21EMP4

Picture Tube

RECTANGULAR GLASS TYPE — **ALUMINIZED SCREEN**
LOW-VOLTAGE ELECTROSTATIC FOCUS — **MAGNETIC DEFLECTION**

DATA

General:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3	volts
Current at 6.3 volts	0.6	amp
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. 2000 min.	μμf μμf
Faceplate, Spherical	Filterglass	
Light transmission (Approx.)	74%	
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	105°	
Vertical	87°	
Electron Gun	Type Requiring No Ion-Trap Magnet	
Tube Dimensions:		
Overall length	13-3/8" ± 5/16"	
Greatest width	20-1/4" ± 1/8"	
Greatest height	16-3/8" ± 1/8"	
Diagonal	21-3/8" ± 1/8"	
Neck length	4-3/8" ± 1/8"	
Radius of curvature of faceplate (External surface)	33"	
Screen Dimensions (Minimum):		
Greatest width	19-1/16"	
Greatest height	15-1/16"	
Diagonal	20-1/4"	
Projected area	262 sq. in.	
Weight (Approx.)	23 lbs	
Operating Position	Any	
Cap	Recessed Small Cavity (JEDEC No.J1-21)	
Bulb	J171 H1/J1	
Socket	Ucinite Part No.115446, or equivalent	
Base	Small-Button Neoeightar 7-Pin, Arrangement 1, (JEDEC No.B7-208)	

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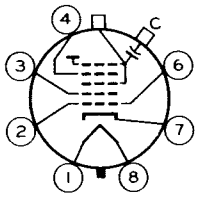
Basing Designation for BOTTOM VIEW. 8HR

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

GRID-DRIVE▲ SERVICE

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

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

ULTOR VOLTAGE	18000 max.	volts
	12000# min.	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_{c_5k}) between 12000# and 18000 volts and grid-No.2 voltage (E_{c_2k}) between 200 and 500 volts

Grid-No.4 Voltage for focus§	0 to 400 volts
Grid-No.1 Voltage (E_{c_1k}) for visual extinction of focused raster	See *Raster-Cutoff-Range Chart for Grid-Drive Service*
Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak positive)	Same value as determined for E_{c_1k} except video drive is a positive voltage
Grid-No.4 Current	−25 to +25 μa
Grid-No.2 Current	−15 to +15 μa
Field Strength of Adjustable Centering Magnet*	0 to 8 gausses

Examples of Use of Design Ranges:

With ultor voltage of	*16000*	*volts*
and grid-No.2 voltage of	*300*	*volts*
Grid-No.4 Voltage for focus.	0 to 400	volts
Grid-No.1 Voltage for visual extinction of focused raster	-35 to -75	volts
Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value.	35 to 75	volts

Maximum Circuit Values:

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

CATHODE-DRIVE■ 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	18000	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	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

Equipment Design Ranges:

With any ultor-to-grid-No.1 voltage (E_{c5g_1}) between 12000# and 18000 volts and grid-No.2-to-grid-No.1 voltage (E_{c2g_1}) between 225 and 640 volts

Grid-No.4-to-Grid-No.1 Voltage for focus§	0 to 400	volts
Cathode-to-Grid-No.1 Voltage (E_{kg_1}) for visual extinction of focused raster.	See *Raster-Cutoff-Range Chart for Cathode-Drive Service*	

Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative)	Same value as determined for E_{kg_1} except video drive is a negative voltage	
Grid-No.4 Current	-25 to +25	μa
Grid-No.2 Current	-15 to +15	μa
Field Strength of Adjustable Centering Magnet*	0 to 8	gausses

Examples of Use of Design Ranges:

With ultor-to-grid-No.1 voltage of	*16000*	*volts*
and grid-No.2-to-grid-No.1 voltage of	*300*	*volts*
Grid-No.4-to-Grid-No.1 Voltage for focus	0 to 400	volts
Cathode-to-Grid-No.1 Voltage for visual extinction of focused raster	34 to 63	volts
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value	-34 to -63	volts

Maximum Circuit Values:

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

▲ Grid drive is the operating condition in which the video signal varies the grid-No.1 potential with respect to cathode.

