

## Picture Tube

**BI-PANEL 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**

### DATA

#### General:

Heater, for Unipotential Cathode:

Voltage (AC or DC) . . . . .	6.3 ± 10%	volts
Current at 6.3 volts . . . . .	0.6	amp
Warm-up time (Average) . . . . .	11	sec

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

Faceplate and Protective Panel . . . . . Filterglass

Total light transmission (Approx.) . . . . . 40%

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

Fluorescence . . . . . White

Phosphorescence. . . . . White

Persistence. . . . . Medium Short

Focusing Method. . . . . Electrostatic

Deflection Method. . . . . Magnetic

Deflection Angles (Approx.):

Diagonal . . . . .	110°
Horizontal . . . . .	99°
Vertical . . . . .	82°

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

Tube Dimensions:

Overall length . . . . .	15-3/16" ± 3/8"
Greatest width . . . . .	21-5/16" + 1/8" - 1/16"
Greatest height. . . . .	17-5/16" + 1/8" - 1/16"
Diagonal . . . . .	24-45/64" + 3/32" - 1/16"
Neck length. . . . .	5-1/8" ± 1/8"

Radius of curvature of protective panel

(External surface):

*Radius at center      Radius at edge*

In plane of diagonal deflection . . . . . 50-1/4"      See Dimensional Outline

In plane of horizontal deflection. . . . . 50-1/4"      35-1/4"

In plane of vertical deflection . . . . . 45-1/2"      35"

Radius of curvature of faceplate (Internal surface):

*Radius at center      Radius at edge*

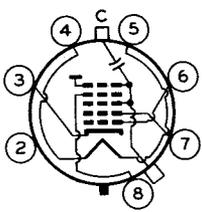
In plane of diagonal deflection . . . . . 39-1/2"      31-1/2"



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	<i>Radius at center</i>	<i>Radius at edge</i>
In plane of horizontal deflection . . .	39-3/4"	26-1/2"
In plane of vertical deflection. . . .	36-3/4"	18-1/2"
Screen Dimensions (Minimum):		
Greatest width. . . . .		19-5/16"
Greatest height . . . . .		15-1/4"
Diagonal. . . . .		22-5/16"
Projected area. . . . .		282 sq. in.
Weight (Approx.). . . . .		33 lbs
Operating Position. . . . .		Any
Cap . . . . .	Recessed Small Cavity (JEDEC No. J1-21)	
Bulb. . . . .	J187 Fitted with Protective Panel FP198	
Base. . . . .	Small-Button Neoeightar 7-Pin Arrangement 2, (JEDEC No. B7-219)	
Basing Designation for BOTTOM VIEW. . . . .		8KP

- Pin 2 - Internal Connection—  
Do Not Use
- Pin 3 - Cathode
- Pin 4 - Heater
- Pin 5 - Heater
- Pin 6 - Grid No. 1
- Pin 7 - Grid No. 2



- Pin 8 - Grid No. 4
- Cap - Ultor  
(Grid No. 3,  
Grid No. 5,  
Collector)
- C - External  
Conductive  
Coating

## CATHODE-DRIVE<sup>▲</sup> SERVICE

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

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

ULTOR-TO-GRID-No. 1 VOLTAGE. . . . .	{	20000 max. volts
		12000 min. volts
GRID-No. 4-TO-GRID-No. 1 (FOCUSING) VOLTAGE:		
Positive value. . . . .	1000 max. volts	
Negative value. . . . .	500 max. volts	
GRID-No. 2-TO-GRID-No. 1 VOLTAGE. . . . .	64 max. volts	
CATHODE-TO-GRID-No. 1 VOLTAGE:		
Positive-peak value . . . . .	200 max. volts	
Positive-bias value . . . . .	140 max. volts	
Negative-bias value . . . . .	0 max. volts	
Negative-peak value . . . . .	2 max. volts	
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode:		
During equipment warm-up period not exceeding 15 seconds. . . . .	410 max. volts	
After equipment warm-up period. . . . .	180 max. volts	
Heater positive with respect to cathode. . . . .	180 max. volts	



## Equipment Design Ranges:

With any ultor-to-grid-No.1 voltage ( $E_{c5g1}$ ) between 12000<sup>•</sup> and 20000 volts and grid-No.2-to-grid No.1 voltage ( $E_{c2g1}$ ) between 40 and 64 volts

