Burroughs NIXIE® INDICATOR TUBES

Burroughs NIXIE® tubes remain industry's most popular display devices for every digital readout application because of their • high reliability (200,000 hrs. life) • high constant brightness (200 ft. lamberts) • best readability • lowest cost • compact size • rugged construction • availability of JAN types • special character tubes

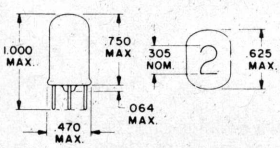
MINIATURE SIZE

AIRBORNE AND MOBILE EQUIPMENT READOUTS
SMALL LIGHTWEIGHT INSTRUMENTS

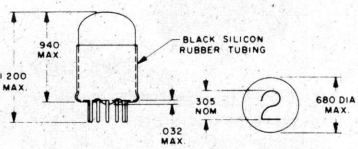
RECTANGULAR *

ROUND

Character Size ..... 0.3″
Viewing Distance ..... 14′



Type B4998

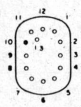


Type 7977

OUTLINE DRAWINGS

PIN CONNECTIONS
NUMERAL

PIN NO.	RECT.	ROUND	PIN NO.	RECT.	ROUND
1—	2	1	8—	8	8
2—	3	2	9—	9	9
3—	4	3	10—	0	0
4—	5	4	11—	Anode	
5—	6	5	12—	1	
6—	IC	6	13—	IC	
7—	7	7			

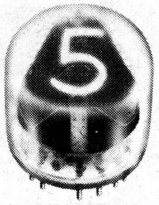


Bottom

STANDARD SIZE

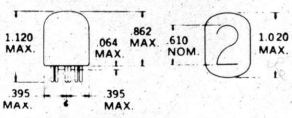
DESK TOP DISPLAYS AND BENCH TEST EQUIPMENT

RECTANGULAR *

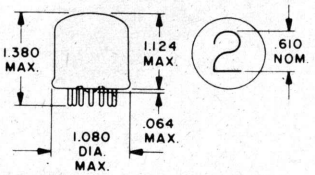


ROUND

Character Size ..... 0.6″
Viewing Distance ..... 30′



Type 8422

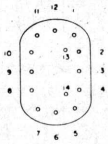


Type 8421

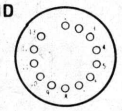
OUTLINE DRAWINGS

PIN CONNECTIONS
NUMERAL

PIN NO.	RECT.	ROUND	PIN NO.	RECT.	ROUND
1—	Anode	IC	8—	4	IC
2—	0	Anode	9—	3	5
3—	9	0	10—	2	4
4—	8	9	11—	1	3
5—	7	8	12—	IC	2
6—	6	7	13—	IC	1
7—	5	6	14—	IC	



Bottom



Bottom

ELECTRICAL DATA (Note 1) MINIATURE (Notes 2 & 3)	B4998* Long Life Rectangular	7977 (B4032) Long Life
Absolute Ratings Ionization Voltage (Max)	170 Vdc	170 Vdc
Supply Voltage (Min)	170 Vdc	170 Vdc
Cathode Current (Peak)	2.5 ma	2.0 ma
Test Conditions		
Supply Voltage	170 Vdc	170 Vdc
Series Resistor	15K	15K
Cathode Current: (Min) (Max)	1.0 ma 2.0 ma	0.7 ma 1.4 ma
Sockets: Standard Wiring Printed Circuit	SK176 SK178	SK116A SK118A

ELECTRICAL DATA (Note 1) STANDARD (Notes 2 & 3)	8422 (B5991)* Long Life Rectangular	8421 (B5092) Long Life Wide Angle
Absolute Ratings Ionization Voltage (Max)	170 Vdc	170 Vdc
Supply Voltage (Min)	170 Vdc	170 Vdc
Cathode Current (Peak)	3.5 ma	3.5 ma
Test Conditions		
Supply Voltage	170 Vdc	170 Vdc
Series Resistor	8.2K	10K
Cathode Current: (Min) (Max)	1.5 ma 3.0 ma	1.5 ma 3.0 ma
Sockets: Standard Wiring Printed Circuit	SK169 SK144	SK112 SK130

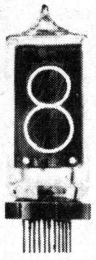
* Preferred type (for long life, readability and size).

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+ & Rp; 2) more uniform brightness; 3) more constant current operation; 4) improved operation with temperature and 5) 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 (μ, mV) are also available.

