## 7183

**DISPLAY STORAGE TUBE**

**DIRECT-VIEW TYPE**

**4"-DIAMETER DISPLAY**

### DATA

#### General:

<table>
<thead>
<tr>
<th>Writing Section</th>
<th>Viewing Section</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heater, for Unipotential</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Cathode:</strong></td>
<td></td>
</tr>
<tr>
<td>Voltage (AC or DC)</td>
<td>6.3 ± 10%</td>
</tr>
<tr>
<td>Current</td>
<td>0.6</td>
</tr>
<tr>
<td><strong>Minimum Cathode Heating</strong></td>
<td></td>
</tr>
<tr>
<td>Time before other electrode voltages are applied</td>
<td>–</td>
</tr>
<tr>
<td><strong>Direct Interelectrode Capacitances</strong></td>
<td></td>
</tr>
<tr>
<td>(Approx.):°</td>
<td></td>
</tr>
<tr>
<td>Grid No.1 to all other tube electrodes</td>
<td>7</td>
</tr>
<tr>
<td>Cathode to all other tube electrodes</td>
<td>5</td>
</tr>
<tr>
<td>Backplate to all other tube electrodes</td>
<td>–</td>
</tr>
<tr>
<td><strong>Focusing Method:</strong></td>
<td>Electrostatic</td>
</tr>
<tr>
<td><strong>Deflection Method:</strong></td>
<td>Magnetic</td>
</tr>
<tr>
<td><strong>Deflection Angle:</strong></td>
<td>–</td>
</tr>
<tr>
<td><strong>Phosphor:</strong></td>
<td>–</td>
</tr>
<tr>
<td><strong>Fluorescence:</strong></td>
<td>–</td>
</tr>
<tr>
<td><strong>Phosphorescence:</strong></td>
<td>–</td>
</tr>
<tr>
<td><strong>Minimum Useful Screen Diameter:</strong></td>
<td>4&quot;</td>
</tr>
<tr>
<td><strong>Maximum Overall Length:</strong></td>
<td>11.62&quot;</td>
</tr>
<tr>
<td><strong>Seated Length:</strong></td>
<td>11.16&quot; ± 0.10&quot;</td>
</tr>
<tr>
<td><strong>Maximum Tube Radius:</strong></td>
<td>3.00&quot;</td>
</tr>
<tr>
<td><strong>Maximum Tube Diameter:</strong></td>
<td>5.19&quot;</td>
</tr>
<tr>
<td><strong>Greatest Bulb Diameter:</strong></td>
<td>5.00&quot; ± 0.06&quot;</td>
</tr>
<tr>
<td><strong>Ambient-Temperature Range:</strong></td>
<td>–65° to +100° C</td>
</tr>
<tr>
<td><strong>Operating Position:</strong></td>
<td>Any</td>
</tr>
<tr>
<td><strong>Weight (Approx.)</strong></td>
<td>1-3/4 lbs</td>
</tr>
</tbody>
</table>

### Terminal Connectors

- See Operating Considerations

**Bulb Terminals:**
- Caps (Three): Recessed Small Cavity (JETEC No. J1-21)
- Flexible leads (Two): See Dimensional Outline

### Base:
- Writing gun: Small-Button Neoditeterar 8-Pin (JETEC No. EB-49)
- Viewing gun: Small-Button Miniature 7-Pin (JETEC No. E7-1)

°: See next page

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9-58

**ELECTRON TUBE DIVISION**

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

**TENTATIVE DATA 1**
DISPLAY STORAGE TUBE

SOLID-LINE CIRCLES DEPICT
MINIATURE 7-PIN BASE
BROKEN-LINE CIRCLES DEPICT
NEODITETRAR 8-PIN BASE

WRITING SECTION
Small-Button Neoditetrar 8-Pin Base

Pin 1 - Grid No. 1
Pin 2 - Heater
Pin 3 - Heater
Pin 4 - Internal Connection —
Connection —
Do Not Use
Do Not Use
Pin 5 - Cathode
Pin 6 - Internal Connection —
Do Not Use
Pin 7 - No Connection
Pin 8 - Grid No. 3

VIEWING SECTION
Small-Button Miniature 7-Pin Base

Pin 1 - Grid No. 2 Flexible Lead (Large) - Screen
Flexible Lead (Small) - Backplate
Pin 3 - Heater Recessed Cavity Cap:
Pin 4 - Heater Located 1-1/4" from Tube Face - Grid No. 5
Located 3" from Tube Face - Grid No. 4
Pin 5 - Internal Connection —
Located Near Viewing Gun - Grid No. 3,
Do Not Use Grids No. 4
Do Not Use & No. 2 of Writing Gun
Pin 6 - No Connection
Pin 7 - Cathode

