

# GENERAL ELECTRIC

INDUSTRIAL AND MILITARY CATHODE RAY TUBES

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## 12ARP- CATHODE RAY TUBE

12-1/2 - INCH

FACE PLATE: SPHERICAL, 40" R

FOCUS - ELECTROSTATIC

DUAL BEAM

DEFLECTION - ELECTROSTATIC

POST ACCELERATION

ALUMINIZED

### DESCRIPTION AND RATING

The General Electric Type 12ARP- is a 12-1/2 inch diameter, dual beam, electrostatic focus and deflection cathode ray tube, having minimum pattern distortion, deflection defocusing, and tracking error.

An aluminized screen is used for greater light output and for stabilization of screen potential.

### GENERAL

#### ELECTRICAL

Focusing Method . . . . . Electrostatic  
Deflecting Method . . . . . Electrostatic

#### Direct Interelectrode Capacitances, Approx.

|                                           |               |
|-------------------------------------------|---------------|
| Cathode to all other electrodes . . . . . | 6.0 $\mu$ mf  |
| Grid #1 to all other electrodes . . . . . | 7.0 $\mu$ mf  |
| D1 to D2 . . . . .                        | 4.0 $\mu$ mf  |
| D3 to D4 . . . . .                        | 3.5 $\mu$ mf  |
| D1 to all other electrodes . . . . .      | 10.0 $\mu$ mf |
| D2 to all other electrodes . . . . .      | 10.0 $\mu$ mf |
| D3 to all other electrodes . . . . .      | 10.0 $\mu$ mf |
| D4 to all other electrodes . . . . .      | 10.0 $\mu$ mf |

#### OPTICAL

| Phosphor Number      | 2     | 7      | 14        | 19        | 25        |
|----------------------|-------|--------|-----------|-----------|-----------|
| Fluorescent Color    | Green | Blue   | Purple    | Orange    | Orange    |
| Phosphorescent Color | Green | Yellow | Orange    | Orange    | Orange    |
| Persistence          | Long  | Long   | Med.-Long | Very Long | Very Long |

Faceplate - Clear

#### MECHANICAL

|                                          |                           |
|------------------------------------------|---------------------------|
| Over-all Length . . . . .                | 24 7/8 $\pm$ 3/8 Inches   |
| Greatest Diameter of Bulb . . . . .      | 12 7/12 $\pm$ 1/16 Inches |
| Minimum Useful Screen Diameter . . . . . | 11 Inches                 |

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|                        |         |
|------------------------|---------|
| Bulb Contact . . . . . | J1-22   |
| Neck Contacts. . . . . | J1-25   |
| Base . . . . .         | H12-37  |
| Basing . . . . .       | Special |

## Bulb Contact Alignment:

J1-22 contact aligns with trace of D1D2 . . . . .  $\pm 10$  Degrees  
J1-22 contact on same side as Pin #4

## Base Alignments:

D1D2 trace aligns with Pin #4 and tube axis . . . . .  $\pm 10$  Degrees  
Positive voltage on D1 deflects beam approximately toward Pin #4  
Positive voltage on D3 deflects beam approximately toward Pin #1

Angle between D3D4 and D1D2 traces . . . . .  $90 \pm$  Degrees

## RATINGS (Design Center Values)<sup>1</sup>

|                                                                 |                       |
|-----------------------------------------------------------------|-----------------------|
| Heater Voltage . . . . .                                        | 6.3 Volts             |
| Heater Current at 6.3 Volts . . . . .                           | $0.6 \pm 10\%$ Ampere |
| Post Accelerator Voltage . . . . .                              | 16,000 Max. Volts DC  |
| Accelerator Voltage . . . . .                                   | 10,000 Max. Volts DC  |
| Accelerator Input . . . . .                                     | 6 Max. Watts          |
| Focusing Electrode Voltage . . . . .                            | 4,000 Max. Volts DC   |
| Ratio Post Accelerator Voltage to Accelerator Voltage . . . . . | 2.0 Max.              |

