



5CPI-A

# 5CPI-A

## OSCILLOGRAPH TUBE

POST-DEFLECTION ACCELERATOR

ELECTROSTATIC FOCUS

ELECTROSTATIC DEFLECTION

### DATA

#### General:

Heater, for Unipotential Cathode:

Voltage. . . . . 6.3 . . . . . ac or dc volts

Current. . . . . 0.6 . . . . . amp

Direct Interelectrode Capacitances (Approx.):

Grid No.1 to All Other Electrodes. . . . . 8 . . . . .  $\mu\text{f}$

Cathode to All Other Electrodes. . . . . 9 . . . . .  $\mu\text{f}$

DJ<sub>1</sub> to DJ<sub>2</sub> . . . . . 2 . . . . .  $\mu\text{f}$

DJ<sub>3</sub> to DJ<sub>4</sub> . . . . . 2 . . . . .  $\mu\text{f}$

DJ<sub>1</sub> to All Other Electrodes. . . . . 9 . . . . .  $\mu\text{f}$

DJ<sub>2</sub> to All Other Electrodes. . . . . 9 . . . . .  $\mu\text{f}$

DJ<sub>3</sub> to All Other Electrodes. . . . . 7 . . . . .  $\mu\text{f}$

DJ<sub>4</sub> to All Other Electrodes. . . . . 8 . . . . .  $\mu\text{f}$

Phosphor (For Curves, see front of this Section) . . . . . P1

Fluorescence and Phosphorescence . . . . . Green

Persistence of Phosphorescence . . . . . Medium

Focusing Method. . . . . Electrostatic

Deflection Method . . . . . Electrostatic

Overall Length . . . . . 16-3/4"  $\pm$  3/8"

Greatest Diameter of Bulb . . . . . 5-1/4"  $\pm$  3/32"

Minimum Useful Screen Diameter . . . . . 4-1/2"

Mounting Position. . . . . Any

Cap. . . . . Recessed Small Ball (JETEC No. J1-22)

Base . . . . . Medium-Shell Diheptal 12-Pin (JETEC No. B12-37)

Basing Designation for BOTTOM VIEW . . . . . 14J<sub>1</sub>

Pin 1-Heater . . . . . Pin 9-Anode No.2,

Pin 2-Cathode . . . . . Grid No.2

Pin 3-Grid No.1 . . . . . Pin 10-Deflecting

Pin 4-Internal Con. . . . . Electr. DJ<sub>2</sub>

Do not use . . . . . Pin 11-Deflecting

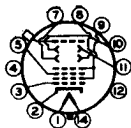
Pin 5-Anode No.1 . . . . . Electr. DJ<sub>1</sub>

Pin 7-Deflecting . . . . . Pin 12-No Con-

Electrode DJ<sub>3</sub> . . . . . necton

Pin 8-Deflecting . . . . . Pin 14-Heater

Electrode DJ<sub>4</sub> . . . . . Cap -Anode No.3



*DJ<sub>1</sub> and DJ<sub>2</sub> are nearer the screen  
DJ<sub>3</sub> and DJ<sub>4</sub> are nearer the base*

With DJ<sub>1</sub> positive with respect to DJ<sub>2</sub>, the spot is deflected toward pin 5. With DJ<sub>3</sub> positive with respect to DJ<sub>4</sub>, the spot is deflected toward pin 2.

The plane through the tube axis and each of the following items may vary from the trace produced by DJ<sub>1</sub> and DJ<sub>2</sub> by the following angular tolerances measured about the tube axis: Pin 5, 10°; Cap (on same side of tube as pin 5), 10°.

The angle between the trace produced by DJ<sub>1</sub> and DJ<sub>2</sub> and the trace produced by DJ<sub>3</sub> and DJ<sub>4</sub> is 90°  $\pm$  3°.

