



21AXP22

21AXP22

COLOR KINESCOPE

THREE-GUN SHADOW-MASK TYPE
MAGNETIC CONVERGENCEELECTROSTATIC FOCUS
MAGNETIC DEFLECTION

DATA

General:

Electron Guns, Three with Axes Tilted
 Toward Tube Axis Blue, Green, Red

Heater, for Unipotential Cathode of
 Each Gun, Paralleled with Each of
 the Other Two Heaters within Tube:

Voltage. 6.3 ac or dc volts
 Current. 1.8 amp

Direct Interelectrode Capacitances (Approx.):

Grid No.1 of any gun to all other
 electrodes except the No.1 grids
 of the other two guns. 7 μf

Cathode of blue gun + cathode of green
 gun + cathode of red gun to all
 other electrodes 16 μf

Grid No.3 (Of each gun tied within
 tube to No.3 grids of other two
 guns) to all other electrodes. 9 μf

Faceplate, Spherical Filterglass
 Light transmission (Approx.) 77%

Screen, on Inner Surface of Faceplate:

Type Metal-Backed, Tricolor, Phosphor-Dot
 Phosphor (Three separate phosphors, collectively). . . . P22
 Fluorescence and phosphorescence of
 separate phosphors, respectively. . . Blue, Green, Red
 Persistence of group phosphorescence Medium
 Dot arrangement. Triangular group consisting of
 blue dot, green dot, and red dot

Spacing between centers of adjacent dot trios (Approx.) 0.029"

Size (Minimum):

Greatest width 19-1/16"
 Height 15-1/4"
 Projected area 255 sq. in.

Focusing Method. Electrostatic
 Convergence Method Magnetic
 Deflection Method. Magnetic

Deflection Angles (Approx.):

Horizontal 70°
 Vertical 55°

Tube Dimensions:

Maximum overall length 25-5/16"

Diameter:

At lip 20-9/16" $\pm$ 1/8"
 At flange. 21-1/4" max.

Weight (Approx.) 28 lbs

Mounting Position. Any

Ultor[•] Terminal. Metal-Shell Lip

Base Small-Shell Neodiheptal 12-Pin (JETEC No.B12-131)

•: See next page.

MAR. 1, 1955

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21AXP22



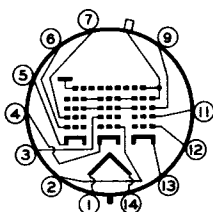
21AXP22

COLOR KINESCOPE

Socket Alden Nos. 214NMINS (Radial leads),
214NMINC (Axial leads), or equivalent

Basing Designation for BOTTOM VIEW 14W

Pin 1 - Heater
Pin 2 - Grid No. 1
 of Red Gun
Pin 3 - Grid No. 2
 of Red Gun
Pin 4 - Cathode
 of Red Gun
Pin 5 - Cathode
 of Green Gun
Pin 6 - Grid No. 1
 of Green Gun
Pin 7 - Grid No. 2
 of Green Gun



Pin 9 - Grids No. 3
Pin 11 - Grid No. 2
 of Blue Gun
Pin 12 - Grid No. 1
 of Blue Gun
Pin 13 - Cathode
 of Blue Gun
Pin 14 - Heater
METAL-SHELL LIP:
 Ultor
 (Grid No. 4,
 Grid No. 5,
 Collector)

Maximum Ratings, Design-Center Values:

ULTOR [•] -TO-CATHODE (Of each gun) VOLTAGE. .	25000 max.	volts
ULTOR CURRENT, (Average, each gun)	500* max.	μamp
GRID-No. 3-TO-CATHODE (Of each gun) VOLTAGE	6000 max.	volts
GRID-No. 2-TO-CATHODE VOLTAGE (Each gun). .	800 max.	volts
GRID-No. 1-TO-CATHODE VOLTAGE (Each gun):		
Negative bias value.	400 max.	volts
Positive bias value.	0 max.	volts
Positive peak value.	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE (Each gun):		
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:

For ultor voltage (E_{c4} each gun) of 25000 volts

Grid-No. 3 (Focusing electrode)-to-Cathode (Of each gun) Voltage.	15.2% to 21.2% of E_{c4} each gun	volts
Grid-No. 2-to-Cathode Voltage (Each gun) when circuit design utilizes grid-No. 1-to-cathode voltage (E_{c1k}) at fixed value for raster cutoff	See Cutoff Design Chart	

* A value of average ultor current per gun higher than 500 microamperes will increase picture brightness but may impair resolution and shorten cathode life.