SIDE-VIEWING NIXIE TUBES

B-5750



B-5855

THE BWB SERIES BEZEL IS DESIGNED FOR USE WITH THE SIDE-VIEWING NIXIE TUBES

B-5441

B-5445

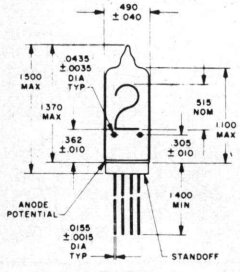
B-5441A

Character Size.....0.5″
Viewing Distance.....24′

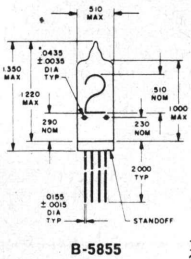
Character Size.....0.6″
Viewing Distance.....30′

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).

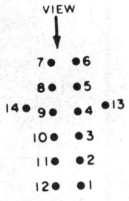
The B-5440 is a low cost, long life NIXIE tube which also features a narrow tube width for 0.80″ center-to-center spacing and a short seated height for minimal instrument panel dimensions.
The B-5441 is identical to the B-5440 except it has two decimal points (right and left of the numeral) inside the 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 .064″ max.). A "keep alive" is also available for consistently rapid ionization.
Bulletin 1104 & 1116 for details.



B-5750



B-5855

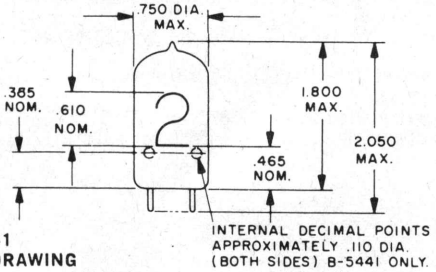


PIN CONNECTIONS

PIN NO.	ELEMENT		
1	Numeral 1	8	Numeral 7
2	Numeral 2	9	Numeral 8
3	Numeral 3	10	Anode*
4	Numeral 4	11	Numeral 9
5	Numeral 5	12	Numeral 0
6	Numeral 6	13	Rt. Dec. Pt.
7	Anode	14	Lft. Dec. Pt.

*Pin 10 removed from B-5850 series.

OUTLINE DRAWING



B-5441
OUTLINE DRAWING

Bottom

PIN CONNECTIONS

PIN	ELEMENT
1	Anode
2	K1
3	K2
4	K9
5	K7
6	Left Dec. Pt.
7	K8
8	Int. Conn.
9	K3
10	K4
11	Right Dec. Pt.
12	K5
13	K6
14	K0
15	Int. Conn.
16	Int. Conn.

Absolute Ratings

	B-5750	B-5855	B-5859
Ionization Voltage	+170Vdc max	+170Vdc max.	+170Vdc max
Supply voltage	+170Vdc min	+180Vdc min.	+170Vdc min
Numeral Cathode Current	3.8ma max		
Peak Numeral Cathode Current	.15ma max	17ma max	
Decimal Point Cathode Current	0.1ma to 0.3ma	note	0.1ma 0.5ma
Cathode Pre-bias	+60Vdc to +120Vdc		+6Vdc to +110Vdc
Anode Current			5.0ma max
Peak Anode Current			20ma max

Typical Operating Conditions

Supply voltage	+170Vdc	+200Vdc nom.	+170Vdc
Series Resistor	9.1K		10K
Anode Current	2.6ma typ		3.5ma typ
Decimal Point Current	0.2ma typ		0.35ma typ
Cathode Pre-bias Voltage	+60Vdc		+60Vdc
Peak Anode Current		14ma typ	
Pulse Duration		100 sec	
Duty Cycle		2msec	

Test Conditions B-5855

Peak Anode Current	11ma peak
Pulse Duration	100 sec
Repetition Rate	600 cps

note: The decimal point must never be operated at a potential more negative than the one numeric cathode.

ELECTRICAL SPECIFICATIONS NOTE 1

Absolute Ratings

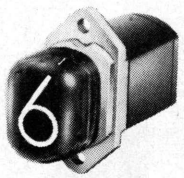
Ionization Voltage	170 Vdc max.
Supply Voltage	170 Vdc min.
Cathode Current	3.5 ma max.
Decimal Point Current (B-5441)	0.7 ma max.

