from JETEC release #2280,
Sept. 22, 1958

RCA®

6342-A
MULTIPLIER PHOTOTUBE
1.68" Dia. Curved Circular Semi-transparent Photocathode
10-Stage, Head-On Type, Flat Faceplate S-11 Response
High-Current Dynodes TENTATIVE DATA

RCA-6342-A is a head-on type of multiplier phototube intended for use in scintillation counters for the detection and measurement of nuclear radiation, and in other applications involving low-level light sources.

Design features of the 6342-A include dynodes with stable high-current capability, a focusing electrode with external connection for shaping the field which directs photoelectrons from the photocathode onto the first dynode, and a semi-transparent photocathode on the curved inner surface of the face end of the bulb.

The focusing electrode permits optimizing the magnitude, uniformity, or speed of the response in critical applications.

The curved photocathode surface of the 6342-A assures very good collection by dynode No.1 of electrons from all parts of the useful photocathode area to give a typical pulse-height resolution of about 8 per cent. The curved surface together with the electrode configuration employed in the 6342-A minimizes variation in electron-transit time between the photocathode and dynode No.1.

The spectral response of the 6342-A covers the range from about 3000 to 6500 angstroms, as shown in Fig.2. Maximum response occurs at approximately 4400 angstroms. The 6342-A, therefore, has high sensitivity to blue-rich light and negligible sensitivity to red radiation.

DATA

General:
Spectral Response: ............................ 5-11
Wavelength of Maximum Response: 4400 & 500 angstroms
Cathode, Semi-transparent:
Shape: ...................................... Curved Circular Window:
Area: .................................. 2.2 sq. in.
Minimum diameter: ................. 1.66 inch
Index of Refraction: ................... 1.51
Direct Inter-electrode Capacitance (approx.):
Anode to dynode No.10: ........... 2,2 μF
Anode to all other electrodes: ...... 7.6 μF
Maximum Overall Length: ........... 5.81"
Sealed Length: ......................... 0.19"
Maximum Diameter: ................. 2.31"
Bulb: .................................. T-16
Base: .................................... Medium-Shell Diheptal 14-Pin (JETEC Group 5, No. 814-56), Non-hygroscopic
Operating Position: ................. Any
Weight (Approx.): .................... 5.2 oz

Maximum Ratings, Absolute Values:
SUPPLY VOLTAGE BETWEEN ANODE AND CATHODE (DC or Peak AC): ........ 1500 max. volts
SUPPLY VOLTAGE BETWEEN ANODE AND DYNODE No.10 (DC or Peak AC): .... 250 max. volts
DYNODE No.1 SUPPLY VOLTAGE (DC or Peak AC): .............. 400 max. volts
FOCUSING ELECTRODE SUPPLY VOLTAGE (DC or Peak AC): ........ 400 max. volts
AVERAGE ANODE CURRENT: ........ 2 max. ma
AMBIENT TEMPERATURE: ............. 75 max. ℃

Characteristics Range Values for Equipment Design:
Under conditions with DC supply voltage (E) across a voltage divider providing 1/2 of E between dynode No.1 and cathode: 1/12 of E for each succeeding dynode stage; and 1/12 of E between anode and dynode No.10.

With E = 1250 volts (except as noted) and Focusing-Electrode Voltage Adjusted to Give Maximum Anode Current

<table>
<thead>
<tr>
<th>Min.</th>
<th>Medium</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radiant, at 4400 angstroms</td>
<td>11000</td>
<td>μF/μW</td>
</tr>
<tr>
<td>Cathode Radiant, at 4400 angstroms</td>
<td>0.044</td>
<td>μF/μW</td>
</tr>
<tr>
<td>Luminous:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>At 0 cps</td>
<td>14</td>
<td>100</td>
</tr>
<tr>
<td>With dynode No.10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>as output electrode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cathode Luminous:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With tungsten light source</td>
<td>50</td>
<td>80</td>
</tr>
<tr>
<td>With blue light source</td>
<td>0.05</td>
<td></td>
</tr>
</tbody>
</table>

Trademark(s) ® Registered
Marca(s) Registrada(s)

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

Printed in U.S.A.
Luminous Sensitivity. The quotient of output current by incident luminous flux, at constant electrode voltages.

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

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 the stated manner produces an rms output current equal to the rms noise current within a specified bandwidth.

Pulse Rise Time. The time required for the instantaneous amplitude of the pulse to go from 10 per cent to 90 per cent of the peak value.

Fig. 1 - Schematic Arrangement of Type 6342-A Structure.

OPERATING CONSIDERATIONS

The maximum ratings in the tabulated data are established in accordance with the following definition of the Absolute-Maximum Rating System for rating electron devices.

Absolute-Maximum ratings are limiting values of operating and environmental conditions applicable to any electron device of a specified type as defined by its published data, and should not be exceeded under the worst probable conditions.

The device manufacturer chooses these values to provide acceptable serviceability of the device, taking no responsibility for equipment variations, environmental variations, and the effects of changes in operating conditions due to variations in device characteristics.

The equipment manufacturer should design so that initially and throughout life no absolute-maximum value for the intended service is exceeded by any device under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in device characteristics.

The use of an average anode current well below the maximum rated value of 2 milliamperes is recommended when stability of operation is important.
Electrostatic and/or magnetic shielding of the 6342-A may be necessary. When a shield is used it should be connected to a potential near that of the cathode.

The high voltages at which the 6342-A is operated are very dangerous. Before any part of the circuit is touched, the power-supply switch should be turned off and both terminals of any capacitors grounded.

**Fig. 2 - Spectral Sensitivity Characteristic of Type 6342-A which has S-11 Response. Curve is shown for Equal Values of Radiant Power at All Wavelengths.**

**Fig. 3 - Characteristics of Type 6342-A.**

Devices and arrangements shown or described herein may use patents of RCA or others. Information contained herein is furnished without responsibility by RCA for its use and without prejudice to RCA's patent rights.
Fig. 4 - Average Anode Characteristics of Type 6342-A.

Luminous sensitivity is varied by adjustment of the supply voltage (E) across voltage divider which provides $\frac{1}{2}$ of E between cathode and dynode N8; $\frac{1}{2}$ of E for each succeeding stage, and $\frac{1}{2}$ of E between dynode N9 and anode. Focusing-electrode voltage adjusted to give maximum anode current. Light source is a tungsten-filament lamp operated at a color temperature of 2970° K. Dashed portion indicates instability. Tube temperature: 23° C.

Fig. 5 - Typical Anode-Dark-Current Characteristic of Type 6342-A.