This value is a working design-center minimum. The equivalent *absolute-minimum* ultor (or ultor-to-grid-No.1) voltage is 11,000 volts, below which the serviceability of the 21EMP4 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 (or ultor-to-grid-No.1) voltage is never less than 11,000 volts.

§ The grid-No.4 (or grid-No.4-to-grid-No.1) voltage required for optimum focus of any individual tube will have a value between 0 and 400 volts independent of ultor current and will remain essentially constant for values of ultor (or ultor-to-grid-No.1) voltage or grid-No.2 (or grid-No.2-to-grid-No.1) voltage within design ranges shown for these items.

* Distance from *Reference Line* for suitable PM centering magnet should not exceed 2-1/8". 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.

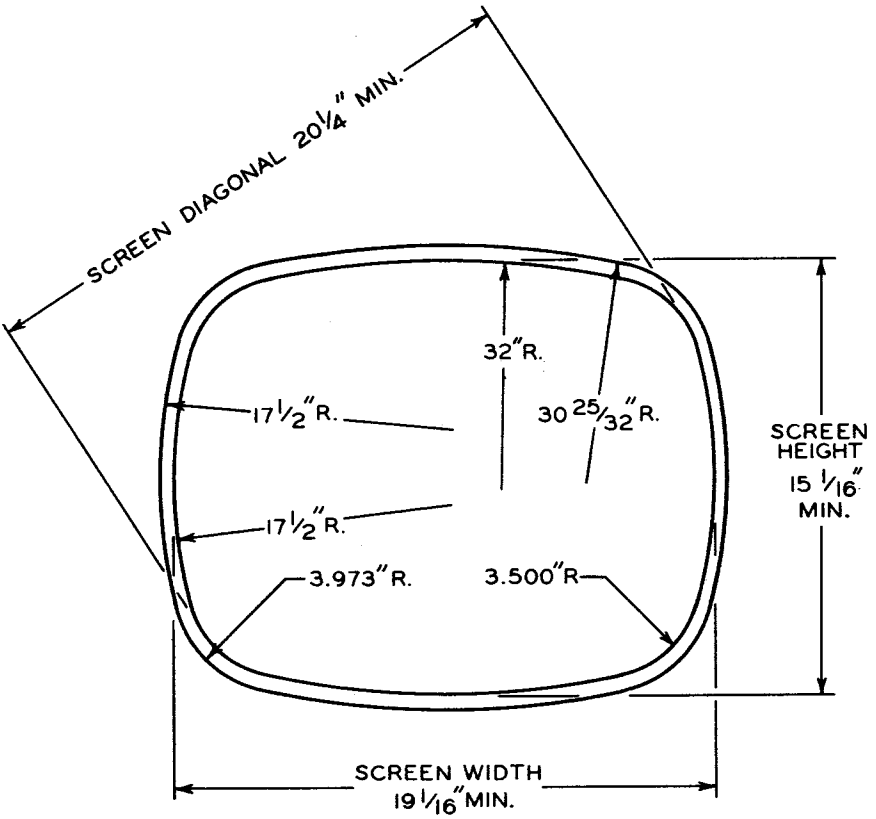
■ Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid No.1 and the other electrodes.