## Grid #1 Voltage

|                               |                   |
|-------------------------------|-------------------|
| Negative Bias Value . . . . . | 300 Max. Volts DC |
| Positive Bias Value . . . . . | 0 Max. Volts DC   |
| Positive Peak Value . . . . . | 0 Max. Volts      |

## Peak Heater-Cathode Voltage

|                                                   |                |
|---------------------------------------------------|----------------|
| Heater negative with respect to cathode . . . . . | 180 Max. Volts |
| Heater positive with respect to cathode . . . . . | 180 Max. Volts |

## Peak Voltage between Accelerator and any

|                                |                  |
|--------------------------------|------------------|
| Deflection Electrode . . . . . | 2,500 Max. Volts |
|--------------------------------|------------------|

## TYPICAL OPERATING CONDITIONS<sup>1</sup>

|                                        |                      |
|----------------------------------------|----------------------|
| Post Accelerator Voltage . . . . .     | 7,700 Volts          |
| Accelerator Voltage . . . . .          | 7,500 Volts          |
| Focusing Electrode Voltage . . . . .   | 1,750 to 2,500 Volts |
| Grid #1 Voltage <sup>3</sup> . . . . . | -150 to -225 Volts   |

## Deflection Factors:

|                     |                                 |
|---------------------|---------------------------------|
| D1 and D2 . . . . . | 130 to 180 Volts DC<br>per Inch |
|---------------------|---------------------------------|

|                                                                            |                                             |
|----------------------------------------------------------------------------|---------------------------------------------|
| D3 and D4 . . . . .                                                        | 130 to 180 Volts DC<br>per Inch             |
| Line Width "A" <sup>3</sup> . . . . .                                      | .015 Inch Max.                              |
| Tracking Accuracy <sup>4</sup> . . . . .                                   | 0.15 Inch                                   |
| Interaction Factor . . . . .                                               | $14 \times 10^{-5}$ Max. Inches<br>per Volt |
| Deflection Defocusing <sup>6</sup><br>Spot Position <sup>7</sup> . . . . . | Within a 5/8" Radius<br>Circle              |

MAXIMUM CIRCUIT VALUES

|                                                                       |                  |
|-----------------------------------------------------------------------|------------------|
| Grid #1 Circuit Resistance . . . . .                                  | 1.5 Max. Megohms |
| Resistance in any Deflecting-Electrode Circuit <sup>8</sup> . . . . . | 5.0 Max. Megohms |

NOTES:

1. The values shown are for each unit unless otherwise stated.
2. The visual extinction of the focused, undeflected spot.
3. For a beam current of 2  $\mu$ A<sub>dc</sub>, measured in accordance with MIL-E-1 specifications,
4. The measurement of tracking error shall be made as follows:

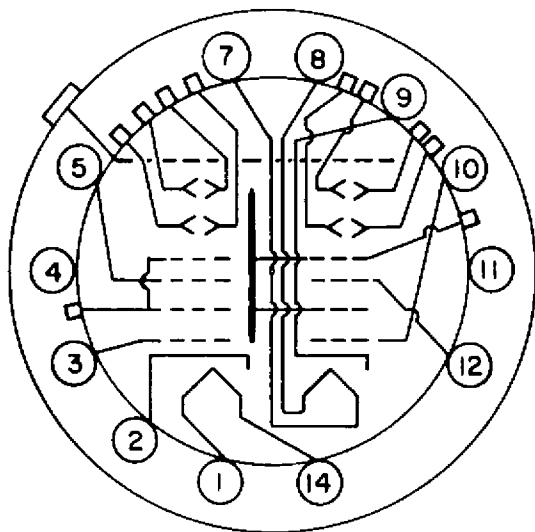
The focused spots of both guns shall be moved by means of a common d-c voltage along the 1D2 axis until the spot of gun A is at +3 inches from the center of the tube. Then by means of a small correction voltage the spot of gun B shall be moved to the same 1D2 position. The spots then shall be moved by means of the common d-c voltage in the opposite direction until the spot of the less sensitive gun reaches -3 inches by means of a voltage divider. The procedure is repeated until 1D2 deflection factor compensation is complete. The entire procedure is then duplicated along the 3D4 axis with a distance from the center of  $\pm 3$  inches. Then by means of the two common d-c voltages the spots shall be tracked over the area within a circle 10 inches in diameter. If desired, a small correction voltage may be applied to the plates of one gun to allow optimum spot positioning for minimum over-all tracking error.

