

# 5AFP- CATHODE-RAY TUBE

The Du Mont Type 5AFP- is a five-inch flat-faced electrostatically focused and deflected cathode-ray tube containing two independent beams. The Type 5AFP- features extremely low interaction between traces plus high deflection sensitivity and excellent deflection accuracy. It is one of the line of Du Mont tight-tolerance cathode-ray tubes.

The Type 5AFP- is designed for applications requiring a dual-beam presentation with high brightness level, excellent deflection accuracy, and minimum spot-size.

High brightness levels can be obtained because of the post-accelerator type of construction. Deflection sensitivity is maintained high, even at high accelerating potentials, by use of limited-scan deflection electrodes.

Termination of deflection electrodes and accelerators are made through the bulb wall, at a ring base, for ease of connection. This minimizes lead inductance and capacitance and improves insulation. The two accelerators, the intergun-shield and the first ring of the post-accelerator which are normally tied together, are provided with separate connections in the Type 5AFP-. These independent and separate connections assure maximum versatility in specialized applications.



## GENERAL CHARACTERISTICS

### Electrical

Heater Voltage .....	6.3 Volts
Heater Current .....	0.6±10% Amperes
Focusing Method .....	Electrostatic
Deflecting Method .....	Electrostatic

Phosphor	No. 1	No. 2	No. 7	No. 11
Fluorescence	Green	Green	Blue	Blue
Phosphorescence	———	Green	Yellow	———
Persistence	Medium	Long	Long	Short

Direct Interelectrode Capacitances	Min.	Max.	
Cathode to all other electrodes	3.4	4.6	μμf
Grid No. 1 to all other electrodes	3.2	4.0	μμf
D1 to D2	1.5	2.1	μμf
D3 to D4	0.9	1.4	μμf
D1 to all	4.0	5.0	μμf
D2 to all	4.0	5.0	μμf
D3 to all	3.1	4.1	μμf
D4 to all	3.1	4.1	μμf

### Mechanical

Overall Length .....	18 $\frac{1}{4}$ ± $\frac{1}{4}$ Inches
Greatest Diameter of Bulb .....	5 $\frac{1}{4}$ ± $\frac{3}{32}$ Inches
Minimum Useful Screen Diameter .....	4.5 Inches
Bulb Contacts .....	J1-22
Collar (12 Pin Diheptal) .....	Special
Base (Medium Shell Diheptal 12-pin) .....	B12-37

Basing .....	Special
Collar and Base Alignment	
Collar Pin No. 1 and Base Key each aligns with the D3D4 trace .....	$\pm 10$ Degrees
Positive Voltage on D1 deflects the beam approximately towards Pin No. 4	
Positive Voltage on D3 deflects the beam approximately towards Base Key	
Bulb Contact Alignment	
Bulb Contacts align with D3D4 trace .....	$\pm 10$ Degrees
Bulb Contact is on the same side as the Base Key	
Trace Alignment	
D1D2 trace aligns with D3D4 trace .....	$90 \pm 1$ Degrees
Corresponding traces align within .....	1 Degree

### MAXIMUM RATINGS—(Design Center Values)

Post Accelerator Voltage .....	10,500 Max. Volts D-C
Accelerator Voltage (Note 2) .....	3,500 Max. Volts D-C
Ratio Post-Accelerator Voltage to Accelerator Voltage (Note 3) .....	3.0 Max.
Focusing Voltage .....	1,750 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 D-C
Peak Heater to 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 .....	750 Max. Volts

### TYPICAL OPERATING CONDITIONS

For Post-Accelerator Voltage of .....	4,000 Volts
For Accelerator Voltage of (Note 4) .....	2,000 Volts
Focusing Voltage .....	400 to 684 Volts
Grid No. 1 Voltage (Note 5) .....	-87 to -53 Volts
Modulation Factor (Note 6) .....	45 Volts Max.
Line Width (Note 7) .....	.030 Inches Max.
P1 Light Output (Note 7) .....	20 Ft. L. Min.
Deflection Factors:	
D1 and D2 .....	54 to 66 Volts D-C/Inch
D3 and D4 .....	43 to 53 Volts D-C/Inch
Deflection factor uniformity (Note 8) .....	2% Max.
Useful Scan (Note 9)	
D1D2 .....	4 Inches*
D3D4 .....	4 Inches*
Pattern Distortion @ 75% of useful scan (Note 10) .....	2½% Max.
Tracking Error (Note 11) .....	2% Max.
Interaction Factor (Note 12) .....	0.000014 Inches/Volt D-C Max.
Spot Position (Undeflected) (Note 9) .....	Within a 5/16-inch radius circle

