# 7029

# MULTIPLIER PHOTOTUBE

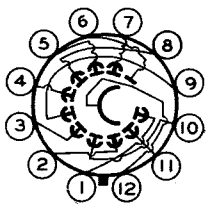
10-STAGE, DORMER-WINDOW TYPE WITH SEMITRANS-PARENT CATHODE ON REFLECTIVE SUBSTRATE AND S-17 RESPONSE

## DATA

**General:**

| | | |
|---|---|---|
| Spectral Response | S-17 | |
| Wavelength of Maximum Response | 4900 ± 500 | angstroms |
| Cathode, Semitransparent on Reflective Substrate: | | |
| Shape | Rectangular on concave spherical surface | |
| Minumum projected length on plane of window | 0.65 | in. |
| Minimum projected width on plane of window | 0.5 | in. |
| Direct Interelectrode Capacitances (Approx.): | | |
| Anode to dynode No.10 | 4 | μμf |
| Anode to all other electrodes | 7 | μμf |
| Maximum Overall Length | 3.75" | |
| Maximum Seated Length | 3.25" | |
| Length from Base Seat to Center of Window Area | 2.69" ± 0.19" | |
| Diameter | 1.50" ± 0.06" | |
| Operating Position | Any | |
| Weight (Approx.) | 3 | oz |
| Bulb | T12 with Special End Contour | |
| Socket | Eby No.9058, or equivalent | |
| Base | Ultrashort Small-Shell Duodecal 12-Pin (JETEC No.B12-186), Non-hygroscopic | |
| Basing Designation for BOTTOM VIEW | 12AH | |

Pin 1 – Dynode No.1
Pin 2 – Dynode No.3
Pin 3 – Dynode No.5
Pin 4 – Dynode No.7
Pin 5 – Dynode No.9
Pin 6 – Anode




DIRECTION OF LIGHT: INTO DORMER WINDOW

Pin 7 – Dynode No.10
Pin 8 – Dynode No.8
Pin 9 – Dynode No.6
Pin 10 – Dynode No.4
Pin 11 – Dynode No.2
Pin 12 – Cathode

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

*For altitudes up to 60,000 feet*

| | | |
|---|---|---|
| ANODE-SUPPLY VOLTAGE (DC or Peak AC) | 1250 max. | volts |
| SUPPLY VOLTAGE BETWEEN DYNODE No.10 AND ANODE (DC or Peak AC) | 250 max. | volts |
| DYNODE-No.1 SUPPLY VOLTAGE (DC or Peak AC) | 300 max. | volts |
| AVERAGE ANODE CURRENT• | 20 max. | μa |
| AMBIENT-TEMPERATURE RANGE | -50 to +75 | °C |

•: See next page.



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## Characteristics Range Values for Equipment Design:

*Under conditions with supply voltage (E) across voltage divider providing 1/11 of E per stage*

**With E = 1000 volts (except as noted)**

| | Min. | Median | Max. | |
|---|---|---|---|---|
| Sensitivity: | | | | |
| Radiant, at 4900 angstroms. | – | 27200 | – | μa/μw |
| Cathode radiant, at 4900 angstroms . . . . . | – | 0.085 | – | μa/μw |
| Luminous● . . . . . | 10 | 40 | 300 | amp/lumen |
| Cathode luminous: | | | | |
| With tungsten light source▲ . . . . . | 100 | 125 | – | μa/lumen |
| With blue light source⊕♦ . | 0.006 | – | – | μa |
| Current Amplification . . . . | – | 320000 | – | |
| Equivalent Anode-Dark-Current Input⊕■ . . . . . | – | $4 \times 10^{-10}$ | – | lumen |
| Equivalent Noise Input★ . . . | – | $1.1 \times 10^{-11}$ | – | lumen |

● Averaged over any interval of 30 seconds maximum.

● For conditions where the light source is a tungsten-filament lamp operated at a color temperature of 2870° K. A light input of 1 microlumen 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 0.001 lumen and 100 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 0.001 lumen. The load resistor has a value of 0.01 megohm, and 100 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.

⊕ 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 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 at color temperature 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.