•: See next page.

MAR. 1, 1955

TUBE DIVISION

TENTATIVE DATA 1

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21AXP22

21AXP22

COLOR KINESCOPE

Grid-No.1-to-Cathode Voltage (Each gun) for Visual Extinction of Focused Raster when circuit design utilizes grid-No.2-to-cathode voltage (E_{c2k}) at fixed value See Cutoff Design Chart

Variation in Raster Cutoff Between Guns in Any Tube. $\pm 21\%$ of average of highest and lowest cutoff values

Grid-No.3 Current for ultor current of 800 μ amp. -45 to +75 μ amp

Grid-No.2 Current (Each gun) . . . -5 to +5 μ amp

Percentage of Total Ultor Current Supplied by Each Gun:

To produce Illuminant-C White (I.C.I. Coordinates $x = 0.310$, $y = 0.316$):

Red gun	47 to 67	per cent
Blue gun.	11 to 24	per cent
Green gun	20 to 33	per cent

To produce White of 8500°K + 27M.P.C.D. (I.C.I. Coordinates $x = 0.287$, $y = 0.316$):

Red gun	42 to 60	per cent
Blue gun.	12 to 27	per cent
Green gun	23 to 38	per cent

Maximum Raster Shift in Any Direction from Screen Center[□]. 1 inch

Maximum Compensation to be Provided by the Following Components:

Purifying coil or magnet Raster shift of 1" in any direction from screen center

Converging component (Each gun):

For static convergence—

After adjustment has been made for optimum color purity and dynamic

convergence Shift of spot by $\pm 5/8"$

● 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 21AXP22, the ultor function is performed by grid No.4. Since grid No.4, grid No.5, and collector are connected together within the 21AXP22, they are collectively referred to simply as "ultor" for convenience in presenting data and curves.

□ centering of the raster on the screen is accomplished by passing direct current of the required value through each pair of deflecting coils to compensate for raster shift resulting from adjustments for optimum convergence and color purity.



21AXP22

COLOR KINESCOPE

For dynamic convergence†—

Effected by mmf of approximately parabolic waveshape synchronized with scanning

Horizontal:

Red spot and green spot Shift of 1/4"
Blue spot Shift of 1/2"

Vertical:

Red spot and green spot Shift of 3/8"
Blue spot Shift of 1/8"

Blue-positioning magnet (Blue gun):

After adjustment has been made for color purity and dynamic convergence Shift of blue spot by $\pm 1/2''$

Examples of Use of Design Ranges:

For ultor voltage of 25000 volts

Grid-No.3 (Focusing electrode)-to-Cathode (Of each gun)
Voltage 3800 to 5300 volts

Grid-No.2-to-Cathode Voltage (Each gun) when circuit design utilizes grid-No.1-to-cathode voltage of -70 volts for raster cutoff 130 to 370 volts

Grid-No.1-to-Cathode Voltage (Each gun) for Visual Extinction of Focused Raster when circuit design utilizes grid-No.2-to-cathode voltage of 200 volts. . . . -45 to -100 volts

Limiting Circuit Values:

High-Voltage Circuits:

In order to minimize the possibility of damage to the tube caused by a momentary internal arc, it is recommended that the *ultor power supply* and the *grid-No.3 power supply* be of the limited-energy type with inherent regulation to limit the continuous short-circuit current to 50 milliamperes. In addition, to prevent cathode damage with resultant decrease in tube life, the effective resistance between the ultor power supply output capacitor and the ultor, and the effective resistance between grid-No.3 power supply output capacitor and the grid-No.3 electrode should not be less than 50000 ohms. These resistances should be capable of withstanding the maximum instantaneous currents and voltages in their

† Indicated values apply when RCA test yoke is used with the 21AXP22.



21AXP22

21AXP22

COLOR KINESCOPE

respective circuits. It is to be noted that the effectiveness of the resistance between the ultor power supply output capacitor and the ultor may be impaired if capacitance in excess of 750 $\mu\mu\text{f}$ is introduced between the kinescope and ground by the mounting arrangement of the kinescope.

