RCA TUBE HANDBOOK HB-3

PHOTOTUBE SECTION

This section contains data on RCA phototubes having a variety of spectral responses, shapes, and sizes. It includes both gas and vacuum single-unit types as well as multiplier types for diversified applications.

For further Technical Information, write to Commercial Engineering, Tube Department, Radio Corporation of America, Harrison, N. J.

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PHOTOTUBE CLASSIFICATION CHART

When choosing tube types, the equipment designer should refer to the RCA PREFERRED TYPES LIST and its companion list - TYPES NOT RECOMMENDED for NEW EQUIPMENT DESIGN - both of which appear in the General Section.

Response	S-1	S-3	S-4	S-5	S-8	S-9	S-10
SINGLE-UNIT PHOTOTUBES							
Vacuum Types	917⊕ 919✱ 922□ 925▲	926□	1P39◆ 929 934 5653	935		1P42●	
Gas Types	1P40◆ 1P41● 868 918 921□ 923 924● 927 928* 930	1P29	1P37 5581 5582□ 5583				
TWIN PHOTOTUBES							
Vacuum Types			5652■				
Gas Types	920⊕		5584⊕				
MULTIPLIER PHOTOTUBES							
Vacuum Types			1P21† 931-A 5819●○ 6199●○ 6328 6342●○	1P28	1P22		6217●○

● End type for head-on operation.

✱ Low-leakage type with anode-terminal cap.

✱ Low-leakage type with cathode-terminal cap.

□ Cartridge type.

▲ Short type.

* Non-directional.

■ Twin type having two composite anode-cathodes.

⊕ Twin type having two separate cathodes and two separate anodes.

† For applications involving very low light levels.

◆ For applications critical as to leakage under high-humidity conditions.

○ For applications involving large-area light sources.

DEFINITIONS
OF PHOTOTUBE TERMS

Current Amplification. Ratio of the output current to the photocathode current, at constant electrode voltages.

Cathode Luminous Sensitivity. The quotient of current leaving the photocathode by the incident luminous flux.

Cathode Radiant Sensitivity. The quotient of current leaving the photocathode by incident radiant energy of a given wavelength.

Luminous Sensitivity. The quotient of output current by incident luminous flux, at constant electrode voltages.

Radiant Sensitivity. The quotient of output current by incident radiant energy of a given wavelength, at constant electrode voltages.

Electrode Dark Current. The electrode current which flows when there is no radiant flux incident on the photocathode.

Equivalent Anode-Dark-Current Input. The quotient of the anode dark current by the luminous sensitivity.

Equivalent Noise Input. That value of incident luminous flux which when modulated in a stated manner produces an rms output current equal to the rms noise current within a specified bandwidth.

PRICES□
OF PHOTOTUBE TYPES

Type	Schedule D●	Schedule U▲
1P21	-	$ 50.00
1P22	-	14.75
1P28	-	15.50
1P29	-	2.95
1P37	-	2.85
1P39	-	1.75
1P40	-	1.90
1P41	-	2.80
1P42	-	5.70
868	-	2.50
917	-	3.50
918	-	3.10
919	-	3.50
920	-	4.15
921	$ 2.05	-
922	-	1.95
923♣	-	2.05
924♣	-	3.30
925	-	2.40
926	-	2.90
927	2.50	-
928	-	2.85
929	-	1.50
930	-	1.65
931-A	-	8.60
934	-	3.40
935	-	7.80
5581	-	2.25
5582	-	2.65
5583	-	3.05
5584	-	3.95
5652	-	6.55
5819	-	55.00
6199	-	55.00
6217	-	70.00

□ This price list applies only in the United States of America and is subject to change without notice. All prices are exclusive of all Federal, State and local excise, sales, and similar taxes.

▲ Schedule U shows user prices for tube types priced for distribution through other than dealer and service channels.

● Schedule D shows list prices for tube types priced for distribution through dealer and service channels.

♣ Not recommended for new equipment design.

INFORMATION ON PURCHASING ABOVE TYPES

Information as to where *RCA Phototube Types* can be purchased may be obtained from our *regional office* nearest you or from *Tube Department, Radio Corporation of America, Harrison, N.J.*

PHOTOTUBE SENSITIVITY AND SENSITIVITY MEASUREMENTS

GENERAL CONSIDERATIONS

The range of luminous-sensitivity limits given for a phototube on the data sheets of this Section is that which the tube will display when operated under low-current conditions.

If the tube is to be operated under conditions approaching its maximum-current rating, the equipment design should provide for a wider sensitivity range having a minimum value equal to one-half of that shown for low-current operation. The sensitivity of a phototube under such high-current conditions is dependent upon the tube type, as follows:

1. Single-Unit and Twin Phototubes

a. Gas Types: For high-current operation, and particularly in applications in which the type is subjected to these higher values continuously, a drop in sensitivity below the values for low-current operation may be expected, the extent of the drop being affected by the severity of the operating conditions. After a period of idleness, a gas phototube usually recovers most of its initial sensitivity.

b. Vacuum Types: Unlike gas phototubes, this class of phototubes shows negligible drop in sensitivity values for different degrees of illumination and over long periods of use. The output current of a vacuum phototube is a linear function of the exciting illumination under normal operating conditions. The frequency response is flat up to frequencies at which transit-time effects become the limiting factor.

2. Multiplier Phototubes

Although RCA Multiplier Phototubes are vacuum types, a drop in sensitivity is to be expected from this class of phototubes when operated at high anode-current values. The extent of the drop is affected by the nature and severity of the operating conditions to which the tube is subjected. After a period of idleness, the multiplier phototube usually recovers a substantial percentage of this loss of sensitivity.

Multiplier-phototube-sensitivity values are dependent on the respective amplification of each dynode stage. Hence, large variations in sensitivity can be expected between individual tubes of a given type. The overall amplification of a multiplier phototube is equal to the average amplification per stage raised to the nth power, where n is the number of stages. Thus, very small variations in amplification per stage produce very large changes in overall tube amplification.

Because these overall changes are very large, it is advisable for designers to provide adequate adjustment of the supply voltage per stage so as to be able to adjust the amplification of individual tubes to the desired design value. It is suggested that an overall voltage-adjustment

(continued on next page)

range of at least 2 to 1 be provided. When the output current can be controlled by change in the illumination of the photocathode of the multiplier phototube, the required range of adjustment in the voltage per stage can be reduced.

SENSITIVITY MEASUREMENTS

The luminous-sensitivity values shown on the data pages of this Section are measured according to the following procedures:

1. Single-Unit and Twin Phototubes

a. Gas Types: The light source consists of a tungsten lamp operating at a filament color temperature of 2870°K. For the 0-cycle measurements, a light input of 0.1 lumen is used, unless otherwise specified. For the 5000- and 10000 cycle measurements, the light input is varied sinusoidally about a mean value of 0.015 lumen from zero to a maximum of twice the mean. For all measurements, a dc anode-supply voltage of 90 volts and a 1.0-megohm load resistor are employed. Under these conditions, the effect of tube capacitance is negligible.

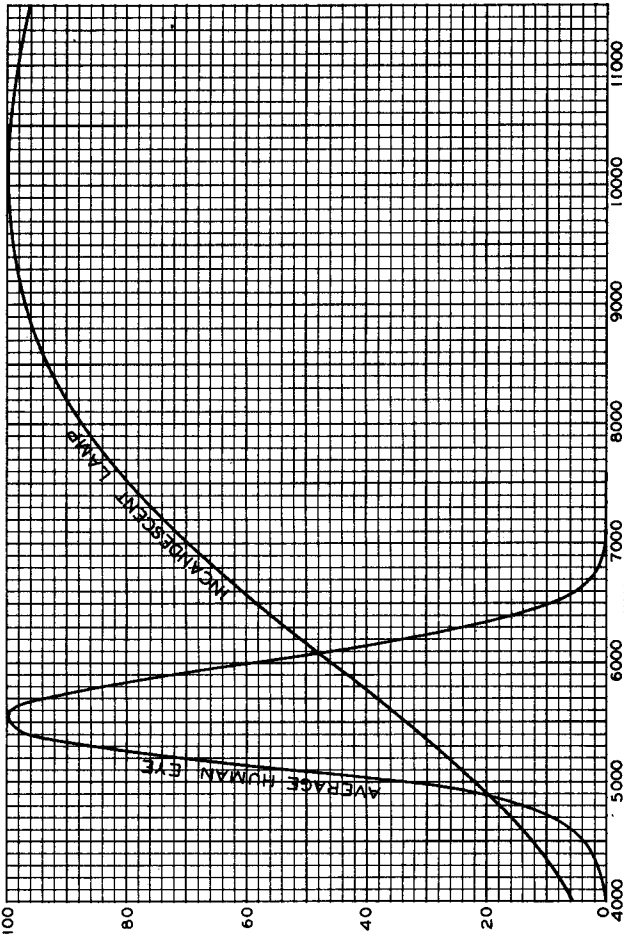
b. Vacuum Types: The light source consists of a tungsten lamp operating at a filament color temperature of 2870°K. A steady light input of 0.1 lumen is used, unless otherwise specified, together with a dc anode-supply voltage of 250 volts and a 1-megohm load resistor.

2. Multiplier Phototubes

The light source consists of a tungsten lamp operating at a filament color temperature of 2870°K. A light flux of 10 microlumens from a rectangular aperture approximately 0.8" long and 0.2" wide is projected normal to the cathode in the direction noted on the basing diagram and outline. The load resistor has a value of 0.01 megohm. The applied voltages are specified on the individual data sheets.

SPECTRAL CHARACTERISTIC OF HUMAN EYE & OF TUNGSTEN LAMP AT COLOR TEMPERATURE OF 2870 °K

EYE CURVE IS ON BASIS OF EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS



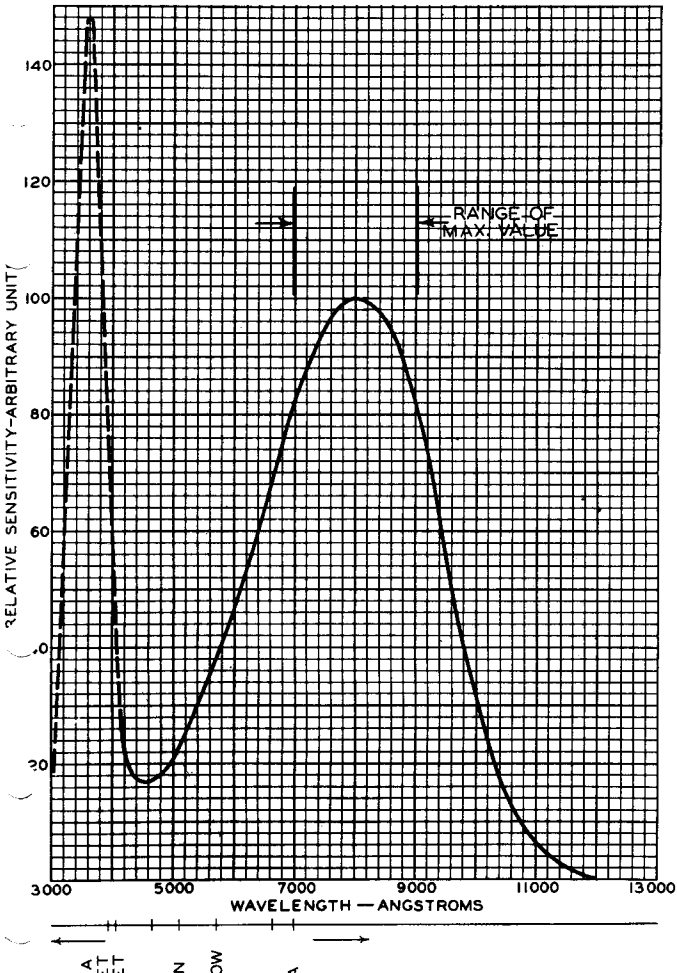
RELATIVE ENERGY DISTRIBUTION OF LAMP-ARBITRARY UNITS

RELATIVE SENSITIVITY OF EYE-ARBITRARY UNITS

OCT. 20, 1947 TUBE DEPARTMENT 92CM-6435RI
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

SPECTRAL SENSITIVITY CHARACTERISTIC OF PHOTOTUBE HAVING S-1 RESPONSE

FOR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS



MAR. 18, 1946

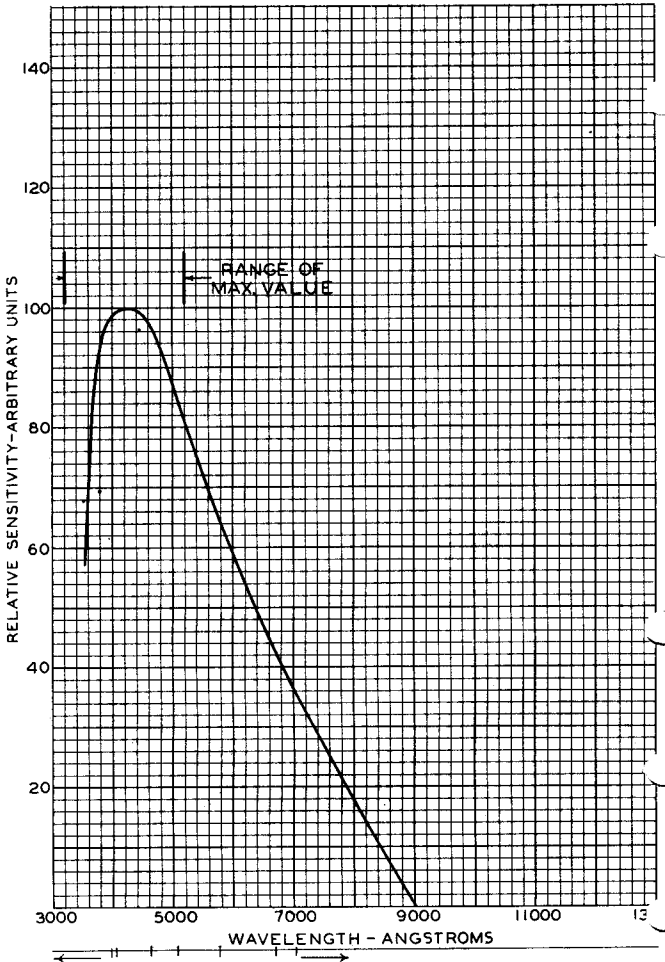
TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6056R5

SPECTRAL SENSITIVITY CHARACTERISTIC OF PHOTOTUBE HAVING S-3 RESPONSE

FOR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS



MAR. 21, 1946

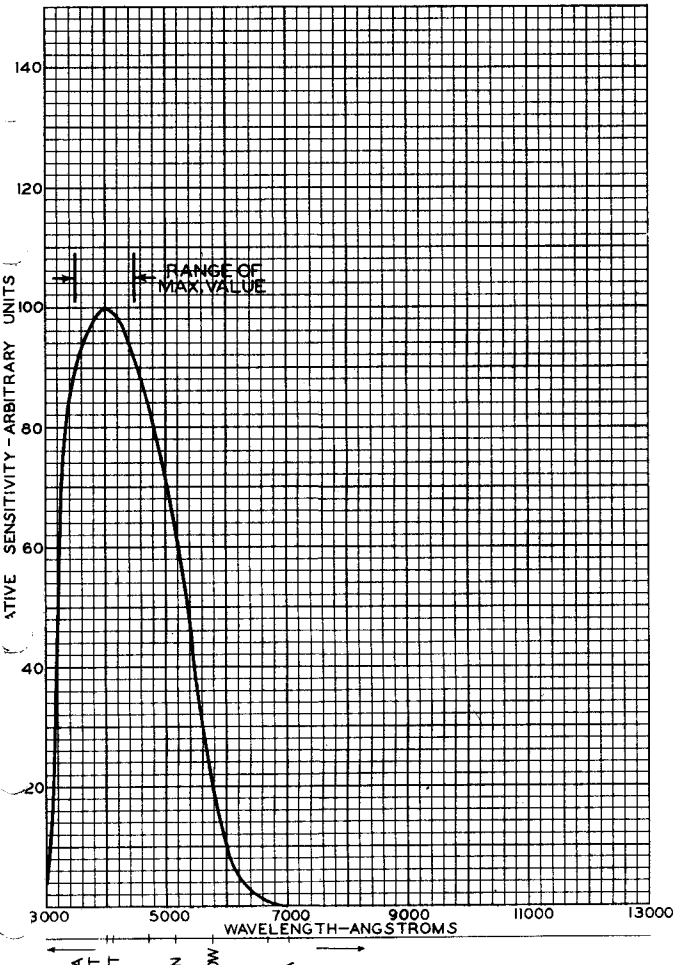
TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6057R6

SPECTRAL SENSITIVITY CHARACTERISTIC OF PHOTOTUBE HAVING S-4 RESPONSE

FOR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS



AUG. 12, 1947

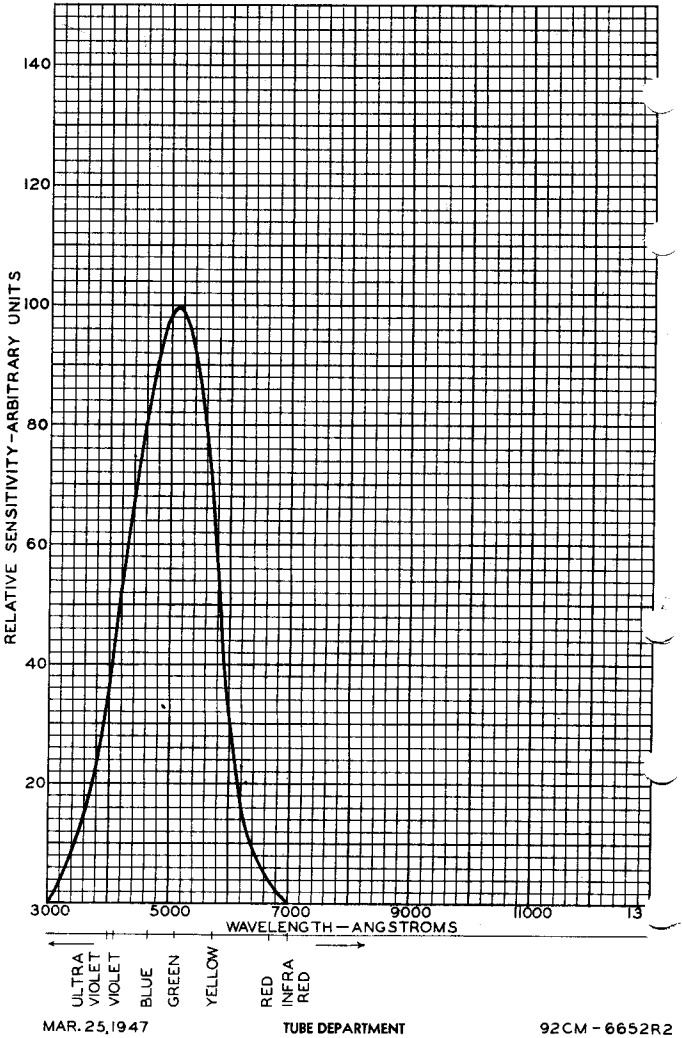
TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM - 6152R7

SPECTRAL SENSITIVITY CHARACTERISTIC OF PHOTOTUBE HAVING S-4 RESPONSE

RADIANT FLUX FROM TUNGSTEN SOURCE AT 2870°K



MAR. 25, 1947

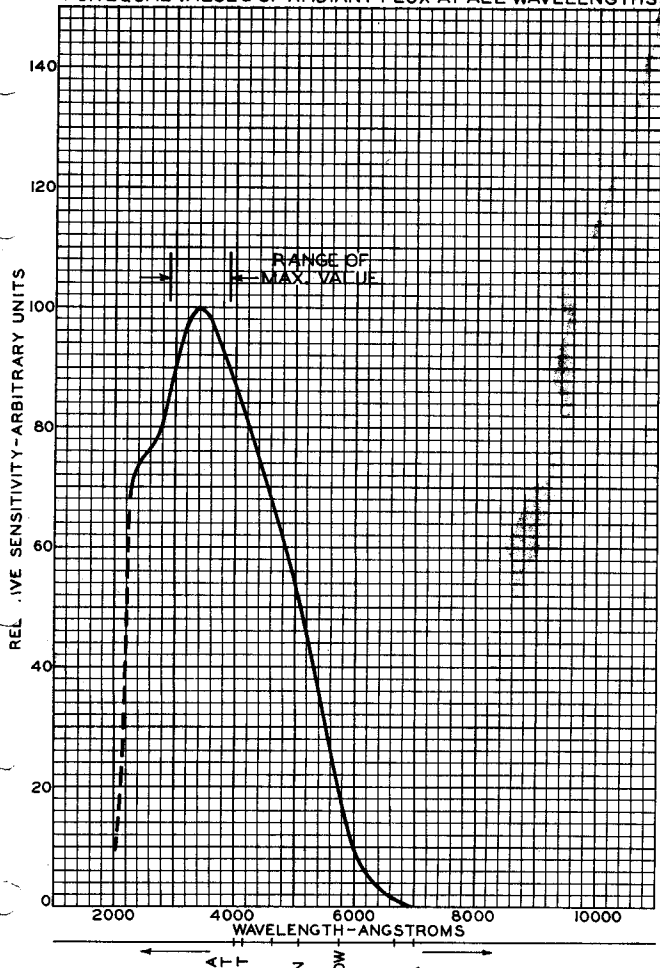
TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6652R2

SPECTRAL SENSITIVITY CHARACTERISTIC OF PHOTOTUBE HAVING S-5 RESPONSE

FOR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS



MAR. 25,1947

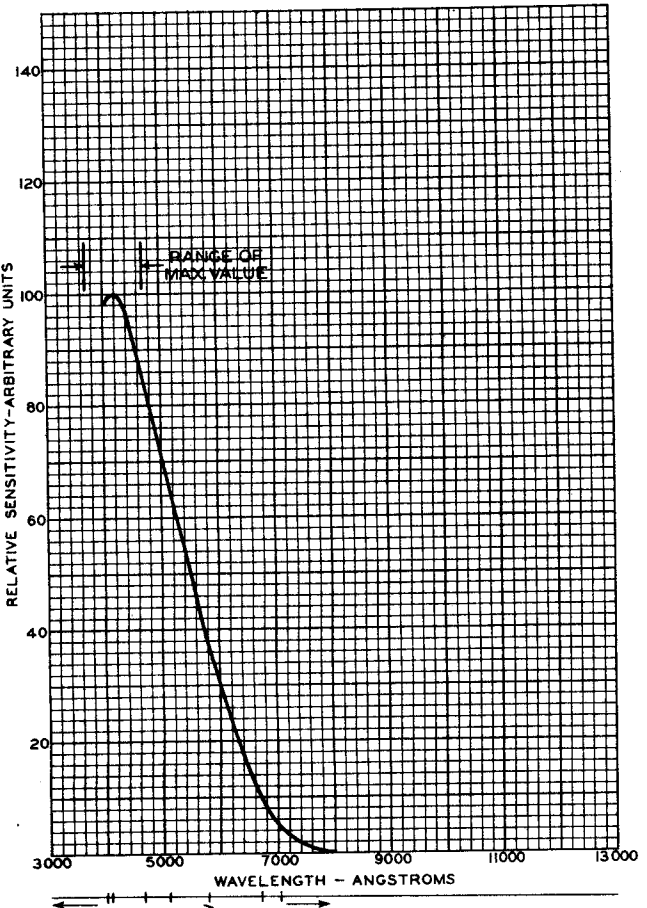
TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6814

SPECTRAL SENSITIVITY CHARACTERISTIC OF PHOTOTUBE HAVING S-8 RESPONSE

FOR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS



JULY 19, 1945

TUBE DEPARTMENT

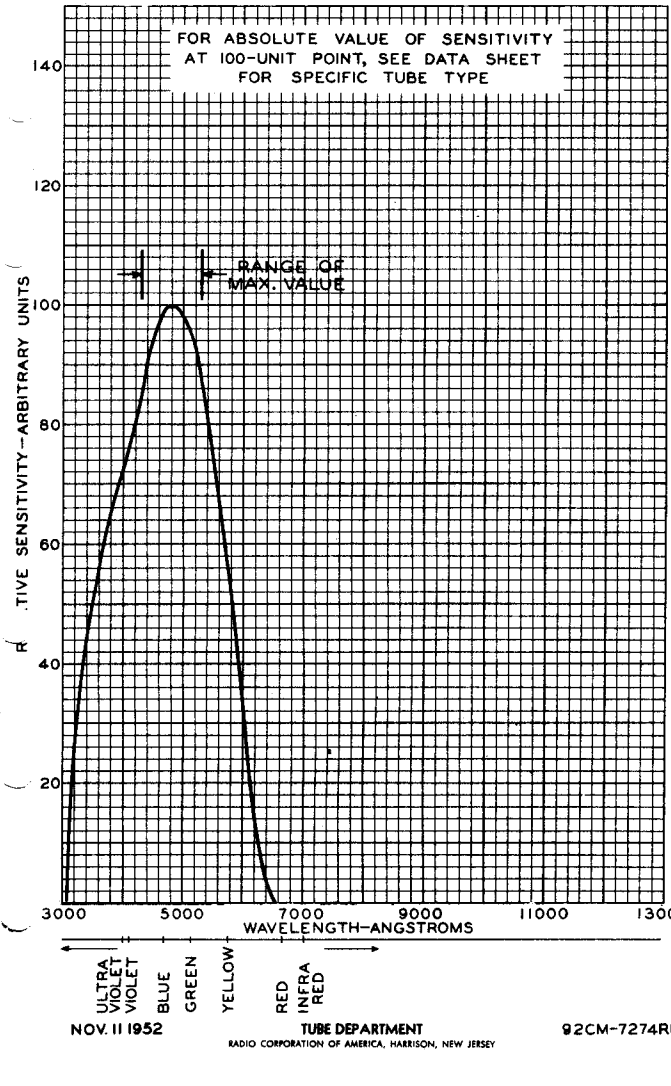
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6592RI

RCA

SPECTRAL SENSITIVITY CHARACTERISTIC OF PHOTOTUBE HAVING S-9 RESPONSE

FOR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS



NOV. 11 1952

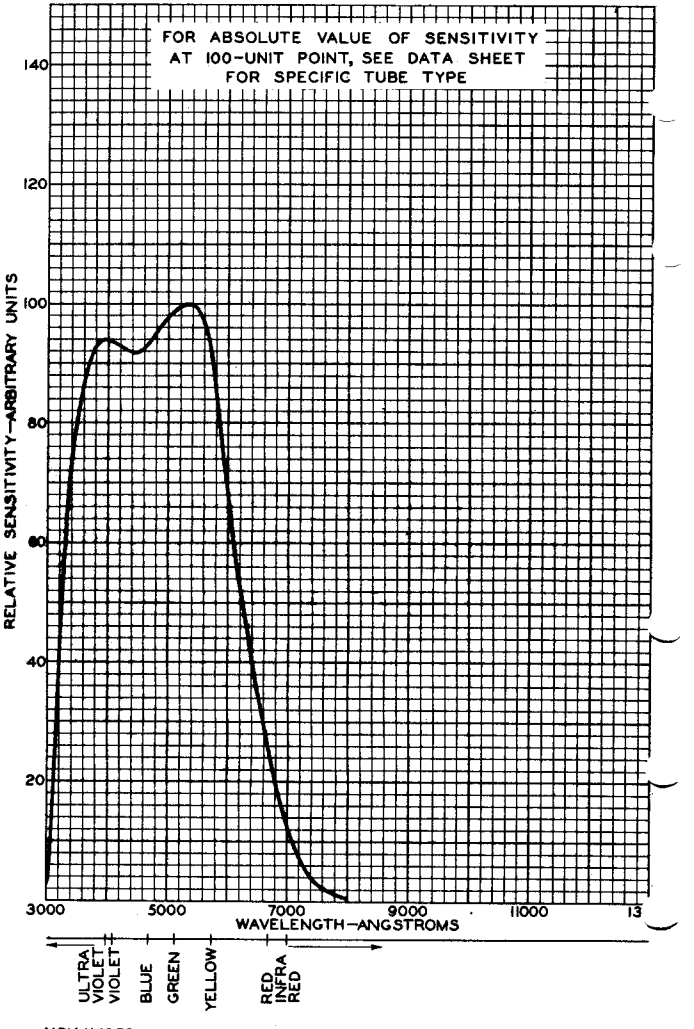
TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7274RI

