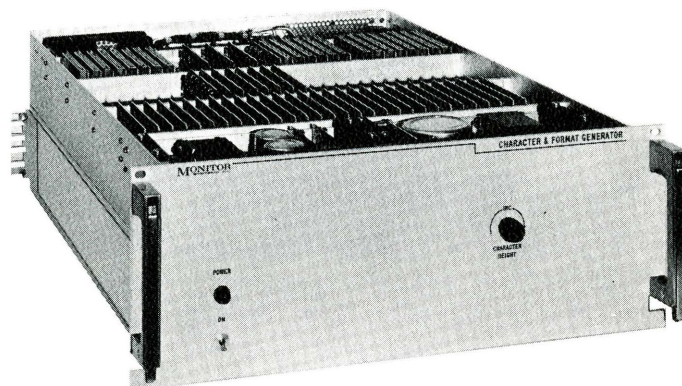




MONITOR 8040 CHARACTER AND FORMAT GENERATOR for

High-Performance CRT Displays



The MONITOR Model 8040 Character and Format Generator provides high-speed digitally controlled stroke character and format generator for use with direct-writing cathode ray tube display systems. Its Character Generator produces 20-stroke characters in 2 microseconds, offering unusually high performance for applications such as 2000-character flicker-free computer controlled displays. Its Format Generator permits location and annotation of targets such as on radar or map displays, by providing an identifying symbol from which a leader may be drawn to another area of the display where a descriptive array of characters may be projected.

DESIGN FEATURES

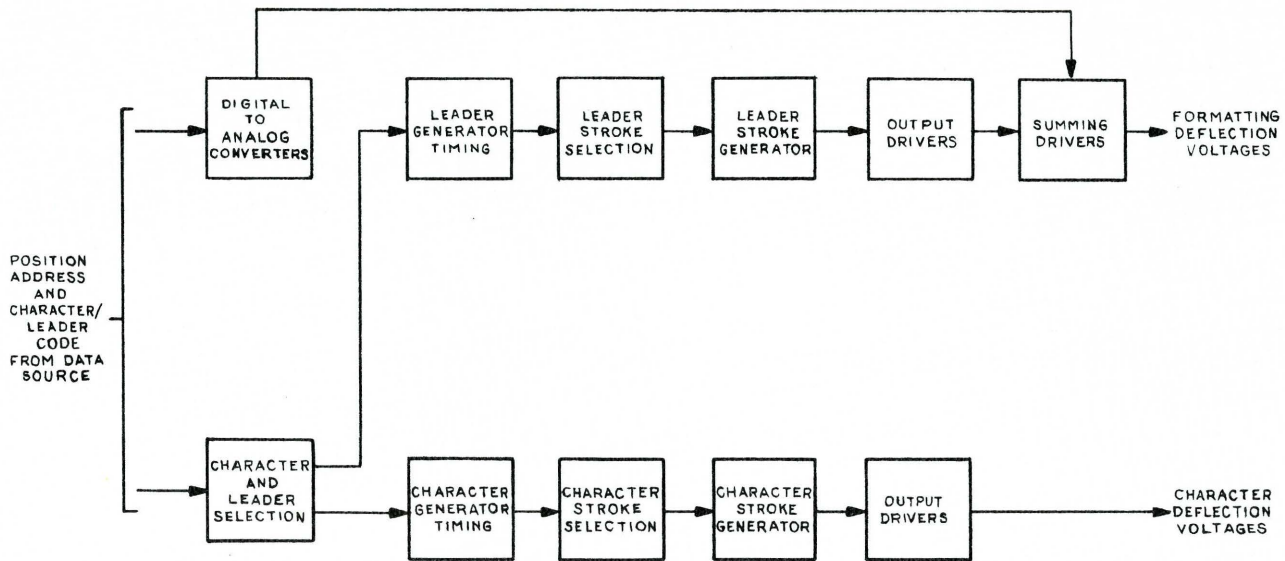
- Separate outputs for characters and formatting.
- Up to 20 strokes per character.
- Maximum character writing time: 2 microseconds.
- Average character writing time: 1.3 microseconds.
- Maximum leader writing time: 4 microseconds.
- Leader writing time proportional to leader length.
- Positioning Time: 1 microsecond.
- Repertoire of 64 alphanumeric characters and symbols of adjustable size.
- Repertoire of 32 leaders of 4 different lengths and 8 different directions with adjustable scale.

