

Color Picture Tube

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

RECTANGULAR TUBE 90° MAGNETIC DEFLECTION
 MAGNETIC CONVERGENCE 3 ELECTROSTATIC-FOCUS GUNS

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

INTEGRAL FILTERGLASS PROTECTIVE WINDOW

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

Grid No.3 to all other electrodes 6.5 pF

All cathodes to all other electrodes. 15 pF

External conductive coating to anode. $\begin{cases} 1900 \text{ max} & \text{pF} \\ 1400 \text{ min} & \text{pF} \end{cases}$

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.) 0.023 in (0.58 mm)



MECHANICAL

Tube Dimensions	
Overall length.	18.048 ± .375 in (458.4 ± 9.5 mm)
Neck length.	6.693 ± .188 in (170.0 ± 4.8 mm)
Diagonal.	19.422 ± .093 in (493.3 ± 2.4 mm)
Greatest width.	16.977 ± .093 in (431.2 ± 2.4 mm)
Greatest height.	13.664 ± .093 in (347.1 ± 2.4 mm)
Minimum Screen Dimensions (Projected)	
Diagonal.	18.075 in (459.1 mm)
Greatest width.	15.585 in (395.9 mm)
Greatest height.	12.185 in (309.5 mm)
Area.	180 sq. in (1161 sq. cm)
Bulb Funnel Designation.	JEDEC No.J153 A1
Bulb Panel Designation.	JEDEC No.FP155-1/2 A3
Protective Window Designation.	JEDEC No.FP154-1/4 B1
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.).	24 lb (10.9 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

The diagram shows a circular base with 14 pins numbered 1 through 14. Internal connections are labeled: G_{1G} (7), G₃ (9), K_G (6), G_{2G} (5), G_{2R} (4), G_{1R} (3), K_R (2), H (1), H (14), G_{1B} (11), K_B (12), G_{2B} (13). A central anode is labeled ANODE. The diagram is identified as 14BE.

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.	750 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)

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

After equipment warm-up period:

Combined AC and DC value. 200 max V

DC component value. 200 max V

Heater positive with respect to cathode:

AC component value. 200 max V

DC component value. 0 max V

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 focused spot *Cutoff Design Chart*

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 $x = 0.281$, $y = 0.311$)

Red Blue Green

Percentage of total anode current

supply by each gun (average) 34 32 34 %

Ratio of cathode currents:

	Min	Typ	Max
Red/blue.	0.75	1.10	1.50
Red/green	0.65	1.00	1.50
Blue/green.	0.60	0.91	1.30

Displacements, Measured at Center of Screen

Raster centering displacement:

Horizontal. ± 0.47 in (± 11.9 mm)

Vertical. ± 0.45 in (± 11.4 mm)

Lateral distance between the blue beam

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

Radial convergence displacement

excluding effects of dynamic con-

vergence (each beam) ± 0.37 in (± 9.4 mm)

Maximum Required Correction for

Register^c (Including Effect of

Earth's Magnetic Field when

Using Recommended Components). 0.005 in (0.13 mm) max

Measured at the center of the 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.	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 19GWP22 is designed to be operated at anode voltages as high as 27.5 kilovolts (design-maximum value), shielding of the 19GWP22 for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.

