4804/H Series

SIT Camera Tubes

16-Millimeter Fiber-Optic Types

- **Improved Blooming Characteristic**
- **Improved Output Sensitivity**
- **Improved Discharge Capability**
- **Tightened Blemish Selection**
- **Improved Resolution**
- **Improved Dynamic Range (Gain Ratio)**

The RCA 4804/H Series types are sturdy, compact, 16-millimeter Silicon-Intensifier Target (SIT) camera tubes designed for use in very-low light level TV systems.

All tubes in the 4804/H Series employ the silicon diode array target known for its low lag and its ability to exhibit low blooming when exposed to bright light sources and intense specular reflections within a scene.

The 4804/H Series consists of two premium grades (4804B/H/P-, 4804A/H/P-) and a surveillance grade (4804/H/P-).

The suffix P- indicates a specific potting configuration used on the image section of the tube. These potting variants are described in the outline drawing section of this bulletin. Other than for the potting, the tubes in each grade are mechanically identical. The major electrical differences between grades are the performance values for such characteristics as maximum voltage rating [which reflects in current gain capability, gain ratio (dynamic range) and tube sensitivity], picture blemishes, and photocathode responsivity.

The improved dynamic range of the 4804/H Series is obtained by increasing the peak target current rating and by improving the beam discharge capability with greater beam reserve. As a result, the "comet tail" and blooming is minimized when viewing specular highlights without any sacrifice in picture quality or life.

The sturdy, compact structure of the 4804/H Series lends itself to operation in applications involving environments of vibration and shock. A ruggedized version of the P2 potting configuration, when assembled with the rugged RCA AJ2216 deflection/focus component, can be mounted to operate through the aircraft vibration schedule of Mil-Std-810 (11.9 g rms random, etc.) with little mechanical amplification and an acceptable level of spurious microphonic signal generation.

These tubes operate at light levels near the photoelectron noise limit. Operation at the photoelectron noise limit is possible by coupling a single image tube. Coupled assemblies, such as the RCA 4849/H Series (ISIT), are available to meet the needs of most systems.

Non-potted variants are also available on request. For greater safety, ease of use, and life expectancy, the potted variants are strongly recommended.

General Data

The majority of these data apply to all tube types in the 4804/H Series. Where exceptions exist, the data are labeled appropriately.

Heater Voltage (AC or DC):		
Operational	6.5	V
For standby with no other electrode voltages applied	3.0	V
Heater Current at 6.5 V	0.1	A
Capacitance (Approx.)		
Target to all other electrodes:		
P1 and P4 versions	10	pF
P2 and P5 versions	12	pF
Photocathode to all other electrodes	75	pF
Focus/gate to all other electrodes:		
P5 only	60	pF
Unpotted tube	12	pF

For further information or application assistance on these devices, contact your RCA Sales Representative or write Camera Tube Marketing, RCA, Lancaster, PA 17604.

Information furnished by RCA is believed to be accurate and reliable. However, no responsibility is assumed by RCA for its use; nor for any infringements of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of RCA.

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

Printed in U.S.A./12-81
Supersedes 9-77 **4804/H Series**

General Data (Cont'd)

Target:

Maximum useful size of rectangular image	12.8 mm x 9.6 mm (0.50 in x 0.38 in)

Image Surface:

Shape	Flat, Circular
Material	Dark-Clad Fiber-Optics
Pitch (nominal center-to-center spacing)	6 μm

Image Section:

Focusing method	Electrostatic

Configuration:

/P5	Triode
All other /P-	Diode-Connected Triode

Internal focus bleeder (P1, P2, and P4 types only), nominal	1 to 2 GΩ

Scanning Section:

Focusing method	Magnetic
Deflection method	Magnetic
Operating Position	Any

Absolute-Maximum Ratings[1,2]

	Limiting Values	
Temperature:		
Operating (See **Figure 6**)	-54 to +60	°C
Storage	-54 to +71	°C
Image Section:		
Photocathode and focus electrode (with respect to anode):		
4804B/H, 4804A/H types	12	-kV
4804/H types	10	-kV
Focus electrode (with respect to photocathode) non-potted and P5	-1500 to 250	V
Anode voltage	Normally operating near ground or thermionic cathode potential	
Exposure[3], point sources (See **Figure 9**)	10^4	fc:s
Illuminance[3], average scenes (See **Figure 9**)	10^{-2}	lm/ft² (fc)
Scanning Section:		
Heater-voltage tolerance (between pins 1 and 8)	± 5	%
Grid-No.4 voltage[4]	VG3 to 500	V
Grid-No.3 voltage[4]	500	V
Grid-No.2 voltage	350	V
Grid-No.2 dissipation	1	W
Grid-No.1 voltage	-150 to 0	V
Heater-cathode voltage	-125 to 10	V
Target voltage (briefly during special cycling)	300	V
Target voltage (during operation)	20	V
Peak target current	850	nA

Typical Operating Values[2]

With tube operated in an RCA AJ2216 assembly, or equivalent, faceplate image size of 12.8 mm x 9.6 mm (0.50 in x 0.38 in), and standard CCIR "M", or EIA, TV scanning rate (525 lines, interlaced 2:1, frame time 1/30 second), and in a non-pulsed mode.

Temperature	28	°C
Image Section:		
Photocathode voltage, E_{pc} (with respect to anode)[5]	4.5	-kV
Focusing-grid voltage (with respect to anode)[6]	Adjusted For Best Focus	
Anode voltage	Zero	
Scanning Section:		
Heater, for unipotential cathode:		
Current (ac or dc)	0.1	A
Nominal voltage for current of 0.1 ampere[7]	6.5	V
Grid-No.4 (decelerator) voltage[4]	500	V
Grid-No.3 (beam focus electrode) voltage[4]	325	V
Grid-No.2 (accelerator) voltage	300	V
Grid-No.1 (beam) voltage (approx.)[8]	-40	V
Peak-to-peak blanking voltage:		
When applied to grid No.1	-75	
When applied to cathode	20	V
Target current, for scene highlights	300	nA
Target voltage	9	V
Focusing-coil current (approx.)[9]	110	mA
Peak-to-peak deflection coil current:		
Horizontal	360	mA
Vertical	270	mA
Field strength of each adjustable alignment coil	0 to 4×10^{-4}	T[10]

Performance Data

Under conditions shown under Typical Operating Values

	Min.	Typ.	Max	
Grid-No.1 Voltage for Picture Cutoff	-120	-80	-	V
Photocathode Luminous Responsivity:				
4804B/H, 4804A/H types	130	160	-	μA/lm
4804/H types	90	160	-	μA/lm
Lag-Percent of Initial Signal Output Current 1/20 Second After Illumination is Removed:[11] (See **Figure 4**)	-	7	10	%
Dark Current (See **Figures 5 and 6**)	-	7	15	nA
Contrast Transfer (Amplitude Response) to a 400 TV Line Square-Wave Test Pattern at Center of Picture, (See **Figure 7**):	30	34	-	%
Resolution, (See **Figure 8**)	-	700	-	TV Lines
Current Gain, at Rated Epc (See **Figure 10**):				
4804B/H, 4804A/H types	1600	2100	-	
4804/H types	1200	1600	-	
Gain Ratio for Photocathode Voltage Swing from Rated Epc to -2.5 kV (See **Figure 10**):				
4804B/H, 4804A/H types	600	950	-	
4804/H types	450	700	-	

	Min.	Typ.	Max.	
Sensitivity (At Rated Epc):				
4804B/H, 4804A/H types	325	450	-	μA/fc
4804/H types	200	350	-	μA/fc
Geometric Distortion[12]	-	2	3	%
Blooming[13] (See **Figure 11**) ...	-	4	6	
Signal Nonuniformity[14]	-	20	-	%

1 In accordance with the Absolute-Maximum rating system as defined by the Electronic Industries Association Standard RS-239A, formulated by the JEDEC Electron Tube Council.

