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DISPLAY STORAGE TUBE

DIRECT-VIEW TYPE
3.8"-DIAMETER DISPLAY

WRITING GUN:

ELECTROSTATIC DEFLECTION

ELECTROSTATIC FOCUS

VIEWING GUN:

NO DEFLECTION

NO FOCUS

DATA

General:

Writing Section Viewing Section

Heater, for Unipotential Cathode:

Voltage (AC or DC)	6.3	6.3	volts
Current	0.6	0.6	amp

Minimum Cathode Heating Time

before other electrode voltages are applied.	—	30	sec
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Direct Interelectrode Capacitances (Approx.):^o

Grid No.1 to all other tube electrodes	6.5	11	μuf
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Cathode to all other tube electrodes	5.5	8	μuf
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Backplate to all other tube electrodes	—	116	μuf
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Deflecting electrode DJ ₁ to deflecting electrode DJ ₂ . . .	1.9	—	μuf
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Deflecting electrode DJ ₃ to deflecting electrode DJ ₄ . . .	2	—	μuf
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DJ ₁ to all other tube electrodes.	6	—	μuf
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DJ ₂ to all other tube electrodes.	7	—	μuf
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DJ ₃ to all other tube electrodes.	5.5	—	μuf
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DJ ₄ to all other tube electrodes.	4.8	—	μuf
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Focusing Method Electrostatic

None

Deflection Method Electrostatic

None

Deflecting-Electrode Arrangement. *See Dimensional Outline*

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Phosphor (For Curves, see front

of this Section).	—	P20, Aluminized
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Fluorescence.	—	Yellow-Green
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Phosphorescence	—	Yellow-Green
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Minimum Useful Viewing Diameter^o 3.8"

Maximum Overall Length. 13.64"

Seated Length 12.50" $\pm$ 0.39"Greatest Bulb Diameter. 5.25" $\pm$ 0.06"

Maximum Tube Radius 2.69"

Bulb Terminals:

Caps (Three). Recessed Small Ball (JEDEC No. J1-22)

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

Temperature Range:

Operating -65° to +100° C

Storage -55° to +85° C

Operating Position. Any

Weight (Approx.). 2-3/4 lbs

Base. Medium-Shell Diheptal 14-Pin (JEDEC Group 5, No. B14-38)

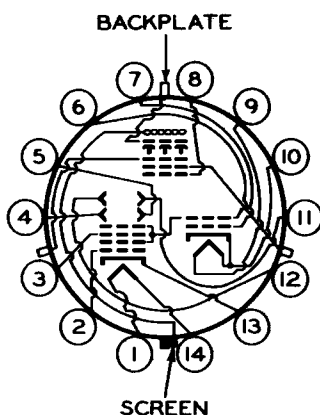


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BOTTOM VIEW

- Pin 1—Heater of Writing Gun
 Pin 2—Grid No.1 of Writing Gun
 Pin 3—Grid No.3 of Writing Gun
 Pin 4—Deflecting Electrode DJ_3 of Writing Gun
 Pin 5—Deflecting Electrode DJ_4 of Writing Gun
 Pin 6—Grid No.2 of Viewing Gun, Grid No.2 and Grid No.4 of Writing Gun
 Pin 7—Grid No.1 of Viewing Gun
 Pin 8—Grid No.3 of Viewing Gun
 Pin 9—Heater of Viewing Gun
 Pin 10—Heater and Cathode of Viewing Gun
 Pin 11—Deflecting Electrode DJ_1 of Writing Gun
 Pin 12—Deflecting Electrode DJ_2 of Writing Gun



- Pin 13—Cathode of Writing Gun
 Pin 14—Heater of Writing Gun
 Recessed Ball Cap:
Over Pin
 3—Grid No.5 of Viewing Gun
Over Pin
 12—Grid No.4 of Viewing Gun
On Side of Tube Opposite Base
 Key—Backplate
 Recessed Cavity Cap:
Over Base
 Key—Screen

Maximum and Minimum Ratings, Absolute-Maximum Values:

For altitudes up to 10,000 feet

Writing Section		Viewing Section	
SCREEN VOLTAGE.	—	11000 max.**	volts
BACKPLATE VOLT-AGE (Peak).	—	20 max.**	volts
<i>Equivalent Values</i>		<i>Equivalent Values</i>	
GRID-No.5 VOLT-AGE	— —	— 300 max.**	volts
GRID-No.4 VOLT-AGE	2950 max.* [▲] 200 max.**	— 300 max.**	volts
GRID-No.3 VOLT-AGE	1200 max.* -1550 max.**	— { 200 max.** 10 min.** }	volts
PEAK VOLTAGE BETWEEN GRID No.3 AND GRIDS No.2 & No.4.	— 2950 max.	— —	volts



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Writing Section		Viewing Section	
GRID-No.2 VOLT- AGE	2950 max.*▲ 200 max.**	2950 max.*▲ 200 max.**	volts
CATHODE VOLT- AGE	- -2750 max.**	- -	volts
GRID-No.1 VOLT- AGE:			
Negative-bias value . . .	200 max.*	200 max.**	volts
Positive-bias value . . .	0 max.*	0 max.**	volts
Positive-peak value . . .	2 max.*	0 max.**	volts
PEAK VOLTAGE BETWEEN GRIDS No.2 & No.4 AND ANY DE- FLECTING ELECTRODE . .	500 max.	-	volts
PEAK HEATER- CATHODE VOLTAGE:			
Heater nega- tive with respect to cathode . .	125 max.*	-	volts
Heater posi- tive with respect to cathode . .	125 max.*	-	volts

VIEWING SECTION**

Operating Values and Typical Performance Characteristics:

To prevent possible damage to the tube, allow the viewing-gun beam current to reach normal operating value before turning on the writing-gun beam current, and keep the viewing-gun beam on till the writing beam is turned off

Screen Voltage.	10000	10000	volts
Backplate Voltage (DC).	2	2	volts
Grid-No.5 Voltage	210	150	volts
Grid-No.4 Voltage#	50 to 150	30 to 90	volts
Grid-No.3 Voltage#	10 to 50	10 to 40	volts
Grid-No.2 Voltage▲	150	125	volts
Grid-No.1 Voltage#	0 to -80	0 to -60	volts
Maximum Screen Current.	0.75	0.5	ma
Maximum Backplate Current (Peak).	2	1.5	ma
Maximum Grid-No.5 Current	3	2.5	ma
Maximum Grid-No.4 Current	3	2.5	ma
Maximum Grid-No.3 Current	5	4	ma



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Maximum Grid-No.2 Current.	3	2.5	ma
Maximum Cathode Current.	8	6.5	ma
Number of Half-Tone Steps [□]	5	5	
Viewing Duration ^{▲▲}	20	40	sec
Maximum Erasing-Uniformity Factor ^{□□}	0.45	0.4	
Resolution [‡]	50	50	lines/in.
Brightness ^{●●}	2750	1500	fl

WRITING SECTION*

Range Values for Equipment Design:*

For any grids-No.2 & No.4 voltage (E_{C2+4}) between
1500 and 2750 volts[▲]

Grid-No.3 Voltage for focus.	17.5% to 37.5% of E_{C2+4}	volts
Maximum Grid-No.1 Voltage for cutoff of undeflected focused spot	-4.6% of E_{C2+4}	volts
Maximum Grid-No.3 Current.	-15 to +10	μ a
Maximum Cathode Current.	See Curve	
Deflection Factors:		
DJ ₁ & DJ ₂	36 to 48	v dc/in./kv of E_{C2+4}
DJ ₃ & DJ ₄	35 to 47	v dc/in./kv of E_{C2+4}
Focused Beam Position. .	##	
Writing Speed ^{††}	3000	in./sec

Examples of Use of Design Ranges:*

For grids-No.2 & No.4 voltage (E_{C2+4}) [▲]	2000	volts
Grid-No.3 Voltage for focus.	350 to 750	volts
Maximum Grid-No.1 Voltage for cutoff of undeflected focused spot.	-92	volts
Deflection Factors:		
DJ ₁ & DJ ₂	72 to 96	volts
DJ ₃ & DJ ₄	70 to 94	volts

Equivalent Values of Writing-Gun Voltages Referred
to Cathode of Viewing Gun:

Cathode Voltage.	-1875	-1850	volts
Grid-No.3 Voltage for focus.	-1125 to -1525	-1100 to -1500	volts
Grids-No.2 & No.4 Voltage [▲]	+125	+150	volts

VIEWING SECTION and WRITING SECTION

Circuit Values:

Grid-No.1-Circuit Resistance (Either gun).	1 max.	megohm
Resistance in Any Deflecting-Electrode Circuit [■]	0.1 max.	megohm
Series Current-Limiting Resistor (Unbypassed) in Grid-No.5 (Viewing-Section) Circuit	0.01 min.	megohm



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Backplate-Circuit Resistance.	0.005 max. megohm
Series Current-Limiting Resistance in	
Screen Circuit.	1 min. megohm

- Without external shield.
- ♥ Minimum useful viewing area may be eccentric with respect to the tube face.
- ** Voltages are shown with respect to cathode of Viewing Gun.
- * Voltages are shown with respect to cathode of Writing Gun.
- ▲ Grids No.2 and No.4 of Writing Gun are connected together and to grid No.2 of Viewing Gun within the tube.
- ✱ Adjusted for brightest, most uniform pattern.
- Observed with an RCA-2F21 Monoscope display.
- ▲▲ Expressed in terms of the time required for the brightness of the unwritten background to rise from just zero brightness (viewing-beam cutoff) to 10 per cent of saturated brightness.
- Determined as follows: With no erasing pulse, overscan the storage surface with writing beam to obtain maximum pattern brightness. Then cut off writing beam. Apply erasing pulses having an amplitude of between 8 to 10 volts and adjust duty cycle to obtain complete erasure in approximately 10 seconds. Measure time (t_1) from start of erasing to the instant at which any area within the minimum useful viewing diameter is reduced to background-brightness level, and time (t_2) from start of erasing to the instant at which the entire area within the minimum useful viewing-diameter area is reduced to background-brightness level. The erasing-uniformity factor is defined as $(t_2 - t_1)/t_2$.
- ⊕ Measured by shrinking-raster method at a display brightness of 50 per cent of saturated brightness and with grids No.2 & No.4 of Writing Gun at about +2000 volts with respect to cathode of Writing Gun.
- ⚡ Measured with entire storage grid written to produce saturated brightness and with screen at indicated voltage.
- The cathode of the Writing Gun is operated at about -2000 volts with respect to the cathode of the Viewing Gun which is usually operated at ground potential.
- ## The center of the undeflected focused beam will fall within a circle having a 10-mm radius and having its center on the Writing-Gun axis (See *Dimensional Outline*) under the following conditions: grids No.2 & No.4 of Writing Gun at +2000 volts with respect to cathode of Writing Gun, grid No.3 of Writing Gun at voltage to give focus, grid No.1 of Writing Gun at voltage which will permit storage of a charge just sufficient to give a barely perceptible spot on screen, Viewing Section operating under normal conditions, and tube shielded against extraneous fields.
- †† Measured under conditions of writing from just zero brightness (viewing-beam cutoff) to maximum brightness with grid No.1 of Writing Gun at -10 volts with respect to cathode of Writing Gun, and grids No.2 & No.4 of Writing Gun at +2000 volts with respect to cathode of Writing Gun.
- It is recommended that the deflecting-electrode-circuit resistances be approximately equal.

OPERATING CONSIDERATIONS

Shielding. Magnetic shielding must be provided to prevent external fields from interfering with the required accurate control of the low-velocity viewing beam. A cylindrical shield of properly annealed high-permeability material about 1/16-inch thick is usually satisfactory.

Terminal Connections. The base pins of the 7315 fit the Diheptal 14-contact socket. The *Recessed Small Ball caps* and the *Recessed Small Cavity cap* require standard flexible-lead connectors.

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The high voltages at which the 7315 is operated may be very dangerous. Great care should be taken in the design of apparatus to prevent the operator from coming in contact with the high voltages. Safety precautions include the enclosing of high-potential terminals and the use of interlocking switches to break the primary circuit of the power supply when access to the equipment is desired.

In the use of high-voltage tubes, it should always be remembered that high voltages may appear at normally low-potential points in the circuit as a result of capacitor breakdown or incorrect circuit connections. Therefore, before any part of the circuit is touched, the power-supply switch should be turned off, and both terminals of any capacitors grounded.