Grid-No.4-to-Grid-No.1 Voltage for focus <sup>*</sup> . . . . .	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 <sup>♦</sup> . . . . .	0 to 8	gausses

## Examples of Use of Design Ranges:

With ultor-to-grid-No.1 voltage of . . . . .	16000	18000	volts
and grid-No.2-to-grid-No.1 voltage of . . . . .	50	50	volts
Grid-No.4-to-Grid-No.1 Voltage for focus <sup>*</sup> . . . . .	0 to 400	0 to 400	volts
Cathode-to-Grid-No.1 Voltage for visual extinction of focused raster . . . . .	32 to 47	34 to 49	volts
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level):			
White-level value. . . . .	-32 to -47	-34 to -49	volts

## Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . . 1.5 max. megohms

- ▲ 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.
- This value is a working design-center minimum. The equivalent *absolute minimum* ultor-to-grid-No.1 voltage is 11,000 volts below which the serviceability of the 23EP4 will be impaired. The equipment designer has the responsibility of determining a minimum design value such that under the worst probable operating conditions involving supply-voltage variation and equipment variation the absolute minimum ultor-to-grid-No.1 voltage is never less than 11,000 volts.
- ★ The grid-No.4-to-grid-No.1 voltage required for focus of any individual tube may have a value anywhere between 0 and 400 volts.
- ♦ 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 3/8-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.



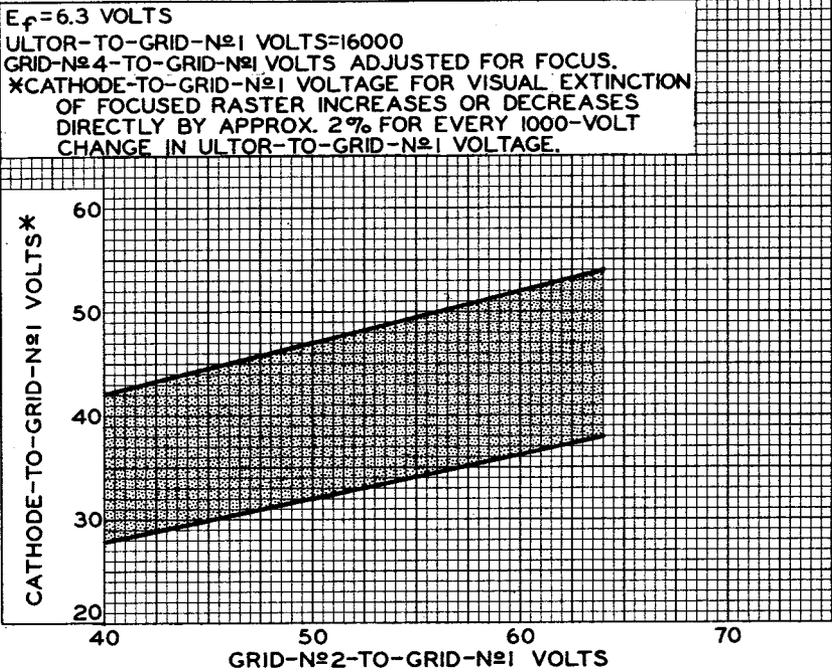
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*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*



