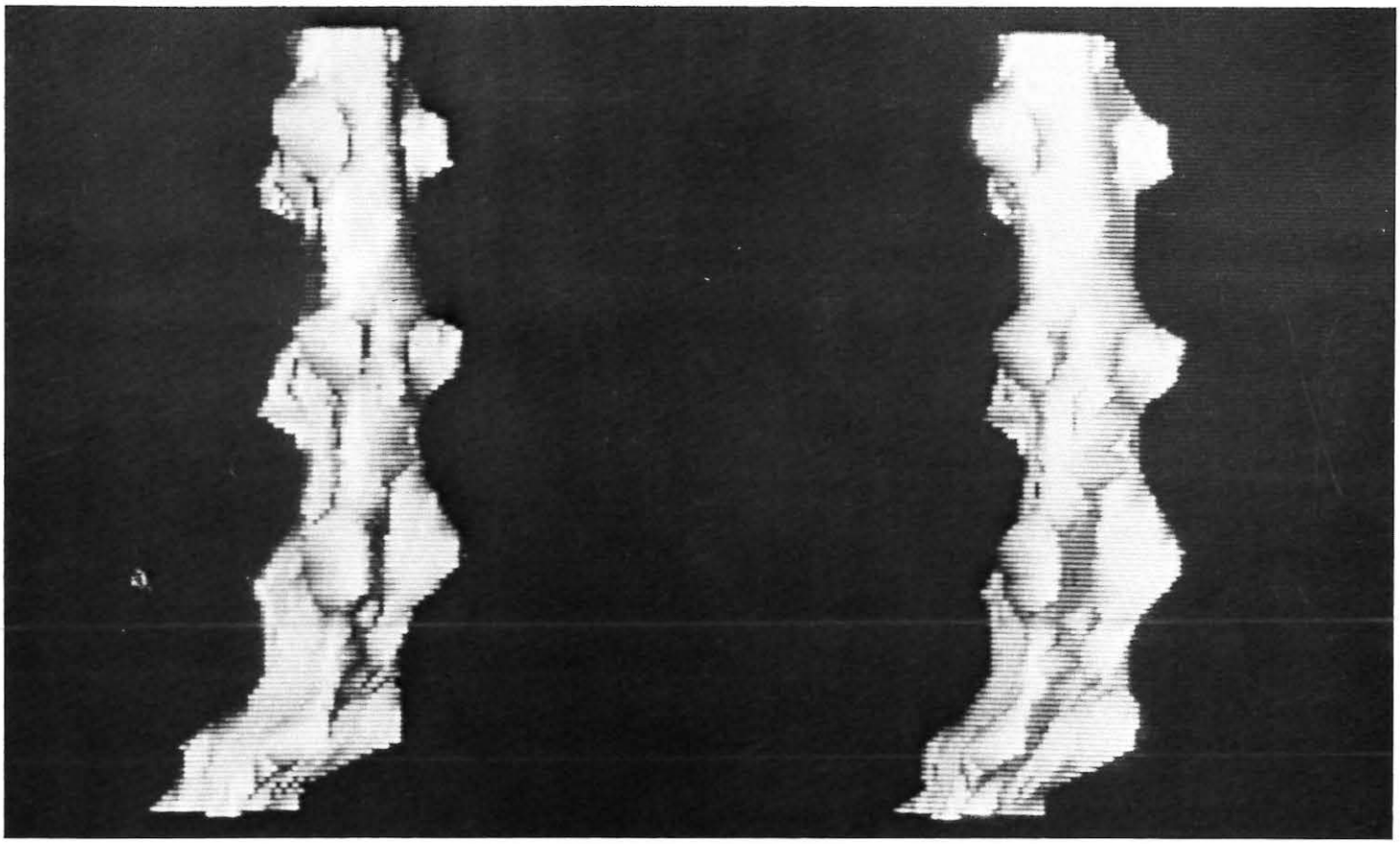
Information Display

The Official Journal of the Society for Information Display November 1982



COMPUTER IMAGING, like the stereotactic pairs of a patient's spine shown above, aids hundreds of doctors in 24 hospitals from Boston to San Diego in detecting cysts, tumors, lumps, obstructions, and organ damage, thanks to a remote imaging network connected to an unusual firm in Torrance, CA. Combining expertise in Computerized Axial Tomography (CAT) and display technology, the team of radiologists and computer scientists at Multiplanar Diagnostic Imaging, Inc. (MPDI) provides a unique service via its own CT scanners in the Los Angeles area and through the GTE Telenet system. MPDI's computer center communicates with CT scanners in leading hospitals at night.

Thanks to SID Publications Chairman Lynn Maldoon, senior project engineer and head of a major computer center at Hughes Aircraft Company, your editor enjoyed a recent tour of the MPDI facility, with Mike Rhodes as our guide. Patients were being diagnosed in the two rooms equipped with GE 8800 scanners. Upstairs were a 32-bit Data General MV8000 computer and associated peripherals, including 16 digital communications channels of 9600 baud each for nocturnal two-way transfer of CT scanner images to and from hospitals tied into the MPDI network.

It was a busy day at the ultra-modern facility. Some 20 physicians were there for a four-hour seminar, tour, and demonstrations of advanced CT scanner imaging and disnostics that afternoon. Another large group of doctors would be similarly instructed that evening.

On pages 4 – 6 of this issue are further details and illustrations as to how the MPDI staff, computer center, and remote imaging network are helping in the progress of medical information display.

FRONT COVER MATERIAL WELCOMED: Every month **Information Display** usually features one or more active members of SID and the products with which they are most closely associated. Please send a glossy print and appropriate captions so that you, too, can be on our front cover. Send your material to Ted. Lucas, Editor, P.O. Box 852, Cedar Glen, CA 92321, or to our National Office Manager, Bettye Burdett, for Information Display, 654 North Sepulveda Blvd., Los Angeles, CA 90049. Next deadline for material from you is December 10 for the January issue. If you miss it, try for the February issue. NOTE: We also welcome feature articles on interesting projects.

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CONTRIBUTORS WANTED

This month's *Information Display* contains as many editorial pages and advertising as the record-breaking October issue, an encouraging sign for our SID Journal. Also we're continuing to get new feature articles such as that on computer imaging and CT scanners, thanks to cooperation from such contributors as Lynn Muldoon.

We're hoping for more previously unpublished technical stories. One source is in the papers presented at SID Chapter meetings. We urge Chapter Chairmen to submit technical papers, with illustrations, for publication in the Journal.

To encourage this effort, Lynn Muldoon, Publications Chairman, Tom Curran, Publicity Chairman, and Ted Lucas, Journal Editor, will judge all such technical papers submitted by SID Chapters and award a prize for the best paper at the SID International Symposium in Philadelphia in May 1983.

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ADVERTISER'S INDEX

CT Scanners, Computer Imaging, and Networking Produce Advances in Medical Procedures

by Ted Lucas

The work being done on a 24-hour schedule every day of the year by Multiplanar Diagnostic Imaging, Inc. (MPDI) is providing significant advances in the application of computer imaging to medical science in three major areas:

1. Use of modern information display techniques, with both hardware and software, for improved interpretation of images from CT scanners — an abbreviation for Computerized Axial Tomography (CAT) X-ray scanners.
2. Supplying computer-aided diagnostic images via networking to 24 hospitals equipped with CT scanners.
3. Developing special equipment such as the improved stereotactic system for CT-aided neurosurgery described in subsequent paragraphs.

Historical Summary

When Sir Geoffrey Hounsfield, MD, and his associates invented the first CT scanner in England 10 years ago, radiologists were immediately impressed with its diagnostic imaging. Now they could view directly the anatomy of the brain. Formerly they could see only shadows on film cast by dense material injected into the brain's blood supply.

American manufacturers, inlcuding General Electric, Technicare, and Pfizer Medical Systems, as well as EMI, the pioneer British maker, produced hundreds of CT scanners to meet worldwide demand. Radiologists soon found these machines useful for examinations of other parts of the body besides the brain.

It became evident that a synergism between radiologists and computer scientists could improve the diagnostics achieved with CT scanners. A pioneer in recognizing this fact — and doing something about it — was Dr. William V. Glenn, Jr., MD, now chairman of MPDI. A radiologist with experience at Mallinckrodt Institute of Radiology and Massachusetts General Hospital, Boston, Dr. Glenn was also trained in computer applications. When he came to Long Beach Memorial Hospital in California in 1976, he quickly assembled a scientific team, including Michael Rhodes, PhD., a computer software specialist, to aid makers of CT scanners in applications techniques. Dr. Glenn's group provided fundamental multiplanar reconstruction and display software for the four leading makers of CT scanners listed in the preceding paragraph. They also worked on 3-D displays for both high-resolution CT machines and nuclear magnetic resonance (NMR) imaging systems.

Next step was the formation of a corporation, MPDI, in 1980. Associates of Dr. Glenn included Robert Brewster, now president of the firm, and former director of product development at Pfizer Medical Systems, New York; and Dr. Rhodes, who brought along a programming team. The firm purchased one GE 8800 CT scanner and began providing a service both to the medical profession and to scanner manufacturers.

Now MPDI has two GE 8800 CT scanners and a model 9800 on order. Its computer center includes a 32-bit Data General MV8000 computer with 4 Mbytes of main memory, a virtual memory operating system, 16 9600-baud communication channels, and 600 Mbytes of disk storage. Backing up this host computer center in Torrance, CA, is similar equipment at the computer maker's regional headquarters in El Segundo, a few miles away.

"MPDI expertise now covers the systems hardware, the computer science and graphics required, and medical applications to radiology," says Mike Rhodes, Research Director.

Fig. 1

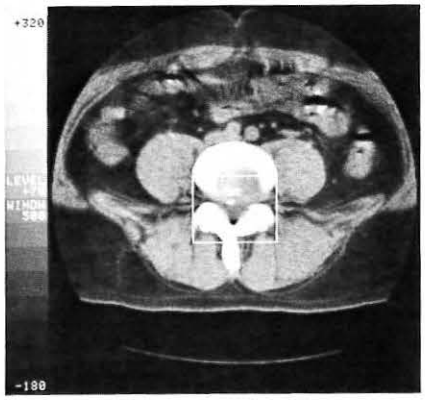
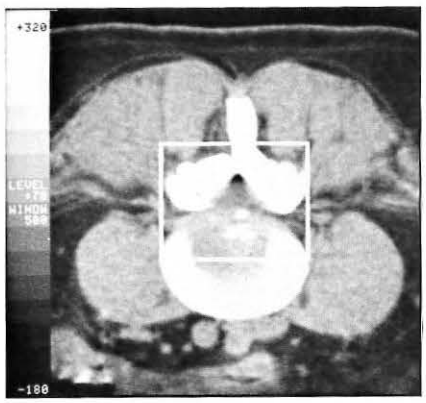


Fig. 2



Thanks to these demonstrated skills, MPDI is now connected by the GTE Telenet network to 24 hospitals in the continental United States to provide a two-way diagnostic imaging service.

Multiplanar Diagnostic Imaging

Computed tomography scanners produce a series of images which are cross-sections of the body. *Transaxial* CT scans are X-ray slices across the long axis of the patient. Each slice can be taken at a different angle by tilting the scanner's gantry.

