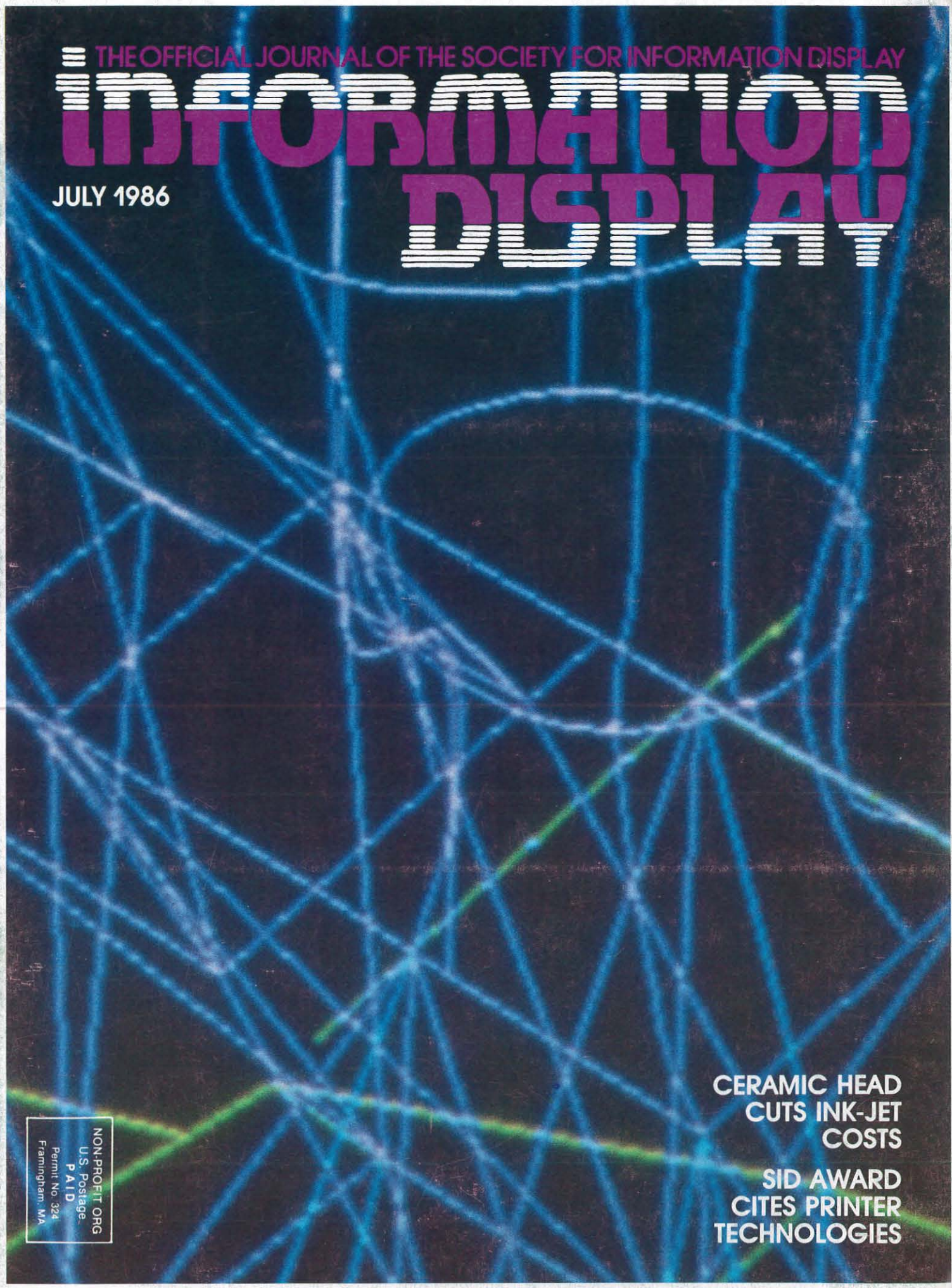
THE OFFICIAL JOURNAL OF THE SOCIETY FOR INFORMATION DISPLAY

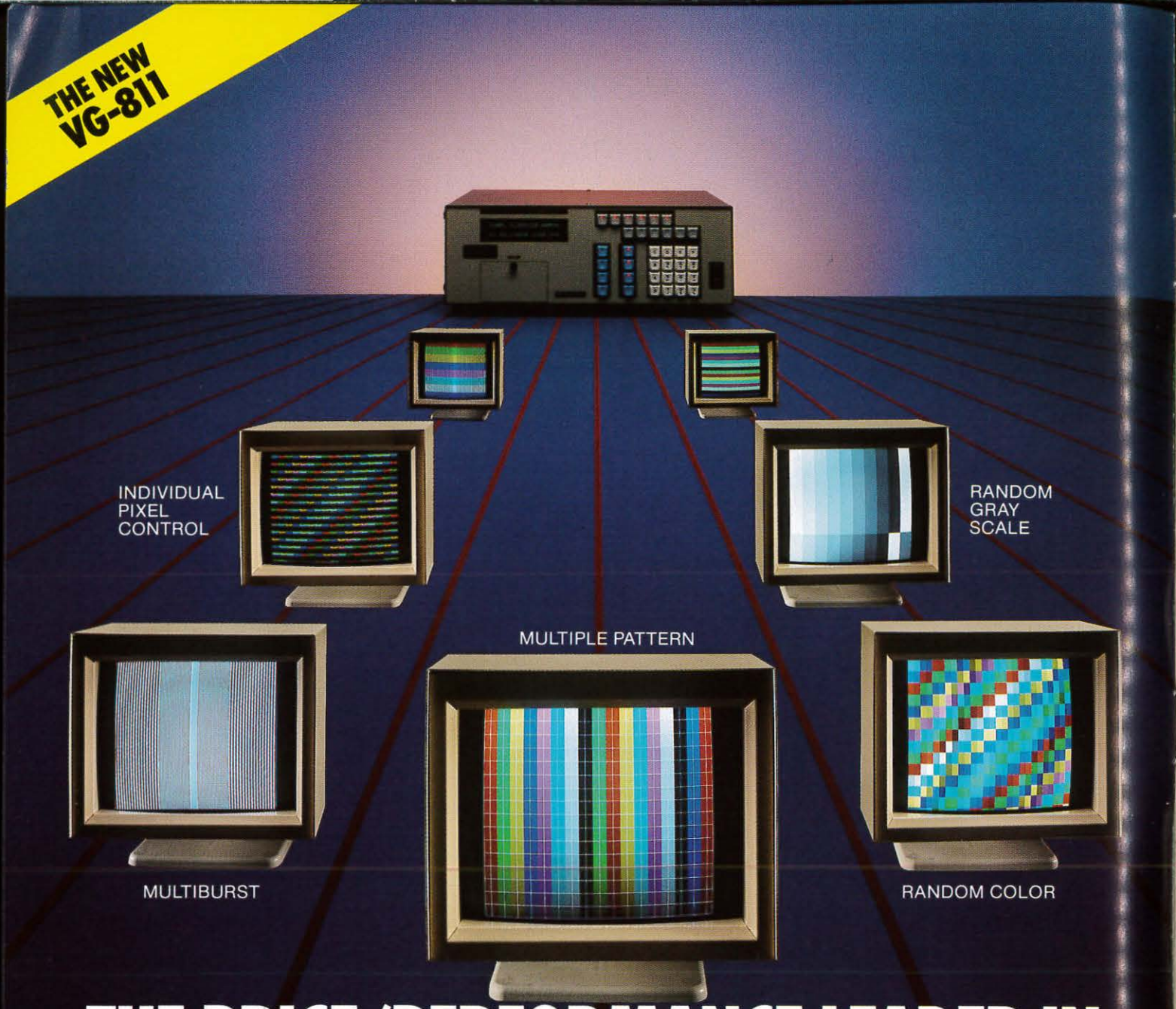
INFORMATION DISPLAY

JULY 1986



CERAMIC HEAD CUTS INK-JET COSTS

SID AWARD CITES PRINTER TECHNOLOGIES



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THE OFFICIAL JOURNAL OF THE SOCIETY FOR INFORMATION DISPLAY

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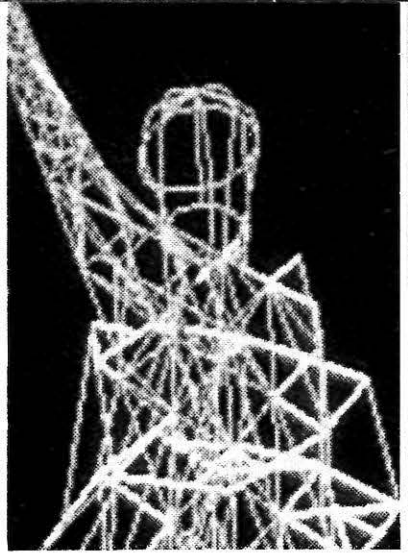
JULY 1986 VOL. 2 NO. 7



Cover picture: The wire-frame dimensional drawing of the Statue of Liberty's complex internal grid structure was generated on a CalComp CAD graphics display screen. Using multiple colors to provide depth and dimension enabled the architects consulting on the Statue's restoration to highlight problem areas, study stress points, and examine element relations.—*Swanke Hayden Connell Architects, New York, NY*

FEATURES

Graphics imager allows check of designs-in-progress 8

Combining a laser-writing device with a liquid crystal cell, a California company has developed a graphic imaging system that enables designers to call up computer-generated images directly from their workstations, check the design-in-progress, and resume their work without interrupting the design process.—*Greyhawk Systems Inc., Milpitas, CA.*

Determining CRT resolution—*(Continued from ID, June 1986, p. 21.)* **10**

System resolution performance in today's medical imaging and display equipment is not a simple thing to determine, since the sum of the component performances must be considered: the display, the video camera, and the video processing.—*John Harshbarger, President, Visual Information Institute Inc., Xenia, OH.*

Continuous ink-jet produces true color halftone images 14

Controlling the number of ink drops deposited in each pixel has enabled a group of researchers at Lund Institute of Technology to plot with an ink-jet plotter true color halftone images having a variation of color density approaching high quality offset prints.—*Prof. C. Hellmuth Hertz, Dept. of Electrical Measurements, Lund Institute of Technology, Lund, Sweden.*

Pre-shaped polymer forms ink-jet nozzles in ceramic 18

In an effort to cut costs of constructing multi-nozzle, ink-jet heads and to lower drive voltages, while at the same time producing precision ink passages and ejection nozzles, Japanese researchers used pre-shaped space-forming polymer sheets to create nozzle openings directly in piezoelectric ceramic sandwiches.—*Michihisa Suga and others, NEC Corp., Kawasaki, Japan.*

Advances in printer technology cited in creating new award 28

Outstanding contributions to the advancement of printer technology will be honored annually by SID through presentation of The Johann Gutenberg Prize—the newest in a number of prestigious awards that the Society bestows upon distinguished professionals in the display community.

afips
American Federation of Information Processing Societies

INFORMATION DISPLAY (The Official Journal of the Society for Information Display) is edited for corporate research and development management; and engineers, designers, scientists, and ergonomists responsible for design and development of input and output display systems used in various applications such as: computers and peripherals, instruments and controls, communications, transportation, navigation and guidance, commercial signage, and consumer electronics.

Editorial covers emerging technologies and state-of-the-art developments in electronic, electromechanical, and hardcopy display devices and equipment; memory; storage media and systems; materials and accessories.