SPECTRAL SENSITIVITY CHARACTERISTIC OF PHOTOTUBE HAVING S-10 RESPONSE

FOR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS

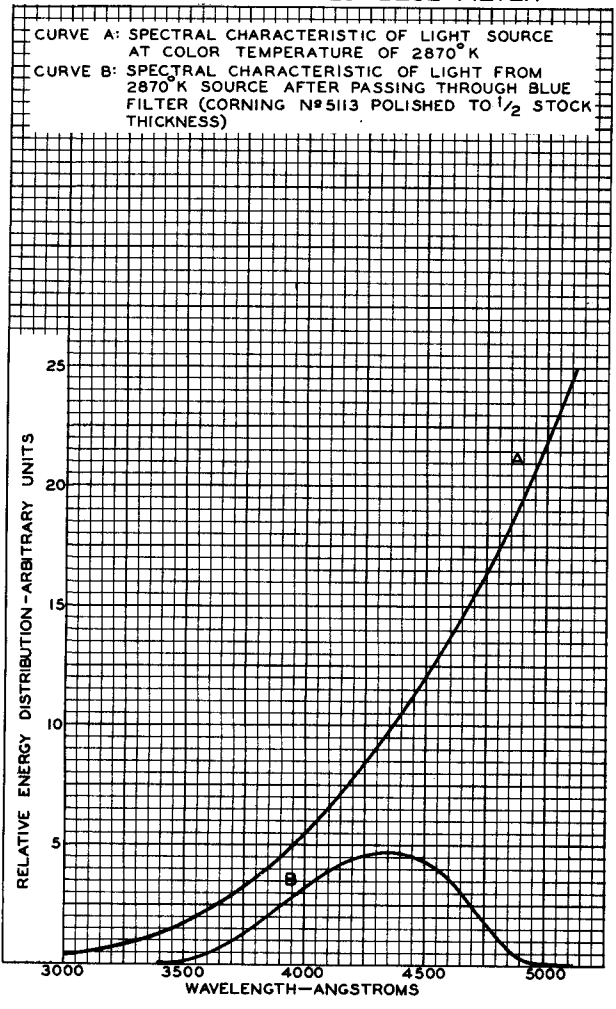


NOV. 11, 1952

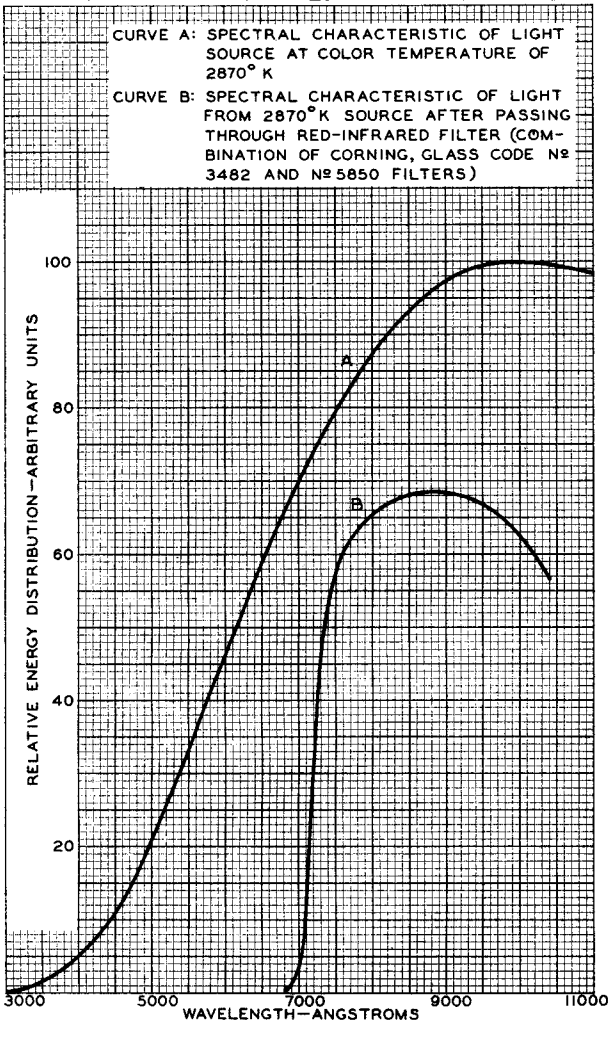
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-782IRI

SPECTRAL CHARACTERISTIC OF 2870°K LIGHT SOURCE AND SPECTRAL CHARACTERISTIC OF LIGHT FROM 2870°K SOURCE AFTER PASSING THROUGH INDICATED BLUE FILTER



SPECTRAL CHARACTERISTIC OF 2870°K LIGHT SOURCE AND SPECTRAL CHARACTERISTIC OF LIGHT FROM 2870°K SOURCE AFTER PASSING THROUGH INDICATED RED-INFRARED FILTER

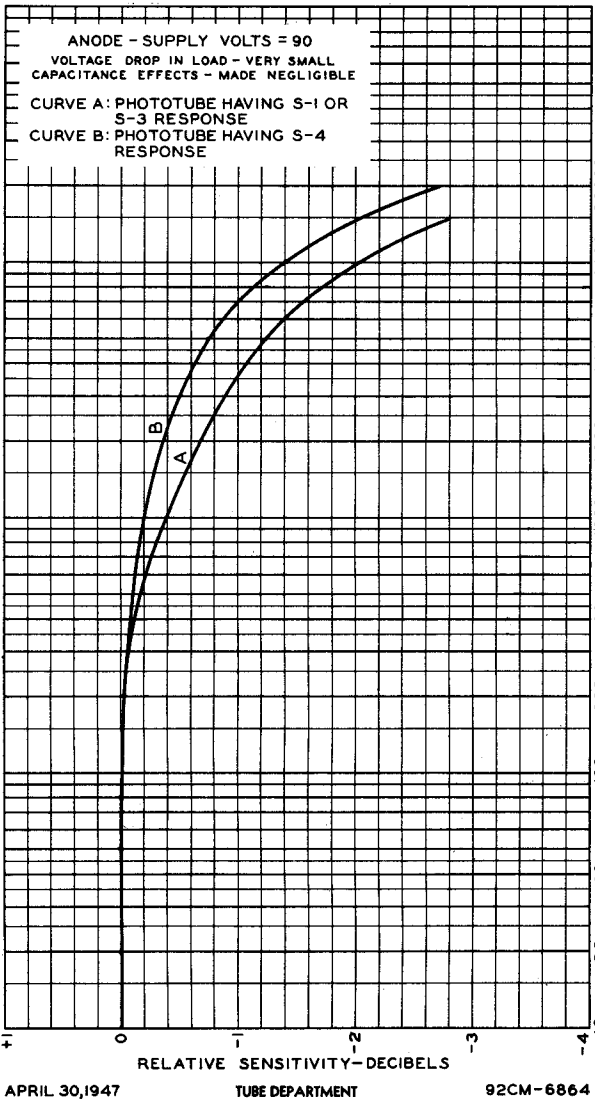


SEPT. 3, 1952

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7838

FREQUENCY-RESPONSE CHARACTERISTICS OF GAS PHOTOTUBES



APRIL 30, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6864

IP21

MULTIPLIER PHOTOTUBE

9-STAGE TYPE WITH S-4 RESPONSE

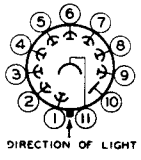
For applications involving very low light levels♦

DATA

General:

Spectral Response	S-4
Wavelength of Maximum Response	4000 ± 500 angstroms
Cathode:	
Minimum Projected Length*	15/16"
Minimum Projected Width*	5/16"
Direct Interelectrode Capacitances:	
Anode to Dynode No.9	4 μμf
Anode to All Other Electrodes	6.5 μμf
Maximum Overall Length	3-11/16"
Maximum Seated Length	3-1/8"
Seated Length to Center of Cathode	1-15/16" ± 3/32"
Maximum Diameter	1-5/16"
Bulb	T-9
Mounting Position	Any
Base	Small-Shell Submagnal 11-Pin, Non-Hygroscopic
Basing Designation for BOTTOM VIEW	11K

Pin 1 – Dynode No.1
Pin 2 – Dynode No.2
Pin 3 – Dynode No.3
Pin 4 – Dynode No.4
Pin 5 – Dynode No.5
Pin 6 – Dynode No.6



DIRECTION OF LIGHT

Pin 7 – Dynode No.7
Pin 8 – Dynode No.8
Pin 9 – Dynode No.9
Pin 10 – Anode
Pin 11 – Cathode

Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)□	1250 max.	volts
SUPPLY VOLTAGE BETWEEN DYNODE No.9 and ANODE (DC or Peak AC)	250 max.	volts
PEAK ANODE CURRENT	1 max.	ma
AVERAGE ANODE CURRENT○	0.1 max.	ma
AMBIENT TEMPERATURE	75 max.	°C

Characteristics:

With 100 volts per dynode stage and 100 volts between dynode No.9 and anode♦

	Min.	Av.	Max.	
Anode Dark Current#●	–	–	0.1	μamp
Sensitivity:				
At 4000 Angstroms	–	74000	–	μamp/μwatt
Luminous▲	40	80	–	amp/lumen
Current Amplification■	–	2000000	–	
Equivalent Noise Input★	–	5×10^{-13}	–	lumen

♦ For the more usual applications, the 931-A is recommended.

♦ The use of about 50 volts between dynode No.9 and anode will give improved operating stability without sacrifice in sensitivity as explained in note under Type 931-A.

* On plane perpendicular to indicated direction of incident light.

□,○,#,●,▲,■,★: See next page. ←Indicates a change.

1P21

MULTIPLIER PHOTOTUBE

Characteristics:

With 75 volts per dynode stage and 50 volts between dynode No.9 and anode

	Av.	
Sensitivity:		
At 4000 Angstroms.	11000	μamp/μwatt
Luminous▲.	12	amp/lumen
Current Amplification■	300000	

□ Referred to cathode.

○ Averaged over any interval of 30 seconds maximum.

✱ Dark current due to thermionic emission and ion feedback may be reduced by the use of refrigerants.

● For maximum signal-to-noise ratio, operation below 1000 volts is recommended.

▲ Measured under conditions specified on sheet "PHOTOTUBE SENSITIVITY and MEASUREMENTS" at the front of this Section.

■ Ratio of anode sensitivity to cathode sensitivity.

★ Defined as the value where the rms output current is equal to the rms noise current determined under the following conditions: 100 volts per stage, 25°C tube temperature, bandwidth of 1 cycle per second, tungsten light source at 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.

OUTLINE DIMENSIONS for Type 1P21
are the same as those for Type 931-A

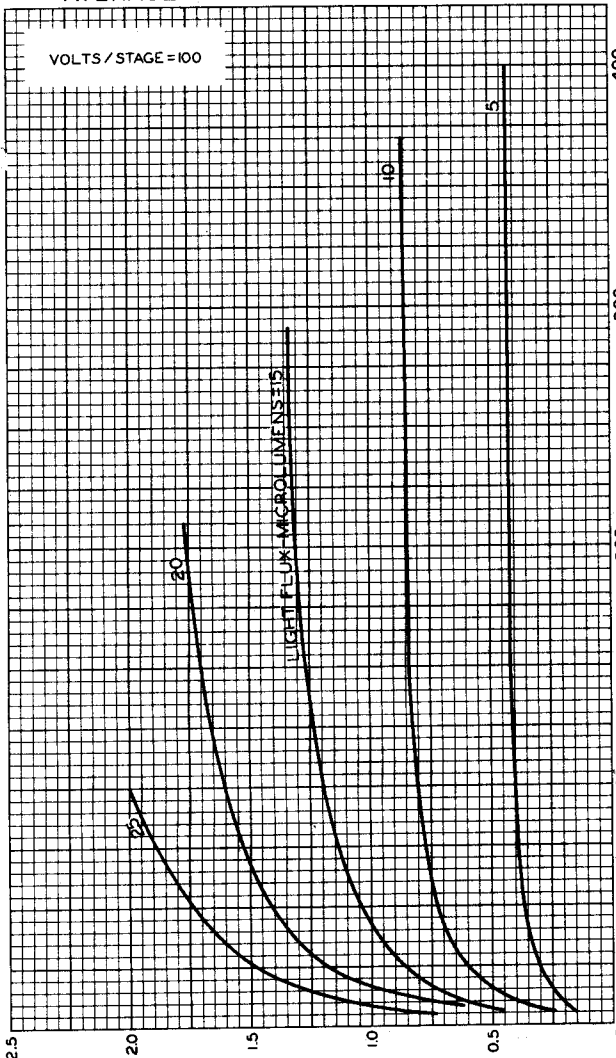
SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-4 Response
is shown at the front of this Section

→ Indicates a change.

RCA

IP21

AVERAGE ANODE CHARACTERISTICS



OCT. 26, 1949

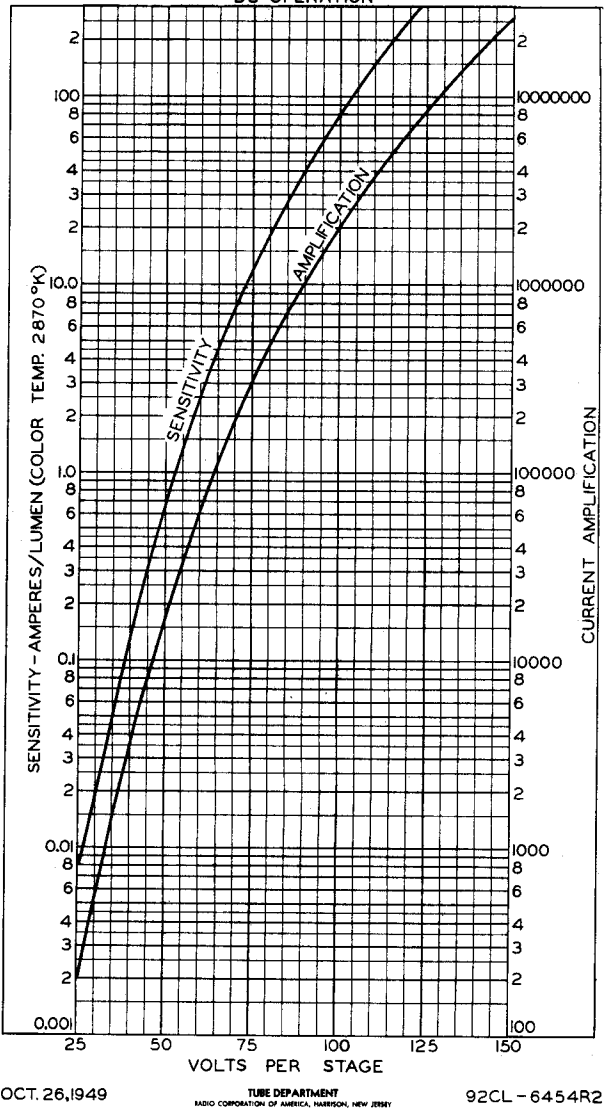
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6456R3

IP21

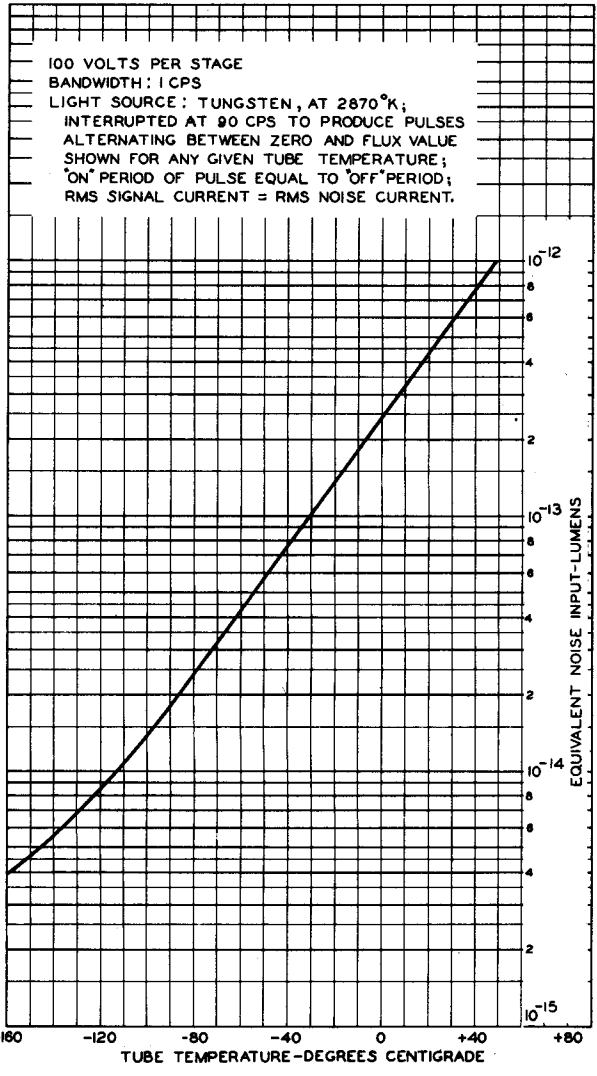
IP21

AVERAGE CHARACTERISTICS
DC OPERATION



IP21

EQUIVALENT-NOISE-INPUT CHARACTERISTIC



IP22

MULTIPLIER PHOTOTUBE

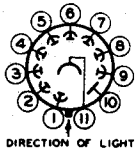
9-STAGE TYPE WITH S-8 RESPONSE

DATA

General:

Spectral Response	S-8
Wavelength of Maximum Response	4200 ± 500 angstroms ←
Cathode:	
Minimum Projected Length*	15/16"
Minimum Projected Width*	5/16"
Direct Interelectrode Capacitances:	
Anode to Dynode No. 9	4 μμf
Anode to All Other Electrodes	6.5 μμf
Maximum Overall Length	3-11/16"
Maximum Seated Length	3-1/8"
Seated Length to Center of Cathode	1-15/16" ± 3/32"
Maximum Diameter	1-5/16"
Bulb	T-9
Mounting Position	Any
Base	Small-Shell Submagnal 11-Pin, Non-Hygroscopic
Basing Designation for BOTTOM VIEW	11K

Pin 1- Dynode No.1
Pin 2- Dynode No.2
Pin 3- Dynode No.3
Pin 4- Dynode No.4
Pin 5- Dynode No.5
Pin 6- Dynode No.6



DIRECTION OF LIGHT

Pin 7- Dynode No.7
Pin 8- Dynode No.8
Pin 9- Dynode No.9
Pin 10- Anode
Pin 11- Cathode

Maximum Ratings, *Absolute Values:*

ANODE-SUPPLY VOLTAGE (DC or Peak AC)□	1250 max.	volts
SUPPLY VOLTAGE BETWEEN DYNODE No.9 and ANODE (DC or peak AC)	250 max.	volts
PEAK ANODE CURRENT	10 max.	ma ←
AVERAGE ANODE CURRENT○	1 max.	ma ←
AMBIENT TEMPERATURE	50 max.	°C

Characteristics: ←

With 100 volts per dynode stage and 100 volts between dynode No.9 and anode●

	Min.	Av.	Max.	
Anode Dark Current#●	–	–	0.25	μamp
Sensitivity:				
At 4200 Angstroms	–	370	–	μamp/μwatt
Luminous▲	0.115	0.6	50	amp/lumen
Current Amplification■	–	200000	–	
Luminous Detectivity*	1×10^{-10}	–	–	lumen

● The use of about 50 volts between dynode No.9 and anode will give improved operating stability without sacrifice in sensitivity as explained in note under Type 931-A.

* On plane perpendicular to indicated direction of incident light.

□ Referred to cathode.

○, #, ●, ▲, ■, *: See next page. ← Indicates a change.

1P22
MULTIPLIER PHOTOTUBE

Characteristics:

With 75 volts per dynode stage
and 50 volts between dynode No.9 and anode

	Av.	
Sensitivity:		
At 4200 Angstroms.	55	μamp/μwatt
Luminous▲	0.09	amp/lumen
Current Amplification■	30000	

° Averaged over any interval of 30 seconds maximum.

♯ Dark current due to thermionic emission and ion feedback may be reduced by the use of refrigerants.

● For maximum signal-to-noise ratio, operation below 1000 volts is recommended.

▲ Measured under conditions specified on sheet "PHOTOTUBE SENSITIVITY AND SENSITIVITY MEASUREMENTS" at the front of this Section.

■ Ratio of anode sensitivity to cathode sensitivity.

★ Defined as the value where the rms output current is equal to the rms noise current determined under the following conditions: 100 volts per stage, 25°C tube temperature, bandwidth of 1 cycle per second, tungsten light source at 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.

OUTLINE DIMENSIONS for Type 1P22
are the same as those for Type 931-A

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-8 Response
is shown at the front of this Section

→ Indicates a change.

RCA

IP22

AVERAGE ANODE CHARACTERISTICS

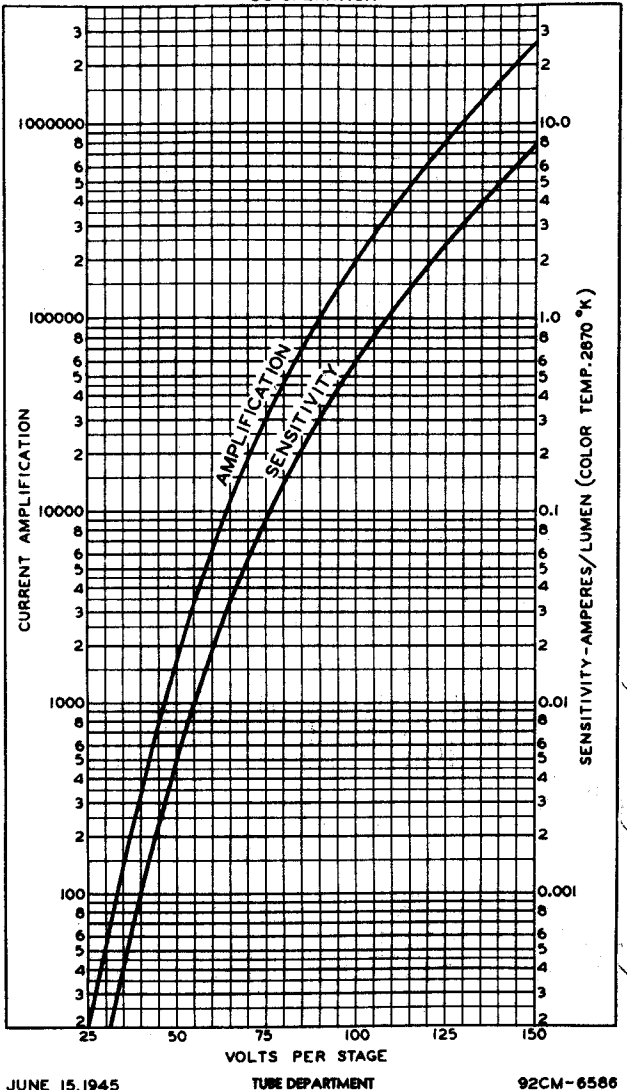
MAR. 12, 1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6585R1

IP22

AVERAGE CHARACTERISTIC
DC OPERATION



JUNE 15, 1945

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6586

IP28

IP28

MULTIPLIER PHOTOTUBE

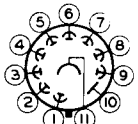
9-STAGE TYPE WITH S-5 RESPONSE

DATA

General:

Spectral Response	S-5
Wavelength of Maximum Response	3400 ± 500 angstroms
Cathode:	
Minimum Projected Length*	15/16"
Minimum Projected Width*	5/16"
Direct Interelectrode Capacitances:	
Anode to Dynode No.9	4 μμf
Anode to All Other Electrodes	6.5 μμf
Maximum Overall Length	3-11/16"
Maximum Seated Length	3-1/8"
Seated Length to Center of Cathode	1-15/16" ± 3/32"
Length, Base Seat to Center of Useful Cathode Area	1-15/16" ± 3/32"
Maximum Diameter	1-5/16"
Bulb	T-9
Mounting Position	Any
Base	Small-Shell Submagnal 11-Pin, Non-Hygroscopic
Basing Designation for BOTTOM VIEW	11K

Pin 1- Dynode No.1
Pin 2- Dynode No.2
Pin 3- Dynode No.3
Pin 4- Dynode No.4
Pin 5- Dynode No.5
Pin 6- Dynode No.6



Pin 7- Dynode No.7
Pin 8- Dynode No.8
Pin 9- Dynode No.9
Pin 10- Anode
Pin 11- Cathode

DIRECTION OF INCIDENT RADIATION

Maximum Ratings, *Absolute Values:*

ANODE-SUPPLY VOLTAGE (DC or Peak AC)□	1250 max.	volts
SUPPLY VOLTAGE BETWEEN DYNODE No.9 and ANODE (DC or Peak AC)	250 max.	volts
PEAK ANODE CURRENT	5 max.	ma
AVERAGE ANODE CURRENTo	0.5 max.	ma
AMBIENT TEMPERATURE	75 max.	°C

Characteristics:

With 100 volts per dynode stage and 100 volts between dynode No.9 and anode

	Min.	Av.	Max.	
DC Anode Dark Current#●	-	-	0.1	μamp

* On plane perpendicular to indicated direction of incident radiation.

□ Referred to cathode.

o Averaged over any interval of 30 seconds maximum.

At 25°C. Dark current due to thermionic emission and ion feedback may be reduced by the use of refrigerants.

● For maximum signal-to-noise ratio, operation below 1000 volts is recommended.

←Indicates a change.

IP28
MULTIPLIER PHOTOTUBE

	Min.	Av.	Max.	
Sensitivity:				
At 3400 angstroms. . .	–	22600	–	μamp/μwatt
Luminous:				
Cathode§	–	20	–	μamp/lumen
Anode:▲				
At 0 cps	4.5	20	300	amp/lumen
At 100 Mc.	–	19	–	amp/lumen
Current Amplification■	–	1×10^6	–	
Luminous Equivalent Noise Input★ .	–	7×10^{-12}	–	lumen
Ultraviolet Equivalent Noise Input† .	–	6×10^{-15}	–	watt

→ **Characteristics:**

With 75 volts per dynode stage and 50 volts between dynode No.9 and anode

Sensitivity:	Av.	
At 3400 angstroms.	3400	μamp/μwatt
Luminous:		
Cathode§	20	μamp/lumen
Anode▲, at 0 cps	3	amp/lumen
Current Amplification■	150000	

§ For conditions the same as shown under Anode Luminous Sensitivity except that the value of light flux is 0.01 lumen and that 100 volts are applied between cathode and all other electrodes connected together as anode.

▲ Measured under conditions specified on sheet "PHOTOTUBE SENSITIVITY AND SENSITIVITY MEASUREMENTS" at the front of this Section.

■ Ratio of anode sensitivity to cathode sensitivity.

★ Defined as the value where the rms output current is equal to the rms noise current determined under the following conditions; 100 volts per stage, 25°C tube temperature, ac-amplifier bandwidth of 1 cycle per second, tungsten light source at 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.

† Defined the same as Luminous Equivalent Noise Input except that use is made of a monochromatic source having radiation at 2537 angstroms.

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-5 Response
is shown at the front of this Section

OPERATING NOTES

The operating stability of the IP28 is dependent on the magnitude of the anode current and its duration. When the IP28 is operated at high values of anode current, a drop in sensitivity (sometimes called fatigue) may be expected. The extent of the drop below the tabulated sensitivity values depends on the severity of the operating conditions.

(continued on next page)

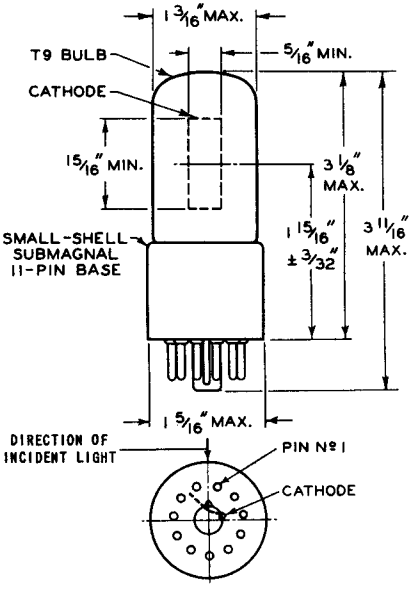
→ indicates a change.

IP28

MULTIPLIER PHOTOTUBE

After a period of idleness, the IP28 usually recovers a substantial percentage of such loss in sensitivity.

The use of an average anode current well below the maximum rated value of 0.5 milliampere is recommended when stability of operation is important. When maximum stability is required, the anode current should not exceed 10 microamperes.



BOTTOM VIEW

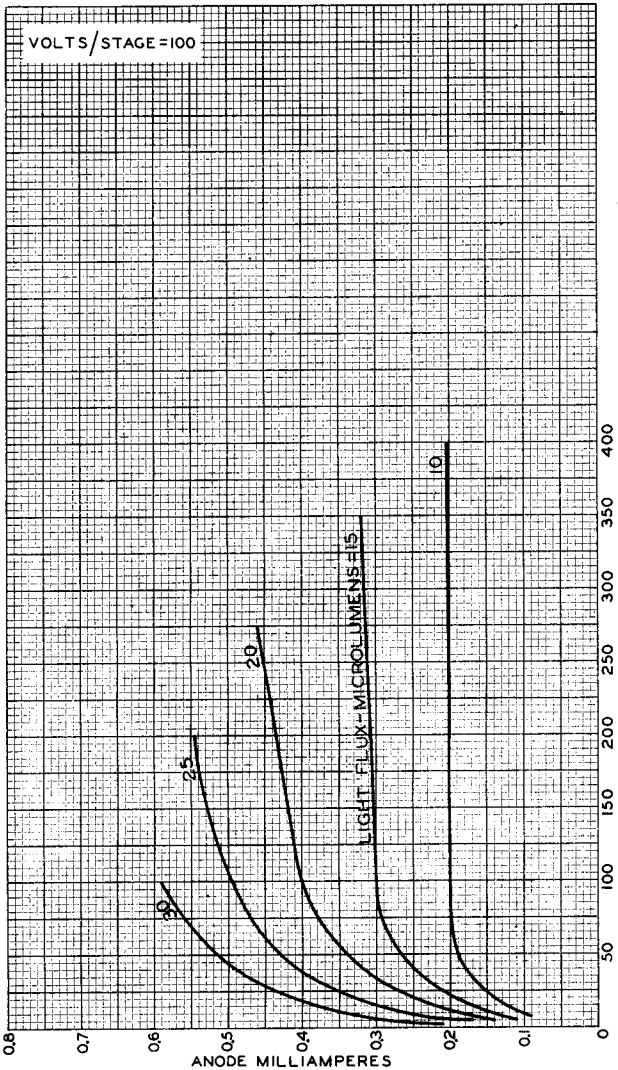
℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE.

