OSCILLOGRAPH TUBE
POST-DEFLECTION ACCELERATOR
ELECTROSTATIC FOCUS
ELECTROSTATIC DEFOCUSB

DATA

General:
Heater, for Unipotential Cathode:
Voltage: 6.3 ac or dc volts
Current: 0.6 amp

Direct Inter electrode Capacitances (Approx.):
Grid No. 1 to All Other Electrodes: 8 μf
Cathode to All Other Electrodes: 8 μf
DJ1 to DJ2: 2.5 μf
DJ3 to DJ4: 2 μf
DJ1 to All Other Electrodes: 8 μf
DJ2 to All Other Electrodes: 7 μf
DJ3 to All Other Electrodes: 7 μf
DJ4 to All Other Electrodes: 8 μf

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: 10" ± 1/4"
Greatest Diameter of Bulb: 3" ± 1/16"
Minimum Useful Screen Diameter: 2-3/4"
Mounting Position: Any
Cap: Recessed Small Ball (JETEC No. J1-22)
Base: Medium-Shell Dihéptal 12-Pin (JETEC No. B12-37)
Basing Designation for BOTTOM VIEW: 14J1

Pin 1 - Heater
Pin 2 - Cathode
Pin 3 - Grid No. 1
Pin 4 - Internal Connection - Do Not Use
Pin 5 - Anode No. 1
Pin 7 - Deflecting Electrode
Pin 8 - Deflecting Electrode DJ4
Pin 9 - Anode No. 2, Grid No. 2
Pin 10 - Deflecting Electrode DJ2
Pin 11 - Deflecting Electrode DJ1
Pin 12 - No Connection
Pin 14 - Heater Cap - Anode No. 3

DJ1 and DJ2 are nearer the screen
DJ3 and DJ4 are nearer the base

With DJ1 positive with respect to DJ2, the spot is deflected toward pin 5. With DJ3 positive with respect to DJ4, 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 DJ1 and DJ2 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 DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° ± 3°.

AUG. 1, 1951
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
# Maximum Ratings, Design-Center Values:

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

# 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** and 2000 volts

- Anode-No.1 Voltage: 20% to 34.5% of $E_{b2}$... volts
- Grid-No.1 Voltage†: 1.5% to 4.5% of $E_{b2}$... volts
- Anode-No.1 Current for any Operating Condition... -50 to +10... µamp

# Deflection Factors:

When $E_{b3} = 2 x E_{b2}$

<table>
<thead>
<tr>
<th>DJ1 &amp; DJ2</th>
<th>85 to 115 v dc/in./kv of $E_{b2}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>DJ3 &amp; DJ4</td>
<td>62.5 to 85 v dc/in./kv of $E_{b2}$</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>DJ1 &amp; DJ2</th>
<th>68 to 92 v dc/in./kv of $E_{b2}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>DJ3 &amp; DJ4</td>
<td>50 to 68 v dc/in./kv of $E_{b2}$</td>
</tr>
</tbody>
</table>

# Spot Position...

- Anode No.2 and grid No.2, which are connected together within tube, and 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 transients.
- Recommended minimum value of anode-No.2 voltage.
- With heater voltage of 6.3 volts, anode-No.3 voltage of 1500 volts, anode-No.2 voltage of 1500 volts, anode-No.1 voltage adjusted for 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 undeflected focused spot will fall within a 15-mm square centered at the geometric center of the tube face and having one side parallel to the trace produced by DJ1 and DJ2.

†: See next page.
OSCILOGRAPH TUBE

Examples of Use of Design Ranges:

<table>
<thead>
<tr>
<th>Voltage of Anode-No. 3</th>
<th>2000</th>
<th>3000</th>
<th>4000</th>
<th>Volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage of Anode-No. 2</td>
<td>2000</td>
<td>1500</td>
<td>2000</td>
<td>Volts</td>
</tr>
<tr>
<td>Anode-No. 1 Volt.</td>
<td>400 to 690</td>
<td>300 to 515</td>
<td>400 to 690</td>
<td>Volts</td>
</tr>
<tr>
<td>Grid-No. 1 Volt.†</td>
<td>-30 to -90</td>
<td>22.5 to -67.5</td>
<td>-30 to -90</td>
<td>Volts</td>
</tr>
</tbody>
</table>

Deflection Factors:

- DJ₁ & DJ₂: 136 to 184 127 to 173 170 to 230
- DJ₃ & DJ₄: 100 to 136 94 to 128 125 to 170

Maximum Circuit Values:

- Grid-No. 1 Circuit Resistance: 1.5 max. megohms
- Resistance in Any Deflecting-Electrode Circuit: 5.0 max. megohms

† For visual extinction of undeflected focused spot.
- Volts dc/in.

