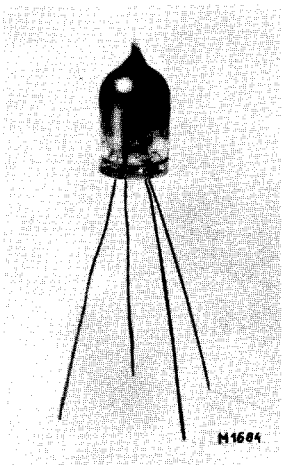
2. Technical Data

DESCRIPTION



The Z70U is a subminiature cold-cathode trigger tube for operation at a positive starter voltage, and chiefly intended for d.c. supply. The tube is provided with a priming cathode, so that it can be extinguished by a positive cathode voltage without the priming discharge being affected. Due to the priming discharge the anode delay time is short, so that the Z70U can be used in counters with a frequency from 2-5 kc/s depending on the circuit, the tolerances of the components and the stability of the supply voltage.

The Z70U has been made according to the molybdenum "sputtering technique". Therefore the cathode consists of pure molybdenum and the inert gas filling is also free of any contamination. The result is that the operating characteristics are remarkably stable, for short periods as well as during life. This renders the Z70U an attractive tube in those applications where stability of the ignition voltage is essential, such as in counters, timers, protective circuits, etc. The life expectancy in counting circuits is longer than 30 000 hrs.

TYPICAL CHARACTERISTICS

(D.C. values; primer discharge ignited; valid during life)

Anode voltage		250 V
Starter ignition voltage		137-153 V[1])
Temperature coefficient of the starter ignition voltage	max.	-25 mV/°C
Starter current for transfer (see Fig.14*b*)	max.	30 μA
Starter voltage during discharge		see Fig.14c
Anode burning voltage at 3 mA anode current (see Fig.14*d*)		111-121 V
Anode ignition voltage at zero starter voltage minimum value (see Fig.14e)		325 V
Primer-to-anode ignition voltage	max.	200 V
Primer-to-anode voltage at 3 μA primer current		155 V
Cathode current	(recommended values)	2-4 mA
Primer current	(recommended values)	1-10 μA
Primer series resistance	(recommended values)	18 MΩ

[1]) See Fig.14*a*. The individual ignition voltage drift during life in normal applications is generally less than 3 V. When a tube is ignited for very long periods, drawing negative starter current, a greater drift of the ignition voltage may occur. It is therefore advisable to design circuits for such applications for an ignition voltage of 175 V.

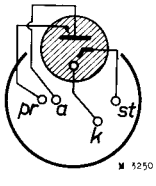
DYNAMIC CHARACTERISTICS

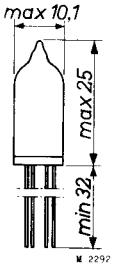
Starter ignition voltage (duration of pulse 20 μsec)			175 V[2]
Pulse height plus starter bias voltage (recommended value)			200 V
Anode delay time			5 μsec[3]
Maximum counting frequency			2-5 kc/s[4]
Typical component values for self extinguishing pulse forming circuits			
Anode resistance	1.8	1.2	0.7 MΩ
Capacitor	300	600	2000 pF

LIMITING VALUES (absolute limits)

Anode supply voltage (with primer ignited)	max.	310 V
	min.	200 V
Cathode current (average time max. 1 sec)	max.	4 mA
Peak cathode current	max.	16 mA[5]
Negative starter current (tube ignited)	max.	150 μA
Negative starter current (tube extinguished)	max.	0 μA
Starter series resistance	max.	20 MΩ
Negative starter pulse voltage at 300 V supply	max.	-30 V
at 200 V supply	max.	-50 V
Ambient temperature	max.	70 °C

MAXIMUM DIMENSIONS (in mm) AND BASE CONNECTIONS





OPERATIONAL NOTES

1. The Z70U is provided with flying leads. When soldering the tube in the circuit, care should be taken that the seals are not overheated and that the soldered connections should be kept at least 5 mm from the seals. Sharp bends in the leads should be avoided; bends should be kept at least 2 mm from the seals.
2. Starter and primer resistors should be mounted close to the tube.
3. The Z70U is sensitive to unintentional firing if the envelope is touched by conductive elements. Such elements should be kept at a distance of at least 2 mm from the envelope.
4. In capacitive starter circuits the capacitor should have a value between 50 pF and 1000 pF, the required value being in-

---

[2]) Circuit Fig.13a.

[3]) Circuit Fig.13b.

[4]) Circuit Fig.13b; see also operational notes.

[5]) Higher peak currents are permissible in pulse-forming circuits.

versely proportional to the anode supply voltage. The starter series resistance should not exceed 20 MΩ if the priming discharge is established.

In special cases higher values of starter series resistance may be tolerated, it is then advisable to consult the tube manufacturer.

5. If the Z70U is ignited by pulses of short duration the total starter voltage (bias plus pulse) should exceed 175 V. A recommended value with a 100 pF starter capacitor is 200 V (see Fig. 13a).

6. If square starter pulses are used, attention should be paid to the trailing edge of the pulse at high amplitudes. When using the circuit of Fig. 13b with pulses of more than 100 V amplitude, a trailing edge as defined by a time constant of at least 50 μsec must be used. In special cases the tube manufacturer should be consulted.

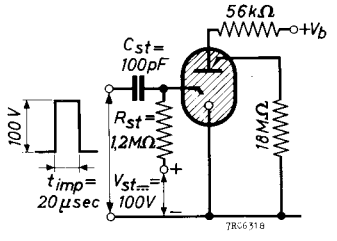


Fig. 13a. Recommended circuit with pulse ignition.

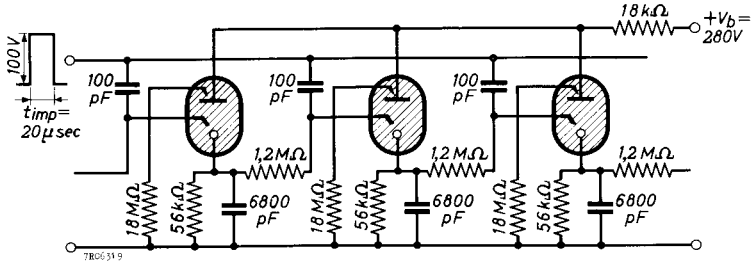


Fig. 13b. Recommended counting circuit.

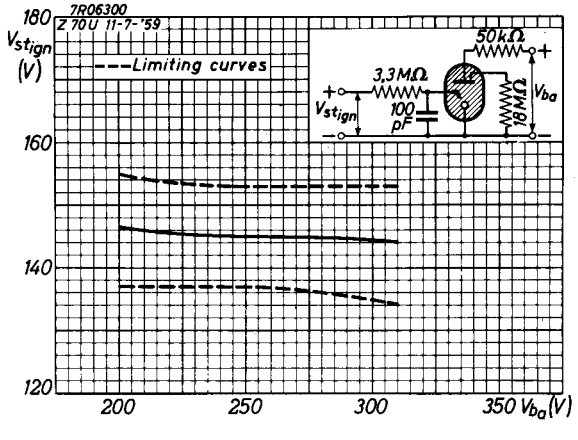


Fig. 14a. Starter breakdown characteristic.

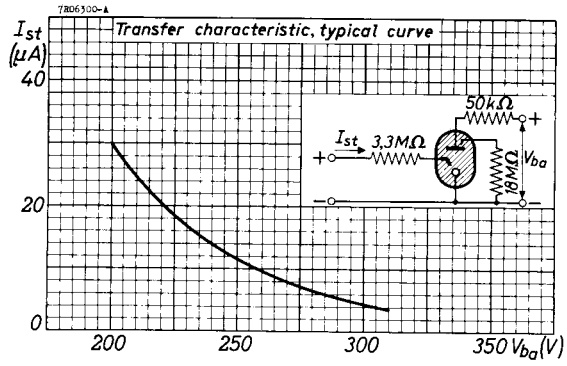


Fig.14b. Transfer characteristic.

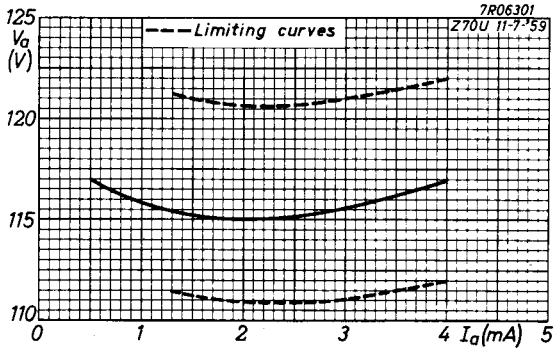


Fig.14c. Anode burning voltage characteristic.

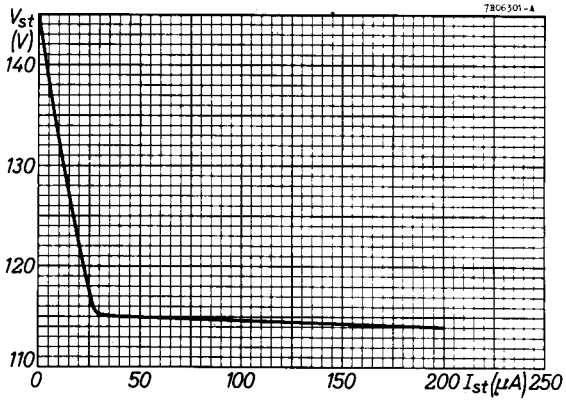


Fig.14d. Starter burning voltage characteristic.

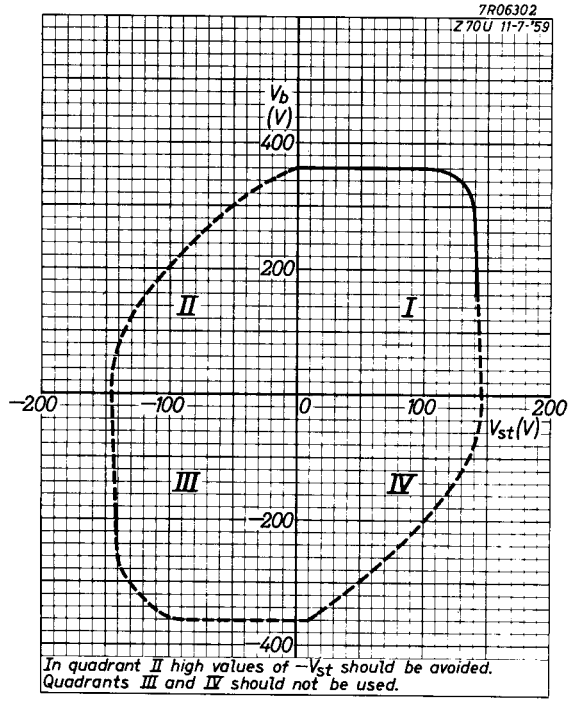


Fig.14e. Breakdown characteristic.

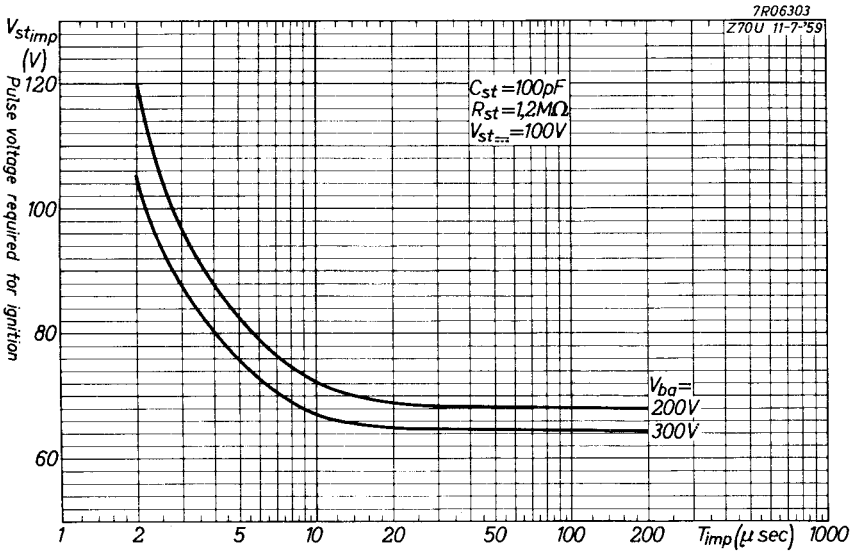


Fig.14f. Starter pulse voltage required for ignition as a function of the duration of the pulse and the anode supply voltage as parameter (see Fig.13a).

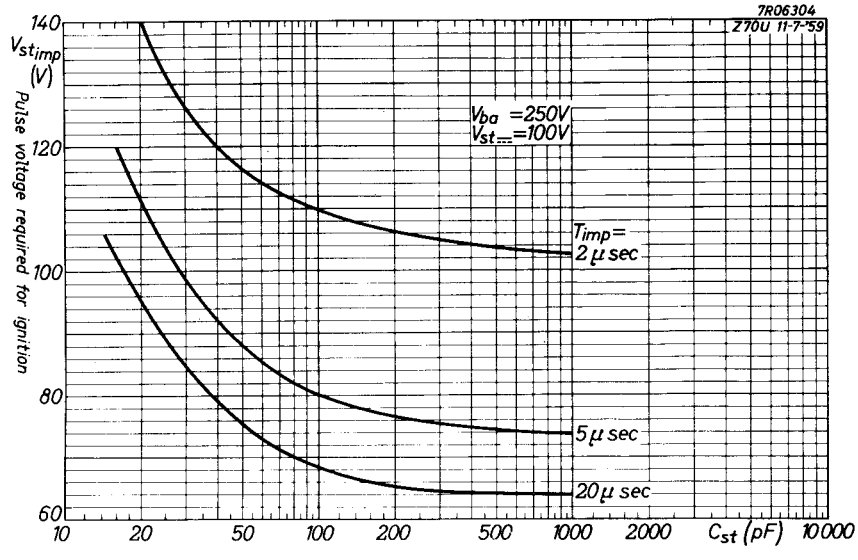


Fig.14g. Starter pulse voltage as a function of the value of the starter capacitor, with the pulse time as parameter (see Fig.13a).