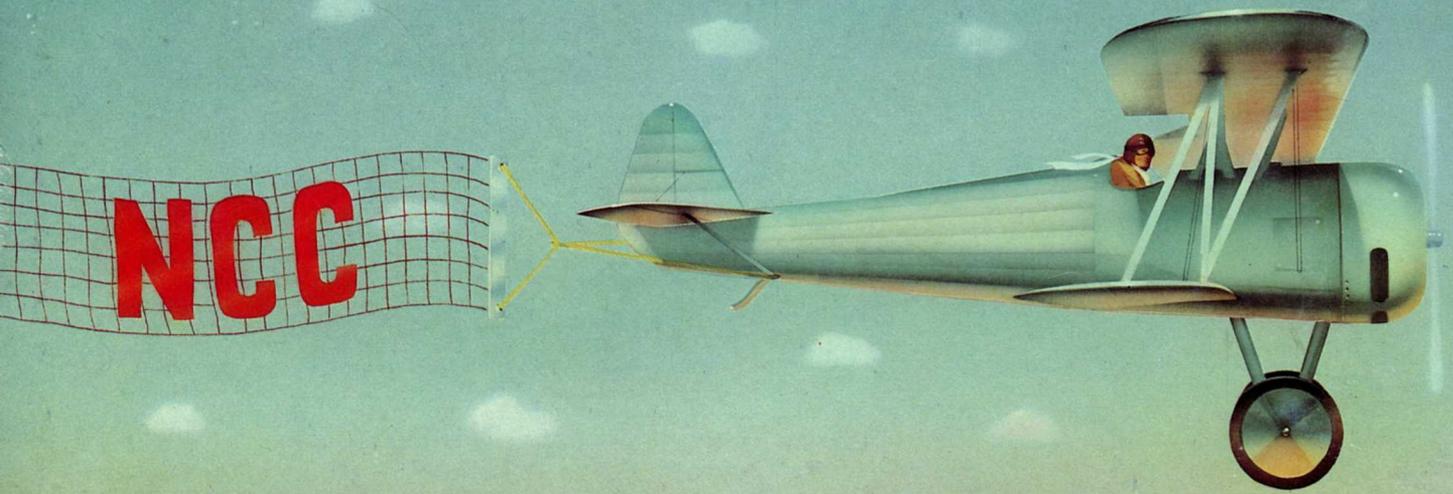


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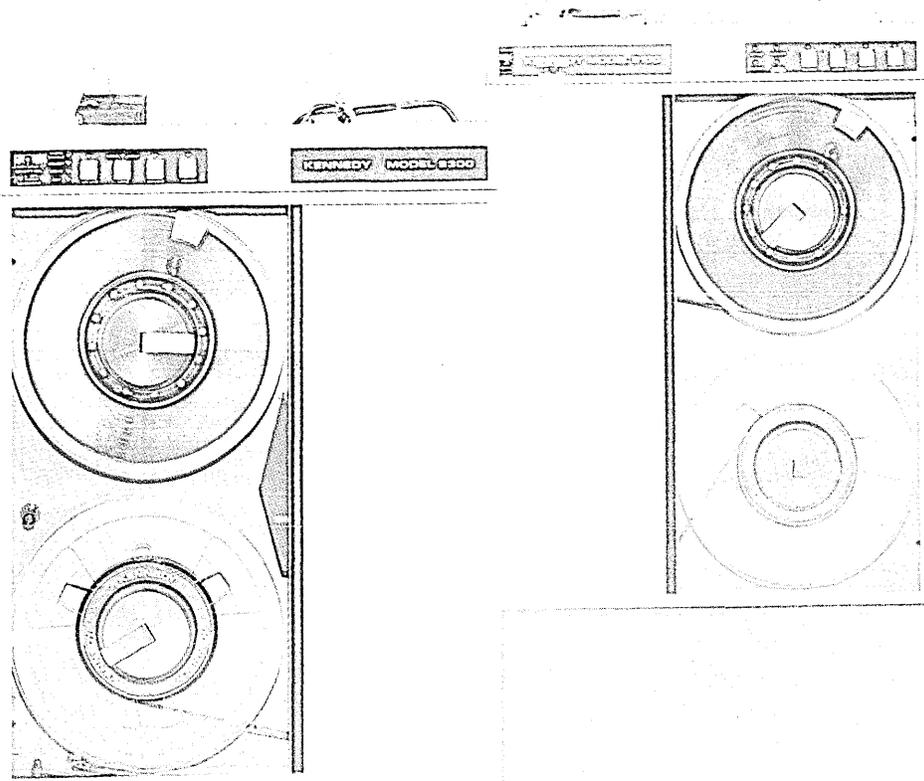
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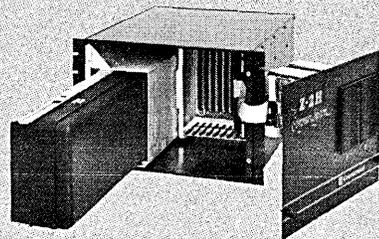
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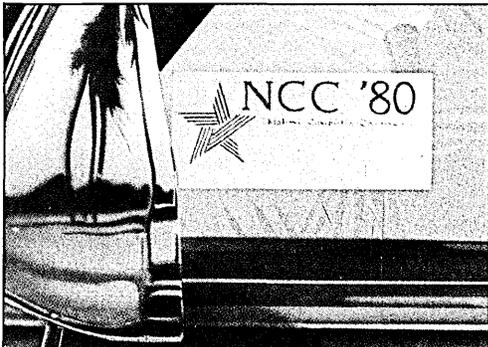
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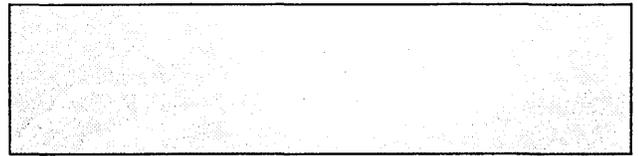
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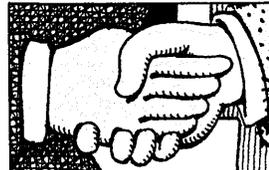
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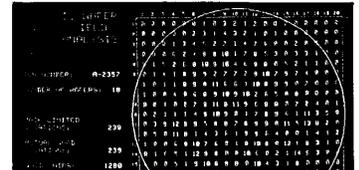
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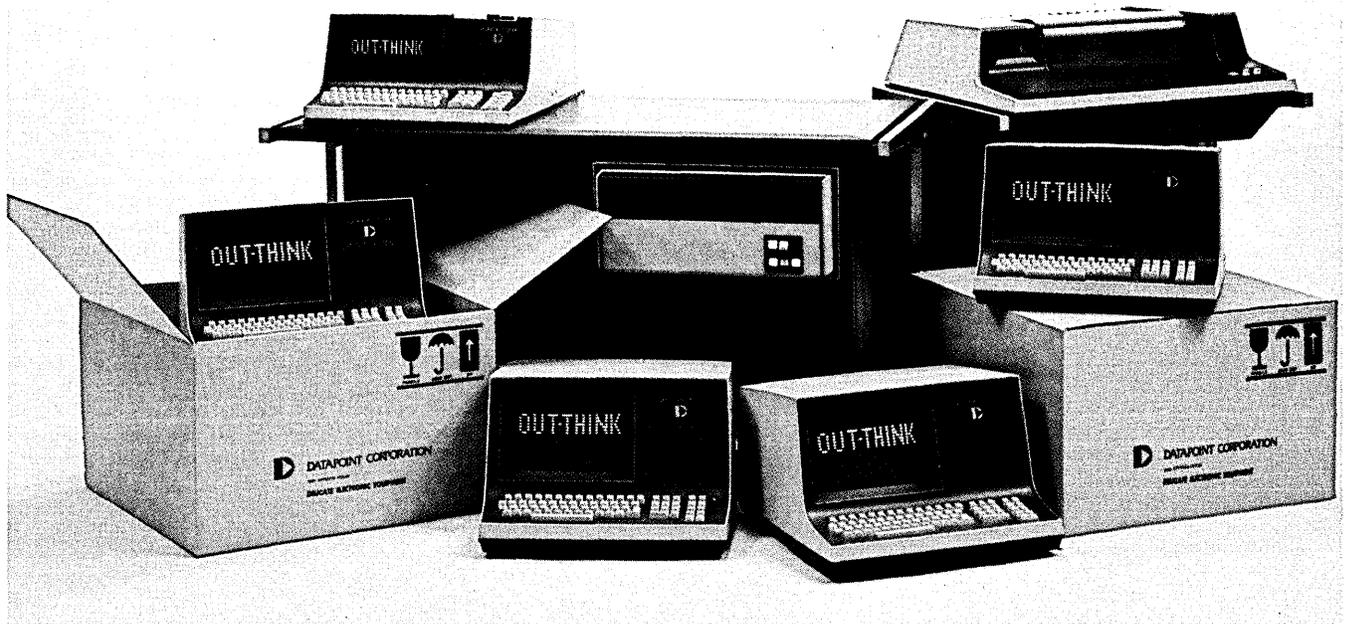
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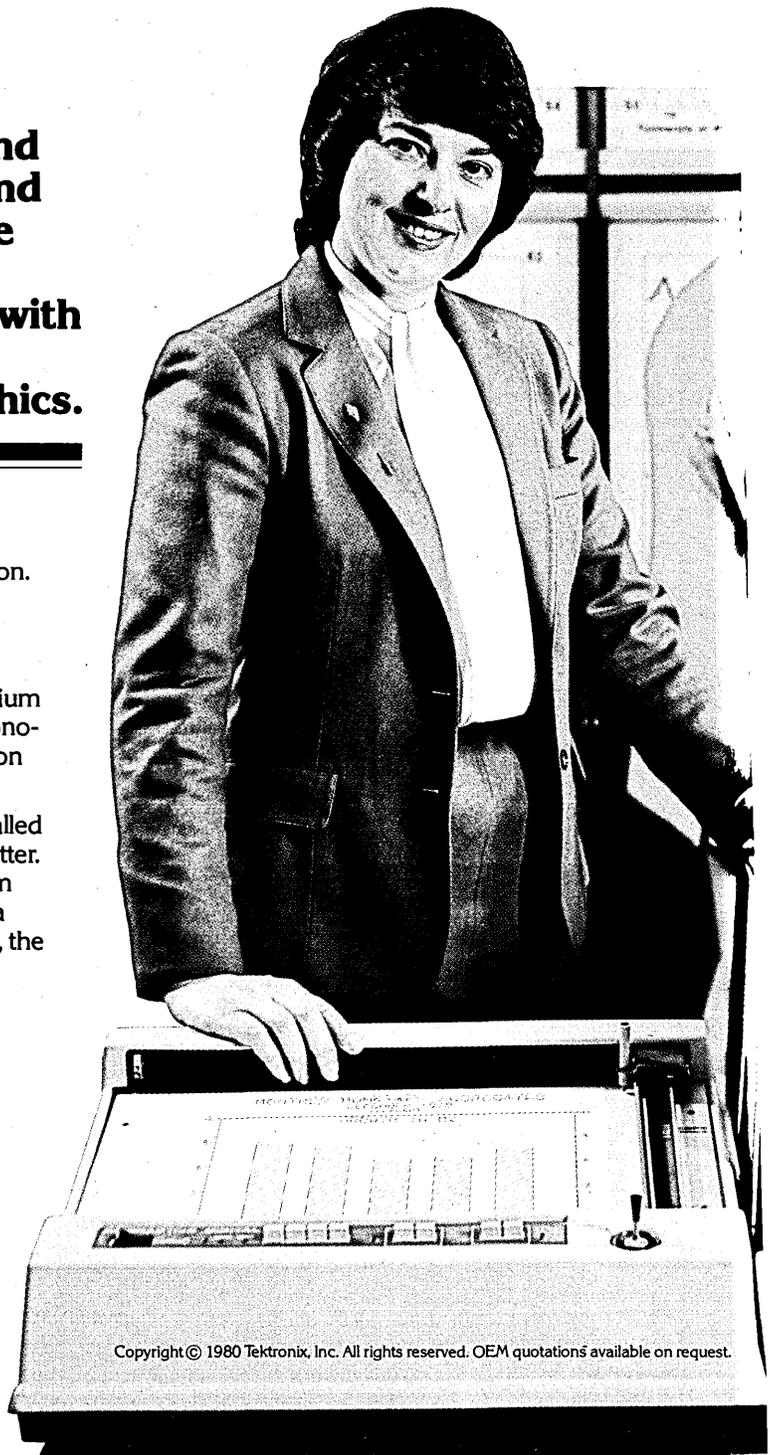
Mellon Bank has long been respected for its analyses and presentation of financial and economic conditions. Reports, once composed with ordinary columnar printouts, are now being improved with multi-color, instantly meaningful graphs ... thanks to Tektronix Graphics.

Deborah Rejniak
Assistant Economist
Mellon Bank
Pittsburgh, Pennsylvania

Business indicators such as money supply, interest rates and GNP are perfect subjects for graphic presentation. Mellon Bank is now able to visually interpret this data as well as expand its coverage of important issues.

“We discovered a whole new medium of communication,” says assistant economist Deborah Rejniak, “with the addition of automated graphics.”

A year and a half ago, Mellon installed a Tektronix 4662 Interactive Digital Plotter. Tied to an interactive graphics program and to economic data bases through a major computer services organization, the 4662 draws precise plots of from one to eight colors, on paper or mylar, to highlight reports and information for management meetings.



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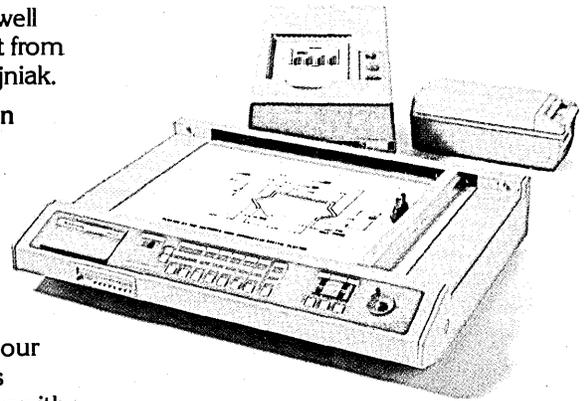
information with our expanded



"The plots are extremely well received and generate interest from all areas of the bank," says Rejniak.

As an input device, Mellon recently added the Tektronix 4025, an easy-to-use graphics and alphanumeric terminal with exceptional editing, forms ruling and buffering capabilities. "There's no question that it has increased our turnaround," says Rejniak. "It's very efficient for experimenting with variables and seeing the effects before committing a graph to the plotter."

As the world's computer graphics leader, Tektronix can assemble a complete graphics package, including easy but versatile software that's suitable for your financial analysis. No one else comes close to our broad line of graphics capabilities, including fast field service and a worldwide reputation for product reliability. For more detailed information, call your local Tektronix sales office or our automatic answering service at 1-800-547-1512 (in Oregon, 644-9051 collect).

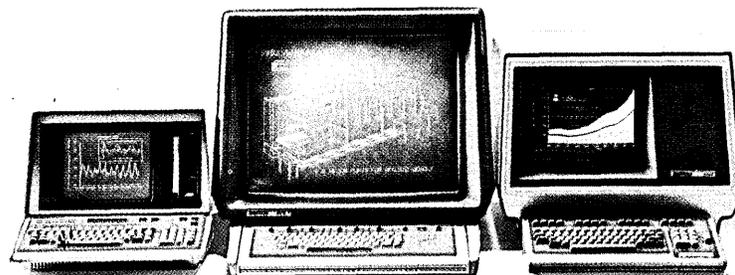


In addition to its small plotters, Tektronix also offers quiet, compact, reliable hard copy units that produce sharp, binder-size copies of on-screen graphic displays at the push of a button.

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LOOKING BACK

MAY/JUNE 1960

Brian Pollard, Burroughs Corp., gave a detailed comparison of the U.S. and United Kingdom computer industries. Although the computer business was still young, several patterns were already distinguishable.

Computers were originally developed in both countries for scientific applications. Traditionally in Great Britain, however, computers were considered a sideline for engineers. Unlike the U.S. market, as of January 1959, no British insurance firms had installed computers. And while the aircraft industry was a heavy consumer here, in Great Britain installation of computers was slower in that industry and started picking up when general business activity slowed down. Commercial applications in the U.S. were creating increased interest and excitement, but were greeted with the usual United Kingdom conservatism. Due to this conservatism and the view of computers as a sideline, the amount of financial investment in manufacturing and developing computers in Britain was far less than here. British government monies were not contributed freely, and the British National Research Development Corp. lent its money at the current lending rate, assuming a profit.

There was a shortage of skilled engineers in Britain, and proportionally, a smaller number of college graduates than in the U.S. Because of these smaller numbers, highly trained engineers in England were used sparingly in developing computer systems. In summarizing, Pollard stated, "The monthly output of the smallest of the American Big Three manufacturers is probably greater than the yearly output of the largest British manufacturer."

ICL was formed in 1968 in an attempt to consolidate the British mainframe industry, and it ranks today as the seventh

largest worldwide mainframe manufacturer. Through the '70s Britain had a number of the finest computer people in the world—most of whom left the U.K. due to the shortage of funding. While the U.S. benefited from this brain-drain, the U.K.'s dp industry suffered tremendously. Most of its remaining computer people moved to universities to work on "one of a kind" machines. A prime example of Britain's recent advances in computer technology can be seen in the British Post Office's Prestel viewdata system. The viewdata idea is a simple one, consisting of connecting modified television sets via telephone to computer data bases. Prestel is presently available on the U.K. public market, and international demonstrations are in the works.

MAY 1970

In March, the FCC announced it was accepting applications for domestic satellite system operation plans. A few days after that release, Datran and MCI disclosed they were "seriously considering" such plans in the near future. One option open for Datran was using "a satellite system offering a full complement of voice, data, and video services," which would place Datran in direct competition with AT&T. This prompted some questions by the commission concerning AT&T and its competitors. One such question was "whether AT&T's expansion into the satellite field, at this initial stage, might pose a substantial constraining factor for such potential entrants (Datran, MCI, etc.)." Both the FCC and the White House Report on Domestic Satellites expressed this uncertainty where AT&T was involved. Since it was the dominant domestic carrier, others could not begin to approach the problems and possibilities of domestic satellite applications from an equal competitive position.

—Deborah Sojka

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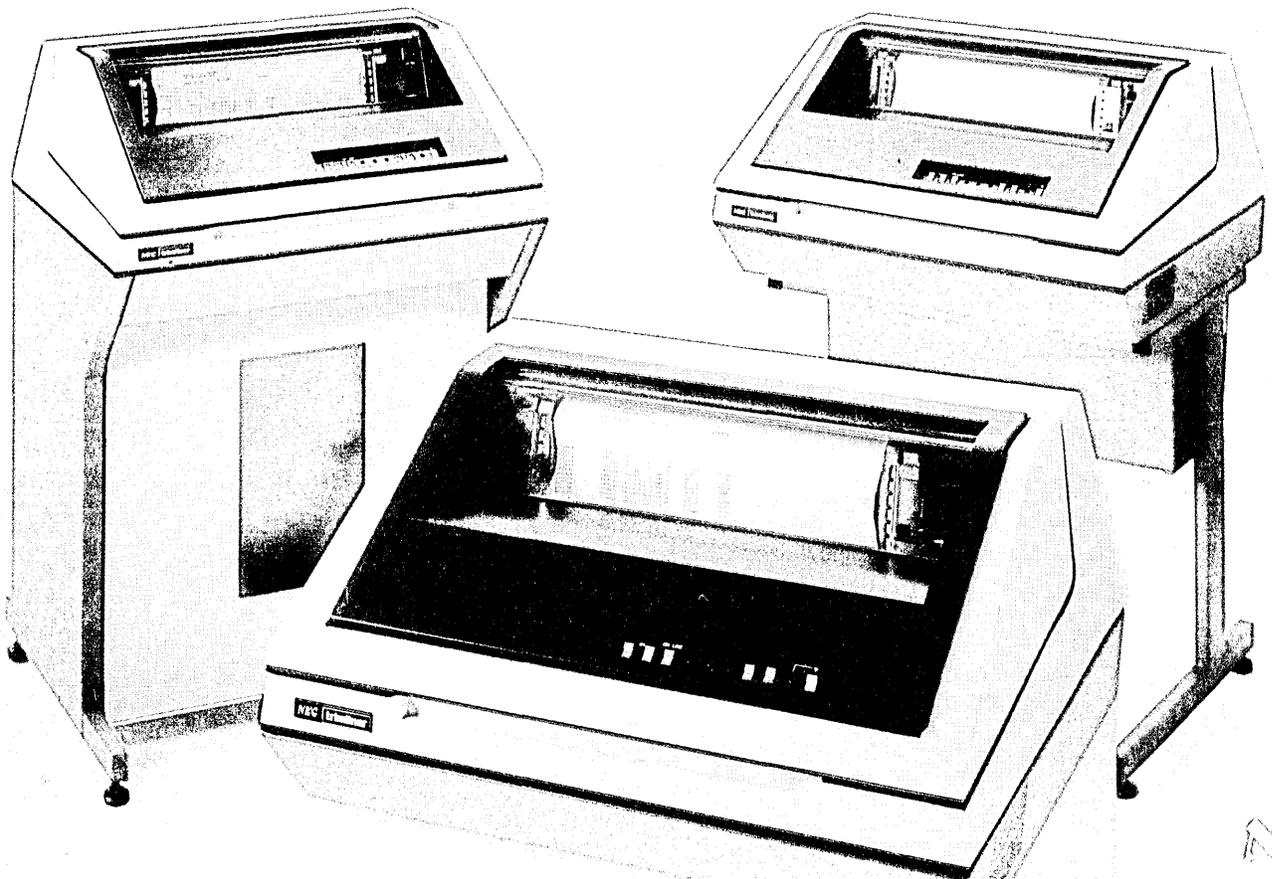
duce higher quality printed output. The feature reduces the 300 LPM speed to 170 LPM, and the 600 LPM rate to 350 LPM.

NEC's Trimliner printers have *never* experienced any band breakage. They have uptimes 50% higher than the competition. Trimliners average less than 30 minutes to repair. They're quiet, modular, ultra-cool and available in desktop, pedestal-mounted or two models of quiet cabinetry.

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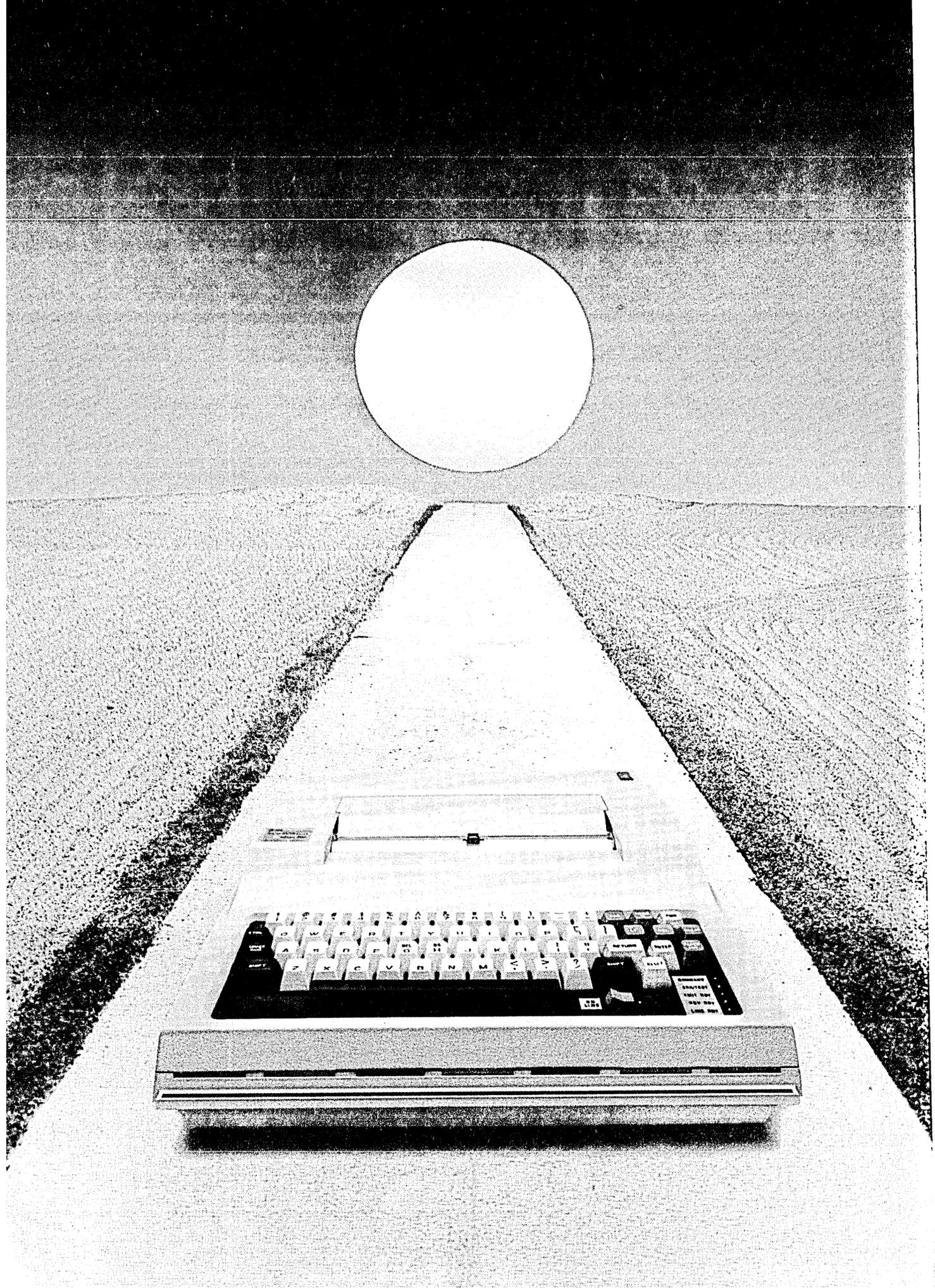
Europe: Intel Semiconductor (Nederland) B.V., Commercial Systems Division, Oranjestraat 1, 3441 Ax Woerden, The Netherlands, 31/3480-11264, Telex 47970 CSD NL.

Please introduce me to Intel's new family of Information Resource Management products.

Name _____
Company _____
Mailing address _____
_____ State _____ Zip _____

Return to Intel Commercial Systems Division,
P.O. Box 9968, Austin, Texas 78766

CIRCLE 11 ON READER CARD



The Sign of the 80's.

Greater yield has arrived with TI's new *Silent 700** 780 Series Electronic Data Terminal Family.

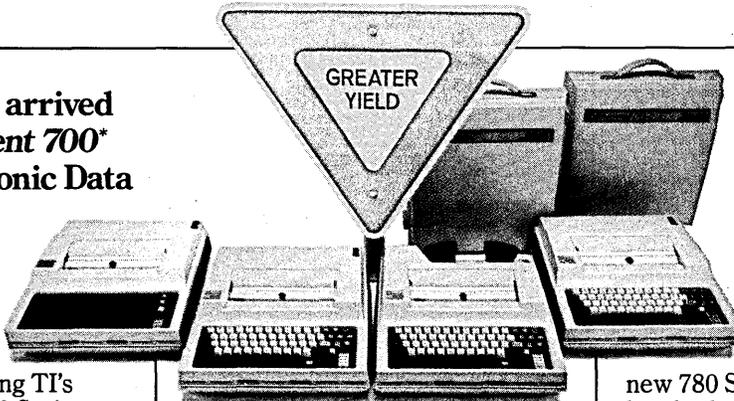
Clear the road for the most innovative thermal printing data terminals available on the market today. Introducing TI's new state-of-the-art 780 Series of 120 characters-per-second data terminals.

Every model in the four-member family features TI's innovative dual-matrix thermal print-head providing virtually silent 120-cps optimized bi-directional printing, that cuts down on print cycle time and yields four times the printing speed of conventional thermal printing data terminals.

Industries with high output printing demands will find the Model 781 Receive-Only Printer a reliable business partner. The 781 RO features an operator control keypad for referencing the terminal's operating status, a 1000-character receive buffer and 110 to 9600 bits-per-second communications speed.

Commercial applications can get top-quality performance from the desktop Model 783 Keyboard Send-Receive Data Terminal with features like a full ASCII keyboard, self-test diagnostics and programmable answerback memory.

The lightweight 17-pound Model 785 Portable Data Terminal



is an ideal traveling companion for remote data access and entry applications. With a built-in 1200-bps acoustic coupler, the 785 can transmit and receive data from anywhere using a standard telephone and electrical outlet.

The Model 787 Portable Communications Data Terminal is designed to improve your communications capabilities. The 787's 1200-bps direct-connect internal modem allows users to plug directly into a standard data jack. With its memory dialing feature, the 787 can dial a stored number and provide audible feedback of the phone line's status. The 787 can also disconnect the phone line with a simple hang-up command, so you can optimize on-line communications and minimize communications costs.

Available user-oriented 780 Series options like international keyboards and protected answerback memory add even more versatility to your business communications.

TI is dedicated to producing quality, innovative products like our

new 780 Series Family. And TI's hundreds of thousands of data terminals shipped worldwide are backed by the technology and reliability that comes from over 30 years of experience in the electronics industry.

Supporting TI's data terminals is the technical expertise of our worldwide organization of factory-trained sales and service representatives, and TI-CARE†, our nationwide automated service dispatching and field service management information system. That's why TI was appointed the official computer and calculator company of the 1980 Olympic Winter Games.

The 80's can be yours today. For more information on the 780 Series Family, contact the TI sales office nearest you, or write Texas Instruments Incorporated, P.O. Box 1444, M/S 7784, Houston, Texas 77001, or phone (713) 937-2016.



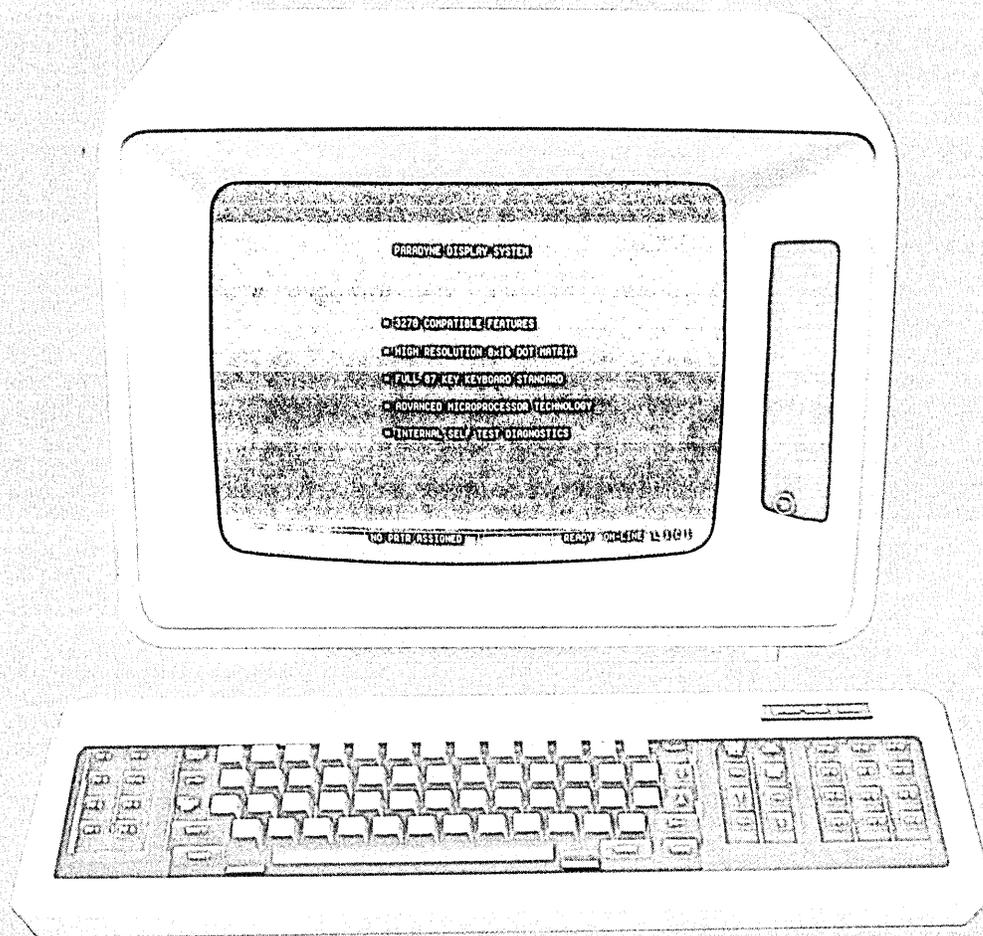
*Trademark of Texas Instruments †Service Mark of Texas Instruments Copyright ©1980, Texas Instruments Incorporated

TEXAS INSTRUMENTS

We put computing within everyone's reach.

CIRCLE 12 ON READER CARD

The PDS 270



Announcing Our Latest Addition to Coordinated Network Architecture

Simple solutions to complex problems. The PDS 270 Paradyne Display System has joined our PIXNET/PXNET and RESPONSE family of products.

The PDS 270 is a microprocessor based system utilizing high speed "loop" technology - the most advanced technology available today for interconnecting data terminals. The PDS 270 is designed with diagnostic capability (creep or maintenance). In addition to the features listed above on the PDS 270 screen, an integral response time monitor is provided. The PDS 270 represents a significant step in the continued growth and evolution of the Paradyne product line.

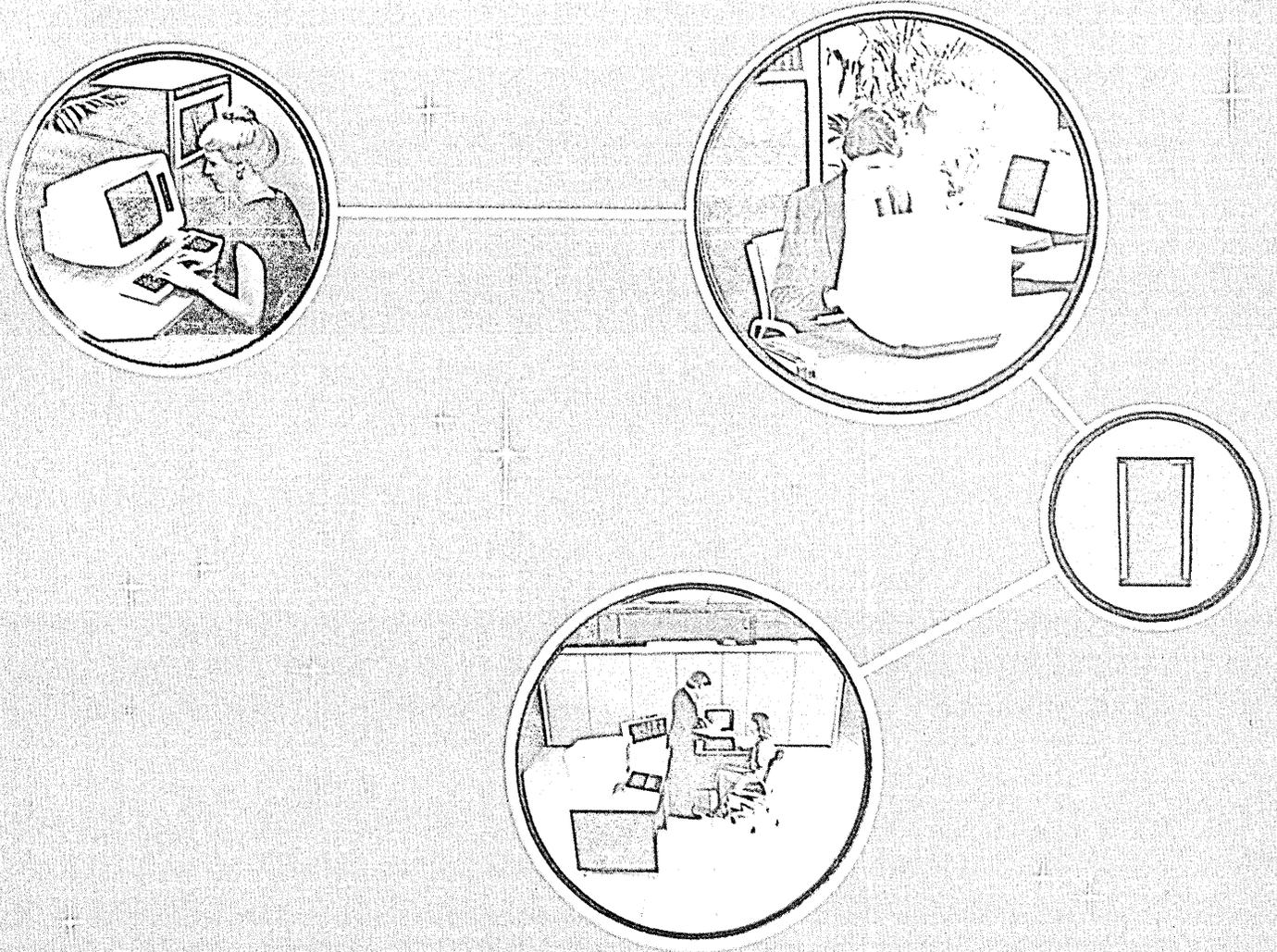
PIXNET is the most innovative approach to data communication networking. PIXNET expands data communications networks in a modular fashion. All devices within the network appear to the host processor as locally attached, resulting in reduced processor over-

head and increased efficiency. Installation of the network is simplified. Host polling, error detection and correction is eliminated, and throughput and response time are significantly improved.

PIXNET'S SDLC communications protocol between control units improves data transmission efficiency. PIXNET'S unique data compression routines result in higher performance throughout the network. Intelligence in our PIXNET Control Units is responsible for all network traffic, providing the terminal operator turn-of-the-file application access, multiple CPU access, alternate routing and line concentration, all independent of the host processor.

PIXNET'S Remote Control Unit (RCU) provides the communications interface between Paradyne or IBM peripherals located at sites thousands of miles away from the host processor. Devices supported include Paradyne card readers, line printers, magnetic tapes, diskettes, CRT keyboards, character printers systems

from Paradyne



consoles and RESPONSE. All these devices appear to the host processor as locally attached IBM devices.

RESPONSE is Paradyne's distributed processing system designed to satisfy the requirement to process information at the remote site. It uses the PIXNET communications systems to provide interactive and bulk file transfers with the host processor.

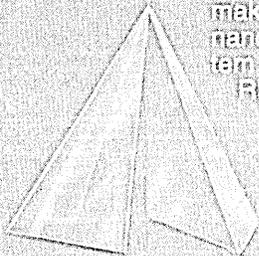
Therefore, complex IBM teleprocessing software is eliminated, making installation and maintenance of the communications system simple.

RESPONSE utilizes a powerful

IBM 370 type architecture which includes ANSI 74 COBOL and an operating system with transaction processing capabilities which are all familiar to the IBM user. Access to the system can be obtained from any location, therefore support groups are not required at remote sites. All this makes the transition to distributed processing practical.

If you'd like to learn more about how Paradyne will offer solutions to your networking problems, call or write:

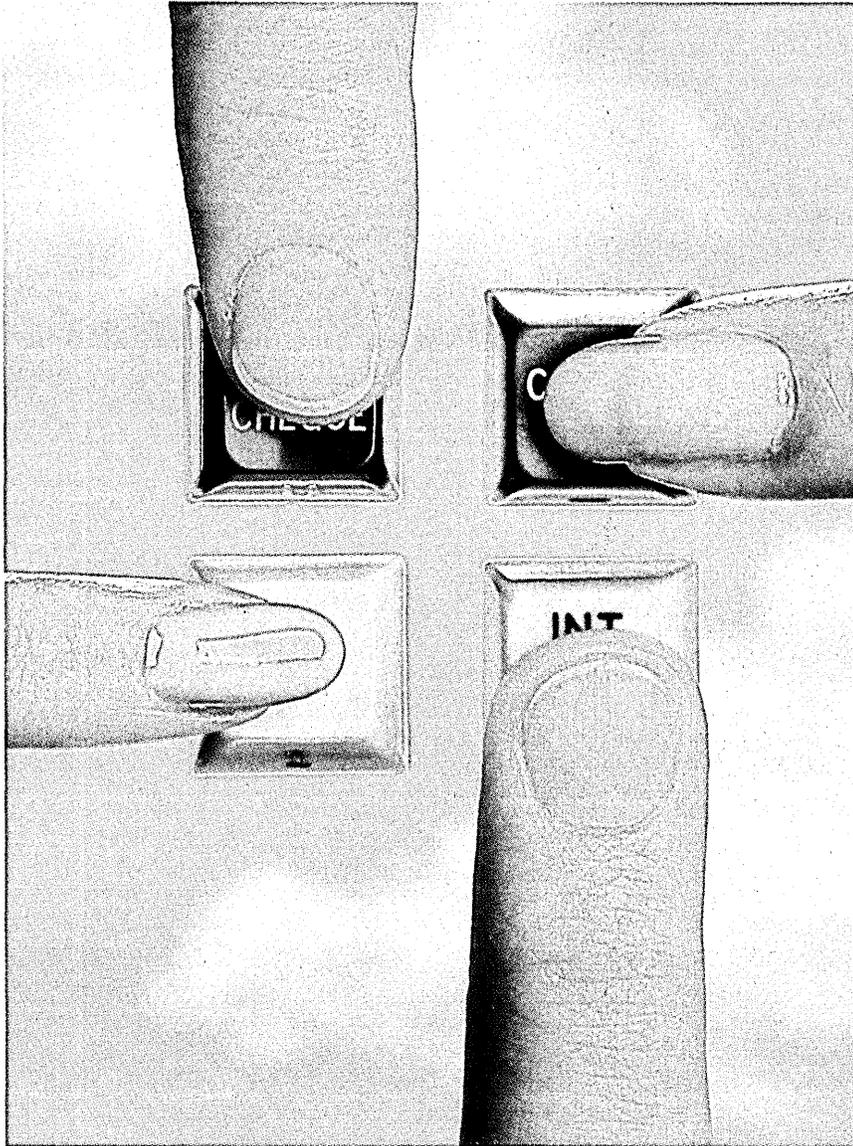
Paradyne, Box 1377, Largo, FL 33541, 813-536-7771
Paradyne Canada Ltd. 416-490-0453



paradyne

CIRCLE 13 ON READER CARD

DISTRIBUTED POWER.



Honeywell's new DPS 8/20 puts more remote processing power at users' fingertips.

The whole point of a distributed processing system is to have the right data in the right place at the right time. Right?

Well, that's what the Honeywell DPS 8/20 is all about. The smallest of the DPS 8 family of large-scale distributed processing systems, it's a cost-effective way to bring big processing power to more and more locations. It's another option between the large central computer and the minicomputer in

a network. And it's another plus for Honeywell.

With its powerful GCOS operating system, it's a free-standing processor that can be used as a remote host to a series of Level 6 systems. Or use it to provide peak-load back up to a larger DPS 8 or Level 66 mainframe computer.

It's compact, energy efficient, versatile, compatible, and available now.

You'll give it extra points for software flexibility. You can take advantage of the new GCOS 8 operating system, Data Management-IV (DM-IV) Transaction Processor, COBOL-74, and Integrated Data Store/II (I-D-S/II) Data Manager.

For more information, write Honeywell, 200 Smith Street (MS 487), Waltham, Massachusetts 02154.

Or better yet, see the DPS 8/20 making its debut at NCC. Check out its data base and transaction processing capabilities. Hands on.

Honeywell

"You can't afford to
send your employees to
college."

Lawrence Finch, President
Shasta General Systems

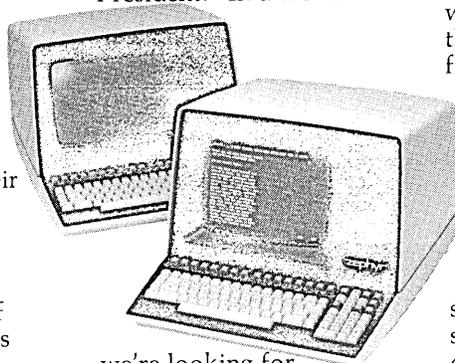


When you're selling over 75 small business systems a month like Shasta General Systems, you've got to have terminals that are as reliable, if not more reliable, than the system itself.

That's why Shasta chose to integrate Zentec CRT's into their Diablo 3200 small business and word processing systems.

As the largest independent distributor of small business systems in the United States, Shasta is a real stickler for quality. "We're incorporating Zentec Zephyrs

and ZMS-40s into our system for one main reason," commented Lawrence Finch, Shasta President. "In a word . . .



we're looking for quality. The CRT is the direct interface with our customers. In their eyes,

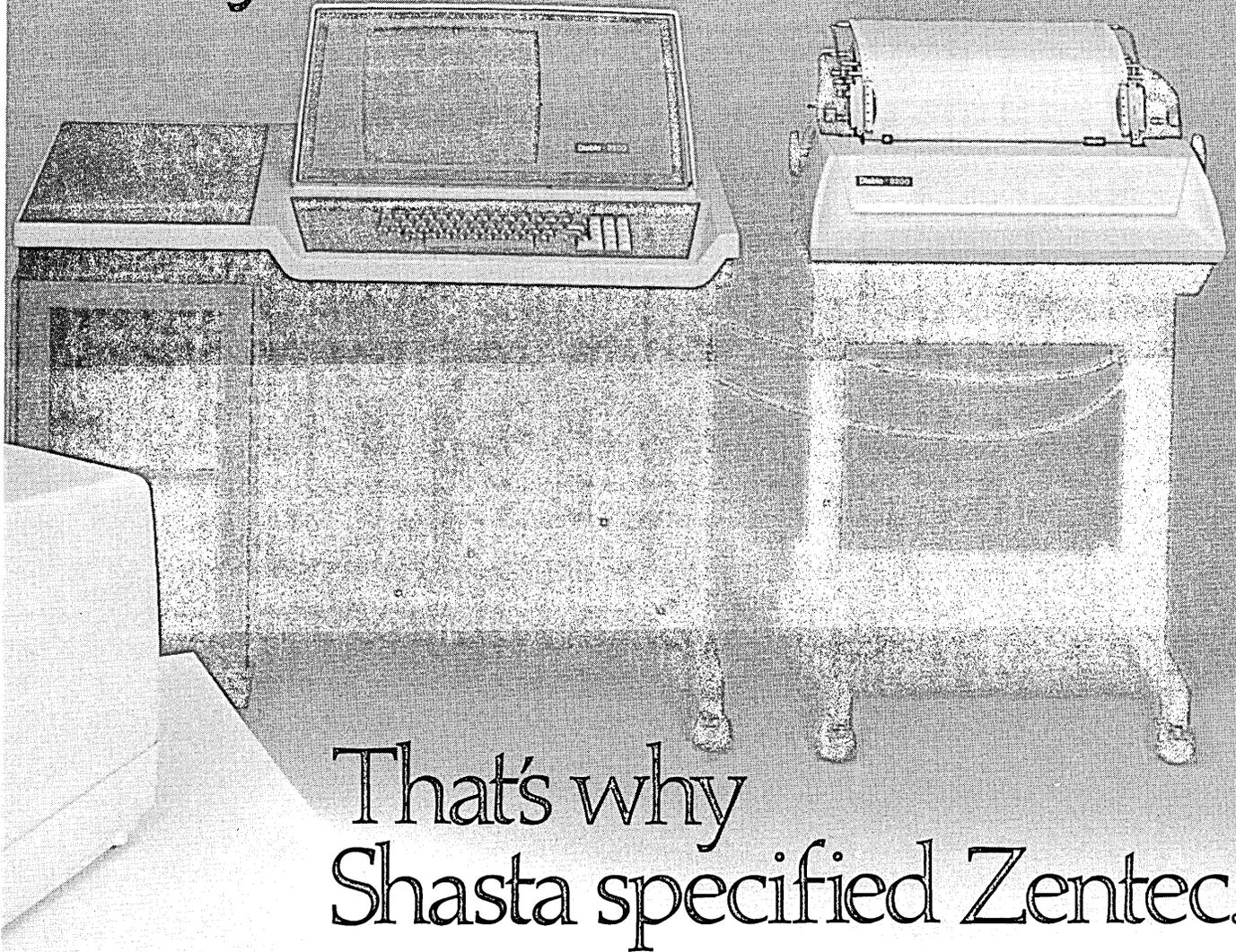
if the terminal fails, we fail. And at \$20K plus per system, we really can't afford that. We chose Zentec for that extra measure of reliability."

Getting the most from your host.

Shasta is now integrating Zentec's new Zephyrs and ZMS-40s into their Diablo 3200 small business system to satisfy a wide range of data processing and word processing applications. The system, expandable up

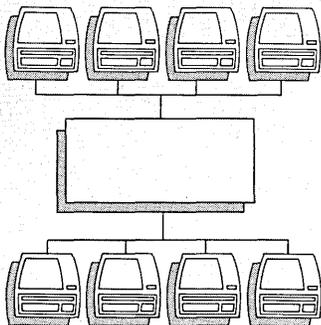
to 8 CRT's, utilizes the Zentec Zephyr to perform all data entry and data processing functions. Capitalizing on the Zephyr's intelligent features such as full cursor addressability, full editing and protected forms modes, the Diablo 3200 system offers users improved system throughput. The ZMS-40s, incorporating custom keyboards and firmware are designed

ford to have a defective tube tire system down the tubes."



That's why Shasta specified Zentec.

to Shasta's
specifications,



handling all word processing functions. Word processing programs can now be downloaded to the terminal from the

CPU and executed in firmware, relieving the CPU of valuable processing time. Together, they make powerful additions to an already powerful system.

Like Shasta, more and more people are turning to Zentec for intelligent solutions to their data and word processing problems.

Why?

Simply this. Every Zentec terminal is designed, manufactured and stress-tested to give you the best MTBF rate in the business. The Zephyr's a perfect example. It's the first low-cost

smart terminal designed around Zentec's proven intelligent terminal technology. Incorporating custom LSI circuitry, the Zephyr offers you a powerful, full function terminal at a very competitive price. Equally important, Zephyr quality offers you less dead-on-arrivals. Fewer premature failures. And more reliability . . . from power-up to payout.

Don't let a defective CRT come between you and your CPU.

You really can't afford to become a victim of terminal trauma. Take a

close look at the new Zentec Zephyr. Or any one of the growing ZMS Family of intelligent terminals. Like Shasta, they could be the most intelligent solutions to your data or word processing problems. For more information, just write: Zentec Corporation, 2400 Walsh Avenue, Santa Clara, CA 95050. Or call (408) 727-7662.

. . . the last word in intelligent terminals

CIRCLE 15 ON READER CARD

INTRODUCING VARIABLE RESOURCE ARCHITECTURE

Announcing the IBM 3600 32-Bit Multiprocessor System with Variable Resource Architecture (VRA). Based on major advances in hardware and software technology, VRA permits multiple level performance of multiprocessing applications.

The fundamental innovation of VRA is a variable pool of parallel processors controlled by a single self-regulating operating system.

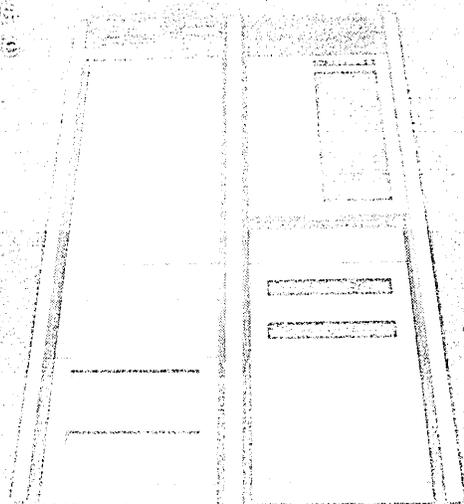
The interesting property of a IBM 3600 is its workload can be varied directly by incrementally adding or deleting hardware modules. Differences in configuration are handled by user software.

Key features of the IBM 3600 are:

- From 1 to 8 full-scale 32-Bit CPUs, controlled and coordinated by one operating system.
- From 256KB to 2 megabytes of main memory.
- From 1 to 230 interactive users, plus batch.
- Full-scale architecture, remote operations.
- Multi-user privacy, security and data protection.
- ANS COBOL 74, ANS FORTRAN 77, PASCAL, Extended BASIC.

The IBM 3600 is an entirely new system. It's the result of four years of intensive development. And it's backed by proven experience with the IBM 3600/4600/5600 series, representing over 2500 installations in the United States, Canada and Europe.

For more information, just contact the IBM office nearest you. Better yet, see us at NOC, Booth 2346.



LOOK AHEAD

ANOTHER
NEW PCM?

When Nixdorf Computer schedules a press conference in Boston and invites the European press to attend -- at the company's expense, you can bet there's something big in the works. Our sources tell us that at the mid-May meeting Nixdorf will announce its entry into the IBM plug-compatible market -- and not alone either, but in conjunction with a major software house.

HEAR AMDAHL
HAS DBMS

Amdahl is whispered to have a data base management system, an independent OS, available for first quarter '81 announcement.

NEW TIGER IN
EXXON'S TANK?

Are portions of the Memorex empire up for sale? That's what Wall Street sources are asking about the communications operations. Among those reported as potential buyers were Exxon Enterprises and Northern Telecom. Exxon is known to have an interest in a communications company that could link its varied office automation segments into compatible systems. The interest in Memorex reportedly would allow Exxon to use the 1270 and 1380 front-ends as controllers that could handle the now-incompatible word processors, electronic typewriters, fax devices, and other products in the arsenal of the Exxon tiger. Despite these reports, a Memorex spokesman denied there's anything in the wind, issuing a flat "no" when asked about the talks of a potential sale.

IBM TO REENTER
SERVICES BIZ

We hear IBM is scheduled to return to the service bureau business this summer, offering remote processing to first-time users from the System/38s now being checked out at IBM's Business Computer Centers. The BCC shop will become increasingly commercial, conventionally retail. On the shelves, third quarter, may be IBM's upgrade replacement for the 5120, apparently more of an interim product than many believed. Sources say IBM has already stockpiled two upgrades: a Japanese-manufactured 5105, offering utilities in BASIC, reportedly priced around \$4,500; and a multiterminal version, the 5130, handling four terminals, multitask programming, with hard disk and matrix printer -- and priced somewhere between \$20,000 and \$40,000.

JUSTICE COAXES
GENE AMDAHL

The Justice Department is trying to convince an unwilling Gene Amdahl to be a rebuttal witness in the IBM trust trial, testifying about executive skeletons in IBM's corporate closets.

LOOK AHEAD

DUAL AT DEC

DEC's efforts to develop a dual 11/70 to challenge Tandem has been shelved because of technical problems. DEC now counts on a dual VAX system to protective its lucrative Bell market. Word has it that DEC's holding two low-end VAX systems ready to counter Data General's new 32-bit "Eagle."

BIG PUSH IN FIBER OPTICS

Fiber optics haven't been used much in production line computer systems, but the recent joint announcement by Honeywell, Dupont and ITT makes that an imminent probability. The three big companies have pooled resources to allow them each to independently offer a new low-cost fiber optic data link, optimized for local system connection. A typical two-meter strand will sell for \$50, assembled and terminated to specs, carrying data rates of up to 30 megabits per second, with a hybrid 9-channel connector that accepts either fiber or wire.

THE LONE RANGER

Gideon Gartner of the Gartner Group is a lonely voice still predicting a second quarter announcement of the H Series from IBM -- the H/4, a packaged MP version of the H uniprocessor.

C.A.T. HAS NINE LIVES

A desktop computer for very small businesses that also teaches accounting procedures in a step-by-step fashion is about to be announced by Cado Systems Corp. of Torrance, Calif. Called the Cado C.A.T. (for computer-aided tutor), the animal is aimed at the four million U.S. small businesses and professions with sales of under \$2 million. The C.A.T. combines instructions on the computer crt with instructions in a printed handbook to provide self-pacing learning to newcomers to computers, with quizzes as they go. The system, which also can be used as a multitasking word processor, is priced at \$13,990 with a 150 cps matrix printer and nine bundled software packages, including a report writer called Just Ask II. To market the system, Cado hopes to line up about 1,000 dealers who would be supported by the company's 110 distributors.

WATCH FOR BOOM IN BACK-UP

If the feature new product technology at NCC last year was the 8-inch Winchester disk drive, its counterpart at this year's show could be back-up devices for fixed disks. At least 14 of them are expected to be announced at the NCC, or just before it, says Raymond C. Freeman, Jr. His new study of back-up devices lists specs on 22 quarter-inch tape drives for this application, 14 of them yet to be announced. And 10 of the latter
(continued on page 61)



Think what your programmers could do if your users did their own reports.

Answer/DB, the latest Implementation System from Informatics, is the new on-line software tool for report generation. It lets non-DP people develop their own report requests at a terminal — in an English like language — with as few as four simple statements.

That means much faster report turnaround, wider smiles from non-DP people in your organization, and greatly increased programmer productivity.

Answer/DB has made old-fashioned batch reporting systems obsolete because it's designed to handle the problems you'll be facing in the data base and data communications world. Answer/DB operates with your standard OS/DOS files and IMS data bases. And it offers completely interactive, on-line query entry with syntax checking and editing capabilities for creating error-free report requests.

For more information on Answer/DB and other information retrieval systems, just complete the coupon. Or, call us at (213) 887-9121.

Informatics Inc., 21050 Vanowen Street, Canoga Park, CA 91304
 Tim Corey, Product Manager
 (213) 887-9121 Telex: 69-8473

- Send me complete details on Answer/DB.
- Send me complete details on:
 - Other Informatics report writers
 - Inquiry systems
 - Have a salesman call me.

informatics inc 

Name _____ Title _____

Company _____

Address _____

City _____ State _____ Zip _____

Telephone (____) _____

Computer _____ Operating System: DOS/VS OS/VS

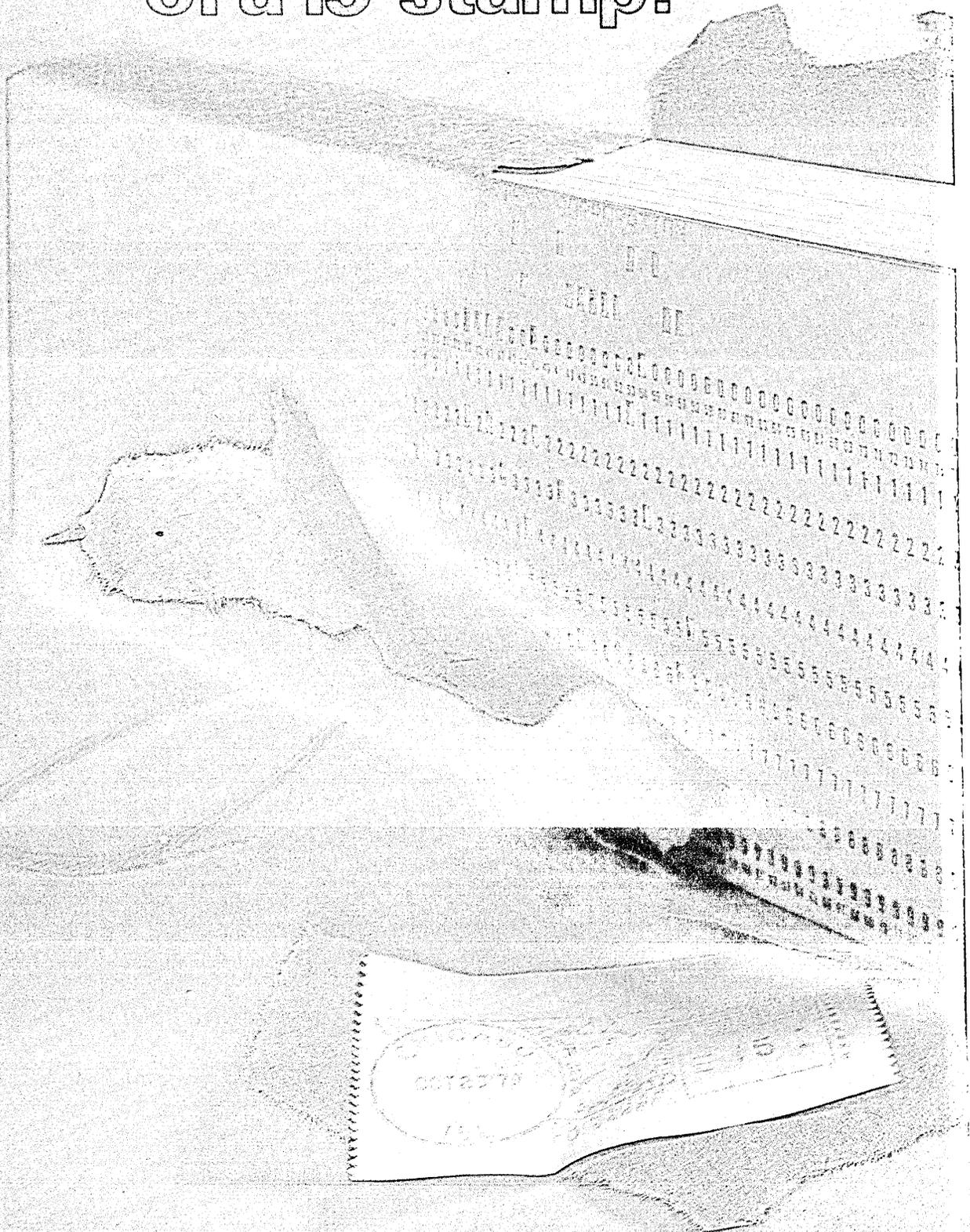
TP Monitor: IMS/DC CICS/VS TSO AD-D-5180

Introducing Answer/DB™ by Informatics®

CIRCLE 17 ON READER CARD

The Information Management Company.

