

ELECTRONIC INDUSTRIES ASSOCIATION



2001 EYE STREET, N. W.
WASHINGTON, D. C. 20006

TELEPHONE: (202) 457-4900
CABLES: ELECTRON WASHINGTON DC



Announcement

of

Electron Device Type Registration

Release No. 6684

July 12, 1977

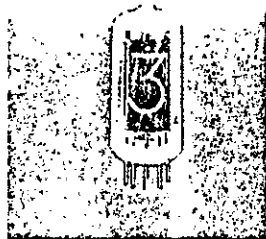
The Joint Electron Device Engineering Council announces the registration of the following electron device designations:

8651	8781
8652	8790

according to the ratings and characteristics found on the attached data sheet on the application of

Burroughs Corporation

Plainfield, NJ



BIQUINARY INDICATOR TUBES

5025 = JEDEC Type 8651
5030 = JEDEC Type 8652

The B-5025 and B-5030 Biquinary NIXIE tubes are cold-cathode, gas-filled, side-viewing numerical indicator tubes containing the numerals 0 through 9. The numeral cathodes are connected internally in five pairs (0-1, 2-3, 4-5, 6-7, 8-9). The cathodes are grouped with the odd numbers separated from the even numbers by a screen. Two anodes, one for each group of cathodes, are used to allow the illumination of any one numeral by applying the specified voltage between the appropriate anode and the cathode pair containing the desired numeral. (See Note 2)

The B-5030 is a long life tube (200,000 hours life). The B-5025 is a non-mercury tube having greater than 10,000 hours of useful life under dynamic operating conditions. MTBF for the B-5025 is 40,000 hours at 95% confidence level.

OUTLINE DRAWING

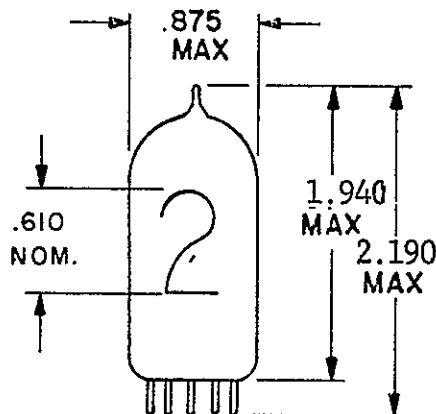
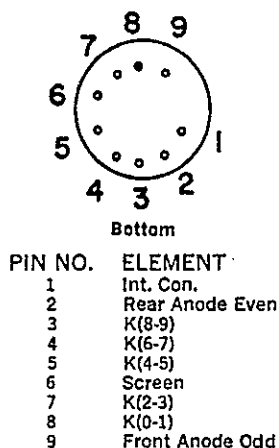


Fig. A

PIN CONNECTIONS



For proper viewing, pins 2 and 7 should be aligned with pin 7 directly opposite the viewer.

Fig. B

ENVIRONMENTAL DESIGN DATA—B-5025, B-5030

1. Salt Spray: MIL-STD 202C, method 101B, Cond. A.
2. Shock: 50 G 11 ±1 millisecc duration 1/2 sine wave pulse.
3. Vibration: 10-50-10 CPS. .08 D.A., 5 minutes in each of 3 planes.
4. Altitude: 70,000 ft.
5. Temperature: -65°C to 70°C (B-5025); -20°C to +55°C (B-5030).
6. Humidity: MIL-STD 202C, Method 103B, Condition B
7. Expected Life (Dynamic): 10,000 hours (B-5025);
200,000 hours (B-5030).

ELECTRICAL DATA—B-5025, B-5030

Absolute Ratings	B-5025		B-5030	
	Min.	Max.	Min.	Max.
Breakdown Voltage (Note 1) (E _z) Vdc	—	130	—	160
Anode Current (I _a) ma	—	4	—	5
Cathode Prebias Voltage (E _{kk}) Vdc	40	70	40	110
"Off" Anode Voltage (E _{b'}) Vdc	65	80	90	110
Screen Voltage (E _{sh}) Vdc	40	55	40	65
Test Limits (Notes 6 & 7)				
Anode Current (I _a) ma	1.8	3.8	2.8	4.8

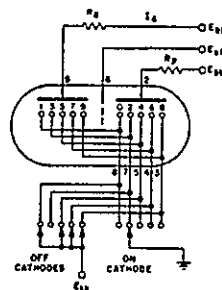
Typical Operating Conditions

"Off" Anode Supply Voltage (E _{bb'}) Vdc	70	100				
Nominal Tube Voltage Drop (Notes 4 & 5)	100	142				
Cathode Prebias Voltage (E _{kk}) Vdc (Note 3)	50	50				
Screen Voltage (E _{sh}) Vdc	50	50				
"On" Anode Supply Voltage (E _{bb}) (Note 2) Vdc	150	200	180	220	250	300
Anode Series Resistor (R _p) (Notes 4 & 5)	18	36	10	20	27	39

NOTES

1. Voltage necessary for breakdown between anode and cathode.
2. E_{b'} may be as stated; however, the use of the highest voltage available with an appropriate series resistor is recommended.
3. Cathode prebias voltage is defined as the potential difference which must be maintained between "on" and "off" cathodes to avoid objectionable background glow.
4. For B-5025 "On" Anode Supply Voltages other than those shown, the series limiting resistor should be calculated on the basis of an anode current design center of 2.8 ma and a nominal tube voltage drop of 100 volts.
5. For B-5030 "On" Anode Supply Voltages other than those shown, the series limiting resistor should be calculated on the basis of an anode current design center of 3.8 ma and a nominal tube voltage drop of 142 volts.
6. B-5025 Test Conditions are the same as typical operating conditions for "On" anode supply voltage of 150 volts.
7. B-5030 Test Conditions are the same as typical operating conditions for "On" anode supply voltage of 180 volts.

TEST CIRCUIT — B-5025, B-5030



TEST CONDITIONS — B-5025

E_{bb} = 150 Vdc
E_{kk} = 50 Vdc
R_p = 18 K
E_{sh} = 50V
E_{bb'} = 70 V

TEST CONDITIONS — B-5030

E_{bb} = 180 volts
E_{kk} = 50 volts
R_p = 10 K ohms
E_{sh} = 50V
E_{bb'} = 100 volts

Fig. C



ALPHANUMERIC NIXIE® TUBES

TYPE

B-5971

JEDEC Type 8781

The alphanumeric NIXIE tube has the ability to display all the letters of the alphabet, numerals 0 thru 9 and special characters in a single tube. (See Figure 1).

From the standpoint of both readability and electrical characteristics, the alphanumeric NIXIE tube provides many unique benefits including: 1) all DC operation; 2) uniform, continuous line characters of equal height; 3) memory with simple solid state drive circuits; 4) readability in high ambient light. . .200 footlamberts brightness; and 5) maintenance-free operation. . .long life with no loss of brightness.

The tube consists of 13 or 15 cathode segments and a common anode. Alphanumeric characters 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 distances of 25 to 100 feet and at angles exceeding 150°. The tube's rectangular shape provides maximum readout density in multi-character displays.

For further information write to Burroughs Corporation, Electronic Components Division, Box 1226, Plainfield, New Jersey 07061.



Fig. 1. ALPHANUMERIC DISPLAY



B-5971

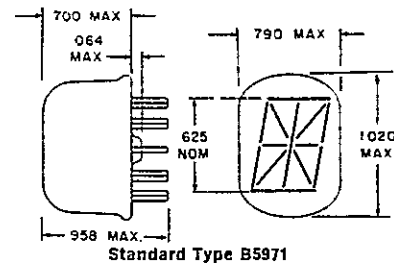


Fig. 2. OUTLINE DRAWING

ABSOLUTE RATINGS

CONDITION	UNITS
Supply Voltage (Ebb) (Vdc min)	170
Cathode Current (MA max)	
1K (Total all cathodes)	12.0
1K (Individual cathodes) B-5971	
K1 through K12 (except K8 and K10)	1.7
K10, K13	1.5
K8	3.0

TEST CONDITIONS

CONDITION	UNITS
Supply Voltage (Ebb) (Vdc)	170
Series Anode Resistor (Rp) (Ohms) (+1%)	6.8K

TEST LIMITS

CONDITION	UNITS
Individual Cathode Current	
Minimum (Note 2)	50µa
Maximum (Note 4)	4.0ma
Anode Current (max) (Notes 2,3)	7.0ma
Ionization Voltage (max) (Vdc)	170
Leakage Current (max) (Note 5)	5.0µa

ENVIRONMENTAL DATA

Altitude (ft)	70,000
Temperature (1)	-20°C to +55°C
(2)	-65° to 85°C (reduced life)
Vibration	10-50-10 cps at .08" D.A. 5 min. ea. in X, Y, Z axis
Shock	50 G's, 11 millise. 350 G's, 1 millise.
Expected Life (Dynamic)	50,000 hours