92CM-6264R2

RCA

IP28

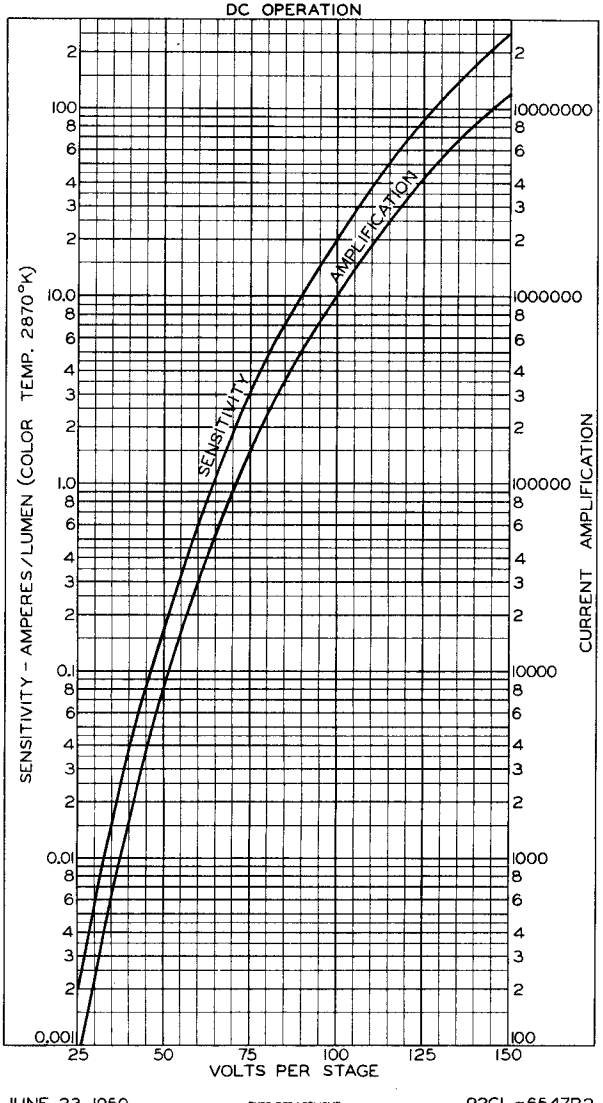
AVERAGE ANODE CHARACTERISTICS



IP28

IP28

AVERAGE CHARACTERISTICS
DC OPERATION

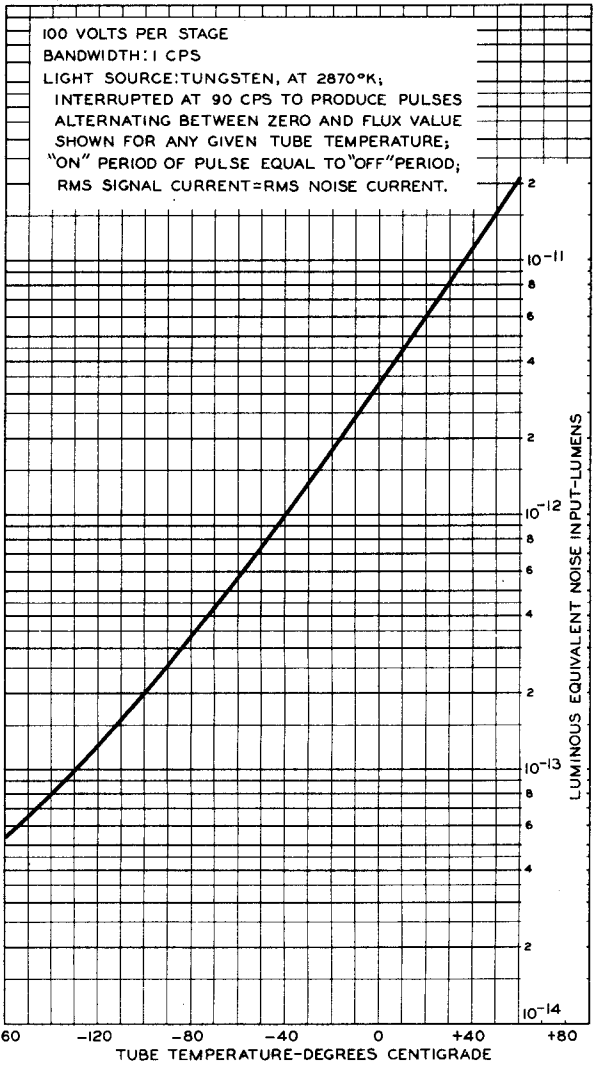


IP28

RCA

IP28

EQUIVALENT-NOISE-INPUT CHARACTERISTIC



JUNE 26,1950

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7503

IP29

GAS PHOTOTUBE

WITH S-3 RESPONSE

DATA

General:

Spectral Response	S-3
Wavelength of Maximum Response	4200 ± 1000 Angstroms
Cathode:	
Shape	Semi-Cylindrical
Minimum Projected Length*	1-1/4" ←
Minimum Projected Width*	5/8" ←
Direct Interelectrode Capacitance	3 μμf
Maximum Overall Length	4-1/8"
Maximum Seated Length	3-1/2"
Seated Length to Center of Cathode	2-1/8" ± 3/32"
Maximum Diameter	1-1/8" ←
Bulb	T-8
Mounting Position	Any
Base	Dwarf-Shell Small 4-Pin ←
Basing Designation for BOTTOM VIEW	2K

Pin 1 – No Connection
Pin 2 – Anode

Pin 3 – No Connection
Pin 4 – Cathode

Maximum Ratings, ***Absolute Values*****:**

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	100 max.	volts
PEAK CATHODE CURRENT	20 max.	μamp ←
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq.in.
AVERAGE CATHODE CURRENT°	5 max.	μamp ←
AMBIENT TEMPERATURE	100 max.	°C

Characteristics:

	Min.	Av.	Max.	
Dark Current at 90 Volts	–	–	0.10	μamp
Sensitivity:				
At 4200 Angstroms	–	0.01	–	μamp/μwatt
Luminous:				
At 0 Cycles	20	40	70	μamp/lumen ←
At 5000 Cycles	–	35	–	μamp/lumen
At 10000 Cycles	–	31	–	μamp/lumen
Gas Amplification Factor	–	–	9	

* On plane perpendicular to indicated direction of incident light.

° Averaged over any interval of 30 seconds maximum. Average current may be doubled when anode-supply voltage is limited to 80 volts.

← Indicates a change.

RCA

IP29

GAS PHOTOTUBE

Minimum Circuit Values:

DC Load Resistance:

With anode-supply voltage of 80 volts or less:

→ For dc currents { above 5 μamp . . 0.1 . . . . megohm
below 5 μamp No Minimum

With anode-supply voltage of 100 volts:

→ For dc currents { above 3 μamp . . 2.5 . . . . megohms
→ below 3 μamp . . 0.1 . . . . megohm

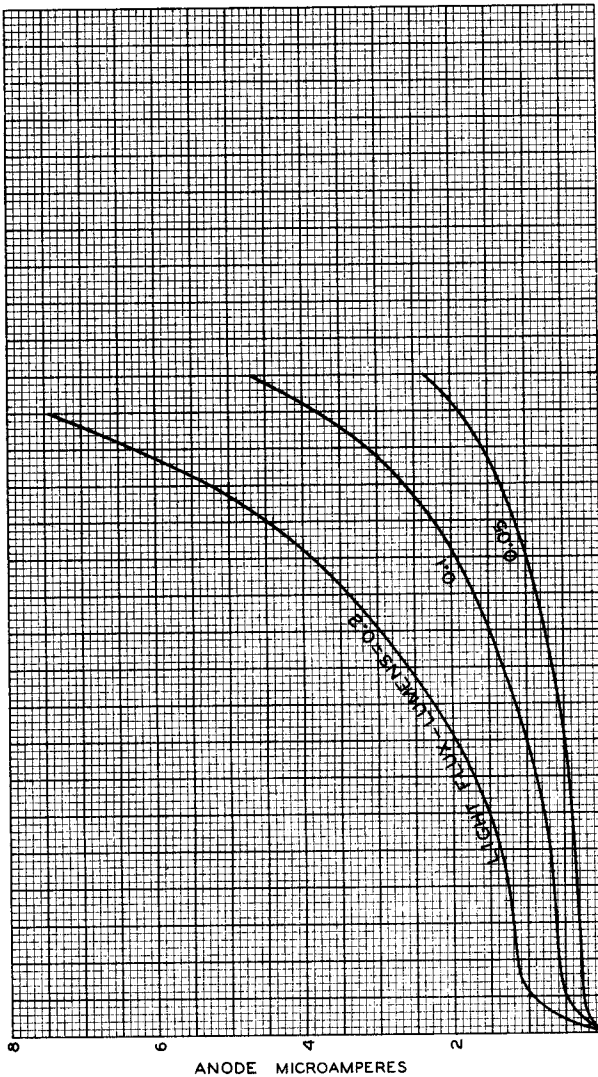
OUTLINE DIMENSIONS for Type 1P29
are the same as those for Type 1P37

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-3 Response
and
FREQUENCY-RESPONSE CHARACTERISTICS
of Gas Phototubes
are shown at the beginning of this Section

→ Indicates a change.

IP29

AVERAGE ANODE CHARACTERISTICS



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IP37

GAS PHOTOTUBE

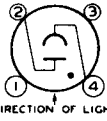
WITH S-4 RESPONSE

DATA

General:

Spectral Response	S-4
Wavelength of Maximum Response	4000 ± 500 Angstroms ←
Cathode:	
Shape	Semi-Cylindrical
Minimum Projected Length*	1-1/4"
Minimum Projected Width*	5/8"
Direct Interelectrode Capacitance	3 μμf
Maximum Overall Length	4-1/8"
Maximum Seated Length	3-1/2"
Seated Length to Center of Cathode	2-1/8" ± 3/32"
Maximum Diameter	1-1/8"
Bulb	T-8
Mounting Position	Any
Base	Dwarf-Shell Small 4-Pin
Basing Designation for BOTTOM VIEW	2K

Pin 1 – No Connection
Pin 2 – Anode



Pin 3 – No Connection
Pin 4 – Cathode

Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	100 max.	volts
PEAK CATHODE CURRENT	20 max.	μamp ←
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq.in. ←
AVERAGE CATHODE CURRENT[o]	5 max.	μamp
AMBIENT TEMPERATURE	75 max.	°C

Characteristics:

	Min.	*Av.*	*Max.*	
Dark Current at 90 Volts	–	–	0.05	μamp
Sensitivity:				
At 4000 Angstroms	–	0.125	–	μamp/μwatt
Luminous:				
At 0 Cycles	75	135	205	μamp/lumen
At 5000 Cycles	–	124	–	μamp/lumen
At 10000 Cycles	–	108	–	μamp/lumen
Gas Amplification Factor	–	–	5.5	

* On plane perpendicular to indicated direction of incident light.

o Averaged over any interval of 30 seconds maximum. Average current may be doubled when anode-supply voltage is limited to 80 volts.

←Indicates a change.

IP37
GAS PHOTOTUBE

Minimum Circuit Values:

DC Load Resistance:

With anode-supply voltage of 80 volts or less:

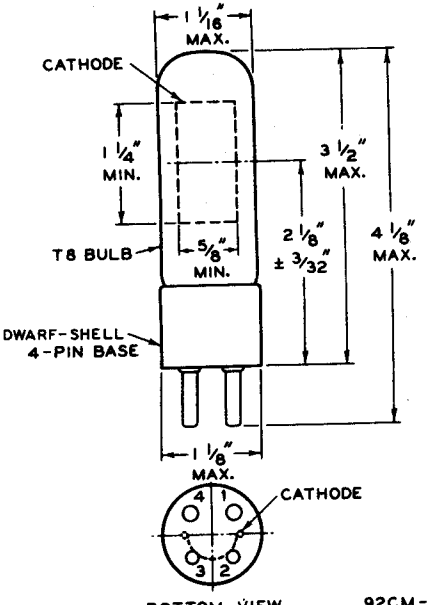
For dc currents { above 5 μamp . . 0.1 . . . . megohm
below 5 μamp . . No Minimum

With anode-supply voltage of 100 volts:

For dc currents { above 3 μamp . . 2.5 . . . . megohms
below 3 μamp . . 0.1 . . . . megohm

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-4 Response
and
FREQUENCY-RESPONSE CHARACTERISTICS
of Gas Phototubes
are shown at the beginning of this Section

AVERAGE ANODE CHARACTERISTICS
of Type 1P37 are the same
as those shown under Type 5581



BOTTOM VIEW

92CM-470R4

→Indicates a change.

IP39

VACUUM PHOTOTUBE

WITH S-4 RESPONSE

For applications critical as to leakage under high-humidity conditions

The 1P39 is like the 929, except that the 1P39 has a maximum dark current of 0.005 μa at 250 volts, and has a non-hygroscopic base which insures a value of resistance between anode and cathode pins about 10 times higher than conventional bases under adverse service conditions of high humidity. ←

←Indicates a change.

IP40

GAS PHOTOTUBE

WITH S-1 RESPONSE

For applications critical as to leakage under high-humidity conditions

The 1P40 is like the 930, except that the 1P40 has a maximum dark current of 0.005 μa at 90 volts, and has a non-hygroscopic base which insures a value of resistance between anode and cathode pins about 10 times higher than conventional bases under adverse service conditions of high humidity. ←

←Indicates a change.

IP41

GAS PHOTOTUBE

END TYPE WITH S-1 RESPONSE

DATA

General:

Spectral Response	S-1
Wavelength of Maximum Response	8000 ± 1000 angstroms
Cathode:	
Shape	Circular
Minimum Diameter	9/16"
Direct Interelectrode Capacitance	1.8 μμf
Maximum Overall Length	2-1/16" ←
Maximum Seated Length	1-19/32" ←
Maximum Diameter	13/16"
Bulb	T-6
Mounting Position	Any
Base	Small-Shell Peewee 3-Pin
Basing Designation for BOTTOM VIEW	$2F_2$

Pin 1 - No Connection

Pin 2 - Anode
Pin 3 - Cathode

Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	90 max.	volts
PEAK CATHODE CURRENT	5 max.	μamp
PEAK CATHODE-CURRENT DENSITY	75 max.	μamp/sq.in.
AVERAGE CATHODE CURRENT°	1.5 max.	μamp
AMBIENT TEMPERATURE	100 max.	°C

Characteristics:

	Min.	*Av.*	*Max.*	
DC Dark Current at 90 Volts:	-	-	0.1	μamp
Sensitivity:				
At 8000 angstroms	-	0.009	-	μamp/μwatt
Luminous:▲				
At 0 cps	50	90	145	μamp/lumen
At 5000 cps	-	77	-	μamp/lumen
At 10000 cps	-	67	-	μamp/lumen
Gas Amplification Factor	-	-	8.5	

° Averaged over any interval of 30 seconds maximum. Average current may be doubled when anode-supply voltage is limited to 70 volts.

▲ Measured with .06 lumen.

← Indicates a change.

1P41
GAS PHOTOTUBE

Minimum Circuit Values:

DC Load Resistance:

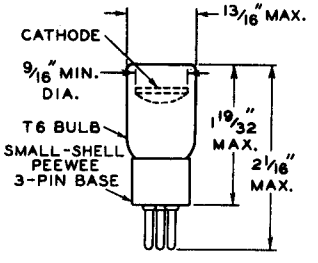
With anode-supply voltage of 70 volts or less:

For dc currents	above 1.5 μamp . .	0.1 . . .	megohm
	below 1.5 μamp . .	No Minimum	

With anode-supply voltage of 90 volts:

For dc currents	above 1.0 μamp . .	2.5 . . .	megohms
	below 1.0 μamp . .	0.1 . . .	megohm

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-1 Response
and
FREQUENCY-RESPONSE CHARACTERISTICS
of Gas Phototubes
are shown at the front of this Section



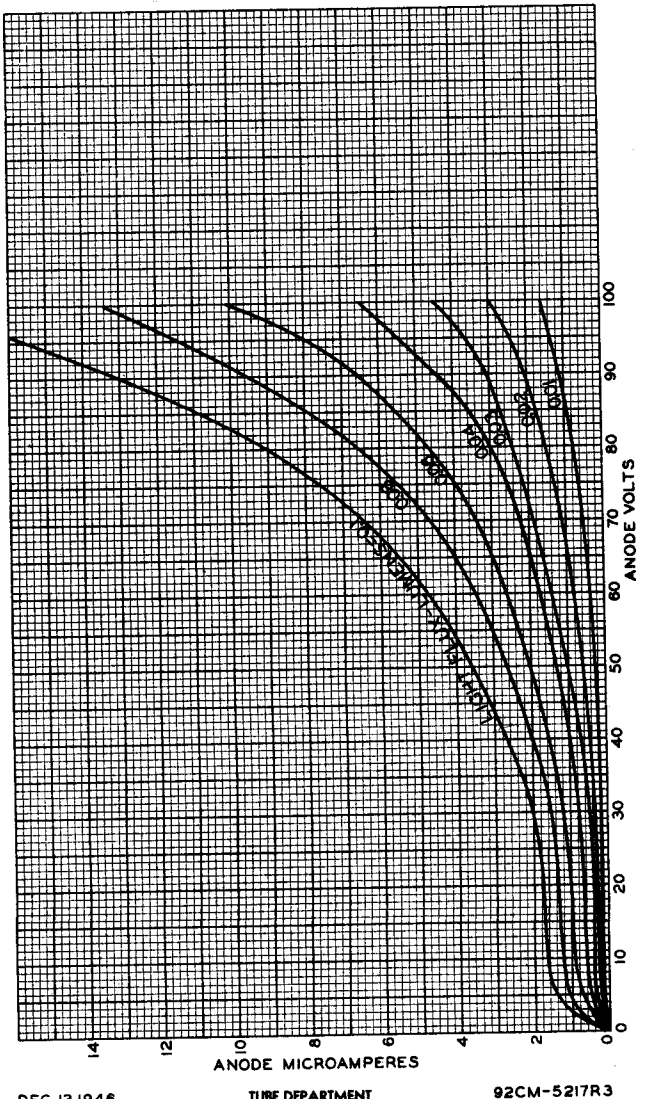
92CS-6676RI

→ Indicates a change.

RCA

IP41

AVERAGE ANODE CHARACTERISTICS



DEC. 13, 1946

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-5217R3

IP42

VACUUM PHOTOTUBE

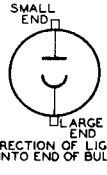
END TYPE WITH S-9 RESPONSE

DATA

General:

Spectral Response	S-9 ←
Wavelength of Maximum Response	4800 ± 500 angstroms ←
Cathode:	
Shape	Circular
Window Area	0.030 sq.in.
Minimum Diameter	0.19"
Direct Interelectrode Capacitance	1.9 μμf ←
Overall Length	1-11/32" ± 1/16"
Maximum Diameter	1/4"
Bulb	T-2
Mounting Position	Any

TERMINAL CONNECTIONS



Small End: Anode

Large End: Cathode

Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	180 max.	volts
PEAK CATHODE CURRENT	1.5 max.	μamp
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq.in.
AVERAGE CATHODE CURRENT°	0.4 max.	μamp
AMBIENT TEMPERATURE	75 max.	°C

Characteristics:

	Min.	*Av.*	*Max.*	
Dark Current at 180 Volts	–	–	0.005	μamp
Sensitivity:				
At 4800 Angstroms	–	0.020	–	μamp/μwatt ←
Luminous▲	20	30	50	μamp/lumen ←

° Averaged over any interval of 30 seconds maximum.

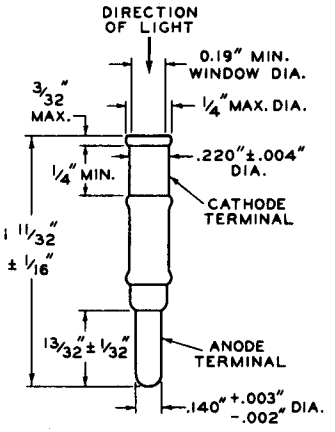
▲ Measured under conditions specified on sheet "PHOTOTUBE SENSITIVITY and SENSITIVITY MEASUREMENTS", at the front of this Section, except that the anode supply is 180 volts and the light flux is 0.015 lumen.

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-9 Response
is shown at the front of this Section

← Indicates a change.

1P42

1P42
VACUUM PHOTOTUBE



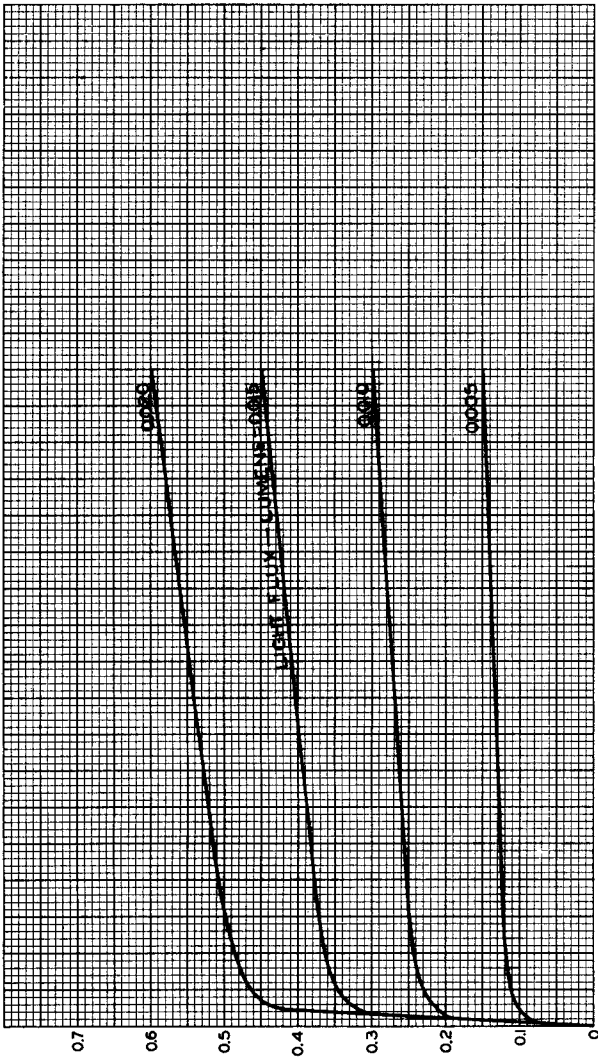
NOTE: WHEN TUBE IS ROTATED ABOUT THE LONGITUDINAL AXIS OF ITS CATHODE TERMINAL, NO PART OF THE ANODE TERMINAL WILL FALL OUTSIDE OF A 0.241"-DIAMETER CIRCLE CONCENTRIC WITH THE LONGITUDINAL AXIS OF THE CATHODE TERMINAL.

92CS-6791R2

RCA

IP42

AVERAGE ANODE CHARACTERISTICS



APRIL 7, 1950

92CM-6783R2

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

868
GAS PHOTOTUBE

WITH S-1 RESPONSE

DATA

General:

Spectral Response	S-1
Wavelength of Maximum Response	8000 ± 1000 Angstroms
Cathode:	
Shape	Semi-Cylindrical
Minimum Projected Length*	1-1/4"
Minimum Projected Width*	5/8"
Direct Interelectrode Capacitance	3 μμf
Maximum Overall Length	4-1/8"
Maximum Seated Length	3-1/2"
Seated Length to Center of Cathode	2-1/8" ± 3/32"
Maximum Diameter	1-1/8"
Bulb	T-8
Mounting Position	Any
Base	Dwarf-Shell Small 4-Pin
Basing Designation for BOTTOM VIEW	2K

Pin 1 – No Connection
Pin 2 – Anode

Pin 3 – No Connection
Pin 4 – Cathode

Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	100 max.	volts
PEAK CATHODE CURRENT	.20 max.	μamp
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq.in.
AVERAGE CATHODE CURRENT°	5 max.	μamp
AMBIENT TEMPERATURE	100 max.	°C

Characteristics:

	Min.	Av.	Max.	
Dark Current at 90 Volts	–	–	0.1	μamp
Sensitivity:				
At 8000 Angstroms	–	0.009	–	μamp/μwatt
Luminous:				
At 0 Cycles	50	90	145	μamp/lumen
At 5000 Cycles	–	77	–	μamp/lumen
At 10000 Cycles	–	67	–	μamp/lumen
Gas Amplification Factor	–	–	8	

* On plane perpendicular to indicated direction of incident light.

° Averaged over any interval of 30 seconds maximum. Average current may be doubled when anode-supply voltage is limited to 80 volts.

◄ Indicates a change.

868
GAS PHOTOTUBE

Minimum Circuit Values:

DC Load Resistance:

With anode-supply voltage of 80 volts or less:

→ For dc currents	above 5 μamp . .	0.1	megohm
	below 5 μamp . .	No Minimum	

With anode-supply voltage of 100 volts:

→ For dc currents	above 3 μamp . .	2.5	megohms
	below 3 μamp . .	0.1	megohm

OUTLINE DIMENSIONS for Type 868
are the same as those for Type 1P37

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-1 Response
and
FREQUENCY-RESPONSE CHARACTERISTICS
of Gas Phototubes
are shown at the beginning of this Section

AVERAGE ANODE CHARACTERISTICS
of Type 868 are the same
as those shown under Type 1P41

→ Indicates a change.

917

VACUUM PHOTOTUBE

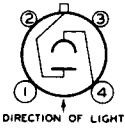
WITH ANODE-TERMINAL CAP AND S-1 RESPONSE

DATA

General:

Spectral Response	S-1
Wavelength of Maximum Response	8000 ± 1000 Angstroms
Cathode:	
Shape	Semi-Cylindrical
Minimum Projected Length*	1-9/16"
Minimum Projected Width*	5/8"
Direct Interelectrode Capacitance	2.2 μμf
Overall Length	4-5/16" ± 1/8"
Seated Length	3-11/16" ± 1/8"
Seated Length to Center of Cathode	2-1/8" ± 3/32"
Maximum Diameter	1-1/8"
Bulb	T-8
Mounting Position	Any
Cap	Small
Base	Dwarf-Shell Small 4-Pin

BOTTOM VIEW



Pin 1 - No Connection
Pin 2 - No Connection
Pin 3 - No Connection
Pin 4 - Cathode
Cap - Anode

Maximum Ratings, ***Absolute Values:***

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	500 max.	volts
PEAK CATHODE CURRENT	30 max.	μamp
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq.in.
AVERAGE CATHODE CURRENT°	10 max.	μamp
AMBIENT TEMPERATURE	100 max.	°C

Characteristics:

	Min.	*Av.*	*Max.*	
Dark Current at 250 Volts	-	-	0.005	μamp
Sensitivity:				
At 8000 Angstroms	-	0.002	-	μamp/μwatt
Luminous	12	20	40	μamp/lumen

* On plane perpendicular to indicated direction of incident light.

° Averaged over any interval of 30 seconds maximum.

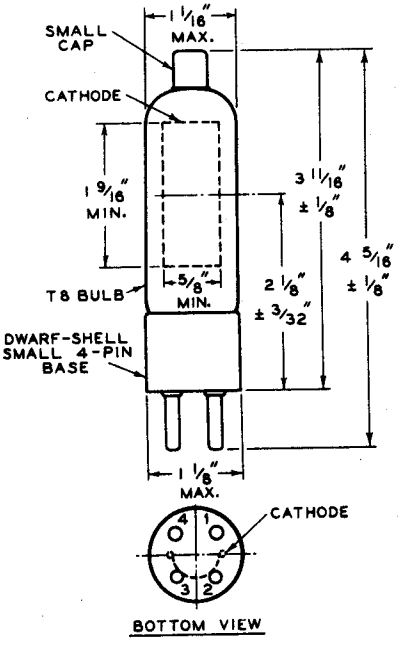
SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-1 Response
is shown at the beginning of this Section

← Indicates a change.

RCA

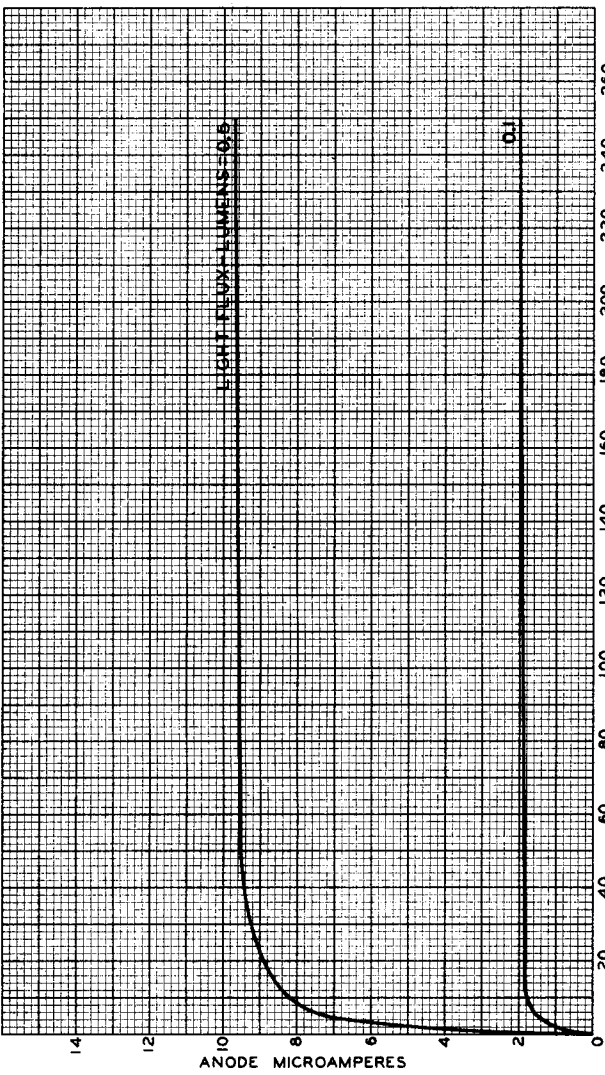
917

VACUUM PHOTOTUBE



92CS-4359R4

AVERAGE ANODE CHARACTERISTICS



918
GAS PHOTOTUBE

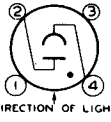
WITH S-1 RESPONSE

DATA

General:

Spectral Response	S-1
Wavelength of Maximum Response	8000 ± 1000 Angstroms
Cathode:	
Shape	Semi-Cylindrical
Minimum Projected Length*	1-1/4"
Minimum Projected Width*	5/8"
Direct Interelectrode Capacitance	3 μμf
Maximum Overall Length	4-1/8"
Maximum Seated Length	3-1/2"
Seated Length to Center of Cathode	2-1/8" ± 3/32"
Maximum Diameter	1-1/8"
Bulb	T-8
Mounting Position	Any
Base	Dwarf-Shell Small 4-Pin
Basing Designation for BOTTOM VIEW	2K

Pin 1 - No Connection
Pin 2 - Anode



DIRECTION OF LIGHT

Pin 3 - No Connection
Pin 4 - Cathode

Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	90 max.	volts
PEAK CATHODE CURRENT	20 max.	μamp
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq.in.
AVERAGE CATHODE CURRENT°	5 max.	μamp
AMBIENT TEMPERATURE	100 max.	°C

Characteristics:

	Min.	*Av.*	*Max.*	
Dark Current at 90 Volts	-	-	0.1	μamp
Sensitivity:				
At 8000 Angstroms	-	0.015	-	μamp/μwatt
Luminous:				
At 0 Cycles	120	150	220	μamp/lumen
At 5000 Cycles	-	120	-	μamp/lumen
At 10000 Cycles	-	105	-	μamp/lumen
Gas Amplification Factor	-	-	7.0	

* On plane perpendicular to indicated direction of incident light.

