer Twelvar 5-pin Socket (JEDEC No. E5-79). The socket may be installed to hold the tube in any position. The socket should be made of insulating material having low leakage. Connection to the plate may be made with a cap having the dimensions of the JEDEC No. C1-44 Small Cap.

The *maximum ratings* in the tabulated data are established in accordance with the following definition of the *Absolute-Maximum Rating System* for rating electron devices.

Absolute-Maximum ratings are limiting values of operating and environmental conditions applicable to any electron device of a specified type as defined by its published data, and should not be exceeded under the worst probable conditions.

The device manufacturer chooses these values to provide acceptable serviceability of the device, taking no responsibility for equipment variations, environment variations, and the effects of changes in operating conditions due to variations in device characteristics.

The equipment manufacturer should design so that initially and throughout life no absolute-maximum value for the intended service is exceeded with any

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[c] Specifications for this tapper will be supplied on request.

device under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in device characteristics.

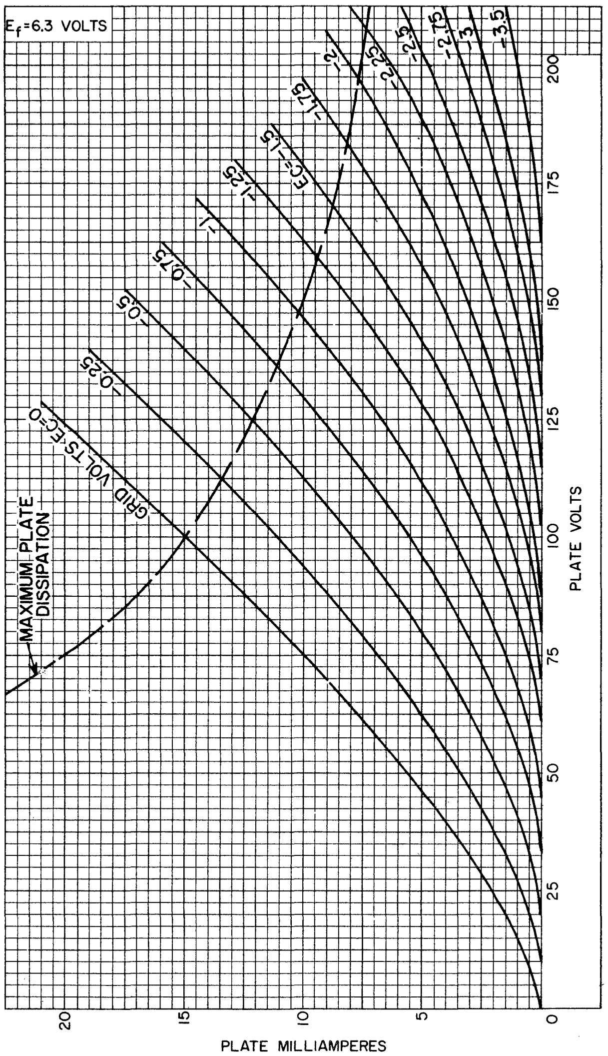


Fig. 1 - Average Plate Characteristics for Type 8058.