Table 1. PIN CONNECTIONS

PIN NUMBER	CONNECTION	PIN NUMBER	CONNECTION
1	Anode	8	Segment 3
2	Segment 6	9	Segment 10
3	Segment 13	10	Segment 2
4	Segment 5	11	Segment 9
5	Segment 12	12	Segment 1
6	Segment 4	13	Segment 7
7	Segment 11	14	Segment 8

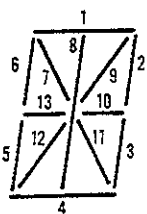


Fig. 3. SEGMENT DESIGNATIONS

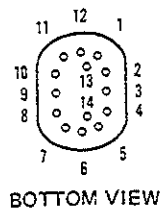


Fig. 4. PIN CONNECTIONS

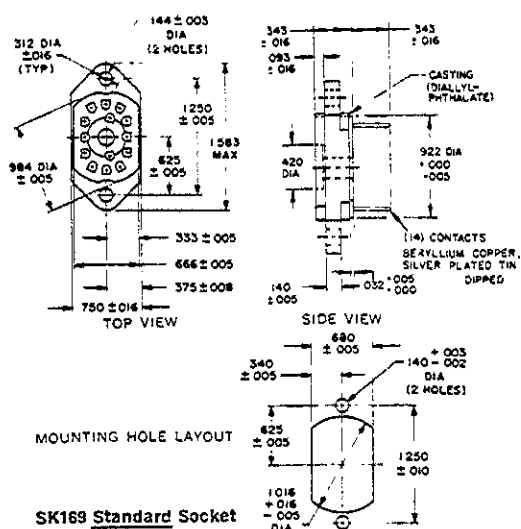


Fig. 5. SOCKET

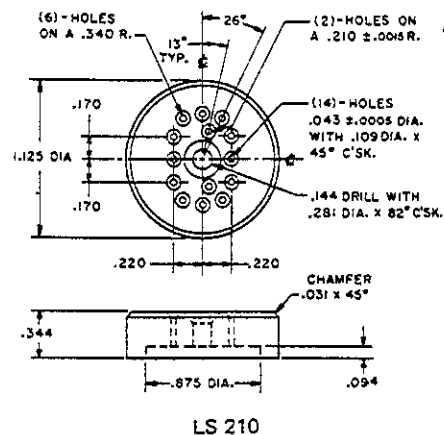


Fig. 6. PIN STRAIGHTENER

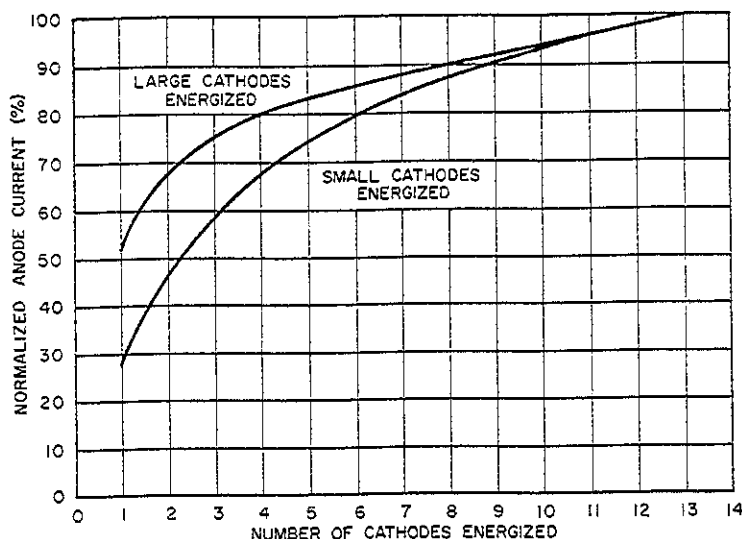


Fig. 7. ANODE CURRENT DISTRIBUTION

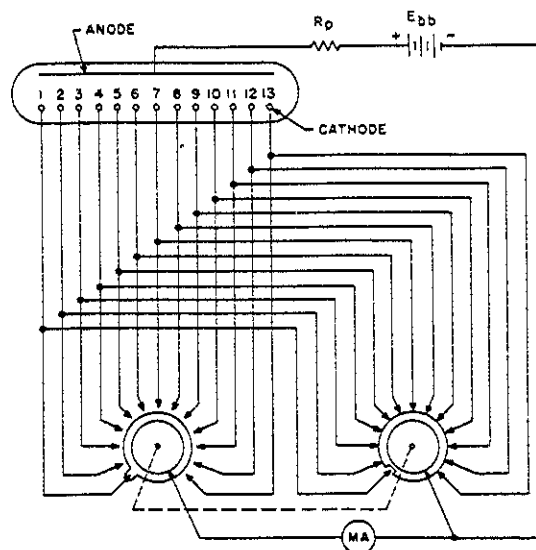


Fig. 8. TEST CIRCUIT

NOTES

1. These conditions are also recommended for operation. Higher values of supply voltage and series resistor limit the ability of the tube's dynamic impedance to compensate for different numbers (1 to 15) of cathodes being ionized.
2. These tests are conducted with all cathodes ionized as shown in Figure 8 except as noted (See notes 4 and 5)
3. Under the specified conditions, all cathodes will exhibit uniform glow over their entire surface.
4. Maximum cathode current is measured with the following cathodes energized: B-5971-K₈; (all other cathodes floating).
5. Leakage current is measured from one element to all others under the following conditions. E_{bb}=50Vdc and R_p = 2.6 megohms.
6. Power requirements for the tubes 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 Fig. 7 gives the normalized anode current as a function of the number of cathodes ionized.



The information contained in this brochure does not necessarily imply a license under patents or pending applications of Burroughs Corp. or assure a freedom from patent rights of others. No warranties of any kind are either expressed or implied by reason of this publication

This data sheet is subject to change without notice

PRINTED IN U.S.A.



MINIATURE RECTANGULAR NIXIE® TUBE

TYPE
B-4998
JEDEC Type 8790

The miniature rectangular NIXIE tube, type B-4998 is a cold cathode, ultra long-life, end-viewing numerical (0-9) indicator tube. It is the smallest electronic readout presently available and is designed for applications where small size and rugged construction is needed, such as in airborne/military systems and mobile equipment. A 0.3" character for viewing up to 14' is in a bulb only .470 wide x .625 high x .750 deep. Sockets are available for chassis or printed circuit mounting. Refer to Brochure 616 for additional NIXIE tube information.

For further information write to Burroughs Corporation, Electronic Components Division, Box 1226, Plainfield, New Jersey 07061.

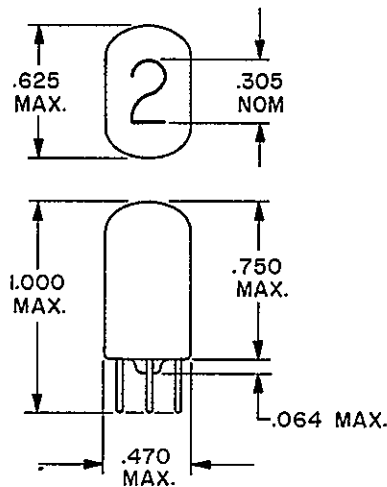


FIGURE 1.
OUTLINE DRAWING

ELECTRICAL CHARACTERISTICS

Absolute Ratings:

Ionization Voltage _____ +170 Vdc max.
 Supply Voltage _____ +170 Vdc min. (Note 1)
 Cathode Current _____ 2.5 ma max.
 Cathode Pre-bias _____ +60 Vdc to +120 Vdc

Typical Operating Conditions (Figure 4)

Supply Voltage _____ +200 Vdc (Note 1)
 Series Resistor _____ 36 K Ω (Note 2)
 Cathode Current _____ 1.35 ma avg., 1.0 ma min., 2.0 ma max.
 Cathode Pre-bias _____ +60 Vdc

MECHANICAL CHARACTERISTICS

Character Height _____ 0.3"
 Viewing Distance _____ 14'
 Outline Drawing _____ Figure 1
 Pin Connections _____ Table 1
 Sockets _____ Figures 2 & 3
 Mounting _____ Figures 2 & 3
 Color _____ Neon red
 Brightness _____ 200 ft. lamberts
 Pin Layout _____ Figure 5

ENVIRONMENTAL CHARACTERISTICS

Average life (dynamic) _____ 200,000 hours
 Altitude _____ 70,000 ft.
 Temperature _____ (1) 0° to +70°C
 _____ (2) -55°C to +85°C (reduced life)
 Acceleration _____ 20 G's
 Vibration _____ 10-50-10 cps at .08" D.A.
 _____ for 5 min. ea. in X, Y, and Z axis
 Shock _____ (1) 50 G's, 11 millisc.
 _____ (2) 250 G's 1 millisc.
 Salt Spray _____ MIL Std. 202, Method 101, Cond. A
 Humidity _____ MIL Std. 202, Method 103, Cond. B

