

Attention is called to the use of Design-Maximum Ratings for this type.



# 23NP4

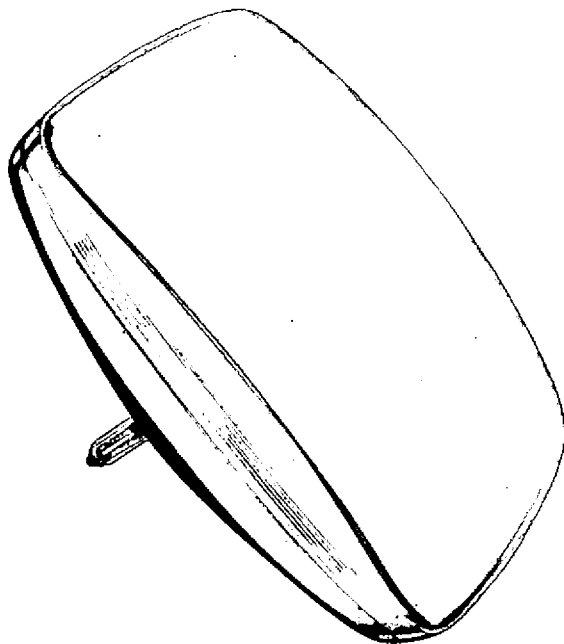
## PICTURE TUBE

Low-Voltage Electrostatic Focus  
114° Magnetic Deflection

Aluminized Screen  
Low-Grid-No.2-Voltage Type  
for Cathode-Drive Operation

19-1/4" x 15-1/8" Screen  
23-31/64" Max. Bulb Diagonal  
14-11/16" Max. Overall Length

RCA-23NP4 is a directly viewed, rectangular glass picture tube having an aluminized screen 19-1/4" x 15-1/8" with nearly straight sides and slightly rounded corners, and a minimum projected screen area of 282 square inches. Maximum overall length is 14-11/16".



The 23NP4 features an envelope having a relatively flat, compound radius faceplate and special internal contouring in the deflecting yoke region to obtain 114° deflection with 110° deflecting components.

The 23NP4 has an electron gun that has improved cathode-drive sensitivity; that requires no ion-trap magnet; and that minimizes deflection distortion.

Other design features of the 23NP4 include a neck diameter of 1-1/8"; an external conductive bulb coating; and a "neoeightar" 7-pin base of the integral glass-button type having straight through leads fitted with an indexing plug.

### GENERAL DATA

#### Electrical:

Heater Current at 6.3 volts . . . . .	600 ± 30	ma
Heater Warm-Up Time (Average) . . . . .	11	seconds
Heater warm-up time is defined as the time required in the test circuit shown in Fig. 1 for the voltage (E) across the heater terminals to increase from zero to 5 volts.		
Direct Interelectrode Capacitances:		
Grid No. 1 to all other electrodes . . . . .	6	μμf
Cathode to all other electrodes . . . . .	5	μμf
External conductive coating to ultor . . . . .	2500 max. 1700 min.	μμf
Focusing Method . . . . .		
Deflection Method . . . . .		Magnetic
Deflection Angles (Approx.):		
Diagonal . . . . .		114°
Horizontal . . . . .		102°
Vertical . . . . .		84°
Electron Gun . . . . .	Type Requiring No Ion-Trap Magnet	

#### Optical:

Faceplate . . . . .	Filterglass
Light transmission at center (Approx.) . . . . .	78%
Phosphor . . . . .	P4-Sulfide Type, Aluminized
Fluorescence . . . . .	White
Phosphorescence . . . . .	White
Persistence . . . . .	Medium Short

#### Mechanical:

Tube Dimensions:	
Overall length . . . . .	14-3/8" ± 5/16"
Greatest width . . . . .	20-1/2" + 1/16"-1/8"
Greatest height . . . . .	16-1/2" ± 1/8"
Diagonal . . . . .	23-25/64" + 3/32"-1/8"
Neck length . . . . .	5-1/8" ± 1/8"
Curvature of faceplate:	
External surface—	
Center radius . . . . .	50"
Edge radius . . . . .	36-3/4"
Internal surface—	
Center radius . . . . .	30"
Intermediate radius . . . . .	48"
Edge radius . . . . .	24"
Screen Dimensions (Minimum):	
Greatest width . . . . .	19-1/4"
Greatest height . . . . .	15-1/8"
Diagonal . . . . .	22-5/16"
Projected area . . . . .	282 sq. in.
Bulb . . . . .	J167 (114°)
Cap . . . . .	Recessed Small Cavity (JEDEC No. J1-21)
Base . . . . .	Small-Button Neoeightar 7-Pin, Arrangement 1, (JEDEC No. B7-208)
Basing . . . . .	8HR
Weight (Approx.) . . . . .	24 lbs.
Operating Position . . . . .	Any