5CPI-A



# 5CPI-A OSCILLOGRAPH TUBE

### Maximum Ratings, Design-Center Values:

ANODE-No.3 VOLTAGE . . . . .	4000 max.	volts
ANODE-No.2* VOLTAGE. . . . .	2000 max.	volts
RATIO OF ANODE-No.3 VOLTAGE TO		
ANODE-No.2 VOLTAGE . . . . .	2.3:1	
ANODE-No.1 VOLTAGE . . . . .	1000 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value. . . . .	200 max.	volts
Positive bias value <sup>•</sup> . . . . .	0 max.	volts
Positive peak value. . . . .	2 max.	volts
PEAK VOLTAGE BETWEEN ANODE No.2 AND		
ANY DEFLECTING ELECTRODE . . . . .	500 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	125 max.	volts
Heater positive with respect to cathode.	125 max.	volts

### Equipment Design Ranges:

For any anode-No.3 voltage ( $E_{b3}$ ) between 2000\*\* and 4000 volts  
and any anode-No.2 voltage ( $E_{b2}$ ) between 1500<sup>▲</sup> and 2000 volts

→ Anode-No.1 Voltage . . . . .	18.7 to 34.5% of $E_{b2}$	. . . . .	volts
→ Grid-No.1 Voltage <sup>♠</sup> . . . . .	1.5% to 4.5% of $E_{b2}$	. . . . .	volts
Anode-No.1 Current of any			
Operating Condition . . . . .	-15 to +10	. . . . .	$\mu$ amp

### Deflection Factors:

$$\text{When } E_{b3} = 2 \times E_{b2}$$

DJ1 & DJ2 . . . . .	39 to 53 v dc/in./kv of $E_{b2}$
DJ3 & DJ4 . . . . .	33 to 45 v dc/in./kv of $E_{b2}$

$$\text{When } E_{b3} = E_{b2}$$

DJ1 & DJ2 . . . . .	31 to 42 v dc/in./kv of $E_{b2}$
DJ3 & DJ4 . . . . .	27 to 37 v dc/in./kv of $E_{b2}$

Spot Position. . . . . <sup>##</sup>

### Examples of Use of Design Ranges:

For anode-No.3			
voltage of. . . . .	2000	3000	4000 volts
and anode-No.2			
voltage of. . . . .	2000	1500	2000 volts

→ Anode-No.1 Volt. . . . .	375 to 690	280 to 515	375 to 690 volts
→ Grid-No.1 Volt. <sup>♠</sup> . . . . .	-30 to -90	-22.5 to -67.5	-30 to -90 volts

### Deflection Factors:

DJ1 & DJ2 . . . . .	62 to 84	59 to 80	78 to 106	□
DJ3 & DJ4 . . . . .	54 to 74	50 to 68	66 to 90	□

### Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . .	1.5 max.	megohms
Resistance in Any		
Deflecting-Electrode Circuit <sup>■</sup> . . . . .	5.0 max.	megohms

\* , • , \*\* , ▲ , ♠ , ## , ■ , □ : See next page.

→ Indicates a change.