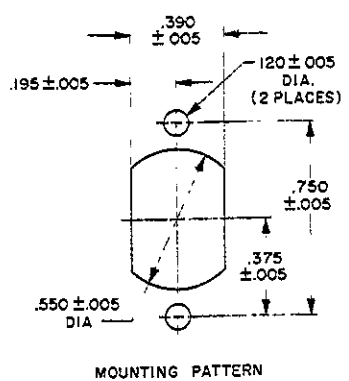
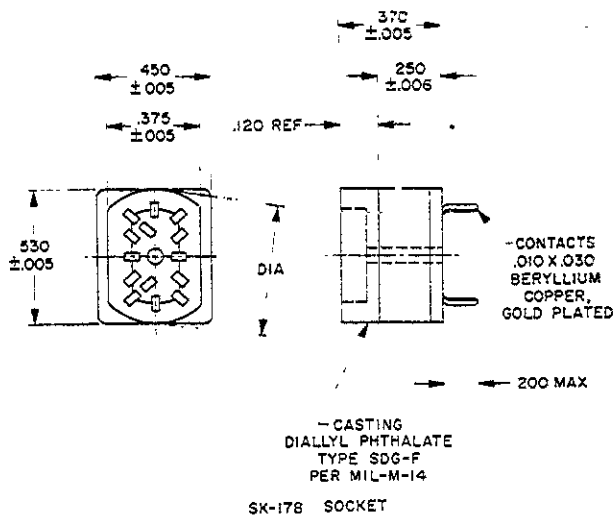
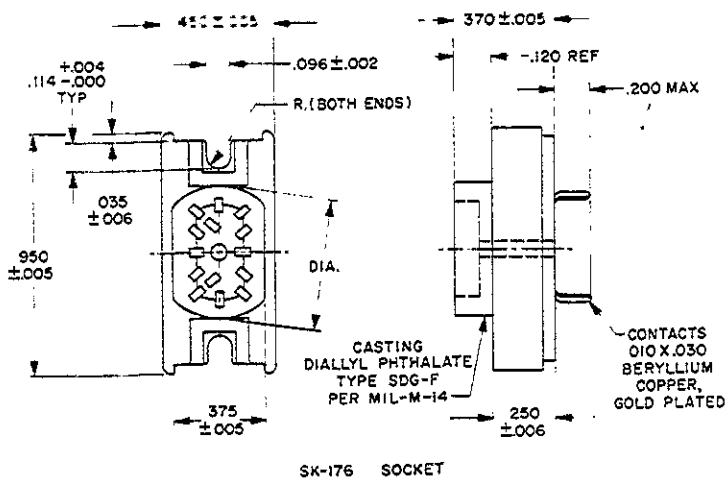
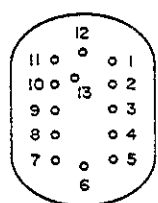


FIGURE 2.
WIRING SOCKET AND
MOUNTING PATTERN



BOTTOM VIEW
FIGURE 5
PIN LAYOUT

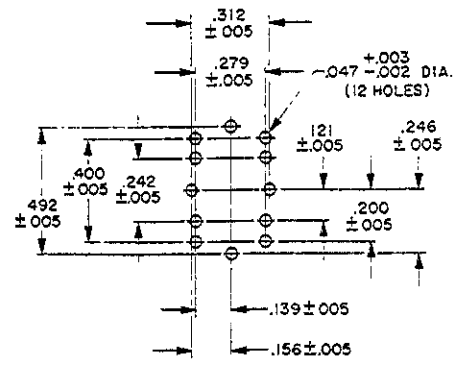


FIGURE 3.
PRINTED CIRCUIT SOCKET
AND MOUNTING PATTERN

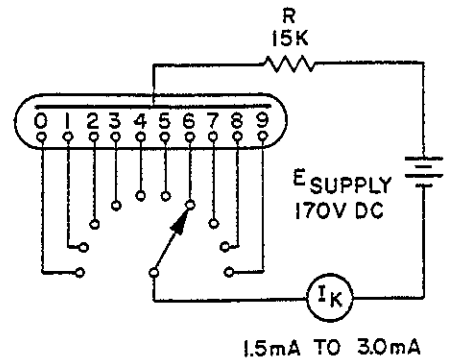


FIGURE 4
TEST CIRCUIT

For proper viewing, pins 12 and 6 should be vertically aligned with pin 6 on top.

PIN NO.	CHARACTER
1	Numeral 2
2	Numeral 3
3	Numeral 4
4	Numeral 5
5	Numeral 6
6	Internal Connection
7	Numeral 7
8	Numeral 8
9	Numeral 9
10	Numeral 0
11	Anode
12	Numeral 1
13	Internal Connection

TABLE 1
PIN CONNECTIONS

NOTES

- 1) The minimum supply voltage should be as stated, however, the use of the highest voltage available is recommended.
- 2) The anode series resistor can be calculated on the basis of an anode current of 1.35 ma and a tube voltage drop of 150 Vdc (Sustaining Voltage). R at 170 Vdc is 15 K Ω , at 250 Vdc is 75 K Ω , and at 300 Vdc is 110 K Ω .
- 3) Miniature rectangular NIXIE tubes with flying leads for direct soldering to printed circuit boards are also available (Type B-4997).
- 4) B-49982 is a miniature rectangular "±" NIXIE tube; request Bulletin 1089.



Burroughs Corporation



FEDERAL AND SPECIAL SYSTEMS GROUP

ELECTRONIC COMPONENTS DIVISION

P.O. Box 1226 • Plainfield, New Jersey 07061
201-757-5000

July 6, 1977

EIA/JEDEC Type Administration Office
2001 Eye Street, N. W.
Washington, DC 20006

Attention: Mr. Steve Forish

Subject: Status of Open Electron Tube Reservation Survey

Gentlemen:

Attached is the information requested in your questionnaire.

The 6715 (Burroughs type BX1204) was built for a customer but never generally advertised or sold by Marketing. As that product line is now obsolete, I feel it should be declared inactive and the registration cancelled. The only product information presently available is our product specification #12955977 which is attached.

The next four numbers, 6716, 8470, 8471 and 8472 were never actually assigned to a specific product and they should be cancelled.

The 8651 (B-5025) and 8652 (B-5030) are still sold but are not currently being manufactured. A common data sheet for these types is attached.

The 8781 (B-5971) and 8790 (B-4998) are currently manufactured and sold and have been so designated. Data sheets for these types are also enclosed.

We trust that this information is satisfactory for your requirement.

Very truly yours,

Arthur B. Shesser
Director of Marketing ECD

ABSmtj
attachments

cc. T. C. Maloney

Burroughs Corporation

ELECTRONIC  COMPONENTS DIV,
PLAINFIELD NEW JERSEY

DWG. NO.
12882411

DATE
11-13-65

SHEET OF
1 5

PRODUCT SPECIFICATION
VACUUM TUBE TYPE 85025

REV
NO

REVISIONS

APPROVALS

DRAWING CONTROL-ENGINEERING

REFERENCE COPY

11-16-65
**CONSULT SPECIFICATIONS DEPT.
FOR LATEST ISSUE**

PRODUCT SPECIFICATION; NIXIE TUBE TYPE B5025

1.0 **Recognition:** The B-5025 NIXIE Tube is a cold cathode, gas filled side viewing bi-primary numerical indicator containing no mercury.

2.0 **Rating:**

PARAMETER	SYM.	Min.	Max.	Units
2.1 Breakdown Voltage ¹	E _{bd}	130		Vdc
2.2 Anode Current	I _a		4	madc
2.3 Cathode Pre-bias Voltage	E _{kk}	40	70	Vdc
2.4 "Off" Anode Voltage	E _b	40	75	Vdc
2.5 Screen Voltage	E _{ss}		50	Vdc
2.6 Ambient Temperature	T	-65	70	°C
2.7 Altitude			70,000	Ft.

Note 1: Voltage necessary for breakdown between anode and cathode.

3.0 **Typical Operating Conditions:**

3.1 "On" Anode Supply Voltage ²	E _{bb}	150	200	Vdc
3.2 "Off" Anode Supply Voltage	E _{bb}	70	70	Vdc
3.3 Nominal Tube Voltage Drop at 2.8 ma ³	E _{td}	100	100	Vdc
3.4 Anode Series Limiting Resistor	R _p	18	36	ohms
3.5 Cathode Pre-bias Voltage ⁴	E _{kk}	50	50	Vdc
3.6 Screen Series Limiting Resistor	R _s	180	180	Kilohms
3.7 Screen Supply Voltage	E _{ssh}	0	0	Vdc
3.8 "On" Anode Current	I _a	2.8	2.8	madc
3.9 "On" Cathode Current	I _k	2.5	2.5	madc

Note 2: E_{bb} may be as stated. However, the use of the highest voltage available, with an appropriate series resistor to maintain anode current within the specified units, is recommended.

