

Display-Storage Tube

Single Writing Gun
Single Viewing Gun
High Display Uniformity

High Luminance
High Resolution
TV Capability

ELECTRICAL

	Writing Section	Viewing Section	Units
Heater: For Unipotential Cathode			
Voltage (AC or DC)	6.3 $\pm$ 10%	6.3 $\pm$ 10%	V
Current at 6.3 V	0.6	0.6	A
Warmup Time ^a		60	s
Direct Interelectrode Capacitances:			
Grid No.1 to all other electrodes	7.0		pF
Cathode to all other electrodes	5.0		pF
Backplate to all other electrodes		150	pF
Focusing Method	Electrostatic		
Deflection Method	Magnetic		
Phosphor	P20 (Aluminized)		

MECHANICAL

Minimum Useful Viewing Diameter	4.0	in
Maximum Overall Length (Excluding Ring) ^b	11.59	in
Maximum Seated Length (Excluding Ring) ^b	11.25	in
Maximum Diameter (Silastic Padding Ring) ^b	5.396 $\pm$ 0.015	in
Bases:		
Writing gun	JEDEC No.E8-49	
Viewing gun	JEDEC No.E7-1	
Bulb terminals (two)	JEDEC No.J1-21	
Screen connector	AMP Type LGH ^c No.832692 or equiv.	
Operating Position	Any	
Weight (Approx.)	20	lb



MAXIMUM RATINGS

Absolute-Maximum Ratings — All voltages are shown with respect to the cathode of the viewing gun unless otherwise specified.

	Min.	Max.	Units
Screen Voltage			
Peak	0	10,000	V
DC	0	9,000	V
Backplate Voltage			
Peak	0	15	V
DC	-30	10	V
Viewing Section Voltages			
Collector (Grid No.5)	180	300	V
Collimator (Grid No.4)	40	150	V
Grid No.3 ^e	10	150	V
Grid No.2		150	V
Grid No.1	-100	0	V
Heater	-125	125	V
Writing Section			
Grid No.4 ^e	10	150	V
Grid No.3 ^f	0	1200	V
Grid No.2 ^e	10	150	V
Grid No.1 ^f	-200	Note g	V
Cathode	-2750	145	V
Heater ^f	-125	125	V
Screen Resistor ^h	1.0		M Ω
Collector Resistor ^h	5,000		Ω

RECOMMENDED OPERATING VALUES

All voltages are shown with respect to the cathode of the viewing gun.

Screen Voltage	8500	V
Backplate Voltage	0	V
Viewing Section Voltages		
Collector (Grid No.5)	200	V
Collimator ⁱ (Grid No.4)	60 to 110	V
Grid No.3 ^j	10 to 60	V
Grid No.2 ^j	110	V
Grid No.1 ^j	-40 to 0	V

RECOMMENDED OPERATING VALUES (Cont'd)**Writing Section Voltages**

Grid No.3 ^k	-2075 to 1575	V
Grid No.1	Notes g,m	
Cathode	-2500	V
Screen Resistor	1.0	MΩ
Collector Resistor	10,000	Ω

PERFORMANCE DATA AND CHARACTERISTICS

	Min.	Typical	Max.	Units
Useful Viewing Diameter	4.0			in
Luminance (Brightness) ^p	700	1300		fL
Viewing Duration ^f	10			s
Undelected Spot Position			Note s	
Screen Current ^p		300	750	μA
Viewing Gun Collector Current ^t		1.0	2.4	mA
Viewing Gun Cathode Current ^u		2.5	4.0	mA
Writing Gun Cathode Current ^v		2.5	5.0	mA
Resolution ^w	400			lines
Erase Time ^x	1.5	2.5	3.5	ms

