### DATA

**General:**

<table>
<thead>
<tr>
<th>Writing Gun</th>
<th>Reading Gun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage (AC or DC)</td>
<td>6.3 ± 10%</td>
</tr>
<tr>
<td>Current</td>
<td>0.6</td>
</tr>
</tbody>
</table>

**Direct Interelectrode Capacitances:**
- Grid No.1 to all other electrodes: 9 µµf
- Cathode to all other electrodes: 5.5 µµf
- Backing-electrode to shading-electrode: 10.5 µµf
- Backing-electrode to all other electrodes (Effective output capacitance): 40 min.
- 7 µµf

**Focusing Method:** Electrostatic Electrostatic

**Deflection Method:** Magnetic Magnetic

**Deflection Angle (Approx.):** 40° 40°

**Overall Length:** 18-3/4" ± 3/8"

**Greatest Diameter:** 2.320" ± 0.010"

**Minimum Useful Target Diameter:** 1.3"

**Operating Position:** Any except those positions where the Diheptal base is up and the tube axis is at an angle of less than 60° from the vertical.

**Weight (Approx.):** 1 lb

**Bases:**
- Writing section: Long Medium-Shell Octal 8-Pin (JETEC No.B8-65)
- Reading section: Small-Shell Diheptal 14-Pin (JETEC No.B14-45)

**Socket Connections:**

**WRITING SECTION — Octal Base**
- Pin 1—Heater
- Pin 2—Grid No.1
- Pin 3—No Connection
- Pin 4—Grid No.3
- Pin 5—No Connection
- Pin 6—Grid No.2
- Pin 7—Cathode
- Pin 8—Heater
- G₄w, C—Grid No.4, External
- Conductive Coating
READING SECTION — Diheptal Base
Pin 1—Heater
Pin 2—No Connection
Pin 3—Cathode
Pin 4—Internal Connection—
Do Not Use
Pin 5—No Connection
Pin 6—No Connection
Pin 7—Grid No.1
Pin 8—Grid No.3
Pin 9—No Connection
Pin 10—Internal Connection—
Do Not Use
Pin 11—Grid No.2
Pin 12—No Connection
Pin 13—No Connection
Pin 14—Heater
G₄R, CL₉, C—Grid No.4, Collector, External Conductive Coating
SJ—Backing-Electrode (Center flange)
SHJ—Shading-Electrode (Conductive L-shaped strip adjacent to center flange)
Basing Diagram:
With each base viewed from its respective end of tube:

SOLID-LINE CIRCLES DEPICT OCTAL BASE
BROKEN-LINE CIRCLES DEPICT DIHEPTAL BASE

Maximum Ratings, Absolute Values:
BACKING-ELECTRODE-TO-SHADING-ELECTRODE VOLTAGE:
Backing-electrode positive with respect to shading-electrode........ 0 max. volts
Backing-electrode negative with respect to shading-electrode........ 37.5 max. volts
BACKING-ELECTRODE-TO-GRID-No.4 (Either gun) VOLTAGE:
Backing-electrode positive with respect to grid No.4........ 0 max. volts
Backing-electrode negative with respect to grid No.4............... 12.5 max. volts
SHADING-ELECTRODE-TO-GRID-No.4 (Either gun) VOLTAGE:
Shading-electrode positive with respect to grid No.4. .... 25 max. volts
Shading-electrode negative with respect to grid No.4. ...... 0 max. volts

Writing Gun Reading Gun

Voltages are referred to cathode of respective gun unless otherwise indicated

GRID-No.4 VOLTAGE ........ 13000 max. 1500 max. volts
GRID-No.4-TO-GRID-No.2 VOLTAGE 10000 max. - volts
GRID-No.3 VOLTAGE ........ 3000 max. 400 max. volts
GRID-No.2 VOLTAGE ........ 450 max. 1500 max. volts
GRID-No.1 VOLTAGE:
Negative bias value ...... \{180 max. 125 max. volts
PEAK HEATER-CATHODE VOLTAGE:
Heater negative with respect to cathode. .... 100 max. 100 max. volts
Heater positive with respect to cathode. .... 10 max. 10 max. volts

Typical Operation and Characteristics:

With grid No.4 of Writing Gun and grid No.4 of Reading Gun grounded

Back-Grid Electrode-to-Grid-No.4 (Either gun) Voltage ........ -10 volts
Shading-Electrode-to-Grid-No.4 (Either gun) Voltage ........ +20 volts

Writing Gun Reading Gun

Voltages are referred to ground unless otherwise indicated

Grid-No.4 Voltage* .... 0 0 volts
Grid-No.3 Voltage for focus. -7800 to -7000 -800 to -700 volts
Grid-No.2 Voltage .... -8750 0 volts
Grid-No.1-to-Cathode Volt-
age for beam-current cutoff .... -70 to -120 -25 to -65 volts
Cathode Voltage .... -9000 -1000 volts
Grid-No.1 Drive above Cutoff:
For target current** of 5 \( \mu A \):
Average value .... 38 - volts
Maximum value .... 56 - volts
For target current of 1 \( \mu A \)##:
Average value .... - 5 volts
Maximum value .... - 12.5 volts

*,,**,##,##: see next page.
### Writing Gun | Reading Gun
--- | ---
Max. Grid-No.3 Current: 230 | μa
For target current of 1 μa | 15 μa
Max. Cathode Current: 235 | μa
For target current of 1 μa | 16 μa
Beam-Landing Position |
Storage Factor for essentially saturated writing | 2.5 μa-sec
Storage-Factor Variation: 25 | %
Circular | 25 |
Radial | %

### Maximum Circuit Values:

**Grid-No.1-Circuit**

<table>
<thead>
<tr>
<th>Writing Gun</th>
<th>Reading Gun</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 max.</td>
<td>1.5 max. meghohms</td>
</tr>
</tbody>
</table>

---

1. Grid No.4 of Writing Gun and grid No.4 of Reading Gun are normally operated at zero (ground) potential.
2. Measured with backing-electrode voltage and shading-electrode voltage of 75 volts with respect to grid No.4 of either gun. With either the writing beam or the reading beam turned on, the total current flowing in the paralleled backing-electrode circuit and shading-electrode circuit is approximately equal to the beam current and is called the target current. This current is not signal current.*
3. This value represents peak writing-beam current necessary to write to saturation a range calibration ring at approximately 20% maximum range in a particular PPI radar application as follows:
   - Maximum range: 80,000 yards
   - Pulse-repetition frequency: 60 cps
   - Antenna-rotation rate: 15 rpm
   - Pulse width: 10 μsec
4. In general, the value of peak writing-beam current necessary for saturated writing increases with increasing antenna-rotation rate and decreases with increasing pulse-repetition frequency, maximum range, and pulse width.
5. This value represents the average reading-beam current for reading durations in the order of 2.5 seconds.
6. With the tube shielded from all extraneous fields and all metal parts of the tube demagnetized, the undeflected focused beam will fall within a circle having a diameter equal to 3% of the minimum useful target diameter and having its center coincident with the center of the target.*
7. With the tube shielded from all extraneous fields and all metal parts of the tube demagnetized, the undeflected focused beam will fall within a circle having a diameter equal to 3% of the minimum useful target diameter and having its center coincident with the center of the target.*
8. Storage factor is defined as the product of the initial value of the peak amplitude of the signal output current (above background or equilibrium level) and the time required for the peak amplitude of the signal output current to drop to 50% of its initial value.

---

* See next page.
On a circle having its center coincident with the center of the target and a radius which is 75% of the target radius, under conditions of saturated writing for any given set of reading conditions.

From the center of the target to a circle having its center coincident with the center of the target and a radius which is 75% of the target radius, under conditions of saturated writing for any given set of reading conditions.

OPERATING CONSIDERATIONS

Shielding. Magnetic shielding of the entire tube must be provided to prevent the influence of external magnetic fields on its performance. Use of a properly annealed high-permeability material for shielding is recommended. It is also recommended that the base end of the reading gun be electrostatically shielded to reduce interference with the sensitive reading beam.

NOTE 2: THE CIRCUMFERENCE OF THE BACKING-ELECTRODE FLANGE WILL FALL WITHIN A 2.165" ± 0.010" DIAMETER CIRCLE CONCENTRIC WITH THE AXIS OF THE WRITING-GUN HOLDER.

Notes 3 to 6: see next page.
NOTE 3: THE CIRCUMFERENCE OF EITHER RIM OF THE READING-GUN HOLDER WILL FALL WITHIN A 2.320" ± 0.010" DIAMETER CIRCLE CONCENTRIC WITH THE AXIS OF THE WRITING-GUN HOLDER.

NOTE 4: THE AXIS OF EITHER THE OCTAL OR DIHEPTAL BASE WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE AXIS OF THE TUBE ENVELOPE.

NOTE 5: WITHIN THIS DIMENSION, THERE WILL BE NO GLASS AT ANY POINT ON THE WRITING-GUN SIDE OF FLANGE.

AVERAGE GRID-N°1-DRIVE CHARACTERISTIC
WRITING GUN

$E_c = 6.3$ VOLTS—WRITING GUN
BACKING-ELECTRODE-TO-GRID-N°4 VOLTS = -10
SHADING-ELECTRODE-TO-GRID-N°4 VOLTS = +20

<table>
<thead>
<tr>
<th>Grid-N°4 Volts to Ground</th>
<th>Writing Gun</th>
<th>Reading Gun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grid-N°3 Volts</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Grid-N°2 Volts to Ground</td>
<td>-8750</td>
<td>0</td>
</tr>
<tr>
<td>Grid-N°1 Volts</td>
<td>Adjusted</td>
<td>0</td>
</tr>
<tr>
<td>Cathode Volts to Ground</td>
<td>-9000</td>
<td>0</td>
</tr>
</tbody>
</table>
**E_x = 6.3 VOLTS—READING GUN**
**BACKING-ELECTRODE-TO-GRID—N°4 VOLTS = -10**
**SHADING-ELECTRODE-TO-GRID—N°4 VOLTS = +20**

<table>
<thead>
<tr>
<th>Writing Gun</th>
<th>Reading Gun</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRID—N°4 VOLTS TO GROUND</td>
<td>0</td>
</tr>
<tr>
<td>GRID—N°3 VOLTS</td>
<td>0</td>
</tr>
<tr>
<td>GRID—N°2 VOLTS TO GROUND</td>
<td>0</td>
</tr>
<tr>
<td>GRID—N°1 VOLTS</td>
<td>0</td>
</tr>
<tr>
<td>CATHODE VOLTS TO GROUND</td>
<td>0</td>
</tr>
</tbody>
</table>

**TARGET MICROAMPERES**

<table>
<thead>
<tr>
<th>0</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>14</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>16</td>
</tr>
</tbody>
</table>

**READING-GUN GRID-N°1 SIGNAL VOLTS FROM BEAM-CURRENT CUTOFF**

**ELECTRON TUBE DIVISION**
**RADIO CORPORATION OF AMERICA, HARRISBRO, NEW JERSEY**

92CM-9404
**MAXIMUM CATHODE CURRENT**

**WRITING GUN**

- $E_c = 6.3$ VOLTS—WRITING GUN
- BACKING ELECTRODE TO GRID $= -10$ VOLTS
- SHADING ELECTRODE TO GRID $= +20$ VOLTS

<table>
<thead>
<tr>
<th>GRID—$#4$ VOLTS TO CATHODE</th>
<th>Writing Gun</th>
<th>Reading Gun</th>
</tr>
</thead>
<tbody>
<tr>
<td>10000</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1700</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>VARIED</td>
<td>AS SHOWN</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

**GRID—$\#1$ VOLTS TO CATHODE**

- 0

---

**GRAPHIC**

- **WRITE-GUN** MAXIMUM CATHODE MILLIAMPERES vs. **WRITING-GUN GRID—$\#2$ VOLTS**

---

**ELECTRON TUBE DIVISION**

**RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY**
**MAXIMUM CATHODE CURRENT**

**READING GUN**

<table>
<thead>
<tr>
<th>Grid Voltage</th>
<th>Writing Gun</th>
<th>Reading Gun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grid-#4</td>
<td>0</td>
<td>VARIED</td>
</tr>
<tr>
<td>Grid-#3</td>
<td>0</td>
<td>AS SHOWN</td>
</tr>
<tr>
<td>Grid-#2</td>
<td>0</td>
<td>300</td>
</tr>
<tr>
<td>Grid-#1</td>
<td>0</td>
<td>AS SHOWN</td>
</tr>
<tr>
<td>Grid-#4</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Graph**

- **Vertical Axis:** Reading-Gun Maximum Cathode Milliamperes
- **Horizontal Axis:** Reading-Gun Grids-\#2 & \#4 Volts

**Note:** The graph shows the relationship between grid voltage and cathode current for the specified grid voltages.
OPERATION CHARACTERISTICS

$E_c = 6.3$ VOLTS—EACH GUN
BACKING—ELECTRODE—TO—GRID—N°4 VOLTS = -10
SHADING—ELECTRODE—TO—GRID—N°4 VOLTS = +20

<table>
<thead>
<tr>
<th>Writing Gun</th>
<th>Reading Gun</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRID—N°4 VOLTS TO GROUND</td>
<td>ADJUSTED FOR FOCUS</td>
</tr>
<tr>
<td>GRID—N°3 VOLTS</td>
<td>ADJUSTED FOR FOCUS</td>
</tr>
<tr>
<td>GRID—N°2 VOLTS TO GROUND</td>
<td>-8750</td>
</tr>
<tr>
<td>GRID—N°1 VOLTS</td>
<td>ADJUSTED TO GIVE TO CUTOFF</td>
</tr>
<tr>
<td>CATHODE VOLTS TO GROUND</td>
<td>-9000</td>
</tr>
<tr>
<td>TARGET MICROAMPERES</td>
<td>0.5</td>
</tr>
<tr>
<td>SCANNING RATE (REV/SEC)</td>
<td>0</td>
</tr>
<tr>
<td>SWEEP PRF (PPS)</td>
<td>1000</td>
</tr>
<tr>
<td>SWEEP TIME (USEC/RADIUS)</td>
<td>100</td>
</tr>
<tr>
<td>INPUT SIGNAL, RECTANGULAR PULSE DURATION (USEC)</td>
<td>1</td>
</tr>
<tr>
<td>REPETITION RATE (PPS)</td>
<td>1000</td>
</tr>
<tr>
<td>NUMBER OF PULSES</td>
<td>AS SHOWN</td>
</tr>
</tbody>
</table>

OUTPUT SIGNAL MICROAMPERES

WRITING—GUN GRID—N°1 PEAK PULSE VOLTS FROM BEAM—CURRENT CUTOFF
**OPERATION CHARACTERISTICS**

- **Writing Gun**
  - $E_f = 6.3$ VOLTS
  - BACKING - ELECTRODE - TO - GRID - No. 4 VOLTS = -10
  - SHADING - ELECTRODE - TO - GRID - No. 4 VOLTS = +20
  - GRID - No. 4 VOLTS TO GROUND = 0
  - GRID - No. 3 VOLTS = ADJUSTED
  - GRID - No. 2 VOLTS TO GROUND = -8750
  - GRID - No. 1 VOLTS = ADJUSTED
  - CATHODE VOLTS TO GROUND = -9000
  - GRID - No. 1 PEAK PULSE VOLTS FROM BEAM - CURRENT CUTOFF = 12.5
  - SCANNING: PPI TV
  - RATE (REV/SEC) = 0
  - SWEEP PWF (PPS) = 10000
  - SWEEP TIME (USEC/RADIUS) = 100
  - INPUT SIGNAL, RECTANGULAR PULSE: DURATION (USEC) = -
  - REPETITION RATE (PPS) = 1000
  - NUMBER OF PULSES = AS SHOWN