In the case of the human spine, however, as a typical body structure organized along a central long axis, more coherent displays are presented in slices cutting the structure *longitudinally.*

Beyond such transaxial and lengthwise images, MPDI goes a further step with CT/MPR (Computed Tomography with Multiplanar Reconstructions). This is a specific scanning procedure to obtain mutually registered slices that yield the necessary image data for the computer to reconstruct many other planes of view. Such planes include the *sagittal* view, images presented as though looking through the patient's side; and *coronal* view, images as though looking through the patient's back.

Figure 1 shows a full-field CT image, viewed from the patient's feet; a transaxial view of the spine's lumbar region. The scanner takes a set of these images, 3 mm apart. Since each CT slice thickness is 5 mm, each one is overlapped 2 mm. These images provide data to create sagittal and coronal views of the spine.

First, an imaginary box is set around the spine as shown in Figure 1. This creates a rectangular 3D block of data through all the overlapped slices in the study. The digital pictures within the block are then used to calculate picture elements for added picture sets of the spine.

Second step appears in Figure 2. The cross-sectional image is rotated 180° to present the anatomy in a surgical (prone) position. Also the useful portion of the image, including the box, is enlarged to actual life-size for surgical measurement and comparisons.

In this brief article, your editor has found it impossible to give as much detail as readers might wish. For additional information, see the bibliography on page 6.

Networking Aids Many Hospitals

MPDI got off to a flying start in supplying its network two-way CT/MPR service. The first CT-scanner-equipped hospital to tie in was the prestigious Massachusetts General Hospital, where Dr. Glenn had once made a reputation as a radiologist with computer expertise.

Now there are 24 hospitals, each with GE 8800 scanners, connected through the GTE Telenet to the CT/MPR processing facility at MPDI. Hardware modifications for these network sites are shown in Figure 3A, the network in figure 3B. Each remote scanner is connected through a universal line multiplexer (ULM) board to a 4800 baud modem installed by MPDI and thence to the network via a dedicated 4800/9600 baud telephone data line.

The CT technologist at a typical hospital on the network triggers a processing connection to the MPDI net by initiating the "CTNET" program before leaving the hospital for the night. At Torrance, the MPDI host computer automatically establishes processing connections with all remote sites (hospitals) found in wait status.

Once any remote CT scanner computer and the MPDI host computer system are connected, they conduct a high-speed dialog. This involves extensive compression of incoming data, high speed batch CT/MPR processing and reformatting, and again data compression of outgoing images to the remote site.

Thus each hospital in the network can expect to get 8 to 20 cases formatted and interpreted by the MPDI system overnight. While much of this work has been applied to spinal problems, CT/MPR has also proved useful for such other body areas as the head, lungs, adrenal glands, pancreas, liver, lymph nodes, pelvis, and bladder.

Beyond its daily service to U.S. continental sites, the MPDI staff has handled difficult cases referred from South America, Canada, and Hawaii. With increasing use of satellite relaying, it's not unreasonable to expect further extensions of this valuable medical imaging service.

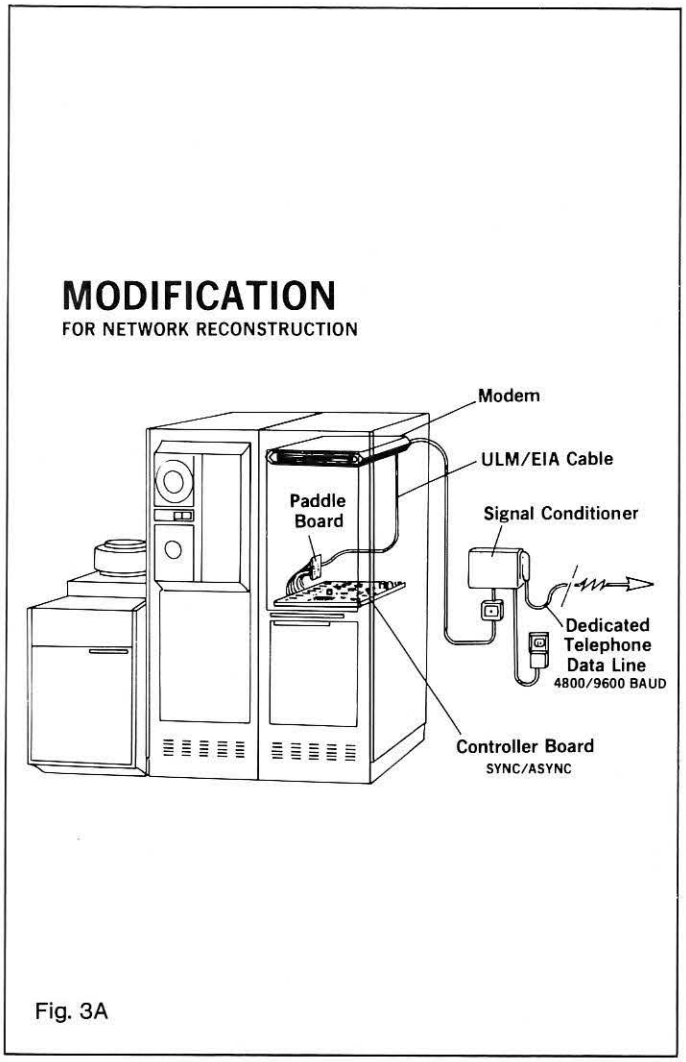


Fig. 3A

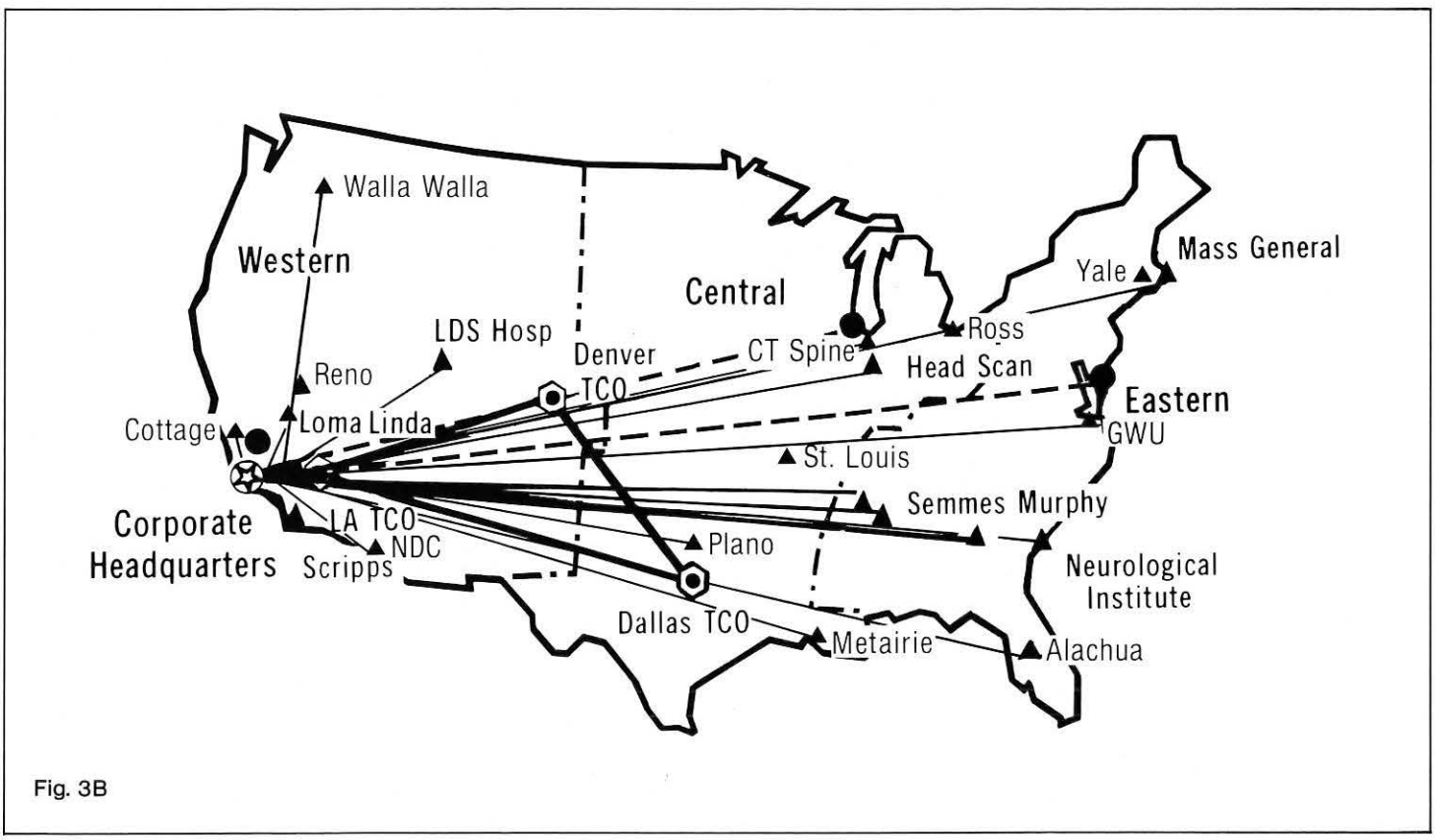


Fig. 3B

Stereotactic System for CT-Aided Neurosurgery

For readers puzzled by the term "stereotactic" on the front cover of this issue, stereotaxy means "arrangement in space". It refers to any neurological procedure that places a probe in a region of the brain or spinal cord without directly visualizing that region. Thus a surgeon can reach a structure in the brain to take a biopsy, stimulate the area, or destroy it without having to make a large incision in the brain or use general anesthesia.

Recently the MPDI staff, which includes Dr. Stephen Rothman, MD, a neuroradiologist, has developed a 2nd generation CT-aided stereotactic system with improved speed, image resolution, accuracy, and patient comfort as compared to previous systems. Drawings of the stereotactic frame used in this system appear in Figures 4 and 5. Figure 6 shows simulation on a CRT display of part of a patient's spine.

When Mike Rhodes was showing the improved stereotactic frame to Lynn Maldoon and your editor, he added an amusing footnote. To prove the accuracy of this frame before neurosurgeons used it for human patients, a watermelon was placed in the frame to simulate a human head. Then, to introduce an anomaly or target into this "brain", a BB shot attached to the end of a copper-wire probe was thrust into the watermelon mounted in the stereotactic frame. After repeated experiments, Dr. Rhodes and his associates found that their CT-aided stereotactic system can accurately locate in three dimensions objects less than 1 mm in diameter.

What this means in the real life of a neurosurgeon is that he can use CT-aided stereotactical equipment both for improved diagnostic ability and also to make actual neurosurgery speedier and safer. Dr. Glenn, Mike Rhodes and their associates are confident that the new stereotactic frame and its software will markedly reduce the time needed for surgery. They also point out that neurosurgeons will find it increasingly comfortable to conduct surgery in CT scanner suites because of this new stereotactic system.

According to the MPDI staff, neurosurgeons have objected in the past to operating in a CT scanner suite because of possible lack of sterility and distance from life-support aids. The new stereotactic system is designed to minimize these objections. Precise probe placement means that drill holes in the skull for simple biopsy or ablation are very small, less than 3 mm in diameter. Risk of infection becomes remote with routine precautions. Also the MPDI staff does not endorse the CT suite for all neurosurgery: it seems likely that many surgical procedures will find CT-aided stereoptic systems increasingly useful.

In their modern facility, the team at MPDI is providing medical sevice with their two CT scanners and computer imaging center for an average of 30 patients a day. When their additional scanner is delivered, this number will probably increase to 45 daily. The MPDI network serves an additional 75 patients per day. Thus the MPDI staff furnishes local medical service for the Los Angeles area, two-way diagnostic imaging for a network of 24 hospitals across the country, and still has time for useful inventions like the new stereotactic frame and associated software.

Bibliography

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CT/MPR Examinations of the Spine, Multiplanar Diagnostic Imaging, Inc., 2730 Pacific Coast Highway, Torrance, CA 90505.

"Network image processing for computer tomography (CT) scanners: report on clinical trial sites," by Michael L. Rhodes, William V. Glenn, Jr., Yu-Ming Azzawi, Robert B. Brewster, Stephen L. G. Rothman, Proceedings of SPIE, Volume 318, January 1981.

"Stereotactic Neurosurgery using 3-D Image Data from Computed Tomography," Michael L. Rhodes, PhD., William V. Glenn, MD, Yu-Ming Azzawi, MS, and Roger Slater, MD. *Journal of Medical Systems,* Vol. 6, No. 1, 1982.

"An Improved Stereotactic System for CT-Aided Neurosurgery," by Michael L. Rhodes, PhD., William V. Glenn, Jr., MD, Yu-Ming Azzawi, MS, and Robert S. Howland. (The latter is head of Howland Industries, Garden Grove, CA, manufacturer of the stereotactic frame for neuroradiology invented by MPDI.) This paper will be presented at the Hawaii International Conference on System Sciences in January 1983. Thus, thanks to a big assist from Lynn Maldoon, *Information Display* scores another editorial first since all the final material on the stereotactic system for CT-aided neurosurgery has never previously been published.

Fig. 4

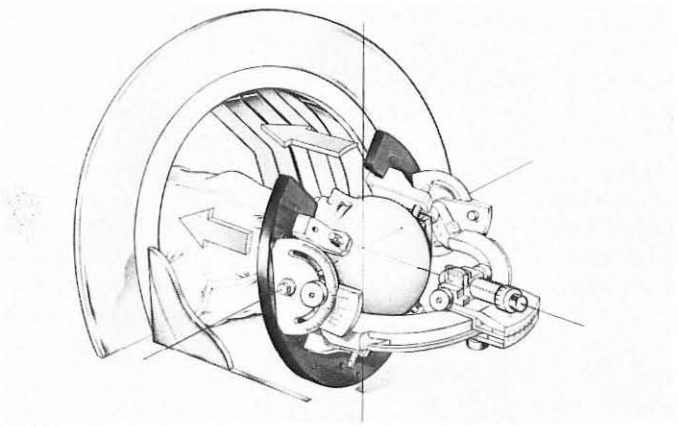


Fig. 5

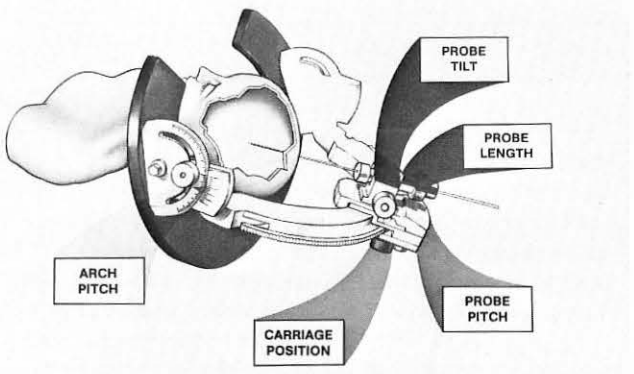
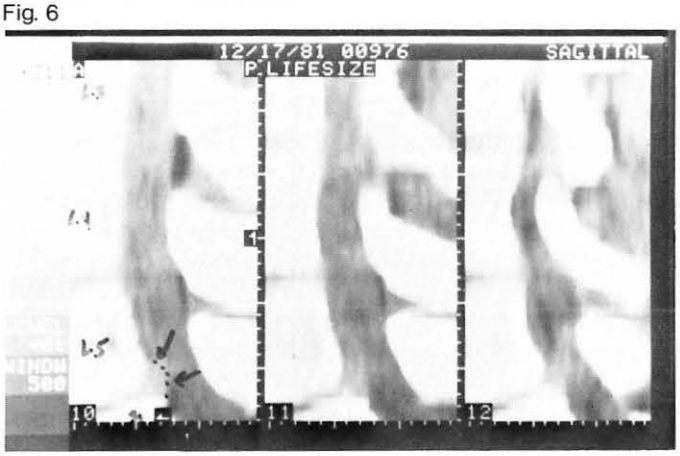


Fig. 6



Color Character Generator Model 801C

The Quantum Model 801C is a programmable RGB video test generator for use in development and manufacture of color monitors and terminals. The unit can be programmed to duplicate the video signals of a given CRT terminal or specific video application. Formats for many CRT applications may be stored in the Model 801C's EPROM, making it an excellent production test generator for companies who manufacture color display monitors for use in terminals. The 801C has all the features of the Model 801A plus color capabilities with sixteen selectable color patterns. These patterns allow testing for purity, convergence, gun tracking, geometry, bandwidth, focus, and brightness. Video amplifier characteristics may be accurately determined as color is switched on a dot basis.

FEATURES

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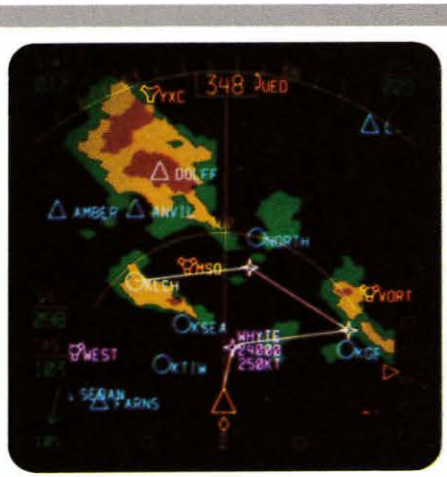

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Pennsylvania Educational TV Picks Hughes To Build 22-Hop FM Microwave System

A contract for a microwave distribution network that will bring educational television programming to the major portion of the state of Pennsylvania has been awarded to Hughes Aircraft Company's microwave communications products, Torrance, CA, by the Pennsylvania Educational Communications System (PECS).

The contract, valued at more than $1 million, calls for Hughes to design and build a 22-hop terrestrial distribution system that will interconnect with the network that is already operational in a portion of the state. It will be a two-channel, bi-directional system, and is scheduled to be in operation by October of this year.

The statewide distribution network, operated by PECS, will provide public access to educational programming via cable television systems throughout Pennsylvania. Plans call for an eventual expansion of the network to an eight-channel, bi-directional system serving more than 1.5 million subscribers. Pennsylvania Educational Communications System is a non-profit organization whose membership includes a number of leading independent cable companies and multiple systems operators in Pennsylvania. Network programming, designated Pennarama, is originated by Pennsylvania State University in State College PA.

"The Pennarama network equipment will utilize proven technology of the Hughes microwave radios to provide a superheterodyne system for reliable medium and long-haul interconnects," Abe Sonnenschein, Hughes AML Manager, says. The initial order from PECS includes the Hughes Model STX-141 high-power AML transmitters, broadband receivers, FM modulators, antennas and accessories.

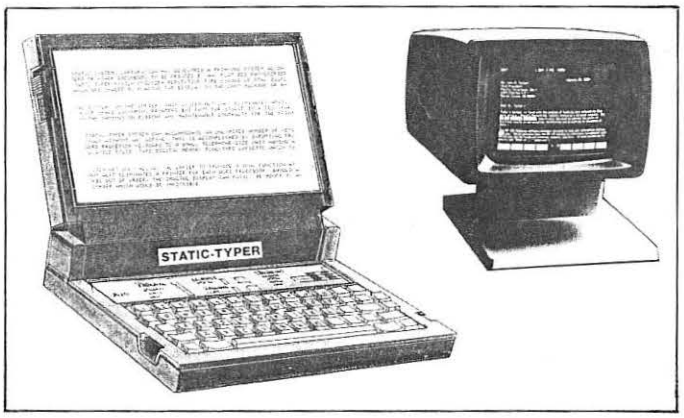
Donald A. Shurtleff, senior staff engineer and psychologist with Hughes Aircraft Company, Ground Systems Group, died May 27, 1982, in Whittier, California. Shurtleff received his doctorate from Boston University and worked for MITRE Corporation as a staff psychologist and for the American Institutes for Research (AIR) as a senior research scientist. He was an expert on the design and testing of visual data displays and had received awards for pioneer work in developing fonts for characters and in display legibility studies. He recently published a text, *How to Make Displays Legible.*

David M. Goodman, founder and president of Davex Engineering Company, San Diego, and a former Secretary-Treasurer of the SID San Diego Chapter, died of a sudden heart attack on October 8. This was particularly tragic because Dave was on the threshold of success, both technical and financial, in the development of his beam-index color CRT display system described in the October issue of this Journal.

Goodman was a graduate of CCNY, with an M.S. in electrical engineering from New York University, where he taught for many years. He did advanced work in display systems for ASW and other military applications, and also designed automatic test equipment. He was the author of seven technical books, including one on the Apollo mission. He is survived by his widow, Mary, who aided with his SID work; and by two daughters, Mrs. Eileen Ashwal, and Michele Goodman.

The Ultimate Extension?

Static Systems Corporation (SSC), New York City, has developed a printing system allowing letters or other documents to be printed by any flat bed photocopier. The static-typer system utilizes reflective type liquid crystal displays which are imaged by placing the display on the copy machine or building it into a replaceable cover adapter. The word processor user types the text document and, after editing, inputs the text to the liquid crystal display on the copier. "This system not only eliminates noise, expensive, space-consuming printers but pays for itself in a few years from the savings on ribbons and maintenance contracts for the printer," says Bob Lester, president of Static Systems Corp. and longtime SID member.



The static typer system can accommodate an unlimited number of keyboard terminals without any wiring. This is accomplished by inputting from the word processor keyboard to a small telephone-size unit having a non-volatile solid-state digital memory (plug-type cassette), which is simply removed and plugged into a similar size electronic decoding unit placed next to the copy machine. This decoder controls the display on the copier. The system not only allows the copier to provide a dual function at low cost but also eliminates a printer for each word processor. Should a copier be out of order, the imaging display can easily be moved to another copier, "This would be impossible with high-priced laser printers," Dr. Lester states.