\*  $\pm 2$ " minimum from tube face center

### CIRCUIT DESIGN VALUES

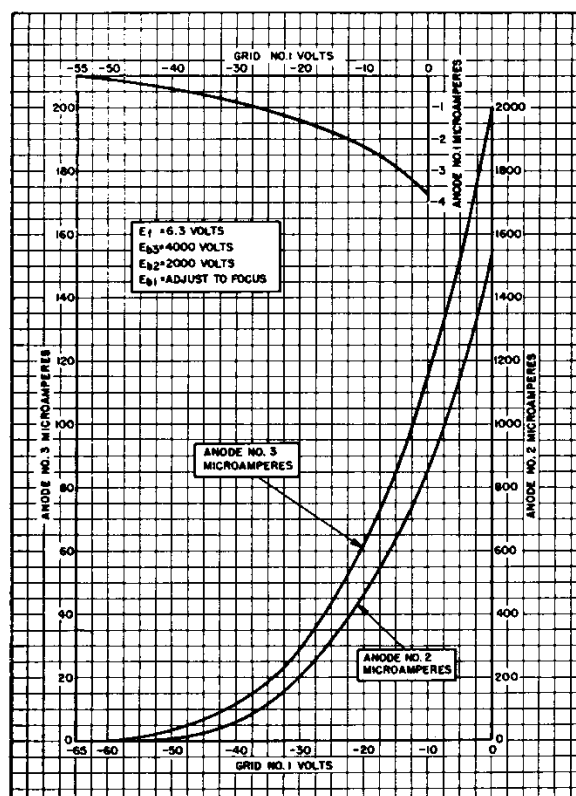
Focusing Voltage .....	200 to 342 Volts per Kilovolt of Accelerator Voltage
Focusing Current for any operating condition .....	-15 to +10 Microamperes
Grid No. 1 Voltage (Note 5) .....	-44 to -26 Volts per Kilovolt of Accelerator Voltage
Grid No. 1 Circuit Resistance .....	1.5 Max. Megohms
Deflection Factors:	
Ratio Post-Accelerator Voltage to Accelerator Voltage .....	2.0
D1 and D2 .....	27 to 33 Volts D-C/Inch/KV of Accelerator Voltage
D3 and D4 .....	24 to 30 Volts D-C/Inch/KV of Accelerator Voltage
Resistance in any Deflecting-Electrode Circuit (Note 13) .....	5.0 Max. Megohms

### NOTES

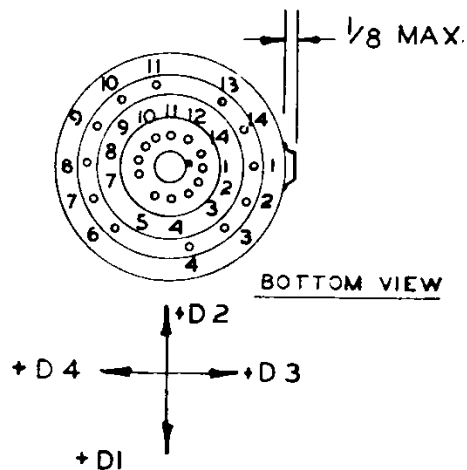
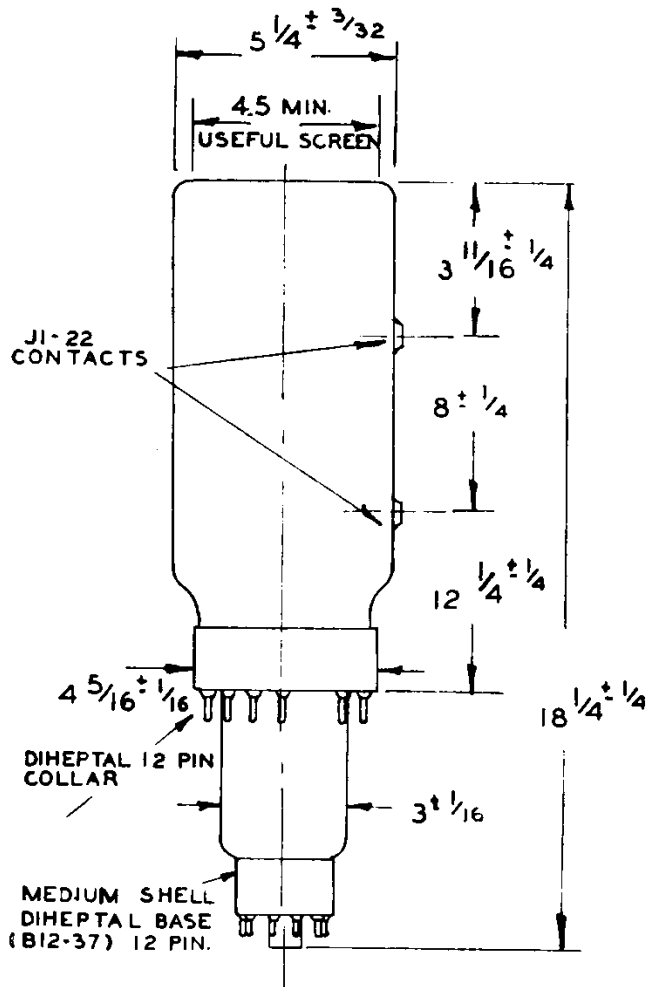
1. Values are for each unit unless otherwise stated.
2. Accelerator power input (Avg.) should be limited to 6 Watts.
3. This tube is designed for optimum performance when operating at an Eb3/Eb2 ratio of 2.0. Operation at other ratios of Eb3/Eb2 may result in increased deflection (non) uniformity, pattern distortion and tracking error.