Is your \$15,000
data entry system
working at the speed
of a 15¢ stamp?



If you don't have a quick, efficient way to communicate with your mainframe, it's tough to get your money's worth from a high-speed volume Data Entry system.

Our KEYBATCH® data entry systems have concurrent communications built in.

Without concurrent communications, you'd have to stop every operator every time you interact with the mainframe. Every time you send. Every time you re-send. Every time you receive. If you interrupt 15 operators for just half an hour each day, that's like wasting one operator's total production.

With concurrent communications, our systems can handle sending, receiving, report processing—even programming—without slowing or stopping data entry operators for a moment.

With concurrent communications, you can even distribute part of your workload during peak hours—to remote locations or outside services. And keep your full-time work force as small as your full-time needs.

Need systems for source data entry?

Northern Telecom combines distributed data entry with remote file management in one economical

system. So you have on-the-spot control of input data, plus quick access to frequently used information.

It's easy to add capacity.

Our data entry systems are modular. So the hardware that fits your needs now, won't limit you later. We're cost-effective with just one data station. Or eight. Or sixteen.

We can meet all your remote processing needs. So we can often meet them for less.

Right now, Northern Telecom can deliver systems for Remote Job Entry, DDP and On-Line, as well as Data Entry. So we could cut your hardware costs.

And we're sure to save you headaches. Because, when you work with Northern Telecom, one phone call brings you factory-trained service for every part of your remote processing operation.

But the best reason to talk to us today, is tomorrow.

Northern Telecom is combining data processing expertise with telecommunications expertise—in a mix no other company can match.

Today, it means better access to all the processing power you're paying for. Tomorrow, it means a smoother transition to the single system that will meet all your processing and telecommunications needs.

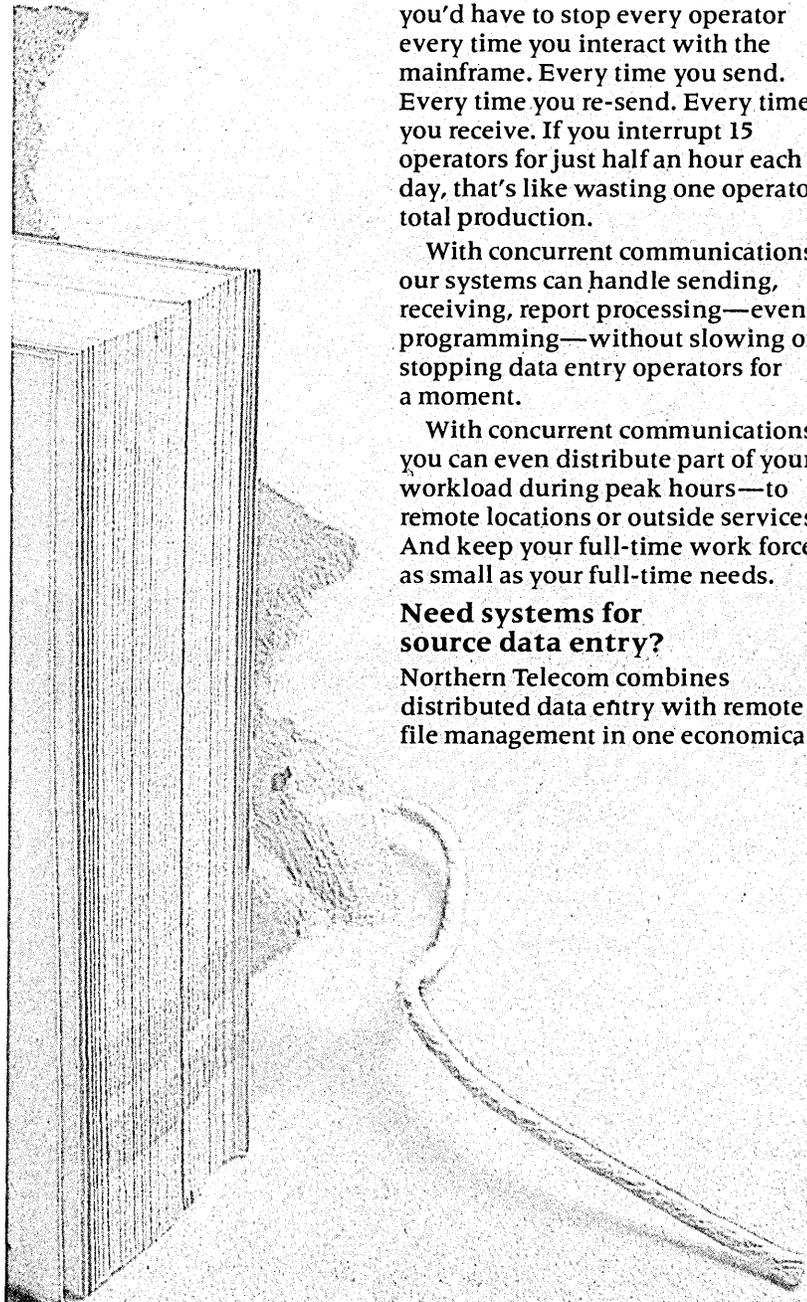
Talk to Northern Telecom Systems Corporation. Where computers and communications meet.

For the office nearest you, call our Marketing Services Department at 1-800-328-6760. In Minnesota, call (612) 932-8202. Or write Northern Telecom Systems Corporation, Box 1222, Minneapolis, MN 55440.



**Northern Telecom
Systems Corporation**

CIRCLE 18 ON READER CARD



CALENDAR

MAY

Fifth Micro Expo '80, May 6-8, Paris.

The largest microcomputer and personal computing conference in Europe, featuring themes relating to personal computing, new products, industrial applications. Contact Robert Maraziti, Sybex, Inc., 2344 Sixth St., Berkeley, CA 94710, (415) 848-8233.

NCC, May 19-22, Anaheim, Calif.

Will cover the broad areas of management, applications, science and technology, and social implications. Contact AFIPS, 1815 North Lynn St., Arlington, VA 22209, (703) 243-4100.

CECON, May 20-22, Cleveland.

The exhibits will display new products related to instruments, components, and systems. Contact Cleveland Electronics Conference, Inc., 2728 Euclid Ave., 5th Floor, Cleveland, OH 44115, (216) 241-5515.

JUNE

Automated Business Systems Exhibition, June 3-6, Mexico City.

The exhibition will be sponsored by the U.S. Department of Commerce. Contact Annette V. Napper, Industry Participation Division, Room 6015, Office of Export Promotion, U.S. Department of Commerce, Washington, DC 20230, (202) 377-2952.

Workshop for International Marketing Decision-Makers, June 16-17, Washington, D.C.

Exporting products in the '80s is the theme. Meeting is cosponsored by DATAMATION and the U.S. Department of Commerce. Contact Graydon Associates, P.O. Box 566, Red Bank, NJ 07701, (201) 741-2690.

National Computer Graphics Association Conference, June 16-19, Washington, D.C.

Will include tutorials in particular computer graphic fields, conferences focusing on new developments in computer graphics, and vendor exhibitions. Contact National Computer Graphics Association, Inc., 1129-20th St., NW, Suite 512, Washington, DC 20036, (202) 466-5895.

DATA COMM, June 17-19, Geneva, Switzerland.

DATA COMM is an international forum where developments in microprocessors, mini/microcomputers and associated services can be seen, together with new equipment for data communications and distributed processing. Contact Industrial and Scientific Conference Management, Inc., 222 West Adams St., Chicago, IL 60606, (312) 263-4866.

Computerfest '80, June 20-22, Columbus, Ohio.

Fifth annual gathering of the Midwest Affiliation of Computer Clubs (MACC), focusing on small business and personal requirements and uses. Contact James Crowley, 4008 Rickenbacker Ave., Columbus, OH 43213.

World Computing Services Industry Congress II, June 23-25, San Francisco.

Geared toward the serious discussion of responsibilities as custodians of the international information resources. Contact ADAPSO, 1925 Lynn St., Arlington, VA 22209, (703) 522-5055.

Syntopicon VIII, June 23-26, Minneapolis.

The International Word Processing Association conference will feature one day of conference and three days of exhibits. Contact IWP, Maryland Rd., Willow Grove, PA 19090, (215) 657-3220.

JULY

Harvard Computer Graphics Week 1980, July 28-August 1, Cambridge, Mass.

Five-day conference features business graphics and computer mapping in commercial, educational, and governmental areas. Contact Kathy Devaney, Center for Management Research, 850 Boylston St., Chestnut Hill, MA 02167, (617) 738-5020.

SEPTEMBER

MIMI '80, September 9-10, Montreal, Quebec, Canada

13th International symposium and exhibition on mini and microcomputer applications. Contact Prof. M.H. Hamza, Department of Electrical Engineering, the University of Calgary, Calgary, Alberta, Canada T2N 1N4.

Integrated Systems Expo '80, September 9-11, Washington, D.C.

The National Micrographics Association will feature the development and promotion of the effective uses of micrographics, including interfaces with other information-processing technologies. Contact John Bidwell, NMA, 8719 Colesville Rd., Silver Spring, MD 20910, (301) 587-8202.

Internecon/Semiconductor International Expo, September 11-13, Singapore.

Keyed to the specific needs of engineering, manufacturing, and support personnel of Southeast Asia. Contact Industrial and Scientific Conference Management, Inc., 222 W. Adams St., Chicago, IL 60606, (312) 263-4866.

Wescon '80, September 16-18, Anaheim, Calif.

This convention is the largest high technology assembly in the U.S. Contact Robert Myers, Communications Counsel, Wescon, 999 N. Sepulveda Blvd., El Segundo, CA 90245, (213) 772-2965.

SIGOB '80, September 17-26, and Convention Informatique, September 15-19, Paris, France.

These back-to-back exhibitions and conferences cover personal computing to office equipment, and constitute the largest French international show. Contact Pierre Wagner, International Trade Shows in France, 1350 Sixth Ave., New York, NY 10019, (212) 582-4960.



A new concept of speed.

Traditional thinking about connecting one computer to another has been limited by the technological barriers to data transmission. For example, channel-to-channel interface is possible only if central processors are of like manufacture and are located close enough to each other. If they are not, the usual option is local data communications, with a transmission "speed limit" of about 56,000 bits per second.

Large mainframes, like IBM 370's, UNIVAC and CDC systems, process data at over a million instructions per second. The tortoise pace of existing data transmission technology has created traffic jams and bottlenecks which prevent these systems from being used to their fullest potential.

Network Systems' HYPERchannel™ has broken through these barriers and initiated a new era in computer-to-computer communications. HYPERchannel allows almost any computer to talk to any other computer—regardless of manufacture. At distances up to a mile in a local mode.

And at speeds up to 50,000,000 bits a second.

Proven in over 60 major installations, HYPERchannel is a means of interconnecting mainframes and mini's and extending data channels. HYPERchannel is not only providing innovative solutions to data transmission problems, but is rapidly changing the way computer centers are designed.

If you have at least two large IBM 370's or their equivalent, write us. Or call our marketing services department (612) 425-2202. We want to help you get your computer room up to speed.

CIRCLE 19 ON READER CARD



**Network Systems
Corporation**

7600 Boone Avenue North, Minneapolis, Minnesota 55428. TWX 910-576-1153.
Sales offices: Atlanta, Boston, Chicago, Detroit, Huntsville, Los Angeles,
New York, Philadelphia, San Francisco & Washington, D.C.

See us at NCC, Booth #4000, West Hall.

Drop by booth 4335-45.

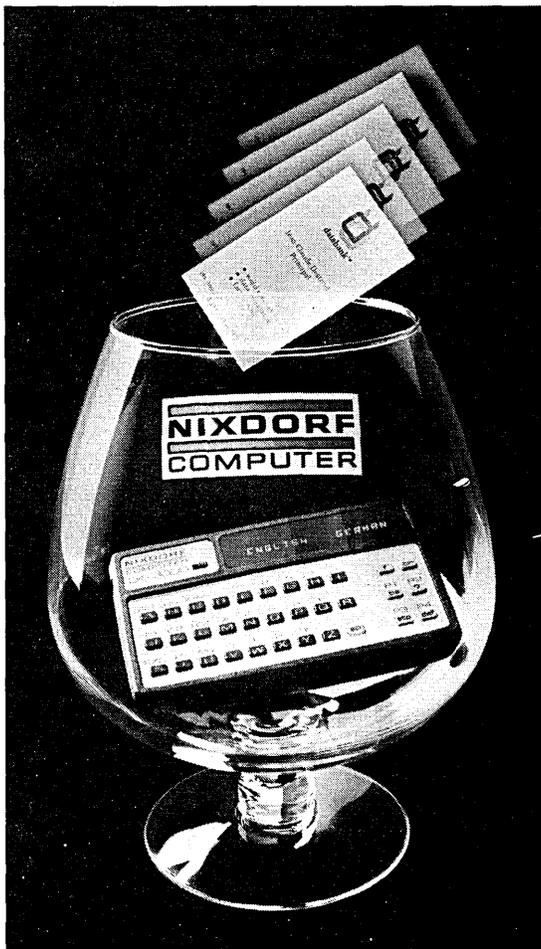
Visit the Nixdorf Computer Corporation booth at the NCC show and see our complete line of:
Word Processing Systems
General Business Systems
Distributed Data Processing Systems.

Drop in your business card.

While you're at our booth, drop a business card into the Nixdorf Brandy Snifter and you'll be eligible to

Win an LK3000 Personal Computer.

Complete with the module of your choice:
Language Translator, Calculator or
Electronic Notepad.
See you at the show.



CIRCLE 20 ON READER CARD

CALENDAR

IPAD National Symposium, September 17-19, Denver.

NASA and an Industry Technical Advisory Board (ITAB) to report on progress of the joint industry/government computer-aided design project called IPAD (Integrated Programs for Aerospace-Vehicle Design). Contact IPAD Project Office, Mail Stop 246, NASA Langley Research Center, Hampton, VA 23665, (804) 821-2888.

Federal Computer Conference, September 22-24, Washington.

Cosponsored by DATAMATION. Will address the management of change in the 1980s for federal dp users. Contact Ms. Lynn Green, P.O. Box 368, Wayland, MA 01778, (617) 358-5181.

12th Annual Conference of the Society for Management Information Systems, September 22-25, Philadelphia.

The conference theme will be "MIS Management in the Emerging Information Age" and will examine the challenges facing the MIS Executive. Emphasis will be on the impact of converging technologies on the role of the MIS executive in the 1980s. Contact M. Rippey, the Society for Management Systems Information, 111 East Wacker Dr., Chicago, IL 60601, (312) 644-6610.

Comcon Fall '80, September 22-26, Washington, D.C.

Theme will be Distributed Processing and Networking. Contact Executive Secretary, P.O. Box 639, Silver Spring, MD 20901, (301) 439-7007.

10th International Symposium on Fault-Tolerant Computing, October 1-3, Kyoto, Japan.

The symposium concentrates on Fault-Tolerant Computing, and covers the basic theory and practice. Official language is English. Contact Secretariat of FTCS-10, Department of Applied Mathematics & Physics, Faculty of Engineering, Kyoto Univ., Kyoto, 606, Japan.

Eighth World Computer Congress, October 6-9, Tokyo, and October 14-17, Melbourne.

Speakers will discuss subjects ranging from computer architecture to computers in everyday life. Contact Joseph Mendez, c/o AFIPS, 1815 North Lynn St., Suite 800, Arlington, VA (609) 764-0100.



CARTOON BY W.R. BROWN

A lot of companies turned to Nixdorf for



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As you may have guessed, Prime's Word Processing system embodies all these features and quite a few more, including a screen editor that displays text as it's entered. Menus that lead the user through the system. Labelled function keys that eliminate the need for heavy user memorization. And system storage capability of over 2 billion characters. Which translates into roughly a million pages of information.

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Correspondence Management cuts paperwork and simplifies filing with its powerful storage and retrieval capabilities.

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Calendar Management allows you to maintain a confidential two month personal calendar.

And Scheduling, which is based on the personal calendar, lets you request a meeting, get confirmation of a specific date and time from all attendees, then actually schedule the meeting.

As you can see, our Management Communications and Support lets you spend less time on routine jobs, and allows you to function better as a manager.

Advanced Text Management.

This tremendously helpful function employs a 60,000 word electronic dictionary. The contents are user-defined, so medical, legal, or industry terminology can easily be added. Spelling is automatically compared with the dictionary for accuracy, and hyphenation is done automatically.

It will also support multi-lingual dictionaries for creating foreign language documents or translating one language to another.

In other words, *C'est si bon.*

Hardworking workstations.

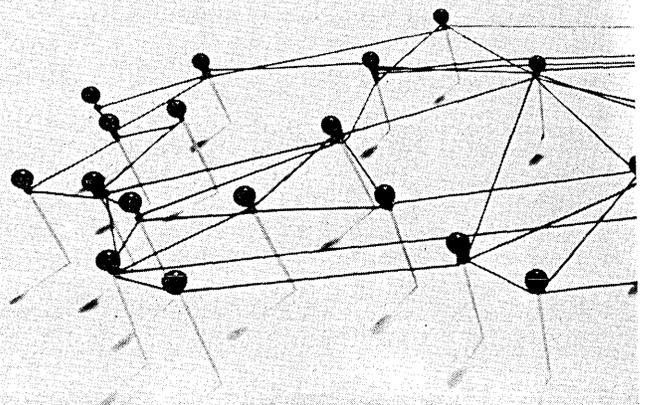
Prime's Office Automation System is supported by two workstations; one administrative and one management. They both can access all capabilities of the system, but each is tailored to the specific needs of its users. Together, they make a highly productive information management tool.

The System operates on a multifunctional Prime 50 Series computer system. All Prime computers share the same operating system, the same file system, and the same communications products. So no matter what size computer you start with, you can move all the way up to a powerful 750 without piling up bills for recompiling programs or modifying software. In fact, your office system can easily and economically grow to support over sixty users.

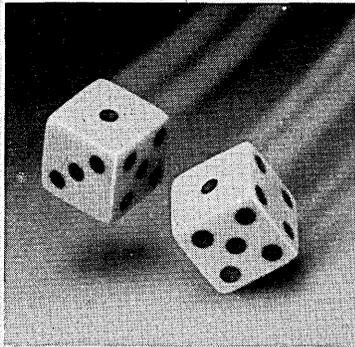
In short, Prime's Office Automation System can deliver what you need. So if you're ready for this kind of office, we're ready to deliver the System. If you'd like to know more, write Prime Computer, Advertising Department, 3 Newton Executive Park, Newton, Massachusetts 02162.

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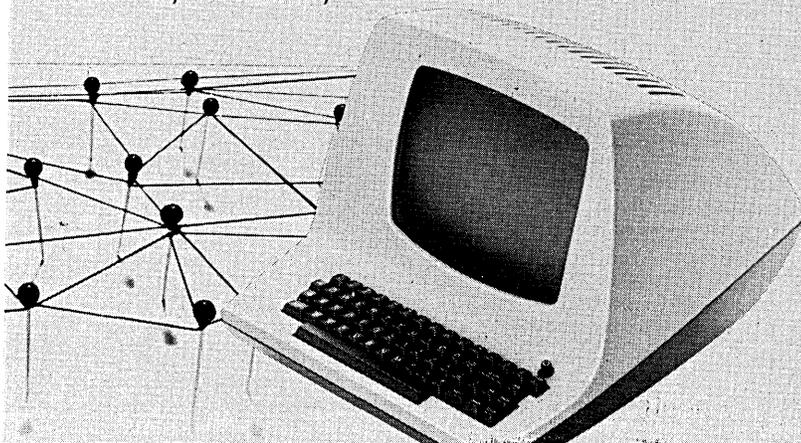
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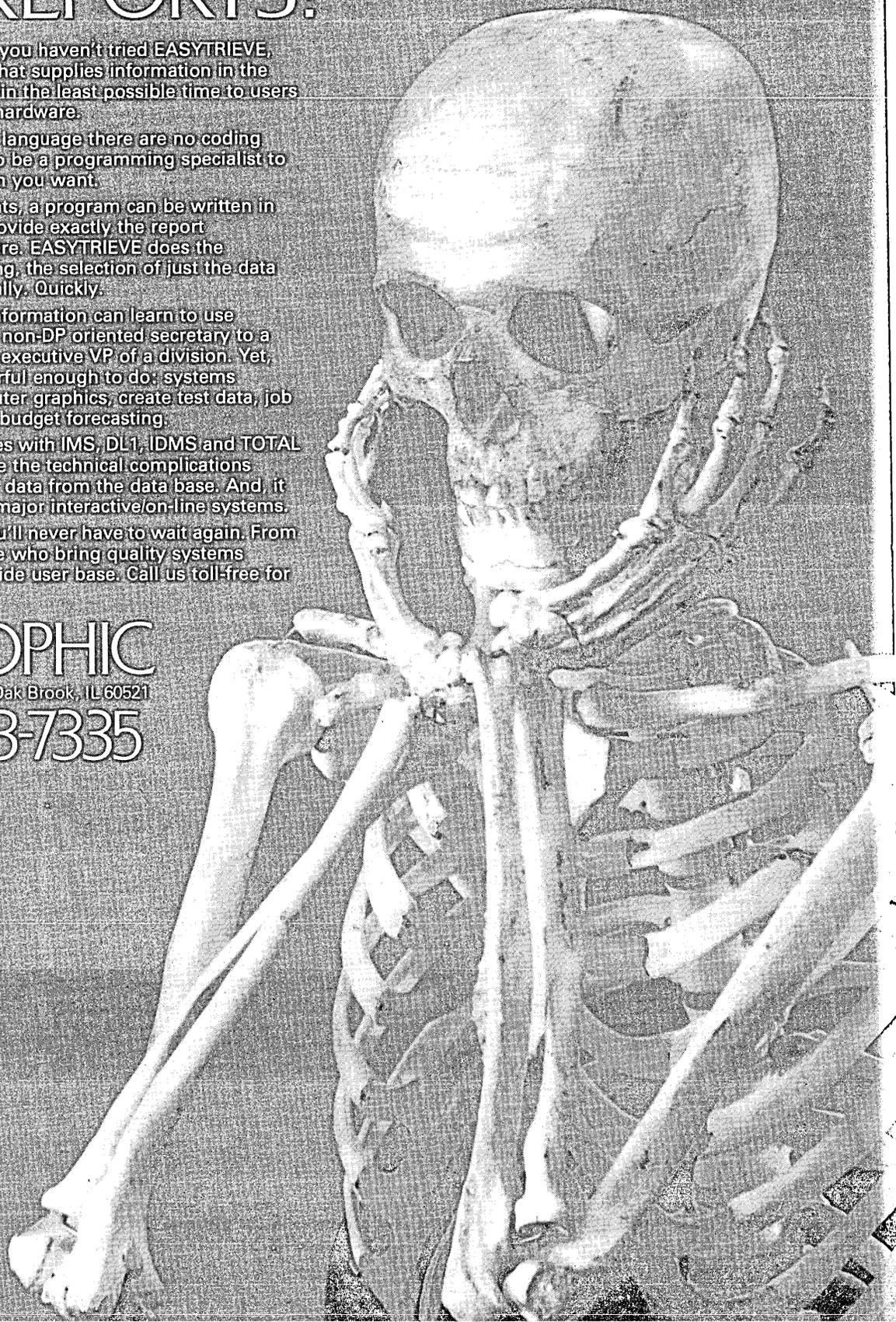
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CIRCLE 24 ON READER CARD

LETTERS

PERFORMANCE MEASUREMENT

The purpose of professional meetings such as the Computer Performance Evaluation Users Group (CPEUG) is to provide a forum for the free dissemination of knowledge and experience. I am, therefore, deeply perturbed that your magazine elected to sensationalize my recent presentation to that group which has subsequently caused me considerable personal embarrassment among my peers and my NASA clients.

"Measure by Dp Measure" (Feb., p. 79) is a collection of misquotes and erroneous conclusions apparently drawn to imply some degree of poor planning of the Shuttle Inventory Management System. This implication is clearly not supported by my paper, National Bureau of Standards Publication 500-52 (1979), which was conveniently not referenced by your article.

NANCY LENNON
Manager
Systems Support and Analysis Section
Computer Science Corp.
Kennedy Space Center, Florida

This story was based on personal interviews and coverage of Ms. Lennon's speech, "Performance Analysis of a Saturated System."—Ed.

USER VIEWS

Re: "Developing User Views" (Feb., p. 141), the problem is partially due to ignoring the learning process which occurs while a data base is being designed. There are two views which must be distinguished:

The data model: a description of the data requirements of the applications which are candidate users of the data base. These models are then integrated into the integrated data base model (see El-Masri and Wiederhold in SIGMOD '79 Proceedings for a formal methodology). During this process much is learned about the data structure which represents the information required to operate the enterprise.

Out of the integrated data base model a number of submodels are then extracted, which will represent the operational view of the implemented applications.

These two views, the original data model and the final data base submodel, often differ considerably due to the learning process which has occurred. If this flexibility is recognized by the data base designers, then some of the problems alluded to in Dr. Holland's article will be minimized. An article outlining this process has appeared (Wiederhold and El-Masri, in the *Entity-Relationship Approach* (Peter Chen, editor), UCLA and North Holland) using modeling tools from my Database Design textbook (McGraw-Hill, 1977).

We are all aware that one of the advantages of moving to automation is in the preparatory analysis that is undertaken in the conversion process. This advantage should be recognized in the development of user views.

GIO WIEDERHOLD
Assistant Professor
Department of Computer Science
Stanford University
Stanford, California

APPLICATION CHECKLIST

Re: "A Checklist for System Design" (Jan., p. 147), we are involved in an evaluation of ddp at The Hartford. The article touched many of the issues we are currently wrestling with as we attempt to unravel the ddp puzzle.

THOMAS B. STRETT
Data Processing Systems Support Dept.
The Hartford
Hartford, Connecticut

It is good to see articles on the human factors of computer systems. Too often, interactive systems are designed with the operator as an afterthought.

My laboratory is interested in man-computer interface problems. We are currently sponsoring work in the development of man-computer dialogue design tools. In the near future, we are considering establishing a man-computer-interaction laboratory devoted to the investigation of this interesting coupling of man to machine. It is

our opinion that the most challenging work of the future does not lie in the development of new technology, but in discovering how man can best utilize this new technology.

DONALD L. MONK
Crew Systems Effectiveness Branch
Human Engineering Div.
Department of Air Force
Wright-Patterson AFB, Ohio

VM AND VIGOR

Re: "VM: A Basic Ingredient in Emergency Planning" (Dec., p. 167), poor Mr. Murphy. He has obviously spent a considerable amount of time and money to get his contingency plan to the point where it will work, which is certainly an effort worth applauding. But, Murphy is in big trouble if he ever has to execute his plan in a disaster situation, especially if he has to use the data center where his test was run.

Murphy's contention is that once the technical problems are overcome, everything else should fall into place. The two problems Murphy pays lip service to are significantly more difficult to solve. These two problems are finding a place to run and, once an alternate site is found, getting enough capability to at least process critical applications in a timely manner, and Murphy hasn't even considered the question of backing up on-line systems, which in most medium- to large-scale operations fall into the critical category.

The problem of finding an alternate site where some sort of reciprocal agreement can be made is not in and of itself a difficult task. Other than this type of agreement not really being binding, the real problems, once a site is found, can be stated in terms of hardware resources and time. What portion of the configuration can the manager of the alternate site afford to give away and for how long? Realistically, the alternate site manager could not afford to give away anything. If he could, then he's probably spending more money on hardware than really needs to be spent.

The performance problem can easily be clarified by using Murphy's test

LETTERS

experience. I have no doubt that Murphy was able to take his MVS system and IMS application from his IBM 370/158 with 3MB of storage and process it under VM at the alternate site on the IBM 370/148 with 2MB of storage, but in a real disaster situation with the overhead required by VM and its inherent performance problems, I find it hard to conceive of IPLing the alternate site owner's operating system in addition to Murphy's, let alone getting any meaningful work done.

I believe the true test of a reciprocal agreement and its chances of being an effective solution in an emergency can be measured very simply. In Murphy's case, all he has to do is ask himself how much of his computer he could spare if the situation were reversed.

HUGH CHEKEMIAN, JR.
Sun Information Services Co.
Philadelphia, Pennsylvania

Mr. Murphy responds: The problems, which exist whether or not VM is considered, are:

1. Selection of an alternate site.
2. Finding the capability to process critical applications.
3. An alternate site does not "give away" resources.

VM does, however, greatly increase one's options in dealing with the above problems.

As to performance, let me ask Mr. Chekemian how much performance degradation he is willing to suffer if he has no data processing facility? I am in bigger trouble not having even the test site to go to.

Mr. Chekemian asks how much of my computer can be spared if the situation were reversed? For the right price, he can have it all. Reading between the lines, it appears Mr. Chekemian is associated with a firm that provides emergency backup service. Let me assuage his fear that I am an advocate of alternative solutions to this type of endeavor. As a matter of fact, his firm stands to take the best possible advantage of the use of VM in this context as it provides the following:

1. Removes a potential client's fear of having to compete with another user who happens to have a catastrophic situation simultaneously.
2. Allows the least difficult manner in which to duplicate a user's environment.
3. Allows the easiest test program to be set up.

As to my being poor, that is easily corrected: send money.

GRAVE ERRORS

Re: Forum (Feb., p. 195), Lance Hoffman suggests that the computer industry can expect a Three Mile Island-type accident in

the 1980s to mobilize public opinion against computing abuses. A gross data abuse has already occurred, in the fall of 1979, when an incorrect data tape almost started World War III. Where was the public concern? Where was Mr. Hoffman?

PAUL BARACOS
Winnipeg, Manitoba
Canada

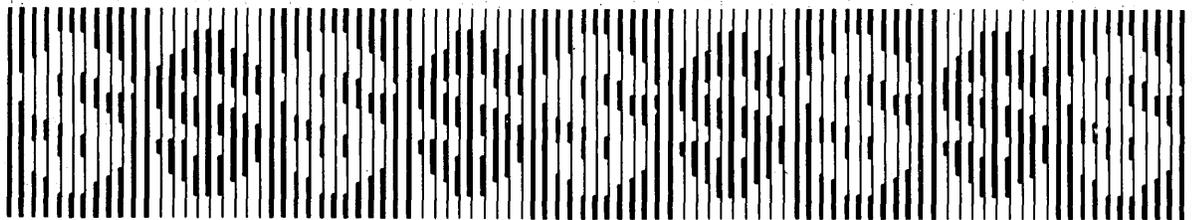
PLACEMENT ETHICS

Re: "That Old Bugaboo Turnover" (Oct., p. 97), as vice president of Recruiting Services Inc., and with 10 years in technical and executive recruiting, I would like to make a comment on so-called "boycotting of placement firms" and "self regulation." It is an unwritten law among ethical recruiting and placement firms not to recruit from existing clients. Of course, there are those placement firms that disregard unwritten laws. The companies that utilize recruiting and placement firms should check on their reputations before dealing with them.

JOSEPH N. GANIM
Vice President/Recruiting Services Inc.
Cincinnati, Ohio

R.A. McLaughlin gives some interesting solutions (and nonsolutions) to the problem of high turnover in the data processing industry. I would like to offer another solu-

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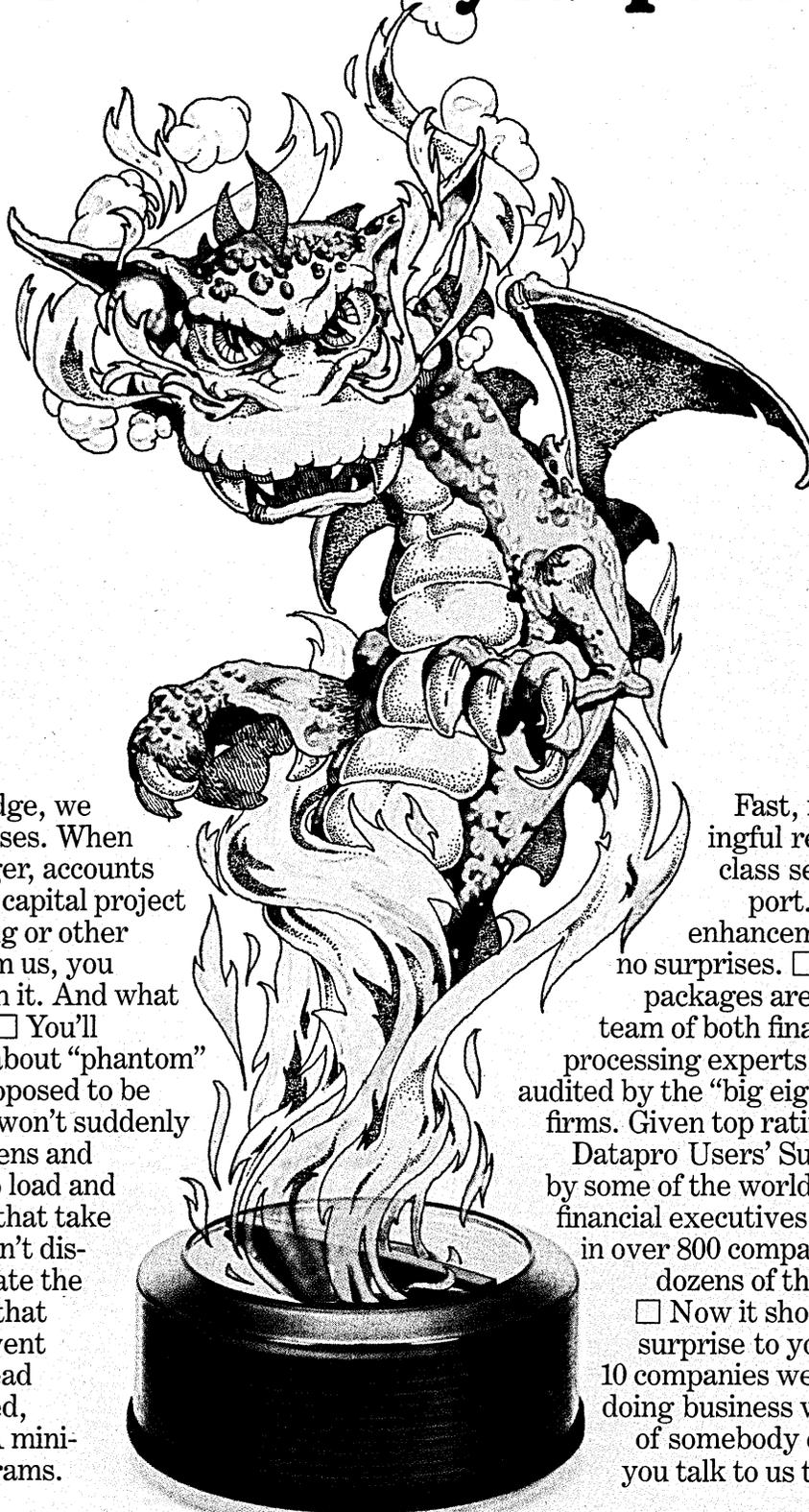
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CIRCLE 26 ON READER CARD

LETTERS

tion which is available to any data processing firm—cooperative education.

Co-op is a program now in existence in over 400 higher education institutions throughout the United States, as well as many others in Canada and abroad. The basic premise of these programs is to provide college students the opportunity to work off-campus in their major field, often earning college credits and a salary at the same time, while still in college.

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Should companies be interested in becoming involved in a cooperative educa-

tion program, they need look only as far as their local community colleges, colleges, or universities. Chances are good that a co-op program will be in existence, and highly qualified students available. In addition, the Cooperative Education Association, 247 Alumni Center, Indiana State University, Terre Haute, IN 47809, would be glad to assist any employer in locating schools in their area with cooperative education programs.

LINDA C. NELSON, Director
Cooperative Education Program
Skagit Valley College
Mount Vernon, Washington

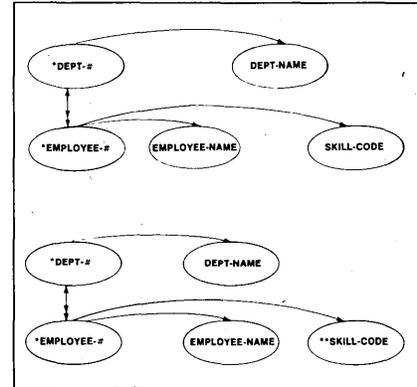
CORRECTIONS

Heights Information Technology Service, Inc. has completed 20 projects in the U.S., not 90 as we reported in an earlier issue, and the company has over 120 panel members signed up.

"Basic Books Briefs" (Feb., p. 178) were written by E. A. Keith of the Hughes Corp. Mr. Keith has been teaching BASIC pro-

gramming for 11 years. We regret his byline was omitted from the reviews.

Re: "DBMS: Developing User Views" (Feb., p. 141), the article refers to bubble charts which use ellipses in drawing user views, yet rectangles were depicted. Also, placement of arrows in some cases were incorrect, and the three-dimensional effect, although more interesting, unfortunately gives the impression of too many relationships. The correct charts should have appeared thus:

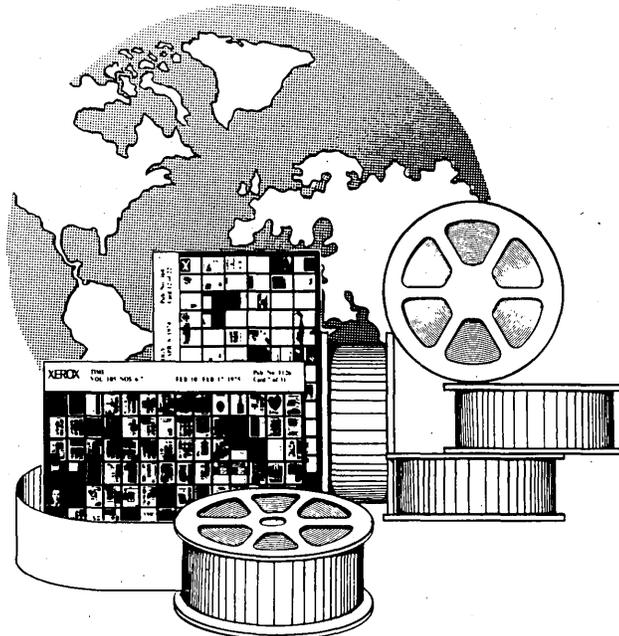


Due to a printer's error the headings for the April salary survey chart on p. 113 were omitted. The headings are listed below.

Cumulative Averages		to \$5,000		to \$12,000		to \$25,000	
Salaries	Usual Range	Salaries	Usual Range	Salaries	Usual Range	Salaries	Usual Range

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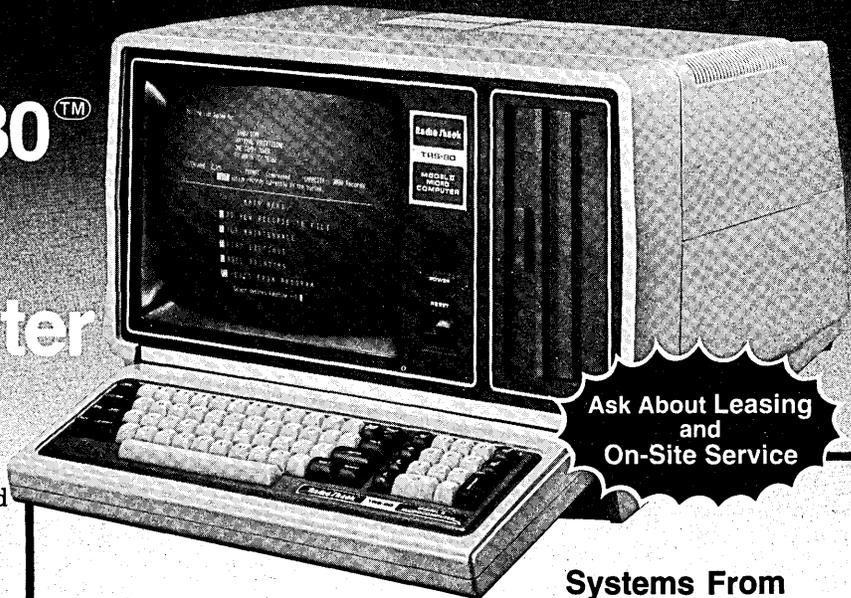
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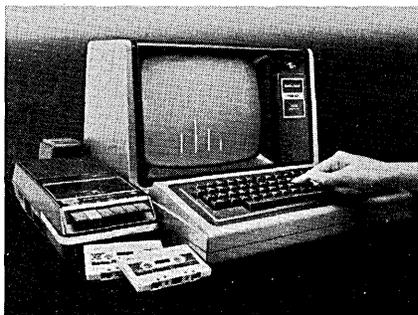
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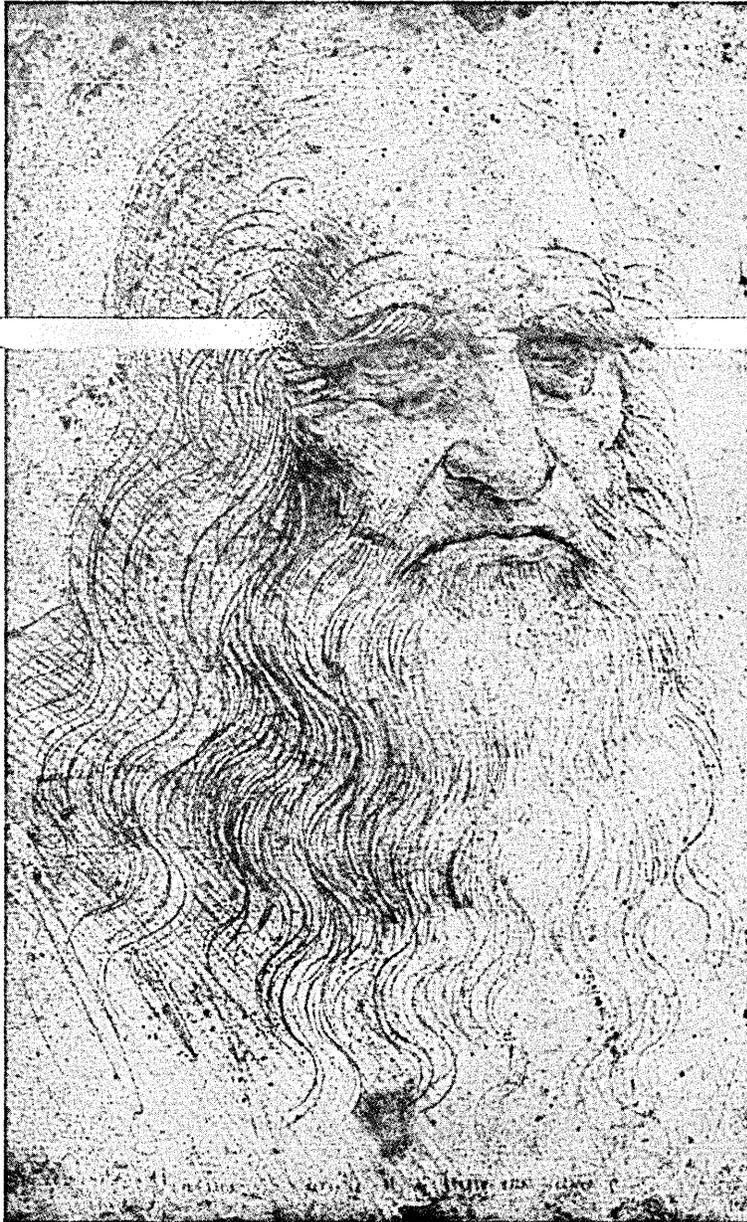
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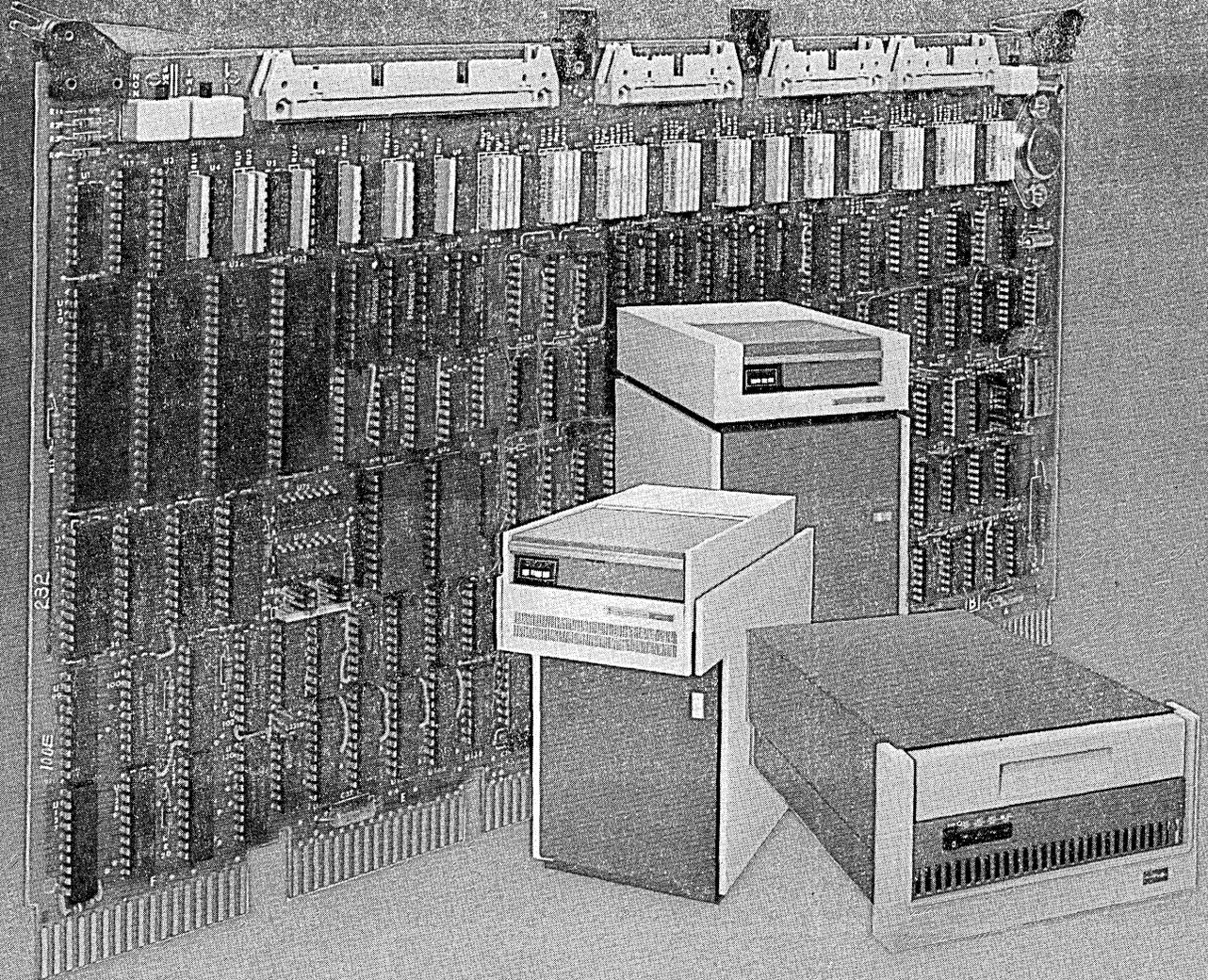
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If you suspect your CPU isn't delivering all the throughput it promises, here's the solution: STC's 8000 Series Disk Subsystem. It's a family of disk drives and controllers that goes beyond mere compatibility to provide innovative hardware features and architectural enhancements. Coupled with STC's uncompromising support, the 8000 Series will enable your IBM or compatible system to process more information, faster. And, at significantly lower cost of ownership.

More paths for your data. More ways to store it.

The 8000 Series is absolutely software compatible with IBM's 3350, but that's where the similarities end. You have a choice of string switch, dual port, or both — on the same subsystem. You get contiguous addressing, 64-volume support and 8-string addressing for configuration flexibility and increased availability. And you get a choice of the proven STC 8350 with 317.5 Mbytes per spindle and the double-density STC 8650 with 635 Mbytes per spindle. In short, it's the most powerful disk subsystem ever offered for mainframe computers.

Fitting the solution to your problem.

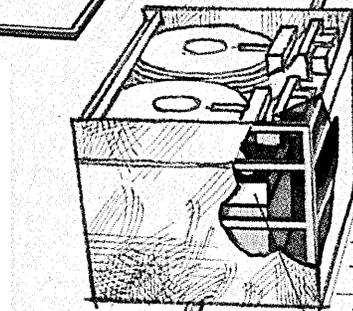
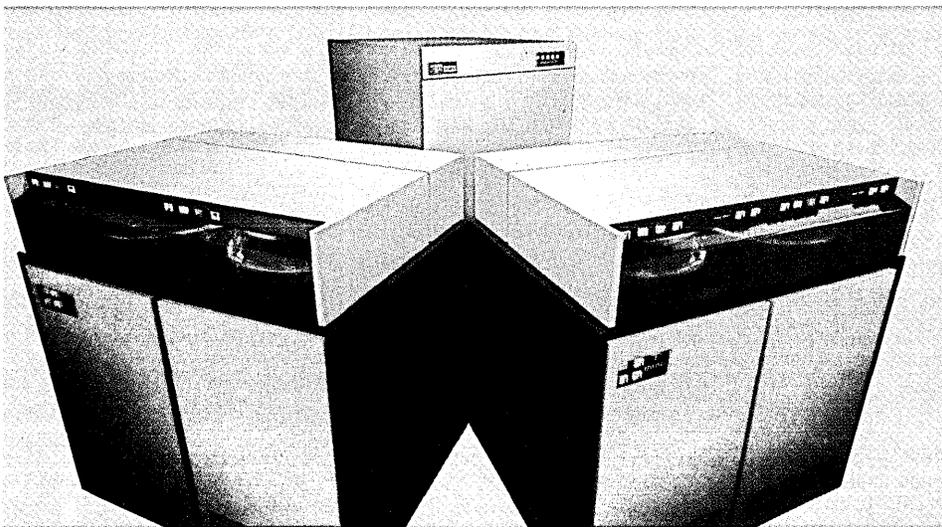
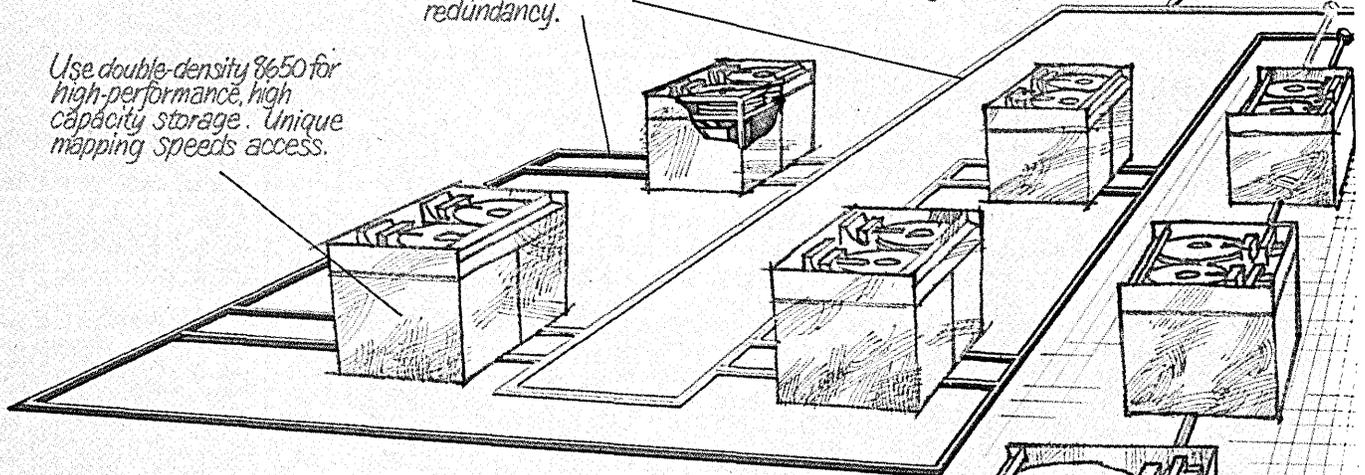
Hardware that extends well beyond mere compatibility is the foundation that permits skilled STC Systems Engineers to craft a solution tailored to your particular operation. Using powerful performance analysis and tuning software, they can virtually split open every pack in your shop to seek out performance bottlenecks and show how to eliminate them. They'll even simulate your new subsystem configuration to document both the performance benefits and the cost — before you spend a nickel.



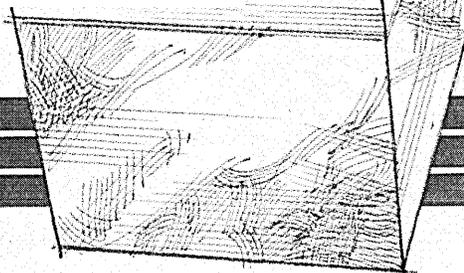
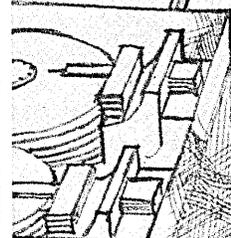
Dual port option improves accessibility and provides path redundancy.

Powerful diagnostics cut service time and cost.

Use double-density 8650 for high-performance, high capacity storage. Unique mapping speeds access.



Fully redundant electronics for enhanced reliability.



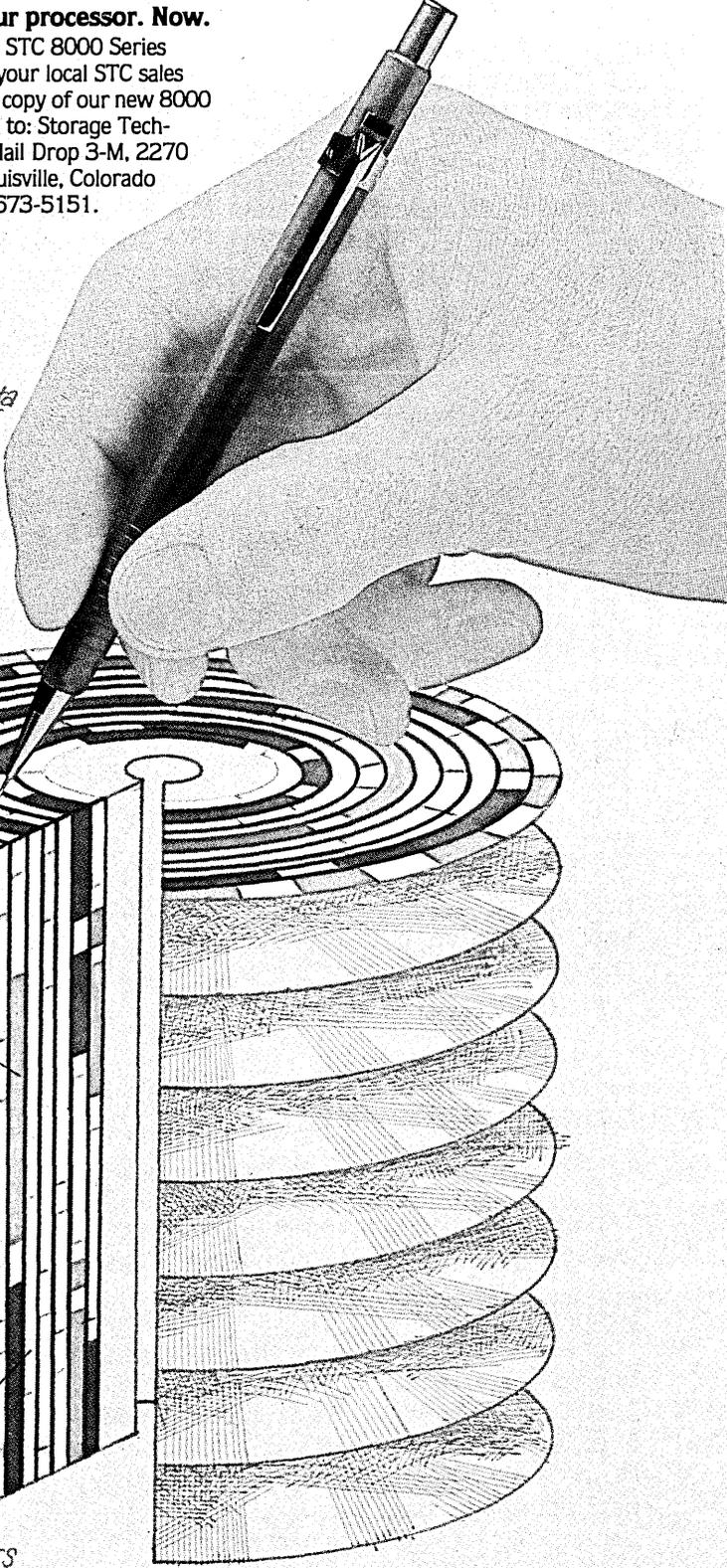
your computer fulfill its potential.

Superior support for peak availability.

Once your 8000 Series Subsystem is up and running, our top-rated Field Engineers will keep it that way. Among their maintenance tools are powerful software programs that highlight performance trends, enabling our FE's to solve problems before they happen. Other programs pinpoint malfunctions quickly to facilitate speedy on-site service. Our uncompromising field support is your assurance that your 8000 Series Subsystem will deliver all the performance we've promised, every day of its service life.

Get more from your processor. Now.

For more details on STC 8000 Series Disk Subsystems, call your local STC sales office. To receive your copy of our new 8000 Series brochure, write to: Storage Technology Corporation, Mail Drop 3-M, 2270 South 88th Street, Louisville, Colorado 80027. Phone (303) 673-5151.



8-string addressing reduces string contention.

STC provides utility programs to help manage data efficiently.

8350's on short strings for catalogs, TSO, sorts - all high activity data sets.

Performance tuning software places data across volumes, strings and channels for maximum performance. Can simulate performance before you install.

STC Systems Engineers analyze performance to reveal inefficiencies and bottlenecks.

STC
**STORAGE
TECHNOLOGY
CORPORATION**

Fulfilling the promise of technology.

CIRCLE 30 ON READER CARD

SCIENCE/SCOPE

Pilots will experience the sights, sounds, and feel of flying in combat in a new Hughes simulator. The system will help train pilots of the U.S. Navy and Marine Corps F/A-18 Hornet strike fighter. It includes two 40-foot domes, each surrounding a simulated cockpit. Projected onto the domes will be computer-generated pictures of sky and earth, maneuvering aircraft, missiles, and gunfire. The images will move in response to the pilots' actions as they "fly" the trainer. An instructor at a separate console can pose tactical problems, monitor the mission, and evaluate performances.

Remotely piloted vehicles using a new video processing technique could relay TV pictures with less chance of being detected or jammed by an enemy. The method, developed by Hughes for the U.S. Army, first separates potential targets from background clutter. Background areas are then converted into a white-on-gray outline picture that's updated every second. A window containing the prime target is allowed a fuller range of tones and is updated at a rate of 7-1/2 frames per second. Other targets receive lower resolution or are converted to symbols, and are updated every second. Though standard TV is sharper because it uses twice the line resolution and is transmitted at 30 frames per second, this compression technique transmits all vital data with one-thousandth the bandwidth.

Improvements to the U.S. Navy's Phoenix missile will enable the radar-guided weapon to meet anticipated airborne threats through the 1990s. The current model, the AIM-54A, now carried on the F-14 Tomcat fighter, is the service's primary long-range air-to-air weapon. The new AIM-54C incorporates a digital guidance unit that will be more flexible and reliable than the analog unit it replaces. Other changes include an inertial reference system to improve range and accuracy, a solid-state transmitter-receiver with increased capability over the existing klystron tube, and a target-detecting device developed by the Naval Weapons Center. Hughes is building 15 engineering development models of the improved Phoenix for captive flight tests and actual firings.

Hughes Research Laboratories needs scientists for a whole spectrum of long-term sophisticated experiments. Advanced research programs include three-dimensional microelectronics, digital picture processing, space optics, solid-state devices, fiber optics, integrated optics, integrated circuit design, and electro-optical materials. Send resume to Professional Staffing, Dept. SE, Hughes Research Laboratories, 3011 Malibu Canyon Road, Malibu, CA 90265. Equal opportunity M/F/H/C.

Finding wasted energy is one of many ways that a hand-held infrared viewer helps its users save money. The device, a Hughes Probeye® viewer, senses heat to create a red-on-black image for display through an eyepiece. It let workers at a large airport pinpoint underground steam leaks within a 10-foot circle, thereby avoiding costly exploratory excavations that would have disrupted airport operations. Paper manufacturers use the viewer to monitor paper sheets for moisture differences that can cause defects. The scanner picks up temperature changes caused by varying moisture conditions. Inquiries about the energy and safety uses of the Probeye viewer should be directed to (714) 438-9191, Ext. 223.

Creating a new world with electronics

HUGHES

HUGHES AIRCRAFT COMPANY
CULVER CITY, CALIFORNIA 90230

EDITOR'S READOUT

CURING THE MEETINGS BLUES

A short time ago we attended a computer conference in Miami Beach. From this experience we learned two great truths:

1. We are in no hurry to return to Miami Beach.
2. There are far too many computer conferences.

The first great truth—like all major revelations—must be experienced to be understood. One hour in Miami Beach should do it.