In equipment utilizing a well-regulated ultor power supply, the *grid-No.3-circuit resistance* should be limited to 7.5 megohms.

Low-Voltage Circuits:

Grid-No.1-Circuit Resistance (Each gun). . . 1.5 max. megohms

When the cathode of each gun is not connected directly to its associated heater, the grid-No.2-to-heater circuit, the grid-No.1-to-heater circuit, and the cathode-to-heater circuit, should each have an impedance such that their respective power sources in combination will not supply an instantaneous or continuous short-circuit current of more than 300 milliamperes total. Such current limitation will prevent heater burnout in case of a momentary internal arc within the tube.

When the cathode is connected directly to the heater, the grid-No.2-to-heater circuit, and the grid-No.1-to-heater circuit should have an impedance such that their respective power sources in combination will not supply an instantaneous or continuous short-circuit current of more than 300 milliamperes total. Such current limitation will prevent heater burnout in case of a momentary internal arc within the tube.

X-RAY WARNING

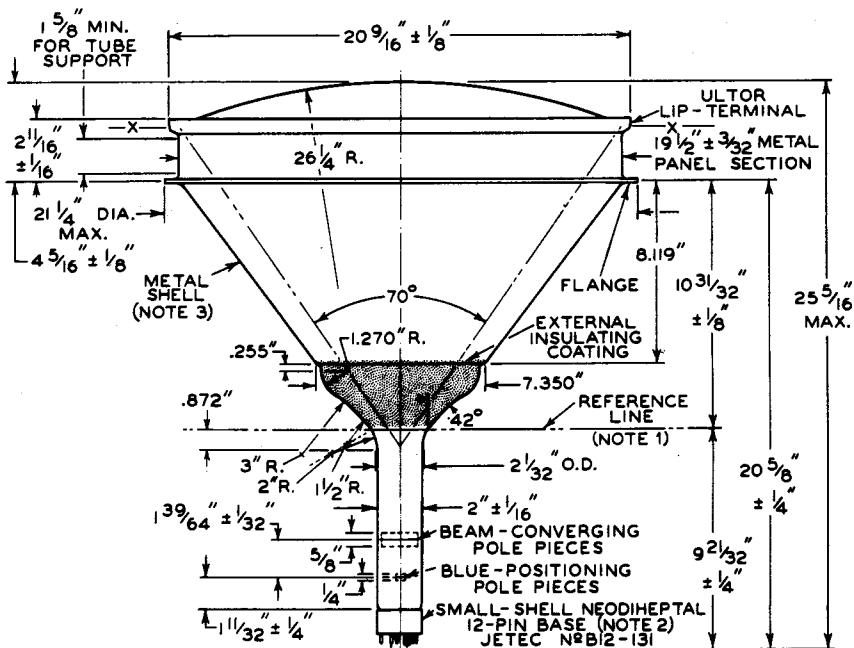
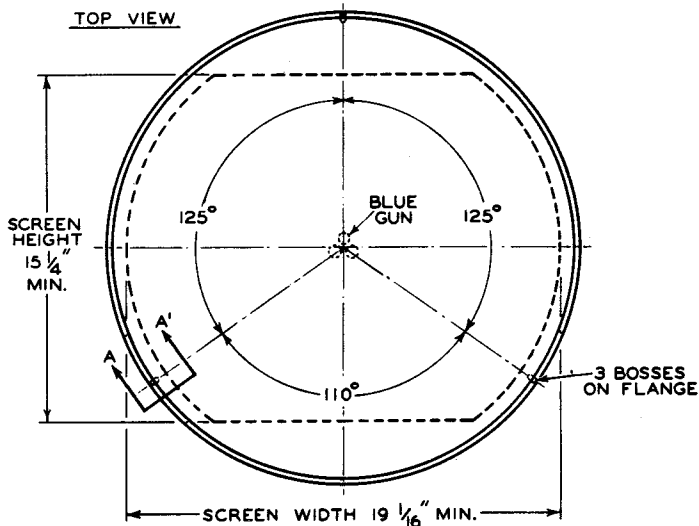
X-ray radiation is produced by the 21AXP22 when it is operated at its normal ultor voltage. The radiation is through the faceplate, and is sufficient to require the adoption of safety measures in TV receivers. Shielding such as that provided by a 1/4-inch thickness of safety glass (lime) in front of the faceplate, should prove adequate to provide protection against personal injury from prolonged exposure at close range when the tube is operated at its maximum ultor voltage rating.

