

25AP22A

Color Picture Tube

RECTANGULAR TUBE

90° MAGNETIC DEFLECTION

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

ELECTROSTATIC-FOCUS GUNS

For Use in Color-TV Receivers

Electrical:

Electron Guns, Three with Axes Tilted

Toward Tube Axis Red, Blue, Green

Heater, of Each Gun, Series Connected

within Tube with Each of the Other

Two Heaters:

Current at 6.3 volts^a. 800 ma

Focusing Method. Electrostatic

Focus Lens Bipotential

Convergence Method Magnetic

Deflection Method. Magnetic

Deflection Angles (Approx.):

Diagonal 89°

Horizontal 78°

Vertical 63°

Direct Interelectrode Capacitances:

Grid No.1 of any gun to all other electrodes 6 pf

All cathodes to all other electrodes 15 pf

Grid No.3 to all other electrodes. 6.5 pf

External conductive coating to anode { 2500 max. pf
2000 min. pf

Optical:

Faceplate and Protective Window. Filterglass

Light transmission at center (Approx.) 41%

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)

(See accompanying *Curve*) P22 — Rare-Earth (Red),
Sulphide (Blue & Green) Type

Fluorescence and phosphorescence of

separate phosphors, respectively Red, Blue, Green

Persistence of group phosphorescence Medium Short

Dot arrangement. Triangular group consisting of
red dot, blue dot, and green dot

Spacing between centers of

adjacent dot trios (Approx.) 0.029"



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Mechanical:

Tube Dimensions:

Overall length	20.924" ± .375"
Neck length.	6.693" ± .188"
Diagonal	24.566" ± .093
Greatest width	21.500" ± .093"
Greatest height.	17.263" ± .093"

Minimum Screen Dimensions (Projected):

Diagonal	22.995"
Greatest width	19.875"
Greatest height.	15.575"

Area 295 sq. in.

Weight (Approx.) 42 lbs.

Operating Position Anode Cap Contact on Top

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

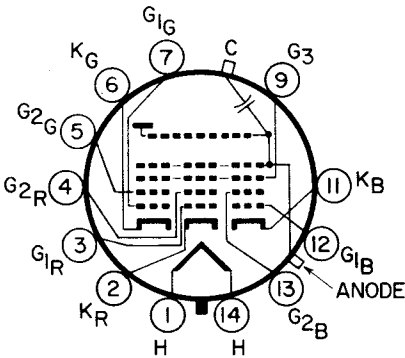
Pin Position Alignment . .Pin 12 Align Approx. with Anode Cap

BaseSmall-Button Diheptar 12-Pin (JEDEC No.B12-244)

Basing Designation for BOTTOM VIEW 14BE

- Pin 1-Heater
- Pin 2-Cathode of Red Gun
- Pin 3-Grid No.1 of Red Gun
- Pin 4-Grid No.2 of Red Gun
- Pin 5-Grid No.2 of Green Gun
- Pin 6-Cathode of Green Gun
- Pin 7-Grid No.1 of Green Gun
- Pin 9-Grid No.3
- Pin 11-Cathode of Blue Gun
- Pin 12-Grid No.1 of Blue Gun
- Pin 13-Grid No.2 of Blue Gun
- Pin 14-Heater

Cap - Anode (Grid No.4,
Grid No.5) Screen,
Collector
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.	{ 27,500 max. volts 20,000 min. volts
Total Anode Current, Long-Term Average.	1000 max. μ a
Grid-No.3 (Focusing Electrode) Voltage . .	6000 max. volts
Peak Grid-No.2 Voltage, Including Video Signal Voltage	1000 max. volts
Grid-No.1 Voltage: Negative-bias value.	400 max. volts
Negative operating cutoff value.	200 max. volts
Positive-bias value.	0 max. volts
Positive-peak value.	2 max. volts



Heater Voltage (AC or DC):

Under operating conditions ^a	{ 6.9 max. volts
	{ 5.7 min. volts
Under standby conditions ^b	5.5 max. volts

Peak Heater-Cathode Voltage (Each gun):

Heater negative with respect to cathode:

During equipment warm-up period

not exceeding 15 seconds 450 max. volts

After equipment warm-up period 200 max. volts

Heater positive with respect to cathode. . . 200 max. volts

Equipment Design Ranges:

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

For anode voltage between 20,000 and 27,500 volts

Grid-No.3 (Focusing Electrode)

Voltage. 16.8% to 20% of anode volts

Grid-No.2 and Grid-No.1 Voltages

for Visual Extinction of

Focused Spot See accompanying *Cutoff Design Chart*

Maximum Ratio of Grid-No.2 Voltages,

Highest Gun to Lowest Gun in Any

Tube (At grid-No.1 spot cutoff

voltage of -100 volts) 1.86

Grid-No.3 Current (Total). -45 to +15 μ a

Grid-No.2 Current. -5 to +5 μ a

To produce White of 9300 °K

+ 27M.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	25	33	

Ratios of

<u>Red to Blue</u>			<u>Red to Green</u>		
Min.	Typ.	Max.	Min.	Typ.	Max.
1.0	1.7	2.0	1.0	1.3	1.8

Cathode Currents

Displacements, Measured at Center of Screen:

Raster centering displacement:

Vertical -0.45 to +0.45 inch

Horizontal -0.47 to +0.47 inch

Lateral convergence displacement of

blue beam with respect to con-

verged red and green beams -0.25 to +0.25 inch

Radial convergence displacement

excluding effects of dynamic

convergence (Each beam). -0.37 to +0.37 inch

Maximum Required Correction for

Register^c (Including Effect of

Earth's Magnetic Field when

Using Recommended Components) as

Measured at Center of the Screen

in any Direction 0.005 inch



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Examples of Use of Design Ranges:

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

Anode Voltage.	25,000	volts
Grid-No.3 Voltage.	4200 to 5000	volts
Grid-No.2 Voltage when circuit design utilizes grid-No.1 voltage of -150 volts for visual extinction of focused spot	285 to 685	volts
Grid-No.1 Voltage for visual extinction of focused spot when circuit design utilizes grid-No.2 voltage of 400 volts.	-95 to -190	volts
Heater Voltage:		
Under operating conditions ^a	6.3	volts
Under standby conditions	5.0	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 **high-voltage power supply and the grid-No.3 power supply** be of the limited-energy type.

Grid-No.3 circuit resistance 7.5 max. megohms

Low-Voltage Circuits

Effective grid-No.1-to-cathode-

circuit resistance (each gun). 0.75 max. megohm

The low voltage circuits should be analyzed by assuming the color picture tube heater is connected directly to the receiver chassis ground. Under these conditions the grid-No.2-to-heater circuit, 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 "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.

^c Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

^d The relative intensities of the narrow-emission bands of the red phosphor are dependent on the resolution of the measuring device.



GENERAL CONSIDERATIONS

X-Radiation Warning. Because the 25AP22A is designed to be operated at anode voltages as high as 27.5 kilovolts (design-maximum value), shielding of the 25AP22A for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.

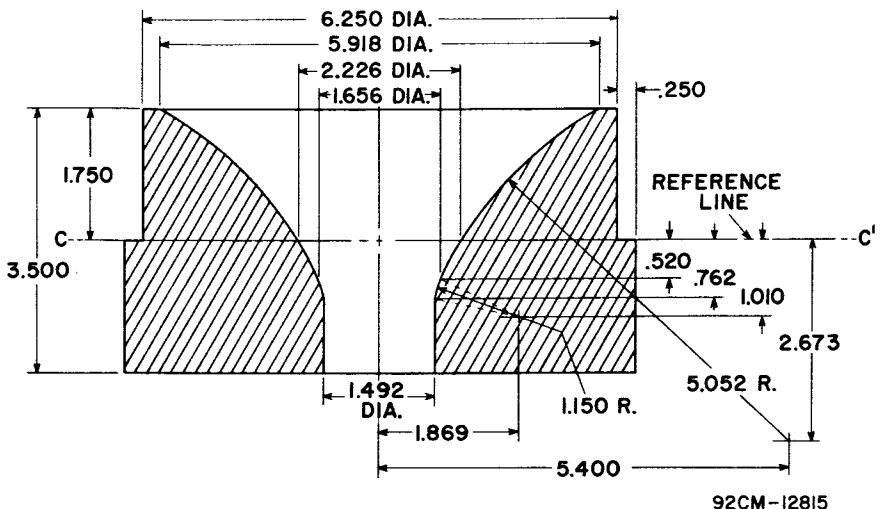
Orientation. The 25AP22A must be operated with tube axis in a horizontal position and with the blue gun uppermost (i.e., anode cap on top). This is the operating position for which the beam-displacement and register correction values shown in the data apply.

