

QUICK REFERENCE DATA

Cold cathode, neon-filled, end viewing indicator tube with long life expectancy. The ZM1021 incorporates a red filter to improve visual contrast, and will form a compatible display with the ZM1020 numerical indicator tube. The ZM1023 is electrically identical with the ZM1021 but has no filter coating.

Character height	15.5	mm
	0.6	in
Characters	V A Ω μ + - %	
Cathode current	2.0	mA
Minimum supply voltage	170	V

CHARACTERISTICS AND OPERATING CONDITIONS (measured at room temperature unless otherwise stated)

Minimum anode-to-cathode voltage necessary for ignition	170	V
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Anode-to-cathode voltage below which all tubes will extinguish	120	V
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D. C. operation (see page 4)

Recommended cathode current	2.0	mA
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Nominal anode-to-cathode maintaining voltage at 2.0mA (see page 5)	140	V
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Minimum positive bias on non-conducting cathodes (see note 1 and page 6)	60	V
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Half wave a. c. supply (see page 4)

Recommended cathode current

Average	1.5	mA
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Peak	7.0	mA
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Minimum positive bias on non-conducting cathodes (see note 1 and page 7)	40	V
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LIFE EXPECTANCY (at recommended operating conditions and room temperature (see notes 1 and 2)

Continuous display of one character	> 5000	h
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Sequentially changing the display from one character to the others, every 100 hours or less	> 30 000	h
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RATINGS (ABSOLUTE MAXIMUM SYSTEM)

Cathode current (each character)

Maximum average (averaging time = 20ms)	2.5	mA
Maximum peak	10	mA
Minimum for d.c. operation	1.0	mA
Maximum negative current	0	mA

Bulb temperature

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

MOUNTING POSITION

Any. The characters are viewed through the dome of the envelope. The characters will appear upright (within $\pm 1.5^\circ$) when the tube is mounted with the line through pins 1 and 8 vertical, pin 8 uppermost.

OPERATING NOTES

1. To obtain a good indication over life, the voltage between the conducting and remaining cathodes should be greater than the values specified. These conditions are automatically satisfied when the non-conducting cathodes are isolated by, for example, mechanical contacts. It should be noted when using the curves on pages 6 and 7 that the probe current is not shared equally between non illuminated cathodes.
2. Bulb temperatures below 10°C result in a reduced life expectancy and changes in characteristics.
For operation in equipment to be used within a wide temperature range, the use of constant current operation (high supply voltage and high anode resistor) is recommended.

ACCESSORY

Valve holder

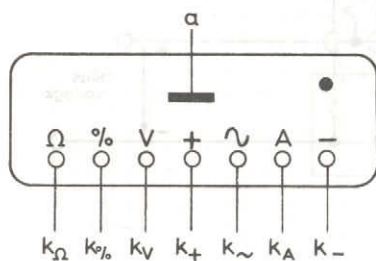
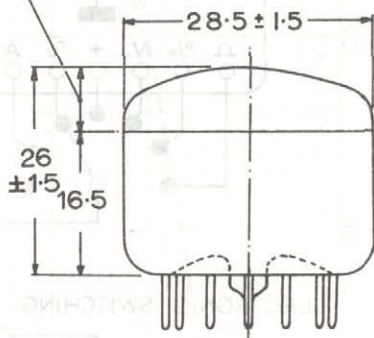
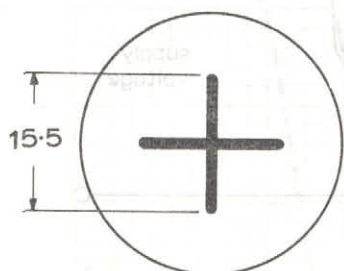
B8 700 67



CHARACTER INDICATOR TUBES

ZM1021
ZM1023

This part of the bulb is
filter coated (ZM1021 only)



B13B Base

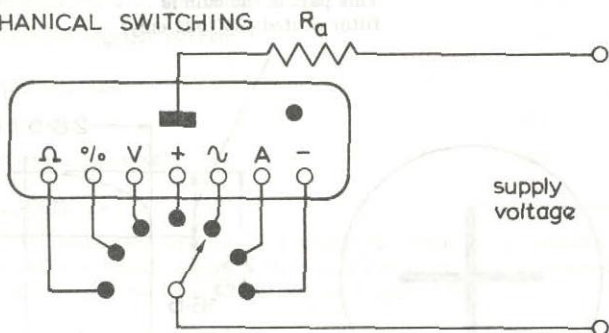
All dimensions in mm



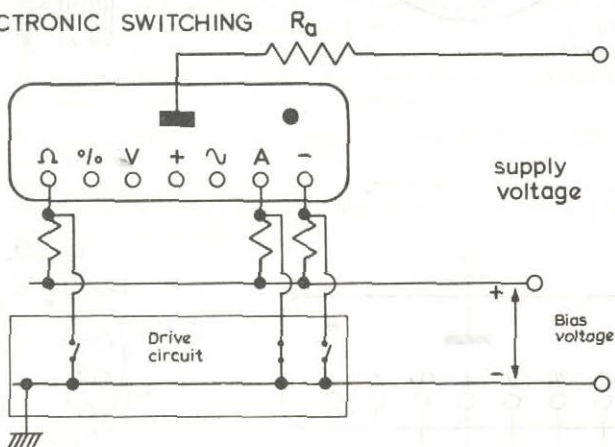
APPLICATION CIRCUITS

86753

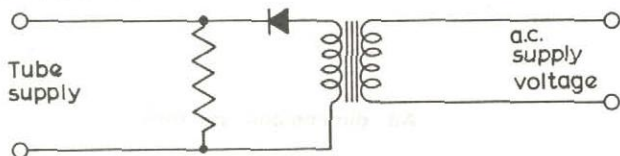
MECHANICAL SWITCHING



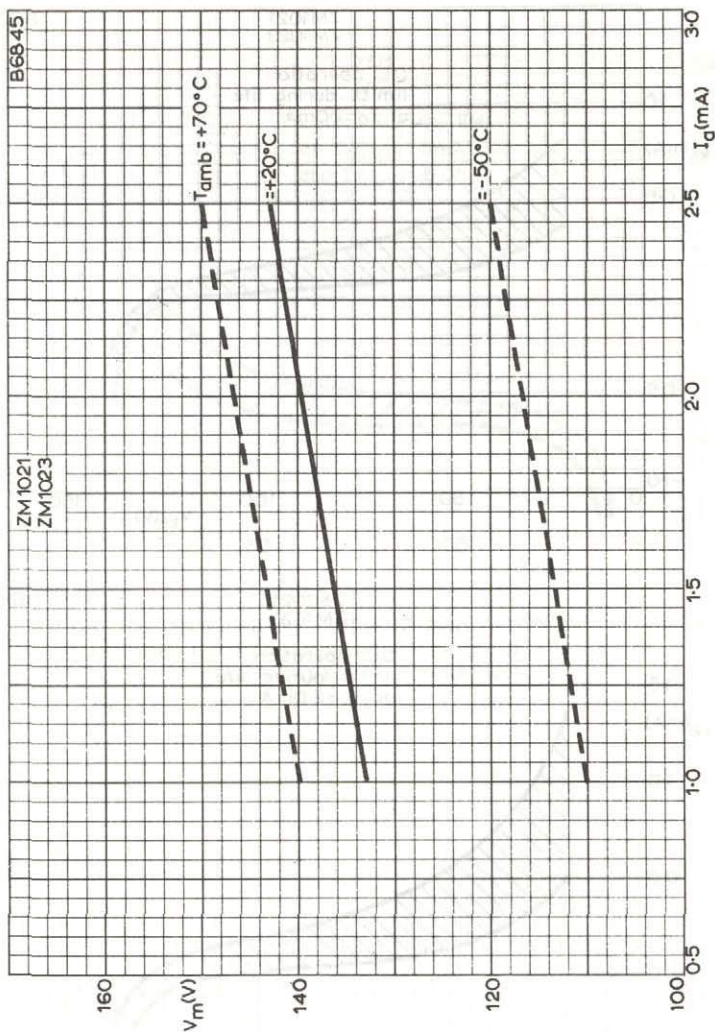
ELECTRONIC SWITCHING



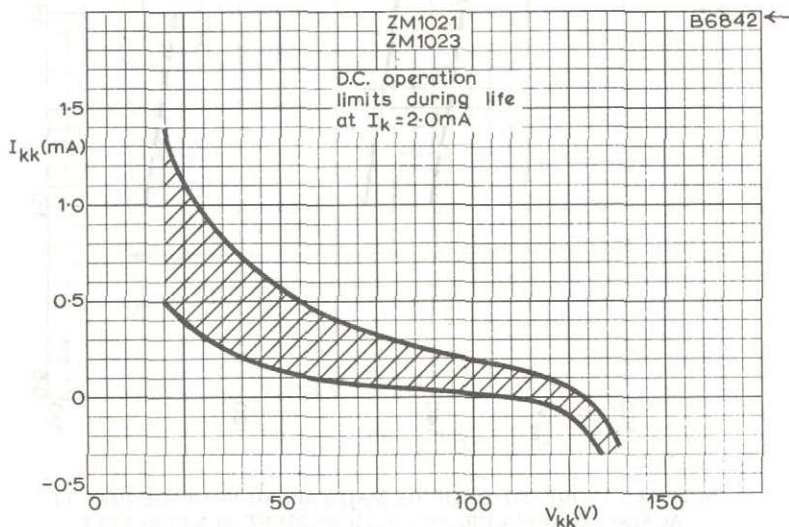
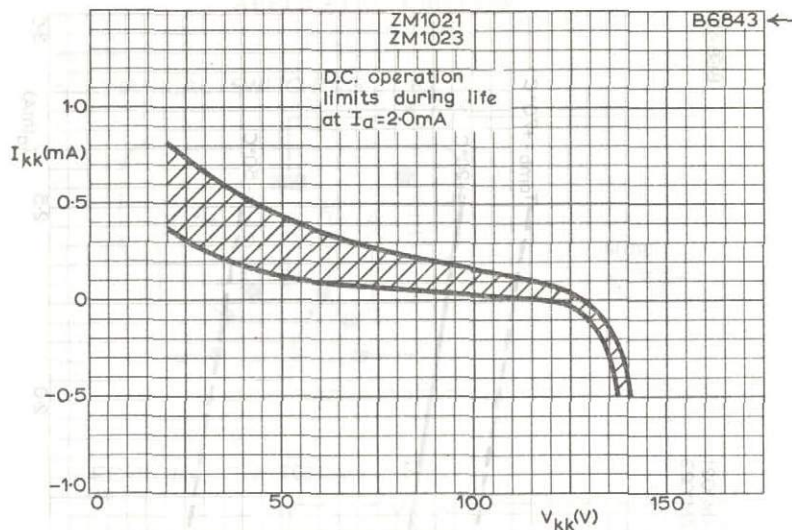
HALF WAVE A.C. SUPPLY



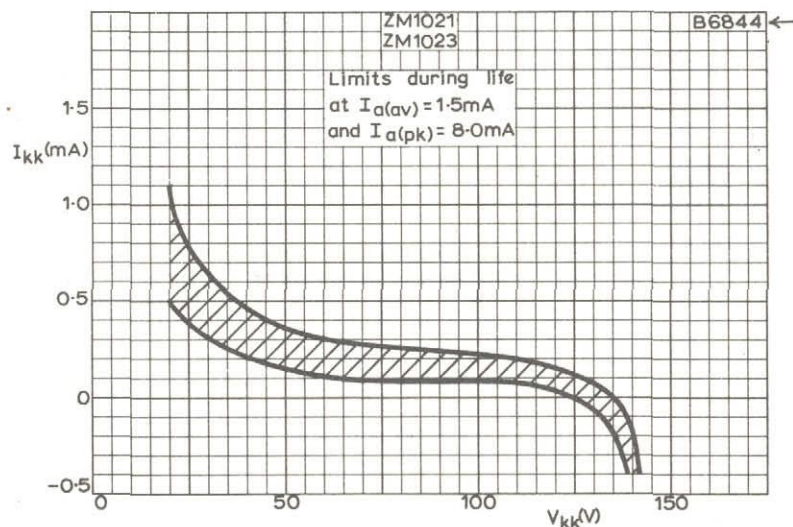
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NOMINAL ANODE-TO-CATHODE MAINTAINING VOLTAGE PLOTTED
AGAINST ANODE CURRENT WITH AMBIENT TEMPERATURE
AS PARAMETER



SUM OF THE TOTAL PROBE CURRENT TO ALL NON-ILLUMINATED
CATHODES PLOTTED AGAINST CATHODE BIAS VOLTAGE
(D.C. OPERATION)



SUM OF THE TOTAL PROBE CURRENT TO ALL NON-ILLUMINATED
CATHODES PLOTTED AGAINST CATHODE BIAS VOLTAGE
(HALF-WAVE A.C. OPERATION)