

Dieter's Nixie Tube Data Archive

This file is a part of Dieter's Nixie- and display tubes data archive

If you have more datasheets, articles, books, pictures or other information about Nixie tubes or other display devices please let me know.

Thank you!

Document in this file	RCA - Numitron tubes datasheet
Display devices in this document	DR2000, DR2010, DR2020, DR2030, DR2100, DR2100V1, DR2110, DR2120, DR2130, DR2200, DR2200V1, DR2210, DR2220, DR2230

Characteristics

	DR2000	DR2100 DR2100V1	DR2200 DR2200V1	
Electrical	Series	Series	Series	
Recommended dc Segment Voltage Range	3.5 to 5.0	3.5 to 5.0	1.5 to 3.0	V
DC Segment Voltage	4.5	4.5	2.5	V
Segment Current @ Rated Voltage	24	24	14	mA
Segment Dissipation	108	108	35	mW
Mean Life Expectancy (at 95% confidence)	100,000	100,000	100,000	h
Visual				
Viewing Angle (included angle)	140°	120°	120°	
Segment Luminance (typ.)	7000	7000	4000	fL
Contrast Ratio	30:1	30:1	30:1	
Response Times:				
Ascent to Visibility (typ.)	15	15	8	ms
Descent to 50% of Luminance	<20	<20	<10	ms
Maximum Segment Deflection From a Straight Line	0.005	0.004	0.004	in

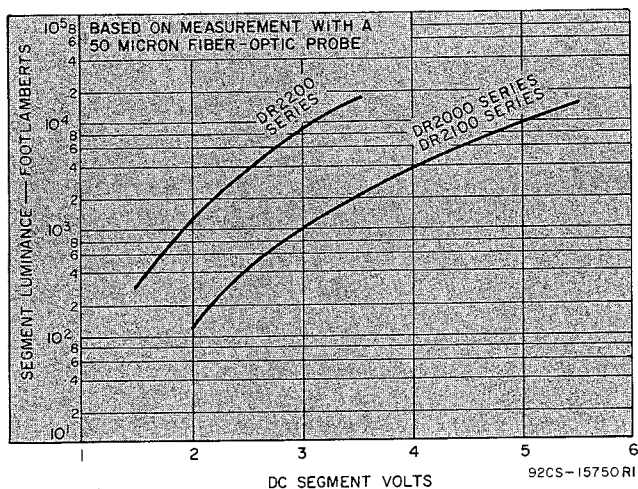


Fig. 1— Segment luminance characteristics

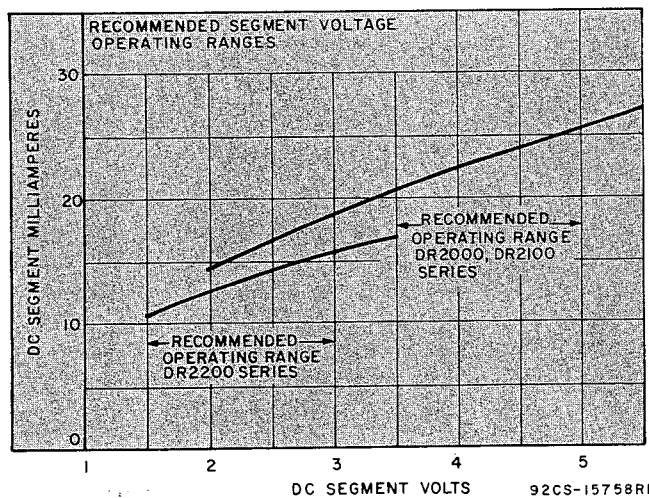


Fig. 2 — Segment Current vs. Segment Voltage

Hardware and Accessories

Sockets

Noval 9-contact Types

DR2000 Series

- Methode Electronics, Inc., M8610 (For 0.8-inch centers) and P460 (standard)
- Cinch Mfg. Co., 121-51-00-040 (standard)

TO-5 10-contact Types

DR2100, DR2200 Series

- Methode Electronics, Inc., M8620
- Cinch Mfg. Co., 133-99-92-054
133-99-92-065 (Spread-Lead Type)

Filters

Polaroid Corp., Cambridge Mass. 02139

Circular Polarizer:

Standard and Diffused Surface for Broader Stroke

Panelgraphic Corp., West Caldwell, N.J. 07006

Chromafilter CF-131: Anti-Reflection Filters

Plastic Light Shield to Reduce Side Reflections

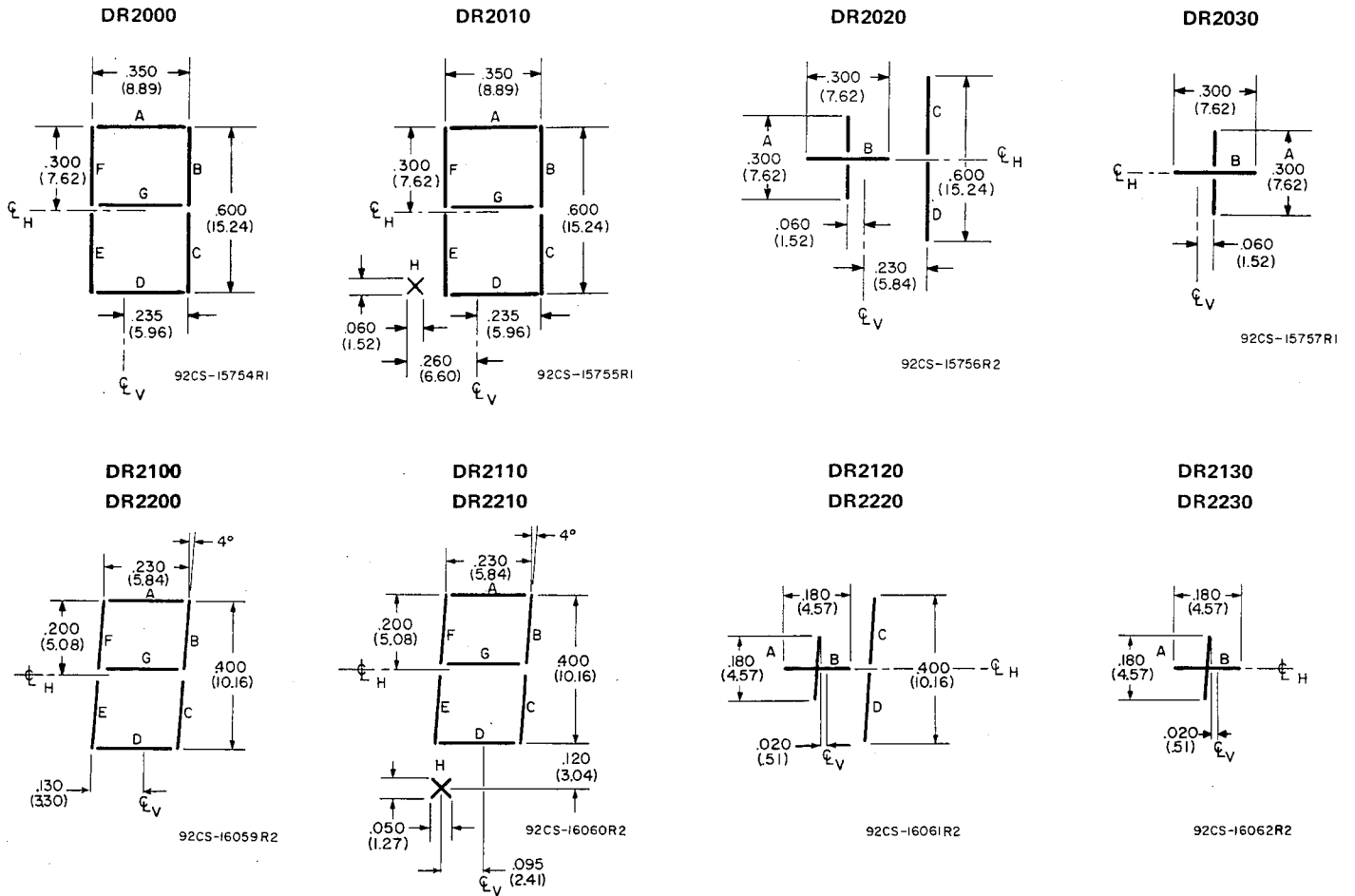
DR2100, DR2200 Series

- RCA DS3000

DR2000 Series

- RCA DS3001

Segment Dimensions and Designations



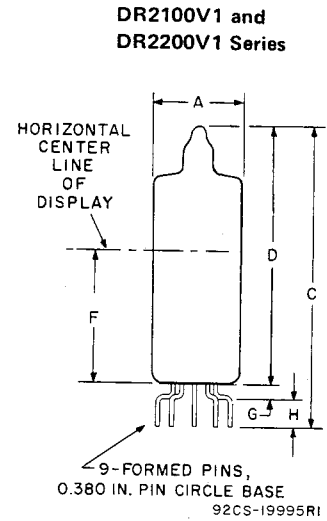
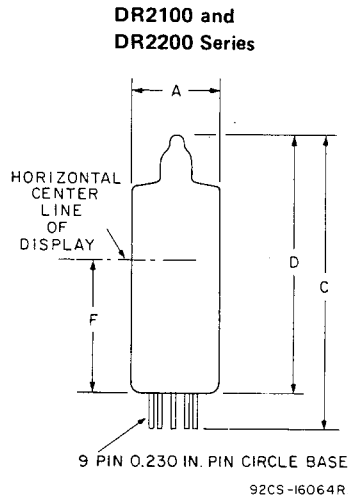
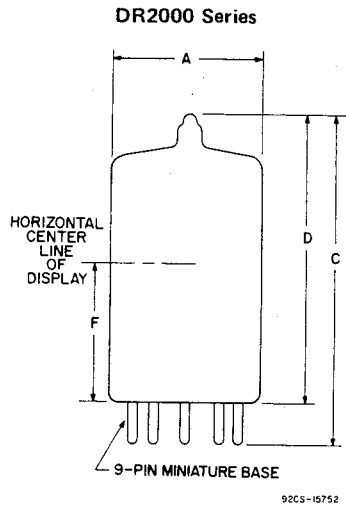
CL_H = Horizontal center line of display (dimension F) with pin No. 3 toward viewer. Segment "G" is 0.030" above CL_H .
 CL_V = Vertical center line of device

On DR2100 and DR2200 series vertical center line of display coincides with vertical center line of device.
 Dimensions in parentheses are in millimeters and are derived from the basic inch dimensions as indicated.

