

5XP-A CATHODE-RAY TUBES

The Types 5XP-A Cathode-ray Tubes are tight-tolerance, electrostatically focused and deflected cathode-ray tubes containing very high sensitivity D3D4 deflection plates and an intensifier sub-divided into several steps for operation at high voltages and at high ratios of intensifier to second anode voltage.

High D3D4 sensitivity is achieved by using long deflection plates and limiting the D3D4 scan to a useful portion of the full screen diameter. Capacitances are low, being comparable to other types such as the 5JP-A and 5RP-A where deflection connections are made through the neck instead of the base.

Manufacturing tolerances have been reduced considerably in the Type 5XP-A. Deflection factors are held to within 10%, and the angle alignment between the D1D2 and D3D4 traces is held to within 1°. Grid cut-off tolerance has been halved to 25%.

Although the Type 5XP-A Cathode-ray Tubes are particularly useful for wide-band oscillographs, they are suitable for any application requiring high precision, high D3D4 deflection plate sensitivity, and the high writing rate capabilities of multi-band tubes.

GENERAL CHARACTERISTICS

Electrical

| | | | |
|------------------------------------|------------------|-------|--------|
| Heater Voltage | 6.3 Volts | | |
| Heater Current | 0.6 ± 10% Ampere | | |
| Focusing Method | Electrostatic | | |
| Deflecting Method | Electrostatic | | |
| Phosphor | No. 1 | No. 2 | No. 11 |
| Fluorescence | Green | Green | Blue |
| Phosphorescence | — | Green | — |
| Persistence | Medium | Long | Short |
| Direct Interelectrode Capacitances | | | |

Min. Max.

| | | |
|--|-----|----------|
| Cathode to all other electrodes | 3.1 | 5.8 μμf. |
| Grid No. 1 to all other electrodes | 3.3 | 6.2 μμf. |
| D1 to D2 | 1.0 | 2.0 μμf. |
| D3 to D4 | 1.0 | 2.0 μμf. |
| D1 to all other electrodes except D2 .. | 1.4 | 2.8 μμf. |
| D2 to all other electrodes except D1 .. | 1.4 | 2.8 μμf. |
| D3 to all other electrodes except D4 .. | 1.1 | 2.3 μμf. |
| D4 to all other electrodes except D3 .. | 1.1 | 2.3 μμf. |

Mechanical

| | |
|--|---|
| Overall Length | 17 ⁵ / ₈ ± 1/4 Inches |
| Greatest Diameter of Bulb | 5 ¹ / ₄ ± 3/32 Inches |
| Minimum Useful Screen Diameter | 4 ¹ / ₄ Inches |
| Bulb Contacts (Recessed Small Ball Caps) | J1-22 |
| Neck Contacts (Small Ball Caps) | J1-25 |
| Base (Medium Shell Diheptal 12-Pin) | B12-37 |
| Basing | 14P |
| Base Alignment: | |

D1D2 trace aligns with Pin No. 5 and tube axis ±10 Degrees
 Positive voltage on D1 deflects beam approximately toward Pin No. 5



| | |
|---|----------------|
| Positive voltage on D3 deflects beam approximately toward Pin No. 2 | |
| Angle between D3D4 and D1D2 traces | 90 ± 1 Degrees |
| Bulb Contact Alignment: | |
| J1-22 contacts align with D1D2 trace | ± 10 Degrees |
| J1-22 contacts on same side as Pin No. 5 | |

MAXIMUM RATINGS—(Design Center Values)

| | |
|--|-----------------------|
| Post Accelerator Voltage | 25,500 Max. Volts D-C |
| Accelerator Voltage ¹ | 3,650 Max. Volts D-C |
| Ratio Post Accelerator Voltage to Accelerator Voltage ² | 10 Max. |
| Focusing Voltage | 1,550 Max. Volts D-C |
| Grid No. 1 Voltage | |
| Negative Bias Value | 200 Max. Volts D-C |
| Positive Bias Value | 0 Max. Volts D-C |
| Positive Peak Value | 0 Max. Volts |
| Peak Heater Cathode Voltage | |
| Heater Negative with respect to Cathode | 180 Max. Volts D-C |
| Heater Positive with respect to Cathode | 180 Max. Volts D-C |
| Peak Voltage between Accelerator and any Deflection Electrode | 1,200 Max. Volts |

TYPICAL OPERATING CONDITIONS

| | |
|---|--|
| For Post Accelerator Voltage ³ of | 12,000 Volts |
| For Accelerator Voltage of | 2,000 Volts |
| Focusing Voltage | 362 to 695 Volts |
| Grid No. 1 Voltage ⁴ | -45 to -75 Volts |
| Modulation ⁵ | 52 Volts Max. |
| Line Width A ⁵ | .020 Inch Max. |
| P1 Light Output ⁶ (at Ib3 = 10 ua.) | 20 Ft. L. Min. |
| Deflection Factors: | |
| D1 and D2 | 130 to 159 Volts D-C per Inch |
| D3 and D4 | 42 to 52 Volts D-C per Inch |
| Deflection Factor Uniformity ⁸ | 5% Maximum |
| Useful Scan ⁷ | |
| D1 and D2 | 4.25 Inches* |
| D3 and D4 | 1.60 Inches** |
| Pattern Distortion at 75% of Useful Scan ^{2,8} | 2% Maximum |
| Frequency for 10% reduction in D3D4 deflection | |
| amplitude due to transit time ¹⁰ | 200 mc. |
| Spot Position (Undelected) | Within a 5/16-inch radius circle ¹¹ |