2 Voltages, unless otherwise indicated, are taken with respect to thermionic cathode.

3 High incident light levels on the photocathode resulting in excessive photocathode current may, over a period of time, result in shortened tube life due to either target damage from photoelectrons or photocathode damage from ion bombardment. Therefore, overexposure for long time periods should be prevented whenever possible. For applications covering wide illumination ranges, suitable combinations of lens stops, light filters and photocathode voltage should be chosen to provide close to typical signal currents. **Figure 9** shows the safe operating range of exposure based upon illumination and time and shows the relationship of photocathode voltage to the safe operating range.

4 Grid-No.4 voltage must always be greater than grid-No.3 voltage. The recommended ratio of grid-No.3 to grid-No.4 voltage is 65/100 (applies to the tube in the RCA-AJ2216). Other magnetic configurations may dictate different ratios. The optimum ratio is that ratio providing the most uniform center-to-edge highlight discharge.

5 A synchronous high-voltage power supply with 0.1% ripple, such as the RCA PF1040 is satisfactory for supplying the photocathode voltage. To obtain satisfactory performance from an assynchronous high-voltage power supply the ripple should be less, 0.01%.

6 As the photocathode voltage is varied (for gain control), the focus voltage will remain at a fixed percentage of the photocathode voltage. This value will range from zero to 2% of the photocathode voltage and may be supplied with a fixed bleeder-divider between photocathode and anode.

7 Heater voltage should be controlled between 6.4 and 6.6 volts to prevent thermionic emission fluctuations which could degrade tube performance and shorten tube life. This precaution is particularly important in applications requiring unattended operation for long periods of time.

8 Operating grid-No.1 voltage should be adjusted for each tube to provide sufficient discharge beam to handle peak* signals two to three times normal highlights. This adjustment will minimize blooming and "comet tail" effects and assure satisfactory operation during long periods of unattended operation, varying input conditions, and environments.

9 The polarity of the focusing coil 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.

10 1T(Tesla) = 10^4 Gauss.

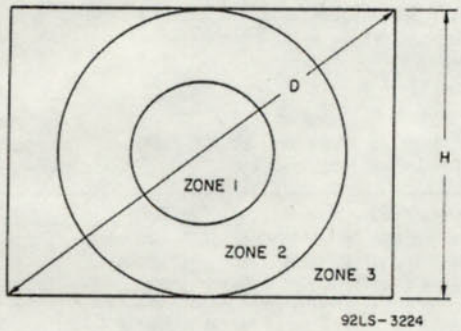
11 For an initial signal output current of 300 nanoamperes, and for a tube with typical dark current.

12 Fiber optic shear distortion is negligible in the 4804B/H types. It may be as great as 2 TV lines in the 4804/H and 4804A/H types.

13 Blooming is the ratio of two spot width measurements (a final to an initial) made at the 50% spot amplitude points on a line-select oscilloscope display. The initial spot width is measured for a spot image having a diameter equal to 1% of the picture diagonal and the light level set to produce 300 nA peak signal. The final spot width is measured for the increased spot diameter when the light level is increased 1000 times and the beam (EG1) is adjusted to saturate the signal at 300 nA peak.

14 Each tube employs a fiber optic faceplate of nonuniform thickness since the electron optical design requires a shaped photocathode. This design results in a characteristic nonuniform signal output, with maximum signal near the center where the faceplate is thinest. It is possible to process the video information electronically to correct most of this nonuniformity with suitable parabolic waveforms.

The deflecting circuits must provide extremely linear scanning for good signal uniformity. Any change in scanning velocity produces a signal uniformity error in proportion to the change in scanning velocity.



D - Active Target Diameter
H - Raster Height (4 x 3 Aspect Ratio)
Zone 1 - Diameter = H/2, Area ≈ 15%
Zone 2 - Diameter = H, Area ≈ 45%
Zone 3 - Peripheral Area ≈ 40%

Figure 1 - Spurious Signal Zones

Spurious Signal Test

This test is performed with the tube carefully focused on a uniformly illuminated test pattern which identifies the zones as pictured in **Figure 1**. The tube is operated in accordance with "Typical Operating Values" with the target operating at 9.0 volts and illuminance is adjusted to provide a highlight reference signal current of 300 nanoamperes. After completion of the setup adjustments, light is excluded and the picture examined to locate and measure bright spots. Thereafter, reference level illuminance is applied and the picture examined for additional spots and other blemishes.

Spots: Spots whose resulting video signal current exceeds the specified value for each test level are acceptable within the size, "polarity" and distribution limits shown in **Table I** for the 4804B/H types, **Table II** for the 4804A/H types, and **Table III** for the 4804/H types. The size of spots (diameter or length plus width divided by two) is measured in terms of the pitch of the raster lines in a 525-line system.

Other Blemishes: Smudges, streaks, mottled or grainy background are acceptable only if their video signal current amplitude does not exceed 30 nA (10% of the reference signal current).

Table I

For 4804B/H Types
Evaluation is made over a 200:1 range of illumination between Epc = -10 kV and Epc = -3 kV

Blemish Size (Equivalent Number of Raster Lines)	Zone 1 Allowed Spots		Zone 2 + 1 Allowed Spots		Zone 3 + 2 + 1 Allowed Spots	
	Wht.	Total	Wht.	Total	Wht.	Total
Over 4	None	None	None	None	None	None
Over 1	None	6	2	15	4	22
1 or less	Note 1					

Spots are recorded at video signal currents in excess of 15 nA (5% of the reference signal current).

Fiber optic block lines are acceptable only if their video signal current amplitude does not exceed 30 nA (10% of the reference signal current).

Table II

For 4804A/H Types
Evaluation is made over a 200:1 range of illumination between Epc = -10 kV and Epc = -3 kV.

Blemish Size (Equivalent Number of Raster Lines)	Zone 1 Allowed Spots		Zone 2 + 1 Allowed Spots		Zone 3 + 2 + 1 Allowed Spots	
	Wht.	Total	Wht.	Total	Wht.	Total
Over 6	None	None	None	None	None	None
Over 4	None	None	None	1	None	2
Over 1	1	6	2	15	4	22
1 or less	Note 1					

Spots are recorded at video signal currents in excess of 30 nA (10% of the reference signal current).

Fiber optic block lines are acceptable only if their video signal current amplitude does not exceed 30 nA (10% of the reference signal current).

Table III

For 4804/H Types
Evaluation is made over a 10:1 range of illumination between rated Epc = -10 kV and typical operating value of Epc = -4.5 kV.

Blemish Size (Equivalent Number of Raster Lines)	Zone 1 Allowed Spots		Zone 2 + 1 Allowed Spots		Zone 3 + 2 + 1 Allowed Spots	
	Wht.	Total	Wht.	Total	Wht.	Total
Over 8	None	None	None	None	None	None
Over 6	None	1	None	1	None	1
Over 4	None	1	None	2	1	3
Over 1	2	6	3	17	4	24
1 or less	Note 1					

Spots are recorded at video signal currents in excess of 30 nA (10% of the reference signal current).

Fiber optic block lines are acceptable only if their video signal current amplitude does not exceed 90 nA (30% of the reference signal current).

Note 1 - Do not count spots of this size unless concentration causes a smudged appearance.

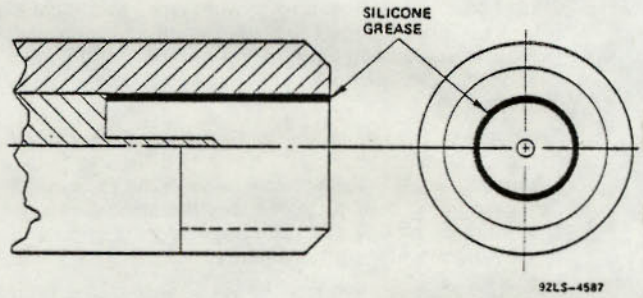
Operating Considerations

Assembling LGH Leads and Receptacles - The potted versions of the 4804/H Series are so designed to withstand environments of altitude and humidity. In such applications the high voltage coupling of the connector to the power supply receptacle may require special attention. For optimum high voltage coupling, the following procedure, supplied by AMP Inc., is recommended:

a Using a clean cloth saturated with toluene, clean the mating end of the "O" ring type or molded end type lead. The surface area to be cleaned should exceed the barrel depth of the mating receptacle.

b Apply a thin coating of Dow Corning High Vacuum Grease (DC-4) to the clean portion of the lead.

c Apply a generous coating of silicone grease to the inside surface of the receptable.



Caution: Too much grease will prevent the lead and receptable from fully mating.

d With a back-and-forth twisting motion, insert the lead into the receptacle until the lead end bottoms. This manner of insertion causes the silicone grease to be forced over the entire circumference of the lead and receptacle.

e With the washers and "O" ring (if applicable) in place, install the cap until the "O" ring or molded shoulder is compressed. This forms a complete seal between the top of the receptacle and lead.

f Remove all excess grease from the mated lead and receptacle with a clean cloth.

Target Voltage

The sensitivity of these tubes is not affected by target voltage. Target voltage provides a collecting potential for cathode current and permits a voltage swing of the scanned side of the target which generates the video signal.

Optimum target voltage is determined by trading off the increase in maximum discharge current and decrease in lag with increased dark current and the intensity of some spots. Beam-landing voltage errors will affect this optimum voltage value. In general, optimum target

voltage is in the range of 8 to 12 V for the recommended yoke assemblies.

In normal operation, the target voltage should not exceed 15 volts because (1) excessive voltage causes excessive dark current with no increase in signal, (2) excessive voltage makes target defects more prominent, and (3) operation at high voltages may result in the deposition of a charge on the dielectric between the diodes causing clipping of signal highlights at normal operating voltage. If such a charge is deposited, it may be removed by brief operation with the target set at +300 volts - see recommended procedure below.

Procedure to remove charge pattern:

1. Use maximum scanning (which results in least image magnification to the picture tube).
2. Set for maximum beam current (Grid No.1 should be -5 to -10 volts).
3. Set target voltage to +300 volts.
4. Cut off beam completely after one or two seconds of operation at the high target voltage.
5. Reset target voltage to normal operating voltage (about 9 volts).
6. Increase beam current to normal target discharge.

The minimum target voltage is that required to allow the beam to satisfactorily discharge the picture highlights. To obtain this operating condition, reduce the target voltage to about 3 or 4 volts until the picture highlights are clipped. If the highlight signal is clipped more in one part of the picture than another, symmetry about the center may be obtained by use of alignment. If, when symmetry is obtained, the picture corners do not have about the same amount of clipping as the center, the ratio of grid No.4 (mesh) voltage to grid No.3 (wall) voltage may be readjusted (while maintaining electron optical focus) to best bring out the corners. The optimum value of this ratio depends on the design of the focus and deflection coils.

At a normal operating target voltage, about 9 volts, neither the features associated with low-voltage operation nor those associated with high-voltage operation are significant.

The anode provides considerable shielding around the target. In normal operation it is grounded at the first video amplifier stage.

Recommended Start-Up Procedure

Upon receipt and after any idle period of ninety (90) days, or more, it is recommended that the tube be operated for one (1) hour, or more, with only heater voltage applied. Following this heater warm-up period, it is further suggested that the tube be operated for an additional one-half (1/2) to one (1) hour with no high voltage (Epc) applied. After tubes have been installed in cameras and the above conditions can not be conveniently applied, it is suggested that the camera be operated for one to eight hours before being placed into service. During this period all light should be excluded from the faceplate. This procedure will minimize possible photocathode damage from excessive ion generation.

Pulsed Operation of the /P5 Configuration

The /P5 suffix indicates a specific potting configuration that does not include an internal image-section focusing voltage-divider network. It has a separate high voltage gating lead internally connected to the focusing electrode for pulsing the image section which makes these devices highly useful in active systems using pulsed illuminators, e.g., laser ranging, and in passive systems operating over a wide dynamic range of light levels.

In pulsed operation, only one value of gate voltage will provide optimum focus for a given photocathode voltage. This optimum value, for an operating photocathode voltage of -8 kV, will be within the range of +180 to zero volts with respect to photocathode. Gating grid cutoff voltage is -900 ± 300 volts. Accordingly, a voltage swing of approximately 1100 volts will be necessary at the dc level of -8 kV from ground to shutter the tube. If the operating photocathode voltage is changed, the voltages required for optimum gate focus and cutoff will change in direct proportion. Under cutoff conditions, the cutoff ratio will be in excess of 10^4:1. Cutoff ratio is defined as the ratio of signal current in the focus mode to signal current in the cutoff mode for the same illuminance level.

Satisfactory tube performance can be obtained with pulse widths as short as one microsecond. Shorter widths may be utilized with power supplies which can accommodate the gating-electrode capacitance with sufficiently fast rise and decay times. Light control applications can operate over a 500:1 range with little danger of over-exposure during cutoff conditions.

Warnings

Failure to observe the maximum dc electrode voltage ratings can drastically reduce the life expectancy of these tubes. When operated within ratings with the recommended deflection-focusing coil assembly, the full performance capabilities of the silicon-diode array target will be easily realized. Normally, a tube life expectancy of thousands of hours of useful service can be obtained when the tube is operated within the specified maximum ratings.

The factory-potted tubes employ a guard electrode in the form of a transparent conductive coating on a cover glass plate which is in contact with the outside surface of the fiber-optic bundle. This guard electrode is operated at photocathode potential. The fiber-optic plate is thus in a field-free region and the cover glass prevents atmospheric particles from accumulating in the focal plane of the optical system. Because of the spacing from the optical plane, due to the cover-glass thickness, any small particles present will be sufficiently out of focus so that they will not be resolved in the resulting picture.

If for some reason it is impossible to use factory-potted tubes and unpotted versions are procured, the system designer must consider the following:

Metal flanges connecting to the photocathode and focus electrode will be operated at voltages (with respect to ground) up to -10 kV. Clearances and connecting structures should be spaced, shaped or coated to provide personnel protection, prevent formation of leakage paths, especially during periods of high relative humidity, and prevent corona. These flanges (and the anode flange) should also be protected from extended exposure to a corrosive atmosphere such as salt air.

The focus electrode operating voltage can be derived from a high impedance voltage divider. External leakage is the only significant load. Note that in the factory-potted tubes, this voltage divider is customarily 10^9 ohms total resistance.

Fiber optic faceplates should not be subjected to high voltage fields between the surfaces. Because the inner surface bears the photocathode which operates 10 kV below ground, the outer surface of the fiber faceplate must be guarded from ground. In a high voltage field, individual fibers in the faceplate will undergo electrical breakdown resulting in a field of scintillations which excite the photocathode. Allowed to continue, this breakdown can lead to catastrophic tube failure due to air leakage.

Warning - Personal Safety Hazards
Electrical Shock - Operating voltages applied to this device present a shock hazard.

Warning
Notice of Warranty Restrictions - RCA highly recommends the purchase of tubes which are completely potted with high voltage protection and connectors. Such assemblies are exceptionally easy to use and offer guaranteed service over a wide range of conditions.

Because the photocathode of this intensifier camera tube operates at a high negative potential, there is a high probability of permanent damage to the device unless adequate corona discharge suppression precautions are employed. Consequently, all warranties are void where evidence of external arcing, corona discharge or high voltage breakdown is present.

RCA designs and manufactures these sophisticated vacuum tube devices to be as durable as is practical. However, because of their nature, the glass-to-metal and ceramic-to-metal seals can be stripped with the application of excessive thermal or mechanical stresses. Care must be exercised, therefore, when making connections to the various electrodes and the target pin. Although the devices are assembled under ultra-clean conditions, there is always some risk of adding blemishes if the tube is handled photocathode end down, as is often necessary in potting operations. Any evidence of thermal or mechanical abuse also must void all warranties.

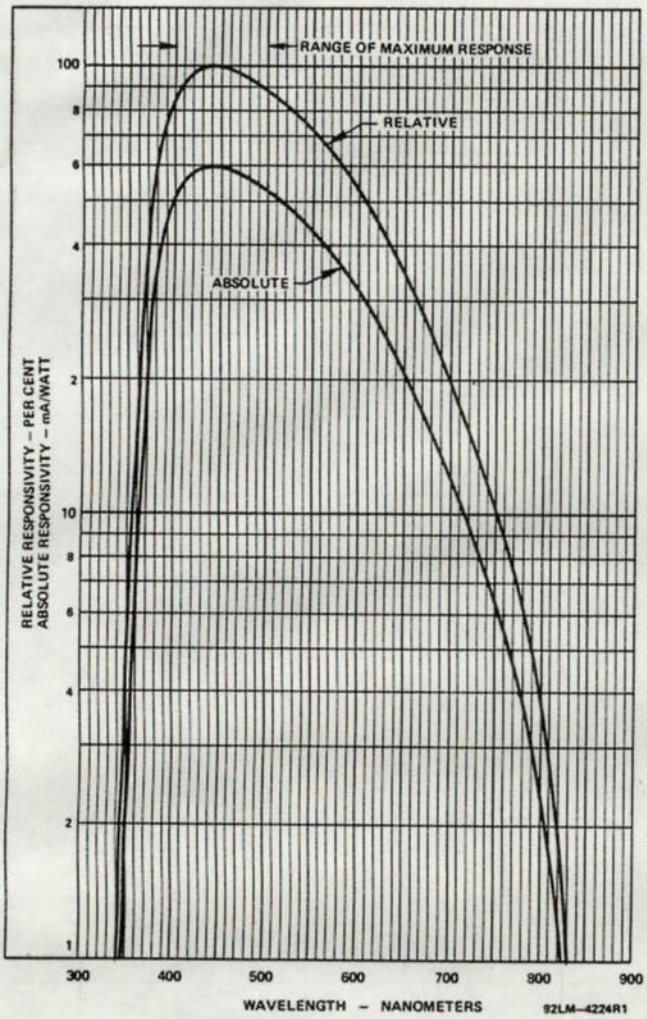


Figure 2 – Typical Photocathode Responsivity – Multialkali (NaKCsSb) as Modified by Fiber Optic Window

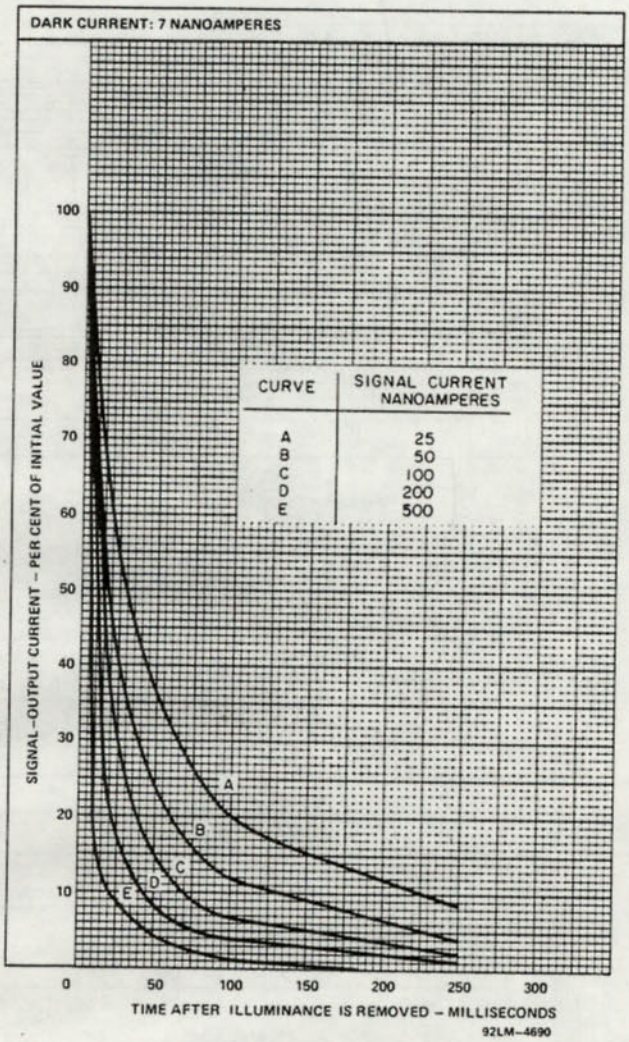


Figure 4 – Typical Persistence Characteristics

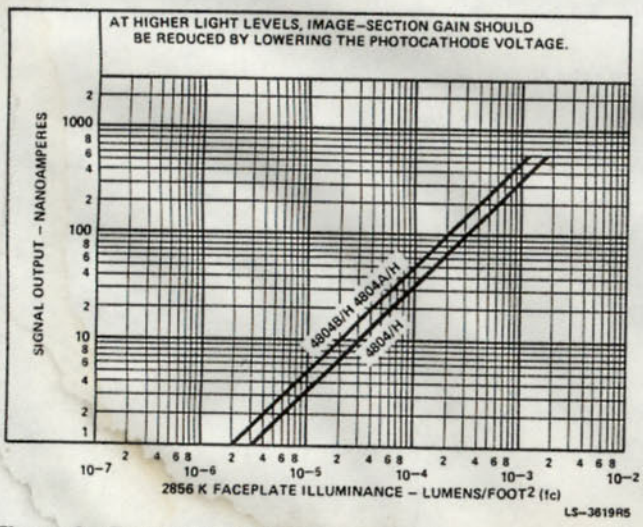


Figure 3 – Typical Transfer Characteristics

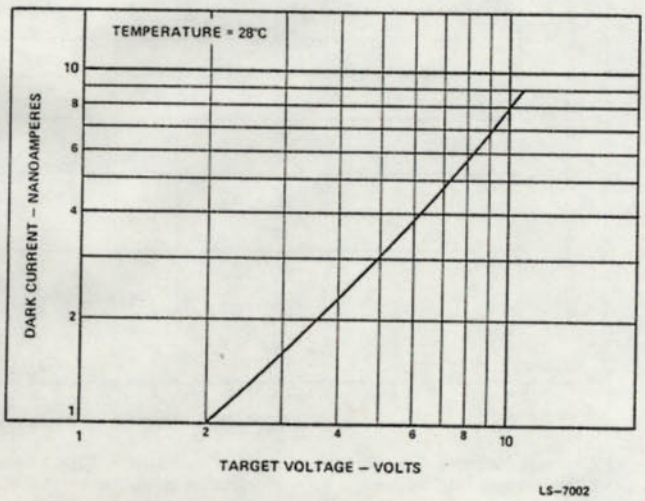


Figure 5 – Typical Dark Current as a Function of Target Voltage

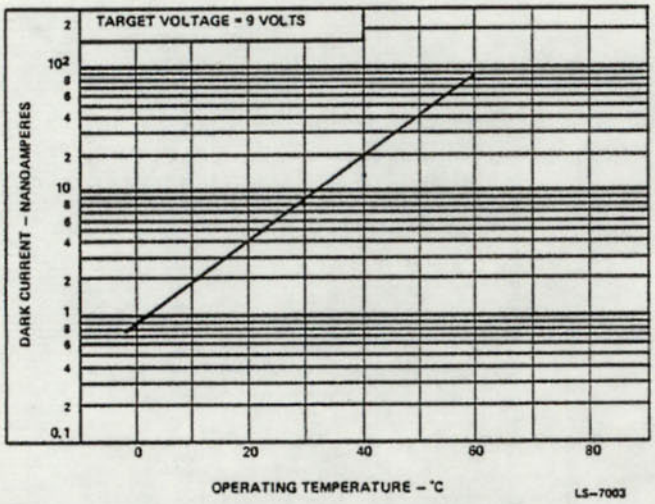
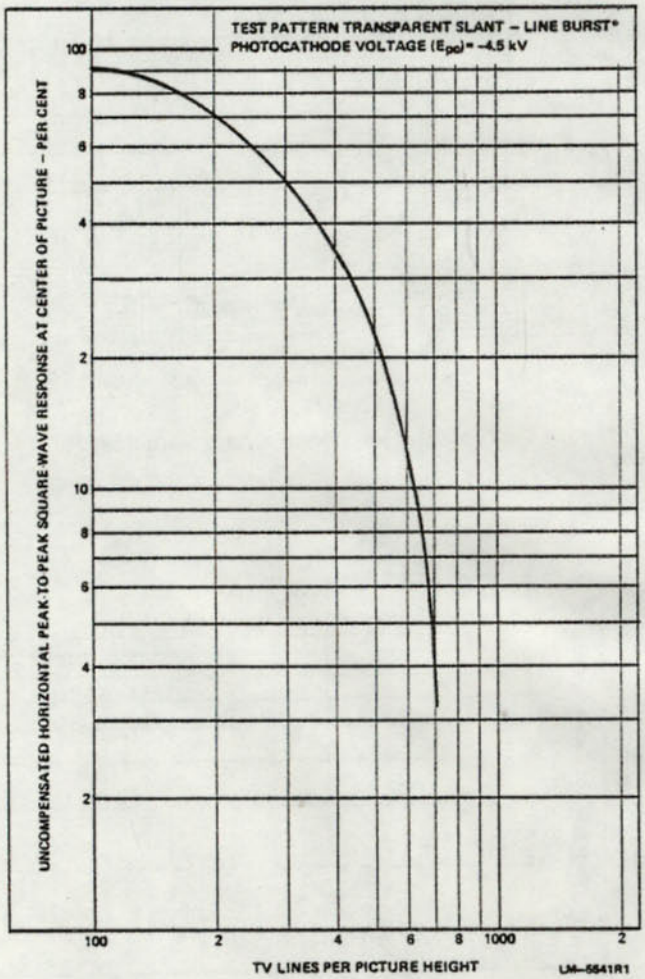


Figure 6 – Typical Dark Current as a Function of Operating Temperature



* Contrast Transfer Function measured using the RCA P2000 slant-line burst pattern with horizontal center response balanced on the 400 line chevrons.

Figure 7 – Typical Horizontal Square Wave Response (Contrast Transfer Function)

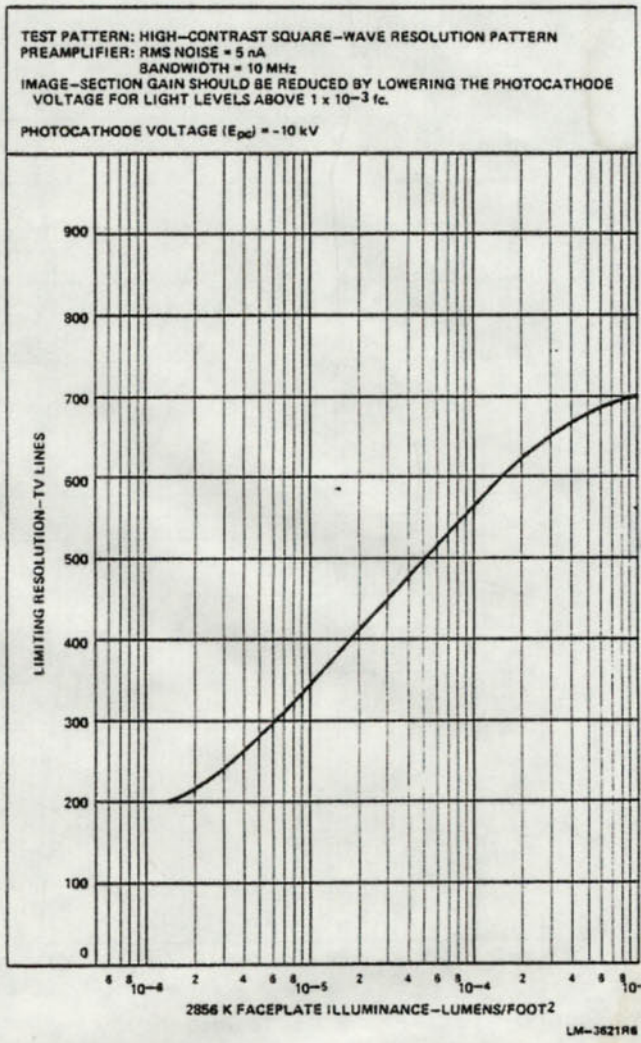


Figure 8 – Typical Resolution Characteristic

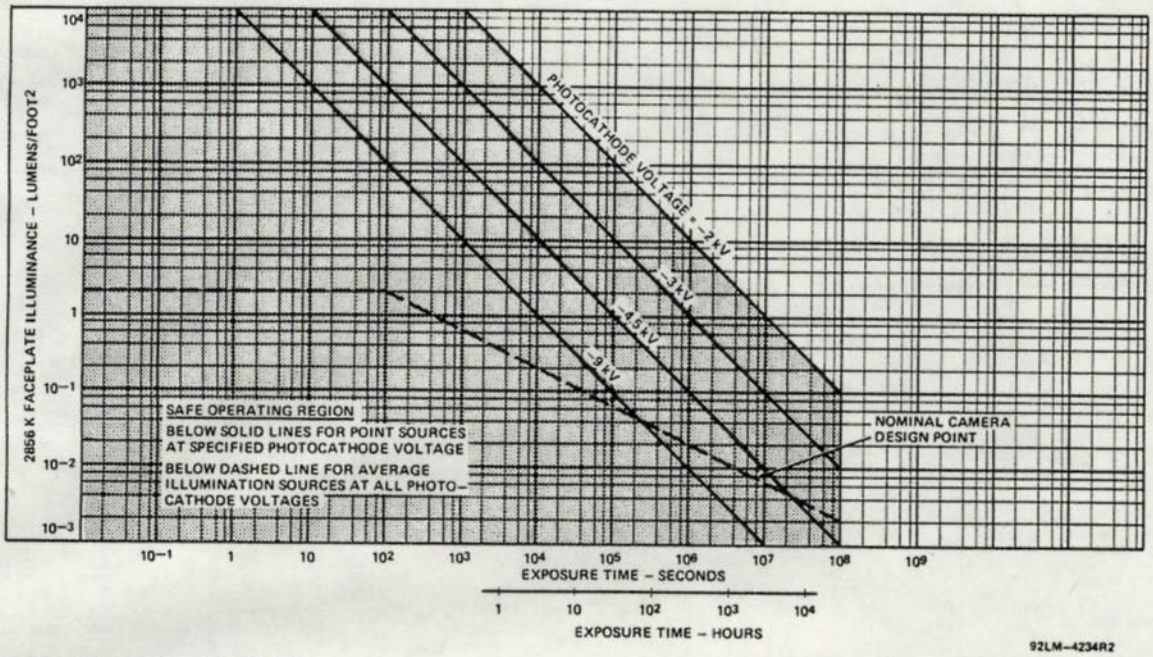


Figure 9 - Faceplate Exposure Limits

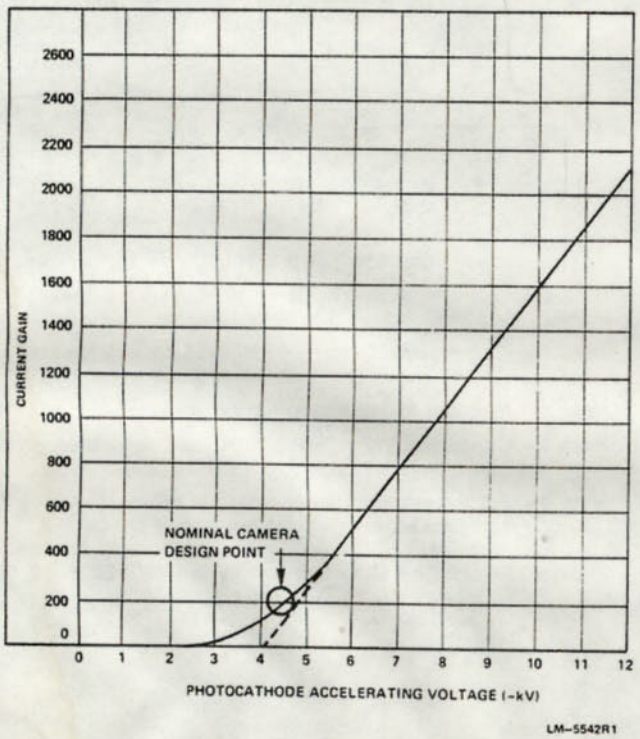


Figure 10 - Typical Gain Characteristic

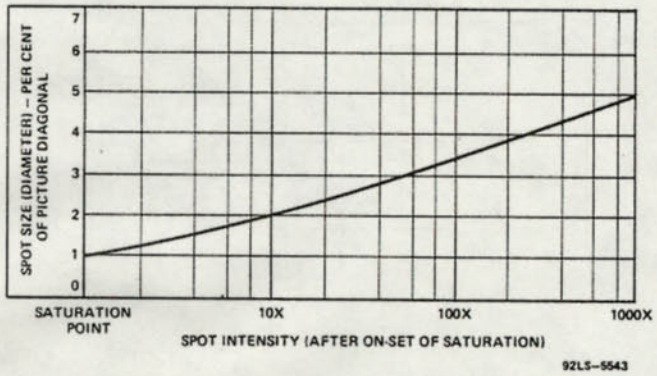
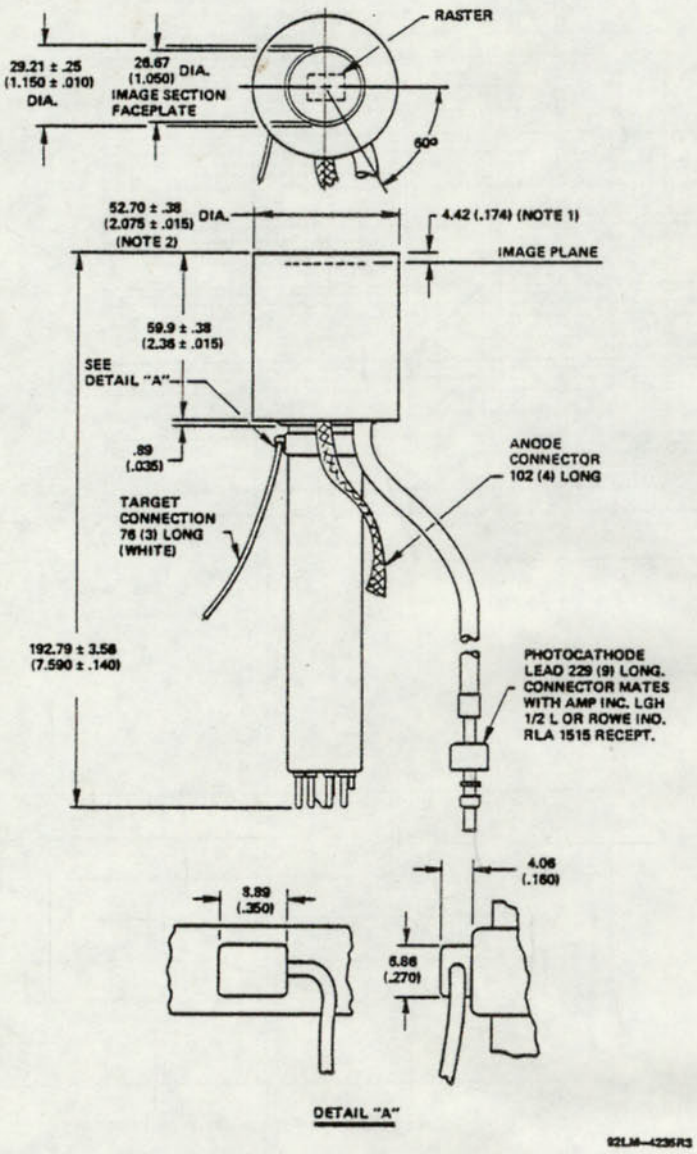


Figure 11 - Typical Blooming Characteristic



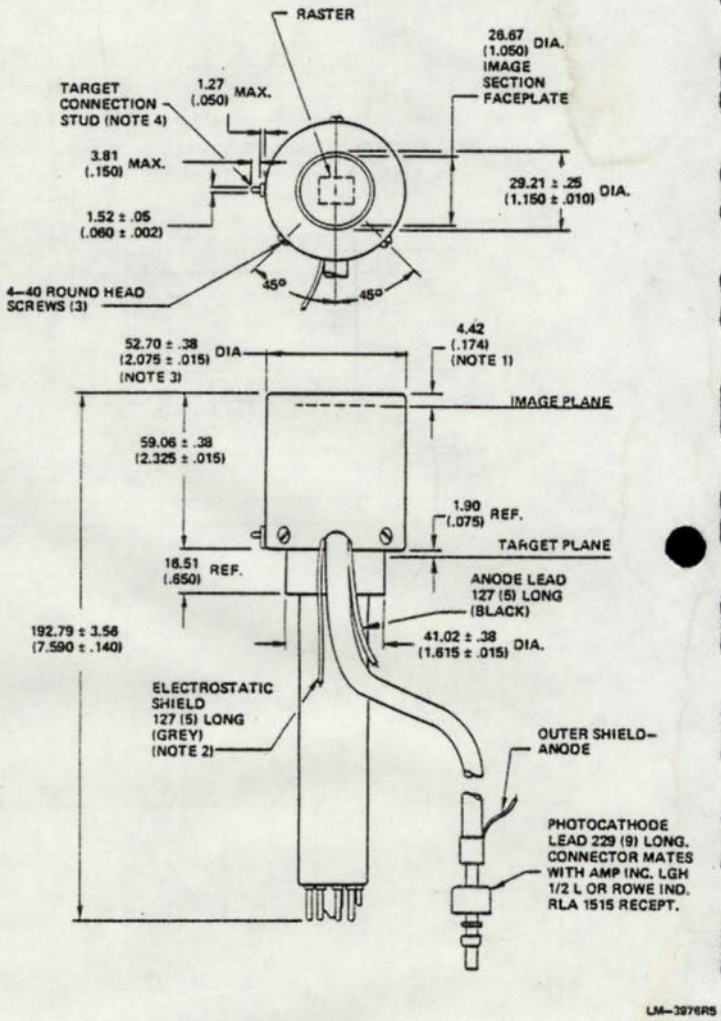
Approx. tube weight: 264 g (9.3 oz)

Dimensions in millimeters. Dimensions in parentheses are in inches.

Note 1 - Cover glass Corning type 7056 44.4 (1.75) dia. x 3.18 (0.125). Index of refraction at 589.3 nm is 1.49.

Note 2 - Concentricity within 0.76 (0.030) to center of raster.

Figure 12 - Outline Drawing for Types 4840B/H/P1, 4804A/H/P1 and 4840/H/P1



Approx. tube weight: 264 g (9.3 oz)

Dimensions in millimeters. Dimensions in parentheses are in inches.

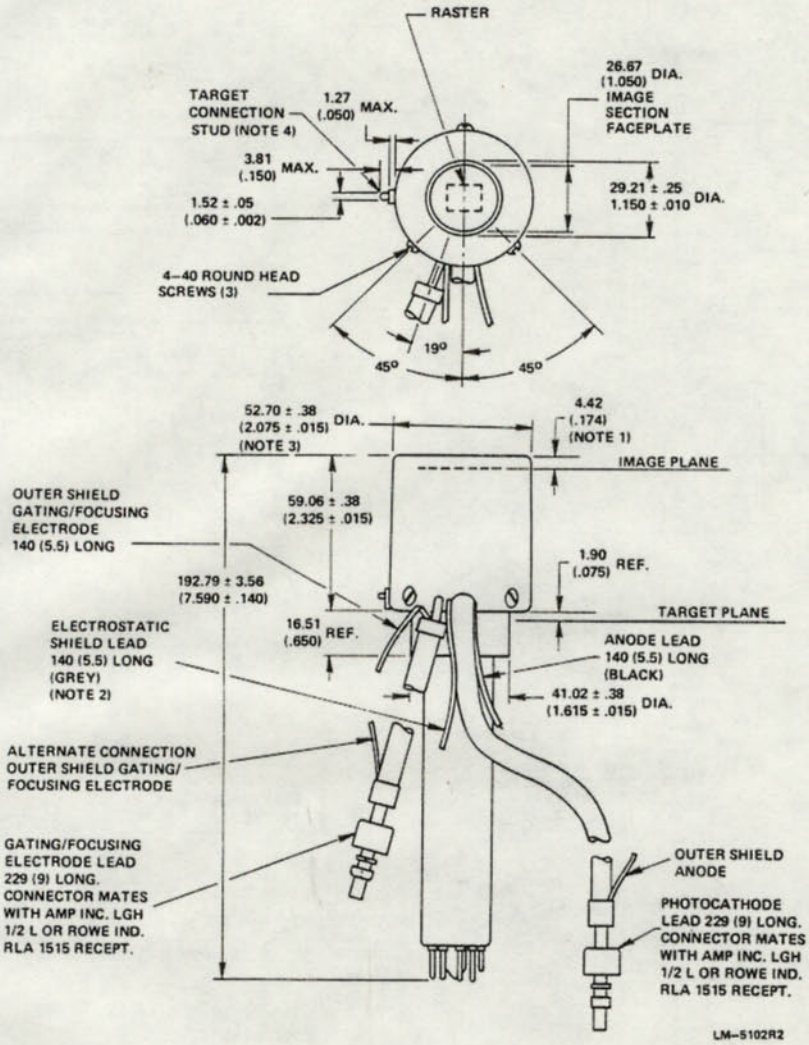
Note 1 - Cover glass Corning type 7056 44.4 (1.75) dia. x 3.18 (0.125). Index of refraction at 589.3 nm is 1.49.