The *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 1/2 inch from its most forward position for adjustment purposes. The yoke mount should also provide for a small amount of rotational adjustment.

Contact to the *external conductive coating* should be made by multiple fingers in order to prevent overheating and possible damage to the tube.

Misregister Compensation. Proper operation of the 25AP22A 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



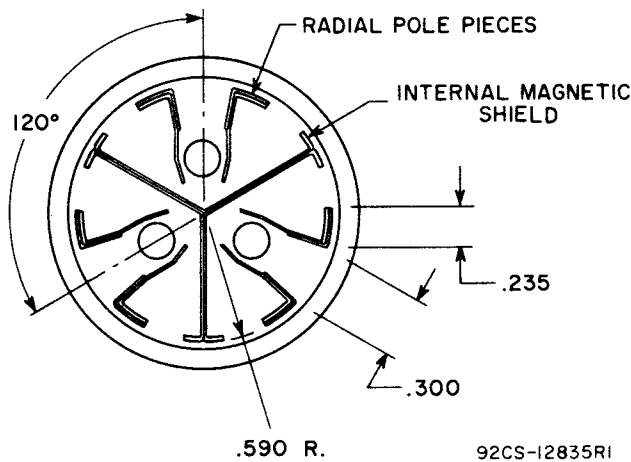
DIMENSIONS IN INCHES

Reference line is determined by plane C-C' when gauge is seated.



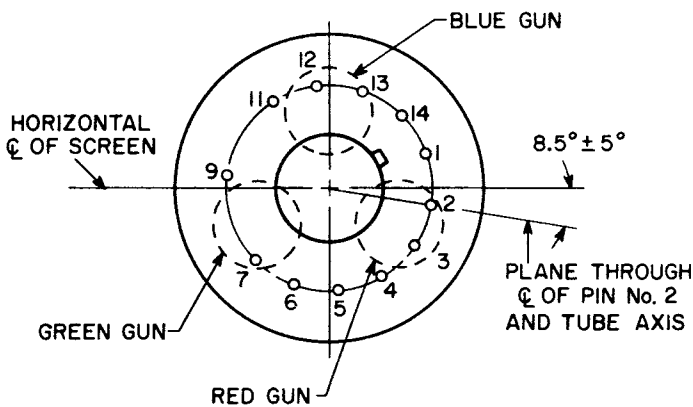
25AP22A

LOCATION OF RADIAL-CONVERGING POLE PIECES
VIEWED FROM SCREEN END OF GUNS



DIMENSIONS IN INCHES

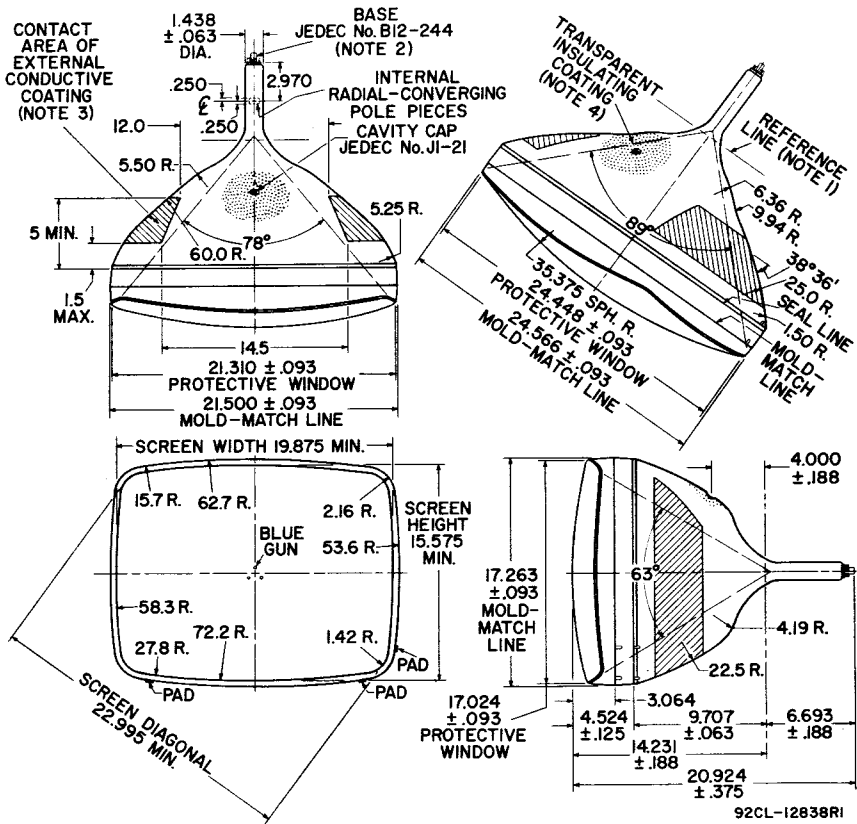
BASE
BOTTOM VIEW



92CS-12816



DIMENSIONAL OUTLINE



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 C-C' of the gauge with the glass funnel.

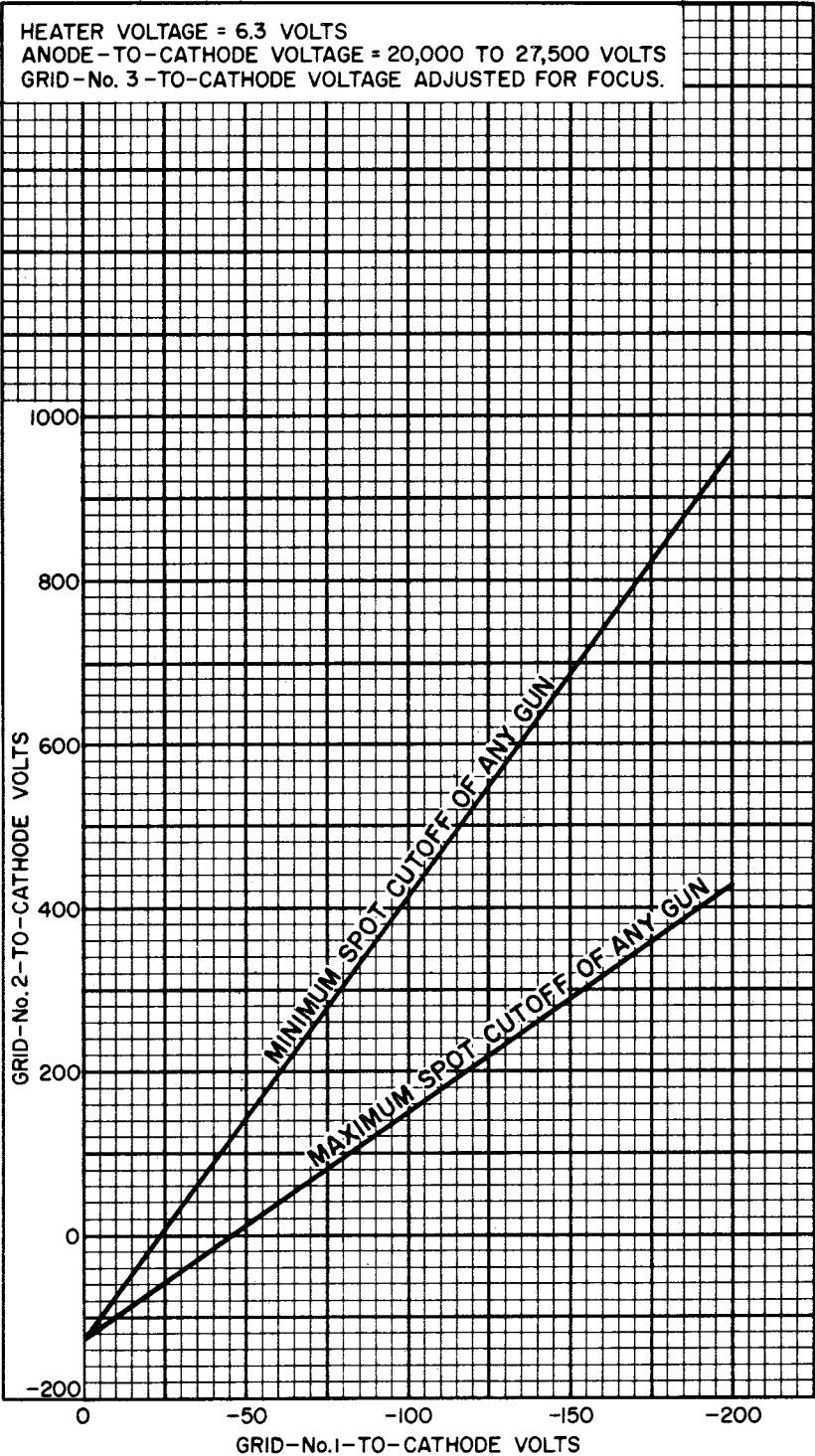
Note 2: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a circle concentric with bulb axis and have a diameter of 2 inches.

