7265

MULTIPLIER PHOTOTUBE

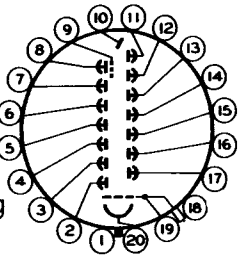
14-STAGE, HEAD-ON, FLAT-FACEPLATE TYPE WITH 1.68"-DIA., CURVED, CIRCULAR, SEMITRANSPARENT CATHODE AND S-20 RESPONSE VERY SHORT TIME-RESOLUTION CAPABILITY

DATA

General:

Spectral Response	S-20
Wavelength of Maximum Response	4200 ± 500 angstroms
Cathode, Semitransparent:	
Shape	Curved Circular
Window:	
Area	2.2 sq.in.
Minimum diameter	1.68 in.
Index of refraction	1.51
Direct Interelectrode Capacitances (Approx.):	
Anode to dynode No.14	2.8 μμf
Anode to all other electrodes	6 μμf
Dynode No.14 to all other electrodes	7.5 μμf
Maximum Overall Length	7.5"
Seated Length	6.69" ± 0.19"
Maximum Diameter	2.38"
Operating Position	Any
Weight (Approx.)	8 oz
Bulb	T16
Socket	Alden No.220FT with 20 contacts, or equivalent
Base	Small-Shell Bidecal 20-Pin (JEDEC No.B20-102)
Basing Designation for BOTTOM VIEW	20C

Pin 1 - No Connection
Pin 2 - Dynode No.1
Pin 3 - Dynode No.3
Pin 4 - Dynode No.5
Pin 5 - Dynode No.7
Pin 6 - Dynode No.9
Pin 7 - Dynode No.11
Pin 8 - Dynode No.13
Pin 9 - Grid No.2 (Accelerating Electrode)
Pin 10 - Anode
Pin 11 - Dynode No.14
Pin 12 - Dynode No.12
Pin 13 - Dynode No.10
Pin 14 - Dynode No.8
Pin 15 - Dynode No.6
Pin 16 - Dynode No.4
Pin 17 - Dynode No.2
Pin 18 - No Connection
Pin 19 - Grid No.1 (Focusing Electrode)
Pin 20 - Photocathode
Metal Collar§ - Connected Internally to Focusing Electrode—Do Not Make Electrical Connection to Collar



Maximum Ratings, *Absolute Values:*

SUPPLY VOLTAGE BETWEEN ANODE AND CATHODE (DC)	3000 max. volts
SUPPLY VOLTAGE BETWEEN DYNODE No.14 AND ANODE (DC)	500 max. volts

§: See next page.

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SUPPLY VOLTAGE BETWEEN CONSECUTIVE DYNODES (DC)	600 max.	volts
SUPPLY VOLTAGE BETWEEN ACCELERATING ELECTRODE AND DYNODE No.13 (DC)	±600 max.	volts
DYNODE-No.1 SUPPLY VOLTAGE (DC)	500 max.	volts
FOCUSING-ELECTRODE SUPPLY VOLTAGE (DC)	500 max.	volts
AVERAGE ANODE CURRENT●	1 max.	ma
AMBIENT TEMPERATURE	85 max.	°C

Characteristics Range Values for Equipment Design:

Under conditions with dc supply voltage (E) across a voltage divider providing electrode voltages shown in Table 1

With E = 2400 volts (Except as noted) and accelerating-electrode voltage adjusted to give maximum gain

	Min.	*Median*	*Max.*	
Sensitivity:				
Radiant, at 4200 angstroms	–	0.6	–	amp/μw
Cathode radiant, at 4200 angstroms	–	0.064	–	μa/μw
Luminous:#				
At 0 cps	165	1400	6800	amp/lumen
With dynode No.14 as output electrode†	–	980	–	amp/lumen
Cathode luminous:				
With tungsten light source▲	100	150	–	μa/lumen
With blue light source**◆	0.05	–	–	μa
With red light source□⊕	0.30	–	–	μa
Current Amplification	–	9.35×10^6	–	
Equivalent Anode-Dark-Current Input✵■	–	2×10^{-10}	8×10^{-10}	lumen
Equivalent Noise Input:★				
At +25° C	–	7.5×10^{-13}	3.3×10^{-12}	lumen
At −80° C	–	1×10^{-13}	–	lumen
Anode-Pulse Rise Time‡	–	3	–	millμsec
Greatest Delay Between Anode Pulses: Due to position from which electrons are simultaneously released within a circle centered on tube face and having				

§,●,#,†,▲,**,◆,□,⊕,✵,■,★,‡: See next page.

