READOUT DEVICES

ALPHA NUMERIC

NIXIE® INDICATOR TUBES

The Type B-5971 Alpha-Numeric NIXIE Tube represents an outstanding addition to Burroughs readout product line. The new tube has the ability to display all the letters of the alphabet, numerals 0 thru 9 and special characters in a single tube.

From the standpoint of both readability and electrical characteristics, the Alpha-Numeric NIXIE Tube provides many unique benefits including:

- All DC operation.
- Uniform, continuous line characters of equal height.
- Memory with simple solid state or gas tube drive circuits.
- Readability in high ambient light . . . 200 foot lamberts brightness.
- Maintenance-free operation . . . long life with no loss of brightness.

The tube consists of 13 cathode segments and a common anode mounted within a rectangular shaped glass envelope. Alpha-numeric characters, .700″ high, are formed by the application of a negative voltage (with respect to the common anode) to the appropriate combination of cathode segments. The characters appear as a bright "continuous line" red neon glow which can be easily read under high ambient light conditions from a distance of 25 feet and at angles exceeding 150°. The tube's rectangular shape allows mounting on .800″ centers, providing maximum readout density in multi-character displays.

The Alpha-Numeric NIXIE Tube's DC operating characteristics make it compatible with conventional, low cost, transistorized drive circuitry. Electrical memory can be provided by means of a transistor latch circuit which conserves power and simplifies the input circuitry.
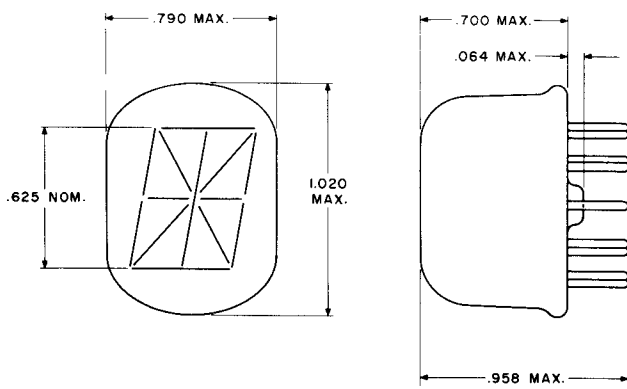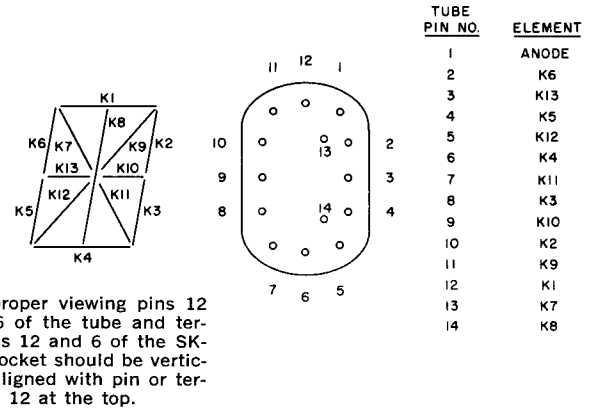
Figure 1. OUTLINE DRAWING.

TUBE PIN NO.	ELEMENT
1	ANODE
2	K6
3	K13
4	K5
5	K12
6	K4
7	K11
8	K3
9	K10
10	K2
11	K9
12	K1
13	K7
14	K8

For proper viewing pins 12 and 6 of the tube and terminals 12 and 6 of the SK-136 socket should be vertically aligned with pin or terminal 12 at the top.
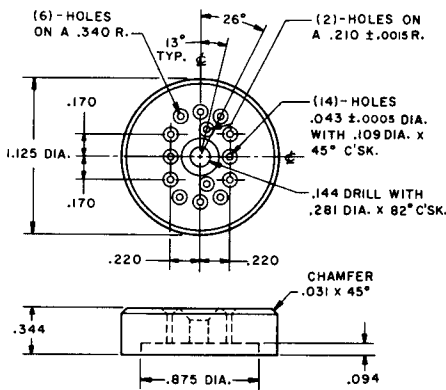
Figure 2. BASING DIAGRAM.
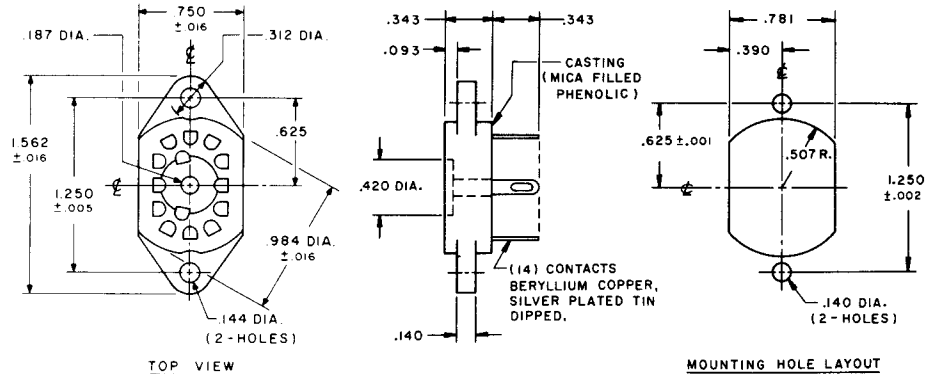

Figure 3. PIN STRAIGHTENER, LS-210.

