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 ....... μf
Cathode to All Other Electrodes ....... 5 ....... μf
DJ1 to DJ2 ....... 2.5 ....... μf
DJ3 to DJ4 ....... 1.3 ....... μf
DJ1 to All Other Electrodes ....... 9 ....... μf
DJ2 to All Other Electrodes ....... 9 ....... μf
DJ3 to All Other Electrodes ....... 9 ....... μf
DJ4 to All Other Electrodes ....... 6 ....... μf

Faceplate, Flat ........ Clear Glass
Phosphor (For Curves, see front of this Section) ........ P1
Fluorescence and Phosphorescence ........ Medium Green
Persistence of Phosphorescence ........ Medium

Focusing Method .......... Electrostatic
Deflection Method .......... Electrostatic
Overall Length ........ 16-3/4" ± 3/8"
Greatest Diameter of Bulb ........ 5-1/4" ± 3/32"
Minimum Useful Screen Diameter ........ 4-9/16"
Bulb ............... J42
Weight (Approx.) ........ 2-1/2 lbs
Mounting Position ........ Any

Cap ........ Recessed Small Ball (JETEC No.J1-22)
Base ........ Medium-Shell Diheptal 12-Pin (JETEC No.B12-37)

BOTTOM VIEW

Pin 1—Heater
Pin 2—Cathode
Pin 3—Grid No.1
Pin 4—No Connection—Do Not Use
Pin 5—Grid No.3
Pin 7—Deflecting Electrode DJ3
Pin 8—Deflecting Electrode DJ4
Pin 9—Ultor (Grid No.2, Grid No.4)
Pin 10—Deflecting Electrode DJ2
Pin 11—Deflecting Electrode DJ1
Pin 12—No. Conn.
Pin 14—Heater Cap—Post-Ultor (Grid No.5, Collector)

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

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TENTATIVE DATA 1
Oscillograph Tube

The following angular tolerances (measured about the tube axis): Pin 5, 10°; side terminal (on same side of tube as pin 5), 10°. Angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° ± 1.5°.

**Maximum Ratings, Design-Center Values:**

- **POST-ULTOR® VOLTAGE** ... 6000 max. volts
- **ULTOR® VOLTAGE** ... 2600 max. volts
- **RATIO OF POST-ULTOR VOLTAGE TO ULTOR VOLTAGE** ... 2.3:1 max.
- **GRID-No.3 VOLTAGE** ... 1000 max. volts

**GRID-No.1 VOLTAGE:**
- Negative bias value ... 200 max. volts
- Positive bias value ... 0 max. volts
- Positive peak value ... 2 max. volts

**PEAK VOLTAGE BETWEEN ULTOR 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 post-ulator voltage (Ec5) between 2000 and 6000 volts and any ulator voltage (Ec4) between 1500 and 2600 volts**

- Grid-No.3 Voltage for Focus ... 20% to 34.5% of Ec4 ... volts
- Grid-No.1 Voltage for Visual Extinction of Undelected Focused Spot ... 2.6% to 4.3% of Ec4 ... volts

**Grid-No.3 Current for Any Operating Condition** ... -15 to +10 ... μamp

**Deflection Factors:**

- **When Ec5 = 2 x Ec4**
  - DJ1 & DJ2 ... 26.5 to 36 v dc/in./kv of Ec4
  - DJ3 & DJ4 ... 18 to 24 v dc/in./kv of Ec4

- **When Ec5 = Ec4**
  - DJ1 & DJ2 ... 21.5 to 29 v dc/in./kv of Ec4
  - DJ3 & DJ4 ... 14.5 to 19.5 v dc/in./kv of Ec4

**Spot Position**

**Examples of Use of Design Ranges:**

- For post-ulator voltage of 2000 and 5000 volts and ulator voltage of 2000 and 1500 volts:
  - Grid-No.3 Volt. for Focus ... 400 to 690 300 to 515 400 to 690 volts
  - Grid-No.1 Volt. ... -52 to -87 -39 to -65 -52 to -87 volts

See next page.
Deflection Factors:
DJ₁ & DJ₂  43 to 58  40 to 54  53 to 72  v dc/in.
DJ₃ & DJ₄  29 to 39  27 to 36  36 to 48  v dc/in.

