

Color Picture Tube

"PERMA-CHROME" ASSEMBLY FOR OPTIMUM FIELD PURITY AND
UNIFORMITY DURING WARM-UP

RECTANGULAR TUBE 90° MAGNETIC DEFLECTION

ALUMINIZED TRICOLOR PHOSPHOR-DOT *Hi-Lite* Screen
(Utilizing a New Improved Rare-Earth Red-Emitting Phosphor)

INTEGRAL FILTERGLASS PROTECTIVE WINDOW

MAGNETIC CONVERGENCE 3 ELECTROSTATIC-FOCUS GUNS

For Use in Color-TV Receivers

ELECTRICAL

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

Heater, of Each Gun

Series connected within tube with each
of the other two heaters

Current at 6.3 volts^a 900 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 (Approx.)

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. $\begin{cases} 2500 \text{ max} & \text{pF} \\ 2000 \text{ min} & \text{pF} \end{cases}$

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)^b P22—New 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 (0.74 mm)



25XP22

MECHANICAL

Tube Dimensions

Overall length.	20.924 ± .375 in (531.5 ± 9.5 mm)
Neck length.	6.693 ± .188 in (170.0 ± 4.8 mm)
Diagonal.	24.566 ± .093 in (624.0 ± 2.4 mm)
Greatest width.	21.500 ± .093 in (546.1 ± 2.4 mm)
Greatest height.	17.263 ± .093 in (438.5 ± 2.4 mm)

Minimum Screen Dimensions (Projected)

Diagonal.	22.995 in (584.1 mm)
Greatest width.	19.875 in (504.8 mm)
Greatest height.	15.575 in (395.6 mm)
Area.	.295 sq. in (1905 sq. cm)

Bulb Funnel Designation JEDEC No. J195-1/2 A1

Bulb Panel Designation. JEDEC No. FP196-1/2 A3

Protective Window Designation JEDEC No. FP196-1/2 C1

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

Pin Position Alignment. Pin No. 12 Aligns Approx.
with Anode Bulb Contact

Operating Position. Anode Bulb Contact on Top

Weight (Approx.). 42 lb (19.1 kg)

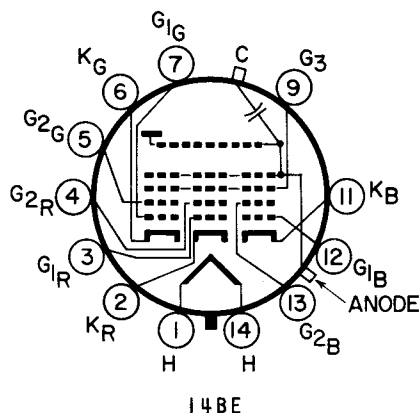
Base. Small-Button Diheptar 12-pin (JEDEC No. B12-244)

TERMINAL DIAGRAM (Bottom View)

- 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 V	20,000 min V
Total Anode Current, Long-Term Average.	1000 max	μA
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)

Under operating conditions ^a	{ 6.9 max	V
	{ 5.7 min	V
Under standby conditions ^b	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
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After equipment warm-up period:

Combined AC and DC value.	200 max	V
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DC component value.	200 max	V
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Heater positive with respect to cathode:

AC component value.	200 max	V
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DC component value.	0 max	V
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EQUIPMENT DESIGN RANGES

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

For anode voltages between 20,000 and 27,500 V

Grid-No.3 (Focusing Electrode Voltage 16.8% to 20%
of anode volts

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

For visual extinction of

Cutoff Design Chart

focused spot

Maximum Ratio of Grid-No.2 Voltages 1.86

Highest gun to lowest gun in any

tube (At grid-No.1 spot cutoff

voltage of -100 volts)

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 +27 M.P.C.D.