4. Grid No. 4 and Grid No. 2 are connected internally and referred to herein as accelerator. The shield electrode and the accelerator electrodes are connected together in the normal operating condition. However, the accelerators as well as the first ring of the post-deflection accelerating system may be operated at different potentials if desired and the shield potential should then be adjusted for optimum performance.
5. Visual extinction of the focused, undeflected spot.
6. The increase in Grid No. 1 voltage from cutoff to produce an  $I_{b3}$  of 25  $\mu$ ADC.
7. Measured in accordance with MIL-E-1 specifications using an  $I_{b3}$  of 25  $\mu$ ADC.
8. The deflection factor (For both D1D2 and D3D4 plate pairs, separately) for deflections of less than 75% of the useful scan will not differ from the deflection factor for a deflection of 25% of the useful scan by more than the indicated value.
9. Centered with respect to the tube face and with the tube shielded.
10. The edges of a raster pattern, whose mean dimensions are the indicated percentage of useful scan, will not deviate from the mean dimension by more than the specified amount.
11. The positions of the spot of each beam, when deflected from the center by applied voltages proportional to the deflection factor will not deviate from each other by more than the indicated percentage of the deflection.
12. The deflection of one beam when balanced d.c. voltages are applied to the deflection electrodes of the other beam will not be greater than the indicated value.
13. Deflection electrode circuit resistances should be equal.
14. The ratio of the deflection factors of corresponding deflection electrodes will not exceed 1.15.
15. Deflection accuracy may be computed from the angle between traces, deflection factor (non) uniformity and pattern distortion characteristics. In general, for deflections less than those indicated the accuracy will improve.
16. The deflection errors including those from pattern distortion and deflection factor (non) uniformity but not including that from angle between traces will not exceed 3.5% of the deflection.

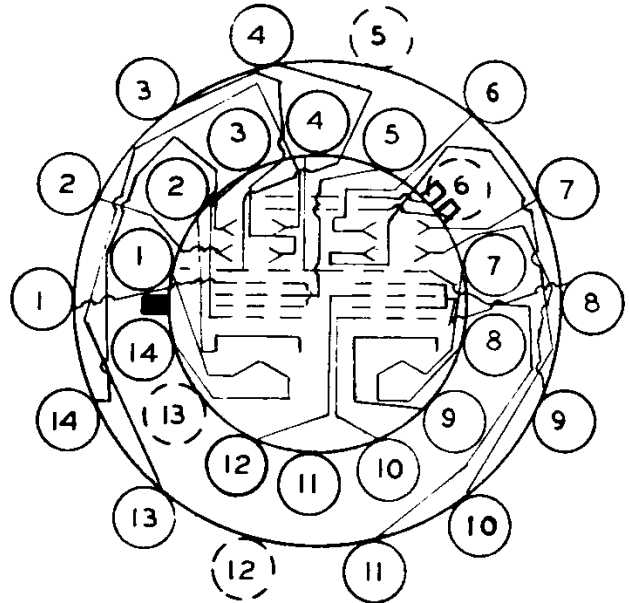
## TYPE 5AFP- AVERAGE CHARACTERISTICS



# TYPE 5AFP-



DEFLECTION DIRECTIONS SHOWN WITH REFERENCE TO ABOVE BOTTOM VIEW



## BASE AND COLLAR CONNECTIONS

COLLAR PIN NO.	ELEMENT
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BEAM A	14	DEFLECTOR D1
	13	DEFLECTOR D2
	1	ACCELERATOR G2 & 4
	2	DEFLECTOR D3
BEAM B	3	DEFLECTOR D4
	4	SHIELD
	6	DEFLECTOR D1
	7	DEFLECTOR D2
BEAM B	8	ACCELERATOR G2 & 4
	9	DEFLECTOR D4
	10	DEFLECTOR D3
	11	SHIELD

BASE PIN NO	ELEMENT
1 & 14	HEATER
2	CATHODE
3	GRID NO1
4	INTERNAL CONNECTION
5	ANODE NO1
7 & 8	HEATER
9	CATHODE
10	GRID NO1
11	INTERNAL CONNECTION
12	ANODE NO1

NOTE: SHIELD(COLLAR PINS NO 4 & 11) IS COMMON TO BOTH BEAMS  
J1-22 CONTACTS, COLLAR PIN NO1, AND BASE KEY EACH ALIGN WITH THE 3D4 TRACE  $\pm 10^\circ$