- a Viewing-gun Heater Warm-up Time must be completed before any other voltages are applied.
- b The silastic-padding ring is permanently attached to the bulb and is used to facilitate shock mounting.
- c Mates with AMP No.833589 or equiv. from AMP Inc., 155 Park Street, Elizabethtown, PA 17022.
- e Grids No.4 and No.2 of Writing Gun and grid No.3 of Viewing Gun are connected within the tube.
- f Voltages are shown with respect to cathode of Writing Gun.
- g The writing-gun grid No.1 should never be more positive than necessary to write the display to saturated brightness for a given scanning and drive condition. In no case should the writing-gun No.1 voltage have a value greater than zero with respect to the writing-gun cathode.
- h Unbypassed, current-limiting resistor.
- j Adjust for brightest, most uniform, full-size pattern.
- k Adjust for the smallest, most circular spot.

- m The maximum bias-voltage value for writing-beam cutoff is -130 volts with respect to writing-gun cathode.
- p Luminance (Brightness) and screen current are measured after the entire display is written to saturated brightness, the writing gun has been turned off, and with no erasing pulse applied.
- r The time required for any 1.5-inch diameter area of the useful 4-inch diameter viewing area to spontaneously rise (with no writing or erasing) from zero brightness (viewing-beam cutoff) to 10% of saturated brightness.
- s The undeflected spot position must fall within a circle having a 5/16-inch radius (maximum), 1-3/4-inches from the geometric center of the tube face, on the radius passing through the center of the neck of the writing gun.
- t With writing gun turned off, with no erasing pulse applied, and display erased to cutoff.
- u Measured with viewing-gun grid No.1 at zero volts and with all other electrodes at voltages shown under Recommended Operating Values.
- v Measured with writing-gun grid No.1 at zero volts while writing an overscanned TV-type raster.
- w Adjust erase pulser to 60 pps, 0.5 milliseconds width, and sufficient amplitude to just erase any written information. Using a standard television raster, without blanking or video, adjust raster to 3.0 inch horizontal by 2-1/4 inch vertical. Adjust writing-gun grid No.1 bias to reduce the raster to just under write threshold. Adjust the video amplitude so that all half-tones, of a television pattern such as that provided by an RCA 2F21 Monoscope, are clearly discernable. Move the raster and adjust the erase-pulse amplitude to eliminate undersirable picture retention. Minor re-adjustment of the write-gun grid No.1 bias, the erase pulse amplitude and the video drive may be necessary to obtain the best subjective picture.
- x Measured from saturated brightness to cutoff with an erase pulse 0.5 volt more positive than that necessary for complete erasure.

ENVIRONMENTAL TESTS

The 4547 is designed to withstand the following environmental tests:

Test 1. Vibration in each of the three orthogonal axes as shown in **Figure 1**, to a double amplitude of 0.03 inch, varied at a uniform rate from 10 to 55 Hz and back to 10 Hz over a five minute interval for each axis.

Test 2. Temperature storage for 24 hours each at 100°C and at -65°C .

Test 3. Temperature and altitude in three phases as follows:

Phase 1. Storage for one hour at a temperature of -40°C followed by tube operation for five minutes under the conditions shown under Recommended Operating Values.

Phase 2. Temperature is increased from -40°C at a rate of 2°C per minute until a temperature of $+86^{\circ}\text{C}$ is reached. Following one hour storage at $+86^{\circ}\text{C}$, the tube is operated for five minutes under the conditions shown under Recommended Operating Values.

Phase 3. Barometric pressure is next reduced until a pressure equivalent to an altitude of 20,000 feet is attained. The tube is then operated for five minutes under the conditions shown under Recommended Operating Values. Upon completion of the third phase of this test, pressure is increased and temperature decreased, at a rate of 2°C per minute, until ambient pressure-temperature conditions are reached.