Display	Type	Segment Designations A-H								
		1	2	3	4	5	6	7	8	9
	DR2000 DR2100 DR2200	NC	COMMON	E	D	C	G	A	B	F
	DR2010 DR2110 DR2210	H		E	D	C	G	A	B	F
	DR2020 DR2120 DR2220	NC		NC	NC	NC	D	B	C	A
	DR2030	NC		NC	NC	NC	B	NC	A	NC
	DR2130 DR2230	NC		NC	NC	NC	NC	B	NC	A

NC = no connection – may be used as tie point.

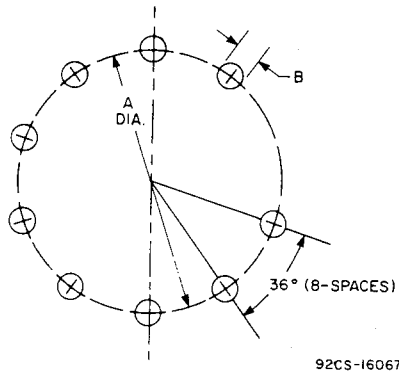
Dimensional Outlines



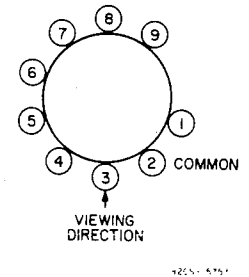
DIMENSION	DR2000 Series				DR2100 and DR2200 Series				DR2100V1 and DR2200V1 Series			
	INCHES		MILLIMETERS		INCHES		MILLIMETERS		INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
A		0.800		20.32		0.485		12.32		0.485		12.32
C		1.875		47.62		1.700		43.18		1.665		42.29
D		1.625		41.27		1.450		36.83		1.450		36.83
F	0.700	0.730	17.78	18.54	0.625	0.655	15.87	16.64	0.625	0.655	15.87	16.64
G									0.060	0.090	1.52	2.28
H									0.095	0.125	2.41	3.18

