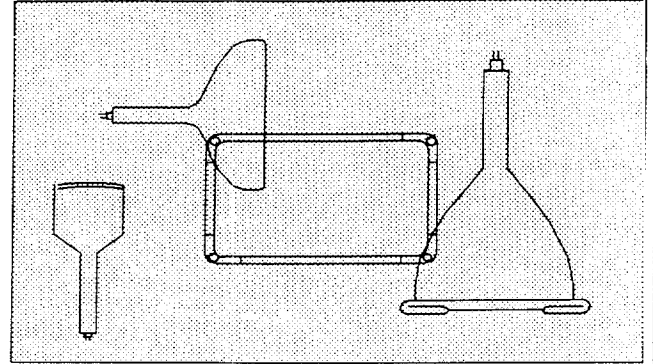


# CLINTON ELECTRONICS CORPORATION

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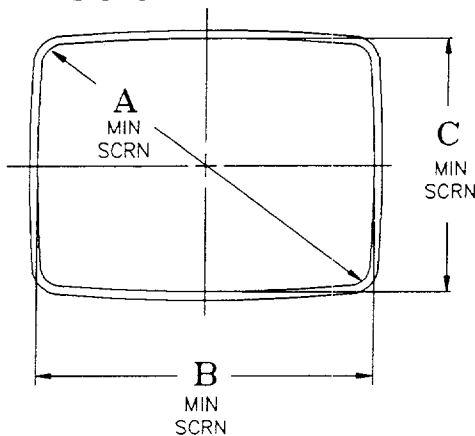
## CRT TYPE: 951

20" RECTANGULAR  
HIGH RESOLUTION

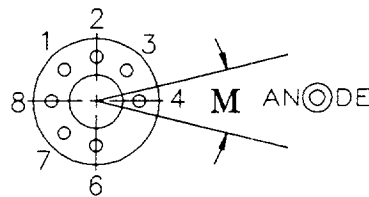
114 DEG DEFLECTION  
LOW VOLTAGE FOCUS

1.125" NECK  
CATHODE RAY TUBE

### SCREEN DIMENSIONS

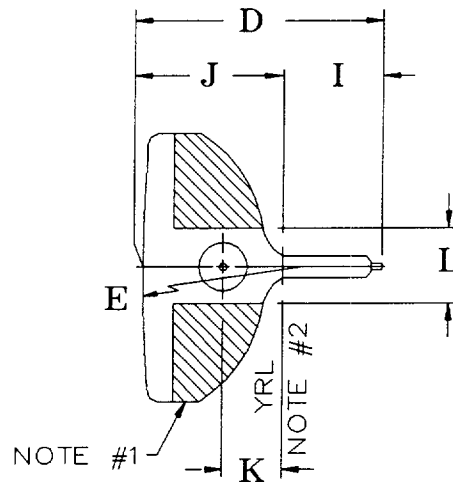
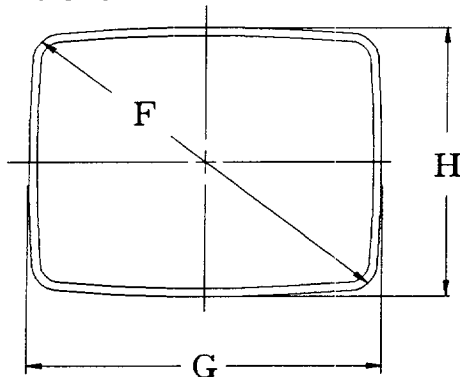


### BASING BOTTOM VIEW



- 1-HEATER
- 2-GRID 1
- 3-GRID 2
- 4-GRID 4
- 6-GRID 1
- 7-CATHODE
- 8-HEATER

### BULB DIMENSIONS



### USEABLE ALPHA-NUMERIC SCREEN DIMENSIONS

	DIAGONAL A	MAJOR B	MINOR C	OVERALL LENGTH D	FACEPLATE RADIUS E
INCHES	18.362	15.161	11.684	12.894	37.0
METRIC	466.39	385.10	297.76	327.5	939.8
TOLERANCE	MAX	MAX	MAX	±.250	SPHERICAL(NOM).

