

21FJP22A

Color Picture Tube

ALUMINIZED TRICOLOR PHOSPHOR DOT "Hi-Lite" SCREEN
(Utilizing a Rare-Earth Red-Emitting Phosphor)

INTEGRAL FILTERGLASS PROTECTIVE WINDOW
(Treated to Minimize Specular Reflection)

MAGNETIC CONVERGENCE & DEFLECTION

ELECTROSTATIC FOCUS

For Use in Color-TV Receivers

ELECTRICAL

Electron Guns, Three Red, Blue, Green
Axes tilted toward tube axis

Heater, for Unipotential Cathode of Each Gun

Paralleled with each of other two heaters within tube

Current at 6.3 V^a 1.8 A

Focusing Method. Electrostatic

Convergence Method Magnetic

Deflection Method. Magnetic

Deflection Angles (Approx.)

Horizontal 70°

Vertical 55°

Direct Interelectrode Capacitances (Approx.)

Grid-No.1 of any gun to all other electrodes. 10 pF

All cathodes to all other electrodes 16 pF

Grid-No.3 to all other electrodes. 12 pF

External conductive coating to anode $\begin{cases} 2500 \text{ max pF} \\ 2000 \text{ min pF} \end{cases}$

OPTICAL

Faceplate and Protective Window. Filterglass

Light transmission (Approx.):

Combined faceplate and protective window 39%

Faceplate. 72%

Protective window. 55%

Surface of Protective Window Treated to minimize
specular reflection

Screen, on Inner Surface of Faceplate

Type Aluminized, Tricolor, Phosphor-Dot

Phosphor (three separate
phosphors, collectively)^b P22-Rare-Earth (Red),
Sulfide (Blue & Green) Type

Fluorescence and phosphorescence of

separate phosphors, respectively Red, Blue, Green

Persistence of group phosphorescence. Medium-Short

Dot Arrangement. Each triangular group consists of a
red, green, and blue dot

Spacing between centers of adjacent

dot trios (Approx.) 0.029 in

MECHANICAL

Tube Dimensions

Overall length 25-7/32 $\pm$ 3/8 in

Diameter, Maximum. 2 1/2 in



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Screen Dimensions Minimum

Greatest width	19-1/4 in
Greatest height	16 in
Projected area	267 sq in
Weight (Approx.)	41 lb

Operating Position . . .Tube Axis Horizontal, V-grooved panel pad on top (Base pin 12 near top)

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

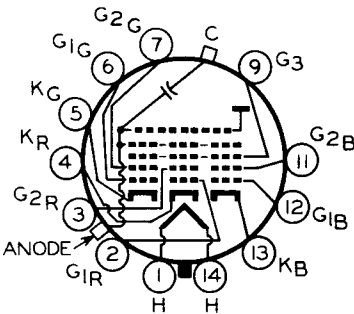
SocketAlden Nos.214NMINS (Radial leads),
214NMINC (Axial leads), or equivalent

BaseSmall-Shell Neodiheptal 12-pin (JEDEC No.B12-131)

Basing Designation for BOTTOM VIEW 14AU

- 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-Grid 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

Cap - Anode
C - External Conductive Coating



MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES

Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode

Anode Voltage.	{ 27500 max V 20000 min V
Total Anode Current, Long-Term Average.	1000 max μ A
Grid-No.3 (Focusing Electrode) Voltage	6000 max V
Peak Grid-No.2 Voltage, Including Video Signal Voltage.	1000 max V
Grid-No.1 Voltage	
Negative bias value.	400 max V
Negative operating cutoff value.	200 max V
Positive bias value.	0 max V
Positive peak value.	2 max V
Heater Voltage (ac or dc)	
Operating conditions ^a .	{ 6.9 max V 5.7 min V
Standby conditions ^c .	5.5 max V

Peak Heater-Cathode Voltage

Heater negative with respect to cathode:	
During equipment warm-up period not exceeding 15 seconds.	450 max V
After equipment warm-up period	200 max V
Heater positive with respect to cathode.	200 max V