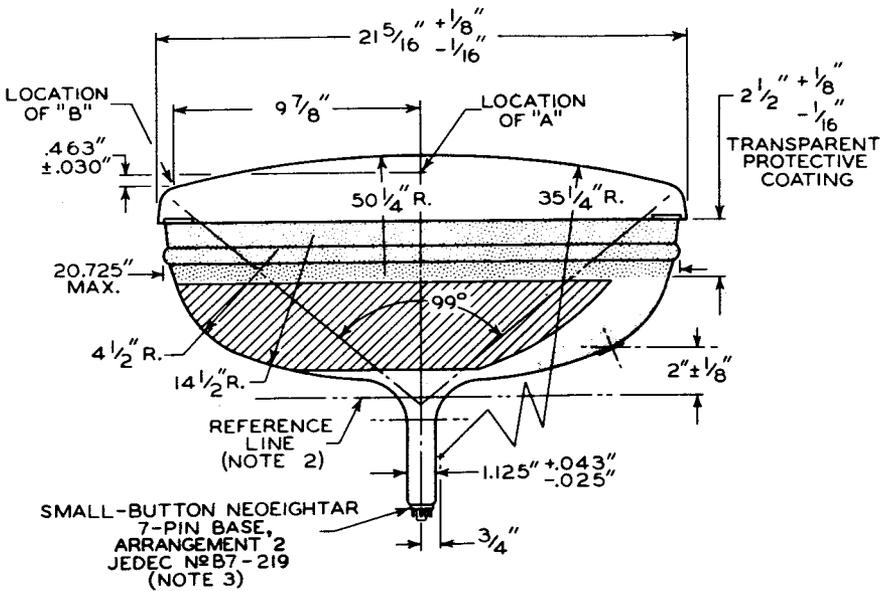
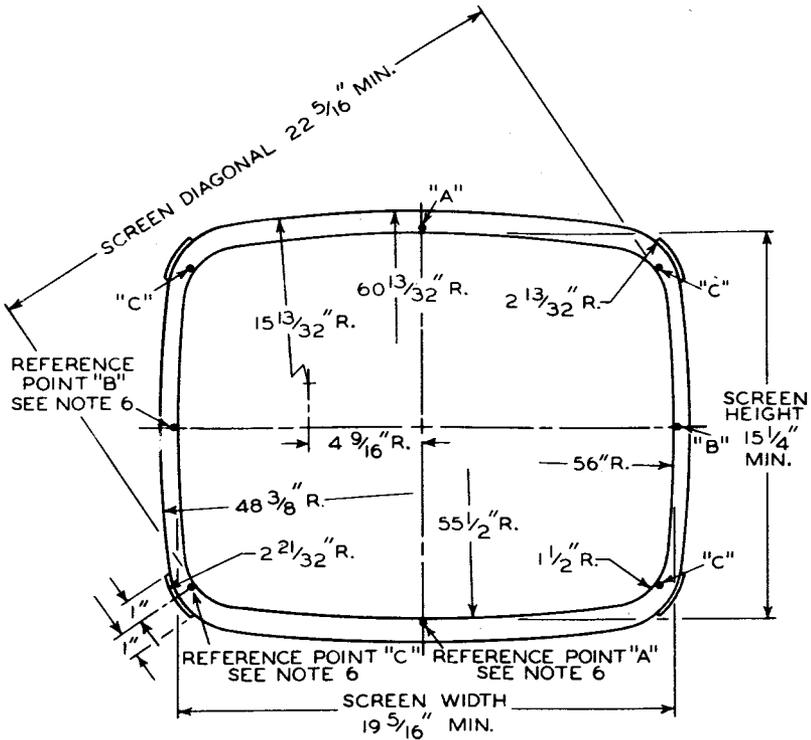
## RASTER-CUTOFF-RANGE CHART Cathode-Drive Service