Maximum Ratings, Absolute Values:

<table>
<thead>
<tr>
<th>Writing Section</th>
<th>Viewing Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCREEN VOLTAGE</td>
<td>10000 max.**</td>
</tr>
<tr>
<td>PEAK BACKPLATE VOLTAGE</td>
<td>30 max.**</td>
</tr>
</tbody>
</table>
**DISPLAY STORAGE TUBE**

<table>
<thead>
<tr>
<th>Writing Section</th>
<th>Viewing Section</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Equivalent Values</td>
</tr>
<tr>
<td>GRID-No.5</td>
<td>VOLTAGE. . . .</td>
</tr>
<tr>
<td></td>
<td>-</td>
</tr>
<tr>
<td>GRID-No.4</td>
<td>VOLTAGE. . .</td>
</tr>
<tr>
<td></td>
<td>2900 max.**</td>
</tr>
<tr>
<td>GRID-No.3</td>
<td>VOLTAGE. . .</td>
</tr>
<tr>
<td></td>
<td>1200 max.</td>
</tr>
<tr>
<td>GRID-No.2</td>
<td>VOLTAGE. . .</td>
</tr>
<tr>
<td>CATHODE VOLTAGE.</td>
<td>VOLTAGE. . .</td>
</tr>
<tr>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>-2750 max.**</td>
</tr>
</tbody>
</table>

**VOLTAGE:**
- Negative-bias value... 200 max.* 100 max.** volts
- Positive-bias value... 0 max.* 0 max.** volts
- Positive-peak value... 2 max.* 0 max.** volts

**PEAK HEATER-CATHODE VOLTAGE:**
- Heater negative with respect to cathode... 125 max.* 125 max.** volts
- Heater positive with respect to cathode... 125 max.* 125 max.** volts

**VIEWING SECTION**

Operating Values and Typical Performance Characteristics:
To prevent possible damage to the tube, allow the viewing-gun beam current to reach normal operating value before turning on the writing-gun beam current, and keep the viewing beam on till the writing beam is turned off.

<table>
<thead>
<tr>
<th>Screen Voltage</th>
<th>DC Backplate Voltage</th>
<th>Grid-No.5 Voltage</th>
<th>Grid-No.4 Voltage</th>
<th>Grid-No.3 Voltage</th>
<th>Grid-No.2 Voltage</th>
<th>Grid-No.1 Voltage</th>
<th>Maximum Screen Current</th>
<th>Maximum Peak Backplate Current</th>
<th>Maximum Grid-No.5 Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>8500 volts</td>
<td>0 volts</td>
<td>220 to 250 volts</td>
<td>40 to 100 volts</td>
<td>10 to 40 volts*</td>
<td>100 volts</td>
<td>0 to -75 volts</td>
<td>0.6 ma</td>
<td>2 ma</td>
<td>2.4 ma</td>
</tr>
</tbody>
</table>

See next page.
DISPLAY STORAGE TUBE

Maximum Grid-No.4 Current ........................................... 0.3 ma
Maximum Grid-No.3 Current ........................................... 0.5 ma
Maximum Grid-No.2 Current ........................................... 0.08 ma
Maximum Cathode Current .................................................. 4 ma
Number of Half-Tone Steps .................................................. 5
Viewing Duration .......................................................... 20 sec
Maximum Erasing-Uniformity Factor:
For 4"-diameter area (A4) .................................................. 0.65
For the 3.5"-diameter portion (A3.5)
centered on A4 .......................................................... 0.50
Resolution .............................................................. 50 lines/in.
Brightness .............................................................. 1500 f1

WRITING SECTION

Operating Values:

<table>
<thead>
<tr>
<th>Equivalent Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grid-No.4 Voltage ▲ ▲ ........................................... 2510 to 2540*</td>
</tr>
<tr>
<td>Grid-No.3 Voltage for focus ........................................... 425 to 925*</td>
</tr>
<tr>
<td>Grid-No.2 Voltage ▲ ▲ ........................................... 2510 to 2540*</td>
</tr>
<tr>
<td>Maximum Grid-No.1 Voltage for cutoff .................................. —</td>
</tr>
<tr>
<td>of undeflected focused spot ........................................... —</td>
</tr>
<tr>
<td>Cathode Voltage .......................................................... —</td>
</tr>
<tr>
<td>Maximum Grid-No.3 Current ........................................... —15 to +10</td>
</tr>
<tr>
<td>Maximum Peak Cathode Current ........................................... 4.5</td>
</tr>
</tbody>
</table>