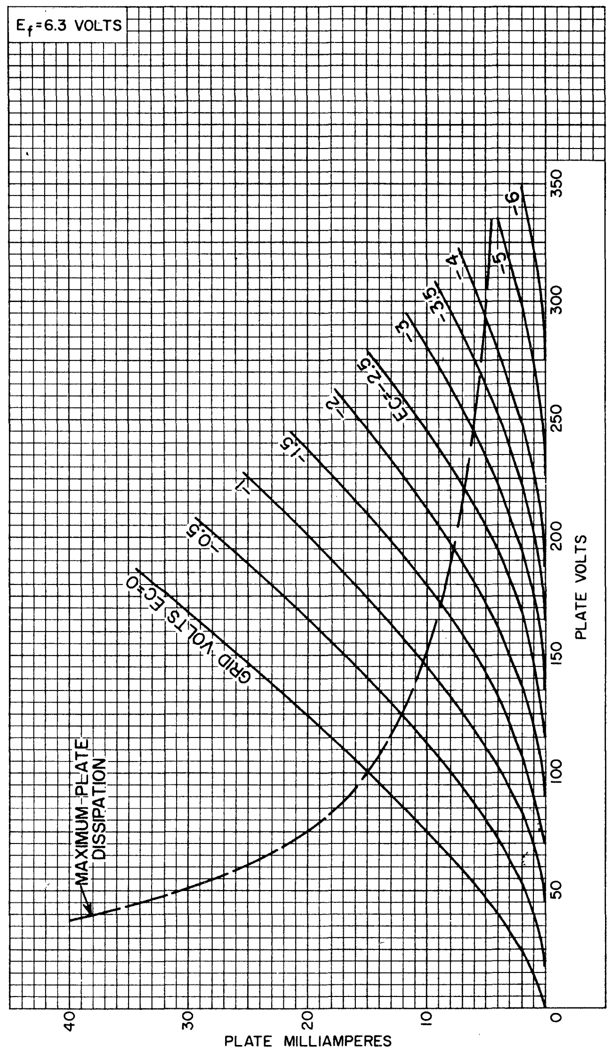


Fig. 2 - Average Plate Characteristics for Type 8058.

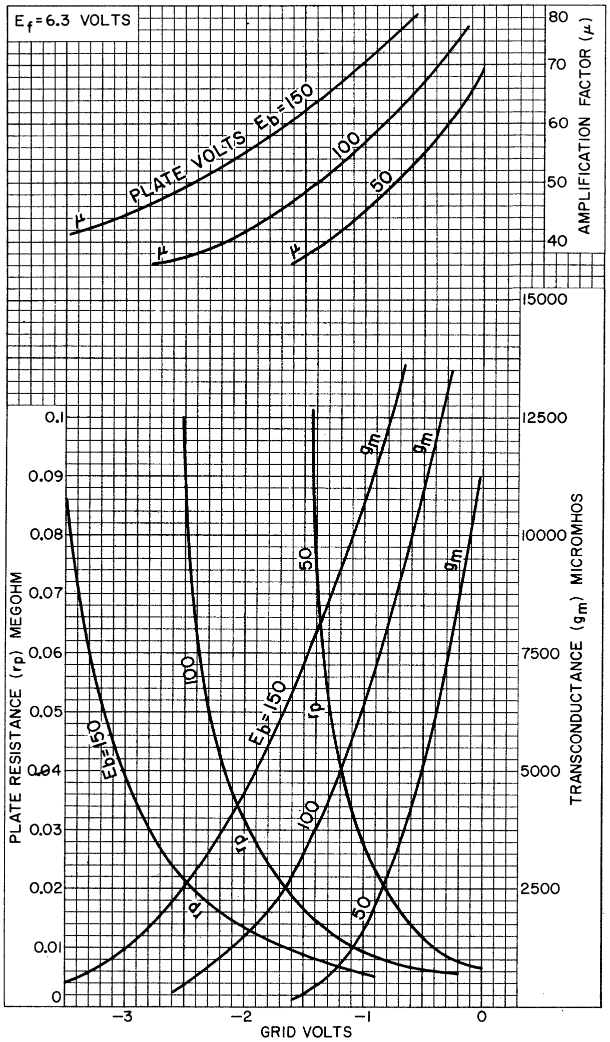


Fig. 3 - Average Characteristics for Type 8058.