Note 3: For other conditions of "on anode supply voltage", the series limiting resistor should be calculated on the basis of an anode current design center of 2.8 ma & a nominal tube voltage drop of 100 volts.

Note 4: Cathode pre-bias voltage is defined as the potential difference which must be maintained between "on" and "off" cathodes to avoid objectionable background glow.

4.0 **Visual Characteristics:**

- 4.1 Color - Neon red;
- 4.2 Uniformity of cathode glow: All glow shall be confined to the cathode apex and all numerals shall be distinguishable.
- 4.3 Light Output: Minimum Light Output for individual cathodes at recommended operating conditions is .5 foot candles. Light Output of each

UNLESS OTHERWISE SPECIFIED XXX ±	DO NOT SCALE DRAWING	GENL. QUAL SPECS APPLY	SCALE	DRAWN	DATE
MATERIAL				CHECKED	
FINISH TREATMENT	SURFACE TREATMENT			DSGN	

DRAWING CONTROL ENGINEERING

numeral is measured with a foot-candle meter and an eye-corrected Photronic cell. The entire cell area is illuminated and is coupled to the tube by a light-tight cylinder so that the face of the cell is 1.25 inches from pin number 3.

5.0 Environmental Ratings: The B-5025 has been designed to meet the following requirements:

- 5.1 Salt Spray: MIL-STD - 202C, method 101B, Cond. A 96 hours.
- 5.2 Shock: 500 lbf-millicsec duration 1/2 sine wave pulse
- 5.3 Vibration: 50 CPS 10G, 5 minutes in each of 3 planes.
- 5.4 Altitude: 70,000 ft.
- 5.5 Temperature: -65°C to 70°C
- 5.6 Humidity - MIL-STD-202C Method 103B, Condition B

6.0 Life Expectancy:

6.1 Life tests listed below are for implant quality assurance only.

- 6.2 Life Test Conditions (see para. 7.4)
 - 6.2.1 "On" Anode Supply Voltage - 150 Volts
 - 6.2.2 "Off" Anode Supply Voltage - 70 Volts
 - 6.2.3 Anode Series Limiting Resistor - 18 Kilohms
 - 6.2.4 Cathode Pre-bias Voltage - 50 Volts
 - 6.2.5 Screen Voltage - 0 Volts
 - 6.2.6 Screen Limiting Resistor - 180 Kilohms

6.3 Static Life Test
 6.3.1 One numeral glowing steadily for 1,500 hours.

6.4 Dynamic Life Test
 6.4.1 Sequential counting at 1 cps with a duty cycle greater than 90% for 1,500 hours.

6.5 Life test end points:
 6.5.1 No cathode shall have glow on other than the cathode area and all numerals shall be distinguishable.

6.5.2 Anode current:

	<u>Limit</u>	
Min.	Max.	Units
1.0	2.0	milliamps

7.0 Assembly Data:

- 7.1 Test Conditions
 - 7.1.1 $E_{bb} = 150$ Volts
 - 7.1.2 $E_{pk} = 50$ Volts
 - 7.1.3 $E_p = 10K$
 - 7.1.4 $R_{cath} = 0$
 - 7.1.5 $R_a = 100K$
 - 7.1.6 $E_{bb} = 70V$

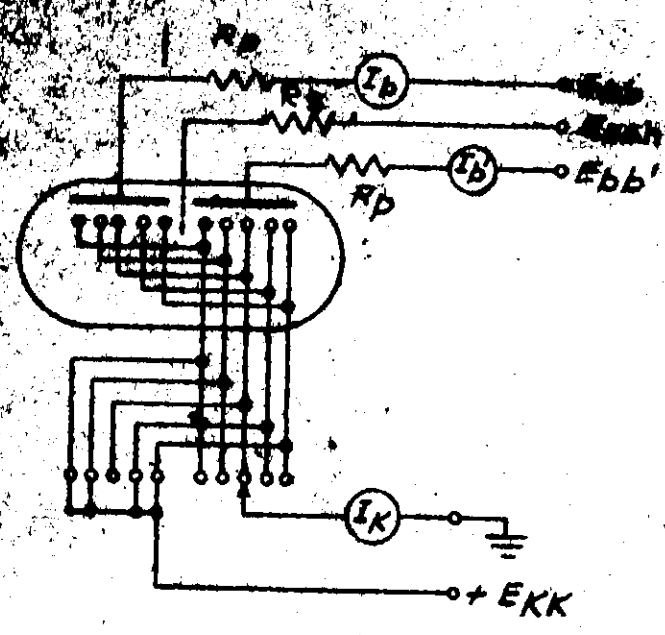
DRAWING CONTROL-ENGINEERING

CHECKS OTHERWISE SPECIFIED DIM ± ANOLES ±	DO NOT SCALE DRAWING	GENL QUAL SPECS APPLY	SCALE	DRAWN	DATE
MATERIAL				CHECKED	
HEAT TREAT	SURFACE TREATMENT			DSGN	

WARRANTY SPECIFICATION, NIXIE TUBE TYPE 53025

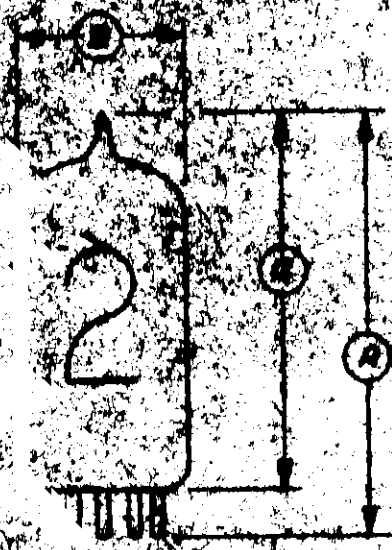
- 1.0. Cathode Circuit
- 1.1. Uniformity of cathode glow
- 1.2. Heat Circuit

Conditions: Individual cathodes shall exhibit glow on the entire area. There shall be no evidence of pin or lead glow.



DRAWING CONTROL-ENGINEERING

DO NOT SCALE DRAWING	GENL. QUAL. SPEC. APPLY	SCALE	DRAWN	DATE
			CHECKED	
			DSGN	



**S.O. MECHANICAL
Design Capability**

Dimension	Limits	
	MIN.	MAX.
A		
B		
C		.050
D	.500	.500

For proper viewing Fig. 8 & 9 should be aligned with Fig. 8 in front.



DRAWING CONTROL-ENGINEER

DATE MADE	DATE USED	SCALE	DRAWN
	WHICH APPLY	FULL	<i>P. Schwartz</i>
			CHECKED
			DESN

Burroughs Corporation
ELECTRONIC COMPONENTS DIV.
PLAINFIELD NEW JERSEY

X DWG. NO. 12925855
DATE 4.28.65
SHEET 1 of 5

TITLE: PRODUCT SPECIFICATION; MIXER TUBE TYPE B5030

REV. NO.	REVISIONS	APPROVALS
	PRE RELEASE - DWG	

REFERENCE COPY
CONSULT SPECIFICATIONS DEPT.
FOR LATEST ISSUE

TITLE

PRODUCT SPECIFICATION, NIXIE TUBE TYPE B5030

1.0 Description: The B-5030 NIXIE Tube is a cold cathode, gas filled side viewing bi-quinary numerical indicator containing mercury.

2.0 Ratings:

Parameter	Sym.	Min.	Max.	Units
2.1 Breakdown Voltage ¹	E_{bd}		160	Vdc
2.2 Anode Current	I_a		5	ma dc
2.3 Cathode Pre-bias Voltage	E_{kk}	40	120	Vdc
2.4 "Off" Anode Voltage	E_b'	90	110	Vdc
2.5 Screen Voltage	E_{sh}		85	Vdc
2.6 Ambient Temperature	TA	-65	70	°C
2.7 Altitude			70,000	Ft.

Note 1: Voltage necessary for breakdown between anode and cathode.

3.0 Typical Operating Conditions:

3.1 "On" Anode Supply Voltage ²	E_{bb}	180	300	Vdc
3.2 "Off" Anode Supply Voltage	E_{bb}'	100	100	Vdc
3.3 Nominal Tube Voltage Drop at 3.8 ma ³	E_{td}	142	142	Vdc
3.4 Anode Series Limiting Resistor	R_p	10	39	Kilohms
3.5 Cathode Pre-bias Voltage ⁴	E_{kk}	50	50	Vdc
3.6 Screen Series Limiting Resistor	R_s	180	180	Kilohms
3.7 Screen Supply Voltage	E_{ssh}	0	0	Vdc
3.8 "On" Anode Current	I_a	3.8	3.8	ma dc
3.9 "On" Cathode Current	I_k	3.0	3.0	ma dc

Note 2: E_{bb} may be as stated. However, the use of the highest voltage available, with an appropriate series resistor to maintain anode current within the specified limits, is recommended.