Typical Operating Conditions

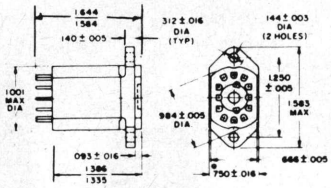
Supply Voltage	170 Vdc
Series Resistor	10 K ohm
Numeral Cathode Current (B-5440)	**2.5 ma (1.5 to 3.0 ma)**
Numeral Cathode Current (B-5441)	**2.5 ma (1.5 to 3.0 ma)**
Decimal Point Cathode Current (B-5441)	0.5 ma nom.

Burroughs

NIXIE TUBE DECODER/DRIVERS, DECADE COUNTING UNITS



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



* A DRAFT OF UP TO 0°30' PER SIDE INCREASING THE PACKAGE WIDTH AT THE PLUG END TO 775 MAX IS STANDARD

OUTLINE DRAWING

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.

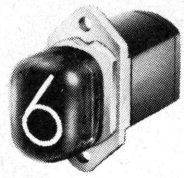
The BIP-8804 series modules are non-latching in that they require a continuously available BCD information input.

The BIP-8806 series modules have memory capability; they do not require a continuously available BCD information input.

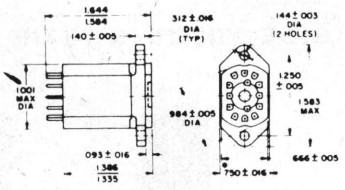
The BIP-8804-1 and BIP-8806-1 modules drive a standard rectangular "0-9" NIXIE tube type 8422 (B-5991). The BIP-8804-2 and BIP-8806-2 modules drive the B-59956 standard rectangular NIXIE tube "0-9 with a decimal point". The NIXIE tube is supplied as part of the module and prices include both the module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

ELECTRICAL SPECIFICATIONS

	BIP-8804	BIP-8806
Input Requirements	...4 line 8-4-2-1 BCD	...4 lines 8-4-2-1 BCD
Logic "0" (E_0)	....—0.5V to +0.85V	....—1.0V to +0.5V
Logic "1" (E_1)	....2.0V to 6.0V	....1.0V to 4.0V
Input Current		
Logic "0" present	.....1.5 mA max.	....—20 A to +20 A
Logic "1" present	.....10 μA max.	.... 400 μA max.
Power Requirements		
Positive High Voltage	...+200 Vdc ±10V	....200 Vdc ±10V
Positive Low Voltage	...5 Vdc ±0.25V	....5Vdc ±0.25V
Current at 200V	.....2.3 mA typ. (BIP-8804-1)	.....2.3 mA typ. (BIP-8806-1)
	2.8 mA typ. (BIP-8804-2)	.....2.8 mA typ (BIP-8806-2)
Current at 5.0V	.....60 mA max.	.....90 mA typ.
Temperature		
Operating (free air)	.....0°C to +75°C	.....0°C to +75°C
Non-operating	.....—55°C to +125°C	....—55°C to +125°C



BIP-8820 UNIT
WITH BCD OUTPUT
BIP-8821 UNIT
WITH PRESET INPUT



* A DRAFT OF UP TO 0°30' PER SIDE INCREASING THE PACKAGE WIDTH AT THE PLUG END TO 775 MAX IS STANDARD

OUTLINE DRAWING

The BIP-8820 and BIP-8821 Modules are 20 MH_z 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 model 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.

TABLE 1 GENERAL CHARACTERISTICS

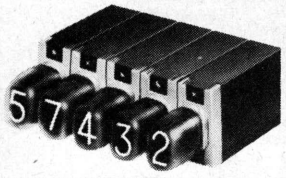
	Preset Input	BCD Output	Decimal Point
BIP-8820-1	No	Yes	No
BIP-8820-2	No	Yes	Yes
BIP-8821-1	Yes	No	No
BIP-8821-2	Yes	No	Yes

ABSOLUTE MAXIMUM RATINGS

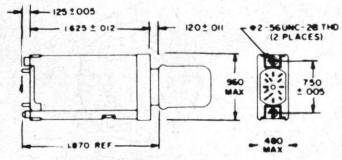
Rating	Value
High Voltage Supply	300V
V_{CCL} Low Voltage Supply	6V
Logic 1	6V
V_{IN} (Negative Logic 0	5.5V
I_{OFF} Decimal Output Current (off)	1.5mA
I_{ON} Decimal Output Current (on)	15mA
Output Current at Counter Output Terminals	±100mA
Operating Temperature Range	0 to 75°C
Storage Temperature Range	—20 to +125°C

POWER REQUIREMENTS

V_{CCH} High Voltage Supply	190 to 210V (200V typ.)
V_{CCL} Low Voltage Supply	4.75 to 5.25V (5V typ.)
I_{CCH} High Voltage Supply Current B-59956	2.8mA typ. (4.0mA Max.)
I_{CCH} High Voltage Supply Current B-5961	2.3mA typ. (3.5mA Max.)
I_{CCL}	57mA Max.



BIP-9800 SERIES
DECODER/DRIVERS



OUTLINE DRAWING

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-9802 and BIP-9806 modules shown in the outline drawing.

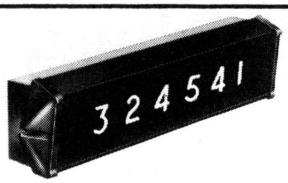
The modules feature the use of integrated circuits for decoding and driving, and are potted in anodized sheet aluminum enclosures which can be mounted on 0.5" centers. A tantalum decoupling capacitor is used to bypass 5V power supply transients while a 2% metal glaze anode resistor is used to optimize performance.

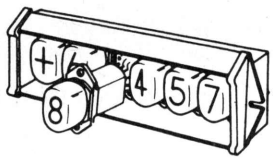
The individual characteristics of each module are described below. • BIP-9801-1 Miniature (4998) NIXIE tube decoder/driver • BIP-9801-2 Miniature +, — NIXIE tube decoder/driver • BIP-9802-1 Same electrically as BIP-9801-1 except features blanking, dimming and temperature range to +125°C • BIP-9806-1 Same as BIP-9802-1 except features memory.

ELECTRICAL SPECIFICATIONS

	BIP-9801-1 BIP-9801-2	BIP-9802-1	BIP-9806-1
Input Requirements	..4 line 8-4-2-1 BCD		
Logic "0" (Eo)	....—0.5V to +0.8V	....—0.5V to +0.8V	....0 to +0.8V
Logic 1	.....+2.1V to +6.0V	.....+2.1V to +6.0V	.....+2.1V to +6.0V
Input Current			
Logic 0 present	.....—1.6mA max.	....—1.6mA @ .45V	—1.6mA @ .45V
Logic 1 present	..... 5 μA max.	.....5 μA @ 4.0V	..5 μA @ 4.0V
Power Requirements			
Positive High Voltage	.+200Vdc ±10V		
Positive Low Voltage	..+5.0Vdv ±0.5V		
Current at +200Vdc	..1.5mA typ.	.....2.0mA typ.	....2.0mA typ.
Current at +5.0Vdc	.. 60mA max.		.....135mA max.
Temperature			
Operating (Free Air)	.. —25°C to +100°C	.... —25°C to +100°C	
Non-operating	..... —55°C to +125°C	.... —55°C to +125°C	

NIXIE TUBE BEZELS, SPECIAL PURPOSE DISPLAY SYSTEMS, COMPLETE HYBRID CAPABILITY

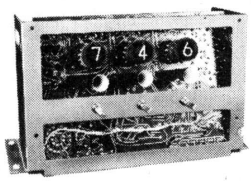




NIXIE tube bezel assemblies offer an efficient, attractive, and economical means of packaging NIXIE tubes, driver modules and sockets for multi-digit displays. The bezels enhance the appearance of equipment, provide optimum readability and save production labor as well as electrical and mechanical design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

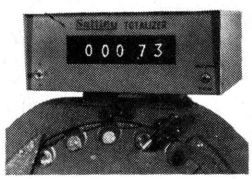
Assemblies are available for use with all size NIXIE tubes. They are available in various configurations which include complete packages with mounted driver modules, colons, decimal points and tubes, or partial assemblies with mounted sockets only. Amber Polaroid filters which provide maximum contrast 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 Hexidecimal 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 Company on computer interface for a large scale process control system. The process is read out in four letter-number designations.

Each place in the display is supplied with five input logic lines: 8, 8, 4, 2, 1. This logic is decoded to drive the proper segments of the tube. The power supply is the only common connection between the four places of the display. A high voltage power supply for the NIXIE tube is incorporated in this self-contained unit. The Hexidecimal display unit is connected to the Foxboro system through a 36 contact receptacle and plug.

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 .....5ohms 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.
ENCLOSURES
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.