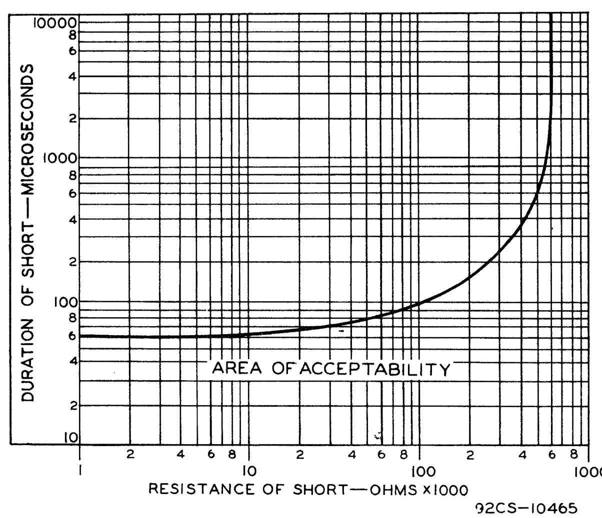
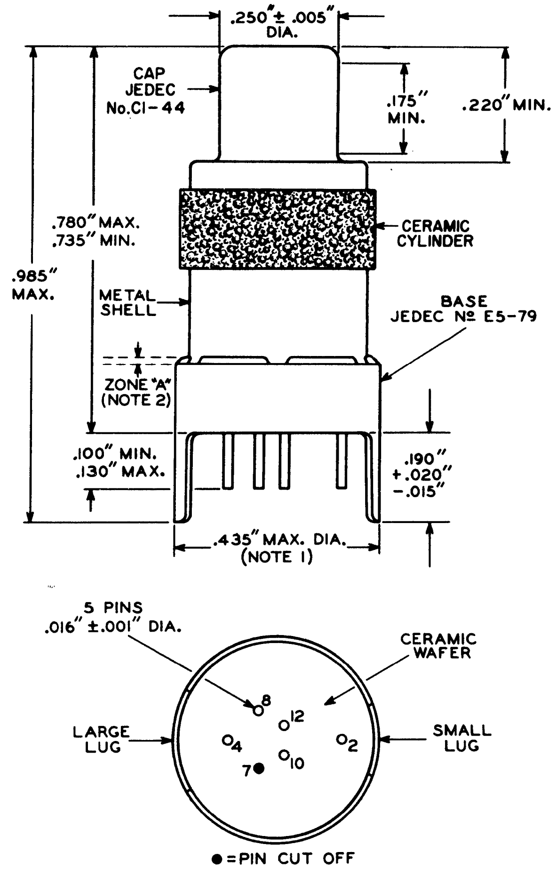


Fig. 4 - Thyratron-Type Shorts Test for Type 8058.

DIMENSIONAL OUTLINE



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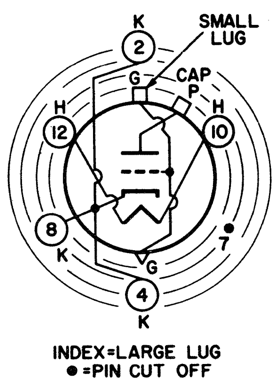
Note 1: Maximum O.D. of 0.440" is permitted along 0.190" lug length.

Note 2: Shell temperature should be measured in the zone 'A' indicated by broken lines.

BASING DIAGRAM (Bottom View)

