

Graphechon Tube

Scan-Conversion Storage-Tube Assembly

Very High Resolution Capability

Ruggedized Structure Designed to
Meet MIL-E-5400 Specification

Integral Shielding and Deflection Coils

Small Size — 15" Max. Length 3.65" Diameter

0.6-Watt Heaters for Writing and Reading Guns

ELECTRICAL

Heater Current at 6.3 Volts, Each Gun 0.1 A

Focusing Method, Each Gun Electrostatic

Deflection Method, Each Gun Magnetic

Deflection Coils See footnote a

Total Deflection Angle, Each Gun (Approx.) 50 degrees

Deflection Coil Alignment^b 0.5 degrees

Undelected Spot Position, Each Gun^c 5% of target diameter

Direct Interelectrode Capacitances:

	Typ.	Max.	
Output-signal-electrode to all other electrodes ^d	17	20	pF
Reading-gun grid No.1 to all other electrodes	—	15	pF
Reading-gun cathode to all other electrodes	—	9	pF
Writing-gun grid No.1 to all other electrodes	—	15	pF
Writing-gun cathode to all other electrodes	—	9	pF

MECHANICAL

Tube Dimensions See Dimensional Outline

Connections See footnote e

Operating Position Any

Maximum Weight 5.25 lbs

MAXIMUM AND MINIMUM RATINGS, *Absolute-Maximum Values*

Voltages are referred to ground unless otherwise specified.

	Min.	Max.	
Writing Gun:			
Heater voltage ^g (AC or DC)	5.7	6.9	V
Cathode voltage	-9000	-	V
Heater-cathode voltage	-125	10	V
Grid-No.1 (control grid) voltage ^h	-300	0	V
Grid-No.2 voltage ^h	-	750	V
Grid-No.3 (beam focus) voltage ^{h,j}	-	1500	V
Grid-No.4 (anode) voltage	Ground		

Reading Gun:			
Heater voltage ^k (AC or DC)	5.7	6.9	V
Cathode voltage	-1500	-	V
Heater-cathode voltage	-125	10	V
Grid-No.1 (control grid) voltage ^m	-300	0	V
Grid-No.2 voltage ^m	-	750	V
Grid-No.4 (beam focus) voltage ^{j,m}	-	750	V
Grids No.3 & No.5 (anode) voltage	-30	30	V
External conductive coating	Ground		

Target Section:			
Output signal electrode voltage	-10	10	V
Shading electrode voltage	-30	30	V
Backplate voltage	-20	50	V

TYPICAL OPERATING CONDITIONS

Voltages are referred to ground unless otherwise specified.

Writing Gun:			
Heater voltage ^g (AC or DC)		6.3	V
Cathode voltage		-8000	V
Grid-No.1 (control grid) voltage for beam cutoff ^h		-120 to -70	V
Grid-No.2 voltage ^h		300	V
Grid-No.3 (beam focus) voltage ^{h,j}		600 to 1400	V
Grid-No.4 (anode) voltage		Ground	

Reading Gun:			
Heater voltage ^k (AC or DC)		6.3	V
Cathode voltage		-1200	V

TYPICAL OUTPUT CONDITIONS

Reading Gun:

Grid-No.1 (control grid) voltage for beam cutoff ^m	-120 to -70	V
Grid-No.2 voltage ^m	300	V
Grid-No.4 (beam focus) voltage ^{j,m}	200 to 440	V
Grids No.3 & No.5 (anode) voltage ⁿ	-20 to 0	V
External conductive coating	Ground	

Target Section:

Output-signal-electrode voltage	0	V
Shading electrode voltage ⁿ	0 to 20	V
Backplate voltage ⁿ	-15 to 0	V

PERFORMANCE CHARACTERISTICS

The Performance Characteristics shown below are obtained in one mode of tube operation which is representative of many applications. Trade-offs in these characteristics may be made to achieve optimum tube performance in other operating modes.

	Min.	Max.
Output Signal Current ^p	0.5	— μ A
Storage Time ^q		See footnote r
Signal-to-Shading Ratio ^s	5:1	—
Signal-to-Background-Shading Ratio ^t ..	8:1	—
Center Resolution, At 50% amplitude response	1600	— TV lines/ target diameter
Edge Resolution, At 50% amplitude response		See footnote v
Writing Speed	200	— μ s/ target diameter
Shades of Gray ^w	7	—
Blemishes ^x		See footnote y

ENVIRONMENTAL CONDITIONS

The 4598 will provide the performance specified under **Performance Characteristics** when the tube is exposed to the following environmental conditions:

	Requirement
Temperature-Altitude ^z . . .	MIL-E-5400L, Par. 3.2.24.3, Table I Class 1A
Humidity	MIL-E-5400L, Par. 3.2.24.4
Shock	MIL-E-5400L, Par. 3.2.24.6
Vibration	See accompanying <i>Vibration Levels</i>

- a The deflection coils are electrically similar to type Y65 manufactured by Syntronic Instruments Inc., Addison, Illinois. A variety of inductances are available, which are suitable for either push-pull or single-ended circuit configurations.
- b The orthogonality of the horizontal and vertical axes of each deflection coil is within 1/2 degree of 90 degrees. The horizontal axis of the writing deflection coil is parallel within 1/2 degree to the horizontal axis of the reading deflection coil.
- c The undeflected spots of both guns fall within a circle having a diameter that is 5 per cent of the target diameter, and is centered on the target.
- d The value shown is the capacitance of the assembly supplied with a solderable terminal as the output signal electrode connection; if a coaxial connector or cable is supplied, their capacitance must be added to this value.
- e Connection to the output signal electrode can be provided by means of a solderable terminal, coaxial connector, or coaxial cable. Connections to the deflection coils and low voltage electrodes are by flexible leads. Connections to the high voltage electrodes are made by silicone rubber leads; connectors such as type 840706 lead assemblies manufactured by AMP Inc., Capistrano Division, Elizabethtown, PA, can also be supplied.
- g One side to be externally connected to writing-gun cathode.
- h With respect to writing-gun cathode.
- i Adjust for best focus.
- k One side to be externally connected to reading-gun cathode.
- m With respect to reading-gun cathode.
- n Adjust for optimum signal and storage performance.
- p This value is the saturated output signal current.
- q Storage time is proportional to the area scanned by the reading-gun raster. The limits are given for a raster of aspect ratio 1:1, and inscribed within the target area.
- r The specified performance characteristics are obtained over a range of storage times from 1.0 second maximum to 3.0 seconds minimum. The specified performance characteristics except shades of gray are obtained over a range of storage times from 0.5 second maximum to 4.0 seconds minimum. Storage time is measured to 10 per cent of signal amplitude.

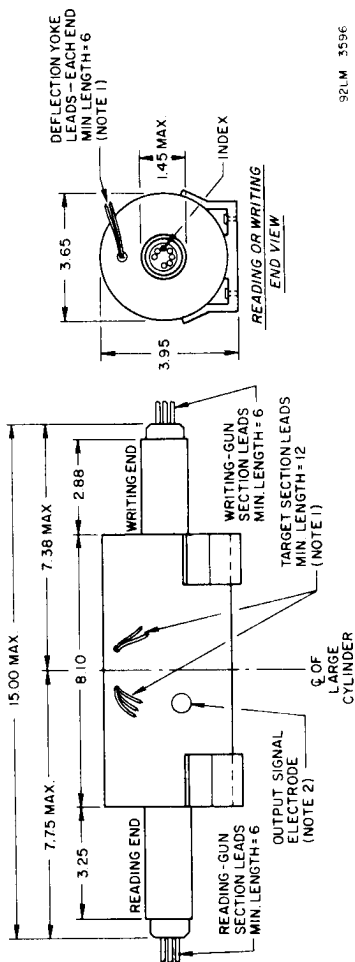
- s This limit applies to the central 75 per cent of the target. The measurement is taken along that single line of the output video signal which has the lowest signal-to-shading ratio.
- t This limit applies to the central 75 per cent of the target. The measurement is taken along that single line of the output video signal which has the lowest signal-to-background-shading ratio.
- u Resolution is measured using a raster written perpendicular to the horizontal scanning lines of the reading-gun raster, and with the writing-gun drive voltage adjusted to give a peak output signal 85 per cent of saturated signal amplitude.
- v A minimum resolution of 1200 TV lines per target diameter is obtained over 75 per cent of the target diameter. A minimum resolution of 1400 TV lines per target diameter is obtained over 75 per cent of the target diameter using dynamic focusing of the reading gun.
- w A step voltage waveform with seven equally spaced levels is used as input.
- x Blemishes are measured within a circular area centered on the target and with a diameter of 90 per cent of the target diameter. Blemish size is specified as a percentage of the target diameter; blemish amplitude, as a percentage of saturated signal amplitude. Blemishes with an amplitude of less than 10 per cent are not counted. Dark blemishes with a size of less than 1/8 per cent are not counted.
- y The maximum size of any light blemish is 1/2 per cent. The amplitude and number of light blemishes are limited as shown in the following table:

Amplitude	Maximum Number
10% to 50%	10
20% to 50%	3
Greater than 50%	0

The maximum size of any dark blemish is 1/2 per cent. The maximum number of dark blemishes is five.

- z The backplate voltage of the tube may be changed in a predetermined manner to compensate for the variation in storage time as a function of temperature.

DIMENSIONAL OUTLINE



92LM 3596

Dimensions in Inches

DIMENSIONAL OUTLINE (cont'd)

Note 1 — All leads are labeled.

Note 2 — Connection to the output signal electrode can be provided by means of a solderable terminal, coaxial connector, or coaxial cable.

TARGET-SECTION LEADS

Lead 1: Writing-Gun Grid No.4

Lead 2: Backplate

Lead 3: Shading Electrode

Lead 4: Reading Gun Grids No. 3 & 5

Lead 5: Reading-Gun External Conductive Coating

WRITING-GUN SECTION LEADS

Lead 1: Heater

Lead 2: Grid No.1

Lead 3: Grid No.3

Lead 4: Grid No.2

Lead 5: Cathode

Lead 6: Heater

READING-GUN SECTION LEADS

Lead 1: Heater

Lead 2: Grid No.1

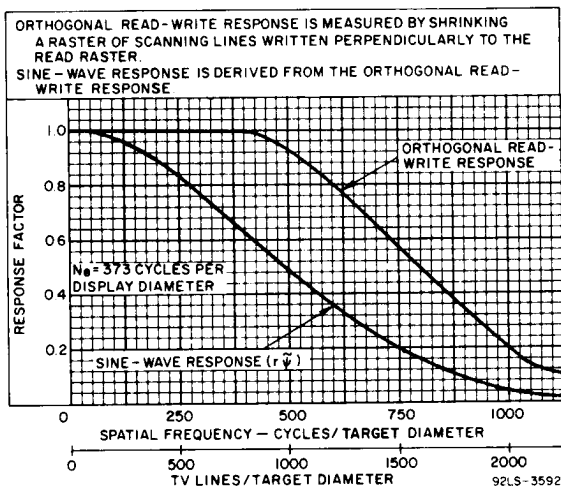
Lead 3: Grid No.4

Lead 4: Grid No.2

Lead 5: Cathode

Lead 6: Heater

FREQUENCY RESPONSE CHARACTERISTICS



VIBRATION LEVELS

