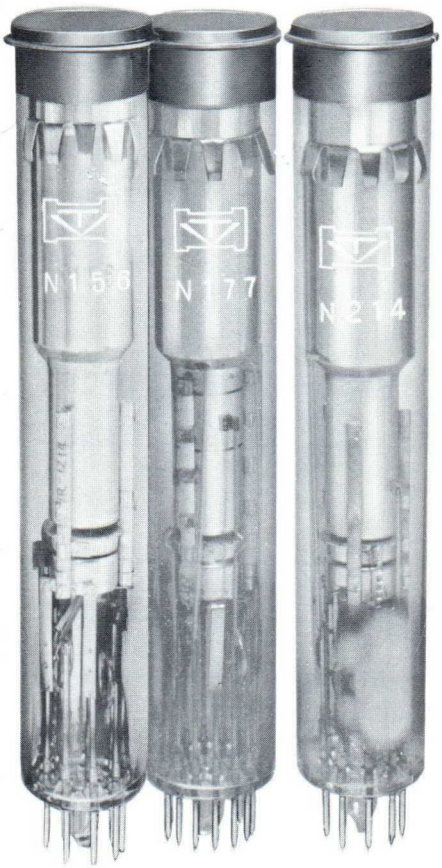
HTV PHOTOSENSITIVE DEVICES

N156
N157
N177
N214
N248

TECHNICAL DATA SHEET

September 1969



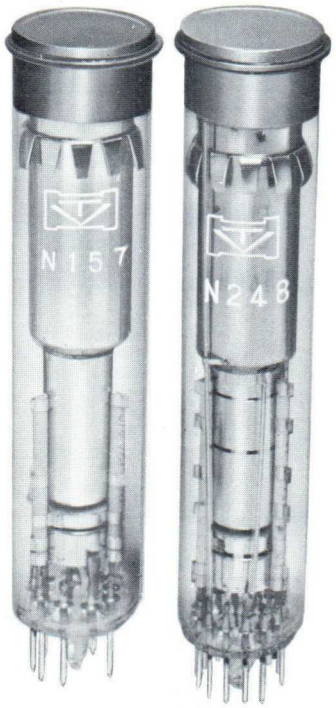


IMAGE PICKUP TUBE
Infrared Sensitive Vidicon Tubes

Hamamatsu infrared vidicons are highly sensitive in the infrared region and are able to image objects by their own thermal radiation at 200°C. They are being used extensively in infrared pickup applications including;

1. Viewing the object in darkness
2. Measurement of temperature and observation of its distribution
3. Observation of microscopic image of dislocations in silicon and germanium, laser patterns and hydrogen flame in sunlight
4. Medical electronics
5. Space applications

The products introduced in this data sheet are;

N156 6 inches long, has magnetic focusing and deflecting methods and can be interchanged with type 7038 or 7735A.

N157 5 inches long, has magnetic focusing and deflecting methods and can be interchanged with type 7262 or 7262A.

N177 6 inches long, has electrostatic focussing and deflecting methods and can be interchanged with type 4514.

N214 6 inches long, has magnetic focusing and deflecting methods and featuring very high resolution.

N248 5 inches long, has electrostatic focusing and deflecting methods.

Notes: When extra circuits are connected in a series with the heater, a 14 ohm resistor should be added in parallel to the heater.

HAMAMATSU TV CO., LTD.

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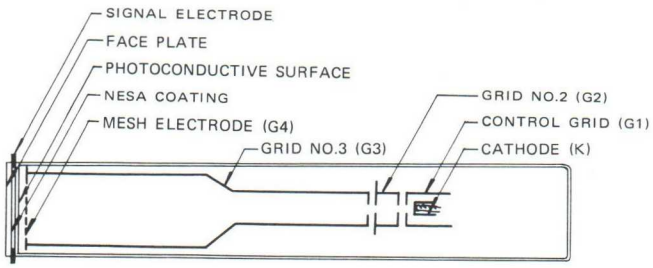
HTV-N156·N157·N177·N214·N248

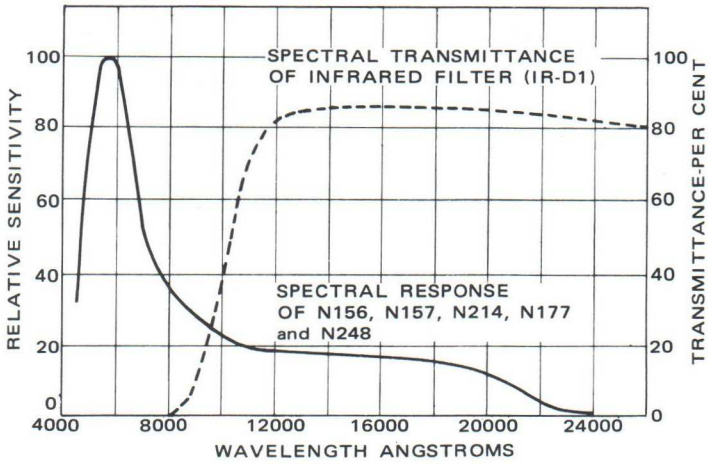
Infrared Sensitive Vidicon Tubes



Typical Construction of Infrared Vidicon

Fig. 1

TYPICAL SPECTRAL RESPONSE



GENERAL

Type	Heater for unipotential cathode: Voltage (AC or DC) volts	Heater for unipotential cathode: Current amp.	Spectral response	Photo-conductive layer ① mm (inch)	Focusing method	Dimensional outline	Bulb	Basing Diagram	Base
N156	6.3±10%	0.15	See Fig. 1	16 (0.62)	Magnetic	See Fig. 4	T-8	See Fig. 5	Small-Button Ditetrar 8-pins
N157	6.3±10%	0.15	See Fig. 1	16 (0.62)	Magnetic	See Fig. 4	T-8	See Fig. 5	Small-Button Ditetrar 8-pins
N214	6.3±10%	0.15	See Fig. 1	16 (0.62)	Magnetic	See Fig. 4	T-8	See Fig. 5	Small-Button Ditetrar 8-pins
N177	6.3±10%	0.15	See Fig. 1	16 (0.62)	Electro-static	See Fig. 4	T-8	See Fig. 5	Small-Button 13-pins
N248	6.3±10%	0.15	See Fig. 1	16 (0.62)	Electro-static	See Fig. 4	T-8	See Fig. 5	Small-Button 13-pins

TYPICAL OPERATION

Type	Signal electrode voltage volts	Grid No. 5 voltage volts	Grid No. 4 voltage volts	Grid No. 3 voltage volts	Grid No. 2 voltage volts	Grid No. 1 voltage for picture cut off volts	Signal-output current at 1 IR foot candle μamp.	Dark current μamp.
N156	10~40	—	250~300	250~300	300	-45~-100	0.07~0.20	0.02
N157	10~40	—	250~300	250~300	300	-45~-100	0.07~0.20	0.02
N214	10~40	—	500	300	300	-45~-100	0.07~0.20	0.02
N177	10~40	500	300	0~60	300	-45~-100	0.07~0.20	0.02
N248	10~40	500	300	0~60	300	-45~-100	0.07~0.20	0.02

DIMENSIONAL OUTLINE

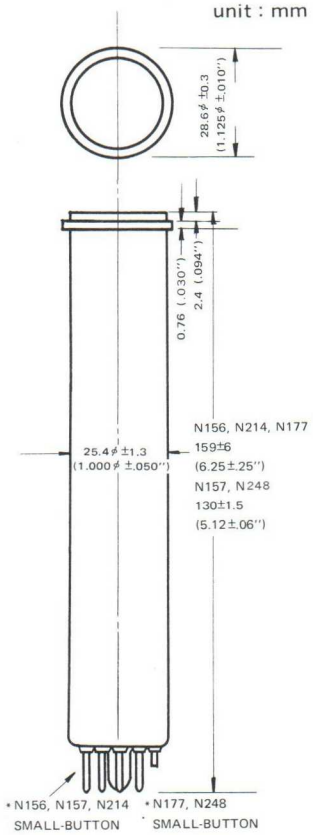


Fig. 4

Note:

1 Maximum useful diagonal of rectangular image (4 x 3 aspect ratio).

2 Grid No.4 and Grid No.3 are interconnected.

3 1 IR foot-candle is defined as the infrared illumination intensity through an infrared (IR-D1) where illumination intensity from a tungsten lamp of color temperature 2854°K is 1 foot-candle.

* Precautions to observe:

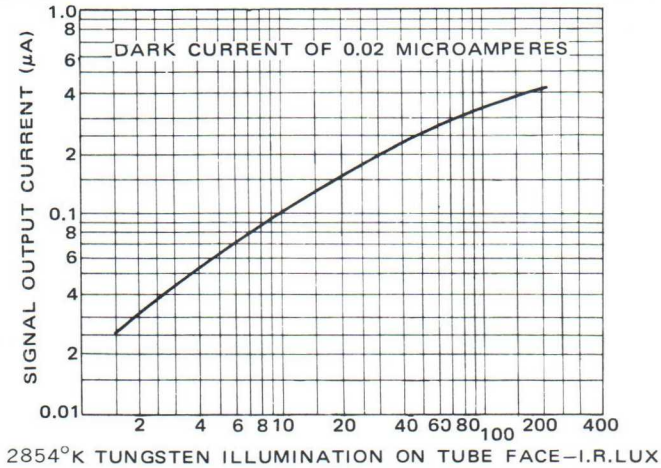
The plane passing through the index pin and the axis of the tube shall parallel with the horizontal scanning direction.

* Mechanical position of the tube:

The tube should be handled not to keep sensitive surface down.

Fig. 2

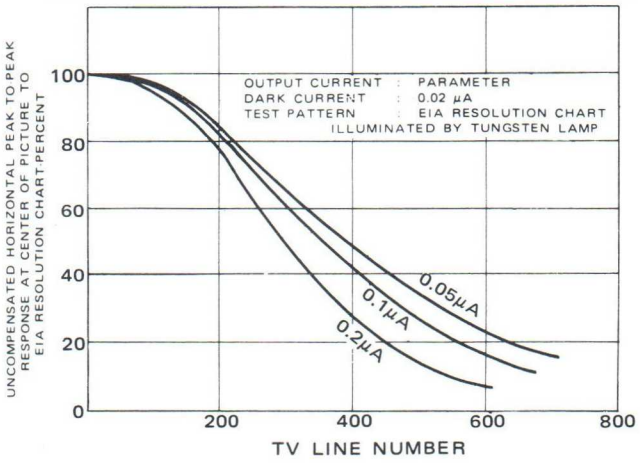
LIGHT TRANSFER CHARACTERISTICS



2854°K TUNGSTEN ILLUMINATION ON TUBE FACE—I.R.LUX

Fig. 3

RESOLUTION CHARACTERISTICS



MAXIMUM RATINGS

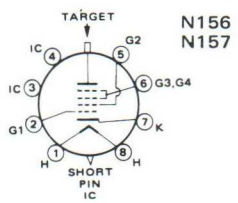
Absolute Values: For scanned area of 12.7 x 9.5 mm (1/2" x 3/8")

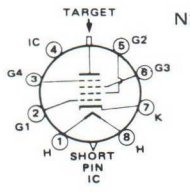
Signal electrode voltage volts	Grid No. 5 voltage volts	Grid No. 4 voltage volts	Grid No. 3 voltage volts	Grid No. 2 voltage volts	Grid No. 1 voltage		Peak Heater-Cathode Voltage		Dark current μamp.	Face-plate	
					Negative bias value volts	Positive bias value volts	Heater negative with respect to cathode volts	Heater positive with respect to cathode volts		Illumination	Temperature °C
125	—	350 ②	350 ②	350	125	0	125	10	0.05	50 foot candles 100 IR foot candles ③	60
125	—	350 ②	350 ②	350	125	0	125	10	0.05	50 foot candles 100 IR foot candles ③	60
125	—	1000	1000	350	125	0	125	10	0.05	50 foot candles 100 IR foot candles ③	60
125	700	700	300	350	125	0	125	10	0.05	50 foot candles 100 IR foot candles ③	60
125	700	700	300	350	125	0	125	10	0.05	50 foot candles 100 IR foot candles ③	60

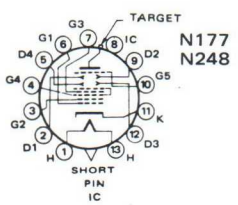
Scanned area of 12.7 x 9.5 mm (1/2" x 3/8") Face-plate Illumination of 10 Lx. Face-plate temperature of 25 to 35°C

Limiting resolution		Min. peak-to-peak blanking voltage		Field strength at center of focusing coil gausses	Field strength of adjustable alignment coil gausses	Deflecting voltage (peak-to-peak)			
at center of picture TV lines	at corner of picture TV lines	when applied to grid No. 1 volts	when applied to cathode volts			Horizontal (D_1 to D_2) volts	Vertical (D_3 to D_4) volts	Horizontal plates DC voltage volts	Vertical plates DC voltage volts
500	350	40	10	approx. 40	0~4	—	—	—	—
500	350	40	10	approx. 40	0~4	—	—	—	—
700	400	40	10	approx. 40	0~4	—	—	—	—
350	250	40	10	—	—	80	70	300	300
350	250	40	10	—	—	80	70	300	300

BASING DIAGRAM Fig. 5

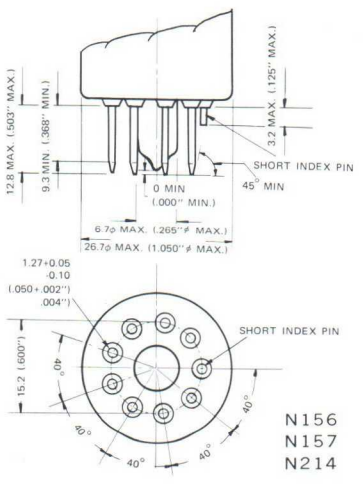


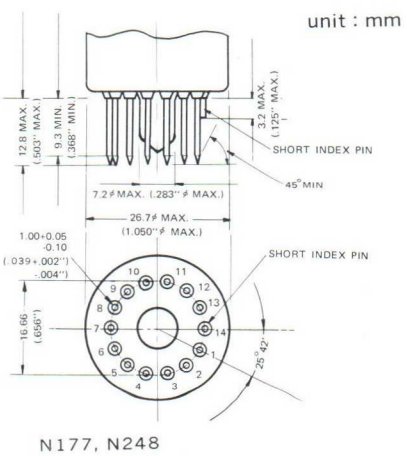




BASE DRAWING Fig. 6

unit : mm





IMAGES ON THE PICTURE MONITORING THROUGH INFRARED VIDICON IN VARIOUS APPLICATIONS

PICTURE MONITORING OF TEMPERATURE DISTRIBUTION

1 Image on the picture monitoring of heated soldering iron through infrared TV camera. Line-selected wave form of the temperature distribution study. The pulse height indicates the temperature of soldering iron.

2 Cement rotary kyln under operation through infared TV camera.

PICTURE MONITORING UNDER DARK ENVIRONMENT

3 Closed pupil (Miosis) when stimulated by an visible ray.

4 Fully opened pupil (Mydiris) when the eye is adapted to dark environment by infrared ray.

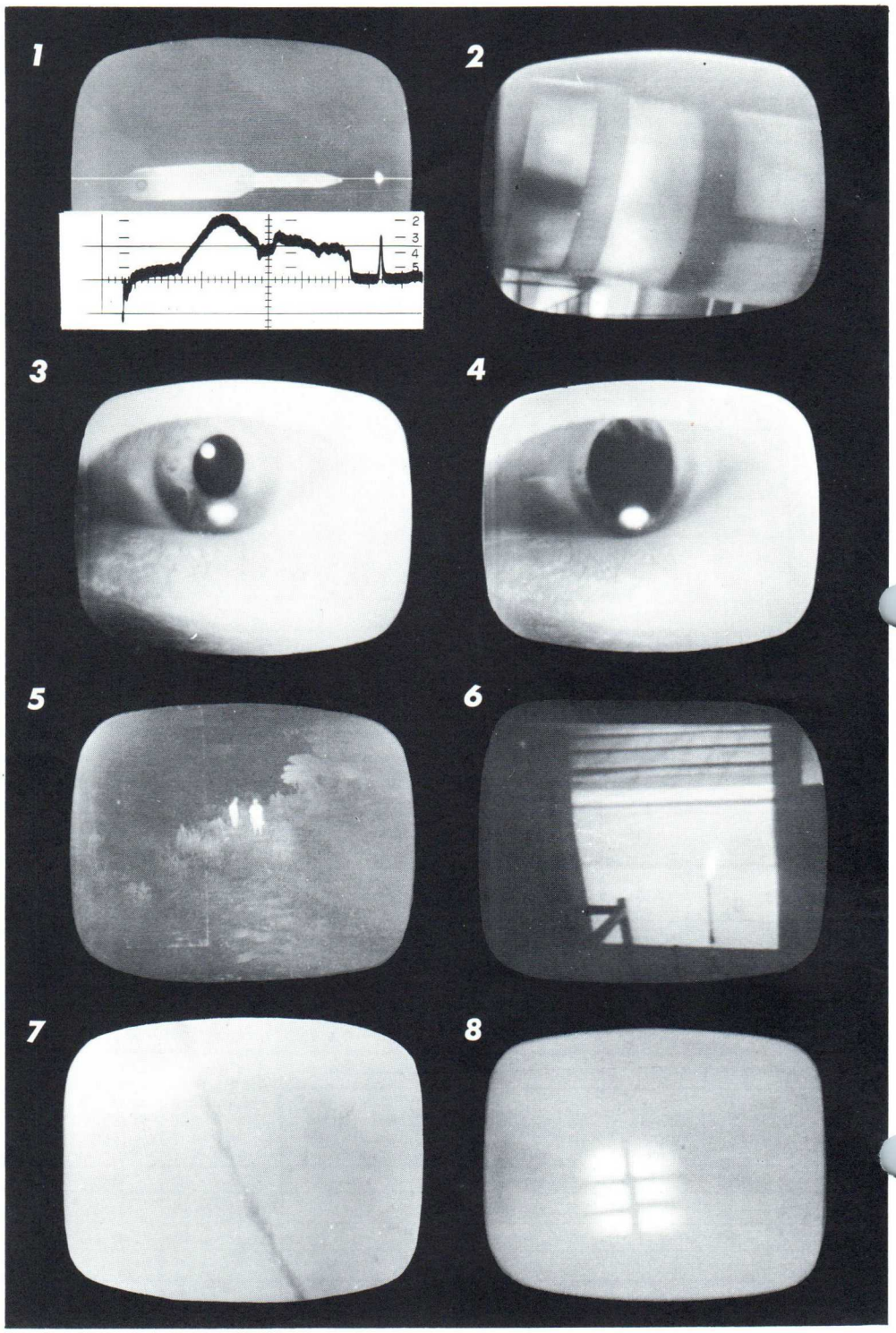
5 Photograph of men taken in darkness from 100 meters.

OTHER VARIOUS APPLICATIONS

6 Image of hydrogen flame under day light through infrared TV camera.

7 Micro-scopic image of wound of germanium single crystal. Thickness: 0.7 mm. Mag. Approx x240

8 Observation of laser pattern. (Ne-Ne)



HTV Infrared Vidicon Tubes are available from:

HAMAMATSU TV CO., LTD.

1126, Ichino-cho, Hamamatsu, Japan
Phone: 0534-34-3311 Telex: 4225-185 JAPAN Cable: HAMA TV HAMAMATSU

PHOTO TUBES • PHOTOMULTIPLIER TUBES • PHOTOCONDUCTIVE CELLS • IMAGE PICKUP TUBES • CCTV CAMERAS

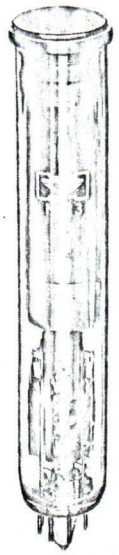
VIDICON TUBE N513

Hamamatsu N513 is a small, 2/3-inch diameter vidicon type of camera tube employing electrostatic focus, magnetic deflection, a precision outer-diameter glass bulb, and a low-power heater requiring only 0.6 watt. It is intended for compact, lightweight, transistorized TV cameras in industrial and other closed-circuit TV systems. It is well suited for black-and-white pickup at standard TV scanning rates.

The weight, size, and power requirements of TV cameras employing this tube are substantially less than the requirements of cameras using conventional magnetic-focus, magnetic-deflection vidicons of comparable size. Camera size and weight are automatically reduced by elimination of the magnetic focusing coil. Negligible power is required for electrostatic focusing.

Resolution of the N513 is about 550 TV line per picture height when operated with a grid-No. 5 voltage of 500 volts and a grid-No. 3 and No. 2 voltage of 300 volts.

Control of alignment fields for optimum focus uniformity and the use of magnetic shielding to prevent external fields from impairing the resolving capability of the N513 are required.



GENERAL DATA

Electrical:	
Cathode	
Heater Voltage	6.3 ± 10% V
Heater Current	95 mA
Direct Interelectrode Capacitance (Note 1)	
Target to all other electrodes	2 pF
Spectral Sensitivity	See Fig.4
Focusing Method	Electrostatic
Deflecting Method	Magnetic
Mechanical:	
Base	Small-Button Miniature 7-pin
Dimensions:	
Overall Length	109 mm Max.
Maximum Diameter	19.6 ± 0.2 mm
Maximum useful Size of Rectangular Image (4 × 3 aspect ratio)	11 mm (diagonal)
Net weight (Approx.)	25 g

Orientation:

Proper orientation is obtained when the horizontal scan is essentially parallel to the plane passing through the tube axis and pin 4.

MAXIMUM RATINGS

(Absolute Maximum Values: For scanned area of 8.8 × 6.6 mm^2)

Grid No. 5 Voltage	650	V
Grid No. 4 Voltage	350	V
Grid No. 3, 2 Voltage	350	V
Grid No. 1 Voltage		
Negative-bias value	300	V
Positive-bias value	0	V
Peak Heater to Cathode Voltage		
Heater Negative with respect to Cathode	125	V
Heater Positive with respect to Cathode	10	V
Target Voltage	100	V
Peak Target Current (Note 2)	600	nA
Dark Current	150	nA
Face Plate:		
Illumination	10^4	Lx
Temperature	−20 ~ 60	°C

TYPICAL OPERATION

For scanned area of 8.8 x 6.6 mm^2 using yoke assembly KV-19B (Note 9)

Face Plate Temperature	25 ~ 35	°C
Grid No. 5 Voltage	500	V
Grid No. 4 (Beam Focus Electrode) Voltage	60 ~ 75	V
Grid No. 3, 2 Voltage	300	V
Grid No. 1 Voltage for Picture Cut-off (Note 3)	−45 ~ −100	V
Minimum Peak-to-Peak Blanking Voltage		
When applied to Grid No. 1	80	Vp-p
When applied to Cathode	20	Vp-p
Field Strength of Adjustable		
Alignment Coil (Note 4)	0 ~ 4	Gausses
Target Voltage (See Fig.1)	10 ~ 40	V
Highlight Signal Current	200	nA
Dark Current (Note 5)	20	nA
Sensitivity to Tungsten Light Source (Note 6)		
Face Plate Illumination	10	Lx
Signal Output Current	160	nA
Average "Gamma"	0.65	
Lag (Note 7)	15	%
Limiting Resolution:		
Center Resolution	550	TV lines
Corner Resolution	500	TV lines
Amplitude Response to a 400 TV Line Square-Wave Test Pattern at Center of the Picture (Note 8)	17	%

Fig.1 Range of Dark Current

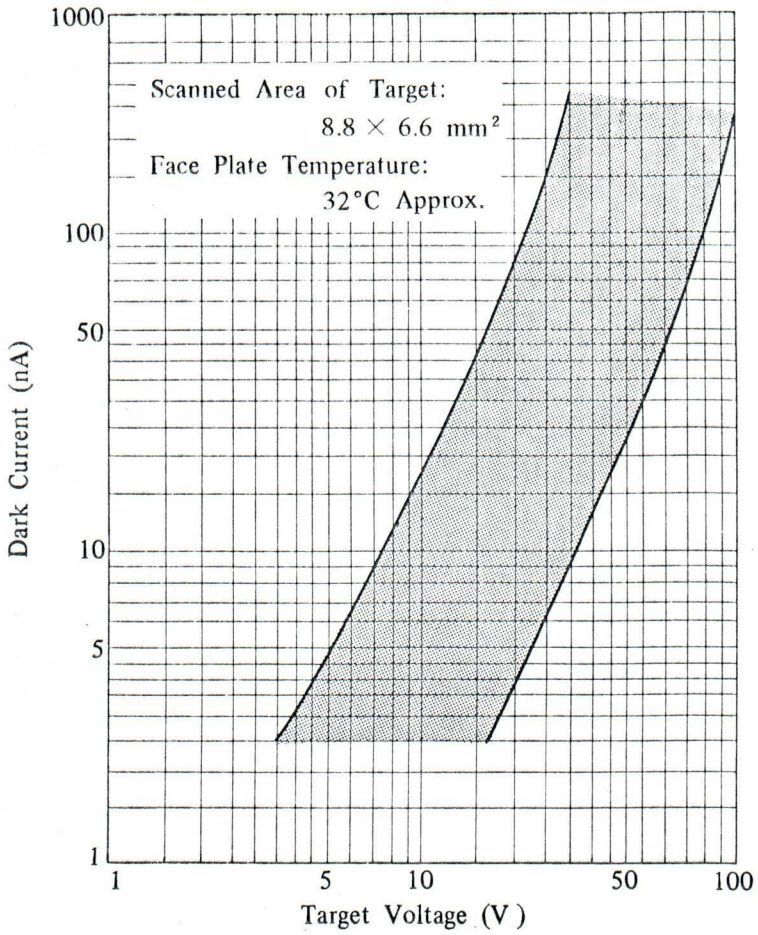


Fig.2 Typical Light Transfer Characteristic

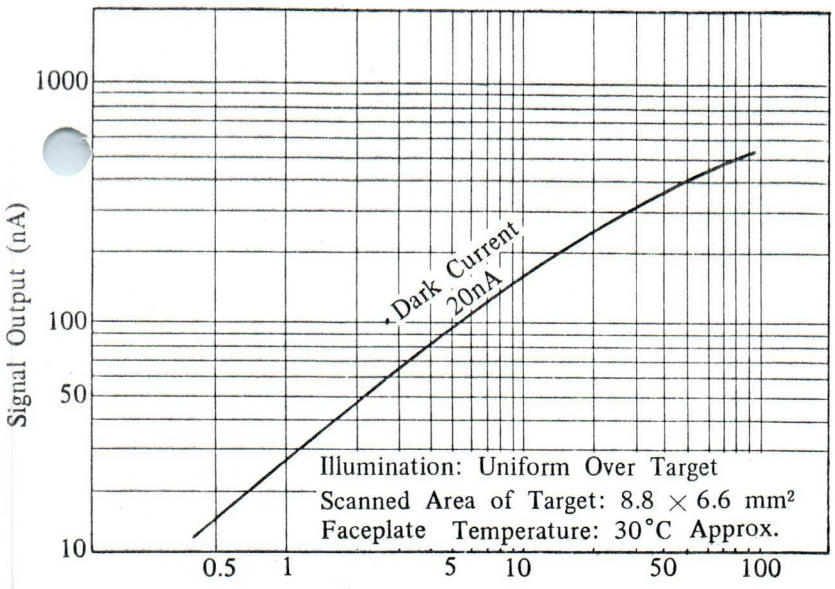
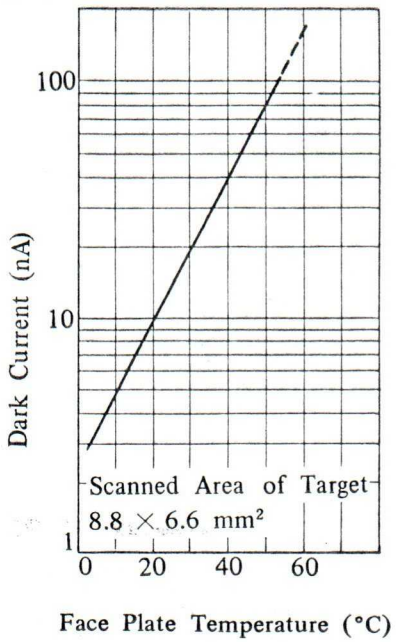


Fig.3 Typical Temperature Characteristic



NOTES:

1. This capacitance, which effectively is the output impedance of this tube, is increased when the tube is mounted in the deflecting-yoke assembly. The resistive component of the output impedance is in the order of 100 megohms.
2. The beam current must be adjusted to less than twice as much as the value to just discharge the highlight signal current on performance data. Flowing more over the above-mentioned beam current, resolution shall be lost.
3. With no blanking voltage on grid No. 1.
4. Control of alignment fields is required in order to obtain a good picture.
   The alignment coil should be located on the tube so that its center is at a distance of 75 mm from the face of the tube, and be positioned so that its axis is coincident with the axis of the tube and the deflecting yoke.
5. The deflecting circuits must provide extremely linear scanning for good black-level reproduction. Dark-current signal is proportionnal to be scanning velocity. Any change in scanning velocity produces a black level error in direct production to the change in scanning velocity.
6. Defined as the component of the highlight target current after the dark-current component has been subtracted.
   The tungsten lamp is operated at the colour temperature of 2854°K. (See Fig. 2)
7. The lag is the percent of the signal output current at 1/20 second after illumination is removed.
8. Amplitude response is the signal amplitude from a given TV line number (fine picture detail) expressed as a percent of the signal amplitude from a very-low-frequency (large-area) picture element. In practice, the large-detail reference is usually 15 TV line with signal amplitude set equal to 100 percent.
   Amplitude response is measured using a test pattern (a slant-line burst pattern) with horizontal center response balanced on the 400 line chevrons. (See Fig. 5)
9. KV-19B coil is made by Chuomusen Co. Ltd., 1-9-12 Omori-nishi Tokyo Japan.

Fig.4 Typical Spectral Sensitivity Characteristic

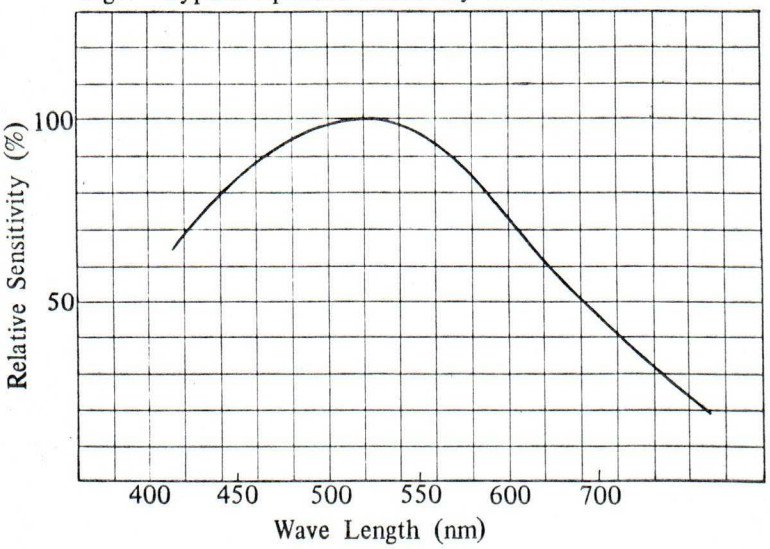


Fig.5 · Typical Horizontal Square-Wave Response
Test Pattern: Transparent slant-line burst

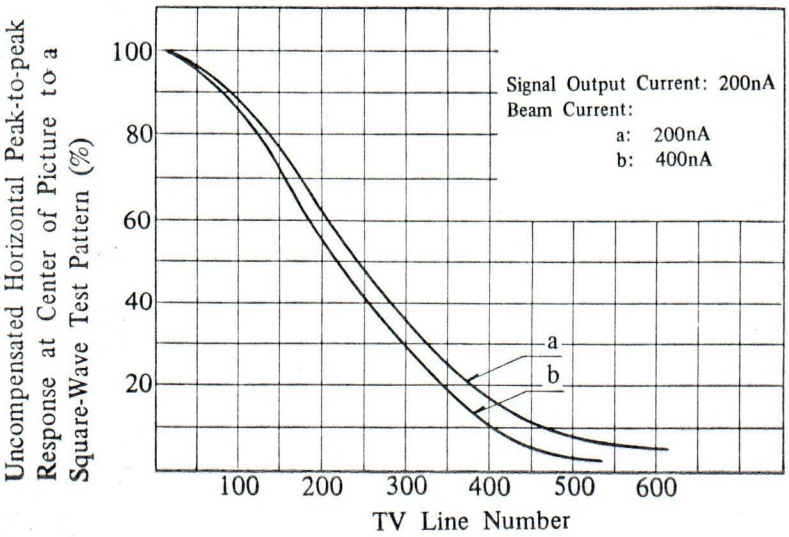


Fig.6 Relative Square-Wave Response Vs. Beam Focus Electrode Volrage Variation

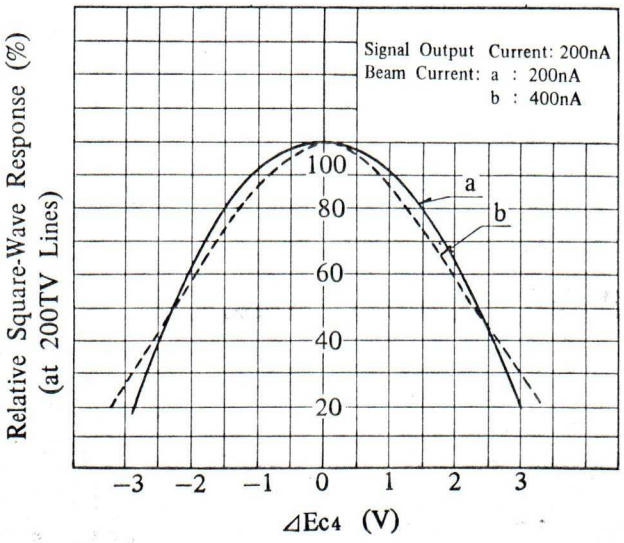


Fig.7 Relative Square-Wave Response vs. Grid-No. 5 Voltage

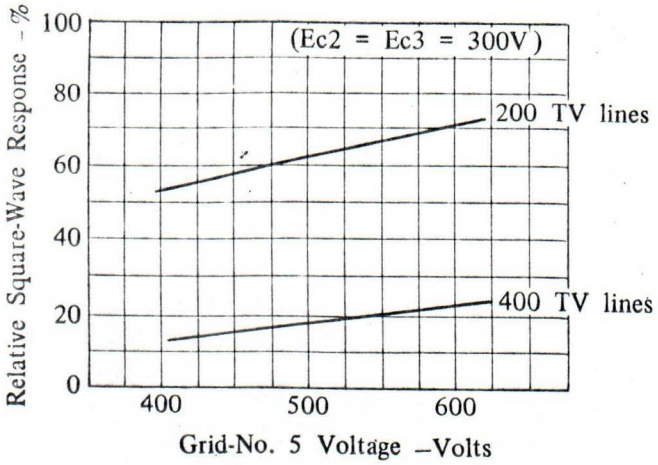


Fig.8 Signal Uniformity vs. Grid-No.5 Voltage

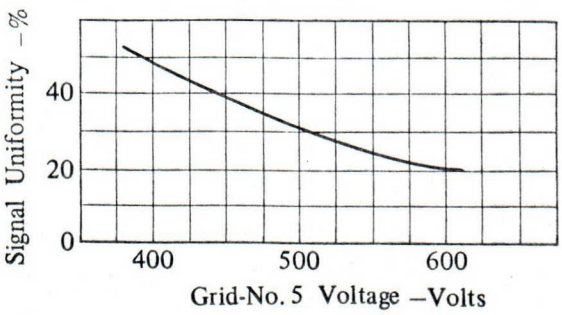
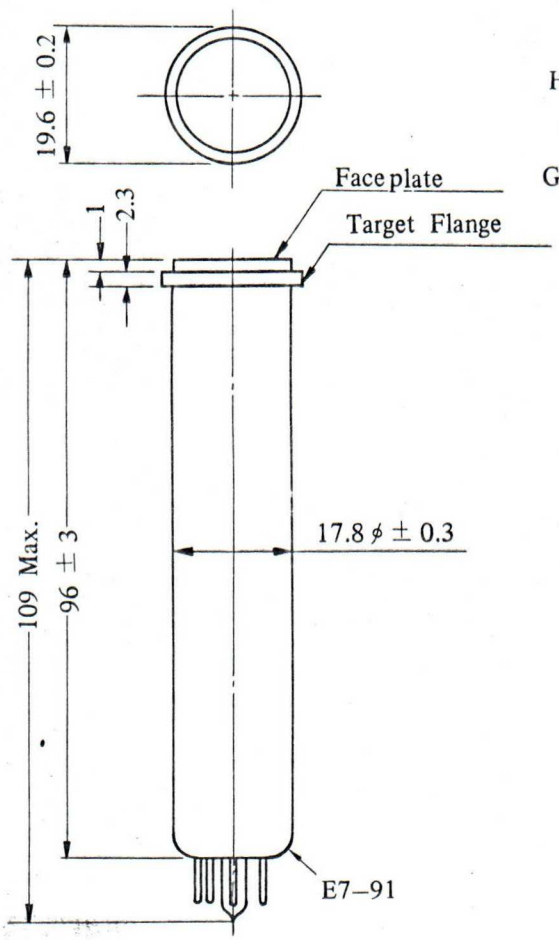
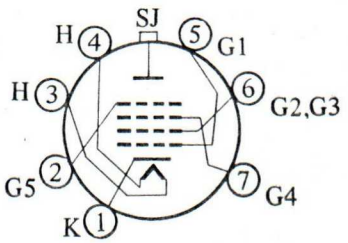


Fig.9 Outline



Base Connections (Bottom View)



Pin 1 . Cathode
Pin 2 . Grid No. 5
Pin 3 . Heater
Pin 4 . Heater
Pin 5 . Grid No. 1
Pin 6 . Grid No. 2, 3
Pin 7 . Grid No. 4
SJ . Target

Unit : mm

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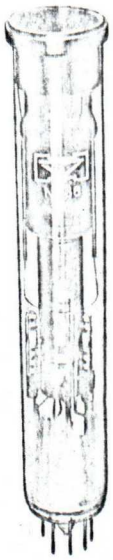
K73-2-10 Printed in Japan

VIDICON TUBE N736



25-millimeter (1 inch) Diameter Vidicon Camera Tube Employing Silicon Diode Array Target.

* Silicon Photoconductor Having Broad Spectral Range 380 to 1,100 nm.
* Extremely High Sensitivity—5340 μA/lm. (2854°K Tungsten Lamp)
* No Burn-In
* Extremely Low Lag.
* Very Low Dark Current.

Hamamatsu N736 is 1"-diameter, magnetic focus and deflection vidicon type camera tube employing silicon-diode array target structure.

The silicon target used by this tube is impervious to image burn-in and has excellent capabilities. The electron-gun structure of the N736 is similar to that of the 8541 and provides separate connection for grid No. 4 and grid No. 3 and low power heater which requires only 0.6 watt.

GENERAL DATA

Electrical:

Cathode: Oxide Coated

Heater Voltage	6.3 ± 10%	V
Heater Current	95	mA
Direct Interelectrode Capacitance (Note 1)		
Target to all other electrodes	4.6	pF
Spectral Sensitivity	See Fig.1	
Focusing Method	Magnetic	
Deflecting Method	Magnetic	

Mechanical:

Base	Small-Button Ditetrar 8-pin (JEDEC No.E8-11)	
Dimensions:		
Overall Length	159 ± 6	mm
Maximum Diameter	28.6 ± 0.3	mm
Maximum useful Size of Rectangular Image (4 x 3 aspect ratio)	15.7	mm (diagonal)

Orientation:

Proper orientation is obtained when the horizontal scan is essentially parallel to the place passing through the tube axis and short index pin.

Net weight (Approx.)	60	g

MAXIMUM RATINGS

(Absolute Maximum Values: For scanned area of 12.7 × 9.5 mm²)

Heater Voltage	6.3 ± 10%	V
Grid No. 4 Voltage	500	V
Grid No. 3 Voltage	500	V
Grid No. 2 Voltage	350	V

Grid No. 1 Voltage:		
Negative-bias Value	300	V
Positive-bias Value	0	V
Peak Heater to Cathode Voltage:		
Heater Negative with respect to Cathode	125	V
Heater Positive with respect to Cathode	10	V
Target Voltage	300	V
Peak Target Current	0.7	μA
Faceplate:		
Illumination (Note 2)	10^8	Lx
Temperature	−20 ~ 70	°C

TYPICAL OPERATION

Scanned Area	12.7× 9.5	mm^2
Faceplate Temperature (Note 3)	25 ~ 35	°C
Grid No. 4 Voltage (Note 4)	300	V
Grid No. 3 (Beam Focus Electrode) Voltage	180	V
Grid No. 2 Voltage	300	V
Grid No. 1 Voltage for Picture Cut-off (Note 5)	−45 ~ −100	V
Target Voltage (Note 6)	6 to 10	V
Average "Gamma" of Transfer Characteristic for Signal Output Current between 0.004 μA and 0.4 μA (Approx.)	1	
Minimum Peak-to-Peak Blanking Voltage;		
When Applied to Grid No. 1	75	Vp-p
When Applied to Cathode	20	Vp-p
Field Strength at Center of Focusing Coil (Approx.)	33	Gausses
Field Strength of Adjustable Alignment Coil	0 ~ 4	Gausses
Limitting Resolution;		
Center Resolution	500	TV lines
Corner Resolution	400	TV lines
Amplitude Response to a 400 TV Line Square-wave Test Pattern at Center of the Picture	20	%
Lag Percent of Initial Value of Signal Output Current 1/20 Second after Illumination is removed	12	%
Sensitivity to Tungusten Light Source (Note 8): Sensitivity	5340	μA/lm
Faceplate Illumination (Highlight)	0.5	Lx
Dark Current	8	nA
Signal Output Current (Note 7)	0.32	μA
Sensitivity to Visible Light (Note 10) Illumination from 2854°K		
Light Source Incident on Infrared Absorbing Filter	5	Lx
Dark Current (Note 9)	8	nA
Typical Signal Output Current	0.49	μA
Sensitivity to Infrared Light (Note 11) Illumination from 2854°K		
Light Source Incident on Visible Absorbing Filter	5	Lx
Dark Current	8	nA
Typical Signal-Output Current	0.46	μA

NOTES:

1. The capacitance, effectively the output impedance of this tube, will increase when the tube is mounted in the deflecting-yoke and focusing-coil assembly. The resistive component of the output impedance is several 100 megohms.
2. The tube can withstand the illumination contained in a focused image of the sun without damage.
3. With increasing temperature of the faceplate dark current increases. Therefore operation with a faceplate temperature in the rang less than 50°C is usually recommended. (See Fig.4).
4. For the best picture qualities with a coil assembly, grid No. 4 voltage should be adjusted to approximately 1.6 times the grid No. 3 voltage value. The ratio of grid No. 4 voltage to grid No. 3 voltage with tube operated, for the best picture qualities changes a little in the different coil assemblies. To reduce beam raster burn caused by long operating time, low grid No. 4 voltage is desirable. Therefore low voltage operation, in which grid No. 4 voltage is 300 volts and grid No. 3 voltage 180 volts, is usually recommended.
5. With no blanking voltage on grid No. 1.
6. Target voltage can be adjusted to obtain desirable characteristics of dark current and lag.
7. For an initial signal-output current of 200 nanoamperes and at target voltage of 10 volts. (See Fig. 3)
   With increasing target voltage, lag decreases. (See Fig. 9)
8. The tungusten lamp is operated at colour temperature of 2854°K.
9. Dependence of dark current on target voltage and dependence of dark current on faceplate temperature are shown in Fig.2 and Fig.4 respectively.
10. With the same light source specified in note 8 except on infrared absorbing filter (Schott Jenaer KG-3, 5mm thick) is interposed between the light source and the faceplate of the tube. (See Fig. 7)
11. With the same light source specified in note 8 expect on infrared transmitting filter (Toshiba IR-DIB) is interposed between the light source and the faceplate of the tube. (See Fig. 8)

Fig.1 Typical Spectral Response Characteristics

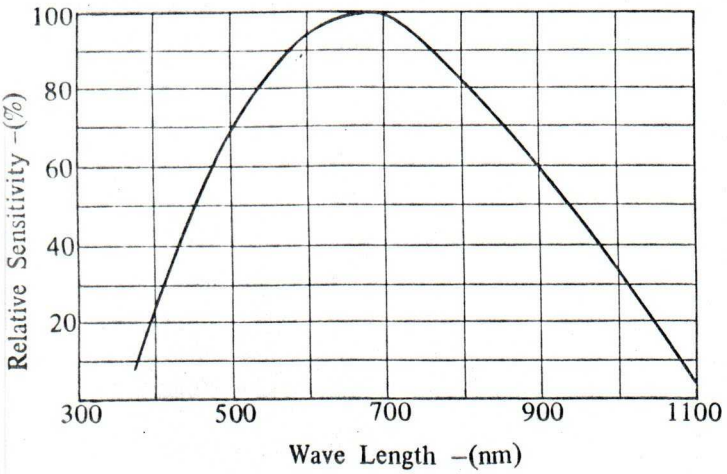


Fig.2 Typical Dark Current Characteristics

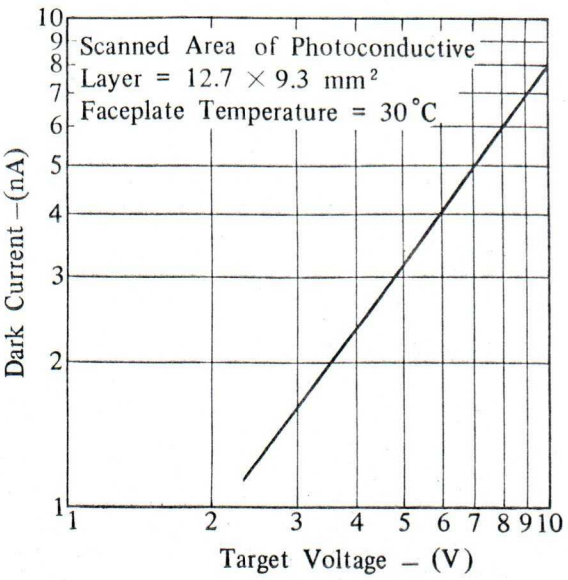


Fig.3 Typical Light Transfer Characteristics

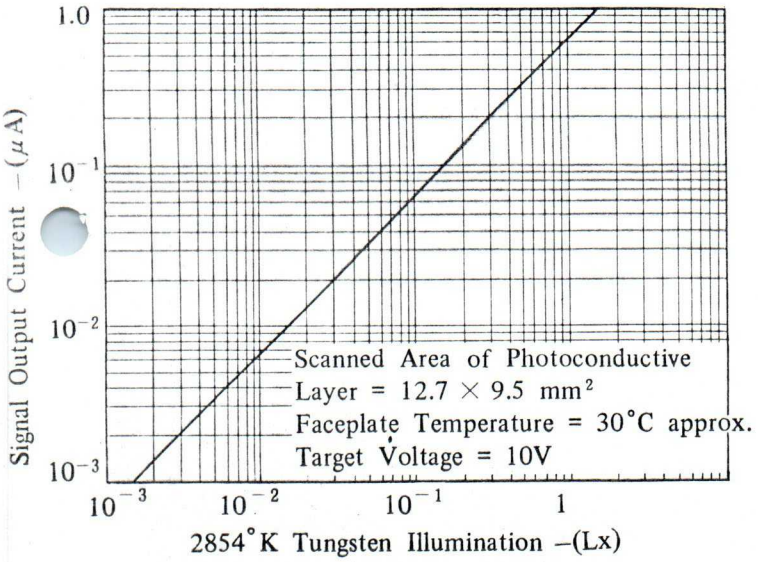


Fig.4 Typical Temperature Charateristics

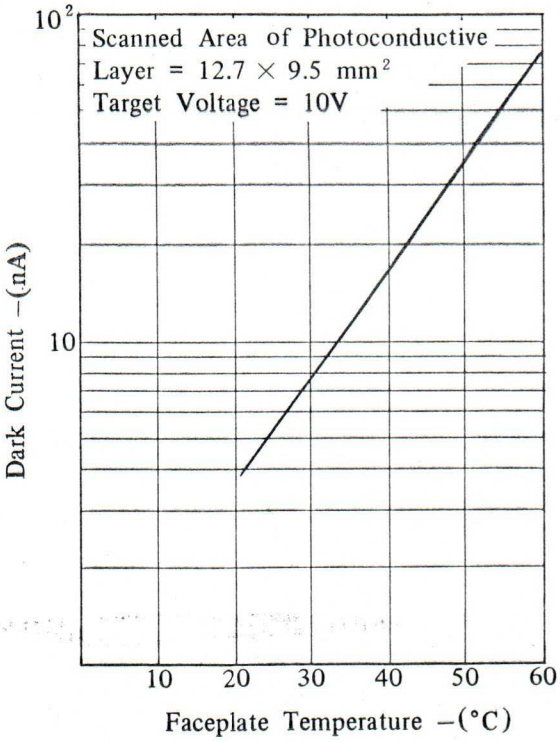


Fig.5 Typical Lag Characteristics

Target Voltage = 10 V
Scanned Area of Target = 12.7 × 9.5 mm²
Faceplate Temperature = 30°C (Approx.)

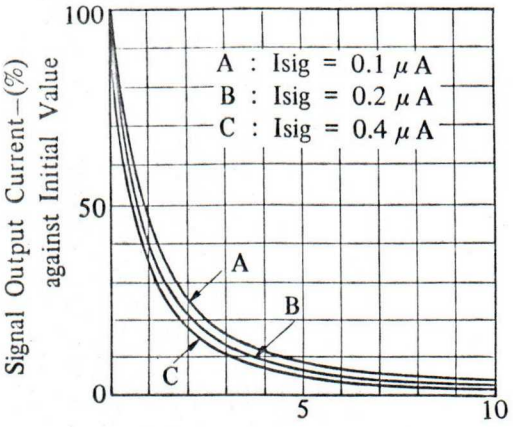


Fig.6 Typical Horizontal Square –Wave Response

Target Voltage = 10V
Highlight Target = 200 nA
Grid No..G4 Voltage=300V, Grid No.G3 Voltage=180V

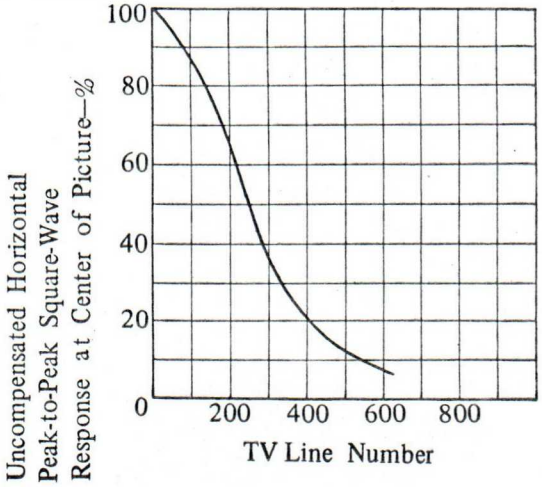


Fig.7 Typical Transmission of Infrared Absorbing Filter, Thickness = 5.0 mm

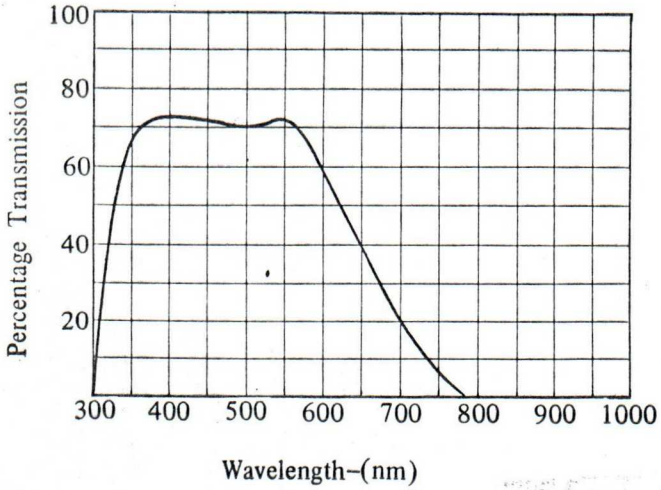


Fig.8 Typical Transmission of Toshiba IR-DIB Visible Absorbing Filter

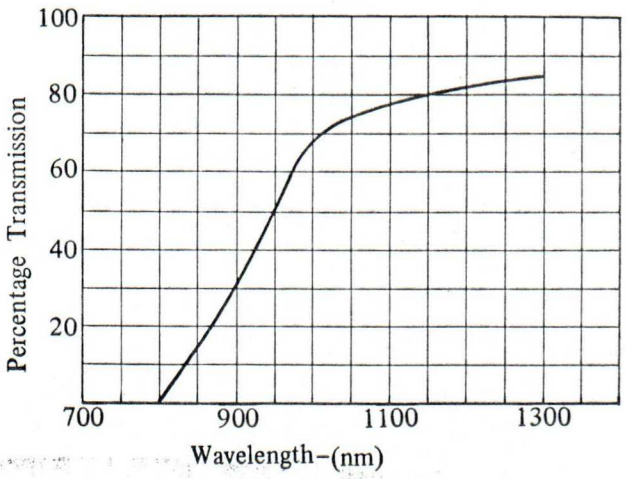


Fig.9 Typical Lag Characteristics

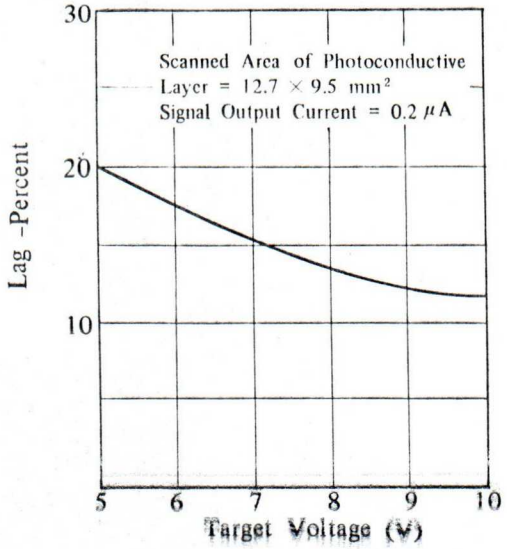
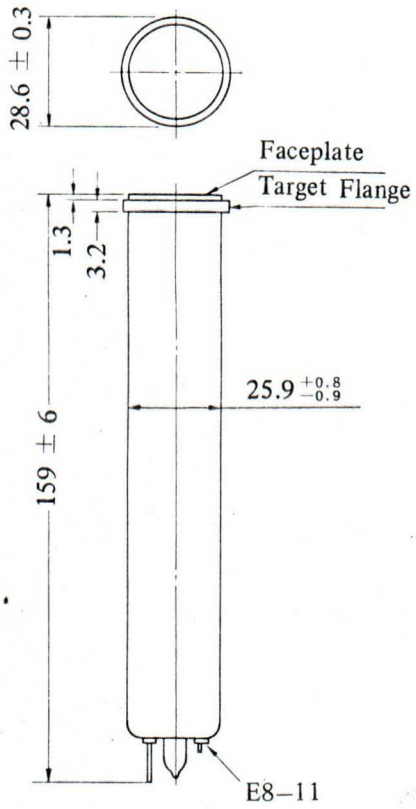
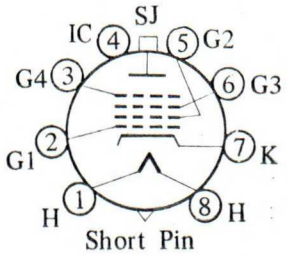


Fig.10 Outline



Base Connections (Bottom View)



Pin 1. Heater
Pin 2. Grid No. 1
Pin 3. Grid No. 4
Pin 4. Internal Connection
Do Not Use
Pin 5. Grid No. 2
Pin 6. Grid No. 3
Pin 7. Cathode
Pin 8. Heater
SJ . Target

Short Index Pin: Internal Connection Do Not Use.

Unit : mm

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K73-2-10 Printed in Japan

VIDICON TUBE N747

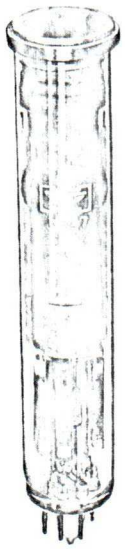
18-millimeter (2/3 inch) Diameter Vidicon Camera Tube Employing Silicon Diode array Target.

* Silicon Photoconductor Having Broad Spectral Range 380 to 1100 nm.
* Extremely High Sensitivity-4300 μA/lm.
* No Burn-In.
* Extremely Low Lag.
* Very Low Dark Current.

Hamamatsu N747 is a 18-millimeter (2/3 inch) diameter, magnetic focus and deflection vidicon type camera tube employing silicon-diode array target structure.

The electron-gun structure of the N745 is similar to that of the 8844 and provides separate connections for grid No. 4 and grid No. 3 and low power heater which requires only 0.6 watt.

The N747 has many advantages over conventional antimony trisulfide vidicons : extremely high sensitivity, very broad spectral response, very low dark current, very low lag and burn-in freedom.



GENERAL DATA

Electrical:	
Cathode	
Heater Voltage	6.3 ± 10% V
Heater Current	95 mA
Direct Interelectrode Capacitance (Note 1)	
Target to all other electrodes	2.0 pF
Spectral Sensitivity	See Fig.4
Focusing Method	Magnetic
Deflecting Method	Magnetic
Mechanical:	
Base	Small-Button Miniature 7-pin (JEDEC No.E7-1 with exhaust pipe)
Dimensions:	
Overall Length	103 mm max.
Maximum Diameter	19.6 ± 0.2 mm
Useful Size of Rectangular Image (4 × 3 aspect ratio)	11 mm (diagonal)
Orientation:	
Proper orientation is obtained when the horizontal scan is essentially parallel to the plane passing through the tube is axis and pin 4.	
Net weight (Approx.)	25 g

MAXIMUM RATINGS

(Absolute Maximum Values: For scanned area of 8.8 × 6.6 mm^2)

Heater Voltage	6.3 ± 10%	V
Grid No. 4 Voltage	400	V
Grid No. 3 Voltage	400	V
Grid No. 2 Voltage	350	V
Grid No. 1 Voltage:		
Negative-bias value	300	V
Positive-bias value	0	V
Peak Heater to Cathode Voltage:		
Heater Negative with Respect to Cathode	125	V
Heater Positive with Respect to Cathode	10	V
Target Voltage	300	V
Peak Target Current	0.7	μA
Faceplate:		
Illumination (Note 2)	10^8	Lx
Temperature	−20 ~ 70 °C	

TYPICAL OPERATION

(With tube operated in a D.O.K. coil No.VY-203)

Scanned Area	8.8 × 6.6	mm^2
Faceplate Temperature (Note 3)	25 ~ 35	°C
Grid No. 4 Voltage (Note 4)	300	V
Grid No. 3 (Beam Focus Electrode) Voltage	180	V
Grid No. 2 Voltage	300	V
Grid No. 1 Voltage for Picture Cut−off (Note 5)	−35 ~ −80	V
Target Voltage	6 ~ 10	V
Average "Gamma"	1	
Lag-Percent of Initial Value of Signal-Output Current 1/20 Second after Illumination is Removed (Note 7)	4	%
Peak-to-Peak Blanking Voltage:		
When applied to grid No. 1	65	V
When applied to cathode	20	V
Field Strength at the Center of Focusing Coil	40	Gausses
Field Strength of Adjustable Alignment Coil	0 ~ 4	Gausses
Limiting Resolution:		
At center of picture	400	TV lines
At corner of picture	350	TV lines
Amplitude Response to a 400 TV Line Square-Wave Test Pattern at Center of Picture (See Fig. 6)	8	%
Sensitivity to Tungusten Light Source (Note 8)		
Sensitivity	4300	μA/lm
Faceplate Illumination	1	Lx
Dark Current (Note 9)	5	nA
Typical Signal-Output Current	0.25	μA

Sensitivity to Visible Light (Note 10)		
Illumination from 2854°K Light Source Incident on Infrared Absorbing Filter	10	Lx
Dark Current (Note 9)	5	nA
Typical Signal-Output Current	0.31	μA
Sensitivity to Infrared Light (Note 11)		
Illumination from 2854°K Light Source Incident on Visible Absorbing Filter	10	Lx
Dark Current	5	nA
Typical Signal-Output Current	0.32	μA

NOTES:

1. This capacitance, which effectively is the output impedance of the N747, is increased when the tube is mounted in the deflecting-yoke and focusing-coil assembly. The resistive component of the output impedance is in the order of 100 megohms.
2. The N747 can withstand the illumination contained in a focused image of the sun without damage.
3. With increasing temperature of the faceplate, dark current increases. Therefore Operation with a faceplate temperature in the range less than 50°C is usually recommended. (See Fig.3)
4. For the best picture qualities with a Denki Onkyo Assembly, grid No. 4 voltage should be adjusted to approximately 1.6 times the grid No. 3 voltage value. The ratio of grid No. 4 voltage to grid No. 3 voltage with tube operated, for the best picture qualities changes a little in the different coil assemblies. To reduce beam raster burn caused by long operating time, low grid No. 4 voltage is desirable. Therefore low-voltage operation, in which grid No. 4 voltage is 300 Volts and grid No. 3 voltage 180 Volts, is usually recommended.
5. With no blanking voltage on grid No. 1.
6. Target Voltage should be adjusted to provide an optimum operating dark current and lag.
7. For an initial signal-output current of 200 nanoamperes and at target voltage of 10 volts. (See Fig. 5)
   With increasing target voltage, lag decreases. (See Fig. 9)
8. The Tungusten lamp is operated at colour temperature of 2854° K.
9. Dependance of dark current on target voltage and dependance of dark current on faceplate temperature are shown in Fig.2 and Fig. 3 respectively.
10. With the same light souce specified in note 8 except on infrared absorbing filter (Schott Jenaer KG-3, 5.5 mm thick) is interposed between the light source and the faceplate of the tube. (See Fig. 7)
11. With the same light souce specified in note 8 except on infrared transmitting filter (Toshiba IR-DIB) is interposed between the light source and the faceplate of the tube. (See Fig. 8)

Fig.1 Typical Light Transfer Characteristic

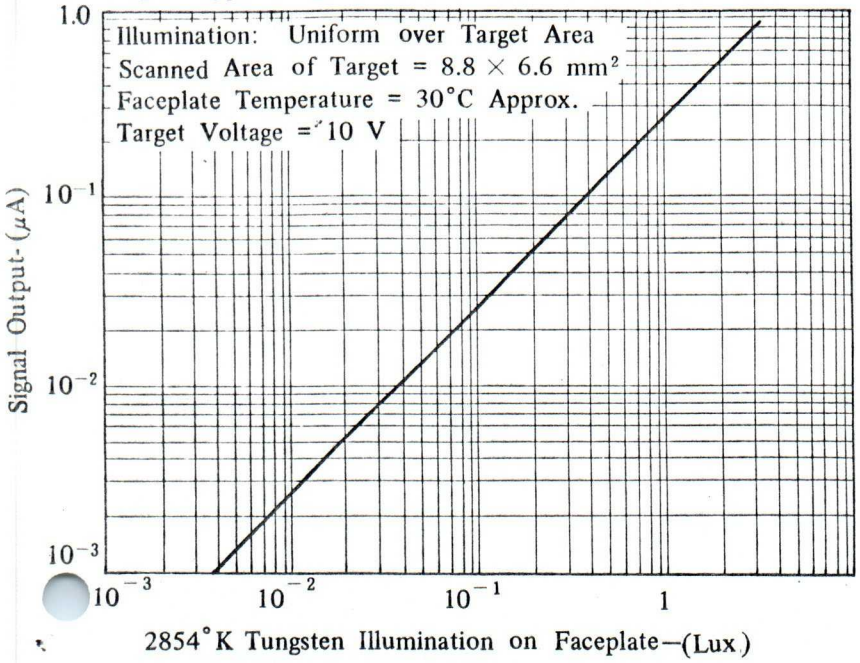


Fig.2 Typical Dark Current—Target Voltage Characteristic

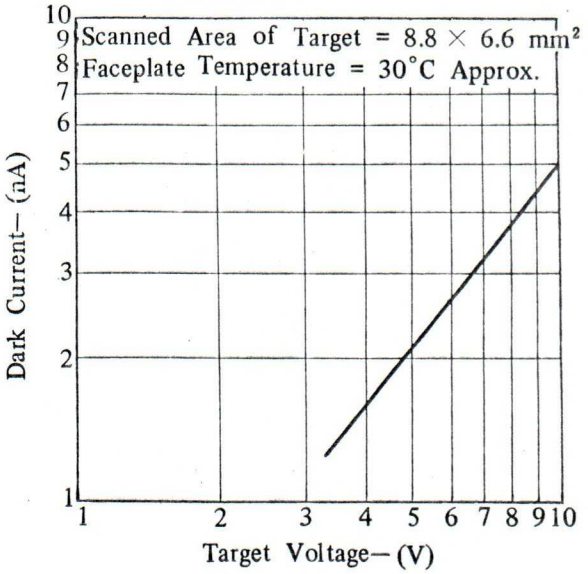


Fig.3 Typical Dark Current—Faceplate Temperature Characteristics

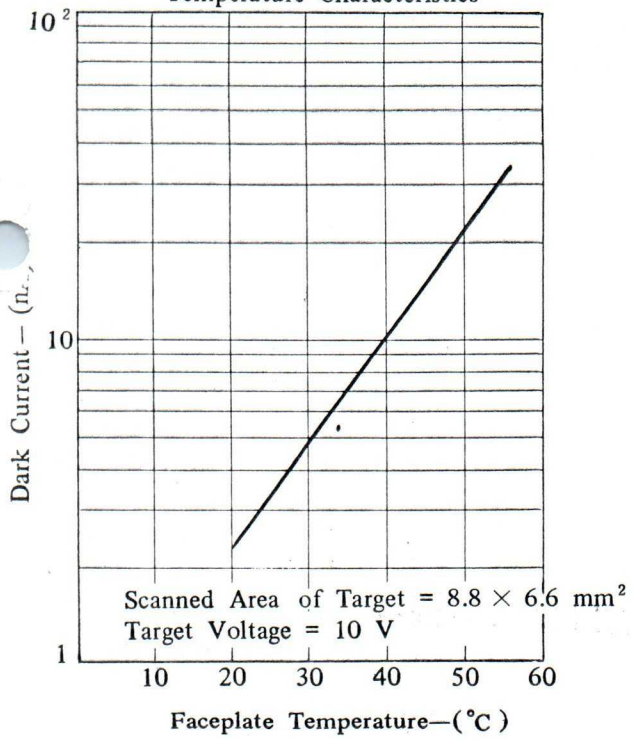


Fig.4 Typical Spectral Sensitivity Characteristic

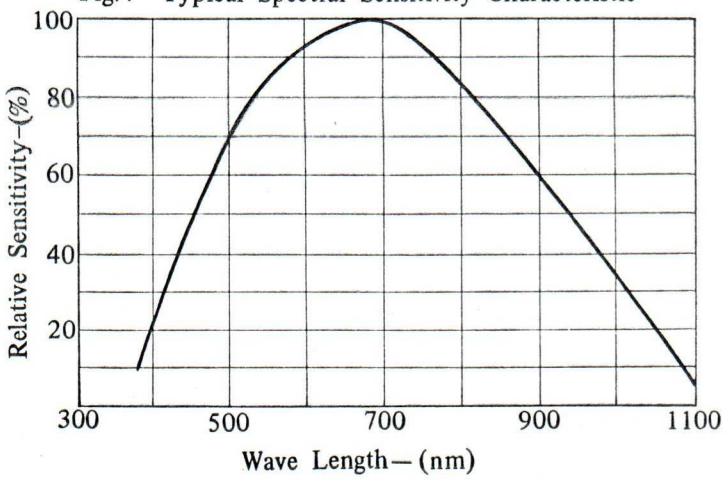


Fig.5 Typical Lag Characteristics

Target Voltage = 10 V
Scanned Area of Target = 8.8 × 6.6 mm²
Faceplate Temperature = 30°C Approx.

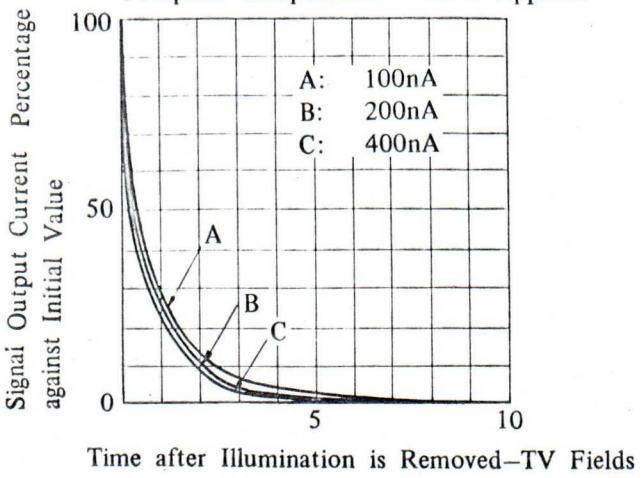


Fig.6 Typical Horizontal Square-Wave Response

Target Voltage = 10 V
Highlight Target = 200 nA

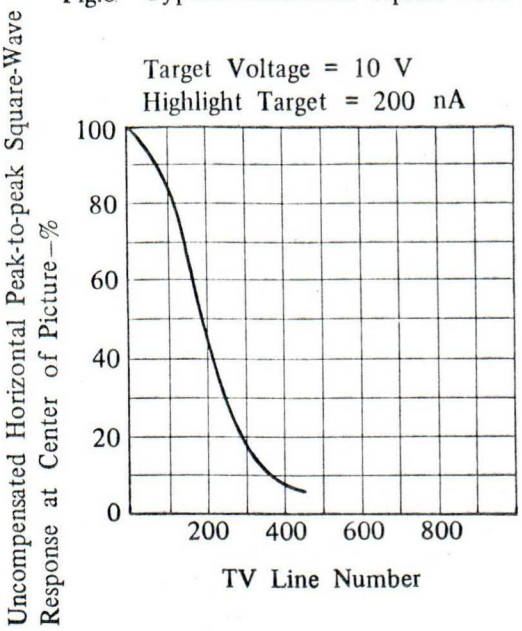


Fig.7 Typical Transmission of Schott Jenaer KG-3 Infrared Absorbing Filter, Thickness = 5.5 mm

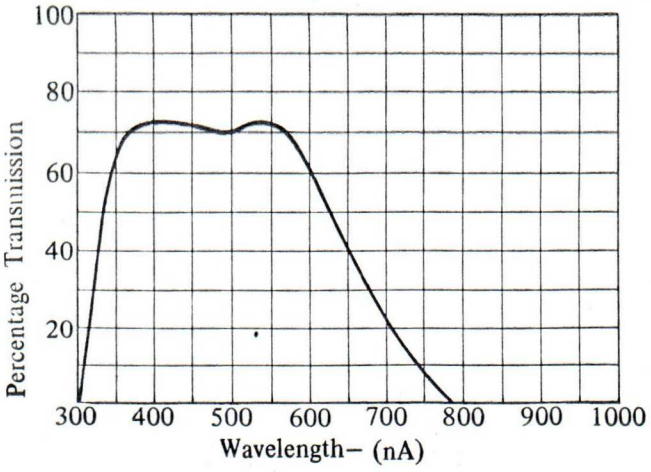


Fig.8 Typical Transmission of Toshiba IR-DIB Visible Absorbing Filter

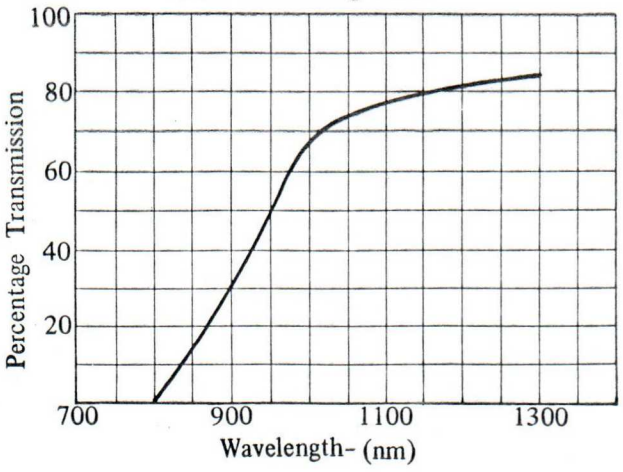


Fig.9 Lag-Target Voltage Characteristic
Scanned Area of Target = 8.8 × 6.6 mm²
Highlight Target = 200 nA

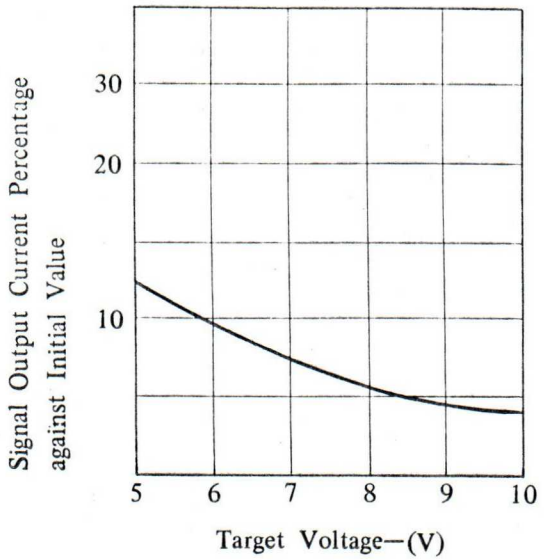
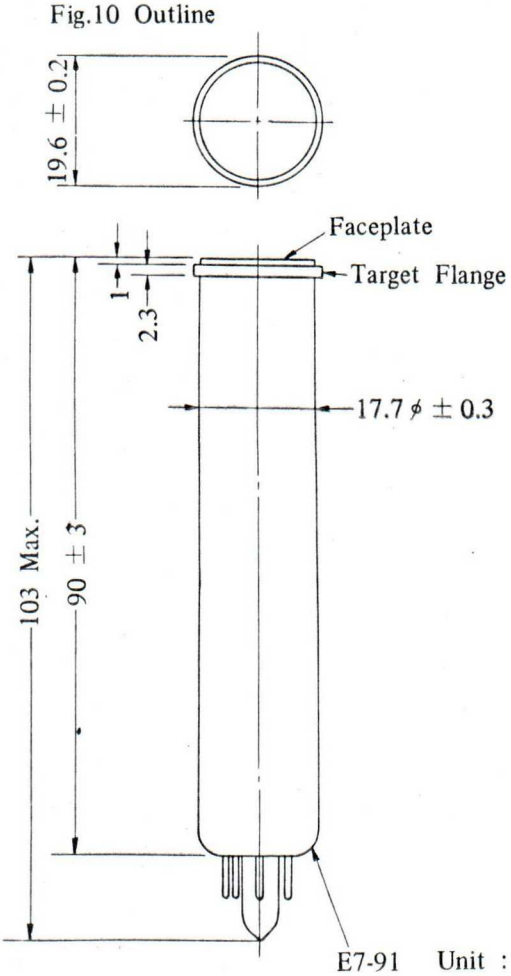
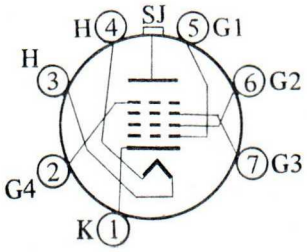


Fig.10 Outline



Unit : mm

Base Connection (Bottom View)



Pin 1. Cathode
Pin 2. Grid No. 4
Pin 3. Heater
Pin 4. Heater
Pin 5. Grid No. 1
Pin 6. Grid No. 2
Pin 7. Grid No. 3
SJ . Target

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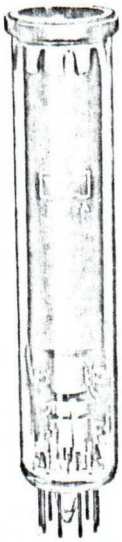
VIDICON TUBE 7262A



Hamamatsu 7262A is a small vidicon intended for use in compact, transistorized closed-circuit television camera.

Hamamatsu 7262A features low power heater which requires only 0.6 watt and short overall length. Because of the high sensitivity of the photoconductive surface employed by Hamamatsu 7262A, high quality pictures can be obtained under normal room-lighting conditions.

Hamamatsu 7262A is also suited for use in color television cameras.

GENERAL DATA

Electrical

Cathode: Oxide Coated

Heater Voltage	6.3 ± 10 % V
Heater Current	95 mA
Direct Interelectrode Capacitance:	
Target to all other electrodes	4.6 pF
Spectral Sensitivity	See Fig.1
Focusing Method	Magnetic
Deflecting Method	Magnetic
Mechanical:	
Base	Small-Button Ditetrar 8-pin (JEDEC No.E8-11)
Mounting Position	Any
Dimensions:	
Overall Length	130 ± 1.5 mm
Maximum Diameter	28.6 ± 0.3 mm
Maximum useful diagonal of Rectangular Image (4 × 3 aspect ratio)	15.7 mm

Orientation:

Proper orientation is obtained when the horizontal scan is essentially parallel to the plane passing through the tube axis and short index pin.

MAXIMUM RATINGS (Absolute Maximum Values)

Heater Voltage	6.3 ± 10%	V
Grid No.3 & Grid No.4 Voltage	750	V
Grid No.2 Voltage	750	V
Grid No.1 Voltage:		
Negative-bias value	300	V
Positive-bias value	0	V
Peak Heater to Cathode Voltage:		
Heater negative with respect to Cathode	125	V
Heater positive with respect to Cathode	10	V
Dark Current	0.25	μA
Peak Target Current	0.55	μA
Faceplate:		
Illumination	10^4	Lx
Temperature	−20~70	°C

TYPICAL OPERATION

For scanned area of 12.7 × 9.5 mm² and faceplate temperature of 30° to 35°C

Grid-No.3 (Beam-Focus Electrode) & Grid-No.4 Voltage (Note 1)	250 ~ 300	V
Grid-No.2 Voltage	300	V
Grid-No.1 Voltage for Picture Cutoff (Note 2)	−45 ~ −100	V
Average "Gamma" of transfer characteristic for signal-output current between 0.02μA and 0.2μA	0.65	
Signal output lag percentage at 1/20 second after illumination is turned off (Note 4)	20	%
Minimum Peak-to-Peak Blanking Voltage:		
When applied to grid No. 1	75	V
When applied to cathode	20	V
Field strength at center of Focusing Coil (Approx.)	40	Gausses
Field strength of Alignment Coil	0 ~ 4	Gausses
Limitting Resolution:		
At center of picture	650	TV lines
Amplitude Response to a 400 TV Line Square-Wave Test Pattern at center of picture	30	%
1) Maximum Sensitivity Operation		
Faceplace Illumination (Highlight)	1	Lx
Target Voltage (Note 3)	35 ~ 70	V
Dark Current	0.2	μA
Signal Output Current (Highlight)	0.14	μA
2) Average Sensitivity Operation		
Faceplate Illumination (Highlight)	10	Lx
Target Voltage (Note 3)	20 ~ 40	V
Dark Current	0.02	μA
Signal Output Current (Highlight)	0.20	μA

Note 1. Definition, focus uniformity, and picture quality decrease with decreasing the voltage of grid No. 4 and No. 3. Thesefore grid No. 4 and grid No. 3 should be operated over 250 volts. A substantial increase in both limiting resolution and amplitude response of the 7262A may be obtained by increasing grid No. 4 and grid No. 3 voltage to the maximum rating of 750 volts. With this mode of operation, the field strength of the focus must be increased to 70 gausses.

Note 2. With no blanking voltage on grid No. 1.

Note 3. The target voltage for each tube must be adjusted to that value which gives the desired operating dark current.

Note 4. For initial signal-output current of 0.2μA and a dark current of 0.02μA.

Fig.1 Typical Spectral Sensitivity Characteristics

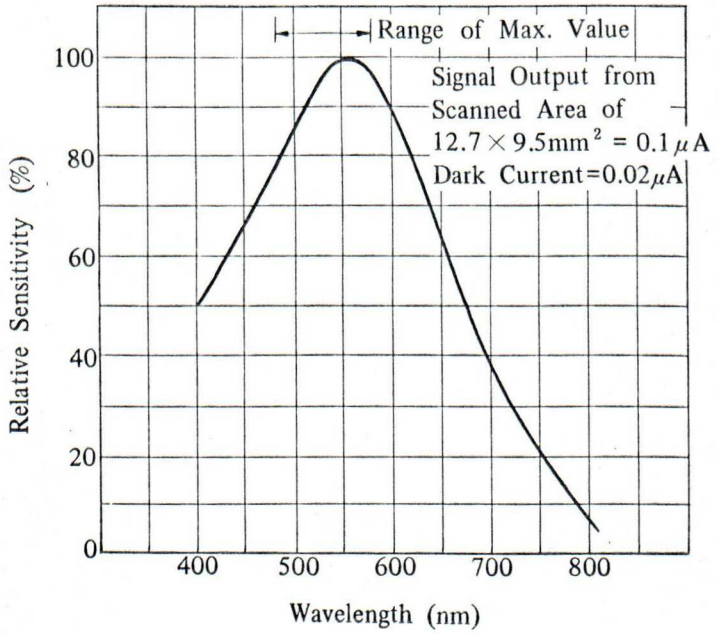


Fig.2 Typical Light Transfer Characteristics

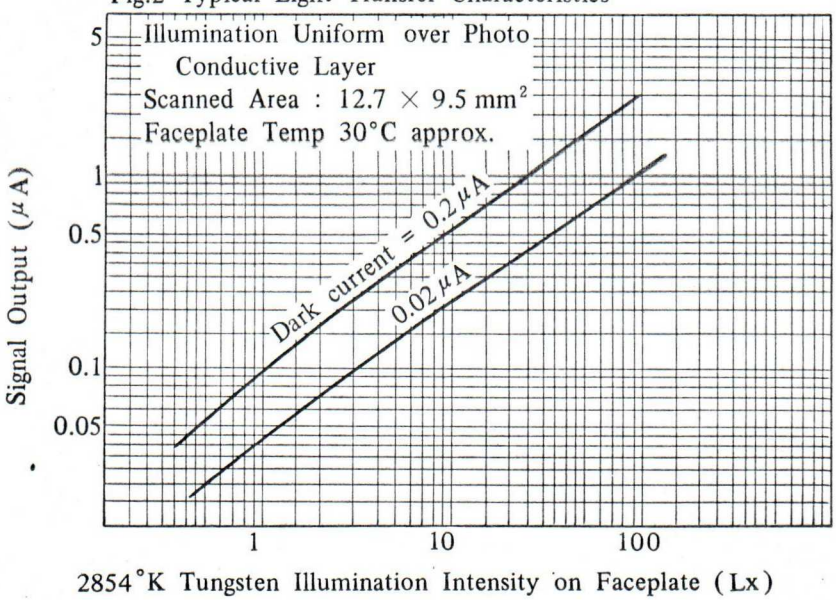


Fig.3 Typical Resistance Characteristics

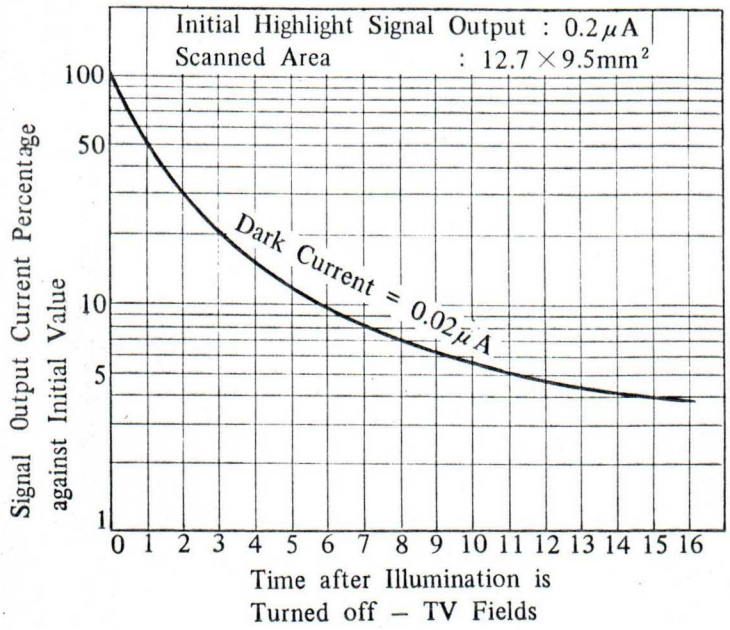
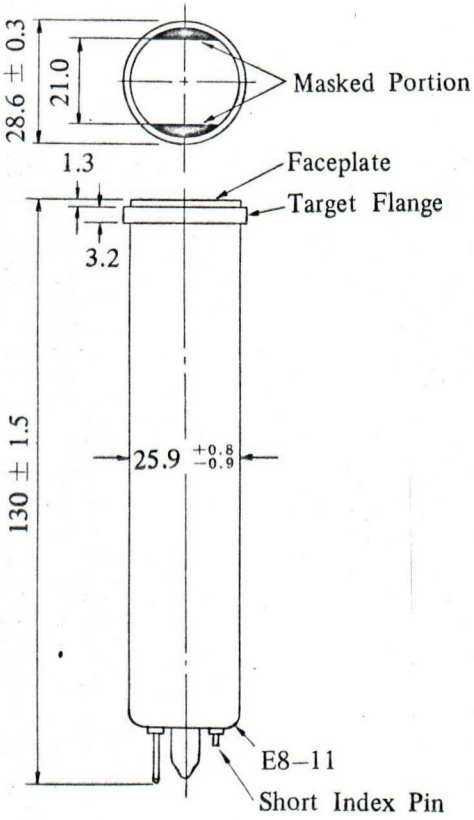
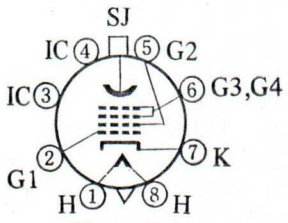


Fig.4 Outline



Unit : mm

Base Connections (Bottom View)



Short Pin

Pin 1. Heater
Pin 2. Grid No. 1
Pin 3. Internal Connection Do Not Use
Pin 4. Same as Pin 3
Pin 5. Grid No. 2
Pin 6. Grid No. 3 & Grid No. 4
Pin 7. Cathode
Pin 8. Heater
SJ . Target
Short Index Pin, Same as Pin 3.

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K73-2-10 Printed in Japan

VIDICON TUBE 7735A

Hamamatsu 7735A is a small camera tube intended for televising live scenes in industrial and other closed-circuit black-and-white TV applications. Because of the high sensitivity of the photo-conductive surface employed by Hamamatsu 7735A, high quality pictures can be obtained under normal room-lighting conditions, Hamamatsu 7735A is also suited for use in color television cameras.

For broadcasting television applications, Hamamatsu 7735A (For Broadcasting) is especially suitable.

GENERAL DATA

Electrical:

Cathode: Oxide Coated

Heater Voltage	6.3 ±10% V
Heater Current	0.6 A
Direct Interelectrode Capacitance:	
Target to all other electrodes	4.6 pF
Spectral Sensitivity	See Fig. 1
Focusing Method	Magnetic
Deflecting Method	Magnetic

Mechanical

Base	Small-Button Ditetrar 8-pin (JEDEC No.E8-11)
Mounting Position	Any
Dimensions:	
Overall Length	159 ± 3 mm
Maximum Diameter	28.6 ± 0.3 mm
Useful Size of Rectangular Image (4 × 3 aspect ratio)	15.7 mm (diagonal)

Orientation:

Proper orientation is obtained when the horizontal scan is essentially parallel to the plane passing through the tube axis and short index pin

Net Weight (Approx.)	60 g

MAXIMUM RATINGS (Absolute Maximum Values)

Heater Voltage	6.3 ± 10%	V
Grid No.3 & Grid No.4 Voltage	750	V
Grid No.2 Voltage	750	V
Grid No.1 Voltage:		
Negative-bias value	300	V
Positive-bias value	0	V
Peak Heater to Cathode Voltage:		
Heater Negative with Respect to Cathode	125	V
Heater Positive with Respect to Cathode	10	V
Dark Current	0.25	μA
Peak Target Current	0.55	μA
Faceplate:		
Illumination	10^4	Lx
Temperature	−20 ~ 70	°C

TYPICAL OPERATION

For scanned area of 12.7 × 9.5 mm^2 and faceplate temperature of 30° to 35°C

Grid-No.3 (Beam-Focus Electrode) & Grid-No.4 Voltage (Note 1)	250 ~ 300	V
Grid-No.2 Voltage	300	V
Grid-No.1 Voltage for Picture Cutoff (Note 2)	−45 ~ −100	V
Average "Gamma" of Transfer Characteristic for signal-output current between 0.02 μA and 0.2 μA	0.65	
Lag Percent of Initial value of signal-output current 1/20 second after illumination is removed (Note 4)	20	%
Minimum Peak-to-Peak Blanking Voltage:		
When applied to grid No.1	75	V
When applied to cathode	20	V
Field Strength of Center of Focusing Coil (Approx.)	40	Gausses
Field Strength of Adjustable Alignment Coil	0 ~ 4	Gausses
Limitting Resolution:		
at center of picture	650	TV lines
Amplitude Response to a 400 TV Line Square-Wave Test Pattern		
at center of picture	30	%
1) Maximum Sensitivity Operation		
Faceplate Illumination (Highlight)	0.1	Lx
Target Voltage (Note 3)	35 ~ 70	V
Dark Current	0.2	μA
Signal Output Current (Highlight)	0.14	μA
2) Average Sensitivity Operation		
Faceplate Illumination (Highlight)	10	Lx
Target Voltage (Note 3)	20 ~ 40	V
Dark Current	0.02	μA
Signal Output Current (Highlight)	0.20	μA

Note 1. Definition, focus uniformity, and picture quality decrease with decreasing grid No. 4 and No. 3 voltage. In general grid No. 4 and grid No. 3 should be operated above 250 volts. A substantial increase in both limiting resolution and amplitude response of the 7735A may be obtained by increasing grid No. 4 and grid No. 3 voltage to the maximum rating of 750 volts. With this mode of operation, the focus-coil field strength must be increased to 70 gausses.

Note 2. With no blanking voltage on grid No. 1.

Note 3. The target voltage for each tube must be adjusted to that value which gives, the desired operating dark current.

Note 4. For initial signal-output current of 0.2 μA and a dark current of 0.02 μA.

Fig.1 Typical Spectral Sensitivity Characteristics

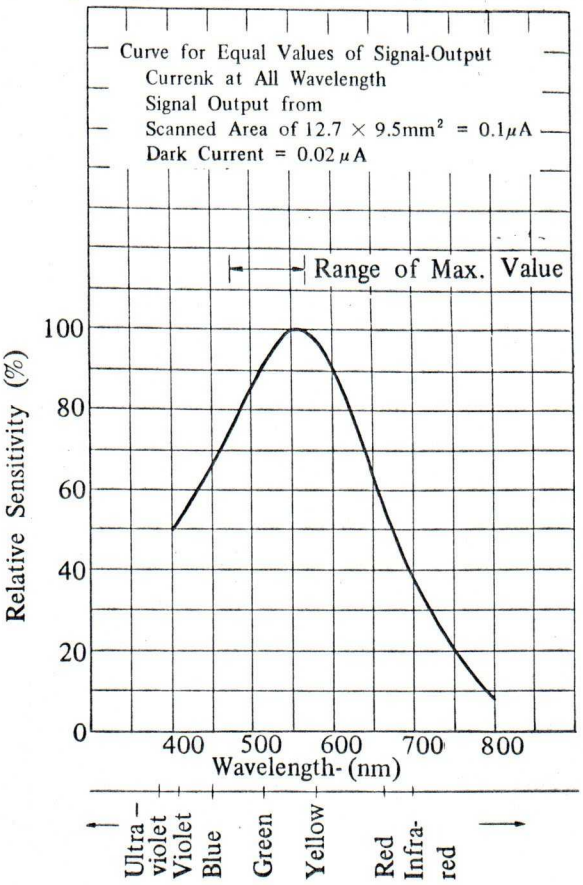


Fig.2 Typical Light Transfer Characteristics

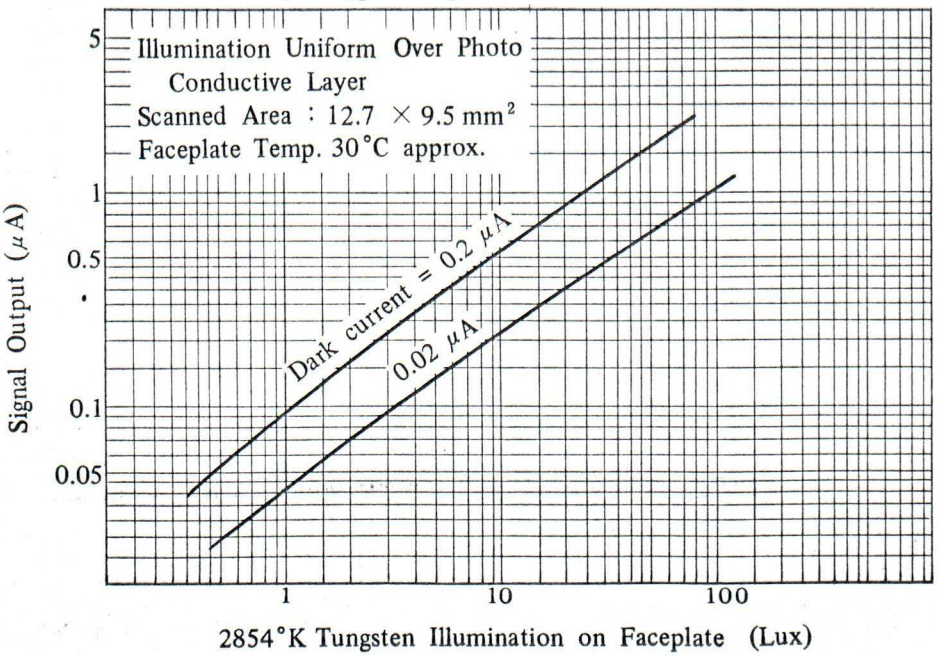


Fig.3 Typical Resistance Characteristics

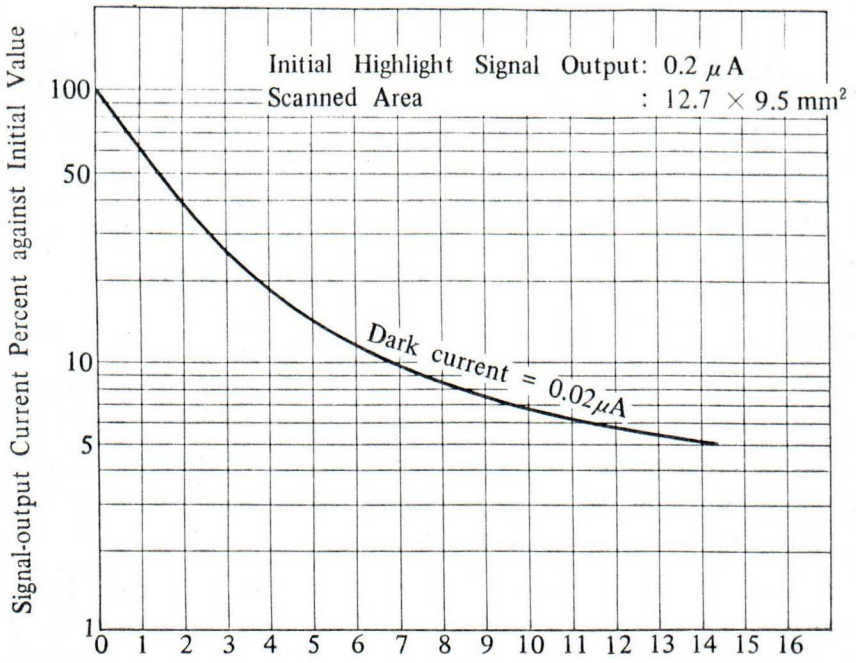
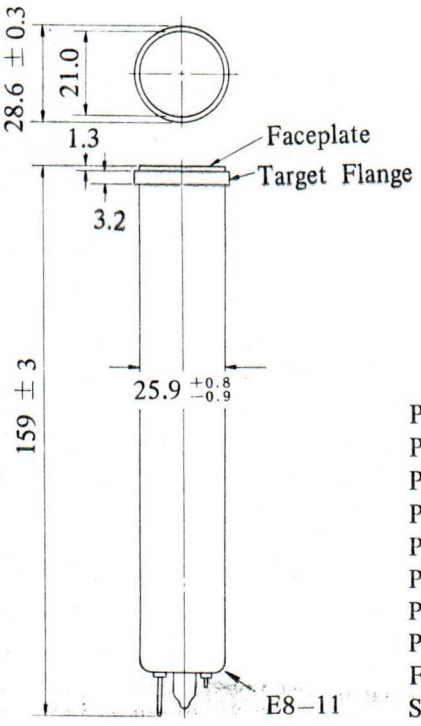
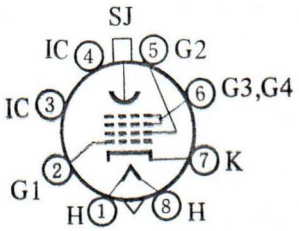


Fig.4 Outline



Unit : mm

Base Connections (Bottom View)



Short Pin

Pin 1. Heater
Pin 2. Grid No. 1
Pin 3. Internal Connection Do Not Use
Pin 4. Same as Pin 3
Pin 5. Grid No. 2
Pin 6. Grid No. 3 and Grid No. 4
Pin 7. Cathode
Pin 8. Heater
Flange. Target
Short Index Pin. Same as Pin 3.

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K73-2-10 Printed in Japan

VIDICON TUBE 8844

Hamamatsu 8844 is a 18mm dia, small vidicon featuring small size, low-lag and high resolution capability. It is designed especially for black-and-white and color television pickup in industrial closed circuit TV system where a compact transistorised television camera with high resolution is required.

The 8844 incorporates in its small size, a mesh electrode with separate external connection. The isolated mesh electrode permits the 8844 to operate in high beam current with small distortion and least resolution change.

GENERAL DATA

Heater Characteristics:	
Heater Voltage	6.3 ± 10 % V
Heater Current	95 mA
Direct Interelectrode Capacitance:	
Target to all other electrodes	2.0 pF
Spectral Response	See Fig.2
Photoconductive Layer:	
Maximum useful diagonal of rectangular image (4 × 3 aspect ratio)	11 mm
Focusing Method	Magnetic
Deflection Method	Magnetic
Overall Length	103
Maximum Diameter	19.6±0.2 mm
Bulb	See Dimensional Outline
Base	E7-91
Coil Assembly	DOK–VY–203 or equivalent
Mounting Position	Any
Net Weight (Approx.)	25 g

MAXIMUM RATINGS

(Absolute, maximum value: For scanned area of 8.8 × 6.6mm²)

Grid-No.4 Voltage	1,000 V
Grid-No.3 Voltage	750 V
Grid-No.2 Voltage	350 V

Grid-No.1 Voltage:		
Negative bias value	300	V
Positive bias value	0	V
Peak Heater-Cathode Voltage:		
Heater negative with respect to cathode	125	V
Heater positive with respect to cathode	10	V
Target Voltage	100	V
Dark Current	0.15	μA
Peak target current	0.5	μA
Faceplate:		
Illumination	10^4	Lx
Temperature	−20 ~ 60	°C

TYPICAL OPERATION

For scanned area of 8.8 × 6.6mm²
Faceplate temperature of 30° to 35°C

Grid-No.4 Voltage	400	V
Grid-No.3 (Beam focus electrode) Voltage	240	V
Grid-No.2 (Accelerator) Voltage	300	V
Grid-No.1 Voltage for Picture Cutoff	−35 ~ −80	V
Average "Gamma" of Transfer Characteristic for Signal-Output Current between 0.02 μA and 0.2 μA	0.65	
Lag-Percent of Initial Value of Signal-Output Current 1/20 Second after Illumination is Removed (Maximum Value)	25	%
Minimum Peak-to-Peak Blanking Voltage:		
When applied to grid No.1	65	V
When applied to cathode	20	V
Limitting Resolution:		
at center of picture	650	TV lines
Amplitude Response to 400 TV Line Square-Wave Test Pattern at Center of Picture	25	%
Field Strength at Center of Focusing Coil (Approx.)	50	Gausses
Field Strength of Adjustable Alignment Coil	0 ~ 4	Gausses
Average-Sensitivity Operation		
Faceplate Illumination (Highlight)	10	Lx
Target Voltage	10 ~ 40	V
Dark Current	0.02	μA
Signal-Output Current: (Minimum)	0.1	μA

Fig.1 Typical Range of Dark Current

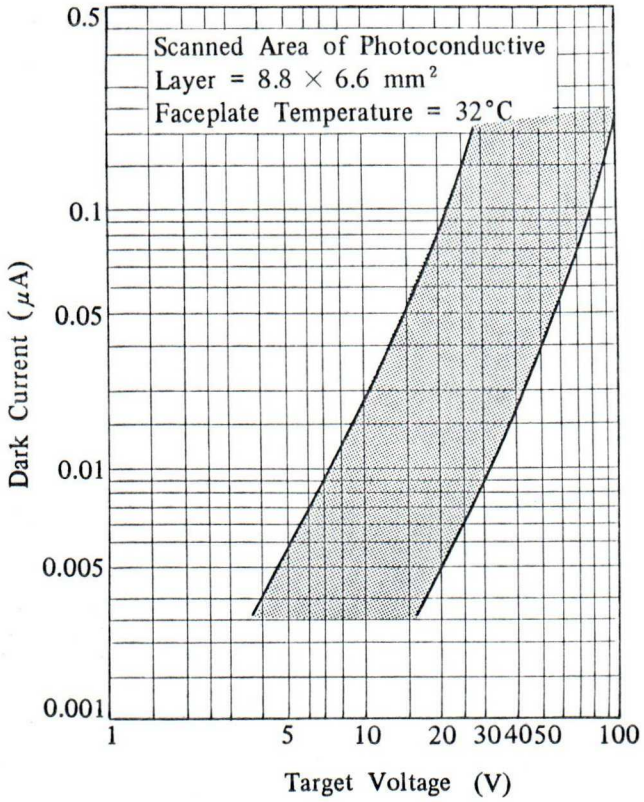


Fig.2 Typical Spectral Sensitivity Characteristic

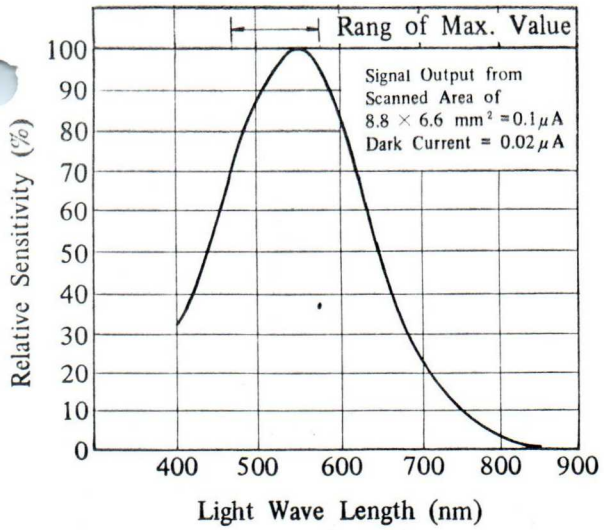


Fig.3 Typical Persistence Characteristics

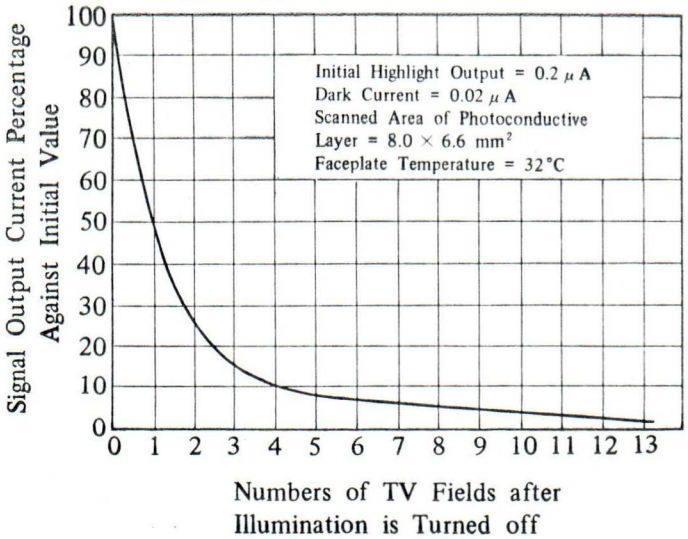


Fig.4 Typical Light Transfer Characteristics

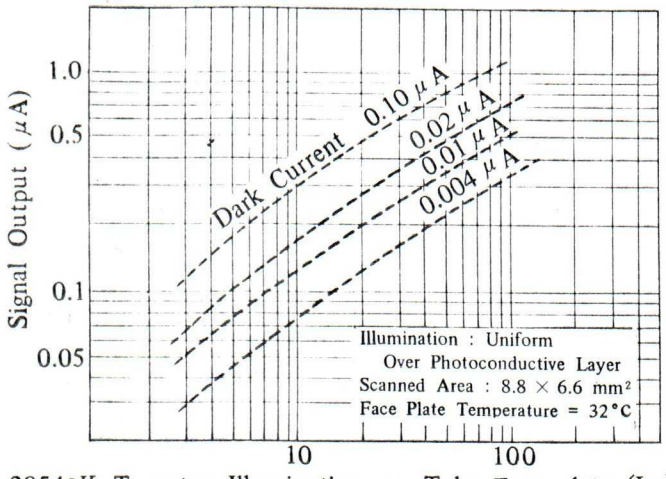


Fig.5 Typical Horizontal Square-Wave Respo

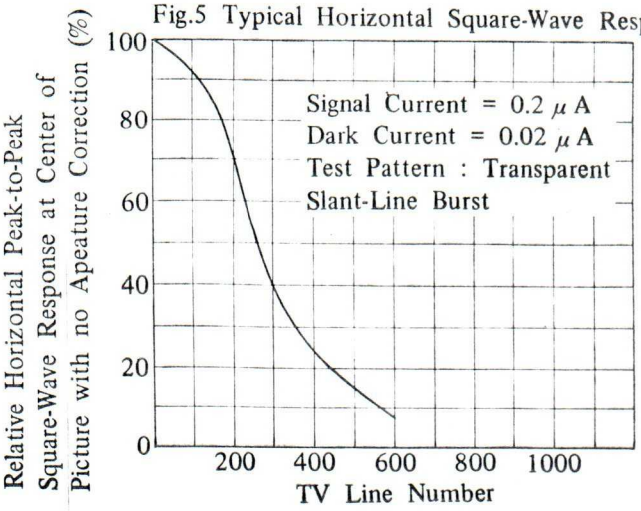
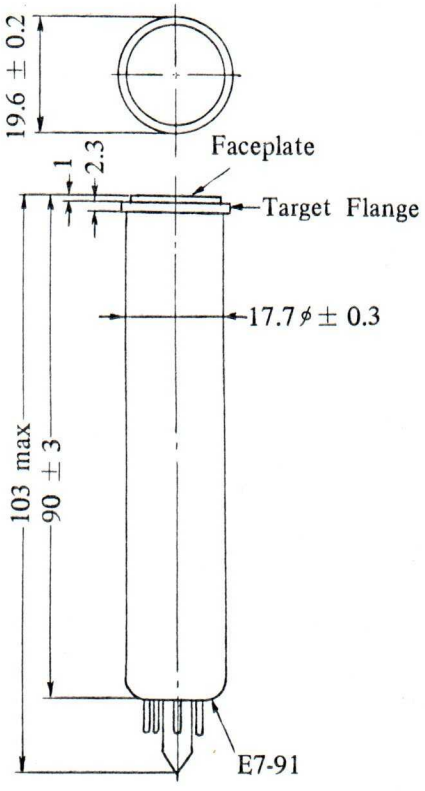
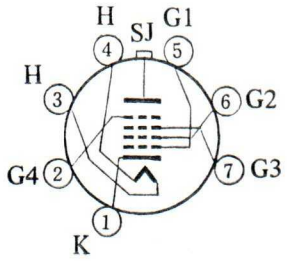


Fig.6 Outline



Base Connection (Bottom View)



Pin 1. Cathode
Pin 2. Grid No.4
Pin 3. Heater
Pin 4. Heater
Pin 5. Grid No.1
Pin 6. Grid No.2
Pin 7. Grid No.3
SJ . Target

Unit : mm

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K73-2-10 Printed in Japan

TELEVISION PICKUP TUBE FOR INFRARED RAYS

VIDICON TYPE N 1 5 6

Tentative Data

HTV-N156 is infrared pickup tube of 6 inches long vidicon type. Its threshold wavelength extends over 2 microns so that it is possible to see the objects in darkness illuminated with infrared radiation.

The sensitivity of these tubes is sufficient to image objects at 200°C, by their own thermal radiation, therefore, they can be used to measure temperature and to observe its distribution.

Another interesting applications of these tubes are observing crystal dislocations of the semi-conductor silicon or germanium, laser patterns and hydrogen flame under the sunlight, etc.

This tube can be operated by TV cameras which operate ordinary 6 inches long vidicons.

D A T A

GENERAL:

Heater, for Unipotential Cathode;	
Voltage (AC or DC)	6.3 ± 10% volts
Current	0.15 amp
Spectral Response	See curves in Fig.1 and Fig.2
Photoconductive Layer:	
Maximum useful diagonal of rectangular image (4 x 3 aspect ratio)	16 mm (0.62 inch)
Focusing Method	Magnetic
Deflection Method	Magnetic
Overall Length	159 ± 6 mm (6.25" ± 0.25")
Greatest Diameter	28.6 ± 0.3 mm (1.125" ± 0.010")
Bulb	T-8
Base	Small-Button Ditetrar 8-pin(JEDEC NO. E8-11)

MAXIMUM RATINGS, Absolute Values:

For scanned area of 12.7 x 9.5 mm (1/2" x 3/8")

SIGNAL ELECTRODE VOLTAGE	125 max. volts
GRID-NO.4 &. GRID- NO.3 VOLTAGE	350 max. volts
GRID-NO.2 VOLTAGE	350 max. volts
GRID-NO.1 VOLTAGE	
Negative bias value	125 max. volts
Positive bias value	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
DARK CURRENT	0.05 max. μa
FACEPLATE:	
Illumination	50 foot-candles 100 IR foot-candles*
Temperature	60 max. °C

TYPICAL OPERATION:

Grid-No.3 connected to grid-No.4; scanned area of 12.7 x 9.5 mm (1/2" x 3/8"); faceplate temperature of 25 to 35 °C.

Signal-Electrode Voltage	10 to 40 volts
Grid-NO.4 & Grid-NO.3 Voltage	250 to 300 volts
Grid-No.2 Voltage	300 volts
Grid-No.1 Voltage for Picture Cutoff	-45 to -100 volts
Signal-Output Cuttent at 1 IR foot-candle	0.07 to 0.20 μa
Dark Current	0.02 μa
Minimum Peak-to-Peak Blanking Voltage:	
When applied to grid-No.1	40 volts
When applied to cathode	10 volts
Field Strength at Center of Focusing Coil (Approx.)	40 gausses
Field Strength of Adjustable Alignment Coil	0 to 4 gausses

---

* 1 IR foot-candle is defined as the infrared illumination intensity through a infrared filter (IR-DI) where illumonation intensity from a tungsten lamp of color timperature 2870 °K is 1 foot-candle.

Note:

Mechanical positioning of the Tube:

The plane passing though the index pin and the axis of the tube shall be parallel with the horizontal scanning direction.

Precautions to Observe:

The tube should not be handled to keep sensitive surface down.

Fig. 1 Spectral Response of Type N156 and N157

(Infrared Region)

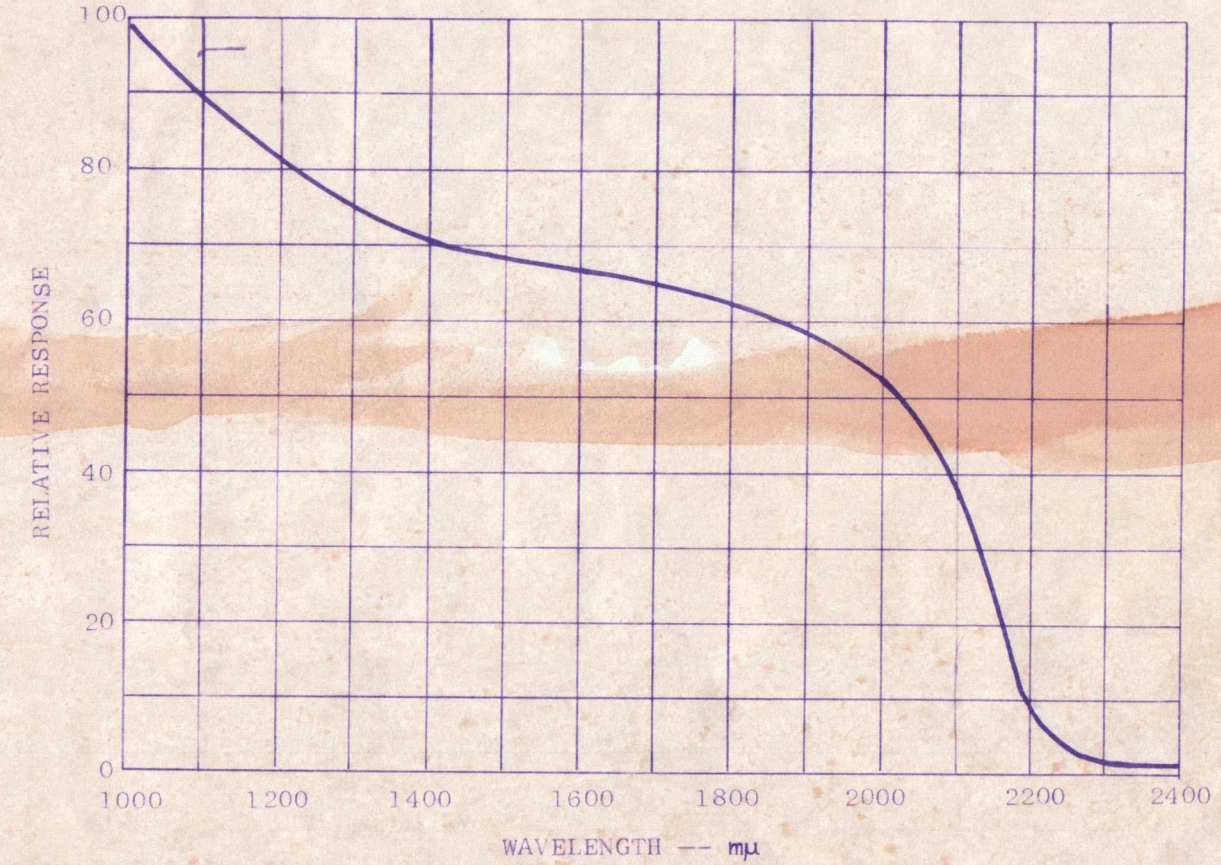


Fig. 2 Spectral Responce of Type N156 and N157

(Visible and Near Infrared Region)

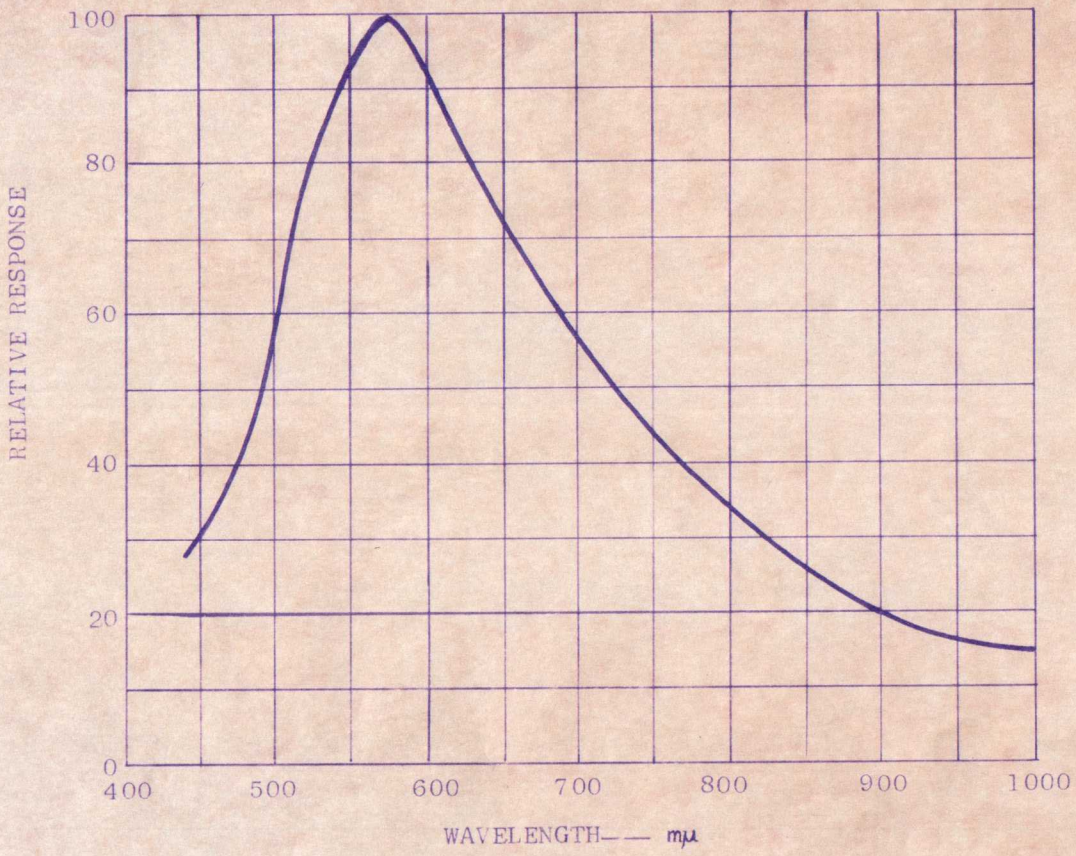
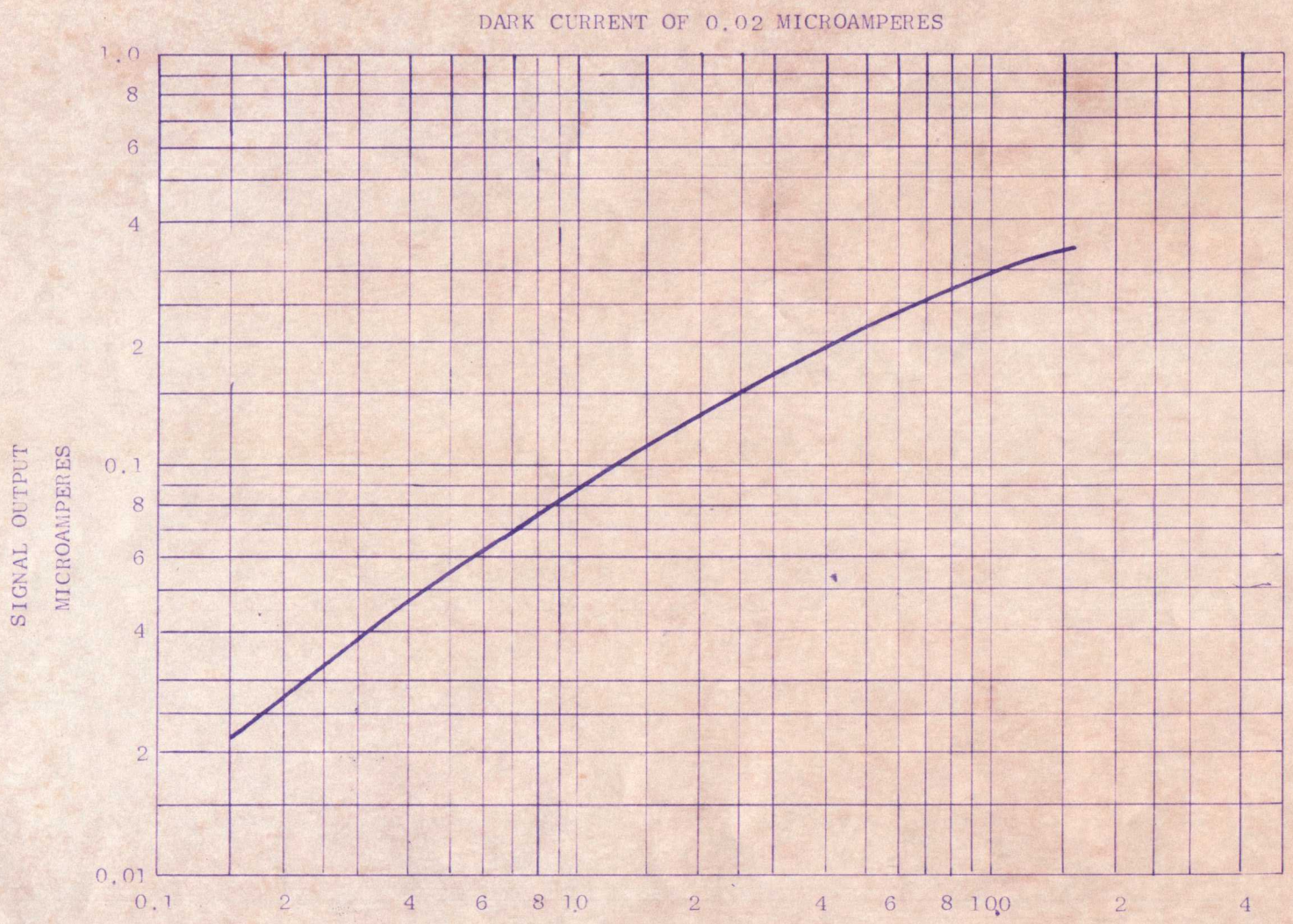


Fig. 3 Light Transfer Characteristics of Type N156 and N157



Note: 1 IR foot-candle is defined as the infrared illumination intensity through a infrared filter (MAZDA IR-D1) where illumination intensity from a tungsten lamp of color temperature 2870°K is 1 foot-candle.

Fig. 4 Spectral Transmittance of TOSHIBA IR-D1 filter

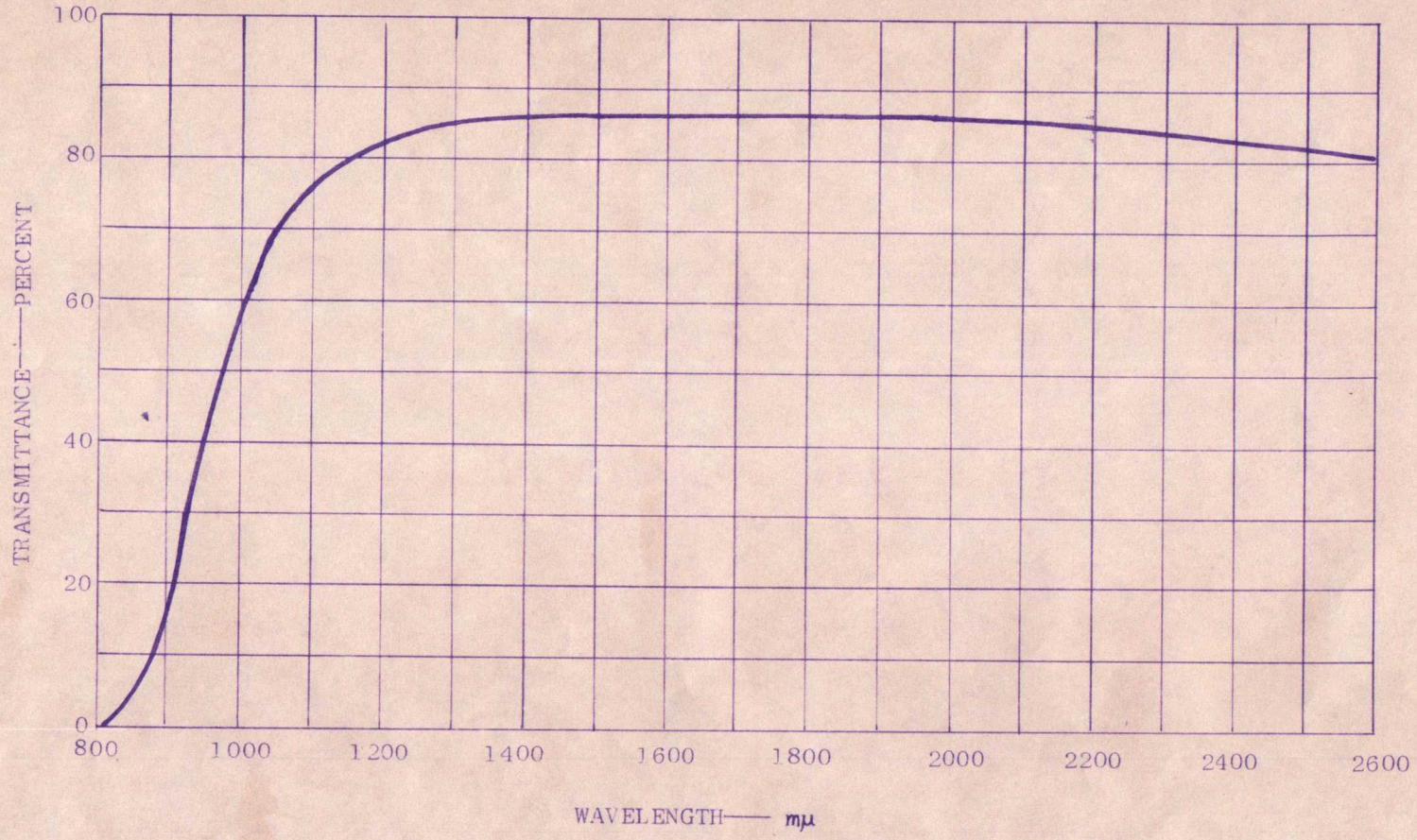


Fig. 6 SPECTRAL SENSITIVITY OF TYPE N156 AND N157

Scanned area of photoconductive layer = 12.7 x 9.5 mm

Dark current = 0.02 microamperes

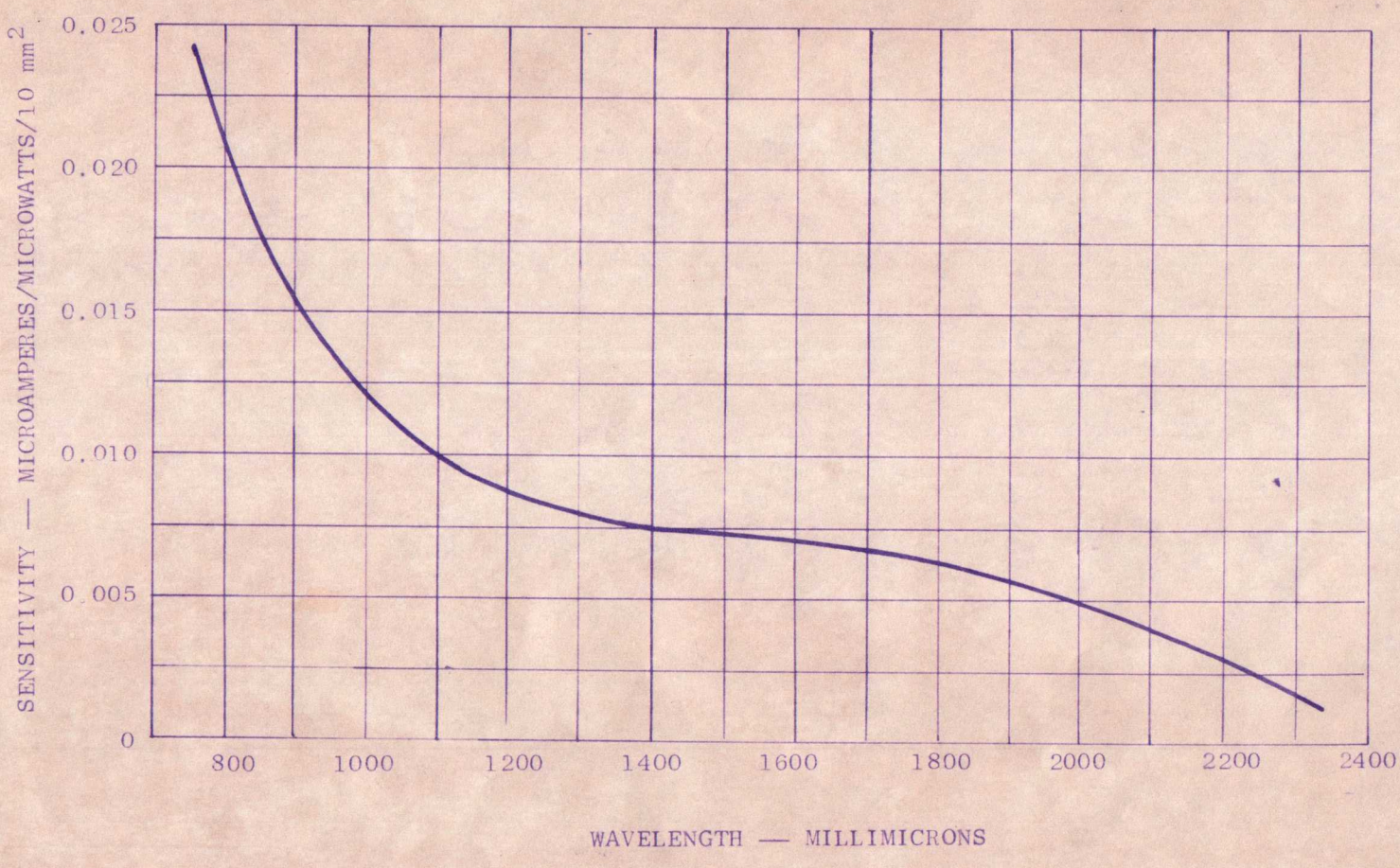


Fig. 7 PERSISTENCE CHARACTERISTIC OF TYPE
N156 and N157

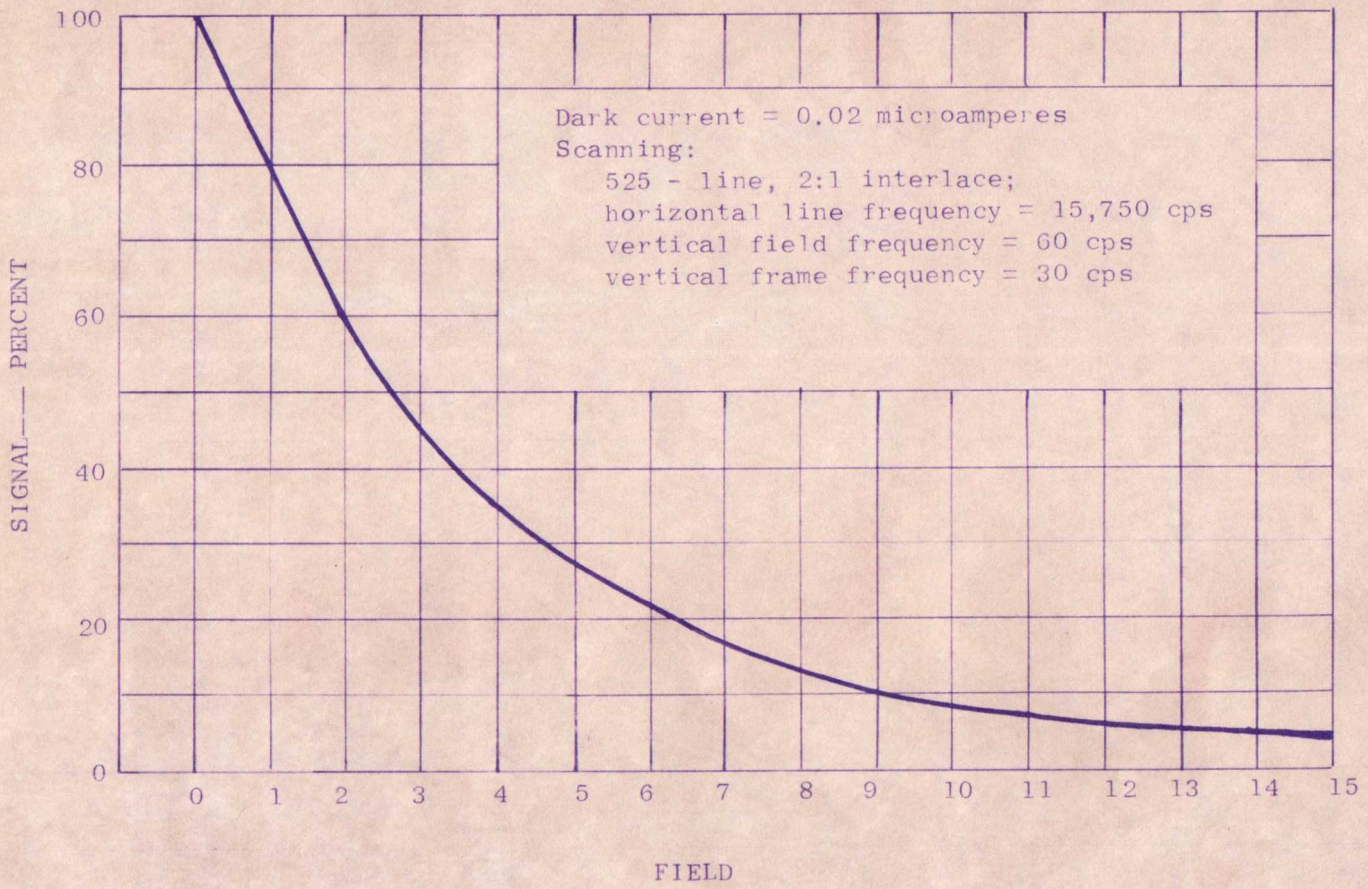
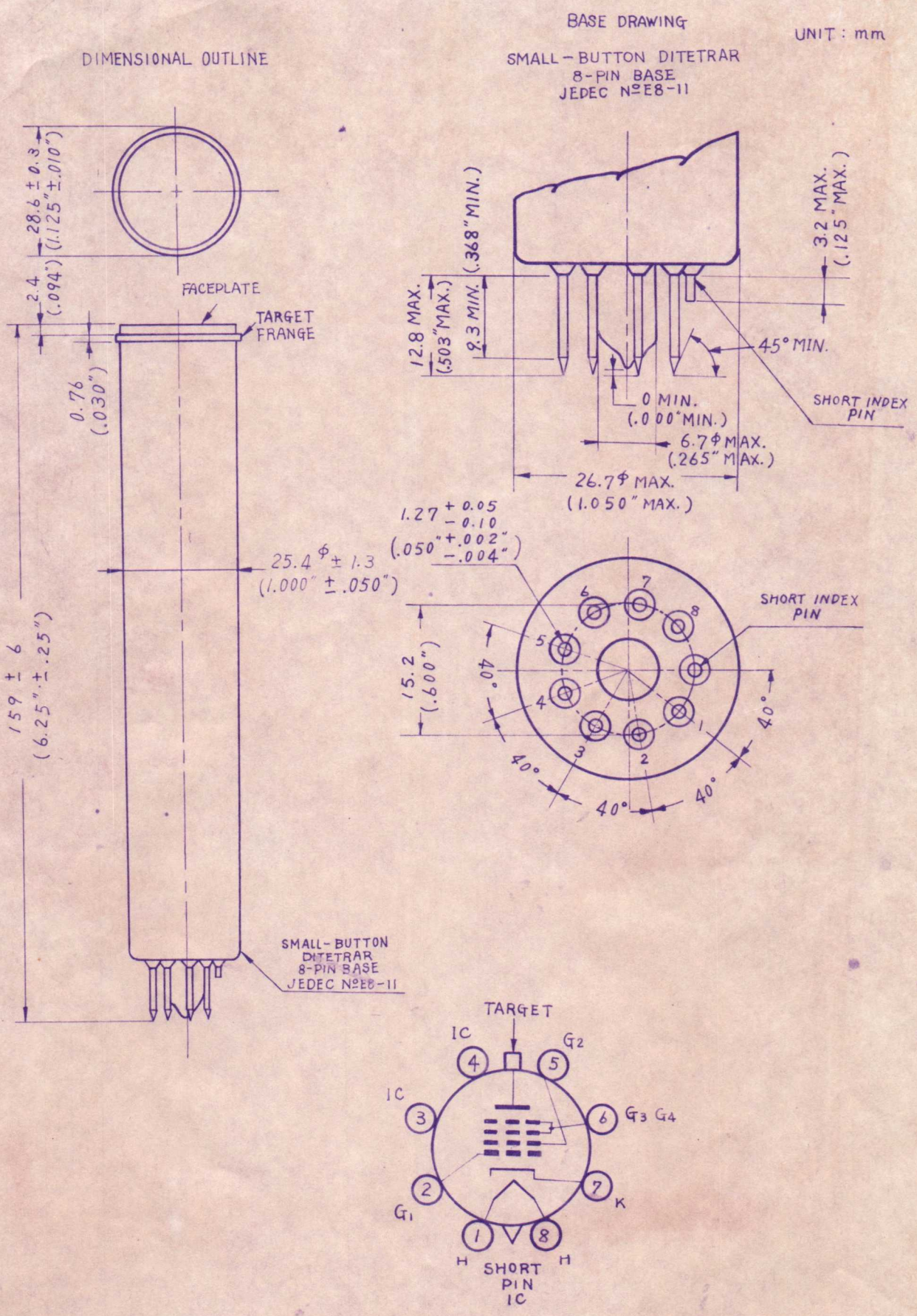


Fig.5 Dimensional Outline, Base Drawing and Socket Connections of Type N156



TELEVISION PICKUP TUBE FOR INFRARED RAYS

VIDICON TYPE N 1 5 7

Tentative Data

HTV-N157 is infrared pickup tube of 5 inches long vidicon type. Its threshold wavelength extends over 2 microns so that it is possible to see the objects in darkness illuminated with infrared radiation.

The sensitivity of these tubes is sufficient to image objects at 200°C, by their own thermal radiation, therefore, they can be used to measure temperature and to observe its distribution.

Another interesting applications of these tubes are observing crystal dislocations of the semi-conductor silicon or germanium, laser patterns and hydrogen flame under the sunlight, etc.

This tube can be oparated by TV cameras which operate ordinary 5 inches long vidicons.

D A T A

GENERAL:

Heater, for Unipotential Cathode;	
Voltage (AC or DC)	6.3 ± 10% volts
Current	0.095 or 0.15 amp
Spectral Response	See curves in Fig.1 and Fig.2
Photoconductive Layer:	
Maximum useful diagonal of rectangular Image (4 x 3 aspect ratio)	16 mm (0.62 inch)
Focusing Method	Magnetic
Deflection Method	Magnetic
Overall Length	130 ± 1.5 mm (5.12" ± 0.06")
Greatest Diameter	28.6 ± 0.3 mm (1.125" ± 0.010")
Bulb	T-8
Base	Small-Button Ditetrar 8-pin (JEDEC NO.E8-11)

MAXIMUM RATINGS, absolute Values:

For scanned area of 12.7 x 9.5 mm (1.2" x 3/8")

SIGNAL ELECTRODE VOLTAGE	125 max. volts
GRID-NO.4 & GRID-NO.3 VOLTAGE	350 max. volts
GRID-NO.2 VOLTAGE	350 max. volts
GRID-NO.1 VOLTAGE:	
Negative bias value	125 max. volts
Positive bias value	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
DARK CURRENT	0.05 max. μa
FACEPLATE:	
Illumination	50 foot-candles 100 IR foot-candle*
Temperature	60 max. °C

TYPICAL OPERATION:

Grid-No.3 connected to grid-No.4; scanned area of 12.7 x 9.5 mm (1/2" x 3/8"); faceplate temperature of 25 to 35°C.

Signal-Electrode Voltage	10 to 40 volts
Grid-NO.4 & Grid-NO.3 Voltage	250 to 300 volts
Grid-No.2 Voltage	300 volts
Grid-No.1 Voltage for Picture Cutoff	-45 to -100 volts
Signal-Output Cuttent at 1 IR foot-candle	0.07 to 0.20 μa
Dark Current	0.02 μa
Minimum Peak-to-Peak Blanking Voltage:	
When applied to grid-No.1	40 volts
When applied to cathode	10 volts
Field Strength at Center of Focusing Coil (Approx.)	40 gausses
Field Strength of Adjustable Alignment Coil	0 to 4 gausses

---

* 1 IR foot-candle is defined as the infrared illumination intensity through a infrared filter (IR-DI) where illumonation intensity from a tungsten lamp of color timperature 2870°K is 1 foot-candle.

Note:

Mechanical positioning of the Tube:

The plane passing though the index pin and the axis of the tube shall be parallel with the horizontal scanning direction.

Precautions to Observe:

The tube should not be handled to keep sensitive surface down.

Fig. 1 Spectral Response of Type N156 and N157

(Infrared Region)

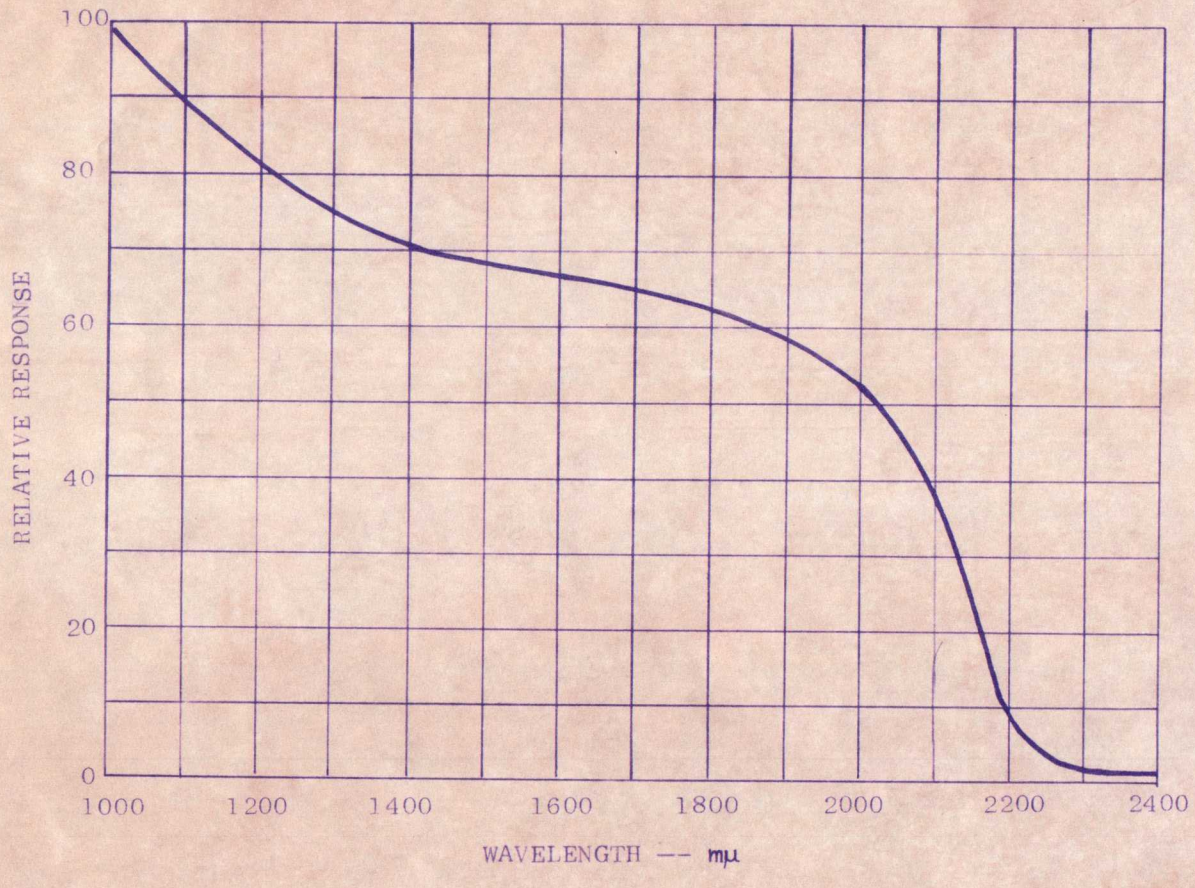


Fig. 2 Spectral Responce of Type N156 and N157

(Visible and Near Infrared Region)

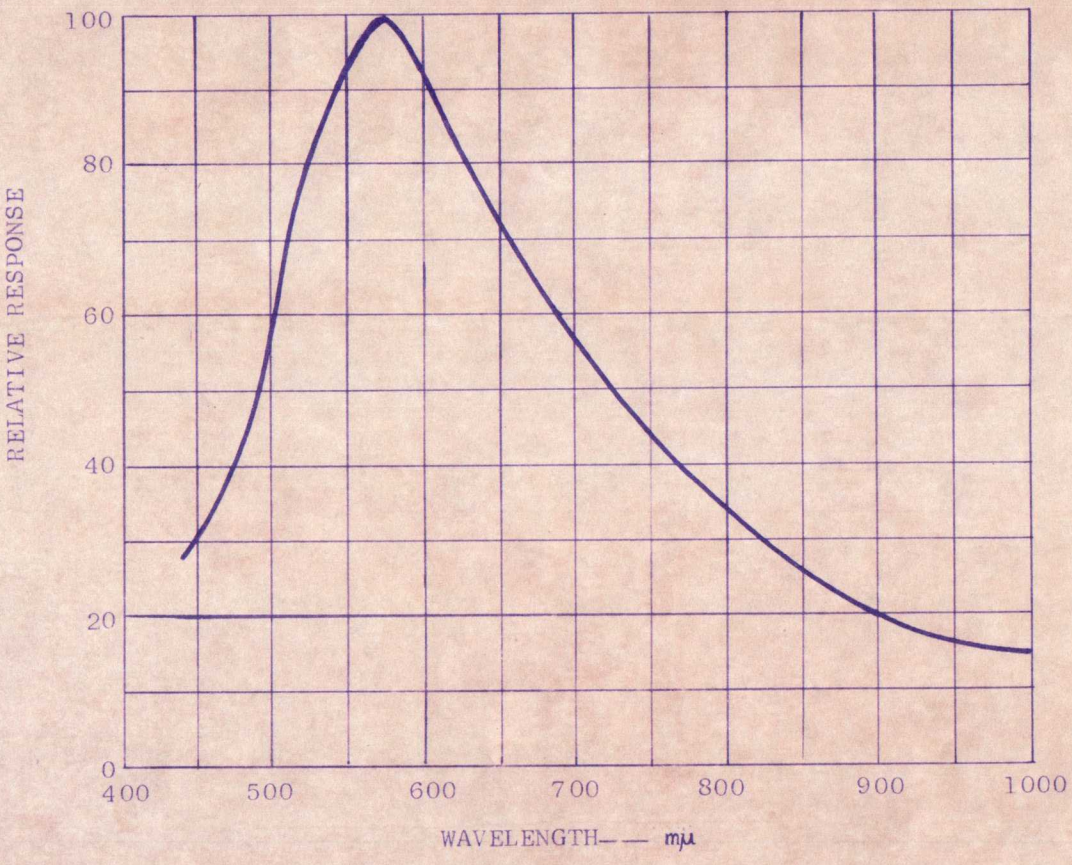
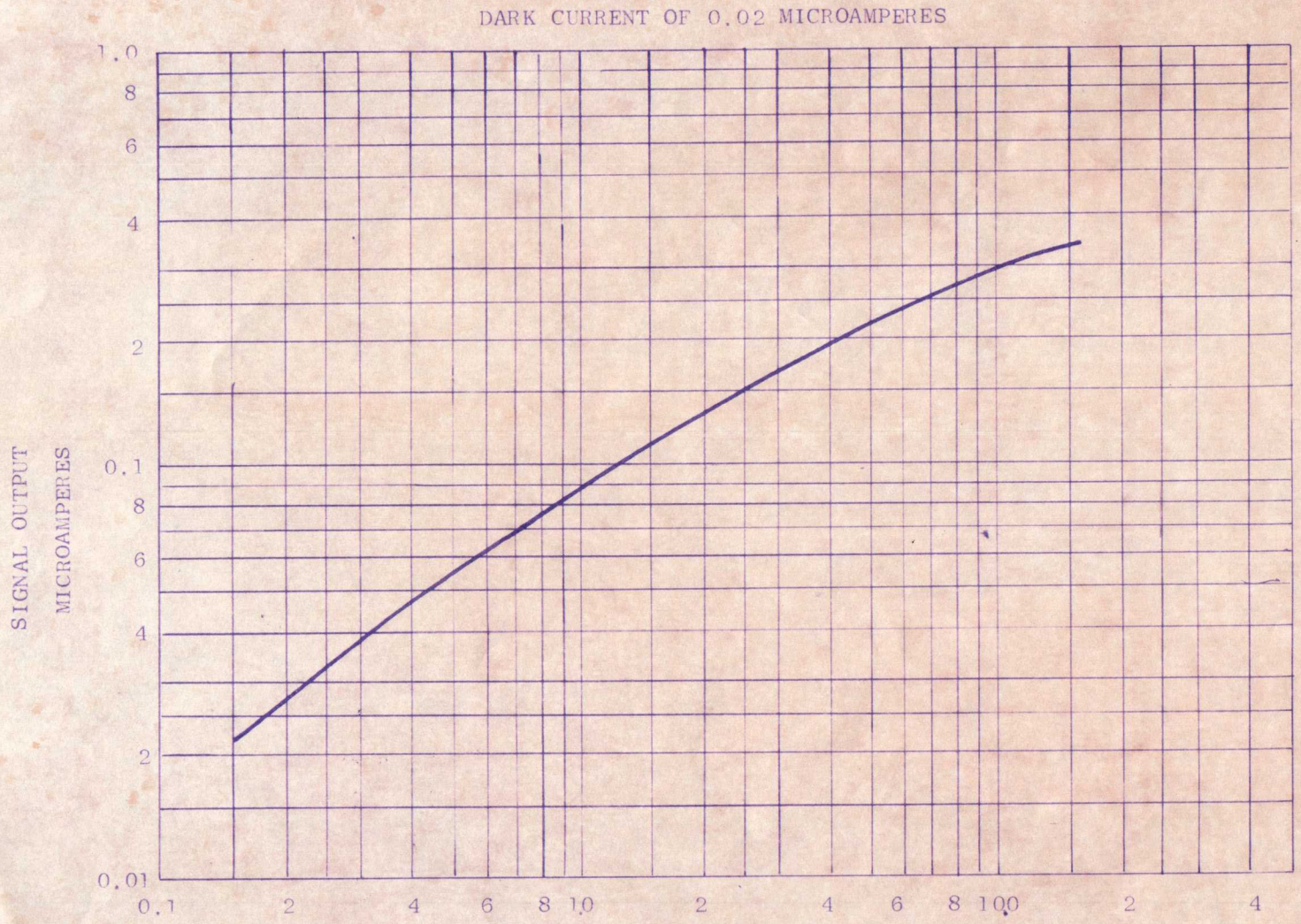


Fig. 3 Light Transfer Characteristics of Type N156 and N157



Note: 1 IR foot-candle is defined as the infrared illumination intensity through a infrared filter (MAZDA IR-D1) where illumination intensity from a tungsten lamp of color temperature 2870°K is 1 foot-candle.

Fig. 4 Spectral Transmittance of TOSHIBA IR-D1 filter

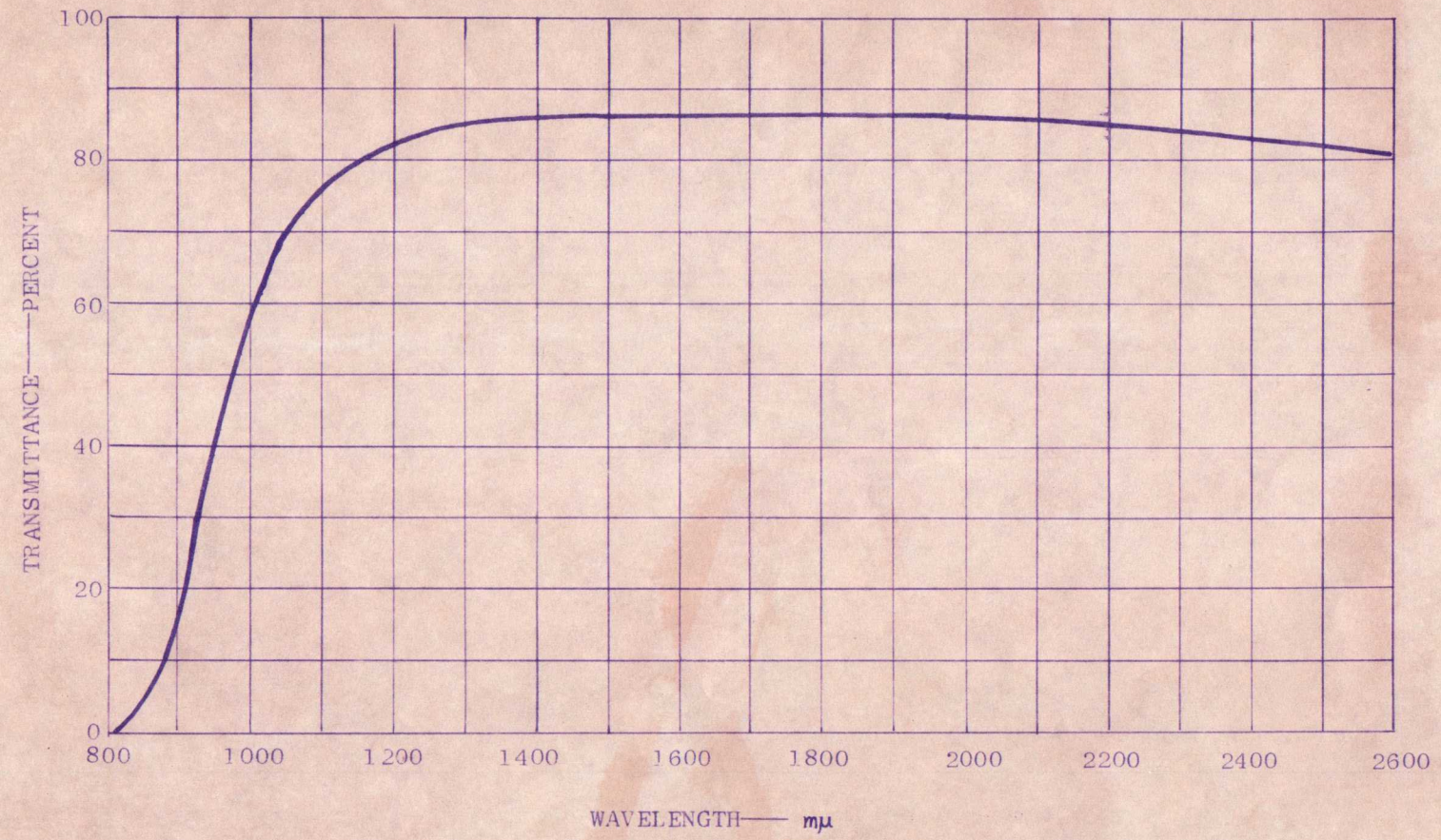


Fig. 6 SPECTRAL SENSITIVITY OF TYPE N156 AND N157

Scanned area of photoconductive layer = 12,7 x 9.5 mm

Dark current = 0.02 microamperes

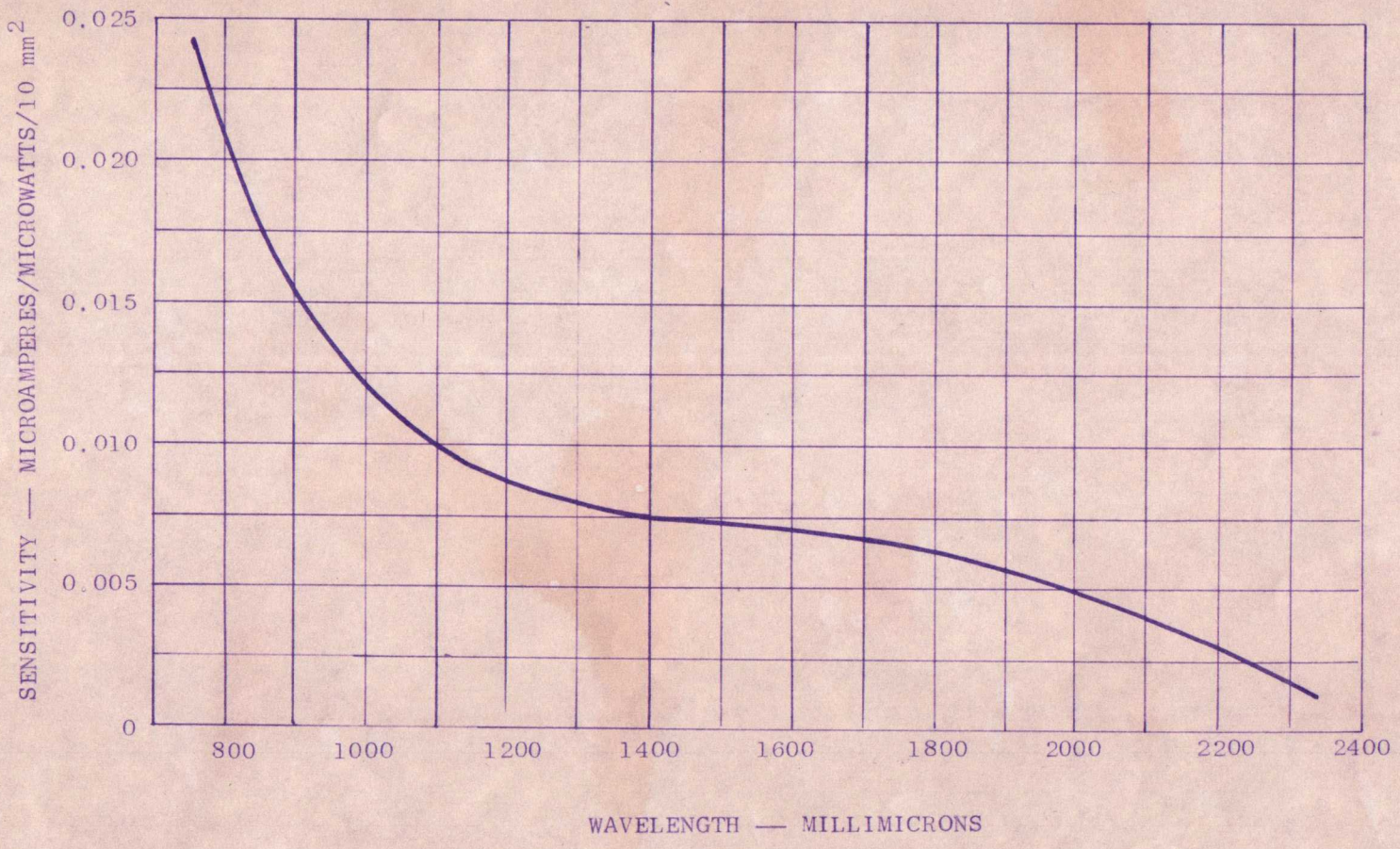


Fig. 7 PERSISTENCE CHARACTERISTIC OF TYPE
N156 and N157

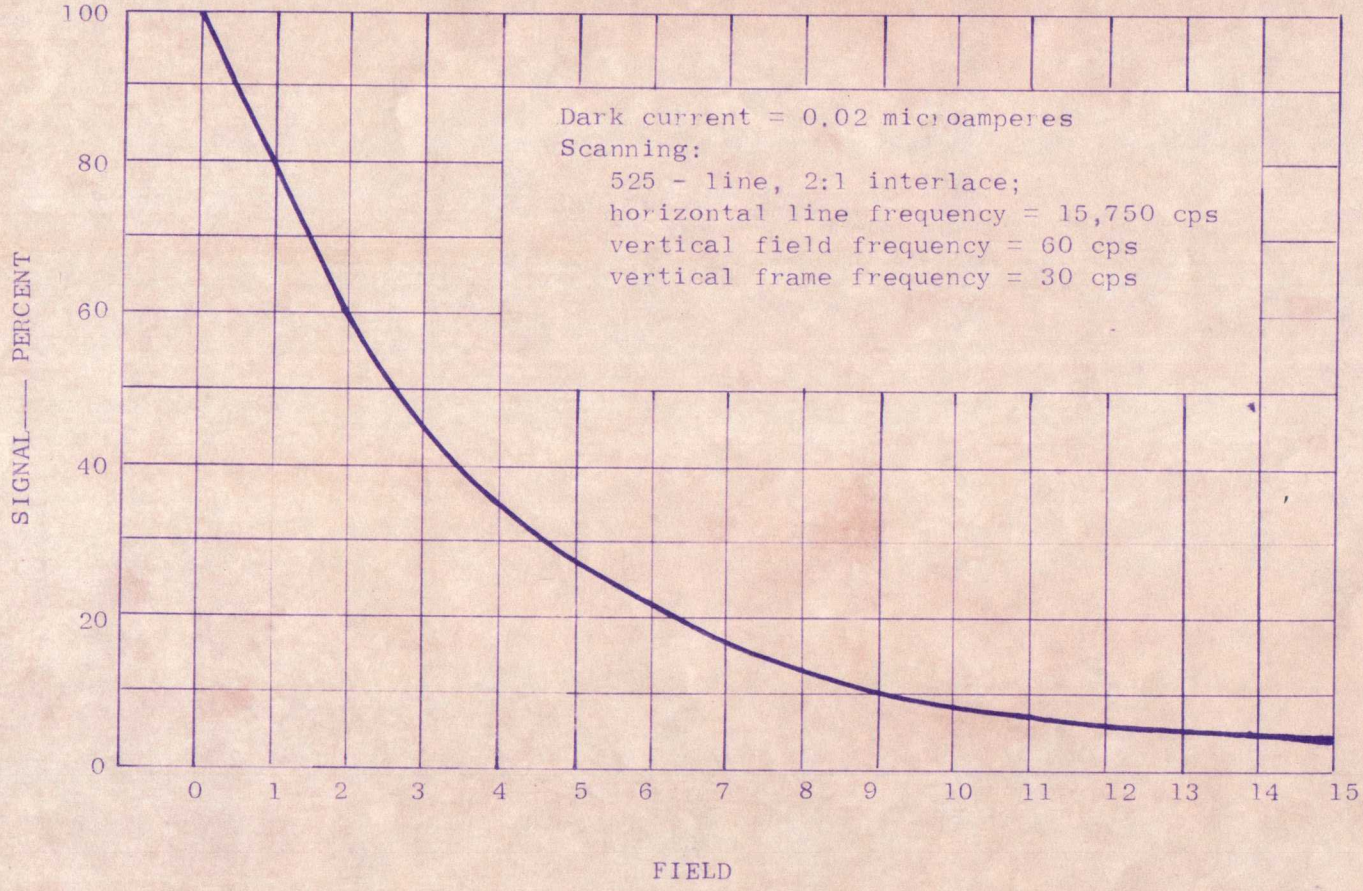
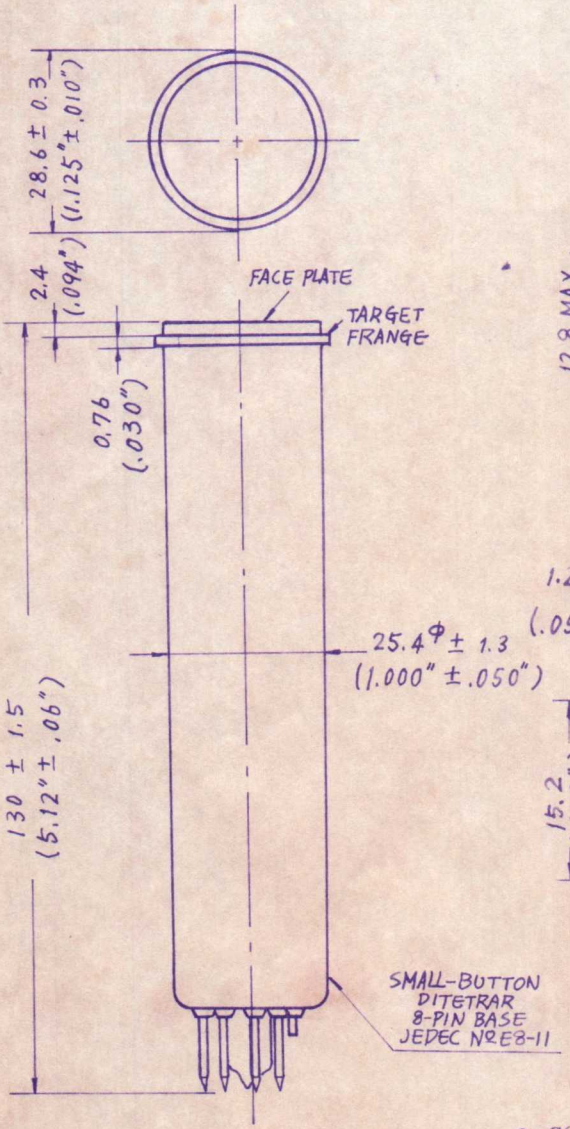


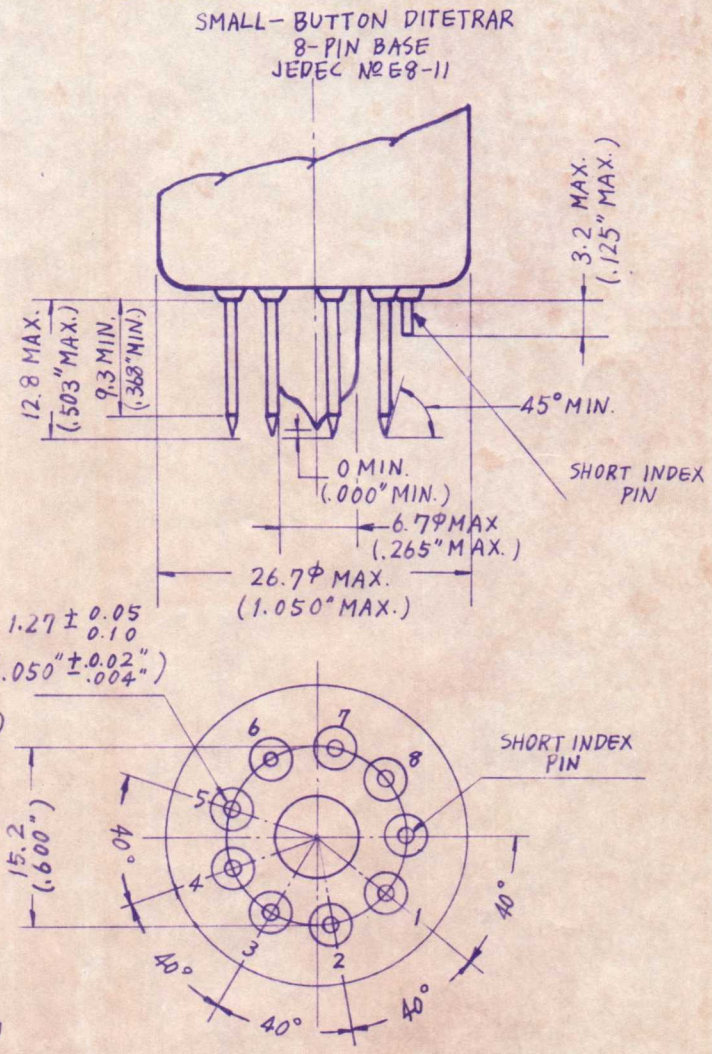
Fig. 5 Dimensional Outline, Base Drawing and Socket Connections of Type N157

UNIT : mm

● DIMENSIONAL OUTLINE



● BASE DRAWING



● SOCKET CONNECTIONS

Bottom View