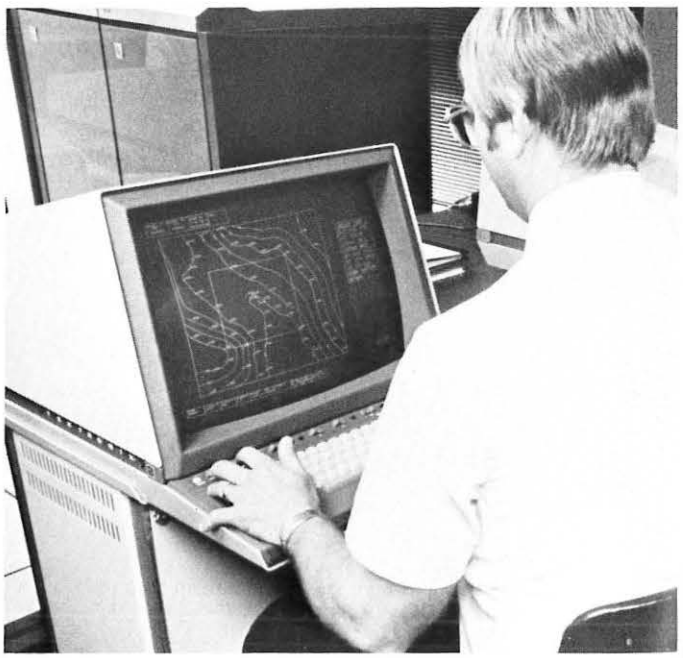
Another significant advantage is coupling to a telephone data unit to send or receive to remote copiers anywhere, thereby eliminating teletype and telex machines. Graphic quality displays will also be available in the near future, allowing the use of a digitizing scanner to transmit pictures, signatures, drawings, etc. Simply pushing the button for the number of copies desired would allow the millions of existing copiers to be converted instantly to word processing printers, while they also retain their function of duplicating originals. The SSC system does all this without altering copier.

The copier imaging display screen flat panel can be connected directly to the remote display from multiple word processor keyboard terminals as an alternate. Since it only requires one remote display equal to the cost of a printer, each additional terminal eliminates the cost of its printer. "As the cost of these flat panel displays decreases, the CRT will also be replaced for the keyboard terminals,"

the SSC president predicts.

"The information display industry has been anxious to replace the CRT with flat panel displays such as those shown on this page. Advantages of liquid crystal flat panel displays over CRTs are as follows: The CRT takes 20 times more space than a flat panel display; the CRT weighs at least 10 times more than the flat panel display; the CRT requires a 15kv to 25kv stepup transformer; the average CRT uses 100 w at 120v. The LC display uses less than 1 watt at only 2 volts. The CRT cannot be read as easily in bright light as the LC display can. The CRT causes more eye strain after many hours of viewing. The CRT is not portable in a briefcase as is the LC terminal display. The CRT shipping charges cost considerably more. It is therefore quite apparent that the future will consist only of low power flat panel digital information displays of unlimited sizes," Bob Lester declares.

New Software System from Radian Corp.



A new software system, CPS-1/G from Radian Corporation, Austin TX, is ideal for interactive contour plotting applications, says Michael Haecker.

NO RIBBON TYPEWRITER

A sound comparison between the STATIC-TYPER®

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clickety-clack
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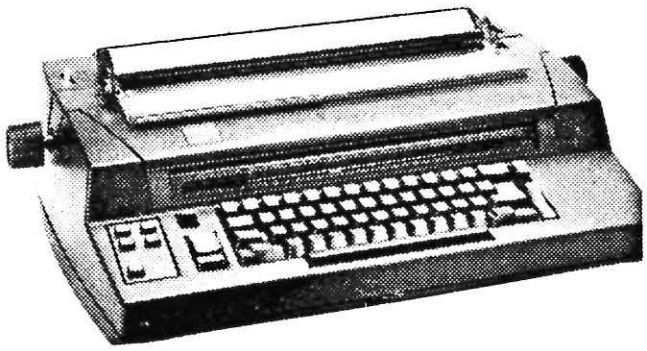
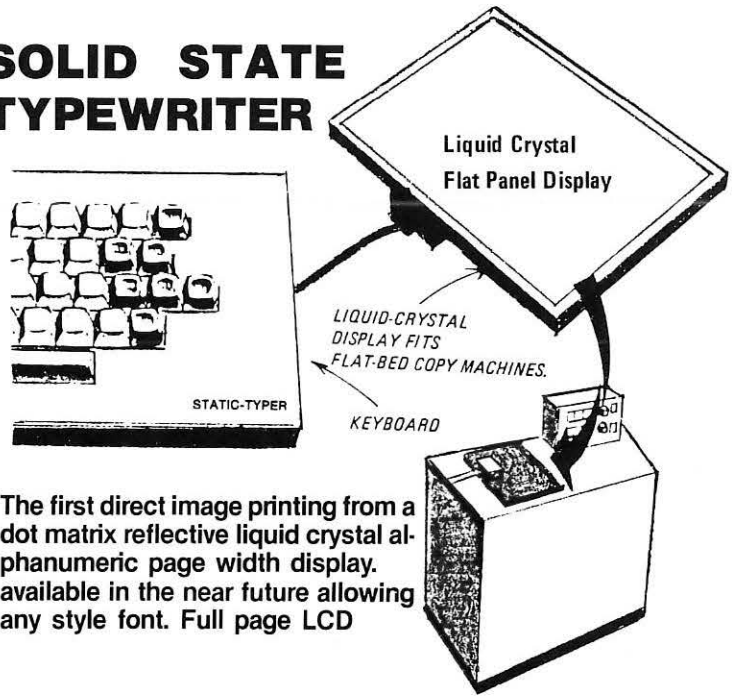


NO NOISE

NO WEAR

NO RIBBONS

SOLID STATE TYPEWRITER



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GREETINGS TO NEW SID MEMBERS!

Each month you'll find a roster of new SID Members, listed by chapters with the Chapters in alphabetical order. If your name — or a friend's — should have been listed and was inadvertently omitted, please let Bettye B. Burdett or your Editor know immediately. We'll make amends in the next issue. Additional new SID Members are listed on subsequent pages and others will appear in the December issue.

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SID CALENDAR

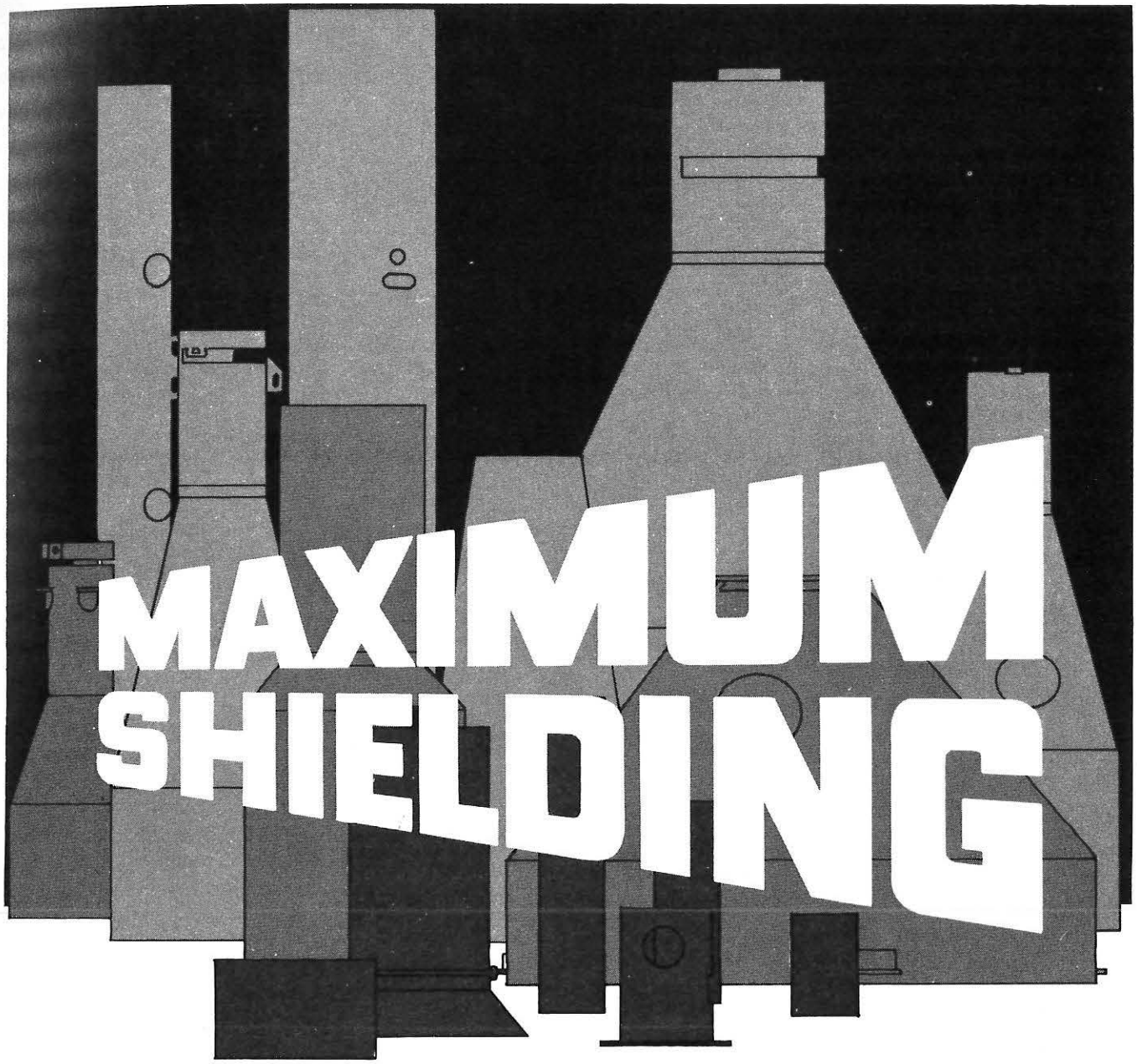
DECEMBER 1982 to OCTOBER 1983

December	1	Honors and Awards Nominations Deadline (Submit to Gene H. Slottow, 101 Meadows, Urbana, IL 61801)
	6	Abstract Deadline for SID 1983 International Symposium (Submit to Leonard Klein, Palisades Institute, 201 Varick St., New York, NY 10014)
	15	Nominations for National Officers and Regional Directors Due, (Submit to T. DuPuis, Nominations Committee Chairman)
	15	Bylaws Recommendations Due

1983		
January	11, 12	SID 1983 International Symposium Program Committee Meeting, Hilton Hotel, San Francisco
	11	Executive Committee Meeting, Hilton Hotel, San Francisco
	20	Quarterly Chapter Rebates Mailed
February	15	National Ballot Mailed
March	4	Post-Deadline Papers for SID 1983 International Symposium
April	12	National Ballot Return Deadline
	20	Quarterly Chapter Rebates Mailed
May	8	Executive Committee Meeting
	9	National Board Meeting, Philadelphia, PA
	9 – 13	SID 1983 International Symposium, Mariott Hotel, Philadelphia, PA
July	20	Quarterly Chapter Rebates Mailed
October	3 – 5	Japan Display '83, 3rd International Display Research Conference, Kobe, Japan

OTHER EVENTS

June	8 - 8	1983 National Educational Computing Conference (Towson State University host, Baltimore, MD)
	26 - 30	National Computer Graphics Association, Chicago
September	19 - 23	9th World Computer Conference, Paris, France