° Averaged over any interval of 30 seconds maximum. Average current may be doubled when anode-supply voltage is limited to 70 volts.

< Indicates a change.

918
GAS PHOTOTUBE

Minimum Circuit Values:

DC Load Resistance:

With anode-supply voltage of 70 volts or less:

For dc currents { above 5 μamp . . . 0.1 . . . megohm
→ For dc currents { below 5 μamp . . . No Minimum

With anode-supply voltage of 90 volts:

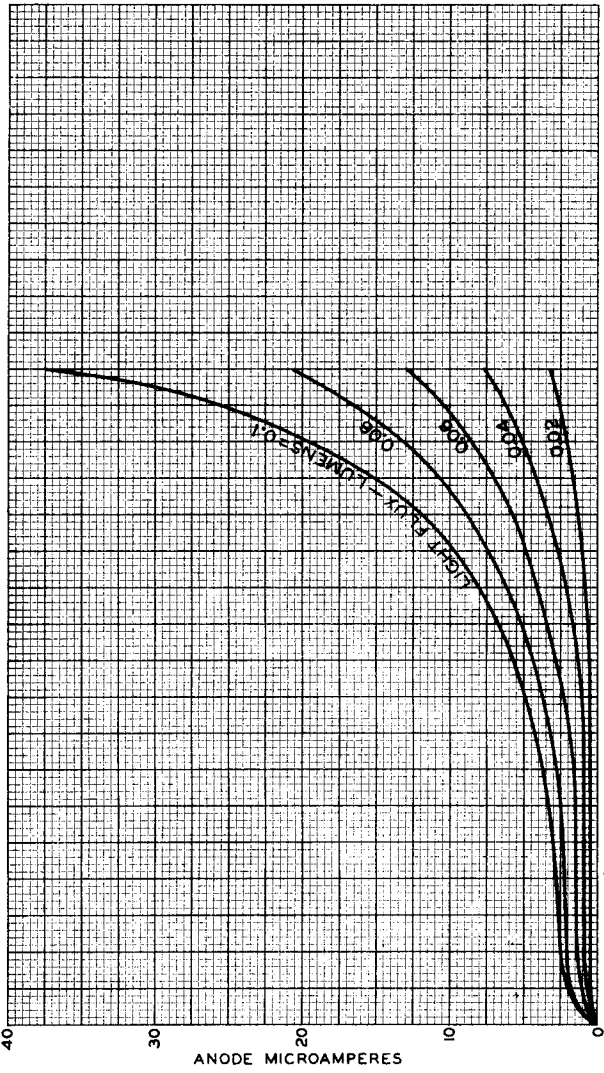
For dc currents { above 3 μamp . . . 2.5 . . . megohms
→ For dc currents { below 3 μamp . . . 0.1 . . . megohm

OUTLINE DIMENSIONS for Type 918
are the same as those for Type 1P37

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-1 Response
and
FREQUENCY-RESPONSE CHARACTERISTICS
of Gas Phototubes
are shown at the beginning of this Section

→Indicates a change.

AVERAGE ANODE CHARACTERISTICS



APRIL 7, 1950

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-4351R2

RCA

919

VACUUM PHOTOTUBE

WITH CATHODE-TERMINAL CAP AND S-1 RESPONSE

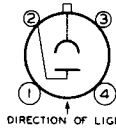
DATA

General:

Spectral Response	S-1
Wavelength of Maximum Response	8000 ± 1000 Angstroms
Cathode:	
Shape	Semi-Cylindrical
Minimum Projected Length*	1-9/16"
Minimum Projected Width*	5/8"
Direct Interelectrode Capacitance	2 μμf
Overall Length	4-5/16" ± 1/8"
Seated Length	3-11/16" ± 1/8"
Seated Length to Center of Cathode	2-1/8" ± 3/32"
Maximum Diameter	1-1/8"
Bulb	T-8
Mounting Position	Any
Cap	Small
Base	Dwarf-Shell Small 4-Pin

BOTTOM VIEW

Pin 1 - No Connection
Pin 2 - Anode
Pin 3 - No Connection



Pin 4 - No Connection
Cap - Cathode

Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	500 max. volts
PEAK CATHODE CURRENT	30 max. μamp
PEAK CATHODE-CURRENT DENSITY	100 max. μamp/sq. in.
AVERAGE CATHODE CURRENTo	10 max. μamp
AMBIENT TEMPERATURE	100 max. °C

Characteristics:

	Min.	*Av.*	*Max.*	
Dark Current at 250 Volts	-	-	0.005	μamp
Sensitivity:				
At 8000 Angstroms	-	0.002	-	μamp/μwatt
Luminous	12	20	40	μamp/lumen

* On plane perpendicular to indicated direction of incident light.

o Averaged over any interval of 30 seconds maximum.

OUTLINE DIMENSIONS for Type 919 are the same as those for Type 917

← Indicates a change.

919

VACUUM PHOTOTUBE

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-1 Response
is shown at the beginning of this Section

AVERAGE ANODE CHARACTERISTICS
of Type 919 are the same
as those shown under Type 917

920

GAS PHOTOTUBE

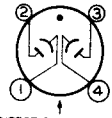
TWIN TYPE WITH S-1 RESPONSE

DATA

General:

Spectral Response	S-1
Wavelength of Maximum Response	8000 ± 1000 Angstroms
Cathodes (Each):	
Shape	Quarter-Cylindrical
Minimum Projected Length*	1-3/16"
Minimum Projected Width*	1/4"
Direct Interelectrode Capacitances:	
Cathode to Anode♦	1.6 μμf
Cathode to Cathode□	1.8 μμf
Anode to Anode●	0.44 μμf
Maximum Overall Length	4"
Maximum Seated Length	3-3/8"
Seated Length to Center of Cathode	2-1/8" ± 3/32"
Maximum Diameter	1-3/16"
Bulb	T-9
Mounting Position	Any
Base	Small-Shell Small 4-Pin

BOTTOM VIEW



Pin 1 - Cathode, Unit No.2
Pin 2 - Anode, Unit No.2
Pin 3 - Anode, Unit No.1
Pin 4 - Cathode, Unit No.1

DIRECTION OF LIGHT

Maximum Ratings, *Absolute Values* **(Each Unit):**

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	90 max.	volts
PEAK CATHODE CURRENT	6 max.	μamp
PEAK CATHODE-CURRENT DENSITY	50 max.	μamp/sq. in.
AVERAGE CATHODE CURRENTO	2 max.	μamp
AMBIENT TEMPERATURE	100 max.	°C

Characteristics:

	Min.	Av.	Max.	
Dark Current at 90 Volts	–	–	0.1	μamp
Sensitivity:				
At 8000 Angstroms	–	0.010	–	μamp/μwatt
Luminous:▲				
At 0 Cycles	50	100	175	μamp/lumen
At 5000 Cycles	–	85	–	μamp/lumen
At 10000 Cycles	–	74	–	μamp/lumen
Gas Amplification Factor	–	–	9	

* On plane perpendicular to indicated direction of incident light.

♦ Each unit, with other unit grounded.

□ Anodes grounded.

● Cathodes grounded.

O Averaged over any interval of 30 seconds maximum. Average current may be doubled when anode-supply voltage is limited to 70 volts.

▲ Measured with .04 lumen.

← indicates a change.

920
GAS PHOTOTUBE

Minimum Circuit Values:

DC Load Resistance:

With anode-supply voltage of 70 volts or less:

→ For dc currents	above 2 μamp	. . .	0.1	megohm
	below 2 μamp	. . .	No Minimum	

With anode-supply voltage of 90 volts:

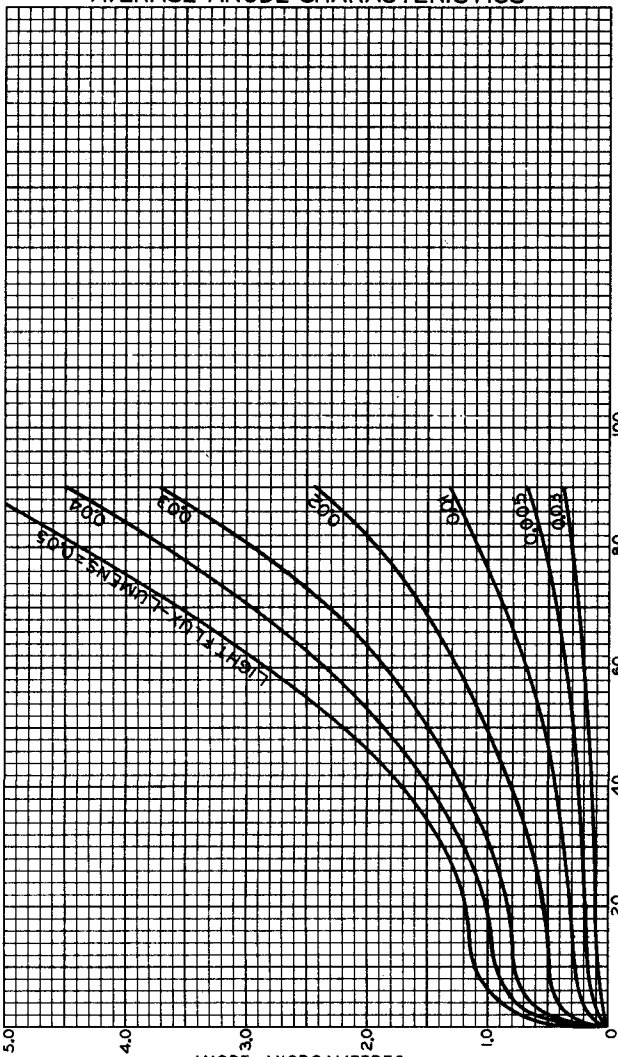
→ For dc currents	above 1 μamp	. . .	2.5	megohms
	below 1 μamp	. . .	0.1	megohm

OUTLINE DIMENSIONS for Type 920
are the same as those for Type 5584

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-1 Response
and
FREQUENCY-RESPONSE CHARACTERISTICS
of Gas Phototubes
are shown at the beginning of this Section

→ Indicates a change.

AVERAGE ANODE CHARACTERISTICS



SEPT. 19, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-4618R3

921

GAS PHOTOTUBE

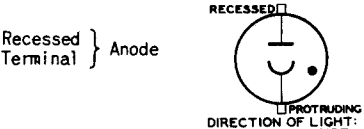
CARTRIDGE TYPE WITH S-1 RESPONSE

DATA

General:

Spectral Response	S-1
Wavelength of Maximum Response	8000 ± 1000 Angstroms
Cathode:	
Shape	Semi-Cylindrical
Minimum Projected Length*	7/8"
Minimum Projected Width*	1/2"
Direct Interelectrode Capacitance	1.0 μμf
Overall Length	1-21/32" ± 1/16"
Seated Length	1-13/32" ± 1/32"
Length, Cathode Center to plane A-A' (See Outline)	11/16" ± 1/16"
Maximum Diameter	0.890"
Mounting Position	Any
Terminal Caps	See Outline

BOTTOM VIEW



Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	90 max.	volts
PEAK CATHODE CURRENT	10 max.	μamp
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq. in.
AVERAGE CATHODE CURRENT°	3 max.	μamp
AMBIENT TEMPERATURE	100 max.	°C

Characteristics:

	Min.	*Av.*	*Max.*	
Dark Current at 90 Volts	–	–	0.1	μamp
Sensitivity:				
At 8000 Angstroms	–	0.0135	–	μamp/μwatt
Luminous:▲				
At 0 Cycles	75	135	205	μamp/lumen
At 5000 Cycles	–	119	–	μamp/lumen
At 10000 Cycles	–	108	–	μamp/lumen
Gas Amplification Factor	–	–	10	

* On plane perpendicular to indicated direction of incident light.

° Averaged over any interval of 30 seconds maximum. Average current may be doubled when anode-supply voltage is limited to 70 volts.

▲ Measured under conditions specified on sheet "PHOTOTUBE SENSITIVITY and SENSITIVITY MEASUREMENTS", at the front of this Section.

← Indicates a change.

921
GAS PHOTOTUBE

Minimum Circuit Values:

DC Load Resistance:

With anode-supply voltage of 70 volts or less:

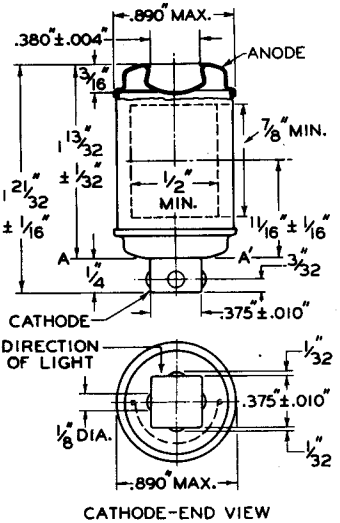
For dc currents { above 3 μamp . . . 0.1 . . . megohm
below 3 μamp . . . No Minimum

With anode-supply voltage of 90 volts:

For dc currents { above 2 μamp . . . 2.5 . . . megohms
below 2 μamp . . . 0.1 . . . megohm

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-1 Response
and
FREQUENCY-RESPONSE CHARACTERISTICS
of Gas Phototubes
are shown at the front of this Section

AVERAGE ANODE CHARACTERISTICS
of Type 921 are the same
as those shown under Type 930



CATHODE-END VIEW

92CM-4789R4

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

922

VACUUM PHOTOTUBE

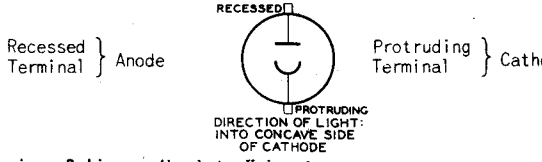
CARTRIDGE TYPE WITH S-1 RESPONSE

DATA

General:

Spectral Response	S-1
Wavelength of Maximum Response	8000 ± 1000 Angstroms
Cathode:	
Shape	Semi-Cylindrical
Minimum Projected Length*	5/8"
Minimum Projected Width*	1/2"
Direct Interelectrode Capacitance	1 μμf
Overall Length	1-21/32" ± 1/16"
Seated Length	1-13/32" ± 1/32"
Length, Cathode Center to plane A-A' (See Outline)	11/16" ± 1/16"
Maximum Diameter	0.890"
Mounting Position	Any
Terminal Caps	See Outline

BOTTOM VIEW



Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	500 max.	volts
PEAK CATHODE CURRENT	15 max.	μamp
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq.in.
AVERAGE CATHODE CURRENT°	5 max.	μamp
AMBIENT TEMPERATURE	100 max.	°C

Characteristics:

	Min.	*Av.*	*Max.*	
Dark Current at 250 Volts	–	–	0.005	μamp
Sensitivity:				
At 8000 Angstroms	–	0.002	–	μamp/μwatt
Luminous	12	20	40	μamp/lumen

* On plane perpendicular to indicated direction of incident light.

° Averaged over any interval of 30 seconds maximum.

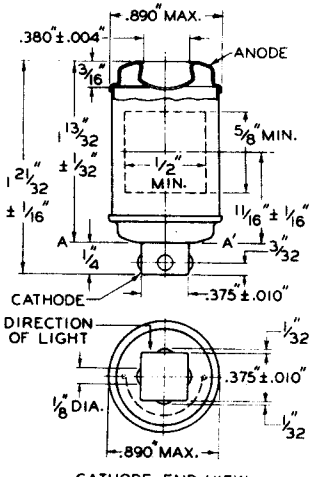
SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-1 Response
is shown at the beginning of this Section

AVERAGE ANODE CHARACTERISTICS
of Type 922 are the same
as those shown under Type 917

← Indicates a change.

922

VACUUM PHOTOTUBE



CATHODE-END VIEW

92CM-4818R2

923
GAS PHOTOTUBE

WITH S-1 RESPONSE

DATA

General:

Spectral Response	S-1
Wavelength of Maximum Response	8000 ± 1000 Angstroms
Cathode:	
Shape	Semi-Cylindrical
Minimum Projected Length*	13/16"
Minimum Projected Width*	5/8"
Direct Interelectrode Capacitance	2 μμf
Maximum Overall Length	3-9/16"
Maximum Seated Length	2-15/16"
Seated Length to Center of Cathode	1-31/32" ± 3/32"
Maximum Diameter	1-3/16"
Bulb	T-9
Mounting Position	Any
Base	Small-Shell Small 4-Pin
Basing Designation for BOTTOM VIEW	2K

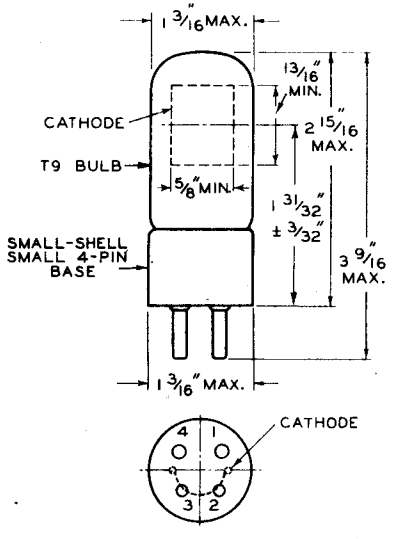
Pin 1 - No Connection
Pin 2 - Anode
Pin 3 - No Connection
Pin 4 - Cathode

Maximum Ratings, Characteristics, and Curves for the 923 are the same as those shown for Type 930

* On plane perpendicular to indicated direction of incident light.

← indicates a change.

923
GAS PHOTOTUBE



BOTTOM VIEW

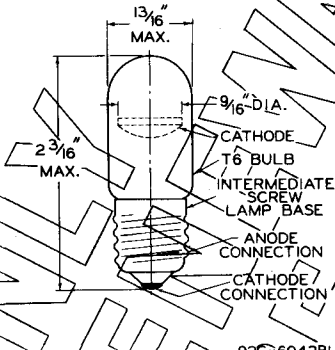
92CM-4788R3

924

924
GAS PHOTOTUBE
END TYPE
RED—INFRARED SENSITIVE

The 924 is the same electrically as the 1P41 with the exception of its interelectrode capacitance. Mechanically, the 924 and 1P41 differ as to base, base connections, and overall length.

Direct Interelectrode Capacitance	2.6 μμf
Overall Length	2-1/16" ± 1/8"
Base	Intermediate Screw



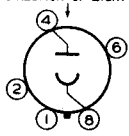
925
VACUUM PHOTOTUBE

SHORT TYPE WITH S-1 RESPONSE

DATA

General:

Spectral Response	S-1
Wavelength of Maximum Response	8000 ± 1000 Angstroms
Cathode:	
Shape	Semi-Cylindrical
Minimum Projected Length*	13/16"
Minimum Projected Width*	5/8"
Direct Interelectrode Capacitance	1.6 μμf
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-1/16"
Seated Length to Center of Cathode	1-9/32" ± 3/32"
Maximum Diameter	1-9/32"
Bulb	T-9
Mounting Position	Any
Base	Intermediate-Shell Octal 5-Pin
Basing Designation for BOTTOM VIEW	3J



Pin 1 – No Connection
Pin 2 – No Connection
Pin 4 – Anode
Pin 6 – No Connection
Pin 8 – Cathode

Maximum Ratings, ***Absolute Values*:**

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	250 max.	volts
PEAK CATHODE CURRENT	15 max.	μamp
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq. in.
AVERAGE CATHODE CURRENT°	5 max.	μamp
AMBIENT TEMPERATURE	100 max.	°C

Characteristics:

	Min.	*Av.*	*Max.*	
Dark Current at 250 Volts	–	–	0.0125	μamp
Sensitivity:				
At 8000 Angstroms	–	0.0015	–	μamp/μwatt
Luminous	10	20	40	μamp/lumen

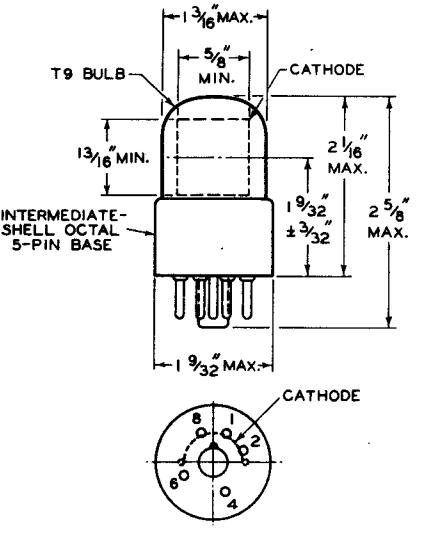
* On plane perpendicular to indicated direction of incident light.
° Averaged over any interval of 30 seconds maximum.

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-1 Response
is shown at the beginning of this Section

← Indicates a change.

925

VACUUM PHOTOTUBE

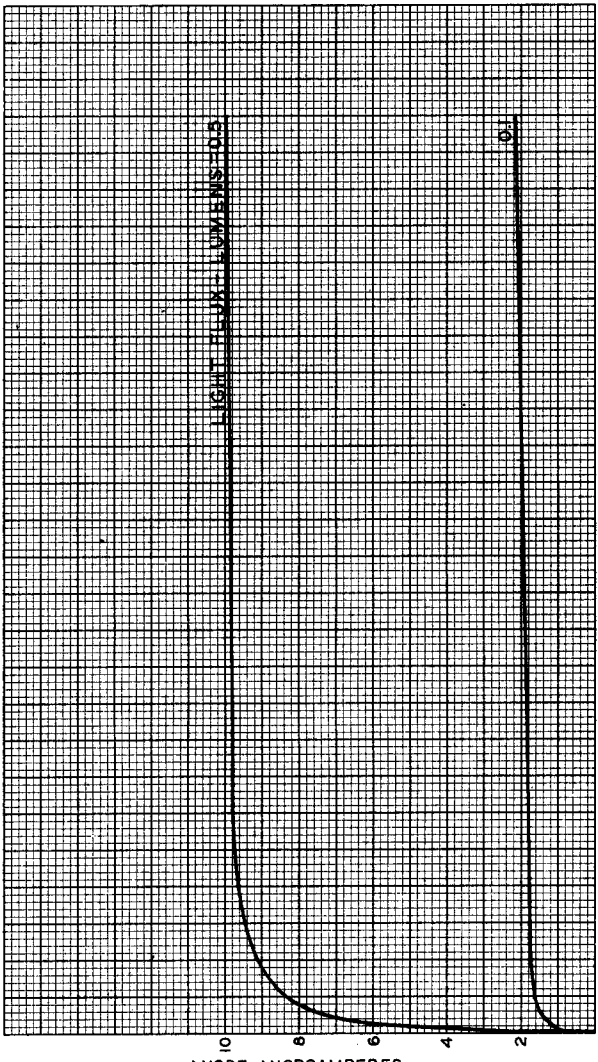


BOTTOM VIEW

92CM-6054R2

925

AVERAGE ANODE CHARACTERISTICS



JULY 31, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6208R1

926

VACUUM PHOTOTUBE

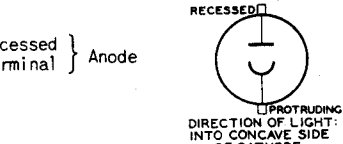
CARTRIDGE TYPE WITH S-3 RESPONSE

DATA

General:

Spectral Response	S-3
Wavelength of Maximum Response	4200 ± 1000 Angstroms
Cathode:	
Shape	Semi-Cylindrical
Minimum Projected Length*	7/8"
Minimum Projected Width*	1/2"
Direct Interelectrode Capacitance	1 μμf
Overall Length	1-21/32" ± 1/16"
Seated Length	1-13/32" ± 1/32"
Length, Cathode Center to plane A-A' (See Outline)	11/16" ± 1/16"
Maximum Diameter	0.890"
Mounting Position	Any
Terminal Caps	See Outline

BOTTOM VIEW



Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	500 max.	volts
PEAK CATHODE CURRENT	15 max.	μamp
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq. in.
AVERAGE CATHODE CURRENT°	5 max.	μamp
AMBIENT TEMPERATURE	100 max.	°C

Characteristics:

	Min.	*Av.*	*Max.*	
Dark Current at 250 Volts	–	–	0.005	μamp
Sensitivity:				
At 4200 Angstroms	–	0.0016	–	μamp/μwatt
Luminous▲	4	6.5	15	μamp/lumen

* On plane perpendicular to indicated direction of incident light.

° Averaged over any interval of 30 seconds maximum.

▲ Measured under conditions specified on sheet "PHOTOTUBE SENSITIVITY and SENSITIVITY MEASUREMENTS" at the front of this Section.

OUTLINE DIMENSIONS for Type 926 are the same as those for Type 921

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-3 Response is shown at the front of this Section

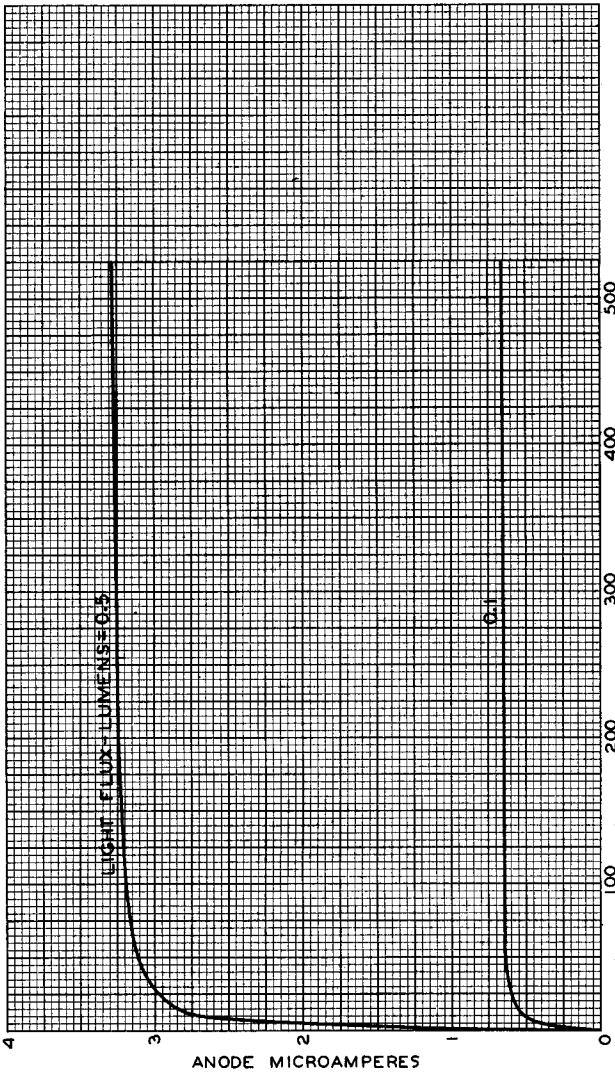
← Indicates a change.

926

RCA

926

AVERAGE ANODE CHARACTERISTICS



AUG. 4, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM – 6209RI

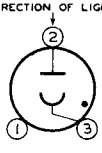
927
GAS PHOTOTUBE

WITH S-1 RESPONSE

DATA

General:

Spectral Response	S-1
Wavelength of Maximum Response	8000 ± 1000 angstroms
Cathode:	
Shape	Semi-Cylindrical
Minimum Projected Length*	11/16"
Minimum Projected Width*	7/16"
Direct Interelectrode Capacitance	2 μμf
Maximum Overall Length	2-13/32" ←
Maximum Seated Length	1-15/16" ←
Seated Length to Center of Cathode	1-1/4" ± 3/32"
Maximum Diameter	0.669" ←
Bulb	T-5-1/4 ←
Mounting Position	Any
Base	Small-Shell Peewee 3-Pin
Basing Designation for BOTTOM VIEW	2F



Pin 1 – No Connection
Pin 2 – Anode
Pin 3 – Cathode

Maximum Ratings, ***Absolute Values*****:**

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	90 max.	volts
PEAK CATHODE CURRENT	6 max.	μamp
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq. in.
AVERAGE CATHODE CURRENT°	2 max.	μamp
AMBIENT TEMPERATURE	100 max.	°C

Characteristics:

	Min.	*Av.*	*Max.*	
DC Dark Current■	–	–	0.1	μamp
Sensitivity:				
At 8000 angstroms	–	0.0125	–	μamp/μwatt
Luminous:				
At 0 cps	75	125	185	μamp/lumen
At 5000 cps	–	110	–	μamp/lumen
At 10000 cps	–	100	–	μamp/lumen
Gas Amplification Factor	–	–	10	

* On plane perpendicular to indicated direction of incident light.

° Averaged over any interval of 30 seconds maximum. Average current may be doubled when anode-supply voltage is limited to 70 volts.

■ At 25°C and 90 volts.

← Indicates a change.