EQUIPMENT DESIGN RANGES

Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode

For anode voltage (E_{c4k}) between 20000 and 27500 volts

Grid-No.3 Voltage. 16.8% to 20% of E_{c4k}

Focusing electrode

Grid-No.2 Voltage. See accompanying Cutoff Design Chart

When circuit design utilizes grid-No.1 voltage (E_{c1k}) at fixed value for visual extinction of focused spot

Grid-No.1 Voltage. See accompanying Cutoff Design Chart

For visual extinction of focused spot when circuit design utilizes grid-No.2 voltage (E_{c2k}) at fixed value

Maximum Ratio of Spot Cutoff Voltages 1.53

Highest gun to lowest gun in any tube ($E_{c2k} = 200$ V)

Grid-No.3 Current (Total). -45 to +45 μ A

Grid-No.2 Current. -5 to +5 μ A

To Produce White of 9300°K + 27 M.P.C.D.
(CIE Coordinates $x = 0.281$, $y = 0.311$)

Percentage of total anode current supplied by each gun (average)

Red	Blue	Green	%
42	28	30	

Red to Green

Red to Blue

Min	Typ	Max	Min	Typ	Max
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Ratio of cathode currents 0.85 1.4 1.95 0.8 1.5 2.2

Displacements, Measured at Center of Screen

Raster centering displacement:

Horizontal -0.60 to +0.60 in

Vertical -0.45 to +0.45 in

Lateral displacement of blue beam with respect to convergence red and green beams -0.55 to +0.55 in

Radial convergence displacement excluding effects of dynamic convergence (each beam) -0.50 to +0.50 in

Maximum Required Correction for Register^d

(Including Effect of Earth's Magnetic Field when Using Recommended Components). 0.005 max in

Measured at center of screen in any direction

EXAMPLES OF USE OF DESIGN RANGES

Unless otherwise specified, voltage values are for each gun and are positive with respect to cathode

Anode Voltage. 25000 V

Grid-No.3 Voltage. 4200 to 5000 V

Focusing electrode

Grid-No.2 Voltage. 310 to 690 V

When circuit design utilizes grid-No.1 voltage of -150V for spot cutoff

Grid-No.1 Voltage. -90 to -190 V

For visual extinction of focused spot when circuit design utilizes grid-No.2 voltage of 400V

Heater Voltage

Operating conditions^a 6.3 V

Standby conditions 5 V



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LIMITING CIRCUIT VALUES

High-Voltage Circuits

Grid-No.3 Circuit Resistance 7.5 max MΩ

In order to minimize the possibility of damage to the tube caused by a momentary internal arc, it is recommended that the **high-voltage power supply** and the **grid-No.3 power supply** be of the limited-energy type.

Low-Voltage Circuits

Effective Grid-No.1-to-Cathode-Circuit

Resistance (Each gun) 0.75 max MΩ

The low voltage circuits should be analyzed by assuming that heater winding for the color picture tube is connected directly to the receiver chassis ground. Under these conditions the grid-No.2-to-heater circuit, the grid-No.1-to-heater circuit, and the cathode-to-heater circuits of all other tubes operating from the same heater winding as the color picture tube and all connections of any other circuits to the heater winding should each have an impedance such that their respective power sources in combination will not supply a continuous short circuit current of more than 750 milliamperes total. Such current limitation will prevent heater burnout in case of a momentary internal arc within the color picture tube.

- a For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts.
- b For Curve, see Group Phosphor P22—Rare-Earth (Red), Sulfide (Blue & Green) at front of this section.
- c For "instant on" applications, a maximum heater voltage of 5.5 volts (design-maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.
- d Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

GENERAL CONSIDERATIONS

X-Radiation Warning. Because the 21FJP22A is designed to be operated at anode voltages as high as 27.5 kilovolts (design-maximum value), shielding of the 21FJP22A for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.

