

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)
 ANTIGLARE INTEGRAL 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 Unipotential

Convergence Method Magnetic

Deflection Method. Magnetic

Deflection Angles (Approx.)

Diagonal 90°

Horizontal 79°

Vertical 63°

Direct Interelectrode Capacitances (Approx.)

Grid No.1 of any gun to all other electrodes 7.5 pF

Grid No.4 to all other electrodes. 6 pF

All cathodes to all other electrodes 15 pF

External conductive coating to anode (Approx.) $\begin{cases} 1050 \text{ max} & \text{pF} \\ 550 \text{ min} & \text{pF} \end{cases}$

OPTICAL

Faceplate and Protective Window. Filterglass

Light transmission at center (Approx.). 44 %

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.) 0.025 in (0.64 mm)



MECHANICAL

Tube Dimensions

Overall length	15.191 ± .375 in (385.8 ± 9.5 mm)
Neck length	6.693 ± .188 in (170.0 ± 4.8 mm)
Diagonal	14.744 ± .093 in (374.5 ± 2.4 mm)
Greatest width	12.903 ± .093 in (327.7 ± 2.4 mm)
Greatest height	10.390 ± .093 in (263.9 ± 2.4 mm)

Minimum Screen Dimensions (Projected)

Diagonal	13.557 in (344.3 mm)
Greatest width	11.689 in (296.9 mm)
Greatest height	9.139 in (232.1 mm)
Area	102 sq in (658 sq cm)

Bulb Funnel Designation. JEDEC No. J117-3/4A1

Bulb Panel Designation JEDEC No. FP118B1

Protective Window Designation. JEDEC No. FP116-3/4A2

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

Bulb Contact Designation Recessed Small Cavity Cap
(JEDEC No. J1-21)Pin Position Alignment Pin No. 5 Aligns Approx.
with Anode Bulb Contact

Operating Position Anode Bulb Contact on Top

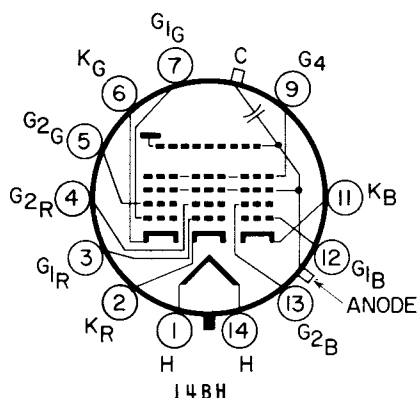
Weight (Approx.) 12.5 lb (5.7 kg)

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.4
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.3,
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.	22,500 max V 17,000 min V
Total Anode Current, Long-Term Average	750 max μ A
Grid-No.4 (Focusing Electrode) Voltage	
Positive value	1100 max V
Negative value	550 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.	140 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 ^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:

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 voltage between 17,000 and 22,500 V

Grid-No.4 (Focusing Electrode) Voltage -75 to 400 V

Grid-No.2 and Grid-No.1 VoltagesFor visual extinction of focused spot. See *Cutoff Design Chart*

Maximum Ratio of Grid-No.2 Voltages. 1.86

Highest gun of lowest gun in any tube (At grid-No.1 spot cutoff voltage of -100 V)

Heater VoltageUnder operating conditions^a. 6.3 V

Under standby conditions 5.0 V

Grid-No.4 Current (Total). -60 to +60 μ AGrid-No.2 Current. -5 to +5 μ A

To Produce White 9300°K + 27 M.P.C.D.

(CIE Coordinates $x = 0.281$, $y = 0.311$)

Red Blue Green

Percentage of total anode current supplied 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

convergence (each beam). ± 0.37 in (± 9.4 mm)

**Maximum Required Correction for
Register^d (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.	20,000	V
Grid-No.4 (Focusing Electrode) Voltage . .	-75 to 400	V
Grid-No.2 Voltage when circuit design utilizes grid-No.1 voltage of -100 volts for visual extinction of focused spot. . .	150 to 390	V
Grid-No.1 Voltage for visual extinction of focused spot when circuit design utilizes grid-No.2 voltage of 200 volts	-57 to -125	V
Heater Voltage		
Under operating conditions ^a	6.3	V
Under standby conditions	5.0	V
Effective grid-No.1-to-cathode- circuit resistance (Each gun).	0.75 max	MΩ

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 15LP22 is designed to be operated at anode voltages as high as 22.5 kilovolts (design-maximum value), shielding of the 15LP22 for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.

