**Burroughs NIXIE® TUBES**

**MINIATURE SIZE**
Airborne and Mobile Equipment Readouts
Small, Lightweight Instruments

**STANDARD SIZE**
Desk Top Displays and Bench Test Equipment

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**Character Size**
Miniature: 0.3"  
Standard: 0.6"

**Viewing Distance**
Miniature: 14'  
Standard: 30'

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**OUTLINE DRAWINGS**

**PIN CONNECTIONS**

**NUMERICAL**

<table>
<thead>
<tr>
<th>PIN NO.</th>
<th>RECT.</th>
<th>ROUND</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>5</td>
</tr>
</tbody>
</table>

**Notes**

1. The minimum supply voltage should be +170 Vdc, however, the use of the highest voltage available with an appropriate series resistor is recommended to provide: 1) greater tolerance of B+ & Ro; 2) more uniform brightness; 3) more constant current operation.

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**ELECTRICAL DATA**

**MINIATURE (Notes 2 & 3)**

<table>
<thead>
<tr>
<th></th>
<th>B4998*</th>
<th>7977 (B4032)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute Ratings</td>
<td>Long Life</td>
<td>Rectangular</td>
</tr>
<tr>
<td>Ionization Voltage (Max)</td>
<td>170 Vdc</td>
<td>170 Vdc</td>
</tr>
<tr>
<td>Supply Voltage (Min)</td>
<td>170 Vdc</td>
<td>170 Vdc</td>
</tr>
<tr>
<td>Cathode Current (Peak)</td>
<td>2.5 ma</td>
<td>2.0 ma</td>
</tr>
<tr>
<td>Test Conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>170 Vdc</td>
<td>170 Vdc</td>
</tr>
<tr>
<td>Series Resistor</td>
<td>15K</td>
<td>15K</td>
</tr>
<tr>
<td>Cathode Current (Min) (Max)</td>
<td>1.0 ma</td>
<td>0.7 ma</td>
</tr>
<tr>
<td>Sockets:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Wiring</td>
<td>SK176</td>
<td>SK116A</td>
</tr>
<tr>
<td>Printed Circuit</td>
<td>SK178</td>
<td>SK118A</td>
</tr>
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</table>

**STANDARD (Notes 2 & 3)**

<table>
<thead>
<tr>
<th></th>
<th>8422 (B5991)*</th>
<th>8421 (B5092)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute Ratings</td>
<td>Long Life</td>
<td>Rectangular</td>
</tr>
<tr>
<td>Ionization Voltage (Max)</td>
<td>170 Vdc</td>
<td>170 Vdc</td>
</tr>
<tr>
<td>Supply Voltage (Min)</td>
<td>170 Vdc</td>
<td>170 Vdc</td>
</tr>
<tr>
<td>Cathode Current (Peak)</td>
<td>3.5 ma</td>
<td>3.5 ma</td>
</tr>
<tr>
<td>Test Conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>170 Vdc</td>
<td>170 Vdc</td>
</tr>
<tr>
<td>Series Resistor</td>
<td>8.2K</td>
<td>10K</td>
</tr>
<tr>
<td>Cathode Current (Min) (Max)</td>
<td>1.5 ma</td>
<td>1.5 ma</td>
</tr>
<tr>
<td>Sockets:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Wiring</td>
<td>SK169</td>
<td>SK112</td>
</tr>
<tr>
<td>Printed Circuit</td>
<td>SK144</td>
<td>SK130</td>
</tr>
</tbody>
</table>

*Preferred type (for long life, readability and size).

**NOTES**

1. Improved operation with temperature and improved life.
2. Special NIXIE tubes such as regular life wide angle types and weldable or tin dipped flying lead types are also available.
3. Special character NIXIE tubes such as — and — tubes, tubes with alphabet characters, and symbols (u, mv) are also available.