Orientation. The 21FJP22A must be operated with tube axis in a horizontal position and with the blue gun uppermost (i.e., V-grooved panel pad on top and base pin 12 near top). This operating position is required to take advantage of the correction built into the tube for the vertical component of the earth's magnetic field in the northern hemisphere, and is the position for which the beam-displacement values shown in the data apply.

Deflecting yoke should not be used for supporting the picture tube because it should be centered on the neck and be free to move along the neck for a distance of approximately 5/8 inch from its most forward position for adjustment purposes. The yoke mount should also provide for a small amount of rotational adjustment.



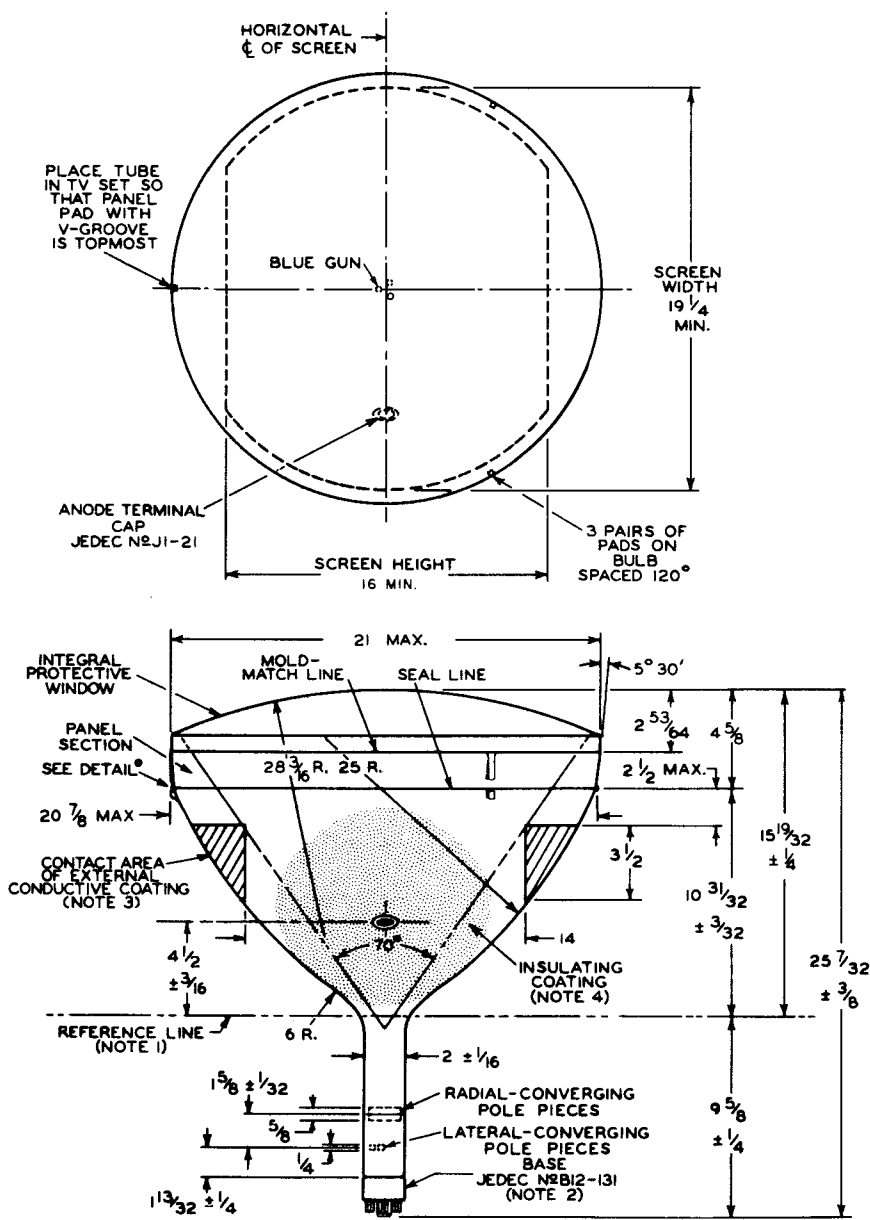
External conductive coating contact should be made by multiple fingers in order to prevent overheating and possible damage to the tube.