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	Min.	Median	Max.	
a diameter of—				
1.12".	–	1	–	milliμsec
1.56".	–	3	–	milliμsec

§ The metal collar may be at high potential depending on the circuit application and should be insulated accordingly.

● Averaged over any interval of 30 seconds maximum.

✱ Under the following conditions: The light source is a tungsten-filament lamp operated at a color temperature of 2870° K. A light input of 0.1 microlumen is used. The load resistor has a value of 0.01 megohm.

† An output current of opposite polarity to that obtained at the anode may be provided by using dynode No.14 as the output electrode. With this arrangement, the load is connected in the dynode-No.14 circuit and the anode serves only as collector.

▲ Under the following conditions: The light source is a tungsten-filament lamp operated at a color temperature of 2870° K. The value of light flux is 0.01 lumen and 200 volts are applied between cathode and all other electrodes connected together as anode. The load resistor has a value of 0.01 megohm.

** Under the following conditions: Light incident on the cathode is transmitted through a blue filter (Corning, Glass Code No.5113 polished to 1/2 stock thickness) from a tungsten-filament lamp operated at a color temperature of 2870° K. The value of light flux on the filter is 0.01 lumen. The load resistor has a value of 0.01 megohm, and 200 volts are applied between cathode and all other electrodes connected together as anode.

◆ For spectral characteristic of this source, see sheet SPECTRAL CHARACTERISTIC OF 2870° K LIGHT SOURCE AND SPECTRAL CHARACTERISTIC OF LIGHT FROM 2870° K SOURCE AFTER PASSING THROUGH INDICATED BLUE FILTER at front of this section.

□ Under the following conditions: Light incident on the cathode is transmitted through a red filter (Corning, Glass Code No.2418, or equivalent) from a tungsten-filament lamp operated at a color temperature of 2870° K. The value of light flux on the filter is 0.01 lumen. The load resistor has a value of 0.01 megohm, and 200 volts are applied between cathode and all other electrodes connected together as anode.

⊕ For spectral characteristic of this source, see sheet SPECTRAL CHARACTERISTIC OF 2870° K LIGHT SOURCE AND SPECTRAL CHARACTERISTIC OF LIGHT FROM 2870° K SOURCE AFTER PASSING THROUGH INDICATED RED FILTER at front of this section.

Measured at a tube temperature of 25° C and with the supply voltage (E) adjusted to give a luminous sensitivity of 1000 amperes per lumen. Dark current caused by thermionic emission may be reduced by the use of a refrigerant.

■ For maximum signal-to-noise ratio, operation with a supply voltage (E) below 2400 volts is recommended.

★ Under the following conditions: Supply voltage (E) is 2400 volts, external shield connected to metal collar, ac-amplifier bandwidth of 1 cycle per second, tungsten light source of 2870° K interrupted at a low audio frequency to produce incident radiation pulses alternating between zero and the value stated. The "on" period of the pulse is equal to the "off" period. The output current is measured through a filter which passes only the fundamental frequency of the pulses.

‡ Measured between 10 per cent and 90 per cent of the maximum anode-pulse height. This anode-pulse rise time is determined primarily by transit-time variations in the multiplier stages only and with an incident-light spot approximately 1 millimeter in diameter centered on the photocathode.

These values also represent the difference in time of transit between the photocathode and dynode No.1 for electrons simultaneously released from the center and from the periphery of the specified area.

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TABLE 1

VOLTAGE TO BE PROVIDED BY DIVIDER

Between	5.4% of Supply Voltage (E) multiplied by
Cathode and Focusing Electrode*	1.6
Cathode and Dynode No.1	2
Dynode No.1 and Dynode No.2	1
Dynode No.2 and Dynode No.3	1
Dynode No.3 and Dynode No.4	1
Dynode No.4 and Dynode No.5	1
Dynode No.5 and Dynode No.6	1
Dynode No.6 and Dynode No.7	1
Dynode No.7 and Dynode No.8	1
Dynode No.8 and Dynode No.9	1
Dynode No.9 and Dynode No.10	1
Dynode No.10 and Dynode No.11	1
Dynode No.11 and Dynode No.12	1.25
Dynode No.12 and Dynode No.13	1.5
Dynode No.13 and Dynode No.14	1.75
Dynode No.14 and Anode	2
Anode and Cathode	18.5

OPERATING CONSIDERATIONS

Exposing the 7265 to strong ultraviolet radiation may cause an increase in anode dark current. After cessation of such irradiation, the dark current returns rapidly toward its initial value.