- Individual character font or leader length and direction programmable by replacement of printed circuit card.
- Positions characters at the end of a leader in response to digital input addressed, either by individual location or with optional typewriter sequencing.

By deletion of the Format Generator, the unit is available as only a high-speed Character Generator.

FUNCTIONAL DESCRIPTION

The input lines accept the character, leader, and position information upon which the generators operate to provide the proper character, leader, and position signals. The block diagram shows the inter-relationship of the various functional elements.



01-410

BLOCK DIAGRAM

CHARACTER GENERATOR

The receipt of a write-start signal enables a character clock gate thereby permitting clocked generation of the signals required to generate the character. This timing provides up to 20 sequential signals for the generation of the character strokes. A character is formed automatically by generating a vector stroke signal in each of up to 20 intervals. The standard character repertoire is shown in Figure 1.

Each individual stroke is a vector sum of one or more units in the plus or minus X, plus or minus Y or one-half unit in the plus or minus X directions.

Any of the character stroke functions may be used in any time segment by diode decoding one of the sixty-four arrays of 20 x 7 character matrices. The desired array is selected by one of sixty-four character-select lines.

The outputs of the stroke matrices are strobed to the function generators and an intensity modulator which turns the beam off during retrace or background motions.

Function generators provide accurate voltage levels which

are summed and integrated by output driver circuits. These outputs are the complex X and Y deflection voltages necessary for the stroke generation of characters.

A write-complete pulse is provided for asynchronous operation.

FORMAT GENERATOR

The Format Generator consists of a Leader Generator and a Position Generator.

Leader Generator

The receipt of a write-start signal enables a leader block gate thereby permitting clocked generation of the signals required to generate a leader. A leader is formed automatically by generating a vector sum of X and Y component signals for each leader interval. Leaders available for selection are shown in Figure 2.

This combination of signals includes one unit in each of

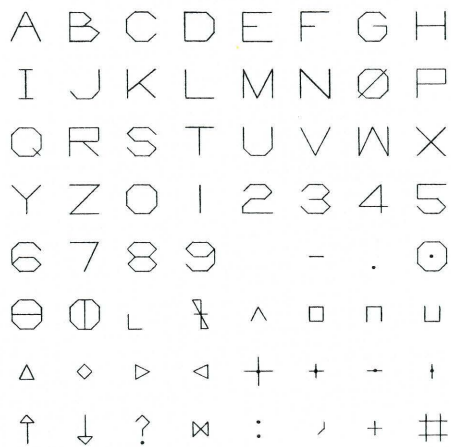


FIGURE 1
CHARACTER REPERTOIRE

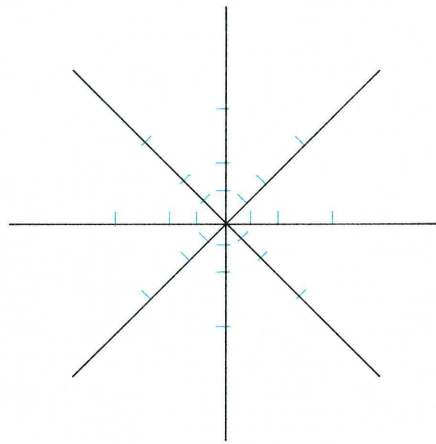


FIGURE 2
LEADER REPERTOIRE

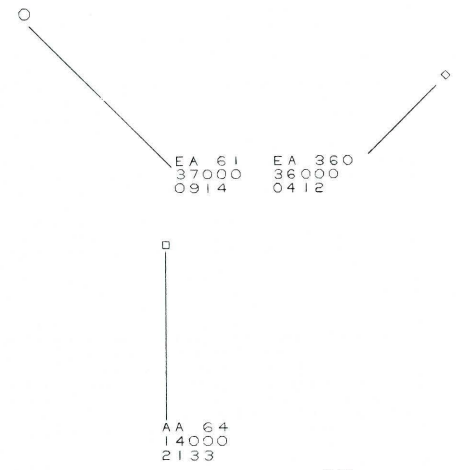


FIGURE 3
SAMPLE DISPLAY

the plus or minus X, or plus or minus Y directions.