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Feedback

More for the buck

Of the plethora of trade shows on the 1986 schedule, SID '86 stands out as the premier vehicle for communication with all strata of display professionals . . . as a matter of fact, we know of none better.

Contrary to the feeling at some shows, we regret we didn't bring a larger staff to man our booth. There were six of us with nary a break during the exhibit hours and we found the work exhilarating. Attendees literally (were) standing in the aisles at times, awaiting their turn for a technical exchange, or an opportunity for a closer look (at the Clinton "Square Sixteen" ultra-high resolution, four-million pixel CRT).

As far as we're concerned, SID '86 was a smashing success . . . an excellent value for the buck.

Dennis D. Kocent
Regional Sales Mgr.
Clinton Electronics Corp.
Rockford, IL

Call 800 . . .

Thank you for your mention of our Optical Consulting Service in your April issue. I believe we have already received some promising inquiries from it. We certainly appreciate the coverage in your publication.

Unfortunately, the paragraph neglected to mention the toll free number we installed specifically for the Optical Consulting Service . . . 1-800-MICRO CO. Our idea was to save that line solely for Optical Consulting calls. Is there any way that could be mentioned in a future issue?

In any case, we certainly appreciate your interest in us.

Christine S. Simons
Marketing Specialist
MicroCoatings Inc.
Westford, MA

JAPAN DISPLAY '86

6th International Display Research Conference
September 30 to October 2, 1986
Tokyo, Japan

Sponsored by S.I.D., and ITE of Japan

Advanced registration forms and hotel reservation forms are now available from Palisades Institute, 201 Varick Street, New York, NY 10014, and must be sent directly to the Japan Travel Bureau in Tokyo.

Plan to maximize your trip by attending one or more of the following exhibitions and conferences during the same period:

Japan Software Oct 1-3
Japan Electronics Oct 2-7
Japan Audio Fair Oct 2-7
Japan Optoelectronics Oct 6-9
Intl Optical Fiber Sensor Oct 7-9
Intl Semiconductor Laser Oct 14-17

Though hotel bookings must be made directly through the Japan Travel Bureau, Commerce Tours (San Francisco), the official travel agent for S.I.D., can arrange transportation and tours to help you coordinate and simplify your travel arrangements. Phone (415) 433-3072.

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"He knew the things that were and the things that would be and the things that had been before . . ." —*Homer*

Buzzwords come and go in the electronics industry as inevitably as the seasons. And this season the buzzword appears to be "non-impact"—the printer technology that has captured the public's fancy, caused prices of hard-copy machines to tumble, and sales of these newest information display systems to skyrocket.

A number of recent industry studies have examined the several non-impact printer entries currently jockeying to dominate the field, and they have attempted to assess the prospects of the various devices against each other and against entrenched impact printer products. While individual projections for potential sales vary, all the surveys generally agree that non-impact devices will constitute at least 50% (or more) of the eventual overall printer market within the next decade.

- Frost & Sullivan (F&S, New York, NY) predicts that from a base of only $543 million in 1985, nearly $1.4 billion in non-impact printers will be sold in 1986, and that amount will more than double by 1987. The F&S study projects 1990 sales for non-impact microprinters will amount to $8.5 billion—nearly two-thirds of all printer dollars at that time.
- And, CAP International (Marshfield, MA)—formerly C.A. Pesko Associates—is projecting that non-impact printers will grow from a $1.26-billion 1986 base (18% share of the total market) to $7.65 billion (51% share) by 1989.

Despite their differences in bottom-line prophecies for end-of-decade market shares, the studies do concur on the implications of non-impact printer technology in today's business community and the trend of moving away from text-based towards graphics-based printing—namely, that each non-impact printer installation constitutes an in-house publishing center, with the potential to generate more hard copy, faster, and at lower cost per copy than ever before in the history of printing.

Less than two decades ago, the soothsayers augured the early demise of the printed word in favor of electronic display and dissemination of information.

Today, there's a renewed, and rapidly growing interest in improving hard-copy technologies—attested to by the highly successful and expanding efforts of SID's two-year-old printer technology group in encouraging the presentation of papers on developments in hard-copy display technologies, both at the Society's International Symposium and its Research Conference each year. Added to this are an increasing number of other conferences devoted exclusively to non-impact printer technology.

The non-impact printer revolution of the 1980s has unleashed a new era in information display—just as significant as did Johann Gutenberg's invention of moveable type over 500 years ago (see p. 29).

Joseph A. MacDonald
Editorial Director

Events

NATIONAL

JULY 27-29: Videodisc Systems & Applications, Bi-annual Conference, Monterey Beach Hotel, Monterey, CA. Contact: Institute for Graphic Communication, 375 Commonwealth Ave., Boston, MA 02115. (617/267-9425)

JULY 28-30: 1986 Summer Computer Simulation Conference, MGM Grand Hotel, Reno, NV. Sponsor: Society for Computer Simulation. Contact: SCS, PO Box 17900. San Diego, CA 92117. (619/277-3888)

JULY 28 - AUGUST 1: Fiber Optic Communication Systems, Santa Barbara, CA. Short-course: University of California Extension, Santa Barbara, Fee: $895. Contact: UCSB Extension, Santa Barbara, CA 93106. (805/961-4200)

JULY 31 - AUGUST 3: Fifth Annual University of Oregon Summer Conference—Extending the Human Mind—Computers in Education, Eugene Conference Center/Hilton Hotel Complex, Eugene, OR. Sponsor: University of Oregon. Contact: U of O Continuation Center, 1553 Moss St., Eugene, OR 97403-1942. (503/686-3537)

AUGUST 24-28: Third International Congress on Advances in Non-Impact Printing Technologies, Fairmont Hotel, San Francisco, CA. Sponsor: Society of Photographic Scientists and Engineers (SPSE). Contact: Executive Director, SPSE, 7003 Kilworth Lane, Springfield, VA 22151. (703/642-9090)

SEPTEMBER 8-10: NCC-Telecommunications Conference, Philadelphia, PA. Sponsor: AFIPS, SCS, and others. Contact: NCC-Telecommunications, AFIPS, 1899 Preston White Drive, Reston, VA 22091. (800/622-1986)

SEPTEMBER 9-10: Fourth Symposium on Optical Fiber Measurements, National Bureau of Standards Laboratories, Boulder, CO. Co-sponsors: IEEE Optical Communications Committee and the Optical Society of America. Contact: Douglas L. Franzen, Div. 724.02, National Bureau of Standards, 325 Broadway, Boulder, CO 80303 (303/497-3198)

SEPTEMBER 15-19: Tutorial Week Boston '86, Boston, MA. Contact: IEEE Computer Society, 1730 Massachusetts Ave., NW, Washington, DC 20036-1903. (202/371-0101)

SEPTEMBER 15-19: Laser Safety—Inspection & Control, Cincinnati, OH. Short-course: Laser Institute of America. Fee: $900. Contact: Education Director, LIA, 5151 Monroe St.—Ste102W, Toledo, OH 43623. (419/882-8706)

SEPTEMBER 29 - OCTOBER 3: Fundamentals & Applications of Lasers, Hilton Head, SC. Short-course: Laser Institute of America. Fee: $900. Contact: See above, LIA SEPTEMBER 15-19.

SEPTEMBER 28 - OCTOBER 2: 49th Annual Meeting of the American Society for Information Science, Chicago Hilton Hotel, Chicago, IL. contact: ASIS, 1424 16th St. NW, Washington, DC 20036. (202/462-1000)

INTERNATIONAL

AUGUST 20-22: 1986 International Conference on Solid State Devices and Materials, Tokyo Prince Hotel, Tokyo, Japan. Contact: Prof. Takuo Sugano, Dept. of Electrical Engineering, University of Tokyo, Hongo, Bunkyo-ku, Tokyo, 113 Japan. (03/812-2111)

SEPTEMBER 7-10: 4th International Conference on Molecular Beam Epitany, University of York, York, England. Contact: Dr. B.A. Joyce, Philips Research Laboratories, Redhill, Surrey, England. (0293/785544-Horley)

SEPTEMBER 9-12: Second European Simulation Conference, Antwerp, Belgium. Sponsor: Dutch Benelux Simulation Society. Contact: Society for Computer Simulation, % Ghislain C. Vansteenkiste, Prof. of Engineering, University of Ghent, Coupure Links 653, B-9000 Ghent, Belgium. (91-236961 - ext. 400)

SEPTEMBER 10-16: International Congress of Photographic Science 1986 (ICPS), University of Cologne, Cologne, West Germany. Co-sponsored by SPSE and Deutsche Gesellschaft fur Photographie (DGPh). Contact: Executive Director, SPSE, 7003 Kilworth Lane, Springfield, VA 22151

SEPTEMBER 14-18: 43rd Conference and Congress of the International Federation for Documentation, Montreal, Quebec, Canada. Sponsored by the Canada Institute for Scientific and Technical Information of the National Research Council of Canada. Contact: 43rd FID Conference and Congress, C.P. 1144, Succursale Place Desjardins, Montreal, Quebec, Canada H5B 1B3.

SEPTEMBER 15-18: EURO MICRO '86—Twelfth Symposium on Microprocessing and Microprogramming, Venice, Italy. Contact: Fausto Distante, Deputy Conference Organizing Chairman, Politecnico di Milano, Instituto di Electronica, 1-20133 Milano, Italy (39/2-236-7241)

SEPTEMBER 15-20: INTERCOMM '86—The International Communications Exposition & Conference for Science and Technology, Beijing Exposition Center, Beijing, China. Sponsored by the Chinese Association of Science and Technology (CAST) and the China Computer Society (CCS). Contact: INTERCOMM, Cahners Exposition Group, 7315 Wisconsin Avenue, PO Box 70007, Washington, DC 20088 (301/657-3090)

SEPTEMBER 22-25: XII International Symposium on Discharges and Electrical Insulation in Vacuum, Hotel Shoresh, Shoresh, Israel. Contact: Prof. S. Goldsmith, Faculty of Exact Sciences, Tel-Aviv University, Tel-Aviv, Israel (03/420303)

SEPTEMBER 23-26: HCI '86—People and Computers: Designing for Usability, York, England. Sponsored by the British Computer Society. Contact: HCI '86, Conference Dept., The British Computer Society, 13 Mansfield St., London W1M OBP, UK.

SEPTEMBER 23-25: AI EUROPA—Artificial Intelligence and Advanced Computer Technology Conference/Exhibition, Rhein-Main Halle, Wiesbaden, West Germany. Sponsor: Computer Magazin, Expert System User, DM Data, International Directory of AI companies, Applied Artificial Intelligence Report and Society of Computer Simulation. Contact: Tower Conference Management Co., 331 W. Wesley St., Wheaton, IL 60187. (312/668-8100)

PAPERS ON DISPLAY

Information Display is soliciting original articles that cover all aspects of display technology and applications—display systems, sensing and imaging instrumentation, printing technologies, input/output devices, interactive graphics, storage media, and human factors engineering.

Notes for contributing authors and specifications for submitting manuscripts can be obtained from the Editor of ID. Address all inquiries and submit contributed articles to: The Editor, Information Display, 310 East 44th Street, #1124, New York, NY 10017.

Guide profiles periodicals on computer display design

A guide to selected periodicals, covering the design of interactive computer displays, profiles 94 current publications. It provides professionals working with the screen presentation of visual information a resource for locating and evaluating the most current literature that contributes to the field of display systems.

