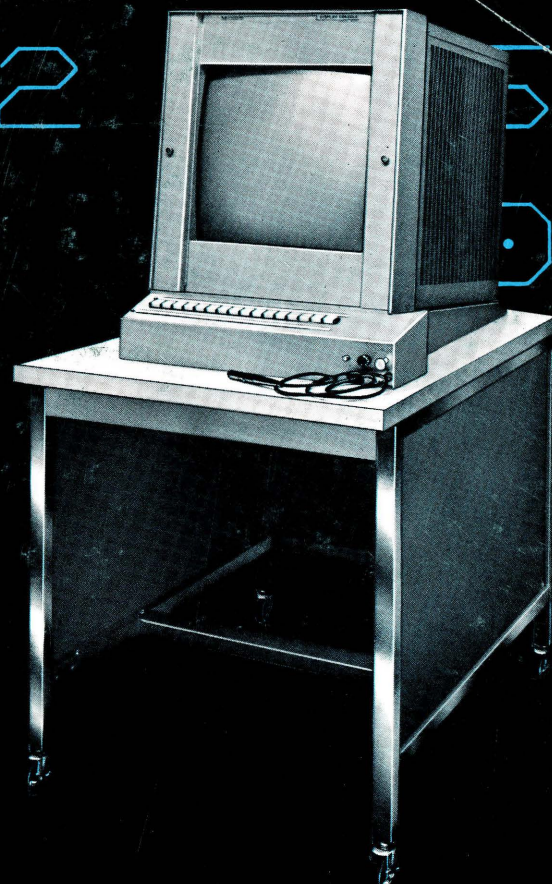



# Presenting the High Performance **MONITOR 8100**

**COMPUTER CONTROLLED DISPLAY SYSTEM  
FEATURING BOTH STAND ALONE AND REMOTE OPERATION**



  
**MONITOR**  
SYSTEMS  
an AYDIN company



# The MONITOR 8100 Offers Computer Versatility Integrated Circuitry Economy

AN APPLICATION-ORIENTED GRAPHIC DATA  
TERMINAL DESIGNED AS A TOTAL SYSTEM  
OR INTERFACED TO A GENERAL COMPUTER  
— REMOTELY OR LOCALLY

## User Features

- **Performance** — High Resolution display of alphanumeric and graphic information. Up to 20 strokes per character and 64 characters. Vector and circle generators are provided.
- **Capacity** — 2000 characters, 80 per line, 25 lines; or 5000 inches of vectors; or some combination of vectors, circles and characters.
- **Complete Software Package** — Includes assembler, interrupt, light pen, edit, diagnostics, and program call routines.
- **Stand-Alone Capability** — Provides display capability in a stand alone mode with its own self-contained computer and software. In conjunction with another computer system, it provides for highly efficient use of both computer and display system.
- **I/O Options** — Computer interface selection: Light pen, keyboard, function switches, ASR33, paper tape reader, line printer.

## Design Features

- **Displays** high resolution graphic and alphanumeric data.
- **Utilizes** a general purpose computer for data storage, display image manipulation, refresh, and information updating.

- **Provides** character generation, vector generation and circle generation hardware.
- **Accepts** information from a computer, teletype keyboard, function switches and light pen.

## SYSTEM DESCRIPTION

The basic 8100 Computer Controlled Display System consists of the following units:

- Cathode Ray Tube Display Console with light pen and 16 function switches.
- ASR33 Typewriter with Keyboard, Printer, Paper Tape Input.
- A free-standing unit which contains:
  1. General Purpose Computer
  2. Display Controller
  3. Character Generator
  4. Vector Generator
  5. Circle Generator

## OPTIONS TO THE 8100 SYSTEM

- A second independent cathode ray tube display console with light pen and 16 function switches.

- A second ASR33 Teletypewriter
- Additional memory in 4096 word increments to 32,768 words.
- Data set interface bit serial at 1200, 2400, 4800, 9600 or 40,800 baud, as ordered.

## PERIPHERAL DEVICE OPTIONS

- High speed paper tape reader
- High speed printer
- Magnetic tape transport
- Punched card equipment
- Digital plotter

## TYPICAL APPLICATIONS

- Computer aided design
- Computer aided instruction
- Simulation
- Process control
- Automatic inspection and check out system
- Physical experimentation
- Biomedical experimentation
- Tactical command and control



## FUNCTIONAL ORGANIZATION

The **MONITOR 8100 System** provides for display of computer output in high resolution alphanumeric or graphic form. The system relies on the capability of its own internal general purpose computer and software to minimize software requirements in the external equipment.

The CRT display system utilizes the internal computer core memory as the refresh memory. In the sequential mode, it displays 25 rows of 80 characters. In the random mode, memory accesses permit a more limited display, dependent on the number and location of the various characters and vectors.