It is recommended that the deflecting-electrode-circuit resistances be approximately equal.

OPERATING NOTES

The 3JPI utilizes a medium-persistence screen having green fluorescence and phosphorescence. The screen has high visual efficiency and exceptionally good brightness contrast between the scanned line and the background. Under conditions of high ambient light, contrast may be maintained by the use of a green filter, such as Watten No. 58.

For high-speed scanning, it is recommended that the anode-No. 3 (post-deflection accelerator) voltage be not less than 3000 volts, but for low- and medium-speed scanning, anode No. 3 may be operated at a voltage as low as 2000 volts.

Because of its medium persistence, the 3JPI is particularly useful where either medium-speed non-recurring phenomena or medium- and high-speed recurring phenomena are to be observed. The persistence is such that the 3JPI can be operated with scanning frequencies as low as 20 cycles per second without excessive flicker.
SCREEN RADIUS
1 $\frac{3}{4}$ MIN.

ANODE Nº 3
RECESSED
SMALL BALL
CAP

1 $\frac{3}{4}$ + 1 $\frac{1}{4}$

3 $\frac{7}{8}$ R.

12 $\frac{7}{16}$ R.

8" R.

2" + $\frac{1}{16}$

10" ± $\frac{1}{4}$

9 $\frac{1}{4}$ R.

3.50"

$\frac{1}{4}$ R.

MEDIUM-SHELL
DIHEPTAL
12-PIN
BASE

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

92CM-6583

AUG. 1, 1951

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

CE-6583
CHARACTERISTICS

$E_c = 6.3$ VOLTS
ANODE-N$\#1$ VOLTS ADJUSTED FOR FOCUS
ANODE-N$\#3$ VOLTS GREATER THAN ANODE-N$\#2$ VOLTS
GRID-N$\#1$ VOLTS = 0

---
TYPICAL FLUORESCENT-SCREEN (ANODE-N$\#3$) CURRENT
---
MAX. TOTAL CURRENT FOR ANY TUBE

JUNE 22, 1951
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7671
### Average Characteristics

**$E_f = 6.3$ Volts**

**Anode-№1 Volts Adjusted to Give Focus**

<table>
<thead>
<tr>
<th>CURVE</th>
<th>Electrode Current</th>
<th>Anode-№2 Volts</th>
<th>Anode-№3 Volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Anode №1</td>
<td>2000</td>
<td>4000</td>
</tr>
<tr>
<td>B</td>
<td>Anode №1</td>
<td>1500</td>
<td>3000</td>
</tr>
<tr>
<td>C</td>
<td>Anode №2</td>
<td>2000</td>
<td>4000</td>
</tr>
<tr>
<td>D</td>
<td>Anode №2</td>
<td>1500</td>
<td>3000</td>
</tr>
<tr>
<td>E</td>
<td>Anode №3</td>
<td>2000</td>
<td>4000</td>
</tr>
<tr>
<td>F</td>
<td>Anode №3</td>
<td>1500</td>
<td>3000</td>
</tr>
</tbody>
</table>

---

**Diagram: Grid-№1 Volts vs. Anode-№1 Microamperes**

-60 -40 -20 0

**Anode-№2 or Anode-№3 Microamperes**

-60 -40 -20 0

---

**June 22, 1951**

_Tube Department_  
_Radio Corporation of America, Harrison, New Jersey_
The 3JP7 is electrically and mechanically like the 3JP1 but utilizes a long-persistence, cascade (two-layer) screen which exhibits bluish fluorescence of short persistence and greenish-yellow phosphorescence which persists for several minutes under conditions of adequate excitation and low ambient light.

Because of its long persistence, the 3JP7 is particularly useful where either low-speed non-recurring phenomena or high-speed recurring phenomena are to be observed.

The persistence is such that the 3JP7 without filter can be operated with scanning frequencies as low as 30 cycles per second without excessive flicker. When used with a yellow filter, such as Wratten No.15 (G), the 3JP7 can be operated with much lower scanning frequencies.

**GENERAL DATA, MAXIMUM RATINGS, AND EQUIPMENT DESIGN RANGES**

for the 3JP7 are identical with those for the 3JP1 except that Spot Position is defined as follows:

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 for 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 undeflected focused spot will fall within a 12-mm square centered at the geometric center of the tube face and having one side parallel to the trace produced by DJ1 and DJ2.

**THE SPECTRAL-ENERGY EMISSION CHARACTERISTIC, BUILDUP CHARACTERISTICS,**

and **PERSISTENCE CHARACTERISTICS** of the P7 Phosphor are shown at the front of this Section.