927
GAS PHOTOTUBE

Minimum Circuit Values:

DC Load Resistance:

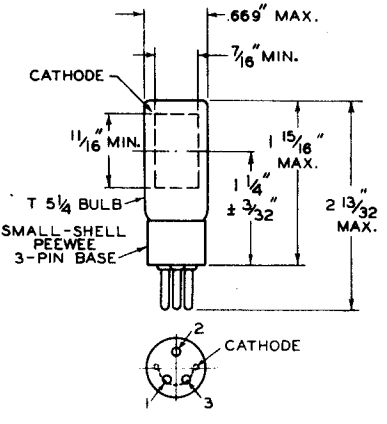
With anode-supply voltage of 70 volts or less:

For dc currents { above 2 μamp . . . 0.1 . . . megohm
below 2 μamp . . . No Minimum

With anode-supply voltage of 90 volts:

For dc currents { above 1.0 μamp . . 2.5 . . . megohms
below 1.0 μamp . . 0.1 . . . megohm

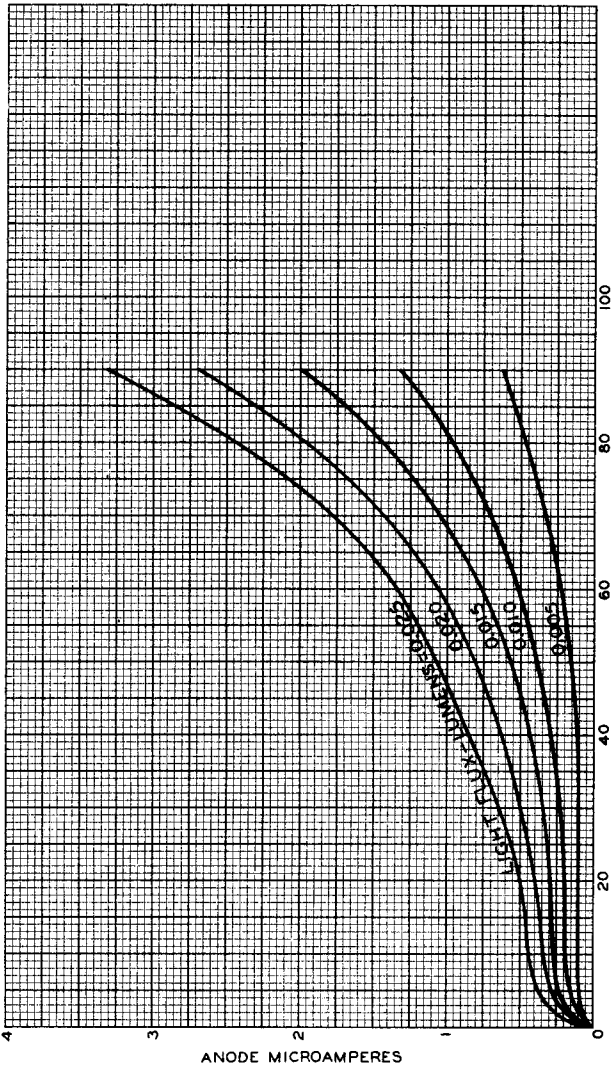
SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-1 Response
and
FREQUENCY-RESPONSE CHARACTERISTICS
of Gas Phototubes
are shown at the front of this Section



92CM-6053R4

→ indicates a change.

AVERAGE ANODE CHARACTERISTICS



APRIL 5,1950

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6258R2

928

928

GAS PHOTOTUBE

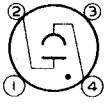
NON-DIRECTIONAL TYPE WITH S-1 RESPONSE

DATA

General:

Spectral Response	S-1
Wavelength of Maximum Response	8000 ± 1000 Angstroms
Cathode:	
Shape	Cylindrical Mesh
Minimum Length	13/16"
Minimum Diameter	5/8"
Direct Interelectrode Capacitance	3 μμf
Maximum Overall Length	3-9/16"
Maximum Seated Length	2-15/16"
Seated Length to Center of Cathode	1-31/32" ± 3/32"
Maximum Diameter	1-3/16"
Bulb	T-9
Mounting Position	Any
Base	Small-Shell Small 4-Pin
Basing Designation for BOTTOM VIEW	$2K_1$

Pin 1 – No Connection
Pin 2 – Anode



Pin 3 – No Connection
Pin 4 – Cathode

Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	90 max.	volts
PEAK CATHODE CURRENT	10 max.	μamp
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq.in.
AVERAGE CATHODE CURRENT°	3 max.	μamp
AMBIENT TEMPERATURE	100 max.	°C

Characteristics:

	Min.	*Av.*	*Max.*	
Dark Current at 90 Volts	–	–	0.1	μamp
Sensitivity:				
At 8000 Angstroms	–	0.0065	–	μamp/μwatt
Luminous:				
At 0 Cycles	40	65	100	μamp/lumen
At 5000 Cycles	–	56	–	μamp/lumen
At 10000 Cycles	–	50	–	μamp/lumen
Gas Amplification Factor	–	–	10	

° Averaged over any interval of 30 seconds maximum. Average current may be doubled when anode-supply voltage is limited to 70 volts.

←Indicates a change.

928
GAS PHOTOTUBE

Minimum Circuit Values:

DC Load Resistance:

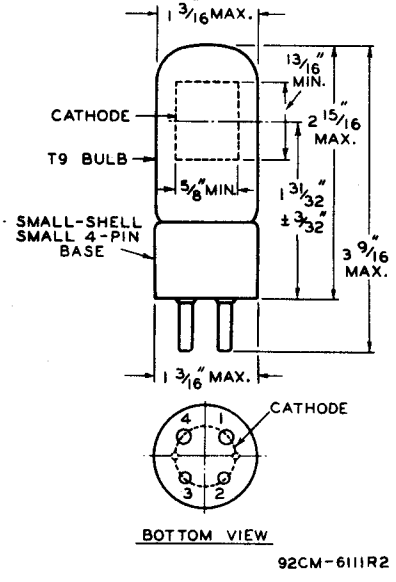
With anode-supply voltage of 70 volts or less:

→ For dc currents { above 3 μamp . . . 0.1 . . . megohm
below 3 μamp . . . No Minimum

With anode-supply voltage of 90 volts:

→ For dc currents { above 2 μamp . . . 2.5 . . . megohms
below 2 μamp . . . 0.1 . . . megohm

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-1 Response
and
FREQUENCY-RESPONSE CHARACTERISTICS
of Gas Phototubes
are shown at the beginning of this Section



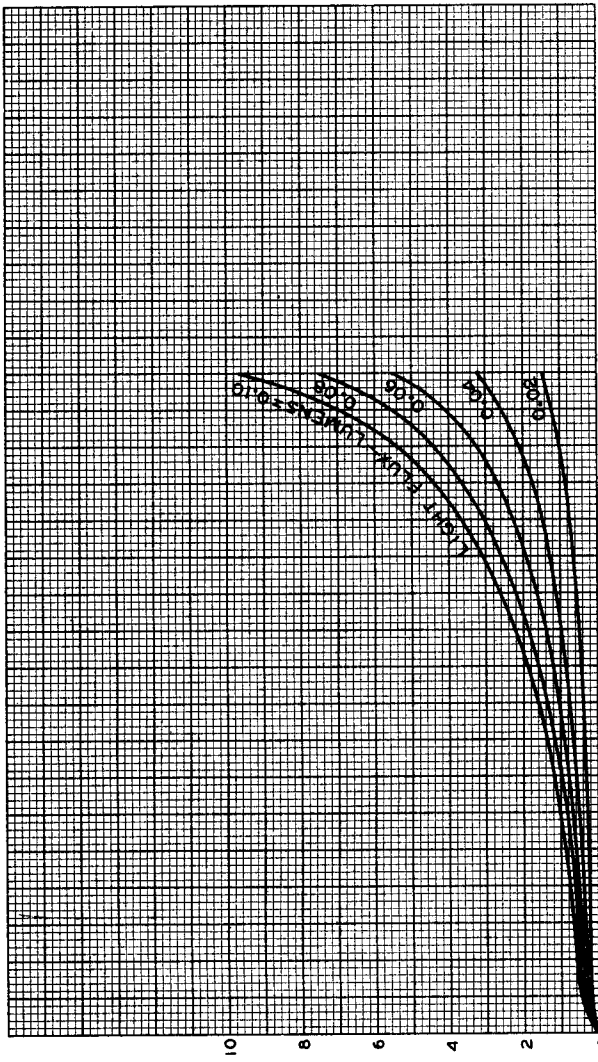
BOTTOM VIEW

92CM-6111R2

→Indicates a change.

928

AVERAGE ANODE CHARACTERISTICS



JAN. 16, 1940

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6117

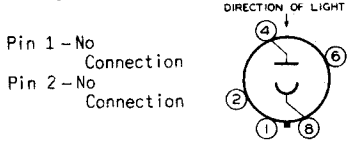
929

929
VACUUM PHOTOTUBE
WITH S-4 RESPONSE

DATA

General:

Spectral Response	S-4
Wavelength of Maximum Response	4000 ± 500 Angstroms ←
Cathode:	
Shape	Semi-Cylindrical
Minimum Projected Length*	13/16"
Minimum Projected Width*	5/8"
Direct Interelectrode Capacitance	2.6 μμf
Maximum Overall Length	3-1/16"
Maximum Seated Length	2-1/2"
Seated Length to Center of Cathode	1-5/8" ± 3/32" ←
Maximum Diameter	1-9/32"
Bulb	T-9
Mounting Position	Any
Base	Intermediate-Shell Octal 5-Pin
Basing Designation for BOTTOM VIEW	3J



Pin 1 – No Connection
Pin 2 – No Connection
Pin 4 – Anode
Pin 6 – No Connection
Pin 8 – Cathode

Maximum Ratings, *Absolute Values*: ←

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	250 max.	volts
PEAK CATHODE CURRENT	20 max.	μamp
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq.in.
AVERAGE CATHODE CURRENT°	5 max.	μamp
AMBIENT TEMPERATURE	75 max.	°C

Characteristics: ←

	Min.	Av.	Max.	
Dark Current at 250 Volts	–	–	0.0125	μamp
Sensitivity:				
At 4000 Angstroms	–	0.042	–	μamp/μwatt
Luminous	25	45	70	μamp/lumen

* On plane perpendicular to indicated direction of incident light.
° Averaged over any interval of 30 seconds maximum.

OUTLINE DIMENSIONS for Type 929
are the same as those for Type 5581

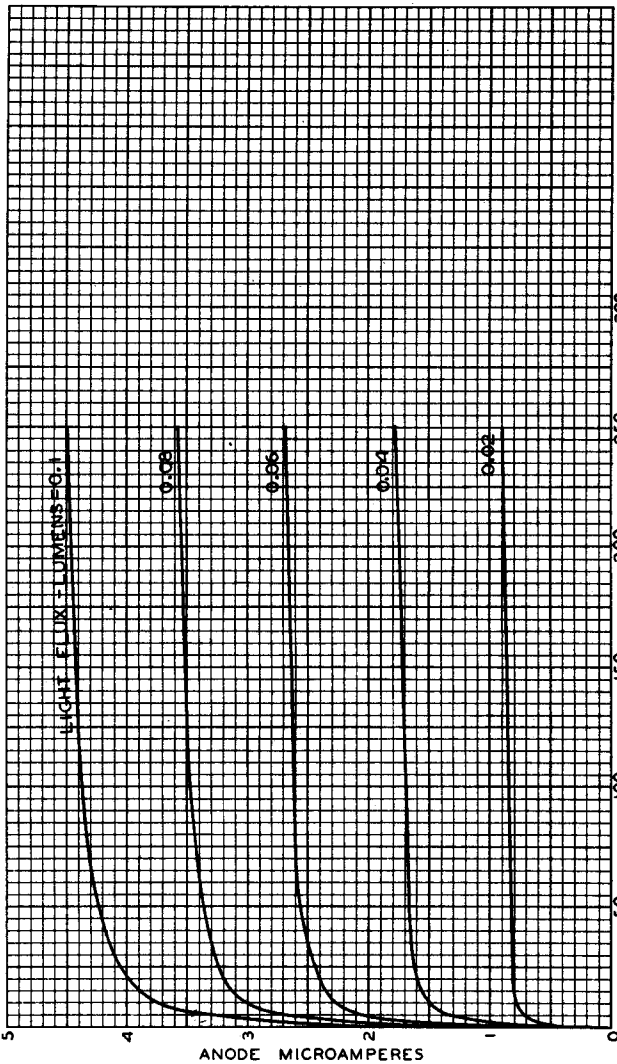
SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-4 Response
is shown at the beginning of this Section

←Indicates a change.

RCA

929

AVERAGE ANODE CHARACTERISTICS



AUG. 4, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6151R1

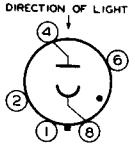
930
GAS PHOTOTUBE
WITH S-1 RESPONSE

DATA

General:

Spectral Response	S-1
Wavelength of Maximum Response	8000 ± 1000 Angstroms
Cathode:	
Shape	Semi-Cylindrical
Minimum Projected Length*	13/16"
Minimum Projected Width*	5/8"
Direct Interelectrode Capacitance	2.4 μμf
Maximum Overall Length	3-1/16"
Maximum Seated Length	2-1/2"
Seated Length to Center of Cathode	1-5/8" ± 3/32"
Maximum Diameter	1-9/32"
Bulb	T-9
Mounting Position	Any
Base	Intermediate-Shell Octal 5-Pin
Basing Designation for BOTTOM VIEW	$3J_1$

Pin 1 - No Connection
Pin 2 - No Connection



Pin 4 - Anode
Pin 6 - No Connection
Pin 8 - Cathode

Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	90 max.	volts
PEAK CATHODE CURRENT	10 max.	μamp
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq. in.
AVERAGE CATHODE CURRENT°	3 max.	μamp
AMBIENT TEMPERATURE	100 max.	°C

Characteristics:

	Min.	*Av.*	*Max.*	
Dark Current at 90 Volts	-	-	0.1	μamp
Sensitivity:				
At 8000 Angstroms	-	0.0135	-	μamp/μwatt
Luminous:				
At 0 Cycles	75	135	205	μamp/lumen
At 5000 Cycles	-	111	-	μamp/lumen
At 10000 Cycles	-	101	-	μamp/lumen
Gas Amplification Factor	-	-	10	

* On plane perpendicular to indicated direction of incident light.

° Averaged over any interval of 30 seconds maximum. Average current may be doubled when anode-supply voltage is limited to 70 volts.

◄ Indicates a change.

930

GAS PHOTOTUBE

Minimum Circuit Values:

DC Load Resistance:

With anode-supply voltage of 70 volts or less:

→ For dc currents	above 3 μamp	0.1	megohm
	below 3 μamp	No Minimum	

With anode-supply voltage of 90 volts:

For dc currents	above 2 μamp	2.5	megohms
	below 2 μamp	1	megohm

OUTLINE DIMENSIONS for Type 930
are the same as those for Type 5581

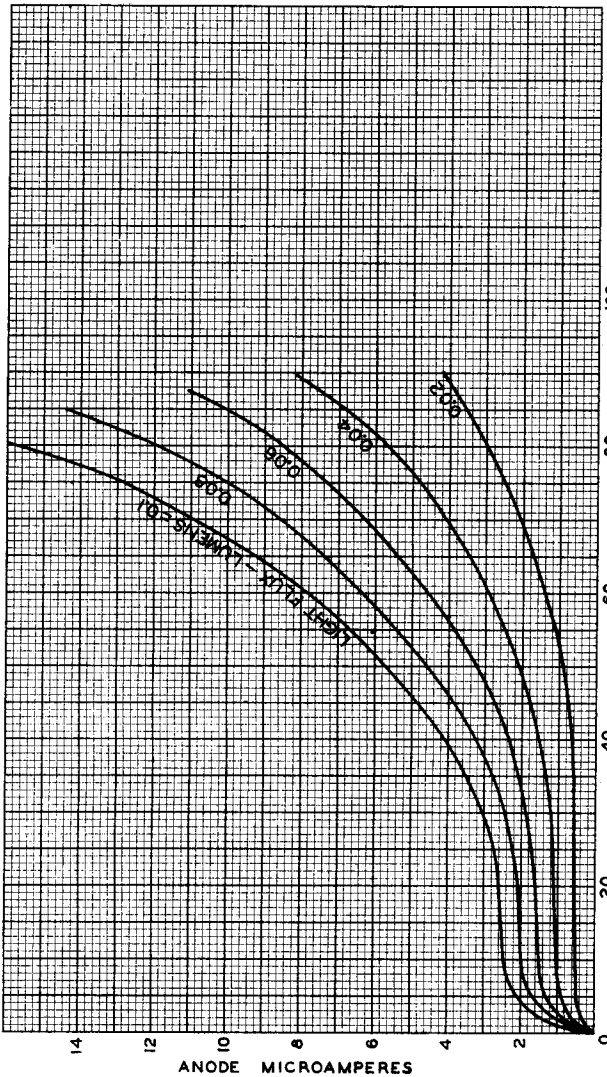
SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-1 Response
and
FREQUENCY-RESPONSE CHARACTERISTICS
of Gas Phototubes
are shown at the beginning of this Section

→ Indicates a change.

930

930

AVERAGE ANODE CHARACTERISTICS



AUG. 4, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-4806RI

931-A
MULTIPLIER PHOTOTUBE

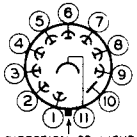
9-STAGE TYPE with S-4 RESPONSE

DATA

General:

Spectral Response	S-4
Wavelength of Maximum Response	4000 ± 500 angstroms
Cathode:	
Minimum Projected Length*	15/16"
Minimum Projected Width*	5/16"
Direct Interelectrode Capacitances:	
Anode to Dynode No.9	4 μμf
Anode to All Other Electrodes	6.5 μμf
Maximum Overall Length	3-11/16"
Maximum Seated Length	3-1/8"
Length, Base Seat to Center of Useful Cathode Area	1-15/16" ± 3/32"
Maximum Diameter	1-5/16"
Bulb	T-9
Mounting Position	Any
Base	Small-Shell Submagnal 11-Pin, Non-Hygroscopic
Basing Designation for BOTTOM VIEW	11K

Pin 1 – Dynode No.1
Pin 2 – Dynode No.2
Pin 3 – Dynode No.3
Pin 4 – Dynode No.4
Pin 5 – Dynode No.5
Pin 6 – Dynode No.6



DIRECTION OF LIGHT

Pin 7 – Dynode No.7
Pin 8 – Dynode No.8
Pin 9 – Dynode No.9
Pin 10 – Anode
Pin 11 – Cathode

Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)□	1250 max.	volts
SUPPLY VOLTAGE BETWEEN DYNODE No.9 and ANODE (DC or Peak AC)	250 max.	volts
PEAK ANODE CURRENT	10 max.	ma
AVERAGE ANODE CURRENT○	1 max.	ma
AMBIENT TEMPERATURE	75 max.	°C

Characteristics:

With 100 volts per dynode stage and 100 volts between dynode No.9 and anode

	Min.	Av.	Max.	
DC Anode Dark Current#●	–	–	0.1	μamp

* On plane perpendicular to indicated direction of incident light.

□ Referred to cathode.

○ Average over any interval of 30 seconds maximum.

At 25°C. Dark current due to thermionic emission and ion feedback may be reduced by the use of refrigerants.

● For maximum signal-to-noise ratio, operation below 1000 volts is recommended.

← Indicates a change.

931-A
MULTIPLIER PHOTOTUBE

	Min.	Av.	Max.	
Sensitivity:				
At 4000 angstroms. . . .	–	18600	–	μamp/μwatt
Luminous:				
Cathode§	–	20	–	μamp/lumen
Anode:▲				
At 0 cps	4.5	20	300	amp/lumen
At 100 Mc.	–	19	–	amp/lumen
Current Amplification■ . .	–	$1x10^6$	–	
Equivalent Noise Input★. .	–	$7x10^{-12}$	–	lumen

→ **Characteristics:**

With 75 volts per dynode stage and 50 volts between dynode No.9 and anode

	Av.	
Sensitivity:		
At 4000 angstroms.	2800	μamp/μwatt
Luminous:		
Cathode§	20	μamp/lumen
Anode▲, 0 cps.	3	amp/lumen
Current Amplification■	150000	

§ For conditions the same as shown under Anode Luminous Sensitivity except that the value of light flux is 0.01 lumen and that 100 volts are applied between cathode and all other electrodes connected together as anode.

▲ Measured under conditions specified on sheet "PHOTOTUBE SENSITIVITY AND SENSITIVITY MEASUREMENTS" at the front of this Section.

■ Ratio of anode sensitivity to cathode sensitivity.

★ Defined as the value where the rms output current is equal to the rms noise current determined under the following conditions: 100 volts per stage, 25°C tube temperature, ac-amplifier bandwidth of 1 cycle per second, tungsten light source at 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.

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-4 Response
is shown at the front of this Section

OPERATING NOTES

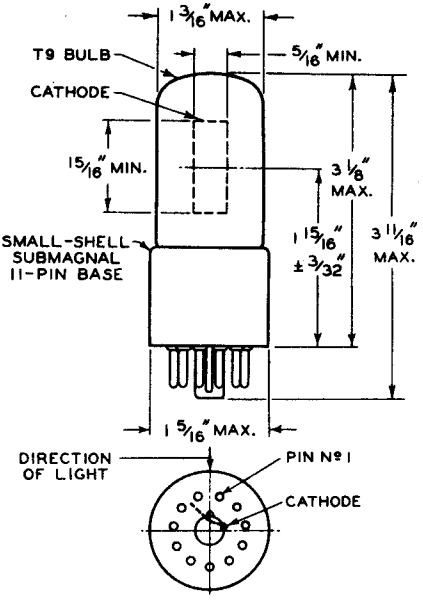
The operating stability of the 931-A is dependent on the magnitude of the anode current and its duration. When the 931-A is operated at high values of anode current, a drop in sensitivity (sometimes called fatigue) may be expected. The extent of the drop below the tabulated sensitivity values depends on the severity of the operating conditions. After a period of idleness, the 931-A usually recovers a substantial percentage of such loss in sensitivity.

(continued on next page)

→ indicates a change.

931-A
MULTIPLIER PHOTOTUBE

The use of an average anode current well below the maximum rated value of 1.0 milliampere is recommended when stability of operation is important. When maximum stability is required, the anode current should not exceed 250 microamperes.



BOTTOM VIEW

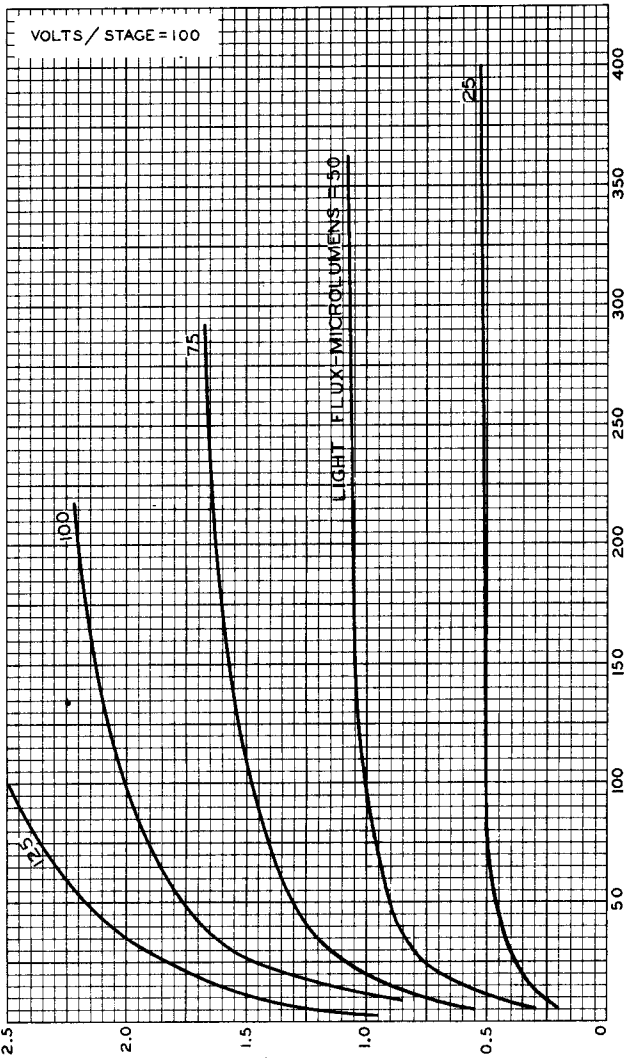
℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE.

92CM-6264R2

RCA

931-A

AVERAGE ANODE CHARACTERISTICS



JUNE 30, 1950

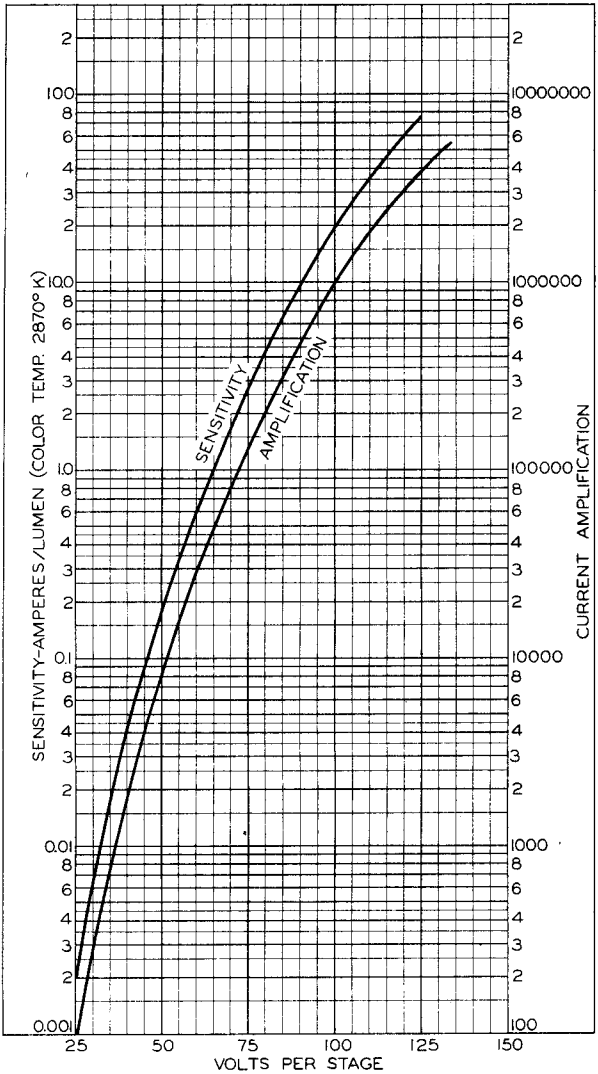
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6268R4

RCA

931-A

AVERAGE CHARACTERISTICS
DC OPERATION



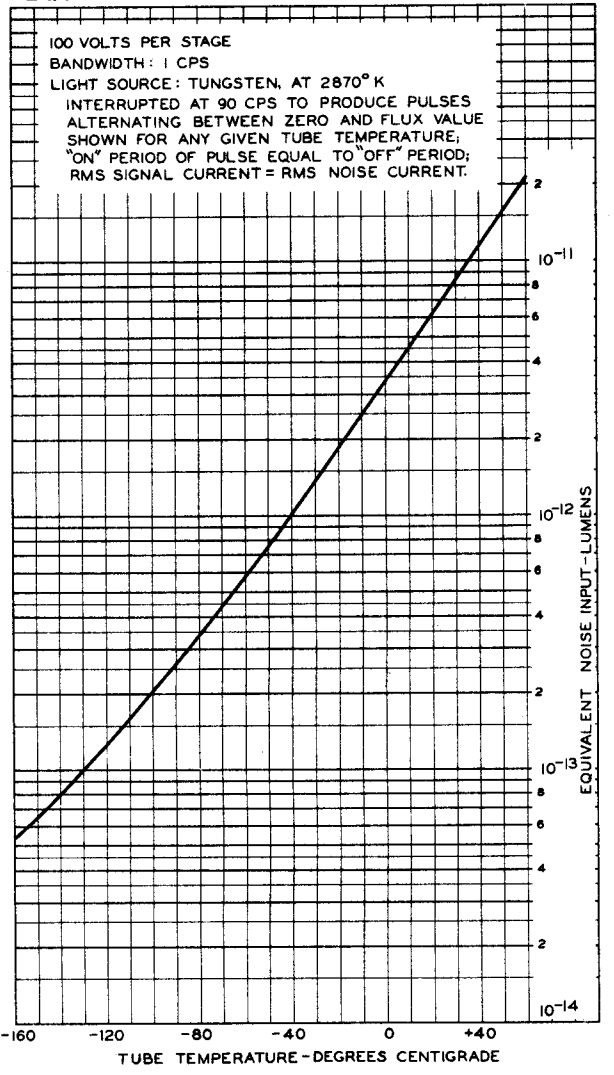
JULY 21, 1950

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

931-A

EQUIVALENT-NOISE-INPUT CHARACTERISTIC



934

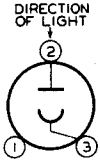
VACUUM PHOTOTUBE

WITH S-4 RESPONSE

DATA

General:

Spectral Response	S-4
Wavelength of Maximum Response	4000 ± 500 angstroms
Cathode:	
Shape	Semi-Cylindrical
Minimum Projected Length*	11/16"
Minimum Projected Width*	7/16"
Direct Interelectrode Capacitance	1.5 μμf
Maximum Overall Length	2-13/32" ←
Maximum Seated Length	1-15/16" ←
Seated Length to Center of Cathode	1-1/4" ± 3/32"
Maximum Diameter	0.669" ←
Bulb	T-5-1/4 ←
Mounting Position	Any
Base	Small-Shell Peewee 3-Pin
Basing Designation for BOTTOM VIEW	$2F_1$



Pin 1 – No Connection

Pin 2 – Anode

Pin 3 – Cathode

Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	250 max.	volts
PEAK CATHODE CURRENT	12 max.	μamp
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq.in.
AVERAGE CATHODE CURRENT●	4 max.	μamp
AMBIENT TEMPERATURE	75 max.	°C

Characteristics:

	Min.	*Av.*	*Max.*	
DC Dark Current□	–	–	0.005	μamp
Sensitivity:				
At 4000 angstroms	–	0.028	–	μamp/μwatt
Luminous	15	30	70	μamp/lumen

* On plane perpendicular to indicated direction of incident light.