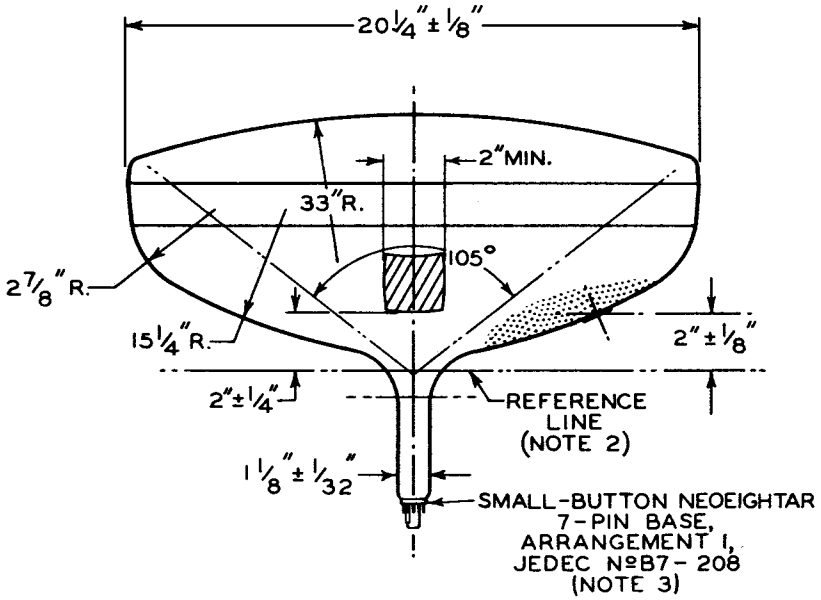
OPERATING CONSIDERATIONS

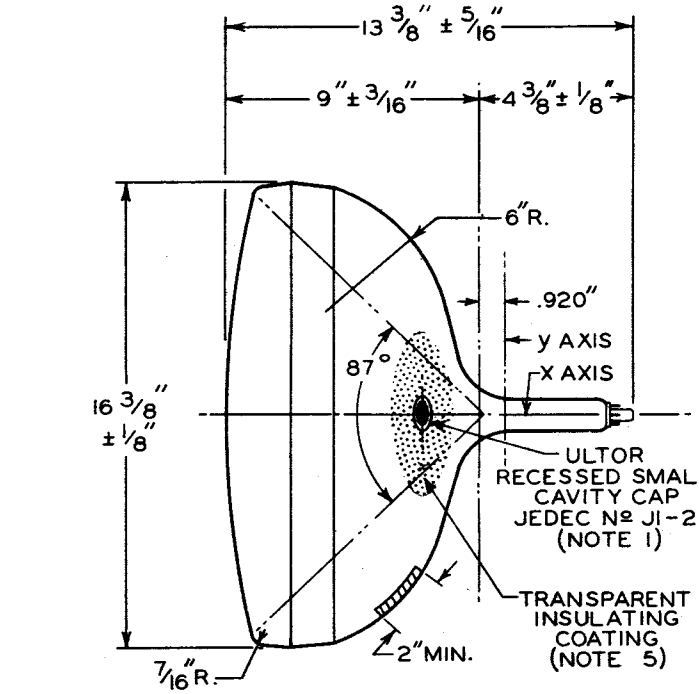
Shatter-Proof Cover Over the Tube Face. Following conventional picture-tube practice, it is recommended that the cabinet be provided with a shatter-proof, glass cover over the face of the 21EMP4 to protect it from being struck accidentally and to protect against possible damage resulting from tube implosion under some abnormal condition. This safety cover can also provide X-ray protection when required.

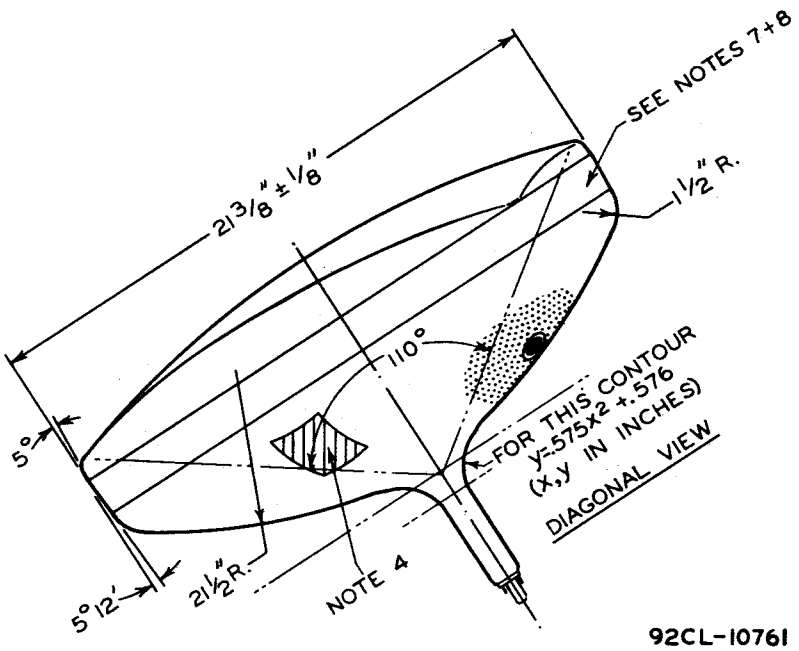
For X-ray shielding considerations, see sheet
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES
at front of this Section