The *operating stability* of the 7265 depends on the magnitude and duration of the anode current. When the 7265 is operated at high average values of anode current, a drop in sensitivity (sometimes called fatigue) may be expected. The extend of the drop below the tabulated sensitivity values depends on the severity of the operating conditions. After a period of idleness, the 7265 usually recovers a substantial percentage of such loss in sensitivity.

Operation at an average anode current well below the maximum rated value of 1 milliampere is recommended when stability is important. When maximum stability is required, the anode current should not exceed 250 microamperes.

Electrostatic and/or *magnetic shielding* of the 7265 may be necessary.

* The metal collar *(See Dimensional Outline)* is connected internally to the focusing electrode. Extreme care should be taken in the design of apparatus to prevent operating personnel from coming in contact with the collar when the circuit application is such that the collar is at high potential.

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Adequate *light shielding* should be provided to prevent extraneous light from reaching any part of the 7265. Although the metallic coating on the inner side wall of the glass bulb serves to reduce the amount of extraneous light reaching the electrodes, it is inadequate to shield completely the entire structure from extraneous light.

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-20 Response is shown at the front of this Section

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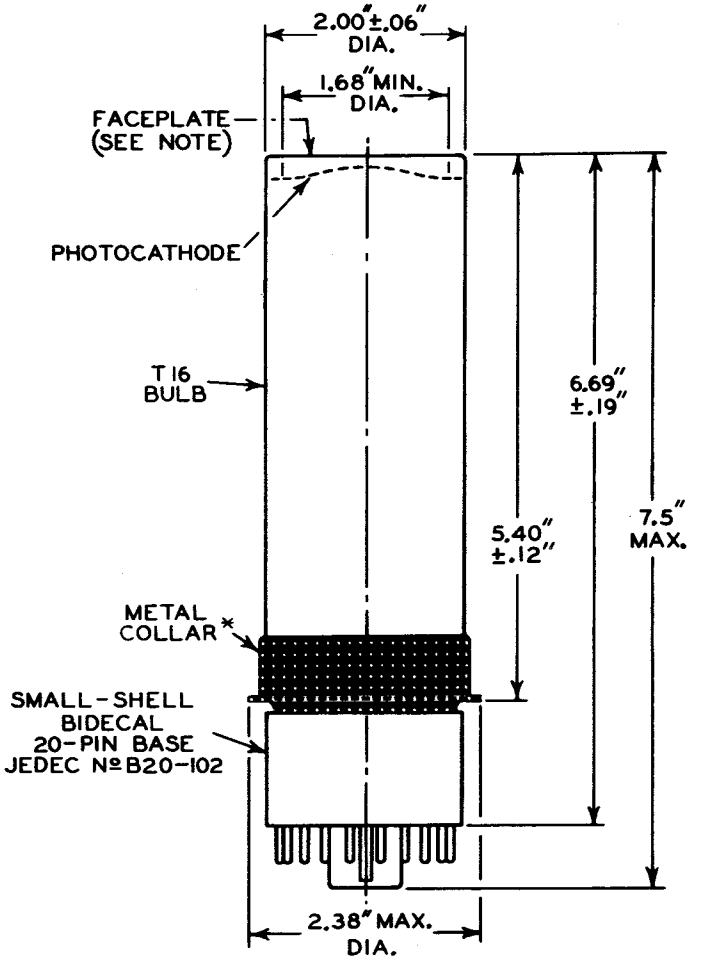

CENTER LINE OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF BOTTOM OF THE BASE.

NOTE: WITHIN 1.68" DIAMETER, DEVIATION FROM FLATNESS OF EXTERNAL SURFACE OF FACEPLATE WILL NOT EXCEED 0.005" FROM PEAK TO VALLEY.