When this tube is being serviced outside of the TV receiver cabinet, it should never be operated without providing adequate X-ray shielding in front of faceplate. Because the ultor voltage may rise above its maximum rated value for short periods during adjustment with increase in the amount of X-ray radiation, provision should be made for placing a 3/8-inch thickness of safety glass in front of the faceplate to avoid the hazard of X-ray radiation.

21AXP22



21AXP22 COLOR KINESCOPE



MAR. 1, 1955

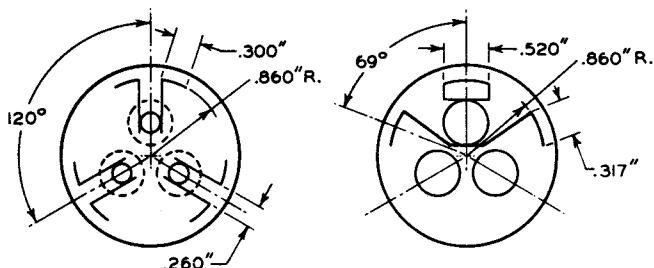
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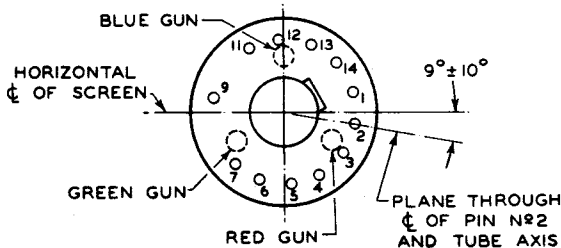
21AXP22

21AXP22 COLOR KINESCOPE

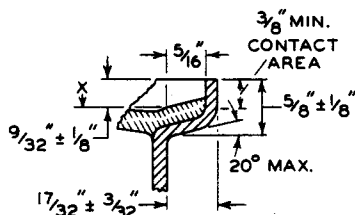


LOCATION OF BEAM-
CONVERGING POLE PIECES

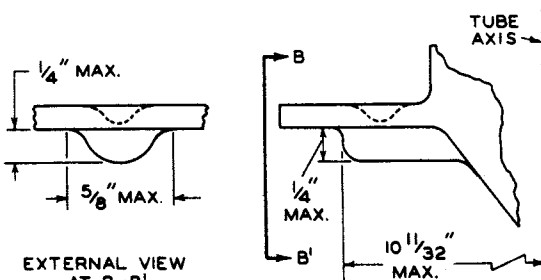
LOCATION OF BLUE-
POSITIONING POLE PIECES



BASE
BOTTOM VIEW



DETAIL OF LIP



EXTERNAL VIEW AT A-A'
DETAIL OF FLANGE BOSSES

92CL-8399R3

21AXP22



21AXP22 COLOR KINESCOPE

NOTE 1: REFERENCE LINE IS DETERMINED BY POSITION WHERE A CYLINDRICAL GAUGE $2.465" \pm 0.001"$ I.D. CONCENTRIC WITH NECK AXIS, WILL REST ON ENVELOPE FUNNEL.

NOTE 2: 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 METAL-SHELL AXIS AND HAVING A DIAMETER OF 3".