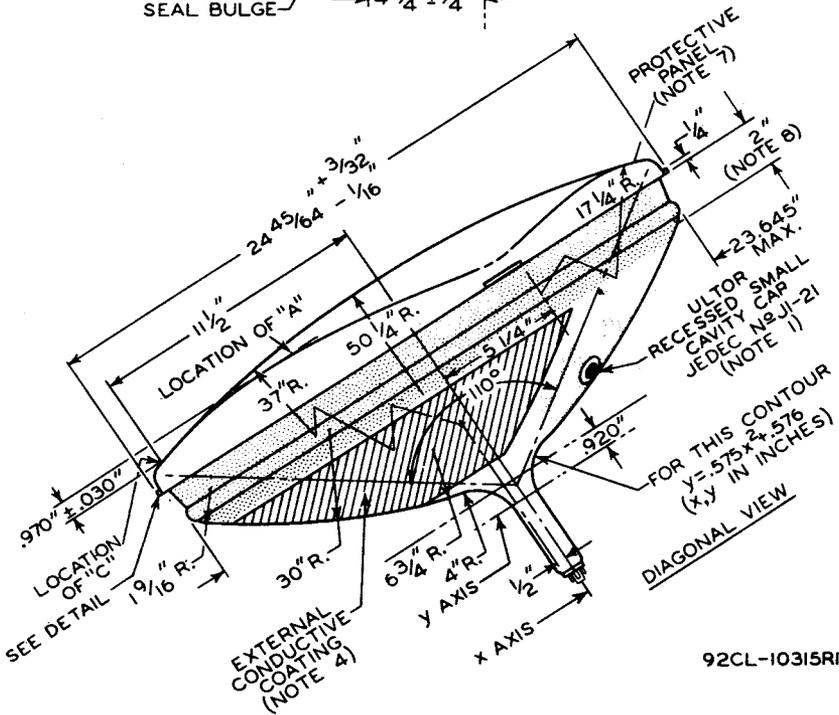
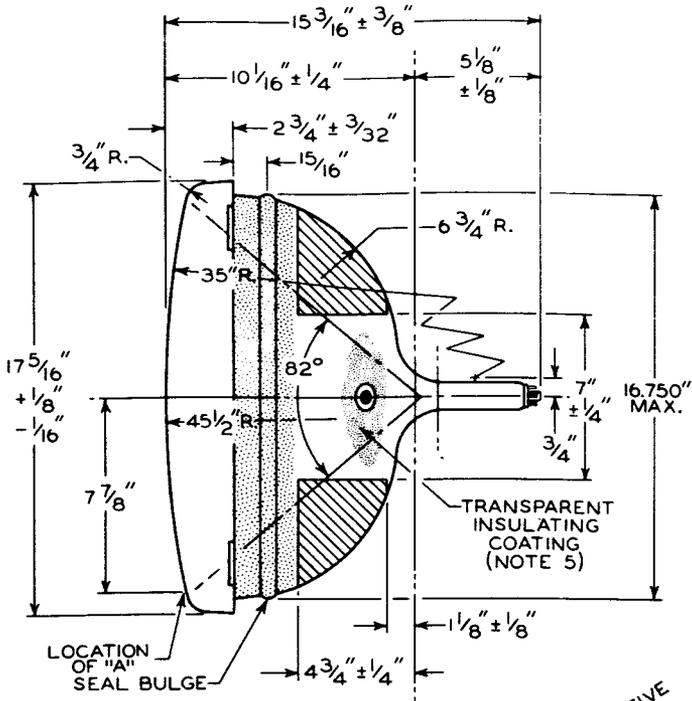


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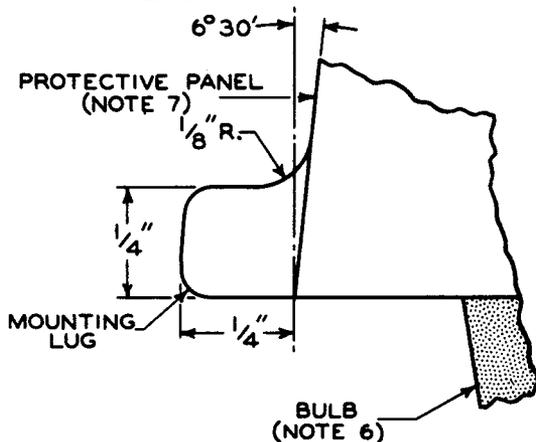




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## DETAIL OF MOUNTING LUG



**NOTE 1:** THE PLANE THROUGH THE TUBE AXIS AND PIN 8 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 8.

**NOTE 2:** WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JEDEC No. G-126 (SHOWN AT FRONT OF THIS SECTION) 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 CIRCUIT WIRING CANNOT IMPRESS LATERAL STRAINS THROUGH THE SOCKET CONTACTS OF 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 LINT-LESS CLOTH.

