

# TECHNICAL INFORMATION



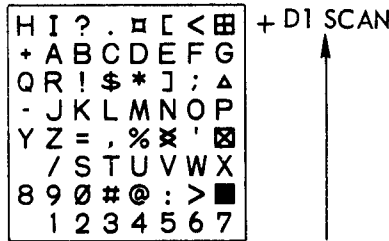
## SYMBOLRAY\* CHARACTER GENERATING CATHODE RAY TUBE

# CK1414

### GENERAL DATA

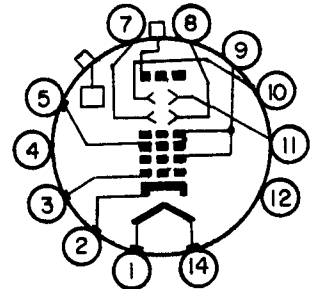
The CK1414 is a cathode ray device used for electrical generation of alphanumeric characters and symbols. The tube is operated in the monoscope mode and output signals are generated by scanning the symbol that appears on the target pattern.

This type has applications with business data processing equipments as an economical method for generating characters for hard copy print-out or for cathode ray display.



TARGET PATTERN  
(Actual Size)  
ELECTRON GUN:  
Focus Method - Electrostatic  
Deflection - Electrostatic

### MECHANICAL DATA



BASE:.....Medium Shell Dihoptal  
12-pin No. B12-37  
MOUNTING POSITION:..... Any  
BASING..... 14J

### ELECTRICAL DATA

#### DIRECT INTERELECTRODE CAPACITANCES: ( $\mu$ fds. approx.)

Grid #1 to all other electrodes . . . . .	6
Cathode to all other electrodes . . . . .	4.5
D1 to D2 . . . . .	2.4
D3 to D4 . . . . .	1.0
D1 to all other electrodes except D2 . . . . .	4.4
D2 to all other electrodes except D1 . . . . .	4.4
D3 to all other electrodes except D4 . . . . .	3.1
D4 to all other electrodes except D3 . . . . .	3.6
Collector to all other electrodes. . . . .	6.0
Target to all other electrodes. . . . .	2.5

#### RATINGS - ABSOLUTE MAXIMUM VALUES:

Heater Voltage. . . . .	6.3±10 % volts
Peak Heater-Cathode Voltage, Max.	
Heater Negative with respect to cathode. . . . .	200 volts
Heater Positive with respect to cathode. . . . .	200 volts
Anode, Target, and Collector Voltage . . . . .	2850 volts DC
Focus Electrode Voltage . . . . .	1100 volts DC
Grid #1 Voltage	
Negative - Bias Value . . . . .	220 volts DC
Positive - Bias Value . . . . .	0 volts DC
Positive - Peak Value . . . . .	0 volts
Peak Voltage Between Anode and Any Deflecting Electrode . . . . .	550 volts DC

#### TERMINAL CONNECTIONS:

Pin 1	Heater
Pin 2	Cathode
Pin 3	Grid #1
Pin 4	Do not use
Pin 5	Focus
Pin 7	D3
Pin 8	D4
Pin 9	Anode
Pin 10	D2
Pin 11	D1
Pin 12	No Connection
Pin 14	Heater
Cap 1	Collector
Cap 2	Target Pattern

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ELECTRICAL DATA (Cont'd.)

CHARACTERISTICS AND TYPICAL OPERATION: (See Caution Note)

Anode and Target Voltage . . . . .	1200 volts DC
Collector Voltage (vary) . . . . .	+1203 VDC
Focusing Electrode. . . . .	150 to 515 volts DC
Grid #1 Voltage required for cutoff of beam current (vary) . . . . .	25 to 65 volts DC
Deflection Factors: (See Note 3)	
D1-D2 (vertical scan of 1 symbol) . . . . .	9.0 volts nominal
D3-D4 (horizontal scan of 1 symbol) . . . . .	6.5 volts nominal
D1-D2 Deflection Voltage required to scan from lower row (1,2,3,---) to Upper Row (H,I,?,---) Note 2 . . . . .	90 volts nominal
D3-D4 Deflection Voltage required to scan from left row (H+Q---) to right row (H G A ---) Note 2 . . . . .	55 volts nominal
Target Output Resistance . . . . .	500 ohms
Typical Peak Output Signal . . . . .	5 $\mu$ a

ALIGNMENT OF TRACES:

- D1-D2 trace aligns with pin #5 and collector button
- Positive Voltage on D1 deflects beam toward top row of target (H I --- H)
- Positive Voltage on D3 deflects beam toward left side of target (H+Q ---)
- Angle between D3, D4 and D1, D2 traces . . . . . 90 degrees  $\pm$  1 degree
- Angle between traces and target symbols . . . . .  $\pm$  1 degree

MAXIMUM CIRCUIT VALUES:

Grid #1 Circuit Resistance . . . . .	1.5 meg.
Resistance in any deflecting electrode current (Note 1) . . . . .	5.0 meg.

NOTE 1: It is recommended that the deflecting-electrode-circuit resistances be approximately equal.  
 NOTE 2: Undelected beam normally dwells on center of target pattern between L, M, (comma) and % symbols.  
 NOTE 3: Nominal voltage of deflection plates should be approximately equal to anode voltage (+1200 Vdc).

CAUTION: Electron beam should be cut-off when no raster is being developed. A blemish may be generated by a change in secondary emission of the target.

