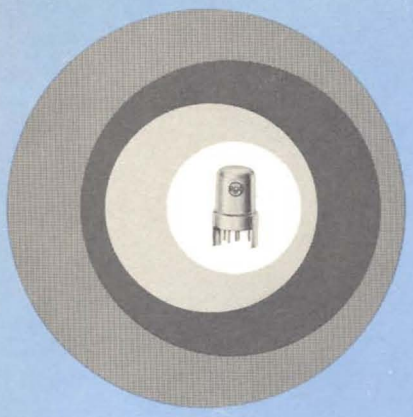


2CW4
6CW4
13CW4

RCA nuvistor

HIGH-MU TRIODES

FOR TV AND FM TUNER DESIGNS

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

PRINTED IN U.S.A.

2CW4, 6CW4, 13CW4 11-62
Supersedes 2CW4, 6CW4 issue dated 7-62

RCA-2CW4, 6CW4, 13CW4

High-Mu Nuvistor Triodes

RCA-2CW4, 6CW4, and 13CW4 are high-mu triodes of the nuvistor type, intended for use as grounded-cathode, neutralized rf-amplifier tubes. The 2CW4 and 6CW4 are particularly useful in vhf tuners of television and FM receivers. The 13CW4 is designed especially for use in antennaplex and antenna-system booster amplifiers. In these applications the tubes provide exceptional performance in fringe areas and other locations where signal levels are extremely weak. These nuvistor triodes feature excellent signal power gain and a noise factor significantly better than tubes currently in use in such applications.

The high-gain and low-noise capabilities of these tubes are achieved by very high transconductance and excellent transconductance-to-plate-current ratio (12500 micromhos at a plate current of 7.2 milliamperes and a plate voltage of 70 volts).

The 2CW4, 6CW4, and 13CW4 nuvistor triodes, because of their unique design, offer these additional advantages: extreme reliability; exceptional uniformity of characteristics from tube to tube; very small size; and low heater-power and plate-power requirements. All metal-and-ceramic construction insures ruggedness and long-term stability.

These nuvistors utilize the RCA Dark Heater to insure long life and dependable performance. The heater of the 2CW4 has controlled warm-up time for use in series heater-string arrangements.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:	*2CW4*	*6CW4*	*13CW4*	
Voltage (ac or dc)	2.1	6.3 ±10%	13.5 ±10%	volts
Current	0.45 ±6%	0.135	0.060	amp
Warm-up Time (Average)	8	-	-	seconds
Direct Interelectrode Capacitances (Approx.):				
Grid to plate			0.92	pf
Grid to cathode, shell, and heater			4.3	pf
Plate to cathode, shell, and heater			1.8	pf
Plate to cathode			0.18	pf
Heater to cathode			1.6	pf
Characteristics, Class A_1 Amplifier:				
Plate Supply Voltage			110	volts
Grid Supply Voltage			0	volts
Cathode Resistor			130	ohms
Amplification Factor			65	
Plate Resistance (Approx.)			6600	ohms
Transconductance			9800	μmhos
Plate Current			7	ma
Grid Voltage (Approx.) for plate current = 10 μa			-4	volts

Mechanical:

Operating Position	Any
Maximum Over-all Length	0.8"
Maximum Seated Height	0.625"
Maximum Diameter	0.440"
Envelope	Metal Shell
Base	Medium Ceramic-Wafer Twelvar 5-Pin (JEDEC No.E5-65)

Maximum Ratings, *Design-Maximum Values:*

PLATE SUPPLY VOLTAGE	300●	max.	volts
PLATE VOLTAGE	135	max.	volts
GRID VOLTAGE:			
Negative-bias value	55	max.	volts
Peak positive value	0	max.	volts
PLATE DISSIPATION:			
With a minimum series plate-circuit resistance of 5000 ohms	1.5	max.	watts
For lower values of series plate-circuit resistance	See *Fig.1 and Operating Considerations*		
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

Typical Operation:

Plate Voltage	70	volts
Grid Supply Voltage	0	volts
Grid Resistor	47000	ohms
Amplification Factor	68	
Plate Resistance (Approx.)	5440	ohms
Transconductance	12500	μmhos
Plate Current	7.2	ma

Maximum Circuit Values:

Grid-Circuit Resistance:★			
For fixed-bias operation	0.5	max.	megohm
For cathode-bias operation	2.2	max.	megohms

● A plate supply voltage of 300 volts may be used provided sufficient plate-circuit resistance and agc voltage are used to limit the voltage at the plate of the tube to 135 volts under conditions of maximum rated plate dissipation (1.5 watts).

