# **Dieter's**

# Nixie Tube Data Archive

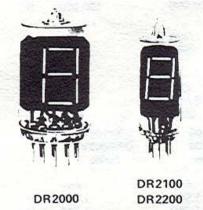
This file is a part of Dieter's Nixie- and display tubes data archive

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	DR2000, DR2010, DR2020, DR2030, DR2100, DR2100V1, DR2110,
this document	DR2115, DR2120, DR2130, DR2200, DR2200V1, DR2210, DR2215,
	DR2220, DR2230

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





## **NUMITRON** Digital Display Devices

## Series DR2000, DR2100 and DR2200

### Segmented Incandescent Types

For use as visual displays in a wide variety of digital counter and measuring applications.

Features

- high brightness fully adjustable
- low-voltage operation
- high contrast segmented digits viewed against a dark background
- compatible with IC Decoder/Drivers such as the RCA CD2500E family
- high reliability rugged construction
- wide-spectrum light emission permits unlimited color filter selection

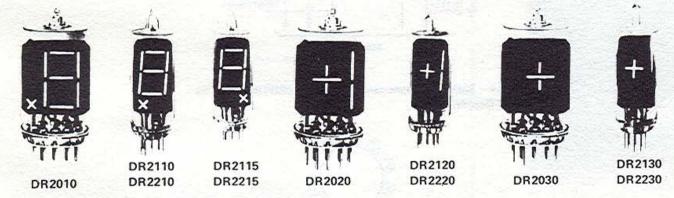
- wide viewing angle
- void of "clutter"
- solderable base pins permit direct PC board mounting
- DR2000 series fits low-cost
  9-pin miniature socket
- DR2100 and DR2200 series fit TO-5 style, 10-pin socket

The DR2000, DR2100 and DR2200 series NUMITRON digital display devices provide a sharp, high-brightness numeric\* display. These low-voltage, incandescent-type devices have wide-spectrum light emission which permits the use of filters to obtain a display of any desired color. Intended for use in equipment which requires a numeric display output, these devices are fully compatible with IC decoder/drivers and may be operated in either a direct or multiplex mode.

These NUMITRON devices utilize a rugged, single-plane unit construction which results in a highly reliable device with very long life expectancy. The "up-front" display surface permits a wide viewing angle with a display that is free of "clutter" and residual images. Brightness is completely adjustable, with simple voltage controls, from zero output to a level that is easily viewable under very high ambient-light conditions. The devices are free of induced or radiated interference. The 9-pin, circular basing arrangement facilitates the design of PC board layout.

The DR2000 series NUMITRON devices fit into a standard 9-pin miniature electron tube socket. However, for PC board applications where mounting space is limited, a commercial PC board socket which permits 0.8-inch center-to-center mounting is available. Base pins are solderable and permit direct PC board mounting.

The DR2100 and DR2200 series NUMITRON devices are available in two versions: the DR2100 and DR2200 series with straight leads and the DR2100V1 and DR2200V1 series with formed leads. The straight lead devices may be mounted on 0.5-inch centers directly on PC boards or may be used with standard TO-5 style, 10-pin sockets. The formed lead devices are intended for direct PC board mounting. For application information see RCA NUMITRON Display Device Booklet, NUM-421.



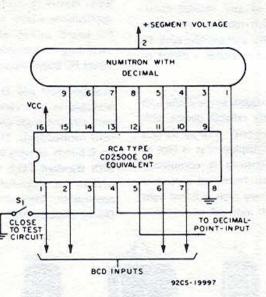
ADR2200 series formerly RCA Dev. Nos. DTF 137, 138, 139, 140 and 141

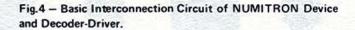
\*Individual segments may be addressed to provide symbol or alphabetic output such as the letters A, C, E, F, H, J, L, P, & U.

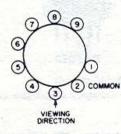
Information furnished by RCA is believed to be accurate and reliable. However, no responsibility is assumed by RCA for its use; nor for any infringements of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of RCA.

### NUMITRON Digital Display Devices

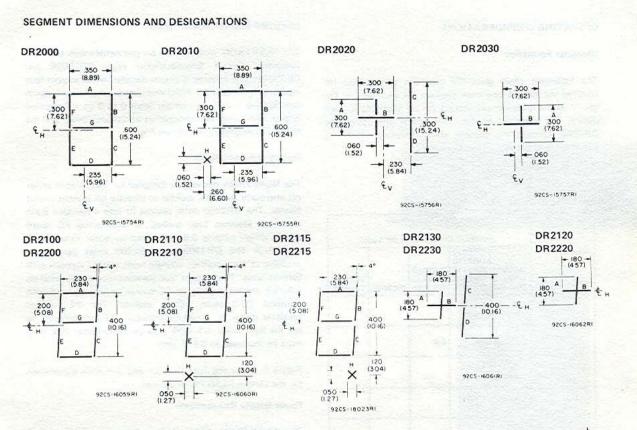
		A DESCRIPTION OF THE OWNER OF THE	All the second second	
ELECTRICAL CHARACTERISTICS	DR2000 Series	DR2100 Series	DR2200 Series	
Recommended DC Segment Operating Voltage Range	3.5 to 5.0	254.50	15	
DC Segment Voltage uplace otherwise specified		3.5 to 5.0	1.5 to 3.0	V
DC Segment Voltage unless otherwise specified	4.5	4.5	2.5	V
Segment Current	24	24	14	m
Mean Life Expectancy (at 95% confidence)	100,000	100,000	100,000	h
VISUAL CHARACTERISTICS				
Viewing Angle (including angle)	140	120	120	0
Segment Luminance (typ.)	7000	7000	4000	fL
Response Times:		dau.	19	t self.
Ascent to Visibility (typ.)	15	15	8	m
Descent to 50% of Luminance	<20	<20	<10	m
Maximum Segment Deflection From a Straight Line	0.005	0.004	0.004	in
Contrast Ratio	30:1	30:1	20:1	22 312
••••••••••••••••••••••••••••••••••				
	Sector Sector	DR2100	DR2100V1	
	DR2000	DR2200	DR2200V1	
	Series	Series	Series	
DIMENSIONAL CHARACTERISTICS				
Mounting Position	Any	Any	Any	
Maximum Overall Length	1.875	1.660	1.705	in
Maximum Seated Length	1.625	1.450	1.540	in.
Maximum Diameter	0.800	0.485	0.485	in.
Base	pin miniature	9-pin, 0.230 in.	9-pin, 0.380 in.	
	and a state of the state of the	pin circle	pin circle	
			the second second second	