## CATHODE-DRIVE SERVICE

Unless otherwise specified, voltage values are positive with respect to grid No. 1

### Maximum and Minimum Ratings, Design-Maximum Values:

ULTOR TO-GRID-NO. 1 VOLTAGE . . . . .	{ 22000 max. volts	
	{ 11000 min. volts	
GRID-NO. 4-TO-GRID-NO. 1 VOLTAGE:		
Positive value . . . . .	1100 max. volts	
Negative value . . . . .	550 max. volts	
GRID-NO. 2-TO-GRID-NO. 1 VOLTAGE . . . . .		
	{ 70 max. volts	
	{ 40 min. volts	
CATHODE-TO-GRID-NO. 1 VOLTAGE:		
Positive peak value . . . . .	220 max. volts	
Positive bias value . . . . .	154 max. volts	
Negative bias value . . . . .	0 max. volts	
Negative peak value . . . . .	2 max. volts	
HEATER VOLTAGE . . . . .		
	{ 6.9 max. volts	
	{ 5.7 min. volts	
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode:		
During equipment warm-up period not exceeding 15 seconds . . . . .	450 max. volts	
After equipment warm-up period . . . . .	200 max. volts	
Heater positive with respect to cathode . . . . .		
	200 max. volts	

### Equipment Design Ranges:

With any ultor-to-grid-No. 1 voltage ( $E_{c5g1}$ ) between 11000 and 22000 volts and grid-No. 2-to-grid-No. 1 voltage ( $E_{c2g1}$ ) between 44 and 70 volts

Grid-No. 4-to-Grid-No. 1 Voltage for focus $\phi$ . . . . .	0 to 400 volts
Cathode-to-Grid-No. 1 Voltage ( $E_{kg1}$ ) for visual extinction of focused raster . . . . .	See Raster-Cutoff-Range Chart
Cathode-to-Grid-No. 1 Video Drive from Raster Cutoff (Black level):	
White-level value {Peak negative} . . . . .	Same value as determined for $E_{kg1}$ except video drive is a negative voltage
Grid-No. 4 Current . . . . .	-25 to +25 $\mu$ a
Grid-No. 2 Current . . . . .	-15 to +15 $\mu$ a
Field Strength of Adjustable Centering Magnet $\Phi$ . . . . .	0 to 8 gauss

### Examples of Use of Design Ranges:

With ultor-to-grid-No. 1 voltage of 18000 volts and grid-No. 2-to-grid-No. 1 voltage of 50 volts	
Grid-No. 4-to-Grid-No. 1 Voltage for focus $\phi$ . . . . .	0 to 400 volts
Cathode-to-Grid-No. 1 voltage for visual extinction of focused raster . . . . .	34 to 49 volts
Cathode-to-Grid-No. 1 Video Drive from Raster Cutoff (Black level):	
White-level value . . . . .	-34 to -49 volts

### Maximum Circuit Values:

Grid-No. 1-Circuit Resistance . . . . .	1.5 max. megohms
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The maximum ratings in the tabulated data are established in accordance with the following definition of the Design-Maximum Rating System for rating electron tubes.

Design-Maximum ratings are limiting values of operating and environmental conditions applicable to a bogey 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 responsibility for 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 Design-Maximum value for the intended service is exceeded with a bogey device under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, and environmental conditions.

The "ultor" in a cathode-ray tube is the electrode to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection. In the 23NP4, the ultor function is performed by grid No. 5. Since grid No. 5, grid No. 3, and collector are connected together within the 23NP4, they are collectively referred to simply as "ultor" for convenience in presenting data and curves.

Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid No. 1 and the other electrodes.

Individual tubes will have satisfactory focus at some value of grid-No. 4-to-grid-No. 1 voltage between 0 and 400 volts with the combined bias voltage and video-signal voltage adjusted to give an ultor current of 200 microamperes.