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.



Cutoff Design Chart



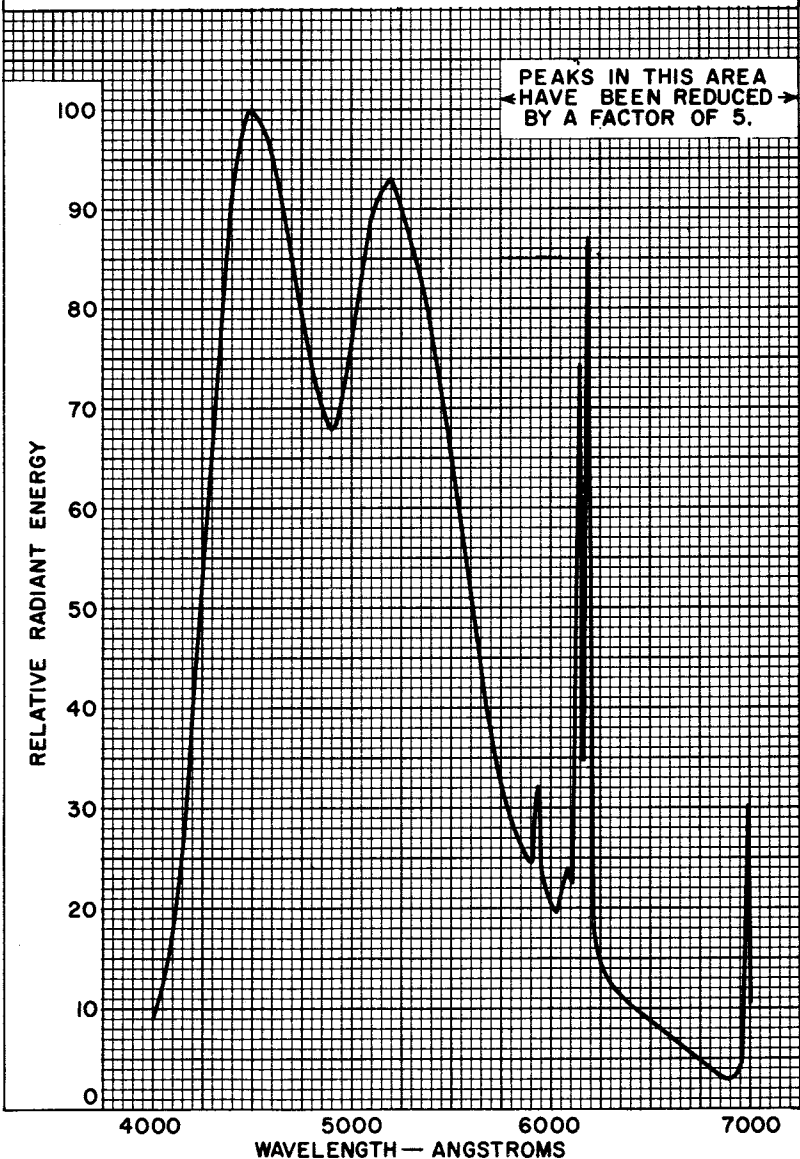
92CM-12803



Spectral-Energy Emission Characteristic of Group Phosphor P22—Rare-Earth (Red), Sulfide (Blue & Green) Type^d

SIMULTANEOUS EXCITATION OF RED PHOSPHOR, BLUE PHOSPHOR,
AND GREEN PHOSPHOR TO PRODUCE 9300° K + 27 M.P.C.D.
WHITE (X = 0.281, Y = 0.311).

