

## Picture Tube

**NO ION-TRAP MAGNET REQUIRED**

**RECTANGULAR GLASS TYPE  
LOW-VOLTAGE ELECTROSTATIC FOCUS  
LOW GRID-NO.2 VOLTAGE**

**ALUMINIZED SCREEN  
114° MAGNETIC DEFLECTION  
CATHODE-DRIVE TYPE**

### Electrical:

Direct Interelectrode Capacitances:

Grid No.1 to all other electrodes. . . . .	6	pf
Cathode to all other electrodes. . . . .	5	pf
External conductive coating to anode . . . . .	2500 max. 1700 min.	pf
		pf

Heater Current at 6.3 volts. . . . . 600 ± 30 ma

Heater Warm-Up Time (Average). . . . . 11 seconds

Electron Gun . . . . . Type Requiring No Ion-Trap Magnet

### Optical:

Phosphor (For curves, see front of this section). . . P4—Sulfide Type

Aluminized

Faceplate. . . . . Filterglass

Light transmission at center (Approx.) . . . . . 78%

### Mechanical:

Weight (Approx.) . . . . . 24 lbs

Overall Length. . . . . 14.531" ± .281"

Neck Length. . . . . 5.125" ± .125"

Projected Area of Screen . . . . . 282 sq. in.

External Conductive Coating:

Type . . . . . Regular-Band

Contact area for grounding . . . . . Near Reference Line

For Additional Information on Coatings and Dimensions:

See *Picture-Tube Dimensional-Outlines and Bulb J187 B* sheets  
at front of this section

Cap. . . . . Recessed Small Cavity (JEDEC No. J1-21)

Base . . . . . Small-Button Neoeightar 7-Pin,  
Arrangement 1 (JEDEC No. B7-208)

Basing Designation for BOTTOM VIEW. . . . . 8HR

Pin 1—Heater

Pin 2—Grid No.1

Pin 3—Grid No.2

Pin 4—Grid No.4

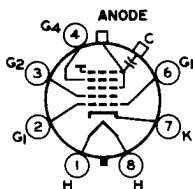
Pin 6—Grid No.1

Pin 7—Cathode

Pin 8—Heater

Cap—Anode (Grid No.3,  
Grid No.5, Screen,  
Collector)

C—External  
Conductive Coating



# 23NP4

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

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

Anode Voltage. . . . .	{ 22000 max. 11000 min.	volts volts
Grid-No. 4 (Focusing) Voltage:		
Positive value . . . . .	1250 max.	volts
Negative value . . . . .	400 max.	volts
Grid-No. 2 Voltage. . . . .	{ 70 max. 40 min.	volts volts
Cathode Voltage:		
Negative peak value. . . . .	2 max.	volts
Negative bias value. . . . .	0 max.	volts
Positive bias value. . . . .	155 max.	volts
Positive peak value. . . . .	220 max.	volts
Heater Voltage . . . . .	{ 6.9 max. 5.7 min.	volts 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 . . . . .	300 max.	volts
Heater positive with respect to cathode:		
Combined AC and DC voltage . . . . .	200 max.	volts
DC component . . . . .	100 max.	volts

## Typical Operating Conditions for Cathode-Drive Service:

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

Anode Voltage. . . . .	18000	volts
Grid-No. 4 Voltage. . . . .	200	volts
Grid-No. 2 Voltage. . . . .	50	volts
Cathode Voltage for visual extinction of focused raster . . . . .	34 to 52	volts

## Maximum Circuit Value:

Grid-No. 1 Circuit Resistance . . . . .	1.5 max.	megohms
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For X-radiation shielding consideration, see sheet

*X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES*  
at front of this Section