Distance from Reference Line for suitable PM centering magnet should not exceed 2-1/4". Excluding extraneous fields, the center of the undeflected focused spot will fall within a circle having a 7/16-inch radius concentric with the center of the tube face. It is to be noted that the earth's magnetic field can cause as much as 1/2-inch deflection of the spot from the center of the tube face.

## OPERATING CONSIDERATIONS

**X-Ray Warning.** When operated at ultor voltages up to 16 kilovolts, the 23NP4 does not produce any harmful X-ray radiation. However, because the rating of this type permits operation at voltages as high as 22 kilovolts (design-maximum value), shielding of the 23NP4 for X-ray radiation may be needed to protect against possible injury from prolonged exposure at close range whenever the operating conditions involve voltages in excess of 16 kilovolts.

**Shatter-Proof Cover Over the Tube Face.** Following conventional picture-tube practice, it is recommended that the cabinet be provided with a shatter-proof, glass cover over the face of the 23NP4 to protect it from being struck accidentally and to protect it against possible damage resulting from tube implosion under some abnormal condition. This safety cover can also provide X-ray protection when required.

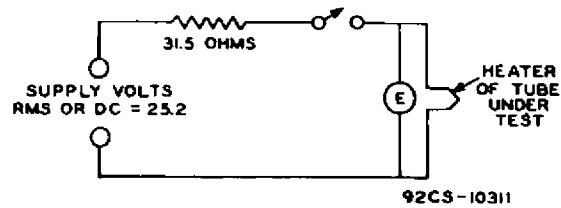


Fig. 1 - Test Circuit for Determining Heater Warm-Up Time.

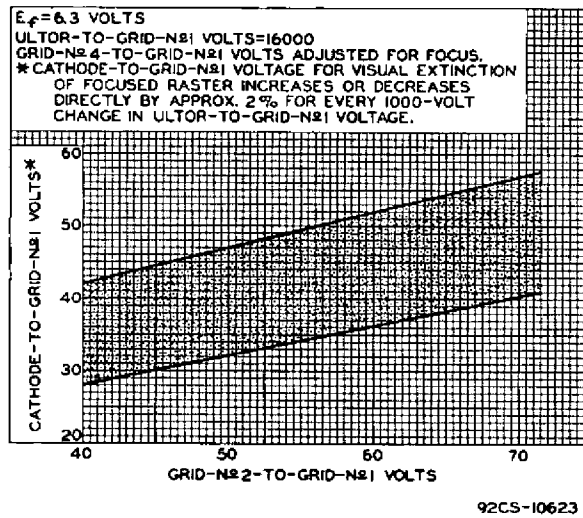
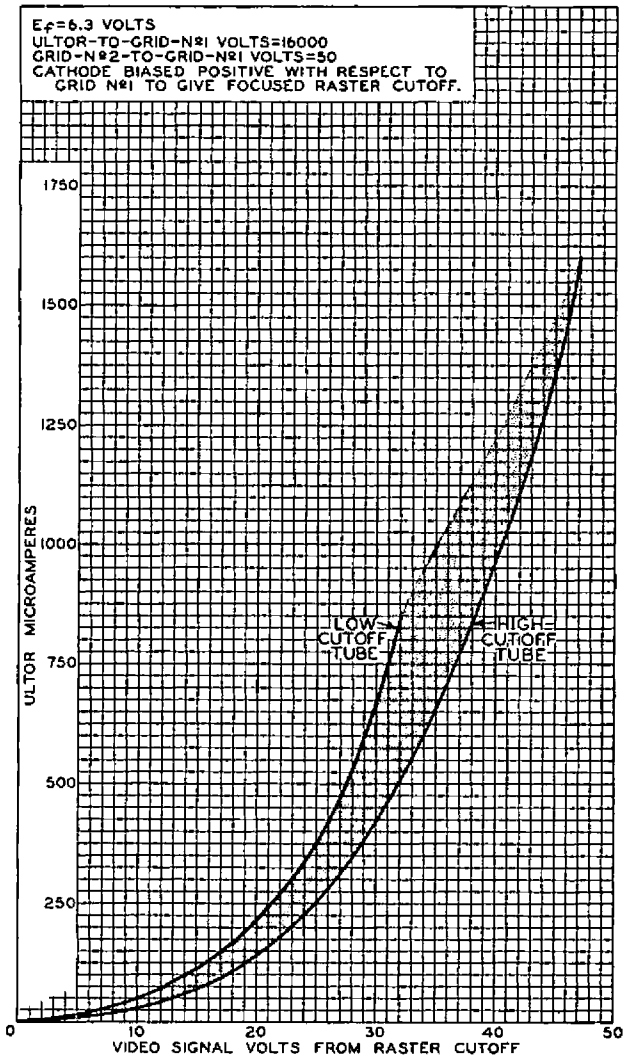
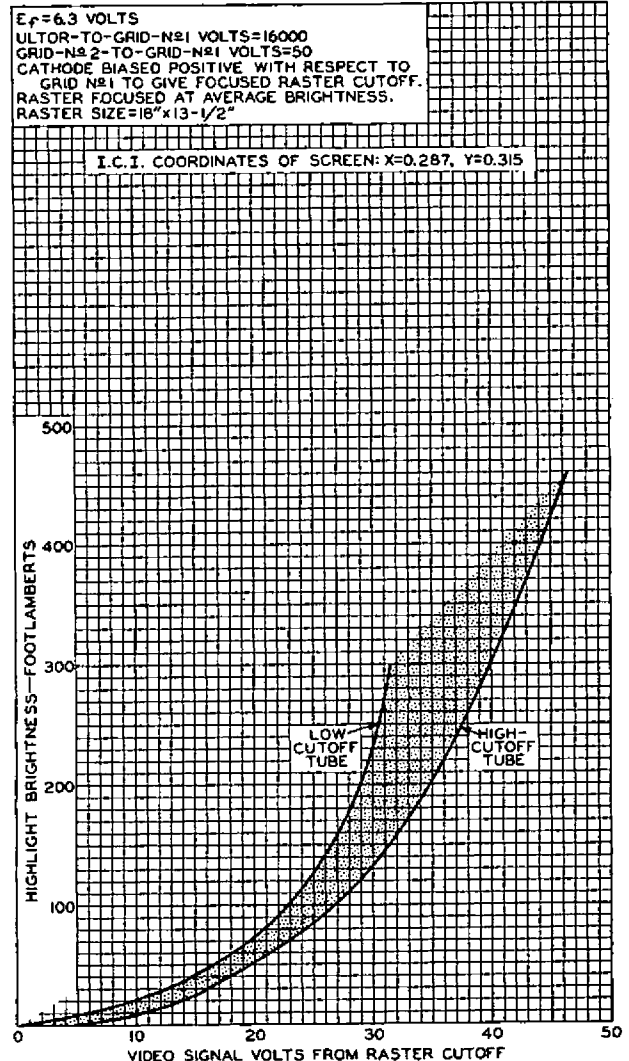