### BULB DIMENSIONS

	DIAGONAL F	MAJOR G	MINOR H	I	J	K	L	M
INCHES	19.685	16.724	13.453	5.00	7.894	1.75	5.0	
METRIC	500.0	424.8	341.7	127.0	200.3	44.5	127.0	
TOLERANCE	±.10"	±.10"	±.10"	±.12"	±.12"		±.25"	±10°

Clinton Electronics Corporation reserves the right to alter these specifications without prior notification.

## 1.0 DESCRIPTION

The 951 is a 20" diagonal, 114 deg magnetic deflection, 29mm diameter neck, low focus, cathode ray tube designed for high resolution alpha-numeric and video display. This tube is designed with a 6.3V/240mA heater and incorporates internal arc surge limiting.

## 2.0 ELECTRICAL DATA

2.1 FOCUSING METHOD..... Electrostatic

### 2.2 DEFLECTION

DEFLECTION METHOD..... Magnetic

#### DEFLECTION ANGLES

Diagonal..... 114°

Horizontal..... 99°

Vertical..... 82°

### 2.3 DIRECT INTERELECTRODE CAPACITANCES

Cathode to all other electrodes..... 3.5 pF Typ 4.5 pF Max

Grid #1 to all other electrodes..... 8.0 pF Typ 9.5 pF Max

External conductive coating to anode(note#3)..... 1500 pF Min 3000 pF Max

2.4 HEATER VALUES (nominal)..... 240 mA @ 6.3 V

## 3.0 OPTICAL DATA

### 3.1 PHOSPHOR (Aluminized)

For specific phosphor information, refer to "CLINTON Phosphor Data Sheet"

### 3.2 FACEPLATE

Light Transmission (approximate)(NOTE #4)

Light tint..... 44 %

Dark tint..... 32 %

For faceplate treatments refer to CLINTON Specification: CS115

## 4.0 MECHANICAL DATA

For mounting systems refer to CLINTON mechanical specification: CS136

### 4.1 BULB

EIA Designation (or equivalent)..... J157<sup>1</sup>/<sub>2</sub>A1

Bulb Contact (EIA Designation)..... J1-21

Base (EIA Designation)..... B7-208

Basing (EIA Designation)..... 8HR

## 4.2 AGENCY APPROVALS

SYSTEM	AGENCY	NUMBER
T-band with ears	UL/CSA	CEULJ157 <sup>1</sup> / <sub>2</sub> A1TE
Rim band	UL/CSA/VDE	CEULJ157 <sup>1</sup> / <sub>2</sub> A1CKE
Shell bond	UL/CSA/VDE	CEULJ157 <sup>1</sup> / <sub>2</sub> A1S
Panel w/T-band + ears	UL/CSA/VDE	CEULJ157 <sup>1</sup> / <sub>2</sub> A1TEI

## 5.0 RATINGS (Absolute Maximum Operating Ratings)

Clinton does not recommend tubes be operated at Maximum conditions. Unless otherwise specified, voltage values are measured with respect to the cathode.

5.1 VIEW SCREEN VOLTAGE..... 15.0 KV Min 21.0 KV Max

5.2 GRID #4 (Focus Voltage)..... -500 V Min 1100 V Max

### 5.3 GRID #2

For fixed grid #2 operation ..... 300 V Min 1000 V Max

For fixed grid #1 operation ..... 200 V Min 1200 V Max

### 5.4 GRID #1 VOLTAGES

Instantaneous (non-repetitive)

Positive Peak..... 0 V max

Negative Grid #1 Voltage..... -210 V Max

Maximum Drive Voltage (note #5) 2A/cm<sup>2</sup>..... 43 V Max

### 5.5 HEATER VOLTAGES

Negative Heater to Cathode Voltage During

Warm Up Period Not to Exceed 15 Seconds..... -450 V Max

After Equipment Warm Up..... -200 V Max

Positive Heater to Cathode Voltage..... 200 V Max

Operating Heater Voltage (DC or RMS) (note #6)..... 6.3 V ± 5%

5.6 MAX. circuit resistance not to exceed 1.5 Meg Ohms

## 6.0 TYPICAL OPERATING CONDITIONS

Unless otherwise specified, voltages are measured with respect to the cathode with cathode at ground