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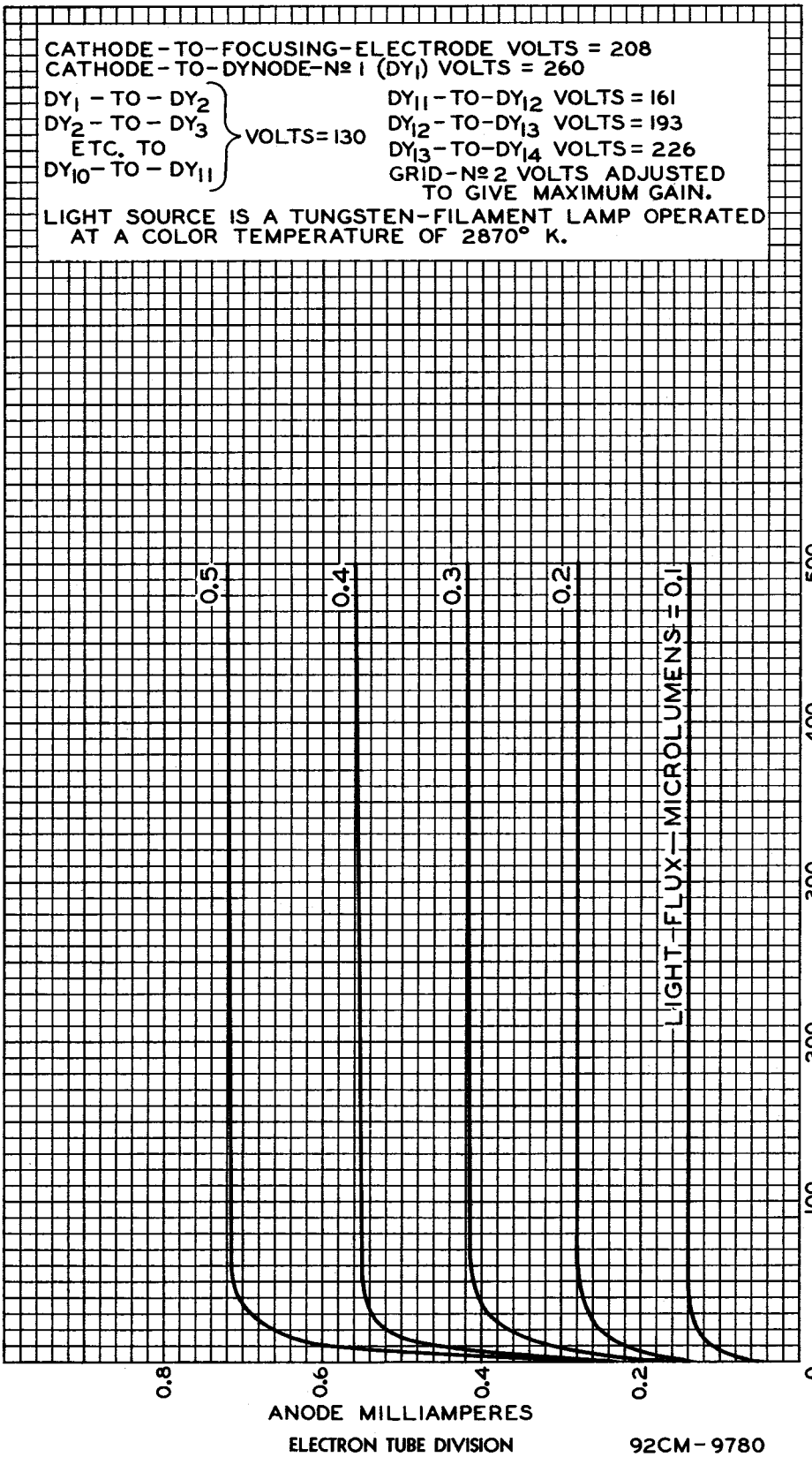
AVERAGE ANODE CHARACTERISTICS