● Averaged over any interval of 30 seconds maximum.

□ At 25°C and 250 volts.

OUTLINE DIMENSIONS for Type 934 are the same as those for Type 927 ←

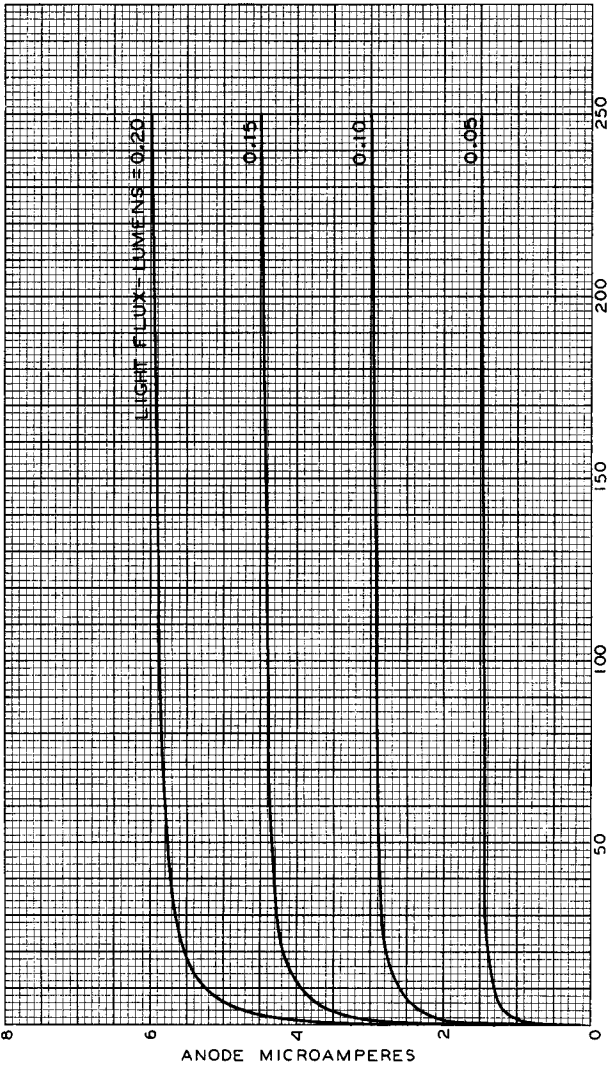
SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-4 Response is shown at the front of this Section

← Indicates a change.

934

934

AVERAGE ANODE CHARACTERISTICS



OCT. 16, 1944

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6479

935

VACUUM PHOTOTUBE

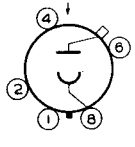
WITH S-5 RESPONSE

DATA

General:

Spectral Response	S-5
Wavelength of Maximum Response	3400 ± 500 Angstroms
Cathode:	
Shape	Semi-Cylindrical
Minimum Projected Length*	1-5/16"
Minimum Projected Width*	5/8"
Direct Interelectrode Capacitance	0.6 μμf
Overall Length	4-1/8" ± 1/8"
Seated Length	3-9/16" ± 1/8"
Seated Length to Center of Cathode	2" ± 1/16"
Maximum Diameter	1-9/32"
Bulb	T-9
Mounting Position	Any
Cap	Skirted Miniature
Base	Intermediate-Shell Octal 5-Pin

BOTTOM VIEW



Pin 1 – No Connection
Pin 2 – No Connection
Pin 4 – No Connection
Pin 6 – No Connection
Pin 8 – Cathode
Cap – Anode

Maximum Ratings, ***Absolute Values*:**

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	250 max.	volts
PEAK CATHODE CURRENT	30 max.	μamp
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq. in.
AVERAGE CATHODE CURRENT°	10 max.	μamp
AMBIENT TEMPERATURE	75 max.	°C

Characteristics:

	Min.	*Av.*	*Max.*	
Dark Current at 250 Volts	–	–	0.0005	μamp
Sensitivity:				
At 3400 Angstroms	–	0.032	–	μamp/μwatt ←
Luminous▲	18	35	70	μamp/lumen ←

* On plane perpendicular to indicated direction of incident radiation.

° Averaged over any interval of 30 seconds maximum.

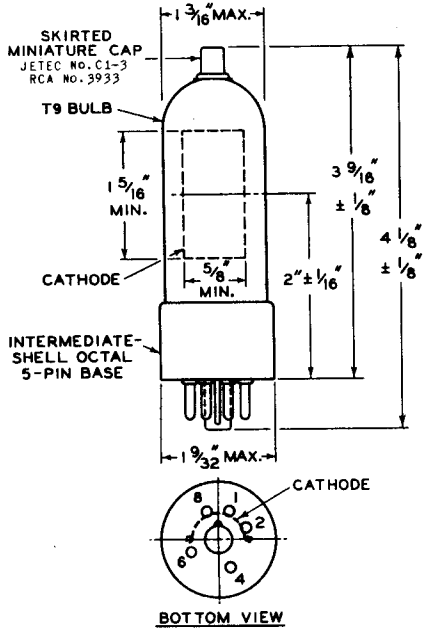
▲ Measured under conditions specified on sheet "PHOTOTUBE SENSITIVITY AND SENSITIVITY MEASUREMENTS" at the front of this Section.

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-5 Response
is shown at the beginning of this Section

← Indicates a change.

935

VACUUM PHOTOTUBE

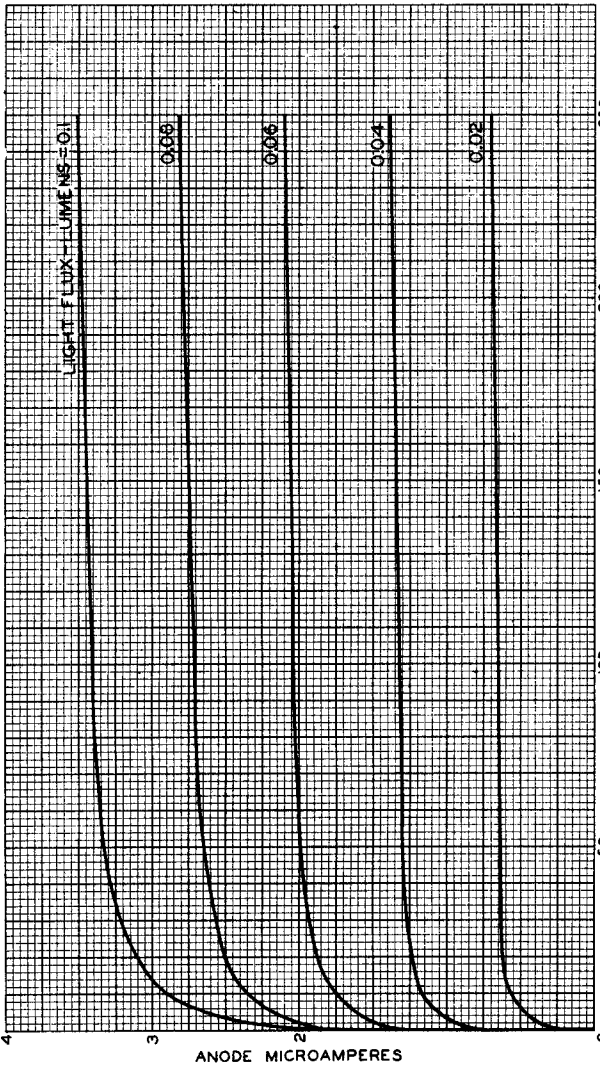


92CM-6411R4

RCA

935

AVERAGE ANODE CHARACTERISTICS



APRIL 20, 1950

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6478RI

5581

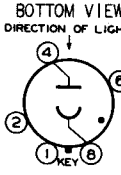
GAS PHOTOTUBE

BLUE-SENSITIVE

DATA

General:

Spectral Response	S-4
Wavelength of Maximum Response	4000 ± 500 Angstroms
Cathode:	
Shape	Semi-Cylindrical
Minimum Projected Length*	13/16"
Minimum Projected Width*	5/8"
Direct Interelectrode Capacitance	2.6 μμf
Maximum Overall Length	3-1/16"
Maximum Seated Length	2-1/2"
Seated Length to Center of Cathode	1-5/8" ± 3/32"
Maximum Diameter	1-5/16"
Bulb	T-9
Mounting Position	Any
Base	Intermediate-Shell Octal 5-Pin



Pin 1 – No Connection
Pin 2 – No Connection
Pin 4 – Anode
Pin 6 – No Connection
Pin 8 – Cathode

Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	100 max.	volts
PEAK CATHODE CURRENT	10 max.	μamp
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq. in.
AVERAGE CATHODE CURRENT°	3 max.	μamp
AMBIENT TEMPERATURE	75 max.	°C

Characteristics:	*Min.*	*Av.*	*Max.*	
Dark Current at 90 Volts	–	–	0.050	μamp
Sensitivity:				
At 4000 Angstroms	–	0.125	–	μamp/μwatt
Luminous:				
At 0 Cycles	75	135	205	μamp/lumen
At 5000 Cycles	–	124	–	μamp/lumen
At 10000 Cycles	–	108	–	μamp/lumen
Gas Amplification Factor	–	–	5.5	

Minimum Circuit Values:

DC Load Resistance:

With anode-supply voltage of 80 volts or less			
For dc currents above 3 μamp	0.1		megohm
For dc currents below 3 μamp	No Minimum		
With anode-supply voltage of 100 volts			
For dc currents above 1 μamp	2.5		megohms
For dc currents below 1 μamp	0.1		megohm

*,°: See next page.

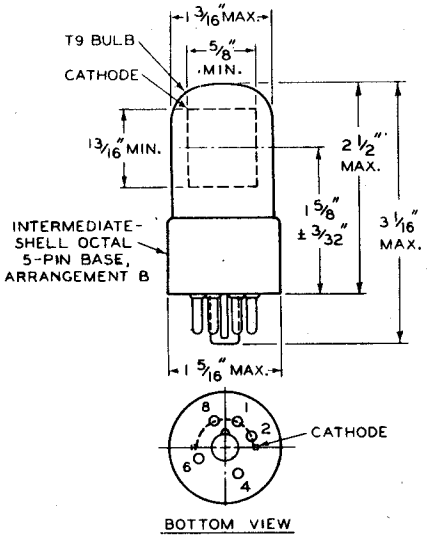
5581

GAS PHOTOTUBE

* On plane perpendicular to indicated direction of incident light.

O Averaged over any interval of 30 seconds maximum. Average current may be doubled when anode-supply voltage is limited to 80 volts.

SPECTRAL-SENSITIVITY CHARACTERISTIC
and
FREQUENCY-RESPONSE CHARACTERISTIC
of Gas Phototube having S-4 Response
are shown at beginning of this Section

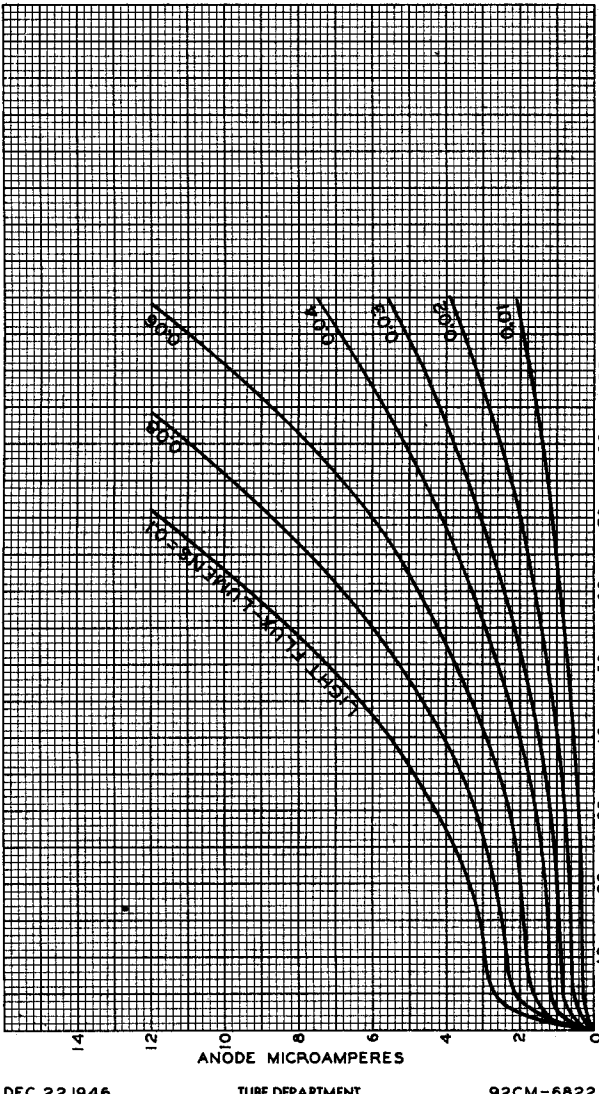


92CM-6137R2

RCA

5581

AVERAGE ANODE CHARACTERISTICS



5582

GAS PHOTOTUBE

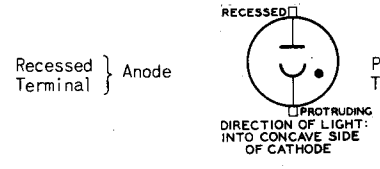
CARTRIDGE TYPE WITH S-4 RESPONSE

DATA

General:

Spectral Response	S-4
Wavelength of Maximum Response	4000 ± 500 Angstroms
Cathode:	
Shape	Semi-Cylindrical
Minimum Projected Length*	5/8"
Minimum Projected Width*	1/2"
Direct Interelectrode Capacitance	1.0 μμf
Overall Length	1-21/32" ± 1/16"
Length, Cathode Center to plane A-A' (See outline)	11/16" ± 1/16"
Maximum Diameter	0.890"
Mounting Position	Any
Terminal Caps	See Outline

BOTTOM VIEW



Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	100 max.	volts
PEAK CATHODE CURRENT	10 max.	μamp
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq.in.
AVERAGE CATHODE CURRENT°	2 max.	μamp
AMBIENT TEMPERATURE	75 max.	°C

Characteristics:

	Min.	Av.	Max.	
Dark Current at 90 Volts	–	–	0.050	μamp
Sensitivity:				
At 4000 Angstroms	–	0.11	–	μamp/μwatt
Luminous:▲				
At 0 Cycles	80	120	175	μamp/lumen
At 5000 Cycles	–	110	–	μamp/lumen
At 10000 Cycles	–	96	–	μamp/lumen
Gas Amplification Factor	–	–	5.5	

Minimum Circuit Values:

DC Load Resistance:

With anode-supply voltage of 80 volts or less

For dc currents	above 3 μamp	0.1	megohm
	below 3 μamp	No Minimum	

With anode-supply voltage of 100 volts

For dc currents	above 1 μamp	2.5	megohms
	below 1 μamp	0.1	megohm

*, °, ▲: See next page.

← indicates a change.

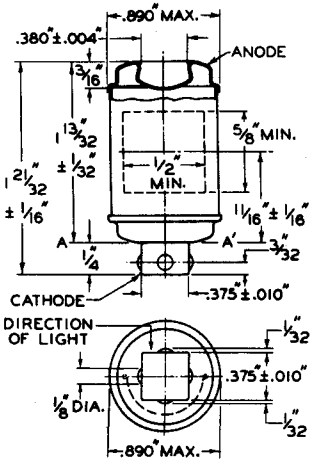
5582
GAS PHOTOTUBE

* On plane perpendicular to indicated direction of incident light.

O Averaged over any interval of 30 seconds maximum. Average current may be doubled when anode-supply voltage is limited to 80 volts.

▲ Measured under conditions specified on sheet "PHOTOTUBE SENSITIVITY and SENSITIVITY MEASUREMENTS" at the front of this Section.

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-4 Response
and
FREQUENCY-RESPONSE CHARACTERISTICS
of Gas Phototubes
are shown at the front of this Section

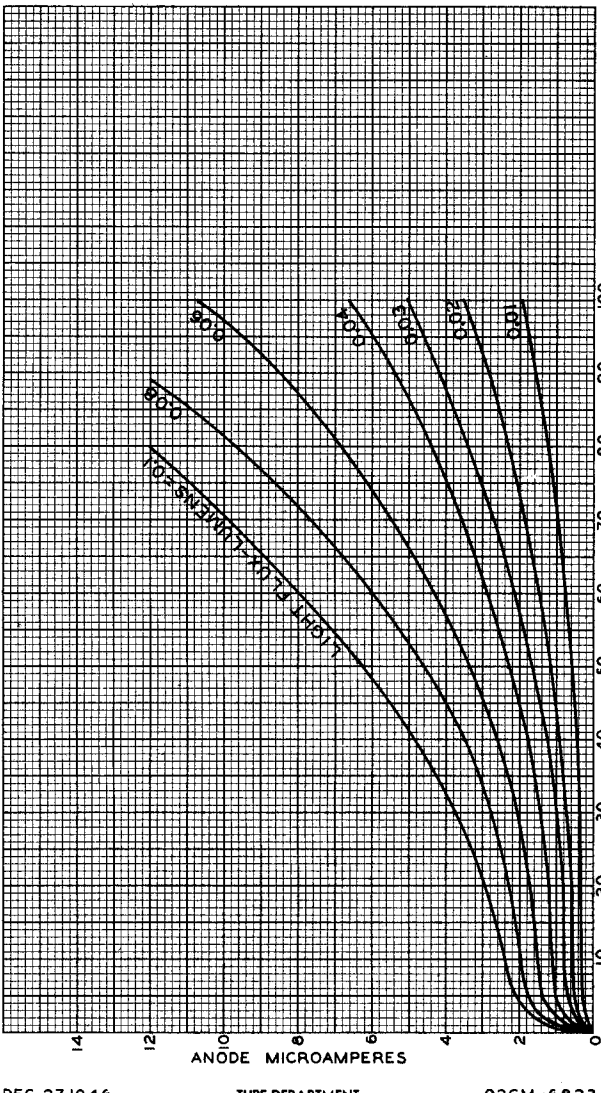


CATHODE-END VIEW

92CM-4818R2

5582

AVERAGE ANODE CHARACTERISTICS



5583

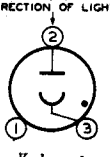
GAS PHOTOTUBE

WITH S-4 RESPONSE

DATA

General:

Spectral Response	S-4
Wavelength of Maximum Response	4000 ± 500 angstroms
Cathode:	
Shape	Semi-Cylindrical
Minimum Projected Length*	11/16"
Minimum Projected Width*	7/16"
Direct Interelectrode Capacitance	2.0 μμf
Maximum Overall Length	2-13/32" ←
Maximum Seated Length	1-15/16" ←
Seated Length to Center of Cathode	1-1/4" ± 3/32"
Maximum Diameter	0.669" ←
Bulb	T-5-1/4 ←
Mounting Position	Any
Base	Small-Shell Peewee 3-Pin
Basing Designation for BOTTOM VIEW	2F



Pin 1 – No Connection

Pin 2 – Anode
Pin 3 – Cathode

Maximum Ratings, ***Absolute Values:***

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	100 max.	volts
PEAK CATHODE CURRENT	10 max.	μamp
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq.in.
AVERAGE CATHODE CURRENT°	2 max.	μamp
AMBIENT TEMPERATURE	75 max.	°C

Characteristics:

	Min.	*Av.*	*Max.*	
Dark Current at 90 Volts	–	–	0.050	μamp
Sensitivity:				
At 4000 angstroms	–	0.125	–	μamp/μwatt
Luminous:▲				
At 0 cps	75	135	205	μamp/lumen
At 5000 cps	–	124	–	μamp/lumen
At 10000 cps	–	108	–	μamp/lumen
Gas Amplification Factor	–	–	5.5	

Minimum Circuit Values:

DC Load Resistance:

With anode-supply voltage of 80 volts or less

For dc currents { above 3 μamp . . . 0.1 . . . . megohm
below 3 μamp . . . No Minimum

With anode-supply voltage of 100 volts

For dc currents { above 1 μamp . . . 2.5 . . . . megohms
below 1 μamp . . . 0.1 . . . . megohm

*, °, ▲: See next page. ← Indicates a change.

5583
GAS PHOTOTUBE

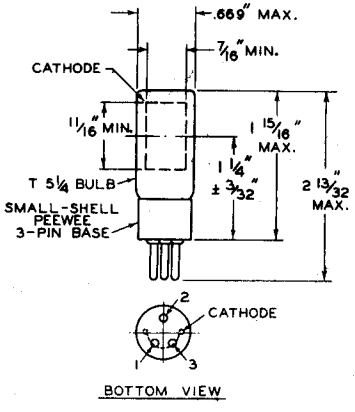
* On plane perpendicular to indicated direction of incident light.

○ Averaged over any interval of 30 seconds maximum. Average current may be doubled when anode-supply voltage is limited to 80 volts.

▲ Measured under conditions specified on sheet "PHOTOTUBE SENSITIVITY AND SENSITIVITY MEASUREMENTS" at front of this Section.

SPECTRAL-SENSITIVITY CHARACTERISTIC
and
FREQUENCY-RESPONSE CHARACTERISTIC
of Gas Phototube having S-4 Response
are shown at front of this Section

AVERAGE ANODE CHARACTERISTICS
of Type 5583 are the same
as those shown under Type 5581



92CM-6053R4

→ Indicates a change.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5584

5584
GAS PHOTOTUBE

BLUE SENSITIVE, TWIN TYPE

DATA

General:

Spectral Response	S-4
Wavelength of Maximum Response	4000 ± 500 Angstroms
Cathode (Each):	
Shape	Quarter-Cylindrical
Minimum Projected Length*	1-3/16"
Minimum Projected Width*	1/4"
Direct Interelectrode Capacitances:	
Cathode to Anode ♦	1.6 μμf
Cathode to Cathode ■	1.8 μμf
Anode to Anode ●	0.44 μμf
Maximum Overall Length	4"
Maximum Seated Length	3-3/8"
Seated Length to Center of Cathode	2-1/8" ± 3/32"
Maximum Diameter	1-3/16"
Bulb	T-9
Mounting Position	Any
Base	Small-Shell Small 4-Pin
Basing Designation for BOTTOM VIEW	4BG

Pin 1 – Cathode, Unit No.2
Pin 2 – Anode, Unit No.2
Pin 3 – Anode, Unit No.1
Pin 4 – Cathode, Unit No.1

DIRECTION OF LIGHT

Maximum Ratings, *Absolute Values* **(Each Unit):**

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	100 max.	volts
PEAK CATHODE CURRENT	10 max.	μamp
PEAK CATHODE-CURRENT DENSITY	50 max.	μamp/sq.in.
AVERAGE CATHODE CURRENT°	2 max.	μamp
AMBIENT TEMPERATURE	75 max.	°C

Characteristics (Each Unit):

	Min.	*Av.*	*Max.*	
Dark Current at 90 Volts	–	–	0.050	μamp
Sensitivity:				
At 4000 Angstroms	–	0.11	–	μamp/μwatt
Luminous:				
At 0 Cycles	80	120	175	μamp/lumen
At 5000 Cycles	–	110	–	μamp/lumen
At 10000 Cycles	–	96	–	μamp/lumen
Gas Amplification Factor	–	–	5.5	

Minimum Circuit Values (Each Unit):

DC Load Resistance:

With anode-supply voltage of 80 volts or less

For dc currents { above 3 μamp . . . 0.1 megohm
below 3 μamp . . . No Minimum

*, ♦, ■, ●, °: See next page.

5584

GAS PHOTOTUBE

With anode-supply voltage of 100 volts

For dc currents { above 1 μamp . . . 2.5 . . . . . megohms
below 1 μamp . . . 0.1 . . . . . megohm

* On plane perpendicular to indicated direction of incident light.

♦ Each unit, with other unit grounded.

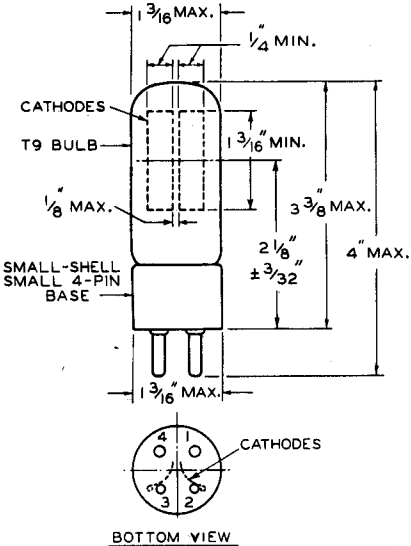
■ Anodes grounded.

● Cathodes grounded.

o Averaged over any interval of 30 seconds maximum. Average current may be doubled when anode-supply voltage is limited to 80 volts.

SPECTRAL-SENSITIVITY CHARACTERISTIC
and
FREQUENCY-RESPONSE CHARACTERISTIC
of Gas Phototube having S-4 Response
are shown at beginning of this Section

AVERAGE ANODE CHARACTERISTICS
of Type 5584 are the same
as those shown under Type 5582



92CM-4561R3

5652

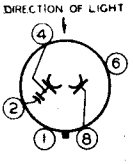
5652
VACUUM PHOTOTUBE

COMPOSITE ANODE-CATHODE TYPE WITH S-4 RESPONSE

DATA

General:

Spectral Response	S-4
Wavelength of Maximum Response	4000 ± 500 Angstroms
Cathode:	
Shape	Flat
Minimum Projected Length*	1/4"
Minimum Projected Width*	19/32"
Direct Interelectrode Capacitance (C_1)▲	1 μμf
Balancing Capacitance (C_2)□	1 μμf
Capacitance Difference Between C_1 and C_2	Not more than 0.3 μμf
Maximum Overall Length	2-7/8"
Maximum Seated Length	2-5/16"
Seated Length to Center of Cathode	1-5/8" ± 3/32"
Maximum Diameter	1-9/32"
Bulb	T-9
Mounting Position	Any
Base	Intermediate-Shell Octal 5-Pin, Non-hygroscopic
Basing Designation for BOTTOM VIEW	2AB



Pin 1: No Connection
Pin 2: Balancing Capacitance
Pin 4: Cathode or Anode
Pin 6: No Connection
Pin 8: Anode or Cathode

Maximum Ratings, ***Absolute Values*****:**

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	250 max.	volts
PEAK CATHODE CURRENT (For either electrode)	12 max.	μamp
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq. in.
AVERAGE CATHODE CURRENT (For either electrode)○	4 max.	μamp
AMBIENT TEMPERATURE	75 max.	°C

Characteristics:

	Min.	*Av.*	*Max.*	
Dark Current at 250 Volts	–	–	0.01	μamp
Sensitivity:				
At 4000 Angstroms	–	0.042	–	μamp/μwatt
Luminous	30	45	70	μamp/lumen

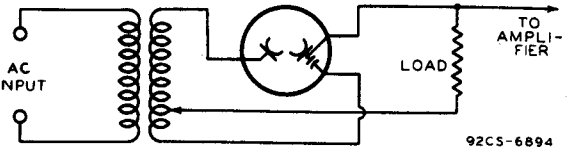
* On plane perpendicular to indicated direction of incident light.
▲ Measured between base pins 4 and 8.
□ Measured between base pins 2 and 4.
○ Averaged over any interval of 30 seconds maximum.