## Picture Tube

RECTANGULAR GLASS TYPE  
 LOW-VOLTAGE ELECTROSTATIC FOCUS  
 LOW GRID-NO.2 VOLTAGE

ALUMINIZED SCREEN  
 MAGNETIC DEFLECTION  
 CATHODE-DRIVE TYPE

With Heater Having Controlled Warm-Up Time

### GENERAL DATA

#### Electrical:

Heater Current at 6.3 volts. . . . .	600 ± 30	ma
Heater Warm-Up Time (Average). . . . .	11	seconds
Direct Interelectrode Capacitances:		
Grid No.1 to all other electrodes. . .	6	μf
Cathode to all other electrodes. . . .	5	μf
External conductive coating to ultor .	{ 2500 max.	μf
	{ 1700 min.	μf
Focusing Method. . . . .	Electrostatic	
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 (For curves, see front of this section) . . . . .	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 (Radii):	

	<i>Center</i>	<i>Intermediate</i>	<i>Edge</i>
External surface . . . . .	50"	-	36-3/4"
Internal surface . . . . .	30"	48"	24"

##### Screen Dimensions (Minimum):

Greatest width . . . . .	19-1/4"
Greatest height. . . . .	15-1/8"
Diagonal . . . . .	22-5/16"
Projected area . . . . .	282 sq. in.

Weight (Approx.) . . . . .	24 lbs
Operating Position . . . . .	Any
Cap. . . . .	Recessed Small Cavity (JEDEC No. J1-21)
Bulb . . . . .	J187 (114°)

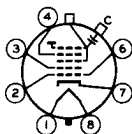


# 23NP4

Base . . . . . Small-Button Neoeightar 7-Pin, Arrangement 1,  
(JEDEC No. 87-208)

Basing Designation for BOTTOM VIEW. . . . . 8HR

- 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

## CATHODE-DRIVE<sup>A</sup> 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 (FOCUSING) VOLTAGE:	
Positive value. . . . .	1250 max. volts
Negative value. . . . .	400 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 <sup>B</sup> . . . . .	0 to 400	volts
Cathode-to-Grid-No.1 Voltage ( $E_{kg1}$ ) for visual extinction of focused raster . . . . .	<i>See Raster-Cutoff-Range Chart for Cathode-Drive Service</i>	
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 value	



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Grid-No.4 Current . . . . .	-25 to +25	$\mu$ a
Grid-No.2 Current . . . . .	-15 to +15	$\mu$ a
Field Strength of Adjustable Centering Magnet*. . . . .	0 to 8	gausses

## Examples of Use of Design Ranges:

<i>With ultor-to-grid-No.1 voltage of</i>	18000	volts
<i>and grid-No.2-to-grid-No.1 voltage of</i>	50	volts
Grid-No.4-to-Grid-No.1 Voltage for focus <sup>•</sup> . . . . .	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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<sup>▲</sup> 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.

<sup>•</sup> 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.

<sup>\*</sup> 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, this picture tube 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 this picture tube for X-ray radiation may be needed to protect against possible injury from prolonged exposure at close range whenever the operating conditions involve voltage 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 this picture tube 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.

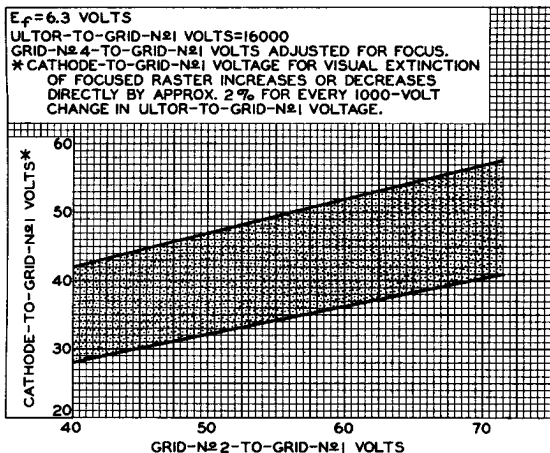
## DIMENSIONAL OUTLINE and BULB-CONTOUR DIMENSIONS