Leader length is determined by the time allotted to a constant-velocity stroke.

The four available leader time segments are one, one-half, and one-quarter and one-eighth units.

Any of the leader stroke functions may be decoded with any timing segment to generate "ON" or "OFF" axis leaders. The input code is used to select one of 32 possible leaders. These include selection of N, NE, E, SE, S, SW, W, and NW directions, each of which will be 1/8, 1/4, 1/2 or 1 full unit in length. The leader length, as defined for any display, is directly related to the ratio of full scale output voltage representing 1 unit of leader length to the amount of linear CRT beam motion caused by this voltage in a specific display.

The outputs of the leader selection matrices are strobed to function generators. Intensity modulation signals are provided for the blanking of the beginning and ending portions of each leader to permit symbols to be located in the blanked area.

The function generators provide accurate voltage level signals which are summed and integrated by the output driver circuits. These output voltages are the X and Y deflection voltages necessary for leader generation.

Position Generator

Input signal lines accept the character positioning address and strobe it into two digital to analog converters which produce the X and Y positioning voltages. These positioning voltages are summed with the leader deflection voltages and are provided at the output for character positioning at the end of a leader. The leader generator maintains its final position for up to 70 microseconds. The resultant positions generated by the position generator are relative to this end of the leader.

Optionally, automatic sequencing logic is available to provide typewriter-like advance of characters, including the equivalent return and line-feed in response to corresponding input codes;

An example of an annotated radar display is shown in Figure 3.

ELECTRICAL SPECIFICATIONS

All digital input and output signal levels and impedances are compatible with conventional TTL integrated-circuit logic.

Inputs

Character and leader selection by 7-bit parallel words.

Character position: 4 bits X, 3 bits Y

Optional typewriter mode for sequencing of character positions.

Control pulses: Position Start, Write Start.

Outputs

Control pulses: Position Complete, Write Complete, Data Block Complete.

Leader and positioning deflection voltages: ± 1.5 volts @ 20 ma. (Measured at the input to any display when terminated with 75 ohms).

Character deflection voltages: ± 1.5 volts @ 20 ma. (Measured at the input to any display when terminated with 75 ohms).

Remote operation to 50 feet maximum

Character & Symbol Characteristics

Number of characters and symbols: 64, optionally expandable in increments of 64. Standard set per Figure 1. (Any other characters which are derivable using up to 20 strokes in a 4 x 8 matrix may be ordered optionally to replace any of the 64 standard characters.

Writing Time: 2.00 microseconds maximum, 100 nanoseconds minimum.

Average Character and symbol writing time: 1.35 microseconds or less.

Number of strokes: 20 maximum.

Character Size continuously variable in height from 0.6 volts to 1.5 volts (optionally from 0 to 2.0 volts).

Aspect ratio: 4 units high by 3 units wide. Others optional.

Uniformity: $\pm 5\%$ of character height.

Leader and Character Positioning Characteristics

Number of leaders: 32 as shown in Figure 2, Length and direction programmable by selection of printed circuit matrix card.

Writing time: 4.0 microseconds maximum for maximum length leader. Time for shorter leaders is dependent on length.

Hold time for end of leader position: 70 microseconds maximum to 2% of full scale.

Leader blanking for approximately 1/20 of longest leader length at beginning and end of each leader. (May be deleted on order).

Character positioning as programmed by an array of characters (8 x 16) whose individual locations are referred to the end of the leader.

Power Requirements

115 volts $\pm 10\%$, 60 Hz ± 3 cycles, 1.0 ampere.

MECHANICAL CONFIGURATION

19" relay rack drawer with slides using 7" of panel height and 25-1/2" of depth.

ENVIRONMENT

Ambient temperature: 50^o to 100^oF.

Relative humidity: to 95% without condensation.

Other ranges on special order.



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