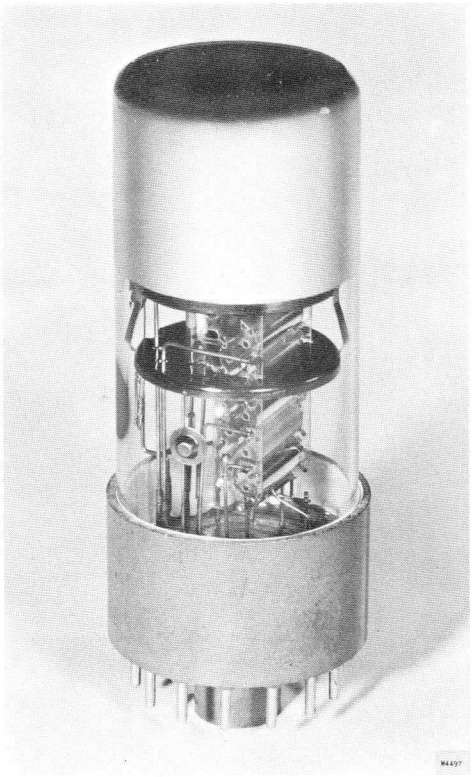
PHILIPS 153 AVP

PHOTOMULTIPLIER

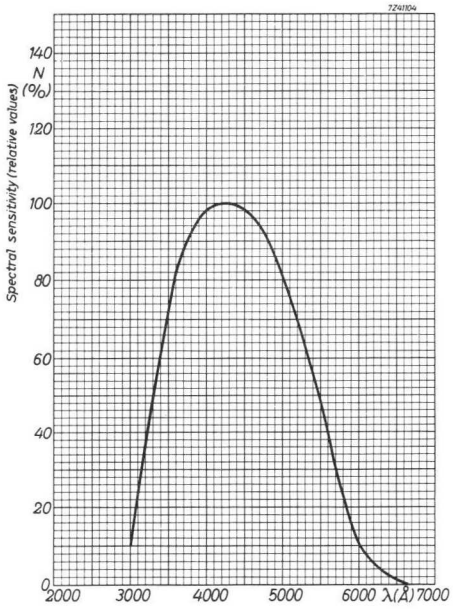


The 153 AVP is an 11-stage photomultiplier tube provided with a caesium-antimony semi-transparent flat cathode, which has a diameter of 44 mm. The highly sensitive uniform photocathode has a typical sensitivity of 70 μA/lm and a spectral response lying mainly in the visible region, with its maximum at 4200 Å as shown in the spectral-response curve.

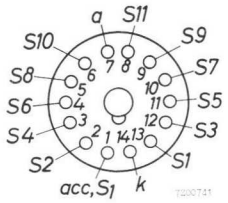
The 153 AVP is intended for use in applications such as gamma-ray spectrometry.

The tubes are tested with a 1½"×1" NaJ crystal to guarantee an energy resolution of less than 9 % for the 0.661-MeV caesium line.

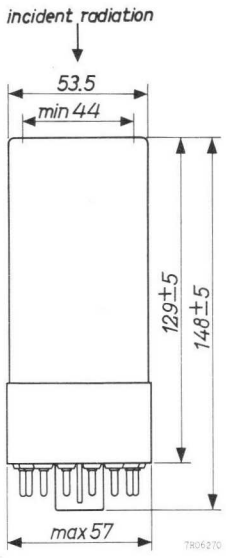
NOVEMBER 1961 PHILIPS ELECTRON TUBE DIVISION



Spectral response



14-pins socket
type No. B8 700 40



Dimensions (in mm) and electrode connections

μ-metal screening cylinder type No. 56128
length 90 ± 1 mm
diam. 57 $^{+1}_{-0}$ mm

PHOTOCATHODE

Semi-transparent, head-on, flat surface

Cathode material		SbCs	
Minimum useful diameter		44	mm
Wavelength of max. response		4200±300	Å
Luminous sensitivity [1]	avg.	70	μA/lm
	min.	50	μA/lm
Radiant sensitivity [2]	avg.	55	mA/W
Dark current (at room temperature)		10^{-15}	A/cm^2

MULTIPLIER SYSTEM

Number of stages	11	
Dynode material	AgMgOCs	
Capacitance between anode and final dynode	3	pF
Capacitance between anode and all other electrodes	5	pF

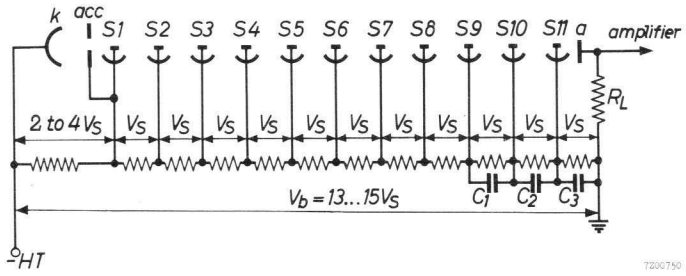
[1]) Measured with a tungsten ribbon lamp having a colour temperature of 2850 °K