Misregister Compensation. Proper operation of the 21FJP22A requires compensation for the effects of extraneous magnetic fields, the earth's magnetic field, and other causes which may produce misregister. Compensation for these effects may be accomplished by the use of a purifying magnet.

REFERENCE-LINE AND NECK-FUNNEL-CONTOUR GAUGE
for Type 21FJP22A is the same as that shown for
Type 21AXP22A



DIMENSIONAL OUTLINE

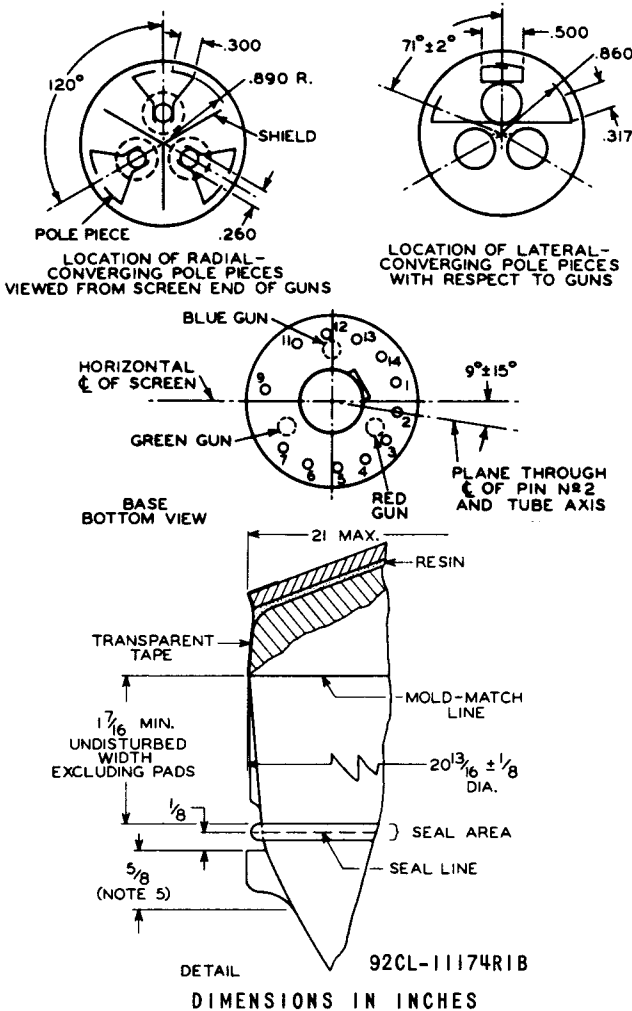


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• Detail and Notes shown on following page.

DIMENSIONS IN INCHES





Note 1: With tube neck inserted through flared end of reference-line and neck-funnel-contour gauge 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 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 bulb axis and having a diameter of 3".