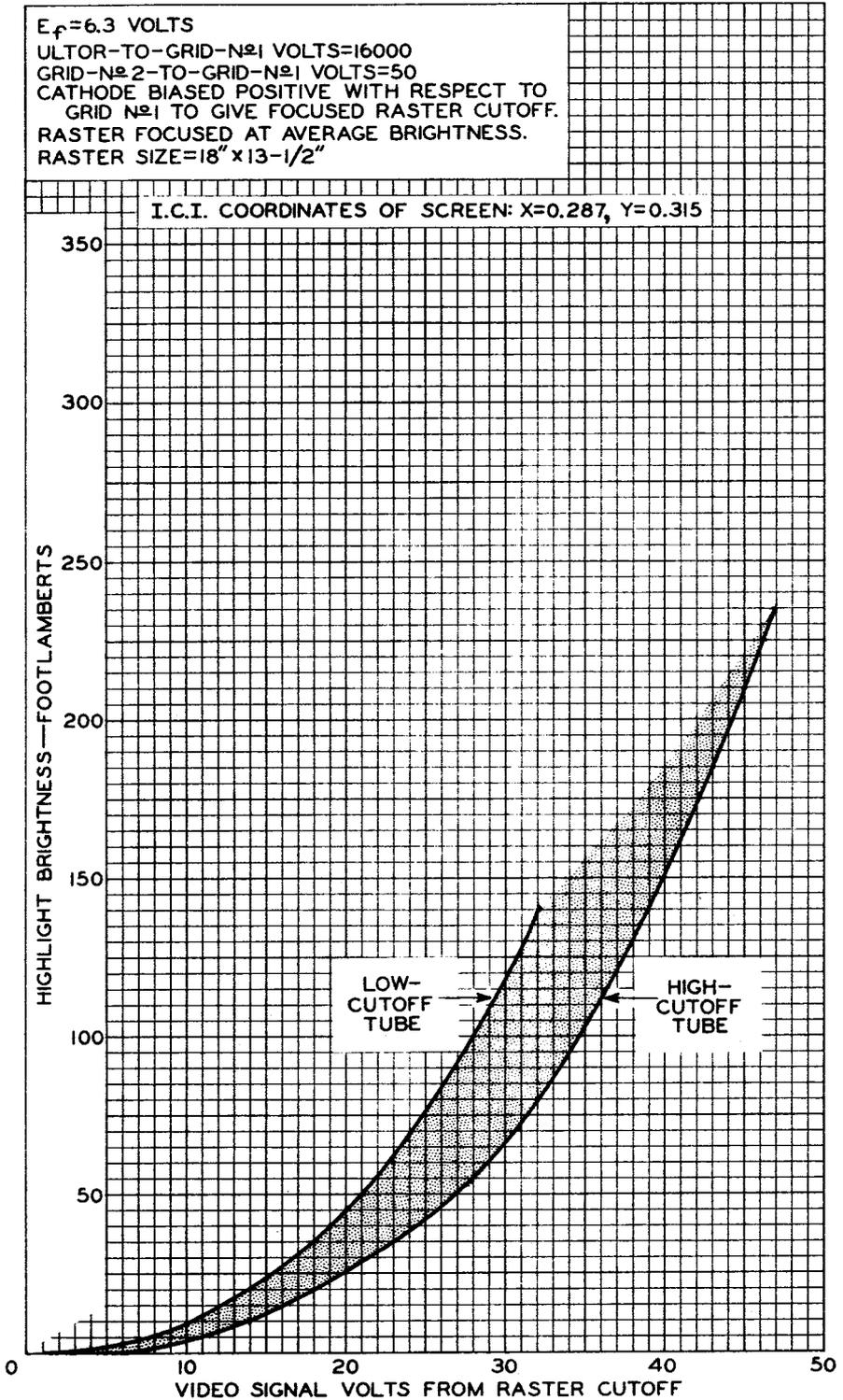
**NOTE 6:** REFERENCE POINTS A, B, AND C ARE PROVIDED FOR USE IN DESIGN OF A MASK CONTOURED FOR CLOSE FIT TO THE PROTECTIVE PANEL.

**NOTE 7:** THE CENTER OF THE PROTECTIVE PANEL MAY BE ECCENTRIC WITH RESPECT TO THE AXIS OF THE TUBE ENVELOPE. ASSOCIATED SHIFT OF THE PROTECTIVE PANEL ALONG ITS MINOR AND/OR MAJOR AXIS WILL NOT EXCEED 1/16".

**NOTE 8:** KEEP THIS CIRCUMFERENTIAL AREA FREE OF MOUNTING HARDWARE.

**NOTE 9:** ADEQUATE TUBE SUPPORT IS OBTAINED BY CLAMPING TO THE MOUNTING LUGS PROVIDED AT EACH CORNER OF THE PROTECTIVE PANEL. TUBE MOUNTING AND YOKE SUPPORT CLAMPS MUST BE SPACED FROM THE TUBE BY USE OF CUSHIONING PADS MADE OF MATERIAL SUCH AS ASPHALT-IMPREGNATED FELT, OR EQUIVALENT.