21EMP4


SCREEN DIAGONAL 20¼" MIN.
32"R.
17½"R.
30 25/32"R.
SCREEN HEIGHT 15 1/16" MIN.
17½"R.
3.973"R.
3.500"R
SCREEN WIDTH 19 1/16" MIN.


20¼" ± ⅛"
2"MIN.
33"R.
105°
2 7/8"R.
15¼"R.
2" ± ⅛"
2" ± ¼"
REFERENCE LINE (NOTE 2)
1 ⅛" ± 1/32"
SMALL-BUTTON NEOEIGHTAR 7-PIN BASE, ARRANGEMENT 1, JEDEC NºB7-208 (NOTE 3)


13 3/8" ± 5/16"
9" ± 3/16"
4 3/8" ± 1/8"
6" R.
.920"
y AXIS
X AXIS
87°
16 3/8" ± 1/8"
ULTOR
RECESSED SMALL
CAVITY CAP
JEDEC Nº J1-21
(NOTE 1)
TRANSPARENT
INSULATING
COATING
(NOTE 5)
2" MIN.
7/16" R.


SEE NOTES 7+8
21 3/8" ± 1/8"
1 1/2" R.
110°
5°
FOR THIS CONTOUR
y=.575x² +.576
(x,y IN INCHES)
DIAGONAL VIEW
5° 12'
21 1/2" R.
NOTE 4
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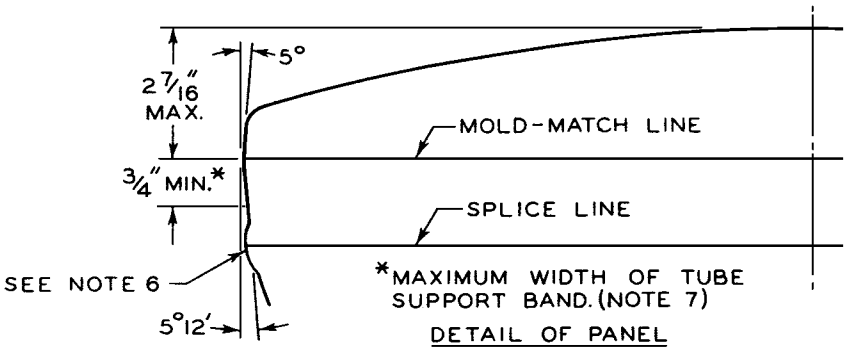


DETAIL OF PANEL

NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND PIN 4 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 30°. ULTOR TERMINAL IS ON SAME SIDE AS PIN 4.

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 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.