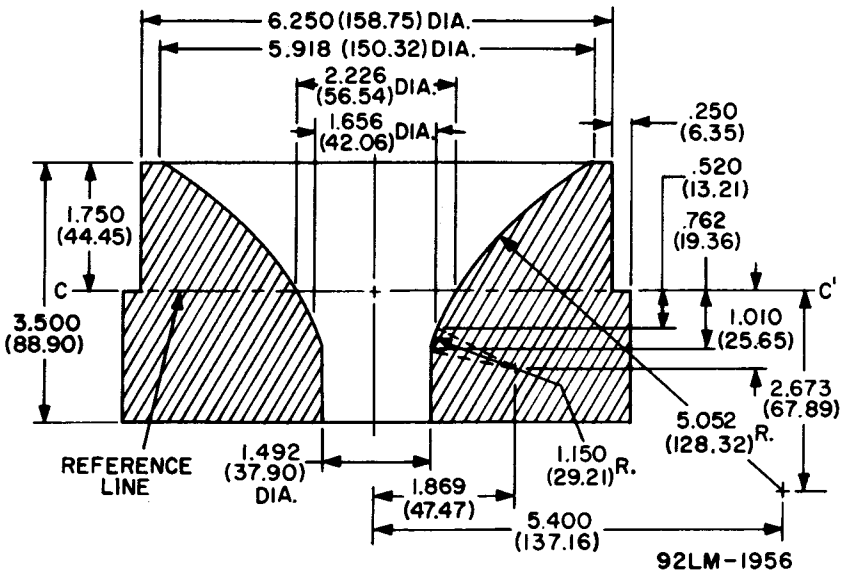
Orientation. The 19GWP22 must be operated with tube axis in a horizontal position and with the blue gun uppermost (i.e., the anode contact button on top).

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 19GWP22 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.

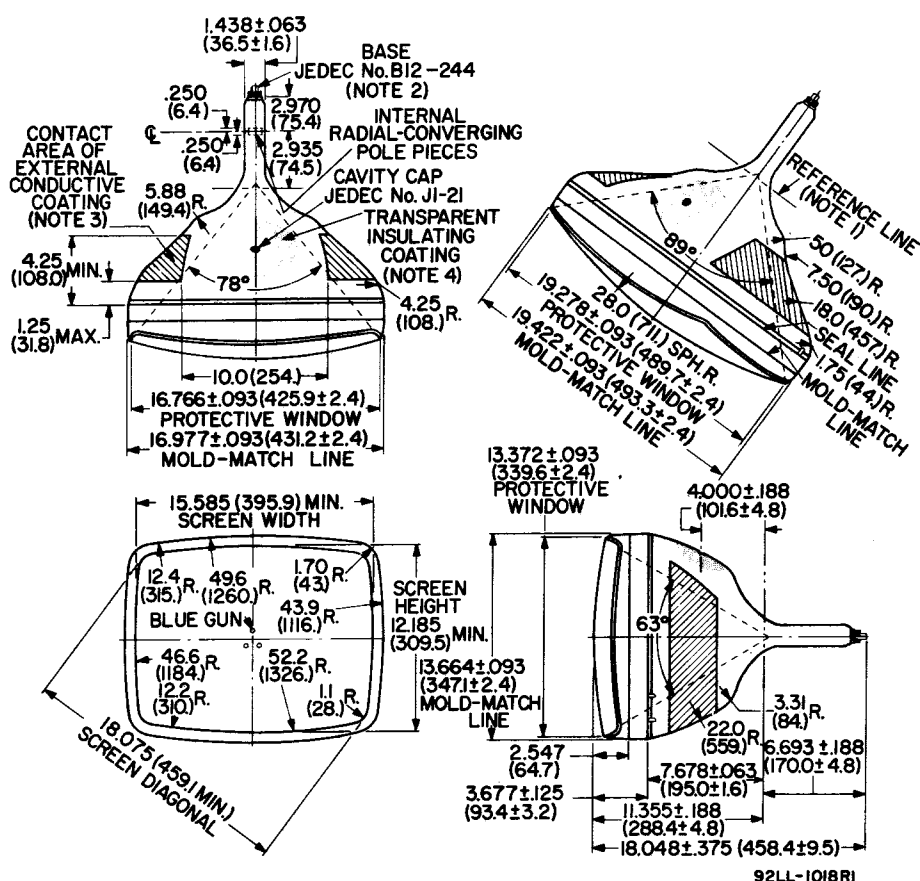
DIMENSIONS IN INCHES
(mm)

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

for Type 19GWP22 is the same as that shown for Type 25XP22



DIMENSIONAL OUTLINE



DIMENSIONS IN INCHES
(mm)

Note 1: With tubeneck 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.