5652
VACUUM PHOTOTUBE

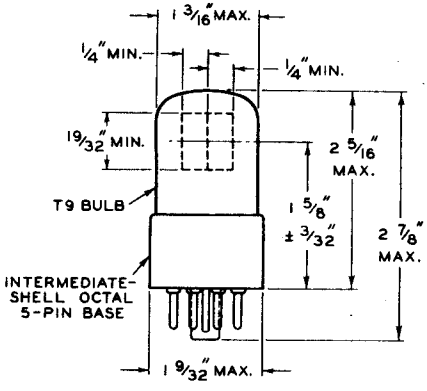
SPECTRAL SENSITIVITY CHARACTERISTIC
of Phototube having S-4 Response
is shown at the beginning of this Section

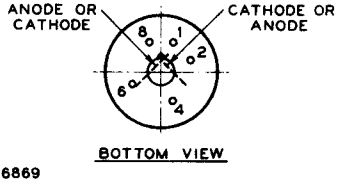
The curve shown under Type 929
is also applicable to the 5652

TYPICAL CIRCUIT



92CS-6894





BOTTOM VIEW

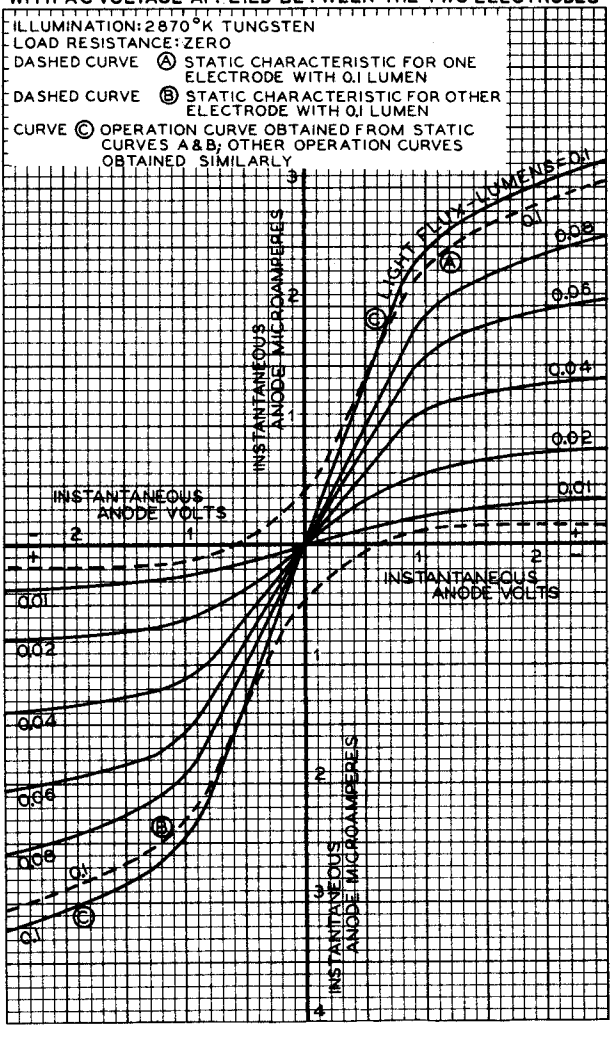
92CS-6869

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

5652

AVERAGE OPERATION CHARACTERISTICS
WITH AC VOLTAGE APPLIED BETWEEN THE TWO ELECTRODES



5653

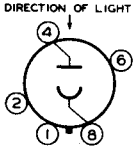
VACUUM PHOTOTUBE

WITH S-4 RESPONSE

DATA

General:

Spectral Response	S-4
Wavelength of Maximum Response	4000 ± 500 Angstroms
Cathode:	
Shape	Semi-Cylindrical
Minimum Projected Length*	13/16"
Minimum Projected Width*	5/8"
Direct Interelectrode Capacitance	2.6 μμf
Maximum Overall Length	3-1/16"
Maximum Seated Length	2-1/2"
Seated Length to Center of Cathode	1-5/8" ± 3/32"
Maximum Diameter	1-9/32"
Bulb	T-9
Mounting Position	Any
Base	Intermediate-Shell Octal 5-Pin
Basing Designation for BOTTOM VIEW	3J



Pin 1 – No Connection
Pin 2 – No Connection
Pin 4 – Anode
Pin 6 – No Connection
Pin 8 – Cathode

Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	250 max.	volts
PEAK CATHODE CURRENT	20 max.	μamp
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq. in.
AVERAGE CATHODE CURRENT°	5 max.	μamp
AMBIENT TEMPERATURE	75 max.	°C

Characteristics:

	Min.	*Av.*	*Max.*	
Dark Current at 250 Volts	–	–	0.25	μamp
Sensitivity:				
At 4000 Angstroms	–	0.042	–	μamp/μwatt
Luminous	20	45	100	μamp/lumen

* On plane perpendicular to indicated direction of incident light.

° Averaged over any interval of 30 seconds maximum.

OUTLINE DIMENSIONS for Type 5653 are the same as those for Type 5581

SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-4 Response is shown at beginning of this Section

AVERAGE ANODE CHARACTERISTICS of Type 5653 are the same as those shown under Type 929

5819

MULTIPLIER PHOTOTUBE

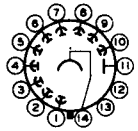
10-STAGE, HEAD-ON TYPE WITH
1-1/2" SEMI-TRANSPARENT CATHODE AND S-4 RESPONSE

DATA

General:

Spectral Response	S-4	←
Wavelength of Maximum Response	4000 ± 500	angstroms
Cathode, Semi-Transparent:		
Shape	Circular	
Window:		
Area	1.8	sq. in.
Minimum diameter	1.5	in.
Index of refraction	1.51	←
Direct Interelectrode Capacitances (Approx):		
Anode to dynode No.10	4.2	μμf
Anode to all other electrodes	6.5	μμf
Overall Length	5-5/8" ± 3/16"	
Seated Length	4-7/8" ± 3/16"	
Maximum Diameter	2-1/4"	
Mounting Position	Any	
Bulb	T-16	
Base	Medium-Shell Diheptal 14-Pin, Non-hygroscopic (JETEC No.B14-38)	

BOTTOM VIEW



DIRECTION OF LIGHT: INTO END OF BULB

Pin 1 – Dynode No.1
Pin 2 – Dynode No.2
Pin 3 – Dynode No.3
Pin 4 – Dynode No.4
Pin 5 – Dynode No.5
Pin 6 – Dynode No.6
Pin 7 – Dynode No.7
Pin 8 – Dynode No.8
Pin 9 – Dynode No.9
Pin 10 – Dynode No.10
Pin 11 – Anode
Pin 12 – No Connection
Pin 13 – Internal Con. Do Not Use
Pin 14 – Cathode

Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)[□]	1250 max.	volts
SUPPLY VOLTAGE BETWEEN DYNODE No.10 AND ANODE (DC or Peak AC)	150 max.	volts
SUPPLY VOLTAGE BETWEEN CATHODE AND DYNODE No.1 (DC or Peak AC)	300 max.	volts ←
ANODE CURRENT:		
Peak	7.5 max.	ma
Average[○]	0.75 max.	ma
AMBIENT TEMPERATURE	75 max.	°C

□ Referred to cathode.

○ Averaged over any interval of 30 seconds maximum.

← Indicates a change

5819

5819

MULTIPLIER PHOTOTUBE

→**Characteristics Range Values for Equipment Design:**

Under conditions with supply voltage (E) across voltage divider providing 1/6 of E between cathode and dynode No.1; 1/12 of E for each succeeding dynode stage; and 1/12 of E between dynode No.10 and anode.

	Min.	Median	Max.	
With E = 1000 volts (except as noted)				
Sensitivity:				
Radiant, at 4000 angstroms	–	23200	–	μamp/μwatt
Luminous:♦				
At 0 cps	10	25	–	amp/lumen
At 100 Mc	–	22	–	amp/lumen
Cathode radiant, at 4000 angstroms	–	0.0464	–	μamp/μwatt
Cathode luminous:				
With tungsten light source▲	40	50	–	μamp/lumen
With blue light source●♦	0.04	–	–	μamp
Current Amplification . .	–	500000	–	
Equivalent Anode-Dark-Current Input●●	–	8.5×10^{-10}	2×10^{-9}	lumen
Equivalent Noise Input★ .	–	2×10^{-11}	–	lumen
With E = 750 volts (except as noted)				
Sensitivity:				
Radiant, at 4000 angstroms	–	2320	–	μamp/μwatt
Luminous:♦				
At 0 cps	–	2.5	–	amp/lumen
Cathode radiant at 4000 angstroms	–	0.0464	–	μamp/μwatt
Cathode luminous:				
With tungsten light source▲	40	50	–	μamp/lumen
With blue light source●♦	0.04	–	–	μamp
Current Amplification . .	–	50000	–	

♦ For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870°K. A light input of 10 microlumens is used. The load resistor has a value of 0.01 megohm.

▲ For conditions the same as shown under (♦) except that the value of light flux is 0.01 lumen and that 150 volts are applied between cathode and all other electrodes connected together as anode.

● 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 150 volts are applied between cathode and all other electrodes connected together as anode.

♦,●,●,★: See next page

→ Indicates a change

5819

MULTIPLIER PHOTOTUBE

♦ 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.

✱ Measured at a tube temperature of 25°C and with the supply voltage (E) adjusted to give luminous sensitivity of 20 amperes per lumen. Dark current caused by thermionic emission and ion feedback may be reduced by the use of a refrigerant.

● For maximum signal-to-noise ratio, operation below 1000 volts is recommended.

★ under the following conditions: Supply voltage (E) is 1000 volts, 25°C tube temperature, 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.

OPERATING CONSIDERATIONS

The *operating stability* of the 5819 is dependent on the magnitude of the anode current and its duration. When the 5819 is operated at high values of anode current, a drop in sensitivity (sometimes called fatigue) may be expected. The extent of the drop below the tabulated sensitivity values depends on the severity of the operating conditions. After a period of idleness, the 5819 usually recovers a substantial percentage of such loss in sensitivity.

The use of an average anode current well below the maximum rated value of 0.75 milliampere is recommended when stability of operation is important. When maximum stability is required, the anode current should not exceed 100 microamperes.

Electrostatic and/or magnetic shielding of the 5819 may be necessary.

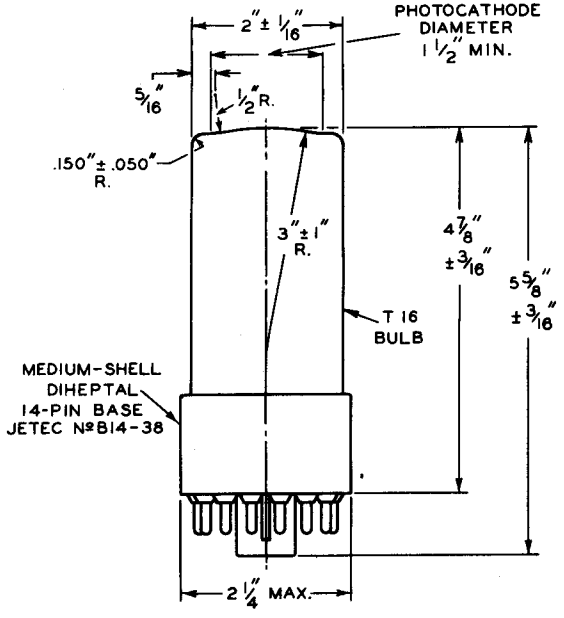
AVERAGE ANODE CHARACTERISTICS
are the same as those shown for Type 6199

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-4 Response
is shown at the front of this Section

RCA

5819

MULTIPLIER PHOTOTUBE



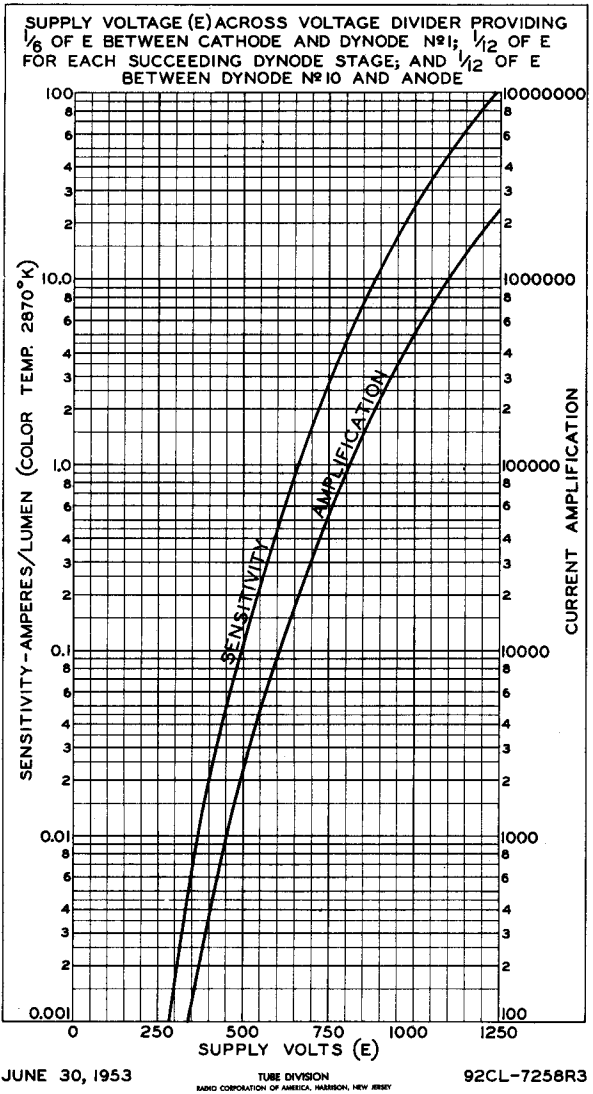
℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF BOTTOM OF THE BASE.

92CM-7232R3

RCA

5819

AVERAGE CHARACTERISTICS



RCA

5819

TYPICAL ANODE DARK-CURRENT CHARACTERISTIC

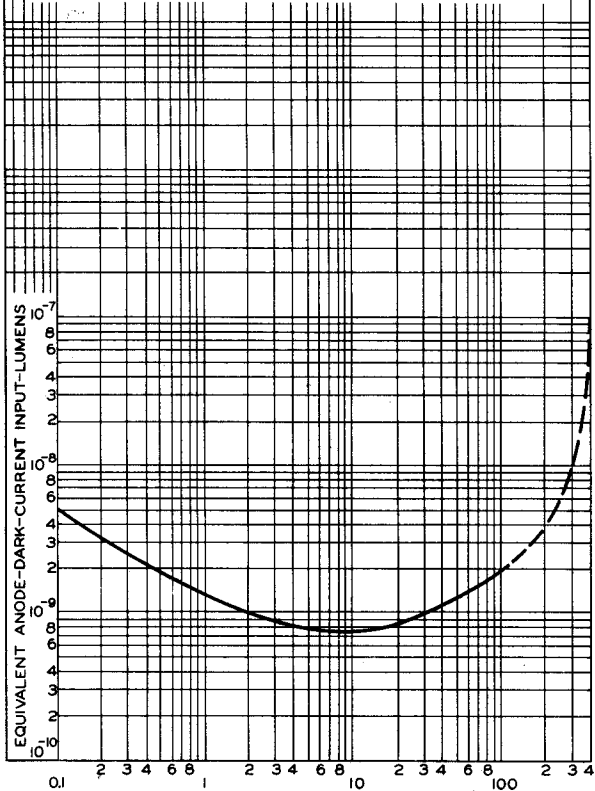
ANODE LUMINOUS SENSITIVITY IS VARIED BY ADJUSTING THE SUPPLY VOLTAGE (E) ACROSS VOLTAGE DIVIDER WHICH PROVIDES $1/8$ OF E BETWEEN CATHODE AND DYNODE Nº 1: $1/12$ OF E FOR EACH SUCCEEDING STAGE: AND $1/12$ OF E BETWEEN DYNODE Nº 10 AND ANODE.

TUBE TEMPERATURE = 25°C

DASHED PORTION INDICATES INSTABILITY

LIGHT SOURCE IS A TUNGSTEN-FILAMENT LAMP OPERATED AT A COLOR TEMPERATURE OF 2870°K.

TUBE TEMPERATURE=25°C



FEB. 6, 1953

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7920RI

RCA

6199

MULTIPLIER PHOTOTUBE

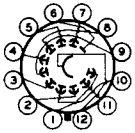
10-STAGE, HEAD-ON TYPE WITH
1-1/4" SEMI-TRANSPARENT CATHODE AND S-4 RESPONSE

DATA

General:

Spectral Response	S-4	
Wavelength of Maximum Response	4000 ± 500	angstroms
Cathode, Semi-transparent:		
Shape	Circular	
Window:		
Area	1.2	sq. in.
Minimum Diameter	1.24	in.
Minimum Diameter of Flat Surface	1	in.
Index of Refraction	1.51	
Direct Interelectrode Capacitances (Approx.):		
Anode to Dynode No.10	4	μμf
Anode to All Other Electrodes	7	μμf
Overall Length	4-3/8" ± 3/16"	
Seated Length	3-7/8" ± 3/16"	
Maximum Diameter	1-9/16"	
Bulb	T-12	
Mounting Position	Any	
Base	Small-Shell Duodecal 12-Pin, Non-hygroscopic (JETEC No.B12-43)	

BOTTOM VIEW



DIRECTION OF LIGHT: INTO END OF BULB

Pin 1 – Dynode No.1	Pin 7 – Dynode No.10
Pin 2 – Dynode No.3	Pin 8 – Dynode No.8
Pin 3 – Dynode No.5	Pin 9 – Dynode No.6
Pin 4 – Dynode No.7	Pin 10 – Dynode No.4
Pin 5 – Dynode No.9	Pin 11 – Dynode No.2
Pin 6 – Anode	Pin 12 – Cathode

Maximum Ratings, *Absolute Values:*

ANODE-SUPPLY VOLTAGE (DC or Peak AC)[□]	1250 max.	volts
SUPPLY VOLTAGE BETWEEN DYNODE No.10 AND ANODE (DC or Peak AC)	150 max.	volts
ANODE CURRENT:		
Peak	7.5 max.	ma
Average[○]	0.75 max.	ma
Average for Minimum Fatigue[○]	0.1 max.	ma
AMBIENT TEMPERATURE	75 max.	°C

□ Referred to cathode.
○ Averaged over any interval of 30 seconds maximum.

RCA

6199

MULTIPLIER PHOTOTUBE

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

Under conditions with supply voltage (E) across voltage divider providing 1/6 of E between cathode and dynode No.1; 1/12 of E for each succeeding dynode stage; and 1/12 of E between dynode No.10 and anode

With E = 1000 volts (except as noted)

	Min.	Av.	Max.	
Sensitivity:				
Anode, at 4000 angstroms	–	22300	–	μamp/μwatt
Luminous:				
Anode:†				
At 0 cps	10	24	–	amp/lumen
At 100 Mc . . .	–	22	–	amp/lumen
Cathode:				
With Tungsten Light Source▲	20	40	–	μamp/lumen
With Blue Light Source♦♦	0.028	–	–	μamp
Current Amplification■	–	600000	–	
Equivalent Anode-Dark-Current Input*● .	–	8×10^{-10}	2.5×10^{-9}	lumen
Equivalent Noise Input★	–	4×10^{-12}	–	lumen

With E = 750 volts (except as noted)

	Min.	Av.	Max.	
Sensitivity:				
Anode, at 4000 angstroms	–	2230	–	μamp/μwatt
Luminous:				
Anode:†				
At 0 cps	–	2.4	–	amp/lumen
Cathode:				
With Tungsten Light Source▲	20	40	–	μamp/lumen
With Blue Light Source♦♦	0.028	–	–	μamp
Current Amplification■	–	60000	–	

† For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870°K. A light input of 10 microlumens is used. The load resistor has a value of 0.01 megohm.

▲ For conditions the same as shown under (†) except that the value of light flux is 0.01 lumen and that 150 volts are applied between cathode and all other electrodes connected together as anode.

♦ 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 150 volts are applied between cathode and all other electrodes connected together as anode.

♦,●,*,●,★: See next page.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

6199

MULTIPLIER PHOTOTUBE

♦ 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.

□ Ratio of anode sensitivity to cathode sensitivity under conditions of 2870°K tungsten light input.

* Defined as the quotient of the dc anode dark current by the anode luminous sensitivity. It is measured at a tube temperature of 25°C and with the supply voltage (E) adjusted to give an anode luminous sensitivity of 20 amperes per lumen. Dark current caused by thermionic emission and ion feedback may be reduced by the use of a refrigerant.

● For maximum signal-to-noise ratio, operation below 1000 volts is recommended.

★ Defined as the value where the rms output current is equal to the rms noise current determined under the following conditions: Supply voltage (E) is 1000 volts, 25°C tube temperature, 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 pulse.

OPERATING NOTES

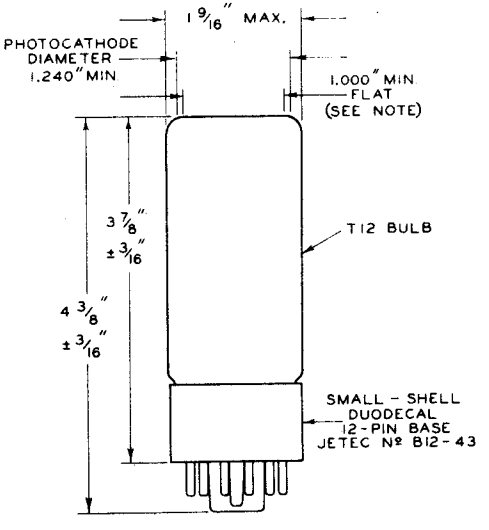
Performance of the 6199 is affected by magnetic fields. It will be observed with certain orientations of the 6199 that the earth's magnetic field is sufficient to cause a noticeable decrease in the response of the tube. Therefore, it may be desirable to provide magnetic shielding for the 6199 particularly when it is to be used in a strong magnetic field.

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-4 Response
is shown at the front of this Section

RCA

6199

MULTIPLIER PHOTOTUBE



NOTE: DEVIATION FROM FLATNESS WILL NOT EXCEED 0.015" FROM PEAK TO VALLEY.

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

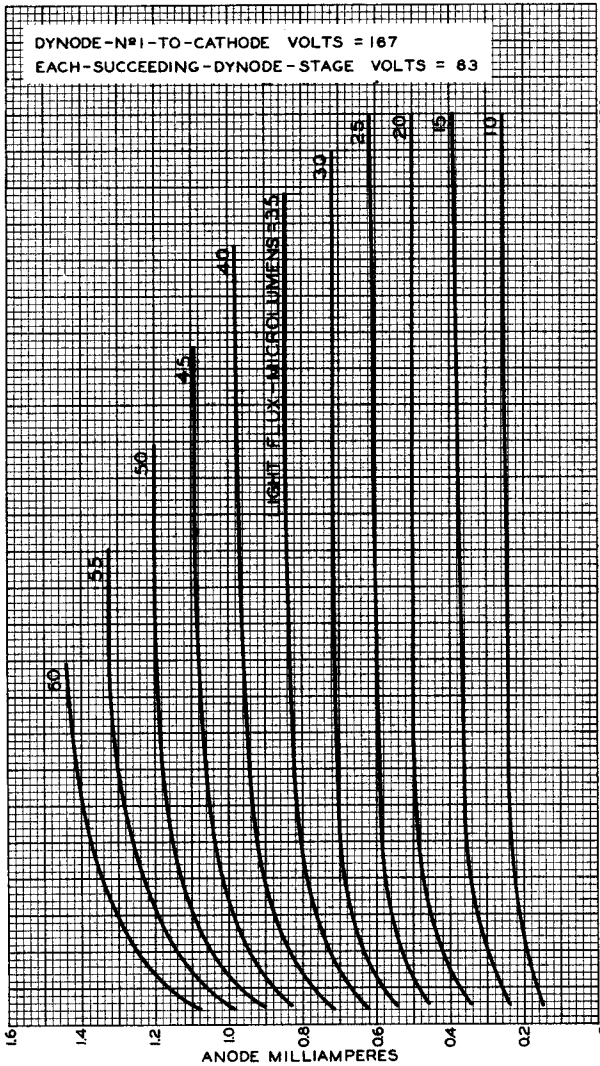
92CS-7770

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

6199

AVERAGE ANODE CHARACTERISTICS



JUNE 10,1952

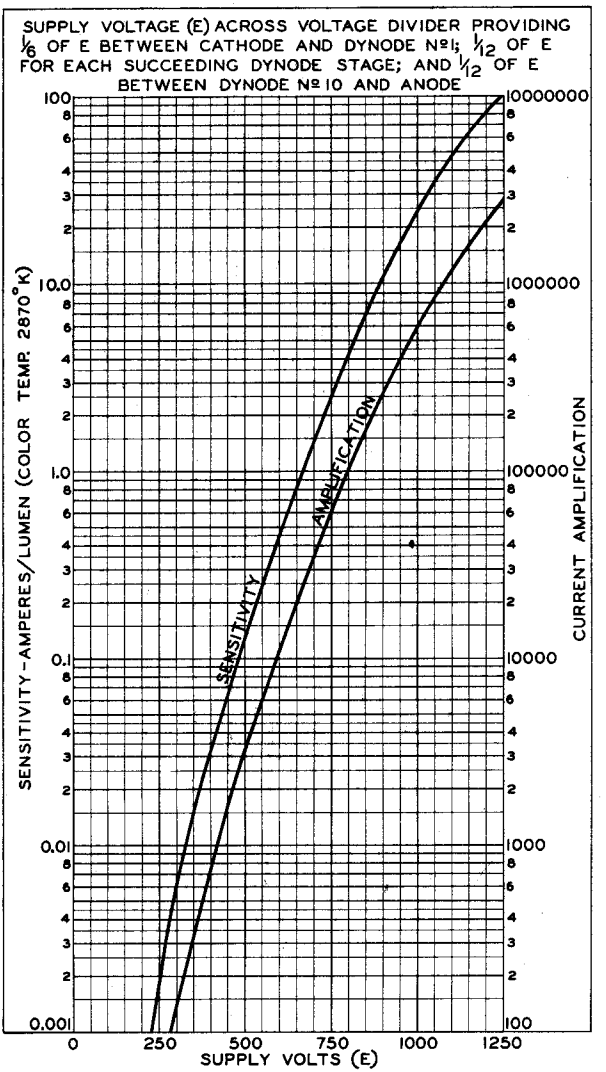
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7255R3

RCA

6199

AVERAGE CHARACTERISTICS



TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

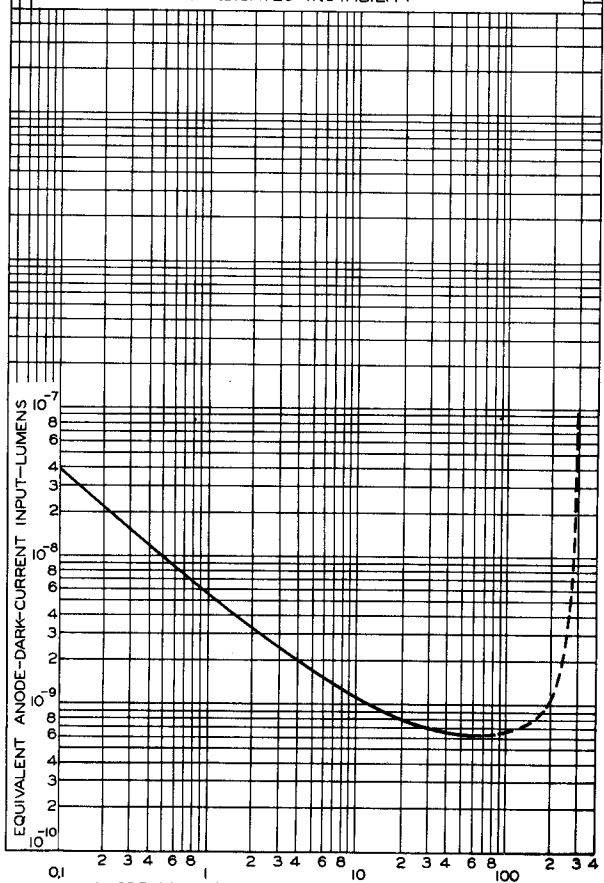
6199

TYPICAL ANODE-DARK-CURRENT CHARACTERISTIC

ANODE LUMINOUS SENSITIVITY IS VARIED BY ADJUSTING THE SUPPLY VOLTAGE (E) ACROSS VOLTAGE DIVIDER WHICH PROVIDES $^1/_6$ OF E BETWEEN CATHODE AND DYNODE Nº 1; $^1/_{12}$ OF E FOR EACH SUCCEEDING STAGE; AND $^1/_{12}$ OF E BETWEEN DYNODE Nº 10 AND ANODE.

TUBE TEMPERATURE = 25°C

DASHED PORTION INDICATES INSTABILITY



6217

MULTIPLIER PHOTOTUBE

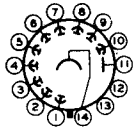
10-STAGE, HEAD-ON TYPE WITH
1-1/2" SEMI-TRANSPARENT CATHODE AND S-10 RESPONSE

DATA

General:

Spectral Response	S-10	
Wavelength Range of Highest-Response Region	3700 to 5600	angstroms
Cathode, Semi-transparent:		
Shape	Circular	
Window:		
Area	1.8	sq. in.
Minimum Diameter	1.5	in.
Index of Refraction	1.51	
Direct Interelectrode Capacitances:		
Anode to Dynode No.10	4.2	μμf
Anode to All Other Electrodes	6.5	μμf
Overall Length	5-5/8" ± 3/16"	
Seated Length	4-7/8" ± 3/16"	
Maximum Diameter	2-1/4"	
Mounting Position	Any	
Bulb	T-16	
Base	Medium-Shell Diheptal 14-Pin, Non-hygroscopic (JETEC No.B14-38)	
Basing Designation for BOTTOM VIEW	14M1	

Pin 1 – Dynode No.1
Pin 2 – Dynode No.2
Pin 3 – Dynode No.3
Pin 4 – Dynode No.4
Pin 5 – Dynode No.5
Pin 6 – Dynode No.6
Pin 7 – Dynode No.7
Pin 8 – Dynode No.8



DIRECTION OF LIGHT: INTO END OF BULB

Pin 9 – Dynode No.9
Pin 10 – Dynode No.10
Pin 11 – Anode
Pin 12 – No Connection
Pin 13 – Internal Con. Do Not Use
Pin 14 – Cathode

Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)□	1250 max.	volts
SUPPLY VOLTAGE BETWEEN DYNODE No.10 AND ANODE (DC or Peak AC)	150 max.	volts
ANODE CURRENT:		
Peak	7.5 max.	ma
Average°	0.75 max.	ma
Average for Minimum Fatigue°	0.1 max.	ma
AMBIENT TEMPERATURE	75 max.	°C

□ Referred to cathode.
° Averaged over any interval of 30 seconds maximum.

RCA

6217

MULTIPLIER PHOTOTUBE

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

Under conditions with supply voltage (E) across voltage divider providing 1/6 of E between cathode and dynode No.1; 1/12 of E for each succeeding dynode stage; and 1/12 of E between dynode No.10 and anode

With E = 1000 volts (except as noted)

	Min.	Av.	Max.	
Sensitivity:				
Anode, at 5400 angstroms	–	8500	–	μamp/μwatt
Luminous:				
Anode:*				
At 0 cps	10	24	–	amp/lumen
At 100 Mc	–	21	–	amp/lumen
Cathode:				
With Tungsten Light Source●.	20	40	–	μamp/lumen
With Red-Infrared Light Source#♦.	0.05	–	–	μamp
Current Amplification■.	–	600000	–	
Equivalent Anode-Dark-Current Input**	–	1×10^{-8}	2.5×10^{-8}	lumen
Equivalent Noise Input##	–	4×10^{-11}	–	lumen

With E = 750 volts (except as noted)

	Min.	Av.	Max.	
Sensitivity:				
Anode, at 5400 angstroms	–	850	–	μamp/μwatt
Luminous:				
Anode:*				
At 0 cps	–	2.4	–	amp/lumen
Cathode:				
With Tungsten . . Light Source●.	20	40	–	μamp/lumen
With Red-Infrared Light Source#♦.	0.05	–	–	μamp
Current Amplification■.	–	60000	–	

* For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870°K. A light input of 10 microlumens is used. The load resistor has a value of 0.01 megohm.