(CIE Coordinates x = 0.281, y = 0.311)

Percentage of total anode current

supplied by each gun (Average)	Red 34	Blue 32	Green 34	%
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Ratio of cathode currents:

	Min	Typ	Max
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Red/blue.	0.75	1.10	1.50
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Red/green	0.65	1.00	2.50
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Blue/green.	0.60	0.91	1.30
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Displacement, Measured at Center of Screen

Raster centering displacement:

Horizontal.	± 0.47 in (± 11.9 mm)
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Vertical.	± 0.45 in (± 11.4 mm)
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Lateral distance between the blue beam

and the converged red and green beams.	± 0.25 in (± 6.4 mm)
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Radial convergence displacement

excluding effects of dynamic

convergence (Each beam).	± 0.37 in (± 9.4 mm)
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25XP22

Maximum Required Correction for
Register^c (Including Effect of
Earth's Magnetic Field when
Using Recommended Components)

Measured at the center of the
screen in any direction. 0.005 in (0.13 mm) max

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	V
Grid-No.3 (Focusing Electrode) Voltage	4200 to 5000	V
Grid-No.2 Voltage when circuit design utilizes grid-No.1 voltage of -150 volts for visual extinction of focused spot.	285 to 685	V
Grid-No.1 Voltage for visual extinction of focused spot when circuit design utilizes grid-No.2 voltage of 400 volts. . . .	-95 to -190	V
Heater Voltage		
Under operating conditions ^a	6.3	V
Under standby conditions.	5.0	V

LIMITING CIRCUIT VALUES

High-Voltage Circuits

Grid-No.3 Circuit Resistance.	7.5 max	MΩ
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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, in which the short-circuit current does not exceed 20 mA.

Low-Voltage Circuits

Effective grid-No.1-to-cathode- circuit resistance (Each gun).	0.75 max	MΩ
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The low-voltage circuits, including all heater circuits, should be analyzed by assuming the color picture tube heater is connected directly to the receiver chassis ground. Under these conditions the circuits to the elements of all tubes, including the color picture tube, operating from the same heater winding 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 mA total in the assumed picture tube heater ground connection. The leads from all other circuits must be separated from the picture tube leads by a minimum distance of 0.25 inch (6.4 mm) to prevent energy transfer to the picture tube circuits. Such current limitation will help prevent picture tube damage in case of momentary cascade arcing.



- a For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts. The series impedance to any chassis connection in the DC biasing circuit for the heater should be between 100,000 ohms and 1 megohm.
- b For curve, see Group Phosphor P22—*New 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 25XP22 is designed to be operated at anode voltages as high as 27.5 kilovolts (design-maximum value), shielding of the 25XP22 for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.

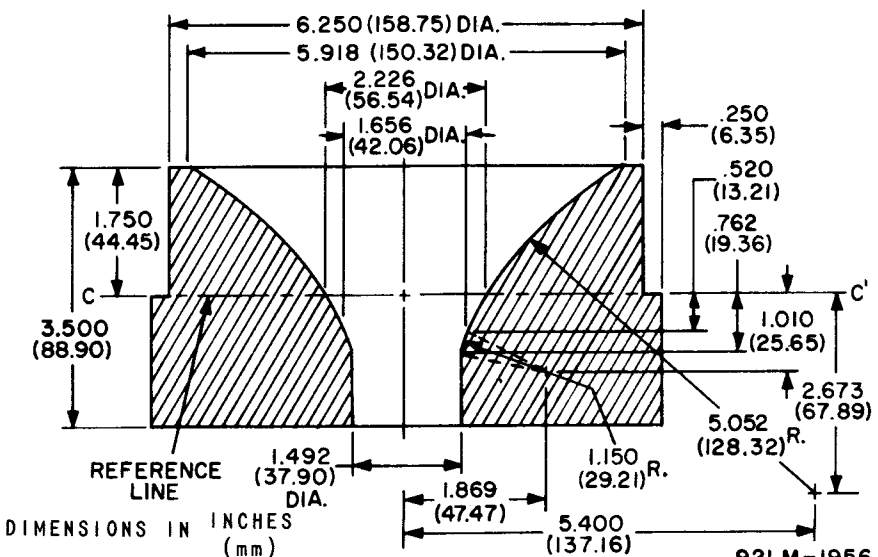
Orientation. The 25XP22 must be operated with tube axis in a horizontal position and with the blue gun uppermost (i.e., the anode contact button on top).

The **Deflecting Yoke** and tube axes must coincide and the yoke must be free to move along the neck for a distance of approximately 0.5 inch (13 mm) 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 to prevent possible damage to the tube from localized overheating due to poor contact.