## SPECIAL PERFORMANCE DATA

### 4-Hour Stability Life Performance:

This test is performed on each 7029. Before this test is made, the tube is kept in total darkness for 24 hours. Under conditions with supply volts E = 1000, tube temperature of 25° C, and light flux adjusted to give an



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anode current = 10 microamperes within 1 minute after turning on light source, the tube is operated for 4 hours. At the end of this period the anode current will not increase by more than 1 microampere nor decrease by more than 1.5 microamperes.

## OPERATING CONSIDERATIONS

The *operating stability* of the 7029 is dependent on the magnitude of the anode current and its duration. When the 7029 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 7029 usually recovers a substantial percentage of such loss in sensitivity.

The use of an average anode current well below the maximum rated value of 20 microamperes is recommended when stability of operation is important. When greater stability is required, the anode current should not exceed 10 microamperes.

*Electrostatic and/or magnetic shielding* of the 7029 may be necessary. It is to be noted that the use of an external magnetic and/or electrostatic shield at high negative potential presents a safety hazard unless the shield is connected through a high impedance in the order of 10 megohms to the potential. If the shield is not so connected, *extreme care should be observed in providing adequate safeguards to prevent personnel from coming in contact with the high potential of the shield.*

**SPECTRAL-SENSITIVITY CHARACTERISTIC**
**of Phototube having S-17 Response**
**is shown at the front of this Section**



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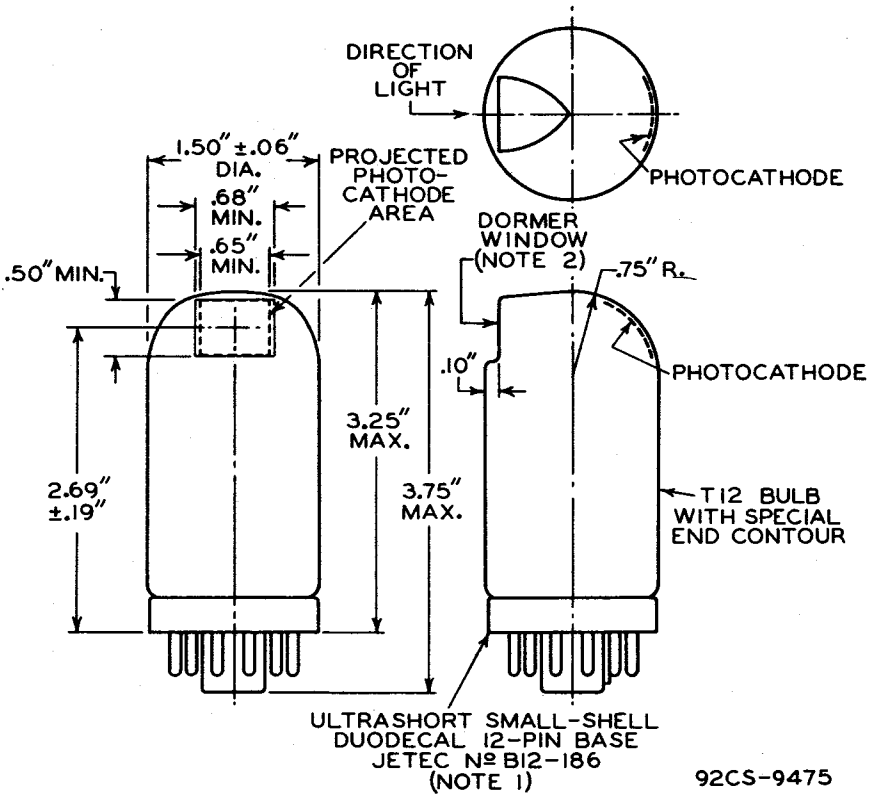