COMPONENT COLOR	C.I.E. COORDINATES	
	X	Y
RED	0.676	0.324
BLUE	0.155	0.061
GREEN	0.290	0.590

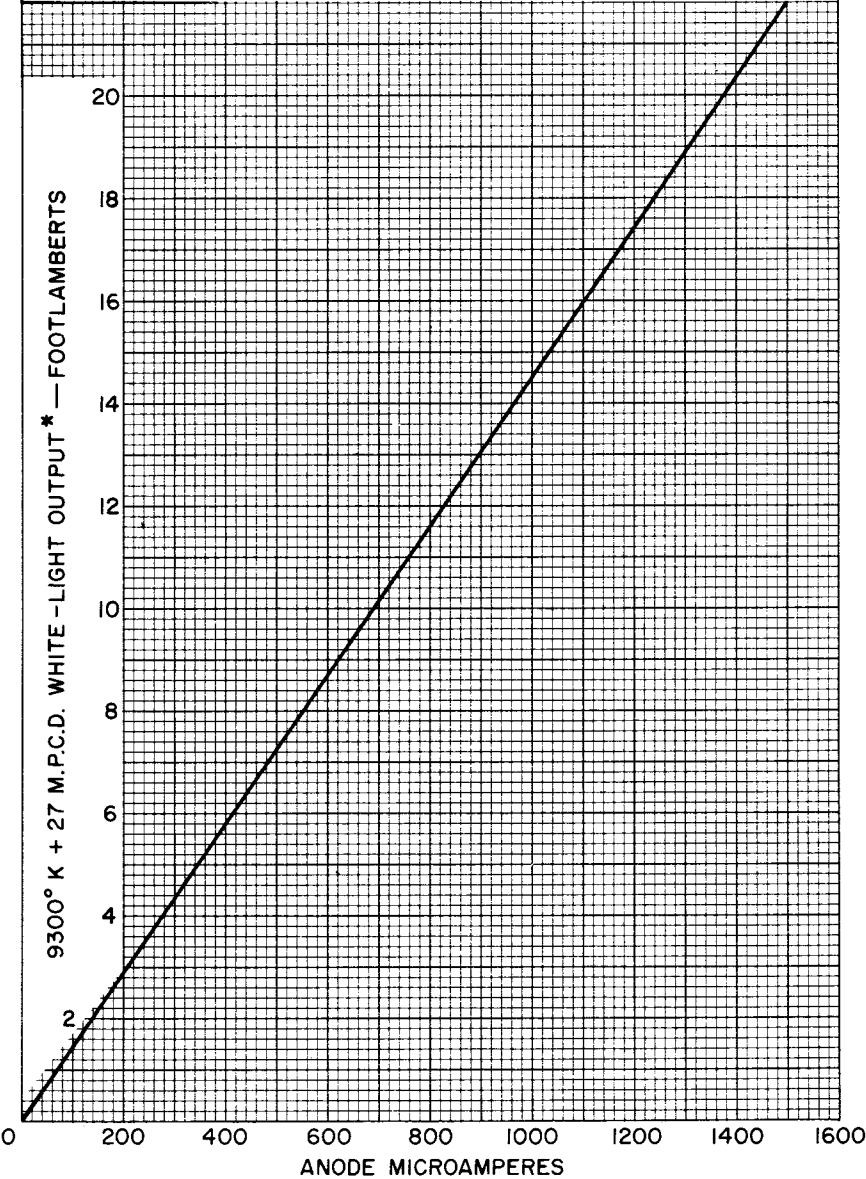


92CM-13088R1



Typical Light-Output Characteristic

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 : 25%
GREEN GUN : 33%
RASTER SIZE : 19.875" x 15.575"
*MEASURED WITHIN 5"-DIAMETER AREA CENTERED ON TUBE FACE.