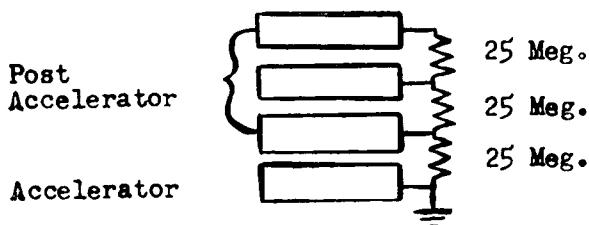
CIRCUIT DESIGN VALUES

| | |
|--|--|
| Focusing Voltage | 181 to 348 Volts per Kilovolt of Accelerator Voltage |
| Focusing Current for any operating condition | -15 to +10 Microamperes |
| Grid No. 1 Voltage ⁴ | 22.5 to 37.5 Volts per Kilovolt of Accelerator Voltage |
| Grid No. 1 Circuit Resistance | 1.5 Max. Megohms |
| Deflection Factors | |
| Post Accelerator Voltage = Accelerator Voltage | |
| D1 and D2 | 38 to 46 Volts D-C/Inch/KV of Accelerator Voltage |
| D3 and D4 | 12 to 15 Volts D-C/Inch/KV of Accelerator Voltage |
| Resistance in any Deflecting Electrode Circuit ¹² | 5 Max. Megohms |
| * ± 2.125" minimum from tube face center. | |
| ** ± .8" minimum from tube face center. | |

NOTES

1. The product of Accelerator Voltage and average Accelerator Current should be limited to 6 watts.
2. It is recommended that Post Accelerator to Accelerator Voltage ratio be not more than 6 to 1 in applications where minimum pattern distortion is required.
3. Accelerator to final intensifier electrode voltage equally divided over the three intensifier electrodes.

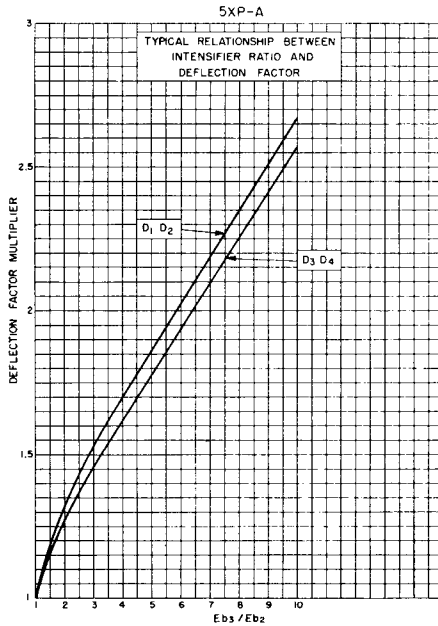
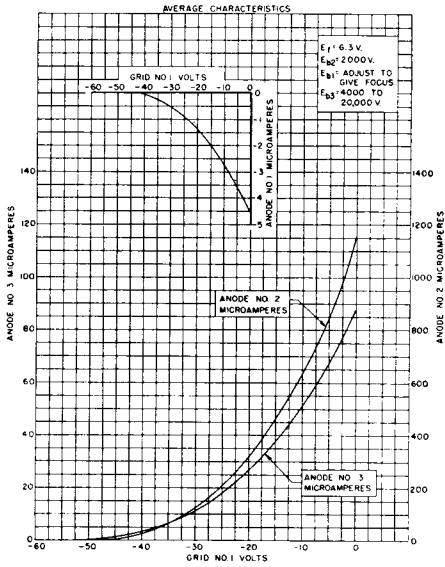
Suggested Method of Intensifier Connection



The two accelerator terminals
must be connected together.

4. Visual extinction of undeflected focused spot.
5. Measured in accordance with MIL-E-1 specifications at $I_{b3} = 25 \text{ ua}$.
6. The deflection factor (for both D1D2 and D3D4 plate pairs, separately) for a deflection of less than 75% of the useful scan will not differ from the deflection factor for a deflection at 25% of the useful scan by more than the indicated value.
7. Reduction in useful scan when Post Accelerator voltage is greater than Accelerator voltage is determined by the ratio of these voltages measured with respect to cathode. Values shown are therefore applicable to any operating condition with the same voltage ratios.
8. All portions of a raster pattern, adjusted so its widest points just touch the sides of a 1.275 x 3.060-inch rectangle, will fall within the area bounded by the 1.275 x 3.060-inch rectangle and an inscribed 1.225 x 2.940-inch rectangle.
9. Deflection accuracy may be obtained by combining angle between traces, deflection factor uniformity and pattern distortion characteristics. In general, for deflections less than those indicated the accuracy will improve.
10. Computed.
11. When the tube is operated at typical operating conditions ($E_h = 6.3 \text{ V.}$, $E_{b3} = 12,000 \text{ V.}$, $E_{b2} = 2,000 \text{ V.}$, E_{b1} at focus); 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 5/16-inch radius circle, centered on the tube face.
Under stable operating conditions, the position of the spot will not shift with changes in intensity by more than .025 inch.
12. It is recommended that the deflecting electrode circuit resistances be approximately equal.
13. For optimum focus the average potentials of the deflection plates and second anode should be the same.

5XP1-A, 5XP2-A, 5XP11-A



TYPE 5XP-A