VIEWING SECTION AND WRITING SECTION

Maximum and Minimum Circuit Values:

<table>
<thead>
<tr>
<th>Circuit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grid-No.1-Circuit Resistance (Either gun) ................................ 1 max.</td>
<td>megohm</td>
</tr>
<tr>
<td>Series Current-Limiting Resistor (Unbypassed) in Grid-No.5 (Viewing-Section) Circuit ................................... 0.005 min.</td>
<td>megohm</td>
</tr>
<tr>
<td>Backplate-Circuit Resistance ........................................... 0.006 max.</td>
<td>megohm</td>
</tr>
<tr>
<td>Series Current-Limiting Resistance in Screen Circuit ................................... 1 min.</td>
<td>megohm</td>
</tr>
</tbody>
</table>

Without external shield.

* See accompanying drawing C8-0578 showing angles of deflection.

▲ Grids No.1 & No.2 of Writing Gun are connected together and to grid No.3 of Viewing Gun within the tube.

** Voltages are shown with respect to cathode of Viewing Gun.

* Voltages are shown with respect to cathode of Writing Gun.

Adjusted for brightest, most uniform pattern.

For conditions with combined adjustment of grid-No.1 voltage, grid-No.2 voltage, grid-No.3 voltage, and grid-No.4 voltage to give brightest, most uniform pattern. After final adjustment, the grid-No.1 voltage should not be more positive than — 20 volts to maintain electrode current within the maximum value indicated.

Observed with an RCA-2F21 Monoscope display.

Expressed in terms of the time required for the brightness of the unwritten background to rise from just zero brightness (viewing-beam cutoff) to 10% of saturated brightness.

See next page.
DISPLAY STORAGE TUBE

Determined as follows: With no erasing pulse, overscan the storage surface with writing beam to obtain maximum pattern brightness. Then cut off writing beam and adjust erasing pulse to obtain complete erasure in approximately 10 seconds. Measure time \(t_1\) from start of erasing to the instant at which any area within the \(4\) inch diameter portion is reduced to background-brightness level, and time \(t_2\) from start of erasing to the instant at which the entire area within the \(4\) inch diameter area (or the \(3.5\) inch diameter portion) is reduced to background-brightness level. The erasing-uniformity factor is defined as \(\frac{(t_2-t_1)}{t_2}\).

- Measured by shrinking-raster method at a display brightness of 50 per cent of saturated brightness and with grids No. 2 & No. 4 of Writing Gun at about +2500 volts with respect to cathode of Writing Gun.
- Measured with entire storage grid written to produce saturated brightness and with screen at indicated voltage.
- The cathode of the Writing Gun is operated at about −2500 volts with respect to the cathode of the Viewing Gun which is usually operated at ground potential.

OPERATING CONSIDERATIONS

Support and shielding for the 7183 may be provided by a shield made of properly annealed high-permeability material. The screen lead and the backplate lead should be placed outside the shield.

Terminal Connectors. The base pins of the Neoditetrarr 8-pin base on the Writing-Gun neck fit the Ditecra 8-contact connector, such as Cinch No.54A18088, or equivalent. The base pins of the Small-Button Miniature 7-pin base on the Viewing-Gun neck fit the Miniature 7-contact socket. The recessed cavity caps require standard flexible-lead connectors as used for television picture tubes.

To prevent possible damage to the tube, allow the viewing-gun beam current to reach normal operating value before turning on the writing-gun beam current, and keep the viewing beam on till the writing beam is turned off.
NOTE A: CENTERING OF THE WRITING BEAM ON THE STORAGE SURFACE IS NECESSARY FOR A CENTERED PPI DISPLAY. THE BEAM IS CENTERED BY SHIFTING IT FROM THE WRITING-GUN AXIS THROUGH AN ANGLE OF 11° WITH A CENTERING MAGNET WHOSE EFFECTIVE CENTER (A) IS LOCATED 1.3" FROM REFERENCE LINE.