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See YELLOW SECTION for Local Offices, Phones
The B-5750 and B-5850 series NIXIE tubes are high quality, low cost, side viewing indicator tubes, which display the numerals 0-9 and either of two internal decimal points.
The B-5750 NIXIE tube draws less current than the B-5850 series and is designed for DC and strobed/time sharing applications. Mounting centers of 0.540 center to center can be obtained with this tube.
The B-5855 NIXIE tube is designed specifically for strobed/time sharing applications. This tube features all glass construction, a lower seated height than the B-5750 series, and 0.520 center to center mounting.
The B-5859 NIXIE tube is the same as the B-5855 except it is designed for both DC and strobed/time sharing applications. The B-5750 and B-5850 series NIXIE tubes are available in a short lead version for use with the SK-207 socket. To order the short lead tube suffix the tube designation number with an S (i.e., B-5750S, B-5855S).

The B-5440 is a low cost, long life NIXIE tube which also features a narrow tube width for 0.80" center-to-center spacing and a short seated height for minimal instrument panel dimensions.
The B-5440A is identical to the B-5440 except it has two decimal points (right and left of the numeral) inside the tube which are independently operable. A "\-\-" NIXIE tube is also available (B-5442).
The B-5445 is identical to the B-5440 except it mounts upside down (stem up).
The B-5440A is identical to the B-5440 except it is stem tubulated and has a seated height of only 1.500" max. (tubulation is 0.644" max.). A "keep alive" is also available for consistently rapid ionization.
Bulletin 1104 & 1116 for details.
**Burroughs**

**NIXIE TUBE DECODER/DIReVRS, DECADE COUNTING UNITS**

**BIP-8804 SERIES**
- **FOLLOW APPLICATIONS**
- **BIP-8806 SERIES**
- **WITH MEMORY**

The BIP-8804 and BIP-8806 series integrated circuit decoder/drivers accept 4-line positive logic 8-4-2-1 BCD input from DTL and TTL circuitry, and provide decimal readout on integrally mounted NIXIE® tubes.

The BIP-8804 series modules are non-latching in that they require a continuously available BCD information input. The BIP-8806 series modules have memory capability; they do not require a continuously available BCD information input.

The BIP-8804-1 and BIP-8806-1 modules drive a standard rectangular "0-9" NIXIE tube type 8422 (B-5991). The BIP-8804-2 and BIP-8806-2 modules drive the B-59956 standard rectangular NIXIE tube "0-9" with a decimal point. The NIXIE tube is supplied as part of the module and prices include both the module and the tube.

**ELECTRICAL SPECIFICATIONS**

**BIP-8804**
- **Input Requirements** .4 line 8-4-2-1 BCD .4 lines 8-4-2-1 BCD
- **Logic 0" (Ea)** .-0.5V to +0.85V
- **Logic 1" (Ea)** .0V to +0.5V
- **Input Current**
  - **Logic 0" present** .15 mA max.
  - **Input Current**
  - **Power Requirements**
  - **Positive High Voltage** .200 Vdc = 10V
  - **Positive Low Voltage** .5 Vdc = 0.25V
  - **Current at 200V** .23 mA typ (BIP-8804-1)
  - **2.8 mA typ (BIP-8804-2)**
  - **Operating Temperature**
  - **Operating (free air)** None to +75°C
  - **Non-operating** None to +125°C

**BIP-8806**
- **Input Requirements** .4 line 8-4-2-1 BCD .4 lines 8-4-2-1 BCD
- **Logic 0" (Ea)** .-0.5V to +0.85V
- **Logic 1" (Ea)** .0V to +0.5V
- **Input Current**
  - **Logic 0" present** .10 μA max.
  - **Input Current**
  - **Power Requirements**
  - **Positive High Voltage** .200 Vdc = 10V
  - **Positive Low Voltage** .5 Vdc = 0.25V
  - **Current at 200V** .23 mA typ (BIP-8804-1)
  - **2.8 mA typ (BIP-8804-2)**
  - **Operating Temperature**
  - **Operating (free air)** None to +75°C
  - **Non-operating** None to +125°C

**OUTLINE DRAWING**

**BIP-8820 UNIT**
- **WITH BCD OUTPUT**
- **UNIT WITH PRESET INPUT**

The BIP-8820 and BIP-8821 Modules are 20 MHz Decade Counters with NIXIE tube readout. A decimal point control line is provided for the decimal point located on the left side of the numerals in the B-59956 NIXIE tube when the decimal point module is required.