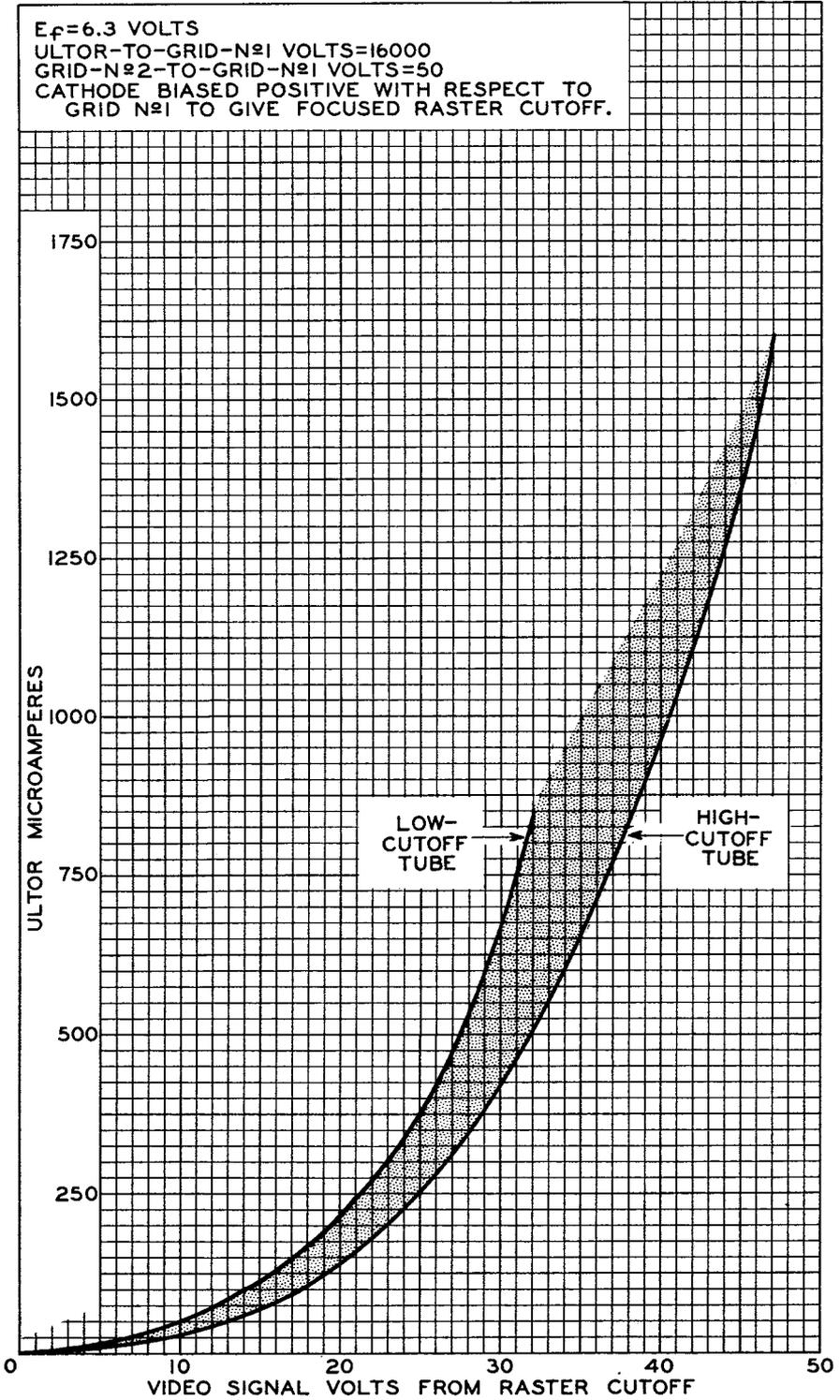
## CATHODE-DRIVE CHARACTERISTICS



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## CATHODE-DRIVE CHARACTERISTICS



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