To prevent possible damage to the tube, allow the Viewing-Gun beam current to reach normal operating value before turning on the Writing-Gun beam current, and keep the viewing beam on till the writing beam is turned off.

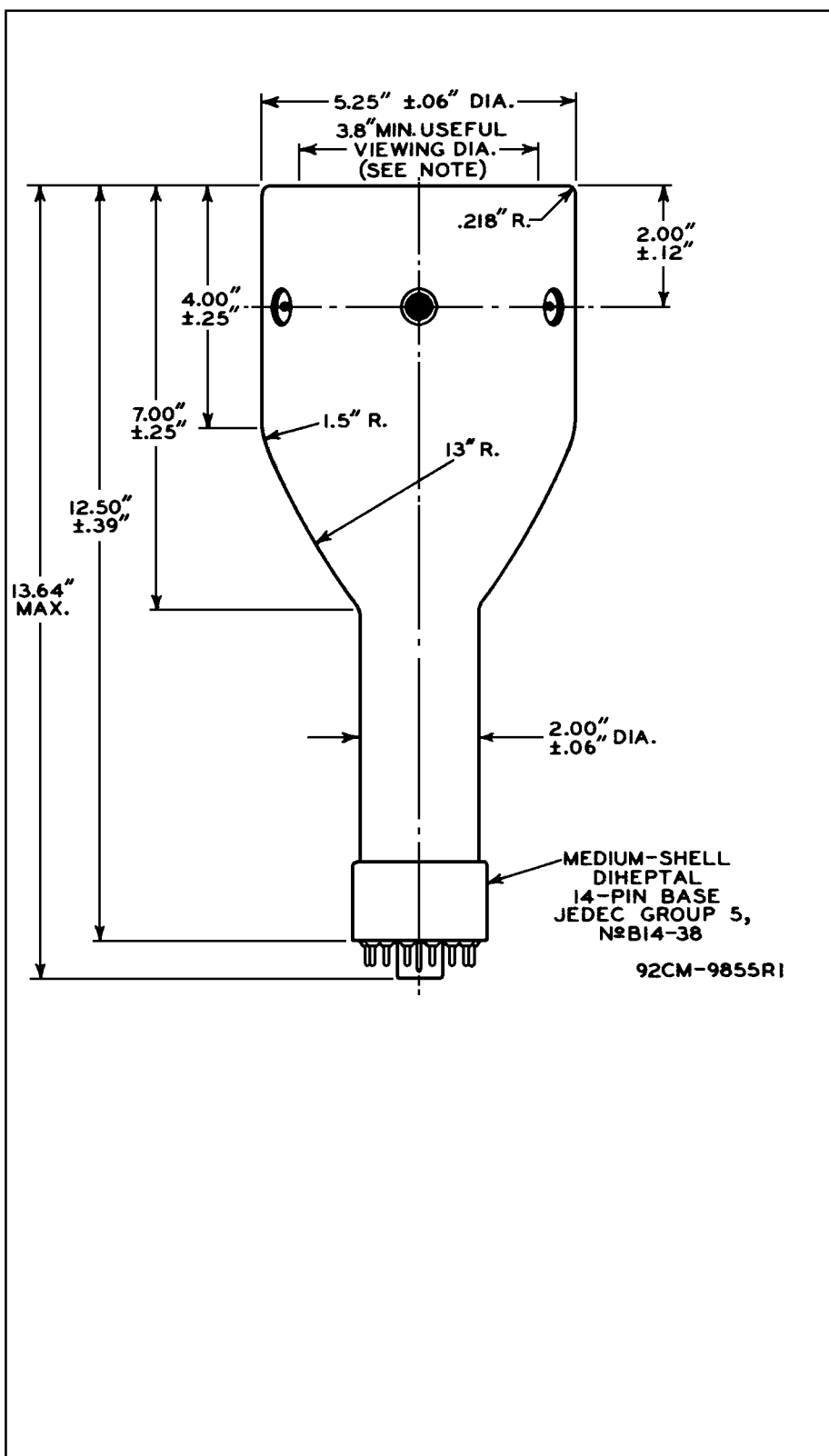
Failure of scanning while the writing beam is turned on may permanently damage the storage grid. Therefore, provision should be made to cut off automatically the writing-beam current in case of a scanning failure. The writing-beam current can be cut off by an electronic switch which applies -200 volts bias to grid No. 1 of the Writing Gun. This switch should be actuated by a portion of the scanning voltages applied to both sets of deflecting electrodes.