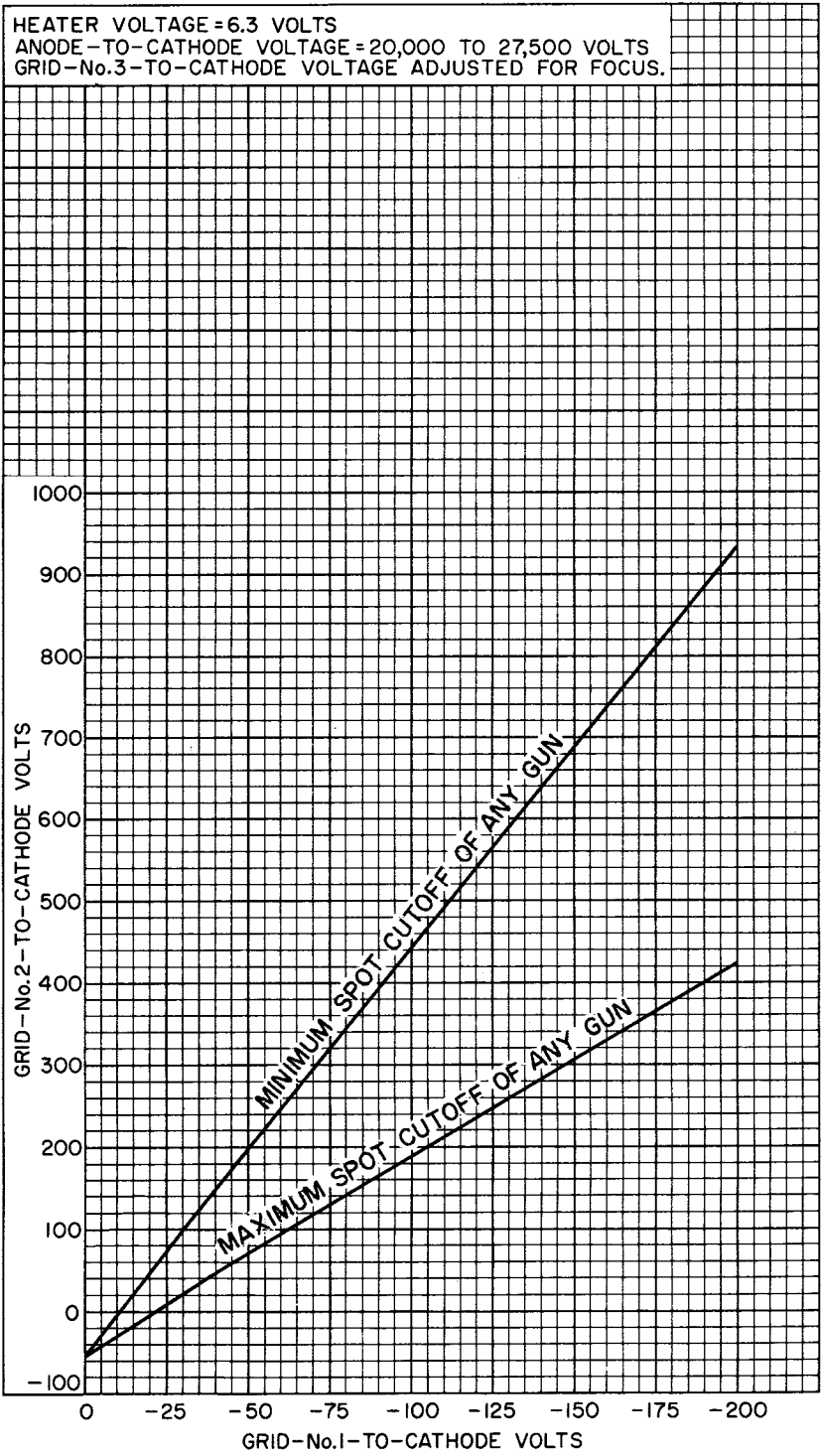
Note 3: The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

Note 4: To clean this area, wipe only with soft dry lintless cloth.

Note 5: The maximum effective width of a funnel pad is 5/8".



