

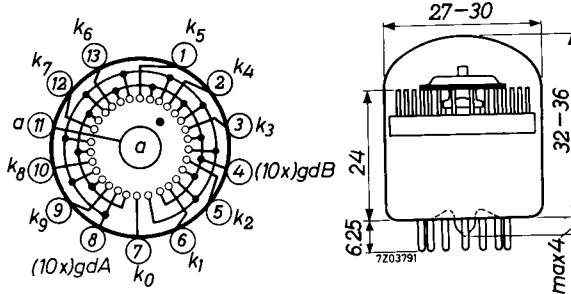
## SELECTOR TUBE

Cold cathode gas-filled bi-directional decade selector and counting tube. This tube has ten main cathodes, all of which are brought out separately. The Z505S gives visual indication and operates at speeds up to 50 kHz.

QUICK REFERENCE DATA		
Maximum counting speed		50 kHz
Supply voltage	$V_{ba}$	500 V
Output, current		800 $\mu A$
voltage		24 V
Indication	position of glow; end viewing	

### DIMENSIONS AND CONNECTIONS

Base: B13B



$K_0$  is aligned with pin 7 to within  $\pm 3^\circ$

#### Mounting position: any

This tube has been designed to close tolerances so that no individual adjustment is necessary to align the bulb with the escutcheon.

#### Accessories

- Socket type 2422 505 00001
- Escutcheon type 55062

#### General note

All voltages are referred to the most positive supply potential to which any main cathode (not guide cathode) is returned.

**CHARACTERISTICS AND RANGE VALUES FOR EQUIPMENT DESIGN**

(initial and during life)

Ignition requirements

Anode supply voltage	$V_{ba}$	400 to 1000 V
Time constant of rise of anode supply voltage		min. 2 ms <sup>1)</sup>

Discharge at rest on a main cathode

Maintaining voltage of anode to main cathode  
at  $I_a = 0.8 \text{ mA}$ ,  $V_{bgd} = 55 \text{ V}$

maximum	$V_m$	max. 275 V
minimum	$V_m$	min. 240 V
Cathode current,		
recommended	$I_k$	0.8 mA
maximum	$I_k$	max. 1.0 mA
minimum	$I_k$	min. 0.6 mA

Guide supply voltage

maximum	$V_{bgd}$	max. 65 V
minimum	$V_{bgd}$	min. 40 V
Resistance between guides and guide supply	$R_{gd}$	max. 22 k $\Omega$

Cathode potential (except during reset)

non conducting cathode	$-V_k$	max. 14 V
conducting cathode, positive	$V_k$	max. 28 V <sup>2)</sup>
negative	$-V_k$	max. 0 V

Stepping requirements See also page 4

Discharge dwell time,		
main cathode		min. 8.0 $\mu\text{s}$
Guide A		min. 6.0 $\mu\text{s}$
Guide B		min. 6.0 $\mu\text{s}$

Interval between trailing edge of  
guide A pulse and leading edge of guide B  
pulse (double rectangular pulse drive)

max. 0.3  $\mu\text{s}$

Guide voltage to step the discharge from a main  
cathode to an adjacent guide cathode

$-V_{gd}$  max. 80 V  
min. 30 V

<sup>1)2)</sup> See page 5

## CHARACTERISTICS AND RANGE VALUES FOR EQUIPMENT DESIGN (continued)

Voltage difference required between a guide and the adjacent guide in order to step the discharge	$V_{gd-gd}$	max. 140 V min. 30 V <sup>3)</sup>
Guide supply voltage to step the discharge from a guide to the next main cathode	$V_{bgd}$	max. 65 V min. 40 V
Cathode potential		
non conducting cathodes	$-V_k$	max. 14 V
conducting cathode, positive	$V_k$	max. 28 V <sup>2)</sup>
negative	$-V_k$	max. 0 V
<u>Resetting requirements</u> <sup>4)</sup>		
Cathode voltage	$-V_k$	max. 140 V min. 100 V <sup>5)</sup>

## LIFE

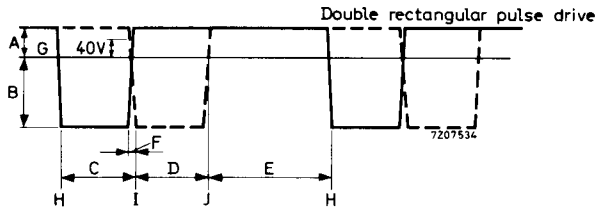
A typical tube can be expected to count correctly with the following conditions after standing on one main cathode for a period of approximately 4500 hours.

Anode current	$I_a$	0.8 mA
Guide supply voltage	$V_{bgd}$	60 V
Guide voltage for transfer	$V_{gd}$	-50 V
Output cathode ( $k_o$ ) voltage,		
non conducting	$V_o$	5.0 V
conducting	$V_o$	-5.0 V
Guide A dwell time		6.0 $\mu$ s
Guide B dwell time		6.0 $\mu$ s
Cathode dwell time		8.0 $\mu$ s
Temperature		$20 \pm 5$ °C

<sup>2)</sup><sup>3)</sup><sup>4)</sup><sup>5)</sup> See page 5

**LIMITING VALUES** (Absolute max. rating system)

Anode supply voltage	$V_{ba}$	max. 1000 V
Cathode current (except during reset)	$I_k$	max. 1.0 mA
Voltage between any two main or guide cathodes (except during reset)		max. 140 V
Guide supply voltage	$V_{bgd}$	max. 65 V
Reset voltage, negative		max. 140 V
Ambient temperature	$t_{amb}$	max. 50 °C <sup>1)</sup>

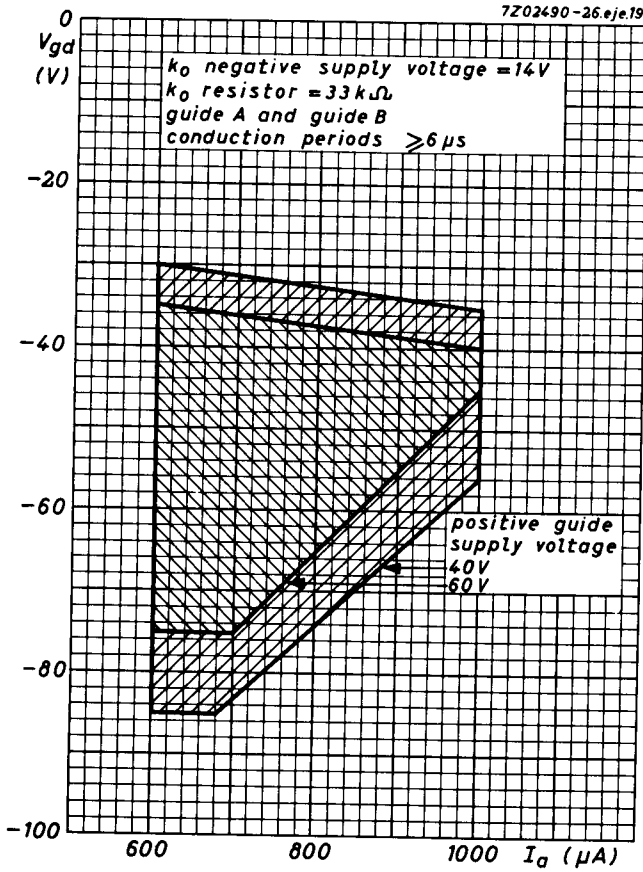
**GUIDE WAVEFORMS**

- A Positive guide supply voltage
- B Negative guide voltage
- C Guide A dwell time
- D Guide B dwell time
- E Main cathode dwell time
- F Interval between trailing edge of guide A pulse and leading edge of guide B pulse
- G Potential of most positive main cathode supply voltage
- H Discharge transfers from main cathode to guide A
- I Discharge transfers from guide A to guide B
- J Latest instant for discharge transfer from guide B to main cathode, dwell time  $\leq 500 \mu s$ .

<sup>1)</sup> It is preferable to store the tube as near as possible to room temperature.

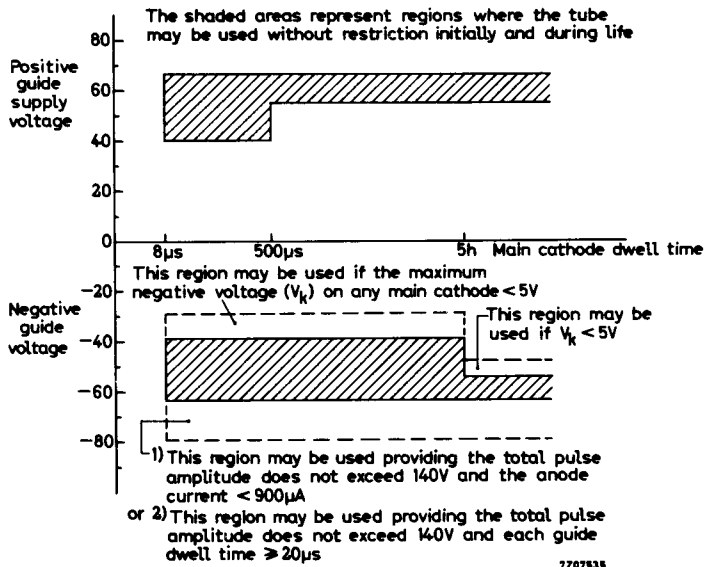
## NOTES

- 1) If the power supply does not have a time constant of 2 ms as one of its characteristics, it can conveniently be obtained by inserting a resistor in series with the anode supply and a capacitor to the negative return.  
(4.7 k $\Omega$  and 0.5  $\mu$ F for 2 ms).
- 2) The maximum voltage difference between any two main cathodes except during reset must not exceed 28 V.
- 3) The adjacent guide (the cathode to which the discharge is being transferred) must also be 30 V negative with respect to the most positive main cathode supply voltage.
- 4) The high current which passes during reset should not be allowed to flow more than a few seconds.
- 5) If the cathode current falls below 0.7 mA when the guide voltage applied to the tube approaches the minimum value of 40 V the negative voltage required for resetting may rise to 110 V.



Guide voltage to ensure stepping.

The area of operation is increased with the use of larger pulse periods



Guide operating voltages

# PHILIPS

Data handbook



Electronic  
components  
and materials

## Z505S

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