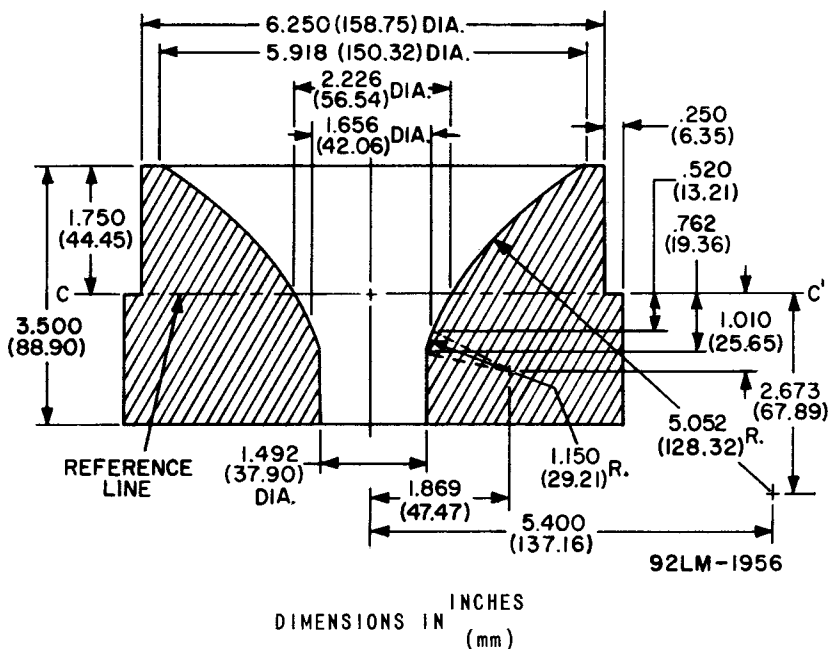
Orientation. The 15LP22 can be operated with the blue gun either up or down. The best apparent balance of top and bottom pincushion distortion under typical viewing conditions is obtained when operated with the blue gun down (anode bulb contact on top).

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.

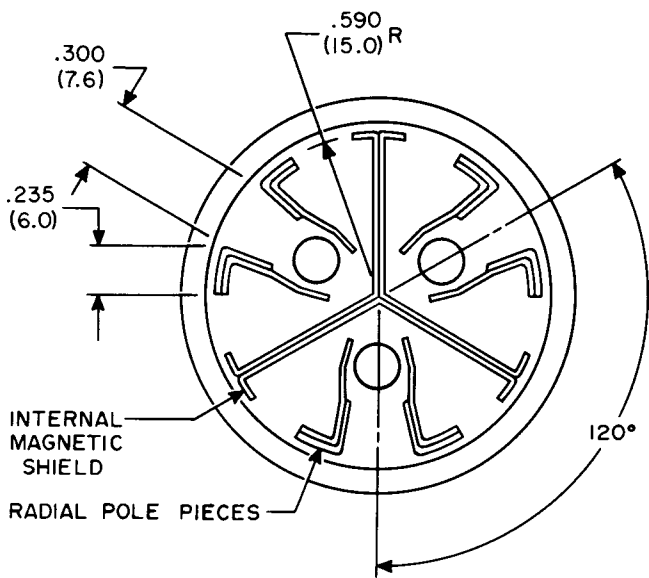
Misregister Compensation. Proper operation of the 15LP22 requires compensation for the effects of extraneous magnetic fields. The earth's magnetic field, and other causes which may produce misregister. Compensation for these effects may be accomplished by the use of a purifying magnet.

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



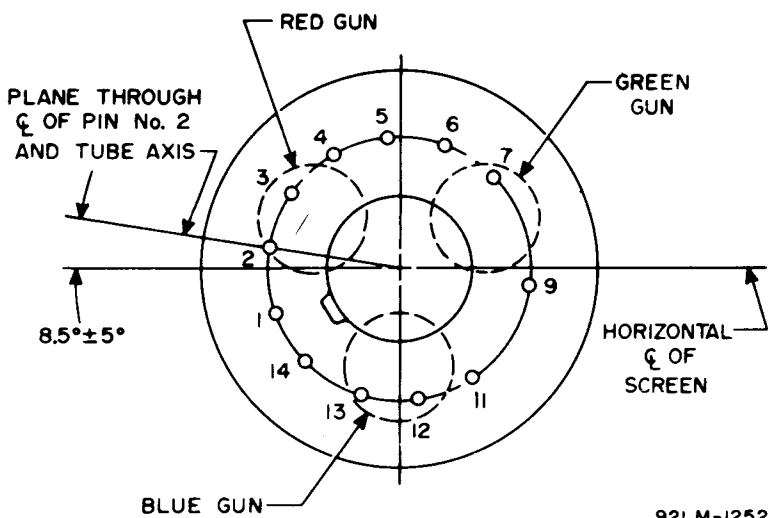
Reference Line is determined by plane CC' when gauge is seated.

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



92LM-1251RI

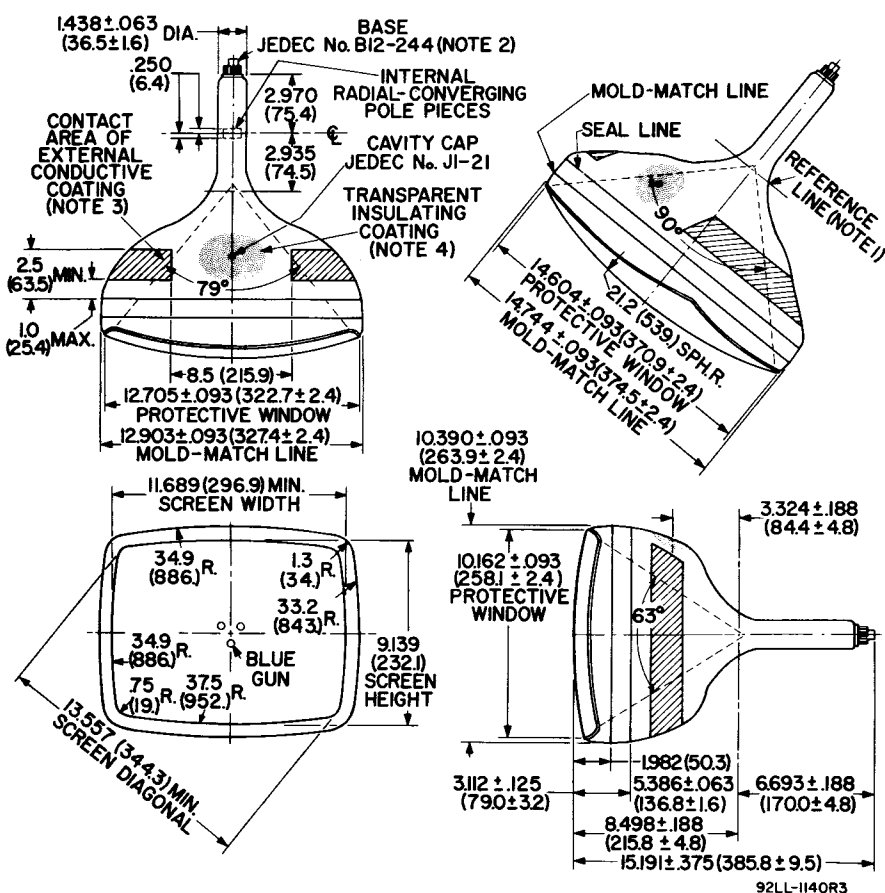
BOTTOM VIEW OF BASE



92LM-1252



DIMENSIONAL OUTLINE



INCHES
DIMENSIONS IN (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 of the plane CC' of the gauge with the glass funnel.