TOP VIEW

MOUNTING HOLE LAYOUT

Figure 4. GENERAL PURPOSE SOCKET SK-136.

SPECIFICATIONS
TENTATIVE
Type B-5971 Alpha-Numeric NIXIE® Tube

ELECTRICAL DATA

Absolute Ratings

Supply Voltage (Ebb) .... 170 Vdc Min.

Cathode Current

I_k (Total all cathodes) .... 12 ma max.

I_k (Individual cathodes, K1 through K12 except K8, K10) .... 4 ma max.

I_k (Individual cathodes, K10, K13) .... 3 ma max.

I_k (Individual cathode, K8) .... 6 ma max.

Test Conditions (See Figure 5 and Notes 1 and 2)

Supply Voltage (Ebb) .... 170 Vdc

Series Anode Resistor (R_p) .... 6.8 K ±1%

Test Limits

	Value	Notes
Individual Cathode Current		
Minimum	50 μa	2, 3
Maximum	4.5 ma	4
Anode Current (Max.)	7.0 ma	2
Ionization Voltage (Max.)	170 Vdc	
Leakage Current (Max.)	5.0 μa	5

MECHANICAL DATA

Outline	See Figure 1
Pin Connection	See Figure 2
Mounting Position	See Figure 2
Pin Straightener	See Figure 3
Socket	See Figure 4

NOTES:

1. Test conditions, Ebb = 170 Vdc and R_p = 6.8K, also constitute recommended operating conditions. Higher values of supply voltage and series resistor limit the ability of the tube's dynamic impedance to compensate for different numbers of cathodes being ionized.

2. These tests are conducted with all cathodes ionized as shown in Figure 5 except as noted. (See notes 4 & 5.)

3. Under the specified conditions all cathodes will exhibit uniform glow over complete surface.

4. Maximum cathode current is measured with cathode K8 ionized and all other cathodes floating.

5. Leakage current is measured from one element to all others under the following test conditions:
   a. Supply Voltage (Ebb = 50 Vdc)
   b. Series Anode Resistor (R_p = 100K ohms)

6. Power requirements for the type B5971 depend to a large extent upon the application; i.e., the maximum number of cathodes required to be ionized at any one time. The graph shown in Chart 1 gives the normalized anode current as a function of the number of cathodes ionized.

Figure 5. TEST CIRCUIT.

Chart 1. ANODE CURRENT DISTRIBUTION (See note 6.)

Figure 6. BLOCK DIAGRAM ALPHA NUMERIC DISPLAY SYSTEM.

Figure 7. MEMORY DRIVER MODULE SCHEMATIC DIAGRAM

APPLICATIONS INFORMATION

The Alpha-Numeric NIXIE Tube has a wide range of applications including stock quotation displays, airline arrival and departure boards, and military tactical situation displays.

Figure 6 shows a block diagram of a 32-tube parallel input alpha-numeric display system driven from binary coded information. Both the information and tube selection inputs are decoded by Burroughs BIPCO® diode matrix modules. The decoded information is fed to an N/13 segment encoder to light the appropriate tube segments on the selected tube. The 13-line information input is synchronized with the tube selection input and the information is stored in the memory associated with each tube. Although the system shown is for 32 tubes, any number could be used; however, larger quantities would require larger capacity tube selection circuitry.

A number of different techniques can be used to provide memory for the tubes. Since they can be operated from moderate DC voltages, low cost germanium or silicon transistor latch circuits can be used as shown in Figure 7. A circuit of this type has been incorporated in a memory driver module. The coded input information is supplied through 13 input lines. Logic levels are 0 volts and —12 volts for true and false inputs, respectively.

For example, if a —12 volt, 12 μsec. pulse is applied at the CLEAR and READ input terminals, transistors Q27 and Q28 will be turned off causing +12 volts to appear at the emitters of Q14 through Q26, turning them off. This will extinguish any segments which are on. At the expiration of the input pulse, the positive going signal will allow Q27 to turn on and Q28 to conduct momentarily, allowing —12

(continued)

volts to appear at the emitters Q14 through Q26. This allows "turn on" base current to flow from whichever input lines are "True" (at ground). The voltage at these collectors thus starts to fall from +80 volts (approximate collector voltage when segment is not lighted) towards −12 volts. When the voltage gets below +12 volts, turn on current will flow from the conducting NPN transistors to the base of the PNP latch transistors bringing them into conduction and establishing the latch condition. Tube current flows through transistors Q14-Q26 to light the selected segments. The selected segment will remain lighted until the next clear and read pulse at which time the latch is broken and the cycle repeats itself. Those segments with a ground input will again be lighted.

The Type B-5971 Alpha-Numeric Tube is an important addition to Burroughs NIXIE Tube readout line which now includes devices for every type of information readout and display. Its flexibility makes it adaptable to a broad range of applications including large scale wall displays as well as small console readouts. In addition, the new tube retains all the characteristics which have earned industry-wide acceptance for Burroughs' numeric NIXIE tubes including economy of operation, high reliability, low maintenance costs, and superior readability. For further information on the Alpha-Numeric Tube and associated memory drivers, contact your local Burroughs Representative or write for applications assistance directly to P. O. Box 1226, Plainfield, New Jersey.

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