

**Electronic Imaging
Output Printers**

Technical Report

AIIM TR29-1993



AIIM

Association for Information and Image Management

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Technical Report for Information and Image Management—

Electronic Imaging Output Printers

Association For Information and Image Management

This technical report describes current electronic printer technologies that are used in the office document handling environment. It can be used as a guide when selecting appropriate printer technology to match electronic image management requirements.

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Foreword (This foreword is not part of AIIM TR29-1993, Electronic Imaging Output Printers.)

This document provides a historical perspective of the printer industry and an overview of current printer technologies. It describes important features which can contribute to the effective use of printers in the electronic image management (EIM) environment and identifies major requirements to be considered in the selection process.

Suggestions for improvement of this technical report are welcome. They should be sent to the Chair, AIIM Standards Board, Association for Information and Image Management, 1100 Wayne Avenue, Suite 1100, Silver Spring, Maryland 20910.

The AIIM Standards Board had the following members at the time it approved and processed this technical report:

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Electronic Imaging Output/Printers, AIIM TR29-1993

1 Scope and purpose

1.1 Scope

This technical report identifies major printer technologies currently used in the office document handling environment, and provides a description of those technologies applicable to the printing of scanned document images in the image processing environment. This report is restricted to those printers which print alphanumeric characters, vector graphics, and digitized images and handle paper sizes up to 11 inch x 17 inch (279 mm x 432 mm).

1.2 Purpose

The purpose of this technical report is to describe current electronic printer technologies that are used in the office document handling environment and to provide a guide for use when selecting appropriate printer technology to match electronic image management requirements.

2 References

AIIM TR2-1992, Technical Report for Information and Image Management, Glossary of Imaging Technology.

ANSI X3.131-1986, Small Computer Systems Interface (SCSI).

ANSI X3.4-1986, Information Systems—Coded Character Sets—7-Bit American National Standard Code For Information Interchange (7-Bit ASCII).

3 Definitions

The following definitions apply to terms that appear in this technical report. Other terms are defined in AIIM TR2, Technical Report for Information and Image Management — Glossary of Imaging Technology.

3.1 ASCII: See American Standard Code for Information Interchange, 3.2.

3.2 American Standard Code for Information Interchange (ASCII): American National Standard binary-coding scheme consisting of 128 eight-bit patterns (7-bits plus a parity check bit) for printable characters and control of equipment functions.

3.3 Band printer: A fully formed character, line printer in which the font is carried by a closed loop steel band moving across the paper, selected hammers are fired as the appropriate character passes each print position.

3.4 Buffer: Routine or storage device used to compensate for a difference in rate of flow of data or time of occurrence of events when transmitting data from one device to another.

3.5 CPS: See characters per second, 3.10.

3.6 Channel: Path or circuit along which information flows.

3.7 Channel connect: A high speed input/output interface for peripheral devices on IBM mainframe systems.

3.8 Character: One of a set of symbols that may be arranged in ordered groups to express information.

3.9 Character set: A fixed set of unique characters which can be selected by code and printed by the printer; commonly 128 characters including letters, numbers, punctuation marks, and a variety of special foreign language letters or graphics shapes; may be permanently resident in the printer, inserted as a cartridge, or downloaded from the host.

3.10 Characters per second (cps): Unit of measure equal to the number of characters a device is capable of displaying or printing in one second.

3.11 DPI: See dots per inch, 3.17.

3.12 Daisy wheel printer: A fully formed character, serial printer in which the molded font is carried at the ends of spokes attached to a hub, much like the petals of a daisy. The carrier is rotated to the proper character at each print position and the character is printed, the print head then moves to the next position across the paper.

3.13 Desktop publishing: A personal computer application which provides a single user with sophisticated facilities for page layout, font selection, and graphics previously available only to professional publishing shops.

3.14 Dielectric drum: Drum coated with a nonconductive material.

3.15 Dithering: Scanning technique to simulate digital grey areas by intermixing black and white pixels. NOTE: Dithering creates the illusion of a continuous-tone image.

3.16 Dot matrix: Array of points of ink, light or similar image-forming elements that are used to form alphanumeric characters.

3.17 Dots per inch (dpi): Measure of output device resolution and quality, e.g., number of pixels per inch on display device. Measures the number of dots horizontally and vertically.

3.18 Draft quality: Dot matrix printing mode that produces a coarse character matrix (usually 7 x 9 dots)

sufficient for draft documents; used when printer speed is more important than font appearance.

3.19 Drum printer: A fully formed character, line printer in which the full character set is replicated at each character print position around the periphery of the drum. The drum rotates continuously on a horizontal axis parallel to the paper; the appropriate character is printed as it passes the print position.

3.20 EIM: See electronic image management, 3.24.

3.21 Electron: Negatively charged subatomic particle capable of exposing photographic film to form images on cathode-ray tubes.

3.22 Electron beam printer: A non-impact, page printer in which the latent image is formed on a dielectric drum by a controlled electron beam.

3.23 Electron beam recorder: Method of using an electron or laser beam to record directly onto film.

3.24 Electronic Image Management (EIM): Techniques associated with recording, storing, retrieving and transmitting documents by electronic means.

3.25 Electrophotographic printer: A page printer in which the latent image on a photoconductive drum attracts toner and transfers the image to paper in a hot fusion process.

3.26 Electrophotography: See electrostatic process, 3.30.

3.27 Electrostatic: (1) Stationary electrical charges generated in non-conducting media as films, prints, etc., by friction or peeling adhered layers of materials. (2) Electrical energy with the capability of attracting and holding small particles carrying an opposite charge. NOTE: This form of energy is used in xerography to form latent images on photoconductive substances.

3.28 Electrostatic latent image: Invisible image formed on a charged photoconductive surface by the action of radiant energy.

3.29 Electrostatic photography: Formation of reasonably permanent images by the development of electrostatic latent images.

3.30 Electrostatic process: Photographic process using certain photoconducting materials, minerals (selenium, zinc-oxide, etc.) or organic materials, to form an electrostatic image generally made visible by applying charged pigmented powder.

3.31 Electrostatography: See electrostatic process, 3.30.

3.32 Font: Complete family of a given size of type, including capitals, small capitals, and lowercase, together with figures, punctuation marks, ligatures, etc. Italics are spoken of as a separate font.

3.33 Font cartridge: A plug-in device installed in the printer so that a greater variety of fonts can be selected for printing.

3.34 Font scaling: The process by which a variety of type sizes may be generated from the basic definition of the typeface outlines.

3.35 Forms overlay: A printer feature by which a set of standard form images may be stored in the printer and selectively overlaid on variable data to be printed in specified fields of the form.

3.36 Fully formed character printer: Impact type printer in which the font typeface is mounted, molded, or engraved on a carrier device such as a drum, band, or wheel.

3.37 Host computer: Large, shared computer in which an application or database resides or to which a user is connected.

3.38 Image compression: Coding techniques which reduce the size of image files for storage or transmission. Run length encoding uses a set of codes varying from 4 to 13 bits in length to express sequences of all white dots or all black dots along scan lines of a digitized image bit-map.

3.39 Image decompression: Expansion of a compressed image file back to the original bit-map representation.

3.40 Image scaling: The process by which resolution of an image bit-map may be changed to accommodate limitations of printers and displays; usually scaled up for printers and scaled down for displays. An example 8.5 inch x 11 inch (216 mm x 279 mm), 200 dots per inch (dpi) image could occupy about 5.3 inch x 7.3 inch (135 mm x 185 mm) on a 300 dpi printer and 14.2 inch x 18.3 inch (361 mm x 465 mm) on a 120 dpi display.

3.41 Impact printer: An output unit that prints characters on paper by physical contact.

3.42 Ink jet printer: A non-impact, dot matrix printer which uses droplets of ink to form the character matrix.

3.43 Interface: (1) Place at which two systems (such as a microcomputer and CD-ROM) meet and interact with each other. (2) Generically, a common interconnection between two components or functions that do not normally interact. NOTE: It can be a piece of hardware equipment or a common area of computer storage or some common instructions shared by two or more programs. (3) In the realm of microcomputers, the circuit board that attaches a particular peripheral device to a microcomputer.

3.44 Ion: Atom or molecule that has an electrical charge.

3.45 Ion deposition printer: See electron beam printer, 3.23.

3.46 JPEG. See Joint Photographic Experts Group, 3.47.

3.47 Joint Photographic Experts Group (JPEG): Algorithm standard developed by an International Telegraph and Telephone Consultative Committee (CCITT) International Organization for Standardization (ISO) Committee for a general purpose compression technique for color and grey-scale image applications.

3.48 LAN: See local area network, 3.57.

3.49 LPM: Lines per minute.

3.50 Laser printer: Printing device that uses a laser beam to generate an image after which it is developed with toner and fused to paper using heat and pressure.

3.51 Letter quality: Dot matrix printing mode that produces a very fine character matrix such that print quality approaches that produced by a typewriter.

3.52 Light-emitting diode (LED) printer: A non-impact page printer in which a row of light emitting diodes are used to form a latent image on a photoconductive drum. The image is developed by electrophotography.

3.53 Line dot matrix printer: An impact printer that creates characters in a matrix of dots such that required dots in a single horizontal row of the matrix for all characters across the page are printed before paper is advanced by one dot space. The print head is stationary and spans the entire width of the page.

3.54 Line printer: Any printer in which a full line of characters (1-132) are received before the print operation is initiated.

3.55 Liquid crystal display (LCD): A non-impact page printer in which a liquid crystal display shutter is used to form a latent image on a photoconductive drum. The image is developed by electrophotography.

3.56 Light-emitting diode (LED): Semiconductor device that produces a visible luminescence when a voltage is applied to it.

3.57 Local area network (LAN): Data communication network of connected devices within a small area, such as a building or group of buildings.

3.58 Magnetostriction: A phenomenon by which certain materials increase in length when subjected to a magnetic field and return to their original length when the field is removed.

3.59 Mainframe: Class of computer providing large storage capacity, high-speed processing, and complex data handling capabilities normally supporting many concurrent users.

3.60 Near letter quality: Dot matrix printing mode that produces a fine character matrix sufficient for finished documents; used when font appearance is more important than print speed. Print quality is significantly better than draft quality but less than letter quality.

3.61 Nonimpact printer: Printing device in which the paper is not struck, but imaged by other means, e.g., ink jet, electrostatic. Synonymous with nip.

3.62 Output device: Device, such as a display, printer or plotter that converts electronic signals to human readable form.

3.63 PPM: Pages per minute.

3.64 Page description language (PDL): Allows an application program to control the format of text and graphics on the printed page.

3.65 Page printer: A non-impact printer in which data for the whole page is received before the printing process is initiated.

3.66 Parallel: Several information units traveling over separate pathways simultaneously. See also serial, 3.82.

3.67 Parallel interface: An interconnection between the host computer and a peripheral device such as a printer, by which individual data bits are transmitted on parallel paths with each clock transition; usually one 8 bit byte on 8 parallel data lines.

3.68 Photoconductive drum: A drum coated with light sensitive material such as selenium.

3.69 Photoconductor: (1) Material which is an electrical insulator in darkness, but which becomes electrically conductive when exposed to light to which the material is sensitive. (2) Material that will hold an electrical charge in the dark, but the charge is dissipated when the material is illuminated with light to which the material is sensitive.

3.70 Piezoelectric device: A ceramic or crystal device which deforms when an electric potential is applied across it, and returns to the original shape when the potential is removed.

3.71 Print: (1) Reproduction or copy on photographic film or paper. (2) To produce a reproduction or copy on photographic film or paper.

3.72 Printer: In electronic imaging, a hardcopy output device. See also output device, 3.62.

3.73 Printer buffer: The data storage area of the printer, usually implemented by random access memory (RAM).

3.74 Print head: The printing mechanism of a printer; generally the wire matrix assembly or the font carrier and hammer of a serial printer.