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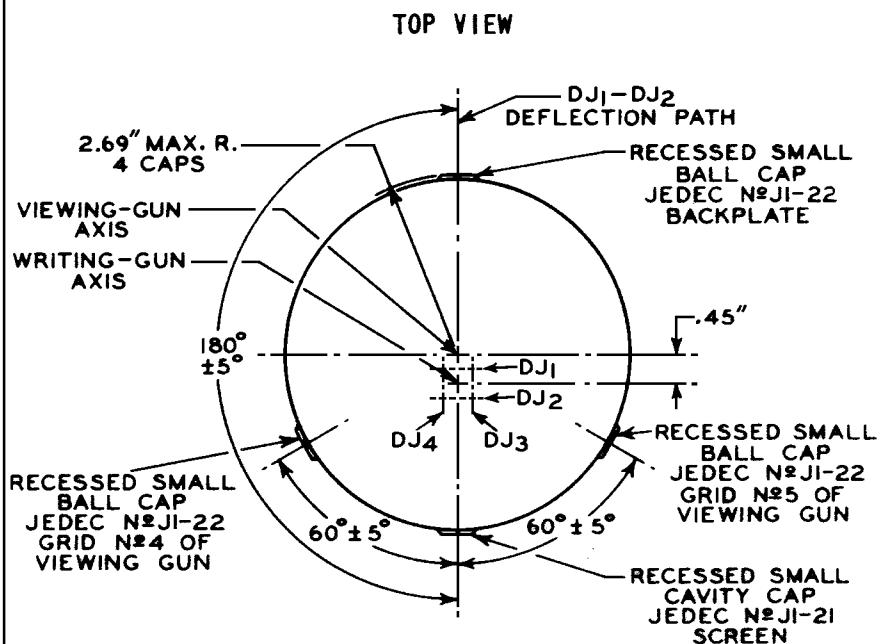
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NOTE: MINIMUM USEFUL VIEWING AREA MAY BE ECCENTRIC WITH RESPECT TO THE TUBE FACE. THE MINIMUM USEFUL VIEWING AREA WILL HAVE DIAMETER OF 3.8".

CENTER LINE OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE.

DEFLECTING ELECTRODES DJ₁ AND DJ₂ ARE NEARER THE SCREEN; DEFLECTING ELECTRODES DJ₃ AND DJ₄ ARE NEARER THE BASE. WITH DJ₁ POSITIVE WITH RESPECT TO DJ₂, THE SPOT WILL BE DEFLECTED TOWARD PIN 8; LIKewise, WITH DJ₃ POSITIVE WITH RESPECT TO DJ₄, THE SPOT WILL BE DEFLECTED TOWARD PIN 4.

THE ANGLE BETWEEN THE DEFLECTION PATH PRODUCED BY DJ₁ AND DJ₂ MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND THE BASE KEY BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF $\pm 10^\circ$. ANGLE BETWEEN DJ₁ - DJ₂ DEFLECTION PATH AND DJ₃ - DJ₄ DEFLECTION PATH IS $90^\circ \pm 3^\circ$.