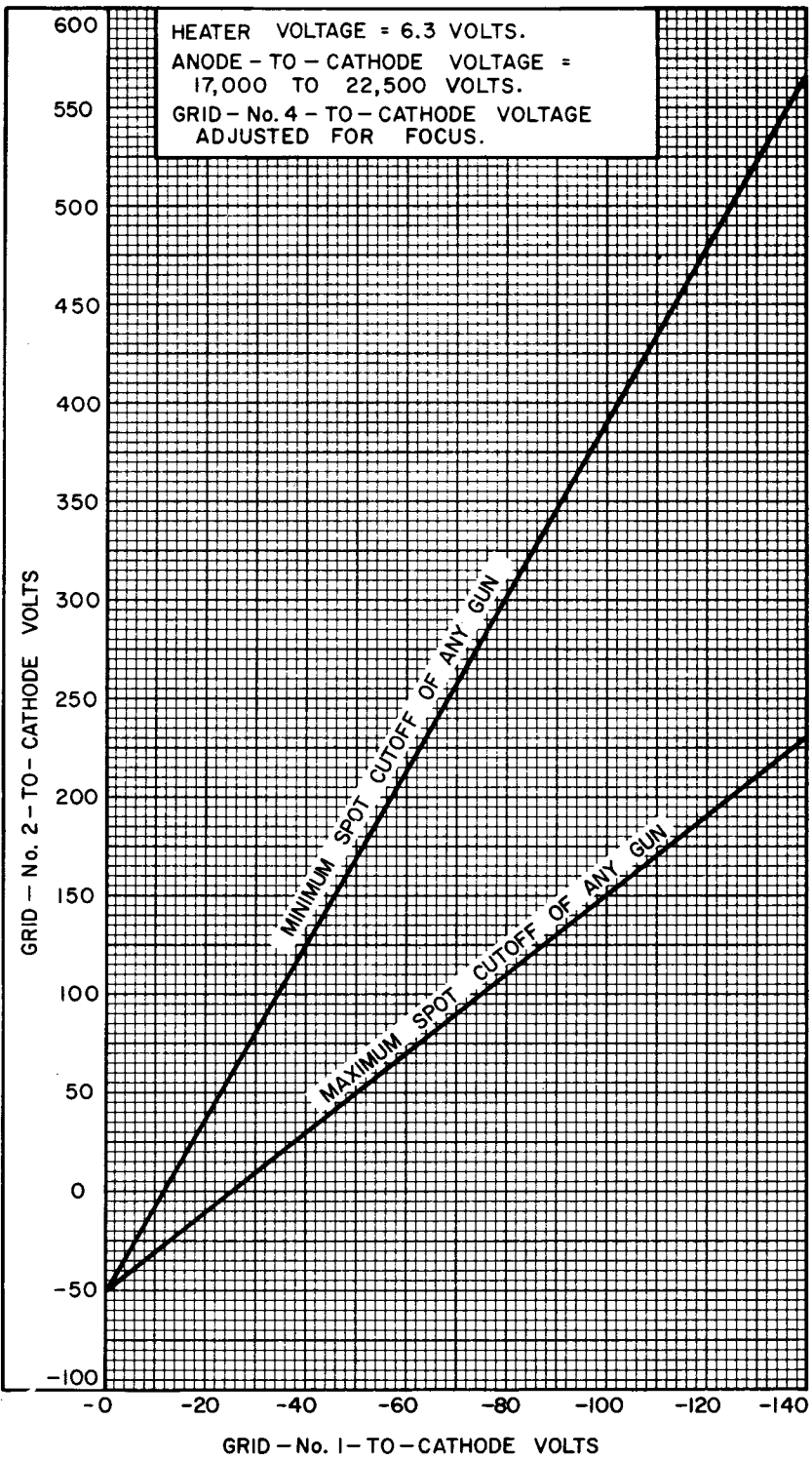
Note 2: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb axis.

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



92LM-1083R2



Typical Drive Characteristics

GRID-DRIVE SERVICE

HEATER VOLTAGE = 6.3 VOLTS

ANODE-TO-CATHODE VOLTAGE = 17,000 TO 22,500 VOLTS

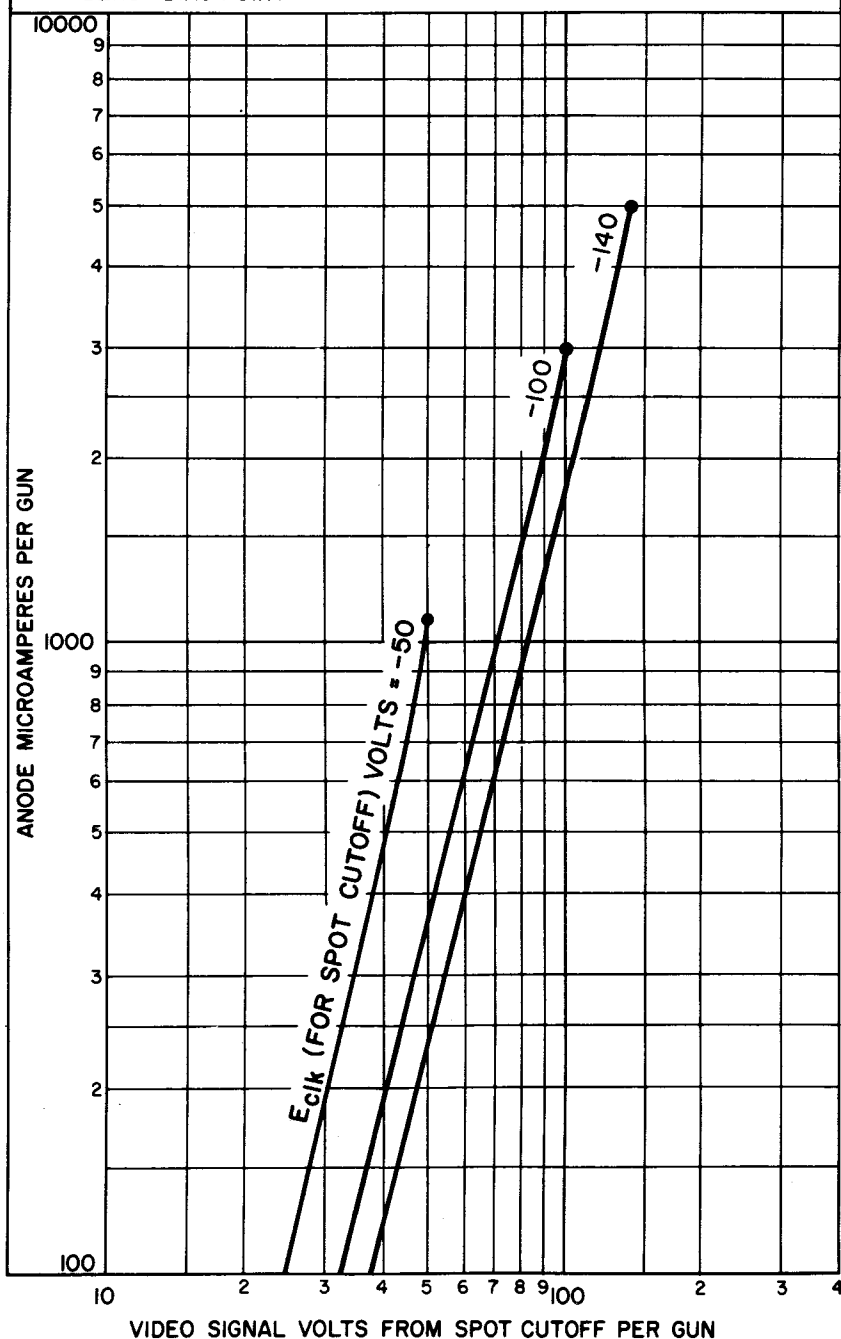
GRID-No. 4-TO-CATHODE VOLTAGE ADJUSTED FOR FOCUS.

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})

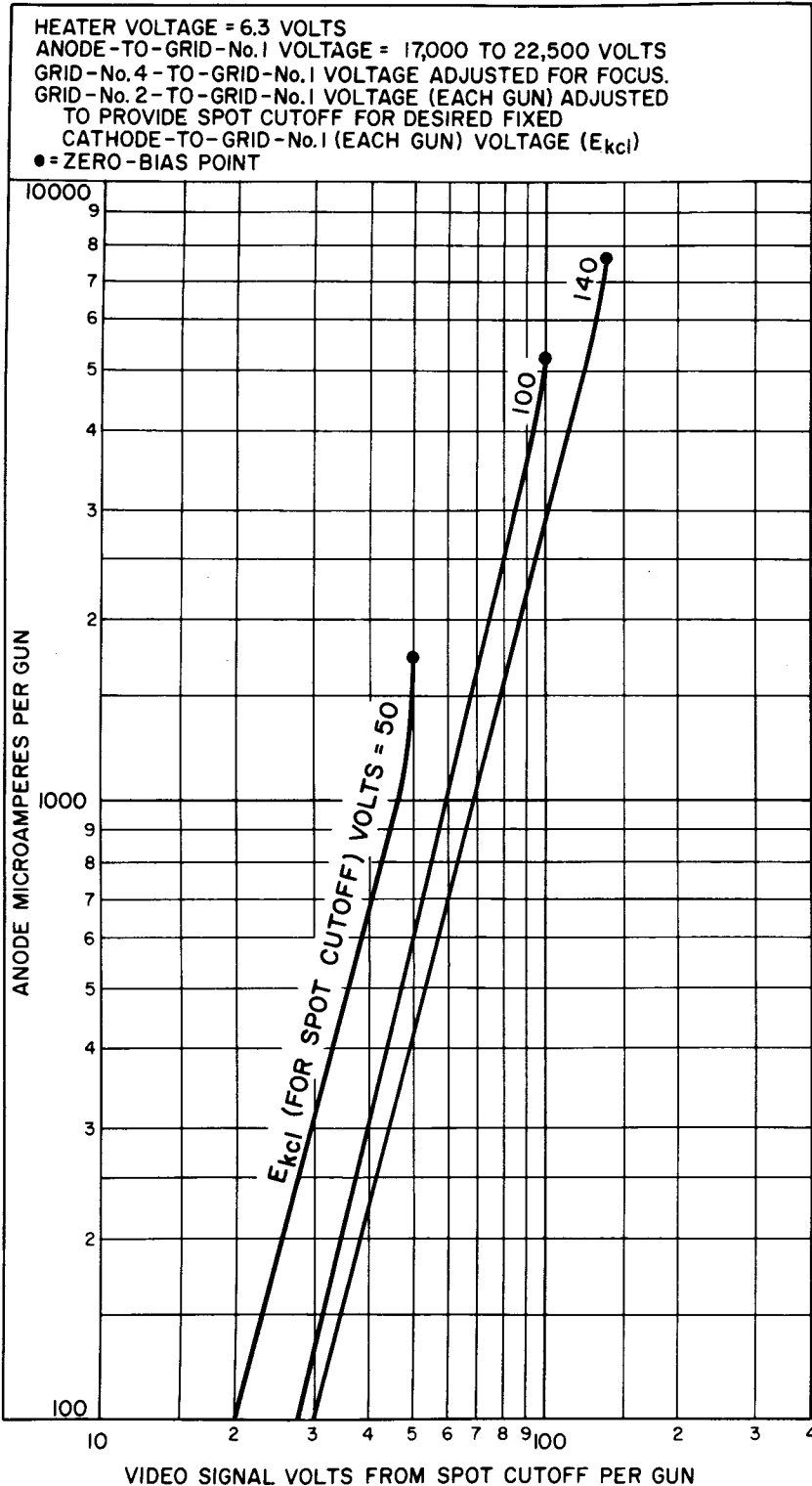
● = ZERO-BIAS POINT



92LM-1261



Typical Drive Characteristics
CATHODE-DRIVE SERVICE



92LM-1260



Typical Light-Output Characteristic

HEATER VOLTAGE = 6.3 VOLTS

ANODE-TO-CATHODE VOLTAGE = 20,000 VOLTS

