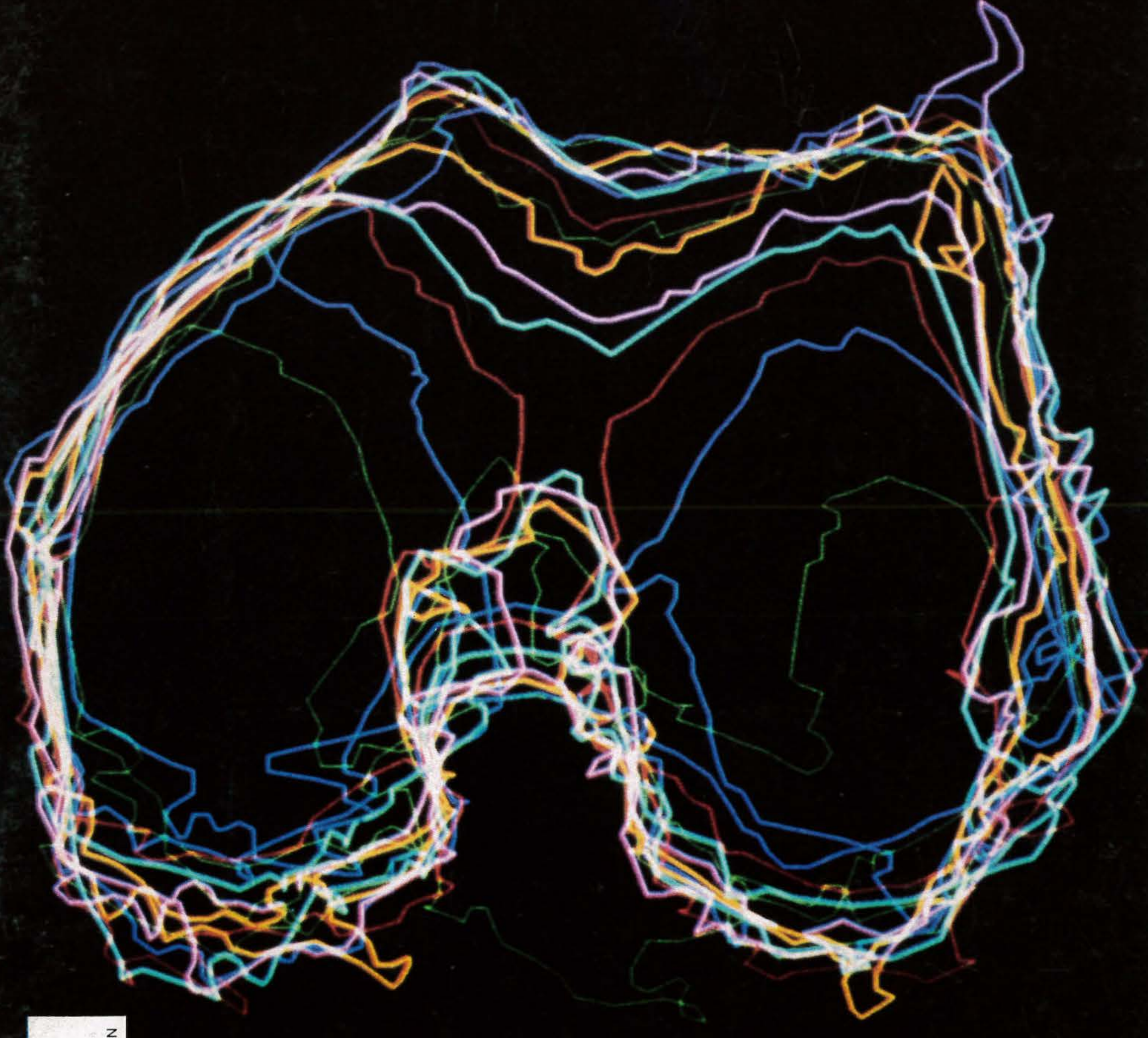
THE OFFICIAL JOURNAL OF THE SOCIETY FOR INFORMATION DISPLAY

INFORMATION DISPLAY

AUGUST 1985



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Events

NATIONAL

SEPTEMBER 30-OCTOBER 2: Modern Radiometric & Photometric Measurements; Tempe, AZ. Begins with the fundamentals of radiometry and photometry, developing the topic by examining the traditional approaches to absolute measurements. Course fee: $800. Contact: Education Director, Laser Institute of America, 5151 Monroe Street, Suite 102W, Toledo, OH 43623.

OCTOBER 7-8: 13th IFAC/IFIP Workshop on Real-Time Programming, Purdue University, West Lafayette, IN. Contact: American Federation of Information Processing Societies Inc., 1899 Preston White Drive, Reston, VA 22091 (703/620-8900)

OCTOBER 7-10: IEEE International Conference on Computer Design—VLSI in Computers, Port Chester, NY. Contact: ICCD '85, 1109 Spring St., Suite 300, Silver Spring, MD 20910 (301/589-8142)

OCTOBER 8-10: Nepcon Northwest, San Mateo Exposition Center, San Mateo, CA. Sponsor: Electronic Packaging & Production Magazine. Contact: Jerry Carter (312/299-9311)

OCTOBER 14-17: Info '85, NY Coliseum, New York, NY. Contact: Cahners Exposition Group, Jennifer Patchell (203/964-0000)

OCTOBER 14-16: 1985 ACM Annual Conference—The Range of Computing/Mid 80s Perspective, Denver Hilton Hotel, Denver, CO. Contact: Dr. Schlesinger, Association for Computing Machinery, 11 West 42nd Street, New York, NY 10036. (212/869-7440)

OCTOBER 15-17: 1985 International Display Research Conference, San Diego, CA. Co-sponsors: IEEE Electron Devices Society, the Society for Information Display, the Advisory Group on Electron Devices. Contact: Palisades Institute for Research Services, IDRC, 201 Varick St., New York, NY 10014 (212/620- 3388)

OCTOBER 18-20: Computers in Education, Sheraton Centre Hotel, New York, NY. Contact: Carole Dornblasser, Conference Management Corp. 17 Washington Street, PO Box 4990, Norwalk, CT 06856-4990 (203/852-0500)

OCTOBER 20-24: Computer Graphics Atlanta (CGA '85), Georgia World Congress Center, Atlanta, GA. Contact: CGA '85, 2033 M Street NW, Suite 333, Washington, DC 20036 (202/775-9556)

OCTOBER 21-23: Computers in Aerospace V Conference, Hyatt Regency, Long Beach, CA. Sponsor: AIAA Computer Systems TC in cooperation with ACM. Contact: Melvyn J. Brauns, Ford Aerospace MS V03, 3939 Fabian Way, Palo Alto, CA 94303 (415/852-4188)

OCTOBER 23-25: Symposium on Expert Systems in Government, McLean, VA. Sponsor: IEEE-CS. Contact: Marshall Abrams, Mitre Corp., 1820 Dolley Madison Blvd., McLean, VA 22102· (703/883-6938)

OCTOBER 26-27: ISECON '85—The Information Systems Education Conference, The Sheraton Houston Hotel, Houston, TX. Contact: Data Processing Management Association, 505 Busse Highway, Park Ridge, IL 60068-3191 (312/825-8124)

OCTOBER 28-30: Second Annual ACM Northeast Regional Conference, Boston, MA. Sponsor: ACM Northeast Region. Contact: Bryan Kocher, 250 Edge Hill Rd., Sharon, MA 02067 (617/863-5100)

OCTOBER 28-30: DPMA Houston '85, Albert Thomas Hall, Houston, TX. Contact: Conference Manager, Data Processing Management Assn., 505 Busse Highway, Park Ridge, IL 60068-3191 (312/825-8124)

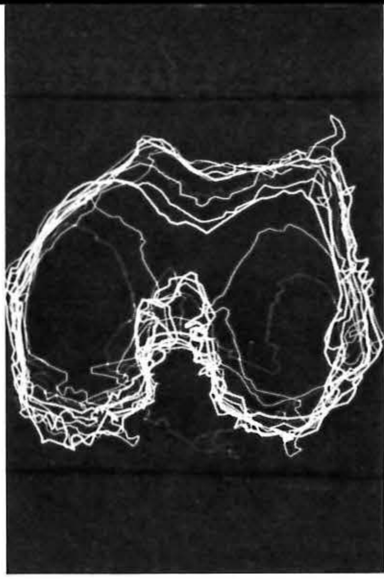
OCTOBER 29-31: CADCON Central, O'Hare Exposition Center, Rosemont, IL. Contact: Ed Martin, Morgan-Grampian Expo. Group (617/232-5470)

OCTOBER 29-31: Laboratory Instrument & Equipment Conference & Exhibition (LABCON/New England) Northeast Trade Center, Woburn, MA. Sponsor: Research & Development Magazine. Contact: Margaret Young (312/668-8100)

INTERNATIONAL

SEPTEMBER 24-26: The Artificial Intelligence and Fifth Generation Computer Technology Conference and Exhibition (AI/Europa), Wiesbaden, West Germany. Sponsor: TCM Expositions Ltd. Contact: Jim Hay, Tower Conference Mgt. Co. 331 W Wesley St., Wheaton, IL 60187 (312/668-8100)

OCTOBER 28-NOVEMBER 1: Systems 85, "Made in America," Computer Show. Munich, West Germany. Contact: Kallman Associates, Munich Trade Fair Corp., 5 Maple Court, Ridgewood, NJ 07450 (201/652-7070)



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Cover photo: Computer-generated contours show the patello-femoral groove (the surface over which the cap glides when the knee is flexed). Contour files are developed by taking a series of CT (computer tomography) scan slices 1.5-mm thick every 1 mm across the femur (page 20).—*Multi-Planar Diagnostic Imaging Inc. Torrance, CA.*

FEATURES

DEPARTMENTS

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.

NEW IN THIS ISSUE

Reader-Service cards have been bound into this issue (front & back) to make it easier for you to request more information about products and literature discussed in ID's advertising and editorial pages.

You only need to fill in the card with your name and address (and check a few boxes). Then circle the numbers corresponding to the items you are interested in.

No stamp necessary - just drop the card in the mail and ID will forward your requests to the appropriate companies within five days.

If you need information faster, please use the phone number provided in the advertising or editorial material. It would be a big help to the magazine if you mention that you saw the item in INFORMATION DISPLAY.

NOTES FOR CONTRIBUTING AUTHORS

Readers are invited to contribute articles and papers on all aspects of display technology and applications for possible publication in Information Display. (Articles or papers previously published in commercial business or trade magazines WILL NOT be considered for publication in ID.)

SPECIFICATIONS

Manuscripts—Should be NOT more than 8 to 16 typewritten pages, one side only, double-spaced, 60 characters per line maximum, with one-inch left-hand margin. (Approximately 2,400 to 4,800 words).

Illustrations—Tables, charts, and other diagrams should be prepared on separate sheets of paper, numbered sequentially, and properly identified with descriptive captions.

Drawings, properly labelled and captioned, should be submitted in a camera-ready form—black & white or color originals; or black & white direct-positive, glossy prints.

Photo prints, slides, and transparencies should be properly identified with descriptive captions typewritten on separate sheets of paper, attached with tape to the back of prints; to the bottom of slide mounting frames; or on each protective envelope holding a transparency.

All artwork and photographic material should be adequately protected from possible damage, with strong cardboard, on each side of the material.

MAIL ALL MANUSCRIPTS AND ARTWORK IN A 9 x 12 (OR LARGER) MANILA ENVELOPE . . . DO NOT FOLD MANUSCRIPT OR ARTWORK.

Units of measurement—Metric, with English equivalent, units should be used whenever possible.

Abbreviations—For units of measurement, follow standard editorial style in Information Display.

For acronymns, spell out title in full first time mentioned, followed by the initials in parentheses. Thereafter, in that particular article, use the acronym only, without the parens.

References—Indicate references where they occur within the manuscript by superior Arabic numerals; then list them in numerical order on a separate sheet of paper. Include: author(s), title of article, publication title, volume and number, year of publication (in parens), and page number(s).

Biographical data—Author(s) full name, title(s) or position(s), company name(s), full address(es), and qualifications of author(s) should be typed on a separate sheet of paper.

RIGHTS

By-line—Accepted FEATURE ARTICLES will be published with a by-line of the original author(s). All contributions are subject to review by the ID Editorial Advisory Board to determine appropriateness for publication; and to amendment by the editor to assure conformity with the established style and format of ID.

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For use of the *published* material, authors MUST OBTAIN written permission from the publisher, and must provide appropriate credit line for all such material.

Reprints—Authors will receive free of charge five copies of the issue in which their article appears. Additional reprint copies of contributions (minimum quantity of 100) may be ordered from ID at cost, plus shipping and handling, any time after publication.

RESPONSIBILITY

While every precaution will be taken to protect an author's material, neither the Society for Information Display, nor Information Display Journal, assumes any responsibility for loss or damage to any materials submitted.

Address all correspondence to:

EDITOR, Information Display
310 East 44th Street, #1124
New York, NY 10017

"Every great advance in science has issued from a new audacity of imagination."
- John Dewey

With this issue of *Information Display,* we introduce the ubiquitous "bingo card"—a reader service inquiry postcard—to help you track down information on displays quickly and easily. Just circle the appropriate Reader-Service numbers on one of the cards in the front of the magazine to request additional information on feature articles, new products, and literature appearing in the issue. Your use of these cards will provide valuable feedback, enabling us to better serve your needs in future issues of your Journal.

In response to a number of *ID* reader requests for guidelines on preparing original contributed articles for publication in *ID,* we've developed the manuscript specifications sheet that appears opposite this Editorial page. A more detailed set of Contributing Author Notes and MS Specifications are available upon request—covering not only feature articles, but also news items, product releases, and announcements.

S.I.D. is truly international in its dissemination of information on display systems, technologies, and applications. To this end, we've inaugurated a regular feature section from the Japan Chapter—Japan: On Display—which will consist of a contributed short article on display systems recently developed in that country. And, now that the UK & Ireland Branch is formally functioning as an organized chapter with regular meetings, we look forward to presenting a similar regular feature soon—UK & Ireland: On Display.

These one-page featurettes, however, DO NOT preclude the publication of full technical articles from any reader in these countries or any other part of the world.

As summer days begin to wane, and S.I.D. Chapter meetings go back on-line, it's time to use the Chapter Notes section of your Journal to let fellow members in other parts of the country and the world know what your chapter is planning for 85-86 in the way of meetings, seminars, or workshops, so they might plan anticipated trips around specific dates. We can provide this kind of information in *ID* only if you take the time to drop us a calendar outlining your Chapter's plans and scheduled dates, with name and telephone number of a contact for updated information as the time approaches.

A final aside—we're planning a year-end issue that will take a look at recently announced display technology developments and their potential future impact on the quality of life—in the home, in school, at work, at play. In particular, we're inviting researchers and developers to submit short papers describing these new display systems, and projections for how such systems will change the way things will be done. Make your papers concise and to the point, but be sure to provide sufficient detail to fully explain the technology and how it might be applied to future consumer products.

S.I.D. is recognized worldwide as the prime mover of information exchange on display technology. Let's take a look at the future together and share our thinking.

Joseph A. MacDonald
Editorial Director

INFORMATION DISPLAY (ISSN 0362-0972) is published monthly by MetaData Inc., 310 East 44 Street, New York, NY 10017, Telephone: 212/687-3836

Subscription: US & Canada - $36 one year, $64 two years, $90 three years; Elsewhere - $72 one year, $128 two years, $180 three years. Single copy: US & Canada - $3.00; Elsewhere - $6.00.

Call for Papers

Photographic Systems

Authors are invited to submit papers for original contributions to the 1986 International Congress on Photographic Science to be held at the University of Cologne, September 10-14, 1986.

Although emphasis of the program will be on silver halide photographic systems, the congress will cover the whole information chain from recording to display, including information processing in silver halides, nonsilver photochemical and physical materials, electronic imaging and hybrid systems.

Contact:
Dr. Paul Gilman or Dr. George Bird
Society of Photographic Scientists
and Engineers
7003 Kilworth Lane
Springfield, VA 22151
(703/642-9090)

Deadline for submittal: October 1, 1985.

Systems Simulation

Abstracts of papers on Recent Advances in Simulation of Complex Systems are now being accepted for the Japan Society for Simulation Technology Conference to be held July 15-17, 1986 in Tokyo, Japan.

Topics of the conference include: Simulation and Modeling of Systems, Simulation Methods, Model Validation, Simulators and Hardware, Simulation in Artificial Intelligence, Simulation and Modeling Theory, CAD/CAM, Decision Support Systems, and Computational Mechanics.

A three-page abstract of a paper to be presented at the conference should be submitted to:

Secretariat JPSST
c/o Union of Japanese Scientists
and Engineers
5-10-11, Sendagaya, Shibuya-ku
Tokyo 151, Japan
03/352-2231

Deadline for submittal: November 1, 1985.

NEW IN THIS ISSUE

Use the Reader-Service card in this issue to request more information.

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.