**NOTE 1:** ℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF BOTTOM OF THE BASE.

**NOTE 2:** DORMER WINDOW IS ON OPPOSITE SIDE OF TUBE FROM BASE KEY.

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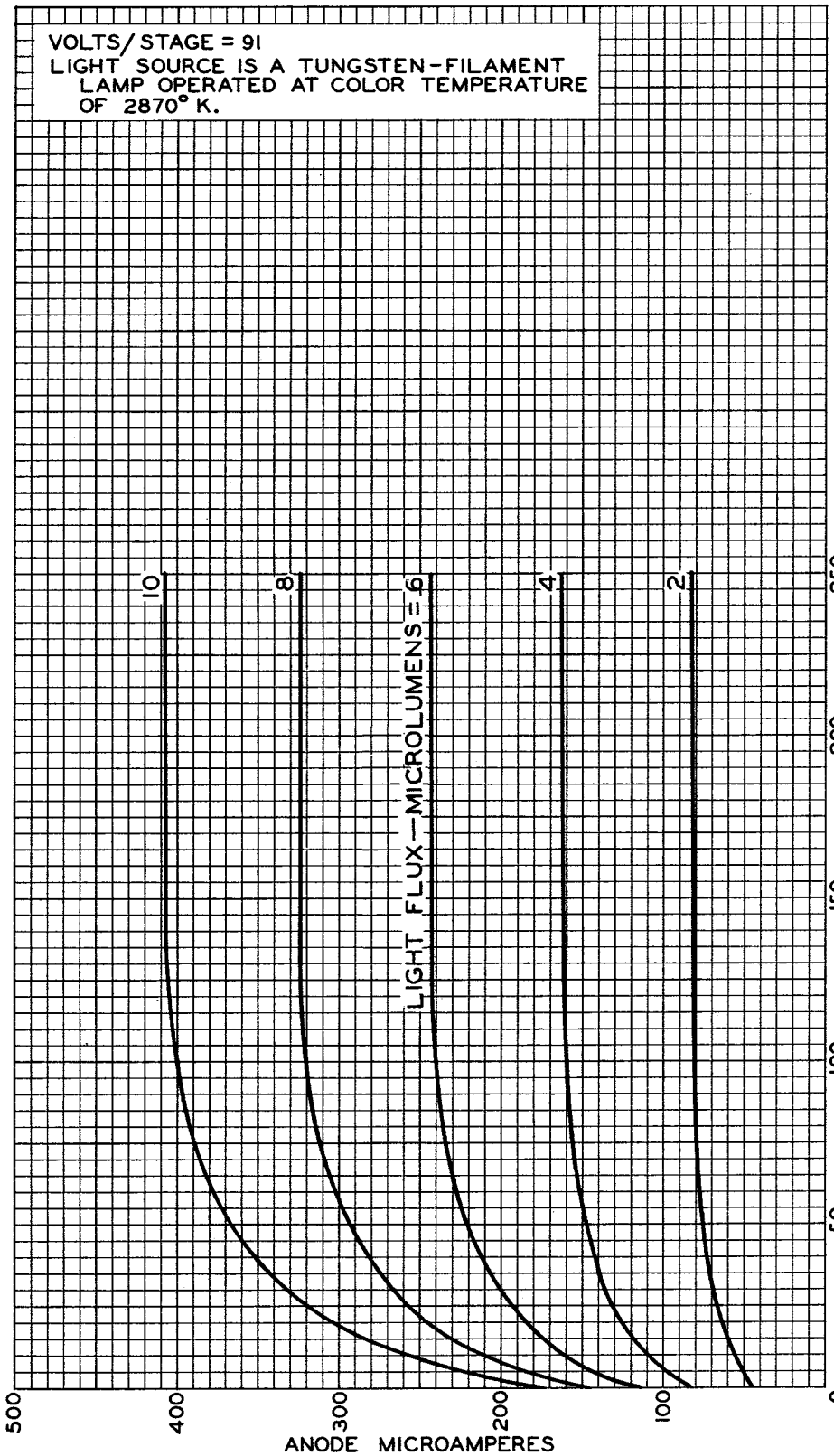
# AVERAGE ANODE CHARACTERISTICS