Including power supplies, the system (see Block Diagram below) comprises the following subsystems:

- **CATHODE RAY TUBE DISPLAY CONSOLE.** The 21" rectangular cathode ray tube and associated video amplifiers, deflection yokes, and high voltage power supply represent the output device generating the final display. It is capable of displaying a minimum of 2000 characters (80 per line, 25 lines) or 5000 inches of vectors, or some combination of vectors and characters in 33 milliseconds (30 frames per second).

- **LIGHT PEN.** A light pen is provided. When it is activated, the character, circle, or vector which is closest to the pen will cause a pulse to be generated. This signal is applied to a counter, which in turn, provides the computer with information necessary to determine which character was "light penned" so that the program may be controlled accordingly.

- **FUNCTION SWITCHES.** A front panel containing 16 function switches is located at the display console to interface with the computer. Operations of the switches causes an action by the computer dependent upon the program being operated by the computer.

- **KEYBOARD.** The keyboard is that of the standard ASR33 included with the 8100, and interfaces with the general purpose computer.

- **COMPUTER.** The internal general purpose digital computer has a standard memory capacity of 4096 words, 16 bits each, and contains a direct memory access channel, 8 levels of priority interrupt and power fail/restart circuitry. It interfaces with the computer, an ASR33 teletypewriter, function switches, a light pen, and the display controller. It is programmed to accept inputs from these sources and manipulate the information to generate a block of data. When interrogated by the display controller this data block describes the patterns and control necessary to update the CRT display.

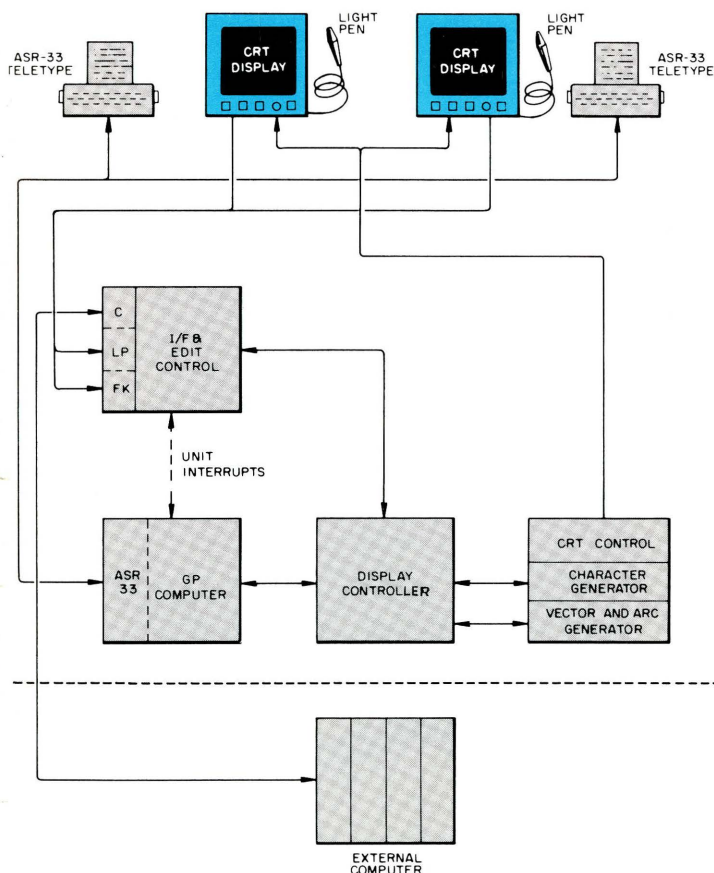
- **SOFTWARE.** Standard software, provided with the equipment includes an assembler, Fortran compiler, debugging routines, diagnostic routines and a multi-purpose library. The program decodes the information originating in edit control, executes the proper sequence of instructions necessary to perform the task required by the input data, encodes the resultant information in a form acceptable by the display control logic, and stores it in the proper location in the refresh memory.

- **DISPLAY CONTROLLER.** The display controller is the interface between the computer and the system function generators and accepts information from the DMA channel of the computer. It processes the stored information as a character, vector, point plot, or circle as instructed by the contents of the computer memory. The display controller directs data to the character generator, vector generator, position generator or circle generator. If characters are being processed, it automatically positions the next character without requiring additional information concerning character position, unless directed to do so. The display control mixes the analog data generated by the position generator, the vector generator, character generator or circle generator, and combines a CRT intensity signal with the information. This action permits the characters to either blink or be displayed at one of four intensities.

- **CHARACTER GENERATOR.** The character generator forms a character from up to 20 strokes. Sixty-four (64) characters can be generated, including all standard characters and many special symbols. These symbols include all capital letters, the digits 0 through 9 and almost any required additional symbols, punctuation marks and mathematical symbols.

- **VECTOR GENERATOR.** The vector generator uses a continuous line generation technique. Its required inputs are the relative vector projections in digital form. Resultant vector analog output will permit the display of the vector, at a constant rate per unit length, thereby providing constant image brightness regardless of length or direction of the vector. The vector generator can display a vector anywhere in the display area with a resolution of 1024 x 1024.

- **CIRCLE GENERATOR.** The circle generator also uses a constant writing speed, continuous line generation technique and accepts, as an input, the radius of the circle to be generated along with the position of its center.





# Specifications

## PHYSICAL CHARACTERISTICS

Power Input: 115 vac  $\pm$  10%; 60 Hz  
 $\pm$  10% single phase  
Environment: 40° F to 100° F

## CATHODE RAY TUBE CONSOLE

Tube Size: 21" diagonal  
Display Size: 12" x 12"  
Raster Count: 1024 x 1024  
Raster Interval: 12"/1024 nominal  
Spot Size: 0.015" max.  
Stability:  $\pm$  0.5%  
Repeatability:  $\pm$  0.050"  
Accuracy:  $\pm$  4%  
Phosphor: P31

## CONSOLE INPUT SOURCES

ASR33 Keyboard  
16 Function Switches  
Light Pen  
Computer Operator and Maintenance Panel

## GENERAL PURPOSE COMPUTER

**Type** — General purpose digital computer with magnetic core memory, binary, parallel, single address system.

**MEMORY** — Magnetic Core 16 bits  
1.8 usec cycle time — 4096 words  
standard expandable to 32,768.

## SOFTWARE

Symbolic Assembler (for display commands)  
Light Pen Tracking  
Grid Generation and Scaling  
Character Generation and Edit Routine  
Diagnostic Program  
Standard software, including manual and automatic loaders, sym-

bolic assembly program, Fortran compiler, on line debugging and editing routines, diagnostic and maintenance programs.

## ADDITIONAL COMPUTER HARDWARE:

Priority Interrupt Module  
Power Failsafe Interrupt

The display portion of the core memory is refreshed at a rate dependent on the contents but no faster than 60 frames/sec nor slower than 10 frames/sec.

The computer instruction repertoire permits subroutines. The system is capable of accepting and decoding data entered from the function control switches, as well as accepting and processing data entered from the keyboard. By program, the system is capable of tracking and displaying the track of light pen following a cursor.

## DISPLAY CONTROLLER

The display controller directs data to the character generator, vector generator, position generator or circle generator; mixes the analog data generated and combines a CRT intensity signal with the information. Information may blink or be displayed at one of four intensities.

## CHARACTER GENERATOR

The character generator provides 64 characters in the standard ASCII set. Character words each contain two characters. All sequential characters are strung in a line in either

horizontal or vertical orientation. The characters are generated in one of four sizes.

Characters Per Line: 80 max.  
Lines Per Frame: 25 max.  
Character Generation Rate: 14 usec. max. including positioning time.

## DISPLAY TIMING

Random Positioning: 14 usec. max.  
Small Angle Positioning: 3 usec. max.  
Vector Generation Time: 5 usec. + 5 usec./inch  
Point Plot Time: 6 usec. max.  
Character Generation Time: 10 usec. max.

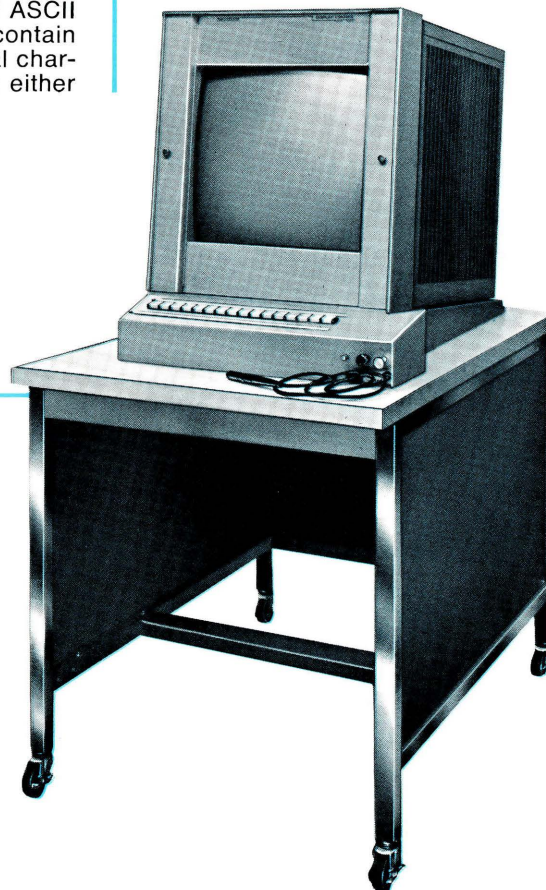
## VECTOR GENERATOR

Vectors can be drawn in succession such that the end point of one vector is the start of another. They can be any length with horizontal and vertical projection up to 1024 units (12 inches) with a resolution of 1/1024. Vectors are either long or short at input source option. Long vectors require two memory words, while short ones (up to 6 bits in X or Y) require one memory word.

Under program control all vectors following a vector control word will be one of 4 forms (solid, dotted, dashed, or dash-dot). They will be generated at one of 4 intensity levels (one is blank).

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