In addition to an abstract of the journal, magazine, or newsletter, the profiles also describe: significant special issues that have been published, ongoing discussions among contributors and writers, regular and special features of the publication, editorial policies, editor and contributor affiliations, where (and if) papers from the work were abstracted or indexed, and the general focus of the work itself.

Overall emphasis is on those periodicals that have a continuing editorial focus and interest in engineering and technology, computer graphics, human factors, cartography, graphic arts, and perceptual or cognitive science. One of the three appendices lists 10 periodicals that cover topics that do not directly impinge on display design, but may be useful to designers with specialized or technical interest. Price $25.

THE REPORT STORE, Lawrence, KS (913/842-7348)

For information circle Reader Service #101

Non-impact printers to displace impact devices

Two key trends in the office information industry are expected to trigger a loss in market share for impact printers—from 75% of the overall printer market to under 50% by 1996—according to a report recently released by International Resource Development Inc.

The first of these trends is networking with accompanying use of shared resources; the second is movement away from text-based to graphics-based computing.

High-duty loads and extremely fast throughput are becoming top priority performance criteria (as networking and shared resources displace personal printers). And non-impact devices, especially electrophotographic ones, fill these requirements better than more traditional impact machines.

Graphics-based computing technology will transform the PC/printer package into a personal publishing workstation. It will make it possible to integrate text, numbers and graphics with relative ease. Different typefaces can be used on different lines or even within a line. Sizes of type can be changed at will. Graphic images can be merged into text and placed anywhere in the copy.

But, according to the report, the advent of graphics-based computing, requires printers to be endowed with a considerable amount of intelligence—microprocessors, ROM, RAM and even disk drives. Because it is prohibitively expensive for personal printers to incorporate all of that circuitry and software, more expensive shared network devices (such as laser printers) will ultimately take over in offices using graphics-based computing—to the demise of impact printers—according to the study.

The 177-page report analyzes the strengths and weaknesses of various non-impact printers, pointing out the significance of color capability in such devices. As it becomes increasingly easier and inexpensive to add color capability to software, the report projects that most printers sold in the future

are likely to support color—at least as an option. In the process, non-color personal printers (except for letter-quality devices) will probably be edged out of the market, concludes the report. *Non-Impact Printers for Personal Computers and Office Automation (#691).* Price: $1,850.
INTERNATIONAL RESOURCE DEVELOPMENT INC., Norwalk, CT (203/866-7800)
For information circle Reader Service #102

Directory provides intercompany access to facsimile machines

The first national facsimile users' directory of business and government facsimile machine telephone numbers and locations contains 27,000 listings, along with information to facilitate intercompany communications with more than 90% of Fortune 500 companies, 130 of the top 150 law firms, 75% of key companies in all industries, the Big Eight accounting firms, major Federal agencies, many state governments, and major universities.

Listings in the 488-page reference volume contain the name and address of the company or agency, departments with facsimiles, machine phone number, reception speeds, hours of operation, and name and phone number of backup person. *Official Facsimile Users' Directory.* Price: $55.
FDP ASSOCIATES, New York, NY (800/223-0507)
For information circle Reader Service #103

Federal laboratories offer unique expertise

The second edition of the *Directory of Federal Laboratory and Technology Resources* describes the capability of special labs, research centers, testing facilities, and special technology information centers; and includes the name and phone number of a specific contact for each facility listed.

Information is readily located by technical areas of interest and detailed indexes cover subject, location by state, organization name, and Federal agency. *Directory of Federal Laboratory and Technology Resources: A guide to services, facilities, and expertise 1986-1987* (PB86-1000013/KCS). Price: $29 (plus $3 shipping and handling).
NTIS, Springfield, VA (703/487-4650)

Laser printer technology leads microprinter growth

Non-impact microprinters—led by laser printing devices—are expected to expand the market to $8.5 billion by 1990, according to a recent study by Frost & Sullivan.

From a base of only $543 million in 1985, the report projects nearly $1.4 billion in sales of electrophotographic (primarily laser), thermal/thermal transfer, and ink-jet printers in 1986; with more than double that in 1987. The 293-page report points out that from less than a tenth of the total 1985 microprinter market, non-impact machines will comprise nearly two-thirds of all printer dollars by 1990.

The report demonstrates why lasers will successfully maintain price and drop less than 10% a year on average, while prices of ink-jet and thermal/thermal transfer devices will decline up to 15% a year. An extensive survey, included in the report, compares printer purchases to date, as well as future plans, along several axes. *Non-Impact Microprinters (#1579).* Price: $1,800.
FROST & SULLIVAN, New York, NY (212/233-1080)
For information circle Reader Service #104

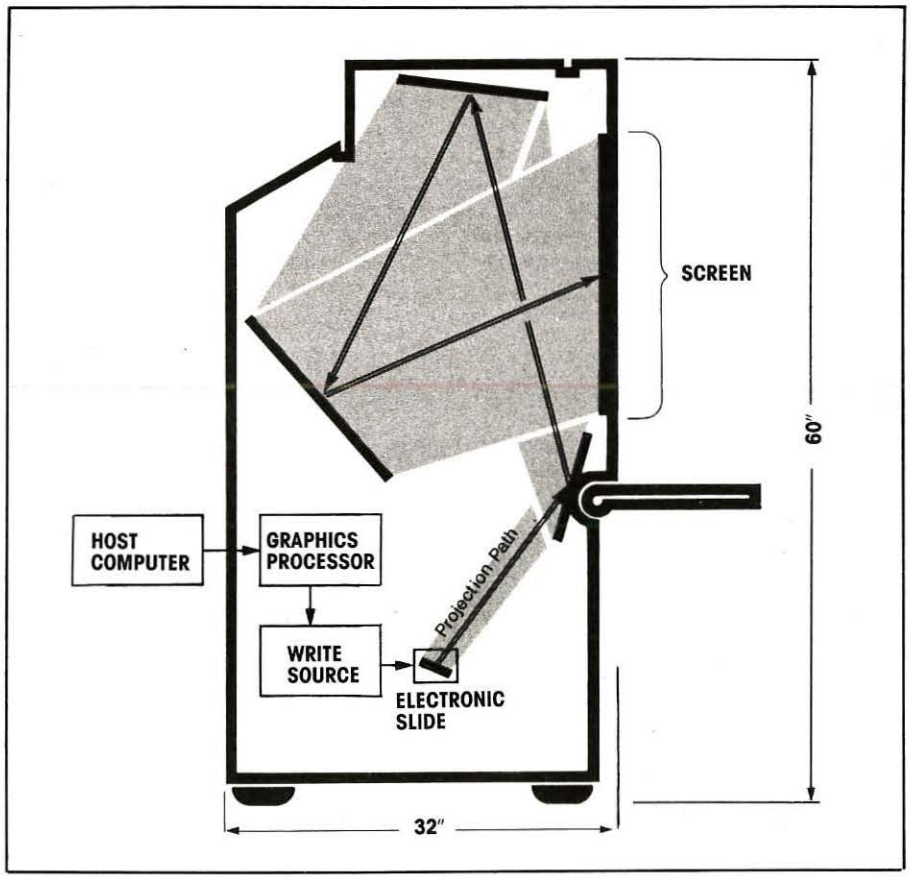
Graphics imager allows check of designs-in-progress

Combining a laser-writing device with a liquid crystal cell, engineers at Greyhawk Systems (Milpitas, CA) have developed a graphic imaging system that enables designers to call up computer-generated images directly from their workstations, check the design-in-progress, and resume their work without interrupting the design process.

The Softplot 2122 system, as it is called, displays full-color, high resolution, "D"-sized engineering drawings (22" × 34") having the image quality of a pen plotter—at the speed of an electrostatic printer. The device does not replace the need for plotters or paper, but rather provides a quick, cost-effective alternative for verifying CAD output at various stages, creating an image in less than a minute. It bridges the gap between the dynamic image from the CRT and the static image from the widebody plotter.

Images are written by a low-power semiconductor laser onto a proprietary liquid crystal cell, which can be thought of as an erasable electronic color slide. Less than six inches square, an image from the "slide" is projected in color onto a high resolution screen. Positioning of the laser writing source on the "slide" is so precise (1 in 13,000) that screen resolution is 400 dots per inch.

A 16-level gray scale provides well-defined modeling, with background being selected as either black or white. Lines can be drawn at widths ranging from 10 to 50 mils in a single pass, providing flexible image composition. Because the system has 120 million addressable points, vectors can begin and end at any point on the screen—even to the screen's edge—without distortion. Images are flicker-free. A raster drawing mode enables text and photo-images to be presented quickly and efficiently.

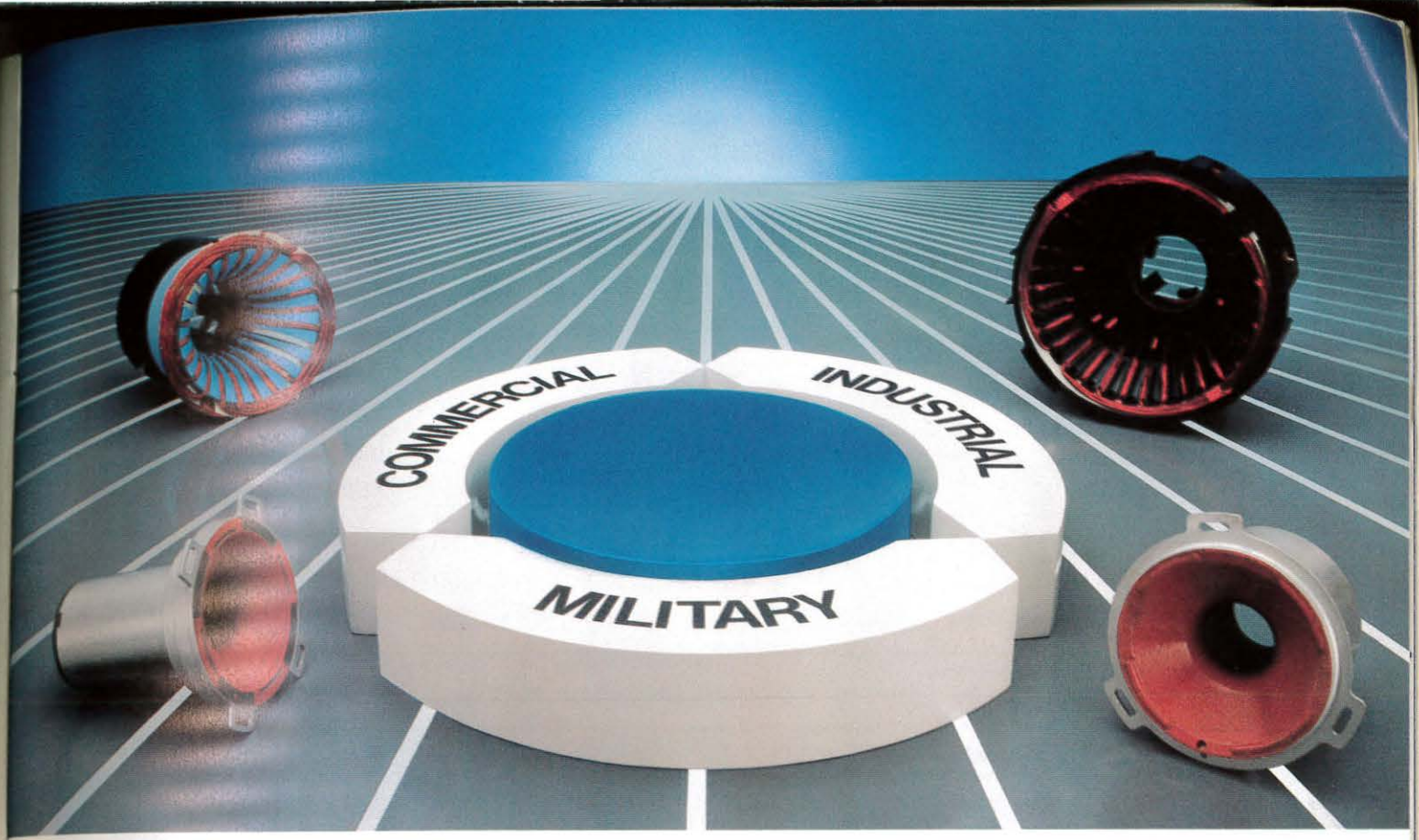


The system's screen can be viewed from very wide angles, making it effective for group presentations. Its high contrast enables displays to be viewed even in bright ambient lighting.