Note 3: For other conditions of "On Anode Supply Voltage", the series limiting resistor should be calculated on the basis of an anode current design center of 3.8 ma and a nominal tube voltage drop of 142 volts.

Note 4: Cathode pre-bias voltage is defined as the potential difference which must be maintained between "on" and "off" cathodes to avoid objectionable background glow.

4.0 Visual Characteristics:

- 4.1 Color - Neon red;
- 4.2 Uniformity of cathode glow: All glow shall be confined to the cathode area and all numerals shall be distinguishable.
- 4.3 Light Output: Minimum Light Output for individual cathodes at recommended operating conditions is .5 foot candles. Light output of each numeral is

IF OTHERWISE SPECIFIED ANGLES ±	DO NOT SCALE DRAWING	GENL QUAL SPECS APPLY	SCALE	DRAWN <i>[Signature]</i>	DATE 1/22/65
MATERIAL				CHECKED <i>[Signature]</i>	1/22/65
HEAT TREATMENT	SURFACE TREATMENT			DSGN <i>[Signature]</i>	

TITLE

PRODUCT SPECIFICATION, NIXIE TUBE TYPE B-5030

measured with a foot-candle meter and an eye-corrected Photronic cell. The entire cell area is illuminated and is coupled to the tube by a light-tight cylinder so that the face of the cell is 1.25 inches from pin number 1.

5.0 Environmental Ratings: The B-5030 has been designed to meet the following requirements:

- 5.1 Salt Spray: MIL-STD-202C, method 101B, Cond. A
- 5.2 Shock: 50G 1111 millisec duration 1/2 sine wave pulse.
- 5.3 Vibration: 10-50-10 cps. 08" excursion, 5 minutes in each of 3 planes. X,Y,Z.
- 5.4 Altitude: 70,000 ft.
- 5.5 Temperature: -65°C to 70°C
- 5.6 Humidity - MIL-STD-202C, method 103B, Condition B.

6.0 Life Expectancy:

6.1 Life tests listed below are for implant quality assurance only.

6.2 Life Test Conditions (see para. 7.4).

- 6.2.1 "On" Anode Supply Voltage - 180 Volts
- 6.2.2 "Off" Anode Supply Voltage - 100 Volts
- 6.2.3 Anode Series Limiting Resistor - 10 Kilohms
- 6.2.4 Cathode Pre-bias Voltage - 50 Volts
- 6.2.5 Screen Voltage - 0 Volts
- 6.2.6 Screen Limiting Resistor - 180 Kilohms

6.3 Static Life Test

- 6.3.1 One numeral glowing steadily for 500 hours

6.4 Dynamic Life Test

- 6.4.1 Sequential counting at 1 cps with a duty cycle greater than 90% for 1000 hours.

6.5 Life test end points:

- 6.5.1 No cathode shall have glow on other than the cathode area and all numerals shall be distinguishable.

6.5.2 Anode current:

	Limits		
	MIN.	MAX.	UNITS
	7.0	5.0	milliamps

7.0 Acceptance Tests:

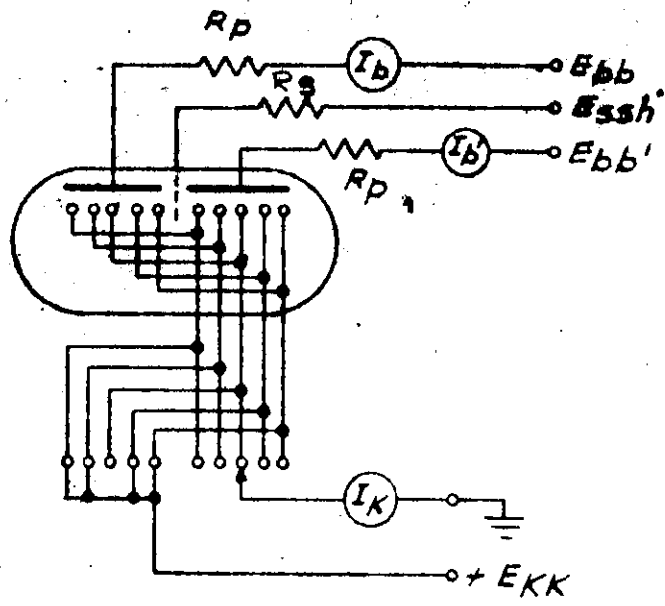
7.1 Test Conditions

- 7.1.1 E_{ob} = 180 Volts
- 7.1.2 E_{ck} = 50 Volts
- 7.1.3 R_p = 10K
- 7.1.4 E_{sh} = 0
- 7.1.5 R_s = 180 K
- 7.1.6 E_{ob}' = 100 V

UNLESS OTHERWISE SPECIFIED XXX ±	ANGLES ±	DO NOT SCALE DRAWING	GENL QUAL SPECS APPLY	SCALE	DRAWN	DATE
MATERIAL					CHECKED	
SURFACE TREATMENT					DSON	

TITLE
PRODUCT SPECIFICATION, NIXIE TUBE TYPE B5030

Test	Conditions	Sym.	Limits		Units
			Min.	Max.	
7.2 Anode Current	Individual cathodes shall exhibit glow on the entire area., There shall be no evidence of pin or lead glow.	I_b	2.8	4.8	ma
7.3 Uniformity of cathode glow:					
7.4 Test Circuit					



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	DO NOT SCALE DRAWING	GENL QUAL SPECS APPLY	SCALE	DRAWN	DATE
MATERIAL				CHECKED	
TREATMENT	SURFACE TREATMENT			DSGN	

878/1

Burroughs Corporation

ELECTRONIC COMPONENTS DIV
PLAINFIELD NEW JERSEY

Part No. **A12853693**

Date **6-18-63**

PRODUCT SPECIFICATION - ALPHA - NUMERIC
INDICATOR B-5971

SHEET 1 OF 8

REVISION		STATUS																DESCRIPTION	DRAFTSMAN	CHECKER	
LTR	NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16				
A	PCN # 2183	A	A	A	A	A	A	-	A									REVISED	SHF 7/10/67		

REFERENCE COPY
 9/1 8/ 1966
 CONSULT RECORDS DEPT.
 FOR LATEST ISSUE

8781

REV NO	REVISIONS	Burroughs Corporation ELECTRONIC COMPONENTS DIV. Plainfield, New Jersey	SHEET OF	2 8	DWG. NO	A12853693
		TITLE Product Specifications, Electron Tube, Type B5971 (Note 1)				

DESCRIPTION: Gas-filled Cold Cathode, Alphanumeric Indicator, Standard Size, Long Life.

RATINGS:

Parameter:	Ebb	Ia	Ik8	Ik10, Ik13	Ik1 thru Ik12 (Except Ik8, Ik10)	Rp	TA	Alt.
Unit:	Vdc	mA dc	mA dc	mA dc	mA dc	Ohms	°C	ft.
Maximum:	(NOTE 12)	12	3.0	1.5	1.7	-	-	-
Minimum:	-	-	-	-	-	-	-	-
Test Conditions:	170	-	-	-	-	6.8K ±1%	-	-
Dimensions:	See Figure 2			Base: Button - 14 - Pin				
Pin Number:	See Figure 2			Characteristic Curve: See Figure 1				

PAR. NO.	TEST	CONDITIONS	SYM.	LIMITS		UNITS
				MIN.	MAX.	
- - - -	Uniformity of Cathode Glow	Individual Cathodes Notes 2, 3	Ik	50	-	vdc
- - - -	Anode Current	Notes 2	Ia	-	7.0	mA dc
4.10, 4.6	Cathode Current (Individual)	Cathode under test kA	Ik	-	4.5	mA dc
4.13.1.1	Ionisation Voltage (1)	Ambient Illumination 5-50 foot-candles	Ebb	-	165	Vdc
- - - -	Leakage Current	Ebb=60 Vdc Rp=2.4 MEG Note 4	LI _b	-	5.0	vdc

UNLESS OTHERWISE SPECIFIED		SCALE	DRAWN BY	SIG	DATE
FRACTIONS ±	DECIMALS ±	ANGLES ±	LAA	7/8/63	
MATERIAL SPECIFICATION			CHECKED BY		
SURFACE TREATMENT		HEAT TREATMENT	DESIGNED OR ENGINEERED BY		
			A.S. 7-8-63		
PROPERTY OF BURROUGHS CORPORATION - NOT TO BE REPRODUCED NOR USED FOR			APPROVED BY		