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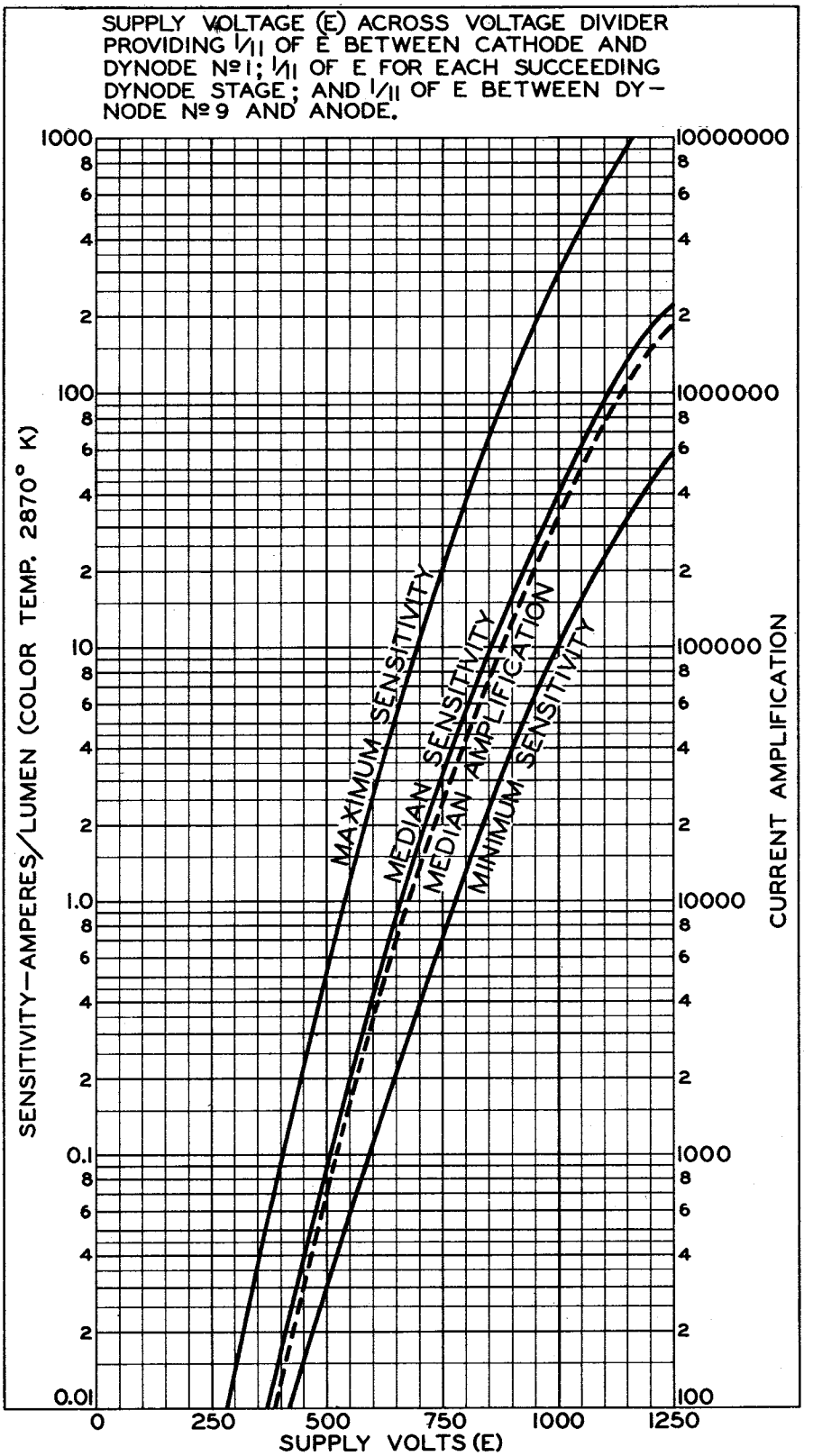
## CHARACTERISTICS