Bottom View



 $\xi_{\rm H}$  = Horizontal center line of display (bulb outline dimension F) with pin No. 3 toward viewer. Segment "G" is 0.030"above  $\xi_{\rm H}$ .

 $c_V$  = Vertical center line of device.

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		Segment Designations A–H									
	Туре			1.000	Base Pin Number			A AS	1. 1. J. W.		
		1	2	3	4	5	6	7	8	9	
Β	DR2000 DR2100 DR2200	NC	Î	E	D	С	G	A	В	F	
with	DR2010 DR2110 DR2115 DR2210 DR2215	Н	COMMON	E	D	с	G	A	в	F	
$\frac{1}{1}$	DR2020 DR2120 DR2220	NC	00	NC	NC	NC	D	В	с	A	
$\frac{1}{1}$	DR2030	NC		NC	NC	NC	В	NC	A	NC	
+	DR2130 DR2230	NC		NC	NC	NC	NC	В	NC	A	

#### BASE PIN NUMBER AND SEGMENT DESIGNATION CHART

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

- 4 -

(; — ;)

#### **OPERATING CONSIDERATIONS**

#### **Character Formation**

The following chart gives the base pin connections for forming the various character displays for each device. Pin No. 2 is the common connection for all segments in each device. For example, to form a numeral one using type DR2000, connect the segment voltage between pin No. 2 (common) and pin Nos. 5 and 8.

#### DIGITAL CHARACTER FORMATION

	Device Pin Number									
		Pin No. 2 Common For All Types								
Display	DR2000 DR2100 DR2200	DR2010 DR2110 DR2115 DR2210 DR2215	DR2020 DR2120 DR2220	DR2030	DR2130 DR2230					
(D)	3,4,5,7, 8,9	3,4,5,7, 8,9			about of					
	5,8	5,8	6,8							
É.	3,4,6, 7,8	3,4,6, 7,8		2						
(U)	4,5,6, 7,8	4,5.6, 7,8								
Ϋ́	5,6,8,9	5,6,8,9		and .	1 79.1					
Ę.	4,5,6, 7,9	4,5,6, 7,9								
Ű,	3,4,5,6, 7,9	3,4,5,6, 7,9	14-34 14-34 14-34 14-14	nciane.						
$(\hat{\mathbf{j}})$	5,7,8	5,7,8		D	erfs ter					
(8)	3,4,5,6, 7,8,9	3,4,5,6, 7,8,9								
( <u>9</u>	4,5,6,7, 8,9	4,5,6,7, 8,9	6							
+			7,9	6,8	7,9					
Ξ		E	7	6	7					
decimal		1								

#### Integrated Circuit Decoder/Driver

The NUMITRON series devices are compatible with the RCA Integrated Circuit Decoder/Driver types CD2500E and CD2501E. The integrated circuit decoder/driver accepts four inputs in BCD (8-4-2-1 code) and decodes them into outputs representing a decimal number from 0 to 9 on a 7-segment display. For basic interconnection of decoder/driver and the NUMITRON display devices see Fig. 4.

#### Mounting Arrangements

The NUMITRON devices are designed for mounting in either commercially available sockets or directly on printed circuit boards. The DR2000 series devices fit into a standard 9-pin miniature electron tube socket. A commercial PC board socket which permits 0.8-inch center-to-center mounting is available. The DR2100 and DR2200 series devices are available in two versions: straight leads and V1 versions with formed leads: The straight lead versions may be mounted on 0.5-inch centers directly on PC boards or may be used with standard TO-5 style, 10-pin sockets. The V1 versions facilitate direct PC board mounting on 0.5-inch centers. To use the light shield, DR3000<sup>+</sup>, the center-to-center mounting must be increased to 0.515-inch.

Figure 5 shows the base diagram and pin-circle dimensions for the various NUMITRON devices.

#### **Power Supply Requirements**

The NUMITRON Series devices do not require critical voltage regulation over the useable operating range. As is the case with any incandescent type device, dc voltage operation above the recommended value may result in reduced life expectancy. For multiplex operation, segment voltage above the normal range may be used provided that the appropriate duty factor is observed. (See NUMITRON Display Device Booklet, NUM-421).

#### Display

Because these NUMITRON devices have a wide-band light spectrum emission, filters<sup>†</sup> can be used to produce any desired color display. A display having a broader stroke can be obtained with an etched glass such as "Trusite"<sup>\*</sup> or a diffused filter. For a larger size display, a Fresnel lens may be used.

\*Trademark "Trusite" Dearborn Glass Co., Chicago, Illinois.

t + see page 3.