ET1B

Toshiba 東芝

ELECTRON TUBE

TECHNICAL DATA

TOSHIBA CATHODE RAY TUBE
E2666B1
·BHD Direct-Viewing Storage Tube

The Toshiba type E2666B1 is BHD (Black matrix-Hybrid mesh-Dot screen) direct viewing bistable storage tube with a 5 inches flat face, electrostatic focus and deflection. It is designed for the more general storage oscilloscope use, and the simplified structure is based on the black matrix technology of our color picture tubes. This tube permits the following features

(1) High contrast

(2) Free from the damage of the storage target by writing beam

(3) Rugged structure as well as CRT's for general oscilloscope use

(4) Shorter overall length

(5) Higher deflection sensitivity

GENERAL DATA

ELECTRICAL DATA:

	Writing Gun		Viewing Gun	
Heater Voltage (Note 1, 2, 3)	6.3	Vac, dc	4.2	Vdc
Heater Current	0.30±10%	A	0.6±10%	A
Direct Interelectrode Capacitance (approx.)				
Grid No. 1 to all other electrodes	6.2	pF	18.0	pF
Cathode to all other electrodes	4.0	pF	15.0	pF
D1 to D2	2.2	pF		
D3 to D4	1.4	pF	-	
D1 to all other electrodes except D2	8.0	pF	-	
D2 to all other electrodes except D1	8.0	pF	-	
D3 to all other electrodes except D4	5.0	pF	-	
D4 to all other electrodes except D3	5.0	pF	-	
Storage target-backplate to all other electrodes	-		1.0	pF
Focusing Method	Electrostatic		Electrostatic	
Deflection Method	Electrostatic			

OPTICAL DATA:

Face Plate	Flat, Clear
Phosphor Number	B1 (P1)
Fluorescence	Green
Phosphorescence	Green
Persistence	Medium

MECHANICAL DATA:

Overall Length	325±10 mm	(12.795±0.394 inches)
Greatest Diameter (Note 4)	134 ± 3 mm	(5.25 ±0.12 inches)
Neck Diameter	51 ± 2 mm	(2.01 ±0.079 inches)
Minimum Useful Screen Diameter	110 mm Min.	(4.331 inches)
Base	Special base	(refer to pages)

Toshiba 東芝

ELECTRON TUBE

TECHNICAL DATA

E2666B1

Bulb and Base Alignment
Angle between the plane through the tube axis and Pin No. 1, and D1-D2 trace ±10 Deg.
Deflection Polarity
Positive voltage on D1 deflects beam approximately toward Pin No. 1.
Positive voltage on D3 deflects beam approximately toward Pin No. 4.
Angle between D1-D2 and D3-D4 traces ..... 90±1.0 Deg.
Weight (approx.) ..... 850 g
Mounting Position ..... Any
STB, CE, Hybrid Electrodes ..... Special Leads (See drawing on page 7)

MAXIMUM RATING (Absolute Maximum Value)

* Market Voltage Value are Positive with Respect to Viewing Gun Cathode
Others Value are to writing Gun Cathode.

	Writing Gun	Viewing Gun
Grid No. 2 Voltage	2200 Max. V 1500 Min. V	*300 Max. V
Accelerator and Deflection System (Anode No. 2, deflection plates)	2200 Max. V 1500 Min. V	-
Focus Electrode		
Voltage range	1000 Max. V	-
Maximum current	-15 to +10 μA	-
Peak Voltage Between Electrodes		
Deflection plate to plate	550 Max. V	-
Plate to all other electrodes in the accelerator and deflection system	500 Max. V	-
Between any two electrodes in the accelerator and deflection system	550 Max. V	-
Grid No. 1 Voltage		
Negative bias value	200 Max. V	*400 V
Positive bias value	0 Max. V	* 0 V
Peak positive bias value	0 Max. V	* 0 V
Peak Heater-Cathode Voltage		
Heater negative with respect to cathode ...	125 Max. V	-
Heater positive with respect to cathode ...	125 Max. V	-
Maximum Electrode Power Dissipation		
Anode No. 2 (Accelerator electrode)	6 Max. W	
Storage-Target-Backplate Electrode Voltage Estb	-	*400 Max. V
Collimator Voltage Ece	-	*400 Max. V
Hybrid Voltage Eh	-	*400 Max. V

Voltage Btween Two Electrodes

Storage target-backplate to hybrid.....400 Max. V

Hybrid to collimator.....400 Max. V

Collimator to viewing gun anode.....400 Max. V

DESIGN RANGE

With Anode No.2 (Accelerator) to Cathode Voltage Between 1500 to 2100 Volts

Grid No.1 Voltage for Visual Extinction of Undeflected Focused Spot	-3.3%xEb2	Max. V
Focus Electrode Voltage	14 to 22%xEb2	Max. V
Focus Electrode Current	-15 to +10	μA
Deflection Factors		
D1-D2	$Eb2x(12.5 \text{ to } 16.2)x10^{-3}$	Vdc/cm
D3-D4	$Eb2x(5.6 \text{ to } 8.0)x10^{-3}$	Vdc/cm

TYPICAL OPERATING CONDITION (See Appendix)

Writing Gun

Unless Otherwise Specified, All Voltages with Respect to Writng Gun Cathode.

Accelerator Voltage(Note 5,6) Eb2	2000	V
Grid No.2 Voltage Ewg2	2000	V
Focus Electrode Voltage Eb1	280 to 440	V
Grid No.1 Voltage (Note 7) Ewco	-25.0 to -66.0	V
Deflection Factors		
D1-D2	24.9 to 32.3	Vdc/cm
D3-D4	11.1 to 16.0	Vdc/cm
Spot Position(Note 8)	10Max.mm (0.394Max.inches)	
Raster Distotion(Note 9)....		

Viewing Gun

Unless Otherwise Specified, All Voltages with Respect to Viewing Gun Cathode.

Grid No.2 (Anode) Electrode (Note 6,10)		
Voltage Eva-Ewg2	200	V
Current	20 Max.	mA
Grid No.1 Voltage Evc1 (Note 11)	0 to -100	V
Grid No.1 for Visual Extinction Evco	-200 to -320	V
Cathode Current Ivk	30 Max.	mA
Collimator Electrode (Note 11)		
Voltage Ece	150 to 250	V
Current Ice	-3 to +5	mA

Toshiba 東芝

ELECTRON TUBE

TECHNICAL DATA

E2666B1

Hybrid Electrode (Note 11,12)		
Voltage Eh	300	V
Current Ih	20	Max.mA
Storage Target-Backplate Electrode (Note 11)		
Voltage Estb		
Storage operation	90 to 210	V
Non-storage operation	0	V
Current Istb	-3 to +20	mA

TYPICAL PERFORMANCE

Line Width (Non-stored) (Note 13)	Approx. 0.5	mm
Stored Luminance (Note 14)	10	Min.ft-L
Storage Time (See Appendix)	Any	
Writing Rate (Stored) (See Appendix)	250	Min.m/sec
Erasing Time	0.5	Max. sec

MAXIMUM CIRCUIT VALUE

Grid No.1 Circuit Resistance Rg1	1.5	MΩ
Resistance in Any Deflecting Electrode Circuit	1.0	MΩ

NOTES:

1. A dc supply is recommended for the viewing gun heater.

2. Pin No. 3, viewing gun heater is internally connected to the cathode of viewing gun.

3. -4.2 V dc supply should be applied to the viewing gun heater (Pin No. 7) not connecting to the cathode.

4. This value is not included the dimension of the insulator for the hybrid and STB electrodes.

5. The accelerator voltage should be operated at more than 1,500 volts for suitable light output and focus.

6. Grid No. 2 electrode and isolation shield electrode are internally connected to grid No. 2 (anode) electrode of viewing gun. The writing gun anode No. 2 electrode is independent of grid No. 2, so the optimum focus is obtained by adjustment of the anode No. 2 and anode No. 1 (focus) voltage.

7. Visual extinction of undeflected focused spot.

8. The position of the undeflected focused spot will fall within 10 mm (0.393 inches) square concentric with the center of the tube face.

9. Raster distortion will fall between two Concentric rectangles 81.2 mm x 64.9 mm (3.197 inches x 2.555 inches) and 78.8 mm x 63.1 mm (3.102 inches x 2.484 inches).

10. Adjust the average voltage between deflection plates or the viewing gun cathode voltage for the optimum operation of viewing gun. When the viewing gun anode (Grid No. 2) is applied to the specified value with respect to the viewing gun cathode

11. The viewing gun Grid No. 1, collimator, hybrid and storage-target-backplate voltage are set at the specified value, after the determination of the viewing gun cathode potential.

12. The hybrid electrode voltage should be kept at the highest potential in any other electrodes during the operation so as to prevent the screen from light output reduction.

13. Line width is directly measured by microscope (X50 power)
Condition

Beam current	10 μA
Raster size	100 mm x 80 mm (3.937 x 3.150 inches) respectively synchronized vertical 4500 Hz and horizontal 60 Hz

14. The stored luminance is measured at the center of all stored storage target (Fade Positive) of which backplate electrode voltage is adjusted at operating voltage. In non-storage operation, it is recommended that the viewing gun heater should be changed stand-by (Evf=2.6V) and the viewing beam cut off.

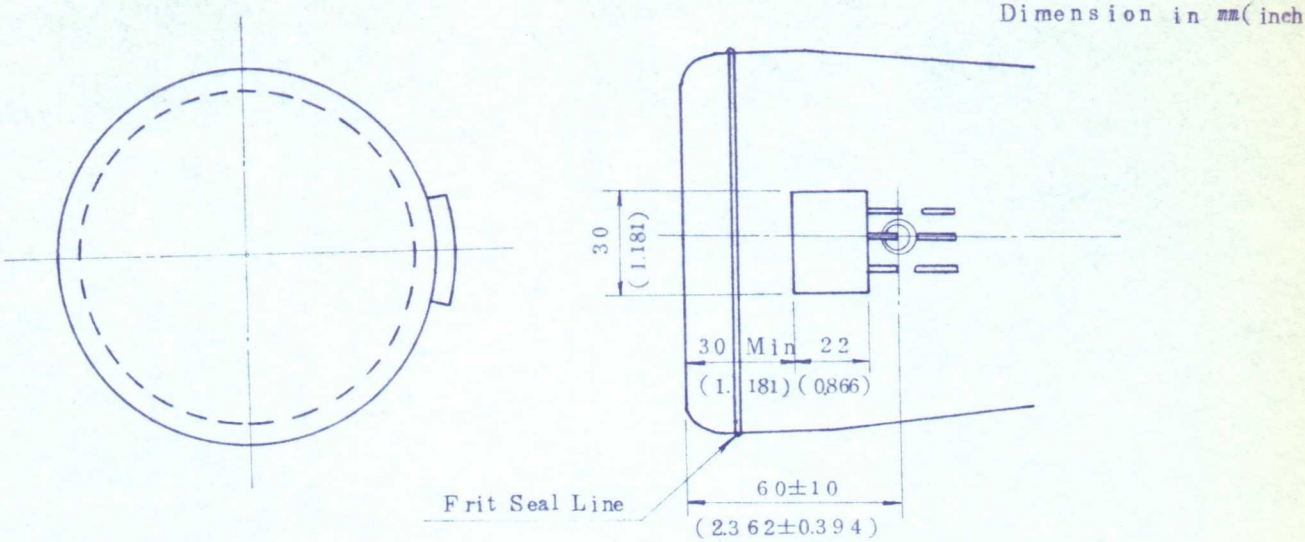
ELECTRON TUBE

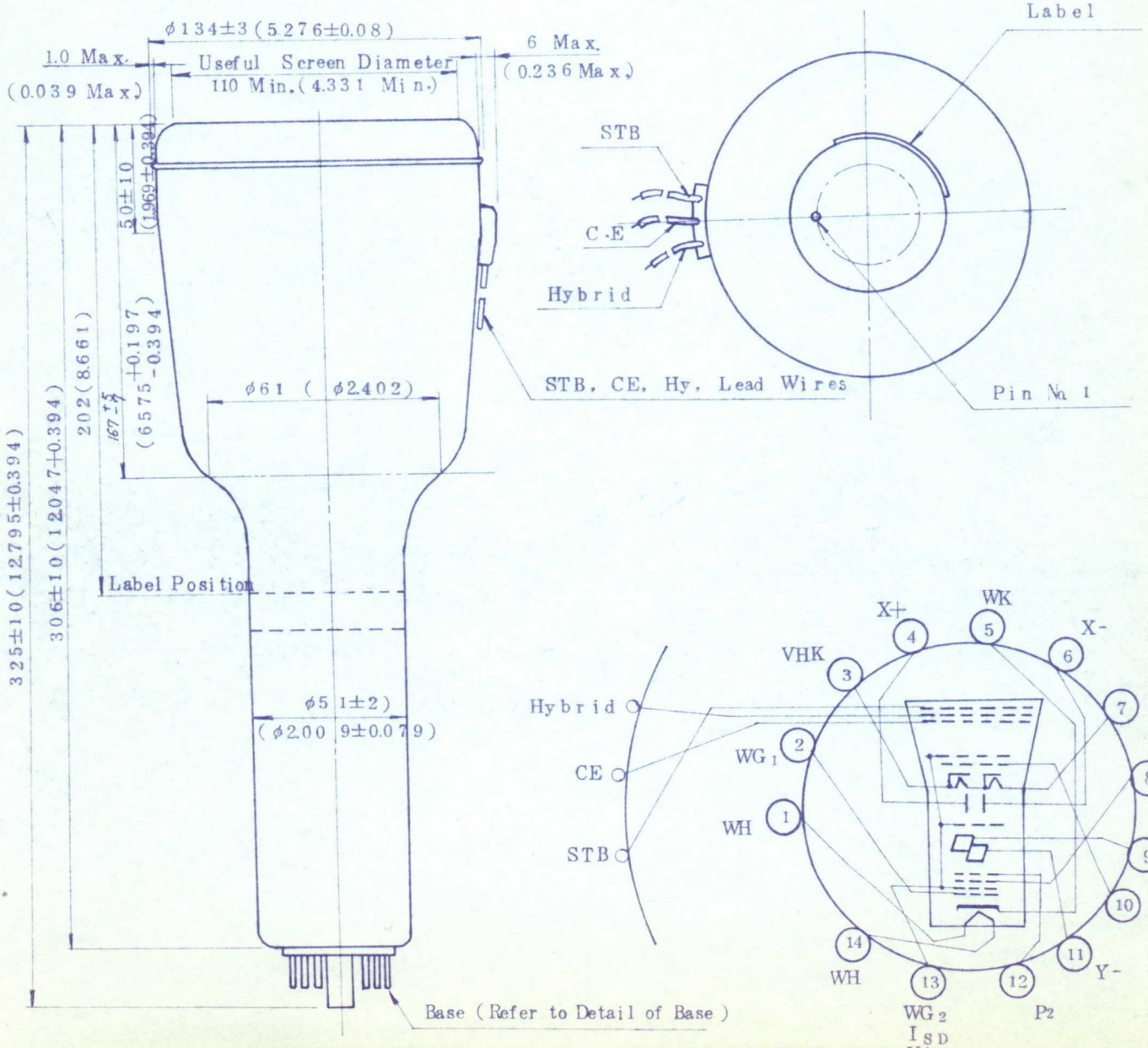
TECHNICAL DATA

E2666B1

DIMENSIONAL OUTLINE

Dimension in mm(inch)





Toshiba 東芝

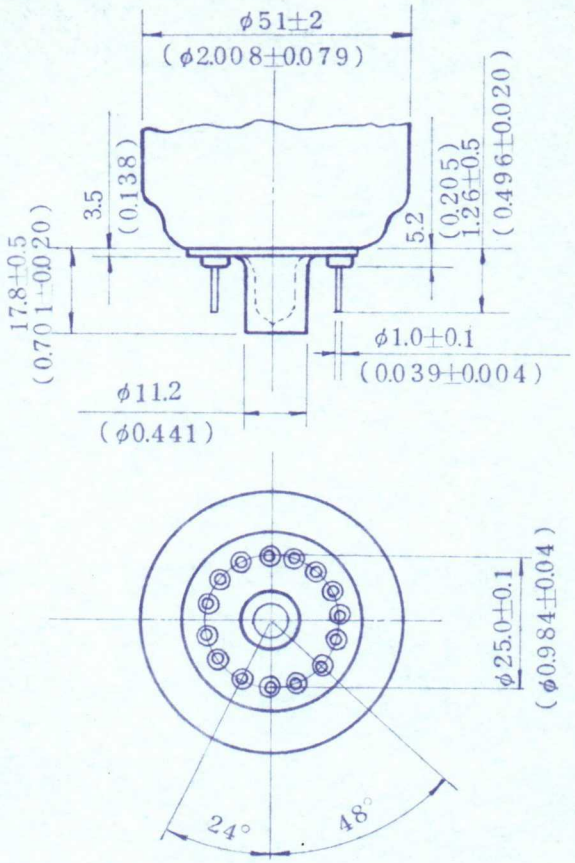
ELECTRON TUBE

TECHNICAL DATA

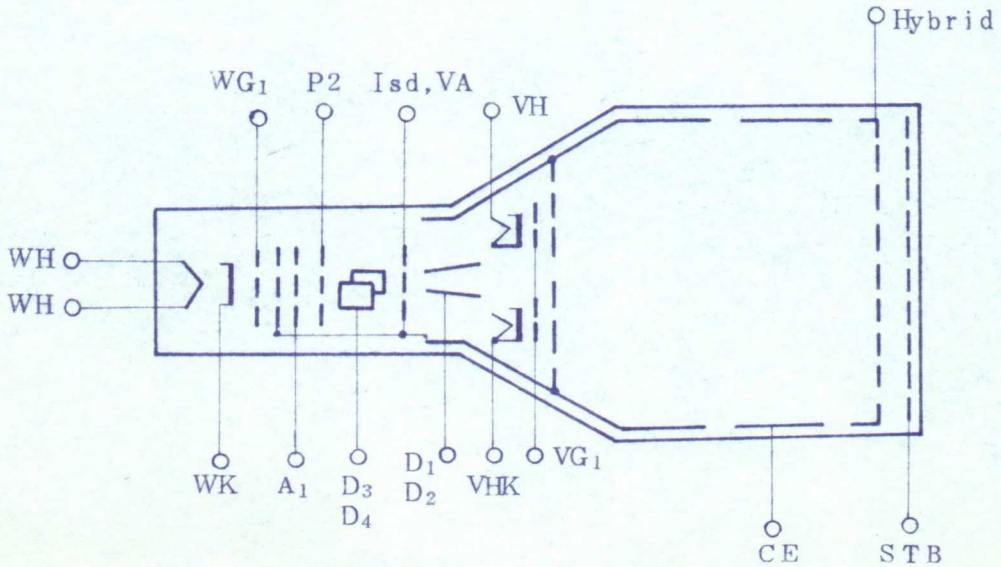
E2666B1

DETAIL OF BASE

Dimensions in mm (inch)



SCHEMATIC DIAGRAM



TYPICAL OPERATING CONDITION
(APPENDIX)

1. Adjustments

(1) Focus adjustment

Adjust the anode No. 2 voltage and focussing voltage of the writing gun **so as to make the best focused spot of the writing beam at the center of the screen.**

(2) Collimator voltage adjustment

After storing the screen entirely by **about 300 volt supply to the storage target-backplate (STB).**

STB voltage should be set again at the operating voltage Estb (OL) of the tube data.

In this entirely illuminated screen,

more brighter light output and better uniformity of the brightness are obtained by collimation voltage adjustment. The low brightness, short useful screen area, **incomplete erasing** and other source of troubles are often caused by **this poor** adjustment of collimation.

(3) Viewing Gun Grid No. 1 Voltage Adjustment

At the same time of the collimating voltage adjustment, the grid No. 1 should be adjusted to obtain the brighter light output. This voltage is approximately −5 V.

(4) Storage-Target-Backplate Electrode Voltage Adjustment

STB electrode voltage should be adjusted from 0 to operating voltage within an appropriate time (Approx. 0.5 sec.) for the storing operation.

The operating voltage recorded on our test sheet is in the case of typical condition.

STB electrode voltage should be adjusted again after confirming the optimum operating voltage of the tube.

In higher STB electrode voltage than the optimum voltage, the brightness and writing rate increases but the contrast decreases.

In other case of lower STB electrode voltage than optimum, contrast increases but brightness and writing rate decrease.

2. Storing & Erasing

(1) Storing Operation

Storing operation is performed by an appropriate writing beam current flow and scanning rate.

(2) Writing Rate & Stored Line Width

Writing rate, stored line width and writing beam current interact each other. Sharp stored line width will be obtained at a given writing flow near the writing rate limit.

(3) Storage Time

After a long time holding of stored image. A few erasing action may be needed for the complete erasing.

If the viewing beam is cut off and the writing beam does not collide to the screen after the storing action, it possible to maintain the stored image up to more than ten hours.

(4) Writing Speed Enhancement

It is recommended that a pulse should be applied to the STB electrode or viewing gun cathode so as to enhance the writing speed.

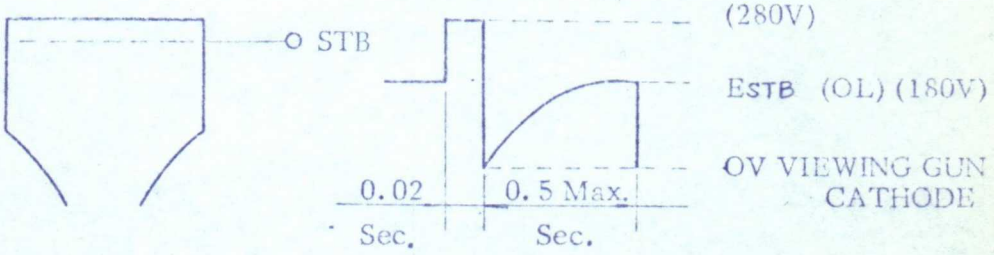
(5) Write Through

When it is required to display other signals which overlapped on the stored image screen without stored image destruction, **operate at a little writing beam current lest the screen should be stored.**

(6) Erasing

Erasing of a stored image is **attained** by appling negative triangle pulse, of which fall time is short and rise time is long, to the storage-target-backplate. Also, the stored image is erased by applying the same shaped positive pulse to the viewing gun cathode. However, for the more complete erasing, it is recommended that the **following** pulse should be applied to STB electrode.

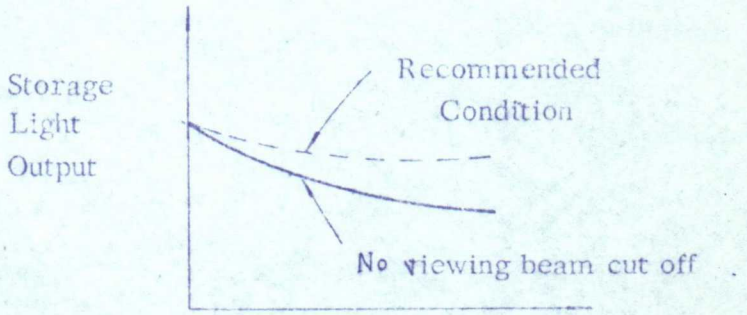
Typical Erasing Pulse



3. Non-**storage** Operation

(1) Storage-target-backplate electrode voltage should be fixed to the viewing gun cathode voltage for the normal oscilloscope use.

(2) It is desirable for the screen protection to make the viewing gun heater voltage stand-by (Evf = 2.6 V ±5%) and the viewing beam cutt off. Under the condition, the light output of storage mode decreases in proportion to only the storage operation time. But if it is not performed to cut off the viewing beam, the light output decreases in proportion to the total operation time (storage operation time plus non-storage operation time). **The storage light output is inclined to reduce as follows.**



However, when the viewing beam is switched from ON to OFF and vice versa, the line of the writing beam is slightly shifted in the vertical direction, so a suitable manner should be required to correct it.