Fig. 2 - Raster-Cutoff-Range Chart for Type 23NP4.



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Fig. 3 - Cathode-Drive Characteristics of Type 23NP4.

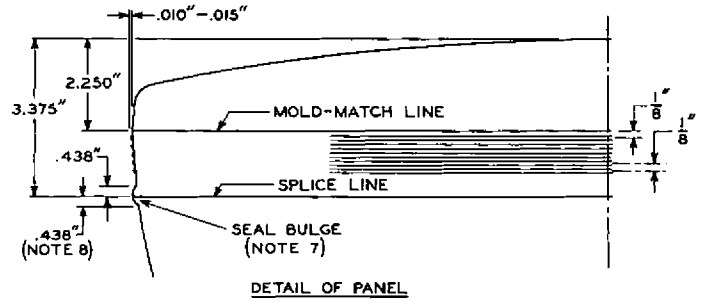
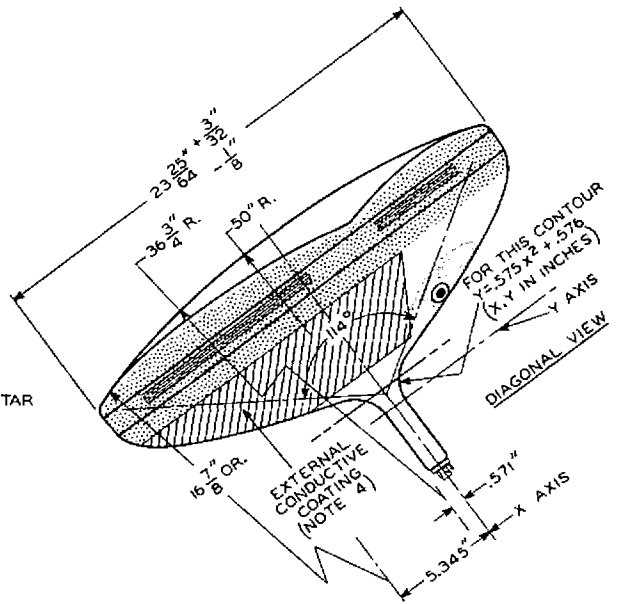
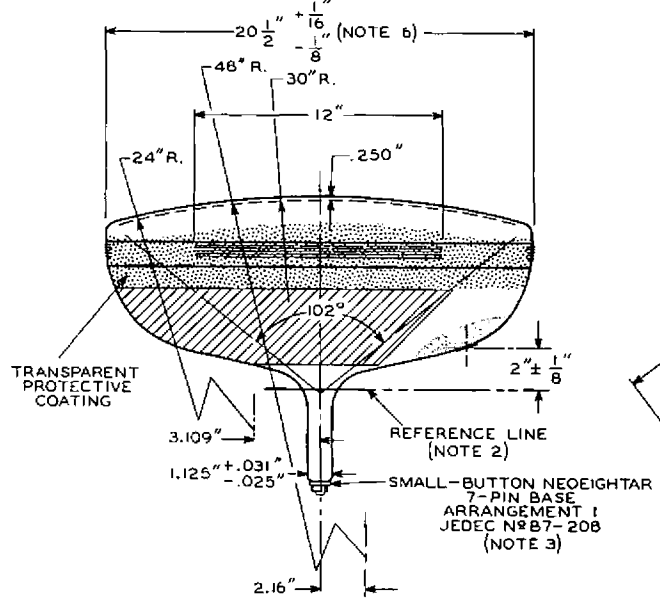
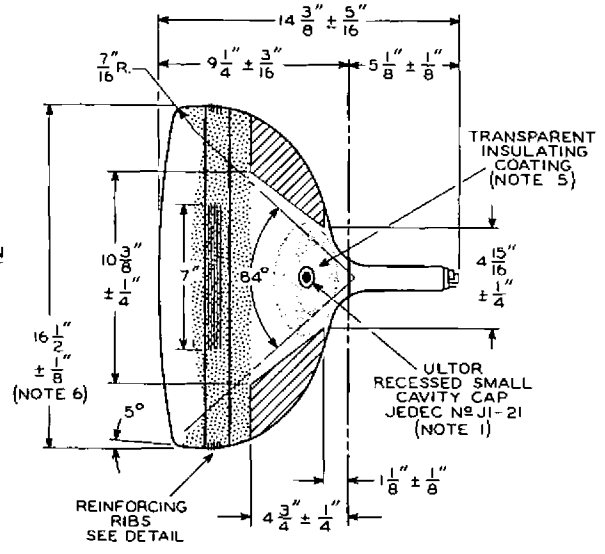
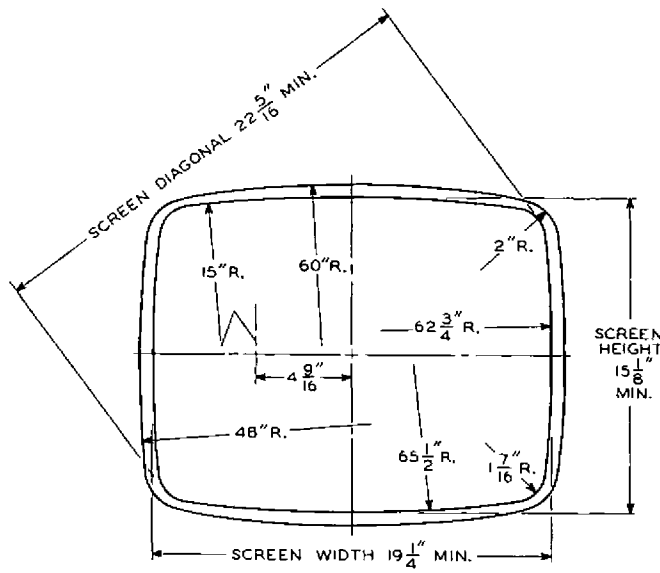


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Fig. 4 - Cathode Drive Characteristics of Type 23NP4.