MILLIMETER DIMENSION DERIVED FROM INCH DIMENSION

Pin Circle Dimensions



NUMITRON SERIES	DIMENSION (INCHES)		
	A	B	
	Nominal	MIN.	Max.
DR2000	0.468	0.038	0.042
DR2100 and DR2200	0.230	0.018	0.022
DR2100V1 and DR2200V1	0.380	0.018	0.022



Base Diagram (All Series) Bottom View

Environmental Tests

DR2000 and DR2100 Series

Shock*

A	Peak Impact Acceleration	100 g
	Duration of Approximate Half Sine-Wave Mechanical Shock Pulse	1 ms
	Operating Condition During Test:	
	DC Segment Voltage	4.5 V
B	Peak Impact Acceleration	50 g
	Duration of Approximate Half Sine-Wave Mechanical Shock Pulse	11 ms
	Operating Condition During Test:	
	Segment Voltage Not Applied	-

Vibration Fatigue*

Peak Vibrational Acceleration	2.5 g
Vibration Frequency	25 Hz
Duration of Test	96 h
DC Segment Voltage	4.5 V

Variable Frequency Vibration

	Peak Vibrational Acceleration	Vibration Frequency Range	Displacement Amplitude	
A Test 1	—	10–44 Hz	0.1 in	
Test 2	10 g	44–200 Hz	—	
DC Segment Voltage	—	—	—	4.5 V
B Test 1	1 g	200-800 Hz	—	
Test 2	10 g	800-2000 Hz	—	
DC Segment Voltage	—	—	—	4.5 V

DR2200 Series

Variable Frequency Vibration

Test 1	—	5–60 Hz	0.1 in	
Test 2	20 g max.	60-500 Hz	—	
DC Segment Voltage	—	—	—	2.5 V

Shock*

A Peak Impact Acceleration	200 g
Duration of Approximate Half Sine-Wave Mechanical Shock Pulse	1 ms
Operating Condition During Test: DC Segment Voltage	2.5 V
B Peak Impact Acceleration	50 g
Duration of Approximate Half Sine-Wave Mechanical Shock Pulse	11 ms
Operating Condition During Test: Segment Voltage Not Applied	—

Vibration Fatigue*

Peak Vibrational Acceleration	2.5 g
Vibration Frequency	25 Hz
Duration of Test	96 h
DC Segment Voltage	2.5 V

*Performed in Accordance with MIL-E-1

The NUMITRON Digital Display Devices will meet the Radio Technical Commission of Aeronautics (RTCA), Document No. DO-138 Dated June 27, 1968. Specifications for operational and crash safety shock tests; standard environmental vibration for instrument panel location in all types of aircraft.

Construction Features and Reliability

Features

The single-helical coil segments of the NUMITRON devices are rigidly supported by accurately positioned pins that protrude through a black substrate to form an in-plane structure for direct viewing. The in-plane viewing surface provides a display that is free of clutter and residual images. The black substrate forms a background that offers an excellent contrast to the display. In addition, the "up-front" type of display surface makes possible a wide viewing angle.

The single-helical coil segments are made from a tungsten-alloy wire that is specially treated to prevent objectionable bowing of the coil segments during the life of the devices. The coil segments are connected to the lead wires by use of highly reliable welding techniques specifically developed for this purpose. The coil-and-substrate structure is firmly supported inside the glass envelope. Additional support is provided by the rugged, formed

internal leads used to connect the coil segments to the external pin connections.

The DR2000 and DR2100 coil segments operate at a temperature of approximately 1350°C and the DR2200 at approximately 1200°C. These temperatures are substantially less than the operating temperature (typically about 2500°C) of filamentary lamps. At this relatively low operating temperature, the vapor pressure of the tungsten-alloy wire is essentially zero so that evaporation of the coil segments is negligible. In addition, the low operating temperature and the relatively small mass of the coil segments assure that all other parts remain cool and, therefore, do not release any gas during operation. The typical envelope temperature of a NUMITRON device during operation is illustrated by Fig. 3, which shows that the bulb temperature is only a maximum of 14°C above the ambient temperature. These factors and the efficient getter employed assure that the high initial vacuum will not be degraded during the useful life of these devices.