Softplot connects to existing CAD/CAM networks, emulating several common software plotting standards, such as Hewlett-Packard Graphic Language, Calcomp 906/907, and Versatec. It interfaces with the host through standard interfaces: RS 232C, DEC DR-11 parallel, Ethernet, Versatec parallel, and others. And, the system also emulates Tektronix 4107 and IBM 3279 graphic terminals to make use of its interactive capabilities. Price: $46,176.

GREYHAWK SYSTEMS INC., Milpitas, CA (408/945-1776)

Circle Reader Service # 100



How Syntronic helps you meet the design challenges of high-frequency, high-resolution CRT displays.

The demands for higher frequencies and higher resolution in CRT displays are more evident today than ever before.

Syntronic recognized this demand years ago. We began —and still are—responding with improvements in CRT deflection component designs for modern high-frequency scan circuitry.

Syntronic offers technical assistance for product development supporting commercial, industrial, and military systems.

High Frequency

At high scan frequencies, ordinary deflection yokes lose efficiency or may even melt, as in raster-type systems.

Syntronic has developed yoke designs incorporating low-loss cores, multi-stranded (Litz) wire, and high-grade molded housings utilizing a flow-through venting system to dissipate heat without forced cooling.

High Resolution

To maintain high resolution from corner-to-corner (with high-speed, low-inductance yoke designs), Syntronic utilizes precision stator-type cores, contour matched to the CRT neck profile.

The coil distribution characteristics are then optimized for the application.

Syntronic stator-core designs allow production repeatability and low spot-growth that is mandatory for modern wide-angle, high brightness displays.

This repeatability, or consistency, assures the user the same product from prototype through production.

Learn More in Syntronic AP Notes

Syntronic publishes a series of Application Notes that detail these and other deflection yoke considerations.

Send for your copy of these AP Notes to learn more about Syntronic and its efforts in high-frequency, high-resolution CRT displays.

syntronic

Syntronic Instruments, Inc.
Department 6A
100 Industrial Road
Addison, IL 60101
Phone (312) 543-6444

Determining CRT resolution—*(Continued from ID, June 1986, p. 21.)*

Processor resolution

Video processing equipment may include amplifiers, coaxial cable, switches, recorders, and so on, as well as the amplifiers in cameras and monitors—basically those items that accept a signal and provide an output intended to be a duplicate of the input. There is a choice in technique, traditional "sine wave response" versus "television resolution square waves."

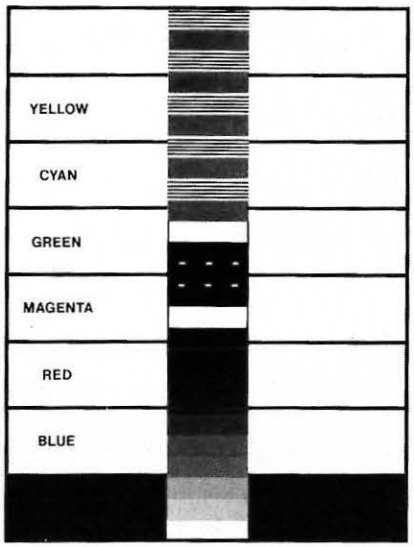
Of course, processor bandwidth and resolution are related quantities. The bandwidth must be sufficiently wide, and proper phase response provided, to produce the sharp rise and fall of a resolution square wave. The bandwidth required to reproduce a particular resolution signal, such as "500 TV lines," is dependent upon the scan rate in use.

The relationship between resolution and bandwidth is strictly mathematical. Resolution rep rate must be fast enough to produce the required number of elements in the active line time. For instance, the 525/60 scan rate has a 52.5 μsec active line time. To produce 800 line resolution in the 4 × 3 aspect ratio, 1066 elements must be developed across the line. That is, 1066 elements must be produced in 52.5 μsec; the time per element is 49.25 nsec, or 98.5 nsec per cycle (2 elements, one white and one black, per cycle). Therefore the fundamental component of 800 line resolution is 10.2 mHz.

The nominal 10 mHz bandwidth for 800-line resolution will produce 100% modulation, but not a sharp square wave. The modulation will appear, essentially, as a sine wave. Production of a sharp square wave at 800 lines would require a bandwidth of as much as ten times that required to reproduce the fundamental, equating to the order of 102 mHz for this example. Obviously there is a lot of compromise in amplifier response.

Resolution evaluation has many complications since each of the system components—lens, camera tube, camera, cabling, processing units, and display—has less than perfect performance.

Resolution performance can be determined by either sine wave response



Combination pattern: A quick overview of display performance can be obtained with a combination pattern that includes Resolution detail, Gray Scale, and Color Range.

or square wave analysis representing resolution. There is, however, no standard or common practice to indicate acceptable limits of performance. Bandwidth commonly is specified as ± 1 db variation allowed throughout the usable spectrum. Usually cutoff is quite sharp at the upper limit, although a gradual rolloff will produce reduced modulation to higher rep rates. Therefore, it is as important to know the rolloff characteristic as the cutoff figure. An adequate specification for video processing equipment will relate both the modulation percentage at performance limit as well as the rolloff characteristic whether the analysis is conducted with square wave resolution signals or sine wave signals.

The format of signal used for testing is important. A continuous sine or square wave from a laboratory oscillator may be distorted in a video amplifier. The video signal format includes the video, blanking, and sync. Video circuits are designed specifically for this signal, and usually will distort signals not in this format; oscillator signals can be processed by a Pedestal Generator.

(Developed from: *Video Standards and Performance Tests of Video Systems*, by John Harshbarger, President, Visual Information Institute Inc., Xenia, OH—SPIE Medical Imaging and Instrumentation '84, Las Vegas, NV 1984.
The Reality of TV Resolution Specifications, Visual Information Institute Inc., Xenia, OH—1982.
Recommended Practice: Performance Test for Medical Imaging Monochrome Display Devices, Visual Information Institute Inc., Xenia, OH—1985.)

Continuous ink-jet produces true color halftone images

Controlling the number of ink drops deposited in each pixel has enabled a group of researchers at Lund Institute of Technology, Lund, Sweden, to plot with an ink-jet plotter true color half-tone images having a variation of color density approaching high quality offset prints.

The plotter used in the experiments was fitted with continuous ink jets having a diameter of 10 microns and a speed of more than 40 meters/second. The small jets spontaneously disintegrate into somewhat less than 1 million drops per second about 1.5 mm in front of the nozzle. By ultrasonic agitation a drop frequency of 1 million drops per second or more can be attained.

A jet of ink is sent through an electrode system similar to a conventional continuous jet device, except that the charge electrode and lower deflection electrode are combined into one unit. While the uncharged drops pass the deflection field unaffected, the charged drops are deflected below a razor blade at the end of the system and do not reach the paper. By using a signal voltage of about 200 volts applied to the lower electrode or the ink supply, this system acts as a pure on/off device. Because of the simplicity of the system several such devices can be closely packed together into a recording head of a drum plotter.

Conventional ink-jet plotters, with 125 scanning lines per inch, print a 0.2 × 0.2 mm pixel in 40 microseconds. Approximately 40 drops of ink are used to fill a pixel with color. Each pixel is either saturated with ink, or left blank. Color shades are obtained by an ordered dither method using a 4 × 4 matrix.

Continuous jet: Halftone color print.

One of the more recently introduced ink-jet plotters generates 250 scanning lines per inch, printing a 0.1 × 0.1 pixel in 30 microseconds. But, even with this enhanced plotter, a dither method is used to generate shades of color. The resultant image only generates 16 shades in each color and shows a visible matrix pattern.

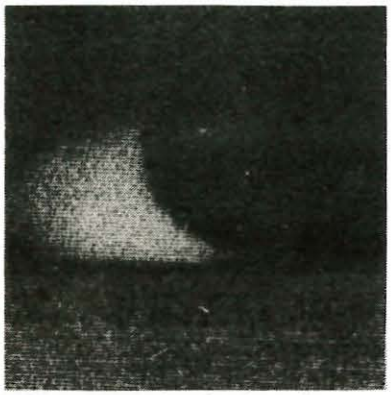
To improve upon this technology, the researchers investigated generating shades of color by controlling the number of drops deposited in each pixel. The experiments produced a considerable improvement of image quality and resolution over the conventional dither method. The 250-lines/inch plotter, with 30 drops of ink available for each pixel, produced 30 different shades of one color in each pixel. (The number of color shades can readily be increased to over 100.)

The researchers anticipate an early application of the new system for prepress proofing of electronically generated images in the graphics industry, as well as in other technical fields. And it may be possible, eventually, to replace conventional photographic color offset printing by ink jets.

(Developed from *High Quality Ink-Jet Printing of Color Images*, by Prof. C. Hellmuth Hertz, Dept. of Electrical Measurements, Lund Institute of Technology, Lund, Sweden—SID '86, International Symposium on Information Display, San Diego, CA, May 6-8, 1986.)

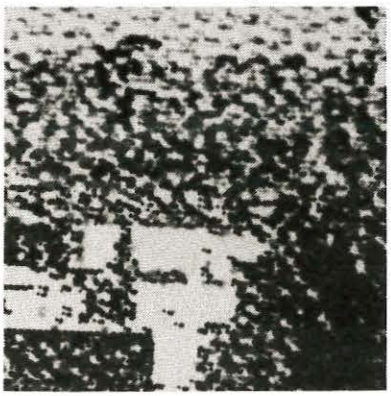
For information circle Reader Service #105

INK-JET COLOR HALFTONES

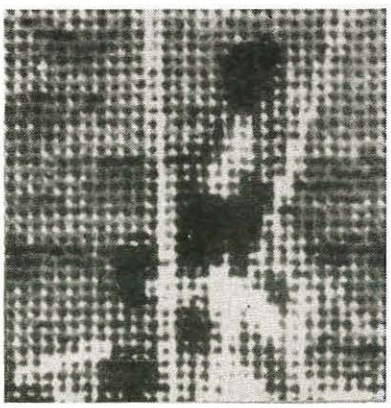


Halftone (10 lines/mm) enlarged.

Dither (10 lines/mm) enlarged.



Drop-on-demand (10 lines/mm) enlarged.



Bubble jet (12 lines/mm) enlarged.