● For conditions the same as shown under (*) except that the value of light flux is 0.01 lumen and that 150 volts are applied between cathode and all other electrodes connected together as anode.

\# Under the following conditions: Light incident on the cathode is transmitted through a red-infrared filter (combination of Corning, Glass Code Nos. 3482 and 5850 filters) from a tungsten-filament lamp operated at a color temperature of 2870°K. The value of light-flux on the filter is 0.1 lumen. The load resistor has a value of 0.01 megohm, and 150 volts are applied between cathode and all other electrodes connected together as anode. This test evaluates the magnitude of the infrared response in the tail of the response characteristic and provides a critical criterion for the response in the red band.

♦,■,**,##: See next page.

6217

MULTIPLIER PHOTOTUBE

♦ 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-INFRARED FILTER at front of this section.

■ Ratio of anode sensitivity to cathode sensitivity under conditions of 2870°K tungsten light input.

** Defined as the quotient of the dc anode dark current by the anode luminous sensitivity. After tube has been in the dark for 30 minutes, the equivalent dark-current input is measured at a tube temperature of 25°C and with the supply voltage (E) adjusted to give an anode luminous sensitivity of 20 amperes per lumen. Dark current caused by thermionic emission and ion feedback may be reduced by the use of a refrigerant.

Defined as the value where the rms output current is equal to the rms noise current determined under the following conditions: Supply voltage (E) is 1000 volts, 25°C tube temperature, 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.

OPERATING NOTES

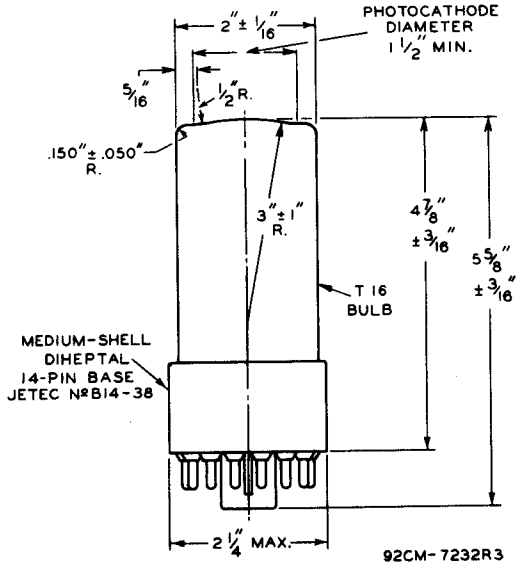
Performance of the 6217 is affected by magnetic fields. It will be observed with certain orientations of the 6217 that the earth's magnetic field is sufficient to cause a noticeable decrease in the response of the tube. Therefore, it may be desirable to provide magnetic shielding for the 6217 particularly when it is to be used in a strong magnetic field.

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-10 Response
is shown at the front of this Section

AVERAGE ANODE CHARACTERISTICS,
SENSITIVITY CHARACTERISTIC,
and
CURRENT AMPLIFICATION CHARACTERISTIC
are the same as those shown for Type 6199

6217

6217
MULTIPLIER PHOTOTUBE



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

RCA

6328

MULTIPLIER PHOTOTUBE

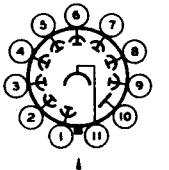
9-STAGE TYPE WITH S-4 RESPONSE
FOR HEADLIGHT-CONTROL SERVICE

DATA

General:

Spectral Response		S-4
Wavelength of Maximum Response		4000 ± 500 angstroms
Cathode:		
Minimum Projected Length*		15/16"
Minimum Projected Width*		5/16"
Direct Interelectrode Capacitances:		
Anode to Dynode No.9	4.2	μμf
Anode to All Other Electrodes	5.5	μμf
Maximum Overall Length		3-1/8"
Maximum Seated Length		2-11/16"
Length from Base Seat to Center of Useful Cathode Area		1-9/16" ± 3/32"
Maximum Diameter		1-5/16"
Bulb		T-9
Mounting Position		Any
Base . . . Small-Shell Neosubmagnal 11-Pin, Non-hygroscopic (JETEC No.B11-104)		
Basing Designation for BOTTOM VIEW		11K

Pin 1: Dynode No.1
Pin 2: Dynode No.2
Pin 3: Dynode No.3
Pin 4: Dynode No.4
Pin 5: Dynode No.5
Pin 6: Dynode No.6



DIRECTION OF LIGHT

Pin 7: Dynode No.7
Pin 8: Dynode No.8
Pin 9: Dynode No.9
Pin 10: Anode
Pin 11: Cathode

Maximum Ratings, *Absolute Values:*

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	1250 max.	volts
SUPPLY VOLTAGE BETWEEN DYNODE No.9 AND ANODE (DC or Peak AC)	250 max.	volts
AVERAGE ANODE CURRENT°	0.1 max.	ma
AMBIENT TEMPERATURE	75 max.	°C

* On plane perpendicular to the indicated direction of light (see *Dimensional Outline*).

° Averaged over any interval of 30 seconds maximum.

6328

6328

MULTIPLIER PHOTOTUBE

Characteristics Range Values for Equipment Design:

Under conditions with supply voltage (E) across voltage divider providing 1/10 of E between cathode and dynode No.1; 1/10 of E for each succeeding dynode stage; and 1/10 of E between dynode No.9 and anode

With E = 1000 volts

	Min.	Av.	Max.	
Sensitivity:				
Radiant, at 4000 angstroms	–	32500	–	μamp/μwatt
Luminous:▲				
At 0 cps	5	35	250	amp/lumen
At 100 Mc	–	33	–	amp/lumen
Electrode Dark Current (At 25°C):				
Anode	–	–	0.1	μamp
Any other electrode	–	–	0.75	μamp

▲ For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870°K. A light input of 10 microlumens is used. The load resistor has a value of 0.01 megohm.

OPERATING CONSIDERATIONS

The *operating stability* of the 6328 is dependent on the magnitude of the anode current and its duration. When the 6328 is operated at high values of anode current, a drop in sensitivity (sometimes called fatigue) may be expected. The extent of the drop below the tabulated sensitivity values depends on the severity of the operating conditions. After a period of idleness, the 6328 usually recovers a substantial percentage of such loss in sensitivity.

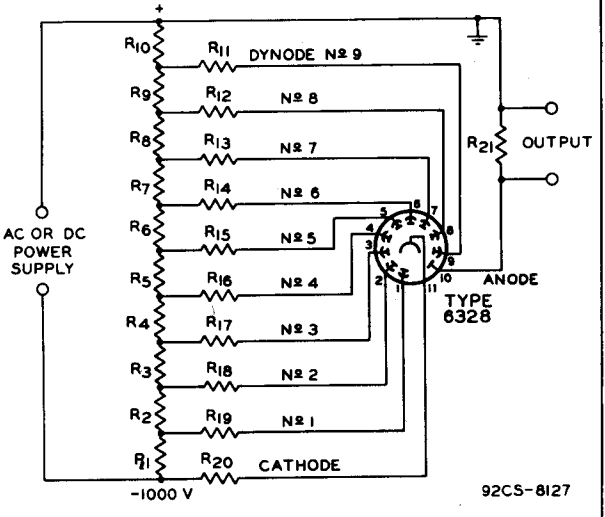
The use of an average anode current well below the maximum rated value of 0.1 milliampere is recommended when stability of operation is important. When maximum stability is required, the anode current should not exceed 10 microamperes.

A recommended design of voltage-divider network for use with the 6328 to provide stable operation and long tube life is shown in the accompanying circuit. This design provides linear operation within the range normally required for dimming. At higher light levels, the network design limits the tube output to a safe value. The indicated design values provide dimming operation for an anode current in the range between 5 and 10 microamperes.

6328

MULTIPLIER PHOTOTUBE

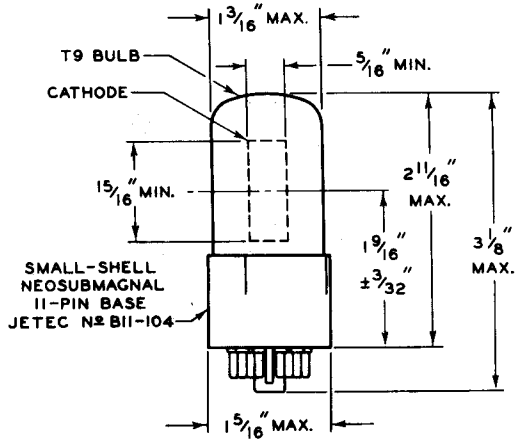
RECOMMENDED VOLTAGE-DIVIDER NETWORK FOR USE WITH TYPE 6328 IN HEADLIGHT DIMMING SERVICE

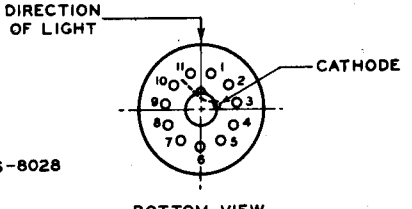


R1 R2 R3 R4 R5
R6 R7 R8 R9 R10: 1 megohm, 1/2 watt
R11: 2 megohms, 1/2 watt
R12: 5.1 megohms, 1/2 watt
R13 R14 R15 R16
R17 R18 R19 R20: 8.2 megohms, 1/2 watt
R21: 820,000 ohms, 1/2 watt

6328

MULTIPLIER PHOTOTUBE





BOTTOM VIEW

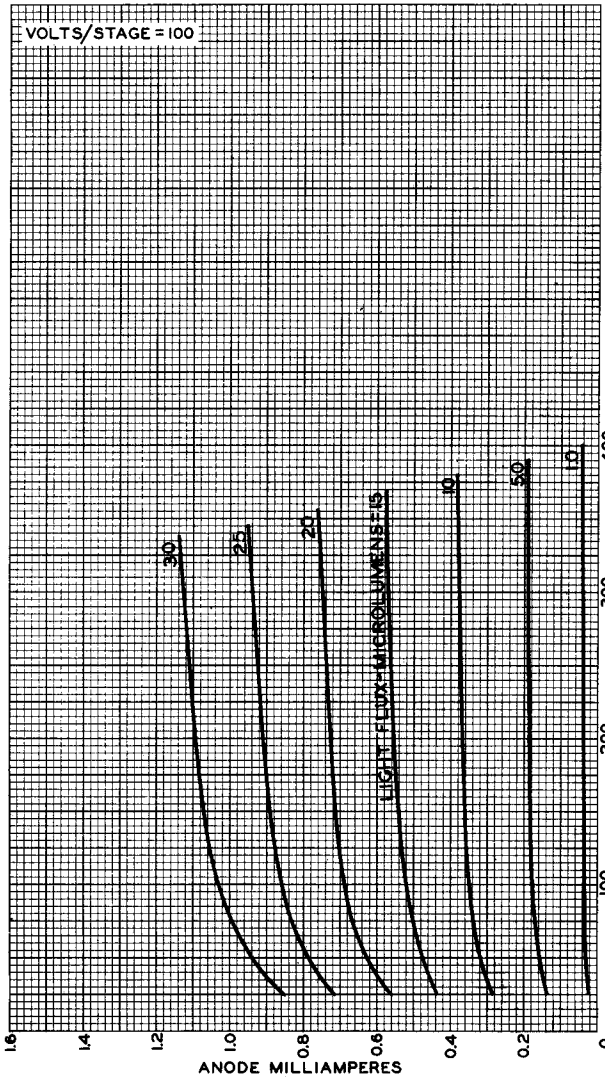
℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF BOTTOM OF THE BASE.

NOTE: THE MAXIMUM ANGULAR VARIATION BETWEEN THE PLANE THROUGH PINS No. 1 AND No. 11 AND THE PLANE OF THE GRILL WILL NOT EXCEED 6°.

RCA

6328

AVERAGE ANODE CHARACTERISTICS



JULY 1, 1953

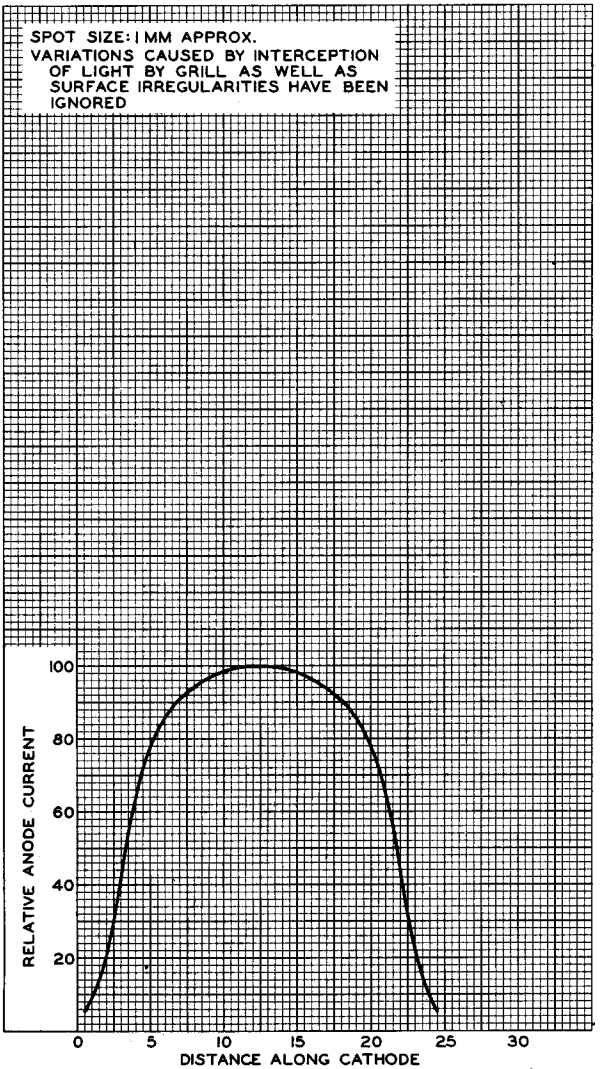
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8029

6328

6328

VARIATION IN SENSITIVITY OF PHOTOCATHODE ALONG ITS LENGTH



MAR. 18, 1954 TUBE DEPARTMENT 92CM-7663R1

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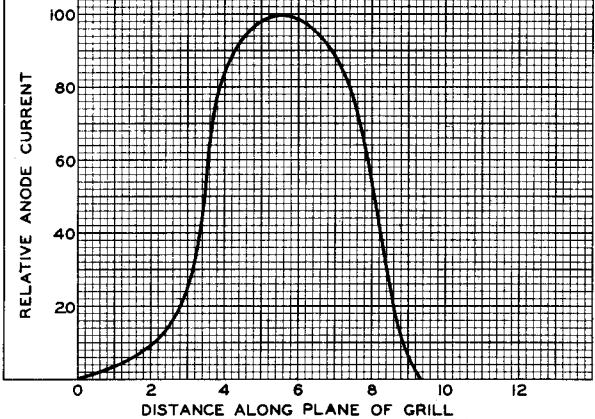
VARIATION IN SENSITIVITY OF PHOTOCATHODE ACROSS ITS PROJECTED WIDTH IN PLANE OF GRILL

SPOT SIZE: 1 MM APPROX.
GRILL TOWARD OBSERVER, BASE DOWN
CATHODE WIDTH PROJECTED NORMAL TO PLANE OF GRILL
VARIATIONS CAUSED BY INTERCEPTION OF LIGHT BY GRILL AS WELL AS SURFACE IRREGULARITIES HAVE BEEN IGNORED



MAR. 18, 1954

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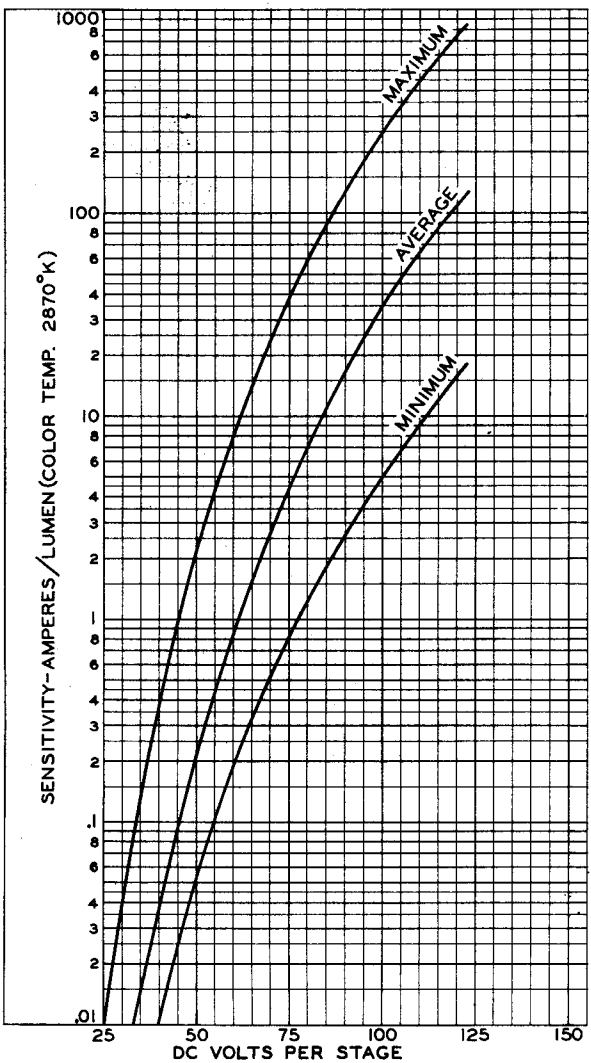
RANGE OF LUMINOUS SENSITIVITY



JUNE 29, 1953

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CL-8027

6342

MULTIPLIER PHOTOTUBE

10-STAGE, HEAD-ON TYPE WITH
1-1/2" SEMITRANSPARENT CATHODE AND S-4 RESPONSE

DATA

General:

Spectral Response	S-4
Wavelength of Maximum Response	4000 ± 500 angstroms
Cathode, Semitransparent:	
Shape	Circular
Window:	
Area	1.8 sq. in.
Minimum Diameter	1.5 in.
Index of Refraction	1.51
Direct Interelectrode Capacitances (Approx.):	
Anode to Dynode No.10	4.4 μμf
Anode to All Other Electrodes	7.0 μμf
Overall Length	5-5/8" ± 3-16"
Seated Length	4-7/8" ± 3/16"
Maximum Diameter	2-1/4"
Bulb	T-16
Mounting Position	Any
Base — Medium-Shell Diheptal 14-Pin, Non-hygroscopic	(JETEC No.B14-38)

BOTTOM VIEW

DIRECTION OF LIGHT: INTO END OF BULB

Pin 1: Dynode No.1
Pin 2: Dynode No.2
Pin 3: Dynode No.3
Pin 4: Dynode No.4
Pin 5: Dynode No.5
Pin 6: Dynode No.6
Pin 7: Dynode No.7
Pin 8: Dynode No.8
Pin 9: Dynode No.9
Pin 10: Dynode No.10
Pin 11: Anode
Pin 12: Internal Con.-Do Not Use
Pin 13: Focusing Electrode
Pin 14: Cathode

Maximum Ratings, *Absolute Values:*

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	1500 max.	volts
SUPPLY VOLTAGE BETWEEN DYNODE No.10 AND ANODE (DC or Peak AC)	150 max.	volts
SUPPLY VOLTAGE BETWEEN CATHODE AND DYNODE No.1 (DC or Peak AC)	400 max.	volts
FOCUSING-ELECTRODE VOLTAGE (DC or Peak AC)	400 max.	volts
AVERAGE ANODE CURRENT●	2 max.	ma
AMBIENT TEMPERATURE	75 max.	°C

Characteristics Range Values for Equipment Design:

Under conditions with supply voltage (E) across voltage divider providing 1/6 of E between cathode and dynode No.1; 1/12 of E for each succeeding dynode stage; and 1/12 of E between dynode No.10 and anode.

(continued on next page)

● Averaged over any interval of 30 seconds maximum.

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MULTIPLIER PHOTOTUBE

With E = 1250 volts (except as noted) and Focusing Electrode connected to Dynode No. 1 at socket*

	Min.	Av.	Max.	
Sensitivity:				
Radiant, at 4000 angstroms	–	7000	–	μamp/μwatt
Cathode Radiant, at 4000 angstroms	–	0.056	–	μamp/μwatt
Luminous:♦				
At 0 cps	3	7.5	–	amp/lumen
Cathode Luminous:				
With tungsten light source▲	40	60	–	μamp/lumen
With blue light source●♦	0.04	–	–	μamp
Current Amplification .	–	125000	–	
Equivalent Anode-Dark-Current Input●■	–	2×10^{-10}	2×10^{-9}	lumen
Equivalent Noise Input★		7×10^{-12}	–	lumen

With E = 1500 volts (except as noted) and Focusing Electrode connected to Dynode No. 1 at socket*

	Min.	Av.	Max.	
Sensitivity:				
Radiant, at 4000 angstroms	–	33600	–	μamp/μwatt
Cathode Radiant, at 4000 angstroms	–	0.056	–	μamp/μwatt
Luminous:♦				
At 0 cps	–	35	–	amp/lumen
Cathode Luminous:				
With tungsten light source▲	40	60	–	μamp/lumen
With blue light source●♦	0.04	–	–	μamp
Current Amplification .	–	600000	–	

* In general, the focusing electrode is connected to dynode No. 1 at the socket and operated at the same fixed potential as dynode No. 1. However, in applications critical as to magnitude, uniformity, or speed of the response, the focusing electrode may be connected to the adjustable arm of a potentiometer between cathode and dynode No. 1 in the voltage divider, and operated at an optimum potential within a range of 10 to 60 per cent of the dynode-No. 1 potential.

♦ For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870°K. A light input of 10 microlumens is used. The load resistor has a value of 0.01 megohm.

▲ For conditions the same as shown under (♦) except that the value of light flux is 0.01 lumen 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.

●,♦,■,★: See next page.

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MULTIPLIER PHOTOTUBE

⊕ 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.

● Measured at a tube temperature of 25°C and with the supply voltage (E) adjusted to give a luminous sensitivity of 20 amperes per lumen. Dark current caused by thermionic emission and ion feedback may be reduced by the use of a refrigerant.

□ For maximum signal-to-noise ratio, operation with a supply voltage (E) below 1250 volts is recommended.

★ Under the following conditions: Supply voltage (E) is 1250 volts, 25°C tube temperature, 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.

OPERATING CONSIDERATIONS

The *operating stability* of the 6342 is dependent on the magnitude of the anode current and its duration. When the 6342 is operated at high values of anode current, a drop in sensitivity (sometimes called fatigue) may be expected. The extent of the drop below the tabulated sensitivity values depends on the severity of the operating conditions. After a period of idleness, the 6342 usually recovers a substantial percentage of such loss in sensitivity.

The use of an average anode current well below the maximum rated value of 2 milliamperes is recommended when stability of operation is important. When maximum stability is required, the anode current should not exceed 250 microamperes.

Electrostatic and/or *magnetic shielding* of the 6342 may be necessary.

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-4 Response
is shown at the front of this Section

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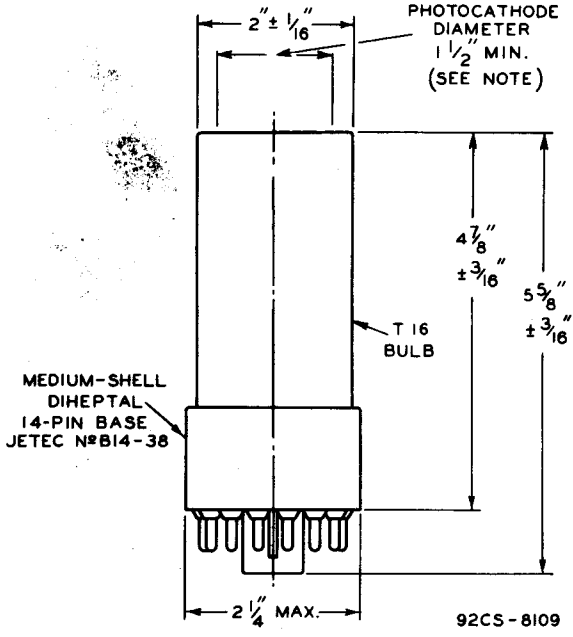
MULTIPLIER PHOTOTUBE



℄ 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 MINIMUM DIAMETER, DEVIATION FROM FLATNESS WILL NOT EXCEED 0.010" FROM PEAK TO VALLEY.

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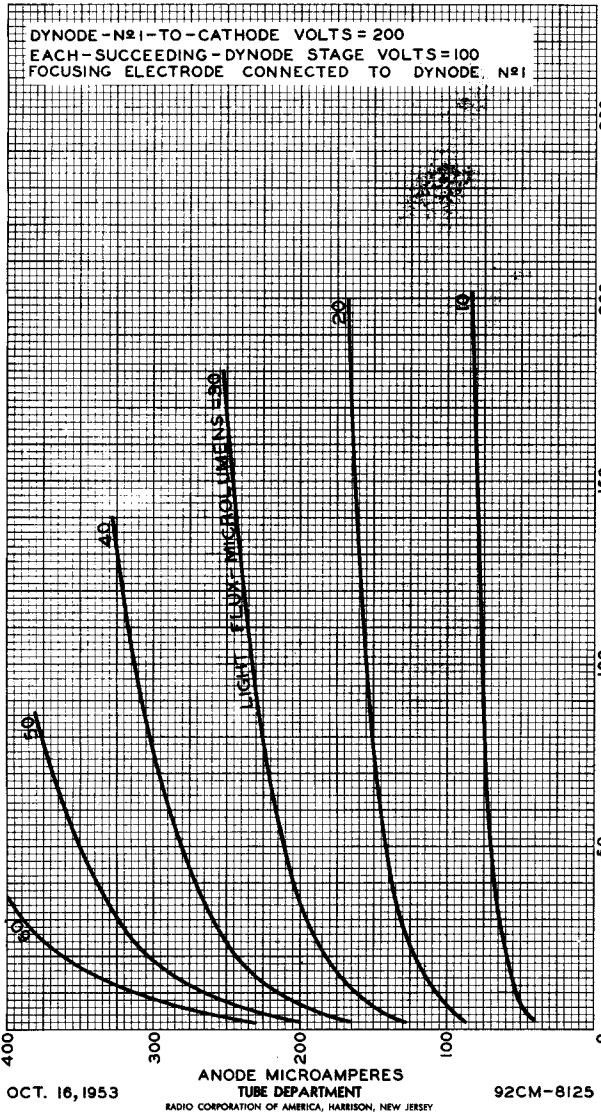
AVERAGE ANODE CHARACTERISTICS



OCT. 16, 1953

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8125

6342

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TYPICAL ANODE-DARK-CURRENT CHARACTERISTIC

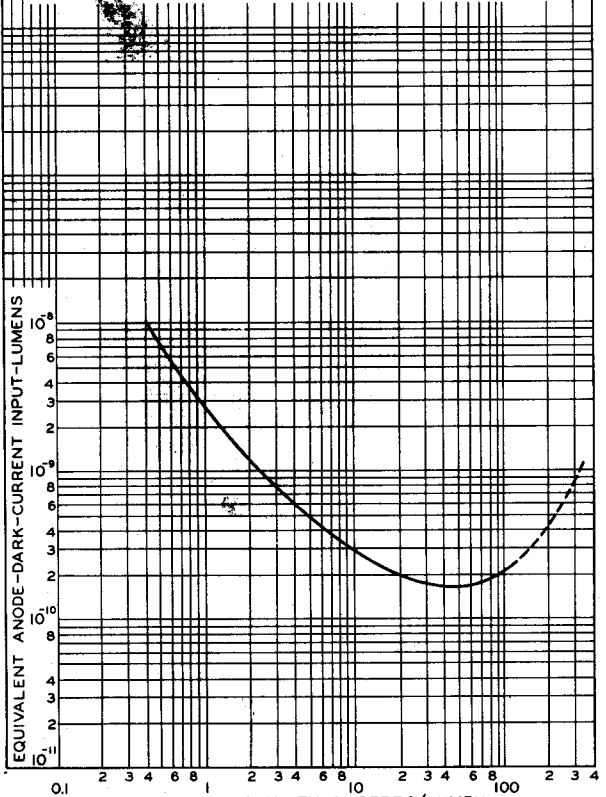
ANODE LUMINOUS SENSITIVITY IS VARIED BY ADJUSTING THE SUPPLY VOLTAGE (E) ACROSS VOLTAGE DIVIDER WHICH PROVIDES 1/6 OF E BETWEEN CATHODE AND DYNODE Nº1; 1/12 OF E FOR EACH SUCCEEDING STAGE; AND 1/12 OF E BETWEEN DYNODE Nº10 AND ANODE.

FOCUSING ELECTRODE IS CONNECTED TO DYNODE Nº1

DASHED PORTION INDICATES INSTABILITY

LIGHT SOURCE IS A TUNGSTEN-FILAMENT LAMP OPERATED AT A COLOR TEMPERATURE OF 2870°K.

TUBE TEMPERATURE=25°C



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AVERAGE CHARACTERISTICS

SUPPLY VOLTAGE (E) ACROSS VOLTAGE DIVIDER PROVIDING 1/6 OF E BETWEEN CATHODE AND DYNODE Nº1, 1/6 OF E FOR EACH SUCCEEDING DYNODE STAGE; AND 1/6 OF E BETWEEN DYNODE Nº10 AND ANODE. FOCUSING ELECTRODE IS CONNECTED TO DYNODE Nº1