5CPI-A

## 5CPI-A OSCILLOGRAPH TUBE

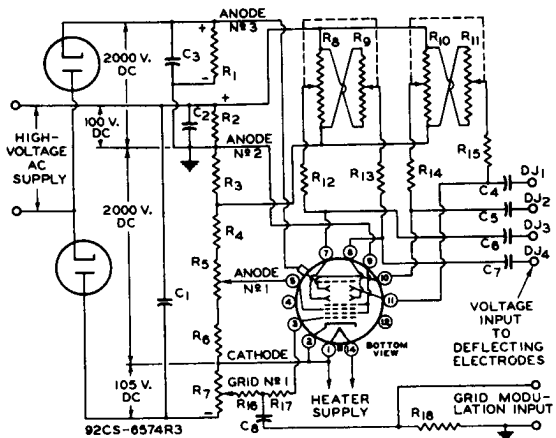
- \* Anode No.2 and grid No.2, which are connected together within tube, are referred to herein as anode No.2.
- At or near this rating, the effective resistance of the anode supply should be adequate to limit the anode-No.2 input power to 6 watts.
- \*\* It is recommended that anode-No.3 voltage be not less than 3000 volts for high-speed scanning.
- ▲ Recommended minimum value of anode-No.2 voltage.
- For visual cutoff of undeflected focused spot.
- Volts dc/in.
- \*\*# With heater voltage of 6.3 volts, anode-No.3 voltage of 4000 volts, anode-No.2 voltage of 2000 volts, anode-No.1 voltage adjusted to focus, grid-No.1 voltage adjusted to give spot that is just visible, each deflecting electrode connected through 1-megohm resistor to anode No.2, and tube shielded from all extraneous fields, the center of the undeflected, focused spot will fall within a circle having a 12.5-mm radius concentric with the center of the tube face.
- It is recommended that the deflecting-electrode-circuit resistances be approximately equal.

5CPI-A



# 5CPI-A OSCILLOGRAPH TUBE

TYPICAL OSCILLOGRAPH CIRCUIT



- |                                                             |                                                          |
|-------------------------------------------------------------|----------------------------------------------------------|
| C1: 0.1 $\mu$ f, 2500 Volts                                 | R5: 2-Megohm Potentiometer                               |
| C2: 1.0 $\mu$ f, 200 Volts                                  | R6: 1.5 Megohms, 0.5 Watt                                |
| C3: 0.1 $\mu$ f, 2500 Volts                                 | R7: 0.5-Megohm Potentiometer                             |
| C4 C5 C6 C7: 0.05- $\mu$ f, Blocking Capacitors*            | R8 R9: Dual 5-Megohm Potentiometer                       |
| C8: 0.0001 $\mu$ f, 2500 Volts                              | R10 R11: Dual 5-Megohm Potentiometer                     |
| R1: 50 Megohms (Five 10-Megohm, 1-Watt Resistors in Series) | R12 R13 R14 R15: 2 Megohms, 0.5 Watt                     |
| R2 R3: 2 Megohms, 0.5 Watt                                  | R16: 0.5 Megohm, 0.5 Watt                                |
| R4: 5.5 Megohms, 2 Watts                                    | R17: Not less than 2000 ohms per volt of positive signal |
|                                                             | R18: 5 Megohms, 0.5 Watt                                 |

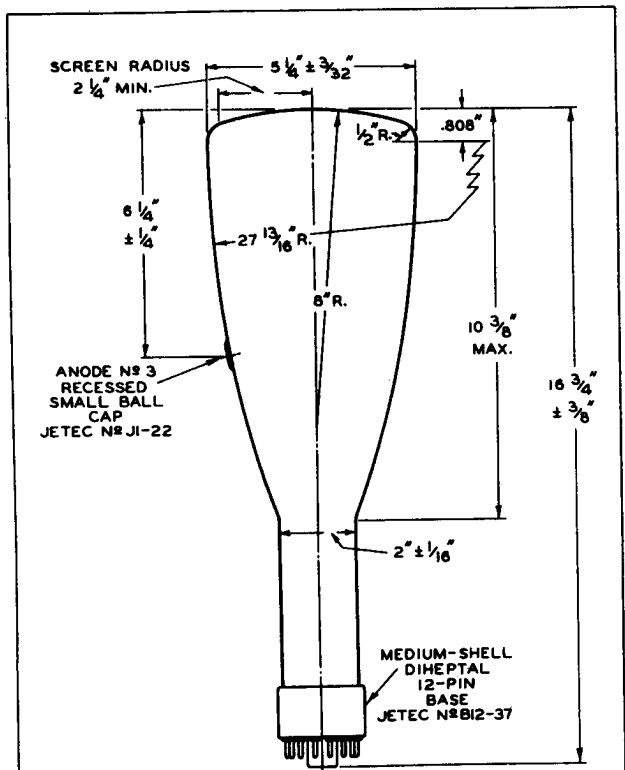
\* When cathode is grounded, capacitors should have high voltage rating (2500 volts); when anode No.2 is grounded, they may have low voltage rating (200 volts). For dc amplifier service, deflecting electrodes should be connected direct to amplifier output. In this service, it is preferable usually to remove deflecting-electrode resistors to minimize loading effect on amplifier. In order to minimize spot defocusing, it is essential that anode No.2 be returned to a point in the amplifier system which will give the lowest possible potential difference between anode No.2 and the deflecting electrodes.