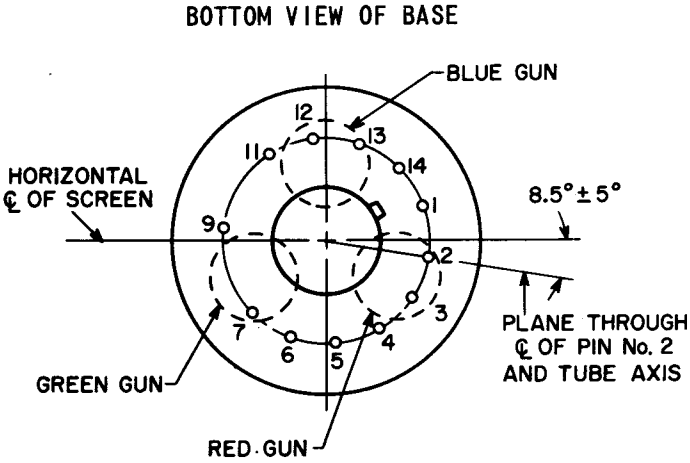
Misregister Compensation. Proper operation of the 25XP22 requires compensation for the effects of extraneous magnetic fields, the earth's magnetic field, and other causes which may produce misregister. Compensation for these effects may be accomplished by the use of a purifying magnet.

REFERENCE-LINE AND NECK-FUNNEL-CONTOUR GAUGE JEDEC No. G162



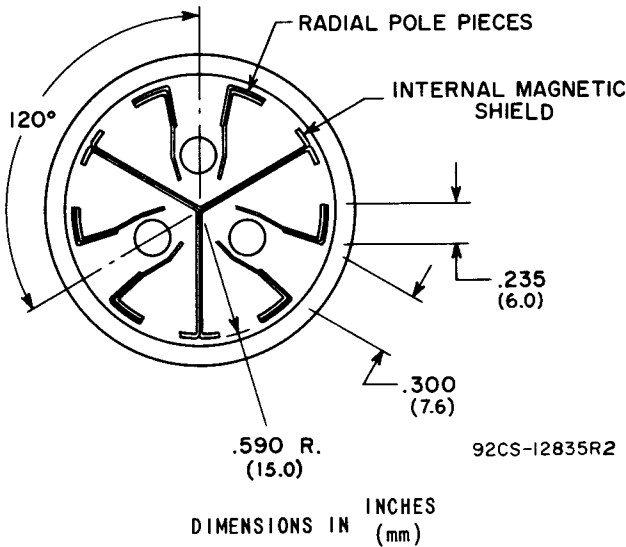
Reference Line is determined by plane C-C' when gauge is seated.