★ For operation at metal-shell temperatures up to 135° C.

OPERATING CONSIDERATIONS

The *base pins* of the 2CW4, 6CW4, and 13CW4 fit the Cinch Manufacturing Co. socket No.133 65 10 001 and the Industrial Electronic Hardware Co. socket Nos.Nu 5044 and Nu 5060, or their equivalents.

In some previous publications reference has been made to a JEDEC No.E5-65 socket. This number is not a socket designation but is a base designation which defines the JEDEC Medium Ceramic-Wafer Twelvar 5-pin base used in nuvistor tubes.

Use of Plate-Dissipation Rating Chart

The *Plate-Dissipation Rating Chart* shown in Fig.1 presents graphically the maximum rated plate dissipation of the 2CW4, 6CW4, and 13CW4 for various minimum

values of series plate-circuit resistance. The region of permissible operation is bounded by the lines representing plate dissipation = 1.5 watts, plate voltage = 135 volts, and plate current = 15 milliamperes. In class A_1 amplifier service, because no grid current flows, the plate current rating is equivalent to the cathode current rating.

To determine the required minimum series plate-circuit resistance for a given set of operating conditions:

1. From Fig. 2, Average Plate Characteristics, select the desired operating conditions.

2. From Fig. 1 determine the corresponding maximum plate dissipation and required minimum value of series plate-circuit resistance.

Example: (a) From Fig. 2 — for a plate voltage of 130 volts and a grid voltage of -1 volt, the corresponding plate current is 10.5 milliamperes.

(b) From Fig. 1 — the plate dissipation for a plate voltage of 130 volts and a plate current of 10.5 milliamperes is approximately 1.37 watts. The required minimum series plate-circuit resistance for this plate dissipation is 3700 ohms.

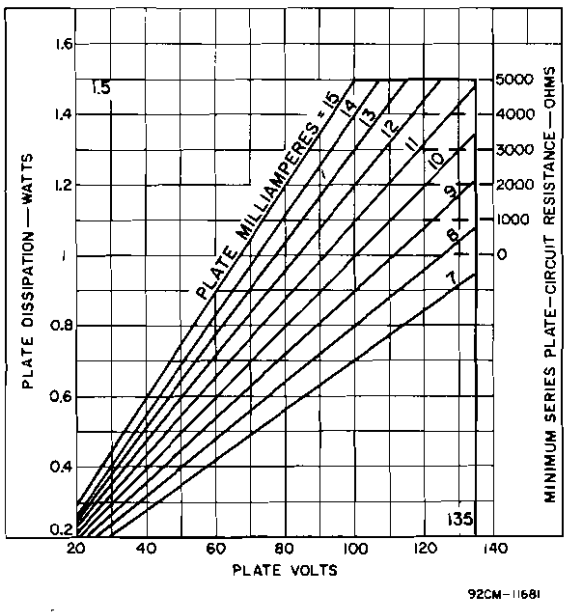


Fig. 1 - Plate-Dissipation Rating Chart for Types 2CW4, 6CW4, and 13CW4.