[2]) At a wavelength of 4200 Å

TYPICAL CHARACTERISTICS

Anode sensitivity (at a total voltage of 1800 V)	N_a =	avg.	4500	A/lm
		min.	100	A/lm
Anode dark current (at an anode sensitivity of 60 A/lm		max.	0.05	µA
Linearity between anode-pulse amplitude and input-light flux		up to	30	mA
Resolution 0.661-MeV caesium line		avg.	8.5	%
		max.	9	%

OPERATING CHARACTERISTICS



C_1 = 220 pF
C_2 = 470 pF
C_3 = 1000 pF

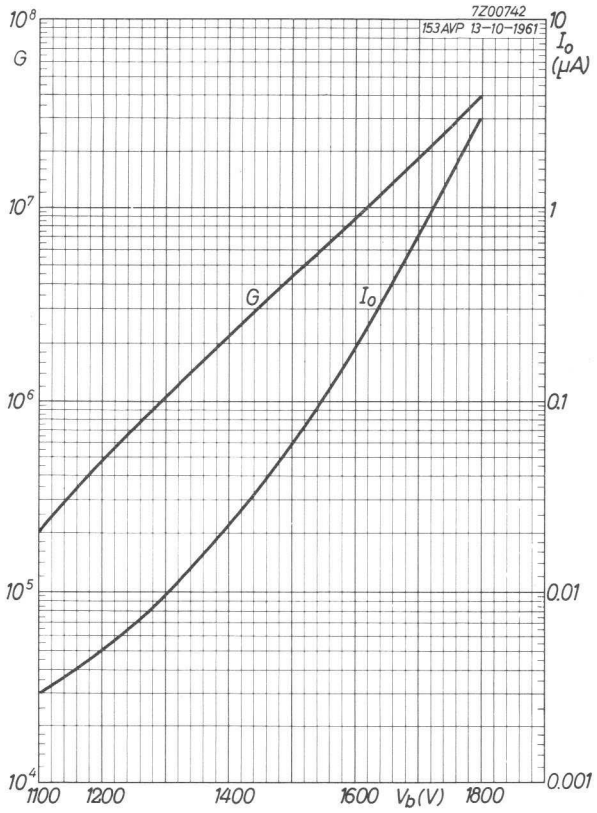
Photomultiplier with voltage divider [3]

k = cathode
acc = accelerating electrode
S_n = dynode No. n
a = anode

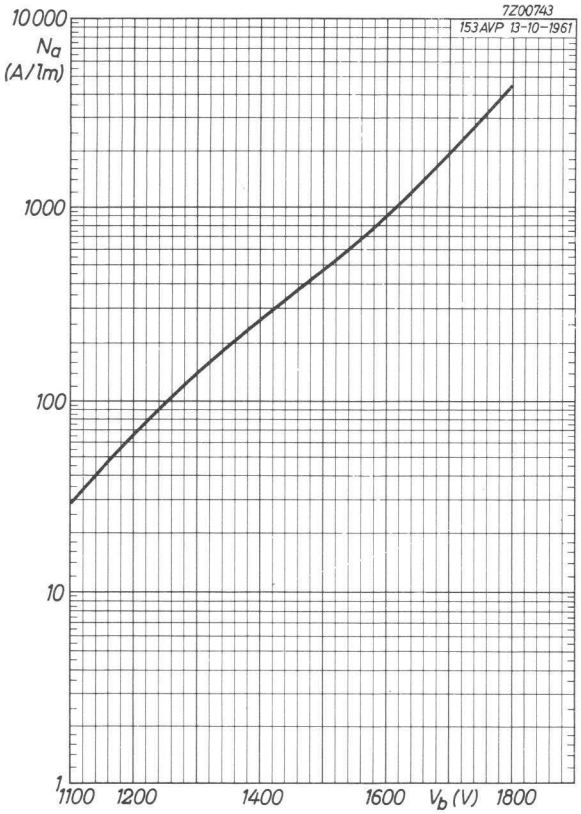
LIMITING VALUES

Total voltage	V_b	= max.	1800	V	
Anode current at continuous operation (in order not to overload the tube)	I_a	= max.	1	mA	
Anode dissipation	W_a	= max.	0.5	W	
Voltage between cathode and first dynode	V_{k-S1}	= min.	200	V	
		= max.	500	V	
Voltage between two consecutive dynodes	$V_{Sn-Sn+1}$	= min.	80	V	
		= max.	300	V	
Voltage between final dynode and anode	V_{a-S11}	= min.	80	V	[3]
		= max.	300	V	

[3] When calculating the anode voltage the voltage drop in the load resistance R_L should not be overlooked.



Gain and dark current



Overall sensitivity

OPERATIONAL CONSIDERATIONS

To achieve a stability of about 1 % the ratio of the current through the voltage-divider bridge to that through the heaviest loaded stage of the tube should be approx. 100.

For moderate intensities of radiation a bridge current of approx. 0.5 mA will be a practical value.

The best results in γ-ray spectrometry will be achieved with a voltage of 4 times "V_s" between the cathode and the first dynode; however, the limiting values must not be exceeded. At a high tension of 1200 V the tube will work most favourably.

When the tube has been exposed to full daylight just before mounting it will probably show an increased dark current, which will be back at its normal value after several hours of operation.

It is advisable to screen the tube with a mu-metal cylinder against the influence of magnetic fields.

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