Memory and control circuits are not provided for the decimal point line.

Both decade counters are positive logic TTL compatible modules which change state during the negative going edge of the clock pulse. A master reset input is also available on the modules to reset the counter to zero.

The BIP-8820 provides 4 line, parallel BCD outputs of the count for use in external coincidence detection circuits and other logic. The BIP-8821 can be set to any predetermined number by 4-line parallel BCD inputs at the data input terminals when the strobe input goes to the low state. When the strobe is in the high state, the counter is unaffected by data on the input lines.

**ABSOLUTE MAXIMUM RATING**

- **Value**
  - **High Voltage Supply** .300V
  - **VCC, Low Voltage Supply** .6V
  - **Logic 1** .5V
  - **Logic 0** .5V
  - **Ixx (Negative Logic 0)** .1.5mA
  - **Ixx (Negative Logic 0)** .1.5mA
  - **Ixx (Negative Logic 0)** .1.5mA
  - **Ixx (Negative Logic 0)** .1.5mA

**POWER REQUIREMENTS**

- **VCC, High Voltage Supply** .190 to 210V (200V typ)
- **VCC, Low Voltage Supply** .4.75 to 5.25V (5V typ)
- **VCC, High Voltage Supply Current B-59956** .2.8mA typ (4.0mA Max)
- **VCC, High Voltage Supply Current B-5961** .2.3mA typ (3.5mA Max)

**BIP-9800 SERIES**
- **DECODER/DIReVRS**

The BIP-9800 series modules are miniature integrated circuit decoder/drivers intended for military mobile or airborne applications. They drive the B-4998 NIXIE tube which displays a 0.3" high number or character. The modules accept 4-line, positive logic 8-4-2-1 BCD input from DTL and TTL circuitry. The BIP-9801 modules are approximately .85 inches shorter than the BIP-8002 and BIP-8006 modules shown in the outline drawing.

The modules feature the use of integrated circuits for decoding and driving, and are potted in anodized sheet aluminum enclosures which can be mounted on 0.2" centers. A tantalum decoupling capacitor is used to bypass 5V power supply transients while a 2% metal glaze anode resistor is used to improve performance.

The individual characteristics of each module are described below.

- **BIP-9801-1** (Miniature 4998) NIXIE tube decoder/driver
- **BIP-9801-2** (Miniature 4998) NIXIE tube decoder/driver

**ELECTRICAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>BIP-9801-1</th>
<th>BIP-9801-2</th>
<th>BIP-9806-1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input Requirements</strong> .4 line 8-4-2-1 BCD .4 line 8-4-2-1 BCD .4 line 8-4-2-1 BCD</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Logic 0&quot; (Ea)</strong> .-0.5V to 0.5V to -0.5V to -0.5V</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Logic 1</strong> .-0.8V to +0.8V</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Input Current</strong> .-1.6mA max. .-1.5mA max. .-1.6mA max.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Power Requirements</strong> .-0.5Vdc = 10V .-0.5Vdc = 10V .-0.5Vdc = 10V</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Current at 500Vdc</strong> .20mA typ. .20mA typ. .20mA typ.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Operating Temperature</strong> .25°C to +125°C .25°C to +125°C .25°C to +125°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Non-operating</strong> .25°C to +125°C .25°C to +125°C .25°C to +125°C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
NIXIE TUBE BEZELS, SPECIAL PURPOSE DISPLAY SYSTEMS, COMPLETE HYBRID CAPABILITY

NIXIE tube bezel assemblies offer an efficient, attractive, and economical means of packaging NIXIE tubes, driver modules and sockets for multi-digit displays. The bezels enhance the appearance of equipment, provide optimum readability and save production labor as well as electrical and mechanical design time.

Assemblies are available for use with all size NIXIE tubes. They are available in various configurations which include complete packages with mounted driver modules, colons, decimal points and tubes, or partial assemblies with mounted sockets only. Amber Polaroid filters which provide maximum contrast and readability in high ambient light are standard with all assemblies. Special configurations can usually be supplied within several weeks at attractive prices. Request Bulletin 1137.