92CS-12816

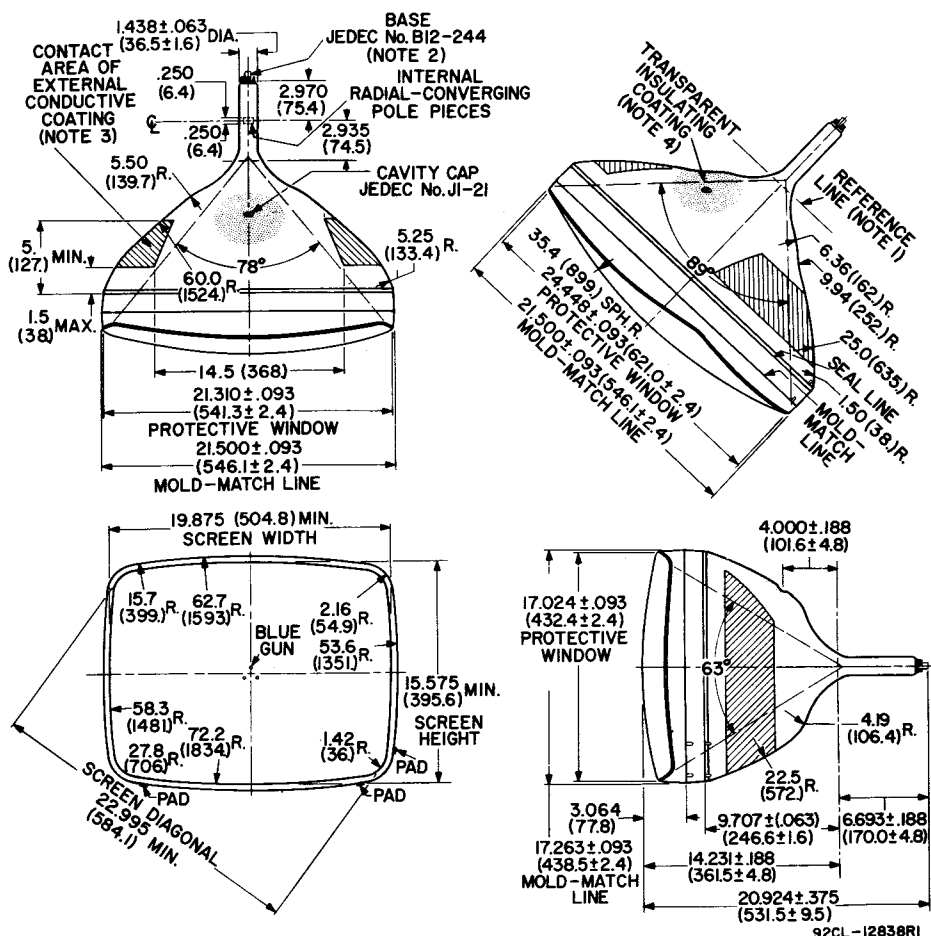
LOCATION OF RADIAL-CONVERGING POLE PIECES
VIEWED FROM SCREEN END OF GUNS



92CS-12835R2



DIMENSIONAL OUTLINE



DIMENSIONS IN INCHES
(mm)

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

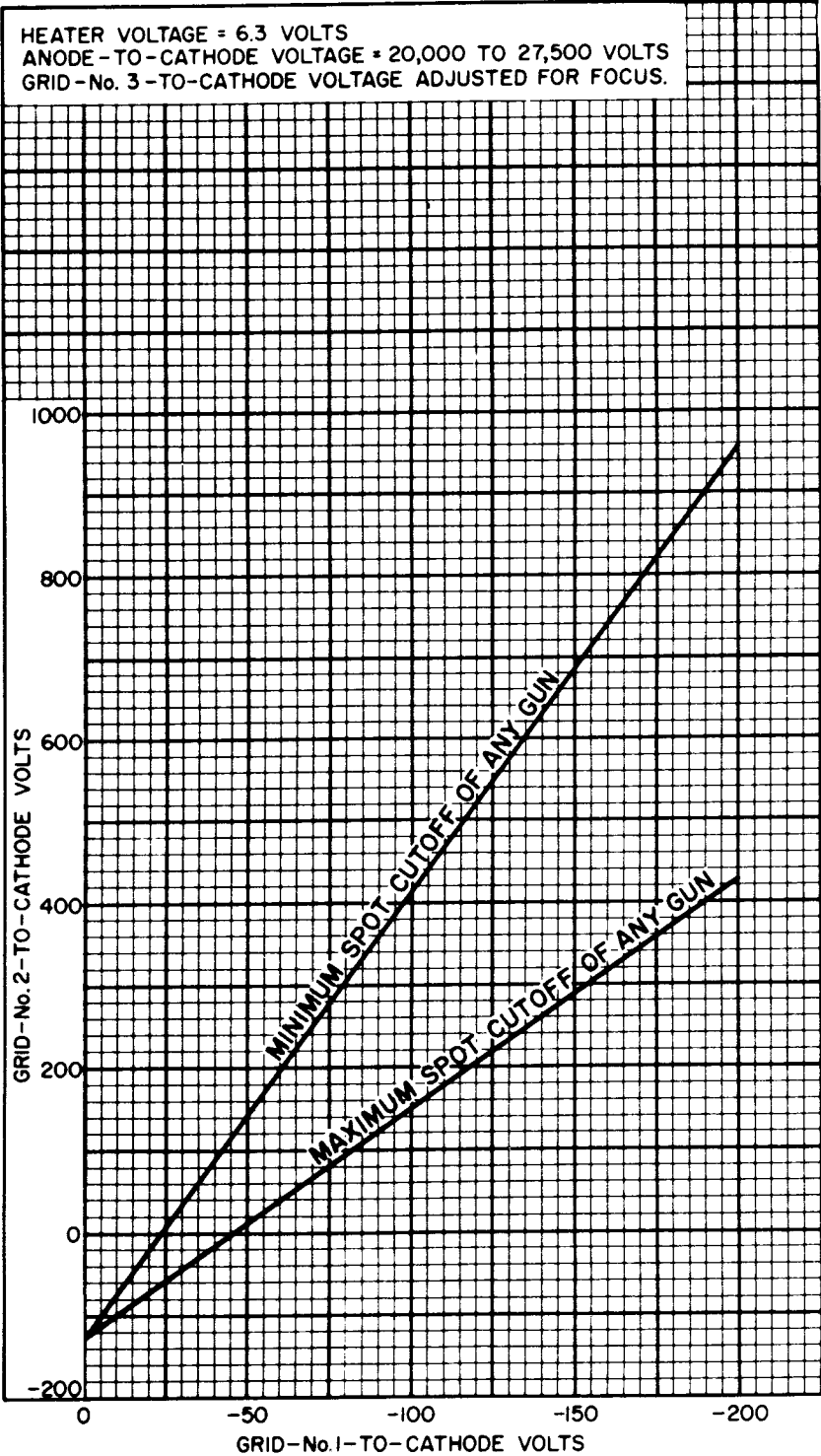
Note 2: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb axis.