TITLE Product Specifications, Electron Tube, Type B-5971	(Note 1)
---	----------

<u>PAR. NO.</u>	<u>TEST</u>	<u>CONDITIONS</u>	<u>LIMITS</u>			
			<u>SYM.</u>	<u>MIN.</u>	<u>MAX.</u>	<u>UNITS</u>
	<u>Design Test</u> (Note 6)					
- - - -	Shock	(1) G-350 1 \pm .5 millisecond duration (2) G-50 11 \pm 1 millisecond duration Note 7, 9	-	-	-	-
- - - -	Vibration	(1) 10-50-10 cps, .08" total t-15 minutes; Note 8, 9	EXCURSION	-	-	-

UNLESS OTHERWISE SPECIFIED			SCALE	DRAWN BY	SIG.	DATE
FRACTIONS \pm	DECIMALS \pm	ANGLES \pm				
MATERIAL SPECIFICATION			CHECKED BY			
SURFACE TREATMENT		HEAT TREATMENT	DESIGNED OR ENGINEERED BY			

TITLE PRODUCT SPECIFICATION SHEET
ELECTRON TUBE, TYPE B-5971

Method or Para.	Requirement or Test	Conditions	Sym.	Limits		Unit
				Min.	Max.	
	LIFE TEST NOTE 13					
4.7	Life Test (1)	Sequential counting; 1 cps, group C (Note 10) t = 1000 hours	-	-	-	-
4.7.3	Life Test (1) end points	Anode Current all cathodes ionized	I _a	-	7.0	mA dc
		Uniformity of Cathode Glow; all cathodes ionized	-	-	-	-
		Light Output	-	.5	-	ftC
		Leakage Current	LI _b	-	10.0	uA dc
4.7	Life Test (2)	One character glowing steadily; group C (Note 11) t=500 hours	-	-	-	-
4.7.3	Life Test (2) end points	Anode Current all cathodes ionized	I _a	-	7.0	mA dc
		Uniformity of Cathode Glow; (Note 11)	-	-	-	-
		Light Output	-	.5	-	ftC
		Leakage Current	LI _b	-	10.0	uA dc

UNLESS OTHERWISE SPECIFIED .XXX ±	ANGLES ±	DO NOT SCALE DRAWING	GENL QUAL SPECS APPLY	SCALE	DRAWN	DATE
MATERIAL					CHECKED	
HEAT TREATMENT		SURFACE TREATMENT			DSGN	
PROPERTY OF BURROUGHS CORPORATION - NOT TO BE REPRODUCED NOR USED FOR					APPROVAL	

TITLE
Product Specifications, Electron Tube, Type B-5971 (Note 1)

NOTES:

1. All paragraph references are to MIL-E-1.
2. The tube shall be tested with all cathodes ionized.
3. These tests were performed during the design evaluation and are not performed on an AQL basis.
4. Leakage current shall be read from one element to all others and shall be within the limit specified.
5. There shall be no evidence of pin or lead glow, or dull or partial areas on any of the cathodes.
6. These tests were performed during the design evaluation and are not performed on an AQL basis.
7. Shock test shall be made on any shock machine capable of producing a half-sine wave-shock waveform of the specified duration and amplitude. No voltages shall be applied during this test. Each tube shall be subjected to a total of 20 shocks, i.e.: five shocks in each of positions X, Y, Z+, and Z- in any sequence. This is a destructive test.
8. The tubes shall be mounted in each of three planes, X1, X2, and Y1 for one third of the total excitation time. On each plane all cathodes shall be energized at the test conditions.
9. No permanent shorts will be permitted.
10. The tubes shall be energized with a duty cycle greater than 90 percent. The life test is to be run with a ten position stepper using the following procedure:

<u>Cathodes Energized</u>	<u>Frequency</u>	<u>Stepper Position</u>
1,2,3,4,5,6	four times	1,3,5,7
10,13	three times	2,4,6
9,11	two times	8,10
7,8,12	once	9

11. The test is to run with cathodes 1,2,3,4,5,6 ionized.
12. When operated in the Common Anode Resistor mode of operation, as described in this specification, the Anode Supply voltage should be regulated at 170 \pm 2 volts in order to limit overloading of the individual cathodes.

UNLESS OTHERWISE SPECIFIED			SCALE	DRAWN BY	SIG. <i>L.P.C.</i>	DATE <i>7-11-52</i>
FRACTIONS \pm	DECIMALS \pm	ANGLES \pm				
MATERIAL SPECIFICATION				CHECKED BY		
SURFACE TREATMENT			HEAT TREATMENT		DESIGNED OR ENGINEERED BY	
PROPERTY OF BURROUGHS CORPORATION - NOT TO BE REPRODUCED NOR USED FOR				APPROVED BY		

Burroughs Corporation
 ELECTRONIC COMPONENTS DIV.
 PLAINFIELD NEW JERSEY



SHEET
6
OF 8

DWG. SIZE
A

DWG. NO.
12853693

REV.
A

TITLE
PRODUCT SPECIFICATIONS, ELECTRON TUBE, TYPE B-5971 (NOTE 1)

13. The life tests are for in-plant quality assurance only. The conditions of operation are E_b 170 Vdc, $R_p=6.8K$.

UNLESS OTHERWISE SPECIFIED .XXX ±	ANGLES ±	DO NOT SCALE DRAWING	GENL QUAL SPECS APPLY	SCALE	DRAWN	DATE
MATERIAL					CHECKED	
HEAT TREATMENT		SURFACE TREATMENT			DSGN	

DRAWN BY:

DATE:



BURROUGHS CORPORATION
ELECTRONIC TUBE DIVISION
PLAINFIELD, N. J.

SHEET 7
OF 8

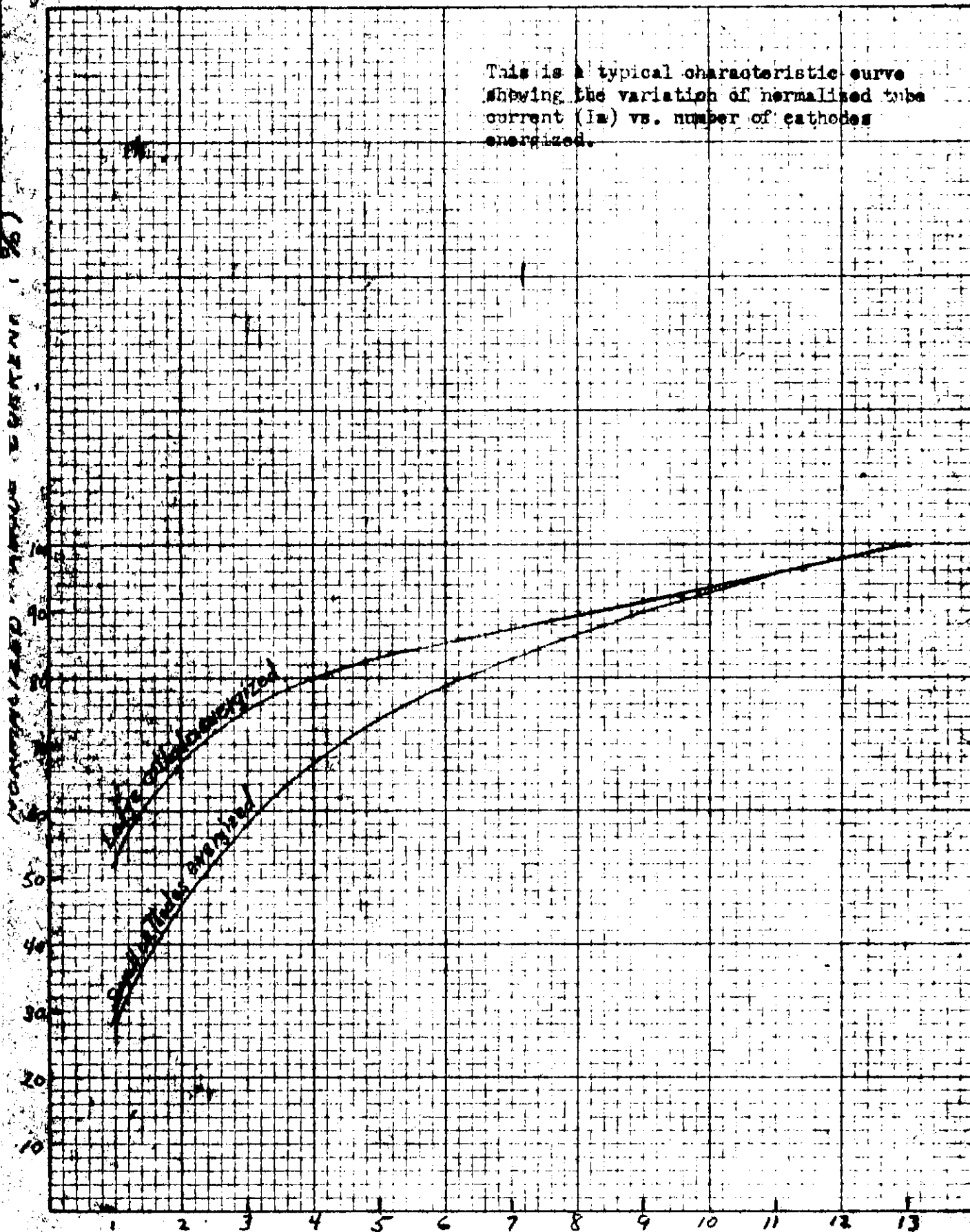
DWG NO A1285369

TITLE

Normalized Anode Current vs. Number of Cathodes Energized

FIG. No. 1

This is a typical characteristic curve showing the variation of normalized tube current (I_a) vs. number of cathodes energized.

