

QUICK REFERENCE DATA

Cold cathode, neon-filled, side-viewing indicator tube with long life expectancy. This tube incorporates a red filter to improve the contrast of display and is particularly suitable where many tubes are displayed side by side.

Numeral height	13	mm
	0.5	in
Minimum distance between mounting centres	19	mm
	0.75	in
Viewing angle	120	deg
Numerals	0, 1, 2, 3, 4, 5, 6, 7, 8, 9	
Cathode current	2	mA
Minimum supply voltage	170	V

CHARACTERISTICS AND RANGE VALUES FOR EQUIPMENT DESIGN (measured at 20 to 50°C unless otherwise stated)

The values given state the range over which the tube will operate both initially and during life. No allowance has been made for supply voltage and component variations.

IGNITION REQUIREMENTS

Minimum anode to cathode voltage	170	V
Ignition delay time	see page C1	

CONDUCTION REQUIREMENTS

D.C. Operation

Maximum cathode current (see note 1)	3.5	mA
Minimum cathode current	1.5	mA
Nominal anode to cathode maintaining voltage at 2.0mA (see page C4)	140	V
Probe current to individual non-conducting cathodes (I_{kk})	see pages C2 and C3	

Pulse Operation

Maximum cathode current, peak	12	mA
Maximum cathode current, average (Averaging time = 20ms)	2.5	mA
Minimum cathode current for satisfactory display, average	0.8	mA
Pulse duration		
Maximum	20	ms
Minimum	100	μ s
Anode to cathode maintaining voltage	see page C4	
Probe current to individual non-conducting cathodes	see pages C2 and C3	

EXTINCTION REQUIREMENTS

Maximum anode to cathode voltage to ensure extinction	115	V
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LIFE EXPECTANCY at recommended operating conditions and room temperature

Continuous display of one digit (see note 1)	>5000	h
Sequentially changing the display from one digit to the next every 100 hours or less	>30 000	h

LIMITING VALUES (ABSOLUTE)

Cathode current (each digit)

Maximum average (Maximum averaging time = 20ms)	3.5	mA
Maximum peak	12	mA
Minimum average during conduction	1.5	mA

Bulb temperature

Maximum	+70	°C
Minimum (see note 2)	-50	°C

MOUNTING POSITION

Any

The numbers are viewed through the side of the envelope. The numbers will appear upright (within $\pm 3^\circ$) when the tube is mounted vertically.

OPERATING NOTES

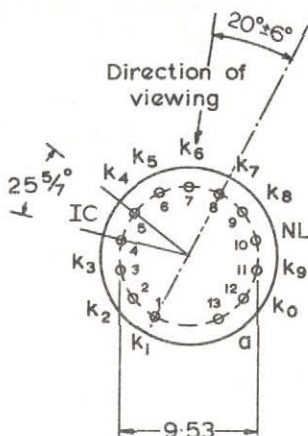
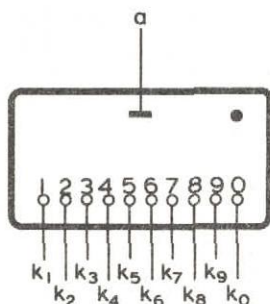
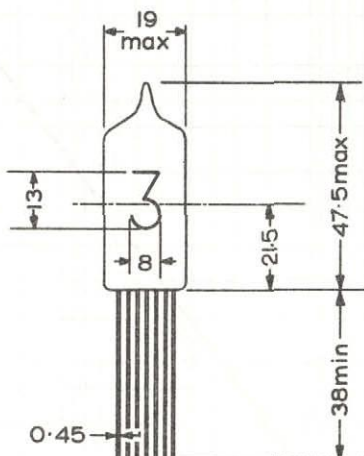
1. The life expectancy figures given above relate to operation with d.c. cathode currents between 1.5 to 2.5mA and at all permitted pulsed cathode currents. When a d.c. cathode current range of 1.5 to 3.5mA is used, the life expectancy exceeds 3000 hours with continuous display of one digit.
2. For bulb temperatures below 0°C the life expectancy of the tube is substantially reduced.