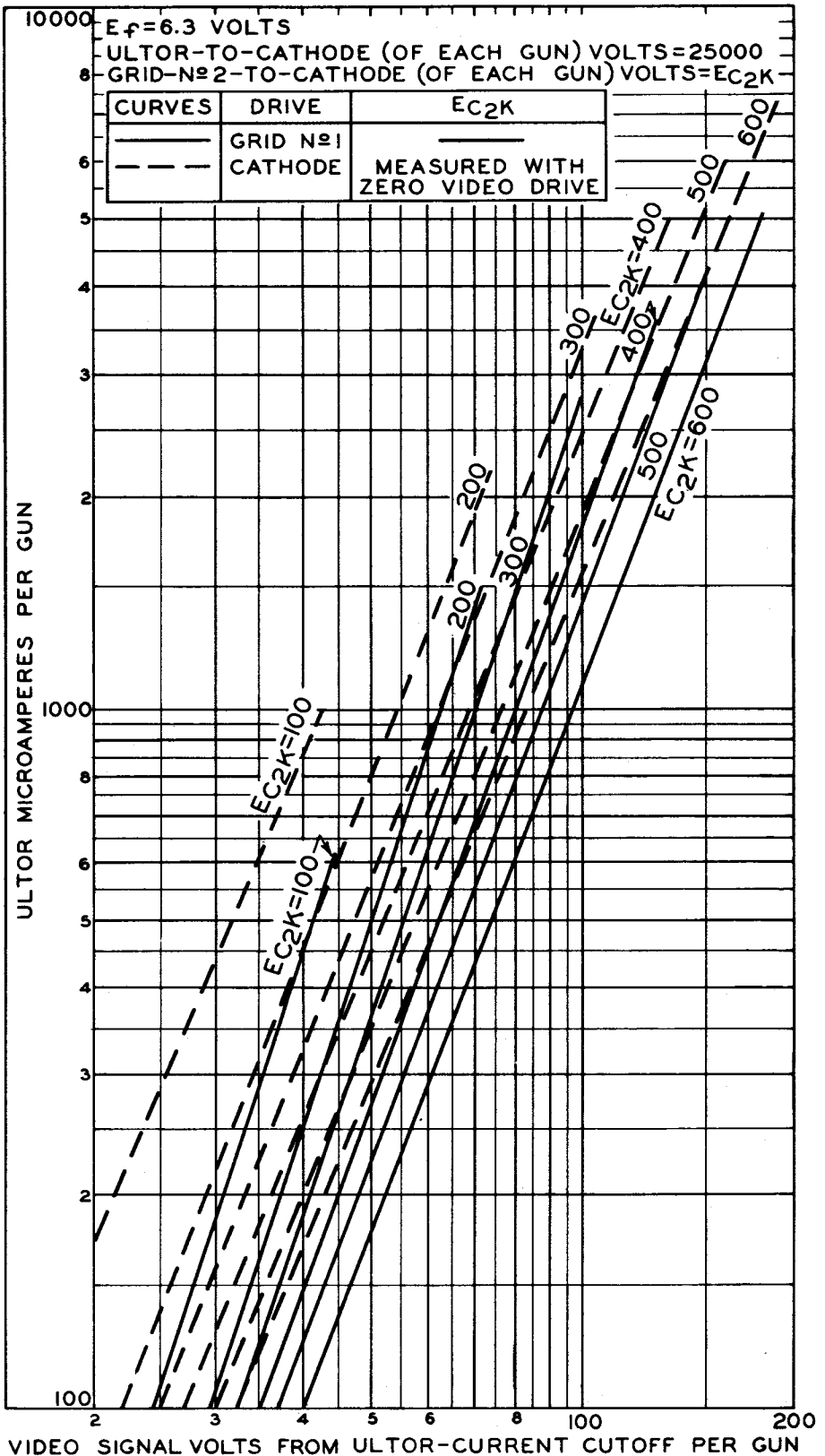
NOTE 3: METAL SHELL AND GLASS FACE OPERATE AT HIGH VOLTAGE. ANY MATERIAL IN CONTACT WITH THE SHELL OR THE FACE MUST BE INSULATED TO WITHSTAND THE MAXIMUM APPLIED ULTOR VOLTAGE.



2IAXP22

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TYPICAL DRIVE CHARACTERISTICS



21AXP22



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TYPICAL LIGHT-OUTPUT CHARACTERISTIC