True Grey Shades at High Speeds for Less than $5000

Raytheon's TDU-850, Thermal Display Unit, produces photo quality images on an 8¾" x 200 ft. roll. The TDU-850 prints 16 shades of grey in less than 20 milliseconds per line; black and white images at 5 milliseconds per line. Price per unit from $4950, depending on interface and application. (Slightly higher overseas). Discounts for OEM large volume quantities. Fixed thermal head assures perfect registration. Resolution better than 200 dots/inch. Direct thermal technology requires no toners or developers. Standard or custom interfacing. For details, contact **Marketing Department, Raytheon Ocean Systems Company, Westminster Park, East Providence, RI 02914 USA. Telephone (401) 438-1780 Telex 6814078.**

Raytheon

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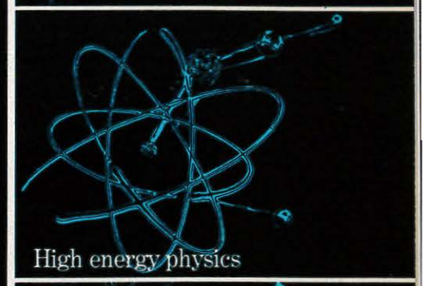
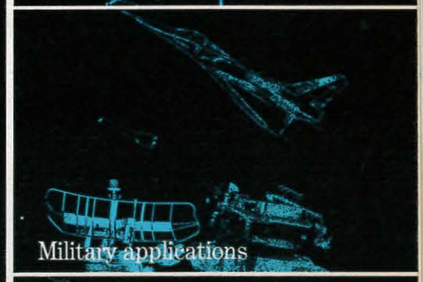
Medical applications



High energy physics

Radio – and TV – broadcasting

Telecommunications



Military applications

Radar and ECM

POLARIS

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Tel. (32-2) 648 64 85
Tx 23 113 THBXL B

Brazil : SAO PAULO
Tel. (55-11) 542 47 22
Tx (011) 24 226 TCSF BR

Canada : MONTREAL-QUEBEC
Tel. (1-514) 288 41 48
Tx 5 560 248 TESAFI MTL

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United-Kingdom : BASINGSTOKE
Tel. (44-256) 29 155
Tx 858 865 TESAFI G

U.S.A. : DOVER
Tel. (1-201) 328 1400
TWX 710987 7901

Circle Reader Service #10

Pre-shaped polymer forms ink-jet nozzles in ceramic

In an effort to cut costs of constructing multi-nozzle, ink-jet heads and lower drive voltages, while at the same time producing precision ink passages and ejection nozzles, researchers at NEC Corp., Kawasaki, Japan, used pre-shaped space-forming polymer sheets to create nozzle openings directly in piezoelectric ceramic sandwiches.

UV-curable polymer sheets were first shaped into the desired nozzle space patterns using a photoelectrographic etching process. Piezoelectric ceramic, in the form of green sheets, was then sandwiched with the space-forming sheets into a laminated structure and fused by a thermal-press technique. All internal electrodes, such as wiring electrodes and driving electrodes for the piezoelectric actuator that generates pressure pulses for ink ejection, were formed by printing metal paste onto the green sheet ceramic surface in a predetermined pattern.

After a burn-out step, in which the preformed spacing polymer is wasted (similar to the jeweler's "lost-wax" method of casting in gold), the laminated green ceramic body is sintered at a

FIG. 1

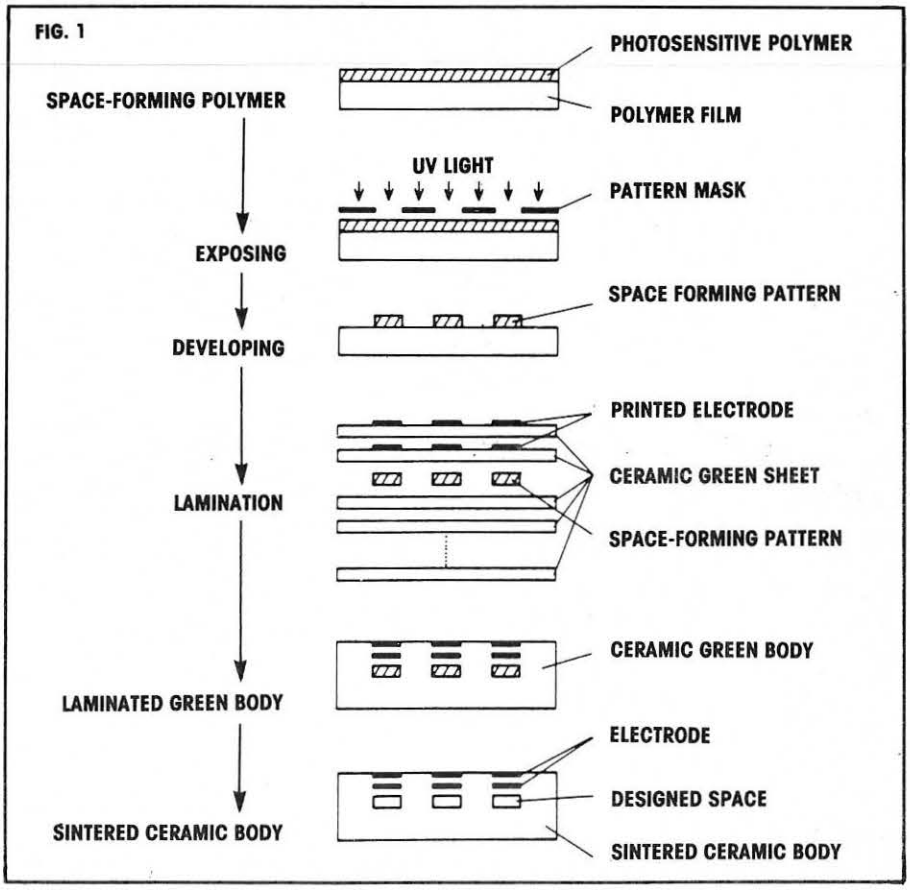
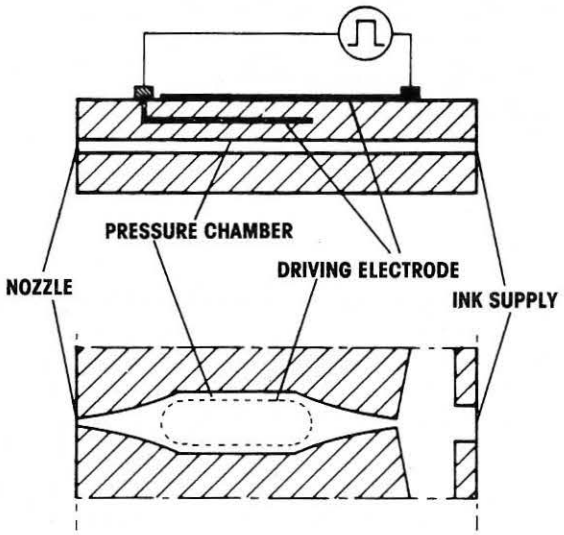


FIG. 2



Driving electrode for the piezoelectric actuator is oblong with two semicircular sides, whose short length and area are 2.75 mm and 19.7 mm^2, respectively.

specific temperature for the material to properly harden. The sintered ceramic body is finished as an ink-jet by polishing the nozzle edge surface.

The space-forming technique makes it possible to form ink passages and internal electrodes simultaneously and precisely. And, it makes it possible to form the piezoelectric actuator directly in the ceramic body.

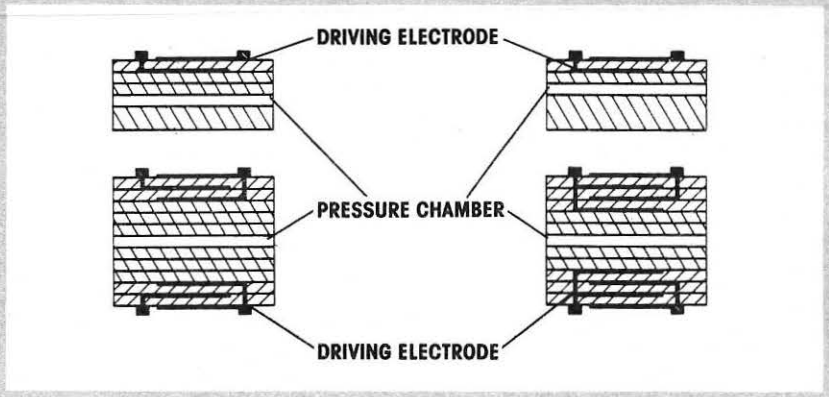
(Developed from *Drop-on-Demand Ceramic Ink-Jet Head Made from Piezoelectric Material*, by Michihisa Suga, Kazuaki Utsumi, Mitsuo Tsuzuki, and Hideo Takamizawa, NEC Corp., Kawasaki, Japan—SID '86 International Symposium on Information Display, San Diego, CA, May 6-8, 1986.)

For information, circle Reader Service #106

Ink-ejection characteristics

In designing the driving electrodes, it was found that high voltages were necessary when the electrodes were located on one side of the pressure chamber. Initially, to reduce voltage requirements, driving electrodes were arranged in a multilayered configuration. The electrodes then were positioned on both sides of the pressure chamber. Resultant driving requirements for any one of the actuators was reduced by half. Additionally, operational noise resulting from driving the actuator from one side only was greatly reduced when driven from both sides.

Driving the actuator from one side also resulted in large electromotive forces on both sides of the actuator—with electromotive force polarities opposite to each other. Apparently, while one actuator stretched, the opposite one shrank, resulting in a bending vibration over the entire head—thus increasing the operational noise. But, by driving the actuators on both sides, only small electromotive forces are set up and few opposite polarity components are observed.



Another finding in the research project was that operational frequency depends on both drop velocity and drop volume. When the operational frequency goes over a constant value, the drop volume decreases suddenly. In the high frequency range, ink supply—depending on capillary action at the nozzle—becomes short. Because the drop volume for a single drive voltage pulse was large for the experimental head, the drop volume decrease was observed for relatively low frequencies.

When the ink supply becomes short, ink meniscus is drawn into the nozzle and is subjected to returning force to the nozzle edge—due to capillarity and acceleration by the succeeding drive voltage pulse at the same time. Therefore, the drop velocity increases as the drop volume decreases.

High ink viscosity decreases ink supply velocity due to capillarity, and causes the range for linear increase for the flow rate to become narrow. To expand the linear increase range, it is desirable to make nozzle dimensions small, so that the drop volume for a single drive voltage pulse becomes small.

SID '86: Post-Show Product Highlights

Cockpit display

Airborne shadow-mask color CRT, M18-E851, is a super-high-resolution device for sunlight-readable avionic cockpit displays and other military applications. The rugged assembly is 166 x 166 x 330 mm; weighs just 4 kg.

The CRT achieves its high resolution through use of a fine 0.2-mm pitch shadow-mask and rugged in-line electron gun. Assembly technology includes a self-converging deflection system, static color purity with convergence correction and an effective contrast enhancement. The device meets the MIL-STD-810C environmental specifications.

AEG CORP., Somerville, NJ (201/722-9800)

Circle Reader Service #51

Flat CRT display

A wrap-around electron-optical system and microchannel plate electron multiplier permits packaging a high-resolution CRT datagraphic display in an assembly only 50 mm thick. The *Slimscreen* device provides excellent brightness, contrast, and resolution.

The system's electron gun projects a low energy (600eV) modulated beam towards a trough-shaped "mirror" electrode at cathode potential that bends the beam through 180 deg and directs it across a series of strip electrodes extending the full width of the display area. The voltage on each strip is switched sequentially between 0 and 400V by means of overlapping ramped waveforms. The beam thus traces out a vertical path across the input to the microchannel plate electron multiplier, forming the frame scan.

Operating at 1400V, the microchannel plate provides current amplification, yet maintains the spatial fidelity of the image. Twin deflection plates are an integral part of the gun structure and provide the line scan. The electrons emerging from the microchannel plate (MCP) are accelerated on to the phosphor by the high potential between the MCP and the screen (15kV), giving a bright high-resolution display.

AMPEREX, Specialized Products Group, Hicksville, NY (516/931-6200)

Circle Reader Service #52

Miniature CRT

Model H-1401, ½-inch miniature cathode ray tube, is a high-quality tube with plano-concave fiber optic faceplate. The device comes as a magnetically shielded, fully potted assembly with magnetic deflection and electrostatic focus. Its size and lightweight (46 gm), along with its high brightness and high resolution, make the unit suited for helmet-mounted display applications.

HUGHES AIRCRAFT CO., Carlsbad, CA (619/931-3000)

Circle Reader Service #53

Touch screen

The RGB Touch Monitor is a color monitor compatible with IBM Color Graphics Adaptor, providing both a four-color display mode with a resolution of 320 x 200 pixels; and a black-and-white monochrome display mode with a resolution of 640 x 200 pixels (non-interlaced). With more powerful graphics adaptors, the monitor supports up to 640 x 200 pixels and 16 colors.

The ENHANCED Touch Monitor is a high-resolution RGB color monitor compatible with both the IBM Enhanced Graphics Adaptor and the IBM Color Graphics Adaptor. The monitor can automatically adjust to either card and has a maximum resolution of 640 x 350 pixels with 16 colors.

The NTSC Touch Monitor is an RGB analog video monitor compatible with RGB or composite outputs. It allows users to merge videodisk and computer graphics input simultaneously. The unit features an audio circuit chip and speaker providing full sound capability.

MICROTOUCH SYSTEMS INC., Woburn, MA (617/935-0080)

Circle Reader Service #54

CRT measurement/analysis

The SUPERSPOT 100 CRT measurement and analysis system permits observing in real time the intensity profiles of monochrome or color CRT's, as well as providing the power of computer analysis and measurement. Intended to serve in laboratory as well as production environments, the system provides the tools needed to make most of the common measurements as well as some new approaches to CRT measurements. The system gains its speed and accuracy from the high quality optic module, which incorporates a solid state photosensitive scanner that provides an accurate response to light. SUPERSPOT 100 is a fully integrated system that contains all the required equipment with the exception of the mechanical positioning devices.

MICROVISION, San Jose, CA (408/374-3158)

Circle Reader Service # 55

Electroluminescent monitor

The EL8358M, EL monitor offers CRT display quality for portable personal computers, industrial control, or any application using MS-DOS graphics, text, or utility software packages. Each of the display's 128,000 pixels may be individually addressed to create high resolution graphics with a 2:1 pixel pitch ratio. Screen images (bright yellow-orange) can be easily viewed even under low ambient light, and from an angle greater than 120 deg. A 60 Hz refresh prevents flickering. With a resolution of 604 × 200 pixels, the display has a 4.8 × 7.7-in. viewing area; is 0.55 in. thick; and weighs just 25 oz.

PLANAR SYSTEMS INC., Beaverton, OR (503/690-1100)

Circle Reader Service # 56

Projection kinescopes

Series C82006 and C82008 projection kinescopes are 5-in.-dia magnetic focus and deflection types for large screen color TV

applications, such as computer-generated alpha/numerics/graphics displays. They are available in blue, green, red, and white phosphors and are well suited for industrial and military applications.
RCA Solid State Div./Electro-Optics and Devices, Lancaster, PA (717/295-6888)
Circle Reader Service # 57

Avionic/military displays

Monochrome and color (shadow mask and penetron) CRTs, for avionic and military vehicle applications, range from 16-mm to 600-mm screen sizes; in round and rectangular configurations. Custom-designed packages are complete with coils, magnetic shields, mounting flange, and leads, which, when coupled with rugged construction, meet the most severe environmental requirements. A comprehensive range of phosphors meet the needs of all applications, and fiber optic faceplates can be used where applicable.
RANK ELECTRONIC TUBES INC., Scotts Valley, CA (408/438-6440)
Circle Reader Service # 58

Thermal printer/recorder

Portable printer/recorder produces CRT hard-copy, computer-generated data, medical imaging scans, radar recordings, and other paper output prints and copies. The device has no moving parts, but instead uses a fixed thermal print-head, thus assuring its reliability and lending itself to both printer and recorder applications. Usefulness as a recorder is further enhanced by its ability to produce a full range of gray levels. Effective printing width is 8.5"; length, up to 200 ft. Dot density of printed images is 203 dots per inch. Sweep speed for 8½" × 11" pages, black-and-white, is 5 seconds; 8 gray shades, 10 seconds; and 16 shades, 20 seconds.
RAYTHEON OCEAN SYSTEMS, East Providence, RI (401/438-1780)
Circle Reader Service # 59

Color display

Trinitron color display monitor, having 1280 × 1024 resolution, provides 11.43 in. × 15.11 in. useful screen area for high resolution CAD applications. The 19-in. picture tube has a superfine pitch and an extremely flat cylindrical face that minimizes distortion. Overall dimensions are 17.11 in. × 19.53 in. × 22.05 in.
SONY CORP. OF AMERICA, San Diego, CA (619/487-8500)
Circle Reader Service # 60

High voltage drivers

Models HV03 through HV06, 64-channel line drivers are packaged as 84-lead Quad Cerpak and plastic surface-mount devices for both military Hi-Rel and commercial/industrial versions. The devices are processed with HVCMOS, a proprietary high-voltage integrated circuit technology. They combine both CMOS, 64-bit shift register, 64 latches, and high-speed control logic along with high voltage DMOS 64 power MOSFET output stages on a single monolithic integrated circuit. Packages measure 0.65 in. per side, with 0.025 in. center-to-center lead spacing. Primary applications for the devices are as row and column drivers used in electroluminescent and gas plasma flat-panel displays. Prices: commercial ceramic and plastic versions (100-199 pieces),

Products

$20.45 to $56.82; Hi-Rel ceramic versions (100-999 pieces), $161.94 to $170.45.
SUPERTEX INC., Sunnyvale, CA (408/744-0100)

Circle Reader Service # 61

Flexible thin-film displays

Displays in sizes greater than 1 ft² are possible with a flexible film substrate consisting of nematic liquid crystals encapsulated in a polymer matrix. The device eliminates the need for polarizers and glass spacers usually required in LCD displays, and offers better thickness control than is possible with glass-sandwich technology. High-contrast displays can be assembled from modules up to 12 × 48 in., having 3-in. dot spacing. Displays are produced by activating some panels to transmit light while letting others block background views of data, colors or scenes. When a light-absorbing dye is incorporated in the LC spheres, the panels may be used with backlights, filters, and transflectors to form multicolor instrumentation displays that can be configured to curved contours.

TALIQ CORP., Mountain View, CA (415/967-2990)

Circle Reader Service #62

Thermal video printer

Model TP-115, thermal video printer, provides a minimum of 32 shades of gray using standard paper and up to 64 shades with a special synthetic paper. No warm-up time is required for the printer, and a 6.5 in. x 8.5 in. print is produced in only 40 seconds. Tonal range of the print can be set to positive or negative and a full range of calibrated settings are provided to ensure compatibility with most video outputs.

The TP-115 is capable of handling interlaced and non-interlaced displays by a simple switch selection. A wide range of horizontal scan rates and vertical refresh rates can be accommodated. The system will accept video clock frequencies 5 MHz to 25 MHz and video levels 0.6 V to 2.5 V. Price: $5,350.
TEAM SYSTEMS, Sunnyvale, CA (408/720-8897) **Circle Reader Service #63**

EL column drivers

Monolithic BIDFET integrated circuits are designed to provide the serial-to-parallel conversion and level translation of data in a matrix-addressable electroluminescent display. Device inputs are diode-clamped CMOS inputs. The column drivers consist of a 32-bit static shift register, 32 latches, and 32 high-voltage outputs. Serial data is entered into the shift register on the low to high transition of the clock signal. A logic high signal on the "latch-enable" input transfers the data from the shift register to the latches while the V_{C22} bus is low. Once stable in the latch circuits, the V_{C22} rail is ramped up to allow the data to appear at the high voltage outputs. By limiting V_{C22} to a maximum of 60 v, these devices may be safely operated in a non-ramped V_{C22} mode.
TEXAS INSTRUMENTS, Dallas, TX. (800/232-3200)

Circle Reader Service #64

Color ink-jet printer

The 4020 color ink jet printer (targeted at the individual engineering/scientific end-user) is intended for output of quick check plots and color hard copy from personnel computer-based CAD/CAM/CAE workstations. Compatible with more than 50 popular business graphics software packages developed for the IBM PC and compatibles, the printer produces high-quality color graphs, charts, and spreadsheets on a variety of media including transparencies and up to 11-in.-wide cut sheet, roll or tractor-feed paper. Operating in two switch- or software-selectable graphics modes, the 4020 prints up to seven distinct colors and more than 4,000 shades. A typical color graphics page prints in about two minutes in the standard 120 x 120 dots per inch mode; and at four minutes a page in the enhanced 240 x 120 dots per inch. Ten-pitch text print speeds are 40 characters per second (cps) in the near letter quality mode; and 80 cps, in draft quality. Speeds increase with 12 or 17-pitch fonts. Price: $1,495 (includes GEM WORDCHART and GEM GRAPH software applications along with the GEM Desktop Operating Environment.)
XEROX CORP., Stamford, CT (203/329-8711)

Circle Reader Service #30

Digital camera interface

Interface package allows IBM PCs to act as host computers for Series 78/79, Series

850, and E-Z SCAN digital imaging systems. The interface package consists of two IEEE-488 interface cards connected by a 12-ft cable. One of the interface cards is installed in the camera's electronic support unit, the other occupies a card slot in the host computer. The interface works with the PC-DOS or MS-DOS operating systems on computers with an IEEE-488 communications port, at least 256K bytes of main memory, and disk or tape storage media. Color imaging applications also require computers with a color graphics adapter card and color monitor.

EIKONIX CORP., Bedford, MA (617/275-5070)

Circle Reader Service #31

Power systems

AP-1000 series of Uninterruptable Power Systems (UPS) operate on single-phase, 120V current for 200, 300, 800, and 1500 VA power ratings. The systems, designed specifically for the small computer user, serve both as powerline filters and as standby backup protection against power outages. Built-in batteries provide power for up to 12 minutes (longer if the power usage is lower), providing sufficient time to start up standby generators, or make an orderly shutdown of the computer to protect its data. Extended back-up time battery packs are available for some models. Price: $379 (200 VA); $529 (300 VA); $899 (800 VA); $1,499 (1500 VA)

EMERSON INDUSTRIAL CONTROLS DIV., Santa Ana, CA (714/545-5581)

Circle Reader Service #32

Schottky diode chips

Offset-junction Schottky diode chips—HSMS-0001, -0002, and -0003—are designed for analog and digital hybrid applications requiring thermosonic or thermocompression bonding techniques. Innovations found in the new diodes are a large, centered bond pad and an offset junction that avoids subjecting the pads to the stresses incurred during the wire-bonding process. With the junction offset from the bond pad, bonding takes place over a relatively thick oxide, thus sonic energy or other applied stresses are much less likely to damage the diode. Additionally, the large centered bond pads aid in targeting and wire-bond placement, thus speeding up automated wire bonding and production rates. Prices: $0.40 to $0.53, depending upon type of chip (in quantities of 10,000).

HEWLETT-PACKARD, Palo Alto, CA (Call local HP sales office).

Circle Reader Service #33

Laser Printers

QMS KISS laser printer offers nine fonts (allowing up to 40 print combinations), print speeds of up to six pages per minute, resident Diablo, Epson, and QUME emulations, and a duty cycle of up to 5,000 pages per month. The printer has 78 KB of user-accessible memory, a Motorola 68000 microprocessor, and a PC-compatible Centronics parallel interface. The device prints 90,000 dots per-square-inch. Price: $1,995.

QMS INC., Mobile, AL. (205/633-4300)

Circle Reader Service #34

Image digitizer board

The Capture image digitizer board for IBM PC/XT/AT and compatible computer systems gives a user the ability to quickly and efficiently capture an image from a standard RS-170 video input, such as a camera. The captured image "frame" is then stored in onboard memory. The acquired image can also be simultaneously displayed on any composite graphics or TV monitor, or printed out on a standard graphics printer. Users can conduct image processing operations such as editing, binary thresholding, filtering, and image enhancement using proprietary software included with the board. Other capabilities, such as zoom, text on overlay, selective shading for image enhancement, test, cutting or combining with previous pictures is also standard. Price: $1,495.

GENOA SYSTEMS CORP., San Jose, CA (408/945-9720)

Circle Reader Service #35

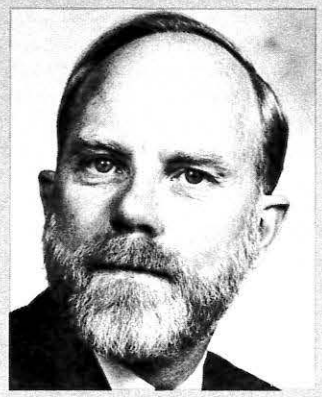
Ink jet printer

Compact color ink jet printer Model JX-720 provides a printing resolution of 120 dots/in. With user-provided software, the printer dots can be adjusted to produce delicate halftones for color images up to 8.5 in. wide. Four ink cartridges of yellow, cyan, magenta, and black can be combined to produce up to 256 basic color combinations. The JX-720 has an automatic printhead cleaning station that minimizes nozzle clogging problems. Price: $1,495.

SHARP ELECTRONICS CORP., Paramus, NJ (201/599-3856)

Circle Reader Service #36

President's Message



The SID members and other readers of *INFORMATION DISPLAY* who were fortunate enough to attend the SID '86 Symposium already know that yet another attendance record was set in San Diego. Without any doubt, this was due to the high quality of the seminars, the technical program and the large number of exceptional exhibits. Many attendees, no doubt, shared my problem of having too little time to attend all the interesting sessions and to see all the newest display products and technologies at the exhibits. I have recently heard a great deal about declining attendance at other conferences and reductions in corporate travel budgets—and this makes the success of SID '86 all the more remarkable. It indicates, in my opinion, that the format of the conference is excellent and that the tremendous efforts by the volunteers of the organizing committees really pay off.

Many of you heard L. Tannas' summary of the Society's finances at the opening session. SID now has an annual budget in excess of $700,000 to cover the Headquarter's office with two full-time employees; the organization of our major annual conferences (the symposia and IDRCs); and our regular publications (the SID *PROCEEDINGS* and *INFORMATION DISPLAY* journal). We sustained a net loss on our operations last year due primarily to the start-up and growth of the expanded monthly journal but we have instituted a number of cost controls to stay in the black this year. We also hope that even more of you will realize that SID membership is a bargain ($35 in 1987), and that you will support the Society and its activities with your time and efforts. It is your involvement and support that makes SID as strong as it is today.

I have appointed a number of new Standing Committee chairmen with the Board's approval (they are listed elsewhere in this journal). It is my intention to give each of them lots of latitude in managing committee activities and in proposing new programs. These volunteers effectively manage the Society's daily activities through their enthusiasm, vision, and experience; I look forward to working with this new team in the months ahead.

At SID '86 I also had the pleasure of announcing the establishment of a new annual SID award, the Johann Gutenberg Prize, for outstanding achievement in the field of hard-copy printing. This prize, which includes a $2000 cash award, has been established by IBM to recognize the growing importance of hard-copy technologies in the field of information display. I am grateful to many of our colleagues at IBM, especially Drs. B. Grant, E. Lean, I. Chang, and P. Pleshko, for their efforts in establishing this award to be administered by SID. Dr. Webster Howard and members of the Honors and Awards Committee have been asked to develop guidelines for the nomination and selection of future recipients of this prize. These will be published in this journal in the near future—consistent with our plan to award the first prize at the SID '87 symposium in New Orleans next spring.

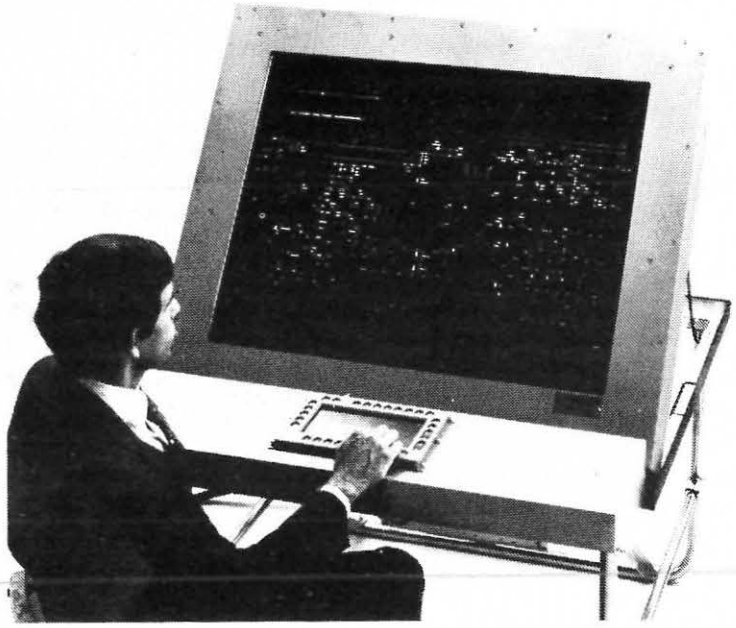
PHOTONICS TECHNOLOGY, INC.

PIONEERS AND LEADERS IN THE Design, Development, and Production of AC Gas Discharge Displays

PHOTONICS TECHNOLOGY PRESENTS

THE WORLD'S FIRST METER-SIZE, HIGH RESOLUTION FLAT DISPLAY TERMINAL

DEVELOPED FOR MILITARY PROGRAMS INCLUDING U.S.ARMY AFATDS



This is the world's first large area, high resolution, non-projected, flat display terminal. Utilizing AC gas discharge plasma display technology, the terminal has an active display matrix of 1600 by 1200 pixels measuring over 39 inches (one meter) diagonally with 5.3 square feet of viewing area and a resolution of 2500 pixels per square inch. All drive electronics are mounted in a 4 inch thick picture frame package around the perimeter of the transparent, thin (0.5 inch) display screen allowing for rear-projected and see-through applications.

Jointly developed by Photonics Technology, Inc., Luckey, Ohio and Magnavox Electronic Systems Co., Ft. Wayne, Indiana.

Photonics and Magnavox are presently completing the development of AC gas discharge flat panel displays ranging in size up to 3 meters with active display matrices up to 4096 by 4096 pixels. Multicolor displays are also being developed.

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Advances in printer technology cited in creating new award

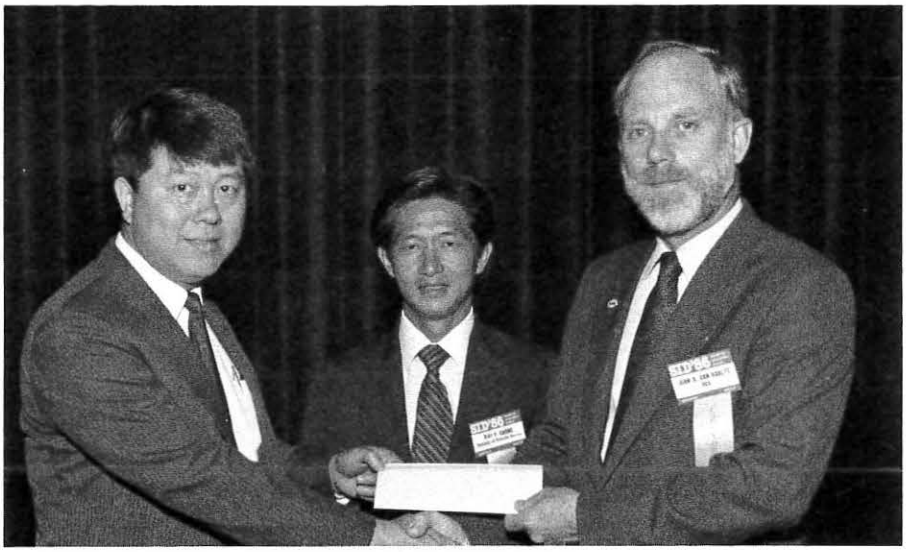
Outstanding contributions to the advancement of printer technology will be honored annually by the Society for Information Display through presentation of *The Johann Gutenberg Prize*—the newest in a number of prestigious awards that SID bestows upon distinguished professionals in the display community.

Named after the 15th century German printer, Johann Gutenberg, who is recognized as the inventor of western printing from moveable type (see box), the prize is "... intended to raise the awareness of the scientific and technical communities to the importance of printer technology." The prize carries with it a cash stipend of $2,000 underwritten by the International Business Machines Corp., and established for a period of ten years.

In presenting his company's commitment to the Society, at SID '86 San Diego in May, Dr. Eric G. Lean, a member of the Senior Technical Staff of the Director's Office of the IBM Research Div., stated: "The Society for Information Display has, over the last several years, placed a strong emphasis on hard-copy techniques. IBM believes that SID, with its global perspective, is the ideal professional organization to administer this prize."

Dr. John A. van Raalte, newly elected president of SID, and Director, Display Systems Materials and Processing Research at RCA Laboratories (Princeton, NJ), expressed the Society's appreciation and indicated that guidelines for the prize would be established by the Society's Honors & Awards Committee and be published in *Information Display*, in a future issue.

The idea for the prize evolved from conversations between Dr. Ifay F. Chang, immediate Past President of the Society, and Dr. Barbara Grant, Director of I/O Technology at the IBM Thomas J. Watson Research Center (Yorktown Heights, NY). Dr. Chang is presently on assignment from IBM as the Director of Research, Institute of Systems Science, National University of Singapore.



Johann Gutenberg Prize: Dr. Eric G. Lean (left) presents IBM's commitment to underwrite an award for outstanding achievement in printer technology to Dr. John A. van Raalte, SID president. Participating is Dr. Ifay F. Chang, SID past president, who initiated the idea for the award.

Johann Gutenberg (1398-1468)

A goldsmith by trade, Johann Gutenberg successfully demonstrated in 1448, in Mainz, Germany, that printing from moveable type was practical. In 1449 or 1450, Gutenberg printed his famous 42-line, two-column, Bible that is regarded by historians and scholars as the first substantial piece of printing to issue from a printing press.

(Leaves of the two-volume, 640-page vellum copy of the Bible, on permanent display at the Morgan Library, measure approximately 12 x 18 in. Each book is approximately 3 in. thick.)

Gutenberg's priority as inventor of printing in Europe from moveable type cannot be seriously contested. The essential and unique elements of his invention consisted of:

- a hand mold with punch-stamped matrices for precision casting of type in large quantities
- a type-metal alloy with low melting point and quick undistorted solidification
- a press adapted from those used by contemporary papermakers and book binders, and
- an oil-based printing ink.

None of these elements existed at that time in Chinese or Korean printing, or in the European techniques of stamping letters on bookbindings, textiles and so forth, or in woodcut printing.

Canada Chapter Inaugural Meeting

On the evening of April 23, 1986, forty five SID members attended the Inaugural Meeting of the Canadian Chapter of SID, at which the Chapter's officers were introduced:

Chairman—A.J. Moffat, Litton Systems Canada Ltd.
Vice-Chairman—A. Bruce, Data Images Inc.
Secretary—S. McFadden, Defence and Civil Institute for Environment Medicine (DCIEM)
Asst. Sec'y—A. Letcher, Canadian Marconi Co. Ltd.
Treasurer—P.J. Baron, Philips Electronics Ltd.
Asst. Treas.—D. Kennedy, Optotek Ltd.

Opening remarks by outgoing SID President, Dr. Ifay Chang, Director of Research, ISS University of Singapore, were followed by two technical speakers.

• Dr. John Lovasik, University of Waterloo, presented a talk on optical, muscular, and neurological problems of the visual system that could cause visual fatigue when using video display units and lead to reduced operator performance.

• Dr. Joe Castellano, President, Stanford Resources Inc., Menlo Park, CA, briefed attendees on the status of and the current and future markets for traditional CRT and emerging flat panel technologies. He indicated that while the flat panel market will exceed $1 billion by 1990, the display market will still be dominated by the CRT.

Sharon McFadden, Secretary

Japan: July 11, 1986
Program: Technical Meeting
Topic: Overview of SID '86
Speakers: K. Miyaji, Shibaura Institute of Technology; and others

Canada: June 18, 1986
Program: Technical Meeting
Topic: Review of SID Symposium 1986 and tour of Data Images liquid crystal display fabrication facilities, Data Images Inc., Ottawa, Canada

UK & Ireland: June 10, 1986
Program: Technical Meeting
Topic: Displays; plus highlights from SID '86 San Diego International Symposium
Speakers: Alan Mosley, GEC—Recent LCD advances
Simon Bliss, PPC—Flat panel DCEL displays
David Emberson, Mullard—Thin flat microchannel plate CRT
Ian Charles, BBC—Display requirements for HDTV

Los Angeles: May 27, 1986
Program: Technical Meeting
Topic: Hughes Liquid Crystal Light Valve (LCLV)
Speaker: Rod Sterling, Hughes Industrial Products Carlsbad, CA

Sterling reviewed LCLV theory and operation, and described performance, operational and technical design features of the projector.

SID HONORS AND AWARDS

Nominations are now being solicited from SID members for candidates who qualify for SID Honors and Awards.

- **Fellow**—Conferred annually upon a SID member of outstanding qualifications and experience as a scientist or engineer in the field of Information Display, and who has made a widely recognized and significant contribution to the advancement of the display field.
- **Frances Rice Darne Memorial Award**—Presented periodically (but not more than once a year) to a SID Member in recognition of outstanding technical achievement (as opposed to teaching, publication, or service) in, or contribution to, the display field.
- **Beatrice Winner Award**—Awarded periodically (but not more than once a year) to a SID Member for exceptional and sustained service to SID.

Special Recognition Awards:—

- Outstanding technical accomplishments,
- Outstanding contributions to the literature, and
- Outstanding service to the Society

granted to members of the technical and scientific community (not necessarily to SID Members) for distinguished and valued contributions to the Information Display field.

Nominations should comply with the 1986 Guidelines for SID Honors and Awards Nominations and should be submitted to the Honors and Awards Committee Chairman before September 1, 1986.

His presentation also covered advanced LCLV applications such as optical data processing and full-color LCLV projection displays (as embodied in the Hughes Ground Systems Group HDP-6000 full-color LCLV projector). A brief overview of device research on improved performance LCLVs (response time, resolution, and so forth), and on special technology applications, such as infrared simulators and charge coupled light valves, concluded the meeting.

Minneapolis-St. Paul: April 26, 1986
Program: Technical Meeting
Topic: Flat Panel DC Plasma Display
Speakers: Herman Person and Keith Raysby
Dale Electronics Inc., Columbus, NB

Los Angeles: April 23, 1986
Program: Technical Meeting
Topic: High Definition Television
Speaker: Don Kline, Director of Technology Panavision

Kline covered the history, current status of hardware, standards and likely future trends in this technology, which is evolving rapidly, fueled by advances in electronics, data compression techniques, and a better understanding of psychophysics of viewing television images. The presentation was followed by a panel discussion, with Kline joined by Richard Stumpf, VP of Engineering and Production, Universal Studios.

Bay Area: April 22, 1986
Program: Technical Meeting
Topic: Inside the Electrohome Color Projector
Speaker: Cliff Guice, Electrohome (USA)

Guice described in detail the workings of the Electrohome ECP1000 portable color projector. Subjects covered included the CRT/optics alignment, the dichroic combining cube, the optics assembly, and the automatic multiformat synchronizing techniques that allow the unit to operate with a wide variety of computers. Models of the key optical elements, and a covers-off demonstration of the unit was presented.

UK & Ireland: April 17, 1986
Program: Technical Meeting
Topic: The Role of Venture Capital in the Display Industry
Speakers: Dr. John Walker and Marek Scibor-Rylski Charterhouse Japhet Venture Fund

The guest speakers at the evening meeting, held at Imperial College, London, set out criteria for evaluating investment potential in the display industry. Among other things, they said, venture capitalists look for the ability to sustain an annual compund return on investment of 40% - 70%, leading to minimum turnover of L5 million and established long-term viability in five years. Management expertise and marketing skills and awareness are also important attributes, but these are often lacking in Britain.

In the displays industry, the data used to evaluate risk judgments mostly come from the US. The speakers' reaction to audience claims that much of this material is incorrect or misleading was that they cannot find equivalent data from UK sources. They do not see LCD manufacture as a good prospect for the UK; even the US cannot compete with the enormous investments being made by the Japanese in this area.

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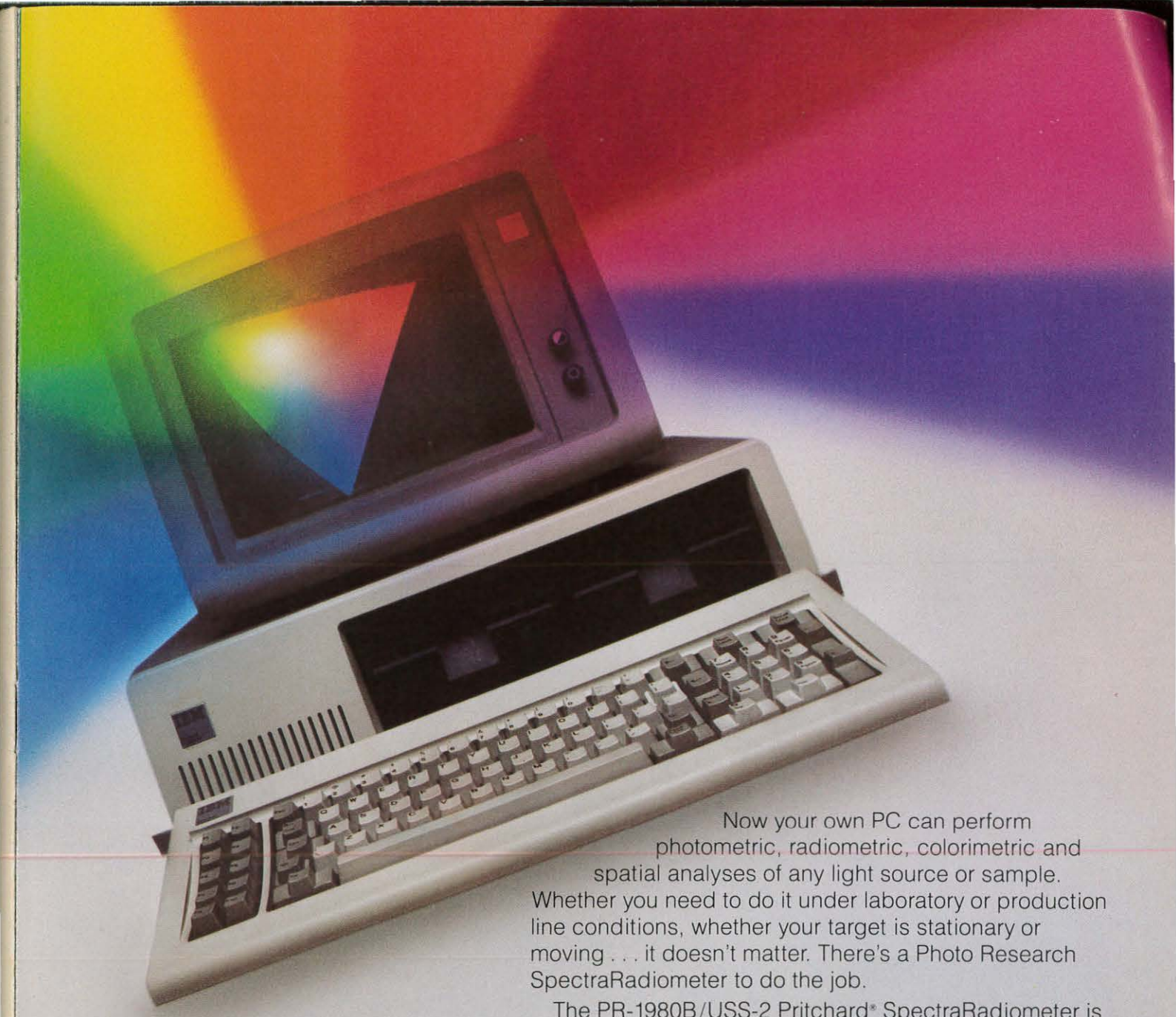

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DA-PP2N-7	4 amps, 20 volts
DA-PP4N-7	8 amps, 20 volts
DA-0420	4 amps, 20 volts
RDA-1220-S86 (Lab Standard)	12 amps, 20 volts
RDA-1220-S86C (Water Cooled)	12 amps, 20 volts
■DA-PP2N-5	4 amps, 35 volts
DA-PP4N-5	8 amps, 35 volts
DA-PP8N-5	16 amps, 35 volts
RDA-1635	16 amps, 35 volts
■RDA-1255	12 amps, 55 volts
■RDA-0660	6 amps, 60 volts
RDA-0960	9 amps, 60 volts
RDA-1260 (Lab Standard)	12 amps, 60 volts
RDA-1660 (Lab Standard)	16 amps, 60 volts
RDA-2060	20 amps, 60 volts

For complete details circle reader service number or call CELCO today with your CRT display requirements.

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Circle Reader Service #20

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