The second comes on gradually over time, sometimes years. The symptoms manifest themselves individually and institutionally. The first is characterized by a vague sense of exhaustion, an inability to remember which city you are in, chronic *déjà vu* immediately upon entering the exhibit floor, and indigestion. The institutional symptoms include skyrocketing corporate show budgets, exhibit booths that are never returned to storage, and a stretching of marketing and sales resources to the breaking point.

Not that we are against shows. They perform a vital function in our industry; they are our 20th century version of the marketplace and bazaar all rolled into one, and the many levels of interaction that take place cannot be duplicated in any other fashion.

And, of course, they make plenty of money for the show organizers. So, as each new wave of technology crests on the horizon, a gaggle of entrepreneurs comes body surfing along with it, and before long . . . lo! a new show is born.

As every marketing manager knows, shows are extraordinarily costly. The cost of the booth is minimal compared to the money spent for salaries, travel, and entertainment. Even more critical is the time lost by salesman pulling booth duty when they could be making rifle shot sales



calls at the offices of their major accounts. But the marketing manager also knows that his competition will be at the show . . . does he dare not show his company's flag?

The problem is compounded by a limited show season—spring and fall are the prime times. And there are only a limited number of cities to consider—the very best of shows will languish if held in some festering secondary town far removed from the major centers of user population.

The marketing manager is between the proverbial rock and a hard place. He has a finite budget and finite sales resources; yet domestic and international show calendars indicate that he could participate in two exhibits a month and still have shows left over. Every year at budget time he must perform a delicate balancing act and hope he's right.

For a moment let's imagine a more idyllic situation. Suppose there were only four major shows a year. The NCC would certainly be one. Interface would be the major data communications show, and Office Automation would target this growing area. The other major show would be highly oriented to both the classic end user: the dp professional, the director of MIS, the manager of corporate information resources, and, for want of a better term, the end, end user—the unit manager who is now heavily involved in dp but is not a dp professional. This show would bring them together and would focus on the cooperative development of the corporation's information re-

source. Info would be folded in here along with several other shows.

Five or six regional shows would cater to specialized needs and accommodate highly focused programs (for example, a federal adp show in Washington, a software and data base conference, and a text and word processing applications show).

While we're fantasizing, let's revamp the programs. At the major shows, all papers would have to be carefully refereed; the sloppily constructed, last minute programs where the same faces and same speeches show up year after year would be taboo.

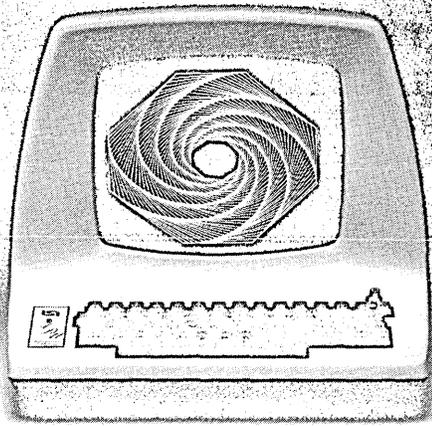
At the regionals, there would be sessions devoted to unabashed vendor presentations, where purveyors of similar services or products would use a prespecified format to pitch their wares so the users could make an apple and apple comparison between the various offerings.

There's much more that could be done, but you get the drift. It is possible? Can it ever happen? Probably not. But while we're fantasizing, let's imagine the major vendors and the organizers of the major shows forming a powerful show governing board to decide such arrangements.

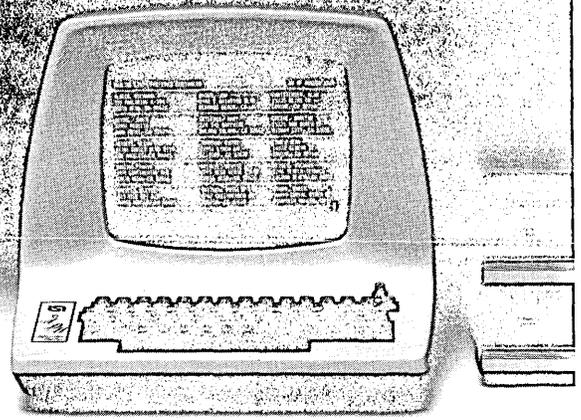
All of us travel-weary industry wanderers would breathe a sigh of relief and beleaguered marketing managers could bring their budgets in line with these difficult, inflation-riddled times.

And one more thing. We might never have to go to Miami Beach again. *

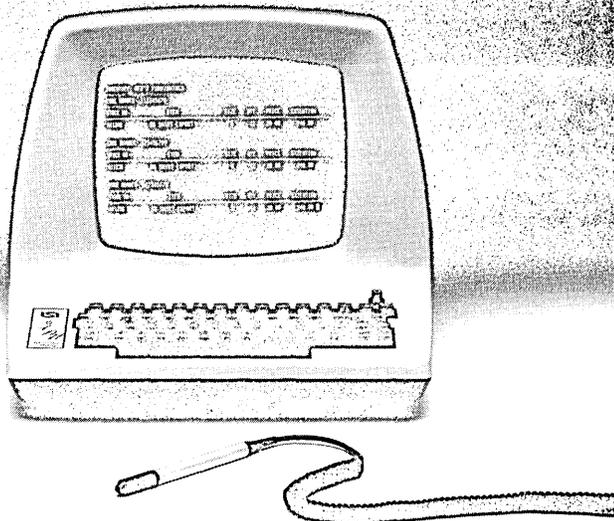
SOPHISTICATED GRAPHICS TERMINAL



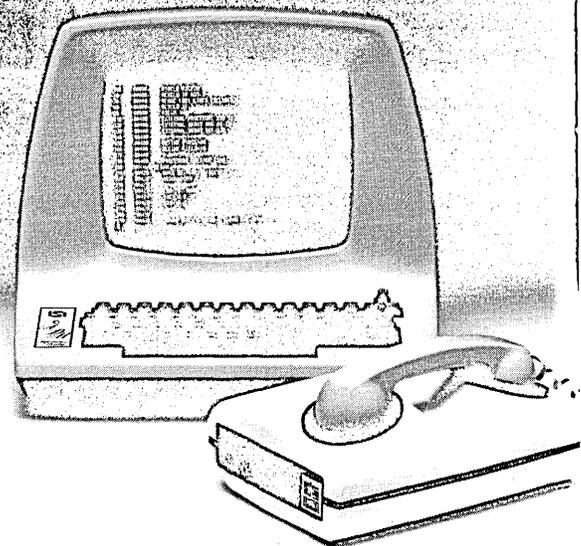
SMALL BUSINESS SYSTEM



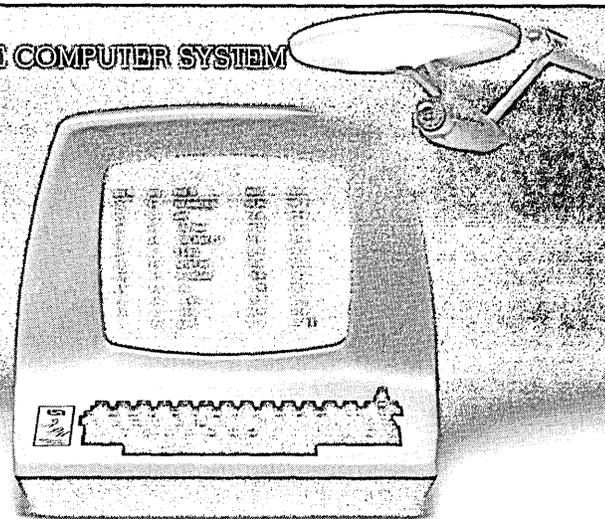
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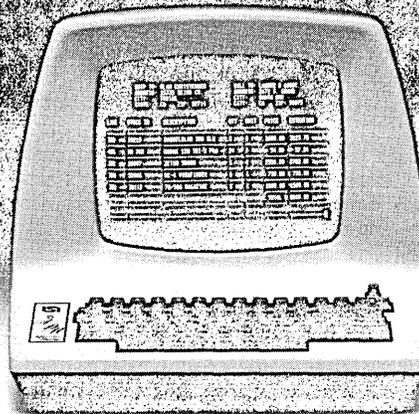
PORTABLE I/O DEVICE



HOME COMPUTER SYSTEM



VERSATILE DATA TERMINAL



What could anyone possibly do with 85,000 Dumb Terminals?

That's how many ADM-3A's there are out in the field working right now. And more being shipped each day. Now just what accounts for such remarkable popularity?

Sure, it's the definitive dumb terminal, adaptable enough to fit a host of applications. It has a 12-inch diagonal screen. Full or half duplex operation at 11 selectable data rates. 1920 easy-to-read characters in 24 rows of 80 letters. 59 entry keys. An RS232C interface extension port. And direct cursor addressing.

But we wondered if all 85,000 Dumb Terminals were being used for just everyday data entry. So we checked around.

And found that people are using Dumb Terminals for things even we never thought of.

THE ADM-3A GOES INTO BUSINESS.

More and more OEM's are putting the Dumb Terminal into small business systems. They assemble a package that usually contains a disk, memory, a printer, and a video display terminal — the adaptable ADM-3A.

So the chances are that when you buy a small business system from someone, it'll contain, you guessed it, the amazing Dumb Terminal.

IT TAKES STOCK OF THE SITUATION.

Many businesses are using the Dumb Terminal, along with a light pen (Universal Product Code Decoder), to keep track of their inventory. The decoder is interfaced to the Dumb Terminal, and when a piece of merchandise imprinted with a Universal Product Code passes under it, the item is entered into a computer for tallying.

Simultaneously, the item is also displayed on the ADM-3A's screen — so it's instantly available for quick double-checking.

PROGRAMMERS LIKE IT, TOO.

Surprisingly enough, many computer programmers use the ADM-3A as an effective, portable I/O device. They can take it into a back room or, along with an acoustic coupler, to their homes if they wish, and compile programs nearly anywhere.

By using telephone lines, they can have direct access to a computer. Or, with the addition of an inexpensive cassette, the programmer can store the program on tape and enter it into the mainframe at a later date — with no loss of data.

THE DUMB TERMINAL PUTS ON A NEW FACE.

Some of our more ambitious customers have transformed their ADM-3A's into sophisticated graphics terminals. Simply by installing another PCB, they've enabled their terminals to perform complex plotting, graphics, and even draw charts.

And the Dumb Terminal is so adaptable that these industrious people had no trouble with installation — the graphics PCB required not the slightest cutting or soldering. It simply slipped right in and started working, all in a matter of minutes.

YOU CAN EVEN TAKE IT HOME TO MEET THE FAMILY.

We discovered that many computer buffs are using the Dumb Terminal as an inexpensive way to upgrade their systems. After all, the equipment found on most microcomputers leaves a lot to be desired. Such as the tiny five or six-inch screen, for instance.

By upgrading to the ADM-3A, they get a full 12-inch screen that's easy on the eyes. Not to mention

DUMB TERMINAL SMART BUY



LEAR SIEGLER, INC.
DATA PRODUCTS DIVISION

Dumb Terminal® terminal is a registered trademark of Lear Siegler, Data Products Division.

CIRCLE 34 ON READER CARD

a lot of capabilities they wanted, but just didn't get on their systems.

All for only \$895.

THE DUMB TERMINAL. THE HALLMARK OF VERSATILITY.

When you get right down to it, the Dumb Terminal's applications are pretty amazing.

It can be interfaced with a staggering variety of RS232 devices. Such as cassettes, disks, floppy disk drives, printers, paper tapes, and readers, to mention just a few.

In fact, the ADM-3A is compatible with just about any RS232 device you can name. Even other video terminals, if you wish.

And people call this a "dumb" terminal?

WHAT WILL THEY THINK OF NEXT?

Who knows? But it seems that as long as there are Dumb Terminals, people will find new, unsuspected uses for them.

Of course, the ADM-3A will continue to be the same dependable data entry terminal that's made it an industry legend.

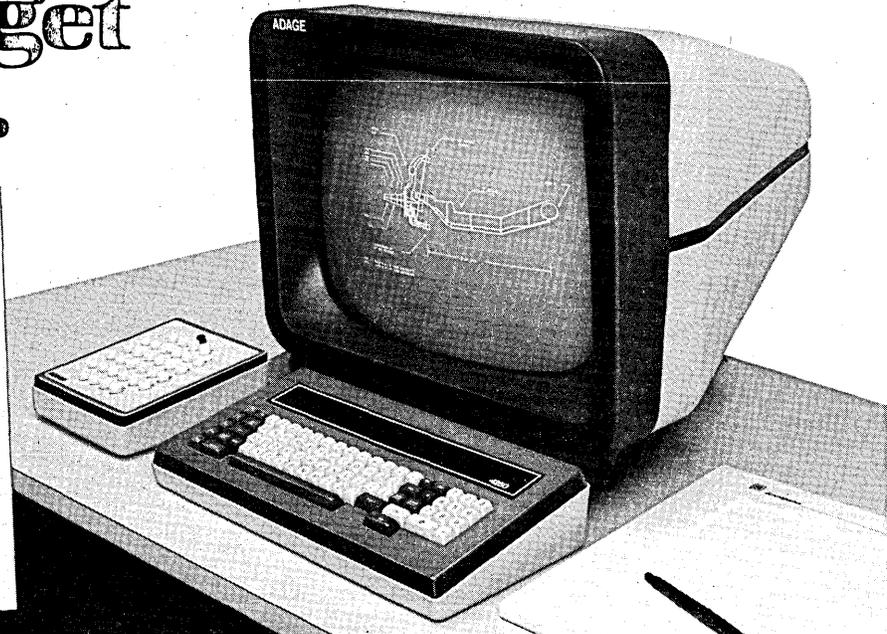
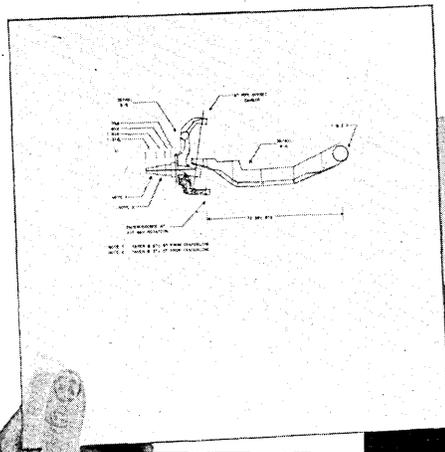
With good, reliable features and a minimum of frills. Nothing could change that. The fact is, we think that's probably the main reason that so many people have come up with so many uses for the ADM-3A.

Who said you can't teach a Dumb Terminal new tricks?

Lear Siegler, Inc./Data Products Division, 714 N. Brookhurst Street, Anaheim, CA 92803. (800) 854-3805. In California (714) 774-1010. TWX: 910-591-1157. Telex: 65-5444. Regional Sales Offices: San Francisco (408) 263-0506. Los Angeles (213) 454-9941. Chicago (312) 279-5250. Houston (713) 780-2585. Philadelphia (215) 968-0112. New York (212) 594-6762. Boston (617) 423-1510. Washington, D.C. (301) 459-1826. England (4867) 80666.

CAID/CAM GRAPHICS

The IBM System 360/370 user can get a grip on.



The Adage 4250 is a plug-compatible improvement on the costlier IBM 3250 Display. With superior graphics, local hard copy output — and a host of advanced, user-oriented features — the Adage 4250 is, quite simply, the best interactive display system available for use with large mainframes.

Basic 4250 System advantages include:

- More terminals per I/O channel, giving you a better ROI.
- Faster full duplex transfer rate, for lower channel loading.
- Larger refresh buffers, so you can locally store and display larger portions of your data base.
- Data tablet input, which is more convenient, less tiring than light pen.

For demanding CAD/CAM applications, these special Adage 4250 features give you an even better grip on the toughest graphic problems.

Local hard copy — at the touch of a button. In seconds the 4250 interface captures and processes full, or partial, CRT images for plotter output from 8½" to 72" wide. No CPU interaction required.

Local zoom — allows operator to "scale up" the image for better readability. Again — no burden on your CPU.

Enhanced keyboard — which can include a numeric keypad for easier entry.

Microwave adapter — enables high-speed (1.544 Mbps) trans-

mission between remote terminals and CPU via telephone, microwave or fiber optic links.

Full 3D graphics — available with Adage 4370 System. Provides an extra dimension in interactive graphics for special applications on large mainframes.

To learn more about the Adage advantage, call or write the leader in interactive graphics.



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THE WEAKEST GO TO THE WALL

Bruce Gilchrist philosophizes on the effects of computers on the economy and society.

by Merrill Cherlin

To find Bruce Gilchrist, you must search out a rather anonymous-looking doorway on West 115th St. between Broadway and Riverside Drive in Manhattan. Columbia University, spilling over the restraining walls of its campus a few blocks away, has invaded the seedy surrounding streets. Its computer center is housed in a distinctly non-ivied pile of brick, and here, on the fifth floor, nestled among books, manuals, and undernourished houseplants, Dr. Gilchrist philosophizes.

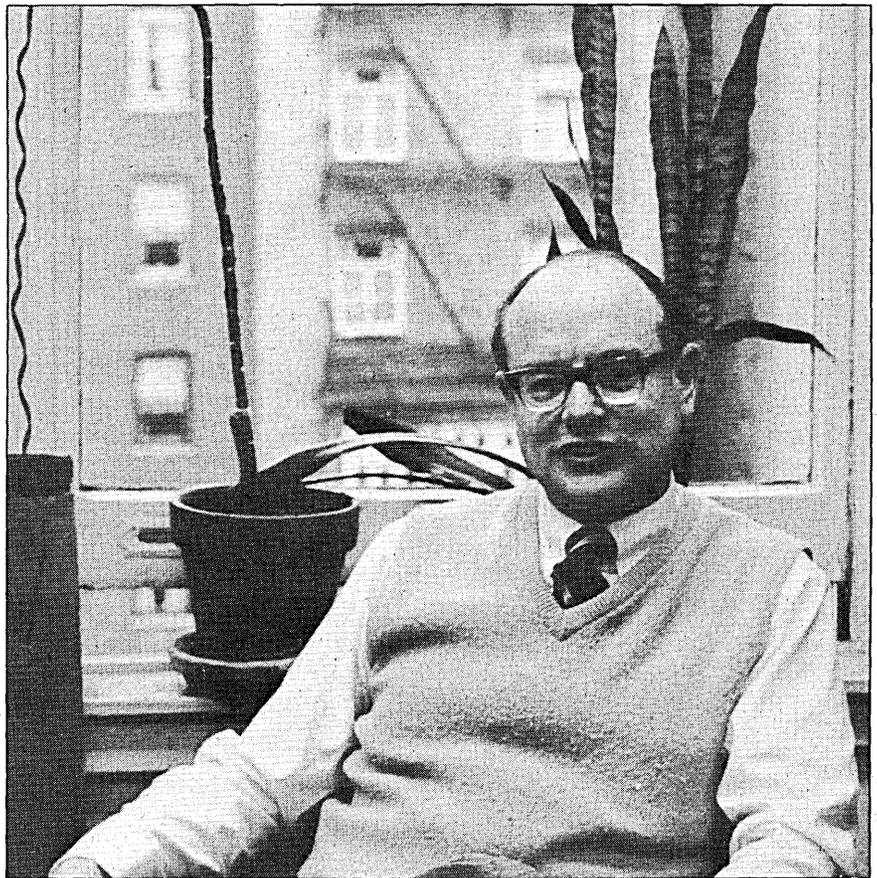
Asked to comment on the long-term effects of computerization on the workplace, the erudite director of Columbia's computer center and former president of AFIPS is definitely not at a loss for words.

"There's one point I'd like to make first," he says. "It's important to realize that computers cannot be considered independently of the economy and society in which we live. It's too simplistic to think otherwise.

"The growth of the economy depends on new products, new services. These imply change—and our economy has continually changed over the last 200 years. The computer is a major cause of change, but not the unique and sole cause. There is no way, therefore, that one can isolate the question: shall we or shall we not use computers? It's like asking: should we run New York City without electricity? It doesn't make sense to ask the question or spend time on the answer. Where there is concern is when change comes so fast in an area that it has an above average effect on people."

Three of those areas in which computerization has caused massive job loss are newspaper composing rooms, supermarket checkout counters (due to electronic scanners), and the telephone company (replacing operators). Gilchrist has studied these particular cases and has written extensively on his findings. His conclusions are that while the job losses could not and should not have been prevented, the lack of support systems and retraining for those fired is pretty shameful.

He says, "Historically, the free enterprise response has been, 'You got in the wrong job—too bad. The weakest go to the wall.' Over the last 40 years the United States has had a number of programs to ameliorate the effects of change, with labor agreements, private charities, and so forth.



These have played a role in facilitating change in the work force. But the difficulty comes when these mechanisms don't work for people. Take the example of newspaper typesetters; suddenly they were obsolete. There, unemployment affected a skilled group led to expect stability. They had earned high wages, but suddenly found themselves back in the labor market at an advanced age. They couldn't find jobs at anything like the level at which they had been. When you earned \$20,000 a year and now can only earn \$10,000, it's a shock to the family unit.

"Our help sources tend to be for people at a much lower economic level. There's no sympathy for an executive who loses a \$100,000 job and who can only find a \$50,000 job. There's more concern for someone who has to go from earning \$20,000 to \$10,000. But CETA programs and so on don't affect these people. We need more government programs for retraining people like this."

According to Gilchrist, supermarket checkers and telephone operators will probably not lose their jobs due to technological improvements in their work; those two jobs have such high staff turnover that employers can simply wait until attrition solves the problem. "Though it's not as easily noticed, the removal of jobs at the bottom end of the spectrum is of concern. It's unlikely that people will get pink slips because their store has installed scanners, for instance; it's just that not as many weekend high school students will be hired. But this has a cumulative effect, and it makes it increasingly hard for the unskilled to find jobs. The yet-to-be-employed have no ombudsman to stand up for them."

This is the group, Gilchrist says, on which computer-related job loss will have the greatest impact—on the young, yet-to-be-employed, unskilled worker. If thousands of jobs are taken away, more will have to be created somewhere else. As he sees it, these jobs will crop up in the service

FOCUS

industry, in areas where computers can't possibly replace people.

"That's where the growth is," he claims, "from waiters to people servicing electronic equipment. The impact of computers on employment will be somewhat less as more people enter the service industry. You can't get one waiter to serve twice the number of people, whereas in a factory, automation can cut the labor force in half."

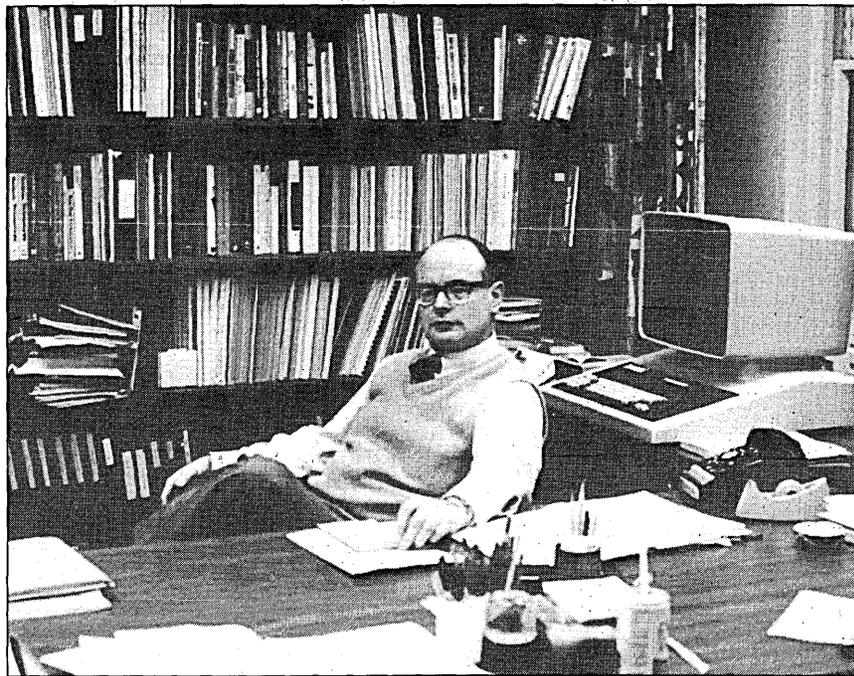
But, he continues, a massive reeducation of society would be necessary to get people to accept the low status service jobs. It means, for them, moving in a direction different from the one they'd been led to expect. "In Europe, in the Middle Ages, fathers, sons, and grandsons all carried on the same work and lived in the same place, but we don't live that way anymore."

"It's almost impossible to find a stonemason now, because the stonemason sends his kid to college. He leaves a gap. He wants to be upwardly mobile and do white collar work. But what happens when you need a stonemason? Or a plumber? You always hear people say that a good plumber is worth his weight in gold. There are a lot of jobs that could be done in the city. New York is filthy, and full of abandoned buildings. It's also full of unemployed people, but we can't seem to match up jobs with people."

Unfortunately, prestige plays a large role in peoples' resistance to do what it seen as menial labor. Gilchrist continues, "A waiter should be just as valued a member of society as a typesetter, but that's not always recognized. We have to learn to pass on some of that respect to the service functions so that young people will be encouraged to go into them. Our educational system has to discuss, from prekindergarten on, realistic expectations for future employment."

He says the women's movement remedied a similar problem—portrayal of women in children's textbooks. Now kids can learn to read in a book about a physician mother and a businessman father. He says that a similar overhauling of textbooks is needed, one where the nice, respectable father is a waiter and the mother a chambermaid, for example. He also hopes to see "reasonable changes in school guidance programs" that will steer students toward the service industry.

Generally speaking, though, Gilchrist does not think the use of computers is driving people from the work force, because computers have improved the economy and we've been more productive. He says, "The level of total employment goes up as the gross national product increases. There's no evidence that computerization over the last 20 years has lessened the total number of jobs. There are a lot more people employed now than in the 1950s, at the start of the computer age. New jobs have been created. There are some exceptions, of



course—we've had increased phone use but fewer operators are employed.

"A lot has been written about the impact in the office on white collar workers; for example, billing systems replace typists who used to get bills out by hand. But I don't feel the change will be as rapid as the prophets of doom predict. A secretary does lots of things besides type. Large typing pools will be affected, but otherwise things will change bit by bit. We're also dealing with the human inertia factor, of course."

"Overall, I'm not alarmed at the prospect of mass unemployment due to computers, but I am alarmed when pockets of employment are affected. We don't have the means of dealing with them."

Gilchrist feels cooperation may be

"Historically, the free enterprise response has been, 'You got in the wrong job—too bad. The weakest go to the wall.'"

the means of coping with this problem, at least in part. "Labor organizations will say, 'We can no longer stand for this [firing of workers because of computerization].' But it may backfire. Workers at the *London Times*, for example, wouldn't accept the newer technology, and the paper nearly went out of business. There is resistance by workers and a lack of understanding by management. It takes two to make a confrontation."

"I'd like to see a cooperative approach. In Norway, management doesn't automate without discussing it first with the workers. We can't solve problems by confrontation, just by cooperation. I think we'll see more cooperation, but for the wrong

reasons: management doesn't want labor problems or people screwing up. The right reason is because people are important.

"The secretaries here have been able to decide how much they want to use terminals for text processing. Now they're the enthusiastic ones who want more terminals. It doesn't work if management just mandates. We've got to solve all these problems before they get worse or we'll just build up resistance."

"I realize, though, that people who say that are accused of wanting palliatives, when 'we should just ban computers!' I feel computers can be helpful to mankind. But I'm biased, I earn my living that way."

Most of all, says Gilchrist, computers mean progress; we all know it, so let's not kid ourselves. "You cannot legislate against progress! Those who hung on to the horsedrawn carriage could not prevent the coming of automobiles. I don't know of any case where progress was stopped because people didn't want it. You can't really ban things."

"I can't envision a world in which we didn't use computers—they can do so much. But—if you look at the whole social cost to an area, you may see you're better off not moving as fast."

"In the U.S. we moved rapidly from operator-run elevators to self-run elevators. In other countries they've preserved the operators. They kept these people employed, and—an additional safety feature—have prevented muggings from occurring in unattended elevators. Maybe we shouldn't have gotten rid of these guys. We may want to preserve jobs and some of the more personal advantages."

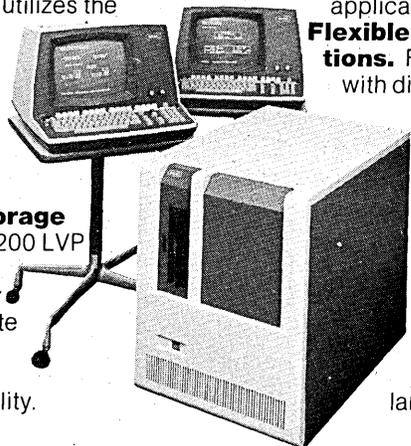
"There has to be an awareness that we can't pull people out of the system entirely. We're not replacing people with ma-

Wang's New 2200 LVP: The multi-user computer that stands alone.

In its under-\$20,000 price range, Wang's new 2200 LVP computer outclasses the competition with a unique combination of:

Powerful Performance. A true multi-terminal, multi-processing system, the 2200 LVP utilizes the same architecture and bus structure that has made the Wang 2200 one of the fastest and most popular small computers in the industry.

Advanced Disk Storage Technology. The 2200 LVP combines new fixed disk and dual-sided, double-density diskette drive technology for greater reliability, performance, and portability.



Comprehensive Data Entry/File Management. The LVP's versatile data entry terminal and I.D.E.A.S. data management software make the system ideal for clustered data entry and program development applications.

Flexible Telecommunications. For larger companies with distributed processing requirements, the 2200 LVP supports a full line of asynchronous and bi-synchronous telecommunications in a variety of industry-standard protocols.

Easy System Expansion. Modularly add terminals and

all the memory and printers you're likely to need as your business grows. And with full software compatibility, you can be sure your investment is protected.

The Wang 2200 LVP. It stands alone.

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chines, but with a combination of people and machines to do a better job. It could involve fewer people or more people. A person and a machine are better than a machine alone. My own feeling is that the combination is more successful, though there are those that argue that the machine is more reliable.

"We also have to be concerned about jumping to systems that may have lots of abilities but, when they don't work right, cause major problems. We have to be careful we don't build systems we grow to depend upon but that don't have backup or failsafe capabilities. Till Three Mile Island we didn't realize how sloppy things can get. Complex systems aren't easy to maintain and keep working. Should we keep a PhD physicist in every control room, just in case

"There's no evidence that computerization over the last 20 years has lessened the total number of jobs."

today's the one day in every 12 years it all collapses?

"We have to reduce the impact of change by going slowly and letting people have time to adjust. The Victorians wore a lot of clothes to the beach. We go practically nude. But over a hundred-year span we

didn't even realize it was happening. My mother was born in the 1890s, pre-Wright Brothers. Now she happily flies the Atlantic. I'm sure it's never concerned her, this change, because it's come over a period of time."

A way of lessening one's fear of anything is through education. Gilchrist feels, "It's almost criminal to have kids leave school without some knowledge of computers. What are its functions? Are computers always right or can they make mistakes? How does an order from shop to plant work? The kids don't have to learn to program. You can talk in simple terms for those without much interest, but in more complex terms for highly motivated kids. They might use these machines in their chosen professions. Unfortunately, there's a significant lack of teachers who know enough to teach others about computers."

Should schoolchildren be allowed to use calculators when doing math problems, or will new generations that use them lose most knowledge of mathematics? Gilchrist's answer: "They have to understand some math concepts, but to not use a calculator seems ridiculous to me right now. I don't think they can use calculators without understanding the process, and it removes the mechanics that cause students the most difficulty and frustration. They make so



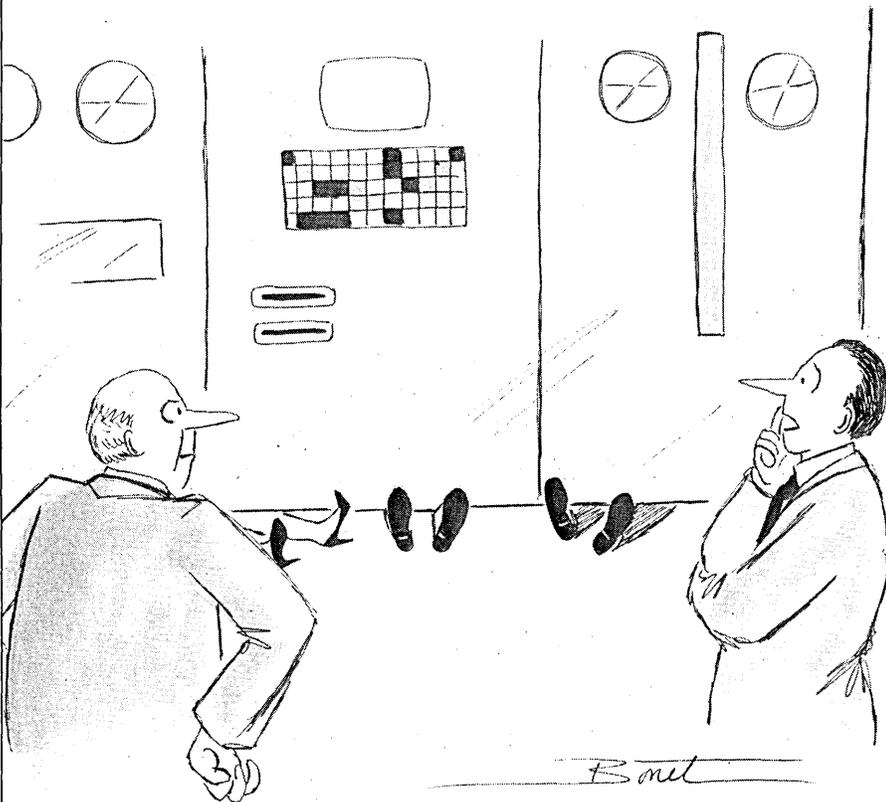
many mistakes, and are never sure the answer's right. Hey—who understands the automobile engine? Yet we're allowed to drive a car. We must know some functions of the car, that's all. They teach driver education without auto mechanics."

Bruce Gilchrist is, of course, heavily involved in education through his role at Columbia. He's responsible for central academic and administrative computing activities, for providing facilities for students and researchers, and for improving administrative systems "such as accounting, payroll, and all that sort of stuff." He teaches a course in the school of engineering and seminars in the graduate school of business. He teaches "Computers and Society"—the object of which is "to get students to think about the possible consequence of computer use."

If by now you have received the impression that Gilchrist is a person with a finely tuned social conscience, you're right. He feels that the responsibility of computer professionals is enormous and hopes to see them exercise this responsibility for the good of people, not just the industry.

He says, "The challenge is to work with users to see they get what they want. Don't be content with just talking to the wholesaler; you should make sure you see what happens at the end of the road. For example, the banks set up these easy money machines so you can withdraw money any time of the day or night. Now they find they are the sites of lots of robberies. It's the job of the computer person to go beyond designing the technology to thinking about the end usage.

"He shouldn't think he's also an expert in sociology, but he should perhaps involve sociologists and psychologists to work out the complete picture. I don't believe systems are neutral nor do I believe in this attitude, 'It's the user's responsibility.' It's like making a gun. You can shoot wildlife or you can shoot people—it's up to the



"It's one thing to replace three employees with this machine, but shouldn't you at least have fired them first?"

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TRUTH NO.

3

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user. You can't wash your hands of your product. You should design and use the product in a thoughtful manner."

Gilchrist gives several more general examples of the kind of long-term thinking he feels should be applied to computer usage, saying, "My mother lives out in the country. There used to be a bus into town every 10 to 15 minutes. With increased car ownership, the bus now only runs once an hour. My mother doesn't own a car, so for her, transportation has deteriorated.

"We built a big highway system in this country. This brought industry out to the countryside and the cities began to die.

That's not to say we shouldn't have built highways, but we should be able to predict the social consequences. After thinking about things we may decide to change them, but we should make modifications, not just rush into change. Maybe we won't be able to stop the outcome, though," he trails off musingly.

"Anyway," he continues, "we need more studies in the U.S. to focus our attention on where problems will be—especially in an office situation.

"I don't want computer people to feel they can take over the world, on the other hand. We have a very special knowl-

edge, can do detailed systems analysis, and have the tendency to think the world can be run by analyzing problems and making logical choices. But the world is not like that. Our knowledge has to be tempered by the skills of other people—for instance, a marketer knows what will sell, even if it's not logical. The user must be an active participant, but not the boss. He shouldn't tell everyone what to do.

"We should inject computer science grads with a good dose of questioning about what they're doing and make sure other people understand something of the technology. We need a coming together. Eventually, most computer people will feel they're not just technicians and others won't feel they're a race unto themselves, speaking a language no one else understands. There are positive signs . . . now an educated person is supposed to know something about computers and most places give computer scientists at least one course in social issues.

"I don't see computer-knowledgeable people becoming the elite of the business world, though they've moved up from department managers to vice presidents. Now they must appreciate the other pieces of it.

"The gap I do see widening is between the employed and the never-employed young people. But I don't think we'll have a subservient mass that goes to revolution. We'd have social protest long before that, and lots of mitigation of the impact of computers along the way!"

Gilchrist appears to never tire of good talk. He speaks of his professional and personal lives as if they are one. A native of England but now a U.S. citizen, Gilchrist has lived in the States since 1952, when he came to the Institute for Advanced Study at Princeton to work with John Von Neumann. He lives with his wife, who is a reading teacher, and three sons in Westchester County, New York, a suburban area not immune to the Gilchrist influence.

For 10 years he served on the school board, and now he's on the zoning board of appeal. There, too, he gets to ponder some of life's great questions. He's so far attended eight meetings devoted to debate on whether or not the Moonies should be allowed to set up a center in town. Currently at issue is whether a goat is a common household pet. The question is still unresolved, and we leave Bruce Gilchrist, leaning back in his desk chair, sipping a diet Pepsi, and pondering this and other cosmic unknowns. *

Ms. Cherlin, a former Datamation employee, is currently a freelance writer in Baltimore, Md. Her articles have appeared in numerous national publications; she's a regular contributor to the *Baltimore Sun* and *Baltimore Magazine*.

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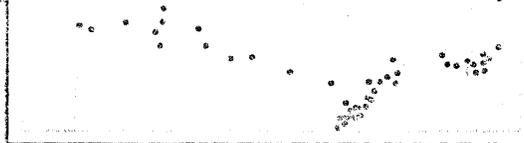
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John's, Newfoundland in the east to Victoria, British Columbia in the west. From each of these network node locations, private and public telephone lines spread out over the country's 3.7 million square miles of territory, moving digital transmissions at up to 55,000 bits per second. The Tran equipment used throughout the network is manufactured in Toronto, Canada.

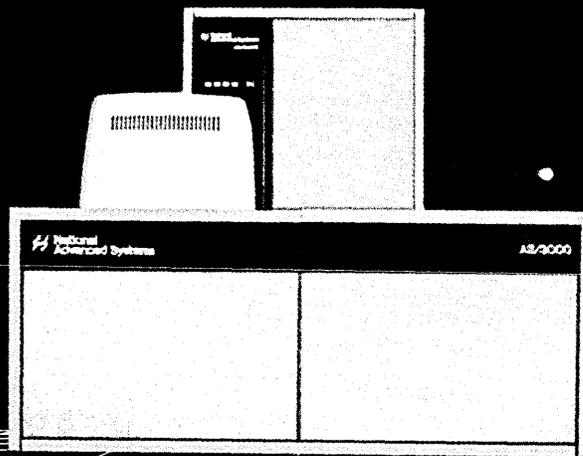
In addition to providing a cost efficient alternative for the nation's high volume communicators needs as it was designed to do, Dataroute has also become a solid, reliable backbone on which other networks are now being implemented. And it continues to grow in size, in traffic volume, and in applications — a con-

tinuing tribute to the pioneering efforts of the Computer Communications Group of the TransCanada Telephone System.

Tran has installed nationwide networks on two continents and statewide networks in several states south of the Canadian border. In addition to its north-of-the-border achievements, its customers include many of the world's most prestigious communications users in private industry, educational and financial institutions, government agencies, and telephone operating companies in the U.S. and in other nations. As a result, Tran now has more international experience in the construction of digital data networks than any other communications company in the world.

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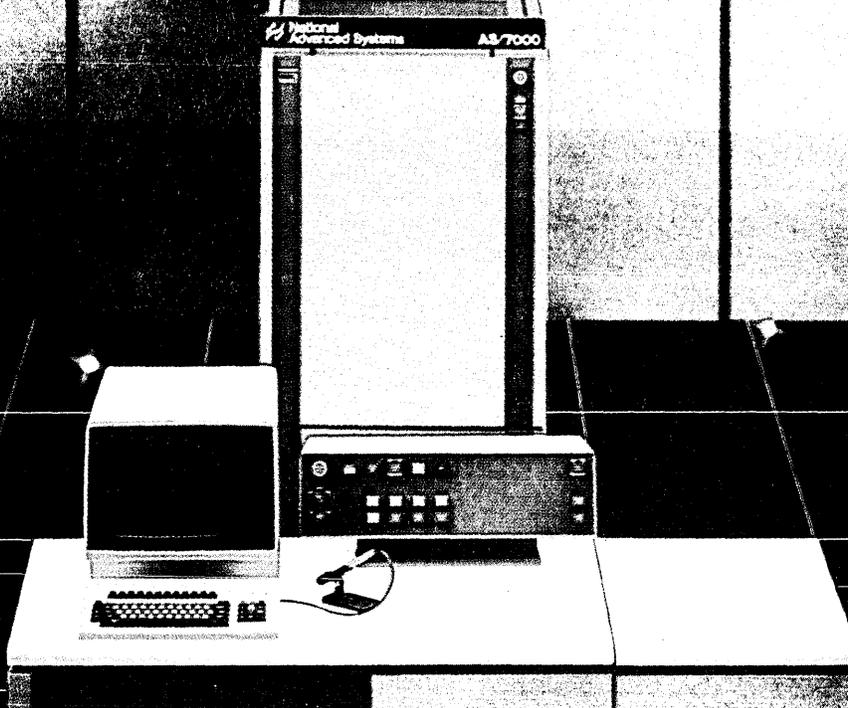
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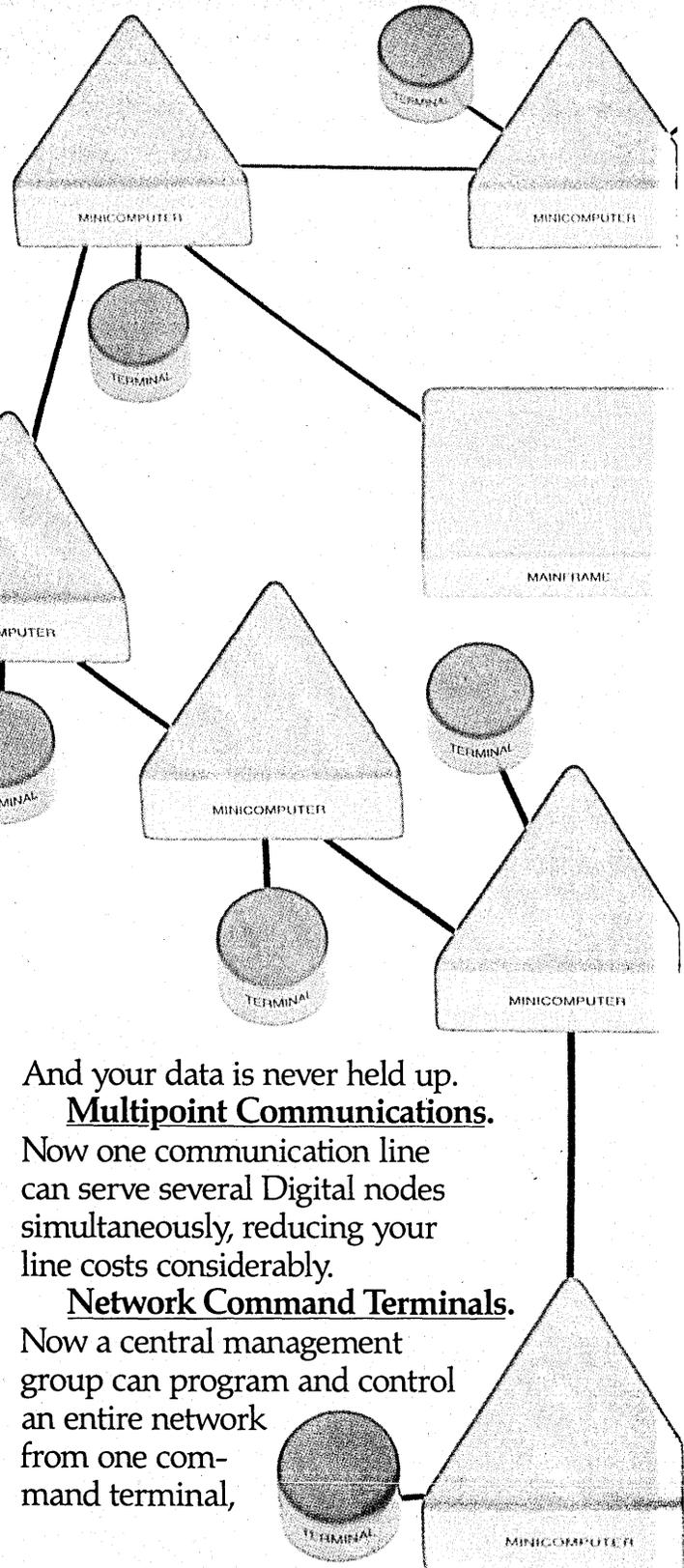
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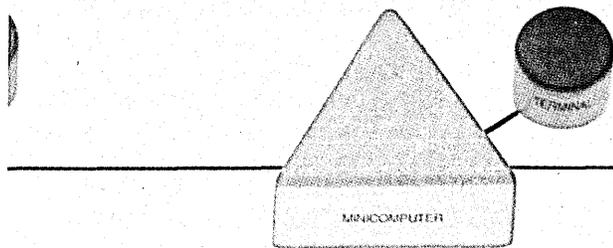
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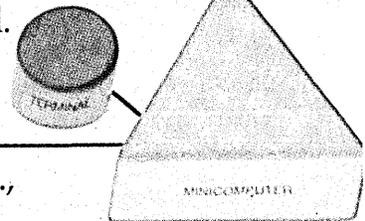
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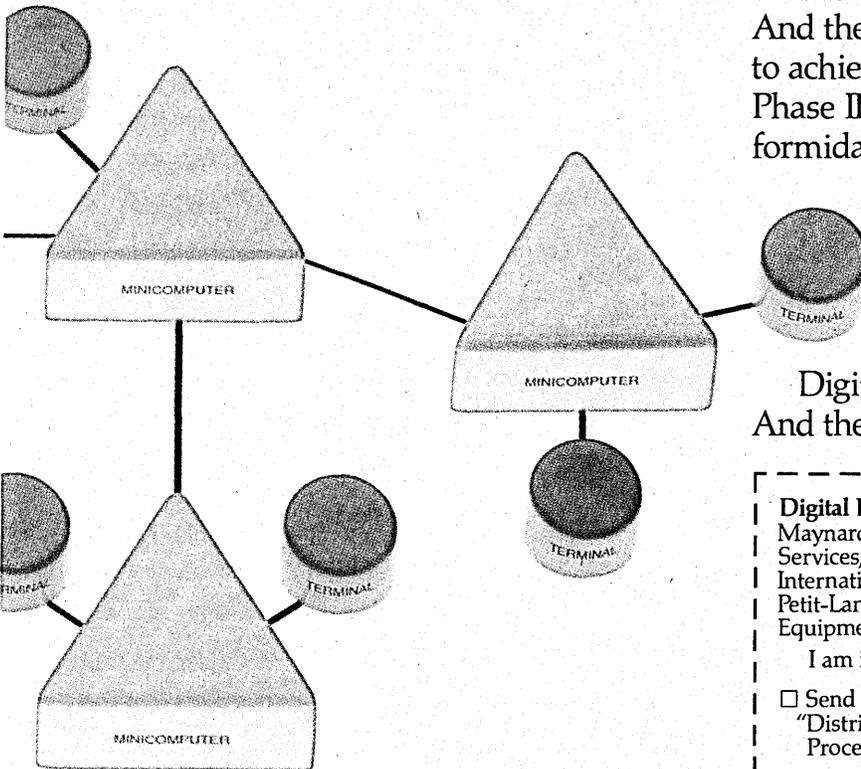


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LOOK AHEAD

(continued from page 22)

ADR BOWS TO
CATV INDUSTRY

are streamers, which Freeman predicts will be the dominant back-up devices. He also has specs on six half-inch drives, three yet to be announced. One is due for introduction at NCC, along with three removable 8-inch cartridge disk drives.

TWO PI TIGHTENS
THE BELT

Applied Data Research is introducing its first turnkey business system, a \$100,000 operations management system built around the DEC 11/34, for the lusty cable tv industry.

First indications of a belt-tightening are showing up. Two Pi Corp. last month closed its advanced R&D facility in Anaheim, Calif., 500 miles from HQ in Santa Clara. The equipment has been sold to the R&D plant of Magnavox, another division of Philips, in Torrance, just south of Los Angeles. And a few people are relocating there, a few being moved to HQ. In Santa Clara, however, plant expansion from 35,000 to 55,000 square feet is planned as shipment of 370-compatible minis is stepped up. President Jared Anderson says they shipped their 100th machine last December, are now shipping three per week, and calls the contraction a consolidation of engineering staffs.

THE GERMANS
ARE HERE

Vollwood Computer Services, GmbH, the largest German third party service company, has set up office in Wayland, Mass., to seek U.S. vendor contracts for total support and service in Europe.

COMPUTERIZED
HIT LISTS?

Is there automated crime? Prof. John M. Carroll of the Univ. of Western Ontario thinks so. He tells of a counter-culture group in Los Angeles that maintains a computer-based hit list of execs of American firms doing business in Latin America and of hit lists of jewelry and valuables and the computerized rigging of odds on horse racing.

RUMORS AND
RAW RANDOM DATA

"It's a good clean operation," says Rube Kuriposky of an organization he is attempting to launch called SOAP (Society of Old Abused Programmers). Programmers over 40 with at least 15 years in programming qualify for membership. "After 15 years, a programmer either gets stage fright or punch drunk and feels frustration with management," says the Informatics employee, who feels SOAP can help. "We'll hold semi-annual meetings and we'll call them SOAP operas"....The pace of foreign takeovers and mergers in the U.S. dp industry seems to have slowed recently, even as the motivation for such deals -- lucrative market growth, expensive money -- grows. "Perhaps," says ADL's Frederic Withington, "we're seeing the calm before the storm."

NEWS IN PERSPECTIVE

MERGERS

STORDAHL IN THE MAKING?

The announcement of merger talks between Storage Tech and Amdahl has met with mixed reactions from industry observers.

Industry pundits last month were generally bullish on news that a new systems company was in the making, this in the IBM plug-compatible marketplace. Should shareholders approve, Amdahl Corp. and Storage Technology Corp. will become one, perhaps forming Stordahl.

This follows earlier merger negotiations last year between STC and Memorex Corp. and between Memorex and Amdahl, neither of which materialized. This new letter of agreement also follows by only a few days the announcement of Amdahl's agreement to merge with Tran Telecommunications Corp. of Marina del Rey, Calif., a successful designer and manufacturer of digital communications networks.

It's possible the new combine, representing companies known for their leading-edge technologies, will chalk up revenues this year of close to \$1 billion. Tran, under the leadership of founder and chairman Ray W. Sanders, had sales of almost \$20 million last year, its 10th anniversary year. The company employs more than 500. Also celebrating its 10th anniversary last year was Storage Tech, which employs 7,500 and had revenues last year of \$480 million. The company historically spends from 6% to 8% of revenues on R&D. And Amdahl last year ended its first decade watching its sales fall by 7% from the year before, to \$300 million. The company, whose success has been based on leading-edge products, typically spends from 9% to 11% on R&D, but this figure rose to the 13% to 15% level last year as revenues fell.

STC cofounder and chairman Jesse I. Aweida, slated to become chairman of the new organization, says the proposed combine "has very strong technology. And the technology's going to put us in a good spot for the future." He notes that the products of the three companies complement each other, even the communications products being marketed by Storage Tech. "I think you're going to see communications becoming an important part of this new business."

But 1979 was a humbling year for Amdahl. Demand for its products plummeted last year as users chose to delay com-



DAVID T. MORGENTHALER II: "We have no intention of voluntarily veering from [IBM] compatibility."

mitments until they could see what IBM's new H Series machines look like. It was the same fickle marketplace that led to ITEL Corp.'s withdrawal from the PCM business. "There is an anxiety hanging over the marketplace," Amdahl chairman Eugene White told the financial community recently. The company last year found it was manufacturing faster than customers wanted deliveries, so it cut back to where shipments exceeded production.

Compounding this situation, Amdahl customers who were expected to buy chose instead to lease. Where historically 90% of shipments were purchases, this figure ran below 70% at times, where it is said to have since leveled off. Finally, Amdahl was the victim of its own charity. Because it provides a field-upgradable capability, users began buying small, ordering mainly from the lower end of the product line. Still, the company has some 350 systems installed—nothing to be ashamed of, to be sure, but far below what had been projected at the start of 1979.

Analysts in the financial community are upbeat about the proposed merger.

But analysts in the financial community are upbeat about the proposed merger, one describing the new organization as being greater than the sum of its parts. Consultant David E. Gold of Saratoga, Calif., thinks "it may be one of those marriages made in heaven." And Omri Serlin, the consultant who expressed his doubts about the PCM business in these pages last month (see p. 63), says he hasn't changed his mind about PCMs but readily admits that for the short haul, meaning the next five years or so, it looks good for Amdahl.

Analyst Ulric Weil of Morgan Stanley & Co. in New York worries about the

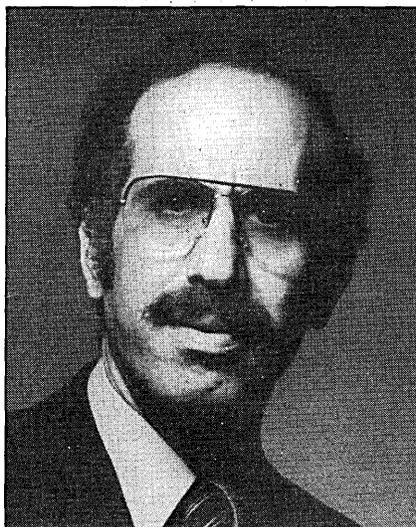
economy in the next 12 to 24 months, what with the upcoming recession and the current monetary crunch. He suggests that one must distinguish between the short and long term, less than 18 and more than 18 months, saying, "Assuming we eventually get to the long term. . . ." And he says that's meant to be a global statement, not referring only to Amdahl.

"If we get to the long term," Weil says, "then I think this could be a more formidable competitor to IBM than two separate companies. And so I would suspect from IBM's point of view this is not necessarily good news."

But for the immediate period, he is more cautious, explaining that both companies are financially weak, that STC in particular has a leveraged balance sheet, that both companies need money to finance both their research and development programs and the buildups of their lease bases. Thus there are defensive reasons for the two companies to get together at this time. Weil says that the partners, becoming a systems company, will find it easier to interest the banking community in providing funds, more so than individually.

"But that's about the best one can say for the short term." In this period, he adds, the two companies face significant problems, and it's not clear that by merging they will be able to alleviate those problems.

Consultant Dave Gold, too, thinks that in terms of access to financing the merged company will have more contacts in the community of money suppliers than either company had before by itself. He also observes "some counter-cyclicity" in the two product lines—mainframes and the business cycles they go through, and peripherals with theirs. There are times when people worry about what IBM is doing or will do and this affects Amdahl's busi-



JESSE I. AWEIDA, Storage Tech's chairman, is slated to become chairman of the new organization.

ness; at different times, people worry about peripherals. "And it's rarely the case that everyone sits around and worries about those two things at the same time." The combined companies, therefore, have a certain financial stability that stems from the diversified product line.

Indeed, Gold is concerned that the new company might be strong enough to stop tracking IBM and, instead, go off in its own direction. Not to worry, says David T. Morgenthaler II, vice president for corporate planning and architecture at Amdahl. The company has done nothing to lead its users away from 370 compatibility, he says.

"We are still 100% compatible. We have no intention of voluntarily veering from that compatibility. . . . And we're spending a lot of money to figure out how to avoid involuntary departure from that compatibility."

The articulate Morgenthaler, still only in his early 30s, speaks like someone who's been steeped in bits and bytes, fans and fan-outs. But he holds a BS in economics from Yale and an MBA from Stanford. He was a management consultant with McKinsey & Co., consulting with Amdahl for about a year before joining the firm in 1977. Asked how long Amdahl had been engaged in merger talks with STC, he said for as long as he's been associated with the company.

He talks about funny things IBM could do to make life more difficult for Amdahl, like taking parts of its operating system and placing them into microcode. He mentions IBM's announcement, almost three years ago, of MVS-SE, which introduced 14 special op codes that previously were not part of the 370 instruction set. Users were given to expect an 8% to 14% performance improvement, a 20% reduction in supervisor state. For the next year, Amdahl was forced to sit down with cus-



EUGENE R. WHITE, now Amdahl's chairman, would become deputy chairman of the new company.

tomers and prospects to explain what it meant and what role a control store plays.

Amdahl had to decide whether it wanted the capability to recognize those new op codes, or whether to give its interrupt handler the ability to recognize a reference to one and to supply the interrupt handler with a routine that takes the place of one of the 14 instructions. It chose the latter alternative, says Morgenthaler, and produced a software package called MVS-SEA that it supplies in order to maintain compatibility.

The combined companies have a certain financial stability that stems from the diversified product line.

IBM charges \$65,000 for MVS-SE on a 168. "It doesn't even start to give you that much performance," he says, "so it's a bad deal for a 168." Amdahl's replacement, which supplies perhaps 80% of the performance boost IBM provides, is available for \$250 a month. Many IBM users were critical because Amdahl did not have anything like MVS-SE, says Morgenthaler, but when the company came up with MVS-SEA, users really didn't want it either. They apparently didn't see that SE or SEA was a big deal after all.

"So that's a software strategy where we're providing software [IBM] didn't, but we're doing it to maintain compatibility," he says.

Nor will Morgenthaler acknowledge any inherent weakness in the company position stemming from the fact that its mainframes are all hardwired. "It is true that it costs more to change a totally hardwired machine than it does to change a microprogrammed machine," he admits. But, he claims, that's irrelevant, for Amdahl has always strived to build the fastest machine, to stay at the forefront of the technology. And if it were to incorporate microprogramming, the machine would be slower.

In early March, speaking to securities analysts gathered at corporate headquarters in Sunnyvale, Calif., Morgenthaler discussed this same issue. The point he makes is that microcode is important for small machines but not for large processors. He said at that time, "It's quite interesting that IBM talks about microcode. But the two key units in its 3033, which are its instruction unit and the storage control unit, are both hardwired." And only in the 3033 execution unit is microcode used.

On that occasion, he briefly traced some early history. The company shipped its first product some four and a half years ago, a mainframe 30% to 50% more powerful than IBM's at 92% of its price; it took up half the floor space, consumed half the power, etc. "And, by God, they still have

NEWS IN PERSPECTIVE

85% of the market. It's kind of amazing," he quipped.

He also discussed various semiconductor technologies and the promises each holds for the late 1980s. He described the Josephson Junction technology as "one of the exciting ones of the future," but dismissed it as being too far down the road to invest any research money in. "Main memory, which used to be the biggest constraint in designing computer systems, is going to be relatively cheap and relatively easy to use," he said. He foresees MOS memory chips packing 256K to a million bits in the mid-'80s, consuming low power, being very inexpensive, and having access times of from 50 to 100 nanoseconds.

In the same timeframe, he sees the ECL RAM chip for cache applications reaching 4K bits (compared with the current 1K bit/chip) and having a 2- to 3-nanosecond access time. "You can figure that the machine, itself, will have a cycle time on the order of 2½ to 3 times the access time of an ECL RAM that is used for its cache or control store, and that would mean we could have a machine with a cycle time of 7 to 9 nanoseconds."

For the mid-'80s, then, Morgenthaler sees a cpu performance of 30 MIPS for a uniprocessor, more than 200 megabytes/second aggregate data rates, and more than 20 megabytes/second/channel. But the data rates, he explained, are higher than required because memory constraints are expected to go away. As memory prices drop it will be possible for everyone to have more, and there will be a lot less paging.

But, he said, obviously knowing that announcement of the STC merger agreement was near, the 20MB/second channels would provide significant opportunities for some interesting peripheral devices. The merged company could, indeed, provide such devices.

—Edward K. Yasaki

COMMUNICATIONS

KEY WORD AT AT&T IS "BUS"

The vehicle that will take AT&T into the future is "BUS"—"Bell Unregulated Subsidiary."

Deep inside the AT&T executive office complex in suburban New Jersey a small group of top-level managers is laboring daily over a secret plan for the future. The project, known internally as "BUS" is headed by Charles Hugel, one of AT&T's four executive vice presidents. "BUS," stands for

"Bell Unregulated Subsidiary," and the plan the group is working on is a blueprint for an entirely new corporate structure for the Bell System.

Last month the group's work took on an extra dimension of urgency as the Federal Communications Commission approved new rules that free AT&T to compete for the first time in unregulated data processing markets. Under the new rules, which are almost certain to be tied up for months in court battles, the company will be allowed to set up a separate subsidiary to market equipment and services that aren't subject to the FCC regulations that have historically constrained AT&T.

If and when that moment comes, the company will be well prepared to finally make its headlong, unobstructed drive into data communications. For in addition to Hugel's planning group, which was working on its secret blueprint long before the FCC issued its new rules, the company has been moving on several fronts in recent months to put itself in a better position to start a new life of competition with IBM and the rest of the computer industry.

AT&T has made significant organizational changes—including a reorganization last month of its crucial business marketing operations group—to beef up its sales forces. It has started to emulate vendors in the data processing industry in the way it introduces new products, making national announcements rather than spreading the word in piecemeal fashion as it had in the past. It has started offering an alternative to the monthly rentals traditional in the telephone industry in the form of variable term leases of up to four years for data communications equipment, another new policy fashioned after standard practices in the computer industry.

Most important, it has continued pouring money and manpower into development of its Advanced Communications Service and other high-priority data projects, in spite of delays caused by massive problems with the ACS software.

"They've retrenched with ACS and there's much more optimism about it now than there has been in a long time," an AT&T source said recently. "And we've made a lot of progress in gearing up for competition in new areas."

That doesn't mean there aren't still major problems with ACS. An AT&T source recently confirmed that the latest timetable for ACS doesn't project a start for the service until 1982, and even then it will only be a "plain vanilla" version of the packet-switched data communications service, with minimal enhancements for subscribers. That delay has led to speculation that other comparable services already up and running, such as GTE-Telenet and Tymnet, will shut out ACS. But most industry analysts don't see that happening.

"I don't see the window closing for

ACS," said Winston Himsworth, a telecommunications analyst with Salomon Brothers in New York. "The time frame in which this is going to grow into a large enough business to be a material source of revenues for the Bell System is way, way out. The longer they wait with ACS, the more opportunity there will be for competitors, but with a flexible service they'll still get a big chunk of the market."

AT&T apparently is thinking in terms of flexibility for ACS. When project director Frank Vigilante was taken off ACS early this year and promoted to vice president of corporate engineering at Western Electric, the title of the ACS project leader was changed to "director of major projects." Although Vigilante's replacement, Sal Barbera, is still working primarily on ACS, he

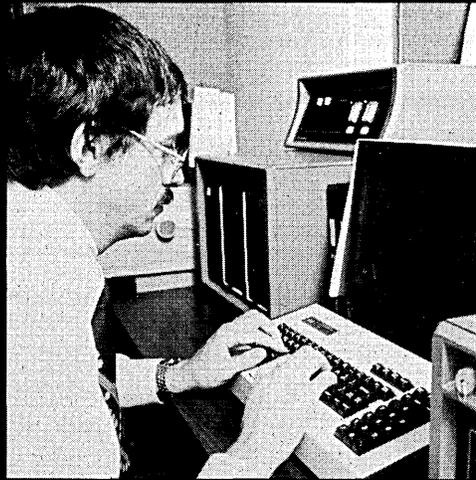
Latest timetable for ACS doesn't project a start until 1982, and then it will only be a "plain vanilla" version.

may be given additional responsibility for developing other new products and integrating them into the ACS framework, an AT&T spokesman said.

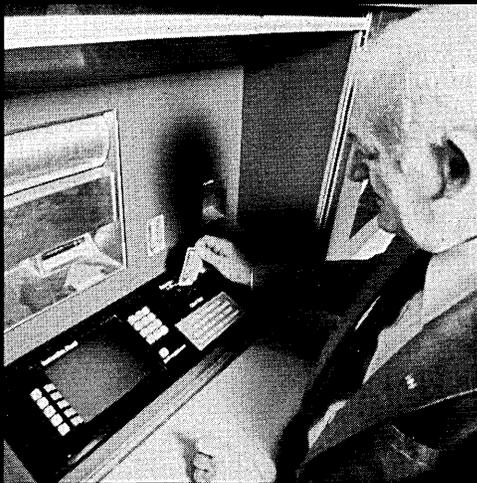
One high-priority project is development of a new voice and data switch, code-named "Antelope," which is envisioned as a new generation communications controller to be installed on customers' premises. The new controller will reportedly handle video communications in addition to voice and data and will be Bell's attempt to leapfrog over sophisticated competition in the private branch exchange (PBX) market from products like the SL-1, manufactured by Northern Telecom, which have presented a threat to Bell's Dimension PBX. However, an AT&T source said that as of the middle of April, technical plans had not even been distributed for the new product, which means the wait for Antelope will most likely be a long one.

A more immediate concern is with another data communications product, the Dataphone II network diagnostic system. After introducing the system last October with a national announcement and simultaneous nationwide tariff filings with state regulatory agencies, AT&T announced delays in the initial deliveries set for the spring to allow for more product testing.

Dataphone II products are high-speed modems with extensive diagnostics and are seen as an aggressive move against competitors who have built up their presence in a segment of the market AT&T previously neglected. A group of those competitors, the International Data Communications Manufacturers Assn., has charged AT&T with "premarketing" the Dataphone II products to undermine competition. The group is currently fighting it out with AT&T in pleadings before the FCC.

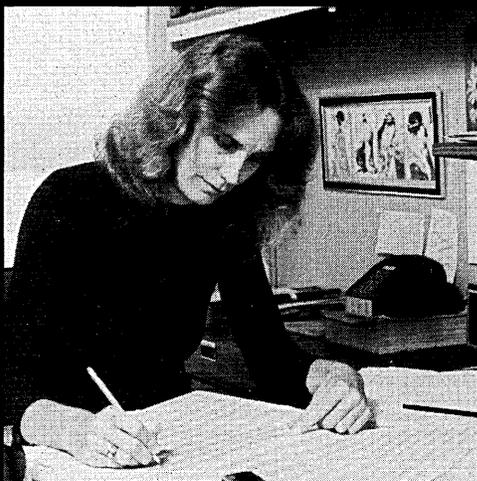


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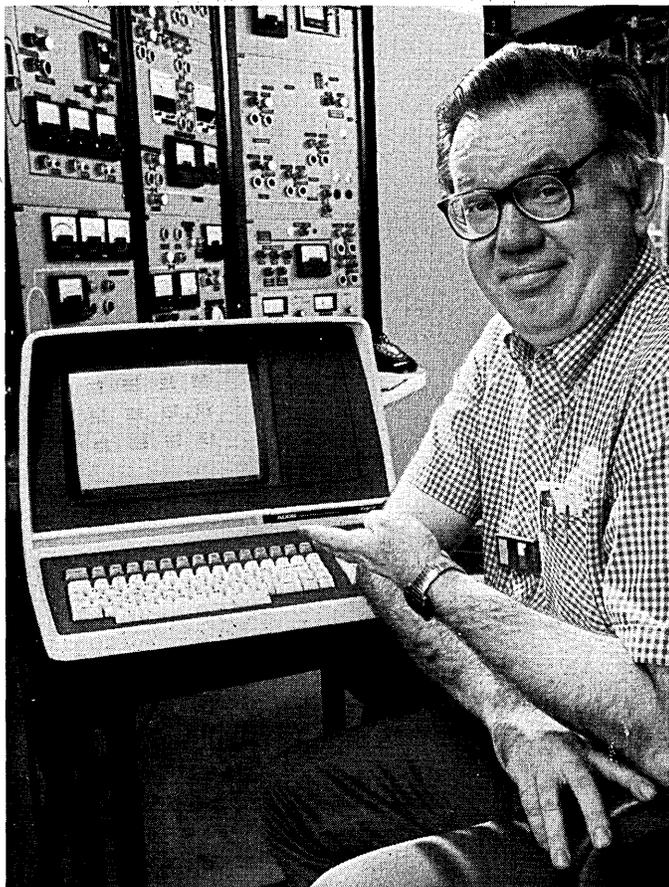
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NEWS IN PERSPECTIVE

Another indication of Bell's new aggressiveness and its willingness to play by the rules of the data processing industry is its new leasing policy for data communications equipment. Starting with its Data-speed 4540 data terminals, AT&T will offer two-year and four-year lease arrangements with customers as an alternative to monthly rentals, according to Robert Hamer, an AT&T service marketing manager. Hamer said the policy, which is patterned after

One high-priority project is development of a new voice and data switch, code-named "Antelope."

practices in the data processing industry, will probably be extended to other new products.

Meanwhile, a key segment of the department headed by Arch McGill, the vice president of business marketing who was recruited from IBM in the early 1970s to help coordinate AT&T's moves into data, was reorganized last month. Titles were changed and responsibilities shuffled among all levels of management in the marketing operations area headed by J. Roger Moody, an assistant vice president and also a former IBM executive, in an effort to provide better support for Bell account representatives, a company spokesman said.

"Before, everything was classed according to specific services and products, but now account executives will be backed up with ranges of solutions to different problems," the spokesman said.

The reorganization is the most recent manifestation of the corporate restructuring started two years ago by former AT&T chairman John deButts, who pledged to toughen up the company's marketing operations in anticipation of a new era of deregulation and competition. It is also the most dramatic recent sign that Bell is taking special pains to prepare for its move into competitive data processing markets.

The extent and exact nature of that move will remain in doubt until the confusion of litigation surrounding the FCC's recent rulings are cleared up. Under the rulings, which formally concluded Computer Inquiry II, AT&T apparently will be allowed to offer unregulated data processing services and equipment. But that decision runs squarely into the 1956 Consent Decree which, in settling a federal antitrust case against AT&T, prohibits the company from competing in unregulated markets, including the data processing market.

Judging by initial reactions of interested parties in the data processing industry, the matter will most likely get a lengthy and bitter hearing in federal courts.

"This is probably the single worst thing that has happened to the computer hardware industry in the past decade. . . . It'll go to the Supreme Court," said

A.G.W. "Jack" Biddle, president of the Computer and Communications Industry Assn. Biddle said he fears AT&T will be able to gain an unfair advantage by subsidizing low prices for competitive data processing products and services using revenues from its monopoly telephone services, where rates are protected and profits guaranteed. He said he feels the separate subsidiary for unregulated products and services isn't enough protection against such cross-subsidies.

For its part, AT&T's initial reaction was cautious approval of the rules, but the company stated reservations about the extent of separation that may be required between the new subsidiary and AT&T's research and manufacturing arms, Bell Labs and Western Electric. The creation of the BUS planning group prior to the FCC's action, however, reflects the readiness of the company to deal with the issue of setting up the subsidiary.

Until now, the planning group has been working under heavy security wraps and has consisted mostly of a close-knit collection of what one source called "the heavy thinkers." But the pace of its work is expected to step up. "At the moment," the source said, "it's still a very small group, but they're starting to bring in people from all over."

—David A. Copithorne

TELEMAIL, ONTYME-II TAKE OFF

GTE Telenet and Tymnet face head-on competition in their electronic mail offerings.

Users of public data networks that want to add electronic mail to their offices now have two such offerings to evaluate.

GTE Telenet has unveiled its Telemail offering, which will join the OnTyme service that has been available for about two years on the Tymnet network. And since Tymnet recently announced OnTyme-II, an upgrade of the earlier service with new features and prices, both networks will have new service within the next few months.

A comparison of Telemail and OnTyme-II indicates that the electronic mail services are very similar, and a user's final choice may be based more on small details rather than major advantages.

Both electronic mail offerings appear to be designed for non-dp users and they include self-help features that prompt the operator on the crt screen. Text editing capabilities are available for those who

Telemail versus OnTyme-II

	Telemail	OnTyme-II
Effective date	July 1980	June 1980
User programmable	no	yes, PASCAL
Av. cost/message	40¢ to 80¢	40¢ to 60¢
Text editing	yes	yes
Fax to fax	no	1980
ASCII to fax	no	yes
3270 support	1980	yes
Telex/TWX delivery	yes	TWX only
Mailgram delivery	yes	no
Transmission speed	110-1,200bps	110-9,600bps
International	if approved	via ITT Telex

want to change their information before sending it to another person on the system.

While both services support ASCII, Correspondence, and EBCD codes, OnTyme-II also has 3270 compatibility. Telemail is planning to add 3270 support by the end of 1980. Tymnet will include facsimile-to-facsimile mail in 1980, which Telemail has planned for the early 1980s. OnTyme-II includes the ability to convert ASCII terminal input so that a message can be delivered to any two-minute to six-minute facsimile device. Telemail has no plans for a similar offering.

Both services will have user directories of those subscribers that agree to be publicly listed.

Both of the electronic mail offerings include delivery of messages via "off-network extensions." Telemail will deliver to telex and TWX terminals and it will also send a message via Mailgram. OnTyme-II has only TWX terminal delivery and, instead of Mailgram, it will offer similar private mail delivery, according to a spokesman.

Each service will accept messages for authorized users on the system with proper password and user ID codes to prevent unauthorized access. Both intracompany and intercompany messages can operate on the mail systems but with intercompany mail, each company must preauthorize such usage. Both Telemail and OnTyme-II will have user directories of those subscribers that agree to be publicly listed.

Telemail supports terminals operating at transmission speeds from 110 to 1,200 bps while OnTyme-II accepts speeds from 110 to 9,600 bps. OnTyme-II includes a user-programmable PASCAL software feature that allows users to tailor the service to their specific needs—especially in the area of word processing. Telemail has no comparable feature but user prompting commands will be tailored to meet special needs, a Telenet spokesman said.

Both carriers said they are prepared to offer their electronic mail systems on a turnkey basis for companies that want to have electronic mail installed on in-house

computers. Although both services are primarily aimed at users within the U.S., some thought is being given to access from overseas locations. OnTyme-II can be accessed via ITT World Communications' Infotex service. Effectively this means an overseas user can send a conventional telex message using Infotex, which is then transferred to the OnTyme-II service in this country. A Tymnet spokesman said there are no other international extensions planned at this time. Telemail will be expanded into an international electronic mail offering if the necessary regulatory approvals can be obtained from both the FCC and overseas telecommunications authorities, Telenet said.

Cost comparisons for the two electronic mail services are similar, although there are differences in the rate structures. Telemail quotes average per message rates ranging from 40 cents to 80 cents; OnTyme rates range from 40 cents to 60 cents. Telemail has an hourly rate of \$13.25; OnTyme charges in the range of \$7.50 to \$10 per hour. But these numbers don't tell the whole story since Telemail has an off-peak-time rate (after business hours) of \$3 per hour, and Tymnet has high density and low density cities in which differing rates apply. Both services offer In-Wats dial rates with Telemail set at \$25 per hour and On-

Although both services are primarily aimed at users within the U.S., some thought is being given to access from overseas locations.

Tyme quoting \$19.60. Other tariff components include a per location fee for multiple destinations of a single message which is set at 5 cents, and separate charges for off-network delivery options. When all the variables are folded in, it appears that usage patterns will be the determining factor in estimating actual user costs.

Assuming that no unexpected regulatory roadblocks are encountered, the OnTyme-II offering will become effective on June 1, with Telemail scheduled to start on July 14.

—Ronald A. Frank

APPLICATIONS

KEEPING UP WITH THE TIMES

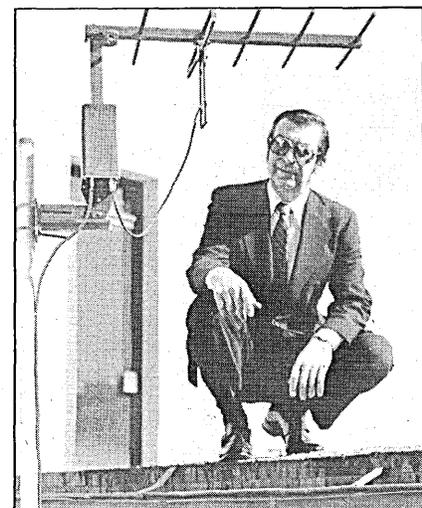
With its new radio frequency data communications system, the Los Angeles Times hopes to cut down on complaints and improve customer service.

Imagine spending \$14,000 preparing for rains that never came.

This has been a regular occurrence with the *Los Angeles Times* subscriber service, which has responsibility for the largest newspaper home delivery program in the world and one of very few that are motor carrier based.

"Your friendly newspaper boy can ring your bell or put your paper on the porch when it rains," said Gerald Ouellette, *Times* subscriber service manager. Not so for the *Times* carriers, who traverse the streets tossing papers from cars in an area that sprawls from Santa Barbara to the Mexican border and from the Pacific Ocean inland as far as Palm Springs, all between 4 a.m. and 6 a.m.

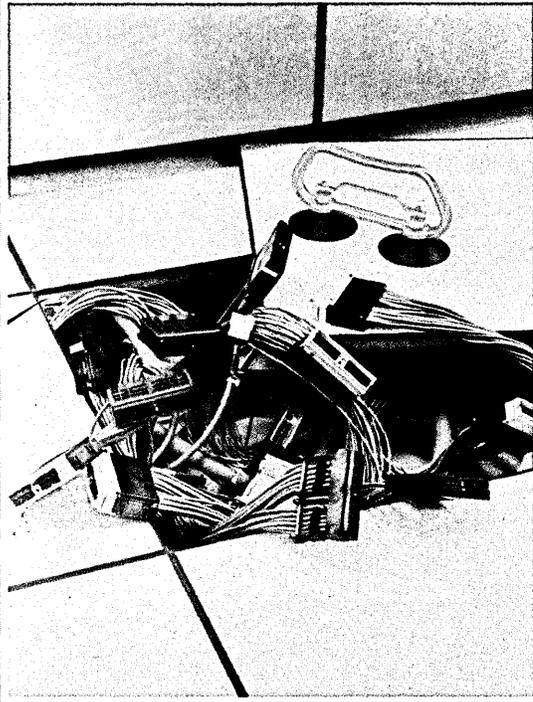
The *Times* delivers some 800,000 papers every weekday and more than that on Sundays. On rainy days papers are enclosed in protective plastic bags. Sometimes that's also done on not-so-rainy days because it's better to be safe than sorry. "Nothing irritates a subscriber more than a soggy



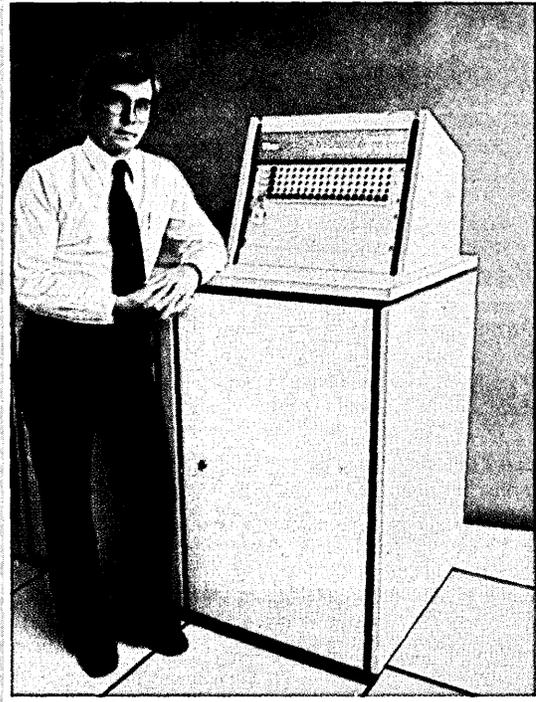
ROBERT D. HYNES: Critical to LADD's effectiveness are specially designed antenna/radio receiver units, such as this one mounted atop the Times-Mirror Building.

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LADD AT WORK: Messages for circulation agents originate in the subscriber service center, where service reps take problems by phone, then enter data in the center's dedicated IBM 3032.

With messages coming automatically, Ouellette explained, agents simply check their terminals periodically and carry out the instructions they receive.

Downtown, the subscriber service representatives become free to devote their efforts to more careful upgrading and maintenance of subscriber information, and soon, to handle the initial phases of subscriber accounting right at their terminals.

"We now have more than one million subscriber records in our CHDS data base," said Robert L. Hernandez, assistant manager of subscriber service. "Currently our operators do many handwriting chores, filling out a dozen or more forms which go into pouches for hand delivery to agents. As they are able to transfer these tasks to the electronic delivery capability of the LADD system, paperwork will diminish and productive work will increase. We'll realize better and faster distribution and virtually foolproof accuracy."

Hynes estimated that the LADD system, when fully implemented late this year, will carry 750,000 characters of information per day, transmitting at a data rate of 1200 baud. He said accuracy of transmissions is anticipated to be far greater than that achievable over leased lines, which historically have an error rate of 5×10^{-5} to 5×10^{-6} . The error rate is expected to be reduced by LADD to about 10^{-8} or 10^{-9} .

Albright said the reason for the lower error rate is that there is no noise intrinsic to FM as there is with switched or leased line services.

Also, he said, "the LADD system has been designed to emphasize signal level and quality, as well as transmission range. Several factors, rather than simply power, contribute to the maintenance of high quality signals at each phase of the data communications process, and ultimately at the antenna/receiver and printer."

Hynes offered an estimate of \$400,000 as his investment in the *Times*' installation of LADD, including all hardware as well as installation costs. "It is not a program the company would have entered into had not the payoff been visible right up front. A primary consideration always is that our systems pay for themselves. We see the LADD system doing this easily, and offering plenty of opportunity to expand its functions in the future as well."

Albright does not see LADD as the most economical use of his type of system. "They send 10 messages to one person. I envision its best use for people sending one message to millions."

His system is geared to one-way transmission of data to be received on paper. "Business runs on paper. It'll be a long, long time before paper goes out. Paper is useful if only as something to doodle on." He sees the use of FM and tv sidebands as "tapping an unused resource," although he admits it was tried as early as 1934 for facsimile transmission.

Albright sees as a potential user of his system "an operation that has already identified its communication problem and has done something about it; one that has a system in place and is already doing it electronically, that has its data in electronic format." He sees wire services and commodity services as good potential users. "We ran UPI at the American Newspaper Assn. show on an experimental basis." His company currently is talking to a commodity service in Fargo, N.D.

Albright feels his system could well be tied to larger, national and global communications networks to "solve the glut at the local level. It's like flying on the airlines. You're sped from coast to coast; then it takes forever to get where you're going locally."

—Edith Myers

KIEWIT DOES IT AGAIN

With its new local data network, Dartmouth hopes to have the best of both worlds—distributed and centralized processing.

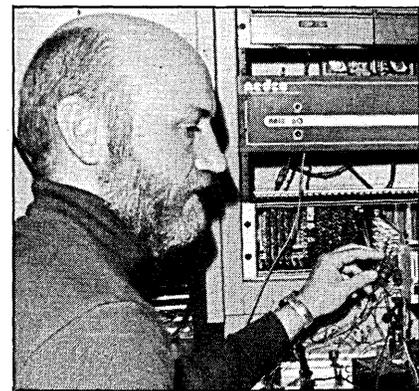
The computer has never been a stranger at Dartmouth College. From the earliest days when John Kemeny and Thomas Kurtz developed the BASIC language, data processing and the educational activities of Dartmouth have been inexorably intertwined.

Today, Kemeny as president of the school still teaches one course each semester emphasizing the importance of the computer, and Kurtz is involved in developing a new graduate curriculum in computer science.

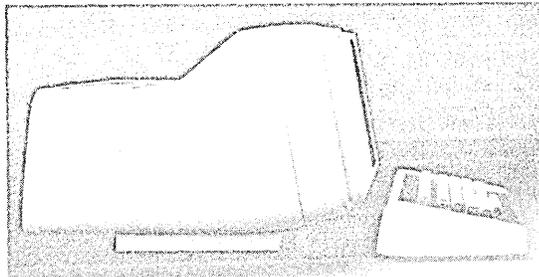
But subtle changes are taking place at the Kiewit Computation Center on campus that will have a profound impact on the ways in which data processing is used at the Hanover, N.H., educational institution.

Kiewit made a name for itself in the 1960s when the Dartmouth Time Sharing System (DTSS) served virtually every student and course on campus and then expanded to provide time-sharing access to a network of colleges and high schools all along the East Coast and into Canada. DTSS pioneered the use of remote terminal access to a large dp center as an integral part of the educational process.

In the mid-'70s the pattern began to change as individual schools began to install their own minicomputers, thus building up in-house dp resources that made them less dependent on the wide resources available at Kiewit. This process was also evident at Dartmouth itself, where individu-



STAN DUNTZEN tests a 9,000-foot experimental link interfaced to the first Nedco processor.



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NEWS IN PERSPECTIVE

al departments on campus began to install processors for specialized projects. Sensing that the trend toward distributed processing went counter to the basic Kiewit centralized time-sharing concept, the dp staff at the computation center began looking for ways in which Dartmouth users could have the best of both worlds.

The solution has been to design a local data network that will link the campus via a coaxial cable system. "Essentially our network design is patterned after the Ethernet architecture developed by Xerox," explains Stan Dunten, chief systems engineer at Kiewit. While Ethernet inspired the new

network, the Kiewit staff has also drawn on the experiences of MIT with its Chaos local network. The main network processor at Dartmouth will be a machine made by New England Digital Corp. in Norwich, Vt., called the Able-60. The Nedco machines, as they are known at Kiewit, will be the main interface to the local network. "They will be the only machines that will talk directly to the network." Dunten says.

The Nedco processors will be programmed in XPL which David Pearson, senior programmer, described as a rough subset of PL/1. Since only the Nedco machines will interface to the net, the program-

ming of the contention protocol and other software needs to be done only once, and it will apply for all nodes.

It cost the college about \$8,000 to install the coaxial cable in the existing conduits running between buildings on campus. The Nedco processor that can hook up

The main net processor will be a machine made by New England Digital Corp. called the Able-60.

a group of terminals costs about \$8,000, Dunten says. At present, Dartmouth pays the phone company \$15 per month for a 300 bps line and \$35 per month for a 1200 bps line. Thus, the Nedco machine becomes cost effective for each group of 10 or more of the higher speed terminals, Dunten says. Actually that includes only the cost of the line and the modem at the remote end. If the modem and required interfacing equipment needed at the computer center is included, the local data network looks even better on paper, Dunten explains.

One of the key elements in the network will be a transceiver/amplifier circuit installed as an interface device at each point where a Nedco processor connects to the local network. The first processor and transceiver are now operating over a 9,000 foot experimental cable at the Kiewit center.

The co-ax network is configured as a star system with five major legs terminating in twisted wire at Kiewit, Dunten explains. Asked why the cable was not used also at the computer center, he said the wire pair was easier to install and at short loop distances the bandwidth is sufficient.

The current implementation schedule calls for the first network nodes to be operating in time for the fall semester this year. As more nodes are added to the local data network, the Kiewit staff knows that it will have to provide network management functions in the form of monitoring and diagnostic capabilities. According to Richard Brown, telecommunications engineer, the monitoring software will have to include the capability to test any of the Nedco machines to see whether they are operating properly. But the Kiewit staff is no stranger to maintenance, since the teleprinters and other terminals now used on campus are maintained in-house.

The Nedco processors will have a series of fault indicators so that the users will be able to notify the Kiewit maintenance staff when a fault alarm is observed. One new requirement of the local data network will be communications. Many of the Nedco processors will be installed in basements or other points where there are no phones. Dunten and his staff are investigating communications systems that could be used between such sites and the Kiewit center. Such methods as radio and transmission

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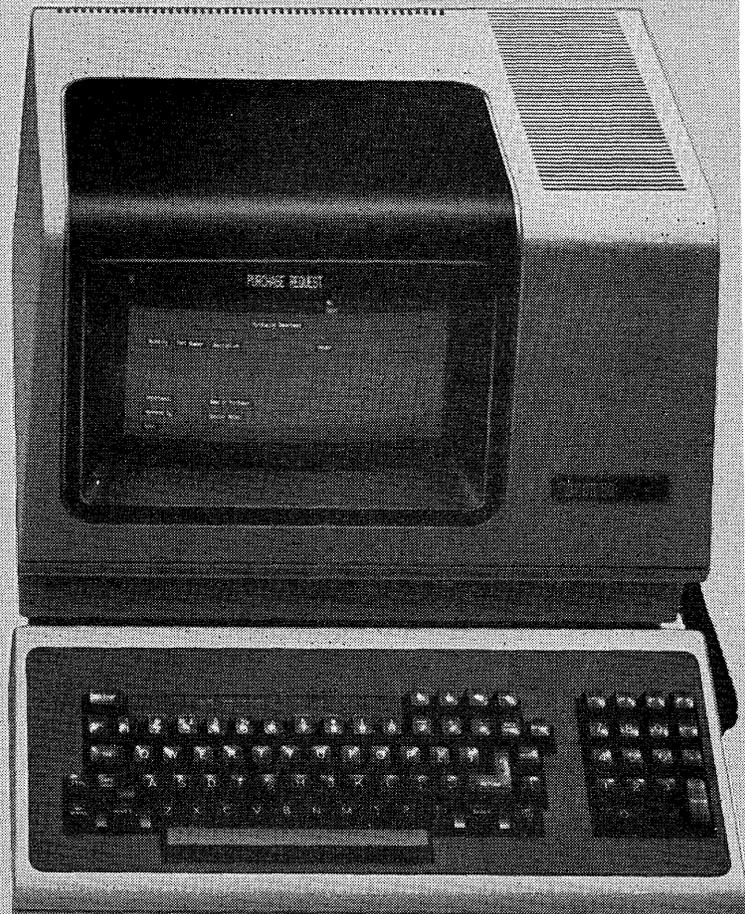
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NEWS IN PERSPECTIVE

UP IN ARMS

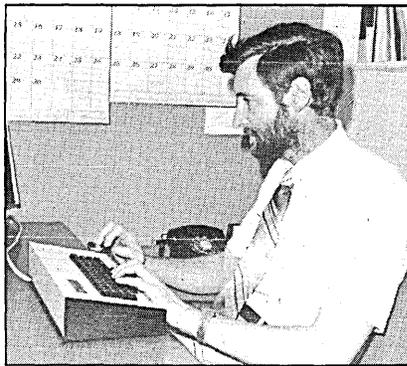
As computers and terminals and systems proliferate at Dartmouth, the man responsible for seeing that they can talk to one another is Dr. William Arms, Kiewit director. Coming to Dartmouth from the Open University in England about two years ago, Arms, while not keenly aware of all the technical nuances, is keenly aware of the importance of having a variety of dp equipment operating in a compatible network.

"Nobody really knows what we will be doing 10 years from now, but all the guesses suggest that there will be many computers. Groups will have their own specialized computers for specialized tasks. In this environment it is important that terminals can be connected flexibly to many machines. So the whole idea is to build a communications network in which all terminals and all computers can be connected to anything [with dp capability]," Arms explains.

While specialized processors are increasing, these users also need to access the larger time-sharing system for calculations not well suited to smaller machines, and that is one of the main reasons why the two dp approaches must be interconnected, he says.

Agreeing that a local network must support different standards and protocols, Arms says terminals are relatively easy because "terminals speak ASCII, and ASCII is standard, but computers speaking to computers is a real problem."

As long as computer A can talk to computer B using a known protocol, the two should be able to connect to a local data network, Arms continues. This assumes that the network knows enough about the protocol used by the two machines so that it can support the computers in a manner that is totally transparent to the users. Initially a



DR. WILLIAM Y. ARMS uses a crt to access the electronic mail system that will be operating on the local data network.

network can support ASCII terminals and then later it can add support for X.25-compatible devices.

At Dartmouth, the first step will be to connect a majority of the 450 on-campus terminals to the local data network. These terminals in many cases now use phone lines to connect to the Kiewit computers. The savings in not having to pay for telephone lines will offset the cost of building the local network, Arms claims. In addition to the cost savings, transmission speeds should increase and the reliability level should reach virtually error-free transmission on the new network, he predicts.

Next, groups on campus that have built up their own dp systems will be connected to the local network. An example is an undergraduate program for scientific study that has several minis but also needs to connect to the large mainframes at Kiewit. Off-campus users of the Dartmouth time-sharing system will be another group interfaced to the local network. This will allow the remote users to interface with the

distributed processing groups if they need such interconnection, Arms explains.

Not to be outdone by its outside users, Kiewit has also begun to diversify its computer resources. It recently installed a Prime 750 processor which will act as a back-end machine to the two Honeywell Level 66/80 DPS 3 mainframes. While the large machines are suited for small and medium size jobs, they are not efficient for larger batch work, Arms says, so the 750 will handle the larger runs. The mainframes and the 750 will interact via the local data network. One major class of users to be tied to the local data network will be the administrative departments at the college. These applications include alumni records, financial records, student files, personnel information, and library data. Each of these users may eventually have a Prime mini-computer for local tasks, and the individual machines will interface with the Kiewit mainframes via the network.

One result of the increased speed and reliability of the local data network will be a lessening of dependence on hardcopy, Arms believes. As users migrate from slower 300 and 1,200 bps teleprinters to 2,400 bps crts, more data manipulation will be done on the screen. In this regard, the Kiewit software staff is developing a screen editor that will be available as "network software" and thus will be available to any crt connected to the network.

One of the most important reasons for building the local data network is that the present system is saturated, says Arms. Since most users come in via phone lines, each ties up a port on the dual 716 front-ends at Kiewit. By connecting users to the local data net and then interconnecting the net to the 716s, Kiewit will be able to serve a greatly expanded number of users.

—R.A.F.

over the all-digital coaxial cable are being evaluated.

There are still problems to be worked out, but Gene Fucci, director of telecommunications, is confident that the system will interconnect the various terminals now operating on campus. This includes LA-36 DECwriters, Datamedia crts, Lear Siegler crts, Tektronix 4010 graphic displays, and a variety of other devices including teletypewriters. "The design goal is to have any RS-232 device compatible with the network," Dunten says.

Even though the Dartmouth local data net is being built to meet specialized needs in an educational environment, its originators at Kiewit acknowledge that the marriage of distributed systems with a centralized time-sharing center has widespread applications. It may be, they agree, that local networks serving a variety of needs can solve similar problems for corporations and other users as well.

—Ronald A. Frank

MEETINGS

RECESSION IS A REALITY

Controlling datacomm costs was the hot topic at Interface '80.

Gone are the days of soft dollar savings. The spending sprees have stopped. The belt tightening has begun. "Recession has become a reality," summed up one data communications manager. This recession mindset was very much in evidence at the Data Communications Interface '80 conference and exposition staged in Miami in late

March.

"We want it cheap. We want it to work. And we want it now," insisted one datacomm user at the conference. Another show-goer echoed these sentiments, saying, "It's getting harder and harder in these times of inflation to cost-justify the purchases we want to make. We're out for a good deal on services and equipment that are reliable and ready. We simply can't afford to wait around for promises a la SBS and ACS."

To help get out from under the economic crunch, many users are turning to productivity ploys. In a session on "Ddp: Ensuring End User Productivity," Allan Elstein, information systems director at ACCO International, sung the praises of distributed data processing. "Every dp user," he said, "has three main goals—reliability, availability, and good response time. Distributed data processing brings these three goals directly to users in the field."

"Companies without a first-rate

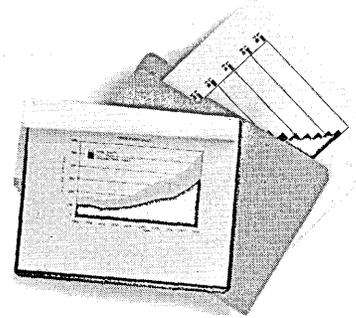
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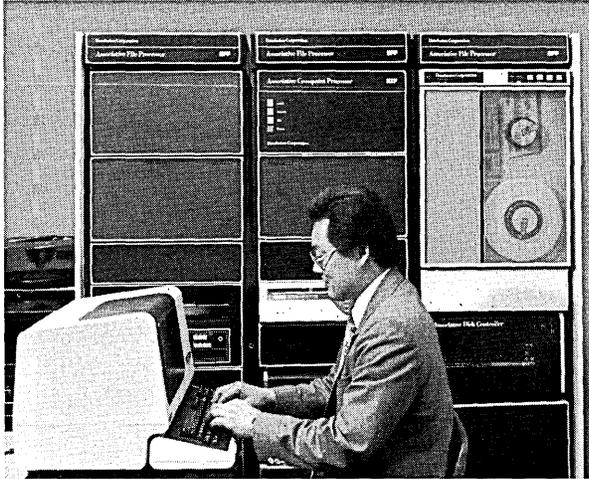
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CIRCLE 54 ON READER CARD

NEWS IN PERSPECTIVE

information system," he warned, "won't survive the '80s." Elstein firmly believes ddp's benefits outweigh its disadvantages. At least that's the case at ACCO, which has implemented a nationwide integrated distributed processing system that provides selective on-line transaction capability via the host cpu. The system links four of ACCO's plants and five of its distribution centers.

Elstein feels the company's ddp setup has been successful. The payoff has accrued to users, he said, who have been better able to manage their operations and gotten improved response time. The system has also been a big help in applications development and tailoring, he added.

Another session speaker, Dr. Leonard Lipner, a consultant with BGS Systems Inc., pointed out the need for capacity planning as a hedge against skyrocketing personnel costs. "Users," he noted, "now want to know the performance of machines before they're rolled in the door."

"It is imperative," the former IBM systems engineer stressed, "that you know the response time in advance." This can be calculated, he explained, even with very sketchy information. "Then it's the user's responsibility," he declared, "to ensure right up front that the vendor delivers what's promised."

"Users now want to know the performance of machines before they're rolled in the door."

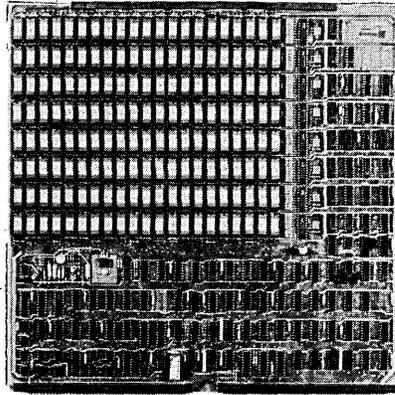
"Every hardware or software decision that's estimated—big or small—has an effect on performance. It's true," Lipner admitted, "that there's partial and uncertain knowledge during the early stages of system acquisition. And system hardware and software decisions and estimates will change many times during the planning stages."

But while it's difficult to plan in this state of flux, where hard data is tough to come by, Lipner maintained it can be done by keeping in mind several key decision areas. His checkoff list includes: transaction volume estimates; host/minicomputer characteristics such as cpu speed, disks, and other peripherals; interaction between ddp and other workloads on the host/mini; line configuration and characteristics; data placement; and programmer projections on resource consumption.

"To keep harmony in the family," Lipner strongly recommended that programmers be involved in this estimating process. While programmers will balk at providing resource consumption estimates before a system is installed, they should be told, according to Lipner, that this information is absolutely essential and is part of their job.

Some more tips on saving dp dollars were offered by another Interface panelist,

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CIRCLE 56 ON READER CARD

NEWS IN PERSPECTIVE

TOP 10 INTERFACE SESSIONS RATED BY ATTENDANCE

SESSION TOPIC	NUMBER OF ATTENDEES
All Digital Communications	380
Integrating Voice & Data at the PBX	374
Digitizing Voice	312
Addressing Network Architecture Alternatives	304
Datacomm School—Introduction	302
Intelligent CRT Workstations	300
Achieving Network Performance Goals	295
Datacomm School—Ddp Networking	281
Ddp Requirements Planning	279
Executive Information Service Requirements	279

Database Design Inc. president Dr. Robert Holland. "Proper data base design is the solution for controlling dp costs. What's essential is that you take the user into account," he explained, "during the design stage of ddp."

The promised payoffs from data base management systems, according to Holland, have yet to be realized. To get the full benefit from these systems, Holland pointed out the need to keep applications independent of the physical telecommunications network structure and DBMS implementation. This separation is necessary, he explained, because of continual changes in network structure.

"We've moved from asynchronous transmission to synchronous transmission to packet switching in telecommunications technology. The same changing nature," he said, "is true in DBMS technology, as we've gone from hierarchical to network to relational data bases. Technology won't stand still over the next five years," he added, "so we have to design our applications independent of the physical structure."

Another angle on productivity was taken in a session on "New Ways to Stimulate Corporate Growth Through Data Communications." In discussing the return on investment in datacomm, session speakers stressed the importance of "intangible benefits." The biggest advantage of the technology, they felt, would come from its ability to give business executives and managers better and quicker decision making power.

The evolving field of network management systems was also explored during another session on fail-safe network control. Paul Weiss, director of network control design at Codex Corp., gave a brief rundown on the current status of these functions.

While network management systems are becoming more sophisticated in the areas of fault detection and diagnosis, Weiss pointed out that failure prediction and prevention features have still not been developed. Existing technical control centers, he noted, now include centralized modem control combined with vendor-provided software. As more sophisticated

capabilities are developed, user-programmable software will be added to these systems, he predicted. This will also allow users, he said, to tailor their management features to the specific needs of customized nets.

Since data communications networks typically expand to meet corporate needs, Weiss suggested management systems be designed with enough flexibility to keep pace. And as network characteristics increase in complexity, the need for various control and monitoring functions will become increasingly important. All of this, he predicted, would spur the evolution of network management into advanced functions.

In addition to monitoring capabil-

ities, users should also be aware of the need for intelligent network processors, according to another session panelist, Warren Wubker, president of Transaction Data Systems. Through the development of specialized software, these processors can include adaptive routing capability that he said would allow automatic switchover to alternate network paths when a failure occurs in primary links. Wubker also suggested that important net links could be protected through the use of redundant equipment.

While these network subjects were the hot topic of discussion at several Interface sessions, they were also the focus of product attention at the show. Several vendors unveiled their new net offerings during the four-day conference. Among them was Tymnet Inc., which announced its

"Proper data base design is the solution for controlling dp costs."

OnTyme-II electronic mail service. Designed to provide communications from ASCII terminals to facsimile terminals for hardcopy output, the service will be available next month over Tymnet's public packet net.

BBN Computer, a subsidiary of Bolt, Beranek and Newman Inc., also announced a packet-switched network processor which

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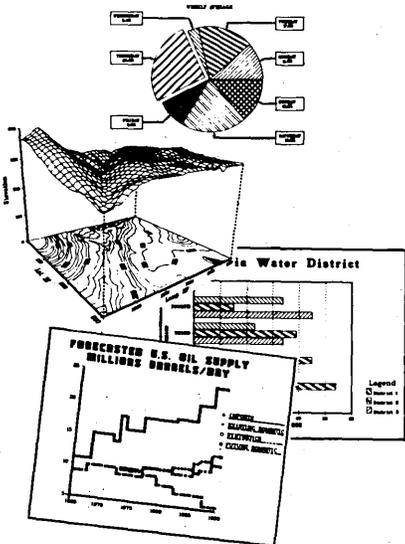
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NEWS IN PERSPECTIVE



THE HOT SPOT: Interface '80 drew more than 9,000 attendees, including a hefty exhibitor force.

is based on principles developed in the ARPA network. Called the C/30, the processor is said to have about twice the throughput of a Digital Equipment Corp. PDP-11/70 at approximately one-third the price. (The C/30 costs around \$25,000, depending on operating features.)

A satellite communications service for distributed networks also made its debut at the Interface show. Developed by American Satellite Corp., the Distributed Data Exchange (DDX) will also support digital voice and fax, remote job entry, computer-to-computer communications, and word processing applications.

Preshow publicity had touted Interface '80 as "the hot spot for data communications and distributed processing." The "hot spot," according to show sponsors, drew more than 9,000 attendees, including a hefty exhibitor force. Interface organizers had counted on a draw of at least 10,000.

Last year's show in Chicago had pulled in approximately 12,000. Show spokesmen attribute this year's lower attendance to the lack of local walk-ins. The show faces the same situation next year when it returns to Las Vegas. But show planners and exhibitors aren't worried. They feel Interface is gaining momentum and "a quality turnout."

While momentum may indeed be building for the conference itself, some industry insiders are forecasting a market deceleration. "The computer-communications industry," declares one observer, "is consolidating and slowing down. Users don't quite know what's going on with the economy, but they are afraid of a recession. That fear was reflected this year at Interface. The show, as a result, wasn't exactly a 'hot spot.' It was more like lukewarm."

—Linda F. Runyan

Also contributing to this story were Becky Barna, Ron Frank, and Bill Musgrave.

A MASTER OF UNDER-STATEMENT

Dr. John V. Atanasoff talks of a time when "I invented in my mind the computer."

"I knew then that it would go far in solving the practical problems of mankind. But I didn't foresee this."

With characteristic understatement, Dr. John Vincent Atanasoff recalls the days of yesteryear, when he began work in his spare time on the first "automatic electronic digital computer."

Looking back now, he declares with all modesty that his pioneering computer project in the late '30s and early '40s "was an important period in my life." And that too is an understatement. At 76, Atanasoff remains a self-effacing, low-key man. His mind, still acutely active, is anything but.

At the recent Interface '80 conference in Miami, Atanasoff was honored at a luncheon hosted by DPF Inc. The Hartsdale, N.Y., company, a third party leasing concern, had T-shirts made up bearing Atanasoff's stately profile. Although he was admittedly "embarrassed" by this form of tribute, he chalked it up to the influence of "the younger generation."

But Atanasoff did seem genuinely touched by the tribute which DPF said was aimed at "hopefully righting a wrong" by giving the inventor long-overdue recognition. Atanasoff himself doesn't seem at all bothered or bitter about the past—a past which saw the plaudits going to Dr. J. Presper Eckert and Dr. John W. Mauchly of ENIAC and UNIVAC I fame.

In his luncheon address, which he claimed would be a "mundane presentation," Atanasoff made scant mention of the landmark lawsuit which resulted in establishing him and his graduate student Clifford Berry as the original inventors of the

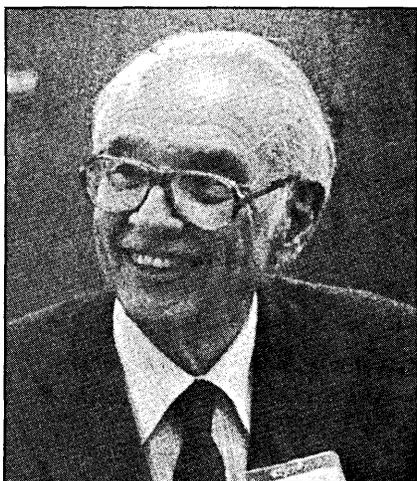
The one-of-a-kind machine ended up costing \$5,000 to build.

electronic digital computer (DATAMATION, Feb. 1974, p.88). What he concentrated on was minutely retracing the steps that led up to the 1942 development of a working computer machine.

Those steps started with a car ride. Traveling at breakneck speed one cold night in the winter of 1937-38, Atanasoff, then a mathematics and physics professor at Iowa State, wound up in a bar 200 miles away in Moline, Il. After a few hours, two bourbon and sodas, and no notes, his brainstorming session had given him the clues—the clues he needed to begin work on an operating breadboard model of a computing machine. That memorable night, Atanasoff recalls, "I invented in my mind the computer." This prototype was then completed in December 1939, and the finished machine was ready to roll in 1942.

Originally designed for the purpose of inverting matrices to help students solve math and physics problems, the Atanasoff-Berry computer (ABC) did indeed do these time-consuming chores admirably. But he did have doubts along the way. "We were not at all sure," he admits, "that vacuum tubes would do." He also says he would have liked to use magnetic memory but he "couldn't afford it."

The one-of-a-kind machine ended up costing \$5,000 to build. It included some firsts, namely the use of the originally troublesome vacuum tubes for logic circuitry and a refreshable memory. Atanasoff also takes credit for inventing the word analog—



DR. JOHN V. ATANASOFF: "We did it. And after that, it's easier for the next man who comes along."

"even Mauchly would admit that," he contends.

In June 1941 on a visit to Iowa, Mauchly received documentation and a demonstration from Atanasoff on the ABC. What Mauchly saw then was an unfinished product which subsequently included two 1,500 bit binary storage drums, 300 vacuum tubes, a spark printer and reader, and an electronic adder circuit. Mauchly, along with Eckert, went on to develop the first large-scale digital computer.

In the court case, the judge on Oct. 19, 1973 found that "Eckert and Mauchly did not themselves first invent the automatic electronic digital computer, but instead derived the subject matter from one Dr. John Vincent Atanasoff." Ironically Sperry Rand had brought the suit against Honeywell, charging the company with infringing Eckert and Mauchly's ENIAC patent.

Atanasoff is reluctant to dredge up the past, preferring to focus on the present. For several years now he's been working in the area of "human communication." His goal is to develop a new phonetic alphabet. But his current pet project has done nothing to erode the pride he clearly has in his former accomplishments. In an oblique reference to Mauchly and Eckert, he boldly proclaims of his and Berry's work: "We did it. And after that, it's easier for the next man who comes along."

—L.F.R.

MINICOMPUTERS

RISKY SUIT FOR DG

At issue is Data General's alleged software/cpu "tie-in."

Data General's long-festering antitrust problems bubbled up from beneath a protective "sealing" court order last month when PCM challengers won an important victory against the Massachusetts minicomputer vendor. Data General's legal problems have drawn relatively little attention until now, in part because of the protective order. But the case has potentially enormous impact upon DG—and not only because it might open the DG base to cpu look-alikes.

DG is being forced to defend the legality of the ingenious and sometimes eccentric marketing schemes that have effectively isolated its user base and protected the firm's industry-leading profit margins. A San Francisco federal court has compounded a number of antitrust cases filed against Data General around the coun-

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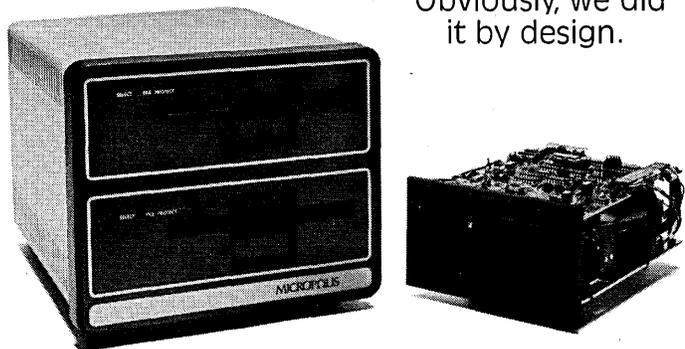
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NEWS IN PERSPECTIVE

try, separating them from DG counterclaims of contract violations and theft of trade secrets which will be tried separately and later.

The plaintiffs in the current case, led by Fairchild Camera and Instrument Corp., seek to force Data General to allow PCM customers to buy or license DG operating systems for use on Nova or Eclipse emulators. Using antitrust law, they have accused DG of illegally restricting competition by use of an illicit "tying arrangement," forcing a customer who wants to buy one product (operating system) to buy a second (the cpu). As part of the same suit, Ampex Corp., a manufacturer of memory boards, charged DG with using the cpu as the "tying product" to force customers to buy DG memory boards.

Last month, the San Francisco court declared that the tying arrangements do exist, artificially linking separate products, and brushed aside many of the arguments Data General planned to use to justify those arrangements. In an upcoming jury trial, Data General must now prove that the two "tying products"—operating systems and cpus—are so insignificant in their own competitive marketplace that they lack the requisite "economic power" to corrupt the competitive atmosphere in the "tied" product markets which the plaintiffs want to enter.

The court's ruling came at the end of a year-long pretrial process—the exchange of 600,000 documents, 150 depositions, and hundreds of formal interrogatories among the contesting firms—when both sides unsuccessfully sought summary judgment in their favor.

Federal Judge William Orrick—a former Deputy Undersecretary of State for Administration, former Assistant U.S. Attorney General responsible for the Antitrust (1963-1965) and Civil (1967-1972) Divisions of the Justice Department—took advantage of a "salvage" provision in the federal court pretrial procedures to declare certain facts effectively "uncontested" and therefore proven on the basis of the evidence and arguments gathered for the summary judgment motions. Orrick effectively subtitled the case; he declared the existence of the tie-ins among the "material facts" established "beyond dispute"; and he ordered a jury trial solely on the economic power issue.

The plaintiffs—Fairchild, SCI Systems Inc., Digidyne Corp., Bytronix Corp., Data Compass Corp., and Ampex—were described as "elated" by the development. Data General's subsequent efforts to have Judge Orrick hear new arguments on the foreclosed issues and the summary procedure—or to formally certify them as major case issues to allow immediate appeal—were rebuffed by the court.

Dual product "tying arrangements" of the sort Data General is accused of are classic examples of anticompetitive prac-

tices outlawed by antitrust legislation. But this is apparently the first time such marketing practices have been litigated in the computer industry. In this case, the core issue is not whether joint or "bundled" sales of the two products are allowed, but rather whether a vendor can refuse to offer each product for sale independently.

"Antitrust law treats tying arrangements harshly," Judge Orrick explained in his opinion. "Proof that a tying arrangement possesses certain critical elements will

Last month, the court declared that the tying arrangements do exist, artificially linking two separate products—operating systems and cpus.

render it illegal *per se*" under the Sherman and Clayton antitrust acts.

Citing classic case law, Orrick said, "There are certain agreements or practices which because of their pernicious effect on competition, and lack of any redeeming virtue, are conclusively presumed to be unreasonable and therefore illegal without elaborate inquiry as to the precise harm they have caused or the business excuse for their use.

"This principle of *per se* unreasonableness not only makes the type of restraints which are proscribed by the Sherman Act

more certain to the benefit of everyone concerned, but it also avoids the necessity of an incredibly complicated and prolonged economic investigation into the entire history of the industry involved, as well as related industries, in an effort to determine at large whether a particular restraint has been unreasonable—an inquiry so often wholly fruitless when undertaken."

The litigation focuses on some of the sales techniques that have made DG an industry profit leader. Data General licenses its operating systems only to customers who sign a program license agreement (PLA) promising to use the software only upon a specific DG cpu. Data General also requires its software licensees to purchase a minimum amount of Data General memory and peripheral products (a "minimum equipment configuration," or MEC), calculated differently for each OS product, or pay a sizable license charge.

Both schemes are now rare; the latter perhaps unique among major vendors, and particularly profitable. Both were reportedly developed by DG's outside counsel, the New York firm of Reavis & McGrath, to deal with an early emulator challenge from Digital Computer Controls Corp., a company DG eventually purchased. (Reavis & McGrath senior partner Fredrick Adler, a major figure in DG's early organization, finance, and corporate strategy, is a Data General director.)

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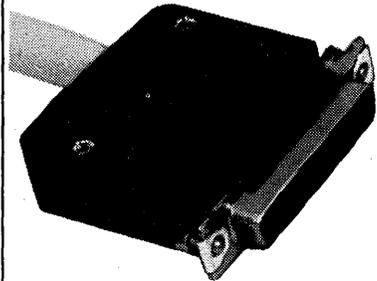
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NEWS IN PERSPECTIVE

The Ampex case against DG focused on the minicomputer vendor's practice of requiring all cpu purchasers to buy a minimum amount of memory boards installed—even if the oem or end user could not or would not actually use DG memory in his installation. (Ampex, in the process of being acquired, actually settled with DG just before Judge Orrick's ruling; in fact, Ampex brought the settlement agreement before the judge for approval the same day. Orrick later refused DG's request that he withdraw that portion of his ruling concerning memory sales and Ampex—and only days later, Keronix Inc. of Los Angeles, an old DG adversary with similar concerns about memory products, filed a new antitrust suit against DG and petitioned for entry in the case.)

Judge Orrick set forth five elements that had to be proven or left uncontested for a Sherman Act tie-in violation—and then proceeded to declare four of them present (as "material facts without substantial controversy") in Data General's entwined OS/cpu and cpu/memory marketing practices. He reserved for jury trial the key and complex issue of whether—in either the operating system software market or the cpu market—DG had sufficient "economic power" to "appreciably" restrain competition in the respective "tied" markets.

Orrick's list of "material facts," the background against which Data General will have to argue its comparative weakness in software and central processors, will severely restrict and narrow the focus of DG's legal defense. Thus far, however, Data General's attorneys have fought a bitter guerrilla war in the courtroom, largely on the defensive, but conceding nothing. Judge Orrick, slicing through the voluminous record, briskly certified the new facts of the case:

1. Data General's OS software and its cpu are separate products subject to a tie-in imposed by DG's program license agreement. Data General's cpu units and main memory boards are separate products subject to a tie-in imposed by DG's minimum memory purchase requirement.

2. Both DG's software/cpu tie-in and the firm's cpu/memory tie-in affect a not insubstantial amount of commerce in the memory market.

3. All plaintiffs except Data Compass, a software firm DG charges breached its contract with the cpu vendor, have "suffered actual injury" of which "a material cause" was the DG tie-in in the two respective markets. (Orrick set aside the question of Data Compass' injury or damage for jury decision.)

4. "There are no legitimate business justifications for either the software/cpu tie-in or the cpu/memory tie-in because less restrictive alternatives are available."

Although early press comment implied a parallel between Data General's

cases and DEC's apparently moribund challenge from National Semiconductor, the cases are very different. The DEC defense against PCMs is built around a bedrock patent, DEC unibus patent. Data General, lacking key patents, uses marketing practices, contracts, copyrights, trademark and trade secret claims to try to isolate its market from emulating competition. Although sometimes referred to as a "bundling" case, and it could perhaps evolve into one, the focus of the plaintiffs' efforts is to force DG to make its OS software available—at a profit, not free—rather than to break up any classic bundling scheme. IBM, even when bundled, allowed customers to use their OS as they would; and most vendors (including DEC) claim they have a policy of allowing purchase license on software. In fact, only IBM, Data General, and (briefly) DEC have faced any PCM challenge and have thus dealt with the issue in the marketplace.

The litigation focuses on some of the sales techniques which have made DG an industry profit leader.

Orrick carefully delineated the differences between this case and the Telex and Transamerica antitrust cases against IBM, when federal courts referred to the OS and cpu as a single unit, one product, and also accepted IBM's distinction that main memory and add-on memory are separate products. He then used a streamlined but subtle legal analysis to reason his way through the complex arguments on market practices and DG policy. As an example, citing case law, he tackled the issue of whether the OS software is separate from the cpu product or just a portion of the single computer product. The test, he argued, was to study the "function of the aggregation," whether the items are normally sold or used "as a unit with fixed proportions," and whether the amalgamation of products resulted in cost savings apart from what could be expected from reduced sales costs and the savings in any joint marketing program.

Judge Orrick argued DG's own marketing practices refute the suggestion that the software and the cpu used in a particular computer system must necessarily be manufactured by the same company. First, he noted, DG admits it sells cpus without requiring the purchaser to obtain DG software; DG price lists show separate charges for hardware and software; until summer 1978, different company executives had responsibility for selling software and hardware.

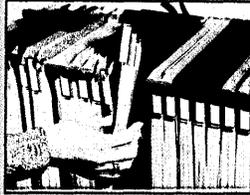
Since cpus can accept several OS software packages, the software is not "sold in fixed proportions" to cpus. Noting DG's claims that coordinated R&D offers cost savings, Orrick said DG offered no evidence that the "asserted benefits of R&D would be sacrificed if DG were to offer its

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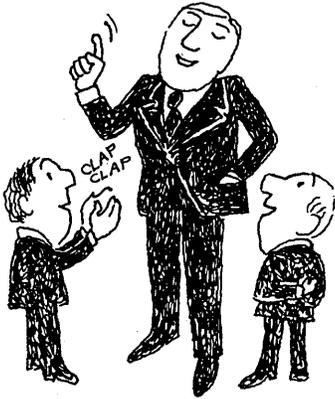
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NEWS IN PERSPECTIVE

software apart from, as well as together with, its cpu.

"The question is not whether joint R&D is more economical than separate R&D, but whether joint R&D calls for joint marketing," he declared. In light of the undisputed material facts in the record, "the Court is compelled to conclude that software and cpus are separate products."

Although the lawyers for the parties were unwilling to discuss the case publicly, and the evidence of the case is still under judicial wraps, a flavor of the irony inherent in the structure of the case can be found in the oral arguments for the summary judgment motions. Data General, on the key issue of economic power, must minimize its software systems' quality, uniqueness, effectiveness, popularity, and competitiveness. For a tough aggressive marketing organization like Data General, the idea of their lawyers backpedaling around the courtroom trying to avoid saying anything good about DG operating systems and cpus must be painful.

During the courtroom debate, Judge Orrick interjected a question for Data General attorney Richard Goff, with a passing reference to a remark of DG president Edwin De Castro that DG software is "the best in the business."

Mr. Goff: "Some people say it's good. . . ."

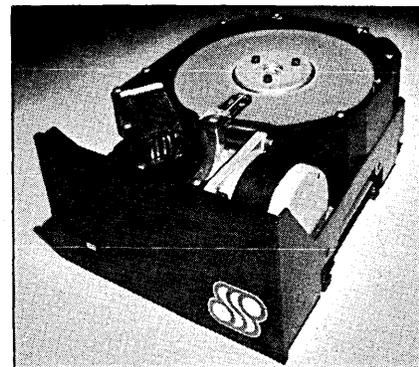
Judge Orrick: "You would answer your client: 'Yes, sir, you bet it is,' wouldn't you?"

Mr. Goff: "Some—some people say it's good; other people say it's not. And many customers say it's obsolete and prefer to use other software."

Judge Orrick: "All right."

Mr. Goff: "There's a difference of opinion."

—Vin McLellan



DISK DRIVE DEBUT: Shugart Technology is ready to roll with its first 5 1/4-inch Winchester disk drive.

gart, cofounder and ex-president of Shugart Associates, Sunnyvale, Calif. Shugart is back in the industry after a five year absence, this time as the head of Shugart Technology, Scotts Valley, Calif., which has staked out a pioneering role in this new marketplace.

Initial applications are expected to be in microcomputer-based very small business systems, in personal computers, and in the low-end word processing systems, where typically a system currently uses two 5 1/4-inch floppy disk drives.

"I think the market available to them is quite sizable," says James N. Porter of Mountain View, Calif., publisher of the "Disk/Trend Report." He observes that shipments of the 5 1/4-inch floppies over the last few years have been significant. He notes that vendors of small systems are anxious to upgrade from the use of two floppies to a system with more capability—typically one hard disk and one floppy. But for a system oem that has been using 5 1/4-inch floppies, an 8-inch Winchester disk is just too large.

Current practice seems to be for minicomputer-based systems to use 8-inch and 14-inch disk drives, while microcomputer-based systems are expected to go to diminutive hard-disk storage units.

Indeed, to make things easier for the oem now using minifloppies, Shugart Technology has designed the drive package to the same size. "Even down to the same screw holes," says Alan Shugart. And he is using the same voltages. The interface selected is the same as the Shugart Associates 1000 and the track capacity is the same as on the 8-inch Winchester from Shugart Associates. Thus, from the software standpoint it's almost transparent.

Along the same lines, Alan Shugart has taken steps to try to get the industry to standardize—to the extent possible. As soon as Shugart and his media supplier, Dysan Corp., agreed on the dimensions of the disk (130 mm outside diameter with a hole in the center having a diameter of 40 mm), he contacted other disk makers—3M Co., Memorex, and BASF.

TECHNOLOGY

SIX MB ON EVERY DESK?

**Alan Shugart is back in
business, this time pushing a
6-megabyte, 5 1/4-inch
Winchester disk drive.**

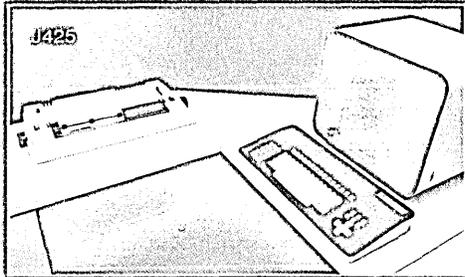
As if a chicken in every pot and two cars in every garage weren't enough, it looks as if 6 megabytes on every desk will be next.

In a hotel suite somewhere near the Anaheim Convention Center this month, a 6-megabyte-capacity, 5 1/4-inch Winchester disk drive is slated to be shown to a select list of invitees. Their host will be Alan Shu-

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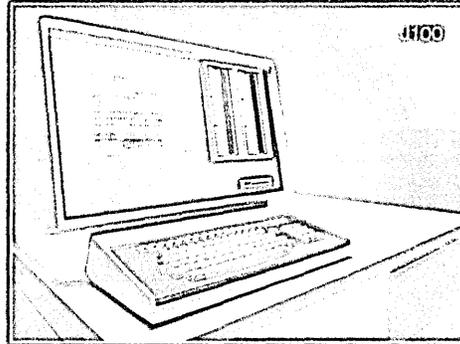
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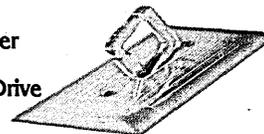
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Says Finis Conner, executive vp and cofounder, "It is important for us to convey what it is we're doing, even to our competitors, because we don't want the same fiasco in the marketplace that happened with the 8-inch Winchester, where you wind up with 20 competitors with 20 different products and the system designer doesn't know what to do."

This confusion, which slows market acceptance, is explained by Raymond C. Freeman Jr., consultant in Santa Barbara, Calif. He says there are four dimensions of the so-called 8-inch Winchester disks. There's the 200-mm outside diameter and 63.5-mm inside diameter disk initially developed by BASF and proposed as a standard by the European Computer Manufacturers Assn. There's also the 210-mm o.d. and 100-mm i.d. used by IBM in its Piccolo drive. To add to the confusion, Memorex at last year's NCC introduced a drive with dimensions of 200 and 100 mm, and Control Data is expected to debut a model this year with dimensions of 195-mm o.d. and 100-mm i.d. What's a mother to do? What's a system designer to do? As Freeman says, "Will the real 8-inch disk please stand up?"

This is the type of fiasco that Shugart is trying to avoid in the 5/4-inch hard disk marketplace. "To have that kind of madness occur in the 5/4-inch world would really be a big self-inflicted wound on the industry," says Freeman. "So if Alan is successful in guiding the industry through those shoals in the startup months, he will have made a very large contribution."

The 5/4-inch disk has 15 times the capacity of the double-sided 5/4-inch floppy but at only three times the cost, says Conner. He stresses that they are not pushing the technology, but are using standard Winchester heads, standard stepper motors, and coated disks. "We'll actually have 20% more capacity in our drive than the Shugart Associates 1002, which is their low-end 8-inch Winchester," he adds.

Conner prices the drive at \$1,500 for a quantity of one, \$925 each for a quantity of 500, and says initial shipments of evaluation units will begin next month.

Projections of market size for the small drives have not yet been made by the likes of Freeman and Porter. It's too early to forecast market size, says Freeman, "in spite of the fact that some people are rushing hard to introduce it . . ." He thinks the development cycle for a product like this will take longer than some of the early entrants are hoping.

He believes the market would have developed out of a need in another two years, but that availability of hardware today will create an earlier demand. "I give [Shugart] credit for really doing a lot to accelerate the unfolding of the market," says Freeman. "because it wouldn't have happened on its own for a couple more years."

—Edward K. Yasaki

SOFTWARE

SOFTWARE SLUMP IN SIGHT?

There's little optimism that the '80s will bring big breakthroughs in software development.

This is not to be the decade of dramatic improvements on the software side of computing.

Such was the consensus of speakers at a summit conference on "Future Shock, Computers in the 1980s," staged in late March in Los Angeles by the American Institute of Aeronautics & Astronautics (AIAA), the Data Processing Management Assn. (DPMA), and Technology Transfer Society (TTS).

The degree of pessimism was both varied and tempered. Dr. Willis Ware, corporate research staff, the Rand Corp., said he was "not gloomy and not exuberant . . . just cautiously hopeful."

Dr. Peter R. Kurzhals, assistant director for research & technology, NASA/Goddard Space Flight Center, suggested that rising software costs will force new efficiency measures.

Dr. Roger R. Bate, manager of advanced software technology, Texas Instruments, Inc., said he wanted to "dispel some of the gloom" cast by other speakers on software prospects for the '80s. Yet, he predicted that the cost per person for software people would increase 10% during the decade.

The people factor was most often cited as the big problem facing software this decade. "We've all experienced the fact that talent is in short supply," said Ware, "and the salary structure reflects this."

He pointed out that "a lot of new companies are coming into the business each week and this drives demand. The microcomputer industry is growing to a point where we are going to have computers where they never were before. This too drives demand."

Ware suggested that the proliferation of microcomputers could generate people "who know something about programming. Maybe we can attract them to the computer industry in a new skill class, to be to programmers what engineering technicians have long been to professional engineers." He called these people a potential "cadre of para-programmers."

Ware said the '70s was "the decade in which we learned how to manage it [soft-

ware], but there still are disasters all over the landscape." He said the software development process should be considered very much like that for hardware. "It is not an art form. It is a development process."

Bate seemed to share this outlook, although hinting that he partially deplored it. "Software development is a discipline, not an art." But while there is the need for this kind of outlook, he acknowledged, "it's taken the fun out of software development." He added that the more disciplined approach has made it possible to produce software at a "relatively predictable cost."

Productivity of software developers was also discussed. Ware called the term "productivity gap" an unfortunate phrase. He said he prefers "productivity shortfall. What an individual does is not the issue."

Of higher order languages, Ware said, "They are always on the scene but the impact of new higher order languages in the '80s will be very modest. There is too much present investment in existing languages. We can't afford to junk that heritage."

He believes higher order languages will only affect new applications, those getting started in the '80s. "And I'm not strong on that. Many programming shops are dedicated to a single language."

TI's Bate said of higher order languages that they generally are the result of a committee development effort and, as such, don't represent a single concept but a collection of concepts.

Other current problems with programming languages listed by Bate were that specifications are frequently incomplete, languages are too complex to learn easily, most languages fail to detect logic errors, and many languages lack adequate support for debugging.

The demand for software people is predicted to grow by 10% per year, from 563,000 people in 1980 to 1.5 million by 1990.

He urged the software community to "identify and back the most promising language for standards, training, and support, and find a single, cohesive, easy-to-learn, general purpose language which enforces correct programming techniques and usage."

Bate said the software community is "not doing at all well" in testing. He said testing bears a share of software cost which must be weighed against the cost of deferred errors.

"Static program verification methods," Bate said, "may be the most feasible way to test complex multiprocessor systems." He said static analysis can be used on code complexity, tracing of logical paths, cross references and program verification, whereas dynamic testing is preferable for program tracing, interactive

NEWS IN PERSPECTIVE

debuggers, and instruction-level simulation.

Bate said that in testing in integrated hardware/software developments, "testing requirements synchronize hardware/software efforts. From the start," he stated, "configuration management is critical. In-circuit emulation provides powerful testing tools. Multiprocessor real-time systems require special care."

He wasn't quite as worried as Ware about the shortage of software people in the decade. He predicted the demand for software people would grow by 10% per year, from 563,000 people in 1980 to 1.5 million by 1990, but he sees a leveling off of the software population caused by an increase in the number of units of computer capacity. He defined these units as "that amount of computer capacity which keeps one software person busy. One unit supports one person."

Ware said the way software organizations will respond to the changes of the '80s will depend on their history and heritage. "New organizations can move most rapidly. Older organizations will have a more difficult time responding to new things that come along."

He listed as positive signs that an organization might respond to change and improve in the '80s: management visibility at the top of the software operation; a stable environment; alertness to modern tech-

niques and willingness to make investments to do it better.

Signs indicating organizations might have trouble improving in the '80s, Ware said, include: lots of old software; scarcity of management experience with the software job; geographically scattered operations; and a sequence of jobs, each one getting better in the '80s. He noted, "The IRS has hundreds of thousands of lines of code written in assembly language."

—Edith Myers

AMERICAN SOFTWARE DREAM

What started out as a nightmare for Britain's Altergo Software now looks like a dream come true in its pact with Insac to export software to the U.S.

The lure of lucrative software in the U.S. could prove to be the bait in a vicious trap unless companies have the resources to handle the cash flow problems created by bal-

ancing the high cost of marketing and software development with the long-term pay-back on investment.

That is the warning delivered by David Brownlee, managing director of Altergo Software, who still has fresh in his mind the bittersweet taste of the American Software Dream. Despite great user acceptance of the British firm's products in its first three years of U.S. trailblazing, Altergo Software Inc. (ASI) found that the costs of entering this new market drained the resources earmarked for enhancing existing products and developing new ones.

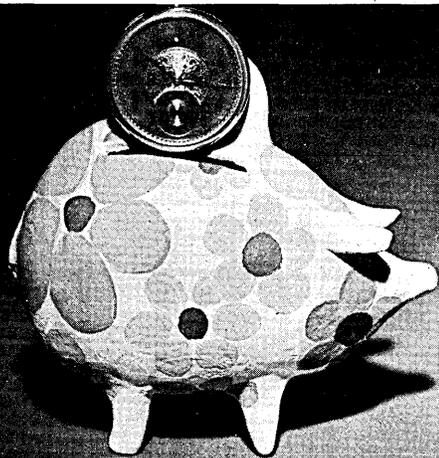
So, earlier this year, ASI was sold for around \$4 million to the company started by the British government to promote the export of software, Insac Products. This deal gives Insac a readymade marketing outlet complete with 40 staff members, seven offices in North America, over 500 product installations and a wide range of product offerings. For ASI back at its London headquarters, it means more money is freed for product development, and it still has a U.S. outlet via Insac.

The pact between Insac and Altergo is fraught with irony. Insac was formed three years ago by the government's National Enterprise Board (NEB) with the intention of helping to export software. At that time, Altergo was starting to move into the U.S. market, with the Shadow II IBM teleprocessing monitor as its spearhead. Insac's main emphasis then was on trying to form a consortium of the largest British software and systems companies, such as Logica and CAP. Smaller companies which were showing private entrepreneurial spirit in setting up American sales, such as Altergo and MSP with its Datamanager system, were thought too small to be aligned with the Insac set.

Now that Insac's initial strategy of bringing together a "supergroup" consortium has effectively failed, it is relying on the ASI base as a springboard for selling what is likely to be its most successful line of IBM-compatible products. In addition, Insac will sell products for other manufacturers' systems.

Altergo's software products strategy is based on a simple formula: stick to IBM-compatible systems which have a proven user need and demonstrable productivity gains. Although ASI's Brownlee says there has been a shift in emphasis recently from products aimed at improving machine productivity, such as Shadow II, to "people productivity aids," such as its CPG communications program generator, there has been no basic change in Altergo's approach. But then, the company was first formed as a four-man outfit in 1969, and it took until October 1973 for the first release of Shadow to appear.

At first, Altergo's target was primarily PL/1 programming and consulting. But in 1973 the company took under its wing a product developed by a user, the



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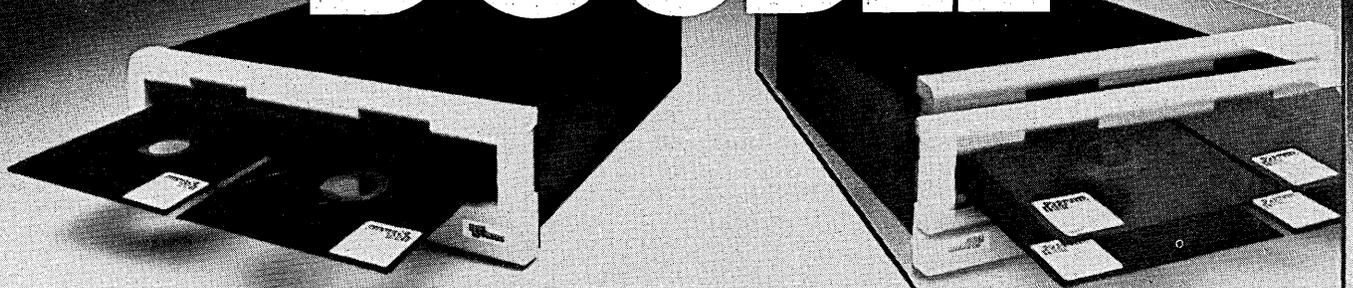
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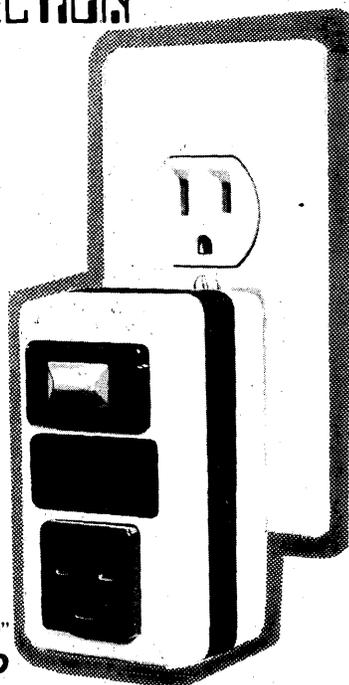
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Thomas Cook travel organization; this product became Shadow.

Underlining the need for strong financial backing in software development, Brownlee points out that although Shadow is seven years old, the company is investing twice as much this year in its development than it did last year. "We will never get to the end of its development," Brownlee comments. He believes that any company contemplating the development of a new software product should work on a five- to seven-year period before reaching a break-even point. And that's why, he explains, his company needed the cash injection from the ASI sale to finance future developments.

Although Shadow II remains the flagship of the company, Brownlee claims Altergo can now offer IBM users a range of software which could be taken as a complete package or from which individual systems can be selected. These systems are grouped under the name Altergo Communications Alternative and include the Quota II on-line program development system (which received an honorable mention in the 1979 Datapro software survey), the GUTS timesharing service, and the AROS data base management system. In the U.S., ASI also markets for the Dutch company Corodale BV, the disk and tape Space/Manager system, another product which earned a 1979 Datapro mention.

With this product range and with its U.S. activities now covered by Insac, Brownlee has his sights set on new markets in Japan, Spain, Australia, and South Africa. At present, 40% of Altergo's software sales are in the U.S. and 20% in the U.K. Brownlee's aim is for a growth to about 60% of its sales in the U.S., which he notes is the estimated U.S. share of the world software market. At the same time, Altergo hopes to increase sales in the rest of the world. Last month an Altergo software office was opened in Spain. And the company is currently talking to prospective agents in Japan, although Brownlee believes that it will be about four years before the Japanese market will "come good." He believes that the use of software in Japan is still many years behind the rest of the world and that the market for independent software will really start to grow when Japanese manufacturers begin to charge realistic prices for their own software. He expects to operate independently in Japan, selling to users of IBM and Japanese-made hardware; Brownlee considers it a bad idea to become closely associated with any one Japanese supplier.

From its four-man PL/1 team in 1969, Altergo has grown to a \$30 million company with a staff of over 500. As well as providing a base for its own future growth, the seeds sown by Altergo in the U.S. could flourish into a healthy British software export industry with its roots firmly established in the rich soil of IBM and IBM look-alike systems.

—Malcolm Peltu

PASCAL CONFUSION EXPLAINED

SofTech Microsystems defends its right to market the university-developed version of PASCAL.

Like those of Mark Twain's death, reports of controversy surrounding SofTech Microsystems' exclusive license to market UCSD PASCAL are labeled by the company as "greatly exaggerated."

The California subsidiary of SofTech, Inc., Waltham, Mass., was organized last year with the sole purpose of licensing and enhancing the popular version of the PASCAL programming language which was developed by the Institute for Information Science at the University of California at San Diego.

The version of the language was developed under the direction of UCSD Professor Kenneth Bowles with portability as the most desired feature. UCSD Pascal has become a virtual standard for microcomputer applications of the language, with more than 10,000 users running it on microcomputers from Apple, Digital Equipment, NorthStar, Pertec, Radio Shack, Texas Instruments, Western Digital, and other manufacturers.

At first UCSD licensed the language's use just to other campuses of the University of California. But its popularity grew, leading to a volume of requests for licenses that created an administrative burden the university was ill equipped to handle.

So, the university approached the California office of SofTech, Inc. and SofTech Microsystems was launched.

Some at the time questioned whether a software product developed at a state land grant college by university-paid professors and their students and at least partially funded by tax monies should not properly be placed in the public domain.

C.A. Irvine, vice president and director of engineering of SofTech Microsystems, said, "We are just an agent of the university as many other firms are for many universities, licensing uses of books and many other products." And, he said, "we intend to put as many dollars into UCSD PASCAL as the university did."

Irvine explained that the university had two types of licenses before it entered into its agreement with SofTech. One was an end user license granting the licensee use of the language but prohibiting him from reproducing it for sale or to give away. These licenses, he said, contained a clause which would grant the user full and unlim-

ited use at the end of two years.

"When we were negotiating with the university," Irvine said, "we saw this as a time bomb which could result in our license having no value."

These end user licenses also contained a clause providing that they could be canceled by the university at any time for any reason. "The university, to preserve value, chose to cancel," Irvine said.

"There were some who were upset that something they had paid \$200 to \$300 for had been canceled and there was some confusion as to what users could do with what they had in their possession. What they could do was what anyone can do with copyrighted materials under copyright laws and the fair use doctrine."

He said a few "were so paranoid they got hold of the fair use doctrine and read it. They feared that entering the language into memory could constitute copying."

The other licenses granted by the university prior to its agreement with SofTech were licenses for distribution, and Irvine estimates there were about 30 of these. Some were assignable, he said, some were nonassignable, and some were even cancelable.

The assignable licenses were assigned to SofTech. Those unassignable and uncancelable, such as one to Apple Computer, continue as before with licensees paying royalties directly to the university.

SofTech has denied published reports that it had tried to get Apple to pay royalties to SofTech. "We want them to sell as many systems as possible to boost the popularity of the language," said Irvine. "They can sell only on Apple computers and we license for the rest."

One of SofTech Microsystems' first moves after being named exclusive licensor by the university was to announce the availability of the UCSD PASCAL Adaptable System. This system can be used on microcomputers using 8080, Z-80, 6502, 6800, and 6809 microprocessor cpus in systems that use any type of floppy disk stor-

"We are just an agent of the university as many other firms are for many universities."

age, including single or double density, standard or minidisks, and hard or soft sectoring.

The application of the UCSD PASCAL Adaptable System to additional microprocessors, Irvine said, means that more OEMs will be able to provide UCSD PASCAL to their customers. "This, coupled with the wide range of I/O environments possible, broadens the options that systems suppliers will be able to offer to end users wanting a PASCAL-based system. Programs developed with the UCSD PASCAL system are compiled into a universal pseudocode that can be exe-

cuted using the UCSD PASCAL interpreter and operating system. The technique allows the same program to run on a wide range of microcomputers without change. Thus, any PASCAL software is now available to virtually any microcomputer user."

John W. Brackett, president of SofTech Microsystems, said the use of UCSD PASCAL software is doubling every few months.

He said companies using a variety of different microcomputers may obtain a license allowing unlimited internal distribution of the UCSD PASCAL system for all their machines, thus allowing standardized company-wide microcomputer usage.

Irvine likes to tell of an aerospace company that, in dealing with the proliferation of microcomputer systems in its engineering ranks, issued the decree: "Get any kind you want, but make sure it runs UCSD PASCAL."

—Edith Myers

STRATEGIES

1403S AT BARGAIN PRICES

Spur Products undercuts IBM's Cadillac prices on the once Cadillac-classed printer—and offers a good deal more.

The venerable IBM 1403 printer is in trouble, but IBM isn't the source for this information.

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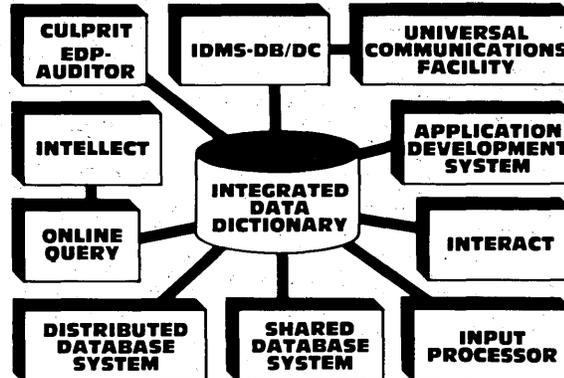
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with upper and lower case text, fonts for COBOL, FORTRAN, OCR and PL/1 symbols and an overprinting technique that allowed users to print scientific symbols. IBM sold about 100,000 of them and priced some 1100 lpm models at \$34,000. When it stopped making the 1403 about 10 years ago, IBM raised its price well over \$41,000.

And if you want a 1403 from IBM today, the price still is \$41,000.

So how can a tiny Los Angeles company, called Spur Products Corp. be offering 1403s at less than a third of the IBM price? President Ray Lorenz explained the phenomenon last month: IBM's marketing

people don't always talk to IBM's pricing people. The computer giant is now pushing sales of its newer printing models, such as the 3203 and the 3800 laser printer, to customers upgrading to newer models and at prices lower than the \$41,000 it's asking for a 1403. The result: as users switch, leasing companies have a glut of 1403s in their warehouses.

"There are at least 25,000 to 30,000 1403s that are going to be available at bargain basement prices," says Lorenz. He estimates they'll be available for as low as \$12,000 from these sources.

So Spur, which a half dozen years

ago began making controllers and interfaces that enabled non-IBM computers to be connected to 1403s, plans to buy up this excess inventory and to sell it with the controller and interfaces at prices ranging up to \$32,000. Lorenz hopes to be selling a system a month by year-end and that figure should rise in 1981 and continue upwards until the 1403 actually bites the dust, "probably in 10 to 15 years."

Lorenz got the idea a few months ago after learning of the drastic price dive the 1403 had undergone after IBM began making it attractive for customers to buy its newer models at prices lower than it was asking for the 1403. Spur already had installed some 90 controllers and interfaces that allowed users to attach any kind of computer to the 1403. That included three models of the DEC PDP line, all Univac models, the XDS Sigma series, the HP 3000, most Burroughs computers, Control Data models 3000 and 6000, the General Automation SPC-16, the Digital Scientific Meta 4, and even the IBM model 1130 which didn't interface with the 1403.

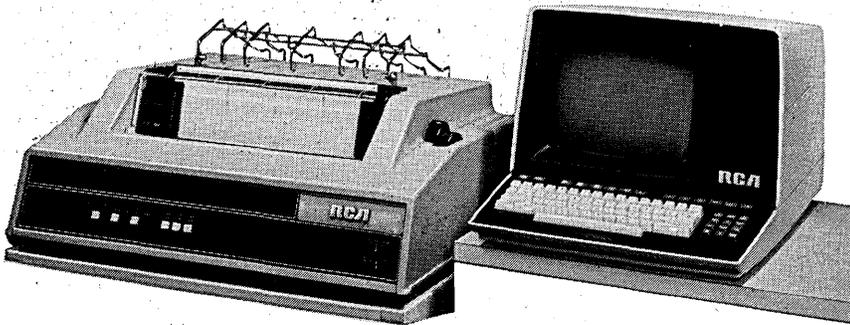
Lorenz, a mechanical engineer, was a founder of Dataproducts Corp., the largest independent manufacturer of printers. While at Dataproducts, he became vice president of product development for end user printers and, he recalls, the most frequent complaint he got from customers was, "Why can't you make it print as good as the 1403?"

Sensing a market for the 1403, Lorenz took off and formed Spur to allow every computer owner to use a 1403. Three years ago he sold manufacturing rights for his controller and interfaces to Grumman Data Systems, but last August bought it back when Grumman found that the size of the market couldn't match the overhead of a large corporation.

Spur now is negotiating to buy printers from leasing companies, refurbish them so that they're certifiable for IBM maintenance, and resell them to users with or without the controllers and interfaces. Lorenz thinks a lot of users can't afford to pay IBM's asking price, so they'll opt for his and then they'll be able to run the printers off any kind of computer. "One prospect told me he planned to discard his 1403 for a higher speed 2200 lpm printer offered by Control Data. I told him, 'Keep the 1403 and buy another from us, because if the CDC printer goes down, you're out of business. With two 1403s, if one goes down, you'll at least be printing at 1100 lpm.' I think we've made the sale," he said.

Spur isn't the only player. Many brokers are jumping on the bandwagon and unloading 1403s at the \$12,000 price. "But they're like used car dealers, making it on volume and then probably disappearing." Spur offers maintenance at \$125 below IBM's monthly rate of \$450, and has refurbishing centers in Washington, D.C., New York, and Los Angeles, from where it also

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NEWS IN PERSPECTIVE

provides maintenance. It also has third-party maintenance agreements with Sorbus and Sirvess.

And in case its new plan doesn't work out, it's about to announce a new product—the Universal Subsystem Adaptor (USA)—which will enable any IBM-compatible peripheral to be attached to anybody else's computer. First component of the USA product is one that allows a Xerox 9700 printer to be attached to Burroughs machines.

—Tom McCusker

TOSS OUT PEN AND PENCIL

A terminal for every programmer is the motto of Maestro Systems.

Within four or five years, all programmers will work in front of a crt terminal. It just doesn't make economic sense to retain the pen-and-pencil method anymore, says B. R. Cabaniss, president of Maestro Systems Inc. The San Francisco, Calif., company is

a spin-off from Itel Corp. and is selling a programmer workstation system that places programmers at a terminal but offloads them from a host cpu.

Cabaniss' projection of four or five years is conservative compared with predictions of two to three years by some in the user community. The interest in speeding this day comes from an appreciation of the increased productivity that results.

"If you can get programmers on-line—off paper and pencil, if you will—you'll increase productivity. No question about that," says a spokesman for the Bank of America. He says studies cite percentage increases ranging from 40% to 80%. While that large computer user organization has not run its own study, its belief is that productivity increases of at least 40% are realistic, but not 80%. And this increase is only from getting programmers onto a tube of some kind.

At the B-of-A, there are 500 users of the 200-or-so TSO terminals. But for the last year they also have been using a Maestro system on an experimental basis. Marketing rights to Maestro had been acquired by Itel in 1978 from a Munich, Germany, company called Softlab GmbH. The Germans, who began selling this system under the Pet name in '76, have installed more than 100 in Europe. In the U.S., some half-dozen have been installed by Maestro Systems, which acquired rights from Itel last year.

The system, designed for the development and maintenance of programs, supports all current languages and can be used with any mainframe that supports normal RJE protocol. But Maestro seems to work best for COBOL programmers because FORTRAN and BASIC shops tend toward line-by-line compilation, the type of feedback that COBOL doesn't have and Maestro doesn't provide. Still, its ability to work with those

"People don't know whether five lines of debugged program per week is good or bad."

languages is said to make it appropriate for mixed shops. It is also strong in a TSO shop.

"We have shoes for the shoemaker's children here," says Cabaniss, who formerly was Itel's vice president of program products. He thinks programmers for too long have been neglected, called on to work late at night or on weekends in order to gain access to the mainframe. "At the price programmers are getting these days, you can't afford to have them roaming from room to room, looking for a terminal not in use, or waiting for one to become available," he adds. "So you're much better off having the tool sitting there, even if it's idle a great deal of the time."

Resistance to the Maestro system is said to come not from programmers but from management. "They already believe that there is a distributed solution for their keypunch operators and their secretaries," explains Maestro vice president Roger Lehman. Companies seem not to object to spending thousands of dollars for terminals for those people. "But they don't agree with that when it comes to programmers, who cost them two to three times as much as a data entry person."

Or when terminals are purchased for programmers, they're attached to the mainframe. And then response times rise dramatically when all these programmers begin vying for mainframe cycles for themselves. And so the company goes out and buys a bigger computer.

"I'm not sure that the dp industry is at that point where everybody understands that this off-line approach is going to be the way it is, that every programmer is going to have a terminal," says Lehman.

And it appears the only thing that will convince them is to be able to prove that productivity increases are real and are achievable. But even that isn't possible without knowing what the base is. "People don't know what they're getting out of programmers," laments Cabaniss. They don't know whether five lines of debugged program per week is good or bad. And if they don't know that, he adds, they won't be able to determine whether terminals, on-line or off, really do increase programmer productivity, and by how much. It's a dilemma.

—Edward K. Yasaki

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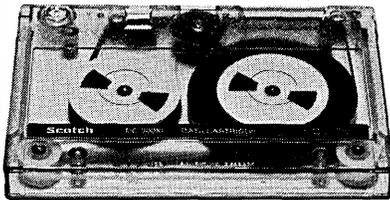
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NEWS IN PERSPECTIVE

COMPANIES

ICL HOPES DAP WILL ZAP U.S.

Once the first commercial DAP is up and running in June, ICL expects its award-winning processor to sell itself.

British mainframer ICL is preparing to ship a revolutionary computing engine to the U.S. by the year's end to probe what it sees as a big technology gap in this country. ICL is hoping to capitalize on what it believes to be a two-year technology lead over the Americans at the "supercomputer" end of the business.

Sources within ICL say the company expects to ship its Distributed Array Processor (DAP) to America in the last quarter of this year. More than 60 solid inquiries for the processor, described by British experts as "revolutionary," are expected to net the first orders for the machine by the summer. Already tipped as a possible first site in the U.S. is Princeton's Plasma Fusion Lab near ICL's U.S. home base in New Jersey.

Of perhaps even more importance to ICL, for the first time since their launch as the firm's "new range" in the mid-'70s, ICL's 2900 family of large mainframes will be sold in the U.S. So far ICL has had no answer to criticisms from U.S. commentators that the company is not really committed to this market until it sells the "climax" of its product portfolio here in the States.

The DAP is described by ICL, and by the British Computer Society whose annual technology achievement award it won, as the world's fastest and most powerful processor, as well as the most technically advanced. The world's most powerful computer in the early '70s, the CDC 7600, has become the standard for measuring processor strength. One 7600 would typically offer 10 MIPS (millions of instructions per second), experts say. Today's leader, the Cray 1, plus a front-end system, is said to offer four to 10 times the processing speed of a 7600 for an average cost of \$10 million.

ICL claims that the DAP, when linked to a host 2900, will offer speeds in excess of the Cray 1 and at about one-fifth the price.

The reason for this, ICL says, is that the DAP is the world's first processor to be based on a matrix of distributed micro-processors, or processing elements, clustered together in what is known as an "array." In this way, each DAP processing engine is in reality a marriage of thousands of smaller processors which work together at speeds far in excess of conventional computers.

The first generation DAP, which goes into manufacture this summer, is based on an MSI array of over 4,000 processing elements. But ICL plans show that the company is working on much denser (LSI) arrays based on over 16,000 processing elements.

Though ICL is reluctant to discuss its plans, the company made clear its belief that there is no competition for DAP in the U.S. "All current American supercomputers from the likes of Cray and CDC are based on conventional or linear processors," comments DAP marketing director Colin Aldridge, "and we estimate that we have a two- to three-year lead over those companies that are developing distributed arrays."

The first American concern to make DAP commercially available could be the Goodyear conglomerate, which has been chosen to develop a DAP for NASA/Goddard Space Flight Center. Sources say that Goodyear's Staran development is one of several costly American projects that have so far failed to produce a DAP (or parallel processor). They add that Goodyear's latest designs are close to ICL's DAP in conception.

Nobody is certain how much federal pressure was exerted, but it is known that ICL wasn't allowed to bid on the NASA/Goddard contract last year. By the autumn of last year, ICL seemed to be despairing of ever capitalizing on lucrative federal contracts through its "technology lead," and it seemed to settle for a selling burst in other technical and scientific areas.

But lately a cautious mood of optimism has been sensed among ICL's top management. Their feeling is that there may have been a shift in attitude by such U.S. agencies as NASA and ERDA, allied to new directives and statements from the U.S. government on the use of non-American gear. Part of this change has come from a

ICL believes there is no competition for DAP in the U.S.

softening of the U.S. stance within NATO, as well as a desire by the U.S. to encourage its European partners.

Though all of this has undoubtedly encouraged ICL, there is still the suspicion in the U.S. that there are not as many market opportunities for superfast number-crunchers as were first envisioned. Fueling this feeling are IBM's apparent hesitancy to make any major moves of its own in this area, as well as the industry leader's lack of commitment to Josephson Junction circuit developments.

But perhaps as much to its own surprise as anybody's, ICL has discovered that it is unlikely to be limited to just technical and scientific number-crunching with its DAP. So far, applications work on the first DAP prototypes has been limited. "But though the machine was designed around weather forecasting applications," says

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NEWS IN PERSPECTIVE

ICL's Aldridge, "we've been delighted to find that the DAP is ideal for image processing." Applications software will undoubtedly provide the key that can unlock the door to U.S. markets. Next year ICL will push hard any business area which has a high element of technical computing; likely targets are America's oil and construction companies. Once these customers are secured, many people at ICL are betting, the applications "bandwidth" can be widened further to embrace straight business computing and networking areas.

To this end, ICL is expected to build smaller DAPs that can be used with business

computers and mainframes under the medium level. At this moment, ICL seems to have no plans to sell small DAPs in bulk to oem buyers, or as front-ends to other host computers, but these do offer further investment opportunities.

Applications software will undoubtedly provide the key that can unlock the door to U.S. markets.

Though all of this paints a rosy picture for ICL, there are several dark clouds

massing on the horizon. The chief worry is where ICL will get the considerable extra financing needed to back its ambitious plans. Some of the money may come from a rights issue of new shares that the company is known to be planning for this year. But much of this funding is expected to be aimed at new acquisitions.

ICL is pinning some hopes on getting monetary support from the British government and from a more nationalistic and protective European community. ICL has already had around \$1 million from Britain's Department of Industry (DOI) to help develop its original DAP prototype. But delays in developing the first DAP for a customer—Queen Mary College in London—have resulted in many opponents to the ICL development plan in Britain. The college will not get its DAP until June—nine months behind schedule.

While the DOI has been largely sympathetic to ICL, the company's delay in producing a demonstrable system, or first showpiece site, have harmed the department's attempts to promote DAP in the lucrative defense sector. One key source at ICL said the Ministry of Defense's expressed opinion was that "ICL is unwise to involve itself in the DAP, as its potential market lies mainly in the U.S.A."

The U.S. could now become a key factor in ICL's latest lobby to get funding for a new LSI or second generation of DAPs. One conservative set of figures floating around ICL suggests that the company is looking to sell some 65 DAPs (both MSI and LSI) over the next 10 years, with profits of some \$50 million on sales of around \$220 million. To do this, the government would have to help ICL find an extra \$25 million or so to get it through to 1985 or 1986, when it expects its first positive cumulative cash flow from DAP. And these figures don't take into account any moves into high volume small LSI DAPs, nor do they account for the resulting high volume of 2900 sales.

So far, ICL's problems have resulted from doubts in the U.K. that the DAP will be just another typical British project that doesn't fulfill its theoretical promise on real problems—a doubt that was given greater credence when ICL's U.S. boss and himself an American, Dick Bright, resigned last month. In essence, ICL has been unable to sell DAP off the drawing board.

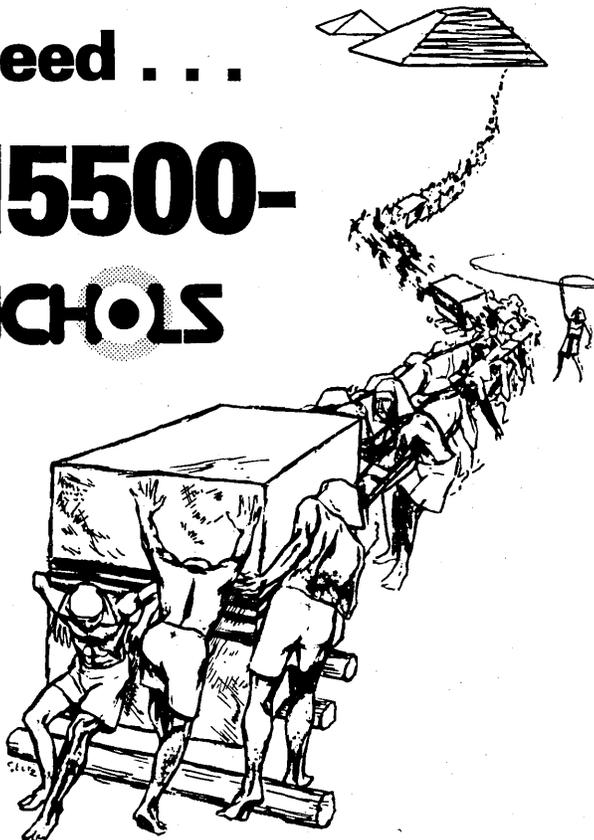
But now that ICL's preparations for the Queen Mary College DAP site are going into their final stages and a visible product is appearing, the company's whole marketing effort is being set for overdrive. It's likely that after June ICL will mount a shuttle service to get interested Americans over to visit the first DAP site. What these observers think and say about DAP will, probably more than anything else, determine the future of this product.

A rumor that some U.S. federal agencies may be prepared to fund further development work on DAP if it is as good as

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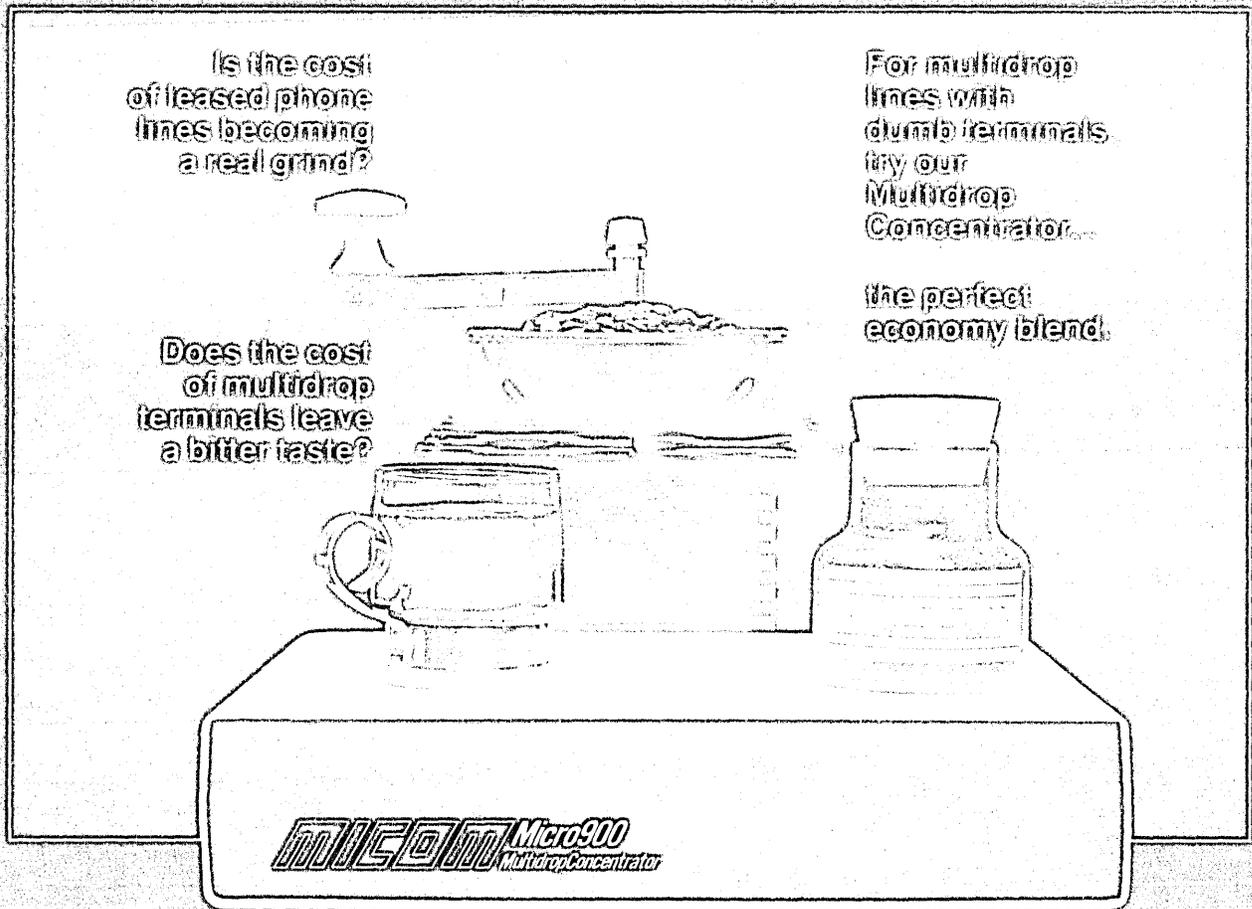
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NEWS IN PERSPECTIVE

ICL says has so far been denied by both parties. But this is the big prize ICL is aiming for. Regardless of what happens in Britain by way of support, it is in the U.S. federal arena that DAP's future as a winner or an also-ran will be shaped.

One thing is certain: if ICL's DAP turns out to be as powerful an engine as the company claims, it will have to be driven with great care through the U.S. marketplace. If, as is speculated, the DAP probes a large weak spot in U.S. computer technology, no one will thank ICL for touching that nerve.

—Ralph Emmett

NEW FIRM, BIG HOPES

Upstart Ungermann-Bass has its sights set on making disparate digital devices talk to each other.

One would expect that a company like Data-point could provide a local communications network to which one could attach processors, disk drives, and terminals. And Xerox

could, too. But a new company emerged in March, one that wants to make it possible to interconnect a wide range of different types of digital devices, including computers and keyboards and printers, from three or four vendors initially.

"We believe in distributed processing and we believe it's a multivendor business," says Ralph K. Ungermann. He contends that a distributed system comprised of a number of disparate devices that cannot talk to each other will not be effective. It's just not conducive to the control and sharing of data. "It needs an underlying glue that holds it together, and that's our product. It's the glue that allows various types of distributed processing equipment to be interconnected so those users can share data and resources."

Net/One is the name of the first product of Ungermann-Bass Inc., Santa Clara, Calif. Ungermann was earlier a co-founder of Zilog, developers of the Z-80 microprocessor chip being used heavily in the Net/One interface box that makes his network tick. The transmission medium linking the boxes will be coaxial cable, but other devices will be used as they become commercially available. The interface boxes initially will perform speed conversion and code conversion, in time handling high-level protocol conversions, too.

"Some of our customers are looking at interconnecting more than a thousand terminals, a few hundred microcomputers, 50 minicomputers, that kind of interconnect scheme," says Ungermann. Those would be scattered in four to six buildings close by, operated in factory environments, industrial laboratories, and in offices.

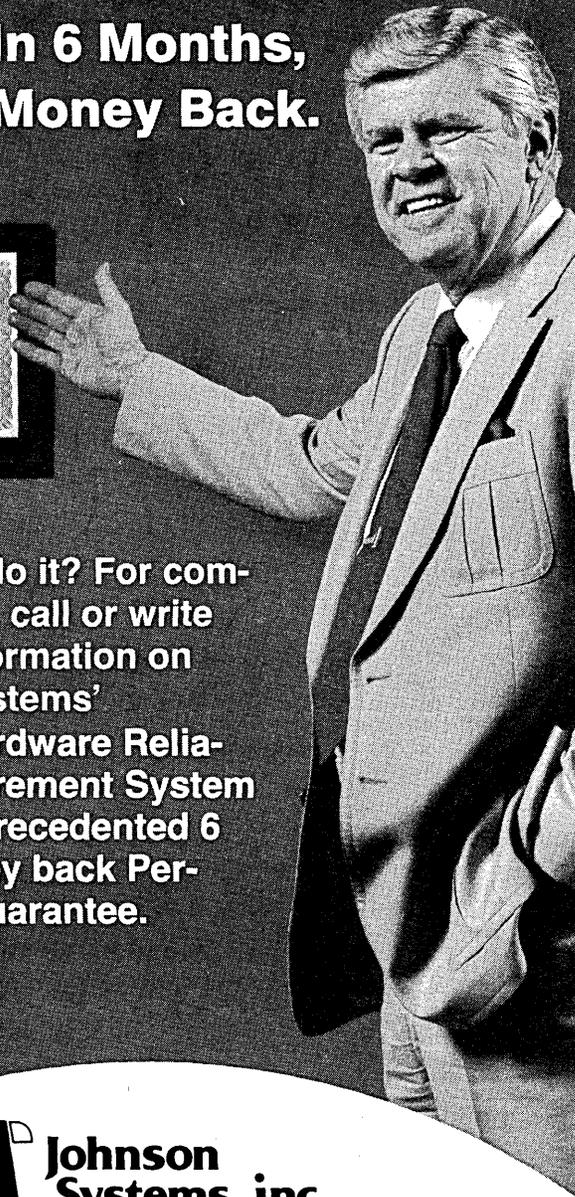
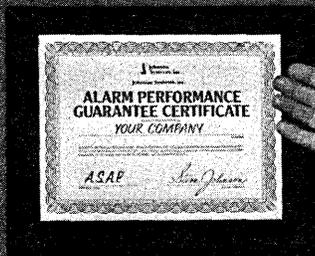
One interface box will be able to serve from four to 20 devices and become a node on the network. The price of the box depends on the number of serial and parallel ports and the amount of memory required. But including the 4 megabit coaxial cable, the price per user port is expected to be between a few hundred dollars and a thousand dollars. Like the Xerox Ethernet, the network will have no central control. And a node can go down without affecting the rest of the network.

Ungermann points to a teletypewriter outside one office with an interface to Telex and TWX. Across the way from it is a word processing system that cannot communicate with the teletypewriter, which means the only way to enter text from the wp system is to rekey it at the teletypewriter. "That's ridiculous," he says. "There ought to be a way for the systems to access each other's resources." And that capability, of course, is what the wp systems companies are providing. But Ungermann is also looking at other working environments.

"Today, factory automation is more advanced," he notes. "Productivity is the problem, and that's what we're aiming at."

—Edward K. Yasaki

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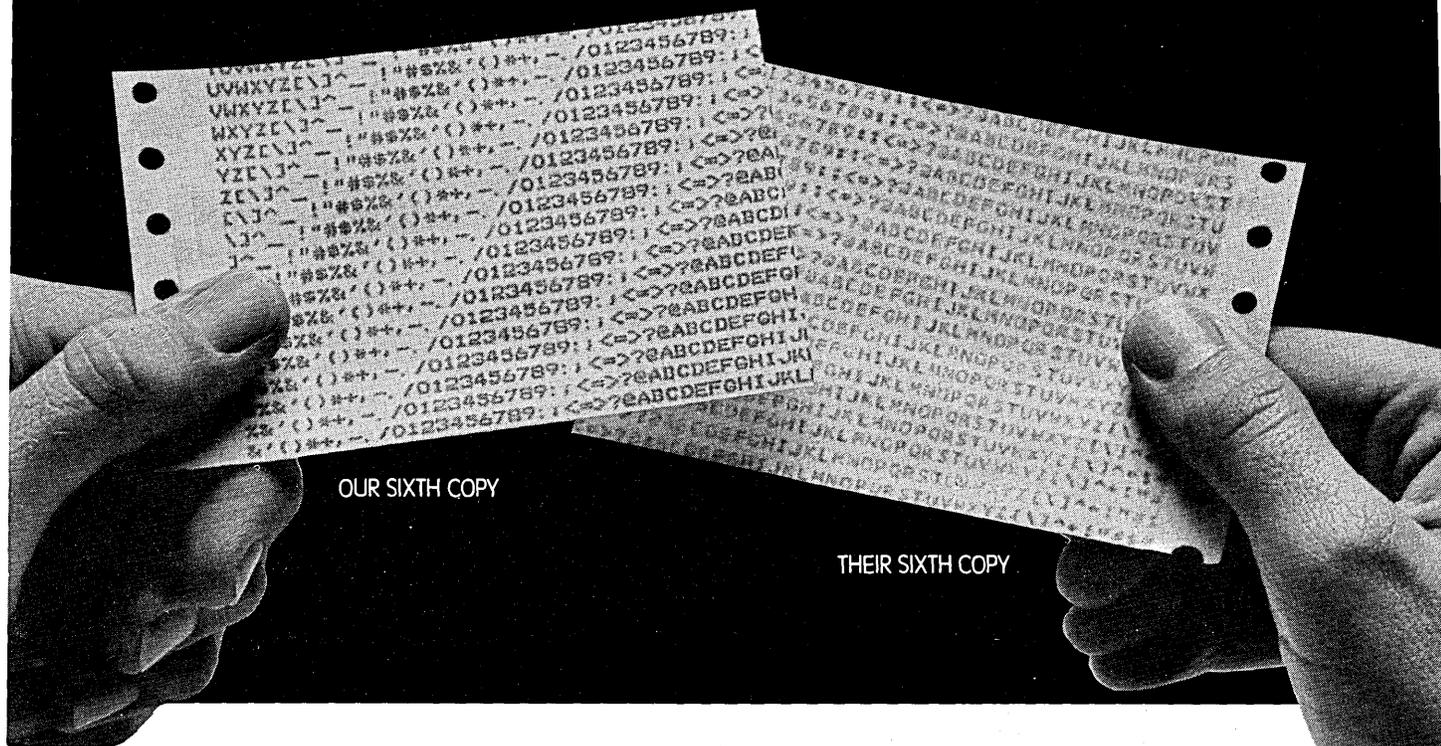
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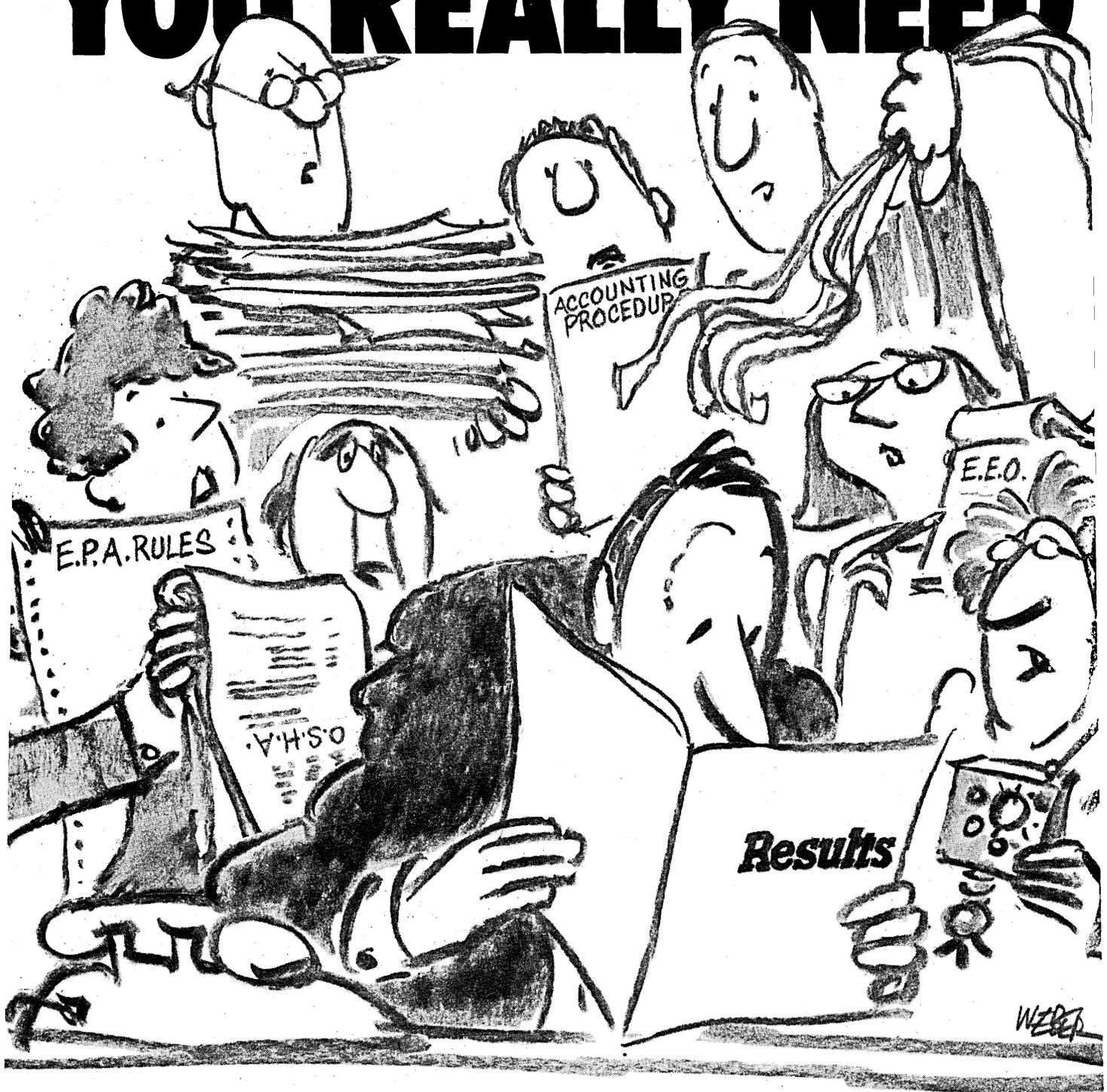


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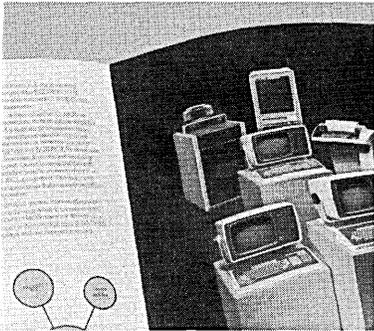
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NEWS IN PERSPECTIVE

BENCHMARKS

ACM CENSOR SCANDAL: The Association for Computing Machinery has been accused of censorship by Dr. Herbert Grosch, council member and prior president of the organization, and who is currently running for reelection to the council. Presidential candidate Roger Mills makes these censorship accusations as well. The defense by ACM vp (and presidential candidate) Peter Denning is that it was not censorship, merely normal editing policy. The ballot statements for the upcoming May 13 election of ACM national officers represent the sore spot. These statements, subject to the "normal editing process," appear in *Communications of the ACM* (CACM), the association's technical journal, as well as on the ballots. Historically, Grosch notes, these statements have never been tampered with in this manner. Grosch's omitted (or edited-out) statement was as follows: "This entire election is scandalous. The nominations were badly botched; attempts to open up stuffy procedures were destroyed in council; letters to the CACM Forum about the fiasco were suppressed ("electioneering"), while Denning's puffery and attacks by Robert Korfhage, an ACM council member, were officially published; the petition process was subverted. I'm not being paranoid; the Establishment [of ACM] is using every trick in the book to recapture the few beachheads the practitioners and chapters people and humanists have seized since the mid-'70s." He continues with a paragraph, which remained on the ballot, on the declining quality of ACM publications, and how he will continue to pursue higher quality publications, "liberal election procedures," better chapters support, and "more contributions to the human world about us," whether or not he is returned to council. The closing sentence, also omitted from the published statements, read: "And I can be more effective if the officers are not unanimously hardhat, so I strongly recommend you also vote for Portia Isaacson." Election of Dr. Isaacson is a controversial subject as well, as her dp "practitioner" background allegedly conflicts with ACM leadership's academic leanings. Presidential candidate Mills' statement was altered as well, though only in one sentence.

CALCOMP CONCEDES: Sanders Associates, Inc., parent company of CalComp, has decided not to pursue its \$300 million antitrust suit against IBM. The appeal to the Supreme Court was not followed through, Sanders' attorneys said, because positive results seemed doubtful. The action began in October 1973, and at that time the stakes were \$100 million. In June 1979, the Ninth Circuit Court of Appeals granted IBM's motion to dismiss the entire case. In February, CalComp received a month's delay to decide whether or not to bring the

case to the Supreme Court. Charles Howe, general counsel for Sanders, stated, "It was a management decision. We generally felt it was not in the best interest of the company to pursue it."

OPEL'S A GEM FOR IBM: John R. Opel, the heir apparent, has officially been named to succeed Frank T. Cary as chief executive officer at IBM next January. Thus, the IBM tradition of promoting the next in line to top-dog positions and corporate executives stepping down at age 60 continue. Cary will remain chairman of the board, concentrating "primarily on board matters, and also on relieving some of the time demands placed on IBM management by the 11-year-old Department of Justice lawsuit and other litigation." Opel will be the fifth chief executive officer since 1924, when IBM was known as Computing-Tabulating-Recording Co. Chronologically, his predecessors were Thomas J. Watson Sr., Thomas J. Watson Jr., T. Vincent Learson, and Cary. Rumors that IBM was unhappy with the Cary/Opel team have been denounced by the disclosure. After this announcement, and a second one concerning a new company debt, IBM stock moved around like a roller coaster. This latest of IBM's borrowings was in the European marketplace, where the company placed \$53 million of 10% notes with European investors. In March, IBM revealed it had borrowed a total of \$277 million through European bank loans and various private placements, with interest rates ranging from 6% to 10%. Dean P. Phypers, IBM senior vice president, finance and planning, said, "We won't pass up opportunities to borrow if we find credit available at attractive terms." The amount IBM borrows this year will depend on two key factors: availability and cost of money, and on how much it needs to finance its lease base.

SECOND TIME AROUND: Greyhound Computer's second antitrust case against IBM has had another postponement, this time on the grounds that pretrial discovery could not be completed by May, as originally scheduled. The retrial is now set for Feb. 3, 1981. District Court Judge William P. Copple said Greyhound's witnesses on the "essential question of damages" were not ready to testify. This case has a lengthy history, dating back to 1971. In the slew of trust suits against IBM, it was preceded in court only by the Control Data case in 1968. Greyhound vs. IBM went to trial in 1972 and ended with a directed verdict in favor of IBM. Greyhound appealed, and in 1977, the Ninth Circuit Court in San Francisco remanded it to the district court in Phoenix. In January 1978, the U.S. Supreme Court rejected IBM's appeal to override the appellate decision, thus paving the way for the retrial.

JOINT DISK VENTURE: Memorex and

Olivetti have teamed up to start manufacturing 8-inch Winchester-type disk drives in Ivrea, Italy. The agreement requires Olivetti to take a 10% equity stake in Memorex's R&D subsidiary, Memorex Mini Disk Drive Corp., San Jose, Calif. Olivetti facilities in Italy will be used to produce the new firm's 11.7-megabyte Memorex 101 drives. The joint venture calls for Olivetti to take a 60% interest in the firm and Memorex 40%. Details on capital investments have not been disclosed. The drives will be used by Olivetti in future systems and sold by Memorex in the European marketplace. Plans are for production to begin this year, and the companies are hopeful of manufacturing 10,000 units in their first year. Memorex is expected to supply the technology, some components, and media, while Olivetti will handle facilities and the necessary working capital.

ADAPSO, CITIBANK AT IT AGAIN:

ADAPSO has filed a petition to barr Citicorp's Citibank from entering the remote computing services industry. This is the latest move by ADAPSO in its two-and-a-half year struggle to keep Citibank out of the time-sharing business. It started in 1977, when ADAPSO charged that Citibank's proposed dp services would be anticompetitive and in violation of government banking regulations. A little over a year later, a half-hearted agreement was reached between the two.

Citibank agreed to separate as much as possible its dp services from its banking activities, though this was not the decision ADAPSO was hoping for. Along with the petition against Citibank, ADAPSO is also challenging Citicorp's Citishare remote computing service, which has filed an application to operate under provisions of the Federal Bank Holding Company Act. According to ADAPSO, Citibank and the Comptroller of the Currency are to respond to the petition early this year.

ONE MORE DOMSAT: Southern Pacific Communications Co. has filed with the FCC for authorization to construct a \$200 million domestic satellite communications network. The proposed three-satellite system would be in competition with existing and potential carriers such as SBS (Satellite Business Systems), RCA, AT&T, RCA, Western Union, and possibly Hughes Communications Corp., which filed its application last December. The SPCC satellites would be equipped with twice the capacity of domestic satellites now used or planned. The company claims this increase in capacity is due to more efficient use of the transmission spectrum, and the use of integrated C-band (4-6GHz) and Ku-band (11-14GHz) transmissions frequencies. Initially, three earth stations will be built, and the number could eventually rise to 100. Coverage by SPCC could include all 50 states. *

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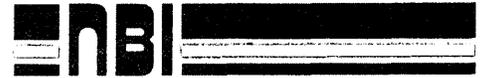
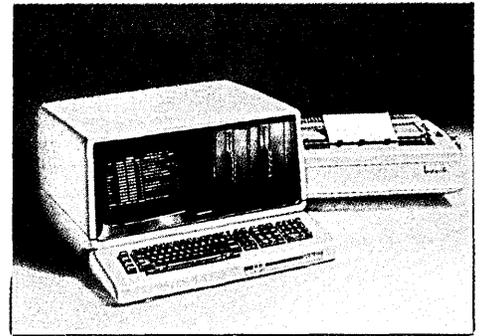
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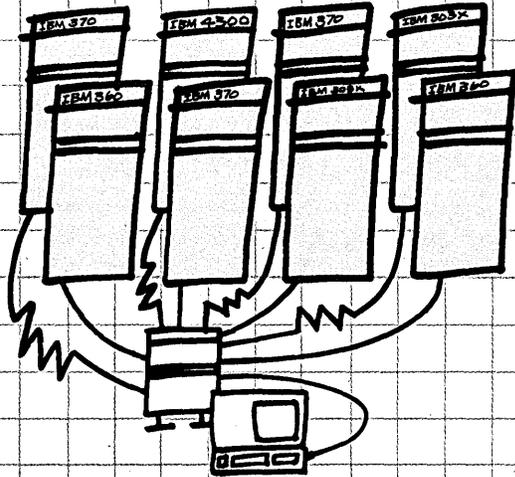


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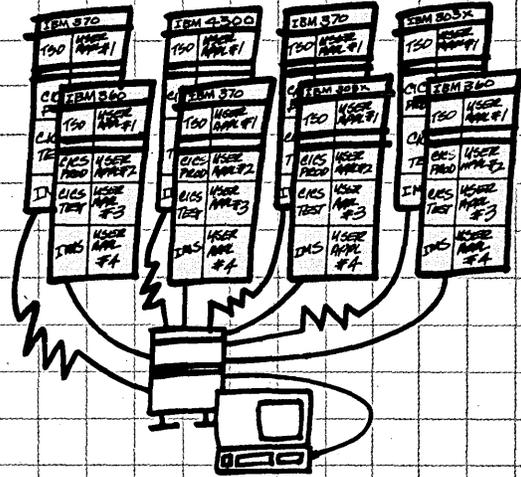
CIRCLE 85 ON READER CARD



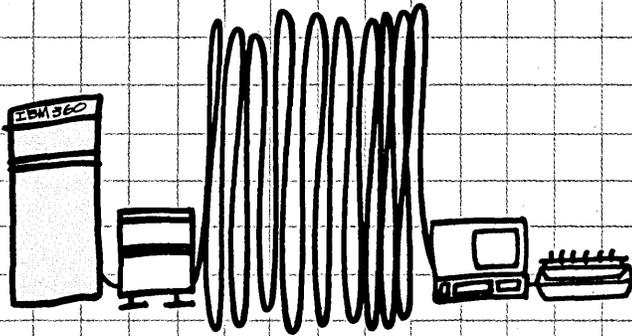
Network Managers: Think with a computer based terminal system that can



access up to eight IBM host computers, either local or remote, from a single terminal



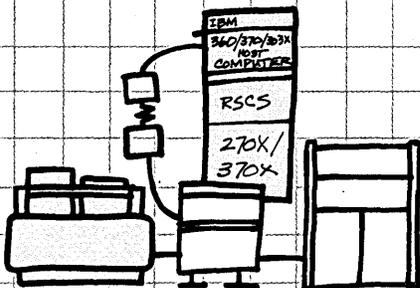
access up to fourteen partitions — with up to eight partitions per host — from a single terminal



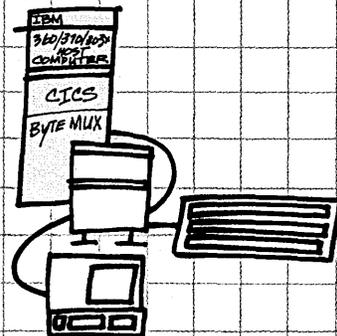
do local processing up to 7,500 feet from the host computer and save remote connection expense



assume the software transparent identity of multiple IBM systems with a single computer/controller and look like... a local interactive communication system



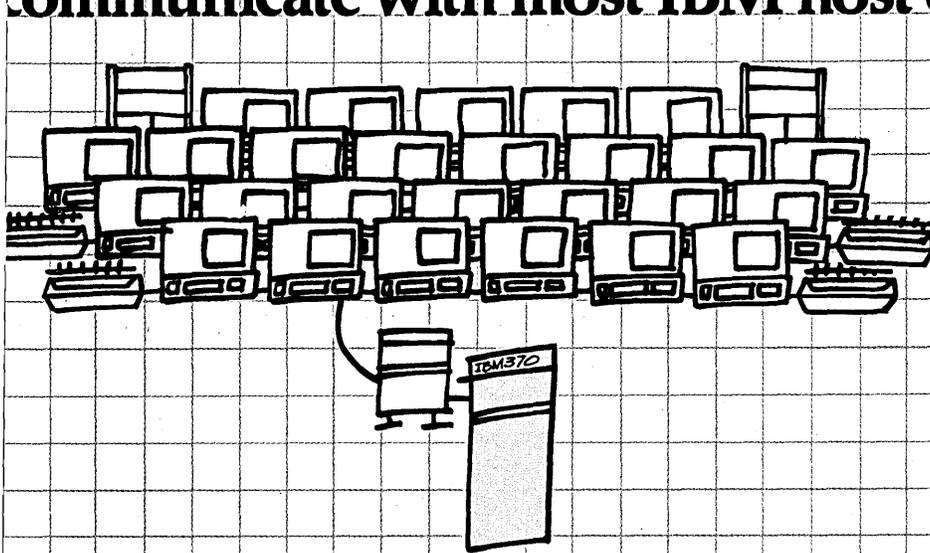
a remote job entry system



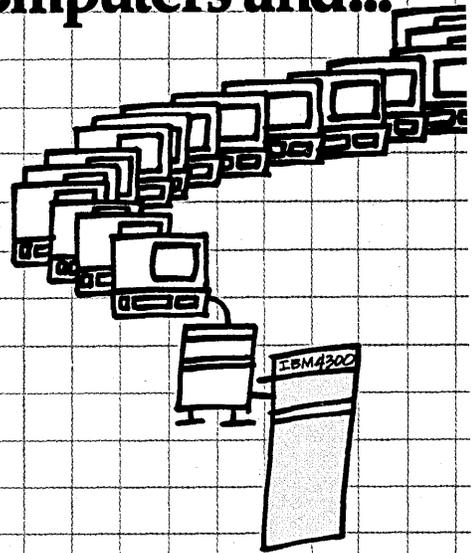
a screen editing system

What Great Things You Can Do

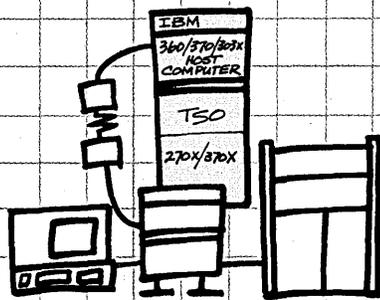
communicate with most IBM host computers and...



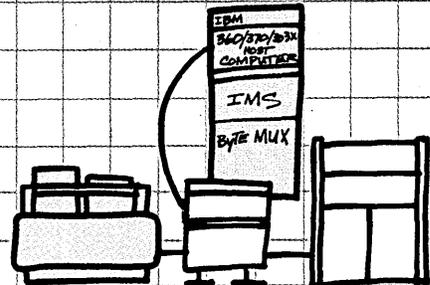
control up to 32 peripherals (card readers, CRTs, printers and disk drives) with a single system



multi-drop up to 16 CRTs on one coax to save cable



a remote interactive communications system



a local job entry system

It's almost unbelievable. But whatever networking requirements your plan calls for, chances are the Braegen computer-based Multi-Task Terminal System can meet them. And when your requirements grow, the Braegen system will still meet them — without changing controllers or making other costly system revisions — because the Braegen MTTs is software based. You get system flexibility never possible before. And think of the money you can save! Another great thing about the Braegen MTTs is Braegen service and support — in 52 cities with more than 300 personnel.

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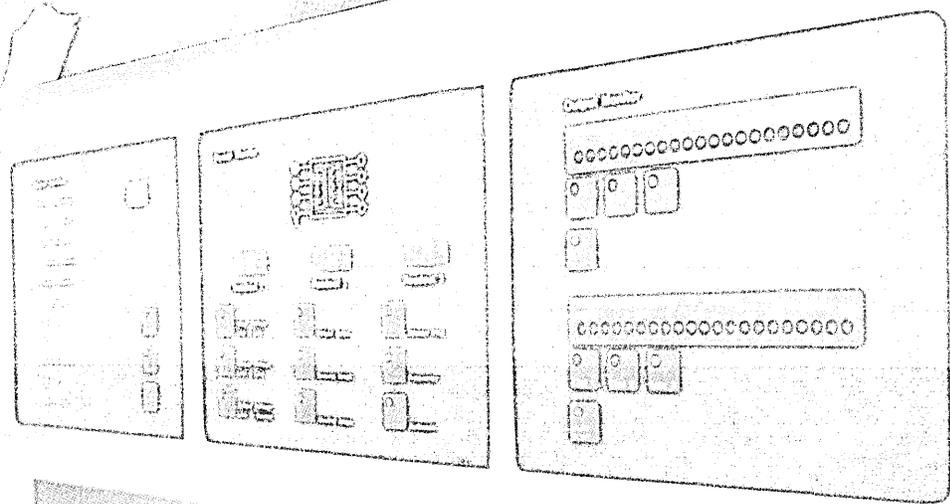
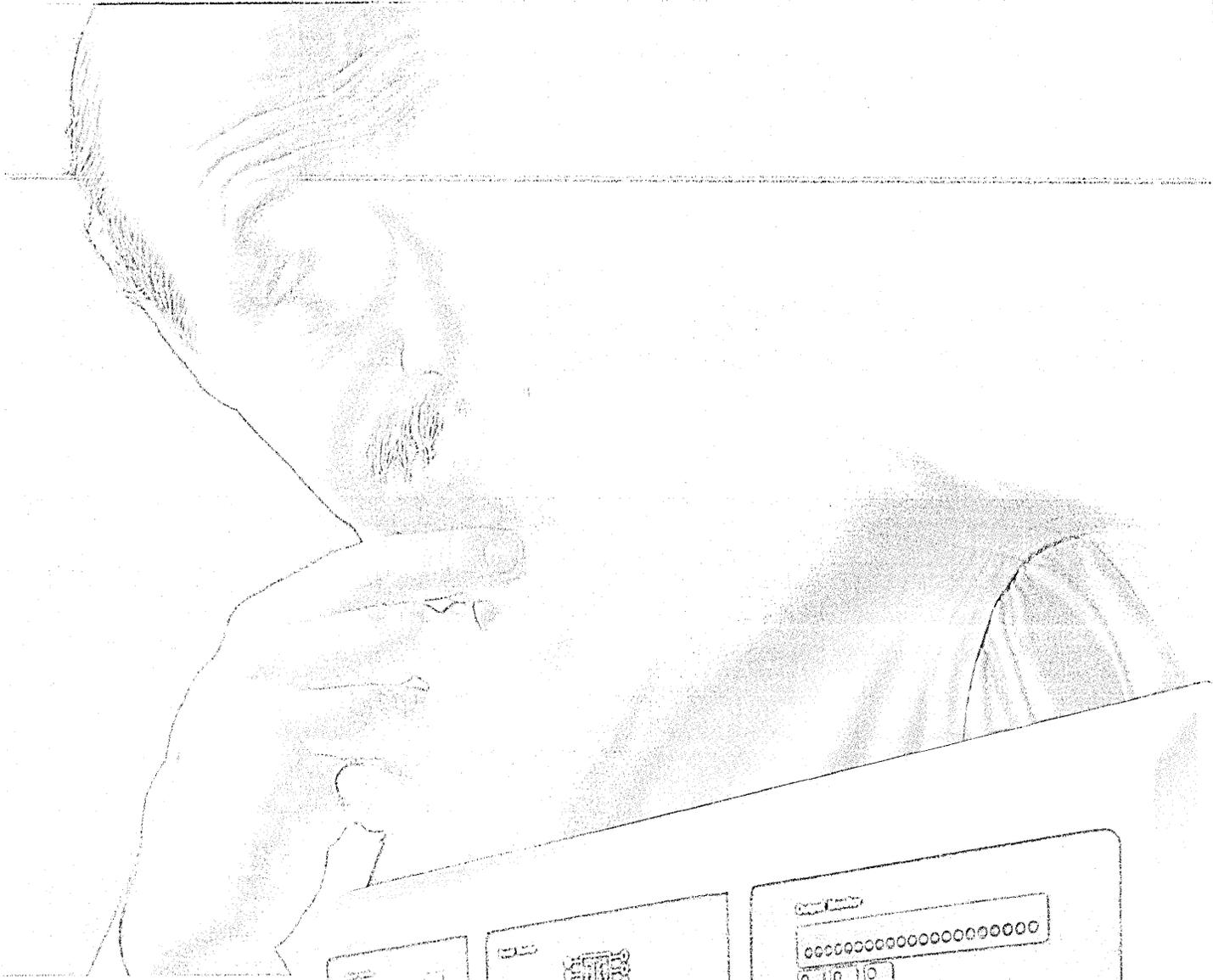
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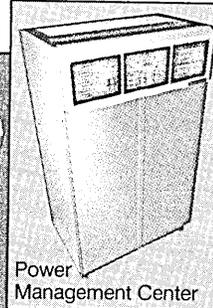
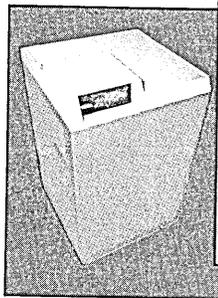
Conditioning — The Power Management Center eliminates all power transients; conditioning raw input power varying as much as plus or minus 40% from nominal.

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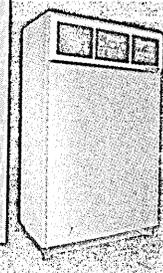
Monitoring — Continuous, precise measurement of the entire system; backed by solid state reliability.

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CIRCLE 87 ON READER CARD



R. W. Bare, Assistant Corporate Controller, J I Case, A Tenneco Company, Racine, Wisconsin

The IBM Series/1 is a family of small, powerful, general-purpose computers for both distributed processing and standalone use. At over 50 company-owned stores nationwide of J I Case, a leading manufacturer of construction equipment and farm machinery, Series/1 systems are resulting in greater customer satisfaction through faster service on crucial parts orders.

"Through a visual display at the parts counter, a store clerk can gain

full information on the availability of a part in that store," says R. W. Bare, assistant corporate controller. "If the part is ordered, the Series/1 prints a picking ticket and produces an invoice to accompany the order.

"By speeding order handling and accounting procedures, the system has cut related workloads in half in some stores, helping to support a 10% to 20% growth in parts sales in the stores in which it is used. This productivity benefit alone justifies

the system for us. Most important, by transmitting consolidated data daily to Case headquarters, it gives management greater control over financial and production planning."

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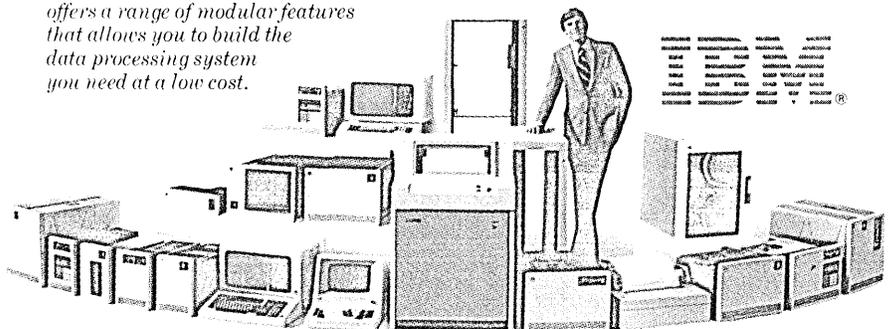


"Our IBM Series/1 network helps meet growing customer needs for parts and service while increasing productivity up to 30%."

you at any terminal just as quickly as it's processed. And because it's modular, Series/1 is ready to grow when you are. What's more, Series/1 is supported by an extensive service organization that enables IBM to respond promptly to your service needs, even in remote areas.

To learn more about the Series/1, get in touch with your nearby IBM General Systems Division office. Or write IBM, P.O. Box 2068, Atlanta, GA 30301.

The remarkably flexible IBM Series/1 offers a range of modular features that allows you to build the data processing system you need at a low cost.



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Full DEC*

Introducing the Mostek VAX Add-In. Now we have all the cards.

With the addition of our 256K byte add-in memory for the VAX-11/780, we now have a full line of add-in, add-on memories for DEC minicomputers. Your advantage? All the inherent advantages of dealing with a reliable single source supplier.

The new Mostek VAX incorporates the same quality found in all our memory systems: Total hardware and software compatibility. High density for maximum capacity in a minimum number of card slots. Burn-in and stress tests at the component level. Pre-burn, burn and post-burn tests at the system level. Standard and optional system features for greater system flexibility and significant cost savings. And a full one-year warranty on all memory boards.

PDP-11/70

MK 8601

Total capacity of two megabytes in a 7" chassis. 256KB or 512KB increments with ECC standard. Can operate in the serial and interleave modes simultaneously. Maintenance program available.

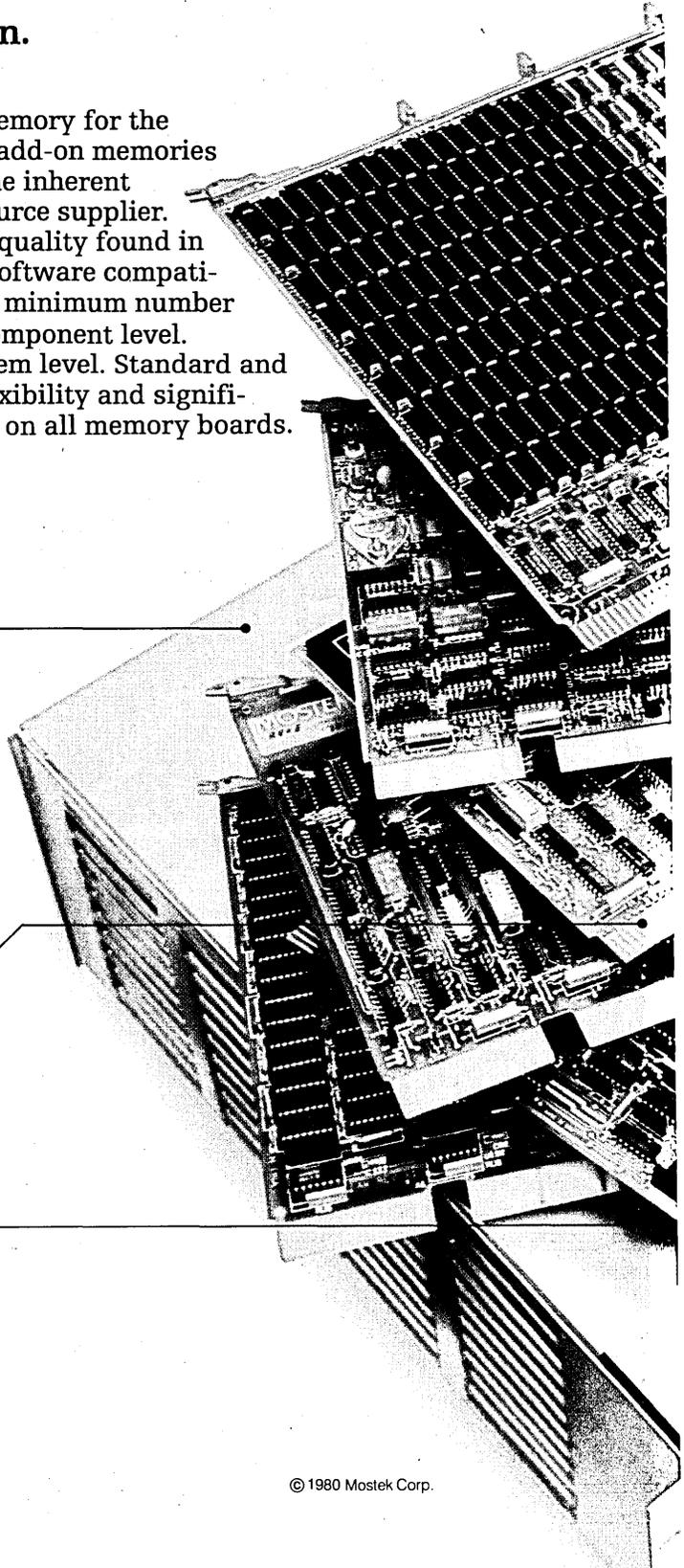
PDP-8

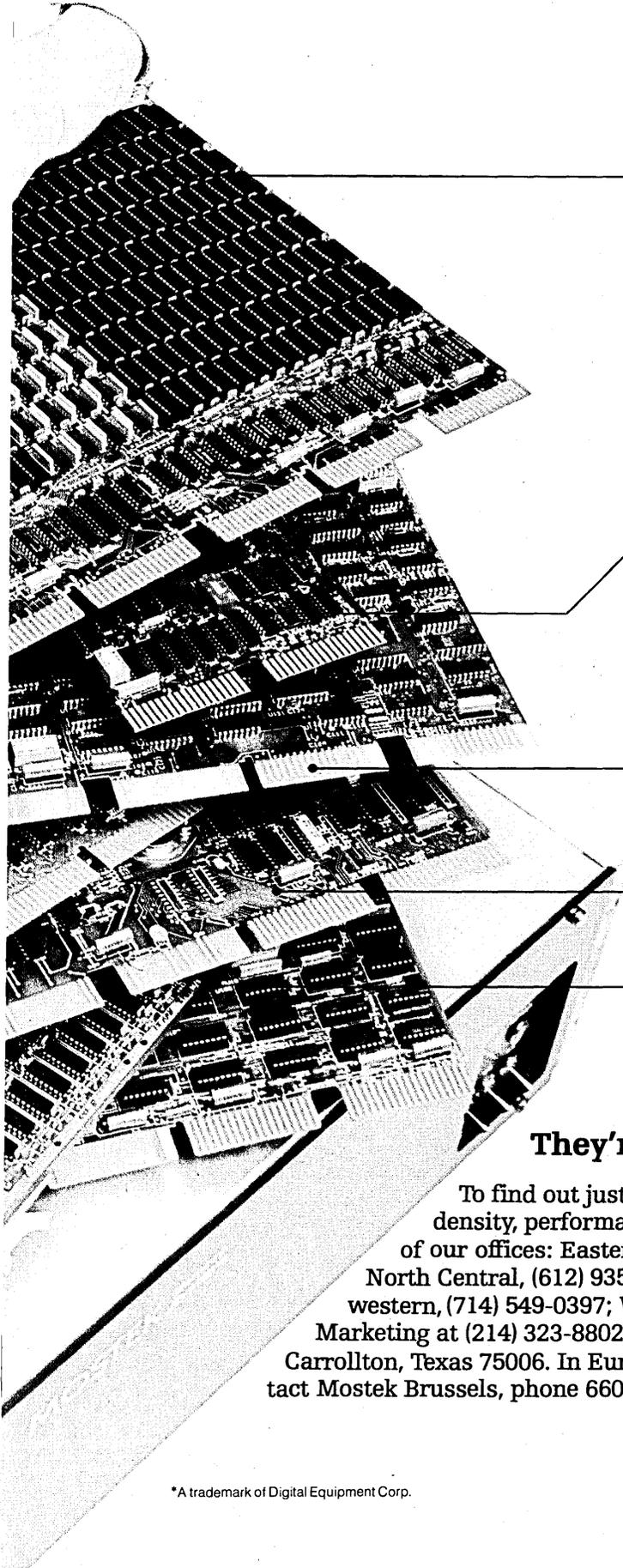
MK 8009 A1"X" (PDP-8A)

16K, 32K, 48K, or 64K words x 12 bits. Compatible with DEC memory management to extend total capacity to 128K x 12 with just two cards.

MK 8009 A0"X" (PDP-8E,F,M)

16K or 32K words x 12 bits. Single +5V supply with synchronous "hidden" refresh control.





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MK 8016

256KB single board capacity (32K words x 72 bits with 64 bits data and 8 bits ECC). Totally hardware and software compatible.

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8K, 16K, or 32K words x 18 bits with optional byte parity generation and checking.

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64K x 18, 96K x 18, or 128K words x 18 bits with parity standard.

They're available out of stock.

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CIRCLE 89 ON READER CARD

NCC has trimmed its exhibitor waiting list by going to a second parking garage in Anaheim. But this year the air conditioning will work.

COPING WITH CROWDS



by Tom McGusker

It'll be easier to attend technical sessions and easier to exhibit at this year's National Computer Conference, May 19-22 in Anaheim, Calif. And it'll be cooler.

Those 57,000 persons who jammed the Anaheim Convention Center when NCC last was held there in 1978 will remember a parking garage that was called the "West

Hall" where despite an air conditioning system of sorts, the temperatures soared to a sweltering 80 degrees. Exhibitors will remember the long waiting list to become a part of the NCC exhibit. And persons who pay up to \$75 to attend technical sessions will particularly remember the NCC in New York last summer, where they had a choice of 156 sessions going on during a four-day period and the huge exhibition by 443 companies—and

the problem of where to start.

The American Federation of Information Processing Societies, which sponsors the NCC, thinks it may have come up with solutions to some of these problems.

Examples:

- It has cut the number of technical program sessions to around 100, from the 156 listed last year in New York.
- Anyone registering to attend the technical

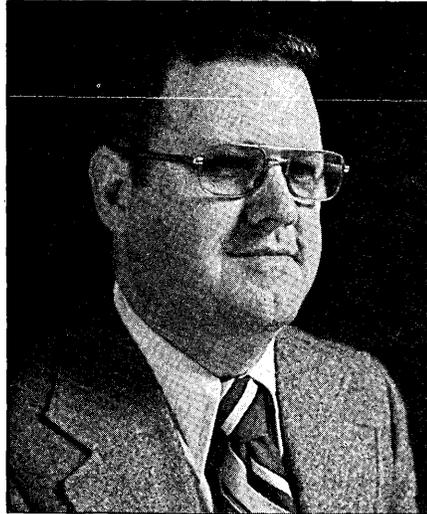


ILLUSTRATION BY DICKFAN/PALU

The program consists of a broad-based agenda designed to appeal to people who come to learn what's new in computing.



HERBERT B. SAFFORD—Chairman of National Computer Conference.



DR. DON B. MEDLEY—Program chairman of NCC.

program will receive a printout that will list the exhibits and the technical sessions that are of interest to these people.

- An additional 222 exhibit areas for 101 exhibitors have been added this year to the total 1,418 exhibit areas in the Anaheim Convention Center to enable NCC to cut its waiting list of 250 would-be exhibitors down to 150.

- Although the overflow to the convention center two years ago was a garage outside the center and this year the additional area also will be a garage underneath the Disneyland Hotel, both have been specially air-conditioned at a cost to AFIPS of \$300,000.

These new features, say the AFIPS people who plan and execute the largest U.S. computer "happening" of the year, should contribute to a smoothly run conference and exhibit that will, as program chairman Dr. Don Medley says, "give people more bang for their buck."

The conference chairman, Herbert B. Safford, of GTE Data Services, Inc., of Los Angeles, says the conference definitely will be more manageable than in 1978, when those 57,000 persons jammed the registration areas in the Anaheim center and where some persons had to wait in line up to four hours for an admission badge. "Unless there's a big crunch in transportation costs next May and companies curtail the number of persons they'll allow to attend the conference, we expect about 60,000 persons . . . maybe up to 70,000," he said.

And all sorts of incentives are being offered for registering ahead of time for the NCC. For example, early registrants will be mailed a questionnaire in which they can list the kinds of exhibits and technical sessions that interest them. These will be processed by a computer whose software was developed by National CSS, a Dun & Bradstreet network

services company, and they'll be mailed a printout of the location of the exhibitors and the time and location of the technical sessions that meld with their needs. The service also will be available to people who register during the four-day NCC for technical sessions.

"For people who attend technical sessions, there is a time factor," said an NCC spokesperson. "They've got several sessions to take in and some exhibits. We feel our computer printout service will help them use their time more effectively."

People who register in advance of the conference will be offered a \$15 discount on the registration fee of \$75. And there'll be an "early birds" registration reception on May 18, the evening before the conference, in the Anaheim room of the Convention Center. The reception will include free cocktails, a five-piece band and a disco dance group.

Coping with crowds—both attendees and exhibitors—is not an unfamiliar problem to AFIPS. In the late '60s when it staged joint computer conferences in the spring and fall, hordes swelled showplaces in Boston and Las Vegas. So AFIPS decided to "hide" succeeding shows in places like Houston, Texas, just when the recession of the early '70s set in. That's when it decided to turn the twice a year conferences into once a year affairs—the first one in New York in 1973, when attendance soared to 25,000. It jumped to 32,000 in Dallas four years ago, to 57,000 in Anaheim, and to nearly 80,000 in New York last summer.

TECHNICAL SESSIONS REDUCED

And although the New York registration of 8,156 for the technical sessions was somewhat of a record, people apparently didn't show up at them, leaving some with turnouts of 11 and 13. That

caused the worried NCC board to make a study of why some sessions pulled so badly. Their conclusions and their orders to his year's organizers: "Cut the number of sessions to 95. Be critical of the content."

In carrying out this edict, Safford said, the program chairman "was the subject of the wrath of a lot of authors wanting to submit papers." Medley, who has been a data processing instructor at Moorpark College near Los Angeles for 11 years, put it more graphically: "I'm a bastard, and other program chairmen weren't."

Medley, who was part of the NCC committee that studied the New York program attendance, said he and his committee reviewed more than 200 proposals for papers or sessions. He said he was insistent that they be of broad interest and not limited to "special interest groups." But he added that he had mixed feelings about last year's poor attendance. NCC people, he said, are different from those attending the more specialized conferences. For example, he said, a session that drew 137 persons to a room for 700, actually brought in 300 people during the two hours it was in progress. "There are people who float in and out all of the time. They come to listen for a while and to sample what is being discussed. Others are there to hear one particular speaker and then they'll leave."

The program, wrapped up in late March, consists of a broad-based agenda designed to appeal people who come to learn, generally, what is new in computing.

THE NCC

Dates: May 19-22

Place: Anaheim Convention Center and Disneyland hotel, Anaheim, Calif.

Conference Program: Monday, 1:30 p.m. to 4:45 p.m.; Tuesday, Wednesday and Thursday, 8 a.m. to 4:45 p.m.

Exhibits: Monday, 11 a.m. to 7 p.m.; Tuesday and Wednesday, 10 a.m. to 6 p.m.; Thursday, 10 a.m. to 4 p.m.

Fees: Conference, exhibits and proceedings for four days: \$75 (\$60 for advance registration). Exhibits one day, \$10. Exhibits and conference for one day, \$25. Four days of exhibits, \$25. Students, \$10 for entire conference and exhibits. Personal Computing Festival, \$9 for three days; \$8 for Personal Computing Festival proceedings; \$15 for three days and the proceedings; \$5 for one day, applicable to NCC registration.

Sponsor: American Federation of Information Processing Societies, 1815 North Lynn St., Arlington, VA 22209, (703) 243-4100.

HOLLYWOOD TIME IN ANAHEIM

With the magic kingdom of Disneyland right across the street, it is only fitting that the 1980 NCC should include a series of sessions on computers and entertainment.

Suzanne Landa, a consultant to the movie industry on computer technology and a proposal manager in communications and office automation at Bunker Ramo, Westlake Village, Calif., is area coordinator for the sessions.

As a kick-off to them she'll entertain NCC attendees with what she terms "a humorous look at computers in the movies" at the All-Conference reception Monday evening, May 19.

To put prospective attendees in the mood, she has devised a test. Try to match the computer stars with the movies in which they appear.

For answers, to the test, attend the reception.

Computer Stars

1. ALPHA 7
2. COLOSSUS
3. NOVAC
4. M505
5. RITA
6. JOSHUA
7. MOTH
8. ETERNAL TABERNACLE
9. ALFRED
10. ICARUS
11. GUARDIAN
12. COM 9001
13. MU/TH/UR 6000
14. ZERO
15. EMMY
16. ALPHA 60
17. BIOCENTRAL COM 2100 Series G
18. HAL
19. MOTHER
20. PROTEUS

Movies

- a. The Forbin Project
- b. Dr. G and the Bikini Machine
- c. Demon Seed
- d. The Phynx
- e. Barbarella
- f. The Love Clinic
- g. The Gladiators
- h. Alien
- i. Hot Millions
- j. Desk Set
- k. Rollerball
- l. GOG
- m. Zardoz
- n. 2001
- o. Alphaville
- p. Sleeper
- q. Dark Star

Landa feels 1980 is an appropriate year for inclusion of movies in an NCC program. "This past year, the annual conference of the Society of Motion Picture and Television Engineers included an entire day on applications of computer technology to film and videotape. This year, ACCESS, a computer-based sound editing system, won the Technical Achievement Academy Award. The time is right for the computer industry in turn to recognize the growing relationship between computer technology and entertainment."

One of the NCC sessions will cover "Computers in Amusements and Sporting Events." Its leader will be Dave Snyder, Walt Disney Productions. Among the participants will be Richard Grey, a consultant on computer uses in special theaters, especially planetariums, who did computer design work on the San Diego Space Theater. Philip C. Stover of Walt Disney Productions will deliver a paper on "Computers and Sports: A Natural Marriage."

A session on "Computers and the Performing Arts" will include a paper on "Computers Helping Dance Notation Help the Dance," by Stephen W. Smoliar, General Research Corp., Santa Barbara, Calif.

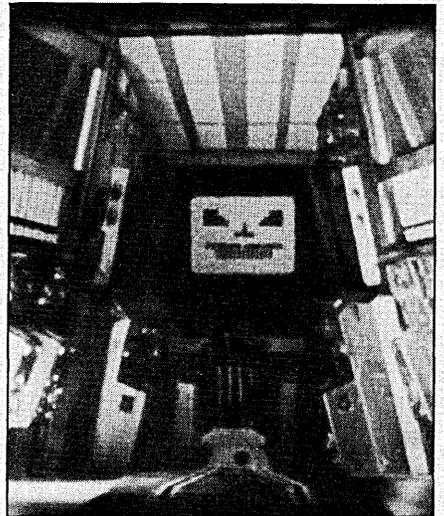
Charles Tucker, Twentieth Century-Fox, Beverly Hills, will chair a session on "Computer Support Behind the Scenes in Movie and Television Production." Participants will include Bill Eberly, Walt Disney Productions, and Terry Gates, General Cinetrics.

"Computer Use for Special Effects in Movies and Television," is the title of a session to be led by William R. Deitrick, Mini-Micro Systems, Inc., Anaheim, Calif. Among the papers to be delivered is one on ACCESS (Automated Computer Controlled Editing Sound System) by R. David Snyder, Wed Enterprises, Glendale, Calif. Another covering Automatic Camera Effects System (ACES), by Steven N. Crane, Wed Enterprises, treats a system up for an Academy Award next year.

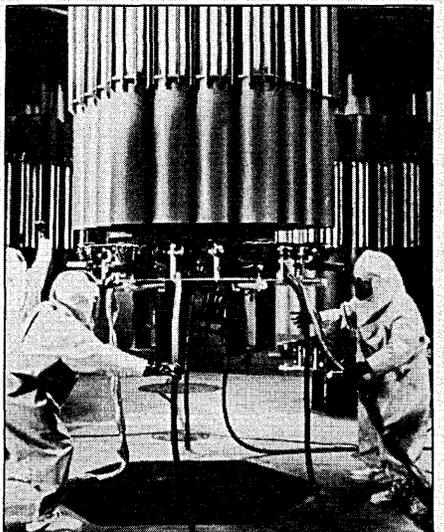
Steven Levine, Lawrence Livermore Laboratories, Livermore, Calif., will chair a session on "Computers in Animation." Participants will include: Edward Catmul, Lucas Films; Don Greenberg, Cornell Univ.; and John Whitney, Information International. The session will include a demonstration of a model of an automated stage set designed in 1963 (System Development Corp. and Rockwell were making it when the Viet Nam war halted the project) and more feasible now than ever with the advent of microprocessors.



HAL



MOTHER



PROTEUS

SHARE TO CELEBRATE 25TH YEAR DURING NCC

NCC '80 Pioneer Day, Wednesday, May 21, will commemorate the 25th anniversary of the founding of SHARE.

The first computer user group, SHARE got started as an ad hoc idea of early IBM 704 customers in the Southern California area. It held its first official meeting during the week of Aug. 22, 1955 at the Rand Corp.

Of the 65 people who attended the first two SHARE meetings, all but 11 were traced and invited to participate in the Pioneer Day program, which is jointly sponsored by NCC and the American Federation of Information Processing Societies (AFIPS) History of Computing Committee, under the direction of Mort Bernstein of System Development Corp.

The first half of the program will focus on the computing environment of the 1950s and why an organization such as SHARE was needed. A highlight of this part of the program will be a 20-minute film, "Piercing the Unknown," covering the IBM 701. Panels of pioneers will describe scientific computing machinery of the era as viewed by its users and their supplier, IBM.

The second half of the program will

address the birth pangs of SHARE itself: the needs of science and industry, the politics of reality, and the evolution of the structure that laid the foundation for SHARE as it is today. This portion will conclude with a retrospective view of SHARE's first quarter-century and address the question of its past, present, and future effectiveness.

A history of SHARE printed in a 1973 SHARE reference manual concludes "... the organization has been most effective when it has been aggressive and taken the lead, far less so when its mode has been reactive ..."

Although the name SHARE stands only for the concept embodied in the ordinary English word, the organization is not without an acronym. It's SCIDS, for SHARE Committee for Informal Discussion Sessions, a tradition born at SHARE II, held in Philadelphia.

Pioneer Day will conclude this year with SCIDS, which will provide an opportunity for reminiscing, long-awaited reunions, and for the younger members of the information processing community to meet and converse with the pioneers.

—Mort Bernstein

Two sessions reflect what Medley said was an attempt by the program committee to expose instances of where computer technology can be "married" to other disciplines. One is a series of talks on the use of computer technology in the entertainment industry (see box). Another is on medical imaging as a method for using computer technology to keep health costs within reasonable limits. A third, on solar energy computer simulation modeling that will be presented by researchers at Jet Propulsion Laboratories, Pasadena, and representatives from the Solar Energy Research Institute and Science Applications, Inc., will give an update on the exploration of alternative energy sources. The organizers note that since a large scale solar energy industry doesn't currently exist, the application of models will be able to save years that might otherwise be wasted on unfeasible systems.

Medley says a series of sessions on office automation follows the same theme of a marriage of computers with another industry. Caroline M. Watteuw, of Office of the Future, Inc., Guttenberg, N.J., has organized a session entitled "Developing Technologies in Office Automation Systems" that will explore "the use of efficient, well-integrated computer tools to cut costs, boost productivity, and increase efficiency" in tomorrow's offices. One paper will describe an experimental multifunctional information system that has been developed in Sweden for office automation.

Sessions on data base technology, which were so popular in New York last year, will be presented as well as sessions on supercomputers, software engineering, designing, distributed data processing, and "PASCAL in the Real World."

Another hot topic, electronic mail, will be discussed in a session entitled "Electronic Mail: Current Developments and State of the Art." It will bring together speakers representing corporations and vendors. Says the session chairman, Walter Ulrich, "The economics in favor of electronic mail will become overwhelming in the next 18 months."

SPECIAL SEMINAR SCHEDULE

Besides the program of nearly 100 sessions, a professional development seminar schedule also is planned, featuring 22 sessions on the following subjects:

- A pragmatic view of distributed processing systems
- Designing and programming parallel systems with dynamic architecture
- Quality control for software
- Performance measurement in systems and programming
- Structuring the day to day system projects
- Software design techniques

- Computer security
- The structured techniques and the project life cycle of the '80s
- Data processing management styles: selecting the successful approach
- Software tools
- Update on small computer systems
- Packaging your image for success
- How to develop a long range plan
- An overview of distributed processing
- Software engineering that works
- Transition from technician to manager
- Design by objectives
- Contract negotiations
- Data base machines are coming back
- Future computing
- Evaluating text editing and office automation systems
- Shifting gears to matrix management

These seminars, which previously took up nearly all the time of attendees, thus keeping them away from the technical program and exhibits, are being revised somewhat this year. Nine will be half-day sessions, and attendees will be referred to exhibits or to papers on the technical program that relate to the topic for the other half of the day. NCC officials said they received 87 submissions for the program and narrowed the subjects to 22 after making a thorough check of the authors' credentials and their track records in presenting seminars on the subjects.

The NCC keynoter is David Packard, chairman of Hewlett-Packard Co. and former Undersecretary of Defense, who will address an opening session on Monday, May 19. The conference luncheon speaker that day is John P. Imlay, chief executive officer of MSA, who will talk about the industry in the '80s. Edson deCastro, president of Data General, will ad-

dress a plenary session May 20 on "The Small Computer Phenomenon and Its Present and Future Impact." Donn B. Tatum, chairman of the board of Walt Disney Productions, will speak at a plenary session on May 21, and Robert T. Cowan, vice president with C. Itoh Electronics, will discuss the "Impact of the Worldwide Computer Suppliers Market" at a session May 22.

A highlight of the science film theater will be a film tracing the role of computers in the making of the movie *Star Wars*.

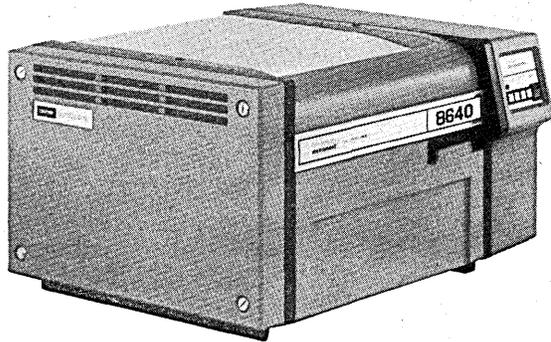
The NCC exhibit will include 414 companies, compared with 443 that exhibited last year in New York (New York was able to provide 1,668 exhibit spaces compared with the 1,640 available in the Anaheim convention center and the Disneyland hotel, about a mile away).

There were 354 companies exhibiting two years ago, when the NCC was last held in Anaheim. Next year in Chicago, the huge McCormick Place will provide 1,900 booth spaces and just might be able to accommodate all the firms who wait in line for precious exhibit space.

Because of the long waiting lists, the sponsors last year began limiting the size of booths to 2,000 sq. ft. for island booths and to 600 sq. ft. for linear booths. That plan will be in force this year and again in Chicago, when the personal computing exhibit will no longer be separated from the NCC exhibit.

The personal computing exhibit is being held this year in the Disneyland hotel ballroom with 76 exhibitors. But many other personal computing companies—such as Apple and Commodore—will be exhibiting as part of the NCC as more and more of their products are aimed at businesses instead of hobbyists. *

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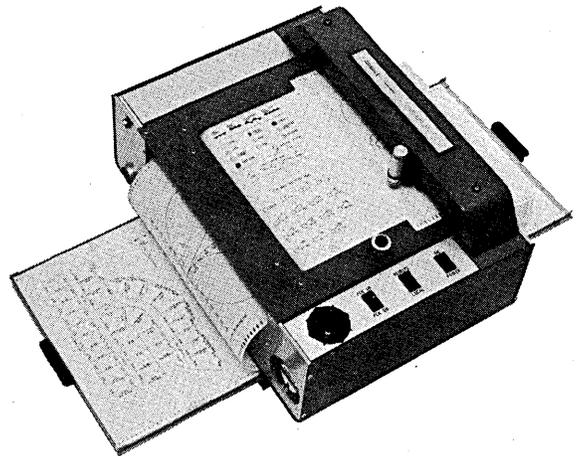
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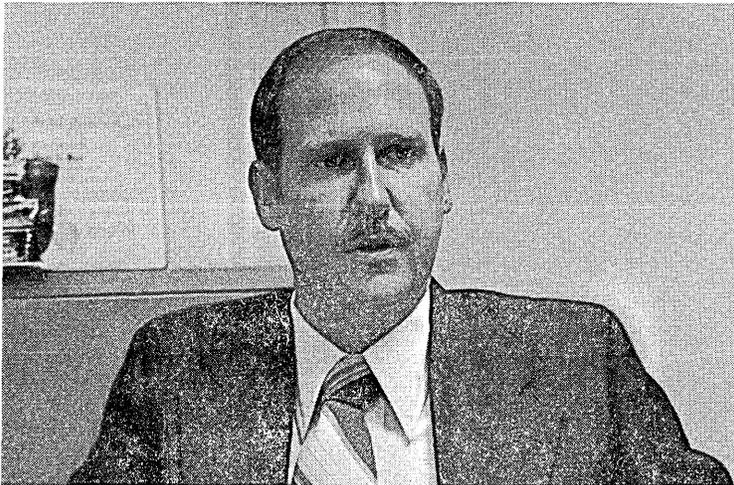
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*Dean A. Banz, Manager, Information Services,
Burr-Brown Research, Tucson, Arizona*

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"The versatility of the DECSYSTEM-2040 has contributed greatly to the growth of our business."

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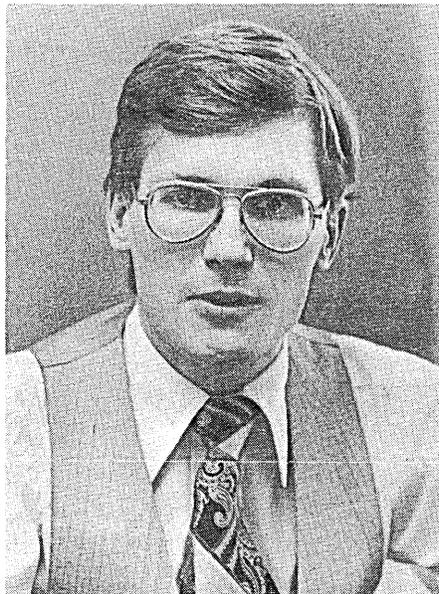
"We provide computer services to our Research Center for use in engineering and scientific analysis as well as information processing related to cancer and solar energy research.

"Because service bureau computer time became too expensive we decided to install our own in-house system, a DECSYSTEM-2040.

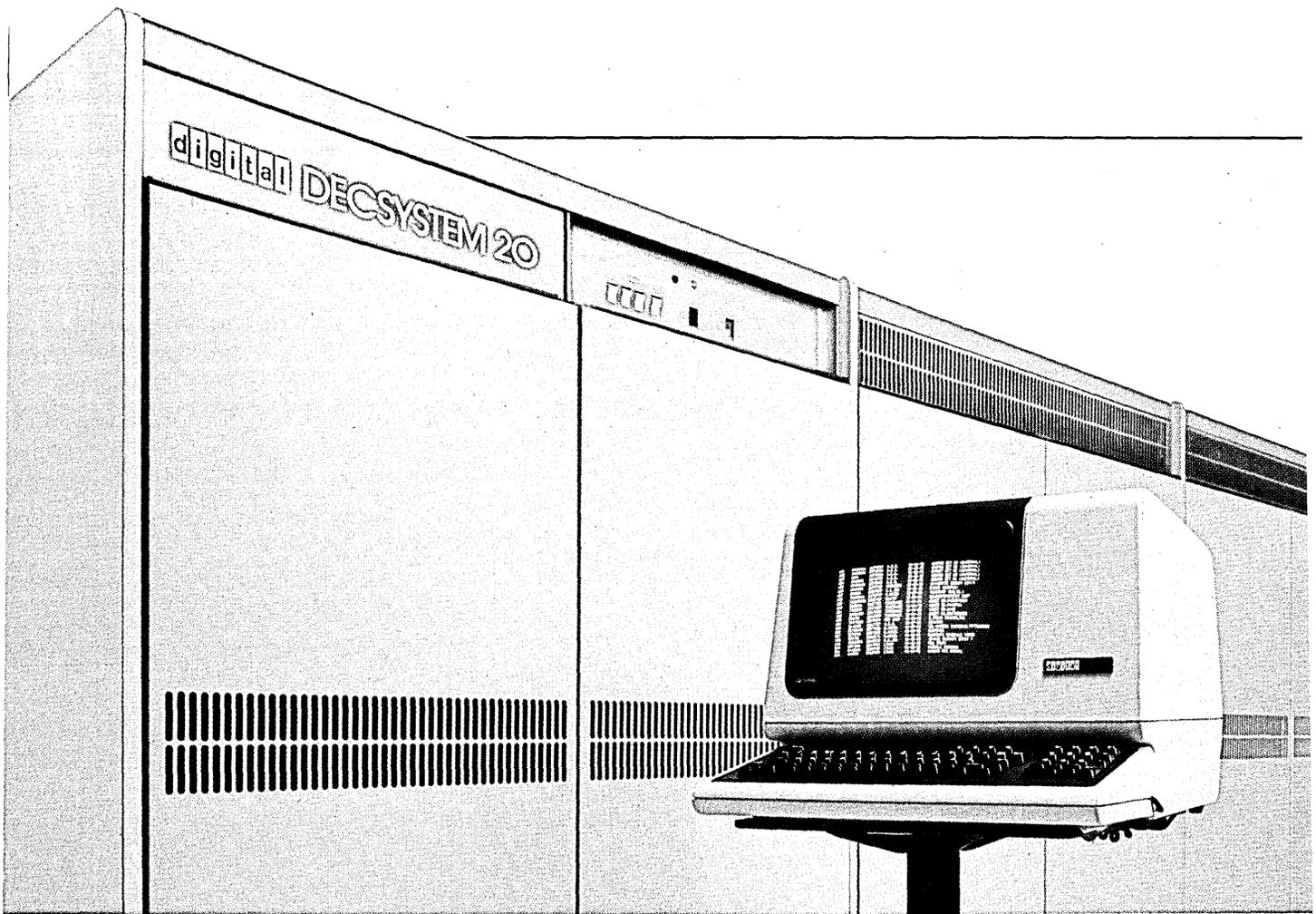
"We started out with eight terminals, but when we found out how productive the system was, we began expanding. Today, we have 45 terminals running simultaneously,

including one in a vice president's home. We've even added cache memory without any software changes. And we still haven't reached the capacity of the system.

"By expanding the DECSYSTEM-2040, we've been able to lower our costs by 40-50% and at the same time substantially increase our services."

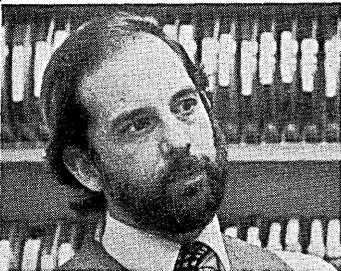


*Michael Jaskowiak, Manager,
Franklin Institute Computer Center,
Philadelphia, Pennsylvania.*



Productivity.

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*Bill Kelleher, Chief,
Computer Facility,
United States Railway
Association,
Washington, D.C.*

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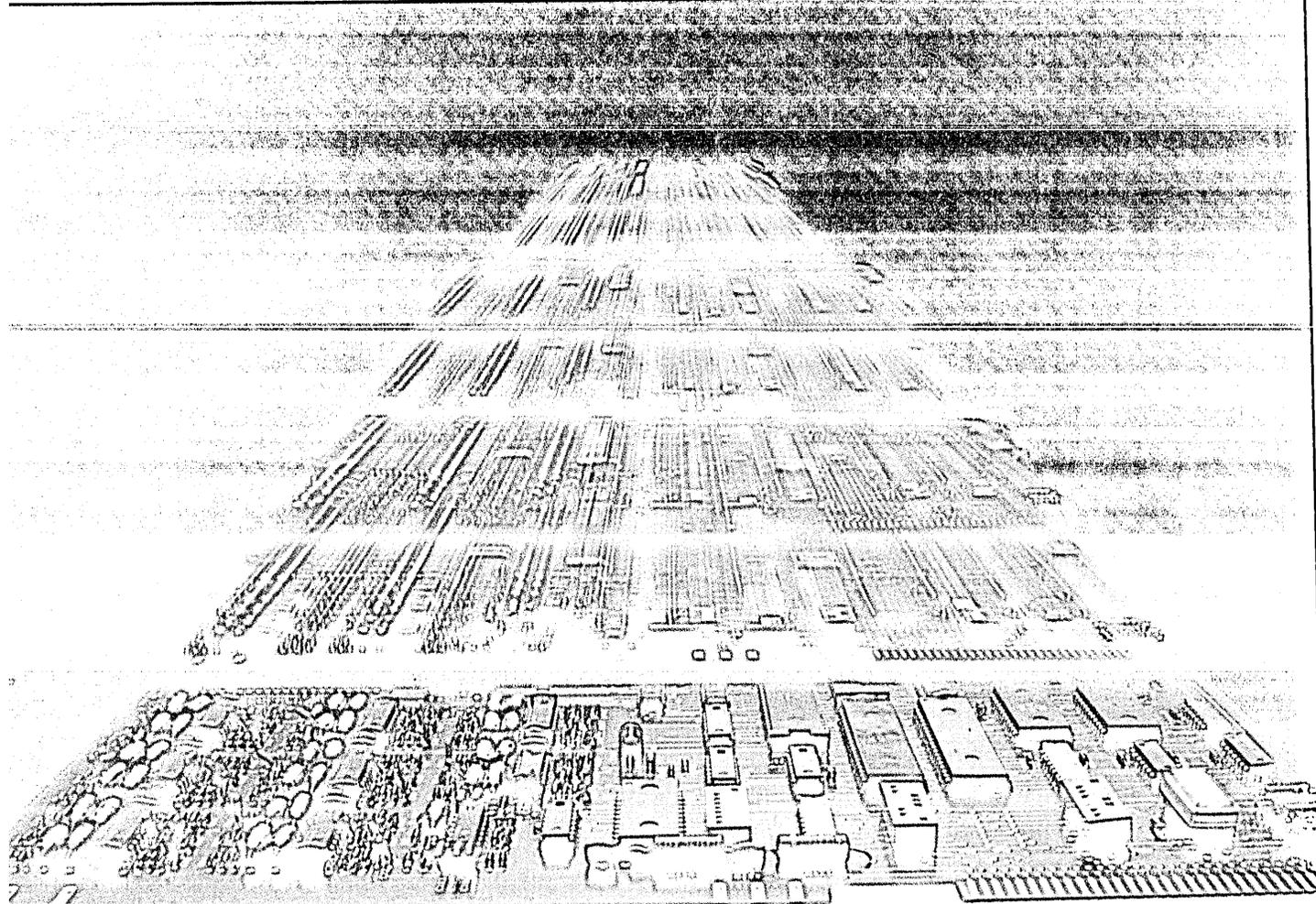
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NCC PRODUCT PREVIEW

If their feet and eyes hold out, attendees at the NCC will be able to visit 1,640 exhibits by 414 companies. Here are some of the products that will be shown, and the booths at which they can be found.

ABLE COMPUTER
Irvine, Calif.
MICROPROGRAMMABLE
INTERFACE **Booth 3411**

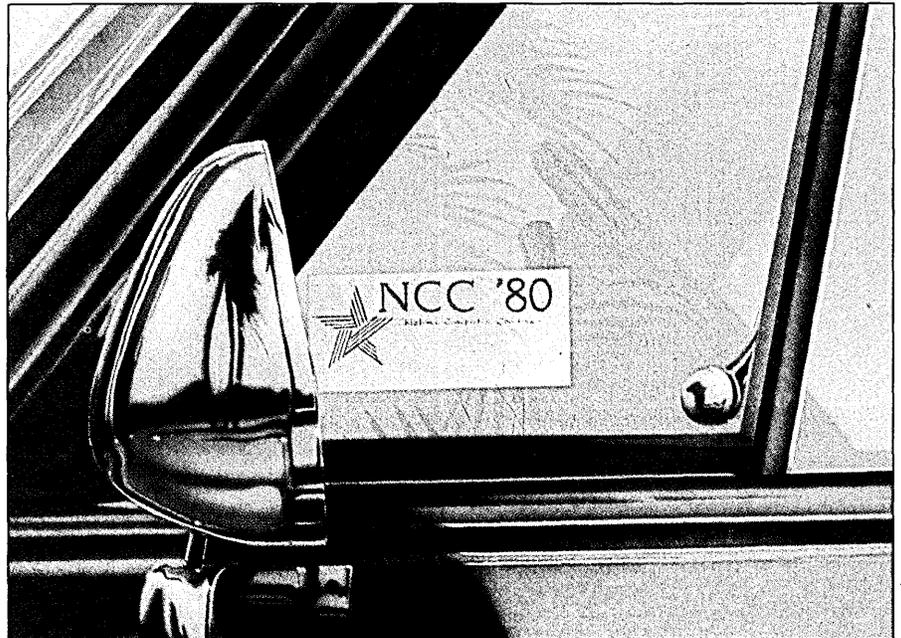
The Uniface—a single board, microprogrammable controller—allows oems to create proprietary device controllers, preprocessors, and the like for use with DEC PDP-11 processors. In fact, the Uniface is said to be the basis of this vendor's DV16 multiplexor. It plugs into the PDP-11 Unibus. The Uniface uses 2901 bit-slice microprocessors, and implements a 32-bit-wide microword instruction set. It has a 200nsec instruction cycle speed. A microconsole and a portable FORTRAN IV microassembler are available to help the oem build special purpose devices. The Uniface sells for \$4,500.

FOR DATA CIRCLE 316 ON READER CARD

ANN ARBOR TERMINALS, INC.
Ann Arbor, Mich.
CRT TERMINAL **Booth 1247**

The Graduate crt terminal will debut at this vendor's booth. Said to include most functions—short of word processing—set forth in the latest ANSI standard for display terminals, the Graduate features a 24-line by 80-column display, with two additional lines for status information. The upper and lower case ASCII terminal has a detachable keyboard with up to 36 function keys. Features include complete line and character editing, user-selectable blinking or nonblinking cursor, and user-definable operating parameters held in battery backed-up memory. Field attributes include guarded (not transmitted in page mode), protected (writable by the computer, but not the user), secure (held in memory but not displayed), and highlighted. Display attributes can be selected on a character by character basis, and more than one attribute can be placed on a character (say, reverse vid-

ILLUSTRATION BY DICKRAN PALULIAN



eo and blink). Transmission rates range from 110bps to 19.2Kbps. Interfaces include RS232 and RS449. A single Graduate is priced at \$1,300.

FOR DATA CIRCLE 300 ON READER CARD

ATLAS ENERGY SYSTEMS
South El Monte, Calif.
POWER SYSTEM **Booth 4427**

With the quality of clean electric power declining around the country, this vendor has developed an uninterruptable power conditioner designed for use with medium to large scale minicomputer systems. Dubbed the UPC/Mini-Series, it combines the ride-through capabilities of an uninterruptable power supply with the conditioning capabilities of a motor generator. The Mini-Series is said to provide up to a quarter of a second ride-through and 100% guaranteed clean power (if the unit fails to deliver clean power, the user can return it for a full refund). There are three models in the Mini-Series, capable of accepting three-phase input (208 volts, 230 volts, or 480 volts) and providing 120 volt or 208 volt,

three phase output power. A 5KVA model sells for \$8,795, a 10KVA model is \$9,295, and a 15KVA model is \$9,995.

FOR DATA CIRCLE 319 ON READER CARD

CALIFORNIA COMPUTER
PRODUCTS, INC.
Anaheim, Calif.
PLOTTER **Booth 2629**

An alternative to large flatbed plotters, this vendor's model 970 beltbed plotter combines features of a flatbed plotter with those of a drum plotter. Capable of drawing on papers up to 52 inches wide and 80 inches long, the 970 moves the paper under the pen as well as moving the pen over the paper. Cut sheets of paper are taped to a mylar belt running between the drum and an idler roller. The 970 plotter operates at up to 30ips and has a resolution of 0.00049 inches. It has four pens, allowing plotting in multiple colors and line widths. The 970 can be operated on-line, off-line, or in a remote time-sharing environment (with communications speed running to 9600bps). With interfacing for most mini-

This year's NCC will have 222 more exhibit areas than were available two years ago.



computers and mainframes, the 970 carries a price tag of less than \$51,000.

FOR DATA CIRCLE 320 ON READER CARD

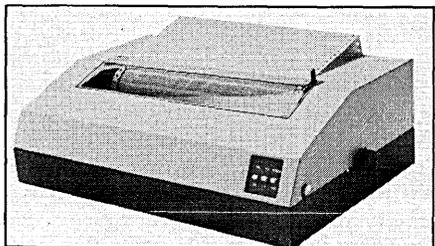
C. ITOH ELECTRONICS, INC. Los Angeles, Calif. PERIPHERALS

Booth 4207

The American arm of this giant Japanese company ('79 revenues in excess of \$32 billion, worldwide) will bring out its new line of computer peripherals for oem systems integrators at this year's NCC. The offerings will include floppy disk drives, daisywheel printers, and matrix printers. Two floppies will be on hand: the 8-inch Maxi-Flexi and the 5¼-inch Mini-Flexi. Both are double-density, double-sided drives, with capacities of roughly 1.5MB and 425KB respectively (the spec sheets give the capacities in terms of bits, with the Maxi-Flexi rated at 12.8MB and the Mini-Flexi at 3.5MB). Both drives "meet all industry standard interface requirements." In quantities of 500, the Maxi-Flexi sells for \$549 and the Mini-Flexi goes for \$249.

The two daisywheel printers are known as the Starwriter and Starwriter II; both use standard 96-character print wheels, and can print 136 columns in 10 pitch type or 163 columns in 12 pitch. Both have parallel interfaces as well as RS232C interfaces. The Starwriter operates at 25cps, while the Starwriter II operates at 45cps. In quantities of 500, the Starwriter sells for \$1,080 and the Starwriter II is \$1,445.

The Comet line of 9 by 7 dot-matrix printers are microprocessor-based impact printers; the Comet is an 80-column unit with



four character sizes, while the Comet II is a 136-column printer with two character sizes. Four international alphabets are offered: English, German, Japanese, and Swedish. Both have industry standard parallel interfaces and RS232C interfaces. Both print at 125cps, with bidirectional throughput of 63 lpm (Comet) and 40 lpm (Comet II). Pricing, in lots of 500, for the Comet is \$449 and for the Comet II, \$691.

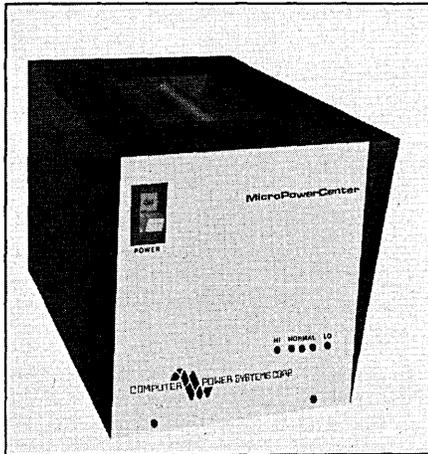
FOR DATA CIRCLE 301 ON READER CARD

COMPUTER POWER SYSTEMS CORP.

Carson, Calif.

POWER REGULATOR Booth 2612

The MicroPower series of computer power interfaces isolate, regulate, and filter power coming from wall outlets and going to terminals or mini and microcomputers. The units protect against power line fluctuations. Computer equipment is protected from brownouts when line voltages fall up to 22% and from



overvoltages of up to 15%. An audible alarm sounds when line voltages pass the normal high or low operating voltage; a green LED indicator shows that line voltage is within limits, and red LEDs indicate out-of-range conditions. An AC filter protects both input and output lines. The MicroPower series come with four output receptacles (1KVA and 3KVA versions), and eight outputs (5KVA, 8KVA, or 10KVA versions). The units operate with 120VAC or 240VAC, single phase, 60Hz power. Quantity one pricing starts at \$795.

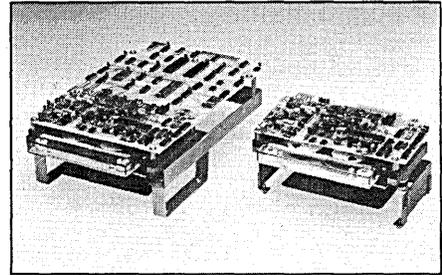
FOR DATA CIRCLE 302 ON READER CARD

DATA ELECTRONICS, INC. San Diego, Calif. CARTRIDGE TAPE DRIVES

Booth 2100

With smaller, fixed-media Winchester disks becoming ever more popular, this vendor is introducing a pair of streaming digital cartridge tape drives for disk backup. The tape

drives have capacities of 10MB and 20MB per cartridge. Both use ¼ inch ANSI/ECMA Data Cartridges, and both are physically compatible with industry standard mounting slots for floppy disk drives. The drives can be supplied with or without streaming electronics. Oems can buy the drives with streaming electronics



for \$746 (10MB) or \$788 (20MB); without streaming electronics the prices are \$415 and \$525, respectively. These prices apply to quantities of 1,000 units.

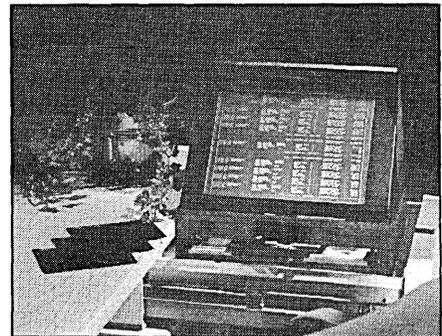
FOR DATA CIRCLE 303 ON READER CARD

DATAGRAPHIX, INC.

San Diego, Calif.

MICROFICHE READER Booth 4201

The DeskMate microfiche reader is a 75% blowback reader that fits into a standard office desk drawer. The user need only pull open the desk drawer, pull up the viewing screen, and the DeskMate is ready to use. In



singles, the DeskMate sells for \$239, with volume discounts offered.

FOR DATA CIRCLE 317 ON READER CARD

DIGITRONICS, Div. of Comtec Information Systems, Inc. Cumberland, R.I.

TERMINAL

Booth 2464

The microprocessor-based Series 400 Alpha-verter remote batch data entry terminals consist of a 55-key alphanumeric keyboard with imbedded calculator keypad, hardcopy printer, mag tape unit, and an acoustic coupler. The Alpha-verter can accept input in either freeformat or under program control with prompts displayed on the printer or an optional display. Data are printed as entered, and at

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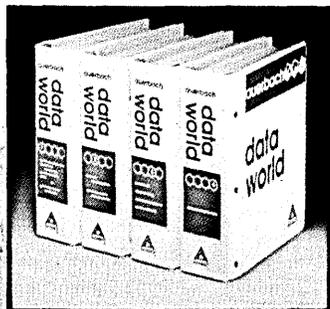
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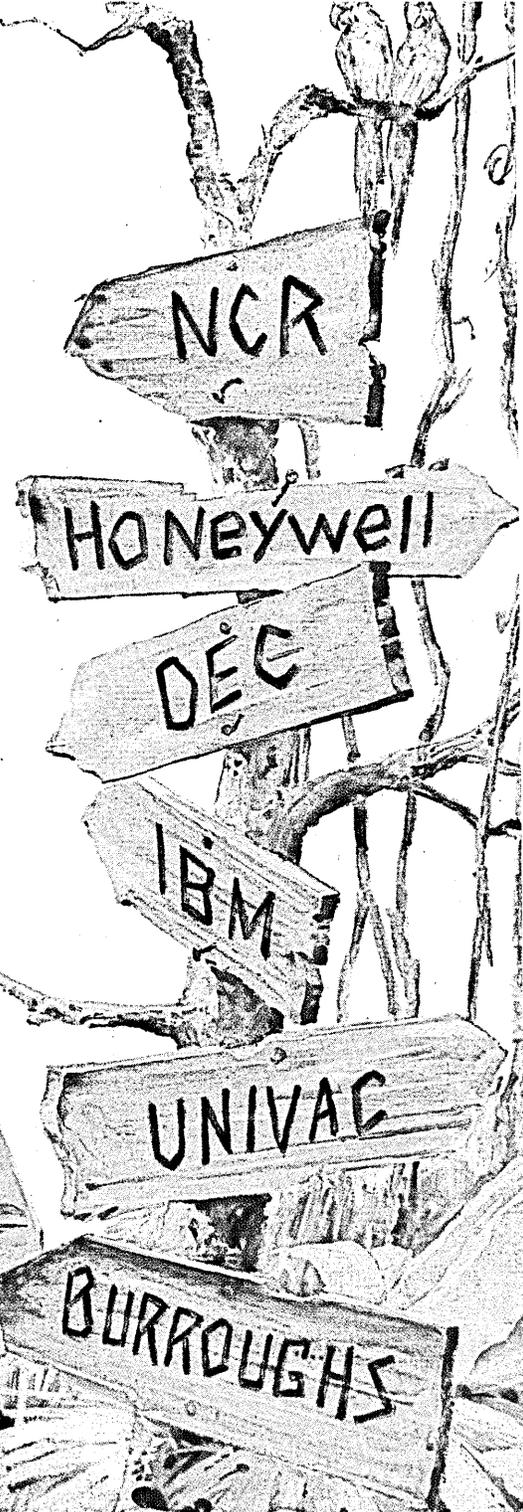


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CIRCLE 94 ON READER CARD

Both the convention center and its overflow garage have been specially air-conditioned by AFIPS.



the same time recorded on the unit's "carrtape." Each tape has a capacity of 87KB. After the data are entered off-line, the user has the option of initiating transmission to his computer via the Alpha-verter's acoustic coupler, or the terminal can be remotely polled from a central site. The unit has an RS232 interface, and communicates asynchronously at 1200bps (other speeds are available). There are four models in the Series 400: the numeric-only model 401, the alphanumeric model 421, and models 411 (numeric) and 431 (alphanumeric) which include 40-character vacuum fluorescent displays. A single model 401 sells for \$3,350 (\$2,325, quantity 50), and the 421 is \$3,475 (\$2,450, quantity 50); corresponding models with fluorescent displays are priced \$375 higher.

FOR DATA CIRCLE 304 ON READER CARD

**EDGE TECHNOLOGY INC.
Portland, Oregon
TELEX COMMUNICATIONS**

Booth 4253

The Telex Buffer allows use of a Teletype Model 43 terminal over the Telex network. Provided as a board that fits into the Model 43's option mounting area, the Telex Buffer contains the Telex interface and 4KB or 8KB of buffer memory. This memory allows the user to compose messages without using paper tape; it also allows more flexible editing than paper tape does. Reliability should be increased, as the Telex Buffer has no moving parts. It's operated by mnemonic commands entered from the keyboard. A 4KB Telex Buffer sells for \$595, and an 8KB version is \$895.

FOR DATA CIRCLE 314 ON READER CARD

**FLOATING POINT SYSTEMS
Beaverton, Ore.
ATTACHED PROCESSOR**

Booth 2452

The 64-bit FPS-164 attached processor, intended for high-speed scientific applications, will be shown for the first time in Anaheim. Used in conjunction with a host processor, the FPS-164 can be viewed essentially as a

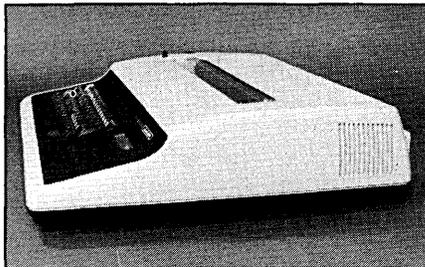
"subroutine box," off-loading the host when applications call for high-precision vector processing, such as FFTs. More detailed information on the FPS-164, which carries a price ranging from \$200,000 to \$600,000 depending on configuration, can be found in last month's hardware section.

FOR DATA CIRCLE 311 ON READER CARD

**GENERAL ELECTRIC CO.
Waynesboro, Va.
TERMINALS**

Booth 4031

The TermiNet 2000 family of impact matrix printers initially consists of a 30cps and a 120cps version, either of which can be had without keyboard. The 30cps model 2030 and the 120cps model 2120 use a 7 by 9 dot-matrix print mechanism, and feature bidirectional printing and underlining capabilities. Friction-feed is standard, with forms tractors optional (and field-installable). Up to three copies can be printed, with horizontal spacing of 10cpi, 13.2cpi, or 16.5cpi, and vertical spacing of 2, 3, 4, 6, 8, or 12 lines per inch.



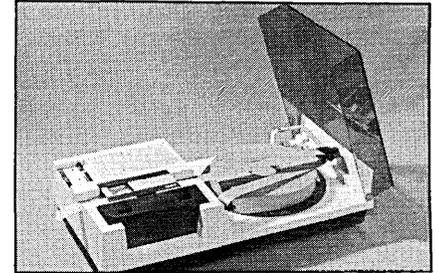
The dual-8085 microprocessor-based terminals can be had with a variety of keyboards, including an ANSI typewriter-paired layout, ANSI/APL, and international keyboards. A numeric keypad is optional. RS232 interfacing is standard. Options include current loop interfaces, 300 bps modems, 4KB data buffer, and a 32KB edit buffer. End user pricing for a single TermiNet 2030 ranges from \$1,400 (receive only) to \$2,300 for a "fully featured unit"; 2130 prices range from \$2,100 (RO) to \$3,000. Discounts are offered to OEMs.

FOR DATA CIRCLE 305 ON READER CARD

**GNT AUTOMATIC INC.
Waltham, Mass.**

SMART TAPE PUNCH Booth 2252

This vendor's 3601 paper tape punch, shown at last year's NCC, has been enhanced with a microprocessor based interface capable of making code conversion without help from the host computer. Two typical applications cited by the vendor are converting to five-level Baudot code for use on Telex networks, and converting to RS244 tape format for use with numerically controlled machine tools. In either case, the user specifies the desired con-



version, and gets a 3601 that accepts ASCII data via its RS232C interface. The 3601 punches at 75cps, and sells for \$2,195.

FOR DATA CIRCLE 306 ON READER CARD

**INTERNATIONAL MATHEMATICAL
& STATISTICAL LIBRARIES, INC.
Houston, Texas
SOFTWARE**

Booth 1657

TWODEPEP—Two Dimensional Elliptic Parabolic and Eigenvalue Problems—is a finite element program for solving time-dependent, steady state, and eigenvalue problems in two-dimensional regions. Applications include solving problems involving potential energy, elasticity, heat conduction, and fluid flow. To simplify the user's effort in solving general partial differential equations, TWODEPEP has automatic mesh refinement and grading capabilities. For solving large problems, the package has an out-of-core storage capability. The program is said to solve many highly nonlinear problems, and handle general regions, including those with curved boundaries or holes. TWODEPEP runs on a number of machines, including IBM mainframes, Univac 1100s, VAX-11/780s, and large Burroughs and Control Data computers. The program leases for \$1,500 per year, with discounts offered for educational institutions and multiyear subscribers.

FOR DATA CIRCLE 313 ON READER CARD

**INTERNATIONAL POWER
MACHINES CORP.
Mesquite, Texas
UPS**

Booth 2501

Specifically designed for common battery operation with the vendor's isolated-redundant 415Hz systems, this 120kW/150KVA can provide power outage protection for from one minute to one hour (or more), depending on battery selection. The UPS can be supplied with all standard 50Hz voltages, reports the vendor. A mimic bus format features a full array of instruments, controls, and indicator lights; remote status stations are among the available options. Batteries and options selected determine pricing, said to range from roughly \$70,000 for a one minute system to \$80,000 for a 30 minute system.

FOR DATA CIRCLE 307 ON READER CARD

Computers, peripherals, applications packages, and software systems will be on display.

KEYTRONIC CORP. Spokane, Wash. OCR READER

Booth 2159

The MR10 is a single font, single line, hand-fed OCR reader offered as both an attachment to existing terminal devices and as a unit that can be integrated (by an oem) into new equipment. Intended to reduce manual data entry in real-time applications (such as banking, point-of-sale, and factory data collection), the MR10 can read any number of characters on a single line. The unit is activated as the user slides a document through a slot in the MR10. The MR10 can read at speeds varying from 3ips to 15ips, and its bidirectional read capability allows single-hand operation by both right- and left-handed users. The unit comes with a standard RS232C interface. It recognizes either MICR (E13B) or OCR-A characters. The reject rate is reported to be less than one in 10,000 characters, and substitution errors are said to be less than one in 20,000 characters. A single MR10 sells for \$1,500.

FOR DATA CIRCLE 312 ON READER CARD

MCCORMACK & DODGE CORP. Needham Heights, Mass. SOFTWARE

Booth 4327

This software vendor will highlight its \$18,000 Purchasing Information Management System and its \$5,000 on-line module for its Accounts Payable Information System. Both packages are for use on IBM mainframes ranging from the aging 360 line through the most recently announced 4300 series.

Among the Purchasing System's capabilities are automatic matching of invoice, receipt, and purchase orders based on user-specified criteria, cash commitment reporting (both long and short term), vendor evaluation reporting, and generating user-specified reports via a report generator. The system also interfaces to general ledger and inventory systems.

A/P Plus On-Line places account information at the fingertips of accounts payable managers and data processing personnel. The system is said to make voucher entry more efficient for data entry personnel by signaling format and accounting errors for individual vouchers or batches of vouchers. Format corrections can be made immediately; error-free vouchers are accepted immediately. Accounting personnel can use the system's two-level search feature to locate and correct errors made during voucher entry. The accounting manager is said to gain improved control over cash flow associated with the remittance procedure. The On-Line module handles a variety of voucher types, including regular invoices, credit memos, debit memos, prepaid checks, contract payments, void checks, and void adjustments. Enhance-

ments planned include inquiry to the A/P open master file, high volume entry and edit, and repeating voucher format.

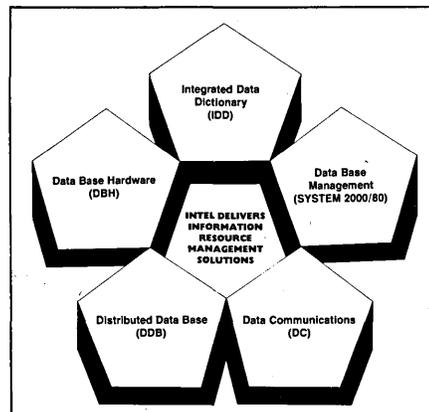
FOR DATA CIRCLE 308 ON READER CARD

MRI SYSTEMS CORP. Austin, Texas INFORMATION RESOURCE MANAGEMENT

Booth 1354

MRI will stress its new name, the Commercial Systems Div. of Intel Corp., in light of its acquisition by the expanding Silicon Valley semiconductor giant. Under the Commercial Systems banner, the firm will present, primarily through video tape productions, its latest generation of data base software and hardware.

To maintain product identity, the vendor calls its latest offerings System 2000/80. The Integrated Data Dictionary (IDD), for use in both batch and interactive modes, simplifies designing, analyzing, defining, and



modifying data structures. The IDD has data modeling and application prototyping capabilities, and it allows the data base to be reconfigured even after it has been placed in production. IDD also provides security, in the form of password protection, all the way down to the item level.

System 2000/80 acquired its 80 suffix after being enhanced to increase performance and reliability, while becoming more efficient for people to use. Capable of running on mainframes from IBM, CDC, and Univac, System 2000/80 can handle both on-line transaction processing and large volume batch applications. Multiple languages provide access to the data base. For end users with ad hoc applications, Quest—a relational query/update language—provides a free-form, natural language path to the data base. It can also help applications developers in prototyping and testing. For use in production environments, PLEX (Programming Language Extension) gives COBOL, FORTRAN, PL/1, and assembly language programmers a high-level access method; PLEX is translated by a pre-

processor into actual calls to the data base management system. Finally, a report writer allows end users and applications programmers alike to use a free-form language to specify complex reports generated against all or selected portions of the data base.

At the base of System 2000/80's capabilities, the Data Base Manager handles IDD, Quest, PLEX, and report writer requests, translating each into physical accesses to the data base.

For data communications, System 2000/80 has a Generalized Communications Interface to CICS, Shadow II, and Intercomm, as well as TSO and TONE. Multiple Systems Coupling (MSC), a feature for channel-to-channel communications between IBM (and IBM-compatible) mainframes, allows distributing a data base among a number of hosts; MSC resides in all processors in the distributed network, but only the host assigned data base management responsibility requires a resident copy of System 2000/80.

For the casual user in a 3270 environment, Query/Update By Example (QUBE) allows access to data using a light pen or the keyboard to move through the data base. QUBE is reportedly similar to IBM's QBE, and requires very little training (two hours or less, the vendor reports, with the first hour spent primarily in learning how to use the terminal).

Hardware—the Data Base Assist Processor (DBAP) option for Intel's FAST 3805 semiconductor disk replacement—reportedly gives IBM users up to a 100% throughput capacity increase while reducing response time by 50% or more. The DBAP keeps System 2000/80 strategic data base index and record location data in semiconductor storage (with less than a 1usec access time). Data base requests are processed through the DBAP-equipped 3805, thus reducing the number of disk accesses required to reach the data.

System 2000/80 software pricing ranges from \$60,000 to \$100,000 (including maintenance), depending on the modules selected.

FOR DATA CIRCLE 315 ON READER CARD

SAS INSTITUTE, INC. Gary, N.C. SOFTWARE

Booth 4446

Graphic presentations make statistical reports easier to understand, and this statistical software vendor will be showing its latest graphics capabilities, SAS/Graph, at NCC. SAS/Graph implements the same procedures that supply printer graphics for SAS, but with a twist: the new software is interactive, exploiting the advanced capabilities of intelligent graphics devices from a variety of hardware manufacturers, including Tektronix, Hewlett-Packard, and CalComp. Running

Introducing The PTS-2000.

Your low-cost, expandable window
to today's and tomorrow's
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The PTS-2000 States is Raytheon's brand new information display system for the 3270s.

In its normal configuration—available right now at prices up to 45 percent below competition—the PTS-2000 system emulates the small-display 3276-type information display system. It is designed to support both binary synchronous and 3270/3277 operating protocols, 9600 bps data rates, screen modes up to 32x80 characters. And all of the advanced features you expect from a business network terminal system: cursor control, zoom, line, and color compatibility within a 3276-type network.

But don't let these similarities end. Because the PTS-2000 was designed to go far beyond alternative products of its class: higher than most in intelligence, expandability, compatibility, and dependability than any other 3270-type terminal system. Soon it will be expanded to emulate 3274-type large-display systems, to support local disk drives for queued input, and to link Raytheon's WII word processors. Later, the family will grow even further—to become powerful SNA-compatible distributed processing, combined word and data processing, and network processing systems.

The PTS-2000 in 3276 mode operation is the stem of an information display terminal family that will grow with your computer needs far into the future. And with total compatibility and dependability.

Get your first PTS-2000 system today. Call our PTS-2000 hotline at (610) 225-9275, or write to PTS-2000, Box 84, at our headquarters for more information.

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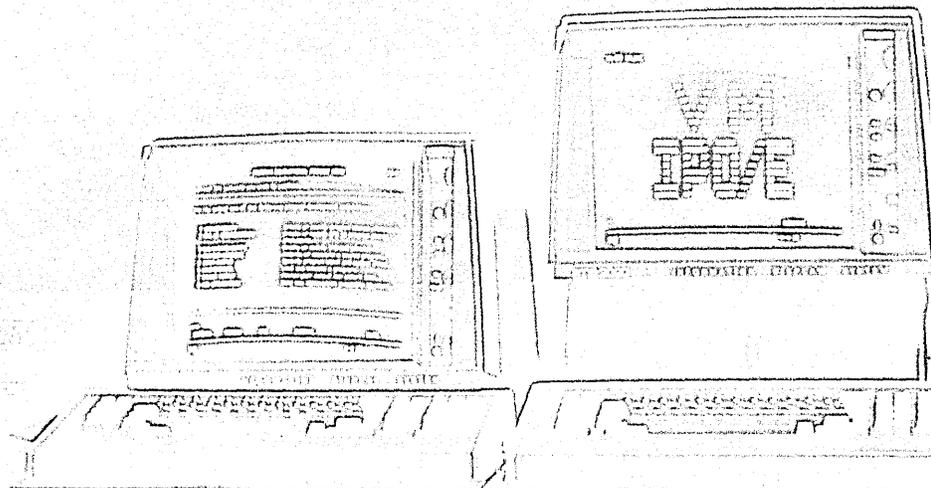


RAYTHEON DATA SYSTEMS

Raytheon Research Corp., Office of Sales for Systems
and Information Systems, 700 Main Street, Waltham,
Massachusetts 01981

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D-80

VISIT OUR BOOTH AT THE NATIONAL COMPUTER CONFERENCE IN ANAHEIM.

CIRCLE 96 ON READER CARD

under VM/CMS and TSO on IBM mainframes, SAS/Graph produces color graphics, typically requiring only two or three statements to produce a display. The vendor sees the software saving time in three ways: computer time, drawing time, and user time. Current SAS installations can get SAS/Graph for \$2,500 the first year, and \$1,000 for each subsequent year. The complete SAS package, including SAS/Graph, goes for \$7,000 the first year and \$2,500 a year thereafter.

FOR DATA CIRCLE 309 ON READER CARD

SOFTWARE AG OF NORTH AMERICA, INC.

Reston, Va.

DATA BASE LANGUAGE

Booth 1816

Natural is an interactive data base language for use with ADABAS files on IBM (and IBM-compatible) mainframes. Natural reduces program development time by handling the "mechanics" of file definitions, OPENS and compilations. The language can be integrated with either the Data Dictionary or user-supplied ADABAS files; Natural programs can be saved in the Data Dictionary for later use, or editing of either source or object code. Relational data base facilities allow users to process logical relationships between data in different files or from the same file viewed in different ways. Natural's mapping facilities are independent of the installations teleprocessing monitor. Additional features include report generation capabilities, logical coupling, and intermediate processing, including sorting, data base maintenance, and explicit looping. Natural carries a purchase price of \$24,000; leases are also offered.

FOR DATA CIRCLE 310 ON READER CARD

SOLA ELECTRIC

Elk Grove Village, Ill.

SMALL UPS

Booth 4422

Intended for use with low power electronic equipment—minicomputers, POS cash registers, etc—the Mini-UPS protects equipment from line noise, transients, and brownouts when the AC line is live, and if and when the line fails, internal batteries power the Mini-UPS's inverter and continue to provide power to the attached electronics. The unit takes 95 volt to 125 volt AC, 60 cycle (plus or minus 10%) power input, and provides 115 volt (plus or minus 3%), 60 cycle output. The unit is available in 400VA and 750VA versions, with 25 minutes and 12 minutes of backup time respectively. The 750VA unit sells for \$1,100, and the 400VA unit is \$900.

FOR DATA CIRCLE 318 ON READER CARD

Perform a death-defying act.

Reduce if overweight.

Give Heart Fund
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A NEW WORLD OF PERSONAL-PROFESSIONAL COMPUTATION.

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Standard typewriter keyboard with separate numeric key pad and eight user-definable special function keys.

High resolution CRT display with powerful editing capability.

Built-in thermal printer produces a hard copy of the display on command.

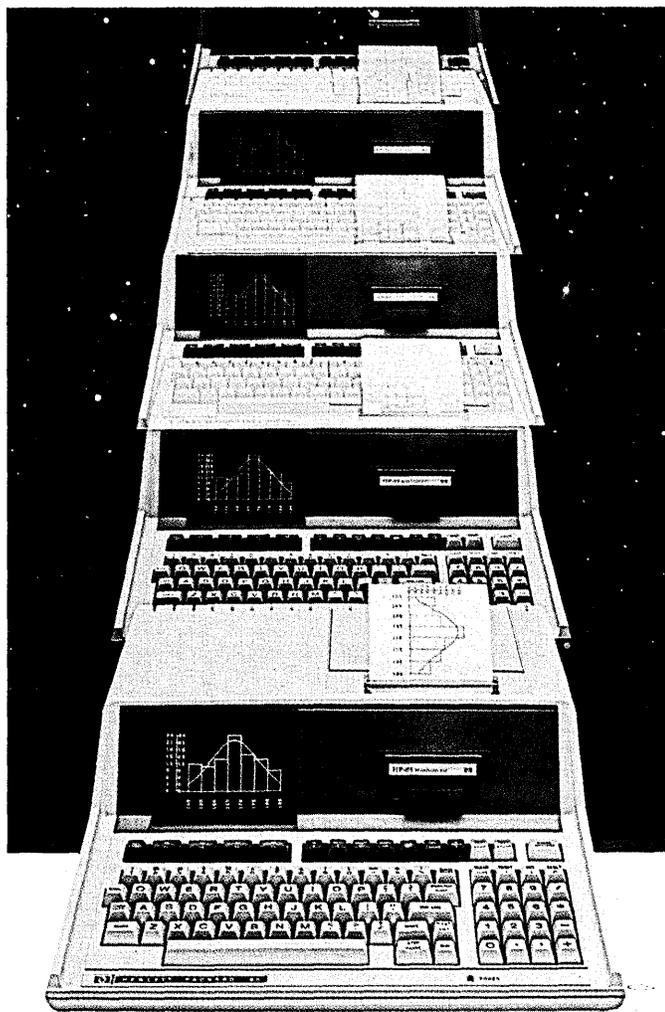
Built-in tape cartridge drive. Each cartridge provides 217K bytes of storage capacity.

Operating system and BASIC language, permanently stored in ROM.

A SOPHISTICATED COMPUTER AT YOUR FINGERTIPS.

Hewlett-Packard has combined these sophisticated capabilities with advanced design to give you a system that is easy to use yet uncompromised in its power.

A key to this achievement is Hewlett-Packard's choice of BASIC for the HP-85's language. The



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Whether you're in science, engineering, industry or business, the HP-85 you need today can easily be expanded or customized to meet your needs tomorrow.

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CIRCLE 87 ON READER CARD

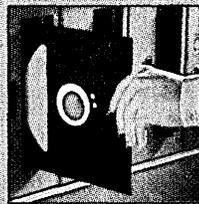
NOW CLEANING YOUR COULD SAVE YOU A AND A L

The recording heads on your diskette drives may be filthy—and that can cause you a lot of grief. There's the serviceman you have to call when the machine doesn't perform. (You know how much service calls cost these days!) There's machine down-time. Idle data entry clerks. All the other delays a cranky machine can cause.

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3M SOLVES THE PROBLEM IN SECONDS— AND LEAVES YOUR HEADS "COMPUTER ROOM CLEAN".

The new Scotch® 7400 head-cleaning diskette kit lets you clean the read-write heads on your 8" or 5¼" diskette drives. In just 30 seconds, without any disassembly, mess or bother, the heads can be completely



cleansed of dirt, dust, magnetic oxides — all the things that can get into your machines every day. And foul them up.

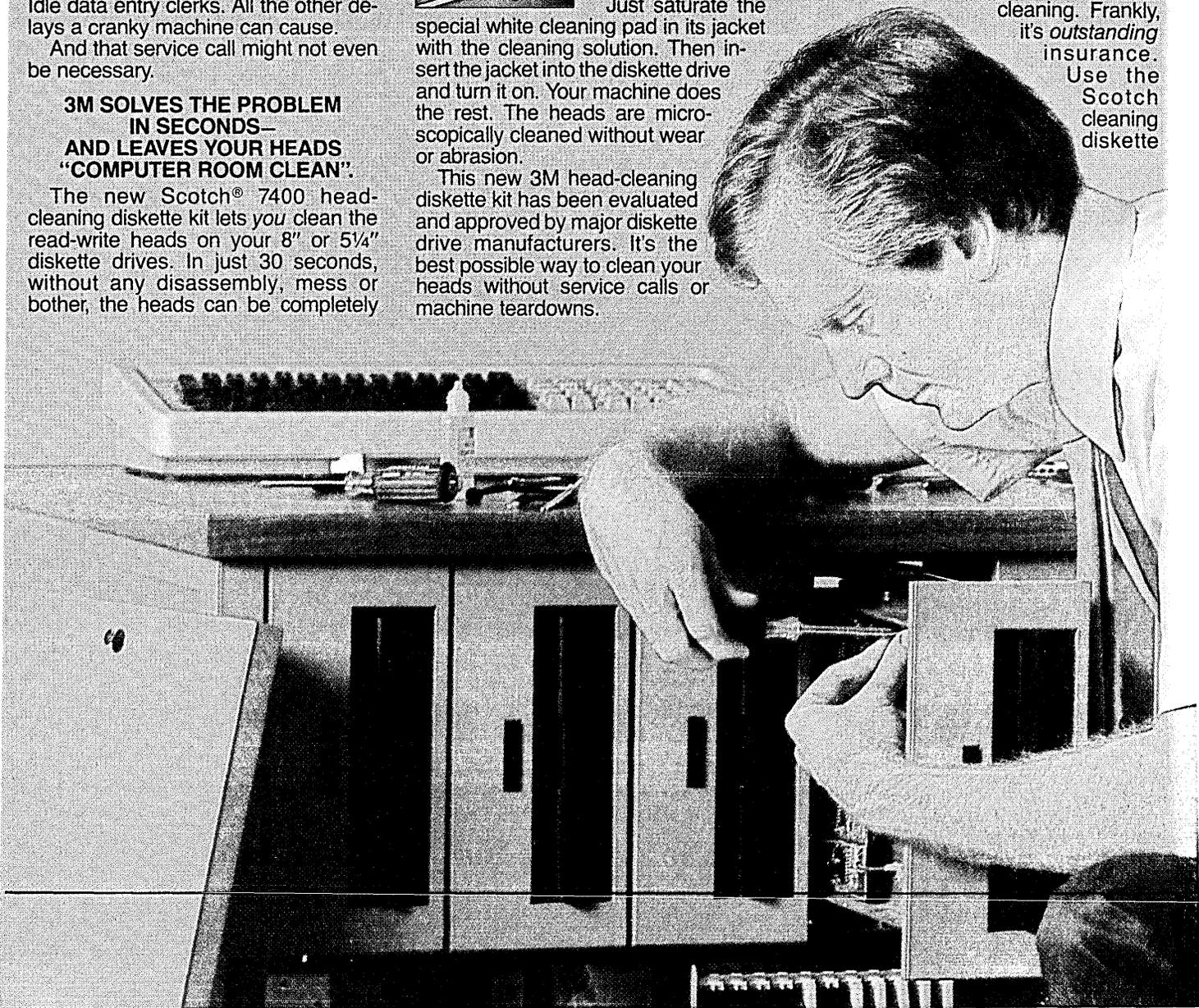
Just saturate the special white cleaning pad in its jacket with the cleaning solution. Then insert the jacket into the diskette drive and turn it on. Your machine does the rest. The heads are microscopically cleaned without wear or abrasion.

This new 3M head-cleaning diskette kit has been evaluated and approved by major diskette drive manufacturers. It's the best possible way to clean your heads without service calls or machine teardowns.

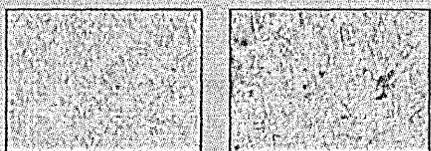
AT ONLY \$1 PER CLEANING IT'S THE BEST INSURANCE YOU CAN GET.

This fast-cleaning new Scotch kit comes with everything you need (including special fluid, applicator tip, cleaning diskettes) to handle up to 30 cleanings. That's only about a dollar a cleaning. Frankly, it's *outstanding* insurance.

Use the Scotch cleaning diskette



WIN DISKETTE HEADS 40 SERVICE CALL. T MORE.



A Scotch cleaning diskette shown before and after 15 cleanings of recording heads.

frequently, to make sure your diskette heads are kept clean. And to help them perform at the level specified by the manufacturer.

You could save yourself a lot more than just a service call. So we want you to try this remarkable new kit now. Order before June 30 and get \$6.00 off... a full 20% discount. Order from your local Scotch Brand Information Processing Products distributor, or send it right to us. Coupon must accompany order. One kit per coupon.



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We'll take \$6 off the list price when you order the 7400 Kit with this coupon and your check or money order. So send for this special offer today. (Send to: 3M, Dept. P, P.O. Box 33984, St. Paul, MN 55133.)

D5

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State _____ Zip _____

Please send my new kit for \$24. I enclose
 Check Money Order. Add state sales tax where applicable. Make check payable to 3M.

Diskette size: 5 1/4" 8" (Not yet available for Burroughs Mini-Disk II or Vydec drives.)

(Offer good in U.S. and Canada only. Void where prohibited by law. Expires June 30, 1980.) Offer valid only if coupon is completed.

CIRCLE 98 ON READER CARD



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Control Data’s complete makes the Series/1

“Our new Certainty Series is a complete line of competitively-priced products that’s ready to help you get optimum performance from the Series/1.

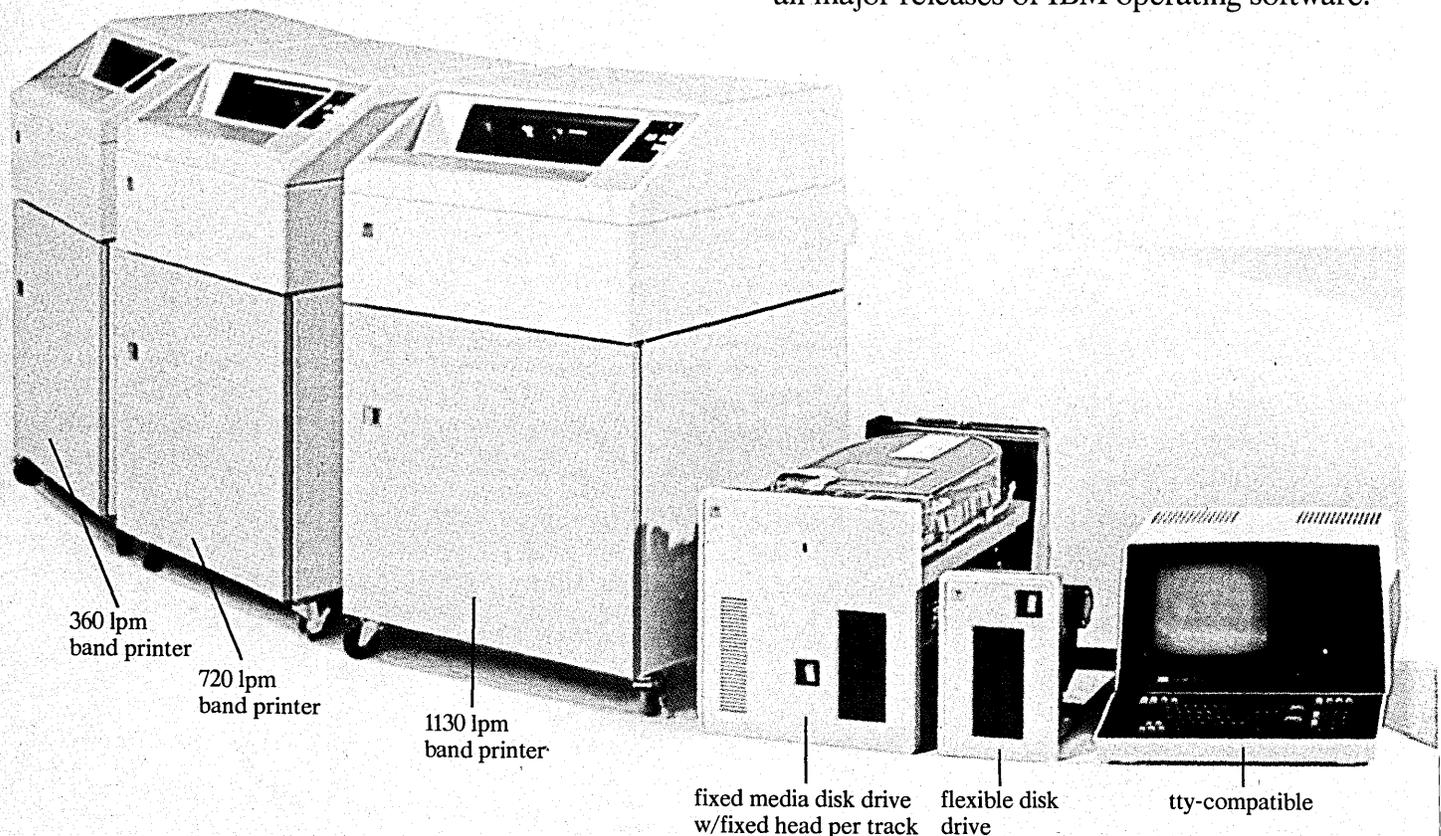
“Now you can add up to 240 Mbytes of removable storage with our Storage Module Drives. Their popular format attaches to the Series/1.

“Our Certainty line printer that gives you clean, crisp printing at 720 lpm and more. It can also cut your paper usage by 30% when you use its compressed pitch option.

“Our display stations eliminate the need for expensive video cabling. Certainty display stations use low-cost digital cabling. So you can put your terminals where your people are—up to 4,000 feet from the cpu.

“Controllers? No outboard controllers, because we incorporated all controllers and interface logic into our hardware. And we engineered Certainty Series around the Series/1 architecture, retaining the important cycle steal feature. All of these products are ready right now to be plugged into the Series/1.

“Control Data knows how important support is. With our miniperipherals, Control Data also provides the required software support of all major releases of IBM operating software.



line of miniperipherals even more attractive.”

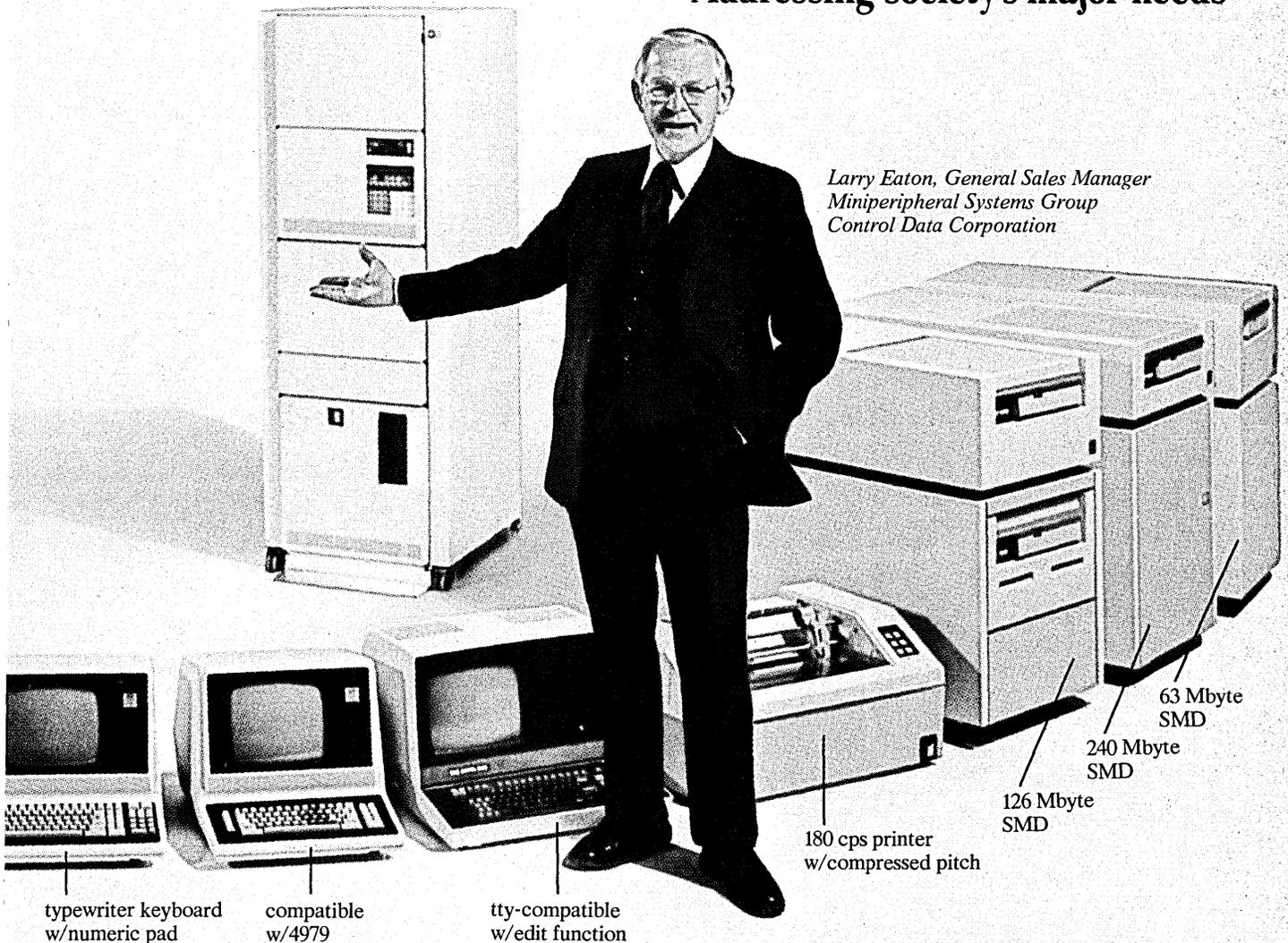
“More than 4,800 Customer Engineers in our worldwide maintenance organization support our products. Our Education Company can train your people. Our Professional Services Division can help you program your applications. Through Commercial Credit, an important part of Control Data, we can provide financing for your purchase.

“Let us show you how our Certainty Series makes the Series/1 even more attractive. For data sheets and more information, call today toll free. 800/328-9565.”

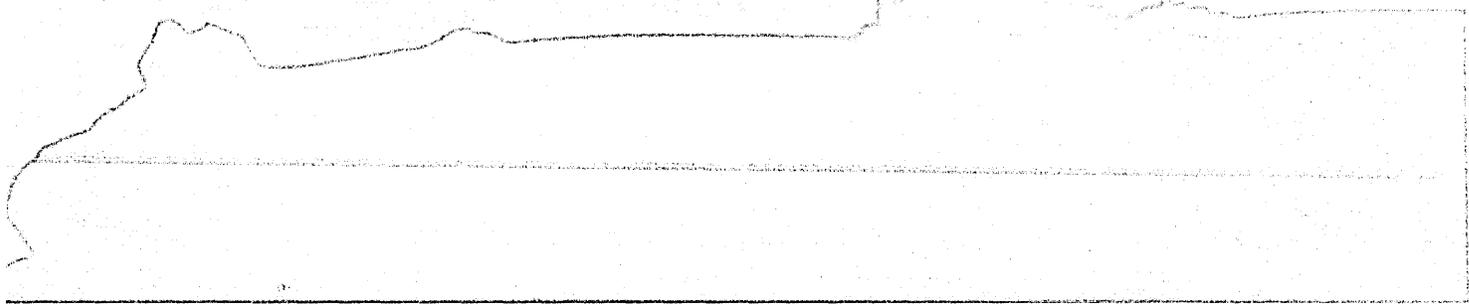
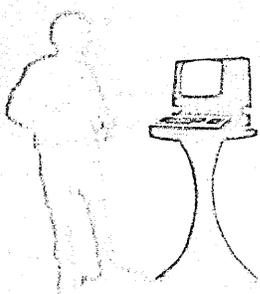


Addressing society's major needs

*Larry Eaton, General Sales Manager
Miniperipheral Systems Group
Control Data Corporation*



CIRCLE 99 ON READER CARD



The goal of this new computing language is to be a personalized information portfolio and application specific desk calculator.

PRESENTING ROSETTA SMALLTALK

by Scott K. Warren
and Dennis Abbe

Nearly 10 years ago I was among a group of about 20 university students gathered to hear Alan Kay of the Xerox Corp.'s Palo Alto Research Center's Learning Research Group.

Those were the days when "small computer" meant "mini," time-sharing implied BASIC and a Teletype Model 33, and logic design courses used the 7400/5400 TTL data books as standard references.

Seers were predicting computers the size of cigar boxes; stories of a new language for teaching, LOGO, were coming out of the Boston/Cambridge intellectual incubator.

Kay told our assembly of his visions for Dynabook, a notebook-sized personal computing device able to handle the information needs of an individual user. Dynabook would be able to store thousands of pages of text, display images with resolution surpassing newsprint, and perform real-time audio synthesis with similarly high fidelity. The imagined computer would talk Smalltalk, which seemed to bear a striking resemblance to LOGO. The language was intended to be adaptable to each user's individual needs.

I left convinced that Kay was a madman. It just wasn't possible to build so much computer into so small a package. Hewlett-Packard had yet to introduce its Model 35 handheld calculator, and Silicon Valley wasn't making microprocessors yet.

Not too many years later, microprocessors and microcomputers were household words, and many of the technological stumbling blocks to Dynabook were gone. Prototypes the size of minis were designed and built at PARC. And a few years later, one of the Dynabook people mentioned that Smalltalk's object-oriented structure actually made LOGO a subset of Smalltalk.

The authors of this article are working to bring object-oriented programming to easily accessible hardware. Rosetta Smalltalk now runs on two different Z-80-based micros; from this test bed, work proceeds to develop a version that will run under CP/M.

—Bill Musgrave

The Rosetta Smalltalk Project grew out of the determination of one of us (Scott Warren) to create a personal computing language after having studied language principles, compiler construction, and the automatic implementation of languages at Rice Univ. Although Warren was entranced with the new microcomputer, it seemed to him that over the long haul there would have to be a radical departure from the BASIC-dominated style of computing then in use on these machines. BASIC was not going to enable people to do the things they wanted to do. Rosetta was thus founded on the conviction that a new personal computing language was needed, one that acted not as a closed universe but rather as an open-ended continuum. This concept of a programming language as the center from which a universe expands reminded Warren of the Rosetta stone, so the name was adopted for our business.

All we could find out about Smalltalk from PARC was that the instruction manual for Smalltalk 72 was out of print. Then, Kay's articles appeared in *IEEE Computer*¹ and in *Scientific American*'s special issue on microcomputing, and in early 1978, we acquired the Proceedings of the ACM Fifth Annual Principles of Programming Languages Conference, where Don Ingalls of PARC had given a paper on Smalltalk 76. The threads we picked up from these documents hinted at the foundation of Smalltalk. The historical currents are clear to someone who has studied programming languages. Smalltalk combines LISP and Simula with the concept of crt windows for interaction. After seeing windows, talking to a Teletype feels like working with blinders.

While the work of the PARC Learning Research Group provided our inspiration, the Rosetta Smalltalk language is our own.

AN IDEAL PERSONAL COMPUTER

The ideal personal computer could store, retrieve, and edit almost any information its owner was interested in: notes, drafts of papers, phone lists.

1. Goldberg, A. and Kay, A. Personal Dynamic Media. *IEEE Computer*, March 1977, pp.31-41.

The same notation for sending messages to objects can add two numbers, turn on a peripheral, rename a file, or invoke an application package.

structured files of data, pictures, simulations, music, and so on. Suppose it could be used as an interactive desk calculator for any problem domain, permitting its owner to deal directly with items in which he is interested, such as notes, timbres, and pitches in music; equations and substitutions in mathematics; or paints, cels, and frames in animation. How could the user, not a computer specialist, cope with the immense variety of data formats, language rules, and processing conventions found among so many diverse application packages? How could he sufficiently understand the intricacies of all of this prewritten software to be able to customize it to his own needs, or to combine separate facilities to accomplish a particular task? And how could he add new facilities of his own, without a large programming effort?

The answer seems to be an open-ended conversational medium in which many special-purpose tools can be embedded, then accessed via a single uniform notation. The goal of Rosetta Smalltalk is to be a personalized information portfolio and application specific desk calculator. The system provides the user with an APL-like workspace which contains all data and programs and which is retained from session to session. Program text is a kind of data and can be manipulated as naturally as numbers and strings.

Such an environment has been called *residential*,² since everything of interest to the user resides within the system rather than being stored and edited by an external facility. The user is given interactive access to his workspace contents, with rich visual feedback. The underlying language of the system treats all entities in the same way, and can be customized with new syntax and new kinds of objects for a particular interest. The system encourages a tool-building paradigm of problem-solving. Tools are built by extending the base language rather than by writing monolithic programs, and are easily combined within the existing language framework.

One of the major goals of Rosetta Smalltalk is to provide a medium for spontaneous problem solving. While the injunction "Think first, program later" is good advice when engineering a software product, it amounts to a straitjacket for the conversational user. It is not uncommon to make false starts or interrupt one activity in order to do something else. In Rosetta Smalltalk, multiple independent crt windows make these shifts of attention easy.

In many ways windows behave like pieces of paper on a desk. We can move them around on the screen; if two windows over-

FIG. 1

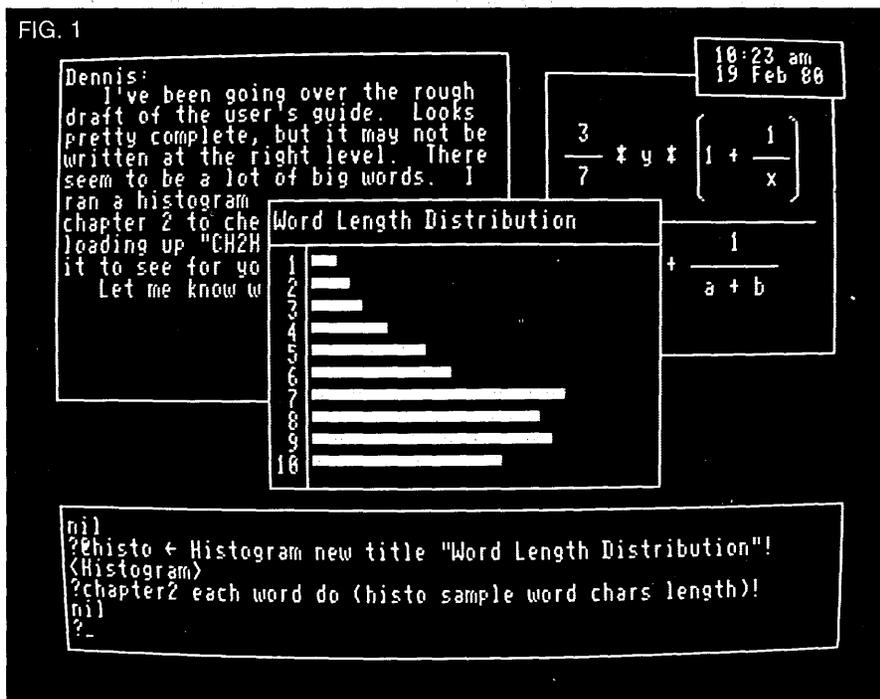
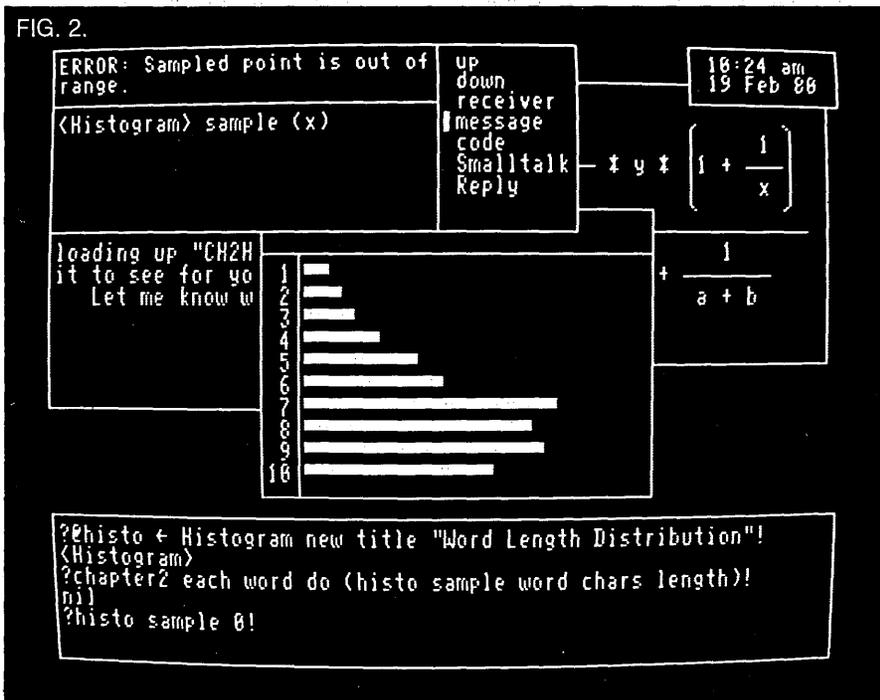


FIG. 2



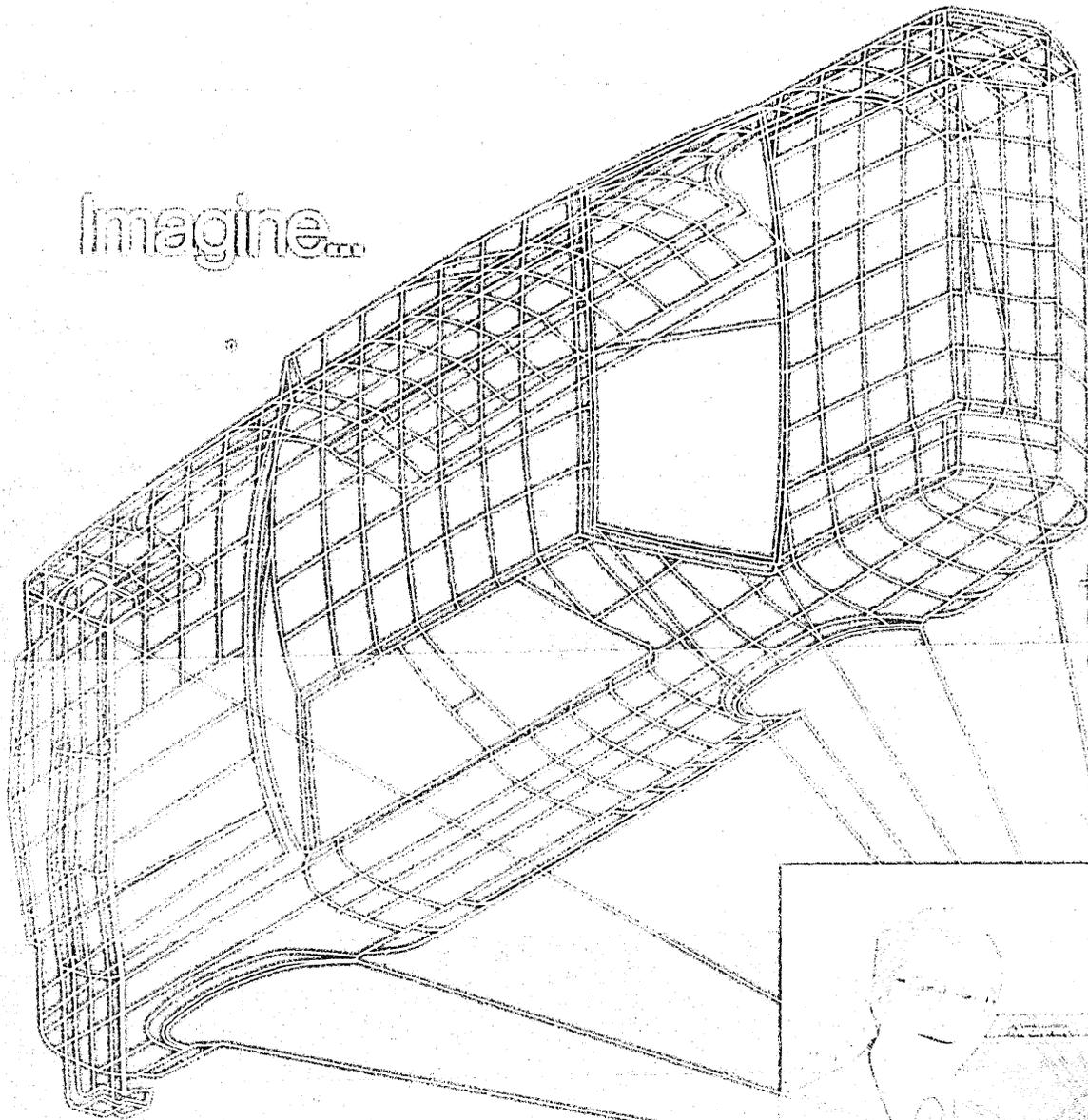
lap, one will be partially hidden behind the other, but its contents are unaffected. When we move the window in front, the window behind it is instantly redisplayed. Using windows we can keep more information visible at once than if the whole screen were dedicated to imitating a single hardcopy device. This visual richness augments our short-term memory, helping us do several things at once without losing our place.

IN AND OUT THE WINDOW

Figs. 1 to 3 show an (admittedly contrived) example in which we type a command in one window and view its output, a histogram, in another. Our next command causes a third window to display an error message, and we use a fourth to edit the code in error. If the screen is too small to display all of this at once, we can rearrange the windows as necessary, moving

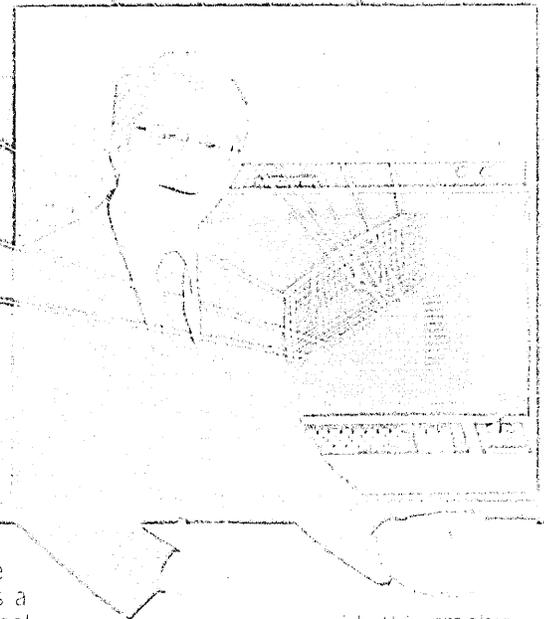
2. Sandewall, E. Programming in an Interactive Environment: The "LISP" Experience. Computing Surveys, March 1978, pp. 1,053-1,058.