6.1 VIEW SCREEN VOLTAGE..... 19.0 KV

### 6.2 OPERATION AT CONSTANT CUT-OFF

Conditions for constant cut-off

Grid #1 voltage for cut-off (note #7)..... -120 V

Grid #2 voltage range..... 670 V Min 1185 V max

Drive Voltage (note #5) ..... 38 V

Cathode Current..... 100 $\mu$ A(Nom)

- 7) Grid #1 voltage for visual extinction of focused, undeflected spot.
- 8) Dynamic focus = corner focus voltage minus center voltage.
- 9) Line width is the 63% amplitude point of line profile (with raster retrace blanking applied).
- 10) Under these conditions, sizeable variations in spot size and light output can be expected due to cut-off variations.

## 10.0 X-RAY EMITTANCE

### 10.1 X-RADIATION REFERENCE POINT

The maximum anode voltage at which the X-Radiation emitted from this tube will not exceed 0.5mR/hour at 250 uA anode current is 23.5 KV

### 10.2 X-RADIATION CHARACTERISTICS

The X-Radiation emitted from this display tube, as measured in accordance with the EIA Publication No. RS-501 (current revision) will not exceed 0.5mR/hour throughout the useful life of the tube when operated within regulation limits of a hypothetical power supply with a 5M ohm internal impedance, as shown by Figure XM-6. The tube should not be operated beyond its' Design Maximum Rated Anode Voltage, but its' X-Radiation will not exceed 0.5mR/hour for anode voltage and current combinations given by the Iso Exposure Rate Limit Characteristics as shown in Figure XM-6. Operation above these values shown by the curve may result in failure of the display unit to comply with the Federal Performance Standard for Television Receivers (21 CFR Subchapter J.). Maximum X-Radiation as a function of anode voltage at 250uA anode current is shown by the curve of Figure XM-5. X-Radiation at constant voltage varies linearly with anode current.

Figure XM-5

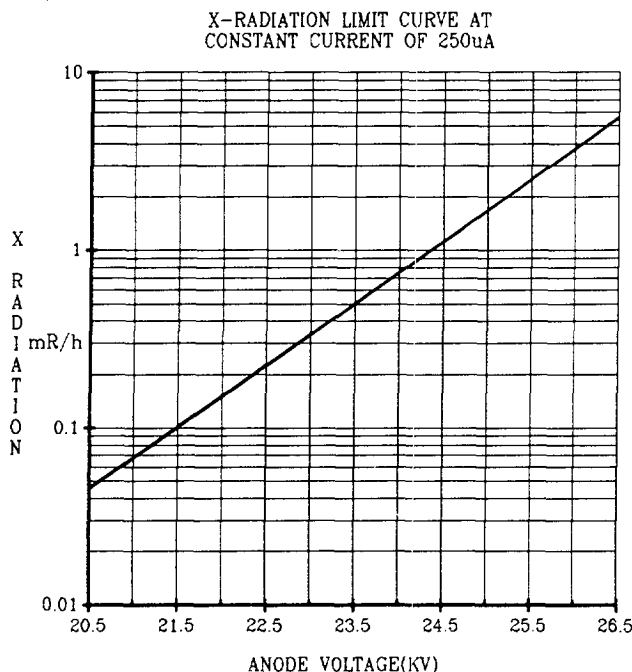
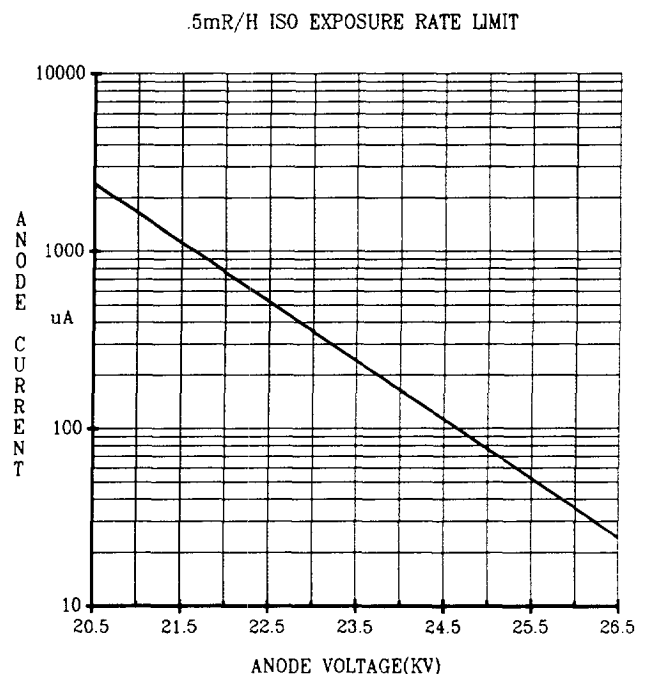


Figure XM-6



Focus Voltage Range	
Best Overall Focus Voltage.....	0 V to 400 V
Center Focus Voltage.....	-100 V to 300 V
Dynamic Focus Voltage (note #8).....	350 V (Nom)
Center Line Width (note #9).....	.006 in (Nom)
	.1524 mm (Nom)

### 6.3 OPERATIONS AT CONSTANT GRID #2 VOLTAGE (NOTE #10)

Grid #2 voltage.....	800 V
Grid #1 cut-off voltage range (note #7).....	-82 V to -142 V
Cathode cut-off voltage range.....	72 V to 128 V

### 6.4 HEATER BIAS (note #6)

With respect to cathode, not to exceed.....	0 V to -50 V
Bias at nominal value .....	6.3 V

## 7.0 SCREEN QUALITY

7.1 Screen Quality in accordance with Clinton Manufacturing Specification number CS106.

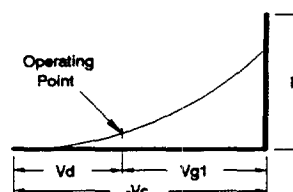
## 8.0 UNDEFLECTED SPOT LAND

8.1 Maximum deviation from the mechanical center is .375" Rad

8.2 Undelected spot land is measured in accordance with Clinton Manufacturing Specification CS120.

## 9.0 OPERATING CHARACTERISTICS

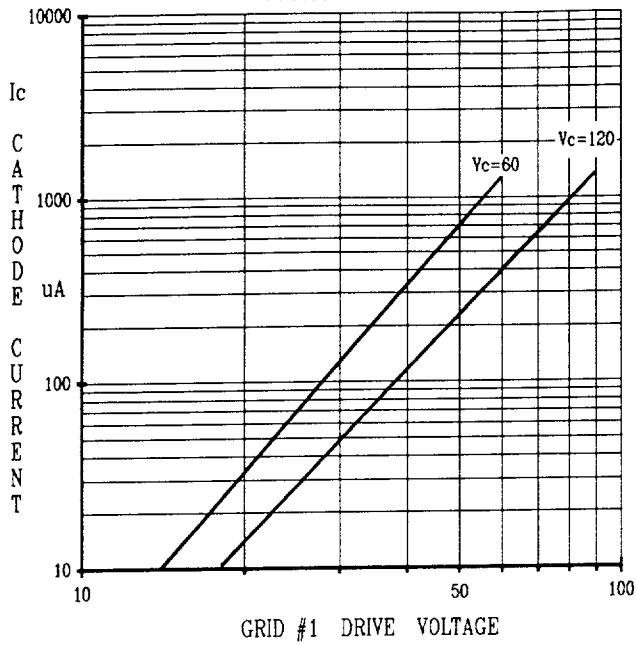
Vd = Drive Voltage  
 Vg1 = Grid #1 Bias Voltage  
 Vc = Grid #1 Voltage cutoff  
 Ic = Cathode Current  
 $\gamma = Vd/Vc$