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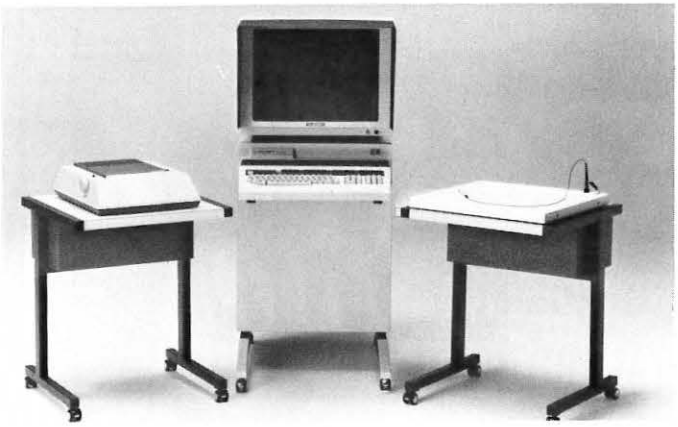


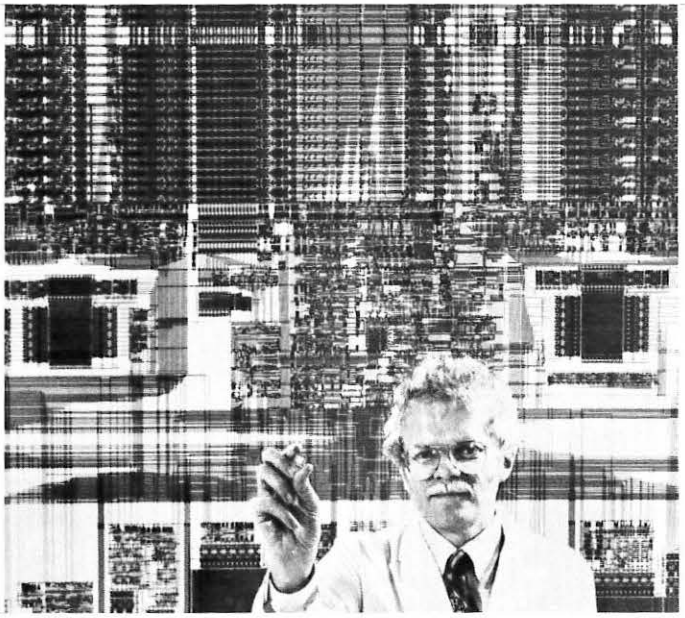
Seiko Instruments Announces First Raster Scan Graphic Display With Hardware Anti-Aliasing

The first raster scan graphics terminals to include integral display anti-aliasing at the hardware level were introduced recently by Seiko Instruments U.S.A., Incorporated, Santa Clara, CA. The newest members of Seiko Instruments' D-Scan series of graphic terminals, introduced abroad nearly three years ago, the GR-2412 7-color intelligent terminal and the GR-2212 intelligent monochrome terminal are said to present the display quality of vector-type terminals, but with all of the features and functions traditionally provided with raster scan technology.

Both terminals are 19-inch screen models that use a viewable resolution of 1024 x 780 pixels to maintain the preferred 4:3 aspect ratio. Direct addressability extending to 4096 x 7094 points, located within a coordinate space of 32k x 32k, allows for true zooming, scaling, and easy manipulation of large data bases. Other Seiko Instruments products are the GR-60 high resolution hard copier and a pair of graphic digitizers.

Fujitsu Sets Up Television Conference Network Linking Its System Laboratory in Tokyo to Its Numazu Complex in Shizuoka

Fujitsu will set up a television conference network this fall to link its System Laboratory in Tokyo with its Numazu Complex about 120 kilometers away. The television conference consists of wide-screen color TV displays, electronic "blackboards," facsimile devices and two-way audio systems. Fujitsu says the television conference network helps save staff time and reduce transportation costs common to conventional conferences lacking a telecommunication system. In late 1983, the company will extend the TV conference network to its Kawasaki Works, Oyama Works and FACOM Building in Tokyo. In a similar effort, NTT will soon begin an experimental TV conference service between major cities via digital transmission lines.



It Takes One to Make One

A 20 foot by 20 foot computer-generated print provided the final quality check for the design of Bell Labs' new BELLMAC™-32A* microprocessor, the dime-size chip held by Robert Krambeck, supervisor of the high-end microprocessor design group at Murray Hill, NJ. BELLMAC-32A offers processing power comparable to that of today's minicomputers.

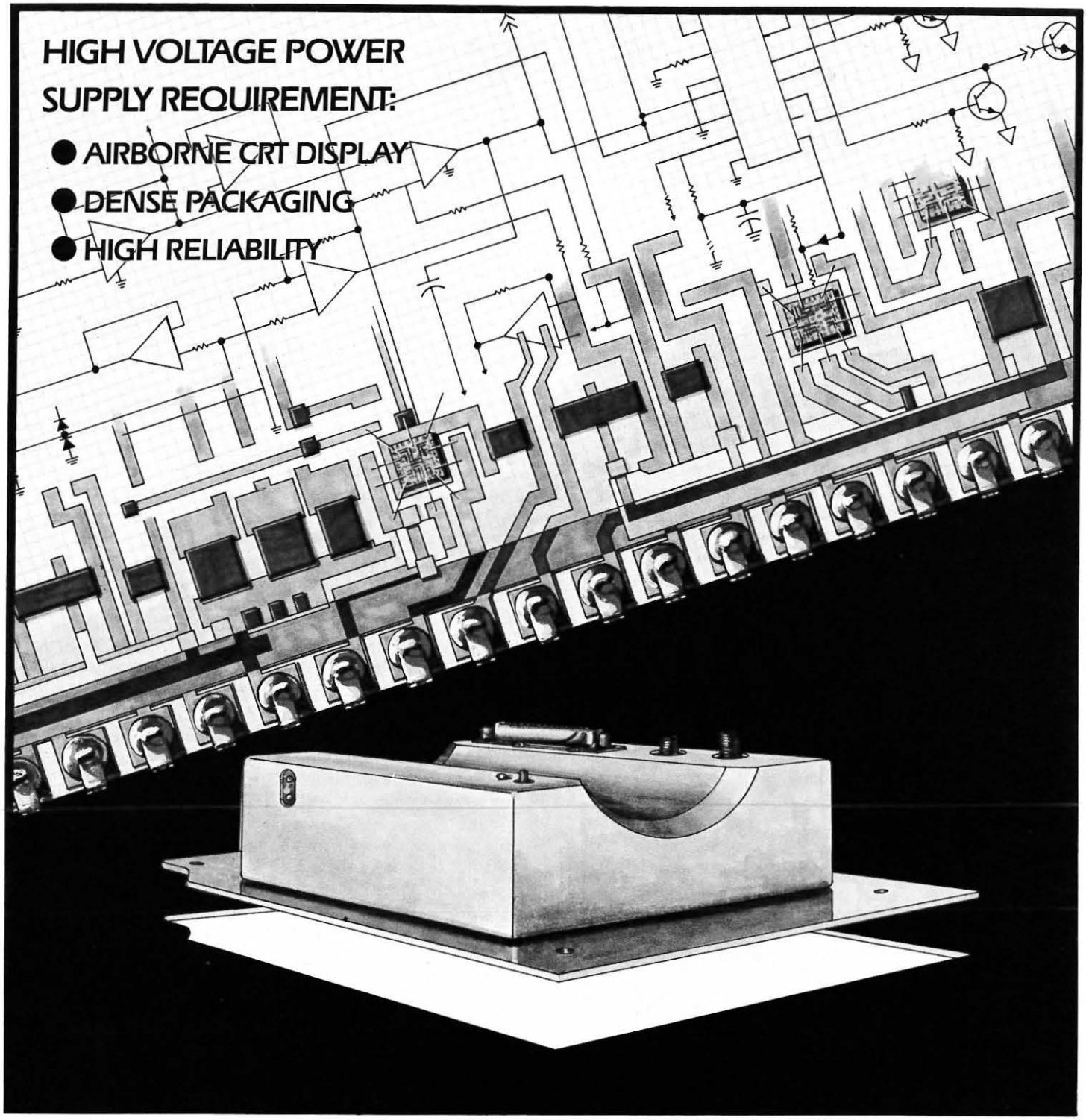
***BELLMAC is a trademark of Western Electric**

NTT Says a "Frozen Silicon Element" for a Supercomputer Operating Device is Promising

NTT Japan, which has been developing a frozen silicon element for supercomputers, says that the future operating speed of the operating element would be comparable to that of the Josephson element. At present, the frozen silicon element, which makes use of superconductivity at a very low temperature (around 270°C below zero), can theoretically achieve an operation speed as fast as 10 picoseconds compared with the conventional silicon element's speeds of 50 to 100 picoseconds.

Fujitsu Achieves an Operation Speed of 12.8 Picoseconds with HEMT, Its Advanced Operational Element

Fujitsu has achieved a computer operation speed of 12.8 picoseconds with HEMT (high electron mobility transistor) at 196°C below zero, making it almost comparable to the operation speed of the Josephson junction element being developed by IBM. One picosecond, or one trillionth of one second, is the time during which light travels 30 cm. In addition, Fujitsu has reduced the operation speed of HEMT at normal ambient temperature from 56 pico seconds to 16.7 picoseconds. This reduction is said to constitute a major step in adapting HEMTs for practical use in computers. However, the transistor integrity of HEMT is still in the initial stages of development.



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Altos Launches Software Line with Accounting and Word Processing Packages

With its newly introduced accounting and word processing packages, Altos Computer Systems, San Jose, CA, has launched a line of software products compatible with the firm's broad range of microcomputers. The move is said to provide complete user-friendly systems tailored specifically for business and industrial applications.

According to Kapil Nanda, vice president of software, both packages contain the on-line ALTOS COMPUTER TUTOR™ that helps users become productive from the first day of operation, not weeks down the line. The incorporation of the tutor into all its application software is consistent with the company's philosophy of producing user-friendly systems.

The ALTOS EXECUTIVE WORD PROCESSOR™ combines extensive text-editing, spelling checking, and a merge program for mailing list management, making it one of the most comprehensive programs on the market.

The ALTOS ACCOUNTANT™ provides seven modules that can be run independently in a multi-user environment: inventory, job costing, accounts receivable, accounts payable, general ledger, sales order processing, and payroll.

"It is Altos' philosophy to implement industry standards such as XENIX/UNIX, CP/M®, MP/M™ and Ethernet wherever possible," said Nanda. "However, in selected vertical areas, such as business accounting and word processing, we want to provide our customers with a complete hardware/software solution."

Altos Computer System has launched its user friendly accounting and word processing systems, featuring the ALTOS COMPUTER TUTOR™ that is said to assure productivity from the first day of operation. The new software is optimized for use on all Altos 8- and 16-bit microcomputers.

Lexidata Graphics Workstation

Lexidata Corporation, Billerica, MA, a manufacturer of high performance raster display systems, recently announced its Model 8400/D, the newest member of its System 8000 family of graphics display systems. The 8400/D adds a Winchester disk and tape cartridge unit to the 8000 high-resolution raster graphics system.

According to Lou Reynolds, product marketing specialist for the System 8000, "The 8400/D is being offered with the tools and documentation necessary to allow an OEM or sophisticated end-user, familiar with Motorola 68000 cross-development, to develop a unique distributed or stand-alone high performance graphics workstation."