NOTE B: WITH ROTATING YOKE WHOSE EFFECTIVE CENTER OF DEFLECTION (B) IS LOCATED 0.5" FROM REFERENCE LINE, THE CENTERED WRITING BEAM (NOTE A) MUST BE DEFLECTED THROUGH AN ANGLE OF 32° TO SWEEP FULLY THE STORAGE SURFACE.

NOTE C: WITH STATIONARY TV-TYPE YOKE WHOSE EFFECTIVE CENTER OF DEFLECTION (C) IS LOCATED 0.8" FROM REFERENCE LINE, THE CENTERED WRITING BEAM MUST BE DEFLECTED THROUGH AN ANGLE OF 32° TO SWEEP FULLY THE STORAGE SURFACE.

NOTE D: WHEN ROTATING YOKE IS USED WITH UNCENTERED DISPLAY, i.e., THE WRITING BEAM IS NOT CENTERED (NOTE A) BUT STRIKES THE STORAGE SURFACE ON THE WRITING-GUN AXIS, AND WITH THE EFFECTIVE CENTER OF DEFLECTION OF THE ROTATING YOKE LOCATED 0.5" FROM THE REFERENCE LINE, THE UNCENTERED WRITING BEAM MUST BE DEFLECTED THROUGH AN ANGLE OF 56° TO SWEEP FULLY THE STORAGE SURFACE.
DISPLAY STORAGE TUBE

ENCAPSULATED JUNCTION
0.000'-0.062'
2.50" MIN.

RECESSED SMALL CAVITY CAPS
JETEC NO. JI-21

SCREEN LARGE-DIAMETER INSULATED FLEXIBLE LEAD
7.25" MAX.

BACKPLATE SMALL-DIAMETER INSULATED FLEXIBLE LEAD
1.25" MAX.

EXHAUST-TIP COVER

VIEWING-GUN NECK

SMALL-BUTTON MINIATURE 7-PIN BASE
JETEC NO. E7-1

WRITING-GUN NECK

SMALL-BUTTON NEOBLEMTR 8-PIN BASE
JETEC NO. EB-49

*AT REFERENCE LINE
NOTE 1: WITHIN THIS DISTANCE, NECK DIAMETER IS .920" MAX.
NOTE 2: WITHIN THIS DISTANCE, NECK DIAMETER IS .950" MAX.

ENLARGED BOTTOM VIEWS OF BASES

92CM-9580
**TYPICAL CHARACTERISTIC**

**VIEWING SECTION**
- $E_f = 6.3$ VOLTS
- BACKPLATE VOLTS $^\star = 0$
- GRID-$\# 4$ VOLTS $^\star$
- GRID-$\# 5$ VOLTS $^\star = 250$
- GRID-$\# 2$ VOLTS $^\star = 100$
- ADJUSTED FOR BRIGHTEST, MOST UNIFORM DISPLAY.
- *REFERRED TO CATHODE OF VIEWING GUN.*

**WRITING SECTION**
- NORMAL OPERATION

**TYPICAL STORAGE-GRID CHARACTERISTIC**

**VIEWING SECTION**
- $E_f = 6.3$ VOLTS,
- SCREEN VOLTS $^\star = 8.500$
- BACKPLATE VOLTS $^\star = 0$
- GRID-$\# 5$ VOLTS $^\star = 250$
- ADJUSTED FOR BEST COLLIMATION.
- *REFERRED TO CATHODE OF VIEWING GUN.*

**WRITING SECTION**
- NORMAL OPERATION

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**92CS-9553**

**92CS-9554**
TYPICAL ERASURE CHARACTERISTICS

VIEWING SECTION

E_f = 6.3 VOLTS
SCREEN VOLTS *= 8500
BACKPLATE VOLTS *= 0
GRID-N°5 VOLTS *= 250

GRID-N°4 VOLTS { ADJUSTED
GRID-N°3 VOLTS { FOR BEST
GRID-N°1 VOLTS } COLLIMATION
GRID-N°2 VOLTS *= 100

* REFERRED TO CATHODE OF VIEWING GUN.

ERASING CONDITIONS

PULSE SHAPE: RECTANGULAR
PULSE DURATION: 10 μSEC. APPROX.
PULSE REPETITION FREQUENCY:
CURVES: 2000 PPS
CURVE: 500 PPS

RELATIVE BRIGHNESS — PER CENT
OF SATURATED BRIGHNESS

TIME AFTER WRITING TO SATURATED BRIGHNESS — SECONDS

ERASING-PULSE AMPLITUDE, VOLTS = 7.5

2.5

5

10

12

12

92CM-9555

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY