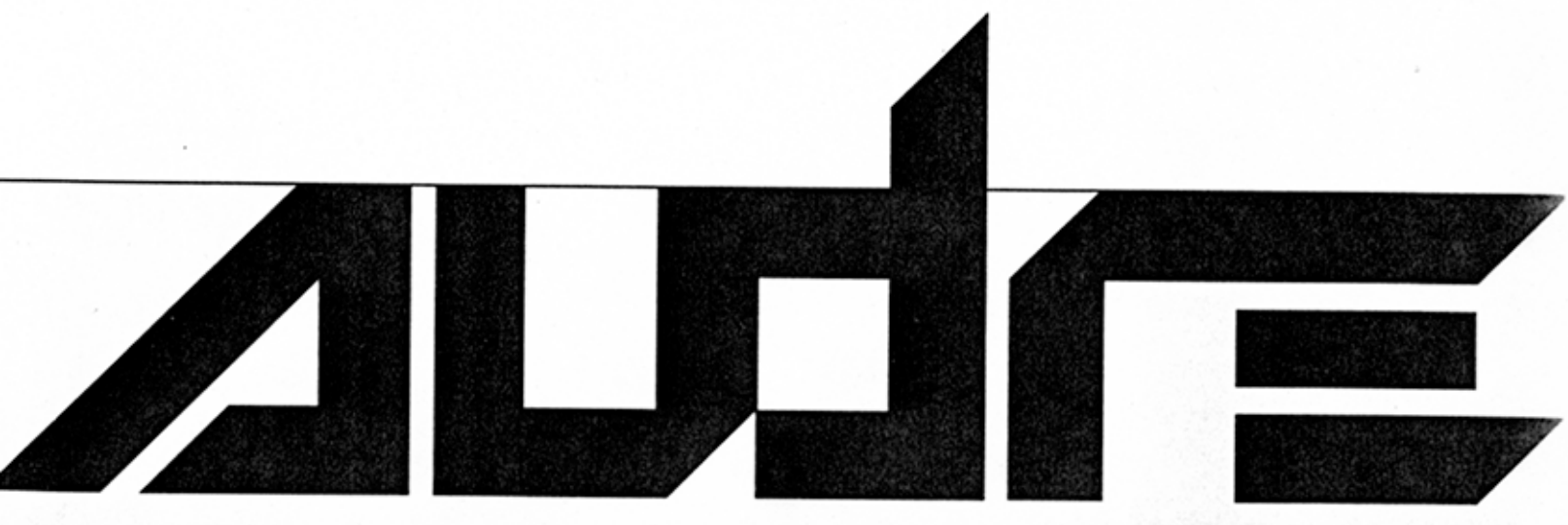
AUDRE™

AUTOMATIC DIGITIZING AND RECOGNITION



AUDRE™ SYSTEM

GENERAL DESCRIPTION

The AUDRE (Automatic Digitizing & Recognition) SYSTEM is a revolutionary computer imaging system designed to take the hand labor out of data and graphic entry. It consists of a linear array camera, using Charge-Coupled Device (CCD) technology, a high speed Direct Memory Access (DMA) interface and a powerful workstation with high resolution display. The system is supported by picture manipulation and camera control software.

This multi-talented, high-performance, general purpose workstation speeds and simplifies the painstaking process of entering pictorial information, graphic drawings and text into the computer. The AUDRE provides an ideal way to convert a paper office environment to an automated office.

The AUDRE System can digitize any stationary object or scene and enter the image into the data base. Once entered into the system, the image is available for manipulation, editing, transfer or output. Using Entity Recognition™ the image may be transformed to vector format for use with CAD or graphics systems.

AUDRE's applications are virtually unlimited. For any procedure where there is a bottle-neck of input documents due to high volume or complex drawings, this unique imaging system is the solution. Input documents such as maps, engineering and architectural drawings, text documents, typesetting, photographic x-rays and charts are easily scanned and digitized for computer processing.

SUMMARY

This product description covers all the components of the AUDRE System. The individual sections are:

- General System Description
- Linear CCD Array Camera
- Hardware/Microcode Interface
- Bit-Slice 16 Bit Workstation
- Hard Copy Device
- Specifications

Each section is divided into a general description, explaining that component's function; a summary of operation, explaining in detail exactly how the function performs; and a specifications listing, which provides information about electrical requirements, dimensions and environmental considerations.

CCD ARRAY CAMERA

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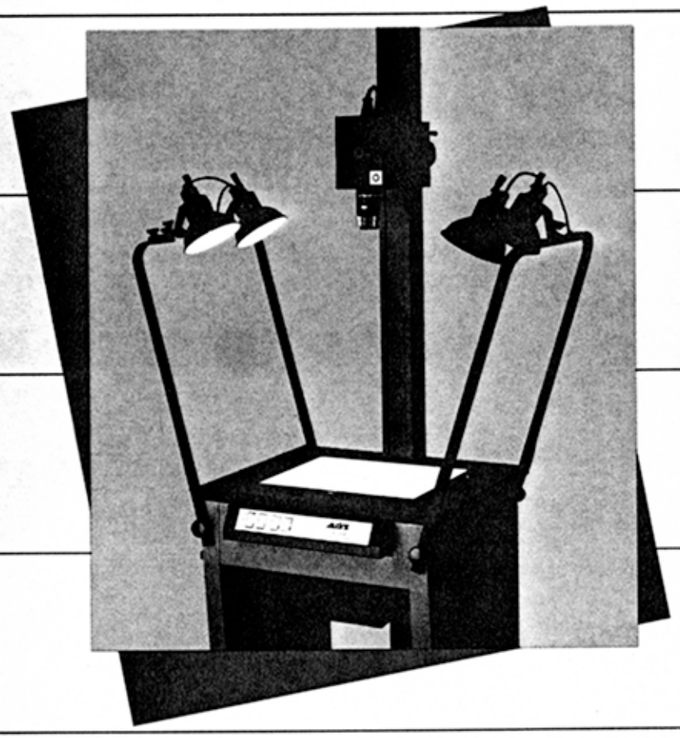


GENERAL DESCRIPTION

The CAMERA is a Charge-Coupled Device (CCD) array camera. A solid state linear array consisting of 1,728 photoelements replaces the film found within a standard 35mm camera. A metal enclosure completely surrounds the camera's internal parts and protects them from damage. On the base of this enclosure, a mounting bar with three tapped holes provides a sturdy surface for attaching the camera. A single screw-on connector mates with a single cable that delivers DC power to the camera electronics. The cable carries multiplexed picture data and control signals through the interface to the workstation.

Like a conventional camera, any standard 35mm bayonet or thread mount lens is acceptable. (When ordering the AUDRE™ System, specify type of mount for lens.) Focus settings, optical characteristics of the lens, and the distance from the camera to the object or scene determine the field of view (viewable copy size).

The camera is mounted on a copy table or desk top copy stand. The height and depth settings can be adjusted for proper image viewing and resolution. A pair of adjustable lighting arms supply proper illumination. Each arm has two 250 watt quartz halogen lamps. A central control panel controls the brightness (high/low) of the lighting arms and the intensity (high/low) of the quartz base illuminator.

SUMMARY OF OPERATION

The operator initiates the picture taking process by selecting a function from a menu on the display screen. This activates a control signal within the workstation, and starts the picture scan.

During the picture cycle, a motor-driven, precision mechanical drive assembly inside the camera moves the linear array across an image field whose size is equivalent to a full frame of 35mm film. The minimum time for the mechanical scan is about two seconds, but longer scans can be adjusted to suit the application.

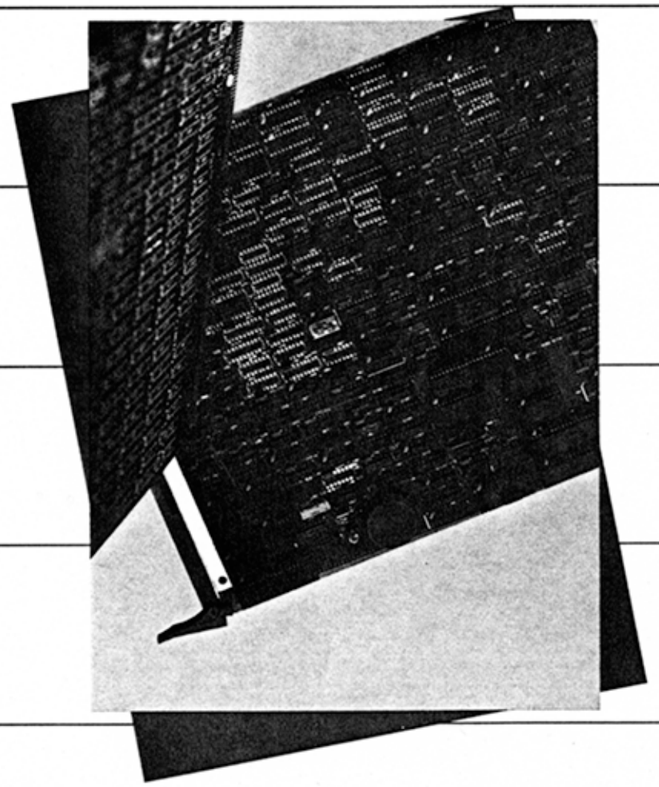
The camera captures 4.5 million pixels (picture elements) in one scan. Each pixel is represented as 8 parallel binary bits, thus giving 256 levels of gray per pixel.

Digital picture data, in 8 bit parallel format, along with synchronization clocking, is transferred to the interface at 16 million bits per second (2 million bytes per second).

SPECIFICATIONS

OPTICAL	Dimensions of image plane:	25.9mm by 38mm
	Number of pixels in image plane:	1,720 x 2,592 (4,458,240)
	Image plane resolution:	33 line pairs per mm
	Dynamic range:	200:1
	Linearity (Gamma):	1.0
	Scan rate:	880 microseconds for 1,720 elements
	Frame rate:	2.35 seconds-minimum
	Video rate:	2 MHz
	Geometric distortion:	None
	Geometric stability:	Zero drift
	Blooming:	None
	Blemishes:	None
ELECTRICAL	Analog ground	
	+15 volts, regulated @ 0.5 amp	
	−15 volts, regulated @ 0.5 amp	
	Digital ground	
	+8 volts +10%, unregulated @ 2.5 amp	
	−8 volts −10%, unregulated @ 2.5 amp	
ENVIRONMENTAL	Operational temperature:	0° to +50°C
	Storage temperature:	−10° to +75°C
	Relative humidity:	0% to 95%, non-condensing
DIMENSIONS	7.170 in. x 5.45 in. x 3.96 in.	