The separation of spots over the tracking area shall not exceed .15 inches.

5. Deflection per unit volt of one beam at any position of the beam within its useful scan when a balanced voltage of at least plus or minus 300 volts is applied to the 1D2 deflection electrodes of the other electron gun shall be not greater than the value specified herein.

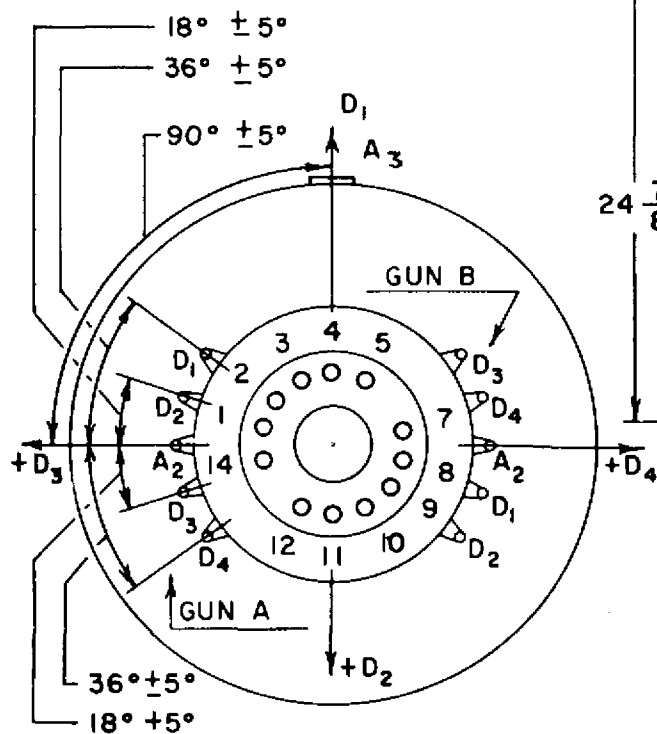
6. Defocusing of the spot resulting from all causes is a minimum within an area 10 inches in diameter. Specifically, the degradation in spot size anywhere within a circle 10 inches in diameter compared to the spot size of compromise focus will not exceed 1.5 to 1.
7. When the tube is operated at typical operating conditions, with  $E_{c1}$  adjusted to avoid damage to the screen, with each of the deflecting electrodes connected to the accelerator, and with the tube shielded against external influences, the spot will fall within a  $5/8$ -inch radius circle, centered on the tube face.
8. It is recommended that the deflection electrode circuit resistances be approximately equal.

Electronic Components Division  
Cathode Ray Tube Department  
Electronics Park - Syracuse, New York