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



Typical Light-Output Characteristic

HEATER VOLTAGE : 6.3 VOLTS

ANODE-TO-CATHODE VOLTAGE : 25000 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:

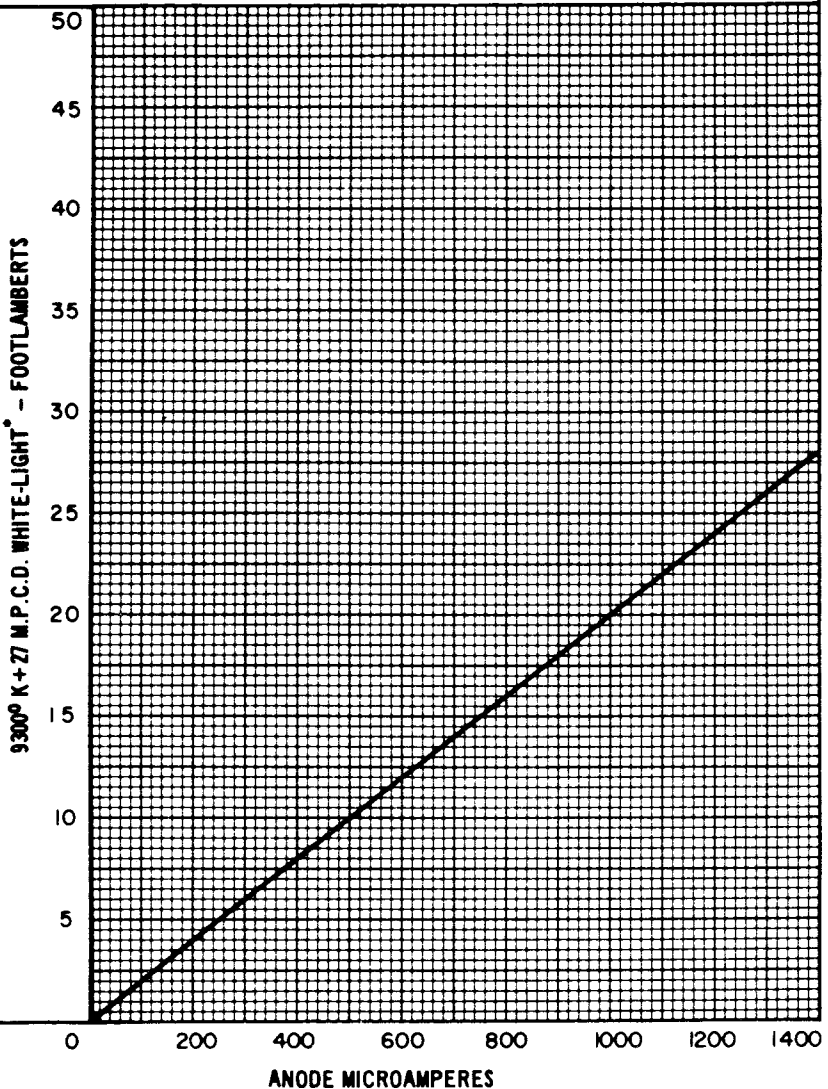
RED GUN: 34%

BLUE GUN: 32%

GREEN GUN: 34%

RASTER SIZE: 19.875" X 15.575" (504.8 mm X 395.6 mm)