92CM-12804RI



Typical Drive Characteristics

Grid-Drive Service

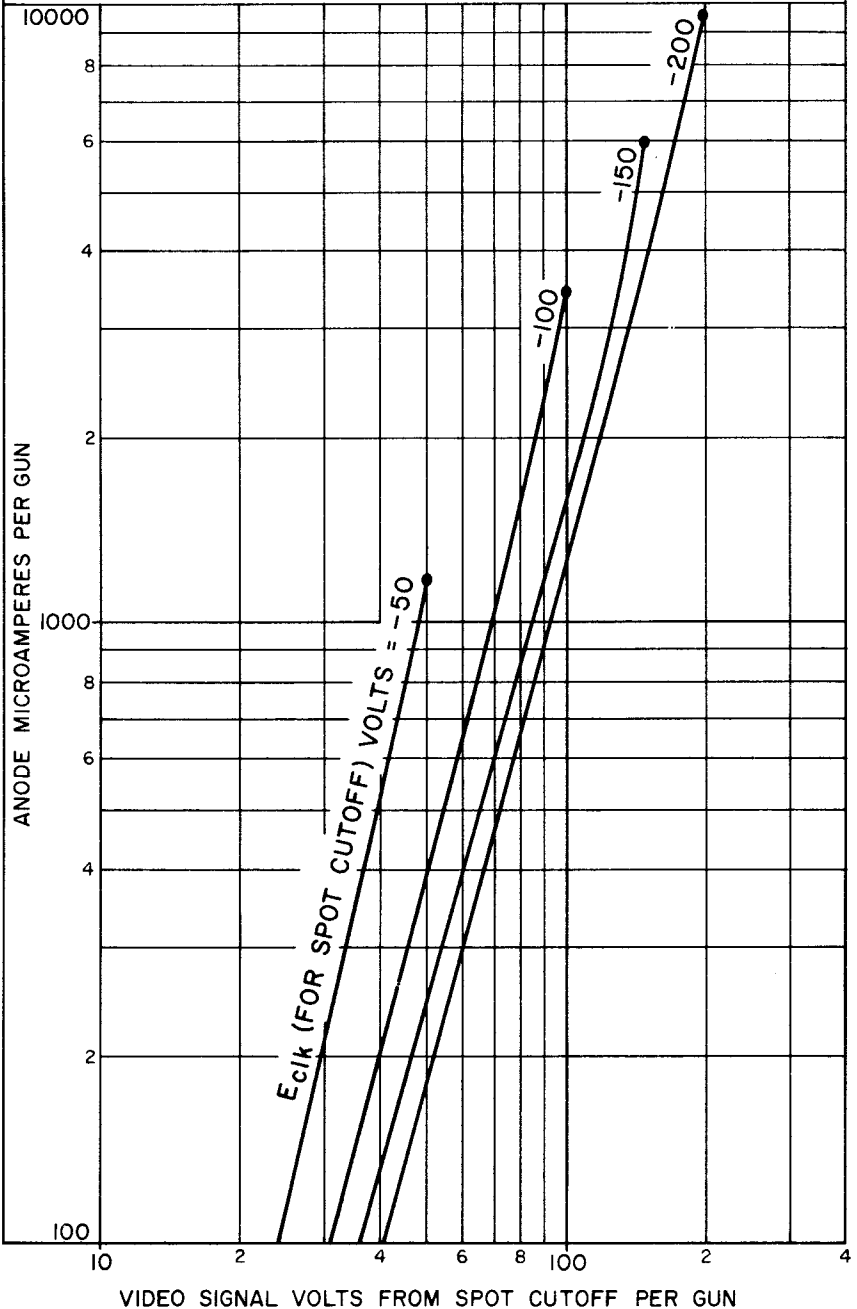
HEATER VOLTAGE = 6.3 VOLTS

ANODE-TO-CATHODE VOLTAGE = 20000 TO 27500 VOLTS

GRID-No. 3-TO-CATHODE VOLTAGE ADJUSTED FOR FOCUS.

