RCA-5769 is a television camera tube recommended for outdoor pickup use but it is also suitable for studio use and other applications where the illumination is not excessively low. The 5769 is very stable in performance at all incident light levels on the object ranging from bright sunlight (several thousand foot-candles) to a deep shadow (one foot-candle or less). Commercially acceptable pictures can be obtained at light levels greater than about 50 foot-candles.

The 5769, like the RCA-5655, utilizes a photocathode characterized by a spectral response having high blue sensitivity, good green sensitivity, useful red sensitivity, and practically no infrared sensitivity. This latter characteristic of the response prevents any color-masking by infrared, and thus permits portrayal of colors in more nearly their true gradation. For the most satisfactory portrayal of colors, it is recommended that the lighting be provided by 3500 or 4500 white fluorescent lamps supplemented by tungsten illumination to provide the red.

Because of its spectral characteristics, its wide light-range capability, and its high sensitivity, the 5769 can be substituted to advantage for the RCA-2P23 in any application where the intensity of illumination is not excessively low. In the studio, the 5769 can be substituted for RCA-5655 to gain somewhat more freedom in set lighting by taking advantage of the greater light-range capability of the 5769, but with some sacrifice in performance because of the lower signal-to-noise ratio of the 5769.

In applications where the high sensitivity of the 5769 is not essential, as in the case of film pickup, the use of a less sensitive type of camera tube, such as RCA-1850-A iconoscope, is suggested.

The relatively small size of the 5769 lends itself to use in comparatively light-weight, portable television cameras, and facilitates the use of a telephoto lens with such cameras.

**PRINCIPLES OF OPERATION**

The 5769 has three sections—an image section, a scanning section, and a multiplier section, as shown in Fig. 1.

**Image Section**

The image section contains an asemi-transparent photocathode on the inside of the face plate, a grid to provide an electrostatic accelerating field, and a target which consists of a thin glass disc with a fine mesh screen very closely spaced to it on the photocathode side. Focusing is accomplished by means of a magnetic field produced by an external coil, and by varying the photocathode voltage.

Light from the scene being televised is picked up by an optical lens system and focused on the photocathode which emits electrons from each illuminated area in proportion to the intensity of the light striking the area. The streams of electrons are focused on the target by the magnetic and accelerating fields.

On striking the target, the electrons cause secondary electrons to be emitted by the glass. The secondaries thus emitted are collected by the adjacent mesh screen which is held at a definite potential of about two volts with respect to target voltage cutoff. Therefore, the potential of the glass disc is limited for all values of light and stable operation is achieved. Emission of the secondaries leaves on the photocathode side of the glass a pattern of positive charges which corresponds with the pattern of light from the scene being televised. Because of the thinness of the glass, the charges set up a similar potential pattern on the opposite or scanned side of the glass.

**Scanning Section**

The opposite side of the glass is scanned by a low-velocity electron beam produced by the electron gun in the scanning section. This gun contains a thermionic cathode, a control grid (grid No. 1), and an accelerating grid (grid No. 2). The beam is focused at the target by the magnetic field of an external focusing coil and the electrostatic field of grid No. 4.
Grid No. 5 serves to adjust the shape of the decelerating field between grid No. 4 and the target in order to obtain uniform landing of electrons over the entire target area. The electrons stop their forward motion at the surface of the glass and are turned back and focused into a five-stage signal multiplier, except when they approach the positively charged portions of the pattern on the glass. When this condition occurs, they are deposited from the scanning beam to quantities sufficient to neutralize the potential pattern on the glass. Such deposition leaves the glass with a negative charge on the scanned side and a positive charge on the photocathode side. These charges will neutralize each other by conductivity through the glass in less than the time of one frame.

Alignment of the beam from the gun is accomplished by a transverse magnetic field produced by an external coil located at the gun end of the focusing coil.

Deflection of the beam is accomplished by transverse magnetic fields produced by external deflecting coils.

The electrons turned back at the target form the return beam which has been amplitude modulated by absorption of electrons at the target in accord with the charge pattern whose more positive areas correspond to the highlights of the televised scene.

Multiplier Section

The return beam is directed to the first dynode of a five-stage electrostatically focused multiplier. This utilizes the phenomenon of secondary emission to amplify signals composed of electron beams. The electrons in the beam impinging on the first dynode surface produce many other electrons, the number depending on the energy of the impinging electrons. These secondary electrons are then directed to the second dynode and knock out more new electrons. Grid No. 3 facilitates a more complete collection by dynode No. 2 of the secondaries from dynode No. 1. The multiplying process is repeated in each successive stage, with an ever-increasing stream of electrons until those emitted from dynode No. 5 are collected by the anode and constitute the current utilized in the output circuit.

The multiplier section amplifies the modulated beam about 500 times. The multiplication so obtained increases the signal-to-noise ratio of the tube and also permits the use of an amplifier with fewer stages. The gain of the multiplier is sufficiently high so that the limiting noise in the use of the tube is the random noise of the electron beam multiplied by the multiplier stages. This noise is larger than the input noise of the video amplifier.

It can be seen that when the beam moves from a less positive portion on the target to a more positive portion, the signal output voltage across the load resistor (R20 in Fig. 2) changes in the positive direction. Hence, for highlights in the scene, the grid of the first video-amplifier stage swingings in a positive direction.

DATA

<table>
<thead>
<tr>
<th>General:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heater, for unipotential cathode:</td>
</tr>
<tr>
<td>Voltage (AC or DC)</td>
</tr>
<tr>
<td>Current</td>
</tr>
<tr>
<td>Direct interelectrode capacitance:</td>
</tr>
<tr>
<td>Anode to All Other Electrodes</td>
</tr>
<tr>
<td>Photocathode Spectral Response</td>
</tr>
<tr>
<td>Image Size (x: y: aspect ratio)</td>
</tr>
<tr>
<td>Focusing Method</td>
</tr>
<tr>
<td>Deflection Method</td>
</tr>
<tr>
<td>Overall Length</td>
</tr>
<tr>
<td>Greatest Diameter of Bulb</td>
</tr>
<tr>
<td>Shoulder Base</td>
</tr>
<tr>
<td>Keyed Jumbo Annullar 7-Pin End Base</td>
</tr>
<tr>
<td>Small-Shelf Dihedral 14-Pin Mounting Position</td>
</tr>
<tr>
<td>Minimum Deflecting-Coil inside Diameter</td>
</tr>
<tr>
<td>Deflecting-Coil Length</td>
</tr>
<tr>
<td>Focusing-Coil Length</td>
</tr>
<tr>
<td>Alignment-Coil Length</td>
</tr>
<tr>
<td>Photocathode Distance Inside End of Focusing Coil</td>
</tr>
</tbody>
</table>

Maximum Ratings, Absolute Values:

| PHOTOCATHODE VOLTAGE | -550 max. volts |
| PHOTOCATHODE ILLUMINATED AREA | 50 max. ft-c |
| OPERATING TEMPERATURE OF ANY PART OF BULB | 65 max. °C |
| OPERATING TEMPERATURE OF BULB AT LARGE END OF TUBE (TARGET SECTION) | 35 min. °C |
The 5769 has three complementary guides for inserting the tube correctly in the annular socket, i.e., the large pin (No. 7) on the annular base, the white radial line on face of bulb, and a white longitudinal line on neck. Designers of equipment should position the annular socket so that pin No. 7 of the annular base, and the white radial line when viewed from the face end of the tube, will be at the bottom of the face after the tube has been correctly inserted in the annular socket. The 5769 is installed by inserting the diheptal-base end of the tube through the coil assembly and then turning the tube until the annular-base pins, keyed by pin No. 7, can be inserted in the annular socket. Proper insertion aligns the white radial line on the face with center of the slot in the annular socket, and makes the longitudinal line on the neck visible through the sight hole in the deflecting-coil assembly. The annular-base pins are then pushed into their socket, and the diheptal socket is put on the 14-pin base.

The operating position of the 5769 should preferably be such that any loose particles in the neck of the tube will not fall down and strike or become lodged on the target. Therefore, it is recommended that the tube never be operated in a vertical position with the diheptal-base end up nor in any other position where the axis of the tube with base up makes an angle of less than 20° with the vertical through the center of the base.

The operating temperature of any part of the glass bulb should never exceed 65°C, and no part of the bulb at the large end of the tube (target section) should ever fall below 35°C during operation. It is recommended that the temperature of the entire bulb be held between 35° and 60°C. Operation at too low a temperature will be characterized by the appearance of a "sticking picture" of opposite polarity from the original when the picture is moved. Operation at too high a temperature will cause loss of resolution. No part of the bulb should run more than 5° hotter than the target section to prevent cesium migration to the target. Such migration will result in loss of resolution and in probable permanent damage to the tube. Like other photosensitive devices employing cesium, the 5769 may show fluctuations in performance from time to time. Strict observance of the above recommendations with respect to operating temperature will not completely eliminate these variations but will greatly improve the stability of the characteristics during the life of the tube.

When the equipment design or operating conditions are such that the maximum temperature rating or maximum temperature difference as given under Maximum Ratings will be exceeded, provision should be made to direct a stream of cooling air from the diheptal-base end of the tube along the entire length of the bulb surface, i.e., through the space between the bulb surface and the surrounding deflecting coil and its extension.

**TEMPERATURE DIFFERENCE:**
- Between target section and any part of bulb hotter than target section: 0°C
- Grid-No. 6 VOLTAGE: -550 max. volts
- Grid-No. 5 VOLTAGE: 0 max. volts
- Grid-No. 4 VOLTAGE: -300 to -400 volts
- Grid-No. 3 VOLTAGE: 0 max. volts
- Grid-No. 2 & Dynode-No. 1 VOLTAGE: -350 max. volts
- Grid-No. 1 VOLTAGE: 0 max. volts

**NEGATIVE BIAS VOLTAGES:**
- Positive bias voltage: 0 max. volts
- Negative bias voltage: 0 max. volts

**PEAK HEATER-CATHODE VOLTAGE:**
- Heater negative with respect to cathode: 125 max. volts
- Heater positive with respect to cathode: 10 max. volts

**VOLTAGE PER MULTIPLIER STAGE:**
- 1650 max. volts
- 350 max. volts

**Typical Operation and Characteristics:**

**Photocathode Voltage (Image Focus):**
- Grid-No. 6 Voltage (Accelerator): -300 to -500 volts
- Grid-No. 5 Voltage (Decelerator): 0 to 100 volts
- Grid-No. 4 Voltage (Beam Focus): 160 to 220 volts
- Grid-No. 1 Voltage (Form): 225 to 350 volts
- Dynode-No. 2 Voltage: 225 to 350 volts
- Dynode-No. 3 Voltage: 225 to 350 volts
- Dynode-No. 4 Voltage: 225 to 350 volts
- Andode Voltage: 225 to 350 volts
- Anode Current: 225 to 350 volts

**Target Temperature Range (See text):**
- Highlight Illumination on Photocathode: 35°C to 60°C
- Ratio of Peak-to-Peak Highlight Video-Signal Current to RMS Noise Current (Approx.):
  - Minimum Peak-to-Peak Blanking Voltage: 50 volts
  - Field Strength at Center of Focusing Coil: 75 gauss
  - Deflecting-Coil Current (Approx.):
    - for coil listed below: 75 max.
    - for assembly listed below: 75 max.
  - Horizontal (Peak to peak): 750 max.
  - Vertical (Peak to peak): 750 max.

**Components:**

- Deflecting-Coil Assembly (Includes)
  - Keyed Jumbo Annular 7-Pin Socket: RCA Type No. 201075
  - Focusing-Coil Assembly: RCA Type No. 202075
  - Alignment-Coil Assembly: RCA Type No. 204075
  - Horizon/Deflection Output Transformer: RCA Type No. 2047
  - Vertical Deflection Output Transformer: RCA Type No. 20472

**Components:**

- Ratio of dynode voltages is shown under Typical Operation.
- Adjustable from -3 to +5 volts with blanking voltage off.
- Taps at 0, 30, 60, and 90 volts are recommended. Set at voltages giving most uniform resolution and signal output over entire picture area.
- Adjust to give the most uniformly shaded picture near maximum signal.

**INSTALLATION:**

The end-base pins of the 5769 fit the diheptal 14-pin socket; the annular-base pins fit the keyed jumbo annular 7-pin socket which is part of the deflecting-coil assembly having RCA type No. 201075.
Fig. 2 - Voltage Dividers for Type 5769 with Connections for: Alignment Coil, RCA Type No. 204B75, and Focusing Coil, RCA Type No. 202B75.
Any attempt to effect cooling of the tube by circulating even a large amount of air around the focusing coil will do little good, but a small amount of air directly in contact with the bulb surface will effectively drop the bulb temperature. For this purpose, a small blower is satisfactory, but it should run at low speed to prevent vibration of the 5769 and the associated amplifier equipment. Unless vibration is prevented, distortion of the picture may occur.

To keep the operating temperature of the large end of the tube from falling below 35°C, some form of controlled heating should be employed. Ordinarily, adequate heat will be supplied by the focusing coil, deflecting coils, and associated amplifier tubes so that the temperature can be controlled by the amount of cooling air directed along the bulb surface. If, in special cases, a target heater is required, it should be shunt between the focusing coil and the bulb near the shoulder of the tube. Such a target heater is included in the RCA Deflecting-Coil Assembly.

The lens system used with the 5769 should be designed according to basic optical principles and should incorporate an iris to control the amount of light entering the television camera lens. Because of the relatively small face diameter of the 5769, the use of a telephoto lens is facilitated. The lens holder should have all inside surfaces finished in matte black to prevent internal reflections from reaching the photocathode.

For the high dc voltages required by the 5769, the use of two pulse supplies for which the plate voltage is provided by a well-regulated, 330-volt, B-supply may be used. Each of these supplies should be actuated by the horizontal driving pulse which is obtained from the synchronizing generator. One of the pulse supplies should be capable of furnishing 1500 volts with an output current of 1 milliamperere for the multiplier section; the other pulse supply should be capable of furnishing 500 volts with an output current of 1 milliampere for the image section. In addition to supplying the plate voltage and current for the pulse supplies, the 330-volt B-supply should also provide an output current of 90 milliamperes for the focusing and alignment coils and for the voltage divider which is used to supply the voltages for the electrodes in the scanning section of the 5769.

Voltage dividers to provide the required operating voltages for the various electrodes of the 5769 are shown in Fig. 2. It is to be noted that the blocking capacitor C6 should be of mineral-oil impregnated type to minimize capacitor leakage which will introduce disturbing effects into the picture.

In designing a voltage divider for the multiplier stages of the 5769, engineers should recognize that the dc output of individual 5769's may have a range of 10 to 1. This range, therefore, must be considered in the choice of bleeder-resistor values. If the values are too high, the distribution of voltages applied to the dynodes will be upset by a 5769 with a dc output at the upper end of the range. As a result, there will be an abrupt drop in the ac output of the tube as the beam current is increased. When this drop occurs before the beam is at its optimum value, the ratio of signal to noise will be lessened.

A horizontal deflection circuit for use with the 5769 is shown in Fig. 3; and a vertical deflection circuit in Fig. 4.

The video amplifier should be designed to cover a range of ac signal voltages corresponding to signal-output currents of 3 to 30 microamperes in the load resistor (R30 in Fig. 2).

**APPLICATION**

Resolution of better than 400 lines at the center of the picture can be produced by the 5769 when the photocathode high illumination from an RMA Standard Test Chart is above the knee of each of the curves in Fig. 5. To utilize such resolution capability in the horizontal direction with the standard scanning rate of 525 lines, it

---

**LEGEND FOR FIG. 2**

<table>
<thead>
<tr>
<th>R11: 82000 ohms, 1/2 watt</th>
<th>R14: 100000-ohm potentiometer, 1 watt</th>
</tr>
</thead>
<tbody>
<tr>
<td>R16: 150000 ohms, 1/2 watt</td>
<td>R17: 10000-ohm potentiometer, 1 watt</td>
</tr>
<tr>
<td>R18: 56000 ohms, 1/2 watt</td>
<td>R19: R20: 200000 ohms, 1/2 watt</td>
</tr>
<tr>
<td>R21: 250000-ohm potentiometer, 1 watt</td>
<td></td>
</tr>
<tr>
<td>R22: 250000-ohm potentiometer, 1 watt</td>
<td></td>
</tr>
<tr>
<td>R23: 180000 ohms, 1/2 watt</td>
<td>R24: 300000 ohms, 1/2 watt</td>
</tr>
<tr>
<td>R25: 350000 ohms, 1/2 watt</td>
<td>R26: 500000 ohms, 1/2 watt</td>
</tr>
<tr>
<td>R27: 600000 ohms, 1/2 watt</td>
<td>R28: 1000000 ohms, 1/2 watt</td>
</tr>
<tr>
<td>R29: 250000 ohms, 1/2 watt</td>
<td>R30: 2000000 ohms, 1/2 watt</td>
</tr>
<tr>
<td>R31: R32: 100000 ohms, 1/2 watt</td>
<td></td>
</tr>
<tr>
<td>R33: 50 ohms, 10 watts</td>
<td>R34: 50 ohms, 10 watts</td>
</tr>
<tr>
<td>R35: 500 ohms, 1/2 watt</td>
<td>R36: 500 ohms, 1/2 watt</td>
</tr>
<tr>
<td>R37: 500 ohms, 1/2 watt</td>
<td>R38: 100000 ohms, 1/2 watt</td>
</tr>
</tbody>
</table>
is necessary to use a video amplifier having a bandwidth of at least 5.5 megacycles. The maximum resolution obtainable is limited by the mesh-screen portion of the target.

Even with a wide-band amplifier, the resolution may be limited by "cross talk" caused by the scanning fields. Unless prevented by proper shielding from extending into the image section, if equipment space will not accommodate the full seven layers of shielding as described above, fewer layers can be used, but will be less effective in minimizing "cross talk".

The sequence of adjustments in operating the 5769 is as follows: After the tube has been inserted in its socket and the voltages applied as indicated under Typical Operation, allow it

C1: 0.01 µf
C2: 150 µµf
C3 C8: 0.01 µf
C6: 6.02 µf
C7 C9: 100 µf
C9: Balancing Capacitor. 10 to 40 µµf
L9: Horizontal Deflecting Coils:
Type No. 20177. L9 has inductance of 5.5 mh and dc resistance of 19 ohms.
R1: 1 Megohm
R2: Sawtooth Amplitude and Linearity Control, 250000 ohms
R3: 250000 ohms
R5: 100 ohms, 2 watts
R6: 100 ohms
R7: 3000 ohms, 2 watts
R8: 10000 ohms, 2 watts, Value should be such that screen output of the 6G6-5 will not be exceeded.
R9: Peaking Amplitude and Linearity Control, 50000 ohms
R10: 50000 ohms, 1 watt
R11: Linearity Control, 250000 ohms
R12: Linearity Control, 1000000 ohms
R13: Linearity Control, 50000 ohms, 5 watts
R14: Centering Control, 10 ohms tapped at 5 ohms
T: Horizontal Deflection Output Transformer, RCA Type No. 20171, DC resistance of used portion of secondary is 3.4 ohms

Fig. 3 - Horizontal Deflection Circuit for Type 5769.

to warm up for 1/2 to 1 hour with the camera lens iris closed. Make certain that the deflection circuits are functioning properly to cause the electron beam to scan the target. Adjust the deflection circuits so that the beam will "over-scan" the target, i.e., so that the area of the target scanned is greater than its sensitive area. This procedure during the warming-up period is recommended to prevent burning on the target a raster slower than that used for on-the-air operation. Note that over-scaning the target results in a smaller than normal picture on the monitor. Then open the iris partially and focus the scene to be televised on the photocathode. Next, adjust the grid-No. I voltage until a picture or noise appears on the monitor screen. If there is no picture, rotate the alignment coil until the picture appears and then adjust the current through the alignment coil until the maximum picture response is obtained. Correct alignment is obtained when the picture does not rotate as the beam-focus control (grid No. 4) is varied. During alignment of the beam, and during operation of the tube, always keep the beam current as low as possible to give the best picture quality. Next, adjust grid-No. I voltage and the
target voltage for the best picture. Then, bring the picture into focus by varying the voltage on grid No. 4 and on the photocathode. Next, vary the voltage on grid No. 3 to give the most uniformly shaded picture at approximately maximum signal. Final adjustment is made by varying the voltages on grids No. 5 and No. 6. In general, these need little adjustment and are varied only and its multiplied output flows through the load resistance.

Shading may be required even with optimum adjustment of voltage on grid No. 3 in order to obtain a uniformly shaded picture. A shading signal having a sawtooth shape, a frequency equal to the horizontal scanning frequency, and an amplitude about twice that of the useful video

after completing the other adjustments. When camera is used for rehearsal, the scanning may be restored nearly to normal size. Complete restoration should be made just prior to air-time.

The target voltage will depend on the type of scene to be televised. If the scene has a large range of illumination (such as that for a baseball game on a sunny day), the target should be operated at about 1.5 to 2 volts above cutoff so that highlights will not bloom. For scenes with a lower range of illumination (such as that for a boxing match under artificial lighting), the target can be operated at about 2 to 3 volts above cutoff with resultant gain in signal-to-noise ratio, and improved detail in the shadows.

A blanking signal should be supplied to the target to prevent the electron beam from striking the target during the return portions of the horizontal and vertical deflecting cycles. Unless this is done, the camera-tube return lines will appear in the received picture.

The blanking signal is a series of negative voltage pulses. The voltage between pulses must be constant to prevent fluctuation of the target voltage. During the blanking periods, the full beam current without video-signal modulation is returned to the multiplier signal, is recommended. Provision should be made for controlling the amplitude of the shading signal and for reversing its polarity. The signal may be introduced into the video channel after the preamplifier in the camera but ahead of the master gain control. With this arrangement, changing the gain-control setting does not change the ratio of the shading-signal amplitude to the video-signal amplitude.

The illumination on the photocathode is related to the scene illumination by the formula

\[ I_s = \frac{4f^2 I_{pc} (m+1)^2}{TR} \]

where

- \( I_s \) = scene illumination in foot-candies
- \( f \) = f-number of lens
- \( I_{pc} \) = photocathode illumination in foot-candies
- \( m \) = linear magnification from scene to target
- \( T \) = total transmission of lens
- \( R \) = reflectance of principal subject in scene.

Except for very close shots, the linear magnification \( m \) from scene to target may be neglected.

For example, assume that the lens is f:3.5 having a transmission \( T \) of 75%, that the photocathode illumination from a tungsten source is 0.15 foot-candle, and that the scene to be tele-
vised is composed largely of whites and blacks (such as a test chart) where the reflectance \( R \) may be in the order of 50%. Then,

\[
I_s = \frac{4 \times 3.5^2 \times 0.15}{0.75 \times 0.50} = 20 \text{ ft-c approx.}
\]

In practice, and under the assumed conditions of the preceding example, it will be found that the required minimum illumination on the scene will be in the range from 10 to 30 foot-candles.

For average scenes where the principal subject has a reflectance of 5 to 10%, the incident illumination should have a value of 50 to 100 foot-candles.

It is good practice before attempting to transmit an individual scene to check its incident illumination with an illumination-measuring device, such as an exposure meter. It is recommended that the average incident light level be greater than approximately 50 foot-candles for a good picture. If white fluorescent or daylight illumination is used, the incident light level may be as low as 25 foot-candles.

**Typical signal output** of the 5769 as a function of the highlight illumination on the photocathode under conditions where the televised scene has balanced blacks and whites for each of three types of illumination is shown by the curves in Fig. 5.

For the most natural appearance of televised subjects, it is recommended that the 5769 be operated so that the highlights on the photocathode bring the signal output slightly over the knee of the curve for the particular type of illumination utilized. Operation further along on the straight part of the curve will give pictures in which the subject has an over-emphasized outline. The position of the knee will shift for individual tubes. With white fluorescent light or daylight, the knee may occur at values of highlight illumination on the photocathode ranging from about 0.05 to 0.1 foot-candle; with tungsten light, the knee may occur in the range from about 0.1 to 0.2 foot-candle.

When colors are televised, the most satisfactory gradation in black and white will be obtained when white fluorescent illumination is augmented by tungsten floodlights. The exact proportion of tungsten to fluorescent illumination will vary with desired results and can best be determined by trial.

The spectral response of the 5769 is not subject to appreciable variation from tube to tube. The spectral response is shown by the curve in Fig. 6.

Retention of a scene by the 5769, sometimes called a "sticking picture," may be experienced if the 5769 is allowed to remain focused on a bright scene for an hour or more, or if it is focused on a bright scene before reaching operating temperature in the range from 35° to 60°. Often the retained image will disappear in a few seconds, but sometimes it may persist for long periods before it completely disappears. A retained image can generally be removed by focusing the 5769 on a clear white screen, and allowing the 5769 to operate for several hours with an illumination of about 1 foot-candle on the photocathode.

To avoid retention of a scene, it is recommended that the 5769 always be allowed to warm up in the camera for 1/2 to 1 hour with the lens iris closed, and that the 5769 never be allowed to remain focused on a stationary bright scene for an hour or more. If a target heater is used, the warm-up time can be reduced to approximately 10 or 15 minutes.
Failure of scanning even for only a few minutes when light is incident on the photocathode, may permanently damage the surface of the target. The damaged area shows up as a spot or line in the picture during subsequent operation.

To avoid damaging the 5769 during scanning failure, provision should be made to prevent automatically the scanning beam from reaching the target. The scanning beam can be prevented from reaching the target by (1) cutting off the scanning beam, or (2) making the target sufficiently negative. The scanning beam can be cut off by a relay which applies -115 to -125 volts bias to grid No. 1. The target can be made sufficiently negative by a relay which applies a bias of at least -10 volts to it. Either relay is actuated by a tube which is controlled by a portion of the scanning pulse voltage developed across either the horizontal or the vertical deflecting coils, or both. It is important to insure that the horizontal scanning pulse and the vertical scanning pulse should each independently actuate the relay in case either one fails.

Rotation in the use of 5769's is recommended. After a 5769 is operated for 200 to 300 hours, it should be given an idle period of 3 or 4 weeks during which it generally will recover much of its original resolution and sensitivity. Spare tubes should be placed in service for several hours at least once a month in order to keep them free from any traces of gas which may be liberated within them during prolonged storage.

Fig. 6 - Spectral Sensitivity Characteristic of Type 5769.
DIMENSIONAL OUTLINE

NOTE 1: MEASURED AT DISTANCE OF 1/32" BELOW BOTTOM OF ANNULAR BASE.

NOTE 2: DOTTED AREA IS FLAT OR EXTENDS TOWARD DINEPTAL-BASE END OF TUBE BY 0.060" MAX.

KEYED ANNULAR BASE GAUGE

ANGULAR VARIATIONS BETWEEN PINS AS WELL AS ECCENTRICITY OF NECK CYLINDER WITH RESPECT TO PHOTOCATHODE CYLINDER ARE HELD TO TOLERANCES SUCH THAT PINS AND NECK CYLINDER WILL FIT FLAT-PLATE GAUGE WITH:

a. SIX HOLES HAVING DIAMETER OF 0.065" ± 0.001" AND ONE HOLE HAVING DIAMETER OF 0.150" ± 0.001". ALL HOLES HAVE DEPTH OF 0.265" ± 0.001". THE SIX 0.065" HOLES ARE ENLARGED BY 45° TAPER TO DEPTH OF 0.047".

b. SIX STOPS HAVING HEIGHT OF 0.187" ± 0.001", CENTERED BETWEEN PIN HOLES, TO BEAR AGAINST FLAT AREAS OF BASE.

c. RIM EXTENDING OUT A MINIMUM OF 1/8" FROM 2-13/16" DIAMETER AND HAVING HEIGHT OF 0.126" ± 0.001".

d. NECK-CYLINDER CLEARANCE HOLE HAVING DIAMETER OF 2.200" ± 0.001".

ANGLES OF 51°26' ± 5' ON CIRCLE DIAMETER OF 2.500" ± 0.001".

6 PINS 0.040" ± 0.002" DIA.

38.5" ± 0.10" DIA.

O93" ± 0.003" DIA.
SMALL-SHELL DIHEPTAL 14-PIN BASE

PIN 1: HEATER
PIN 2: GRID No. 4
PIN 3: GRID No. 3
PIN 4: INTERNAL CONNECTION - DO NOT USE
PIN 5: DYNO DE No. 2
PIN 6: DYNO DE No. 4
PIN 7: ANODE
PIN 8: DYNO DE No. 5
PIN 9: DYNO DE No. 3
PIN 10: DYNO DE No. 1,
PIN 11: INTERNAL CONNECTION - DO NOT USE
PIN 12: GRID No. 1
PIN 13: CATHODE
PIN 14: HEATER

KEYED JUMBO ANNULAR 7-PIN BASE

PIN 1: GRID No. 6
PIN 2: PHOTOCATHODE
PIN 3: INTERNAL CONNECTION - DO NOT USE
PIN 4: INTERNAL CONNECTION - DO NOT USE
PIN 5: GRID No. 5
PIN 6: TARGET
PIN 7: INTERNAL CONNECTION - DO NOT USE