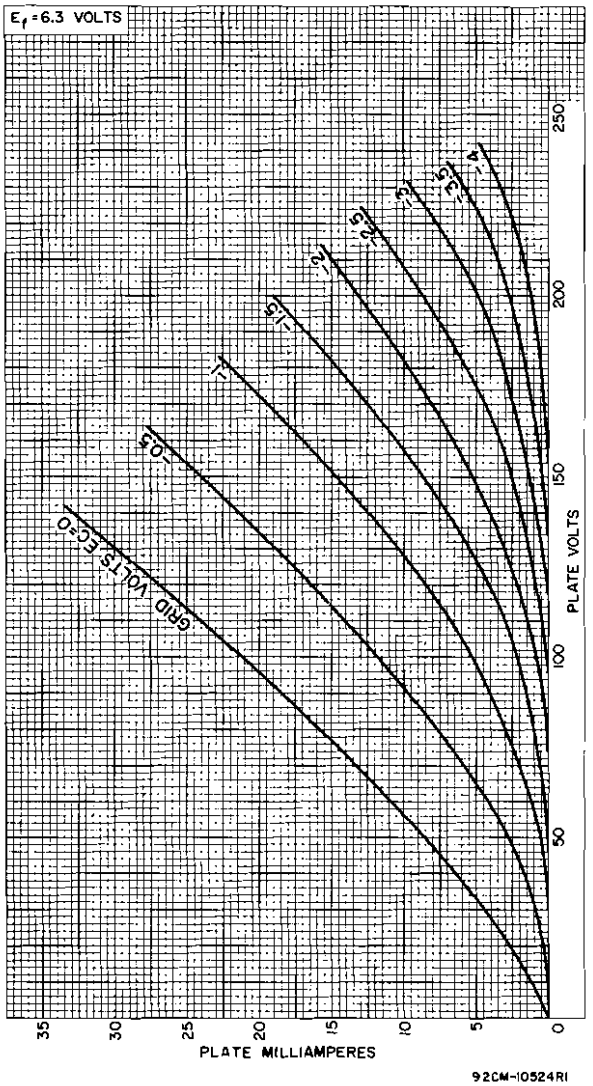


Fig. 2 - Average Plate Characteristics for Type 6CW4 and for Types 2CW4 and 13CW4 Except for Heater Voltage.

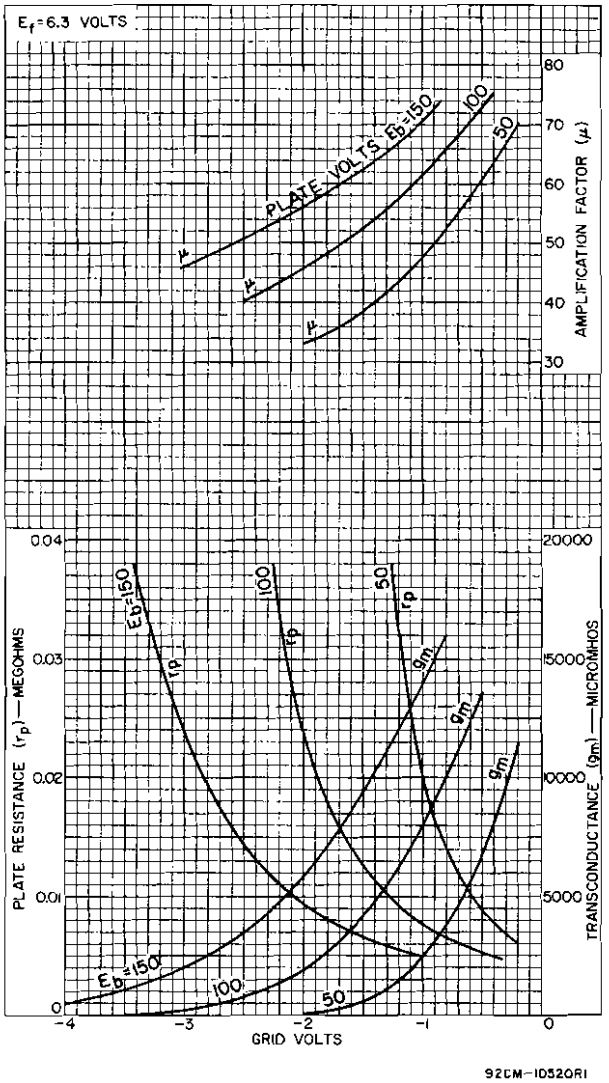
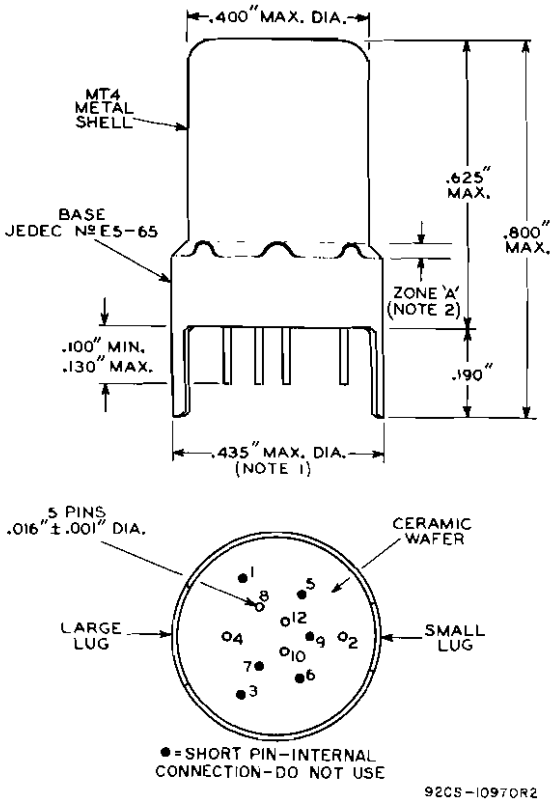


Fig. 3 - Average Characteristics for Type 6CW4 and for Types 2CW4 and 13CW4 Except for Heater Voltage.