The System 8000 family of products features a dual processor architecture combining Lexidata's high speed raster display processor for control of the display pixel memory and the Motorola 68000 microprocessor for execution of high level graphic and control functions. The Model 8400/D incorporates a mass storage subsystem consisting of a Winchester disk and a tape cartridge back-up unit. This includes a 14-inch Winchester device and interface that is available in either a 33 or 67 MB version. Transfer time for the device is 1.04 MB/sec and the average seek time is 45 ms. The tape unit is a start/stop type which can be used for individual file storage or as a disk backup. Either device can be used for initial program loading in a stand-alone configuration.

Basic configurations of the 8400/D include the Motorola 68000 processor with 256 KB RAM, 64 KB ROM, display processor, display monitor, 33 MB disk, 10 MB tape cartridge, 8 RS232 ports packaged in a desk-type or low-boy enclosure.

Display processor configurations include a 1280 x 1024 x 1 black and white 60Hz non-interlaced version, or 640 x 512 with either 4 or 8 image planes at 60Hz non-interlaced color or 1280 x 1024 color with either 3 or 4 image planes at 30Hz interlaced. Color units include a programmable color lookup table offering 8-bits or 4-bits resolution per color.

Also included with the 8400/D to facilitate development of workstation program code are a PROM resident monitor and debugger, sample device drivers, run time kernel, a graphics library written in "C," a programmer's reference guide, and a hardware theory of operations manual.

Guest Column by Bill Mulley, SID/DVC Director

Why can't we program our display and control systems without having to be a software expert?

If Intermetrics of Cambridge, MA. has its way, we will soon be able to. Jim Michener and Bobbi Sroka are leading an effort to develop software tools which the novice can then use to make his display system operational. This is accomplished by a high order language and will allow an operator to make his wishes known in as close to conversational English as possible.

Since the mid-1970s there has been much effort in this country to develop a standard specification for computer graphics software, first in the ACM SIGGRAPH Graphics Standards Planning Committee and lately in the American National Standards Institute Technical Committee for Graphics Standards.

Other countries, such as West Germany, UK, and the Netherlands, have also been active nationally. This led to international cooperation which is being accomplished via the International Standards Organization. This group has reached substantially an agreement on a specification of graphics semantics that bears the name "Graphics Kernel System" or GKS. It has been approved as a Draft International Standard and the hope is that, by 1983, GKS will become an International Standard. Jim Michener is the International Representative of the ANSI Technical Committee dealing with Graphics.

What Jim and Bobbie are doing, under a U.S. Navy contract, is to develop a display software development tool and a programmable control set software development tool.

A display format specifies both what images are to be displayed and how the images change. For instance, formats can contain combinations of dots, straight lines, polygonal lines, positioned text, circles and areas. Each of these can be altered by line style, blinking, intensity, etc., or transformed by rotation, size and translation within a specific image to be developed.

To further complicate matters, if these images are to vary in real-time, a format must specify how the formats are to be modified. This is done by indicating what combinations of geometric shapes change, their initial value, the computational rule determining the change, the range of possible values, and the frequency of change.

This formal language, called GRADS (Graphic Real-Time Application Display Support), expresses an image in terms of its natural components, all under real-time control.

Input devices or multifunction controls are also being developed as control fuctions increase far beyond the physical capability of a switch dedicated to each function. Here, too, a tool is needed to develop the required software in an economical manner.

Each switch on the multifunction control may accomplish an unlimited number of functions, but in reality these functions entail only a small variety of actions. For example, each depression of one key can change the function of that switch only, or any number of other switches, or all the switches, or enable a force stick in the control unit itself. At the same time that depression can set a variable, invoke a new function or send a message to another subsystem. A large, yet regular process such as this is best handled by table manipulations. This way only tables need to be developed for each new design, not the basic software itself.

So hang in there, all you people who dislike the tedious job of programming computer graphics. Help is on the way.

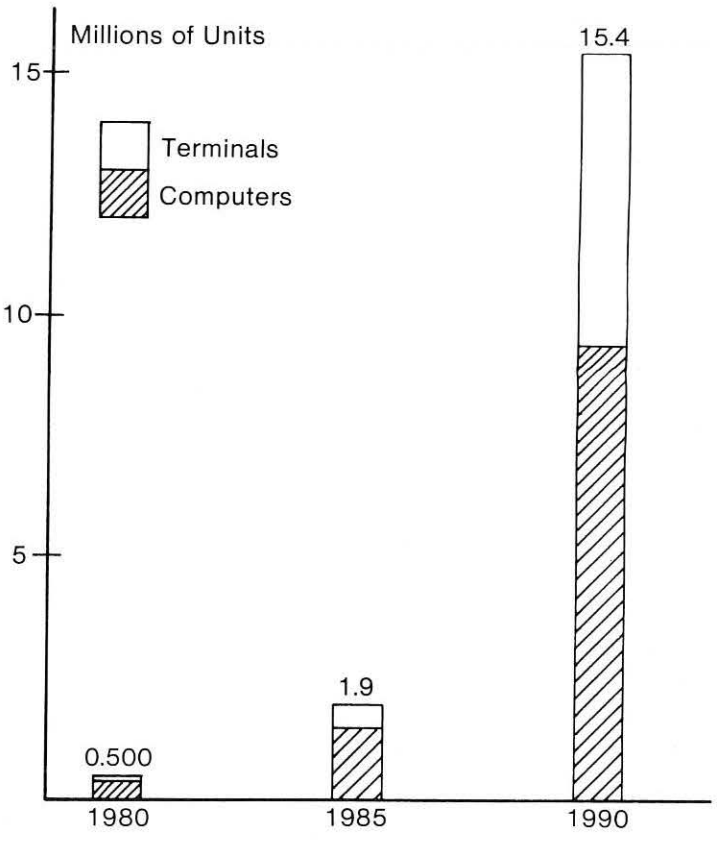
Any Other Guest Columnists?

Bill Mulley, Director for the SID Delaware Valley Chapter, has supplied three guest columns for *Information Display.* The first column on an improved beam-index color CRT system led your editor to obtain the detailed feature article that appeared in the October 1982 issue. The second column, on graphics software, is on this page. Bill's third column will be on page 2 of our December Journal.

If you don't want the strain of preparing a full-fledged technical paper, how about sending us a guest column or two on a current topic?

Prediction of Huge Growth in Information Displays Home Computers & Terminals— Installed Base (Units)

Source: Frost and Sullivan Inc., New York City
Report No. 843



Telesis CAD/CAM System Provides Low Cost/High-Performance Entry Into Printed Circuit Board Design

Telesis Corporation, Chelmsford, MA, has made available its first products, a family of upgradable stand-alone CAD/CAM systems and an applications software package for use in the design of printed circuit boards.

Developed for the emerging low-cost CAD/CAM market, the new systems feature a proprietary operator interface scheme, the Telesis Function Screen— (patent pending). As the single operator control element, the screen and its supporting software effectively eliminate the need for the conventional keyboards, digitizers, data tablets, joysticks, button boxes and thumbwheels of much higher-priced CAD/CAM systems, according to Patrick de Cavaignac, Telesis president.

"The 12-inch function screen is a single device which automatically emulates the functions that, in competitive systems, require five separate and distinct devices," says Gene Robinson, vice president-marketing, "The Function Screen simplifies the operator's work by greatly reducing the number of controls at every step in the design process.

This design concept dramatically reduces the time needed to bring operators up to speed, from the months required on high-priced systems, to days."

The typical Telesis system will be used by small or medium-sized companies or small divisions of larger companies, which heretofore could not afford CAD/CAM technology because of the very high purchase and training costs.

"With system prices starting well below $100,000, including software, and training time cut down to days, Telesis is finally bringing true CAD/CAM functionality to small and medium-sized business," sayd de Cavaignac, Telesis CEO and founder and former CEO of Vydec, Inc.

"The need to increase design productivity by shortening product development cycles, reducing error, providing faster design turnaround, and making products of increasingly higher quality, is as real for the medium-sized business as it is for the Fortune 500 company," he says.

The new Telesis family products are all completely compatible. The single-user systems use fully dedicated computer, graphics, and disc storage resources.

Models T300, T400, and T500 are dual-station systems. The company provides a full upgrade path in the field in order to protect the customer's investment.

The product line incorporates Digital Equipment Corporation's (DEC) LSI-11/23-B central processor using the RSX11M operating system. Storage is handled by Winchester hard disc technology with floppy disc back-up. All systems include a high resolution 19-inch color or monochromatic display.

I-r: Edward Bayone, First National Bank of Boston, John Schickling, VP/Finance, Telesis, Patrick de Cavaignac, President, Telesis, and Tom Bryan, VP, FNB Boston. The First extends Telesis a $3.3 million unsecured line of credit.

Telesis system offers high performance CAD/CAD alternative at affordable price, the maker states. Featuring proprietary Telesis Function Screen™, this system is said to reduce the user learning curve notably.

Telesis offers a variety of peripherals, including a low-cost matrix printer for design verification, a high resolution color plotter, and an optional magnetic tape drive as disc backup and photoplotter interface.

The basic software engine of the Telesis product line is a powerful, high-performance, proprietary, PASCAL-written graphics and database management program designed to support the most complex CAD/CAM applications.

It utilizes a relational database architecture which lets users benefit from full computer intelligence, not just computer graphics. With this built-in intelligence, Telesis systems assist operators at every step of the design process, using previously specified design parameters to check and accelerate the work in progress. Because of their state-of-the-art software engine and unique screen-operator interface, Telesis systems are fully functional and easy to use, the maker states.

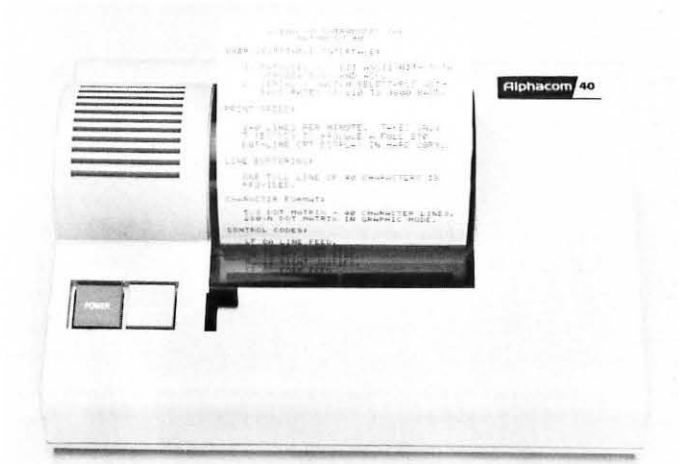
The first application introduced by Telesis is a printed circuit board design software package which is included in the product price. Other applications are scheduled for this multi-applicational system. The PCB application is said to be a fully functional software package which aids at every step of the design process. The powerful features of the relational database underlie the design activity of Telesis' systems. They maintain, with computer accuracy, the relationship between the three components of the design process: circuit schematic, board layout and fabrication tools.

"Gone are the yellow pencils and the last minute errors found in manufacturing, and the confusion which so often surrounds design changes," de Cavaignac says.

A comprehensive symbol library facilitates on-screen schematic design while the system automatically creates a logical database. In addition, Logical Design Rules check errors or exceptions as the design progresses. At any time, a Net List can be extracted to verify the accuracy of the design. To support the circuit board design, features are available to aid in the specification of the mechanical parameters of the board. Rats-nesting, Rubber Banding, and Step-and-Repeat features help in the placement of components as do interactive automatic routing and placement algorithms. Net Lock, Line Lock, and Physical Design Rules Checking are also available to support trace routing work. A variety of fabrication tools are derived automatically from the database. Finally, the system also provides advanced features such as powerful Text Editor, Execute Files and a self-paced Operator Training Mode.

Telesis first started operations in 1981 with the focused objective of finally providing the large community of intermediate sized companies, who still do product design manually, with a high-performance CAD/CAM alternative at an affordable price.

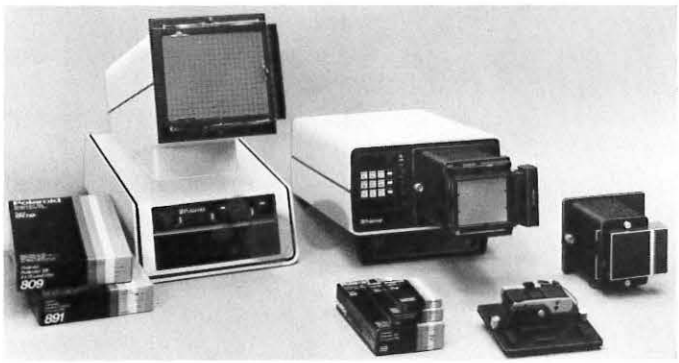
Alphacom, Inc. Wins *Industrial Design* Award for Alphacom 40 Printer Enclosure



Alphacom, Inc. Campbell, CA. has won an "Excellence of Design" award from *Industrial Design* magazine for its Alphacom 40 printer enclosure.

This is a 40-column thermal printer said to feature high speed (4 lines per second), quiet operation, excellent reliability, and a graphics capability. Designed especially for the personal and home computer market, the impact-resistant enclosure is "a major step forward over other designs for the home," according to the award jury. "The design is efficient in terms of enclosure surface area to volume ratio. The way the paper supply role is placed reduces the desk area requirement, simplifies reloading and prevents obstruction. The power supply vent offers enough airflow without letting objects penetrate the enclosure, and there is simple access to the electronic parts for repair or adjustment."

Polaroid Corporation's VideoPrinter Instant Color Film Recorders



Polaroid Corporation's VideoPrinter Instant Color Film Recorders produce high-quality, full-color photographic prints and transparencies from computer or video signals. The Model 8, using digital image processing to capture detail in highlight and shadow areas, produces full-color, 8 x 10-inch instant transparencies on Polaroid Colorgraph Overhead Projection Land film, Type 891. It also produces 8 x 10-in images on Polaroid Polacolor ER Land film, Type 809. The Model 4 VideoPrinter accepts 4 x 5-inch instant sheet or pack instant films, Polaroid SX-70 instant film, as well as conventional 35mm film.

Valid Introduces Scaldsystem — A Computer-Aided Engineering System That Yields Ten Times Faster Design

A computer-aided engineering system, consisting of a complete set of hardware, procedures, and computer programs that can reduce design time for any digital electronic system by more than ten times, has been introduced by Valid Logic Systems (VLS) Incorporated, Sunnyvale, CA.

Configured around graphic design stations, Valid's SCALDsystem offers capabilities not available in any other computer-aided engineering system, says Dr. Jared Anderson of VLS. These include:

A Unix operating system, providing access to a substantial library of software programs;

Interactive, real-time graphic design stations for schematic editing which can share application programs with a mainframe computer, exchanging large data files at high speed;

A cluster system architecture sharing a common data base capable of being accessed simultaneously for a variety of different projects;

A new concept of design validation, known as timing verification, invented by one of the founders of VLS;

A high-speed logic simulator for fast feedback to the design engineer;

A low-cost per terminal system, allowing each design engineer the advantages of "personal" computer-aided engineering.

Based on methodology and computer programs developed at Lawrence Livermore Laboratories by VLS co-founders Dr. L. Curtis Widdoes and Dr. Thomas M.

Continued on page 26

Continued from page 25

McWilliams, SCALDsystem follows a set of procedures—similar to structured programming — that allows the engineer to execute design decisions at a graphic terminal and interactively see the results of those decisions, according to Dr. Anderson, president and CEO.

The hardware is designed to give flexible automated support to this structured design approach. The software, based on the popular Unix operating system, includes powerful programs that enable the engineer to validate design decisions as the design progresses. The validation software runs on either the clustered workstation or a host mainframe.

Using SCALDsystem procedures, the engineer can begin a design with a block diagram comprised of a few functional items. These can, then, be subdivided — with added detail — until each block is described on the screen in terms of actual components. "This 'top-down' logic design permits the engineer to defer dealing with details until the lowest level, resulting in designs that are better connected and free of errors," Anderson says.

The SCALD design methodology has been widely praised in technical literature, Anderson said. According to the Energy and Technology Review, a publication of Lawrence Livermore Laboratory, "manpower savings well in excess of an order of magnitude have actually been demonstrated in practice."

The hardware elements of the system include a desktop graphics-design station based on the Intel 8086 16-bit microprocessor, and a cluster controller designed around the Motorola 68000 16/32-bit microprocessor. The controller can support up to four design stations in a cluster configuration. In addition, the controller can link design stations in a cluster to a network with other clusters, and a host mainframe. Design information between the clusters and the mainframe can be exchanged at rates of up to 800K bytes per second.

The cluster controller contains a 33-megabyte Winchester disk and an industry-standard 1/2 inch, 1600 bpi streaming tape drive. The controller can support an optional electrostatic plotter which can be used to provide reproducible quality hardcopy of schematics.

Entirely designed and manufactured by VLS, a SCALDsystem graphics design station consists of a high-resolution 20-inch CRT display, full ASCII keyboard with programmable function keys, a graphics tablet and two 16-bit microprocessors. The raster-scan display has a refresh rate of 60 times per second and a resolution of 1024 points horizontally x 768 points vertically with four intensity levels.

"Valid chose to run the Unix operating system because it is widely used in universities, making available many scientific and engineering programs useful to desingers such as Berkeley's SPICE program and the Unix VI text editor," Dr. Anderson points out. "We expect to add programs for integrated circuit design, layout and analysis in the future."

SCALDsystem software consists of a graphics editor with which drawings are generated, and a set of computer programs that perform verification procedures throughout the design process. The programs include a compiler, timing verifier, simulator, and post-processor.

The SCALD compiler expands the design in terms of lower-level blocks until the design is expressed in terms of the descriptions of actual parts. Throughout the expansion, interfaces are checked to insure that they are consistent.

The timing verifier assists the engineer throughout the design process in detecting logic-level timing errors such as races, clock glitches, setup and hold violations, and pulse width errors. The timing verifier performs a value-independent analysis of the design, taking into account the full range of delays possible for each component, different rise and fall times, tri-state outputs, and wire-or logic.

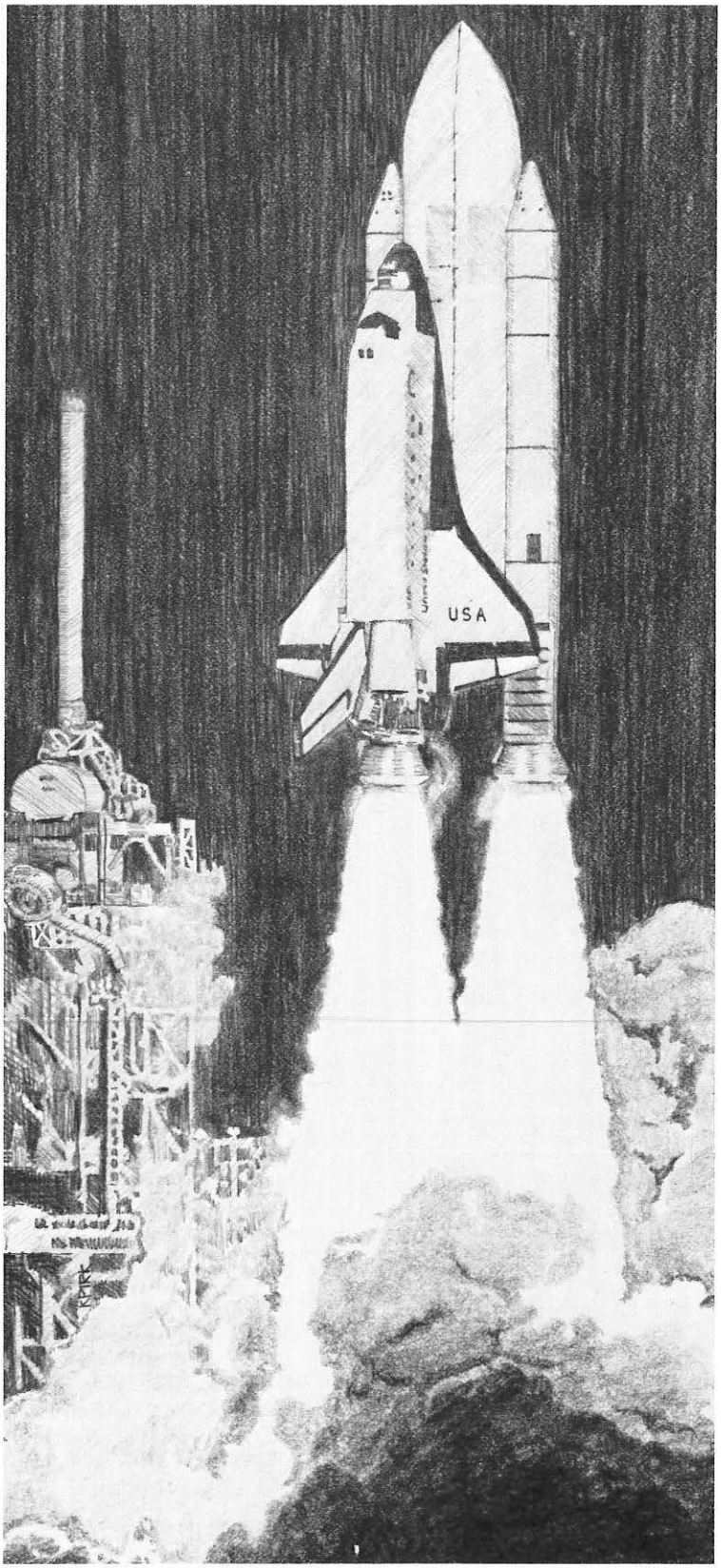
"Ninety percent of design problems are in the timing. The SCALDsystem timing verification tool detects all timing errors in a design when they are still easy to correct. In our experience timing verification is the most important tool in increasing engineering productivity," Anderson explains.

The logic simulator provides interactive simulation at speeds substantially faster than conventional gate-level simulators, according to Anderson. The SCALD logic simulator makes it possible to debug not only hardware, but also microcode firmware or software, he noted. The simulator operates on the primary graphics design database, eliminating the need to define and maintain a separate high-level model for the design.

An interface from the SCALDsystem design database to physical design sytems as well as to other analysis and testing tools is provided by the post processor.

The compiler, timing verifier, and logic simulator are used continuously as the design evolves. Errors are detected early in the design cycle, and since the design itself is debugged, rather than just a prototype, the resulting products are easier to manufacture and more reliable in the field, Anderson stated.

Valid Logic Systems Incorporated was founded in January, 1981 to develop, manufacture, market, and service one of the first systems designed to assist electronic engineers in their work. The SCALD software together with the VALID graphics design station, provide an engineer with a powerful, cost-effective aid for logic design, the maker states.



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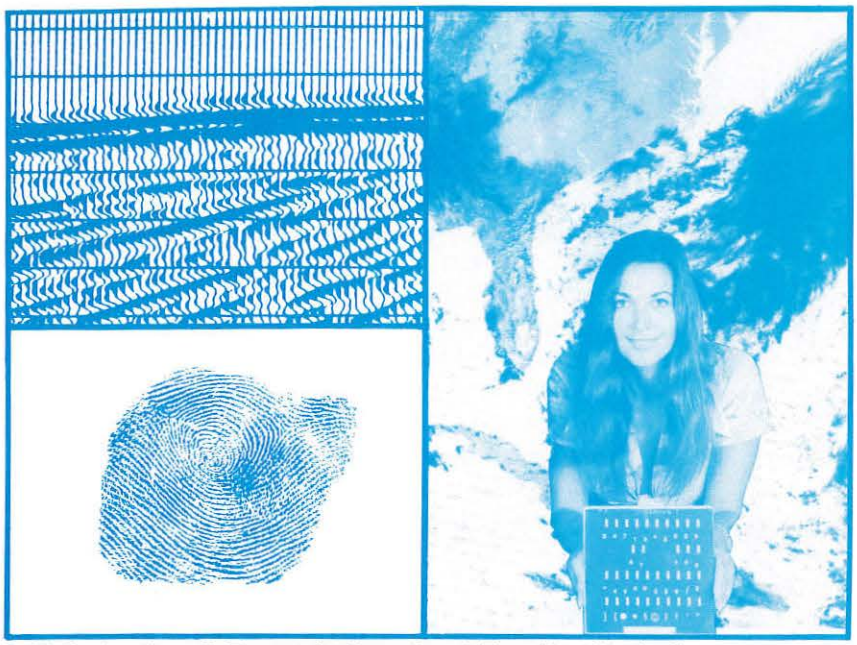

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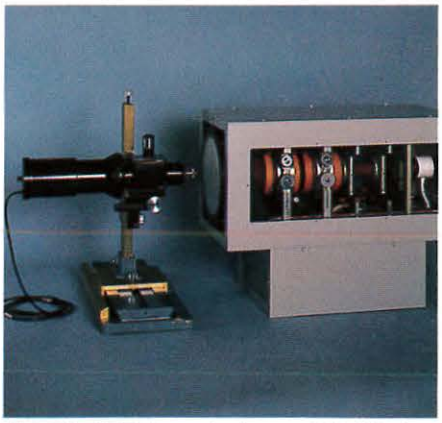

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FOR FURTHER INFORMATION

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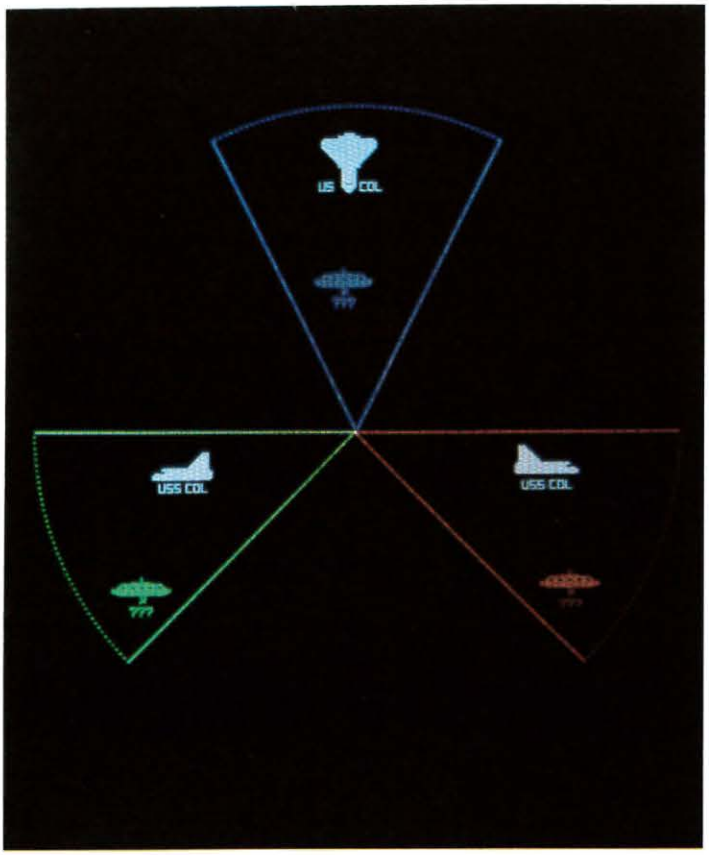

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For further information call John Constantine, Jr. Yoke Designer or Dr. Sam Christaldi, Engineering Sales Manager, Mahwah, New Jersey at 201-327-1123. (Or call Michael Constantine, President or Bud Reese, Manager, in Upland, California at 714-985-9868.)

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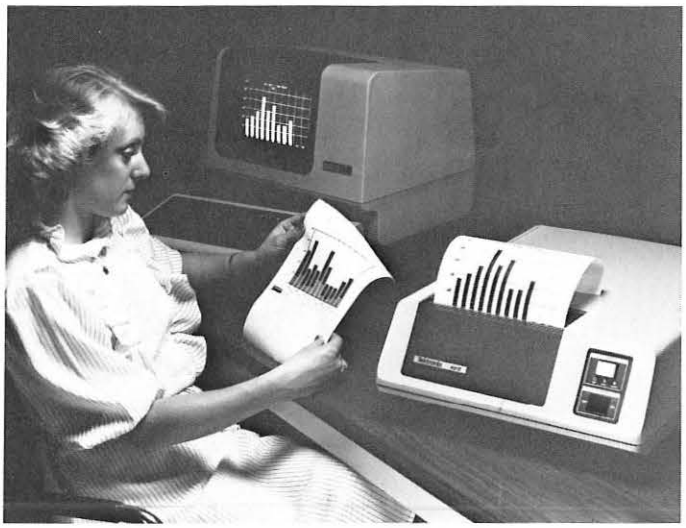
Tektronix Hard Copy Unit Option Creates Compatibility with DEC VT100 Terminals

Tektronix, Inc., Beaverton, OR, announces an option to the 4612 video hard copy unit creating plug-to-plug compatibility with the DEC VT100 series terminals. VT100 users, found primarily in the engineering, data analysis, and business environments, now have a source for high quality, low cost, quick computer graphics hard copies, says Jody Peak of Tektronix.

The standard 4612 is optimized for use with terminals offering a horizontal resolution of 640 pixels such as the Tektronix 4025A computer display terminal. The DEC-compatible option to the 4612 provides images with the correct aspect ratio from the VT100 family of terminals and other terminals with a horizontal resolution of or near 768 pixels.



There is no charge for the option when factory installed. A field kit is available for $40.00.

The 4612 video hard copy unit uses electrostatic technology to provide high quality, high contrast black-and-white copies from up to four raster scan video displays at the push of a button, the maker says. Hard copies are produced in 28 seconds regardless of image density.

The dielectric paper has excellent archival qualities and has the look and feel of plain bond, permitting pencil notations on the copy. These characteristics make the 4612 output ideal for working or archival copies. The copy unit produces 8½" x 11" copies and uses easy-to-load dry toner and rolls of paper providing 540 hard copies each.

The 4612 option broadens and enhances the Tektronix line of hard copy devices to include DEC VT100 terminal users. In addition to the 4612 for raster scan video signal copies, the 4611 Hard Copy Unit for storage tube copies is especially suitable in environments where cost and quality are important considerations.

For applications requiring photographic quality or true continuous gray shades, Tektronix offers the 4631 and 4632 hard copy units. The 4631 produces hard copies from storage tube displays. For imaging and patterning applications, the Tektronix 4634 imaging hard copy unit provides high resolution copy with multiple shades of gray.

Additional Options Now Available for *The Genius* Full Page Display

Micro Display Systems, Inc. Hastings, MN, announces that, in addition to the Apple II, an Apple III interface is now available for The Genius™.

"The Genius full page display responds to a strong need in the mini/micro computer markets. This generic product will soon be available with several additional interfaces the fourth quarter of this year, increasing its compatibility to several of the other popular mini/micro computers in the market. The next to be available will be the IBM-PC interface," says John Hildebrandt, president of this display maker.

The Genius displays an optional 57 or 73 lines of text by 80 characters across. The generic terminal was developed for the office automation industry, applying to word processing, data processing and software development.

The 15-inch CRT reformats during editing at a fraction of a millisecond, rather than the slow sequential updating on most microcomputer CRTs. Display of information from memory to screen is also essentially instantaneous, and information is sent from screen to storage simultaneously.

The Genius is fully compatible with WordStar™ (with SoftCard™), and other CP/M based software programs. For software development, the system can display large sections of code at one time for editing and debugging. The 36-pound display has an 87 MHz bandwidth and 8k bytes of high-speed buffer memory to refresh the screen.

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Chapter News

LOS ANGELES CHAPTER on October 6 had a large turnout for the first technical meeting of the autumn. At the dinner, as shown in the accompanying photograph, plaques were presented to Kevin Kilcoyne, just elected Chapter Chairman; to Gordon Kramer, Lim Teong, and Walter Goede for their services as previous Chapter Chairmen.

Technical feature of the evening was a demonstration of high-speed color graphics systems at the regional office of Chromatics, Inc., Tucker, GA. Ron Hamilton, district sales representative at the Santa Monica, CA, office, provided a most interesting variety of displays on the Chromatics Model CGC 7900 and Model 5599, both stand-alone color graphic computers having high resolution and readily host-connected. Features of the CGC unit shown included 1024 x 768 dot resolution on a 19-inch CRT set in a pedestal base housing a 10 MB fixed disk and dual flexible disk drives, with a Motorola MC68000 16-bit processor capable of both 16-bit and 32-bit operations. This Chromatics 7900 includes bit map memory planes and color look-up table to permit users a palette of more than 16 million color combinations, with a maximum of 256 colors displayable at any one time, including 256 shades of gray. A maximum of 16 color planes can be configured, allowing the system to have two completely independent, full-image memories.

Fig. 1

Ron Hamilton (r.) demonstrates the Chromatics Model CGC 7900 color graphic computer system while Bob Knepper (l.), SID Chairman of Archives/History Committee, watches intently.

Fig. 2

Honored at Los Angeles Chapter meeting on October 6 are (l. to r.) Lim Teong, Walter Goede, Gordon Kramer, and Kevin Kilcoyne, who received plaques for outstanding service to this SID Chapter.

Fig. 3

Some of the SID members enjoying dinner before the color graphics demonstration at Chromatics, Santa Monica.

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