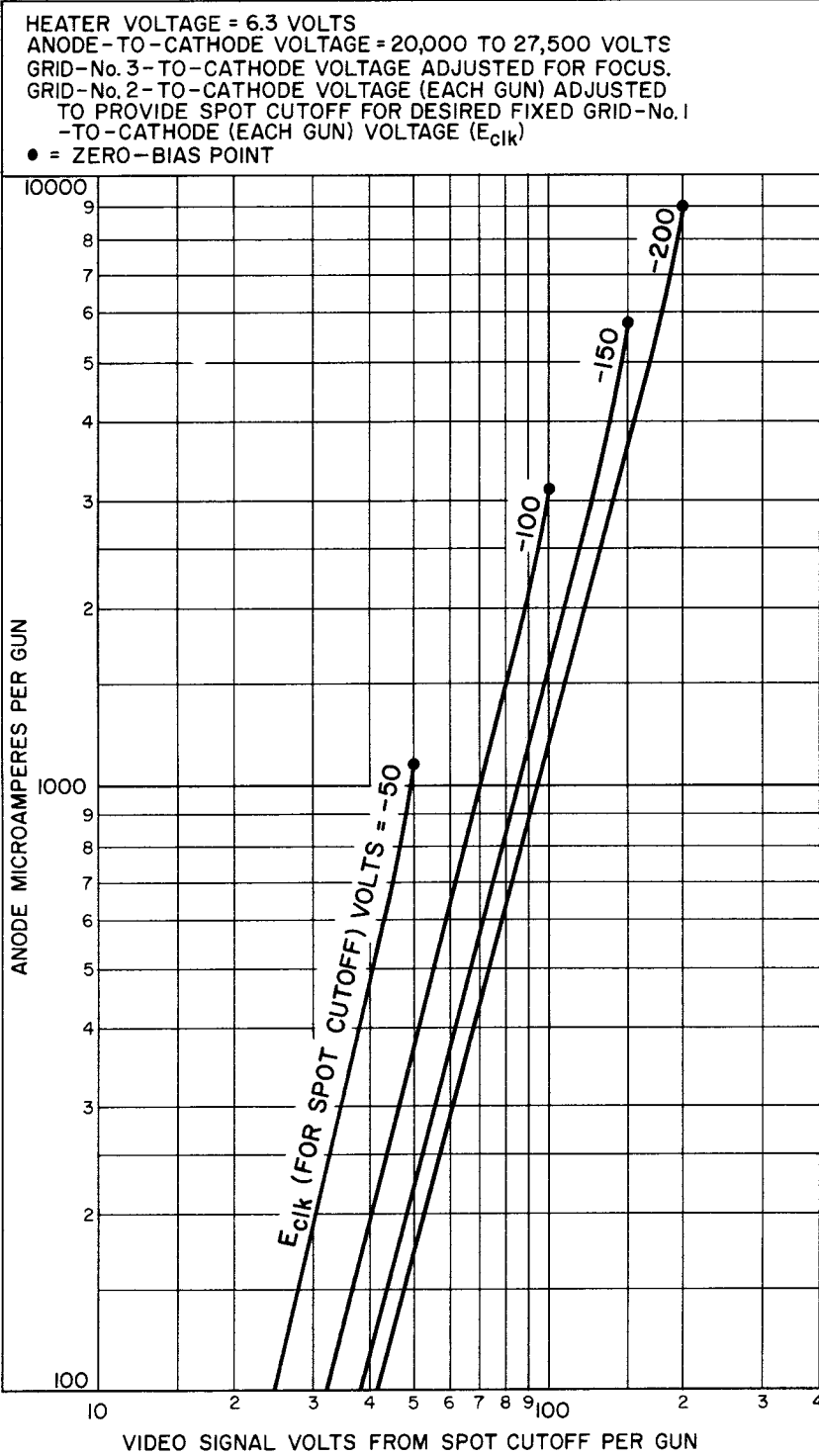
Cutoff Design Chart



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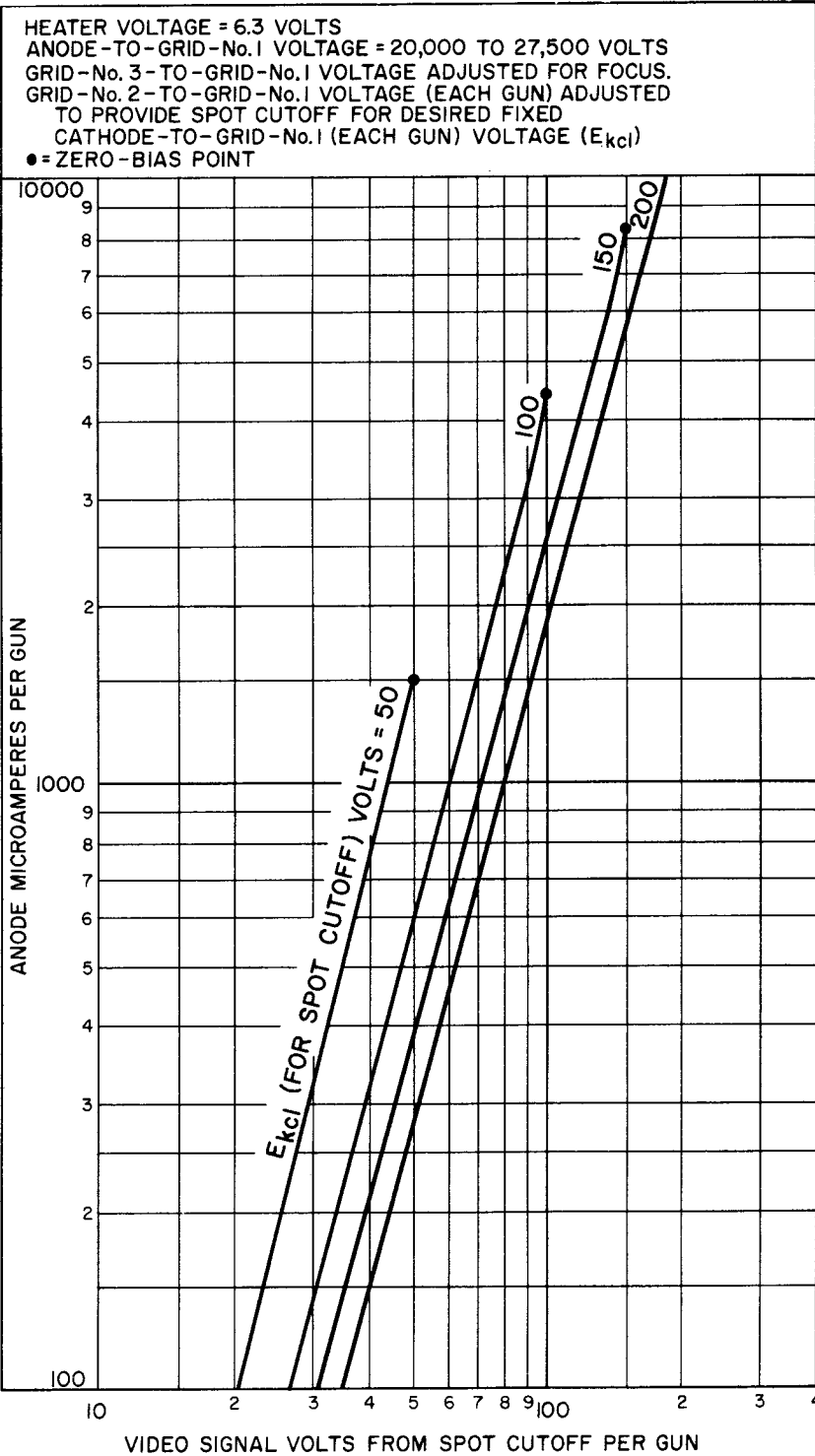
Typical Drive Characteristics
Grid-Drive Service