Pin 2: Cathode
Pin 4: Cathode
Pin 7: a
Pin 8: Cathode
Pin 10: Heater

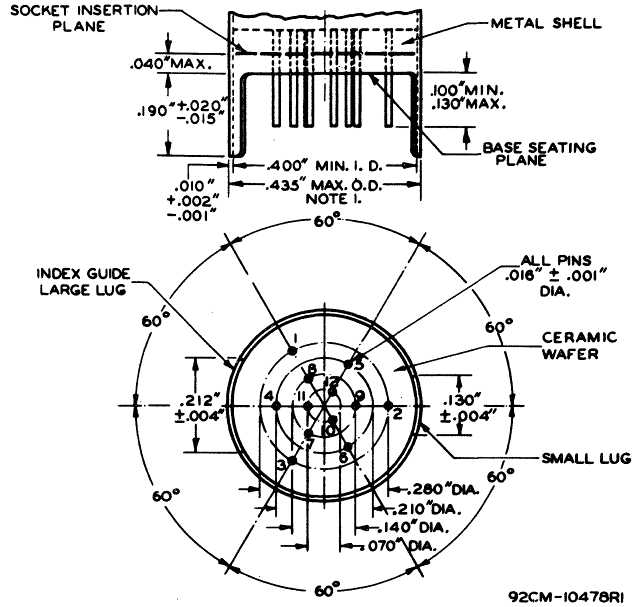


12CT

Pin 12: Heater
Small Lug: Grid
Large Lug: Grid
Cap: Plate

[a] Pin has internal connection and is cut off close to ceramic wafer—Do Not Use.

MEDIUM CERAMIC-WAFER TWELVAR BASE



JEDEC No.	NAME	PINS
E12-64	12-Pin Base	1,2,3,4,5,6,7,8, 9,10,11,12
E5-79	5-Pin Base	2,4,8,10,12 (Note 2)

Note 1: Maximum O.D. of 0.440" is permitted along the 0.190" lug length.

Note 2: Pin 7 is cut off to a length such that its end does not touch the socket insertion plane. Pins 1,3,5,6,9, and 11 are omitted.

PIN-ALIGNMENT GAUGE

Base-pin positions and lug positions shall be held to tolerances such that entire length of pins and lugs will without undue force pass into and disengage from flat-plate gauge having thickness of 0.25" and twelve holes of 0.0350" ± 0.0005" diameter located on four concentric circles as follows: three holes located on 0.2800" ± 0.0005", three holes located on 0.2100" ± 0.0005", three holes located on 0.1400" ± 0.0005", three holes located on 0.0700" ± 0.0005" diameter circles at specified angles with a tolerance of ± 0.08° for each angle. In addition, gauge provides for two curved slots with chordal lengths of 0.2270" ± 0.0005" and 0.1450" ± 0.0005" located on 0.4200" ± 0.0005" diameter circle concentric with pin circles at 180° ± 0.08° and having a width of 0.0230" ± 0.0005".

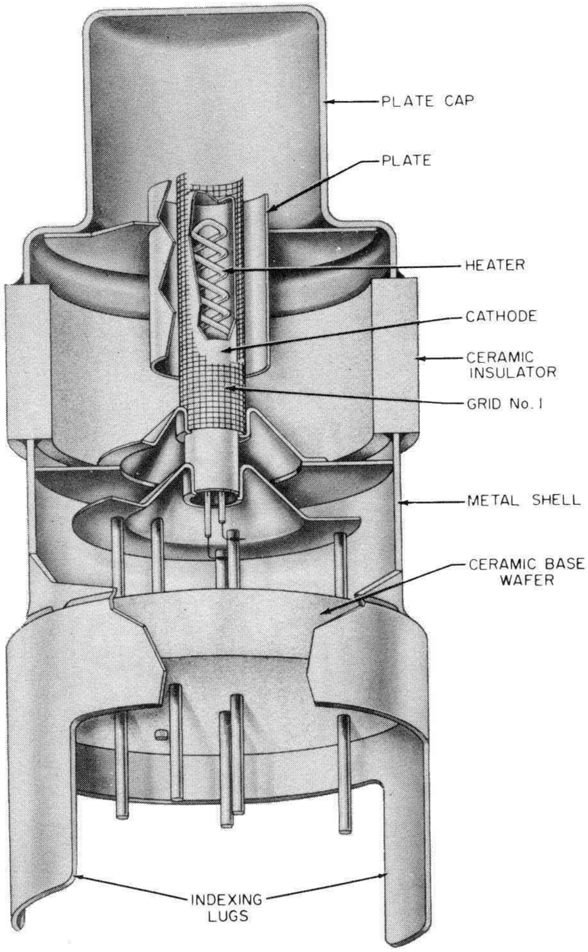


Fig.5 - Illustration of a double-ended nuvistor triode showing cylindrical electrodes and tripod-like supports.

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