Note 2 - Connect to grounding lug on yoke.

Note 3 - Concentricity within 0.76 (0.030) to center of raster. Diameter applies only to front 51 (2.0) of tube.

Note 4 - Solderable terminal is designed to match AMP 61276-2 solderless terminal supplied with each tube.

Figure 13 - Outline Drawing for Types 4804B/H/P2, 4804A/H/P2 and 4804/H/P2



Approx. tube weight: 264 g (9.3 oz)

Dimensions in millimeters. Dimensions in parentheses are in inches.

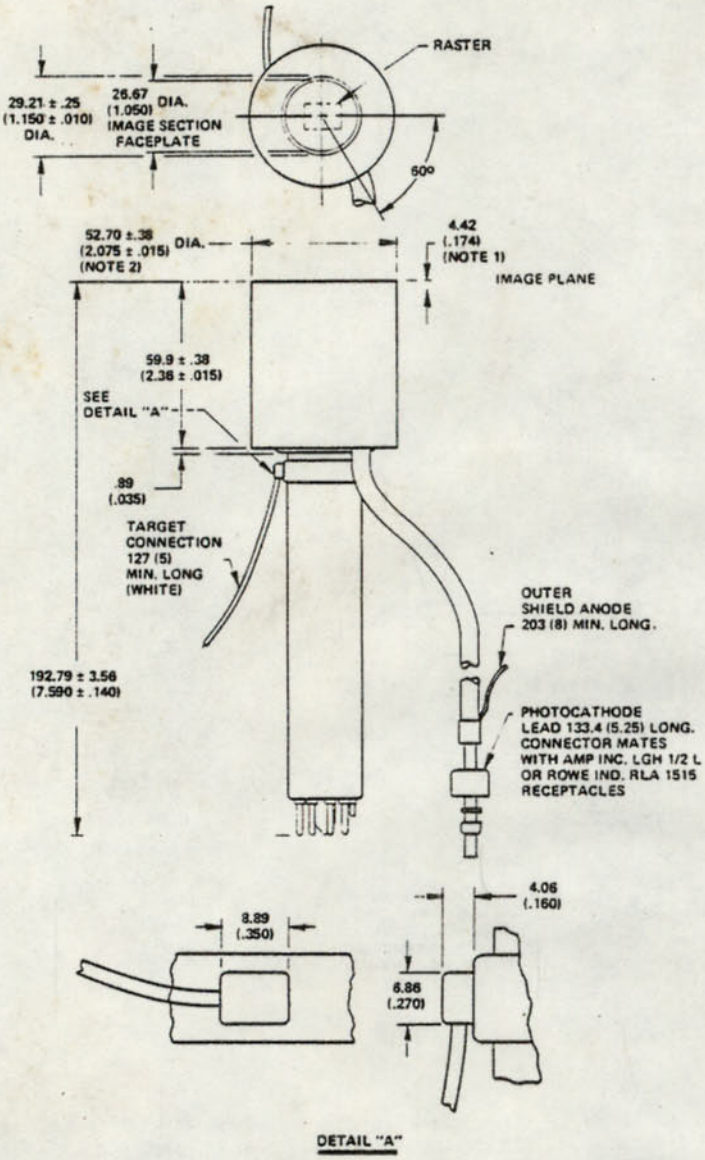
Figure 14 - Outline Drawing for Types 4804B/H/P5, 4804A/H/P5 and 4804/H/P5

Note 1 - Cover glass Corning type 7056 44.4 (1.75) dia. x 3.18 (0.125). Index of refraction at 589.3 nm is 1.49.

Note 2 - Connect to grounding lug on yoke.

Note 3 - Concentricity within 0.76 (0.030) to center of raster. Diameter applies only to front 51 (2.0) of tube.

Note 4 - Solderable terminal is designed to match AMP 61276-2 solderless terminal supplied with each tube.



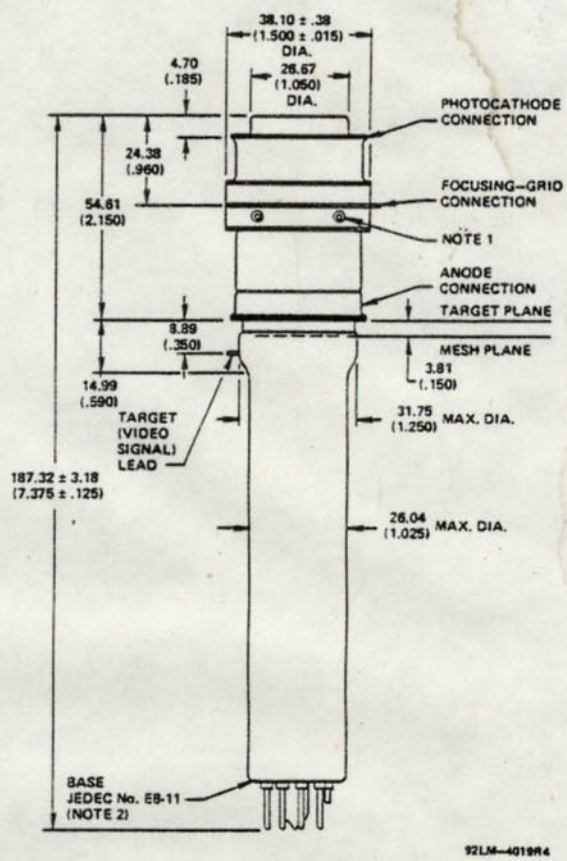
Approx. tube weight: 236 g (8.3 oz)

Dimensions in millimeters. Dimensions in parentheses are in inches.

Note 1 - Cover glass Corning type 7056 44.4 (1.75) dia. x 3.18 (0.125). Index of refraction at 589.3 nm is 1.49.

Note 2 - Concentricity within 0.76 (0.030) to center of raster.

Figure 15 - Outline Drawing for Types 4804B/H/P4, 4804A/H/P4 and 4804/H/P4



Approx. tube weight: 128 g (4.5 oz)

Dimensions in millimeters. Dimensions in parentheses are in inches.

Note 1 - Clearance of 44.83 (1.765) is required to pass all protrusions.

Note 2 - A typical socket for use with this base is the TRW Cinch type 8VT (133-98-11-015), or equivalent.

Figure 16 - Outline Drawing for Non-Potted Versions - Types 4804B/H, 4804A/H and 4804/H

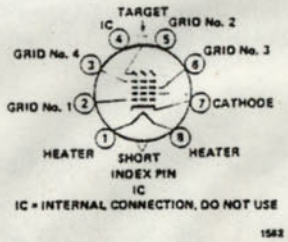


Figure 17 - Basing Diagram, Bottom View All Types

C. D. NEWCOMER P11T
LANCASTER