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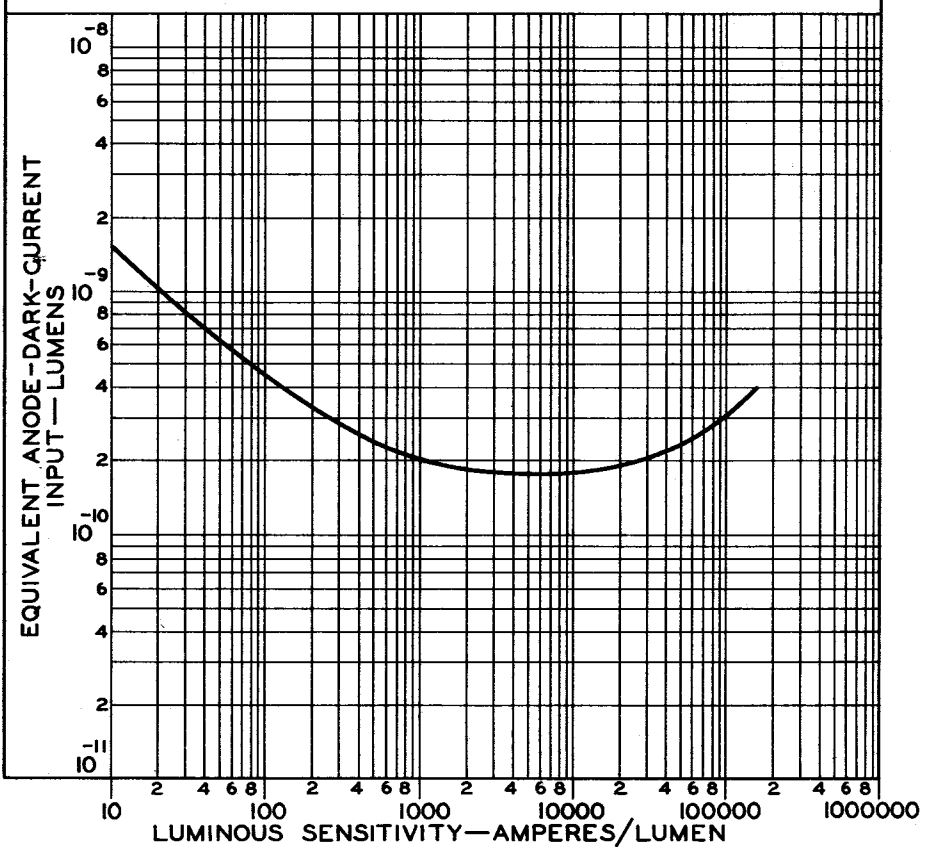
TYPICAL ANODE-DARK-CURRENT CHARACTERISTIC

LUMINOUS SENSITIVITY IS VARIED BY ADJUSTMENT OF THE SUPPLY VOLTAGE (E) ACROSS VOLTAGE DIVIDER WHICH PROVIDES VOLTAGES AS FOLLOWS:

BETWEEN	5.4% OF E MULTIPLIED BY
CATHODE & FOCUSING ELECTRODE	1.6
CATHODE & DYNODE №1 (DY_1)	2
DY_1 & DY_2	1
DY_2 & DY_3	1
DY_3 & DY_4	1
DY_4 & DY_5	1
DY_5 & DY_6	1
DY_6 & DY_7	1
DY_7 & DY_8	1
DY_8 & DY_9	1
DY_9 & DY_{10}	1
DY_{10} & DY_{11}	1
DY_{11} & DY_{12}	1.25
DY_{12} & DY_{13}	1.5
DY_{13} & DY_{14}	1.75
DY_{14} & ANODE	2
ANODE & CATHODE	18.5

GRID-№2 VOLTS ADJUSTED TO GIVE MAXIMUM GAIN.
LIGHT SOURCE IS A TUNGSTEN-FILAMENT LAMP OPERATED AT A COLOR TEMPERATURE OF 2870° K.
TUBE TEMPERATURE = 25° C



ELECTRON TUBE DIVISION 92CM-9783

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CHARACTERISTICS

THE SUPPLY VOLTAGE (E) ACROSS VOLTAGE DIVIDER WHICH PROVIDES VOLTAGES AS FOLLOWS:

BETWEEN	5.4 % OF E MULT. BY	BETWEEN	5.4 % OF E MULT. BY
CATHODE & FOCUSING ELECTRODE	1.6	DY_{11} & DY_{12}	1.25
CATHODE & DYNODE Nº1	2	DY_{12} & DY_{13}	1.5
DYNODE Nº1 (DY_1) & DY_2	1	DY_{13} & DY_{14}	1.75
ETC. THRU DY_{10} & DY_{11}		DY_{14} & ANODE	2

GRID-Nº2 VOLTS ADJUSTED TO GIVE MAXIMUM GAIN.