 $E_f = 6.3$ VOLTS

ULTOR-TO-CATHODE (OF EACH GUN) VOLTS=25000

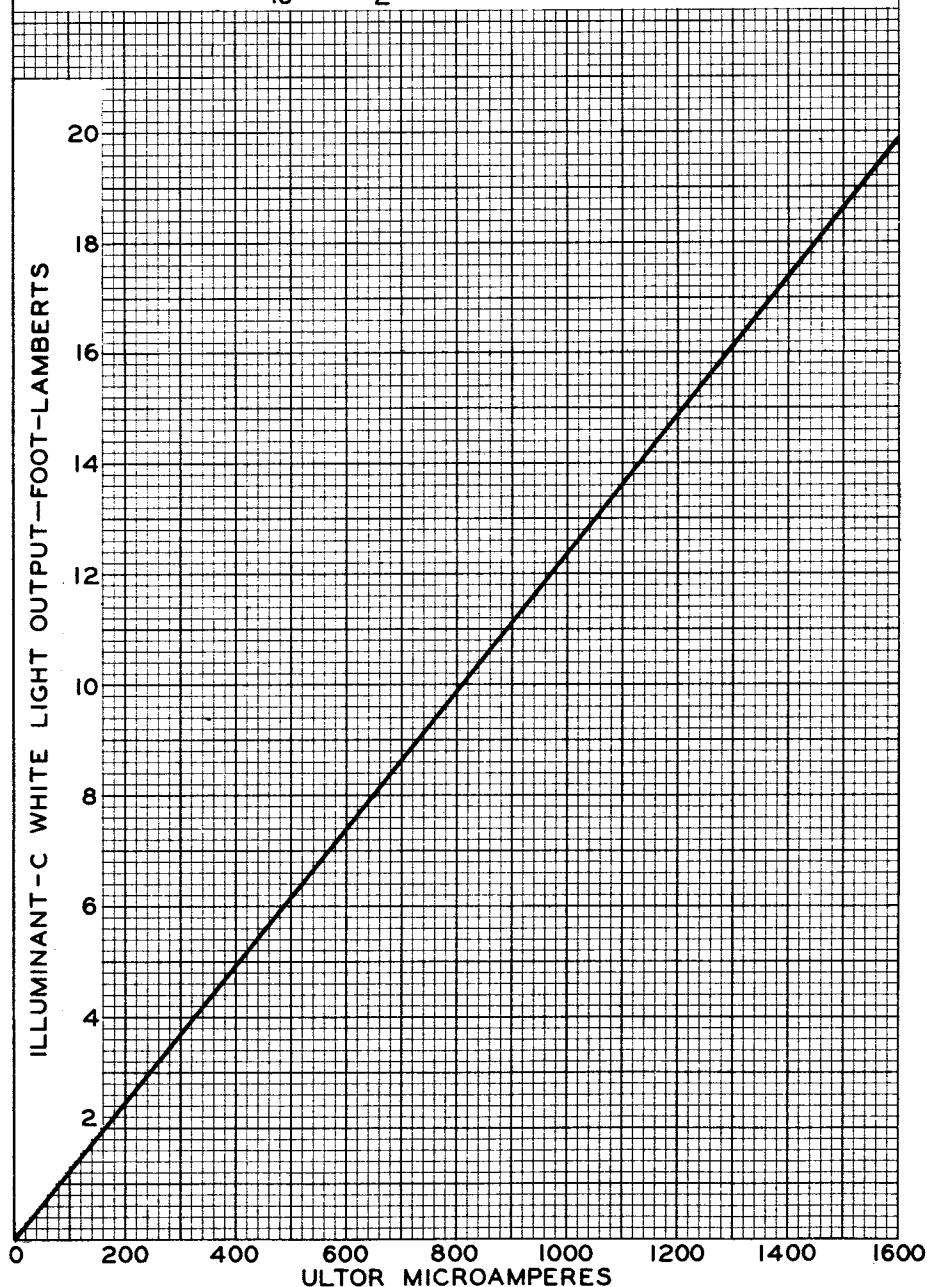
GRID-N₃-TO-CATHODE (OF EACH GUN) VOLTS=ADJUSTED FOR FOCUS

DRIVE OF EACH GUN IS ADJUSTED TO GIVE COMPOSITE ULTOR CURRENT TO PRODUCE ILLUMINANT-C WHITE LIGHT OUTPUT PERCENTAGE OF TOTAL ULTOR CURRENT SUPPLIED BY EACH GUN TO PRODUCE ILLUMINANT-C WHITE:

RED GUN: 57%

BLUE GUN: 17%

GREEN GUN: 26%

RASTER SIZE = $19\frac{1}{16}$ " $\times$ $14\frac{1}{2}$ "

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92CM-8426R2

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21AXP22

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CUTOFF DESIGN CHART