- **Reading Gun**
  - $E_f = 0$
  - BACKING - ELECTRODE - TO - GRID - No. 4 VOLTS = 0
  - SHADING - ELECTRODE - TO - GRID - No. 4 VOLTS = 0
  - GRID - No. 4 VOLTS TO GROUND = 0
  - GRID - No. 3 VOLTS = ADJUSTED
  - GRID - No. 2 VOLTS TO GROUND = 0
  - GRID - No. 1 VOLTS = ADJUSTED
  - CATHODE VOLTS TO GROUND = -10000
  - GRID - No. 1 PEAK PULSE VOLTS FROM BEAM - CURRENT CUTOFF = -
  - SCANNING: PPI TV
  - RATE (REV/SEC) = 0
  - SWEEP PWF (PPS) = -
  - SWEEP TIME (USEC/RADIUS) = -
  - INPUT SIGNAL, RECTANGULAR PULSE: DURATION (USEC) = -
  - REPETITION RATE (PPS) = -
  - NUMBER OF PULSES = -
OPERATION CHARACTERISTICS

E_f = 6.3 VOLTS—EACH GUN
BACKING—ELECTRODE—TO—GRID-N®4 VOLTS = -10
SHADING—ELECTRODE—TO—GRID-N®4 VOLTS = +20

<table>
<thead>
<tr>
<th>Writing Gun</th>
<th>Reading Gun</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRID-N®4 VOLTS TO GROUND</td>
<td>0</td>
</tr>
<tr>
<td>GRID-N®3 VOLTS</td>
<td>ADJUSTED FOR FOCUS</td>
</tr>
<tr>
<td>GRID-N®2 VOLTS TO GROUND</td>
<td>-8750</td>
</tr>
<tr>
<td>GRID-N®1 VOLTS</td>
<td>ADJUSTED TO GIVE TO CUTOFF</td>
</tr>
<tr>
<td>CATHODE VOLTS TO GROUND</td>
<td>-9000</td>
</tr>
<tr>
<td>TARGET MICROAMPERES</td>
<td>0</td>
</tr>
<tr>
<td>SCANNING:</td>
<td>PP1</td>
</tr>
<tr>
<td>RATE (REV/SEC),</td>
<td>0</td>
</tr>
<tr>
<td>SWEEP PRF (PPS)</td>
<td>1000</td>
</tr>
<tr>
<td>SWEEP TIME (µSEC/RADIUS)</td>
<td>100</td>
</tr>
<tr>
<td>INPUT SIGNAL, RECTANGULAR PULSE:</td>
<td>1</td>
</tr>
<tr>
<td>DURATION (µSEC)</td>
<td>—</td>
</tr>
<tr>
<td>REPETITION RATE (PPS)</td>
<td>1000</td>
</tr>
<tr>
<td>NUMBER OF PULSES</td>
<td>AS SHOWN</td>
</tr>
</tbody>
</table>

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
E_f = 6.3 VOLTS—EACH GUN
BACKING ELECTRODE TO GRID — N#4 VOLTS = -10
SHADING ELECTRODE TO GRID — N#4 VOLTS = +20

<table>
<thead>
<tr>
<th>Writing Gun</th>
<th>Reading Gun</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRID — N#4 VOLTS TO GROUND</td>
<td>0</td>
</tr>
<tr>
<td>GRID — N#3 VOLTS</td>
<td>ADJUSTED FOR FOCUS</td>
</tr>
<tr>
<td>GRID — N#2 VOLTS TO GROUND</td>
<td>-8750</td>
</tr>
<tr>
<td>GRID — N#1 VOLTS</td>
<td>ADJUSTED VARIOUS TO GIVE TRANSITION TO CUTOFF</td>
</tr>
<tr>
<td>CATHODE VOLTS TO GROUND</td>
<td>-9000</td>
</tr>
<tr>
<td>GRID — N#1 PEAK PULSE VOLTS FROM BEAM CURRENT CUTOFF</td>
<td>12.5</td>
</tr>
<tr>
<td>SCANNING RATE (REV/SEC)</td>
<td>PP</td>
</tr>
<tr>
<td>SWEEP PRF (PPS)</td>
<td>0</td>
</tr>
<tr>
<td>SWEEP TIME (μSEC/RADIUS)</td>
<td>100</td>
</tr>
<tr>
<td>INPUT SIGNAL, RECTANGULAR PULSE</td>
<td>DURATION (μSEC)</td>
</tr>
<tr>
<td>REPETITION RATE (PPS)</td>
<td>1000</td>
</tr>
<tr>
<td>NUMBER OF PULSES</td>
<td>AS SHOWN</td>
</tr>
</tbody>
</table>

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
92CL-9414