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

- The "post-ultimo" in a cathode-ray tube is the electrode to which is applied a dc voltage higher than the ultimo voltage for accelerating the electrons in the beam after its deflection. In the SAB-types, the post-deflection acceleration function and the collector function are both performed by grid No.5 which is conveniently referred to as "post-ultimo".

- The "ultimo" in a cathode-ray tube is the electrode to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection. In the SAB-types, the ultimo function is performed by grid No.4. Since grid No.4 and grid No.2 are connected together within the SAB-types, they are collectively referred to simply as "ultimo" for convenience in presenting data and curves.

- At or near this rating, the effective resistance of the ultimo supply should be adequate to limit the ultimo input power to 6 watts.

- It is recommended that the post-ultimo voltage be not less than 3000 volts for high-speed scanning.

- Recommended minimum value of ultimo voltage.

- The deflecting electrodes DJ₁ and DJ₄ are designed to have extra-high deflection sensitivity and consequently produce less than full-screen deflection. With post-deflection acceleration, the length of deflection may be limited to 4 inches; without post-deflection acceleration, deflection to full screen diameter will ordinarily be obtained. These electrodes are, therefore, more suitable for the signal voltage than for the time-base voltage.

- With heater voltage of 6.3 volts, post-ultimo voltage of 4000 volts, ultimo voltage of 2000 volts, grid-No.3 voltage adjusted to give focus, grid-No.1 voltage adjusted to give spot that is just visible, each deflecting electrode connected through a 1-megohm resistor to ultimo, 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.

- For visual cutoff of undeflected focused spot.

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

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TYPICAL OSCILLOGRAPH CIRCUIT

C1: 0.1 μF, 2500 Volts
C2: 1.0 μF, 200 Volts
C3: 0.1 μF, 2500 Volts
C4, C5, C6, C7: 0.05-μF, Blocking Capacitors
C8: 0.0001 μF, 2500 Volts
R1: 50 Megohms (Five 10-Megohm, 1-Watt Resistors in Series)
R2, R3: 2 Megohms, 0.5 Watt
R4: 5.5 Megohms, 2 Watts
R5: 2-Megohm Potentiometer
R6: 1.5 Megohms, 0.5 Watt
R7: 0.5-Megohm Potentiometer
R8, R9: 5-Megohm Potentiometer
R10, R11: Dual 5-Megohm Potentiometer
R12, R13, R14, R15: 2 Megohms, 0.5 Watt
R16: 0.5 Megohm, 0.5 Watt
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 ultor is grounded, they may have low voltage rating (200 volts). For dc amplifier service, deflecting electrodes should be connected directly to amplifier output. In this service, it is preferable to use removing deflecting-electrode resistors to minimize loading effect on amplifier. In order to minimize spot defocusing, it is essential that ultor be returned to a point in the amplifier system which will give the lowest possible potential difference between ultor 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.

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CE-6574R4
5ABPI

OSCILLOGRAPH TUBE

POST-ULTOR RECESSED SMALL BALL CAP
JETEC No. J1-22

MEDIUM-SHELL DIHEPTAL 12-PIN BASE
JETEC No. R12-37

\[ \frac{5\frac{1}{4}}{\pm \frac{3}{32}} \]
SCREEN DIA.
\[ 4\frac{9}{16} \text{ MIN.} \]

\[ \frac{6\frac{1}{4}}{\pm \frac{1}{4}} \]

\[ \frac{27\frac{13}{16}}{\text{R.}} \]

\[ \frac{10\frac{9}{32}}{\text{MAX.}} \]

\[ \frac{16\frac{3}{4}}{\pm \frac{3}{8}} \]

\[ 2\frac{1}{16} \]

\[ \frac{92CM-7842}{\text{OF BULB WILL NOT DEVIATE MORE THAN } 2^\circ \text{ IN ANY DIRECTION FROM PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE}} \]

JUNE 1, 1953
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CE-7842
Typical Characteristics

$E_C = 6.3$ Volts

Grid $- N \# 3$ Volts Adjusted for Focus

Post-Ultron Volts = 2 x Ultron Volts

Relative Line Brightness

Ultor Volts

FEB. 11, 1953

Tube Department
Radio Corporation of America, Harrison, New Jersey

92CM-6820R1
CHARACTERISTICS

$E_F = 6.3\ \text{VOLTS}$

GRID-N°3 VOLTS ADJUSTED FOR FOCUS

POST-ULTOR (GRID N° 5 & COLLECTOR) VOLTS

GREATER THAN ULTOR (GRIDS N° 2 & N° 4) VOLTS

GRID-N°1 VOLTS = 0

--- MAX. TOTAL CURRENT FOR ANY TUBE

--- TYPICAL FLUORESCENT-SCREEN (POST-ULTOR) CURRENT

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FEB. 3, 1953

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7910
### AVERAGE CHARACTERISTICS

\[ E_{f} = 6.3 \text{ VOLTS} \]
GRID-N\#3 VOLTS ADJUSTED FOR FOCUS

<table>
<thead>
<tr>
<th>CURVE</th>
<th>ELECTRODE CURRENT</th>
<th>ULTOR VOLTS</th>
<th>POST-ULTOR VOLTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>ULTOR</td>
<td>2000</td>
<td>4000</td>
</tr>
<tr>
<td>B</td>
<td>ULTOR</td>
<td>1500</td>
<td>3000</td>
</tr>
<tr>
<td>C</td>
<td>POST-ULTOR</td>
<td>2000</td>
<td>4000</td>
</tr>
<tr>
<td>D</td>
<td>POST-ULTOR</td>
<td>1500</td>
<td>3000</td>
</tr>
</tbody>
</table>

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**POST-ULTOR (GRID N\#5 & COLLECTOR) MICROAMPERES**

**ULTOR (GRIDS N\#2 & 4) MICROAMPERES**

**GRID-N\#1 VOLTS**

FEB. 4, 1953
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92CM-7911
### 5ABP4 Oscillograph Tube

**POST-DEFLECTION ACCELERATOR**

<table>
<thead>
<tr>
<th>ELECTROSTATIC FOCUS</th>
<th>ELECTROSTATIC DEFLECTION</th>
</tr>
</thead>
</table>

The 5ABP4 is the same as the 5ABP1 except for the following items:

**General:**
- Phosphor (For curves, see front of this section). P4—Sulfide Type
- Fluorescence: White
- Phosphorescence: White
- Persistence: Short

**THE PERSISTENCE CHARACTERISTICS**

of the P4-sulfide phosphor are the same as those shown for the P11 phosphor at the front of this Section

### 5ABP7 Oscillograph Tube

**POST-DEFLECTION ACCELERATOR**

<table>
<thead>
<tr>
<th>ELECTROSTATIC FOCUS</th>
<th>ELECTROSTATIC DEFLECTION</th>
</tr>
</thead>
</table>

The 5ABP7 is the same as the 5ABP1 except for the following items:

**General:**
- Phosphor (For Curves, see front of this Section). P7
- Fluorescence: Blue
- Persistence: Short
- Phosphorescence: Greenish-Yellow
- Persistence: Long

### 5ABP11 Oscillograph Tube

**POST-DEFLECTION ACCELERATOR**

<table>
<thead>
<tr>
<th>ELECTROSTATIC FOCUS</th>
<th>ELECTROSTATIC DEFLECTION</th>
</tr>
</thead>
</table>

The 5ABP11 is the same as the 5ABP1 except for the following items:

**General:**
- Phosphor (For Curves, see front of this Section). P11
- Fluorescence: Blue
- Phosphorescence: Blue
- Persistence: Short

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**NOV. 1, 1955**

**TUBE DIVISION**

**RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY**