The GL-5820 is a television camera tube for outdoor and studio pickup use in which exceptionally high sensitivity is combined with a spectral response approaching that of the eye. It is very stable in performance at all incident light levels on the object ranging from bright sunlight to a deep shadow (several thousand foot-candies to one foot-candle or less). Commercially acceptable pictures can be obtained at incident light levels greater than about 10 foot-candies.

The GL-5820 has a photocathode characterized by a spectral response with high blue and high green sensitivity, very good yellow sensitivity, and good red sensitivity. It has practically no infrared sensitivity. This particular characteristic of the response permits portrayal of colors in nearly their true tonal gradation since it prevents any color-masking by infrared.

**TECHNICAL INFORMATION**

**GENERAL**

**Electrical**

- Cathode—Unipotential
- Heater Voltage, AC or DC ................................................................. .63 ± 10% Volts
- Heater Current .................................................................................. 0.6 Amperes
- Photocathode—Semi-transparent
  - Response—See spectral sensitivity curve on page 3 for details.
  - Rectangular Image, 4 by 3 aspect ratio
  - Useful Size, maximum diagonal .................................................... 1.8 Inches
  - Orientation—Proper orientation is obtained when the vertical scan is essentially parallel to the plane passing through the center of the faceplate and pin No. 7 of the shoulder base.

- Focusing Method—Magnetic
- Deflecting Method—Magnetic
- Direct Interelectrode Capacitance
  - Anode to All Other Electrodes ..................................................... 12 μf

**GENERAL ELECTRIC**

(Supersedes pages 1, 2, 5 and 6 dated 12-56 and 9-57)
TECHNICAL INFORMATION (CONT'D)

Mechanical

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over-all Length</td>
<td>15.20&quot; ± 0.25&quot;</td>
</tr>
<tr>
<td>Greatest Diameter of Bulb</td>
<td>3.00&quot; ± 0.06&quot;</td>
</tr>
<tr>
<td>Minimum Deflecting Coil Inside Diameter</td>
<td>23(\frac{5}{6})&quot;</td>
</tr>
<tr>
<td>Deflecting Coil Length</td>
<td>.5&quot;</td>
</tr>
<tr>
<td>Focusing Coil Length</td>
<td>10&quot;</td>
</tr>
<tr>
<td>Alignment Coil Length</td>
<td>(\frac{1}{4})&quot;</td>
</tr>
<tr>
<td>Photocathode Distance Inside End of Focusing Coil</td>
<td>(\frac{3}{2})&quot;</td>
</tr>
<tr>
<td>Weight, approximate</td>
<td>1.4 lbs</td>
</tr>
<tr>
<td>Operating Position—Any, except with diheptal base up and the tube axis at an angle of less than 20 degrees from vertical.</td>
<td></td>
</tr>
</tbody>
</table>

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

Maximum Ratings, Absolute Values

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photocathode Voltage</td>
<td>-550 Max Volts</td>
</tr>
<tr>
<td>Photocathode Illumination</td>
<td>50 Max Foot-Candles</td>
</tr>
<tr>
<td>Anode Supply Voltage*</td>
<td>1350 Max Volts</td>
</tr>
<tr>
<td>Grid-No. 1 Voltage</td>
<td></td>
</tr>
<tr>
<td>Negative Bias Value</td>
<td>.125 Max Volts</td>
</tr>
<tr>
<td>Positive Bias Value</td>
<td>0 Max Volts</td>
</tr>
<tr>
<td>Grid-No. 2 and Dynode-No. 1 Voltage</td>
<td>350 Max Volts</td>
</tr>
<tr>
<td>Grid-No. 3 Voltage</td>
<td>400 Max Volts</td>
</tr>
<tr>
<td>Grid-No. 4 Voltage</td>
<td>300 Max Volts</td>
</tr>
<tr>
<td>Grid-No. 5 Voltage</td>
<td>150 Max Volts</td>
</tr>
<tr>
<td>Grid-No. 6 Voltage</td>
<td>-550 Max Volts</td>
</tr>
<tr>
<td>Voltage Per Multiplier Stage</td>
<td>350 Max Volts</td>
</tr>
<tr>
<td>Target Voltage</td>
<td></td>
</tr>
<tr>
<td>Positive Value</td>
<td>10 Max Volts</td>
</tr>
<tr>
<td>Negative Value</td>
<td>10 Max Volts</td>
</tr>
<tr>
<td>Peak Heater-Cathode Voltage</td>
<td></td>
</tr>
<tr>
<td>Heater Negative with Respect to Cathode</td>
<td>125 Max Volts</td>
</tr>
<tr>
<td>Heater Positive with Respect to Cathode</td>
<td>10 Max Volts</td>
</tr>
<tr>
<td>Operating Temperature of Any Part of Bulb</td>
<td>50 Max C</td>
</tr>
<tr>
<td>Operating Temperature of Bulb at Large End of Tube, target section</td>
<td>35 Min C</td>
</tr>
<tr>
<td>Temperature Difference</td>
<td></td>
</tr>
<tr>
<td>Between Target Section and Any Part of Bulb Hotter Than Target Section</td>
<td>5 Max C</td>
</tr>
</tbody>
</table>

Typical Operation

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photocathode Voltage, image focus</td>
<td>-400 to -540 Volts</td>
</tr>
<tr>
<td>Grid-No. 1 Voltage for Picture Cut-off, beam</td>
<td>-45 to -115 Volts</td>
</tr>
<tr>
<td>Grid-No. 2 and Dynode-No. 1 Voltage</td>
<td>300 Volts</td>
</tr>
<tr>
<td>Grid-No. 3 Voltage† multiplier focus</td>
<td>225 to 330 Volts</td>
</tr>
<tr>
<td>Grid-No. 4 Voltage beam focus</td>
<td>140 to 180 Volts</td>
</tr>
<tr>
<td>Grid-No. 5 Voltage decelerator</td>
<td>100 to 125 Volts</td>
</tr>
<tr>
<td>Grid-No. 6 Voltage accelerator</td>
<td>-300 to -405 Volts</td>
</tr>
<tr>
<td>Dynode-No. 2 Voltage</td>
<td>600 Volts</td>
</tr>
<tr>
<td>Dynode-No. 3 Voltage</td>
<td>800 Volts</td>
</tr>
<tr>
<td>Dynode-No. 4 Voltage</td>
<td>1000 Volts</td>
</tr>
<tr>
<td>Dynode-No. 5 Voltage</td>
<td>1200 Volts</td>
</tr>
<tr>
<td>Anode Voltage</td>
<td>1250 Volts</td>
</tr>
<tr>
<td>DC Anode Current</td>
<td>30 Microamperes</td>
</tr>
<tr>
<td>Signal Output Current, peak to peak</td>
<td>3 to 24 Microamperes</td>
</tr>
<tr>
<td>Target Voltage†</td>
<td>-3 to +1 Volts</td>
</tr>
<tr>
<td>Target Cutoff Voltage†</td>
<td>-35 to 45 C</td>
</tr>
<tr>
<td>Ratio of Peak-to-Peak Highlight Video Signal</td>
<td>35</td>
</tr>
<tr>
<td>Current to RMS Noise Current, approximate</td>
<td>5 Volts</td>
</tr>
<tr>
<td>Minimum Peak-to-Peak Blanking Voltage</td>
<td>50 to 75</td>
</tr>
<tr>
<td>Field Strength at Center of Focusing Coil§</td>
<td>75 Gs</td>
</tr>
<tr>
<td>Field Strength of Alignment Coil, approximate</td>
<td>0 to 3 Gs</td>
</tr>
</tbody>
</table>

* Ratio of dynode voltages is shown under Typical Operation.
† Adjust to give the most uniformly shaded picture near maximum signal.
‡ Adjustable from -3 to +5 volts with blanking voltage off. Normal setting of target voltage is +2 volts from target cutoff.
§ Direction of current should be such that a north-seeking pole is attracted to the image end of the focusing coil, with the indicator located outside of and at the image end of the focusing coil.

@Denotes a change.
□Denotes an addition.
SPECTRAL SENSITIVITY CHARACTERISTIC
FOR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS
DASHED CURVE SHOWS SPECTRAL CHARACTERISTIC OF AVERAGE HUMAN EYE

WAVELENGTH IN ANGSTROMS

ULTRA VIOLET  VIOLET  GREEN  ORANGE  INFRARED
BLUE  YELLOW  RED
TYPICAL SIGNAL OUTPUT
SCENE; BLACK AND WHITE BALANCED
TUNGSTEN, DAYLIGHT, OR WHITE FLUORESCENT LIGHT

TYPICAL SIGNAL OUTPUT IN MICROAMPERES

HIGHLIGHT ILLUMINATION ON PHOTOCATHODE IN FOOT-CANDLES

10 14-55
TEMPERATURE EFFECT ON AMPLITUDE RESPONSE

TELEVISION LINE NUMBER = 300

AMPLITUDE RESPONSE CHARACTERISTICS
TEST PATTERN: SQUARE WAVE
OPERATING TEMPERATURE OF BULB ADJACENT TO TARGET = 35 C
RESPONSE MEASURED IN SYSTEM HAVING 10 MC BANDWIDTH

<table>
<thead>
<tr>
<th>CURVE</th>
<th>HIGHLIGHTS IN RELATION TO LIGHT TRANSFER CHARACTERISTIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>AT KNEE</td>
</tr>
<tr>
<td>B</td>
<td>ONE LEN S STOP ABOVE KNEE</td>
</tr>
</tbody>
</table>

TELEVISION LINE NUMBER
DETAIL OF BOTTOM VIEW OF JUMBO ANNULAR BASE

NOTE 1: DOTTED AREA IS FLAT OR EXTENDS TOWARD DIHEPTAL-BASE END OF TUBE BY 0.060" MAX.

ANNULAR BASE GAGE

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 GAGE WITH:

a. SIX HOLES HAVING DIAMETER OF 0.065"±0.001" AND ONE HOLE HAVING DIA. 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". ALL HOLES ARE SPACED AT ANGLES OF 51°25'±5' ON CIRCLE DIAMETER OF 2.500"±0.001"

b. SEVEN 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 0.125" FROM 2.812" DIAMETER AND HAVING HEIGHT OF 0.126"±0.001".

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

DIRECTION OF LIGHT: PERPENDICULAR TO LARGE END OF TUBE

WHITE INDEX LINE ON FACE

N-15118AZ—Outline Revised
IMAGE ORTHICON

The GL-5820 is a television camera tube for outdoor and studio pickup use in which exceptionally high sensitivity is combined with a spectral response approaching that of the eye. It is very stable in performance at all incident light levels on the object ranging from bright sunlight to a deep shadow (several thousand foot-candles to one foot-candle or less). Commercially acceptable pictures can be obtained at incident light levels greater than about 10 foot-candles.

The GL-5820 has a photocathode characterized by a spectral response with high blue and high green sensitivity, very good yellow sensitivity, and good red sensitivity. It has practically no infrared sensitivity. This particular characteristic of the response permits portrayal of colors in nearly their true tonal gradation since it prevents any color-masking by infrared.

TECHNICAL INFORMATION

GENERAL

Electrical

Cathode—Unipotential
Heater Voltage, AC or DC ........................................... 6.3 ± 10% Volts
Heater Current ................................................................. 0.6 Amperes
Photocathode—Semi-transparent
  Response—See curve K-69087-72A333 on page 3 for details.
  Rectangular Image, 4 by 3 aspect ratio
  Useful Size, maximum diagonal ................................ 1.6 Inches
Focusing Method—Magnetic
Deflecting Method—Magnetic
Direct Interelectrode Capacitance
  Anode to All Other Electrodes ................................ 12 µF
**TECHNICAL INFORMATION (CONT'D)**

**Mechanical**
- Over-all Length: \(15 \frac{1}{16} \pm \frac{1}{4}\) Inches
- Greatest Diameter of Bulb: \(3 = \frac{1}{16}\) Inches
- Minimum Deflecting Coil Inside Diameter: \(2\frac{3}{8}\) Inches
- Deflecting Coil Length: 5 Inches
- Focusing Coil Length: .10 Inches
- Alignment Coil Length: \(1\frac{1}{2}\) Inches
- Photocathode Distance Inside End of Focusing Coil: \(\frac{1}{2}\) Inches
- Weight, approximate: 1.4 Pounds

**MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS**

**Maximum Ratings, Absolute Values**
- Photocathode Voltage: \(-550\) Max Volts
- Photocathode Illumination: \(50\) Max Foot-Candles
- Anode Supply Voltage*: 1350 Max Volts
- Grid-No. 1 Voltage
  - Negative Bias Value: \(-125\) Max Volts
  - Positive Bias Value: \(0\) Max Volts
- Grid-No. 2 and Dynode-No. 1 Voltage: \(350\) Max Volts
- Grid-No. 3 Voltage: \(400\) Max Volts
- Grid-No. 4 Voltage: \(300\) Max Volts
- Grid-No. 5 Voltage: \(150\) Max Volts
- Voltage Per Multiplier Stage: \(350\) Max Volts
- Target Voltage
  - Positive Value: \(10\) Max Volts
  - Negative Value: \(10\) Max Volts
- Peak Heater-Cathode Voltage
  - Heater Negative with Respect to Cathode: \(125\) Max Volts
  - Heater Positive with Respect to Cathode: \(10\) Max Volts
- Operating Temperature of Any Part of Bulb: \(50\) Max C
- Operating Temperature of Bulb at Large End of Tube (Target Section): \(35\) Min C
- Temperature Difference
  - Between Target Section and Any Part of Bulb Hotter Than Target Section: \(5\) Max C

**Typical Operation**
- Photocathode Voltage (Image Focus): \(-300\) to \(-500\) Volts
- Grid-No. 1 Voltage for Picture Cut-off: \(-45\) to \(-115\) Volts
- Grid-No. 2 and Dynode-No. 1 Voltage: \(300\) Volts
- Grid-No. 3 Voltage†: \(0.225\) to \(0.330\) Volts
- Grid-No. 4 Voltage (Beam Focus): \(0.160\) to \(0.220\) Volts
- Grid-No. 5 Voltage (Decelerator): \(0\) to \(125\) Volts
- Grid-No. 6 Voltage (Accelerator)
  - 75% of Photocathode Voltage: \(-225\) to \(-375\) Volts
- Dynode-No. 2 Voltage: \(600\) Volts
- Dynode-No. 3 Voltage: \(800\) Volts
- Dynode-No. 4 Voltage: \(1000\) Volts
- Dynode-No. 5 Voltage: \(1200\) Volts
- Anode Voltage: \(1250\) Volts
- DC Anode Current: \(30\) Microamperes
- Target Voltage‡: \(0\) to \(3\) Volts
- Target Temperature Range: \(35\) to \(45\) C
- Ratio of Peak-to-Peak Highlight Video Signal
  - Current to RMS Noise Current, approximate: \(35\)
  - Minimum Peak-to-Peak Blanking Voltage: \(5\) Volts
  - Field Strength at Center of Focusing Coil§: \(75\) Gausses
  - Field Strength of Alignment Coil, approximate: \(0\) to \(3\) Gausses

* Ratio of dynode voltages is shown under Typical Operation.
† Adjust to give the most uniformly shaded picture near maximum signal.
‡ Adjustable from \(-3\) to \(+5\) volts with blanking voltage off.
§ Direction of current should be such that a north-seeking pole is attracted to the image end of the focusing coil, with the indicator located outside of and at the image end of the focusing coil.
TYPICAL SIGNAL OUTPUT
SCENE: BLACK AND WHITE BALANCED
TUNGSTEN, DAYLIGHT, OR WHITE FLUORESCENT LIGHT

HIGHLIGHT ILLUMINATION ON PHOTOCATHODE IN FOOT-CANDLES

SPECTRAL SENSITIVITY CHARACTERISTIC
FOR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS
(DASHED CURVE SHOWS) SPECTRAL CHARACTERISTIC OF AVERAGE HUMAN EYE

RELATIVE RADIANT ENERGY
WAVELENGTH IN ANGSTROMS
NOTE 1: DOTTED AREA IS FLAT OR EXTENDS TOWARD DIHEPTAL-BASE END OF TUBE BY 0.060° MAX.

ANNULAR BASE GAGE

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 GAGE WITH:

a. SIX HOLES HAVING DIAMETER OF 0.0625±0.001" AND ONE HOLE HAVING DIAM. OF 0.050±0.001" ALL HOLES HAVE DEPTH OF 0.060±0.002" THE SIX 0.0625" HOLES ARE ENLARGED BY 45° TAPER TO DEPTH OF 0.047" ALL HOLES ARE SPACED AT ANGLES OF 51° 26' 20" CIRCLE DIAMETER OF 2.000±0.015".

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

c. PIN EXTENDING OUT A MINIMUM OF 1/8" FROM 2-13/16" DIAMETER AND HAVING HEIGHT OF 0.186±0.001".

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

DIRECTION OF LIGHT:
PERPENDICULAR TO LARGE END OF TUBE

WHITE INDEX LINE ON FACE
BASING DIAGRAM

SMALL-SHELL DIHEPTAL 14-PIN BASE

PIN 1: HEATER  PIN 6: DYNODE NO. 4  PIN 11: INTERNAL CONNECTION-DON'T USE
PIN 2: GRID NO. 4  PIN 7: ANODE  PIN 12: GRID NO.1
PIN 3: GRID NO. 3  PIN 8: DYNODE NO. 5  PIN 13: CATHODE
PIN 4: INTERNAL CONNECTION-DON'T USE  PIN 9: DYNODE NO. 3  PIN 14: HEATER
PIN 5: DYNODE NO. 2  PIN 10: DYNODE NO.1, GRID NO. 2

KEYED JUMBO ANNULAR 7-PIN BASE

PIN 1: GRID NO. 6  PIN 5: GRID NO. 5
PIN 2: PHOTOCATHODE  PIN 6: TARGET
PIN 3: INTERNAL CONNECTION-DON'T USE  PIN 7: INTERNAL CONNECTION-DON'T USE
PIN 4: INTERNAL CONNECTION-DON'T USE
TEMPERATURE EFFECT ON AMPLITUDE RESPONSE

TELEVISION LINE NUMBER = 300

BULB TEMPERATURE ADJACENT TO TARGET IN °C

AMPLITUDE RESPONSE CHARACTERISTICS

TEST PATTERN: SQUARE WAVE

OPERATING TEMPERATURE OF BULB ADJACENT TO TARGET = 35 °C
RESPONSE MEASURED IN SYSTEM HAVING 10 MC BANDWIDTH

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<tr>
<td>B</td>
<td>ONE LENS STOP ABOVE KNEE</td>
</tr>
</tbody>
</table>

Supersedes pages 5 and 6 dated 12-56.
ANNULAR BASE GAGE

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 GAGE WITH:

a. SIX HOLES HAVING DIAMETER OF 0.065±0.001" AND ONE HOLE HAVING DIA. 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" ALL HOLES ARE SPACED AT ANGLES OF 51°26' ±5' ON CIRCLE DIAMETER OF 2.500±0.001"

b. SIX STOP 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".

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SMALL-SHELL DINEPTAL 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: DYNODE NO. 5
PIN 6: DYNODE NO. 4
PIN 7: ANODE
PIN 8: DYNODE NO. 5
PIN 9: DYNODE NO. 3
PIN 10: DYNODE NO. 1
PIN 11: INTERNAL CONNECTION—DO NOT USE
PIN 12: GRID NO. 1
PIN 13: CATHODE
PIN 14: HEATER
PIN 15: DYNODE NO. 2

KEYED JUMBO ANNULAR 7-PIN BASE

PIN 1: GRID NO. 5
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