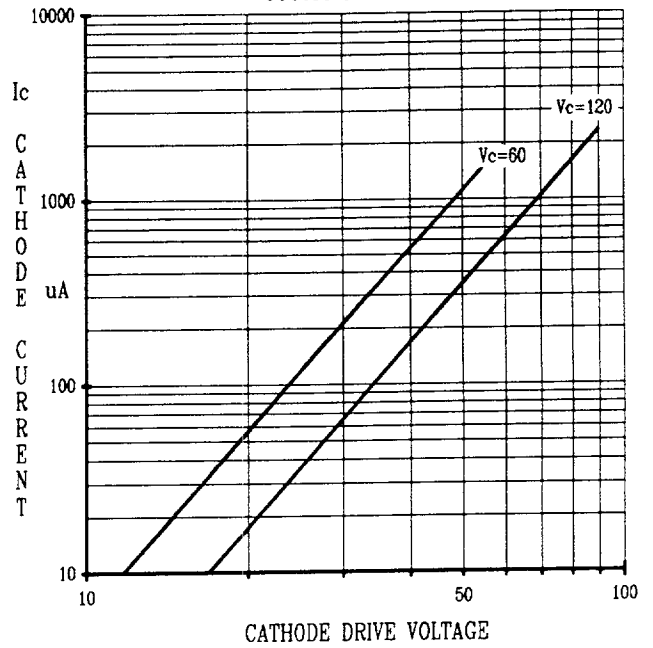
## NOTES

- 1) External conductive coating and mounting hardware, if used, must be grounded. Pattern outline is for reference only. Actual pattern can deviate from outline shown.
- 2) Determined by plane where EIA G-126 contour reference gauge will stop.
- 3) Measured with implosion hardware, if any, connected to external coating.
- 4) This specification applies to a bare faced tube.
- 5) Drive voltage = | Grid #1 voltage for visual extinction of focused undeflected spot | minus | Grid #1 bias voltage |. For optimum life considerations reduced drive voltage must be used for high cathode duty cycle applications.
- 6) For optimum life considerations, it is recommended that the heater be operated as specified and not allowed to float and biased as specified in paragraph 6.4

