National 3BWP1 is a 3-inch oscilloscope tube with flat face, single gun, electrostatic focus and electrostatic symmetrical deflections.

The tube has the following main features.

Very high deflection sensitivity, permitting the use of smaller amplifiers both for the time-base and the signal examination.

High brilliance at small spot dimensions is achieved by high-grade phosphor screen.

As a result of these characteristics, the tube is an outstanding type for measuring equipment with a high standard of accuracy.

**ELECTRICAL DATA**

- **Heater Voltage** \(6.3\) Volts
- **Heater Current at 6.3 Volts** \(0.3 \pm 10\%\) Amperes
- **Focusing Method** Electrostatic
- **Deflection Method** Electrostatic

**Direct Interelectrode Capacitances Approximate**

- Grid No. 1 to all other electrodes \(6.6 \mu\)F
- Cathode to all other electrodes \(4.0 \mu\)F
- \(D_1\) to \(D_2\) \(2.6 \mu\)F

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from JEDEC release #3576, Jan. 29, 1962
D3 to D4 ................................................................. 2.0 μF
D1 to all other electrodes ........................................... 6.0 μF
D2 to all other electrodes ........................................... 6.0 μF
D3 at all other electrodes ......................................... 5.8 μF
D4 to all other electrodes ......................................... 5.8 μF

OPTICAL DATA

Phosphor Number .................................................. P1
Fluorescent Color .................................................. Green
Phosphorescent Color ............................................. Green
Persistence ......................................................... Medium

MECHANICAL DATA

Overall Length ................................................... 11 1/2 ± 1/8 Inches
Greatest Diameter of Bulb ........................................ 3 ± 1/16 Inches
Minimum Useful Screen Diameter .............................. 2 3/4 Inches
Base ................................................................. B 12 — 43

Base Alignment

D3 — D4 trace aligns with pin No. 6 and tube axis ± 10 degrees.
Positive voltage on D1 deflects beam approximately toward pin No. 3.
Positive voltage on D3 deflects beam approximately toward pin No. 12.
Angle between D1 — D2 and D3 — D4 trace .................... 90 ± 1.5 degrees

MAXIMUM RATING

Accelerator Voltage ............................................... 2500 Max. Volts DC
Accelerator Input .................................................. 6 Max. Watts
Grid No. 3 (Focusing Electrode) Voltage ....................... 1000 Max. Volts DC

Grid No. 1 Voltages

Negative-Bias Value ............................................... 200 Max. Volts DC
Positive-Bias Value ................................................ 0 Max. Volts DC
Positive Peak Value ............................................... 2 Max. Volts

Peak Heater-Cathode Voltages

Heater Negative with Respect to Cathode ....................... 180 Max. Volts
Heater Positive with Respect to Cathode ....................... 180 Max. Volts
Peak Voltage between Accelerator and any Deflection Electrode .......................... 500 Max. Volts

TYPICAL OPERATING CONDITIONS

Accelerator Voltage ................................................................................................................. 1500 Volts
Grid No. 3 Voltage (Focusing Voltage) ................................................................. 247 to 397 Volts
Grid No. 1 Voltage (Note 1) .......................................................................................... -40 to -80 Volts
Deflection Factor:

\[ \begin{align*}
D_1 \text{ and } D_2 & \quad \text{62.3 to 75.8 Volts DC per Inch} \\
D_3 \text{ and } D_4 & \quad \text{42.8 to 52.5 Volts DC per Inch} \\
\text{Useful Scan } D_1 - D_2 & \quad \text{2} \frac{1}{2} \text{ Inches} \\
\text{Useful Scan } D_3 - D_4 & \quad \text{2 1/4 Inches} \\
\text{Focusing Electrode Current for any Operating Condition:} & \quad \text{15 to 10 Microamperes} \\
\text{Spot position ( undeflected) (Note 2) } & \quad 3/16 \text{ inches}
\end{align*} \]

For accelerator voltage not shown in the preceding table, the following can be as a guide,

\[ \begin{align*}
\text{Focusing Voltage} & \quad \text{16.5% to 26.5% of Accelerator Voltage} \\
\text{Grid No. 1 Voltage} & \quad \text{2.7% to -5.3% of Accelerator Voltage} \\
\text{Deflection Factor} & \\
D_1 \text{ and } D_2 & \quad \text{41.5 to 50.5 Volts DC per Inch per Kilovolt of Accelerator} \\
D_3 \text{ and } D_4 & \quad \text{28.5 to 30 Volts DC per Inch per Kilovolt of Accelerator}
\end{align*} \]

MAXIMUM CIRCUIT VALUES

Grid No. 1 Circuit Resistance ................................................................................................. 1.5 Max. Megahms
Resistance in any Deflection-Electrode Circuit (Note 3) .................................................. 5 Max. Megahms

Notes:

1. Visual extinction of undeflected focused spot.
2. Connect free deflecting electrode to anode.
3. It is recommended that the deflecting-electrode-circuit resistances are approximately equal.