



21BTP4

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PICTURE TUBE

RECTANGULAR GLASS TYPE

ALUMINIZED SCREEN

LOW-VOLTAGE ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

*Intended for use in equipment having
series heater-string arrangement*

DATA

General:

Heater, for Unipotential Cathode:

Voltage. 6.3 ac or dc volts

Current. $0.6 \pm 5\%$ amp

Warm-up time (Average) 11 sec

*For definition of heater warm-up time and method of determining
it, see sheet HEATER WARM-UP TIME MEASUREMENT at front of
Receiving Tube Section.*

Direct Interelectrode Capacitances:

Grid No.1 to all other electrodes. 6 μf Cathode to all other electrodes. 5 μf

External conductive coating to ultor. $\left\{ \begin{array}{l} 2500 \text{ max.} \\ 2000 \text{ min.} \end{array} \right. \mu\text{f}$

Faceplate, Spherical Filterglass

Light transmission (Approx.) 74%

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

Fluorescence White

Phosphorescence. White

Persistence. Short

Focusing Method. Electrostatic

Deflection Method. Magnetic

Deflection Angles, (Approx.):

Diagonal 90° Horizontal 85° Vertical 68°

Electron Gun Ion-Trap Type Requiring
External Single-Field Magnet

Tube Dimensions:

Overall length $20'' \pm 3/8''$ Greatest width $20-1/4'' \pm 1/8''$ Greatest height. $16-3/8'' \pm 1/8''$ Diagonal $21-3/8'' \pm 1/8''$ Neck length. $7-1/2'' \pm 3/16''$

Screen Dimensions (Minimum):

Greatest width $19-1/16''$ Greatest height. $15-1/16''$ Diagonal $20-1/4''$

Projected area 262 sq. in.

Weight (Approx.) 24 lbs

Operating Position Any

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

Bulb J171D2/E1

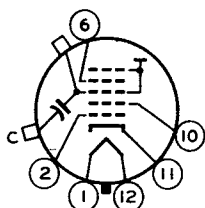


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Base. . . Small-Shell Duodecal 6-Pin (JETEC Group 4, No.B6-63)
 Basing Designation for BOTTOM VIEW. 12L

Pin 1-Heater
 Pin 2-Grid No.1
 Pin 6-Grid No.4
 Pin 10-Grid No.2
 Pin 11-Cathode
 Pin 12-Heater



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

GRID-DRIVE[▲] SERVICE

*Unless otherwise specified, voltage values are positive
 with respect to cathode*

Maximum Ratings, Design-Center Values:

ULTOR VOLTAGE	20000 max.	volts
GRID-No.4 (FOCUSING) VOLTAGE:		
Positive value.	1000 max.	volts
Negative value.	500 max.	volts
GRID-No.2 VOLTAGE	500 max.	volts
GRID-No.1 VOLTAGE:		
Negative-peak value	200 max.	volts
Negative-bias value	140 max.	volts
Positive-bias value	0 max.	volts
Positive-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 voltage (E_{c5k}) between 16000 and 20000 volts
 and grid-No.2 voltage (E_{c2k}) between 200 and 500 volts*

Grid-No.4 Voltage for focus with ultor current of 100 μ a	-0.4% to +2.2% of E_{c5k}	volts
Grid-No.1 Voltage (E_{c1k}) for visual extinction of focused raster	-9.3% to -24% of E_{c2k}	volts
Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value (Peak positive)	9.3% to 24% of E_{c2k}	volts
Grid-No.4 Current	-25 to +25	μ a
Grid-No.2 Current	-15 to +15	μ a

▲, #: See next page.



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Ion-Trap Magnet Current (Average)**	$\sqrt{\frac{Ec_5k}{16000}} \times 30$	ma
Minimum Field Strength of PM Ion-Trap Magnet§	$\sqrt{\frac{Ec_5k}{16000}} \times 33$	gausses
Field Strength of Adjustable Centering Magnet	0 to 8	gausses

Examples of Use of Design Ranges:

With ultor voltage of	16000	18000	volts
and grid-No.2 voltage of	300	400	volts
Grid-No.4 Voltage for focus with ultor current of 100 μ a.	-65 to +350	-75 to +400	volts
Grid-No.1 Voltage for visual extinction of focused raster	-28 to -72	-37 to -96	volts
Grid-No.1 Video Drive from Raster Cutoff (Black Level):			
White-level value.	28 to 72	37 to 96	volts
Minimum Field Strength of PM Ion-Trap Magnet	33	35	gausses

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	1.5 max.	megohms
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CATHODE-DRIVE[■] SERVICE

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

Maximum Ratings, Design-Center Values:

ULTOR-TO-GRID-No.1 VOLTAGE	20000 max.	volts
GRID-No.4-TO-GRID-No.1 VOLTAGE:		
Positive value	1000 max.	volts
Negative value	500 max.	volts
GRID-No.2-TO-GRID-No.1 VOLTAGE	640 max.	volts
GRID-No.2-TO-CATHODE VOLTAGE	500 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

▲, #, **, §, ■: See next page.



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Equipment Design Ranges:

With any ultor-to-grid-No.1 voltage (E_{c5g1}) between 16000* and 20000 volts and grid-No.2-to-grid-No.1 voltage (E_{c2g1}) between 220 and 640 volts

Grid-No.4-to-Grid-No.1

Voltage for focus
with ultor current

of 100 μ a. 0% to +2.6% of E_{c5g1} volts

Cathode-to-Grid-No.1 Voltage

(E_{kg1}) for visual extinction

of focused raster. 8.5% to 19.4% of E_{c2g1} volts

Cathode-to-Grid-No.1 Video

Drive from Raster Cutoff

(Black Level):

White-level value.

(Peak negative). 8.5% to 19.4% of E_{c2g1} volts

Grid-No.4 Current.

-25 to +25 μ a

Grid-No.2 Current.

-15 to +15 μ a

Ion-Trap Magnet Current

(Average)** $\sqrt{\frac{E_{c5g1}}{16000}} \times 30$ ma

Minimum Field Strength of

PM Ion-Trap Magnet§. $\sqrt{\frac{E_{c5g1}}{16000}} \times 33$ gaussess

Field Strength of Adjustable

Centering Magnet 0 to 8 gaussess

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

300

400

volts

Grid-No.4-to-Grid-No.1 Voltage

for focus with ultor current

of 100 μ a. 0 to 415 0 to 470 volts

Cathode-to-Grid-No.1 Voltage

for visual extinction

of focused raster. 25 to 58 34 to 78 volts

Cathode-to-Grid-No.1 Video

Drive from Raster Cutoff

(Black Level):

White-level value. -25 to -58 -34 to -78 volts

Minimum Field Strength of PM

Ion-Trap Magnet. 33 35 gaussess

Maximum Circuit Values:

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

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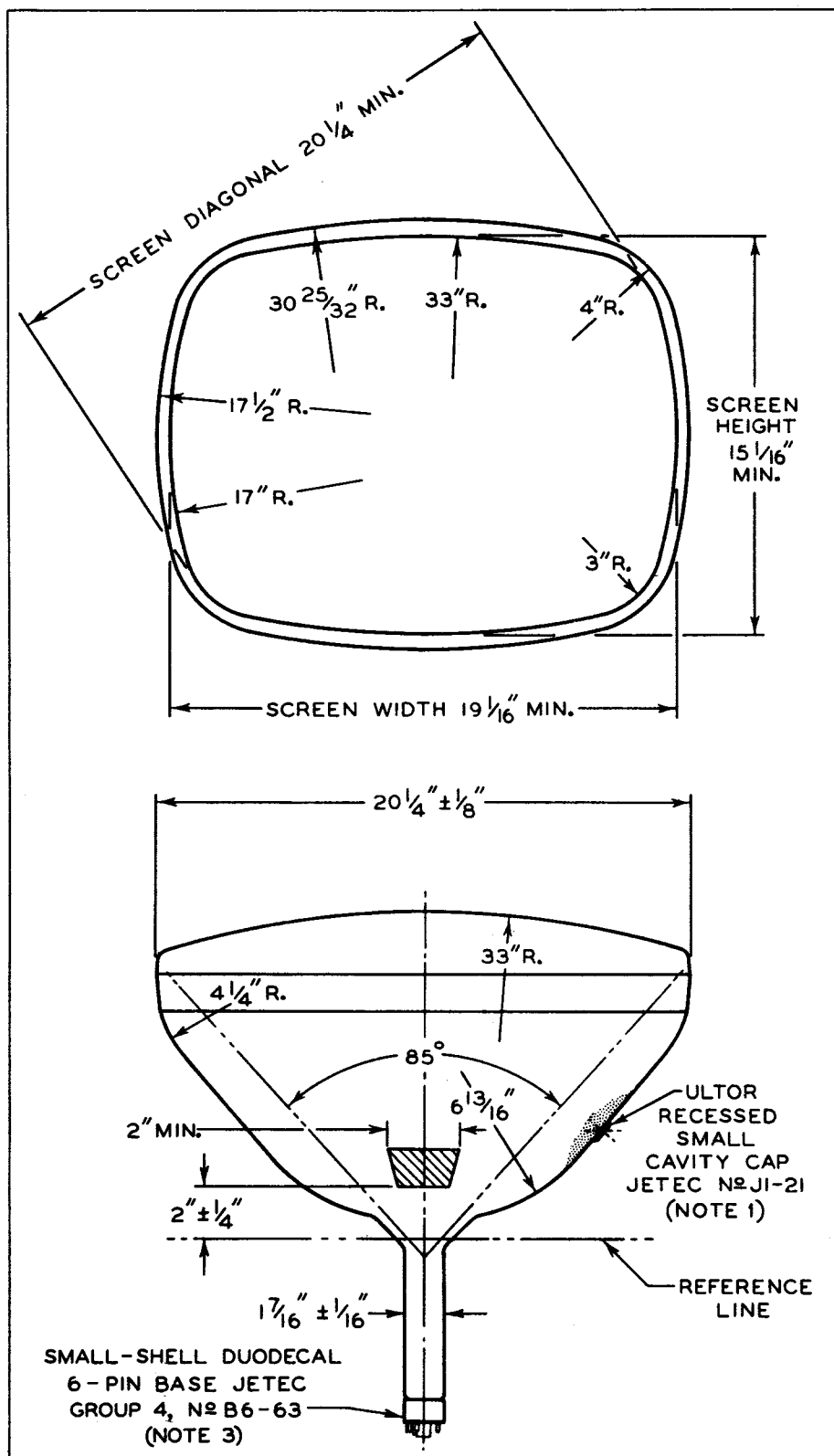
- ▲ Grid drive is the operating condition in which the video signal varies the grid-No.1 potential with respect to cathode.
- # Brilliance and definition decrease with decreasing ultor voltage or ultor-to-grid-No.1 voltage. In general, the ultor voltage or ultor-to-grid-No.1 voltage should not be less than 16,000 volts.
- ** For JETEC Ion-Trap Magnet No.117, or equivalent, located with the trailing edge of the pole pieces located over the gap between grid No.1 and grid No.2 and rotated to give maximum brightness.
- § For specimen PM ion-trap magnet, such as Heppner Model No.E437, or equivalent, located in optimum position and rotated to give maximum brightness. For a given equipment application, the tolerance range for the strength of the PM ion-trap magnet should be added to the minimum value. The maximum strength of this magnet should not exceed the specified minimum value by more than 6 gauss. This procedure will insure use of a PM ion-trap magnet allowing adequate adjustment to permit satisfactory performance without loss of highlight brightness.
- 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.

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

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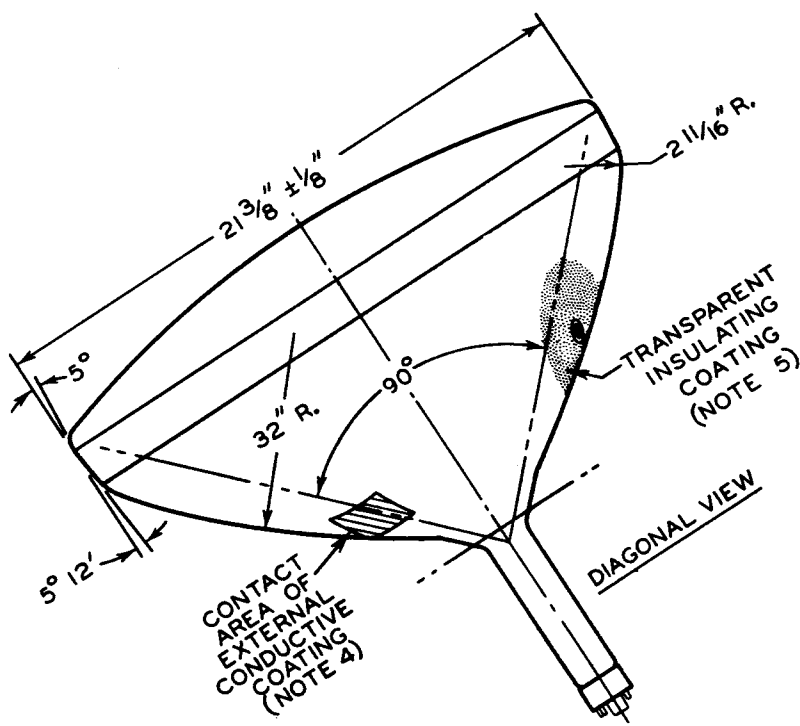
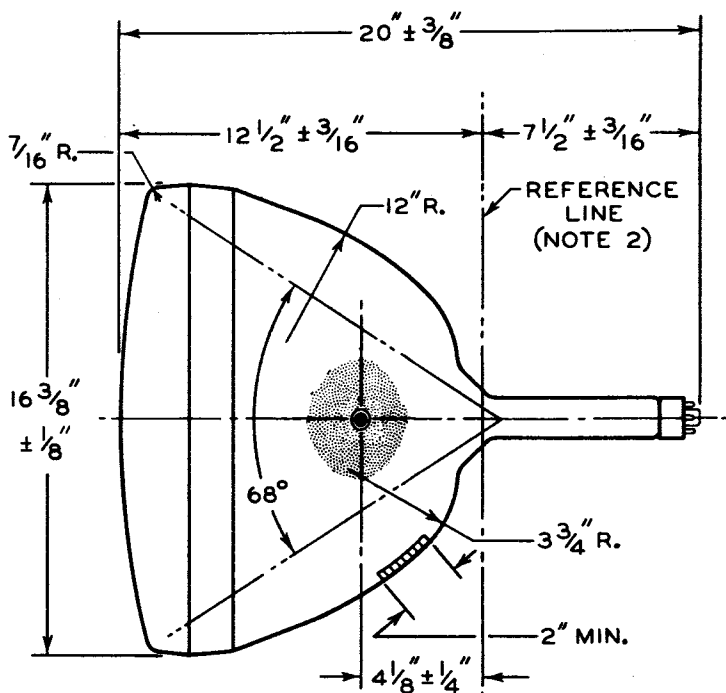
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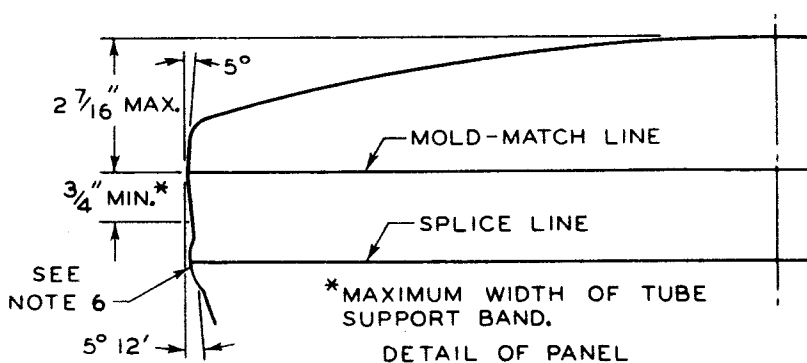
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NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND PIN 6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF $\pm 30^\circ$. ULTOR TERMINAL IS ON SAME SIDE AS PIN 6.

NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC No. G-116 (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. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 3".

NOTE 4: THE DRAWING SHOWS THE MINIMUM SIZE AND LOCATION OF THE CONTACT AREA OF THE EXTERNAL CONDUCTIVE COATING. THE ACTUAL AREA OF THIS COATING WILL BE GREATER THAN THE CONTACT AREA SO AS TO PROVIDE THE REQUIRED CAPACITANCE. EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

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

NOTE 6: 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 MOLD-MATCH LINE.



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AVERAGE DRIVE CHARACTERISTICS

CATHODE-DRIVE SERVICE

$E_f = 6.3$ VOLTS

ULTOR-TO-GRID-№1 VOLTS = 16000

CATHODE BIASED POSITIVE WITH RESPECT TO GRID №1 TO GIVE FOCUSED RASTER CUTOFF.

RASTER FOCUSED AT AVERAGE BRIGHTNESS.

RASTER SIZE = $18'' \times 13\frac{1}{2}''$

GRID-DRIVE SERVICE

$E_f = 6.3$ VOLTS

ULTOR VOLTS = 16000

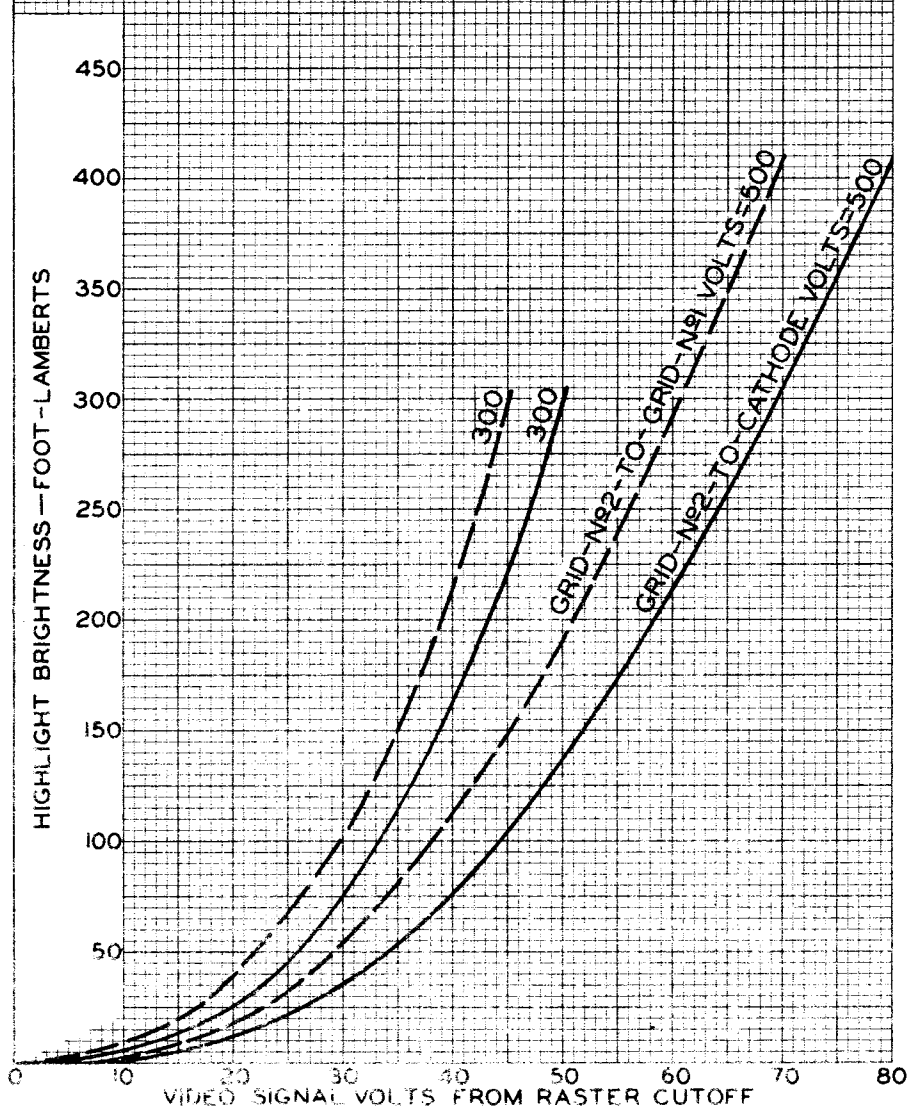
GRID №1 BIASED NEGATIVE WITH RESPECT TO CATHODE TO GIVE FOCUSED RASTER CUTOFF.

RASTER FOCUSED AT AVERAGE BRIGHTNESS.

RASTER SIZE = $18'' \times 13\frac{1}{2}''$

I.C.I. COORDINATES OF SCREEN: $x=0.2890$, $y=0.3260$

--- CATHODE DRIVE
— GRID DRIVE



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AVERAGE DRIVE CHARACTERISTICS

CATHODE-DRIVE SERVICE

$E_f = 6.3$ VOLTS

ULTOR-TO-GRID-№1 VOLTS = 16000 TO 20000

CATHODE BIASED POSITIVE WITH RESPECT TO GRID №1 TO GIVE FOCUSED RASTER CUTOFF.

GRID-DRIVE SERVICE

$E_f = 6.3$ VOLTS

ULTOR VOLTS = 16000 TO 20000

GRID №1 BIASED NEGATIVE WITH RESPECT TO CATHODE TO GIVE FOCUSED RASTER CUTOFF.

--- CATHODE DRIVE
— GRID DRIVE