In addition, special issues of ID are being developed for calendar year 1986, for which relevant articles are being accepted:

- **Display Systems—Impact of Evolving Technologies on Future Consumer Products. Submit NO LATER than September 25, 1985.**
- **Industrial Instrumentation—Measurement, Analysis, Testing, and Control Systems. Submit NO LATER than October 25, 1985.**

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.

Recently Patented

Liquid crystal display device: US 4508427—April 2, 1985.

Describes a liquid crystal display device having a tandem arrangement of two cells. The rear cell is an active silicon matrix-backed, dyed nematic cell with 180 deg twist affording the possibility of grey scale representations. The front cell is a dyed nematic cell oriented to act as a variable density polarizer to absorb the weakly absorbed plane of the rear cell. Control of this absorption is used to optimize the contrast perception in the rear cell under different ambient lighting conditions.
Peter W. Ross, International Standard Electric Corp.—Stansted, UK.

Electronic component with plurality of terminals thereon: US 4509099—April 2, 1985.

Describes an electronic component for a liquid crystal display device that contains a plurality of terminals. Construction is rendered smaller in size and the distributing sheet is rigid in the contact position of the elastic conductor along the juxtaposing direction of the terminal pieces. As a result, the terminal pieces of the base plate can be electrically conducted, without terminal failure through the elastic conductors.
Toshiaki Takamatsu, Fumiaki Funada, Shuhei Yasuda, and Masataka Matsuura—Sharp Kabushiki Kaisha, Tenri, Japan.

Multicolor liquid crystal display with a dead front: US 4506956—March 25, 1985.

Describes a multicolor display comprised of a high contrast liquid crystal device, a light source, and a luminance-balanced color mask. The liquid crystal device is a transmissive, twisted nematic type having high extinction ratio polarizers on the input and output sides. It functions as a light shutter for the display.

The liquid crystal material has dichroic dye added to prevent buildup of the contrast-limiting orthogonal mode electric vector of polarized light.

The color mask contains different colored patches with gray surround. Each colored patch is luminance-balanced so that each different colored data presented is of substantially equal brightness. During the OFF-state, there is no light bleed-through, thus the display presents a uniformly dead front, or dark state.
Gary A. Dir—Xerox, Corp., Fairport, NY.

Liquid crystal display device: US 4505546—March 19, 1985.

Describes a liquid crystal display device in which a liquid crystal material mixed with a dichroic dye is held between a pair of substrates whose facing surfaces are provided with electrodes. A picture element is made up of a pair of facing portions of the electrodes and a portion of the liquid crystal material sandwiched by the facing portions.

At least one of the substrates is formed of a birefringent material having slow and fast principal axes of birefringence. An angle between the direction of the absorption axis of the dichroic dye and one of the principal axes of the substrate's birefringence is selected so as to improve the device's contrast and viewing-direction characteristics.
Takao Ueda, Yuzuru Simazaki, Tatsuo Igawa, Seikichi Tanno, Ken Sasaki, Takao Miyashita—Hitachi, Ltd. Hitachi, Japan.

Liquid crystal display with reflective preventive functions: US 4505547—March 19, 1985.

Describes a liquid crystal device that is composed of a liquid crystal layer sandwiched between electrode plates. At least one plate is composed of a transparent substrate with a transparent electrode thereon. A dielectric layer on said transparent electrode has a refractive index and thickness such as to reduce the light reflected by the transparent electrode.
Nobuyuki Sekimura—Canon Kabushiki Kaisha, Kawasaki, Japan.

Liquid crystal display device: US 4505549—March 19, 1985.

Describes a liquid crystal display device comprised of a liquid crystal composition filled between one pair of electrode substrates. At least one of the substrates is transparent, with the liquid crystal composition containing one or more blue dye(s).
Yasutaka Shimidzu, Hirohito Kenmochi, Toshihiko Ueno, Chizuka Tani—Sumitomo Chemical Co. Ltd., Nippon Electric Co., Ltd., Toyonaka, Japan.

Automated liquid crystal display and process: US 4501471—February 26, 1985.

Describes a liquid crystal display (LCD) capable of being fabricated automatically through use of continuous strips of plastic film on the surface, on which the electrode patterns are defined. The liquid crystal material, and the means for spacing, are sealed between the plastic strips, with sealing rings formed on one of the film strips—thereby defining the individual liquid crystal display.
Bobby G. Culley, Kishin Surtani—Texas Instruments Inc., Wylie, TX.

Industry News

PEOPLE

Caere Corp., Los Gatos CA, announced that Bob Teresi has been named president and chief executive officer of the firm, which manufactures optical character recognitiion (OCR) and bar-code equipment. Teresi previously was executive vice president.

LIA (The Laser Institute of America), Toledo OH, has selected Leon Goldman, MD, as the 1985 recipient of the Arthur L. Schawlow Award (endowed this year by Laser Fare Ltd, Southfield, RI). Dr. Goldman is currently director of Laser Research and director of the Laser Treatment Center at the Cincinnati Jewish Hospital. The annual award recognizes individuals who have made distinguished contributions in applications of lasers for science, industry, or education.

ACM (The Association for Computing Machinery), New York, NY, announced the appointment of Dr. Richard F. Hespos to the position of executive director. Dr. Hespos most recently was senior vice president of the Continental Corp, where he was responsible for data processing, among other administrative functions.

ASTM (American Society for Testing and Materials), Philadelphia PA., has appointed Joseph G. O'Grady president of the society. In his new capacity, O'Grady will direct the ASTM headquarters staff in Philadelphia and its Washington, DC office, which serve the needs of 140 technical committees and 30,000 ASTM members worldwide. Prior to joining ASTM, O'Grady was vice president of PSE&G Research Corp.

Texas Instruments, Dallas TX, elected Jerry R. Junkins president and CEO. Prior to his election, Junkins served as executive vice president responsible for TI's business activities in government, electronics, data systems, and industrial controls.

ORGANIZATIONS

Sperry Corp., Blue Bell PA, has signed a three-year, $42-million plus hardware/software contract to purchase Texas Instruments' Explorer systems for incorporation in Sperry's Knowledge System workstation. The workstation, an advanced artificial intelligence package, is the first of Sperry's A/I Expert System products and will be offered with its Knowledge Engineering Environment software.

LXD, Inc., Cleveland OH, a manufacturer of LCDs, recently merged with Norsk LCD of Norway. LXD, one of the pioneers of LCD technology when it started in 1971, specializes in long life, high reliability LCDs, primarily for use in the outdoor environment. Norsk has developed a proprietary manufacturing technique for production of very large area LCDs and high-level multiplexed dot-matrix panels.

Lexidata, Billerica MA, has signed a one-year contract in excess of $1 million with Singer Co.,'s Link Simulation System Div. in Silver Spring MD. Lexidata's high performance graphics systems will be incorporated into the latest computer-driven command and control simulators presently being produced for the US Army Training Battle Simulation System.

Harris Corp., Melbourne FL, has been awarded $27 million additional funding by the US Navy in a multi-year contract for computerized avionics test systems. The Navy order covers the production and delivery of Harris Series 1000 automatic test systems, plus associated support services, used for high-speed check-out of avionics equipment on F/A-18 aircraft and LAMPS Mark III helicopters.

Carnegie Group Inc., Pittsburgh PA, has signed a joint venture agreement with Intelligent Technology Inc. (ITI) of Tokyo, Japan, that calls for the development of new artificial intelligence products for the Japanese marketplace, among other joint efforts. ITI will serve as general distributor in the East Asia market for all of Carnegie Group products, including its recently introduced Knowledge Craft and Language Craft line of A/I software development tools.

Sanders Associates Inc., Nashua NH, has received a $27.9 million contract from the US Navy Training Equipment Center to develop and produce a computerized surface trainer that will enable Anti-Submarine Warfare (ASW) crew members to train simultaneously ashore as a team rather than as separate station operators. The Surface ASW Trainer will be configured with four operational mockups including sonar, combat information center, bridge, and own ship's aircraft control station. It will feature several general purpose consoles, each with two intelligent graphic displays.

AFIPS Inc. (American Federation of Information Processing Societies), Reston VA has announced receipt of a National Science Foundation grant to develop an expanded taxonomy of occupations in the US computer science workforce. The updated taxonomy, due to be completed in October 1986, will classify occupations in computer science into six to eight broad categories, each of which will be subdivided into a number of classes in terms of their job functions. Dr. Sylvia Charp, immediate past president of AFIPS, is the principal investigator for the project.

Plasmon Data Systems Inc., Hightstown, NJ, has formed a joint-venture company with Kuraray Co. Ltd., of Osaka, Japan, to produce and market optical disk systems developed by Plasmon and PA Technology, also of Hightstown. Unlike other optical disks that rely on "hole blowing" in a thin film of exotic metals, the Plasmon Disk uses a fine surface microstructure. This raises the sensitivity to low power lasers of even the most stable materials, resulting in a simple product configuration that is readily producible, according to its developer.

For membership or subscription, use card in back of magazine.

Active matrix LCDs to lead flat-panel display market

A major shift in LCD market share is forecast for active matrix units beginning in the 1986/87 time frame as they begin to penetrate the market displacing the multiplexed type systems.

According to a new report from Stanford Resources, Inc., *Flat Information Displays—1985*, the worldwide market for flat-panel systems will grow at a 25% annual rate from $227 million in 1985 to $984 million (in constant dollars) in 1992. And, by 1992 nearly 90% of all LCDs sold will be active matrix, because of their better performance characteristics and decreasing prices.

The report estimates, though, that flat-panel displays will only be used in about one-third of those applications where they are suitable—because of high unit costs, and the inability of any one of the flat technologies to satisfy all application requirements. Microcomputers will be the leading application sector, and by 1992 will account for two-thirds of the potential US market for flat information displays. The next most important segments will be application-specific and portable terminals. Use in display telephones will be one of the most rapidly growing segments.

Flat Information Displays—1985 is available from: International Planning Information Inc., 164 Pecora Way, Portola Valley, CA 94025 (415/854-7306). Price: $1995.00.

Catalog summarizes technology developed by Federal R&D

Some 1,200 new processes, inventions, equipment, software, and techniques developed by and for Federal agencies during 1984 have been published in a single-volume catalog that summarizes the information in 24 broad disciplines for easy access.

The publication describes practical technology selected for commercial potential or promising applications, or both, in the fields of Computer Technology, Energy, Electrotechnology, Engineering, Life Sciences, Machinery and Tools, Manufacturing, Materials, Physical Sciences, and Testing and Instrumentation. Contributing agencies include NASA, DOD, DOE, NBS, and other leading sponsors of Federal R&D activity. Sources of additional information are given for each summary and a thorough subject index is included. Price: $23.50 plus $3.00 handling. (Check, MO, or major credit card acccepted.)
Federal Technology Catalog - 1984, Number PB85-106987/KGP
NTIS National Tech Information Service, 5285 Port Royal Rd, Springfield, VA 22161 (703/487-4650).

PC CAD market growth put at 63% annual rate

A newly released analysis of the PC CAD market projects industry revenues will increase at a 63% annual rate—from $60 million in 1984 to $1 billion by 1990.

The nature of the PC-CAD world is examined—and explained—in detail in this two-part study that includes a comprehensive buying guide and vendor directory with statistical information concerning applications and markets.

- Volume I—CAD on the PC: Technology, Applications, Software, and Suppliers contains the buying guide and directory, and objectively analzyes the pitfalls and benefits of PC-CAD, tells how to determine whether or not such systems are warranted and, if so, how to go about making a selection. Price: $179 (Overseas: $191).
- Volume II—Analysis of the PC CAD Market is packed with statistics and charts on market shares, annual revenues, unit shipments, application comparisons, sales channels, and more. Price: $327 (Overseas: $334). Purchased together, both reports are priced at $438 (Overseas: $457).

Technology & Business Communications, Inc., c/o PC-CAD Report, 730 Boston Post Rd., POB 915, Sudbury, MA 01776.

IFIP proposes restructuring to respond to technology

At its recent 25th anniversary symposium, in Munich, the Council of the International Federation for Information Processing (IFIP) devoted a good deal of its time to discussions about the future of IFIP—in particular, a proposal for restructuring the organization to respond more quickly to new technical developments.

The proposal is not a drastic reorganization, but rather a realignment of responsibilities and committee memberships. It includes:

- Abandonment of the existing definition of Special Interest Groups (SIG), with application of the term only to new groups concerned with areas of technical interest not able to be effectively incorporated within any other IFIP structure. A Special Interest Committee would be formed to foster the development of SIGs. This change would enable IFIP to quickly charter groups to hold conferences and workshops in new technical areas.
- Replacement of the existing Activity Planning Committee (ACP) with an Activity Board. Its charter would be unchanged, but membership would be reconstituted to include all TC chairmen, the chairman of the SIC, a representative of the International Medical Informatics Association, a representative of Affiliate Members, the Conference Officer, the Publications Committee Chairman, and up to six additional General Assembly members. The Board would meet twice yearly in conjunction with the IFIP Council and General Assembly meetings to plan future IFIP directions.
- Investment of voting power at General Assembly meetings only to representative of full members (national and regional).
- Assignment of specific responsibilities to IFIP vice presidents. The Vice-Presidents for External Relations would be responsible for specific committees dealing with organizations outside IFIP, while the Vice President for Internal Relations would be concerned with IFIP administrative activities and Congresses.

The Council, recognizing that the proposal in its present form does not give details for the roles of Affiliate Members and IMIA, proposed more thought be given to these organizations. The Task Group on Restructuring will revise the proposal according to the discussions that took place at the Council meeting.

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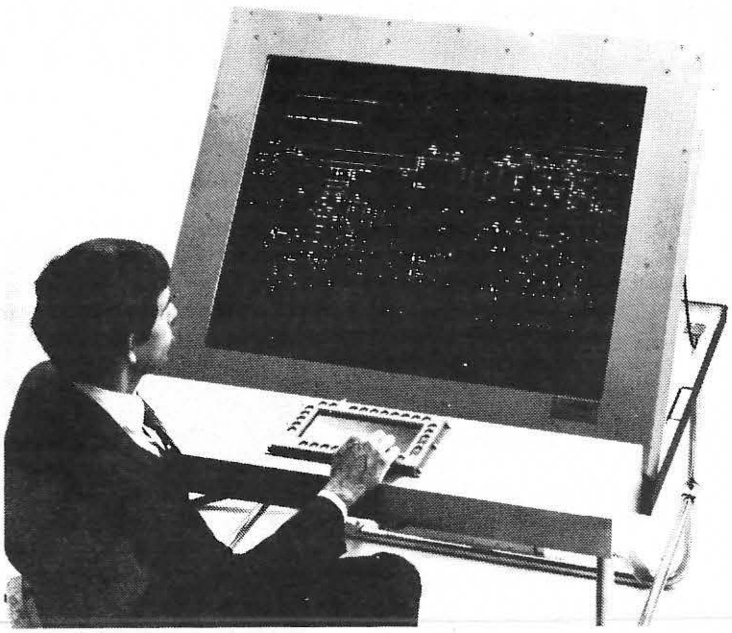

This is the world's first large area, high resolution, non-projected, flat display terminal. Utilizing AC gas discharge plasma display technology, the terminal has an active display matrix of 1600 by 1200 pixels measuring over 39 inches (one meter) diagonally with 5.3 square feet of viewing area and 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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Panel Size, Pixels	Resolution, Pixels Per Linear Inch
128 x 256	40, 60
128 x 512	60
256 x 256	60
256 x 512	64
512 x 512	60, 64, 73, 83
512 x 1024	60
1024 x 1024	60, 73, 83
1200 x 1600	50.8, 101

Our standard display resolution ranges from 30 to 100 pixels per linear inch (900 to 10,000 pixels per square inch). Display resolutions up to 200 pixels per linear inch are available.

For Further Information, Contact:

Donald K. Wedding Sr., VP Marketing Photonics Technology, Inc., P.O. Box 432, Luckey, Ohio 43443, 419-666-0033.
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For information circle Reader-Service # 13

Computers generate 3-D display for domed movie-screen

The 3-D stereoptic movie, dynamically displaying the creation of stars and life at the Fujitsu Pavilion Domed Theater (Tsukuba Science Expo, Tokyo), may be the precursor of more dramatic entertainment and more effective educational programs.

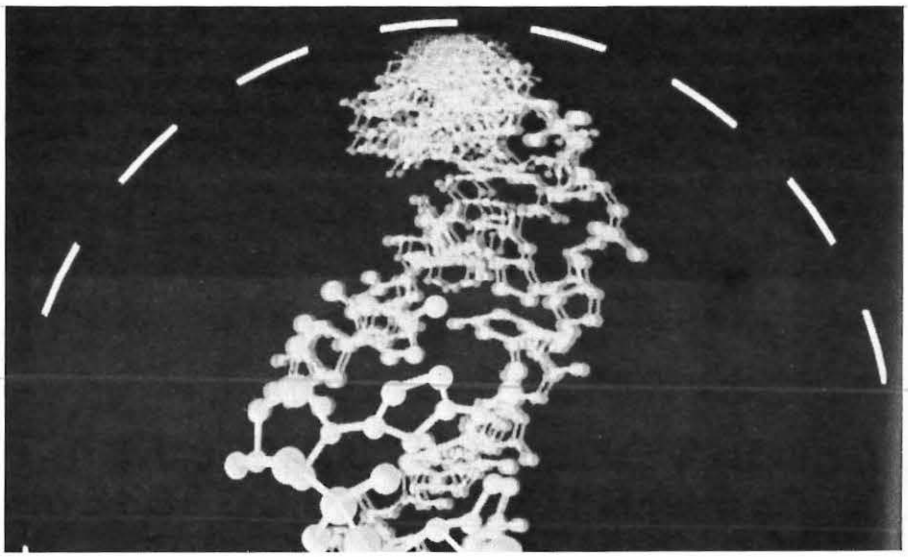
Computer-generated graphics images, on 70-mm film, are projected on the theater's 20-m hemispherical screen—magnified 200,000 fold with clarity of image both close up and distant, in the same frame. To assure clarity of the images projected on the domed screen at such magnification required processing of 2.2 billion (1728 x 1280) pixels per frame—a total of 60.1 billion pixels for the movie's 27,360 frames.

Key to generating the 3-D graphic images for the 9.5-min movie was Fujitsu's FACOM M-380 very large scale general purpose computer used for image data production by simulation and for rectifying distortion; and Toyo Links' specialized computer graphics LINKS-1 parallel processing system, consisting of 256 micro-processors.

Some 80,000 steps of software programs had to be developed for the computer simulation, in addition to a number of programs for the 3-D algorithms required to rectify distortion, and those for processing the graphics images.

Audiences at the EXPO '85 attraction sit in seats that are angled at 23 deg, with the screen tilted at 29 deg, viewing such displays as a supernova exploded by nuclear fission; water generated in a meteorite drifting in the universe, crystalizing into ice; and travel through ice crystal structures.

by Fumio Sumi
Fujitsu Ltd. Tokyo, Japan



Making it work

Conventional 3-D movies, which are projected on a flat screen, require two fisheye-lens cameras positioned 7 cm to 9 cm apart to display images in stereo, with viewers using special filters (lenses) to combine the separate images seen with the left and the right eyes. Two methods of accomplishing stereoptic effect are commonly used: one consists of vertically and horizontally polarized filters for respective eyes; the other, a red and blue filter.

With the polarized method, parallax required to simulate 3-D cannot be maintained with the fisheye-lenses projecting on a domed screen where viewers look around to see the images. Additionally, the Omnimax camera used in the domed theater is 30 x 30 cm—too large for two of them to be placed closely together to simulate parallax of the human eye.

And, even if it were possible to place them correctly, each would be reflected by the other; as the viewing angle of the fisheye-lens is more than 180 deg. Another problem with such cameras is the difficulty in producing sharp images having a large field of depth.

Fujitsu resolved these problems by using the red/blue filter method of viewing—known as anaglyph, and by synthesizing two images for both eyes into one large film format. This, in turn, required only one projector to display the images. Turning to computer generated graphics, they produced crystal-clear images having depth of field at all distances.

CRT displays full-color 3-D images

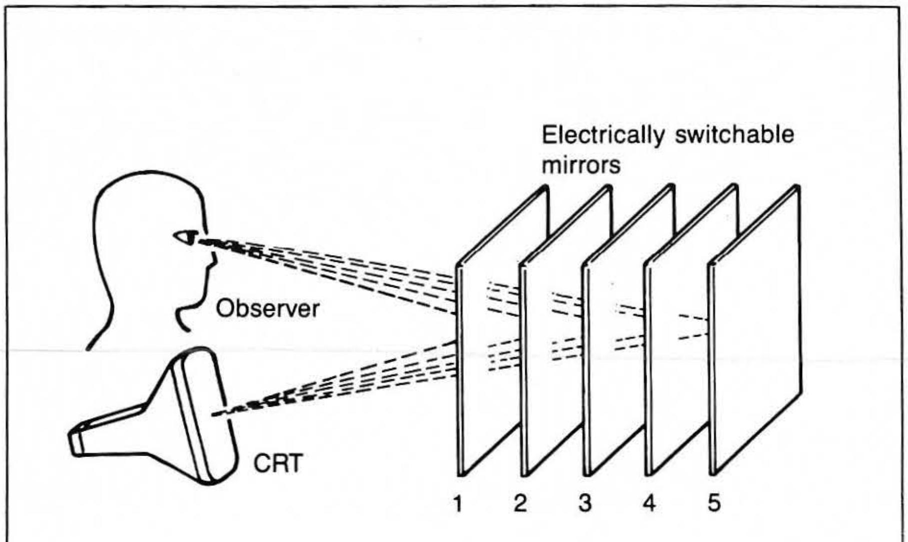
A recently developed, single CRT display generates true stereoscopic images in full color that can be viewed in 3-D using only a pair of simple eyeglasses having polarized lenses.

Creation of stereoscopic images is accomplished using a Liquid Crystal Shutter that acts as a very fast light switch in a time-multiplexed, 3-D system to select one of two slightly different images for each of the viewers' eyes. The two images are displayed in alternating fields on the CRT while the LCS allows each field to pass through only one eye. A single image depth is perceived from the two rapidly alternating images.

Previous methods of producing such images on a CRT have produced varying degrees of success:

- Anaglyph—this inexpensive method uses two-color encoded images (red/blue) displayed simultaneously, that are then separated by similar color filters worn as glasses by the viewer. The resulting image quality is not good, having unnatural colors and some blurring.
- Space-multiplexing—this side-by-side method requires two separate CRTs displaying the two different images. Light from each display is routed to one of the viewer's eyes using lenses or mirrors. The technique provides good images, but is costly because it requires two CRTs.
- Time-multiplexing—this technique presents the two views in a single device, each view displayed sequentially on alternate scan fields. A light-switching mechanism must be used to allow each eye to see only the intended field.

by Thomas S. Buzak
Tektronix Inc. Beaverton, OR



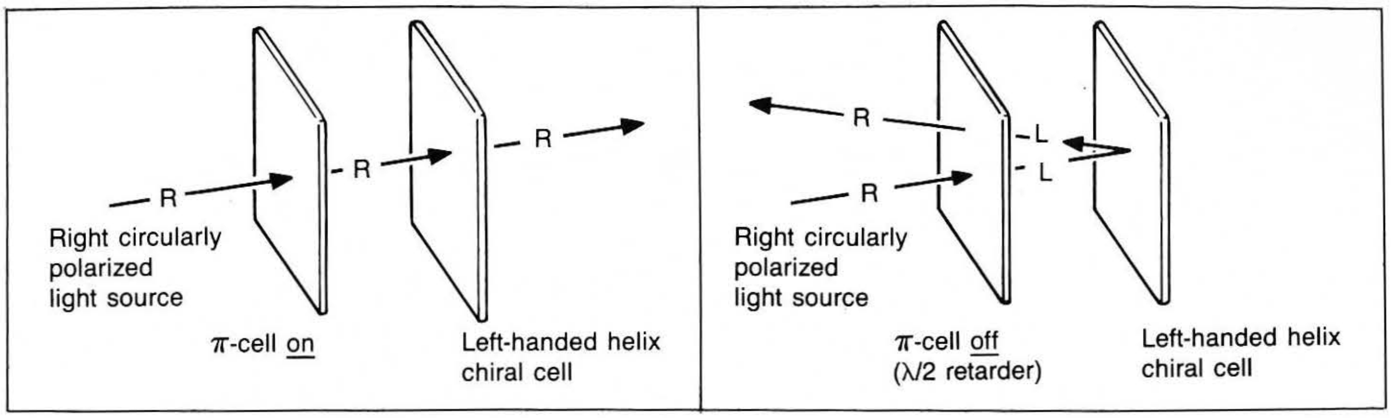
Among the various light-switching methods available, one uses mechanical shutters, which are cumbersome, expensive, and susceptible to malfunction. Another uses PLZT (lead lanthanum zirconate titanate) ceramics as the optical switch. Such switches have low light transmissivity and require high voltage in the user-worn eyeglasses. Both the mechanical shutter and PLZT methods are interfaced to their respective display devices by an "umbilical" cable.

But, with the Liquid Crystal Shutter method, light switching is done by an LCS panel that fits over the front of the CRT display. The stereoscopic 3-D images are then viewed through simple polarizing glassses.

Liquid Crystal Shutter

The LCS system consists of a series of electrically switchable mirrors stacked one in front of the other. Each mirror can be switched into one of two states—reflecting or transmitting. When an image from the CRT is reflected from the stack of mirrors, the apparent distance of the image from the observer is a function of the position of the nearest reflecting mirror. (Fig. 1)

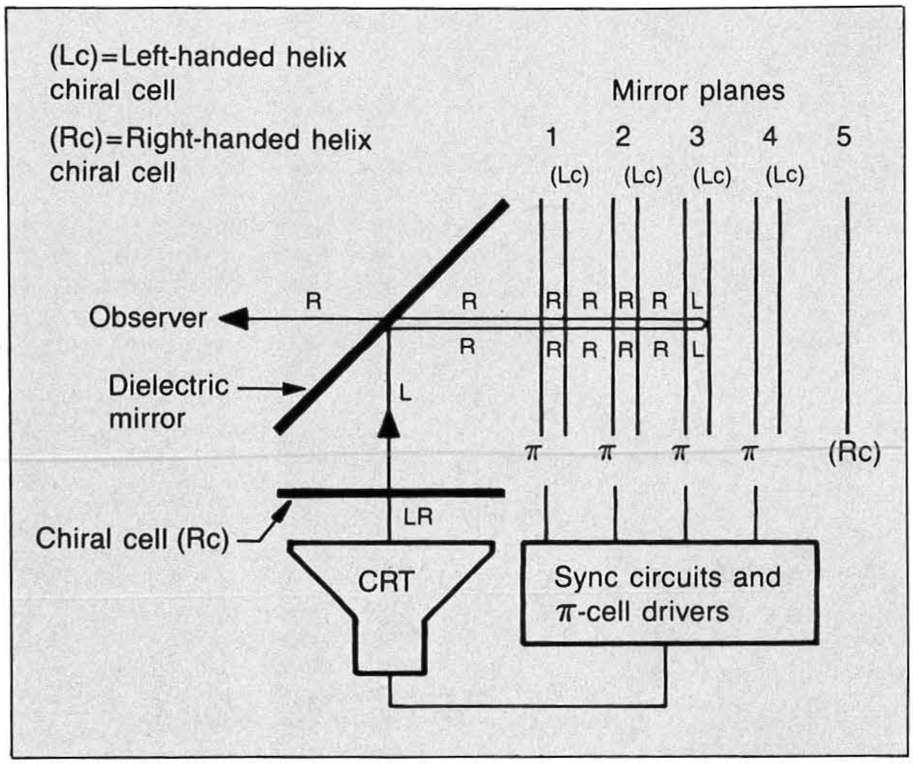
Each mirror consists of two liquid crystal cells. The first cell is switchable between two states: zero and half-wave retardation. The second cell contains a nematic LC plus a high concentration of



a chiral additive. Molecules in this cell are ordered in helices with pitches close to the wavelength of visible light. Such a cell reflects circularly polarized light in only one sense, either right or left depending on the handedness of the helices, and transmits circularly polarized light of the other sense.

Together, the two cells act as an electrically switchable mirror for circularly polarized light. The first LC cell (a π-cell) contains the handedness of the incident light that is then either reflected or transmitted by the ciral LC cell. (Fig. 2)

Switching from one plane to another can be accomplished in 0.2 milliseconds—the turn-on time of the π-cell. In practice, however, it is necessary to wait at least an additional millisecond to allow for phosphor decay between fields. Only at the end of a frame (when all planes have been addressed) are the cells collectively turned off, and there is an additional two-millisecond wait for cell turn-off.



Passive and active

This LCS method of stereoscopic display can be either a passive or active system. The passive system, just described, is in effect a polarization encoder. When a voltage is applied, light passing through the cell exists polarized in direction 1. When the voltage is removed, light passing through the cell is polarized in direction 2. The polarizing glasses worn by the viewer consist of separate linear polarizers (rotated 90 deg) that pass the correct light transmission to each eye.

In an active 3-D device, the LCS replaces the light-switching element in user-worn devices. The active system consists of the π-cell sandwiched between two linear polarizers that are rotated by 90 deg. Each eye observes the display through a separate active system LCS cell. When voltage is applied to the cell, light transmission is stopped; and when removed, the cell transmits light. As the left eye view is displayed on the monitor, the cell in front of the left eye is transparent (voltage removed) and the cell in front of the right eye is opaque (voltage applied). Alternatively when the right eye view is presented on the monitor, the left LCS cell is opaque, and the right LCS is transparent.

For applications in which more than five depth planes are required, an additional CRT can be added. The distance between each CRT and the optical combiner mirror differs by an amount equal to the chiral-cell separation—resulting in twice as many image planes. There are many optical-combiner techniques that can be used to add more CRTs; and with each additional CRT, five more depth planes are added.

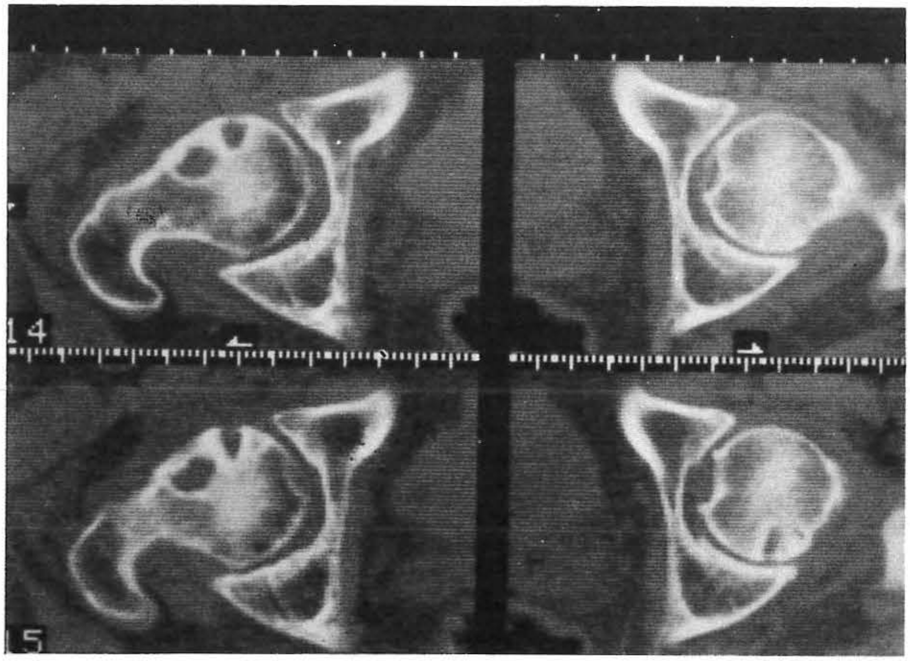
(This article was adapted from *A Field-Sequential Discrete-Depth-Plane Three-Dimensional Display*, by Thomas S. Buzak, Tektronix, Inc., Beaverton, OR.—SID 85 Digest, pp. 345-347.)

Image processing tied to CAD/CAM produces customized prostheses

A computer-aided tomography (CT) scanner image-processing system that is digitally networked and tied into computer-aided design and manufacturing (CAD/CAM) facilities, is enabling orthopedic surgeons across the country to create skeletal models, plan corrective surgery, and custom manufacture prosthetic implants—automatically from their offices.

The image processing system uses a commercial communications network that connects computers of CT scanners located in some 60 hospitals and health care facilities nationwide (ID, November 1982, p. 4-6). By networking the computers, high-volume CT image processing tasks, economically impractical for a remotely sited computer to perform alone, can be shared among the networked system during periods when CT scanners are idle.

And, with the system extended to integrate CAD/CAM into the network, CT image data of bone structure outlines now can be used directly to produce customized implants.



Automated manufacturing

Computer-aided design in manufacturing systems for some time now has been integrated with medical image data. Image processing specialists evaluate absolute CT X-ray attenuation values (much the way radiologists apply subjective density criteria for interpreting X-rays) to determine bone outlines in CT pictures. Bone edges are then represented as closed contours formed by a series of vector end points. Edge information required for numerical control of milling equipment is determined off-line using analog (photo-optical) analysis and manual contour tracing. Implants can be manufactured to precise dimensions using the generated contour files and an algorithm to produce machine instructions.

Integrating CAD/CAM with the CT imaging system eliminates having to manually compile bone contour information. The fully-automated approach uses entirely digital techniques to determine such contour information by reassembling a series of CT images to illustrate the 3-D position of body structure.

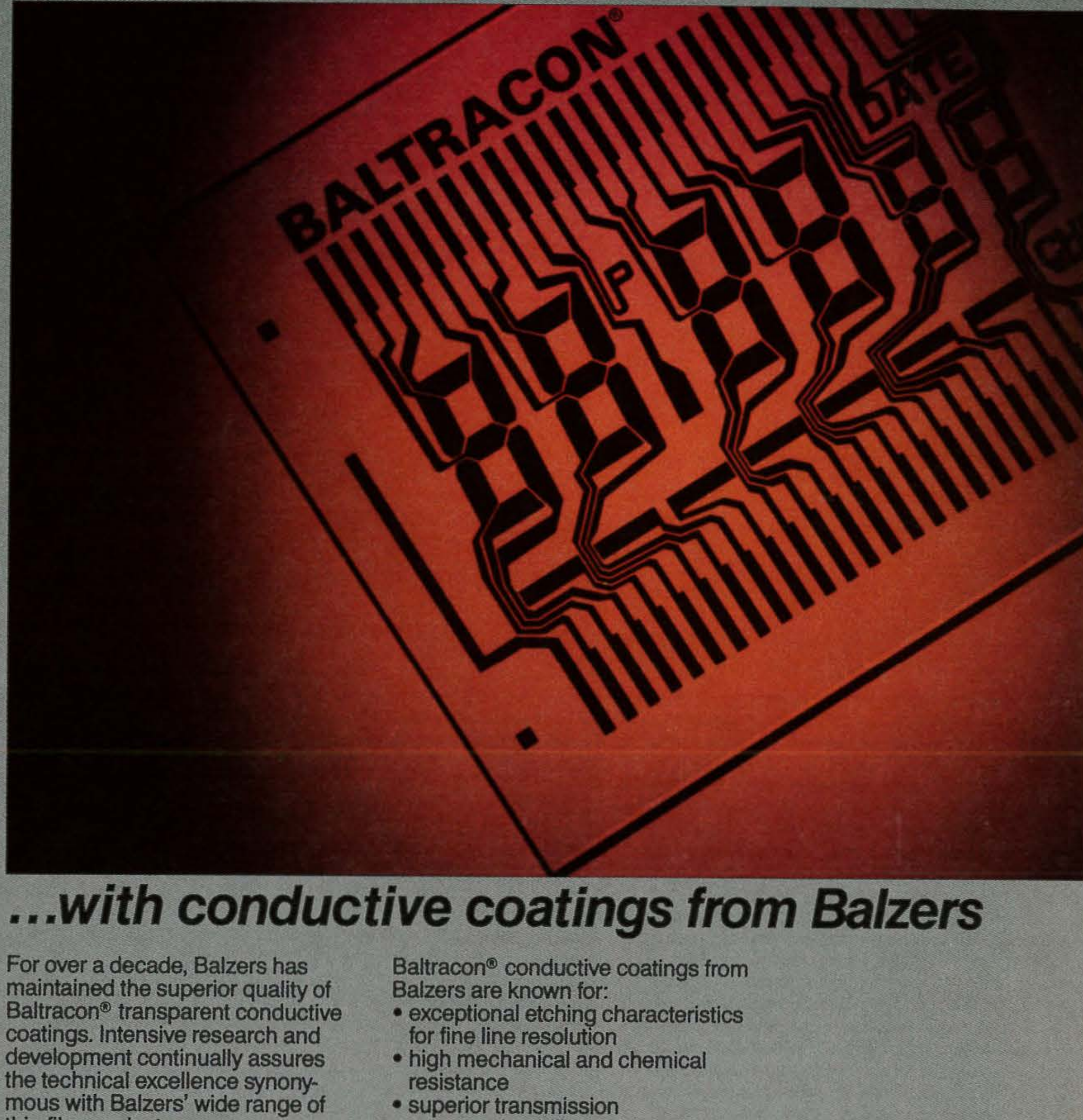
In this automatic approach, CT scans are taken in such a way as to form a series of cross-section slices of the structure under examination. For femur implants, for instance, scans are taken beginning at the end nearest the point of attachment to the hip, with subsequent scans taken at intervals proceeding away from the point of attachment. Each CT image is then examined by an edge detection software program to produce "X-Y" contour data representing the outer surface of cortical bone and inner surface at its interface with marrow. These contours can then be stacked at their "Z" coordinate positions to illustrate their overall shape.

In earlier efforts, stacked contours

(Continued on p.20 ...)

by Michael L. Rhodes Research Director
Multi-Planar Diagnostic Imaging, Torrance, CA

Quality starts here...



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(... continued from p 18)

were represented using computer graphics vector displays (wire diagrams). The digitally networked system presentation of anatomic structure, on the other hand, can be delivered to a surgeon as a hand-held plexiglass model, or prosthesis, or both.

Customized implants

One of the primary problems confronting orthopedic surgeons has been that the types of prosthetic implants available have been restricted to prostheses pre-manufactured to standard sizes (much like shoes and clothes). In many cases, these standard prostheses are adequate. But invariably it is necessary for the surgeon to change both the standard implant and the patient's anatomy to ensure a firm, stable, functional reconstruction.

The use of entirely digital, automatic techniques helps minimize removal of patient skeletal mass by manufacturing implants that are customized for each patient. Automatically manufacturing the implant directly from CT image scan data should result in prostheses at least 20% less expensive than similar manually-developed implants.

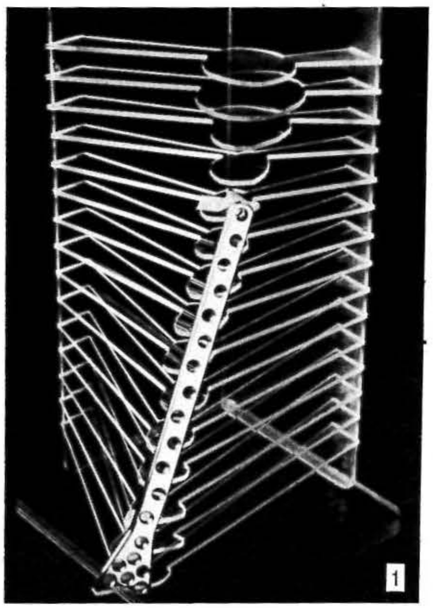
Nationwide commercial computer communication is now commonplace for those applications where digital dialogues are generally short and widely distributed, and where bandwidth does not exceed that of dial-up telephone lines. Image processing using such networks is usually prohibitive because of the large volume of data inherent to digital pictures.

The networked system described in this article, however, utilizes a combination of increasing bandwidth and distributed processing to create a viable mechanism by which anatomic contour data can be transmitted economically to CAD/CAM facilities from remote CT scanners.

(This article was developed from "Anatomic Model and Prostheses Manufacturing Using CT Images," and "CT Image Processing Using Public Digital Networks," by Michael L. Rhodes, Yu Ming Azzawi, Eva S. Chu, William V. Glenn Jr., MD, and Stephen L.G. Rothman, MD., Multi-Planar Diagnostic Imaging Inc. Proceedings of the *National Computer Graphics Assn.* April 1985; the *Conference on Computer Assisted Radiology*, June 1985; and the *1984 Symposium on Computer Applications in Medical Care*, November 1984.)

Examples of digitally-manufactured prostheses include:

- Humerus shaft—An early prosthesis developed by CT imaging technology to replace a humerus shattered by a shot-gun blast. Simple CT scans were taken of the undamaged arm to show bone cross-section, from which spatial coordinates were reflected to reconstruct symmetricaly the damaged arm.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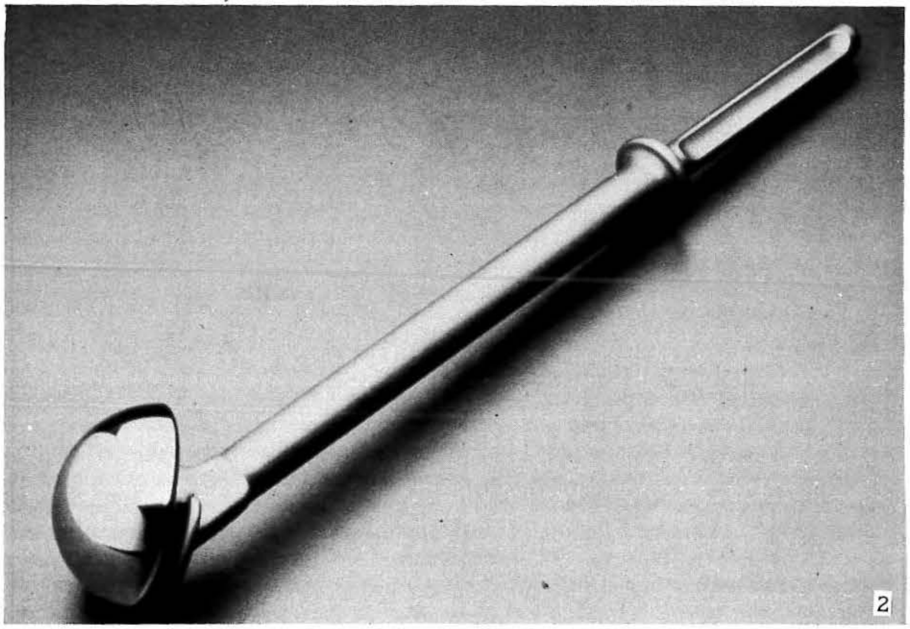
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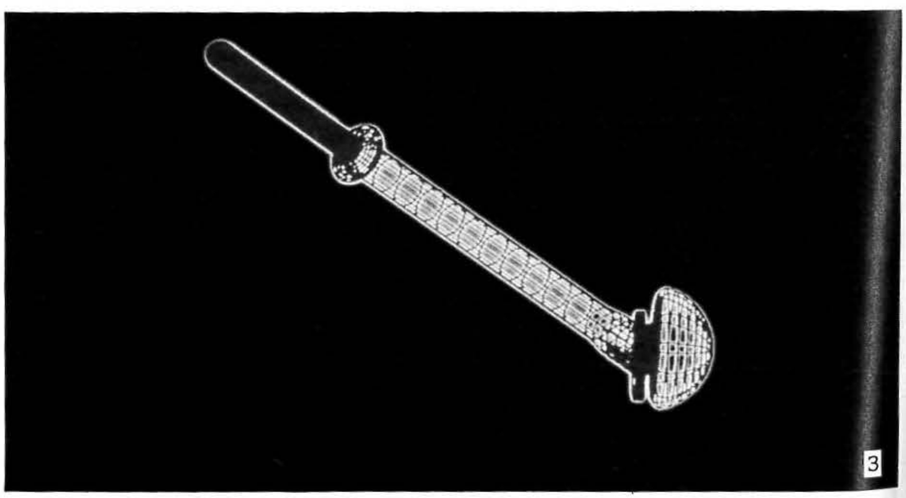
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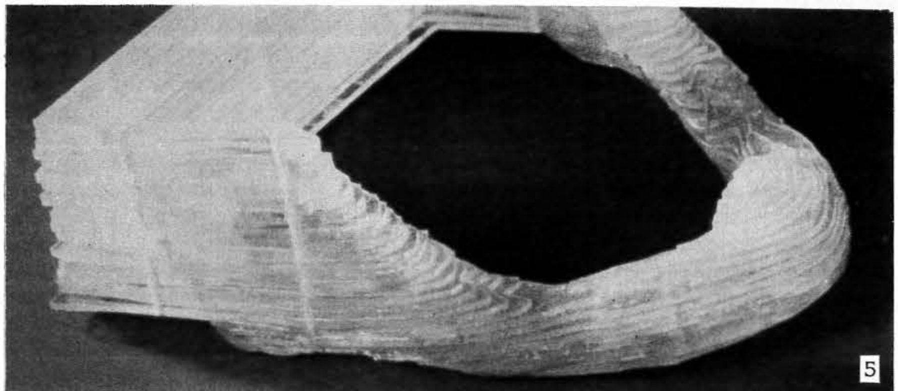
Fig. 1 shows the plastic model of the contours generated by the coordinate reflection step and the prosthesis in place. The resultant manufactured prosthesis is shown in Fig. 2 with a CAD/CAM display of another humerus shaft shown in Fig. 3.

4

- Patello-femoral groove—The most common prosthesis is a resurface plate for the patello-femoral groove (the surface over which the knee cap slides when the knee is flexed). The femur at that point is very thin with soft vascular marrow below; thus, no standard, off-the-shelf re-surface plate can be fitted by removing cortical bone. Only a custom-designed plate can be used. By taking a series of CT slices 1.5-mm thick every 1 mm across the femur, contours are generated that show the femur outline (Fig. 4). The plate is then formed to fit the geometry and rest firmly between the condyles with two fixation screws.



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- Mandible reconstruction—Under some circumstances, mandible (jaw) reconstruction requires cutting the gums, first to expose the jaw and make a plastic cast of its shape, then a second time reopening the healed gum to remove damaged bone and replace it with the manufactured implant. Using the CT technique eliminates the initial surgery. Fig. 5. shows a plastic model of a mandible made by CAD/CAM from the 1.5-mm thick contours generated by CT and Fig. 6, the machined prosthesis prior to implantation.

Network operation

From an operational standpoint, the CT technologist at a remote site triggers network processing simply by initiating the CTNET program just prior to leaving at night. The CTNET program requests the identity of cases to be network-processed and then simply enters a wait state until signaled by the host computer. The CT technologist at the host computer then executes an instruction to connect the host computer with the remote system. The remote CT scanner's computer and the large central host computer conduct a dialog involving extensive compression of the data transmitted to the host computer.

Incoming files are screen presentations representing a survey of each case. For each case submitted, a composite picture is formed and then sent to the host computer. This survey view includes the first, middle, and last axial slices of the case, plus lateral and anteroposterior digital plain views that may have been taken to locate the axial slices.

This survey presentation is used by CT technologists to select processing options for the case. Among other tasks, they position and adjust the region of interest (within which a complete set of sagittal and coronal planes are generated), clip the digital plain views for their inclusion in later composite pictures, select the curvature for network-generated curved image planes (curved coronals), and direct the order in which remote sites are processed.

Once processing options are chosen for all cases simulated, a dialog takes place between the remote CT scanner's computer and the host system. This automated correspondence generates the formatted set of pictures that is selected for each of the cases submitted.

Images generated by the host computer are written over the disk storage locations that were previously occupied by the axial picture files generated by the scanner. As many cases as can be loaded on a scanner's storage system can be submitted to the network.

What and how much image data are transmitted between a remote site and the host computer depends on the type of study requested, network traffic congestion, and the software revision in effect. Some (not all) of the image data for every case are transmitted between the remote computer and the host computer. When submitted cases arrive at the host device each case is examined by a certified CT technologist at the host system to determine processing options.

The network shares processing with the remote users. Some processing for every case is done at the host site and several system utilities take place solely at the remote site: file allocation, disk-space recovery, and file deletions. The result is an image processing system that shares resources—image processing takes place at both facilities.

Printing Technologies

Personal computers, word processors, and various workstations have created expanding demand for new printers. The electronic input from the computer to the printer is capable of generating a variety of fonts and sizes. The printer, in turn, needs to have the capacity to display these different inputs on paper.

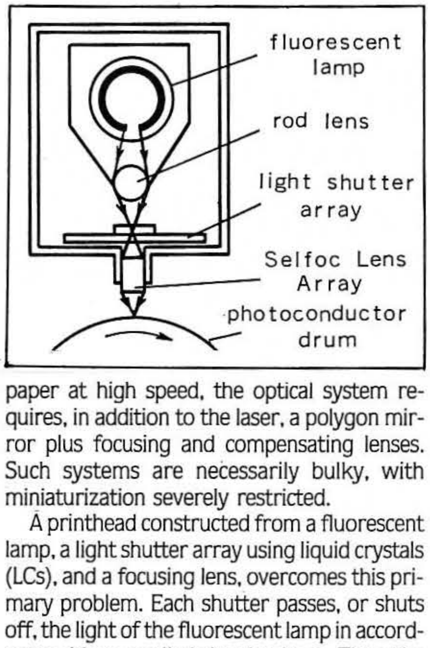
A variety of printing technologies currently are being pursued vigorously, including: impact printers, xerography, magnetography, thermal transfer and ink jet printing. For this reason, the SID '85 International Symposium held in Orlando this past May offered four technical sessions on printing technologies, in which 23 papers were presented.

In the general session—**Printing Technologies**—chaired by Andras I. Lakatos, Xerox Corp., Webster NY, the papers covered the various technologies aimed at providing printing systems that are quiet, fast, reliable, compact, able to produce different colors, and cost a relatively small fraction of the total cost of the system that generates the information to be printed.

Two of the papers presented summarized developments with xerographic and magnetographic devices: one described the use of a liquid crystal shutter to develop a compact printhead for an optical laser printer; the other discussed results of a study on thin-film printheads used in a magnetic printing system.

Print Head with Ferroelectric Liquid-Crystal Light-Shutter Array, by Takao Umeda and others, Hitachi Ltd., Ibaraki, Japan, describes an optical laser scanner using a compact liquid crystal shutter printhead instead of the more bulky semiconductor type now found on laser beam printers.

Although laser-beam optical printers are capable of non-impact printing of both alphanumerical and graphic images on plain



paper at high speed, the optical system requires, in addition to the laser, a polygon mirror plus focusing and compensating lenses. Such systems are necessarily bulky, with miniaturization severely restricted.

A printhead constructed from a fluorescent lamp, a light shutter array using liquid crystals (LCs), and a focusing lens, overcomes this primary problem. Each shutter passes, or shuts off, the light of the fluorescent lamp in accordance with an applied signal voltage. Thus, the lamp light is transformed to a line of dot patterns by the light shutter array, which is then focused on a photoconductor drum. In addition to compactness of size, solid state construction also provides the light scanner greater reliability.

Performance of this type of printhead depends very much on the light shutter array performance, and in particular its response time and contrast ratio characteristics. To develop optical printers that have printing speeds from 10 to 30 pages/min for A4 size paper, the light shutter must have a response time of less than 0.5 ms and contrast ratio greater than 10:1.

Although switching cells using nematic LCs have been produced, these materials have inherent lower response times. Therefore, a ferroelectric LC material was used instead. It has a wide operating temperature range around room temperature and shows submicrosecond electro-optical switching phenomena.

Studies also indicated that light shutters have a high contrast ratio and high switching speed could be obtained by optimizing the LC layer thickness and the arrangement of the polarizers. The device developed for the printing system consists of 2048 light shutters, for which response time is less than 0.25 ms and contrast ratio is greater than 10:1 in the temperature range from 25C to 35C.

For Paper, circle Reader-Service # 104

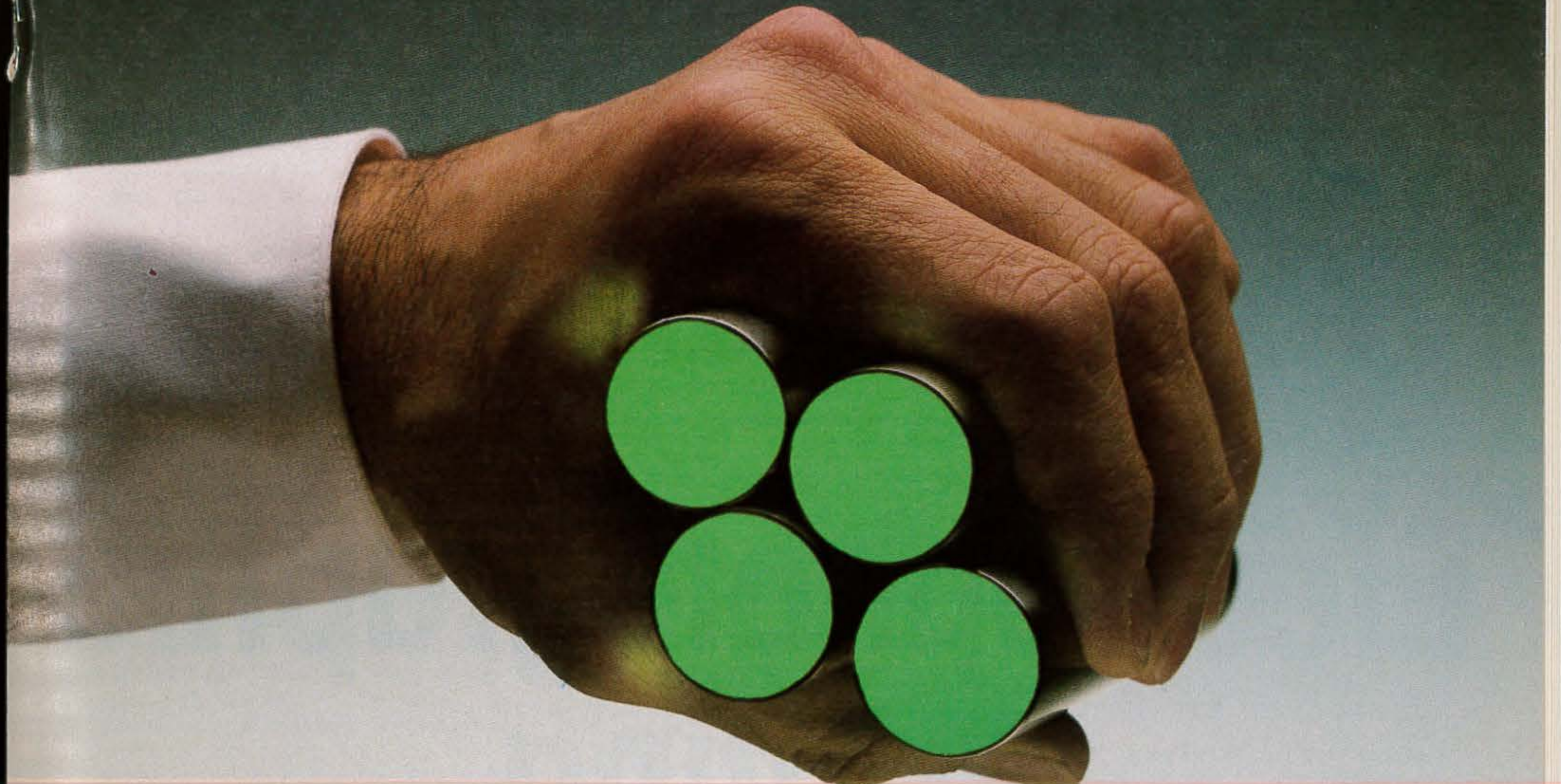
In his paper, *Applications of Thin Film in Magnetographics*, Gilbert D. Springer, Ferix Corporation, Fremont CA explored the practical application of thin film recording structures used in magnetographic technology.

Magnetic printing is one of the new non-impact printing technologies offering a simple engine with fewer components than that of the photocopier adaptations. Features inherent in the magnetic printing method are derived from the non-decaying image properties of the magnetic medium. This enables duplication without rewrite; enhancement of previously recorded images such as overstrike, subscript; and composing techniques of integrating text and graphics from other sources to form a more sophisticated composition. Achieving this property is considerably more difficult. Magnetic printing offers the potential of archiving the composed magnetic engraving with the print drum (if removable) that may be stored for decades.

The printer studied was a 240 dot per inch, medium speed device operating at eight pages per minute with duplication speeds of 30 pages per minute. The device uses a thin-film printhead that is 0.022 in. in diameter. It contains 16 conductors in a spiral form that induce the exciting field, which in turn produces

(Continued on p 24 . . .)

Our new CRTs are quite a handful.



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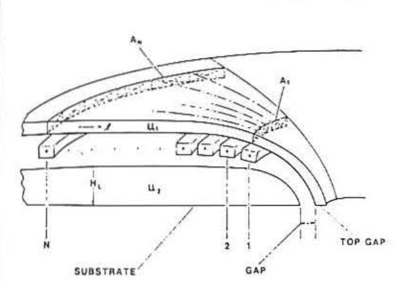
Litton Electron Devices

(... continued from p 22)

the field that crosses the gap region at the bottom portion of the annulus.

These conductors are separated from the top and bottom permeable layers by an organic passivation material that is both non-magnetic and non-conductive in nature. The top magnetic layer is formed to provide an annular pole structure at the inside of the aperture layers. The gaps are established to comply with a toner population having a mean particle size of 14 microns that require a gap field to be produced at approximately 28 microns. The gap flux necessary to switch the magnetic media is 1000 gauss.

One of the unusual characteristics of this annular head design is that the plane of conductors is surrounded by the permeable layers that form the opposing poles at the bottom of the plane. This is inverse to the structure of the well known ring cone head that is the basis for all recording head designs today. Magnetic fields generated by the windings are contained inside this structure, making cross-talk such as coupling of magnetic field between adjacent heads impossible.



Cross-Sectional Analytical Model of the Pel Generating Head

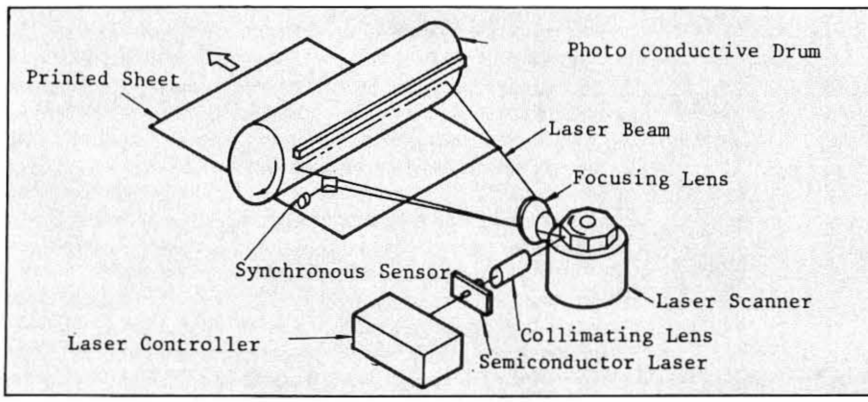
According to Springer, the memory properties of magnetic printing make the system a potential for such applications as on-demand publishing and printing of variable information on static forms. This will cut transmission time and CPU time and offers the added capability of down-loading forms. The non-decaying image also allows the serial composition of a document asynchronously eliminating the need for expansive bit-mapped memory for both text and graphics.

For Paper, circle Reader-Service # 105

Electrophotographic Printing

According to session chairman Eric G. Lean, IBM T.J. Watson Research Center, Yorktown Heights, NY, electrophotographic printers have dominated the high-end page printer market. But improvements in reliability and cost, plus significantly better print quality, have recently enabled these devices to challenge the traditional data-processing-oriented impact line printers, to the point where they have even become competitive in the high-quality workstation market segment.

Of the five papers presented in this session, one discusses the development of a new laser-beam optical scanner printing system; another outlines the development of an electrophotographic display unit capable of reproducing image information in a form that is much closer to that of hard copy; and a third paper presents the results of experiments using thick film hybrid printheads for thermal magnetographic printing systems.



A new laser-beam optical system employing a high-precision scanner is the subject of the paper jointly authored by a team of researchers from two of Toshiba Corp.'s Tokyo Laboratories: Manufacturing Engineering, and Information and Communications.

Laser Beam Printer, by M. Kamiya and others, describes the construction of a laser-beam optical system in which a semiconductor laser (GaAlAs, Power: 10 mW, wavelength: 780~790nm) is used and, unlike conventional scanners, corrective lenses are not attached behind the system's focusing lens. The resultant configuration is considerably smaller and less complicated than existing scanners.

To obtain these special features, though, it was necessary to design and produce a new laser scanner, which consists of a high-precision polygonal mirror and a high-accuracy gas-bearing spindle on which the mirror rotates. The semiconductor laser and a collimating lens were attached to the device.

A single crystal diamond tool was used to assure a sharply cut and flatly finished mirror surface free from scratches. To assure an accurate and reliable rotor for the mirror, a new type of bearing system was developed, composed of a combination of a hydrodynamic gas bearing and a magnetic bearing. The spiral-grooved gas bearing takes in air as a lubricant to generate supporting force without contacting the rotor's load, while the magnetic bearing supports the axial load of the rotor.

According to the authors, accuracy of the scanner is so good that conventional toroidal and cylindrical lenses are not needed. The new laser beam printer has the following characteristics: Resolution — 300 dots/in.; Speed — 26 sheets/min (A4); Paper size — A5~A3.

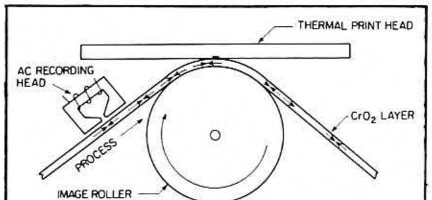
For Paper, circle Reader-Service # 106

Stephen F. Pond, Xerox Research Center, Webster, NY, described in his paper, *Thermal Magnetographic Printing,* results of experiments using thick film hybrid printheads for a thermal magnetographic printing system.

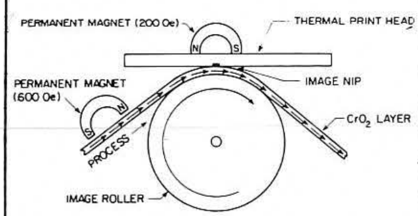
A typical thick film thermal printhead is made by applying a stripe of thick film resistor material over a pattern of interdigitated addressing leads. The resistor portion in between each lead becomes the writing hot spot when current is passed. Adjacent pixels share a common lead so that a scan line of printing must be created by separately pulsing odd and even resistor elements.

Numerous combinations of the basic building blocks of prerecording, applied field, and thermal printhead can be tried to achieve thermal magnetographic image recording. According to Pond, the two combinations selected for this study were: AC magnetic prerecord followed by thermal printhead erasure of white image areas; and DC magnetic prerecord followed by heating and cooling of black image areas in the presence of a reversing DC magnetic field.

Both recording systems were used in an actual magnetographic printing system, and several system reliability issues were addressed—primarily the robustness of the tape magnetoreceptor material and dependability of the thermal contact recording process. It was quickly discovered that the standard 0.92-mil polyester base recording tape media could not tolerate being cycled to 130C without being mechanically and permanently deformed. Experimental media having 0.3-mil polyester and 1.5-mil polyimide substrates were used, resulting in an elimination of the thermo-mechanical deformation of the tape during recording. For all experimental tapes tested, however, it was observed that the media remanence decreased by 10% to 20% after recycling 5000 times.



AC PRE-RECORD, THERMAL ERASE

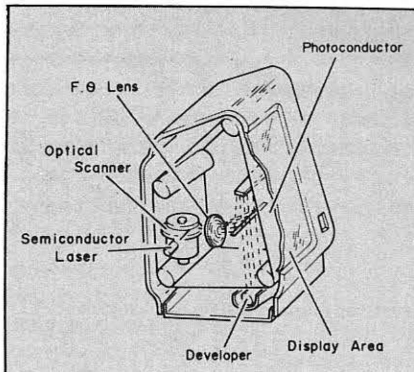


DC PRE-RECORD, THERMOREMANENT SWITCHBACK

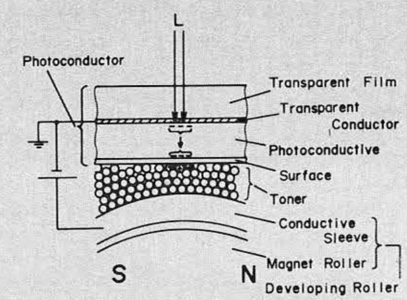
The recording interface was also a subject of reliability concern. It was found that if the magnetoreceptor cleaning system is not significantly improved over normal xerographic practice, the thermal printhead would fuse toner residue to the magnetoreceptor and itself. Establishing magnetoreceptor cleaning levels of two orders of magnitude better than typical xerography provided continuously reliable thermal magnetographic recording for more than 20 hours. Since the process was recording master images for multiple duplications, this level of reliability is quite good, equivalent to about 200 hours full system use.

Conclusions of the study indicate thermal printhead technology offers a low-cost, asynchronous imagewise recording method—slow by normal duplicator speed standards. But, when combined with magnetography (a process with natural image retention, high quality printing capability, and process speeds), the slowness of the thermal printing becomes merely the slowness of the master making.

For Paper, circle Reader-Service # 107



Configuration of the Electrophotographic Display



Schematic view of imaging process

In their paper, *Electrophotography Display,* a team from Canon Inc., Tokyo, Japan, reported on their development of an electrophotographic display unit in which resolution and contrast are comparable to the image recording capabilities of hard copy output devices. The display described by S. Kaneko and others uses the same method of image generation as is employed in printers using the electrophotographic method—in which images displayed are formed of toner on a photosensitive medium.

In this new system, image exposure (by a laser beam) and development of the image with toner take place simultaneously. The process does not involve development of an electrostatic latent image.

The device's photoconductor basically consists of a middle transparent conductive layer (such as ITO) on a base of transparent film (such as polyethylene terephthalate). On top of this is a high-sensitivity photoconductive layer (consisting, for example, of sensitized CdS) and a white surface layer. The toner image is formed on the surface layer, so images have the appearance of hard copy images on plain paper.

The authors claim the newly developed display unit is suitable for applications in which large quantities of information must be displayed at one time and where information displayed requires extended preview.

For Paper, circle Reader-Service # 108

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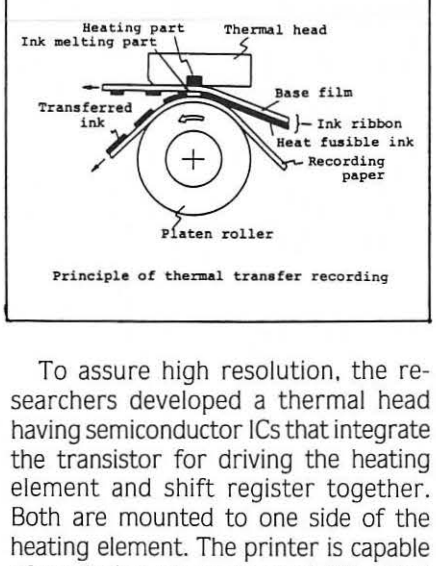
Thermal Transfer Printing

In this session, chairman John S. Moore, Tektronix Inc., Portland OR, pointed out that while thermal printing was a mundane printing technology for calculators and terminal printers just ten years ago, today it competes with electrostatic printing and laser-addressed electrophotography in addressability and general print quality—but at significantly lower cost.

And now, the latest advance in this technology, thermal transfer printing, holds promise for a range of applications from low-cost electronic typewriters to near-letter-quality electronic printers and full-color graphics printers. In transfer printing, a very thin donor sheet coated with a layer of colored material is placed between the printhead and sheet of plain paper. Application of heat to this donor sheet causes the colored layer to be transferred to the plain paper.

Of the six papers presented, three covered new developments in printers: one describing a new high resolution color printer; another a color transfer printer with built-in recoating mechanism; and a third a resistive ribbon printing technique, suitable for low-end, high-quality office systems.

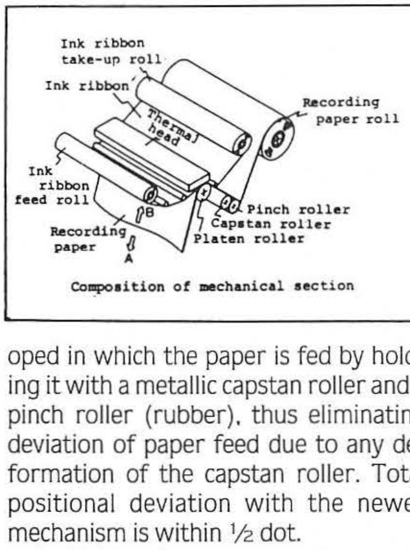
A thermal ink transfer, color printer that offers high-speed printing, high-resolution color images, and full color graphics compatibility is described in the paper authored by researchers at Matsushita Electronic Component Co. Ltd., Osaka, Japan. *High-Resolution Thermal Ink Transfer Color Printer*, by S. Yoshida and others, explains the technology employed in the ink transfer process, the development of a high-resolution thermal head, and an improvement of the paper feeder mechanism to control paper deviation during printing.



Principle of thermal transfer recording

To assure high resolution, the researchers developed a thermal head having semiconductor ICs that integrate the transistor for driving the heating element and shift register together. Both are mounted to one side of the heating element. The printer is capable of producing a large image (260 x 350 mm) at high density (400 dots per inch, 15.75 d/mm) in two minutes, with data transfer speed at least 200K bytes/sec.

In existing thermal ink transfer printers, paper is fed by the platen rollers, thus introducing the possibility of deviation of the paper, due to deformation of the platen roller. To overcome this, an improved feed mechanism was devel-



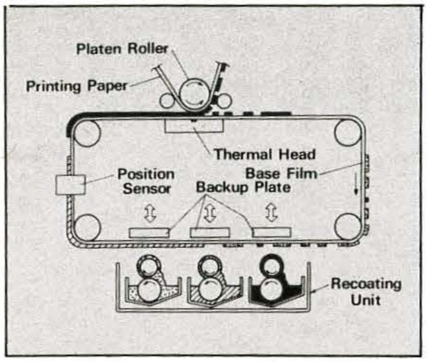
Composition of mechanical section

oped in which the paper is fed by holding it with a metallic capstan roller and a pinch roller (rubber), thus eliminating deviation of paper feed due to any deformation of the capstan roller. Total positional deviation with the newer mechanism is within ½ dot.

A 16-bit microprocessor is used in the transmission control unit where high-speed data processing is required. The mechanism control unit uses an 8-bit microprocessor. This configuration distributes the loads of transmission control and printer mechanism functions.

For Paper, circle Reader-Service # 109

The paper by researchers at Oki Electric Industry Co. Ltd., Tokyo, Japan, describes the structure of a thermal transfer film recoating mechanism developed for a compact color printer. Presented by Isamu Nose and others, *A Color Thermal Transfer Printer with Recoating Mechanism* explains the mechanism, its operating principles, and the control devices required.



The recoating mechanism has a heat insulated ink tank, an inking roller with a built-in heater and spiral V-grooves on its surface, and rubber-coated reverse roller to provide uniform contact with the inking roller. A thermoplastic ink, solid at room temperature and melted by the heater mounted in the inking roller, is used in the printing system.

With inking roller surface at a constant 100C, molten ink is drawn up as the inking roller rotates, and an ink fountain is formed near the contacting area between inking roller and reverse roller. On the opposite surface of the reverse roller, a fixed amount of ink is supplied through the V-grooves onto the inking roller surface. When the backup plate is lowered to bring the base film into contact with the reverse roller surface, ink is transferred from the reverse roller surface to the base film, forming an ink layer 5 μm thick. Unused ink on the base film, melted as the reverse roller rotates, is recovered to the ink fountain.

As the endless film runs, skew tends to be generated because of the imbalance between sides of the film-running mechanism and the periphery length. To overcome this problem, a skew-compensation roller is used that tilts in different directions, depending on position of the film.

The printer with recoating mechanism may be configured in one of two ways: one using independent three-color printing with three endless films corresponding to yellow, magenta, and cyan inks; the other using sequential printing by separately coating the three inks on the endless film. The first method is suitable for high speed printing, but makes size and cost reduction difficult because of the increased number of components.

For Paper, circle Reader-Service # 110

Resistive Ribbon Thermal Transfer Printing (RRP), by Walter Crooks and others, IBM Corp., San Jose CA, and IBM T. J. Watson Research Center, Yorktown Heights NY, describes a new non-impact thermal transfer printing technology that virtually eliminates all of the physical and mechanical limitations associated with the thin-film thermal transfer print head and related technologies.

With the RRP process, current is injected into the smooth, thin, mechanically flexible semi-conductor ribbon substrate from the printhead electrodes. The 40 electrodes are sufficiently flexible individually to ensure that good electrical contact is maintained with the ribbon on an electrode by electrode basis. Electrical contact is maintained independent of the roughness of the receiving surface which is being printed. When the electrodes are selectively energized, resolution of engraved quality is achieved.

In operation, current passes through the 16-micrometer carbon-loaded polycarbonate substrate directly beneath the electrodes and into a 0.1 micrometer electrically-conductive aluminum return path to ground. There is no reciprocity failure with the resistive ribbon thermal transfer printing process. Ink transfer is determined by the Joule heating that occurs within the carbon-loaded substrate.

The ink transfer process can be divided into five stages; namely heat, melt, adhesion, separation, and solidification. Ink transfer temperature determines the required printing power, which is critical to ribbon stability; viscoelasticity and adhesive property of the ink-melt control the print quality. Contact pressure, heat transfer, ink adhesion and separation also play important roles in the process.

The RRP printing technology allows significant improvements in overall performance of the thermal transfer printer, resulting in the ability of this technology to exhibit many of the characteristics that are most desirable in word processing and low-end personal computer output printers. For instance, RRP printing technology is capable of high quality "engraved" type of printing on bond or other textured papers, as well as highly calendered, smooth papers. It also is capable of electronically changeable fonts and pitch, all points addressable "image" printing, color printing, relatively high speed printing (in excess of 430 cps), non-impact low noise printing, high reliability, acceptable ribbon supply costs, and small, highly compact printer configurations.

For Paper, circle Reader-Service # 111

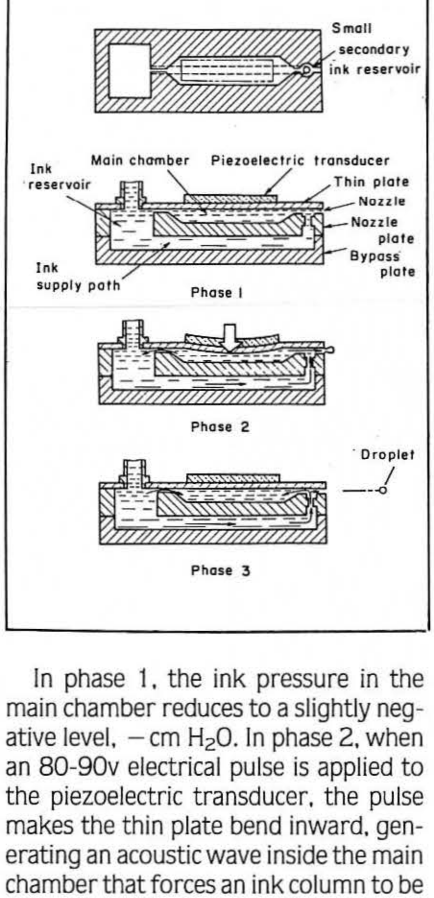
Drop-on-Demand Ink-Jet Printing

Ink-jet technology has long held the promise for high quality, fast, silent, low-cost printing on plain paper. The papers presented in this session, chaired by William J. Lloyd, Hewlett Packard Co., Palo Alto CA, cover recent work in several aspects of this technology. They include studies on pressure generation for the jet-head drive mechanism, multinozzle jet-head dimensioning, spot size modulation, drop-on-demand ink composition and performance, a dual path printhead, and use of multilevel inks.

Full Color Ink-Jet Printer Using Multilevel Ink introduces a high-speed drop-on-demand ink-jet printer capable of producing high-quality halftone images and full color prints.

A team headed by M. Takahasi, NEC Corp., Kanagawa, Japan, developed a dual-path printhead for the ink-jet printer that shortens ink refill time, thus enabling printing speeds up to 6,000 drops per second. Using the newly developed printhead on a full-color ink-jet printer, with multilevel inks, the team was able to print higher resolution images than with a conventional two-level dot matrix method.

Basically, the dual-path printing head is composed of nozzle, main chamber, thin plate, piezoelectric transducer, ink supply path and ink reservoir. While a conventional printhead uses the main chamber of the head for both generating pressure and supplying ink, the dual-path version uses the main chamber only for pressure generation.



In phase 1, the ink pressure in the main chamber reduces to a slightly negative level, $-$cm H_2O. In phase 2, when an 80-90v electrical pulse is applied to the piezoelectric transducer, the pulse makes the thin plate bend inward, generating an acoustic wave inside the main chamber that forces an ink column to be ejected from the nozzle orifice.

In phase 3, the pressure inside the main chamber decreases as a result of the ejection, and a droplet is separated from the ink column (due to kinetic energy drawing the ink column slightly back into the nozzle). Ink refill to the main chamber is performed mainly through the ink supply path; while ink refill to the nozzle is performed mainly through the small secondary reservoir by the surface tension effect of the nozzle meniscus. This ink supply path implementation reduces the fluid resistance for the ink refill, thus effectively shortening ink refill time.

A color ink-jet printer fitted with the dual-path printhead and using multilevel inks permitted production of high-quality, halftone images (without decreasing printing speed). The authors used four densities of multilevel ink designated 1, 2, 3, and 4-nozzle density, where the 1-nozzle is the thinnest color. Using the multi-level inks with a 2x2 pixel matrix will produce a 17-level halftone; with a 3x3 pixel matrix, a 37-level halftone reproduction is possible.

The prototype color ink-jet printer has a head module composed of four head plates (corresponding to yellow, magenta, cyan, and black inks) and 16 ink tanks. Each head, with its front printing face separated into four parts, supports the 1- to 4-nozzle density inks.

In color printing, the number of drops printed in a unit area is three times larger than in monochrome printing, thus ink flow tends to be generated. To avoid undesirable flow, the authors reduced the number of printed drops, by not using the full matrix. Although drop reduction tends to reduce the printed tone level, enhancement techniques and noise addition prevent deterioration of image quality.

For Paper, circle Reader-Service # 112

Sensors and arrays

Three standard array-formats are offered with the option of enhanced blue/ultraviolet (UVO sensitivity, which allows the extension of output sources in spectrophotometers over a broad spectral range. Caesium iodide scintillators may be coupled and matched dimensionally to the arrays or sensors to provide X-ray or gamma-ray detection for applications such as computerized tomography or non-destructive testing.

THORN EMI, Middlesex, England 08-956-30771

For information circle Reader-Service # 66

Electroluminescent plastic film

An EL light source, called Luminescent Atomic Display (LAD), uses a thin plastic base film (3 mil) coated with a proprietary resin that can be used to produce lamps for instrument panels, keyboard backlighting, aircraft formation lights, or automotive lamps, among other applications.

DUNMORE CORP., Newton, PA 215/968-0442

For information circle Reader-Service # 72

Graphics presentation system

The MPS-2000 graphics presentation system combines a Lasergraphics digital controller with a Polaroid color film recorder to produce images at a 2048x1366 resolution, in 45 to 150 sec, depending on image complexity. The system includes a raster controller with up to 0.5M bytes of RAM, a film recorder, a 35-mm camera back, a 35-mm instant slide processor, slide mounts and a 3¼x4¼-in. Polaroid camera back for instant color prints. The Lasergraphics Language (LL) driver, is compatible with most major busines graphics software packages, including IBM's GDDM and ISCCO'S TELL-A-GRAF, DISSPLA and SAS/GRAPH. An optional HP-Graphics Language (HPGL) interpreter is available. The system accepts an RS-232 interface, operates at up to 19.2K baud and can produce up to a million different colors. Price: $6,495.

LASERGRAPHICS INC., Irvine, CA (714/660-9497)

For information circle Reader Service # 74

Color monitor comparator

The IRT comparator is a battery-powered visual comparator for quick and precise color temperature adjustments, and gray scale balance of color monitors to standard D6500K by direct color comparison of the TV kine. The comparator, which may be hand-held or tripod mounted, is presented to the face of the kine, displaying either a gray-scale or a full field white (window) signal. The operator, looking through the device's ocular, will observe a circular field where half of the area is a direct view of the kine face and the other half is the illuminant D reference. This reference is produced by the reflected light emitted from a bulb that has been filtered through conversion filters and stabilized by a control to constant current. The operator adjusts the monitor's screen and gain controls so that the kine white balance will match with the comparator's in both highlights and lowlights. Price: $1,500.

Television Equipment Assoc., Box 393, South Salem, NY 10590 (914/763-8893)

For information circle Reader-Service # 75

For information circle Reader-Service # 27

For information circle Reader-Service # 28

Flat panel touch-input display

The VuePoint II touch interactive, flat-panel display is a 12-line by 40-character gas plasma device that develops up to 480 clear, bright orange or green alphanumeric characters on a black background for maximum visibility. The panel is coupled with a 12-line by 20-column optical "touch" screen with up to 240 high-resolution "touch" points. The system's standard 3-page display memory is expandable to 7, 19, 35, or 51 pages. Smart system features include: multiple touch response formats, auto-scroll, protected fields, multiple blink rates, dual intensity and random cursor positioning, all under user control. The system has a compact design and small footprint (9 in. x 12 in. x 4 in. deep), and comes with an RS-232C interface. Optional enhanced communications modules accommodate RS-422, 423, 485, 20mA, TTL and other serials and parallel communication protocols.

GENERAL DIGITAL CORP., E. Hartford, CT 203/528-9041

For information circle Reader-Service # 40

Ribbon bonder

Model HRB-3600 thermocompression bonder, designed for bonding gold ribbon in hybrid circuits, features three programmable bonding schedules, automatically feeding, bonding,and cutting the bonding ribbon. It can also operate in a stitch mode, performing multiple bonds on continuous ribbons. The bonder manually operates on the pulsed heat principle. Bonding schedule—temperature, time and force—can be individually set according to three different schedules. Temperature range is 100 C to 590 C, digitally preset at 10 C-increments; bonding time is 0.1 to 5.9 seconds, adjustable in 0.1-second increments; and force is 300 to 999 grams, set in 1-gram increments.

HUGHES AIRCRAFT CO., Carlsbad, CA 619/931-3622

For information circle Reader-Service # 43

Laser optic disc drive

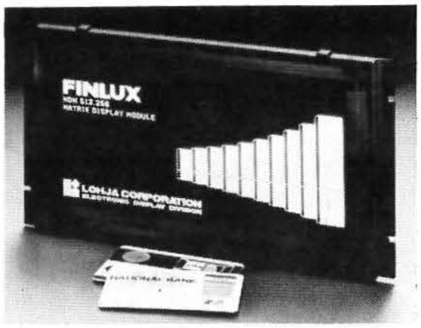
CLASIX DataDrive Series 500 laser optic information distribution system is based on standard CD ROM technology and is designed to deliver up to 550 million characters of data to users of IBM (and compatible) personal computers. The desk-top, read-only laser optic peripheral is a 4-¾ in. prerecorded optical disc. Price: $1,535.

Reference Technology Inc., 1832 North 55th Street, Boulder, CO 80301 (303/449-4157)

For information circle Reader-Service # 41

For information circle Reader-Service # 29

For information circle Reader-Service # 30



Flat EL-display

Electroluminescent display module MDM 512.256-11 has 512 x 256 picture elements capable of displaying a full 25 lines of 80 characters text or detailed high resolution graphics. The fully solid state EL panel and an electronic board, with required high voltage drivers, are assembled into a 0.37-inch thin package that connects to controlling circuitry over a flat cable. A proprietary Atomic Layer Epitaxy thin film growth process is used in the system. Single-unit price: $1,680.

FINLUX INC., Cupertino, CA 408/725-1972

For information circle Reader-Service # 44

Large-screen graphics projector

Series 700 graphics projector provides a real-time large-screen display of computer-generated alphanumeric and graphic images in raster scan format. The projector utilizes a liquid crystal light valve to intensify the image from the cathode-ray tube and project it onto a display up to 12 ft wide.

The light valve's photosensor layer detects the low-level input light image of the CRT and converts it to an electrical pattern that is impressed on the liquid crystal. This pattern, in turn, electrically alters the light-reflective properties of the output face.

A xenon arc light source projects a beam through a polarizing beam splitter onto this face. The reflective properties of the face then modulate the beam, imparting the original pattern on it. Thus, the low-intensity image of the CRT is transferred to the high-intensity projection light beam reflected on the large screen display.

Light output of the modulated beam is greater than 300 lumens, and the contrast ratio is better than 20:1. Resolution exceeds 1,000 TV lines per raster height. Projection distance varies depending upon choice of lenses. The instrument can be used for either front or rear projection, displaying monochromatic simulation and computer output. Price: under $30,000.

Hughes Industrial Products, Carlsbad, CA (619/438-9191 Ex 264)

For information circle Reader-Service # 45

Video test pattern generator

Model 2502A, programmable test pattern generator, has permanent memory capacity to store 69 separate rasters, including different scan rates or the same scan rates with variations in pattern or pulse widths. Rates may be stored, recalled for use, edited, or deleted, all by keypad code entries. Parameters and timing are indicated on a 16-segment alphanumeric display. Software lockout is provided to prevent unauthorized editing without proper security password.

The generator provides individual front panel controls for video level adjustment of the RGB channels. A separate switch is provided for each output allowing individual selection of channels "on" or "off" for ease of color display convergence testing. Test pattern functions include Bars, Dots, Flat Field, Window, V Stripe, Color Bars, Resolution, Character Cx, Gray Scale, Video (five-step resolution, black reference plus ten-step gray scale) and Combination (video test pattern plus color bars). Price: $5,950.

Visual Information Institute Inc., POB 33, Xenia OH 45385 (513/376-4361)

For information circle Reader-Service # 47

Low-light TV camera

Model ETV-1625 25-mm low-light-level television camera provides high resolution — 600 or 700 TV lines — at 2×10^{-5} footcandles, making it suitable for scientific research applications, such as enhancement of electron microscope images. The camera is available in two versions: one has a 25-mm secondary electron conduction (SEC) tube coupled directly to a 40/40-mm intensifier selected for low-equivalent-background input; the other has a single 25-mm electron bombarded silicon (EBS) tube. The SEC/intensifier combination has a resolution of 600 TV lines per picture height at a faceplate illumination of 2×10^{-5} footcandles.

WESTINGHOUSE ELECTRIC CORP., Horseheads, NY 607/796-3211

For information circle Reader-Service # 48

Pin grid array

An 84-pin grid array, designed specifically for the Motorola MC 69012 microprocessor, features a short six-finger contact that has an average insertion force of 2½ ounces per contact. Array bodies are made of molded glass-filled thermoplastic polyester with a UL94 VO flammability rating; contacts are either gold or tin plating. The PRECI-DIP pin grid arrays are available in standard or long solder tail versions, and in two or three-level wrapping pins. Price: $5.24 in 100 piece quantities.

IEE, Van Nuys, CA 818/787-0311

For information circle Reader-Service # 49

Rack-mount UPS

An uninterruptible power system (UPS), with 1.5 kVA output, is available for 60 Hz operation with input/output at 120 VAC. The rack-mount system features a transistor-switching, multiple-pulse-width inverter that holds output voltage within ± 2% despite voltage fluctuations ranging from +10 to −15%. The standard control unit is 8-¾ inches high and is equipped with two meters showing output voltage and current, a primary AC breaker, a battery breaker, and a bypass fuse. Red, amber and green LED indicators arranged in a power-flow diagram continuously display system status and an audible alarm sounds when any fault conditions appear. The system's battery pack is a 5-¼ inches high, sealed, maintenance-free 48-cell lead-acid unit offering 10 minutes of reserve power. Battery packs are automatically recharged as normal UPS output resumes. The rack-mount UPS weighs 185 lb; battery pack weighs 115 lb.

SOLA, Unit of General Signal, Elk Grove Village IL 312/439-2800

For information circle Reader-Service # 50

Digital imaging camera

E-Z SCAN Model 4434 digitalizing scanner utilizes the digital imaging technology of the EIKONIX camera system to capture large format originals, such as line drawings, maps, blueprints, sepias, and mylar prints. It is capable of recovering the original information content of drawings with one scan in 2 to 4 minutes, in sizes up to 36" x 46" without electronic seaming. By using a single linear 4096-element charge-coupled device (CCD) array, the E-Z SCAN takes advantage of lower light requirements and enables the system to achieve high spatial resolution.

The system is a gray scale scanner with a fixed scanning resolution of 110 lines per inch (LPI); and achieves 6 bits per pixel of 64 gray distinguishable levels. An adaptive thresholding technique, used in conjunction with the E-Z SCAN, allows all of the original image detail to be recorded even if the lines are smudged or faded. Price: $35,000.

EIKONIX Corp., 23 Crosby Drive, Bedford, MA 01730 (617/275-5070)

For information circle Reader-Service # 51

Generator Formatter
A 3-Position Modulation (3PM) formatter is described in a 10-page color brochure that contains complete specifications and a detailed description of the system, including diagrams showing data flow and control functions. Designed for today's 2MHz wideband recording as well as for the latest double density and microgap systems, the formatter readily interfaces with any IRIG recorder. The formatter incorporates an Error Detection and Correction (EDAC) system that guarantees virtual error-free performance even with general purpose instrumentation tapes.
THORN EMI Technology Inc., 8601 Dunwoody Place, Atlanta, GA 30338 (800/243-2572)

Circle R-S # 80

Oscillators and Amplifiers
A four-page technical paper on high-efficiency indium phosphide (InP) millimeter-wave oscillators and amplifiers presents information on design of InP Gunn diodes, performance of oscillators and amplifiers, and trends.
VARIAN ASSOCIATES INC., 611 Hansen Way, Palo Alto, CA 94303 (415/424-5781)

Circle R-S # 81

Rocker and Lever Switches
A four-page catalog details ultrasonically sealed rocker and lever switches designed specifically for PC board applications. Descriptions, specifications, and ordering information is provided for the Dialight 578 series.
DIALIGHT CORP., 203 Harrison Place, Brooklyn, NY 11237 (718/497-7600)

Circle R-S # 82

Electronic Components
A four-color, 16-page pamphlet provides an introduction to a wide range of high-quality, high-technology electronic components used in such applications as automobiles, radios, televisions, computers, and robots.
SIEMENS COMPONENTS INC., 186 Wood Avenue South, Iselin, NJ 08830 (201/321-3400)

Circle R-S # 83

Electronic Components
A 26-page brochure describes advanced technology capabilities, engineering services, and strategic alternatives provided by the Electronic Components operation of GTE; and describes electronic connectors used for data processing and telecommunications applications. A section on fiber optics discusses the development links with the GTE Laboratories to integrate fiber optics with traditional electronics.
GTE Electronic Components and Materials Div., 2401 Reach Road, Williamsport, PA 17701.

Circle R-S # 84

Video Display Terminals
Three data sheets highlight the ADM 11 conversational terminal, the ADM 12 block mode editing terminal, and the ADM 12+ advanced editing terminal.
LEAR SIEGLER INC., Data Products Div., 901 East Ball Road, Anaheim, CA 92805 (714/778-3500)

Circle R-S # 85

Signal Analyzer
Four-color, 16-page brochure describes capabilities and available options of multi-pupose signal analyzers, lists equipment specifications, and summarizes systems.
SCIENTIFIC ATLANTA, Spectral Dynamics Div. PO Box 23575, San Diego, CA 92123 (619/268-7100)

Circle R-S # 86

New SID Members

We extend a sincere welcome to these newest SID members, most of whom joined our Society as a result of their attendance at SID '85, last May in Orlando, FL.

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Berkeley, Brian H.
Apple Computer

Bolger, Steve H.
Siliconix Inc.

Bryan, Raymond H.
Hewlett Packard Co.

Cardillo, Louis A.
Engineer
Ford Aerospace

Chang, I-Kwang
Advisory Engineer
IBM

Dempsey, James K.
Manager
Ikegami Electronics

Edmondson, Roy F. III

Gripshover, Paul J.
Vice President
Southwall Technologies

Haddick, David H.
Dunn Instruments, Inc.

Hahn, Alice U.
Manager, Proc. Dev.
Taliq Corporation

Haitz, Ronald H.
Group R&D Mgr.
Hewlett-Packard

Hitchner, Lewis E.
Asst. Professor
Univ of California, SC

Hodel, Thomas E.
Senior Engineer
Flight Dynamics, Inc.

Hough, Wayne E.
Sr. Staff Engr.
Eldec Corp.

Hutteball, Allan R.

Koch, Gene C.
Vice President
Display Engrg. Assocs.

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IBM Research Lab.

Miller, Lawrence D., Jr.
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Eldec Corporation

Moore, John S.
Principal Physicist
Tektronix, Inc.

Nelson, Hayden A.

Pohlman, Jeff
Supertex, Inc.

Pourahmadi, Farzad
Exxon Enterprises

Scheu, Fred
Tektronix Inc.

Tenkate, Bert
Tektronix Inc.

Tolonen, Alvin D.

Tsai, Yuan-Daw
Mgr. Technology Devel
Konica Tech Inc

Wiley, Richard C.
Marketing Mgr.
Taliq Corporation

Delaware Valley Chapter

Backe, Maureen F.
Product Planner
AT&T

Bueno, Clifford
Research Engineer
GTE Products

Campanella, Matthew J.
Unit Manager
RCA, MSR

Cosentino, Louis S.
Dis. Tech. Res. Head
RCA Labs.

Izydorezyk, James A.
Design Engineer
Commodore Computers

Korn, David H.
Mktg. Manager/Systems
Aydin Computer Systems

New, David A.
RCA-VCDD

Pica, Albert P.
RCA Sarnoff Labs

Roach, Ronald W.
Group Head
RCA Labs.

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AT&T Tech. Sys.

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Vice President
Transducer Systems

Wilson, John
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Winarsky, Norman D.
Group Head
RCA Labs

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Mgr. Workstation Development
Harris-Lanier

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NAVAIR

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Caimi, Frank M.
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Griffin, Glen P.
Project Engineer
Harris Corp.

Hall, Anthony D.
Human Factors Scientist
IBM Corp.

Harbison, Tammie S.
EG & G Wash. Ana. Serv. Ctr.

Hislop, Kenneth T.

Holtsinger, Douglas S.
NCR

Kozumplik, Mark C.
Designer
Active Design

LaBarr, James R.
Acct. Mgr.
Blaupunkt Div., Bosch Corp.

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Sr. Buyer
Larry

Loeb, Mitchell L.
Staff Engineer
IBM Corp.

Lyders, William R.
IBM

Morizio, James C.
Assoc. Engineer
IBM Corp.

Peckham, Donald S.
Educ. Specialist
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E. Regional Mgr.
Optical Radiation

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Human Factors Consultant
The Evaluation & Testing Co.

Talley, Walter T.
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Topp, Mark
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Tymms, Charles L.
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IBM Corp.

Yosim, Paul S.
Advisory Engr.
IBM Corp.

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Lead Analyst
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Matsushita Electric Comp. Co.

Miyashita, Kazuhiro
Manager R & D
Nippon Data General

Mochizuki, Akihiro
Fujitsu Labs Ltd.

Nagae, Yoshiharu
Researcher
Hitachi, Ltd.

Nagayama, Tadahiro
Sr. Staff Engr.
NTT

Sumita, Tsuneyo
Toshiba Corp.

Takishita, Toshikazu
IBM Fujisawa Lab

Toshihiro, Kogure
Researcher
Nippon Sheet Glass Co.

Xu-Rong, Xu
Professor
Chinese Academy of Science

Yamamoto, Hajime
Hajime

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Matsushita Elec. Comp. Co.

Los Angeles Chapter

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OTI

Clary, Donald B.
Prin. Member Engrg. Staff
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Zeltex Corp.

Geery, Paul J.
Engrg/Scientist
McDonnell-Douglas

Ho, Kesse
Hughes Aircraft

Hope, Clinton B.
MTS
Hughes Aircraft Co.

Kagoi, Terry
Chief Engineer
Seiko Instruments USA

Kishimoto, Ben T.
Product Spec.
Epson America Inc.

Klein, Peter H.
Staff Engineer
Singer Librascope

Melvin, James
Engineering Section Head
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Muir, Evan
Lake Helen, Florida

Orszulak, James H.
Sr. Engineer
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Sahli, Chuck
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Selvin, Gerald J.
Tech. Director
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Silver, Steve S.
Mgr., Optics Tech.
Technology Training Corp.

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Uno, Frank M.
Arco Solar, Inc.

Van Arnam, Don
Director of Engineering
Optical Radiation Corp.

Weisz, Alexander Z.
Sr. Staff Engr.
Hughes Aircraft Co.

Mid-Atlantic Chapter

Abji, Zahir S.
Mobile Data Intl.

Antonio, John
Sr. Staff Engr.
Trans-Lux Corp.

Bespalko, T. Mark

Bloedon, Robert V.
Mgr. Special Projects
Bell Northern Research Ltd.

Blank, Stuart L.
Dept. Head
AT&T

Bindra, Ashok K.
Tech. Editor
EE Times

Berkstresser, George W.
Mem. Tech. Staff
AT&T Bell Labs.

Cernuto, John J.
Consultant
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Chapman, William A.
Eastman Kodak Co.

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de Leon, Josefino A.
Litton Systems Ltd.

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Gurwitz, David
Staff Engineer
IBM Corp.

Hubbard, David W.
Pitney Bowes

Kimsey, Thomas H.
Mem. Tech. Staff
Bell Comm. Research

Laff, Robert A.
Research Staff Mem.
IBM Corp.

Lavelle, Michael J.
Sr. Software Engr.
Eastman Kodak Co.

Manami, Hiroshi
Prod. Manager
Nitto Denko America Inc.

Marko, Peter J.
Bell-Northern Res.

Martino, Chuck
Thomson CSF Comp. Corp.

McFadden, Sharon M.
Defense Scientist
D.C.I.F.M.

Miyagawa, Masato
Engrg. Manager
Sharp Electronics Corp.

Perten, Herb J.
J & J Ultrasound

Prater, Rudy L.
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Pun, Gary Y-K.
Lab. Technician
IBM Corp.

Salibay, Bernardo B.
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TMX Philippines Inc.

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E. Sales Mgr.
Visual Information Inst.

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Bendix F.S.D.

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Research Chemist
Eastman Kodak Co.

Vogel, Debbie J.
Grumman Aerospace

Waldeck, Gerald G.

Wilson, T. Andrew
Eastman Kodak

Wu, Ming Hsien
Hamamatsu Corp.

Yamashita, Kei
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Hitachi Ltd.

Yencharis, Leonard R.
Vice President
Info. Comp. Assessments

Zupanski, Stan T.
Proj. Manager
J&J Ultrasound

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Adamski, Mark D.
Delco Electronics

Anderson, Susan J.
Sales Coordinator
Visual Info. Inst., Inc.

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Mech. Engineer
General Motors

Buckley, Stephen J.
Chrysler Corp.

Darnold, Robert N.
Information Proc.
Genesee Intermediate

Davis, Dennis H.
Staff Proj. Engineer
GM-Boc-Flint Engineering

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Prod. Res. Des. & Dev.

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Communitec

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IBM Corp.

Gunn, William A.
Assoc. Engineer
IBM Corp.

Habegger, Kenneth L.
Mem. Tech. Staff
AT&T Bell Labs.

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Program Manager
Astronautics

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Sr. R & D Cons. Engr.
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General Dynamics

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Shade Info. Systems

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Ondris, Miroslav
Sr. Research Asst.
Standard Oil Ohio

Remec, Thomas M.
Group Leader
Zenith Elec.

Rubach, James E.
Chief Engineer
General Indicator Corp.

Rutili, Renzo N.
Mgr. Industrial Design
Stewart-Warner

Sattler, Walter J.
Dev. Engineer
General Motors

Shenoy, Panduranga U.

Shogren, William G.

Shores, William M.
Design Engr.
Visual Info. Inst., Inc.

Sklar, Warren A.
Partner
Maky, Renner, Otto & Boiselle

Streelman, Gary A.

Sumera, Michael
Astronautics Corp. of America

Tesic, Mike M.
Mgr. Advtg. Dev.
Picker Intl.

Thiesen, William M.
Engrg. Designer
Ohmeda

Troxell, John R.
Staff Res. Scientist
Gen. Motors Res. Labs

Urban, Carol A.
Engrg. Specialist
Picker Intl.

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RCA

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Borg Instruments

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Honeywell/Comml. Avionics

Chou, Hsin-Hsin
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3M

Doty, C.T.
Appl. Engrg. Specialist
3M

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Sr. Research Specialist
3M-Central Research

Isle, Brian A.
Prin. Development Engr.
Honeywell

Lee, Charles C.
3M/Engrg. Systems Div.

Newman, Donald J.
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3M

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Zeitz, Allen P.
3M-Industrial Optics

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Data Images

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MIT

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Dir. Avionics Engrg.
Kollsman Instrument Co.

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NUSC/ NLL

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Fleming, Gordon R.
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Luminescent Systems

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Sr. Engineer
General Dynamics/Elec. Boat Div.

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Sr. Electrical Engr.
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Marketing Manager
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Ungard, Kenneth R.
Product Mgr.
Luminescent Systems

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Human Factors Engr.
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Carey, Edward H. Jr.
Design Engr.
Hughes Helicopters Inc.

Chu, Steve
Product Manager
Rogers Corp.

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Natl. Mktg. Manager
Teledyne Kinetics

Trautman, Edward
Aerospace Experimental Psych.
Navy Personnel R & D Ctr.

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Sr. Engrg. Specialist
General Dynamics

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Thomson CSF

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Telenova

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Barco Ind.

Kosmowski, Bogdan B.

Lamport, Daphne L.
Physicist
Philips Res. Labs

Magarino, José
L.C.R.
Thomson-CSF

Miscovich, Adrian
Engineer
Elbit Computers Ltd.

Oggioni, Roberto
Research Manager
3 M Italia Ricerche

Paproth, Dr. Hans H.,
Project Leader
NCR

Pieri, Roger
Laboratory Chief
Videocolor

Powell, Dr. Martin J.
Philips Res. Labs

Salomon, Emil
Display Dept. Dir.
Elbit Computers Ltd.

Turner, John A.
Dept. of Elec. Engrg. Sci.
Univ. of Essex

Van Gorkum, Dr. Aaart A.
Philips Res. Labs

Versnel, Leo J.W.
Hyperelec

Wahl, Jurgen
VDO Adolf Schindling AG

Waters, Dr. C.M.
Thorn-EMI

Werner, Hans G.
Dipl. Ing.
MBB

Wheeler, T. Rodger H.
M.O. Valve Company Ltd.

For membership use card in back of magazine.

President's Message

The Tsukuba International Exposition in Japan has attracted millions of people from all over the world. Mr. Shigeo Mikoshiba (Secretary of the SID Japan Chapter) has informed me that the Fujitsu Pavilion at the T.I.E. was regarded as the most popular among 45 pavilions because of its impressive computer generated 3-D movie display projected on a 20-meter diameter dome screen. It was said that waiting time to see the program was running up to four hours. To give you some idea of this display, we have obtained an article from Mr. Fumio Sumi, which you will find in this issue. I would like to thank both Mr. Sumi and Mr. Mikoshiba for sending us this material.

I was very privileged to be invited by our new chapter, *UK & Ireland*, to attend their inauguration meeting on June 5th. I am very happy to inform you that this newborn SID Chapter had an exciting start. The half-day meeting consisted of an extremely stimulating keynote speech by Dr. Cyril Hilsum of GEC, who made some penetrating observations on the display R/D activities and funding situation in the UK. This was followed by a series of critical reviews on SID '85 Symposium papers, presented by Dr. Al Woodhead, Dr. Bill Crossland, and Dr. Aron Vecht. The meeting was oversubscribed and, unfortunately, more than twenty people had to be turned away. The attendees were very enthusiastic in participating in the discussion. It is predictable that *UK & I* will have no problem maintaining a lively and useful chapter. On behalf of all SID members elsewhere, I would like to extend them congratulations.

Ifay Chang

Effective 8/01/85 Dr. Ifay F. Chang's new addresses are:

IBM Singapore Pte. Ltd.
Shing Kwan House
4 Shenton Way
Singapore 0106
Tel: 2200222 or 2242444

Director of Research
Institute of Systems Science
National University of Singapore
Heng Mui Keng Terrace, Kent Ridge
Singapore 0511
Tel: 775-6666

SOCIETY FOR INFORMATION DISPLAY
8055 West Manchester Avenue-Suite 615
Playa Del Rey, CA 90293 - 213/305-1502

Bettye Burdett, *SID Office Manager, wins the pick of the draw from Bill Sadler, President of Dotronix Inc., at NCC '85. The prize, a Quantum Data Opix Generator, is capable of providing video signals for the high-resolution monochrome monitors produced by Dotronix, as well as any monitor up to 200 MHz video in color.*

UK & Ireland: September 17, 1985 Topic: *Liquid Crystal Displays* Meeting and Exhibition, STL, London Road, Harlow, Essex. Featured speakers include: M. G. Clark, RSRE - Overview; W. A. Crossland, STL - Smectic type A; B. Bone, STL - Ferroelectric; and P. Migliarato, GEC - Active Addressing. Admission strictly by ticket obtainable in advance. Contact: Derek Washington, Sec., SID UK & Ireland Branch, c/o Philips Research Labs, Cross Oak Lane, Redhill, Surrey RH1 5HA, UK. Tel: 0293 -785544.

Mid-Atlantic: June 9, 1985
At the Annual Banquet Meeting the following officers were elected to serve for the next year:

Chairman: John Stapleton, Visionary Technology Inc.
Vice Chairman: Ron Feigenblatt, IBM
Secretary: Terry Nelson, Bell Communications Research
Treasurer: Peter Murau, Philips Laboratories

Display Systems/Technologies

Authors are invited to submit an abstract and technical summary of an original paper (not previously published or presented) for the International Information Display Symposium (SID '86) to be held May 6 - 8, 1986, in San Diego, CA.

All areas of information display will be considered, including: Emissive Flat Panels, Nonemissive Flat Panels, CRT Displays, Hardcopy/Display Storage, Display Systems and Applications, Display Addressing/Packaging, Interactive I/O Technology, Human Factors, and Large-Area Displays.

Guidelines for preparing the abstract and technical summary are available from:
Mr. Mark Goldfarb, Symposium Coordinator
Palisades Institute for Research Services Inc.
201 Varick St. Room 1140
New York, NY 10014 (212/620-3445)

Deadline for submittal: December 9, 1985.

DON'T MISS IDRC

Fifth Annual International Display Research Conference

Hyatt Islandia, San Diego CA October 15 - 17, 1985

Emphasis at this year's meeting will be on research and early development aspects of display work. The program committee has solicited papers covering all of the disciplines related to advances in electronic display materials, processes, circuits, and devices. Among the areas of interest are light emitting and non-emissive technologies for direct-view and projection displays, addressing technology, device reliability, display characterization, and new phenomena and concepts.

The conference will feature a series of invited papers by distinguished speakers in fields of current display interest, including:

Keynote Address: Erich Bloch, Director, U.S. National Science Foundation.
Active Matrix Addressed Liquid Crystal Displays—S. Morozumi, Suwa Seikosha Co. Ltd.
Progress in Achieving Full-Color Electroluminescent Displays—C. N. King, Planar Systems Inc.
Ferroelectric Liquid Crystal Displays— N. A. Clark, University of Colorado.

IDRC is presented by the IEEE Electron Devices Society, the Society for Information Display, and the Advisory Group on Electron Devices.

ADVANCE REGISTRATION: For IEEE or SID Members - $85. Non-members - $95. ($10 more at door) Make check payable to IDRC '85.

Send your name, company and address, with check to Hildegarde Hammond, Palisades Institute, 201 Varick Street, New York, NY 10014.

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Somerville, NJ 08876
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Philadelphia, PA 19124
215/535-3000

Asea AB, Dept. YLKHM
S-72183
Vasteras, Sweden
021/10-0000

Audiotronics Corp.
7428 Bellaire Ave.
P.O. Box 3997
No.Hollywood, CA 91609
818/765-2645

Babcock Display Products
1051 S. East St.
Anaheim, CA 92805
714/491-5110

Ball Electronic Systems Div.
P.O. Box 589
Broomfield, CO 80020
303/469-5511

Bendix Corp.
Flight Systems Div.
Teterboro, NJ 07608
201/288-2000

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Hicksville, NY 11801
516/433-0740

Canon, Inc.
7-1, Nishi-Shinjuku 2
Shinjuku-ku, Tokyo 160
Japan
714/556-1036 (California)

Cardion Electronics
Div. of General Signa lCorp.
Long Island Expressway
Woodbury, NY 11797
516/921-7300

CESCA
Sistemas Electronics S.A.
APD036, 189
Madrid, Spain
91/675-4300

CELCO
(Constantine Engrg. Labs Co.)
70 Constantine Dr.
Mahwah, NJ 07430
201/327-1123

Cherry Electrical Products Corp.
3600 Sunset Ave.
Waukegan, IL 60085
312/662-9200

Chomerics Inc.
8 Commonwealth Ave.
Woburn, MA 01888
1-800/225-1936

Clifton Precision/
Special Devices
5100 State Rd.
Drexel Hill, PA 19026
215/622-1718

Clinton Electronics Corp.
6701 Clinton Rd.
Loves Park, IL 61111
815/633-1444

Conrac Corp.
3 Landmark Sq.
Stamford, CT 06901
203/348-2100

Control Interface Co. Ltd.
Optoelectronics Div.
21 Rt. 10
East Hanover, NJ 07936
201/887-3222

Corning Glass Works
Electronic Materials Dept.
MP21-3
Corning, NY 14830
607/974-7451

C.W. Cameron Ltd.
Burnfield Rd.
Giffnock
Glasgow, Scotland
UKG46-7TH

Dale Electronics
P.O. Box 609
Columbus, NE 68601
402/564-3131

Data Images
1283 Algoma Road
Ottawa, Ontario
Canada, K1B3W7

Display Components Inc.
334 Littleton Rd.
Westford, MA 01886
617/692-6000

Dontech Inc.
601 Airport Industrial Blvd.
P.O. Box 889
Doylestown, PA 18901
215/348-5010

Eagle Magnetic Co. Inc.
P.O. Box 24283
Indianapolis, IN 46224
317/297-1030

EG&G Gamma Scientific
3777 Ruffin Rd.
SanDiego, CA 92123
619/279-8034

Electro-Plasma Inc.
4400 Martin-Moline Rd.
Millbury, OH 43447
419/255-5197

Endicott Research Grp. Inc.
2601 Wayne St.
Endicott, NY 13760
607/754-9187

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WDL Div.
3939 Fabian Way
Palo Alto, CA 94303
415/326-4350

Futaba Corp.
629 Oshiba
Mobara, Chiba 297,Japan
0475-24-1111

Garrett Mfg. Ltd.
255 Attwell Dr.
Rexdale, Ontario
Canada M9W 5B8
416/675-1411

GEC Avionics
(Affil. General Electric Co.
p.l.c. of England)
4500 N. Shallowford Rd.
Atlanta, GA 30338
404/394-7800

General Atronics Corp.
Sub. of Magnavox Govt. & Ind.
Electronics Co.
1200 E. Mermaid Lane
Philadelphia, PA 19118
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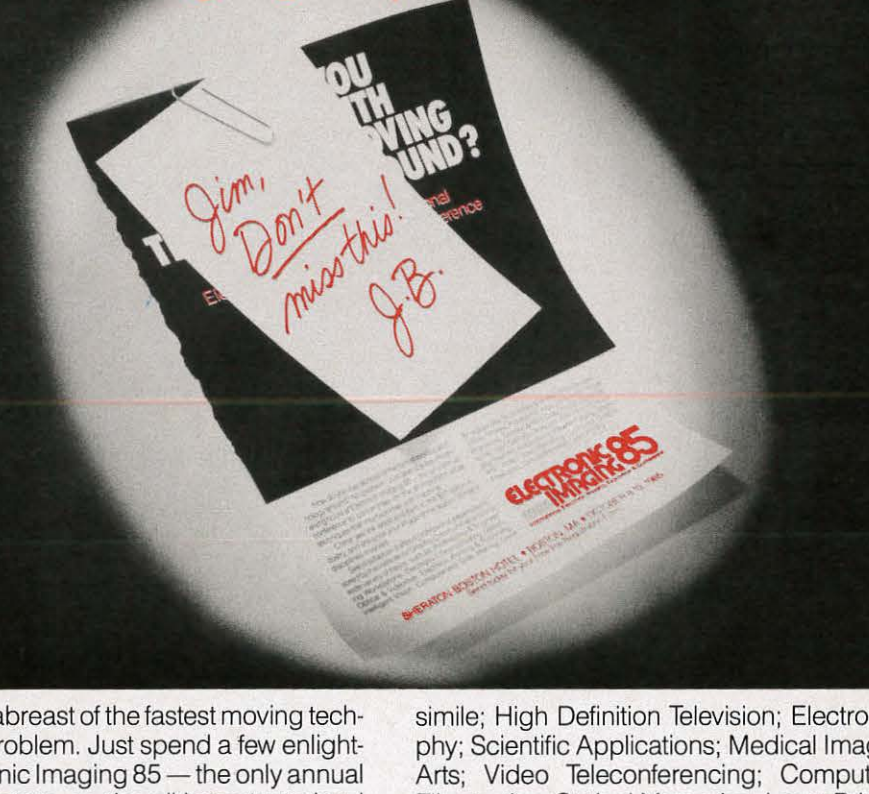

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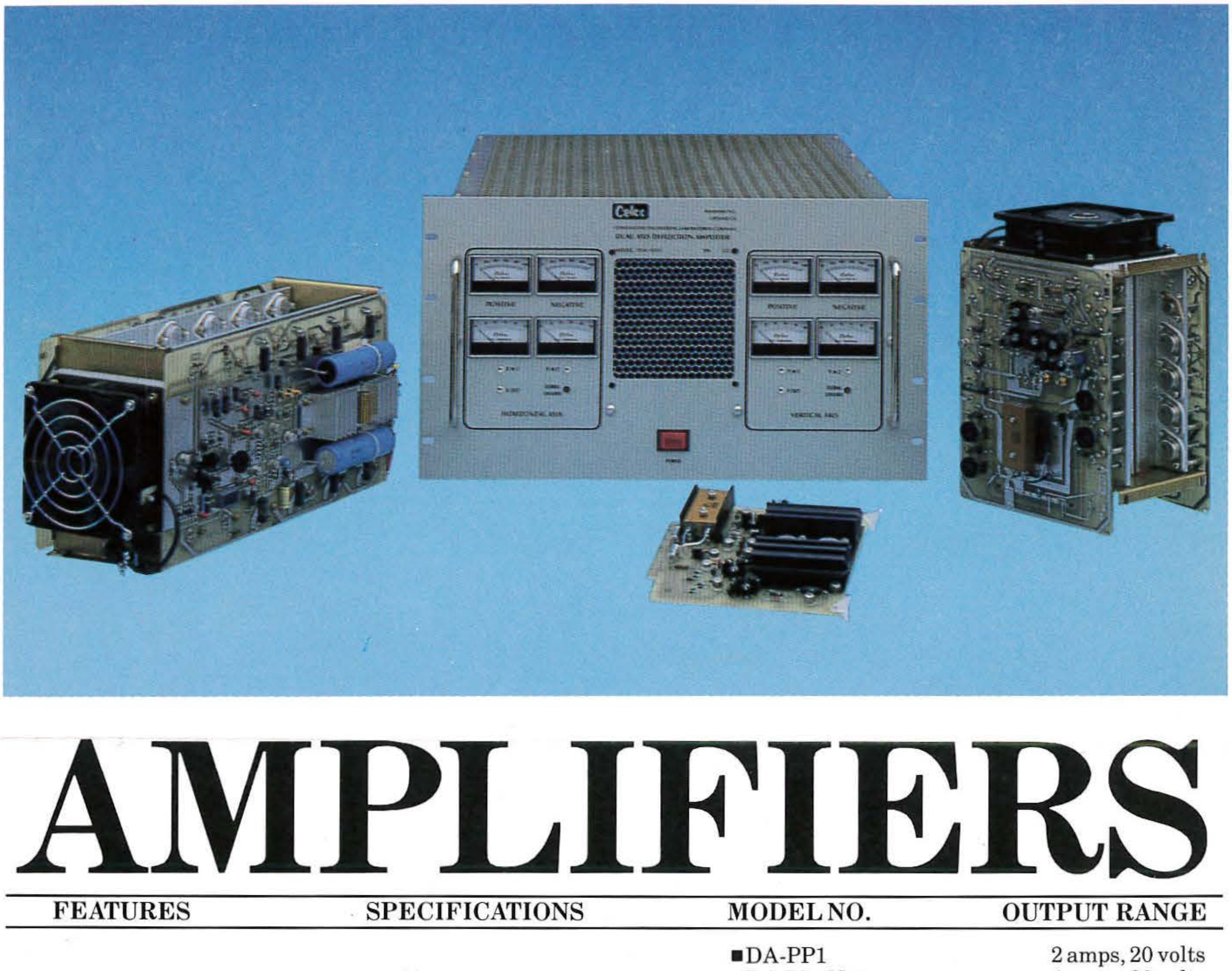

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