92CM-12344



Typical Drive Characteristics
Cathode-Drive Service



92CM-12343R1

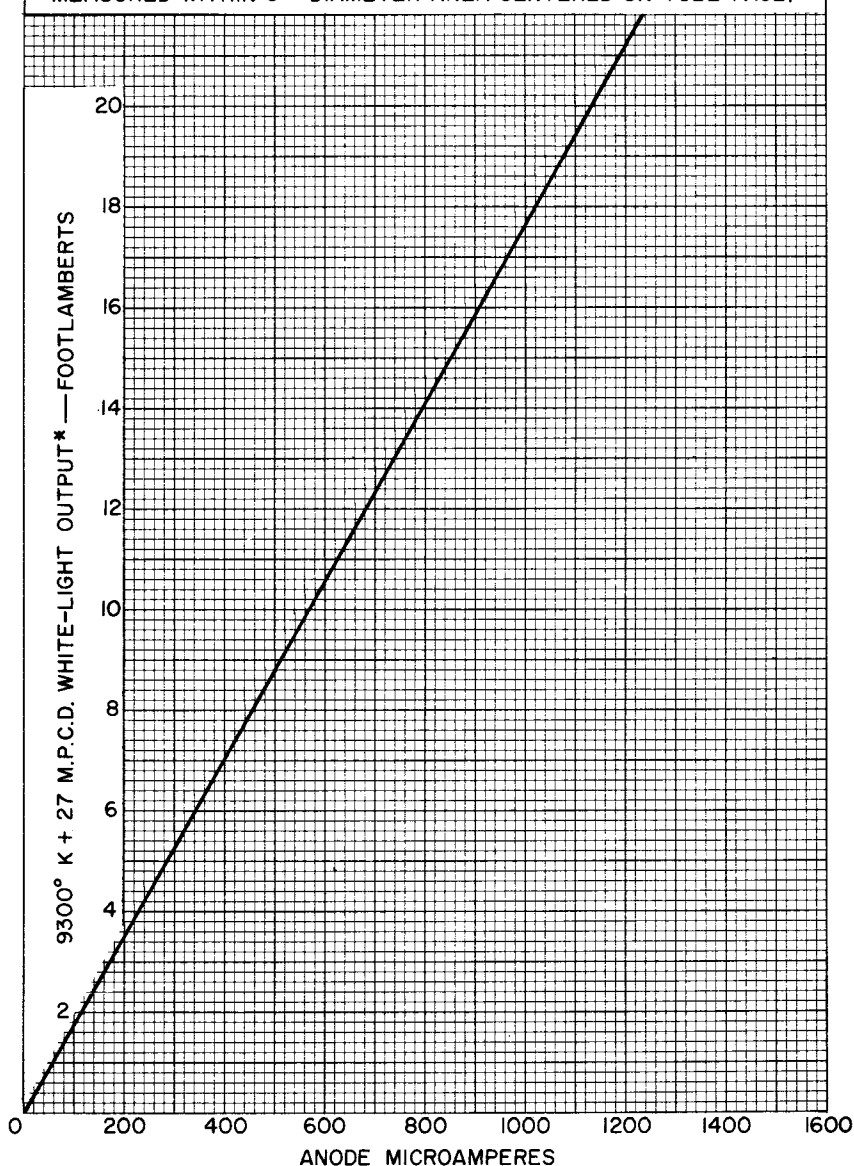


Typical Light-Output Characteristics

HEATER VOLTAGE = 6.3 VOLTS
 ANODE-TO-CATHODE VOLTAGE = 25,000 VOLTS
 GRID-No. 3-TO-CATHODE VOLTAGE ADJUSTED FOR FOCUS.
 DRIVE OF EACH GUN IS ADJUSTED TO GIVE COMPOSITE ANODE
 CURRENT TO PRODUCE 9300° K + 27 M.P.C.D. WHITE-LIGHT OUTPUT.
 PERCENTAGE OF TOTAL ANODE CURRENT SUPPLIED BY EACH GUN
 TO PRODUCE 9300° K + 27 M.P.C.D. WHITE :
 RED GUN : 42%
 BLUE GUN : 28%
 GREEN GUN : 30%

RASTER SIZE : 19 1/4" x 16"

*MEASURED WITHIN 5"-DIAMETER AREA CENTERED ON TUBE FACE.



92CM-III50R2