INTERFACE



GENERAL DESCRIPTION

The INTERFACE connects the camera to the workstation via a 16 megabit per second DMA channel. The data is manipulated in the hardware of the interface to obtain a 1 bit, 2 bit, 4 bit or 8 bit per pixel representation of the image. The number of bits transferred to the workstation is user definable. The conversion is performed by bit masking, thresholding and linear-pixel interpolation hardware. All functions of the conversion hardware are software controlled.

The hardware is implemented on a single plug-in printed circuit board installed in the I/O option slot of the workstation's card cage. A combination of Transistor to Transistor Logic (TTL) and Schottky TTL medium scale integrated circuits are used. The interface is driven by microcode and Pascal software modules which set the parameters and control the image taking function.

The interface is powered by a stand alone power supply. The power supply is connected to the interface board with a six foot cable. The image from the camera is transferred to the interface board via the connecting cable and placed directly into the main memory for immediate viewing and editing.

A VU meter that appears on the display screen aids in camera focusing. As the camera lens is adjusted, the needle on the meter moves. A zero reading indicates perfect focus. A similar technique is used to adjust the lights and insure even light distribution.

SUMMARY OF OPERATION

The single board interface between the digitizing camera and the workstation accepts data from the camera in a multiplexed 8 bit per pixel format. The 8 bit data can be manipulated and stored in two formats. In a one bit mode, the interface converts data by a sequential bit masking, thresholding and adjacent pixel interpolation. In the 8 bit mode, the interface permits 2, 4 or 8 bits per pixel to be transferred to memory under direct memory access. The interface provides all required control and timing signals to operate the camera according to specifications. The parameters for the input bit mask level threshold and the adjacent pixel are set under software control by the user.

A picture scan is initiated under software control to capture the image through the camera lens. As each pixel of data is received, it is stored in a 16 bit First In First Out (FIFO) register. The conversion hardware reduces the number of stored bits per pixel if less than 8 bits per pixel are required. After 64 pixels have been received, a request is made to the DMA controller for transfer to memory. The sequence continues until the end of the scan line, at which time the hardware initiates an interrupt. This process continues until the image is captured.

The power supply unit provides dual voltage power to the camera. Power is controlled by an external switch or by an automatic relay sensing device.

SPECIFICATIONS

DIGITAL	Input data rate:	16 megabits per second
	Output data rate:	2 to 16 megabits per second
	Input data mask:	8 bits
	Input threshold:	8 bits
	Interpolation:	3 bit linear weighted
ELECTRICAL	+5 volts DC @ 2.0 AMPS	
	Power dissipation:	10 Watts
ENVIRONMENTAL	Operating temperature:	0° to +50°C
	Storage temperature:	0° to +75°C
	Relative humidity:	10% to 80%
	Wet bulb maximum:	24°C non-condensing
DIMENSIONS	15 in. x 15 in.	
	four layers	

WORKSTATION

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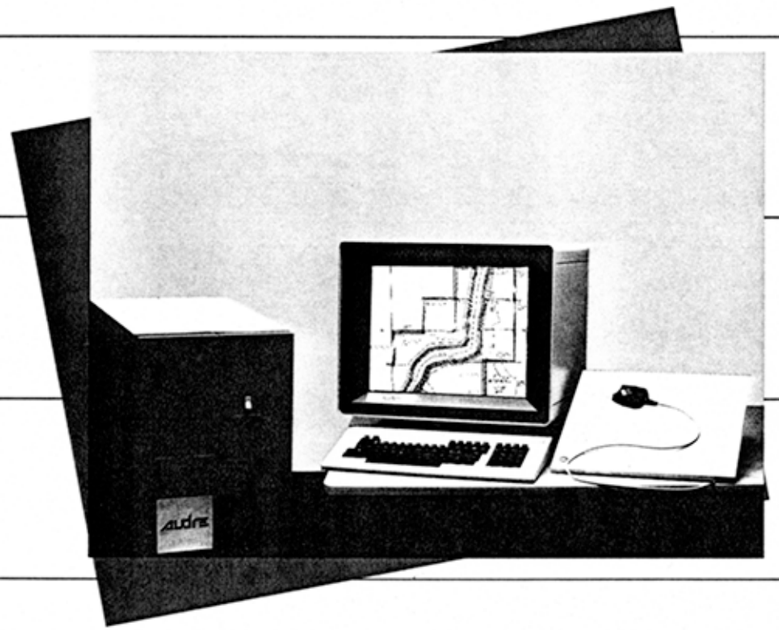

GENERAL DESCRIPTION

The WORKSTATION is a complete single user computer system. The system consists of a microprogrammed TTL processor with language directed architecture, 1 megabyte MOS memory (expandable to 2 megabytes), 40 megabyte integral Winchester Disk (expandable to 80 megabytes), and 4K byte (expandable to a 16K word by 48 bit Writable Control Store).

A 32 bit virtual address means that very large programs can be executed with ease. The high resolution screen can display multiple fonts, proportionally spaced text and graphics. Multiple windows are supported by the operating system. The local network is supported by 10 Megabit per second Ethernet®, which allows a large number of workstations to be interconnected, thereby providing shared resources, uniform short response time, incremental expandability and high reliability.

Peripheral devices include a 768 x 1,024 high resolution raster scanned graphics display (optional 1,024 x 1,280 landscape display — as pictured), a 1 megabyte floppy disk, a 72-key keyboard and a digitizing tablet with a four-button cursor. The operating system supports a hierarchically structured file system, and optional Pascal, C and Fortran compilers. Both IEEE-488 (GPIB) and two RS-232 interfaces are included.

Several software packages are available to support image processing and other tasks. These packages provide specific support for capture and graphic editing of schematic circuit diagrams, interactive architectural design, interactive 2-D drafting design, spreadsheet programs, project network analysis and business graphics and text preparation.

SUMMARY OF OPERATION

The CPU includes a high speed, micro-programmed 16 bit processor. Hardware support for the RasterOp bit-map algorithm allows bit-addressed raster data to be streamed at 32 bits per microsecond for image manipulation. The microprogram sequencer implements two-way and multi-way conditional branches, loops and micro-subroutines with a four level call stack. The arithmetic logic unit includes a 16 level expression stack, 256 registers and a parallel barrel shifter. The processor uses microprograms to control high speed file access, DMA and interrupt I/O and special functions.

The 1 megabyte random access memory transfers 64 bits every 340 nanoseconds. Memory cycles are shared equally between the display and the rest of the system. The memory system features a virtual addressing scheme with segmentation, swapping and large address space. Memory parity is standard. To support the wide bandwidth requirements of the CPU, display, disk and network, the memory system is designed for a 200 megabit per second aggregate memory bandwidth. The memory plane is organized as 64K or 128K of 64 bit-wide words.

I/O device interfaces are implemented by a combination of interrupt driver, DMA hardware and microcoded software. The I/O channel supports four high-speed bandwidth devices (rigid disk, network, AUDRE and one optional controller) and can deliver a 10 megabit per second data rate to each device, with four devices running simultaneously. A single channel can deliver in excess of 40 megabit per second data rate. For low speed devices, the 8 bit program-mable Z-80 micro-processor is included to interface simple peripherals.

SPECIFICATIONS

PROCESSOR		TTL, bit slice processor 48 bit micro-instruction 170 nanosecond microcycle time 16 bit external data path 20 bit internal data path
MEMORY		680 nanosecond-cycle time 64 bits per transfer 200 megabits per second aggregate bandwidth
DISPLAY		8½ in. x 11 in. (15 inch diagonal) dimension 768 x 1,024 pixels resolution 60 Hz non-interlaced refresh P-4 fast-white phosphor 32 bits per microsecond RasterOp 65 MHz bandwidth
KEYBOARD		85 keys, detachable ASCII character set Auto repeat N-Key rollover
HARD DISK		57 millisecond average access time 7 megabits per second transfer
ENVIRONMENTAL	Operating temperature:	0° to +50°C
	Storage temperature:	0° to +75°C
	Relative humidity:	10% to 80%
	Wet bulb maximum:	40°C, non-condensing
ELECTRICAL		115 VAC, 60 Hz 220 VAC, 50 Hz 700 watts power dissipation
DIMENSIONS	Processor:	26 in. x 14⅜ in. x 26½ in.
	Display:	17¾ in. x 12¾ in. x 17¾ in.
	Keyboard:	7½ in. x 14¾ in. x 3⅛ in.
	Digitizing Tablet:	15½ in. x 9/16 in. x 15½ in.

LASER PRINTER

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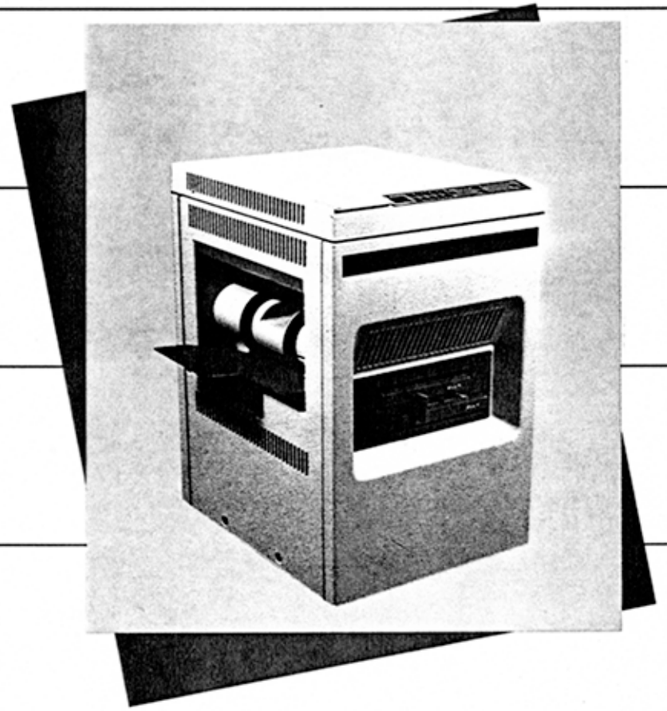

GENERAL DESCRIPTION

All printing interfaces allow dot addressability, providing extraordinary capabilities in printing multiple font text, lines, halftones and other graphics. A range of speeds and print qualities are available to support most applications.

One of the laser printing systems is an electrophotography and semiconductor laser scanning device featuring high quality, plain paper and graphics. The output resolution is 240 dots per inch. The printer has built-in self-diagnosing functions to tell the operator exactly where a problem is located. Module replacement is fast and easy.

Another laser printer is a helium-neon laser with rotating mirror device. The output resolution is 300 dots per inch. A special controller has been designed to allow each output pixel to be addressed individually. The raster image processor utilizes many modes for output copy. Pre-programmed technology re-creates graphics in all forms with perfect letter quality every time.

The final laser printing system is an argon laser device, designed for large format and high resolution. The output resolution is 1000 dots per inch. Designed as a production oriented platemaker, this system provides a proven foundation for a modular building block approach to high resolution output production, while eliminating costly intermediate film or mask.

All printers are certified to comply with Laser Performance Standards published by the U.S. Department of Health and Human Services. They are UL listed under the classification of office appliances and business equipment, and CSA certified under the classification of office machines, Canadian electrical code.

OPERATION - SEMICONDUCTOR LASER

This desktop LASER printer consists of four major sections: an interface section which receives electrical image information from an external source; an optical scanning section which receives the electrical image signal and converts it into a modulated optical beam which scans the surface of the photosensitive drum; an electro-photographic section which produces a hard copy from an optical image signal; and a control section which controls the sequence and the functions of the other three sections.

PRINT METHOD
Electrophotography + semiconductor laser beam scanning

PRINT SPEED
10 letter size pages per minute

TONER
Dry, single component

PAPER
Cassette: Dual-190 sheets per cassette
Size: Letter/legal
Weight: 16 to 24 lbs.

DOT PITCH
Horizontal: Variable with clock vertical, 240 dots per inch
Vertical: Variable with clock

ELECTRICAL
120 VAC
60 Hz
1.14 KVA (9.5 amps max)

ENVIRONMENTAL
Temperaure: +10° to +35°C
Relative humidity: 20% to 80%

OPERATION - HELIUM-NEON LASER

This HELIUM-NEON LASER printer transfers up to 90,000 dots per square inch of high-resolution graphics. The transfer is controlled by a microprocessor, with 1.4 megabytes of full bit-map page memory. In addition, there is a 512K byte buffer memory. Some of the software features include: the ability to scale up, rotate 90°, invert black to white, downloadable fonts, micro and windowing capability.

PRINT METHOD
Raster scan, helium-neon laser beam with rotating polygonal mirror deflection onto photoreceptor

PRINT SPEED
12 pages per minute, 2.075 inches per second

TONER
Dry, two components

PAPER
Cassette: Dual-190 sheets per cassette
Size: Letter/legal
Weight: 16 to 24 lbs.

DOT PITCH
300 dots per inch horizontal and vertical

ELECTRICAL
120 VAC
60 Hz

OPERATION — ARGON LASER

The unique light spectrum of the ARGON LASER operating in the ultraviolet mode allows the reproduction of an image on offset plates, film, or room-light paper made of proofing material. Positive positioning of the writing surface assures registration and repeatability for process color, multiple burn, or double-truck plate production — while maintaining ease of plate loading and unloading. Vacuum hold-down of both input and output media during scanning is operator selectable. The large format argon laser prints up to one million dots per square inch.

PRINT METHOD
Linear scan, argon laser with rotating polygonal mirror and power-moveable plate. A darkroom environment is not required for printing.

PRINT SPEED
One inch per second
3.5 to 5.7 MHz

TONER
None

PAPER
Photosensitive paper, film or plate
Single sheet loading
Input: 25 in. X 27 in.
Output: 25 in. X 36 in.

DOT PITCH
Horizontal: 1,000 dots per inch
Vertical: 200 to 1,800 dots per inch

ELECTRICAL
110/220 VAC ± 5%, 50/60 Hz, three wire single phase, 20 amps

DIMENSIONS
122 in. wide X 52 in. deep X 65 in. high, 2,500 lbs.

ELECTROSTATIC PRINTER

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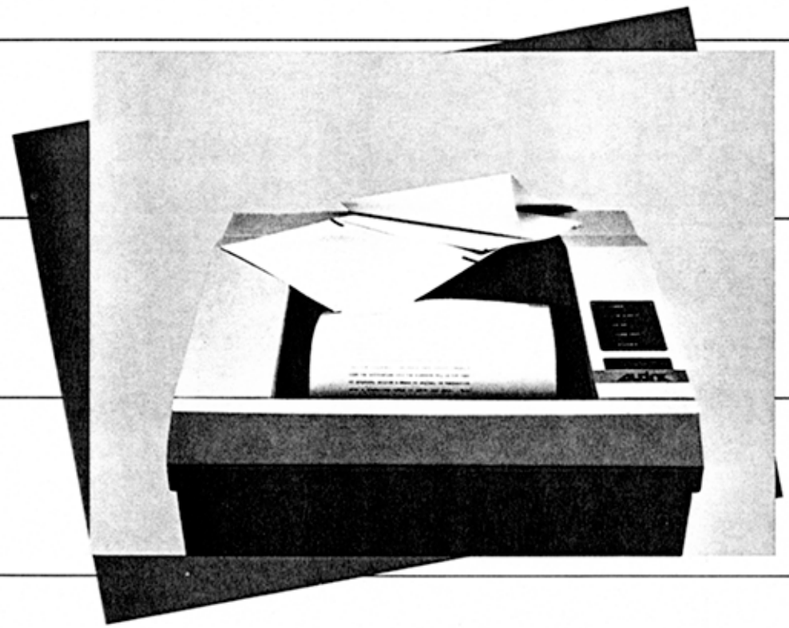


GENERAL DESCRIPTION

The ELECTROSTATIC PRINTER/PLOTTER is a high performance unit which prints up to 500 lines of text per minute, or raster data at 1.0 inches per second (25.4mm/second) or performs both functions simultaneously. The device features a high resolution (200 pixels per inch) output that assures crisp, dark printing and well-defined graphics copy.

The dual array writing head offers an overlapping point pattern for solid blacks and continuous lines. A servo-controlled paper drive provides smooth, accurate paper movement without overshoot.

Toner is handled using a disposable bottle inserted directly into the machine. Micro-processor control of the toner system provides accurate measurement and flow control to assure high quality hard copy.

The paper compartment accepts roll or fanfold opaque paper, translucent paper, matte/back or clear polyester film. Paper supplies are easily accessible from the top of the printer/plotter and can be changed in less than one minute.

Other features include:

- Pause button — halts writing without data loss
- Form feed & advances — for simple paper positioning
- Shading control — adjusts image darkness
- Self-test exerciser — simple problem diagnosis
- Illuminated status display — power, paper, pause

SUMMARY OF OPERATION

During writing, programmed voltages are supplied to an array of densely spaced (200/inch) writing elements or nibs which are embedded in a stationary writing head. Upon command, the nibs selectively place electrostatic charges on the paper as it moves over the writing head. The paper is then exposed to liquid toner. Black particles within the toner adhere to the paper only where charges were previously placed. Excess toner is drawn off the paper, deposited particles are fixed and the paper emerges dry and ready to use. The printed image is of archival quality, insensitive to light and is easily reproduced on office copying machines.

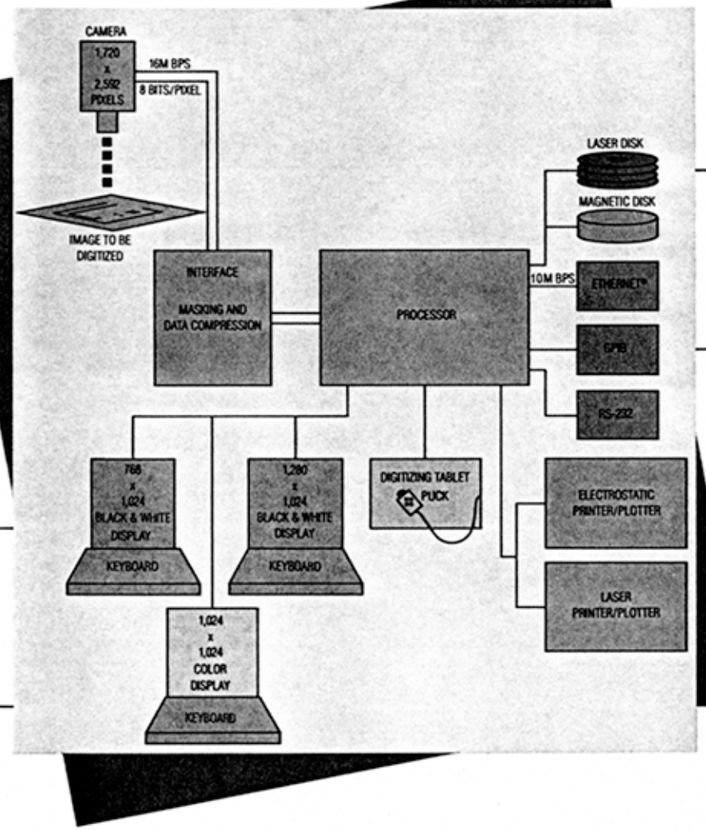
Data enters the printer/plotter in 1 byte increments and is placed on the input lines as it is entered into the input latch. As soon as the input buffer is filled, or a partially filled buffer is properly terminated, the contents are moved to the data buffer. The data buffer consists of 32K bits of RAM that can store up to 12 inch "plot scans" or three "print lines." This feature greatly increases the unit's throughput since it allows data to be input and stored at the same time data is being output.

When the print mode is used, data is accepted in the form of 7 bit ASCII or 8 bit character bytes. The eighth bit of each byte is used for the underline option. One hundred twenty-eight character sets are standard, with greater than 128 characters as an option. Eleven inch paper has a maximum of 132 characters per print line. Each character is composed of a matrix of elements 16 wide by 20 high (maximum character height is 24 elements). When the plot mode is used, data is accepted in the form of 8 bit raster data (unweighted binary). Each nib position on the paper corresponds to one particular bit in the data scan stored in the buffer. Eleven inch paper has a standard plot scan length of 264 bytes (2,112 nibs).

SPECIFICATIONS

PRINTING	Maximum print speed, lines/minute:	500
	Print columns/line:	132
	Print columns/inch:	12.5
	Print lines/inch (roll):	8.5
	Print lines/fanfold page:	1-82
	Font dot matrix:	16 x 16
	Standard character set:	96 US ASCII
	Character size, inch (cm) width:	0.08 (0.20)
	Character size, inch (cm) height:	0.08 (0.20)
PLOTTING	Resolution, nibs/inch (nibs/cm) horizontal:	200 (78.7)
	Resolution, nibs/inch (nibs/cm) vertical:	200 (78.7)
	Points per square inch:	40,000
	Maximum plotting speed, inches/second (cm/second):	1.0 (2.54)
	Maximum plotting speed, square feet/minute:	4.4
	Plot width, inches (cm):	10.56 (26.82)
	Total writing nibs (printing also):	2,112
	Nib size, inches (mm) nominal:	0.005 (0.13)
	Maximum nib-to-nib position deviation Vertical, inches (mm) nominal:	0.002 (0.05)
	Horizontal, inches (mm) nominal:	0.002 (0.05)
ELECTRICAL	102, 118, 204, 236 VAC + 10%	
	50 or 60 Hz	
	285 watts, average operating	
	375 watts, maximum	
ENVIRONMENTAL	0° to +40°C	
	10% to +95%, non-condensing humidity	

SYSTEM



GENERAL DESCRIPTION

The AUDRE™ SYSTEM pulls all the system components together and provides a set of utilities for controlling the camera interface; for capturing, retaining and manipulating the image data; and for using and maintaining the image data base. These capabilities are directed via a menu-based user interface.

CAMERA INTERFACE CONTROL

The camera interface is controlled by an integrated set of Pascal procedures and microprograms for direct memory access data transfer from the camera. Parameters for the input data conversion hardware can be set under program control. A camera scan is initiated to capture the image.

IMAGE DATA MANIPULATION

The AUDRE System maintains the image in memory, with a second copy visible on the display. This allows for updating the display version without altering the original unless desired. The view on the display may be taken from any part of the captured image using the ZOOM-and-PAN functions. The display can visually overlay the original for comparisons and logical functions.

The display may be edited and annotated using a sophisticated, screen-oriented "point and act" method. Images may be added and subtracted, segmented and combined. Multiple images may be dynamically defined and manipulated. Functions that may be performed between images include: REPLACE/REPLACE NOT, AND/AND NOT, OR/OR NOT, and XOR/XOR NOT.

IMAGE DATA BASE

The image data base includes a large high-speed swapping buffer and special utilities for fast file storage and retrieval. Each file is associated with an image variable. Images may be stored in a compressed format to allow up to 40 times compression. Some functions are micro-programmed for improved speed. Images in use are retained in the AUDRE high-speed virtual storage system.

USER INTERFACE

The user interface is an interactive, menu-driven facility for controlling the AUDRE System functions. Full support is provided for creating and using the images and their associated files in a dynamic, user-configured environment. Multiple windows allow the user to retain and view system and image information simultaneously. Pop-up menus and directories provide an effective increase in usable screen space.

VECTORIZATION

For some applications the raster data retrieved from the digitizing camera may be converted to vectorized (x,y coordinates) information. Entity Recognition™, a combination of microcode and Pascal interprets the raster data, recognizing lines, curves, solids, symbols, B-splines and characters. Data is prepared in American National Standards Institute (ANSI) and International Graphics Exchange Standard (IGES) format compatible with most CAD/CAM workstations.

APPLICATION SOFTWARE

1) Software system for designing gate arrays
2) Interactive program which facilitates capture and graphic editing of schematic circuit diagrams
3) Interactive 2-D drafting program
4) Interactive architectural design program
5) Graphical routine and drawing routine systems
6) Spreadsheet calculator
7) Project network analysis
8) Business graphics and text preparation
9) Document formatting system
10) Word processing software system

FUTURE PRODUCTS

- Automatic Inspection
  This software system provides a solution to quality control of electrical parts.
- Mapping
  This software system provides easy entry, modification, restoration and storage of most maps.
- Catalogue
  This software system provides the modification of manuals containing text and graphics. Modifying the changed information is simple and fast.
- CAD/CAM
  This software system along with Entity Recognition provides the front end to CAD/CAM/CAE computer systems.
- Printing
  This software system provides an easy input method to phototypesetting and printing systems.

SOFTWARE

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SKETCH

The SKETCH function allows for freehand drawing in white or black ink. Rubber band type lines can be drawn. MOVE and COPY commands are available. Text can be typed using any font set. Separate windows on the screen contain a wide variety of PAINTS and BRUSHES. These are used to facilitate the freehand sketching and line drawing functions. POLYFILL and CLEAR are also available.

SCAN

The SCAN function initiates a camera scan which transfers the input document into memory for editing and manipulating. Automatic focus and automatic lighting functions occur prior to scanning the image. Threshold, interpolation, masking and input bits are parameters that the user controls to define the imaging process.

HELP

The HELP function provides an on-line set of documentation. It is hierarchical and is available at any level of the system. HELP provides detailed instructions on performing specific functions and use of the system. The user documentation is available on-line.

USER

The USER function provides an opportunity to tailor cursor definition, system variables, window definition and the exception handling to the operator's specific requirements. Special procedures coded by the user may be linked with system software for specific applications.

STATUS

The STATUS function enables the user to see the system status variables, system default parameters and application default parameters. Installation and dynamic parameters may be set on-line or with a log-in profile.

FILES

The FILES function includes saving and retrieving variable size images, using a variety of input and output compression algorithms. Compression techniques include RLE, BURST, CCITT and an open technique for a user-defined algorithm. The directory function interacts with the system directory tree structure.

- SKETCH
- SCAN
- HELP
- USER
- STATUS
- FILES
- CLEAR
- COPY
- VIEW
- TRANSFORM
- IMAGE
- LOGIC

CLEAR

The CLEAR function simply erases the information that appears in the viewing window of the display, or in an image. Erasing the displayed portion need not erase the captured image in memory.

COPY

The COPY function enables an entire screen to be copied to another memory location, or a partial image copied within the same memory. Any part of any image may also be copied to itself or another image using any of the LOGIC functions.

VIEW

The VIEW function enables the user to set the size of the display, the scale for the viewing window and the physical size of windows of the display. Alteration of the size and function of each window is accomplished with this function. Functions performed by VIEW also include Zoom, Pan and Overlay. The pan or slew rate is defined by the user.

TRANSFORM

The TRANSFORM function enables the user to Rotate, Mirror, Expand or Shrink the image and copy the results to any image. These actions can be performed with user-defined precision. TRANSFORM also utilizes the LOGIC function.

IMAGE

The IMAGE function defines and labels the space for a new image and also clears deleted image space. One image can be added to another image by using any one of the logic functions, defined in the LOGIC section. The IMAGE can also be inverted, showing white lines on a black background. When adding images to each other the size, scale, offset and orientation can be adjusted. Also, the source and destination can be independently named.

LOGIC

The LOGIC function defines the logical functions, as available, with the source image and the destination image. These functions include: REPLACE/REPLACE NOT, AND/AND NOT, OR/OR NOT, and XOR/XOR NOT. These may be used to perform color reversal, image subtraction, image addition and differentiating.

SPECIFICATIONS

CAMERA

- Linear CCD array, mechanical scan
- 4.5 million pixels in a 1,720 x 2,592 format
- Resolves up to 256 gray levels per pixel
- Exchangeable 35mm lenses (Telescope to microscope)
- Reads 200 points per inch on 8½ x 11 inch documents
- Reads 75 points per inch on "D" size documents
- Captures any image
- Image scan time of 2.5 seconds

WORKSTATION

- Microprogrammed bit slice processor
- 1 megabyte MOS memory, expandable to 2 megabytes
- 40 megabyte integral Winchester Disk, expandable to 80 megabytes
- Writable control store, 4K or 16K by 48 bits
- Ethernet® 10 megabit local network
- 1,280 x 1,024 landscape display (optional)
- 768 x 1,024 high resolution, raster-scanned graphics display
- 1,024 x 1,024 color display (optional)
- RS-232 and IEEE-488 (GPIB) interfaces
- PNX* Implementation of UNIX** System III**

*PNX is a trademark of ICL Computer Ltd.
**UNIX and System III are trademarks of Western Electric

INTERFACE

- Programmable 8 bit input mask
- Programmable threshold
- Programmable interpolation hardware
- 1 bit per pixel retention, expandable to 8 bit
- Direct memory access transfer
- 2.0 megapixel per second transfer rate to memory
- 256 gray levels per pixel

SOFTWARE

- High level user interface
- Camera interface control
  - Parameter setting
  - Picture acquisition (1-8 bits per pixel)
  - Automatic focus
- Image data manipulation
  - Editing
  - Zoom-and-pan
  - Cut-and-paste
  - Overlay
  - Image logic
  - Multi-font text
  - Pan
- Image data base
  - File storage & retrieval
  - Virtual image storage
  - Compressed file format
- C, Pascal and Fortran compilers

PRINT METHODS

- Electrostatic
- Semiconductor laser
- Helium-neon laser
- Argon laser

PRINT SPEEDS

- 200 scan lines per second
- 440 scan lines per second
- 620 scan lines per second
- 1,000 scan lines per second

TONER TYPES

- Liquid
- Dry, one component
- Dry, two components
- None

PAPER TYPES

- Coded, roll, fanfold
- Letter, legal
- Photosensitive paper, film, plate

DOT PITCHES

- H:200, V:200
- H:240, V:240
- H:300, V:300
- H:1,000, V:200 to 1800

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