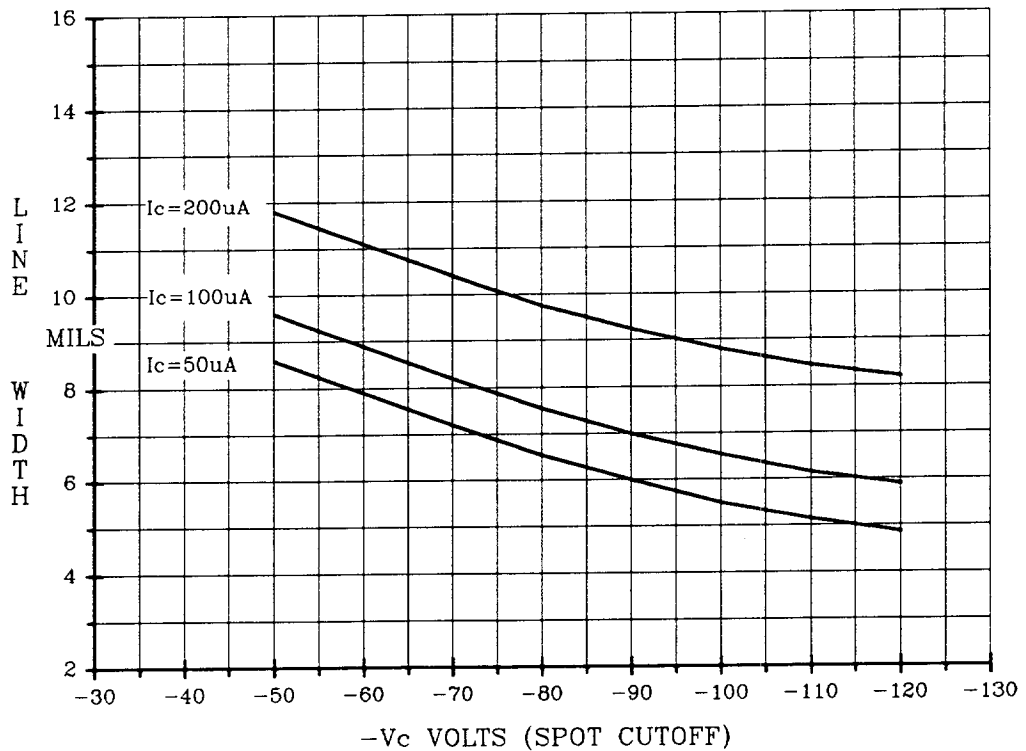
TYPICAL CATHODE CURRENT WHEN  
GRID #1 OF TUBE IS DRIVEN FROM  
CUTOFF'S LISTED



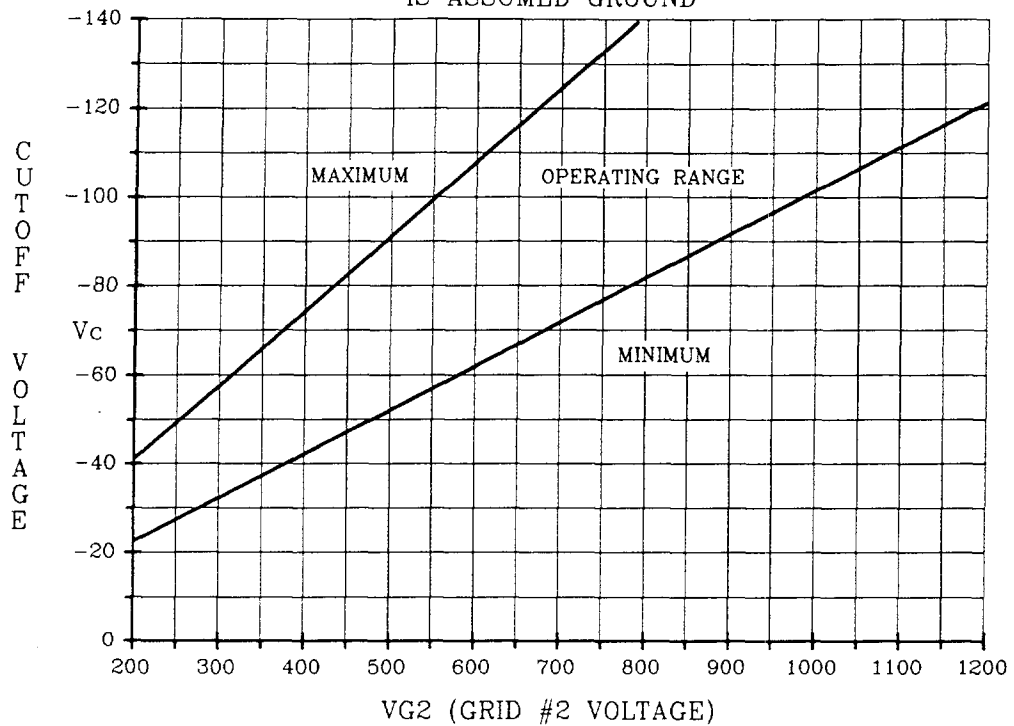
TYPICAL CATHODE CURRENT WHEN  
CATHODE IS DRIVEN FROM THE  
CUTOFF'S LISTED



LINE WIDTH VS. CUTOFF VOLTAGE AT  
CONSTANT CATHODE CURRENT



GRID #1 VOLTAGE NECESSARY TO  
EXTINGUISH A FOCUSED SPOT CATHODE  
IS ASSUMED GROUND



CATHODE VOLTAGE NECESSARY TO  
EXTINGUISH A FOCUSED SPOT GRID #1  
IS ASSUMED GROUND