Devices and arrangements shown or described herein may use patents of RCA or others. Information contained herein is furnished without responsibility by RCA for its use and without prejudice to RCA's patent rights.



5CPI-A

# 5CPI-A OSCILLOGRAPH TUBE



☉ OF BULB WILL NOT DEVIATE MORE THAN  $2^\circ$   
IN ANY DIRECTION FROM PERPENDICULAR  
ERECTED AT CENTER OF BOTTOM OF BASE

92CM-6408R4

OCTOBER 1, 1951

TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

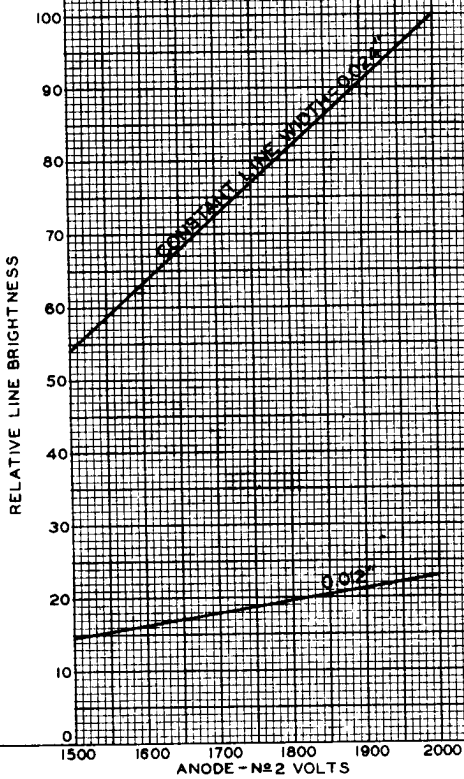
CE-6408R4

5CPI-A



# 5CPI-A CHARACTERISTICS

$E_f = 6.3$  VOLTS  
ANODE - N<sup>o</sup>1 VOLTS ADJUSTED FOR FOCUS  
ANODE - N<sup>o</sup>3 VOLTS = 2 x ANODE - N<sup>o</sup>2 VOLTS

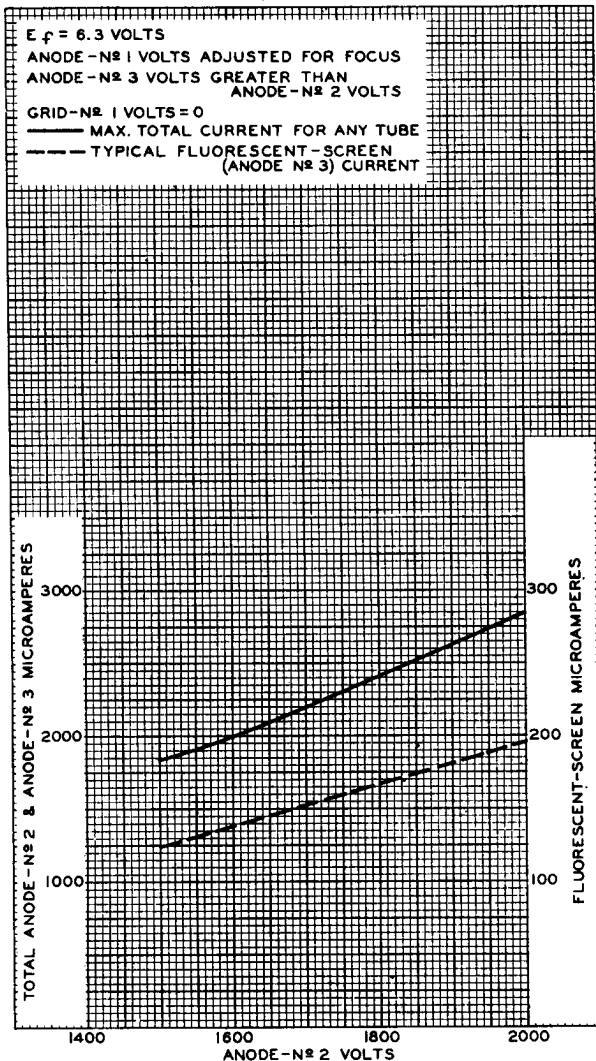




5CPI-A

5CPI-A

### CHARACTERISTICS



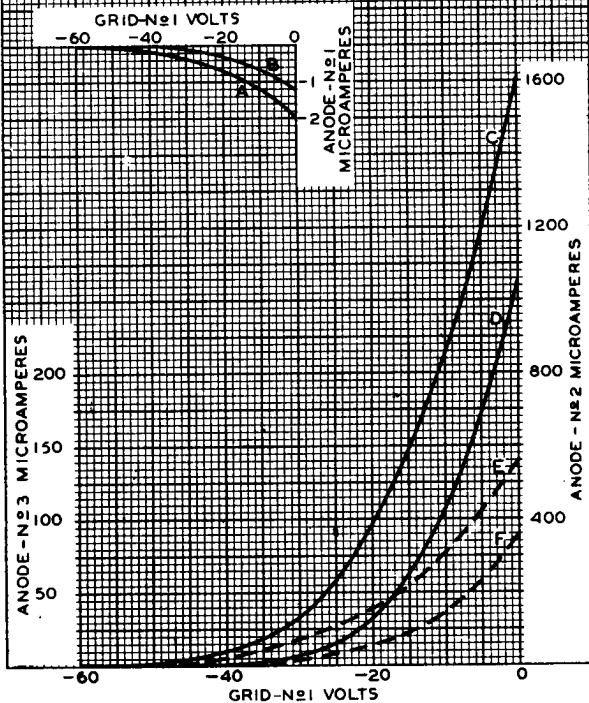
5CPI-A



# 5CPI-A AVERAGE CHARACTERISTICS

$E_f = 6.3$  VOLTS  
ANODE-№1 VOLTS ADJUSTED TO GIVE FOCUS

CURVE	ELECTRODE CURRENT	ANODE-№2 VOLTS	ANODE-№3 VOLTS
A	ANODE №1	2000	2000-4000
B	ANODE №1	1500	1500-3000
C	ANODE №2	2000	4000
D	ANODE №2	1500	3000
E	ANODE №3	2000	4000
F	ANODE №3	1500	3000







5CP11-A

## 5CP11-A OSCILLOGRAPH TUBE

POST-DEFLECTION ACCELERATOR  
ELECTROSTATIC FOCUS      ELECTROSTATIC DEFLECTION

The 5CP11-A is the same as the 5CP1-A, except that it has a screen of the short-persistence, blue-fluorescence type designated P11. Its highly actinic fluorescent spot of unusually high brightness makes the 5CP11-A particularly useful for photographic recording. Because its improved phosphor has exceptional brightness for a blue screen, the 5CP11-A is also quite useful for visual observation of phenomena.

The SPECTRAL-ENERGY EMISSION CHARACTERISTIC,  
as well as the PERSISTENCE CHARACTERISTIC  
for the P11 PHOSPHOR are shown at the  
beginning of this Section.