ORTHOGONAL AXES OF 4547 USED FOR ENVIRONMENTAL TESTING

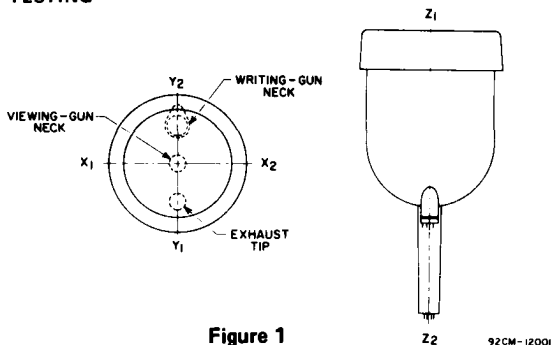


Figure 1

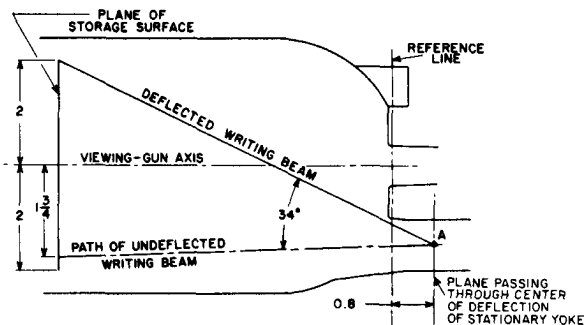
OPERATING CONSIDERATIONS

Deflection. The undeflected, focused writing beam lands nearly normal (perpendicular) to the storage-grid surface at a distance of 1-3/4 inches from its center and in the direction of the writing gun neck.

The writing beam may be deflected by two stationary pairs of coils. One pair is used for horizontal deflection, and the other pair for vertical deflection. When these coils are used, centering the undeflected writing beam can be accomplished by passing direct current of the required value through each pair of deflecting coils.

To avoid neck shadow, when the stationary coils are used, it is essential that the center of deflection should be located not more than 0.8 inch from the reference line as shown below. The writing beam must be deflected from its undeflected position, through a typical angle of 34° to sweep fully the storage surface.

LOCATION OF CENTER OF DEFLECTION



92LS-3654

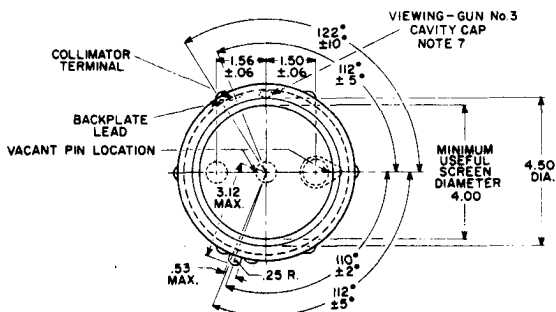
CAUTION

To prevent possible damage to the tube, allow the viewing-gun beam current to reach normal operating value before turning on the writing-gun beam current, and keep the viewing beam on till the writing beam is turned off.

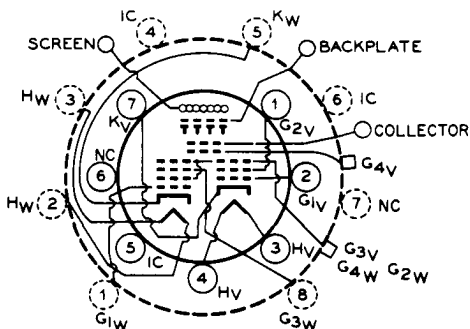
PRECAUTIONS

The following operating precautions must be followed to protect the 4547 from inadvertent damage —

1. Do not exceed maximum ratings.
2. Be sure to include the screen resistor.
3. Be sure to include the collector resistor.
4. Do not apply excessive writing-beam current density.
5. Protect against scanning failure.
6. Protect against loss of bias.
7. Apply voltages to tube in correct order.
8. Never write unless viewing beam is on.
9. Stay within recommended viewing-grid voltage ranges.