shown under Type 23MP4 also apply to the 23NP4



# 23NP4

## RASTER-CUTOFF-RANGE CHART Cathode-Drive Service



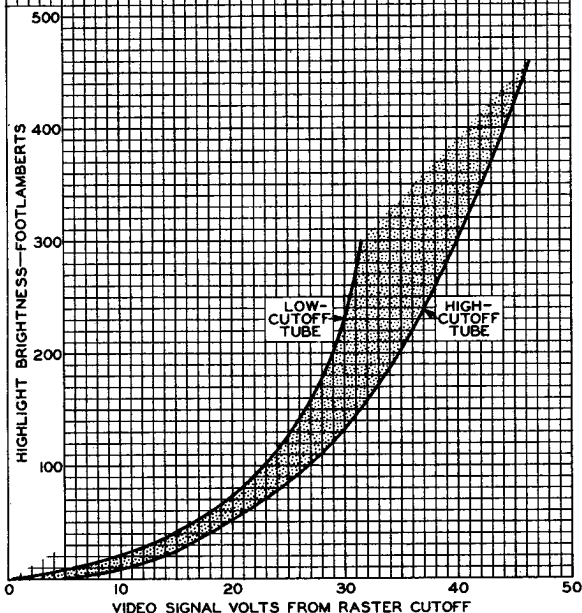
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## CATHODE-DRIVE CHARACTERISTICS

$E_f = 6.3$  VOLTS  
 ULTOR-TO-GRID-N $\#$ 1 VOLTS=16000  
 GRID-N $\#$ 2-TO-GRID-N $\#$ 1 VOLTS=50  
 CATHODE BIASED POSITIVE WITH RESPECT TO  
 GRID N $\#$ 1 TO GIVE FOCUSED RASTER CUTOFF.  
 RASTER FOCUSED AT AVERAGE BRIGHTNESS.  
 RASTER SIZE=16"x13-1/2"

CIE COORDINATES OF SCREEN: X=0.287, Y=0.315



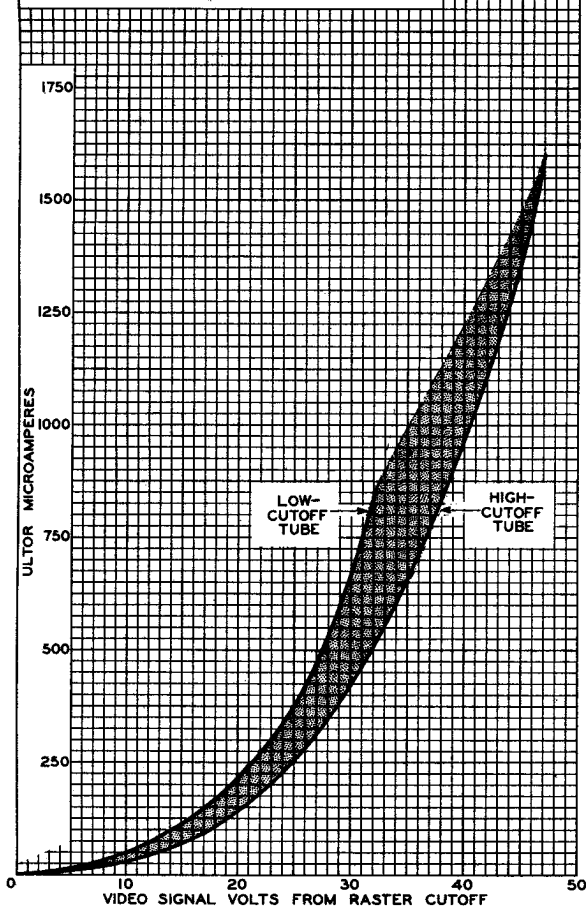
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# 23NP4

## CATHODE-DRIVE CHARACTERISTICS

$E_p = 6.3$  VOLTS  
ULTOR-TO-GRID-N#1 VOLTS=16000  
GRID-N#2-TO-GRID-N#1 VOLTS=50  
CATHODE BIASED POSITIVE WITH RESPECT TO  
GRID N#1 TO GIVE FOCUSED RASTER CUTOFF.



92CM-9946R1