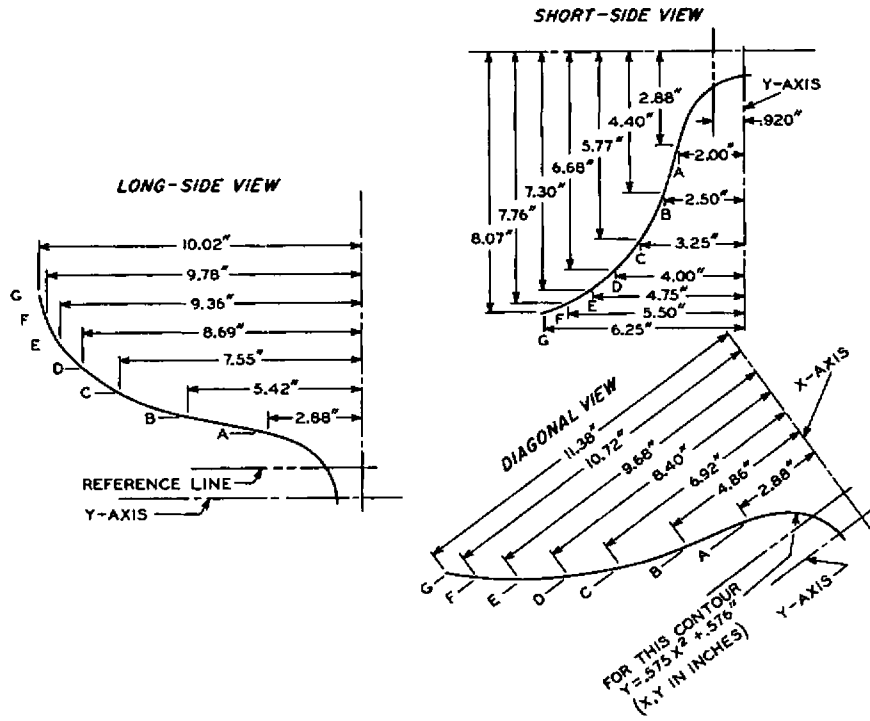
# DIMENSIONAL OUTLINE



92CL-10642



### BULB-CONTOUR DIMENSIONS



92CL-10652

**NOTE:** PLANES A THRU G ARE NORMAL TO THE TUBE AXIS AND AT FIXED LOCATIONS FROM THE Y AXIS. THESE COORDINATES DESCRIBE THE BULB EXTERNAL CONTOUR IN PLANES THROUGH THE TUBE AXIS AND THE RESPECTIVE FACEPLATE AXES.



## NOTES FOR DIMENSIONAL OUTLINE

**NOTE 1:** THE PLANE THROUGH THE TUBE AXIS AND PIN No.4 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF  $\pm 30^\circ$ . ULTOR TERMINAL IS ON SAME SIDE AS PIN No.4.

**NOTE 2:** WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JEDEC NO.G-126 AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

**NOTE 3:** SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. THE DESIGN OF THE SOCKET SHOULD BE SUCH THAT THE CIRCUITRY CANNOT IMPRESS LATERAL STRAINS THROUGH THE SOCKET CONTACTS ON THE BASE PINS. BOTTOM CIRCUMFERENCE OF BASE WAFER WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 1-3/4".

**NOTE 4:** EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

**NOTE 5:** TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINTLESS CLOTH.

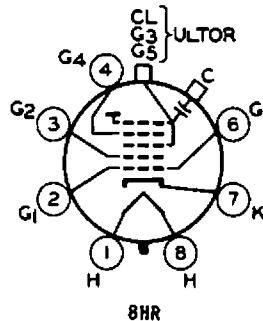
**NOTE 6:** MEASURED AT THE MOLD-MATCH LINE.

**NOTE 7:** BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/8", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN 1/16" BEYOND THE ENVELOPE SURFACE AT THE LOCATION SPECIFIED FOR DIMENSIONING THE ENVELOPE WIDTH, DIAGONAL, AND HEIGHT.

**NOTE 8:** AREA BETWEEN MOLD-MATCH LINE AND SEAL BULGE IS 1/2" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF TUBE SUPPORT BAND. SUPPORTS MUST BE SPACED FROM THE TUBE BY THE USE OF CUSHIONING PADS MADE OF ASPHALT, IMPREGNATED FELT OR EQUIVALENT.

## SOCKET CONNECTIONS Bottom View

PIN 1: HEATER  
PIN 2: GRID No.1  
PIN 3: GRID No.2  
PIN 4: GRID No.4  
PIN 6: GRID No.1



PIN 7: CATHODE  
PIN 8: HEATER  
CAP: ULTOR (Grid No.3, Grid No.5, collector)  
C: EXTERNAL CONDUCTIVE COATING

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