DIMENSIONAL OUTLINE (TOP VIEW)

BASING DIAGRAM – BOTTOM VIEW



SOLID-LINE CIRCLES DEPICT
MINIATURE 7-PIN BASE
BROKEN-LINE CIRCLES DEPICT
NEODITETRAR 8-PIN BASE
Small-Button Miniature 7-Pin Base 461

VIEWING SECTION

Pin 1: Grid No.2

Pin 2: Grid No.1

Pin 3: Heater

Pin 4: Heater

Pin 5: Internal Connection —Do Not Use

Pin 6: No Connection

Pin 7: Cathode

Flexible Lead (Large): Screen $8.38'' \pm 0.20''$ long

Flexible Lead (Green): Backplate $10.00'' \pm 0.50''$ long

Flexible Lead (Red): Collector $10.0 \pm 0.5''$ long

Recessed Cavity Caps: JEDEC No.J1-21

Collimator (Grid No.4)

Small-Button Neoditetrar 8-Pin Base

WRITING SECTION

Pin 1: Grid No.1

Pin 2: Heater

Pin 3: Heater

Pin 4: Internal Connection — Do Not Use

Pin 5: Cathode

Pin 6: Internal Connection — Do Not Use

Pin 7: No Connection

Pin 8: Grid No.3

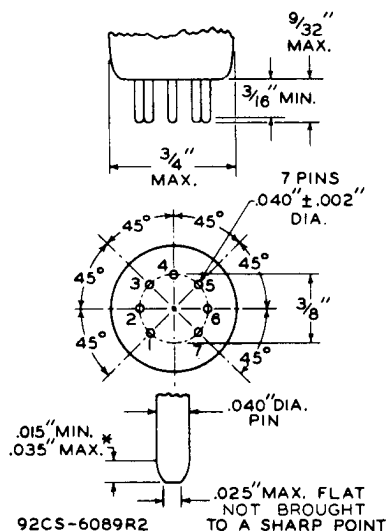
Note: Grids No.4 & No.2 are connected internally to Grid No.3
of viewing gun.



Electronic
Components

DATA 5
2-71

SMALL BUTTON MINIATURE 7-PIN BASE



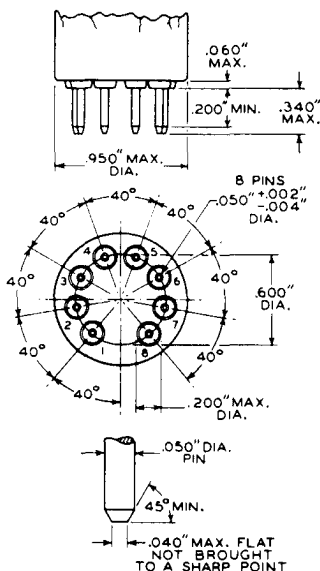
*This dimension around the periphery of any individual pin may vary within the limits shown.

Base-pin positions are held to tolerances such that entire length of pins will, without undue force, pass into and disengage from flat-plate gauge (part of gauge JEDEC No. GE7-1) having thickness of $1/4"$ and eight holes with diameters of $0.0520" \pm 0.0005"$ so located on a $0.3750" \pm 0.0005"$ diameter circle that the distance along the chord between any two adjacent hole centers is $0.1434" \pm 0.0005"$.

The design of the socket should be such that circuit wiring can not impress lateral strains through the socket contacts on the base pins. The point of bearing of the contacts on the base pins should not be closer than $1/8"$ from the bottom of the seated tube.

SMALL BUTTON NEODITETRAR 8-PIN BASE

Base-pin positions are held to tolerances such that entire length of pins will, without undue force, pass into and disengage from flat-plate gauge having thickness of $1/4"$ and nine holes with diameter of $0.0700" \pm 0.0005"$ so located on a $0.6000" \pm 0.0005"$ diameter circle that the distance along the chord between any two adjacent hole centers is $0.2052" \pm 0.0005"$.



92CS-9603

X-RADIATION WARNING: Shielding of this cathode-ray tube for x-radiation may be needed to protect against possible danger of personal injury from prolonged exposure at close range.

For further information or application assistance on this device, contact your RCA Field Representative or write, Display Tube Marketing, RCA, Lancaster, PA. 17604