GRID-No. 2-TO-CATHODE VOLTAGE (EACH GUN) ADJUSTED TO PROVIDE SPOT CUTOFF FOR DESIRED FIXED GRID-No. 1-TO-CATHODE (EACH GUN) VOLTAGE (E_{c1k})

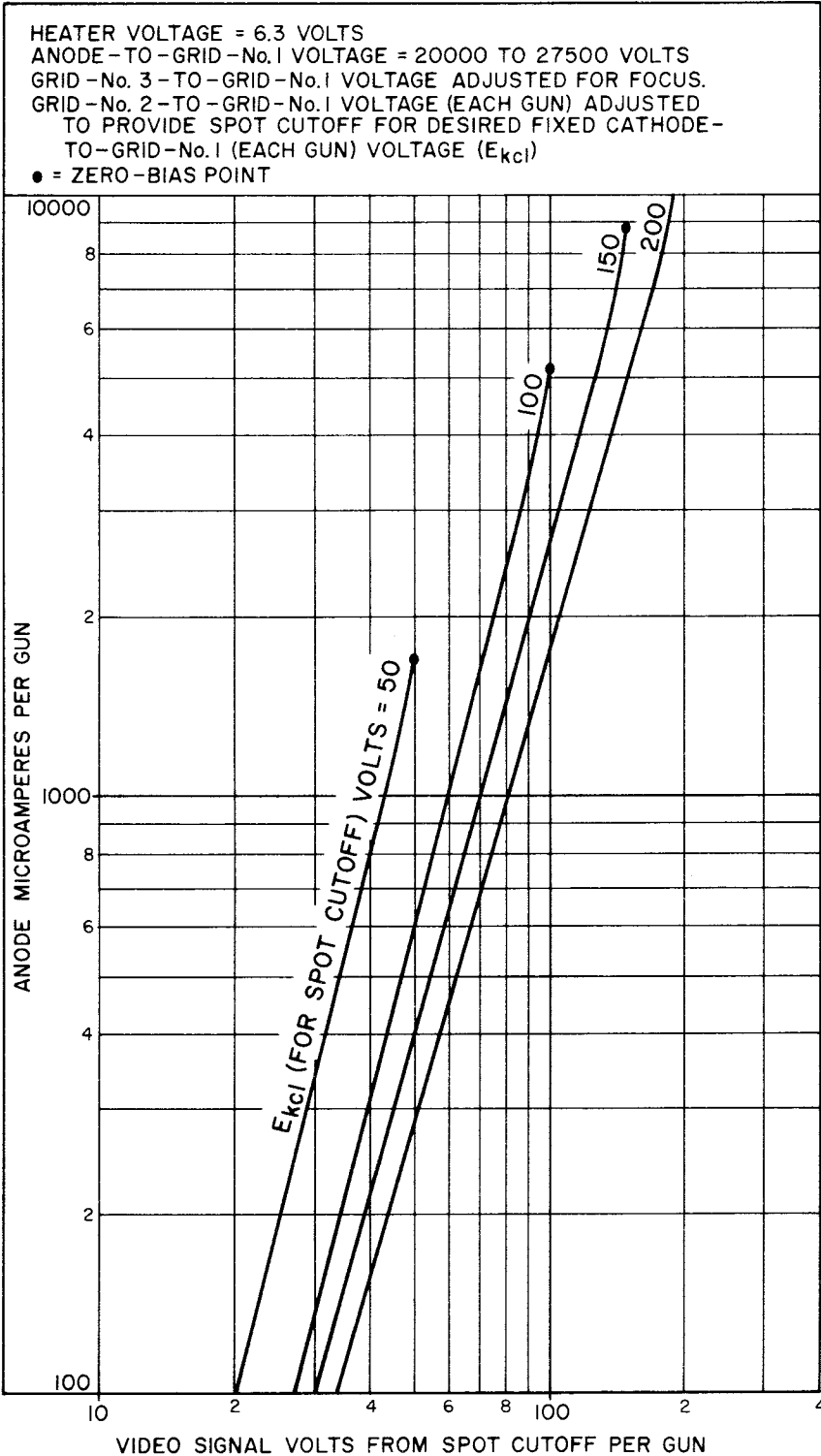
● = ZERO-BIAS POINT



92CM-12807



Typical Drive Characteristics
Cathode-Drive Service



92CM-12806