DIMENSIONAL OUTLINE

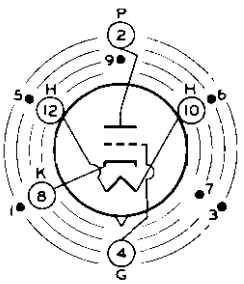


NOTE 1: MAXIMUM O.D. OF 0.440" IS PERMITTED ALONG 0.190" LUG LENGTH.

NOTE 2: SHELL TEMPERATURE SHOULD BE MEASURED IN ZONE 'A'.

BASING DIAGRAM
(Bottom View)

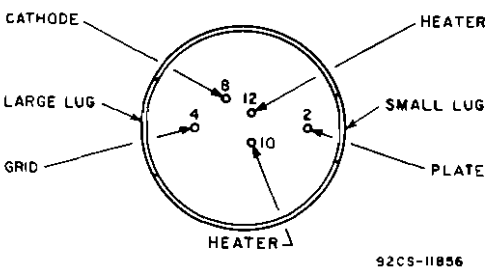
PIN 1: ●
PIN 2: PLATE
PIN 3: ●
PIN 4: GRID
PIN 5: ●
PIN 6: ●
PIN 7: ●
PIN 8: CATHODE
PIN 9: ●
PIN 10: HEATER
PIN 11: OMITTED
PIN 12: HEATER



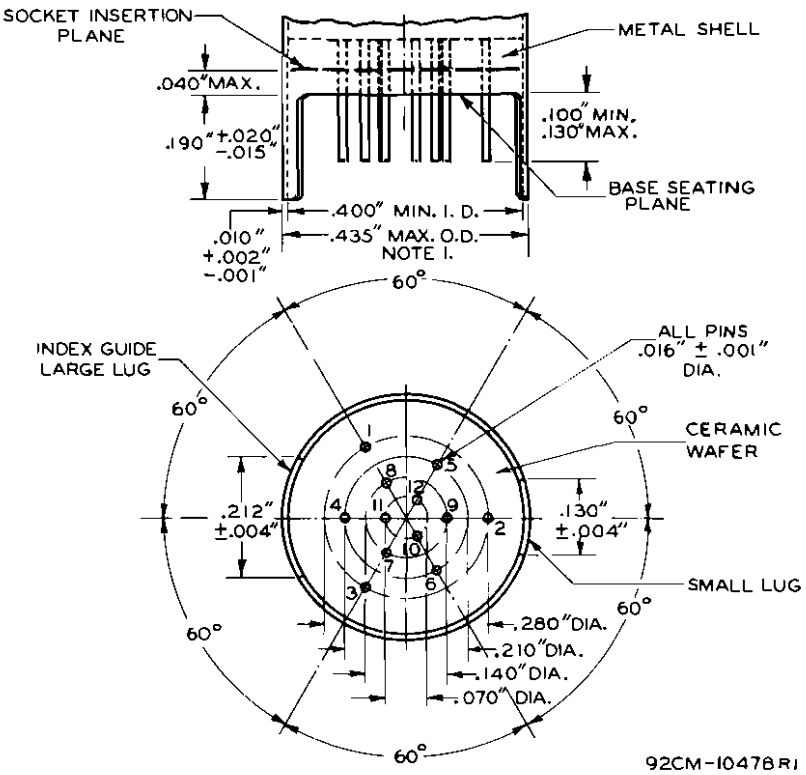
INDEX = LARGE LUG
● = SHORT PIN—INTERNAL CONNECTION—DO NOT USE

12AQ

ARRANGEMENT OF BASE PINS



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
E5-65	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: Pins 1,3,5,6,7, and 9 are of a length such that their ends do not touch the socket insertion plane. Pin 11 is 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".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