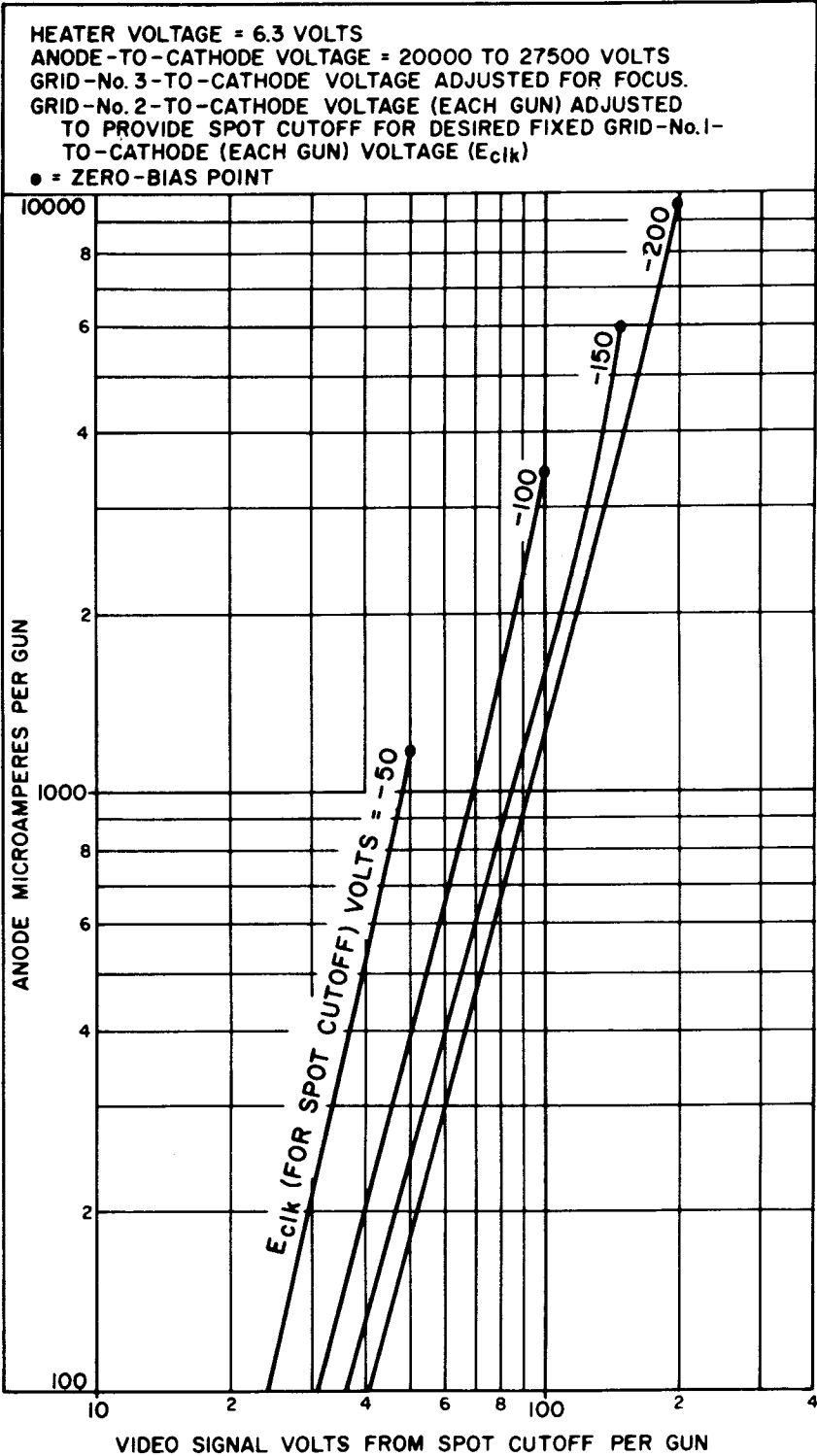
*MEASURED WITHIN 5" - DIAMETER AREA CENTERED ON TUBE FACE.