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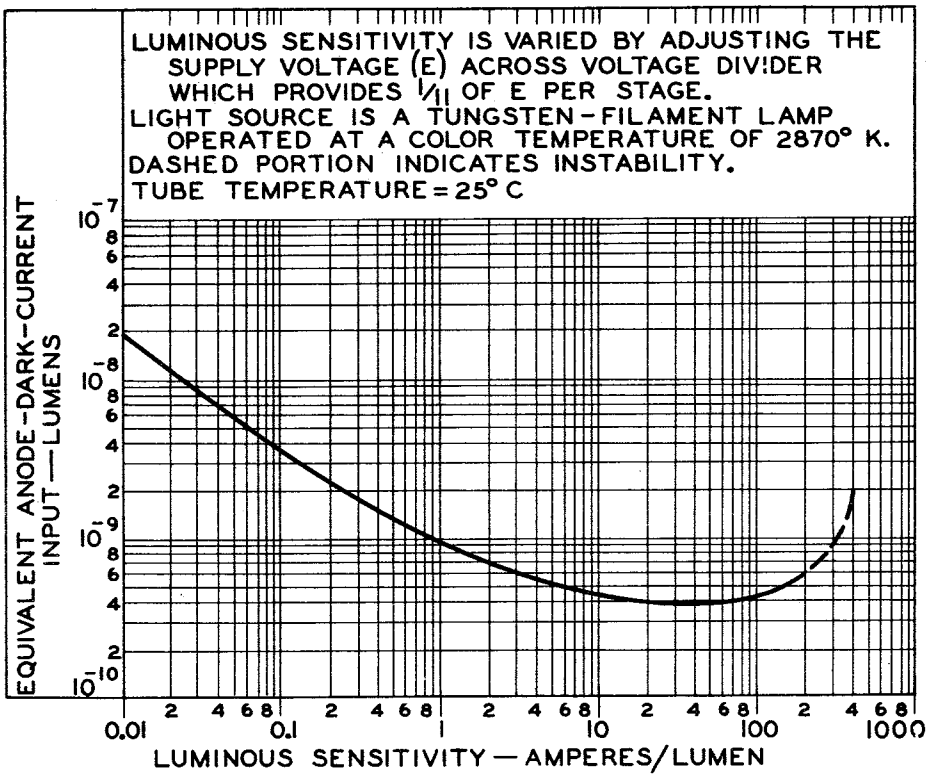
## TYPICAL ANODE-DARK-CURRENT CHARACTERISTIC

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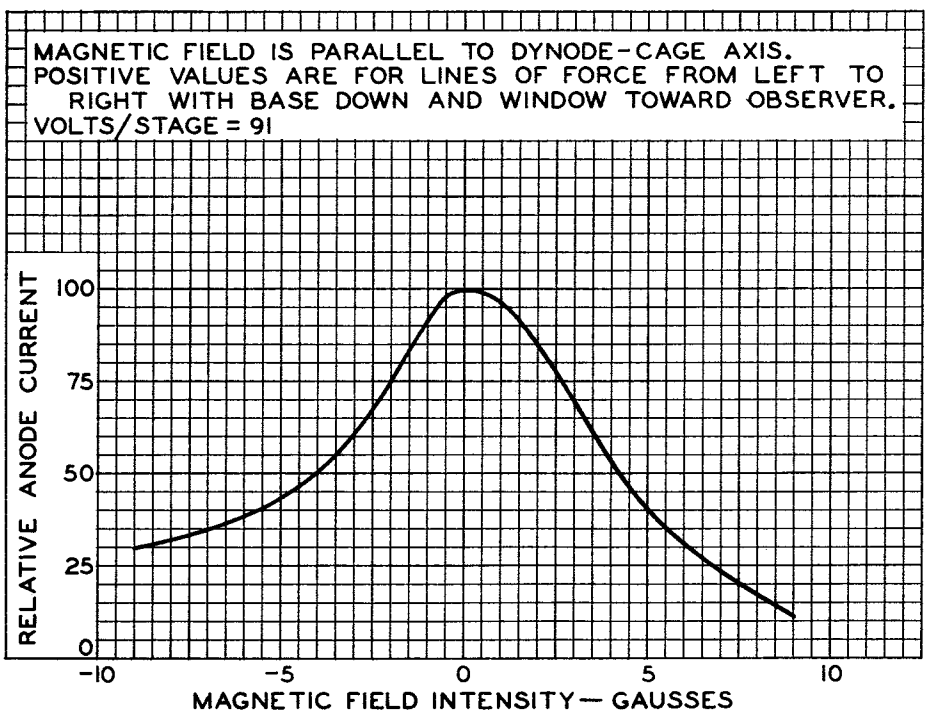
## EFFECT OF MAGNETIC FIELD ON ANODE CURRENT

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