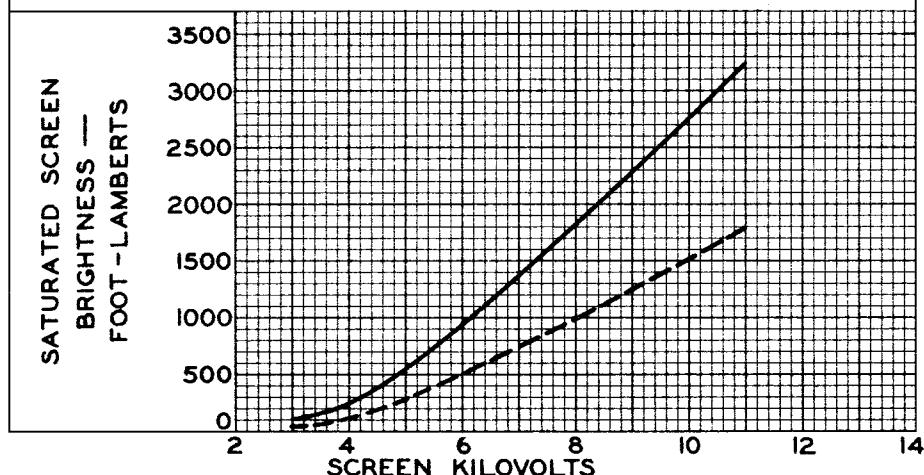
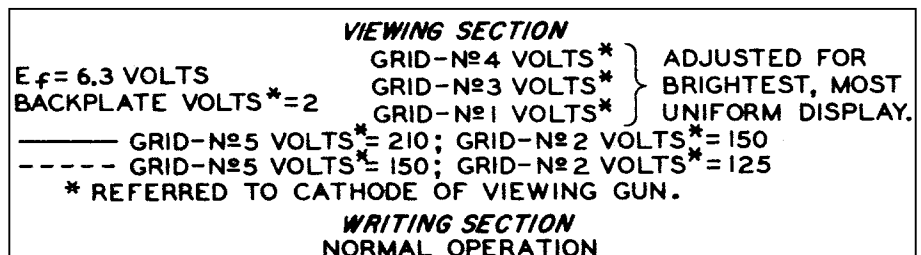
THE ANGLE BETWEEN THE DEFLECTION PATH PRODUCED BY DJ₁ AND DJ₂ MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND THE SCREEN CAP BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF $\pm 10^\circ$.



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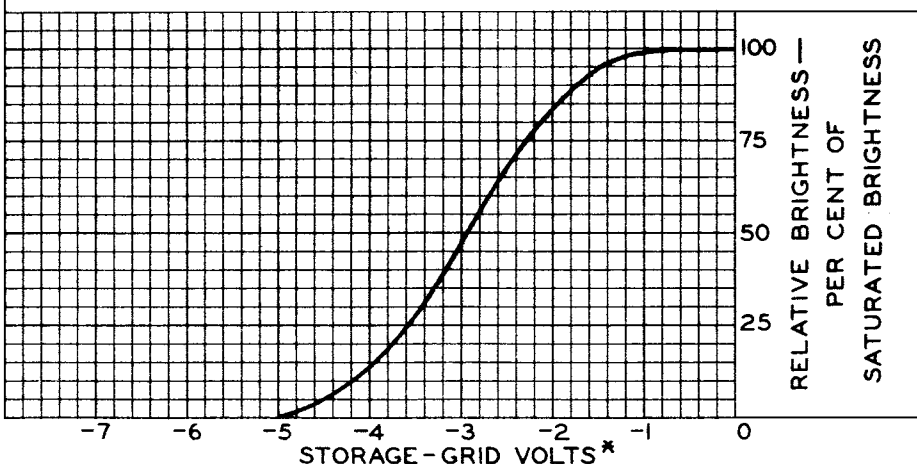
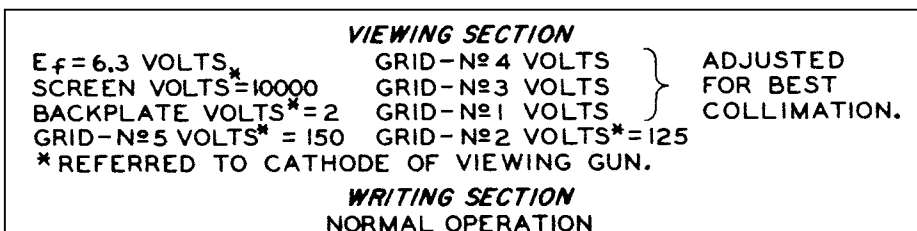
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TYPICAL CHARACTERISTICS