92LM-1951



Typical Drive Characteristics
Grid-Drive Service



92CM-12807



Typical Drive Characteristics

Cathode-Drive Service

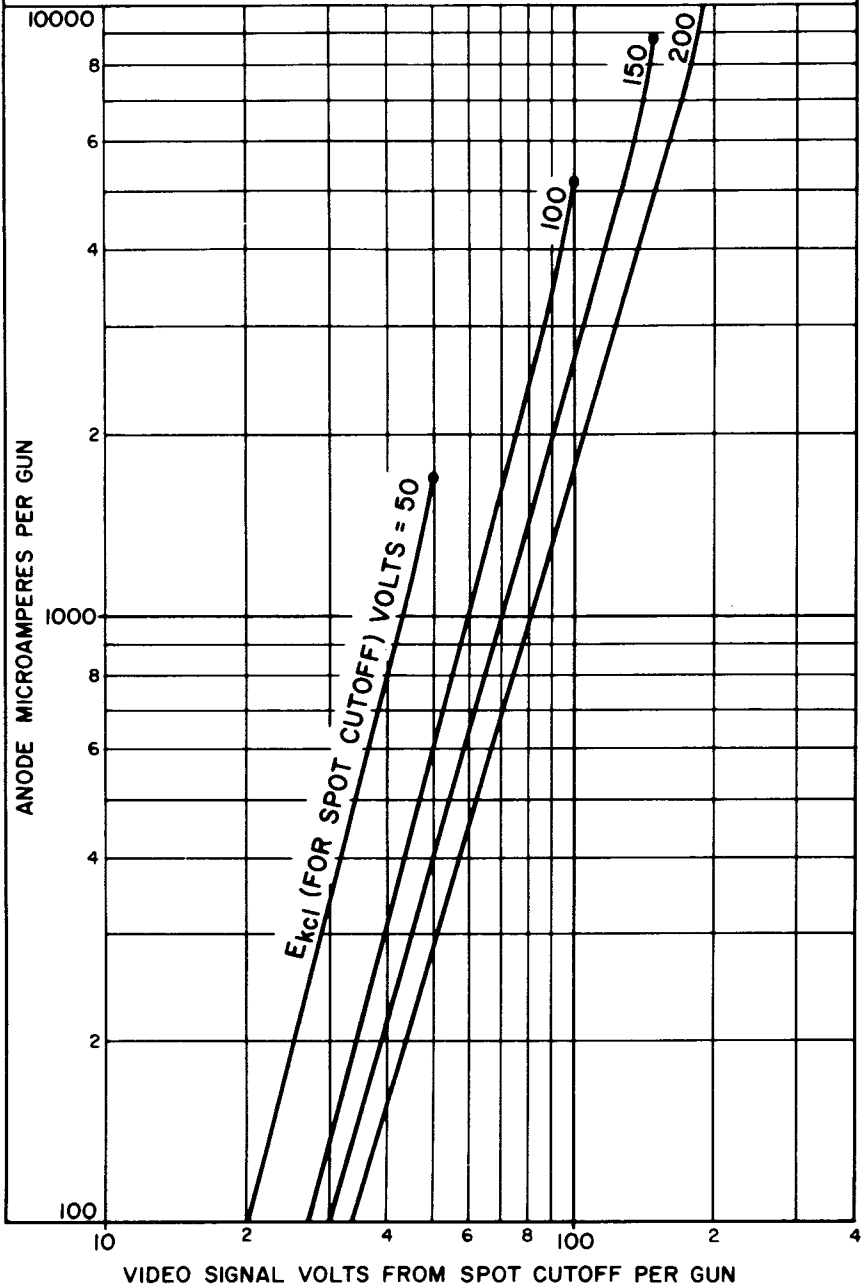
HEATER VOLTAGE = 6.3 VOLTS

ANODE-TO-GRID-No.1 VOLTAGE = 20000 TO 27500 VOLTS

GRID-No. 3-TO-GRID-No.1 VOLTAGE ADJUSTED FOR FOCUS.

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

● = ZERO-BIAS POINT



92CM-12806