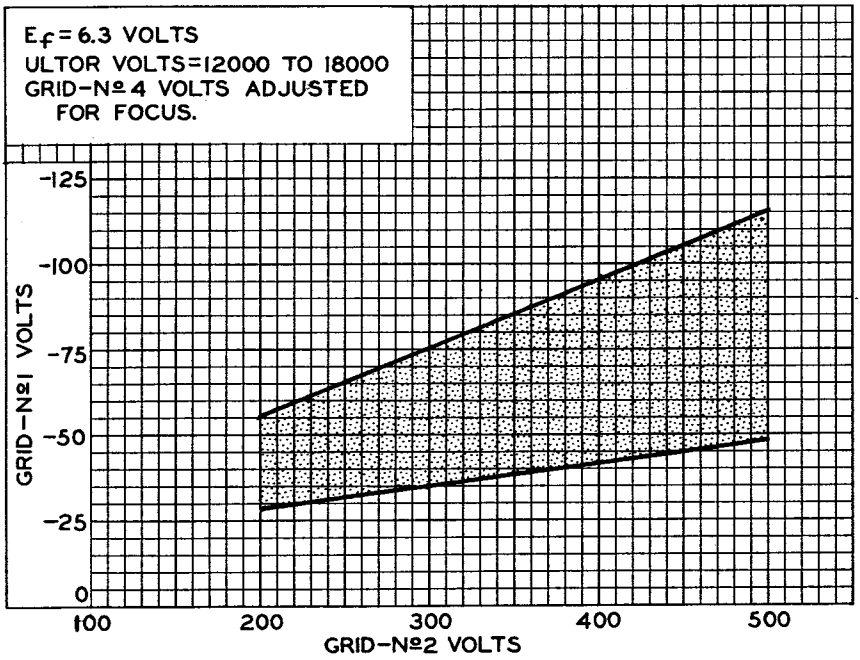
NOTE 5: TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINTLESS CLOTH.

NOTE 6: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDICATED MAXIMUM VALUE OF 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.

NOTE 7: WIDTH OF UNDISTURBED REGION BETWEEN MOLD-MATCH LINE AND SPLICE LINE IS 3/4" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF TUBE SUPPORT BAND.

NOTE 8: TUBE MOUNTING OR YOKE SUPPORT CLAMPS MUST BE SPACED FROM TUBE BY USE OF CUSHIONING PADS MADE OF MATERIAL SUCH AS ASPHALT-IMPREGNATED FELT, OR EQUIVALENT.

RASTER-CUTOFF-RANGE CHARTS
Grid-Drive Service



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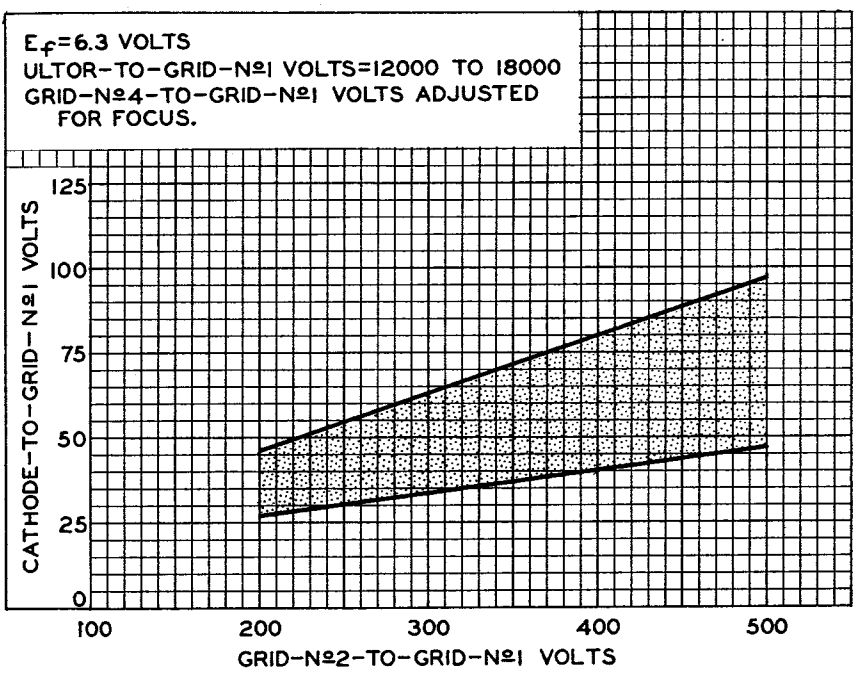
Cathode-Drive Service



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