For the past ten years Burroughs has been building special purpose display systems to fulfill requirements of customers who wish to save design and development costs by using our highly-skilled experienced design group. Members of our engineering staff and a large production area are committed to the design, development and production of these systems. Listed below is a descriptive sampling of systems built for large equipment and systems manufacturers.

The electronic control and display unit shown is produced by Burroughs for Xerox Corporation for their 2400 copier/duplicator. This compact Burroughs unit controls the number of copies being made and features a numerical display indicating both the number of copies made and the accumulated total. The unit stops the machine automatically when the proper number of copies has been made. Simultaneously, it computes the amount to be billed to the user on a sliding scale. The display portion of the unit incorporates Burroughs NIXIE indicator tubes, type B-5092. The Coin Totalizer System shown operates as an adjunct to the Sattley Coin Sorter/Counter to display total dollars and cents. The Sattley Coin Counter is an electromechanical device which separates any mix of change (pennies, nickels, dimes, quarters, and half dollars) and distributes them by denomination into separate bins. As the coins drop into these bins, a switch-closure pulse is generated on one of five input lines of the coin totalizer. The pulses are processed into an accumulator so that the total dollar value of the coins processed is continuously available. The time savings and reduction in errors provided by the totalizer are of obvious value to banks, toll collectors, vending machine operators and other groups who regularly handle large volumes of coins.

The Hexadecimal Display Unit, produced by Burroughs for the Foxboro Company, has the capability to display the numerals 0 through 9 and the letters A through F. This four place display utilizes B-5971 alphanumeric NIXIE tubes. The unit is used by the Foxboro Computer as a computer interface for a large scale process control system. The process is read out in four letter-number designations.

Burroughs maintains a modern, well equipped 5000 square foot engineering facility devoted exclusively to microcircuitry and staffed by engineers whose educational backgrounds include physics, electronic engineering, metallurgy, chemical engineering and mechanical engineering. These highly trained people represent more than 50 years of semiconductor and thick film experience. This facility is backed up by a 40,000 sq. ft. production facility and a 12,000 sq. ft. clean room. Circuits are available in both hermetic and non-hermetic package in all common configurations contain screened resistors and conductors, capacitors and discrete IC or MSI chips. They offer small size for maximum packaging density, low cost, IC compatibility, high power and high voltage capability.

HYBRID CAPABILITY

CONDUCTIVE INKS
Pd/Au, Pd/Ag, Pt/Au
RESISTORS
Range of resistance ........................................... 50ohms to 5 megohms
Temperature Coefficient .................................. to +50 ppm/°C
Tolerance .................................................. to 0.5% trimmed, 15% as fired
Power Capability .................................................. 25W/in² (room temperature)
Temperature range .............................................. 65° to +125°C
CAPACITORS
Attached chip ceramic capacitors are used, however capacitors can also be fabricated on the substrate to required specifications. Typical values range from 10 to 1000 pf.
ACTIVE DEVICES
Discrete Semiconductors, Transistors, Integrated Circuit Chips and MSI. Many active devices are stocked. Our semiconductor facility can produce custom devices when design requires it and design time is available.
SCREEN FABRICATION
In-House
SUBSTRATE SIZES
from .35 in. x .35 in. min. to 2 in. x 2 in. max.
SUBSTRATE MATERIAL
Alumina 96%
MOUNTING TECHNIQUES
Reflow solder machine attaches flat leads, round wire leads, chips, connectors, pins and special purpose formed leads.
ENCLOSURE
Polyurethane (conformed coating)
Flatpacks (hermetic)
Epoxy shells
ENVIRONMENTAL TEST CAPABILITY
Shock
Centrifuge
Temperature — High and Low
Altitude
Humidity — Steady state or programmed
Salt Spray
CIRCUIT PRODUCTION CAPABILITY
Prototype units in 4-6 weeks
Production units 6-9 weeks
Total production capability 100,000 circuits per week.
FURNACES
3 in., 5 in. and 12 in. furnaces available
BONDERS
Multiple thermocompression, ball bonders and ultrasonic bonders are used for wire attachment.