GRID-No. 4 - 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:

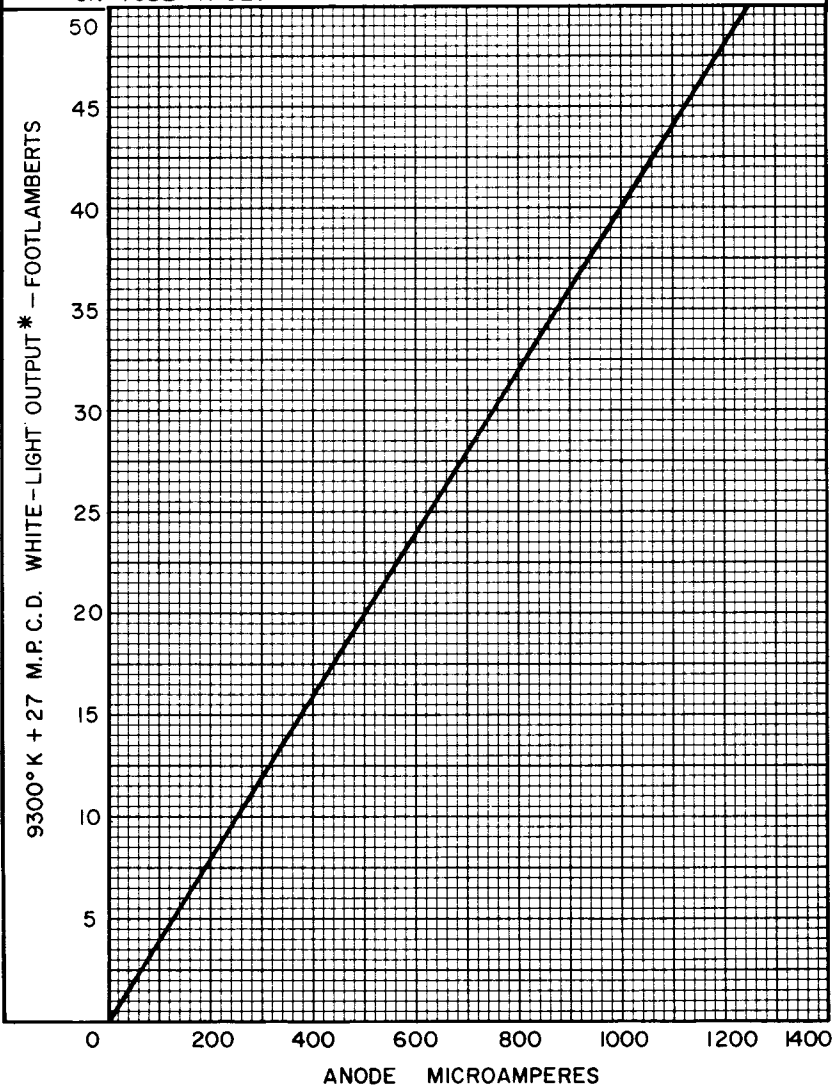
RED GUN 34%

BLUE GUN 32%

GREEN GUN 34%

RASTER SIZE: 11.689" X 9.139" (296.9 mm X 232.1 mm)

* MEASURED WITHIN 3" (76 mm) - DIAMETER AREA CENTERED ON TUBE FACE.



92LM-1266RI