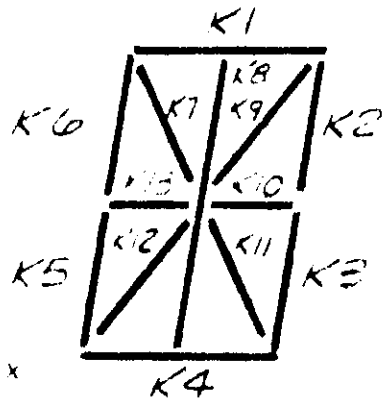
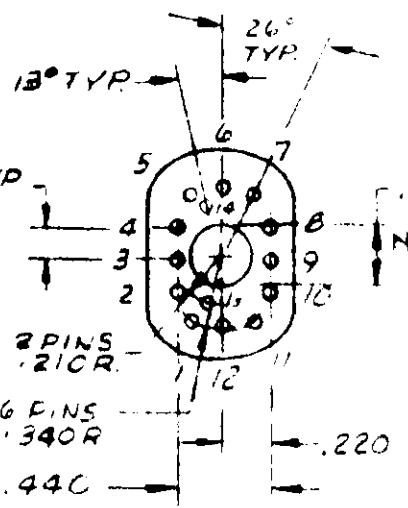
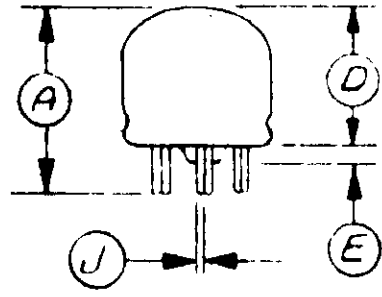
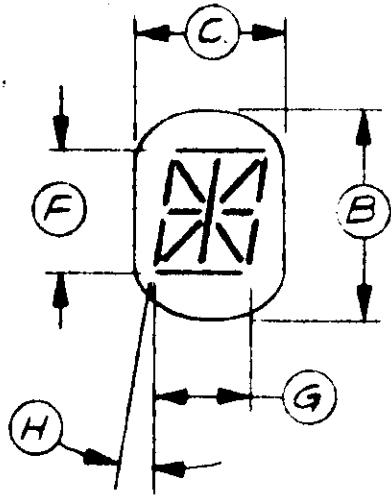


TITLE PRODUCT SPECIFICATION SHEET
ELECTRON TUBE TYPE B-5971

FIGURE 2

QUALITY CONFORMANCE INSPECTION

DIM	LIMITS	
	MIN	MAX.
A	.840	.960
B	.920	1.020
C	.700	.790
D	.600	.700
E	--	.064
F	.625	
G	.445	
H	8°	12°
J	.038	.042



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

1. TIP OFF SHALL NOT EXTEND BEYOND THIS DIMENSION.
2. FOR PROPER POSITION OF CATHODE ONE (K1) PINS 6 AND 12 SHOULD BE VERTICALLY ALIGNED WITH PIN 12 ON TOP.
3. UNDIMENSIONED DIMENSIONS ARE REFERENTIAL.
NOTED

UNLESS OTHERWISE SPECIFIED .XXX ± _____ ANGLES ± _____	DO NOT SCALE DRAWING	GENL. QUANT. SABCS. APPLY	SCALE 1	DRAWN R. Schmitt	DATE 7-26-66
MATERIAL				CHECKED M. F. [Signature]	7-27-66
HEAT TREATMENT	SURFACE TREATMENT			DSGN	

TITLE Product Specification, Tube Type B-4998

Description:

The B-4998 is a Cold Cathode, Gas-filled, Rectangular, Wide Viewing Angle, Miniature, Numerical Indicator containing mercury.

Absolute Maximum Ratings:

Parameter	Sym.	Min.	Max.	Units
2.1 Supply Voltage	E_{bb}	170	-	Volts dc
2.2 Cathode Current	I_k	-	2.5	Milliamperes
2.3 Ambient Temperature	T_a	-40	70	°C
2.4 Altitude	-	-	70,000	Feet

3.0 Typical Operating Conditions (at 25°C):

Parameter	Sym.	Units	$E_{bb}=170V$	$E_{bb}=200V$	$E_{bb}=250V$
3.1 Load Resistor	R_p	Kilohms	15	36	62
3.2 Cathode Current	I_k	Milliamperes	1.4	1.4	1.4
3.3 Potentials to extinguish background glow (1 cathode energized)	V_{pb}	Volts	65	65	65

4.0 Visual Characteristics:

- 4.1 **Color** - Neon Red; maximum intensity lines grouped around 3650, 4358, 5654 and 5852 Angstroms.
- 4.2 **Uniformity of Cathode Glow** - The cathode glow shall appear uniform to the unaided eye when viewed at a distance greater than twelve (12) inches. When a cathode is grounded in the test circuit, the only glow shall be from the numeral grounded.
- 4.3 **Viewing Angle** - When mounted in a vertical position, the minimum included horizontal viewing angle shall be 100°. The vertical included viewing angle shall be ± 25° from the horizontal.
- 4.4 **Light Output** - The numeral under test light output shall be a minimum of .1 foot candles. Light Output is measured with a foot candle meter and an eye-subtracted photronic cell. The entire cell area is illuminated and is coupled to the tube by a light-tight cylinder so that the face of the cell is 1-1/4 inches from the tube base.
- 4.5 **Numeral Shape** - The shape of the numerals shall be as shown in Para. 8.4

8790

CLASS CODE 2-1001

DO NOT SCALE DRAWING	GENL QUAL SPECS APPLY	SCALE	DRAWN A. Gross	DATE 12-23-64
			CHECKED J. J. J.	12-23-64
			DSGN A. Gross	12-23-64

Burroughs Corporation ELECTRONIC COMPONENTS DIV. PLAINFIELD NEW JERSEY	SHEET 3 OF 6	DWG. SHEET NO. A X 12885547 A	REV. A
	TITLE Product Specification, Tube Type B-4998		

TESTING:

The following tests were performed as a part of the design evaluation, and not conducted on an AQL basis.

5.0.1 The tube shall exhibit normal operation when sequencing through each digit with reference to Para. 5.1 - 5.5.

5.1 **Temperature** - When operated in test circuit of Para. 7.5 over the temperature range of -40°C to $+70^{\circ}\text{C}$, the individual cathode currents shall be within the range of 0.8 to 2.4 ma. When operated in a test circuit at normal room temperature, the individual cathode currents shall be within the range 1.0 to 2.0 ma. Verification temperatures shall be -40°C , $+70^{\circ}\text{C}$ and room temperature.

5.2 **Insensitivity FREQUENCY** - Conditions in accordance with MIL-STD-202, Method 105, Condition D.

5.3 **Insensitivity** - Conditions in accordance with MIL-STD-202, Method 103, Condition A.

5.4 **Pressure** - The tube shall be capable of withstanding a pressure of 30 PSIA.

5.5 **Vibration** - Conditions in accordance with MIL-STD-202, Method 204, Condition A.

5.6 **Shock** - Shock characteristics and orientation in accordance with MIL-STD-202, Method 205, Condition B. The shock characteristic shall be a half-sine wave pulse, 50g, 11 ± 1 millisecond duration.

5.7 **Thermal Shock** - Conditions in accordance with MIL-STD-202, Method 102, Condition A.

5.8 **Soak TEST** - Conditions in accordance with MIL-STD-202B, Method 101A, Condition A, 96 hours.

5.9 **Soldering Heat** - The tube shall not be damaged by lead heating in accordance with MIL-STD-202, Method 210, Condition A at a distance 0.3 inches from the glass.

5.10 **Weight** - The weight of the tube shall not exceed 0.2 ounce.

5.11 **Ignition Time** - Time measurements shall be made in the test circuit, Para. 7.5, over temperature range of -40°C to $+70^{\circ}\text{C}$ with either an ambient light level not to exceed 5 foot candles or with an anode current of 5 micro amperes. Verification temperatures shall be -40°C , $+70^{\circ}\text{C}$ and room temperature.

5.11.1 **Initial Ignition Time** - Glow discharge shall occur within 25 milli seconds after the ionization potential is applied.

8790

CLASS CODE 2-1001

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES	DO NOT SCALE DRAWING	GENL QUAL SPECS APPLY	SCALE	DRAWN	DATE
				CHECKED	
SURFACE TREATMENT				DESIGN	

TITLE
Product Specification, Tube Type B-4998

5.21.2 Transfer Ionization Time - With one cathode energized, the existing glow discharge shall return within 200 uses, when the ionization potential is re-applied to the same or another cathode within 3000 micro sec.

5.18 Brightness - When operated at normal room temperature in the test circuit of Para. 7.5, the brightness of the numerals shall be at least 50-foot lamberts.

6.0 Life Summary:

6.1 Life tests listed below are for in-plant quality assurance only.

6.2 Life Test Conditions:

- 6.2.1 Supply Voltage E_{bb} = 170 Volts
- 6.2.2 Anode Resistor R_p = 15 Kiloohms
- 6.2.3 Test Circuit (See Paragraph 7.5)
- 6.2.4 Ambient Temperature = 25°C

6.3 Static Life Test - One numeral glowing steadily for 1000 hours.

6.4 Dynamic Life Test - Sequential counting at 1 cps with a duty cycle greater than 90% for 2000 hours.

6.5 Life Test End Points

6.5.1 No cathode shall have glow on other than the cathode area and all numerals shall be distinguishable.

6.5.2 Cathode Current:

Limits		Units
Min.	Max.	
.8	2.4	Milliamps

6.6 Service Life Guarantee Storage - Burrhoughs guarantees normal operation after storage under the following conditions: One year at any temperature between -40°C and +15°C; one week at any temperature between +15°C and +70°C. Verification temperatures shall be +25°C, -40°C and +70°C respectively. Substantiating data shall not be required from the vendor.

6.7 Service Life Guarantee Dynamic Operation - Burrhoughs guarantees the tube after operation for 2000 hours at any temperature between 0°C and +70°C and after dynamic operation for one week at any temperature between -40°C and 0°C. All characters shall then be readable, and meet the provisions of Para. 5.1 with no more than a 50% decrease in total light output.

8790

CLASS CODE E-1001

DESIGNED BY JRK	CHECKED BY ADDRESS	DO NOT SCALE DRAWING	GENL QUAL SPECX APPLY	SCALE	DRAWN	DATE
APPROVED				CHECKED		
SURFACE FINISH				DESIGN		

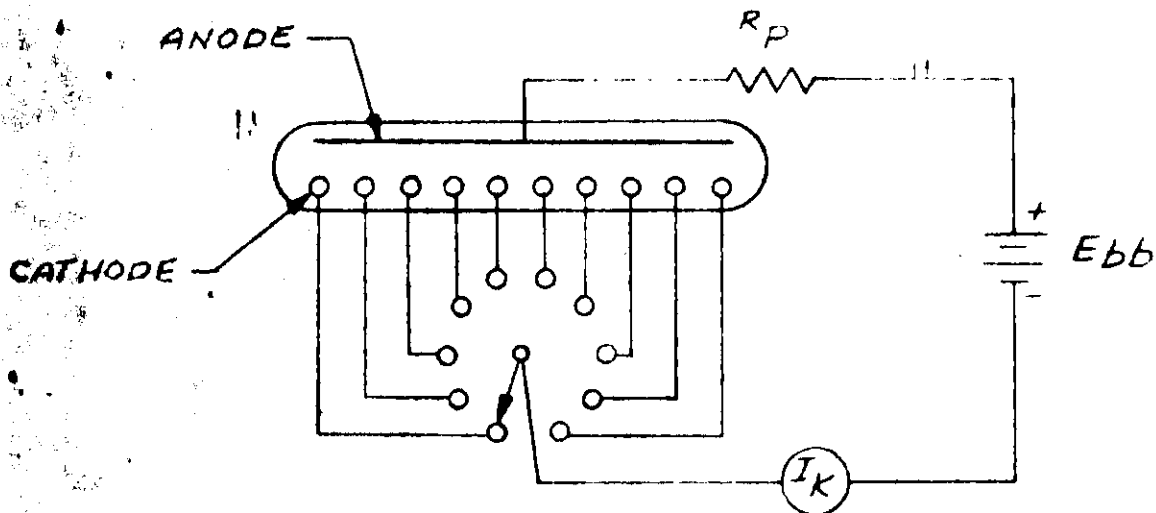
4.3 Service Life Guarantee, Failure Rate - The vendor shall guarantee the amount between failure of 10,000 component hours random failure rate. Failures outside of the above service life guarantees shall not be considered random. Substantiating data shall not be required from the vendor.

Acceptance Tests:

7.1 Test Conditions $E_{bb} = 170Vdc$; $R_p = 15$ Kiloohms

Test	Conditions	Sym.	Limits		Units
			Min.	Max.	
7.2 Radiation Voltage	Ambient Illumination = 5-50 foot candles	E_{bb}	-	170	VDC
7.3 Cathode Current		I_k	1.0	2.0	Milliamps
7.4 Uniformity of Cathode Glow	Individual cathodes shall exhibit glow on the entire area when a cathode is grounded in the test circuit, the only glow shall be from the numeral grounded.				

7.5 Test Circuit:



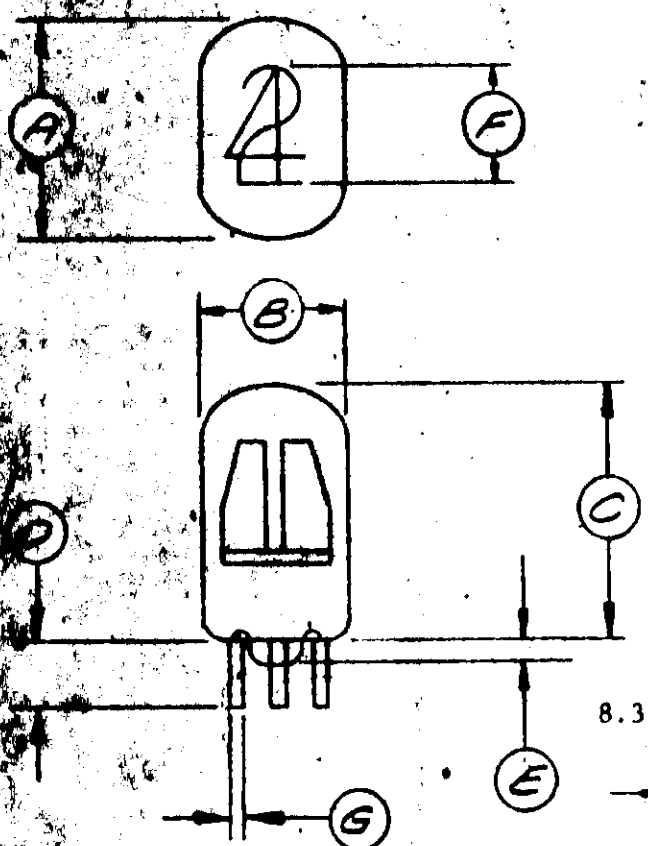
8790

CLASS CODE 2-1001

TITLE **Product Specification, Tube Type B-4998**

General Specifications:

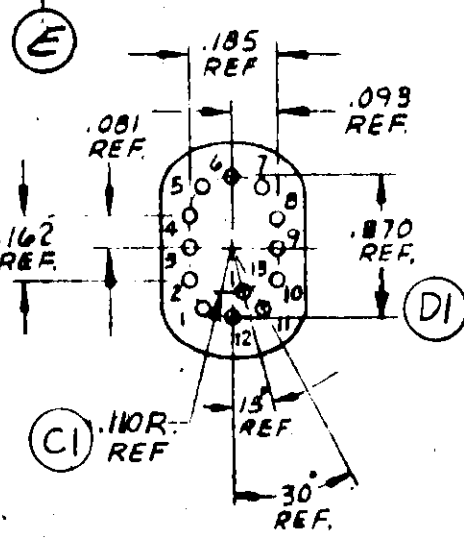
Orientation: The tube should be mounted
6 and 12 vertical with pin 6 on top.



8.5 Mechanical Dimensions

Dimension "	Limits	
	Min.	Max.
A		.625
B		.470
C		.750
D	.230	.250
E		.064
F	.295	.315
G	.018	.022

8.3 Pin Layout:



LEAD FINISH:
IRON ALLOY
WELDABLE LEAD,
UNTINNED.

8.6 Basing

Pin	Element
1	K2
2	K3
3	K4
4	K5
5	K6
6	Int. Con.
7	K7
8	K8
9	K9
10	K0
11	A
12	K1
13	Int. Con.

1234567890

8790

CLASS CODE 2-1001

8.4 Physical Shape:

AS OTHERWISE SPECIFIED	DO NOT SCALE DRAWING	GENL QUAL SPECS APPLY	SCALE	DRAWN	DATE
				CHECKED	
				DSON	