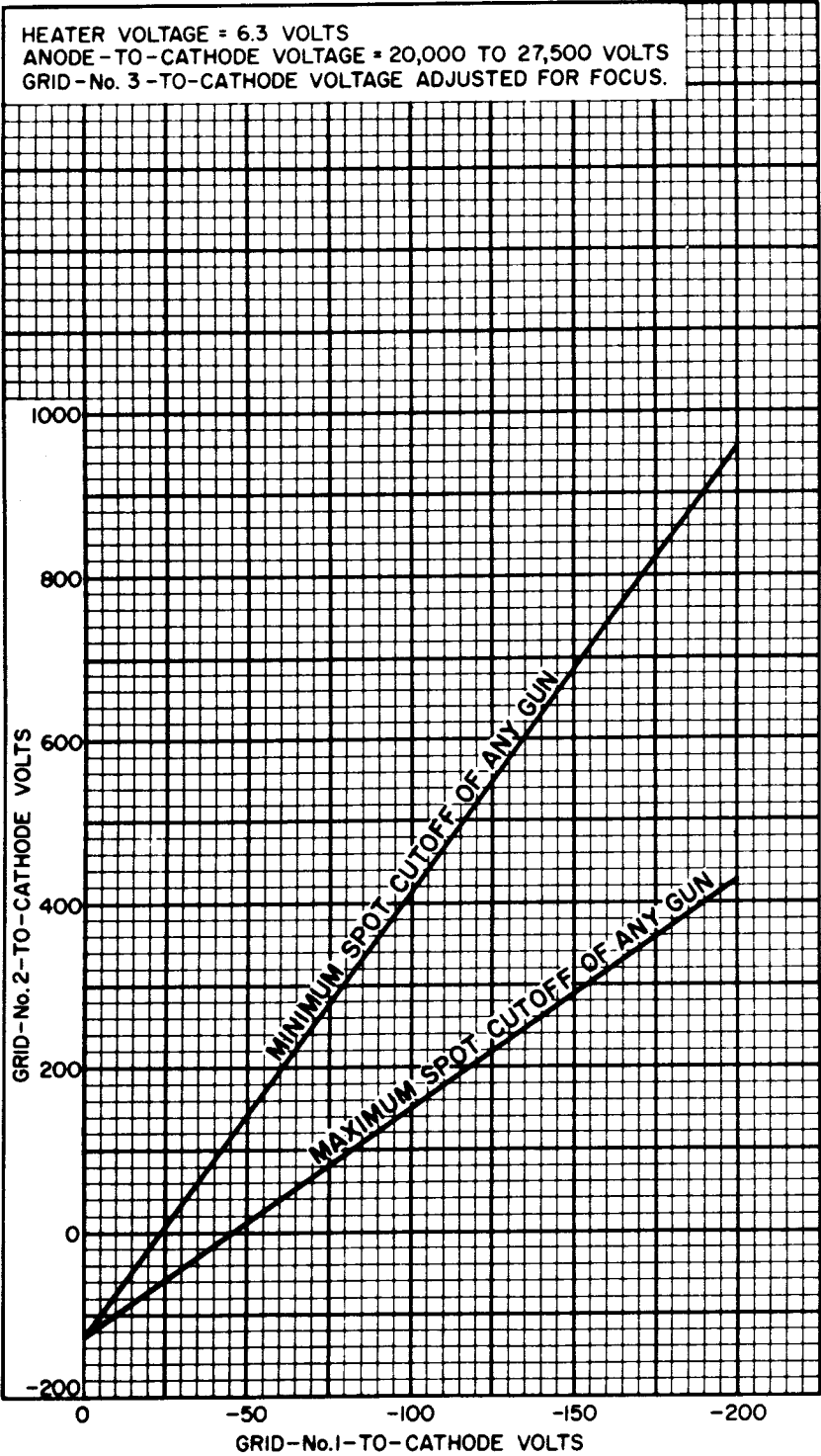
Note 2: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb axis.

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.



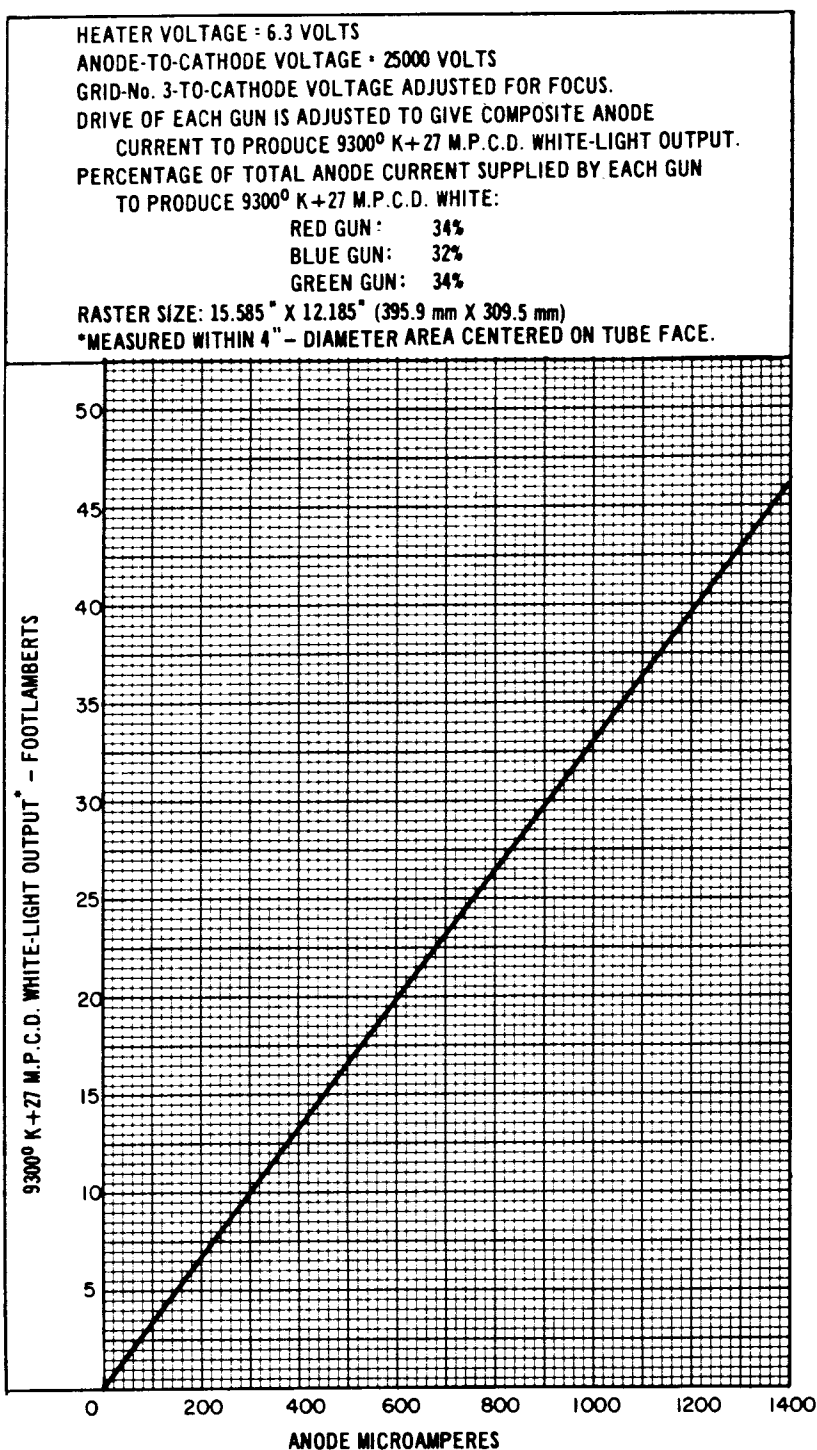
Cutoff Design Chart



92CM-12803



Typical Light-Output Characteristic



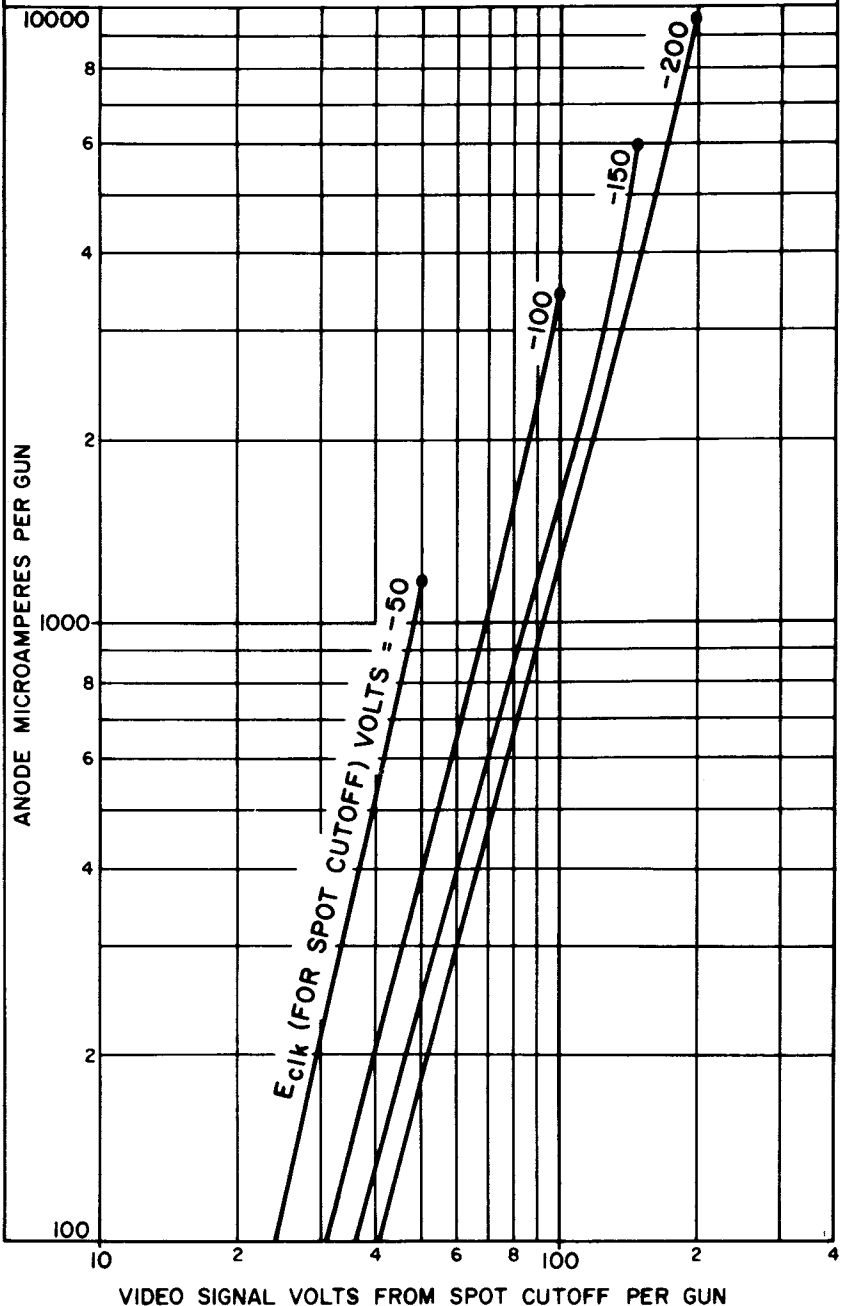
92LM-1998



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

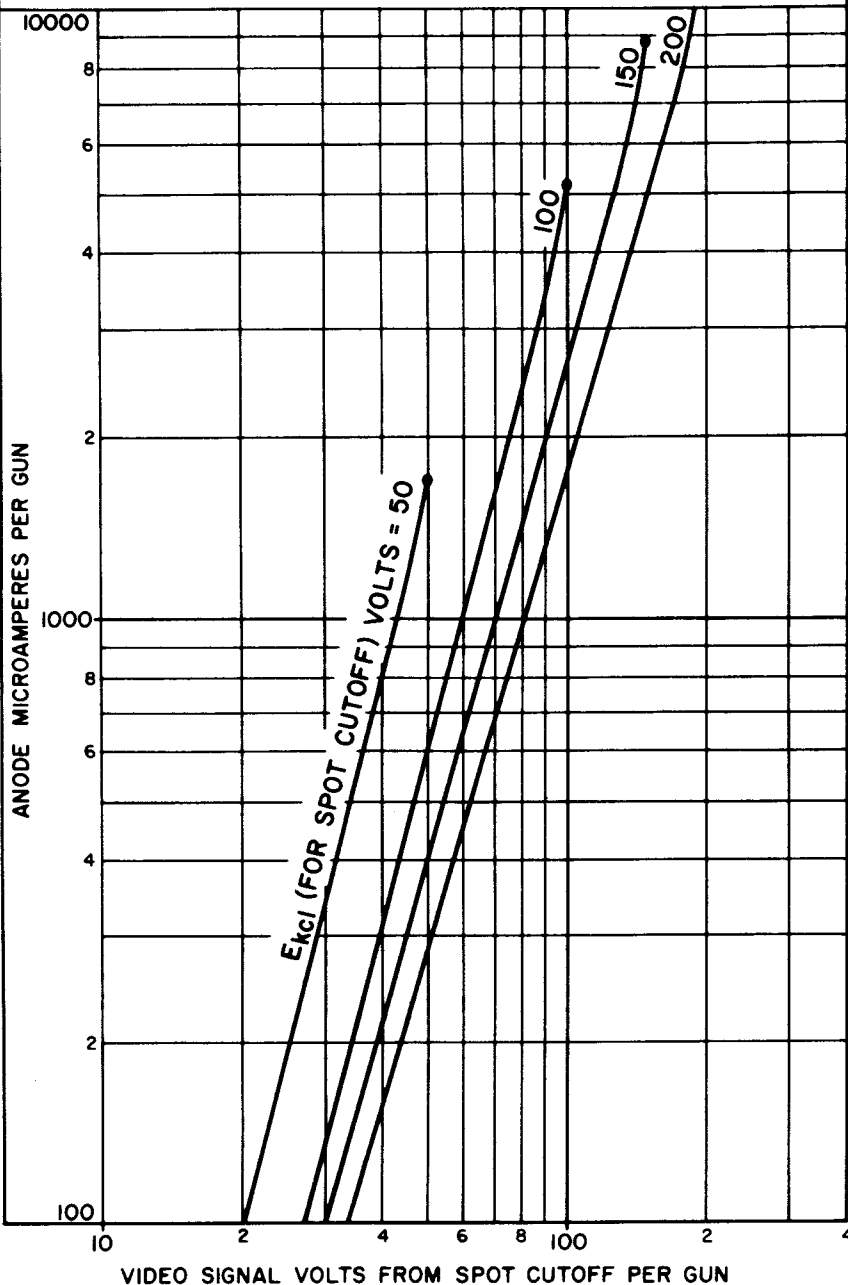


92CM-12807



Typical Drive Characteristics
Cathode-Drive Service

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