92CS-9858

TYPICAL STORAGE-GRID CHARACTERISTIC

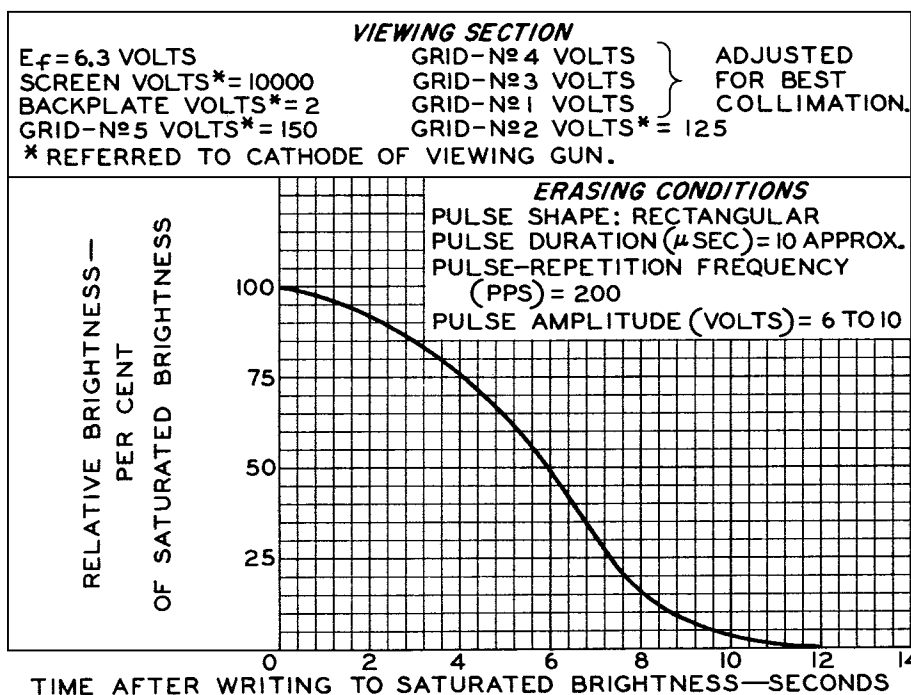


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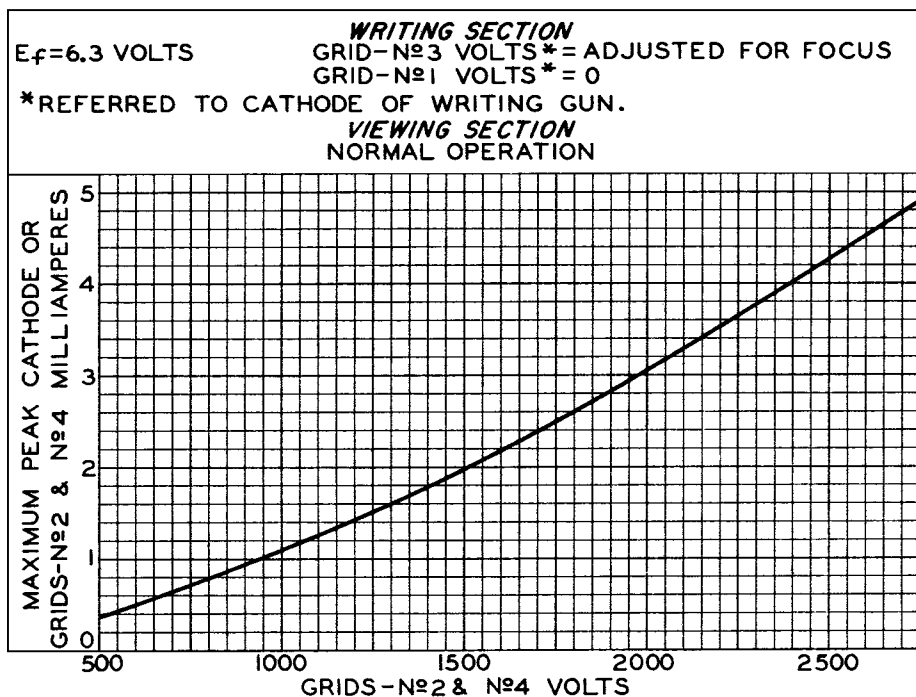
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TYPICAL ERASURE CHARACTERISTIC



92CS-9860

WRITING-GUN-CURRENT CHARACTERISTIC



92CS-9859