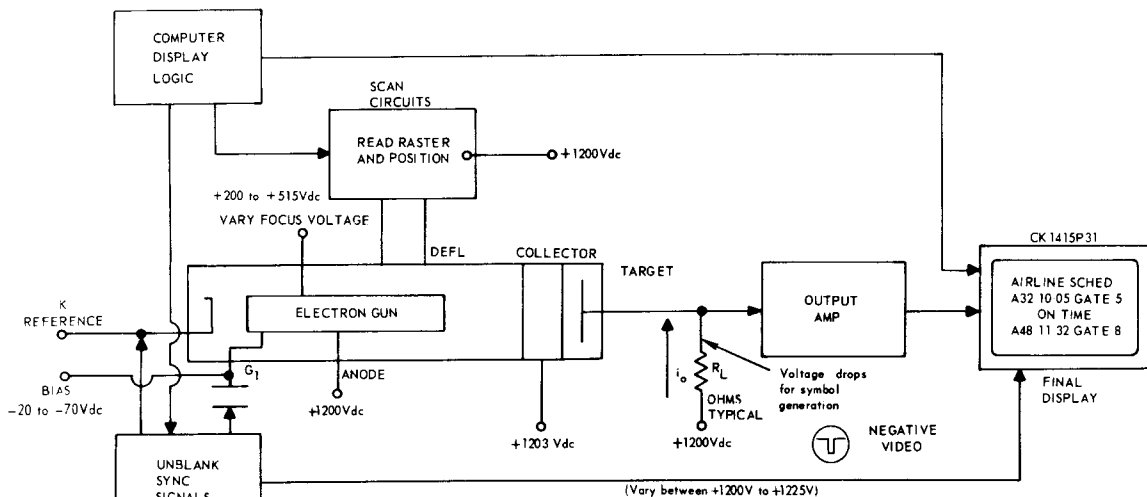


Figure 1.  
 OPERATION BLOCK DIAGRAM  
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APPLICATION DATA

Figure 1 shows basic circuit for operation of the tube.

A small TV type raster is generated in the scan circuit block. This raster is just large enough to scan a single symbol on the target. The scan circuit also selects and positions the beam on the character to be generated.

As the electron beam lands on the target surface a difference in secondary emission of electrons from that surface is caused by the printed portion of the symbols which lowers the current flow from the target. The secondary electrons emitted are attracted to the collector which is at a more positive voltage. See Figure 2.

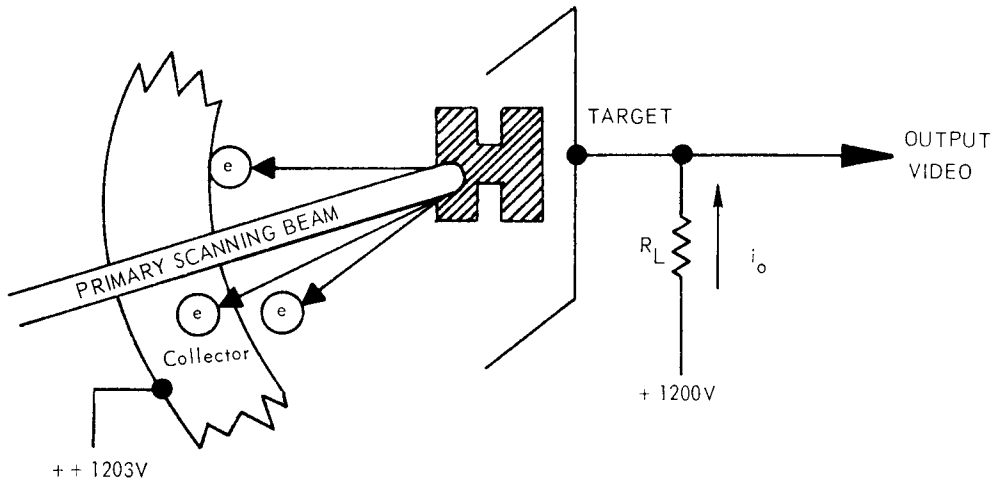
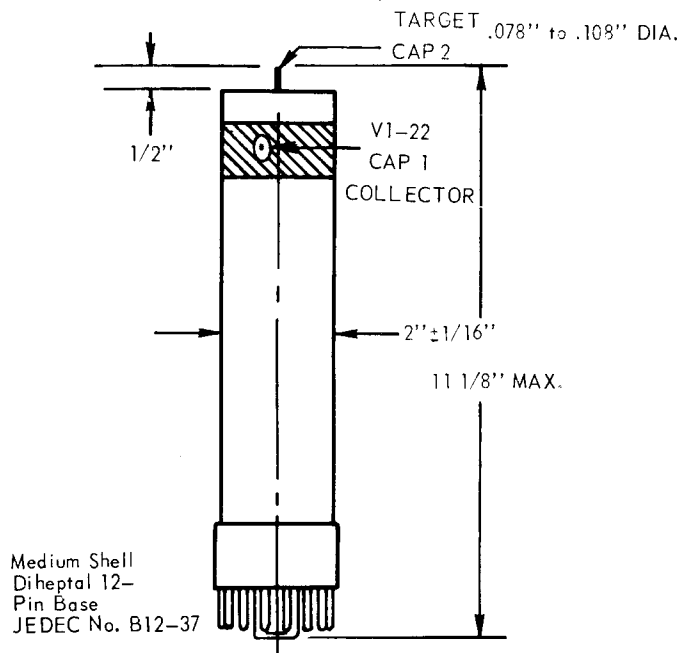


Figure 2.

A lower secondary emission occurs when the cathode ray beam scans the lines of the symbol. Therefore, the current through RL changes and the output video signal is created. By proper synchronization of scan and scan position, the entire character is recreated on the final display cathode ray tube.

Figure #1 shows a system application using the CK1414 Symbolray\* tube and a Dataray cathode ray display tube of CK1415P31, featuring magnetic and electric deflection for high quality character display. The Symbolray\* tube provides instant access to information retrieved from a computer.



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