NUMERICAL INDICATOR TUBE

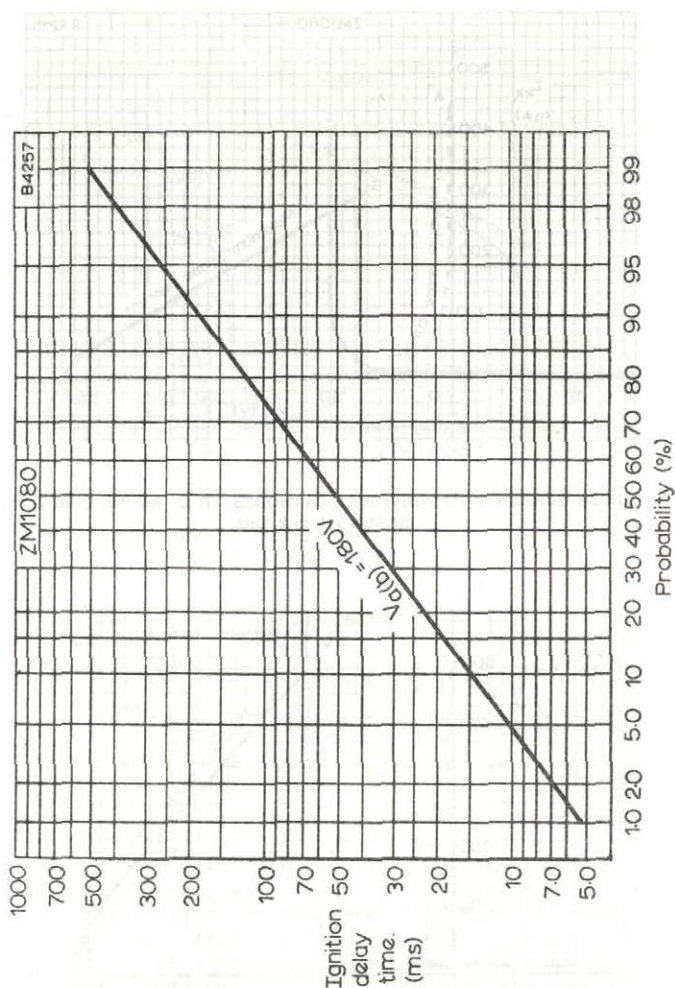
ZMI080

3. The leads are tinned and may be dip-soldered to a minimum of 5mm from the seals at a solder temperature of 240°C for a maximum of 10 seconds.
4. Care should be taken not to bend the leads nearer than 1.5mm from the seals.
5. The tube may be soldered directly into the circuit but heat conducted to the glass-to-metal seals should be kept to a minimum by the use of a thermal shunt.

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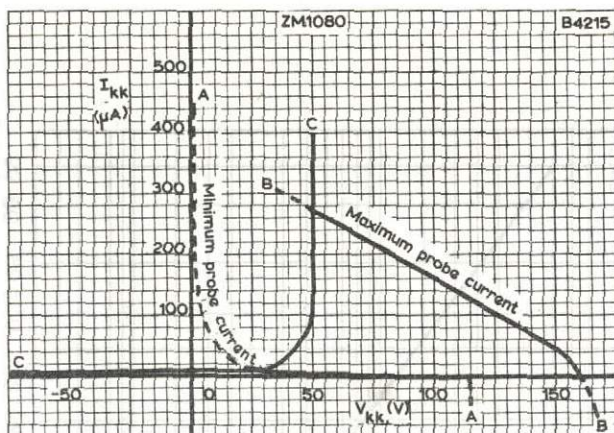


All dimensions in mm

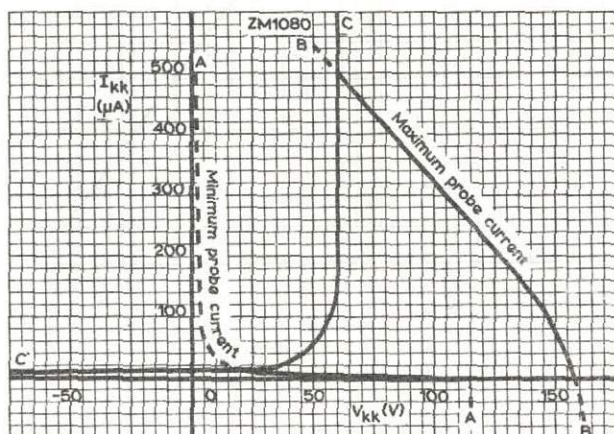


CUMULATIVE DISTRIBUTION OF IGNITION DELAY TIME

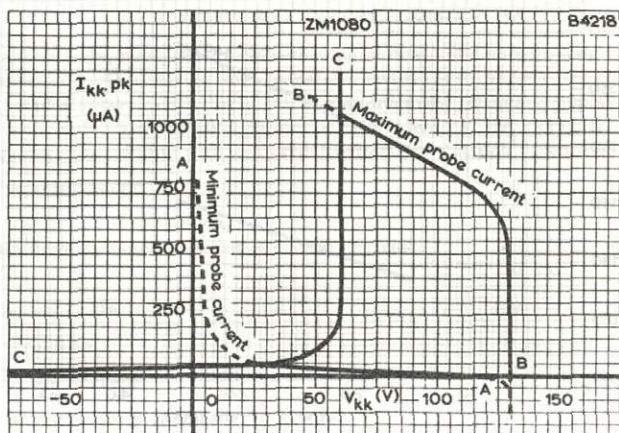
This curve shows the probability that a tube will ignite in less than the time shown after a non-conduction period of a few seconds. The ignition delay time will be appreciably reduced when the interval between conduction periods is less than 100 milliseconds. In general, an increase in the supply voltage will reduce the ignition delay time.



PROBE CURRENTS TO INDIVIDUAL CATHODES. D.C. ANODE CURRENT
RANGE 1, 5 to 2, 5mA



PROBE CURRENTS TO INDIVIDUAL CATHODES. D.C. ANODE CURRENT
RANGE 1, 5 to 3, 5mA



PEAK PROBE CURRENTS TO INDIVIDUAL CATHODES. PULSED ANODE CURRENT 10mA pk. 10% DUTY FACTOR

NOTE

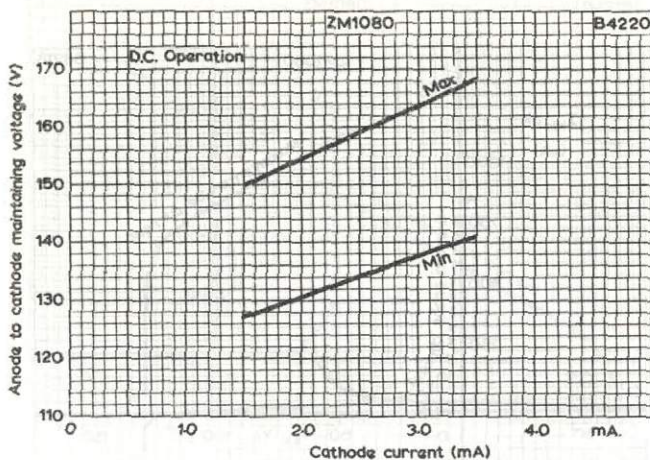
PROBE CURRENT CURVES

The boundaries A-A and B-B of the graphs represent, for the shown anode current ranges, the range of probe currents to individual non-conducting cathodes plotted against the voltage difference between the non-conducting cathodes and the conducting cathode.

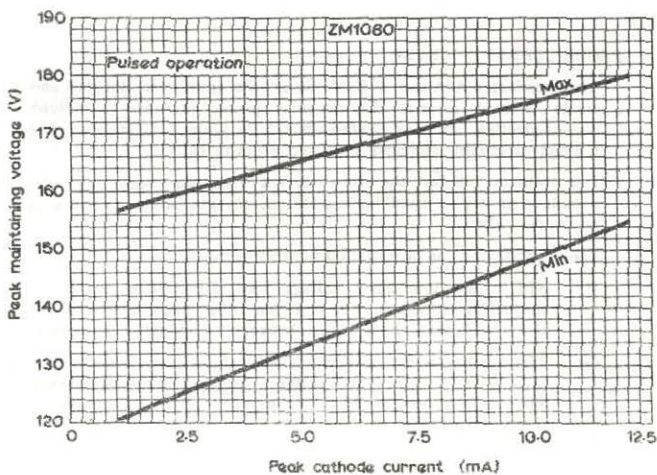
For optimum display, the probe current to any non-conducting cathode should be as low as possible. In addition, reverse probe current should not be permitted.

These conditions can be satisfied in two ways:-

- (1) With a low impedance voltage source connected to the non-conducting cathodes. For example, when using a current range of 1.5 to 2.5mA and a voltage between 50 and 115V is required.
- (2) With a separate high impedance connected to each non-conducting cathode and returned to a voltage source of less than 115V. In this case the load line of the voltage source must lie to the right of boundary C-C.



ANODE TO CATHODE MAINTAINING VOLTAGE PLOTTED AGAINST CATHODE CURRENT



PEAK MAINTAINING VOLTAGE PLOTTED AGAINST PEAK CATHODE CURRENT