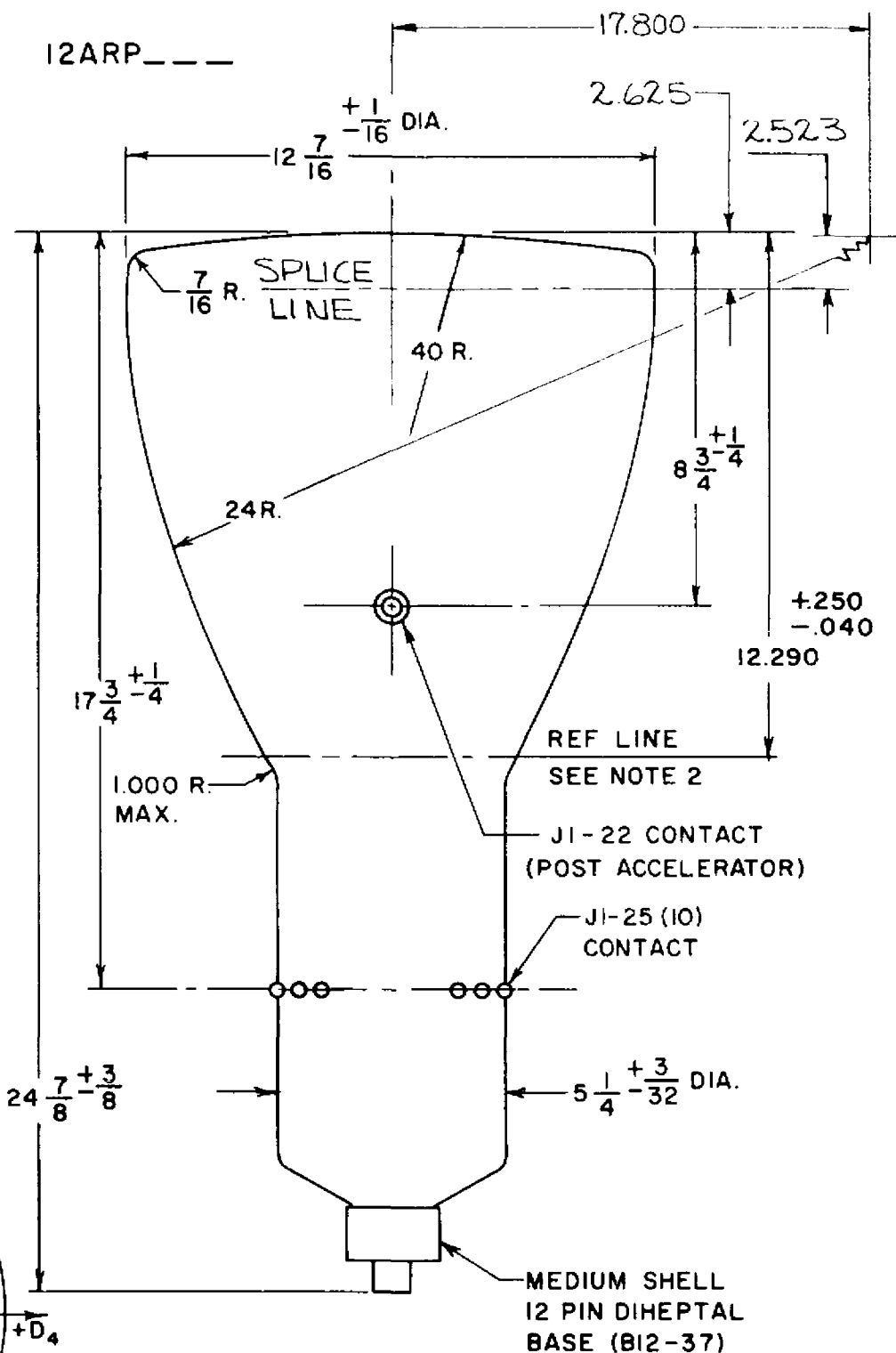


BASING DIAGRAM

- | GUN A                 | GUN B                  |
|-----------------------|------------------------|
| 1. HEATER             | 7. HEATER              |
| 2. CATHODE            | 8. HEATER              |
| 3. GRID NO. 1         | 9. CATHODE             |
| 5. FOCUSING ELECTRODE | 10. GRID NO. 1         |
| 14. HEATER            | 12. FOCUSING ELECTRODE |



BOTTOM VIEW



NOTES : (1) BASE PIN #4 ALIGNS  
WITH J1-22 CONTACT

(2) REFERENCE LINE  
IS THAT POINT WHERE  
A  $5.750 \pm .003$  INCH  
DIAMETER RING  
GUAGE WILL STOP