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Smalltalk encourages the construction of open-ended tools rather than fixed solutions to a problem.

an interesting window where it can be seen or pushing others out of the way.

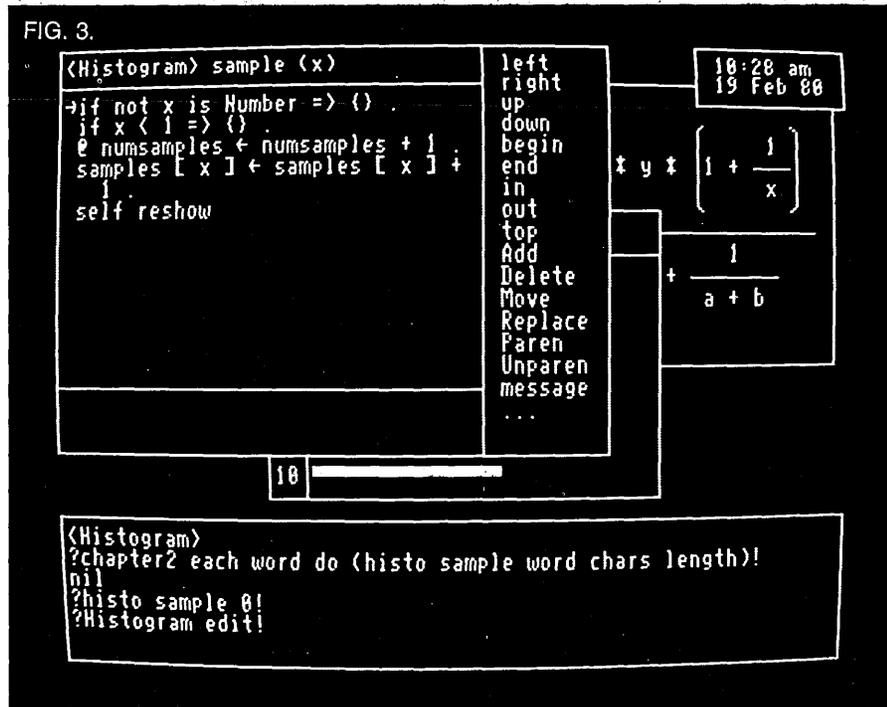
The standard way of communicating with items in the workspace is by typing in commands for immediate execution. Rosetta Smalltalk makes no distinction between program text and commands from the keyboard, and vice versa. Input may be as simple as $2+2$ or may contain multiple statements including control structures, so there is no need to write a program to try something out. Most work is done incrementally by typing in commands and immediately observing their effect, rather than by first writing and then running a long program. Solving problems in this way is faster and more natural than in the conventional "edit-run-debug" programming cycle, because each command we type performs some part of our actual task and gives us immediate feedback. The fully conversational aspect of Smalltalk simplifies testing new code and allows Smalltalk to be used as its own debugging language.

The Smalltalk language is based on the single notion of objects communicating by sending and responding to messages. Every entity in Smalltalk is represented as an object, from numbers and strings to control structures and arbitrary facilities defined by the user. The only operation in Smalltalk is to send an object a message requesting it to perform some action and possibly send back a reply.

Objects are grouped into classes which describe their representation, the messages they can receive, and the methods they use to respond. Thus the same notation for sending messages to objects can add two numbers, turn on a peripheral, rename a file, or invoke an application package. Rosetta Smalltalk thus serves as a command language, a programming language, a debugging language, and host to any number of special purpose applications. This uniformity greatly simplifies the user's view of the system, and reduces the system's size by eliminating the need for several distinct language processors. The user also has an unusual amount of power available at the command and application control levels, since Smalltalk variables and control structures may be used there as well as in programs.

The Rosetta Smalltalk user can easily customize his system by defining new classes of objects or adding new messages to existing classes. The necessary programming is done conversationally, testing each definition as it is entered. The user then solves his problems at the keyboard by directly executing Smalltalk commands. His extensions customize the language so that variables can hold things like musical scores, payroll records, or circuit diagrams, and his commands do real work like playing music, calculating payroll deductions, or simulating waveforms.

FIG. 3.



Extensibility permits new facilities to be used as if they were built in. The user interacts with new objects through the same notation for sending messages with which he is already familiar. When the user adds an extension to his workspace, such as a set of objects for composing and playing music, he gets more than he would from a monolithic program performing the same functions. He has not just a music program but a music language. As an extension of Smalltalk, this language contains powerful features for programming as well as for performing music.

Rosetta Smalltalk encourages the construction of open-ended tools rather than fixed solutions to a problem. The notion of objects sending messages provides a uniform way of accessing extensions to the system, and the class mechanism permits extensions to be self-contained and thus suitable for loading into any workspace. As a result, separately written tools may be combined with relative ease. For example, the music extension mentioned above could be combined with an extension for statistical analysis to permit the interactive search for patterns in a set of scores. A third extension for drawing histograms could be added so that such patterns could be viewed graphically.

There is no need to venture outside of Smalltalk into the realm of operating systems to make the connection between applications. Smalltalk thus supports the same "software tools" approach to software development practiced on the Bell Labs UNIX system, but without the distinction between command language and programming language.

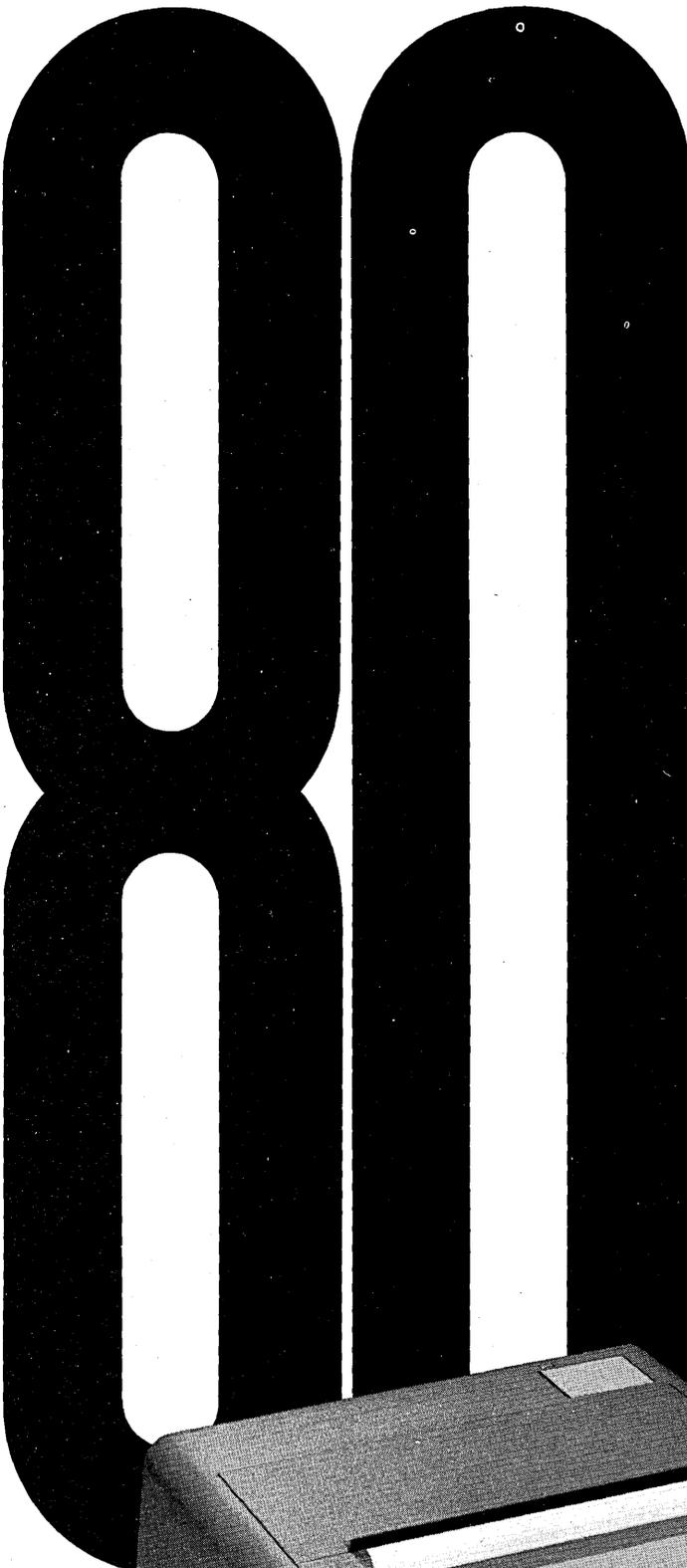
INTERACT THROUGH WINDOWS

As we have said, many windows may be displayed at once. Each window may represent a different activity or view into the workspace. We turn our attention from one activity to another by pointing at the window interest with the cursor; the window we select can then receive our keyboard input. For example, while editing a document in one window we might use a second window to consult a reference.

Different styles of interaction may also be associated with different windows. One window might be used for dialog with Smalltalk, another might represent a menu of key-selectable commands, and a third might simply display some text. Three styles of window interaction are part of the basic Rosetta Smalltalk system: dialog windows, diagnostic windows, and editing windows. Later it will be shown how other kinds of windows may be defined.

A dialog window is used for typing Smalltalk code for immediate evaluation. The user's keystrokes and the result of each evaluation are printed in the window. A dialog window is thus the standard way of interacting with objects in the workspace, providing the "desk calculator" mode of operation common to most conversational systems. The bottom window in Fig. 1 is a dialog window.

Each time a dialog window is ready for input it invokes the system scanner named *read*. *Read* prompts with a "?" followed by a cursor. Input is gathered up until a special key called DOT is pressed; this key is chosen as



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The full power of Rosetta is available as a debugging tool, making a special debugging language unnecessary.

convenient for each keyboard, but always echoes as “!”. Before he presses DORT the user can edit his input by pressing keys to delete the previous character, the entire current line, or all of the input typed so far.

When DORT is finally pressed, the input is evaluated and the result printed. By convention all objects print themselves in the window named *disp*. Each dialog window evaluates its inputs in a context in which *disp* may be temporarily re-bound to another window to send output elsewhere.

USING SEVERAL WINDOWS

It is often convenient to use more than one dialog window. A running program, for example, may prompt the user for input. He can then open a new dialog window, perform some calculations, and finally reply to the waiting program with his calculated value.

When an error is detected during Smalltalk evaluation, a diagnostic window will appear with a brief statement of the complaint. In this window the user can examine the context of the error. The message receiver, the message it received, and the Smalltalk code it was running can be displayed upon request. The user can engage in Smalltalk dialog in the context of the error, for instance, to print or modify variables in the local name scope.

The full power of Smalltalk is available as a debugging tool, making a special debugging language unnecessary. It is also possible to move up and down in the chain of contexts that led to the error, inspecting each one in turn. After examining and perhaps modifying the context of the error, the user can either terminate the suspended execution or resume it in a context prior to the one in which the error occurred. In the latter case he may supply a value to be used as the result of the suspended context. When he is done the diagnostic window disappears; any windows it obstructed become visible again. A diagnostic window appears in the top left corner of Fig. 2.

Like most other Smalltalk system facilities, the error machinery is easily accessible to the user. By evaluating something like *error "This my complaint"* any Smalltalk program can open up a diagnostic window.

Smalltalk programs are typically edited with a hypertext³ editor which uses windows for displaying, entering, and pointing to program text. Fig. 3 shows the screen layout after this editor has been invoked. The window at the top describes what is being edited. The largest rectangle is the text window, in which the current portion of program

text is shown.

The window at the right is a menu of available editing commands. Selections from this menu are made by pressing single keys corresponding to the first character of a command name. Selecting the “. . .” command brings a new menu of additional commands into the window.

The bottom window is used to enter lengthy pieces of text such as insertions. The implementation of the editor is simplified by the fact that each of these windows may be scrolled, cleared, and so on, independently of the rest.

The editor knows about the structure of Smalltalk programs and uses this knowledge to format the displayed code attractively and to allow easy selection of substructures for examination. The Smalltalk code is always shown neatly indented, with each statement starting on a new line. Whenever text is altered it is immediately reformatted.

Only the top level of the code is displayed in the text window; parenthesized subexpressions are simply shown as “{ }.” The *in* command descends into one of these subexpressions to see its top level. The code in the window may be altered by selecting other commands from the menu, with the current version of the text always visible. The *out* command returns to the surrounding level.

To illustrate the use of the editor, suppose we want to insert some new text into the current program level. First, we position the editor's cursor to where we want the text to go by using some combination of the *left*, *right*, *up*, *down*, *begin*, and *end* commands. Next we press *a* for *add*. Immediately the menu goes blank to indicate that no selection from it can be made until our insertion is complete. Simultaneously the prompt “*add?*” appears in the bottom window, followed by a typing cursor. We are now talking to the same read object used by dialog windows. After typing in the new text, we press DORT and the text window immediately shows the result. At the same time, the bottom window clears and the menu reappears.

The Smalltalk language is based on a metaphor of intelligent objects which communicate by sending and responding to messages. An object cannot be operated on directly, but can only be sent requests to perform actions and return replies. Every object is a member of some class that describes its representation, the messages it can receive, and the methods it uses to answer them. Smalltalk is easily extended with new classes of objects and new syntax for messages.

A message is sent by writing the message receiver followed by the message itself. For example, to move the window *disp* to a different place on the screen we can say *disp move to 10 2*

In this expression *disp* is the message receiver and “*move to 10 2*” is the message being sent. We represent the syntax of this message by the message pattern

. . . *move to (newl) (newc)*

The elipsis (. . .) indicates the message receiver, and the parenthesized variables indicate evaluated parameter slots. An object may also receive message parameters unevaluated. For instance, the control structure object *do* responds to a message of the form

. . . *(n) (@code)*

The symbol “@” indicates that *code* is received by *do* unevaluated.

When we send

*do 3*4 (disp hide show)*

n is 12 and *code* is the list (*disp hide show*). *Do* answers this message by evaluating *code* 12 times, causing *disp* to repeatedly disappear and reappear.

The object *x* is returned as the reply to a message by evaluating

reply x

When a message is sent to an object just to achieve an effect and not to compute a result, *reply* may be omitted. In this case the message receiver itself is replied by default. This reply permits several messages to the same object to be cascaded together, as . . . *hide* and . . . *show* were in the example above. Rosetta Smalltalk uses periods to separate message sendings when it is not intended for the reply of one message to become the receiver of the next. Thus the expression

*do 3*4 (disp hide. disp show)*

has the same effect as the example above.

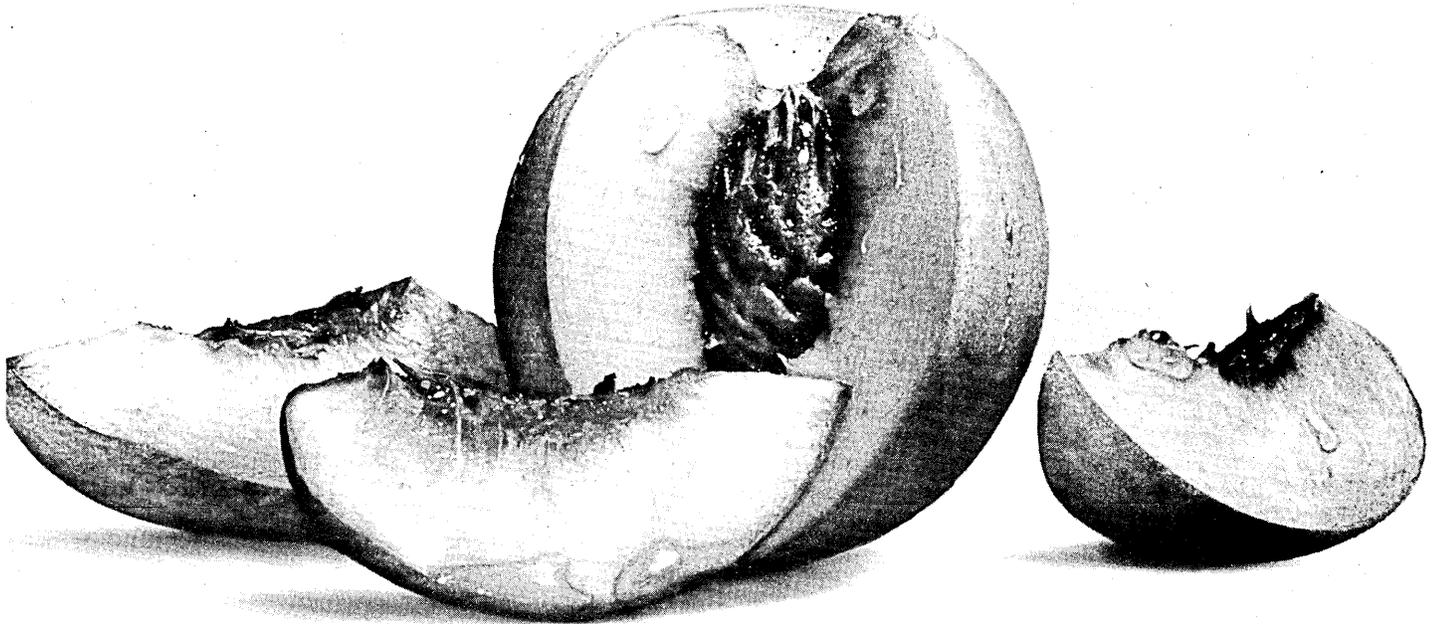
Smalltalk evaluates an expression by first obtaining the message receiver, then matching message patterns against the following tokens. Only those patterns belonging to the receiver's class are eligible to be matched. Matching proceeds from left to right, interleaved with evaluation of subexpressions corresponding to parameter slots. Smalltalk matches a specific token in preference to a parameter slot, and always takes the longest possible match. The empty message will be matched if the receiver can answer it and no longer pattern is found. Once a unique pattern is matched, Smalltalk sends the message, setting up a new context for the object to respond in.

SOME PRIVATE DATA

Every Smalltalk object owns some private data that can be directly accessed only by itself. These *instance variables* are property names common to all instances of a class, for which each instance has particular values. For example, a window object's size is described by two variables and refers to them whenever it is asked to show on the screen. We cannot change these values directly, but a window

3. Carmody, S., Gross, W., Nelson, T.H., Rice, D., Van Dam, A. A Hypertext Editing System for the S/360. Pertinent Concepts in Computer Graphics, University of Illinois, 1969, pp.291-330.

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By creating new classes, the Smalltalk user creates objects modeling his own abstract ideas, and invents his own notations for using them as well.

will do so if asked:

```
disp grow to 10 30
```

Sending this message has the visible effect of setting *disp*'s size to 10 lines of 30 columns each. To accomplish this, *disp* has to hide itself, adjust its text buffer to 300 characters, update its *h* and *w* values, and show itself again. Because unauthorized access to instance variables is prohibited, the window is able to ensure that its buffer size and visible appearance remain consistent with its height and width.

Objects answer their messages by running pieces of Smalltalk code called methods. A method refers directly to the object's private data by mentioning its instance variable names. The method can also mention the special name *self* to refer to the object receiving the message. Objects often send themselves messages this way. For instance, the method by which windows respond to the "grow to" message could be

```
... grow to (newh) (neww) =>
( self hide.
  @text ← String new newh*neww.
  @h ← newh. @w ← neww.
  self show)
```

An object may reveal as much or as little of its representation as it desires by the messages it chooses to answer. It can grant full access to its representation by answering

```
... 's (@code) => (reply code eval)
```

When this message is sent, *code* is an unevaluated piece of Smalltalk code, and the object replies with the result of evaluating that code in its private context. If this message is defined for windows, sending

```
disp's h
```

will reply with the height of *disp*. This kind of message is helpful when debugging, but must be used with care since the object's assumptions about its own data can be disrupted. For instance,

```
disp's (@h ← h+2)
```

increases *disp*'s height without making a corresponding adjustment in its text buffer, and will cause an error the next time *disp* is asked to show.

There are actually three sets of variables in the local context of a message sending: temporary variables, instance variables, and class variables. All three kinds may be accessed directly by a method.

Temporary variables are created when a message is sent and disappear as soon as a reply is made. These variables may be used as scratchpad storage while the method is running. Certain temporaries are initialized with values from the message and thus serve as formal parameters; the variables *newh* and *neww* in the "grow to" message are examples of this. Instance variables are names for the data private to each instance of a class, as discussed above. Their values persist between message sendings as long as the object

exists.

Class variables are accessible to all instances of a class. They usually hold data for communication between instances or for classwide bookkeeping. Their values are stored within the class itself and persist as long as the class exists. Class variables play the role often filled by global variables in other languages, but in a more secure and modular way. The shared information held in class variables is accessible only to members of the class and not to the world at large.

When a name is mentioned that is not one of the three kinds of locals, Smalltalk looks for it in the dynamically enclosing context—that is, the one from which the current message was sent. The search ends in the user's workspace. A common problem with dynamic name scoping is the accidental hiding of global variables when code is run inside a context that happens to use those names for another purpose. Rosetta Smalltalk does not suffer from this problem because all class-related data is accessible from the innermost context, including the class variables that would have been global in some other languages.

CLASSES OF OBJECTS

We group objects into classes so they can share the same representation, message patterns, and methods. The Smalltalk class mechanism is modeled after that of Simula 67, but Smalltalk is unique in representing every facility as an instance of some class. A new class is a description of a kind of object, or data type, of which there may be many instances. A new class is thus a semantic extension to the Smalltalk world.

Furthermore, the message patterns of a new class form a direct extension to the language syntax. By creating new classes the Smalltalk user creates objects modeling his own abstract ideas, and invents his own notation for using them as well. Classes are a tool for extending a language in a modular way. The representation of an object is ordinarily concealed from outside the object, providing information hiding in the sense of Parnas.⁴

The only operation that can be performed on an object is to send it a message requesting some action; how that action is carried out is no concern to the sender, and it may be changed without affecting existing code. Moreover, this object-oriented style of programming collects related code into a central place, the class definition. For instance, details of how a class of objects should be printed are grouped with other details about the class rather than in some all-purpose print

routine. This makes it easier to find all affected code when a change is made.

A new object is created by sending a ... *new* message to the desired class. The object should respond to a message beginning with the special token *isnew* by initializing its instance variables appropriately. One cannot forget to initialize an object because the *isnew* token is automatically supplied by the system. Apart from this bit of synchronization, *isnew* messages are no different from other messages.

For example, a new window must be told its initial size and location. To create a new window and name it *mywindow*, we say

```
@mywindow ← Window new 5 30 2 2
```

This creates a new window which immediately receives the message *isnew 5 30 2*. The new window initializes its height and width to 5 lines of 30 columns and its screen location to line 2, column 2. Other instance variables are computed from the given information. For instance, *mywindow*'s text buffer is allocated to hold 150 characters.

Every object in Rosetta Smalltalk belongs to a class, and classes are no exception. Every class is an instance of the class named *Class*; this class has the unique property of being an instance of itself. To create a new class we send the ... *new* message to *Class*:

```
@Stack ← Class new
```

Of course, the new class must be given variable dictionaries, message patterns, and methods for it to be useful. This could be done by sending appropriate messages to *Stack*, though we would ordinarily invoke the built-in hypertext editor.

One can also extend or modify the definitions of existing classes. This includes predefined classes of the Rosetta Smalltalk system as well as those created by the user. As a simple example, suppose we want windows to be able to flash themselves in order to attract our attention. We must define two things: the syntax of the message and the method used to answer it. Our new message syntax will be

```
... flash (n) times
```

The method for flashing will be to erase and redraw the window's frame the requested number of times. We can add this capability to class *Window* by evaluating

```
Window answer @ ( flash (n) times)
```

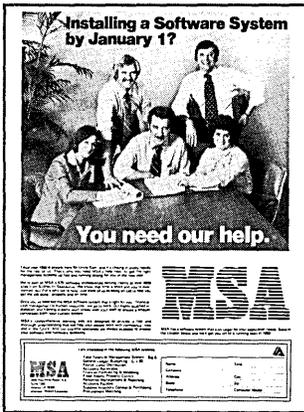
```
by @ ( do n (self unframe frame) )
```

This is just a message to *Window*. The "@" tokens indicate that the following parenthesized lists should be taken literally rather than evaluated. After adding the above message to class *Window* we can say

```
mywindow flash 20 times
```

and our window will blink its frame off and on 20 times. Note that when a new message is added to a class, all existing instances can immediately respond.

1. Parnas, D. On the Criteria to be Used in Decomposing Systems into Modules. Comm. ACM, Dec. 1972, pp. 1,053-1,058.



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The basic Smalltalk system provides fundamental programming language elements and some high-level building blocks to support interactive computing.

BUILDING EXTENSIONS

The message sending discipline we have explained is only a language framework. This skeleton must be augmented with enough predefined objects to enable the construction of extensions. The basic Rosetta Smalltalk system provides fundamental programming language elements and some high-level building blocks to support interactive computing. This set of basic objects includes the primitive classes *Atom*, *Number*, *String*, and *List*; the objects *yes* and *no*; the control structure objects *if*, *do*, *for*, *repeat*, and *done*; the objects *Window*, *read*, *kb*, *File*, and *lp* for input and output; the workspace management objects *vars* and *erase*; and of course the class *Class*. In addition there is a hypertext editor for creating and modifying classes and other program text. Our summary of the basic system is rather informal; many of the predefined messages answered by these objects are omitted.

There are several messages that every object should be able to answer. Rosetta Smalltalk supplies default methods for answering these messages to every new class. These are:

- `..print` = print the title of the object's class in brackets
- `..is?` = reply the object's class
- `..is(c)` = reply *yes* if the object is an instance of class *c*; otherwise reply *no*

Usually the default print method gets replaced by something more useful.

The classes *Atom*, *Number*, *String*, and *List* are primitive classes. We use these objects for variables, arithmetic, and data storage. These classes use familiar notation for concepts found in other languages, such as arithmetic and assignment.

Atoms are LISP-like symbols used as variable names and syntactic tokens in messages. When an atom receives a message of the form `... ← (ob)` it will bind itself to the object *ob* in the current context. Binding occurs under the rule of dynamic name scoping discussed earlier. The message `... eval` sent to an atom replies with the object to which it is bound.

The atom spelled "@@" is always bound to an object called *quote*, which receives a single unevaluated parameter and replies with that parameter. And object may thus be referred to literally in a message by preceding it with @. For example, the result of evaluating @ *x* is just the atom *x*. An "assignment statement" in Smalltalk hence looks like @ *x* ← 3. After this assignment the atom *x* is bound to the number 3.

Atoms also answer messages to print themselves, obtain their print names, and inquire whether one atom is the same as another.

Numbers in our prototype implementation are provided only in the form of small integers. These numbers respond to the usual complement of arithmetic and relational messages. Examples of other messages are

- `97 chars` replies the string "97"
- `97 ascii` replies the string "a"
- `97 print` performs `disp ← 97 chars`
- Strings* are sequences of characters that respond to a rich set of string manipulation messages. For instance, if *s1* and *s2* are strings, then
 - `s1 length` replies the number of characters in *s1*;
 - `s1 + s2` replies the concatenation of *s1* and *s2*;
 - `s1[k]` replies the *k*-th character;
 - `s1[j to k]` replies the substring of *s1* from positions *j* to *k*;
 - `s1 find first s2` replies the position of the leftmost occurrence of *s2* in *s1*

and so on. Strings may also be used as byte arrays which may be selectively updated. For example

- `s1[k] ← "a"` replaces the *k*-th character;
- `s1[j to k] ← s2` replaces a substring of *s1*.

LISTS LIKE STRINGS

Lists are arrays much like strings except that each position of a list can contain any object. Most of the string messages are also answered by lists; one may concatenate two lists, pick out an element of subsequence of elements, or replace elements of a list. Lists also have a method for iterating over their elements. The expression

`1 each x do (x print)`

will print each element of the list *l*. Smalltalk also uses lists to represent programs. A list will respond to the message `... eval` by running itself as Smalltalk code. The Smalltalk interpreter is thus just another method of the class *List*.

Control structures in Smalltalk are implemented by objects which answer messages containing unevaluated code as parameters. Users can easily define new control structures of their own. We have already seen an example of how *do* works. Other control structure objects are briefly discussed below.

The object *if* implements the McCarthy conditional, as found in LISP. The syntax of *if*'s message is

`... (expr) => (@yespart)`

The expression *expr* should evaluate to either *yes* or *no*. If *expr* is *yes*, the *yespart* code is evaluated and the entire list in which the *if* occurs is exited. For example,

`(if i < j => (i print). j print)`

will print the smaller of *i* and *j*. If the value of *expr* is *no*, *if* does nothing and replies immediately with itself. This permits a series of

else-if tests to be cascaded together, as in

- `if x < node val => (left)`
- `x > node val => (right)`
- `x = node val => (found)`

The object *for* implements a for-loop control structure. It answers a message of the form `... (@var) ← (lb) to (ub) do (@code)`. For example, the expression `for k ← 1 to n do (k print. cr)` will print the first *n* integers on separate lines.

The object *repeat* implements an infinite-loop control structure. Control leaves the loop when either the user interrupts, or the object *done* is invoked. For instance, `repeat (read eval print. cr)` is a typical Smalltalk dialog loop.

The object *done* performs single level exits from *for*, *do*, and *repeat* loops, and from the list iteration method for the `"... each"` message. A use of *done* may optionally exit a loop with a reply, which becomes the reply of the loop itself. Thus the loop `repeat (if i < j => (@i ← i + 1). done with "ok")`

will reply with the string "ok" when *i* becomes greater than or equal to *j*.

SMALL-TALK INPUT

Smalltalk input is done primarily with the objects *kb* and *read*. *Kb* will wait for a single keystroke and reply with the ASCII code of the key depressed. The object *read* is used to input Smalltalk tokens or untokenized lines of characters. A token is any instance of one of the classes *Atom*, *Number*, *String*, or *List*. *Read* can thus read anything from a single number to an entire Smalltalk program. By default, *read* reads from the keyboard and echoes in the window named *disp*; its reply is a list of the tokens read. The following messages to *read* are also defined:

- `read in w` echoes input in window *w*;
- `read of ob` *ob* can be a string or any object that replies to the message `... next` with a character: result is as if the characters were typed at the keyboard but no echoing occurs;
- `read line` replies a string of the characters typed, which are echoed in *disp*;
- `read line in w` like *read line* but echoes in window *w*.

Windows display themselves as rectangular areas on the screen, optionally bordered by a frame. Each window has its own size, screen location, text buffer, cursor, and status bits. Each window may be written into, scrolled, cleared, moved, changed in size, and so on independently of the rest of the screen.

Examples of some messages to windows include:

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CIRCLE 104 ON READER CARD

Although the prototype implementation of Rosetta Smalltalk was deliberately kept simple, the system's performance is encouraging.

w ← "some text" writes the text in *w* at the current position of its write cursor;

wclear fills the text buffer with blanks;

wunframe erases *w*'s frame;

wat 2 1 sets *w*'s cursor to its line 2 and column 1;

while erases *w* from the screen; previously obstructed parts of other windows are brought into view;

wshow displays *w* on the screen;

wgrow to 10 30 gives *w* 10 lines of 30 characters each;

wmove to 15 1 moves *w* to line 15, column 1 of the screen;

wscroll scrolls the text in *w* up by one line.

The class *File* provides sequential and random access to secondary storage. The contents of a file are a sequence of bytes. Examples of file messages include:

fopen "x" opens *f* for output with filename "x";

f ← "some text" writes the text to *f*;

fseek n sets *f*'s position to its *n*-th

fnext byte; reads the next byte from a file open for input;

fend replies *yes* if at end of file;

fclose closes the file.

The object *lp* is used to write to a hard-copy device. *Lp* answers some of the same messages as do windows; in particular, *lp* ← "print it" prints the text "print it" on the line printer.

As mentioned earlier, all atom bindings not local to a particular message sending context are made in the user's workspace. A list containing all the atoms so bound can be obtained from the object named *vars*. The object *erase* will remove variables from the workspace, e.g., *erase (x y z)*.

New classes are created by sending the message *new* to the class named *Class*. The messages and methods of a class may be changed by using the messages

answer (message) by (method)
forget (message)

The method for a particular message may be obtained by sending

method for (message)

The *messages* message to a class will

reply with a list of all its message patterns. Messages for changing the other parts of a class also exist. A class can be edited using the hypertext editor by sending it the message *edit*.

SYSTEM WAS KEPT SIMPLE

Our prototype implementation of Rosetta Smalltalk, which currently runs on two different Z80-based personal computers, was intended as a feasibility demonstration and design tool rather than a finished product; its implementation was deliberately kept simple even where it was clear that special-case optimizations would be needed for adequate performance.

Despite this the system's performance is encouraging. The basic system we have described occupies about 16K bytes, consisting of 12K of machine code and 4K of predefined objects. This does not include the workspace. No thorough benchmarking has been done, but an in-memory bubble sort runs seven times slower than the same algorithm in interpreted BASIC on the same machine. We believe we have learned enough from our prototype to design a new version of the system with performance comparable to BASIC.

Our experience in using Rosetta Smalltalk, though limited, has also been encouraging. We have created a number of extensions ranging from menu-driven drawing tools to a simple discrete-event simulation system. In addition, we built several versions of the hypertext editor in Smalltalk before manually translating it into assembly language. Only a few persons besides ourselves have used the system, but they have reacted enthusiastically.

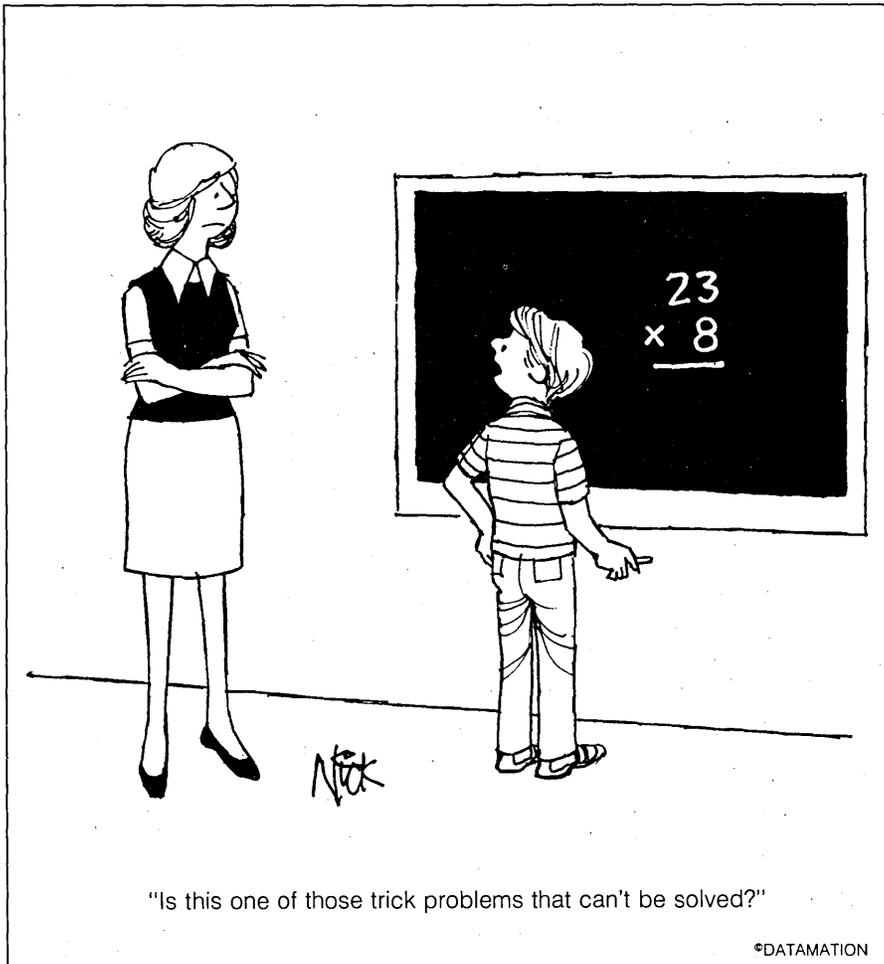
We are aware of a number of limitations in our present system; some are the result of deliberate design tradeoffs, some are due to the simple implementation of the prototype, and some are imposed by our target machines. These limitations include:

No declarations: This is a simplification for the novice and is traditional in highly interactive languages, but the drawbacks are lost security and the necessity for interpretation; we plan to add an incremental declaration facility in a later version.

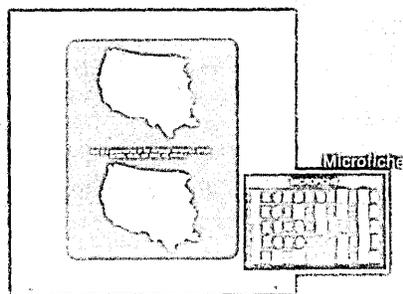
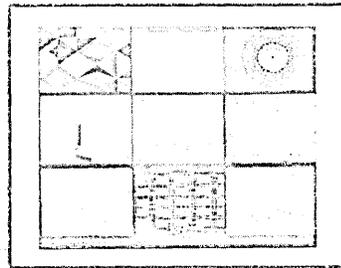
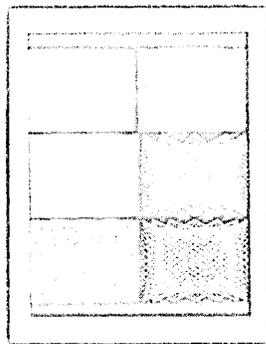
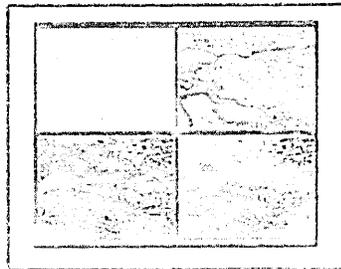
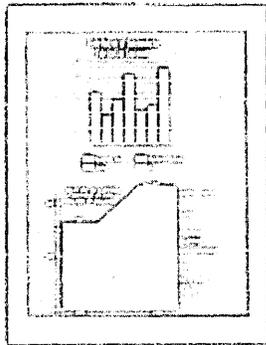
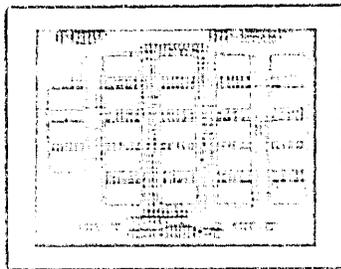
Dynamic parsing: In the absence of declarations, message pattern recognition must be interleaved with evaluation; message patterns allow a friendly, readable syntax and easy syntactic extensibility, but can be confusing if deeply nested or if one is not familiar with the classes of intended message receivers; also, code may be parsed in an unexpected way if the class of a message receiver is not what was expected.

No subclass capability: The use of the subclasses makes the effort involved in defining a new class less, but it is difficult to provide in our prototypes' implementation of parsing.

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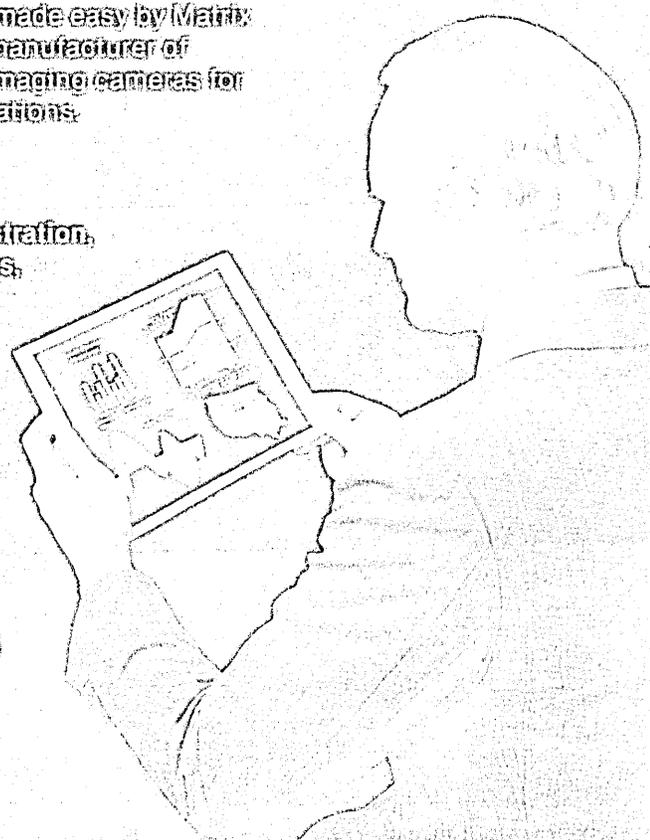
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Programmers and nonprogrammers alike readily accept the metaphor of active objects communicating by sending messages.

No coroutines: As with subclasses, this desirable feature was sacrificed in favor of simplicity in the prototype.

Low bandwidth: Of course our target machines do not have the high-resolution graphics or the computational resources of PARC's interim Dynabooks; still, our system is qualitatively similar to PARC's.

No applications software: The most serious limitation of our present system is the lack of

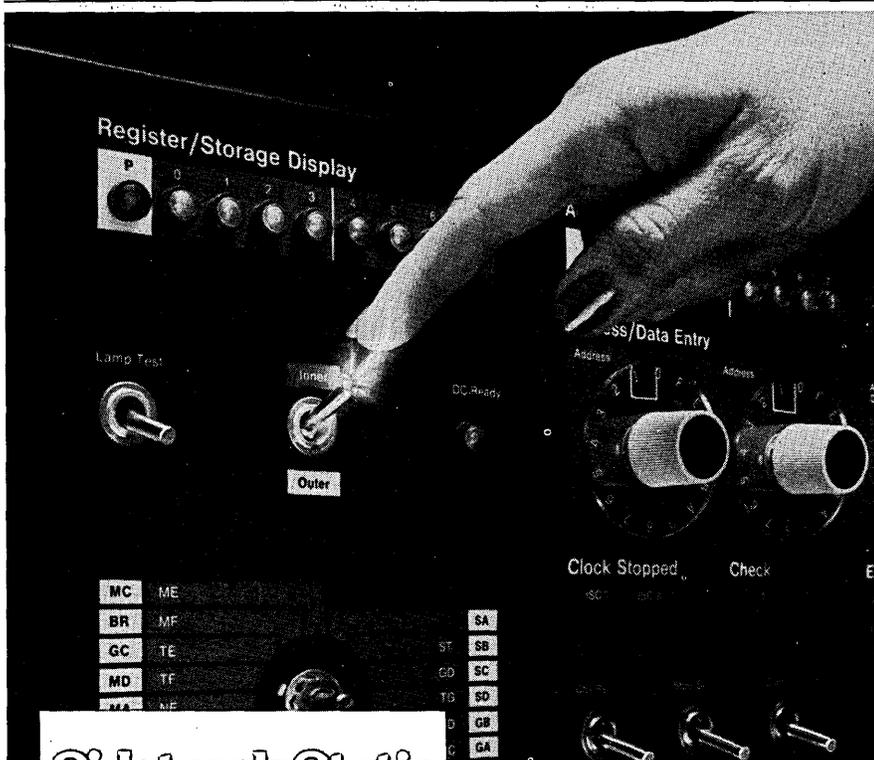
the application extensions that would make Rosetta Smalltalk a full-fledged personal information handling system.

Rosetta Smalltalk is a system offering a rich interactive style, a fully conversational language, a single uniform notation for all operations, syntactic and semantic extensibility, and the modularity to permit building general tools.

But perhaps its most important

characteristic for personal computing is its friendliness. The notion of communicating with intelligent objects has an anthropomorphic flavor which puts abstract data types in a lively, concrete setting. The idea of classes is based on the familiar idea of grouping objects that share common properties.

The Rosetta Smalltalk syntax has a pleasant, readable appearance because syntactic extensibility allows a suggestive notation to be chosen for every operation. Our experience and that of Xerox's Learning Research Group show that programmers and nonprogrammers alike readily accept the metaphor of active objects communicating by sending messages, and can effectively use the powerful tools for abstraction and extensibility that Smalltalk provides. *



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SCOTT K. WARREN



Dr. Warren is president of Rosetta, Inc., and one of the designers of the Rosetta Smalltalk system. He has worked on programming

languages for microcomputers since 1976. Previously he was a founding partner in a software house specializing in interactive information systems for large computers, where he designed and implemented user-oriented command languages. Dr. Warren received his PhD from Rice University in Houston for research into techniques for constructing compilers automatically.

DENNIS ABBE



Mr. Abbe is a vice president of Rosetta, Inc., and one of the designers of the Rosetta Smalltalk system. He spent a year in graduate school at

Carnegie-Mellon University studying artificial intelligence, then took a leave of absence in 1978 to join Scott Warren in implementing Rosetta Smalltalk on a microcomputer. Mr. Abbe received his degree in computer science from Rice University in 1977.

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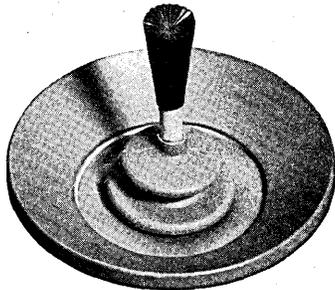
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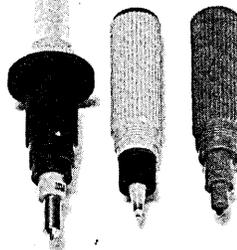
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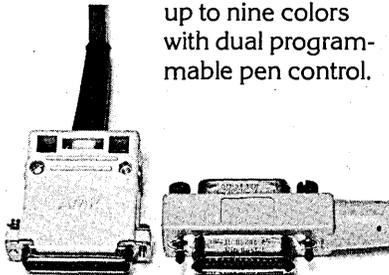


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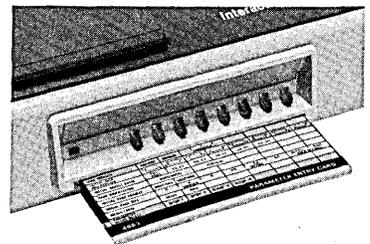
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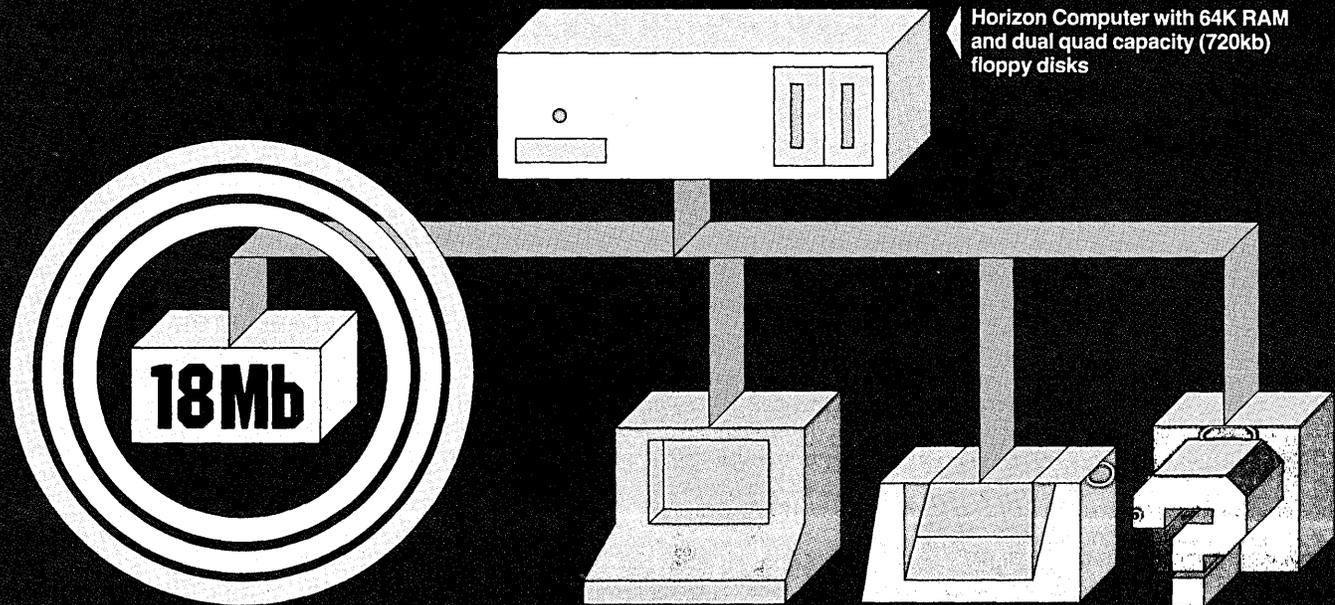
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THE NOMAD APPROACH

by Daniel D. McGracken

Writing software that is reliable, on time, and easy to modify remains today what it has always been: the limit on what we can do with computers. Attacks on this bottleneck have included such improvements as higher level programming languages, report writers, structured programming and design, reusable code, and specialized applications packages. All approaches have helped; none has solved the problem.

Here, we will present another approach: a data base management system combined with a flexible inquiry language. There are a number of systems of this general sort; we will discuss the one with which we are most familiar—NOMAD, which is available on the National CSS time-sharing network and with the NCSS 3200 series computers.

NOMAD can be used by non-dp people to gain quick access to existing data bases. Procedural language, subschemas, and protection of data integrity and security made it suitable for volume data entry by data entry clerks. It also has features for use by dp professionals either to prototype major jobs for improved communication with clients, or for implementing big systems.

Rather than supporting these assertions with abstract discussion, we will show some of the major features in the context of an illustrative application. The example necessarily involves a small data base for simplicity, but the five-year-old NOMAD has several thousand users in a variety of real-world applications, some involving very large data bases. We will conclude with the diary of a terminal session in which we work with a predefined data base of information about the stock holdings of the Jones family.

The numbering of the paragraphs that follow is keyed to the numbers in the left margin of the accompanying terminal session printout. Our input is printed in lower case, the system's response in upper case.

1. While in the CSS time-sharing mode, we print the schema for the illustrative data base. The data base has two masters (groups of data) in a relational implementation. STOCKMASTER is keyed on SYMBOL; INSERT=KEYED guarantees that no two instances of the master will be allowed (by NOMAD) to have identical keys.

For each data item in a master we specify an item name and the format in which it should be printed in reports (the external, or display, format). SYMBOL is three alpha-

```

1 13.22.48 >print jonestok schema

SCHEMA;

MASTER STOCKMASTER INSERT=KEYED(SYMBOL);
  ITEM SYMBOL      A3 HEADING 'STOCK:CODE';
  ITEM STOCKNAME   A25 HEADING 'STOCK NAME';
  ITEM LATESTPRICE $999.99 HEADING 'LATEST:PRICE';
  ITEM LATEDATE    DATE HEADING 'LATEST:PRICE:DATE';

MASTER HOLDING INSERT=KEYED(CODE, OWNER, PURCHDATE);
  ITEM CODE        A3;
  ITEM OWNER       A8;
  ITEM PURCHDATE   DATE HEADING 'PURCHASE:DATE';
  ITEM NOSHARES    9999 HEADING 'NUMBER:OF SHARES';
  ITEM PURCHPRICE  $999.99 HEADING 'PURCHASE:PRICE';
  ITEM CERTNO      A10 HEADING 'CERTIFICATE:NUMBER';
  DEFINE STOCK    EXTRACT'STOCKNAME
                  FROM STOCKMASTER KEY CODE';
  DEFINE PRICE    EXTRACT'LATESTPRICE
                  FROM STOCKMASTER KEY CODE';
  DEFINE PRICEDATE EXTRACT'LATEDATE
                  FROM STOCKMASTER KEY CODE';
  DEFINE MARKETVALUE $999,999 HEADING 'MARKET:VALUE'
                  EXPR = NOSHARES * PRICE;

END;

2 13.23.25 >nomad
NOMAD version 6 04JAN80
>database jonestok
3 >list segment stockmaster

PAGE 1

      STOCK          LATEST
CODE  STOCK NAME    PRICE  DATE
-----
AHG   AMALGAMATED MERCURY    $255.88 01/02/80
AMC   ACME MANUFACTURING     $122.22 01/24/80
CFI   COMPUTING FUTURES INC.   $53.88  01/24/80
CTE   COMBINED TAX EXEMPT FUND $28.39 12/31/79
DDD   DIGITAL DATA DISTRIBUTORS $69.87 01/24/80
OFF   OFFSHORE DRILLING CORP.     $2.16  01/02/80
RLD   RETAIL LUMBER DEALERS     $23.25 01/24/80
USC   UNITED STATES CHROMIUM    $378.50 01/24/80

```

numeric characters, LATESTPRICE is five digits with a dollar sign and a decimal point externally, etc. This is all we have to say; the program figures out the internal formats in which item values are stored in the data base. DATE is a special data type permitting much flexibility in the input and output of dates, as we shall see. For any item that does not have a HEADING entry, the item name will be used as a column heading in reports. If this is not suitable, a HEADING entry can specify the desired heading. Either can be overridden in asking

for the report, as we shall also see.

The DEFINE entries are instructions to NOMAD. The first three specify how to obtain data from the first master while asking for reports based on the second. The last DEFINE, of MARKETVALUE, refers to information that is not stored with the data at all, but is computed whenever needed.

2. Executing the CSS command NOMAD, we are in the interactive NOMAD environment. We specify the data base we wish to use.

NOMAD can be used by non-dp people to gain quick access to existing data bases.

3. We ask to see everything in the segment (master) named STOCKMASTER, and get a report formatted according to the information specified in the schema.

4. We ask for a listing in ascending sequence by stock name, and in ascending sequence by owner within each stock. (The BY calls for this sorting.) For each grouping we ask for the purchase date and the number of shares, and ask for a subtotal on the number of shares within each stock grouping. On the report, these subtotal lines are identified by asterisks; if we had added the modifier LABELST they would have been identified by the stock name instead of an asterisk.

When a command takes more than one line, we place a space and a hyphen at the end of all lines except the last.

5. A table is often the clearest way to present information, such as, for example, the market value of the stocks held by the family members. The ACROSS does this, with an automatic sort on the value of the item named in the ACROSS thrown in. Getting row and column totals is a matter of adding ROWTOT and TOTAL to the specification of what is to be in the body of the report. We could have asked for more than one thing to be reported in the table, with row and/or column totals on none, any, or all of them.

6. Now we would like a summary report showing the lowest and highest prices paid for the stocks owned by the Jones family parents, Fred and Martha, along with the current market value and the total change in value of each stock between the purchase date(s) and the latest price quote.

To compute the value change we use the DEFINE command, which we see can be done at execution time as well as by placing the DEFINE in the schema. Either way, the DEFINE causes the program to make the computation when (and only when) the DEFINED item is referenced. That is, the values resulting from the computation are not stored in the data base at all, but are computed at runtime as needed.

The screening of the data base to include only data for Fred and Martha is done by the SELECT, using an AMONG. The lowest and highest prices are obtained with the MIN and MAX report functions, and in each case we ask for the associated date. As with any date, we can specify the format in which we want it printed; here we ask for month and year. SUM is a report function that returns one value for each group generated by the previous BY. We specify a title, calling for today's date with the &DATE variable that is kept by the system, but in a different format from that of the dates in the body of the report. Since this will be a one-page report, we suppress the otherwise automatic page numbering.

After the report has been printed, we remove the SELECT screen, which would

```

4 list -
  by stock -
  by owner -
  purchdate -
  noshares subtotal for stock

PAGE 1

STOCK          OWNER          PURCHASE DATE    NUMBER OF SHARES
-----
ACME MANUFACTURING  FRED          02/29/72         40
                  MARTHA        08/01/74         40
*
                  80

COMBINED TAX EXEMPT FUND  FRED JR      06/01/78         60
                  12/01/78         70
                  JANE         06/01/78         60
                  12/01/78         70
                  MARTHA       06/01/78         60
                  12/01/78         70
*
                  390

COMPUTING FUTURES INC.  FRED          06/13/79         20
                  FRED JR      06/13/79         50
                  JANE         06/13/79         50
*
                  120

OFFSHORE DRILLING CORP. FRED          02/29/72         100
                  02/20/76         400
*
                  500

UNITED STATES CHROMIUM  FRED          02/25/77         20
                  03/29/78         10
                  03/20/79         10
                  07/09/79         20
*
                  60

```



```

5 list -
  by code -
  across owner -
  sum(marketvalue) rowtot total

PAGE 1

CODE          FRED SUM MARKET VALUE  FRED JR SUM MARKET VALUE  JANE SUM MARKET VALUE  MARTHA SUM MARKET VALUE  TOTAL SUM MARKET VALUE
-----
AMC           $4,888
CFI           $1,077      $2,694      $2,694
CTE           $1,080      $3,690      $3,690      $3,690      $11,070
OFF           $22,710
USC           $22,710
=====
$29,755      $6,384      $6,384      $8,578      $51,101

```

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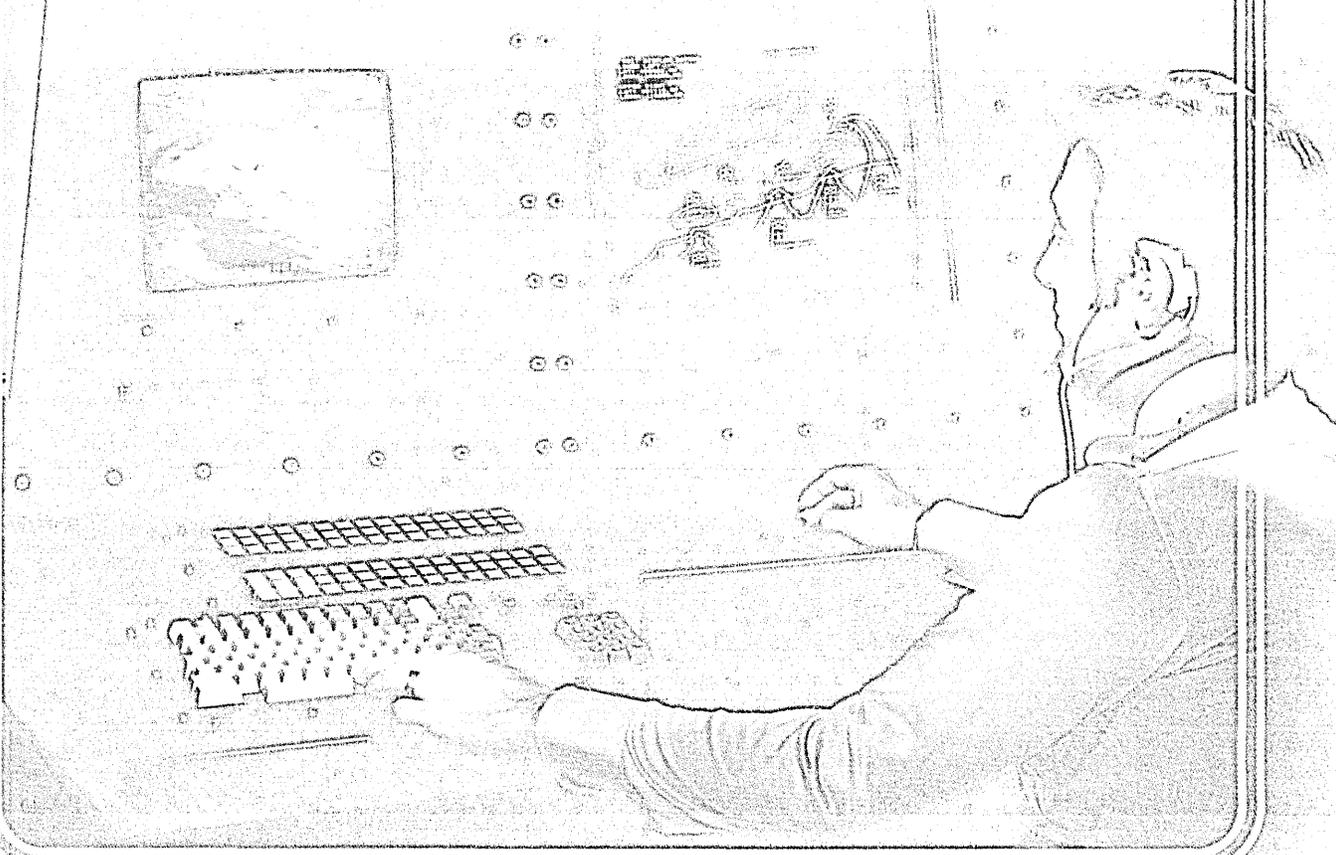
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Dp professionals can use NOMAD to prototype major jobs for improved communications with clients.

otherwise apply to all subsequent operations in this terminal session.

7. As noted, this application was implemented using the relational model. (NOMAD also supports the hierarchical model.) This means, among many other things, that we can ask for reports in terms of the relationships between contents of different masters. For example, suppose we want a report showing which of the stocks in STOCKMASTER the Jones family does not own. The LIST request here says to prepare a report in sequence by SYMBOL, the name of the three-letter code on which STOCKMASTER is sequenced, but REJECT any value of SYMBOL for which there is a MATCHING value of CODE, the name of the three-letter code on which HOLDING is sequenced. This leaves those stocks in STOCKMASTER that are not in HOLDING; for each of these we also print the name of the stock. Other relational operators are MERGE, SUBSET, and EXTRACT.

Although NOMAD is a relational data base system, the usual terminology of that field (domain, n-tuple, Cartesian product, third normal form, etc.) has not been used, in an attempt to make the system more widely understood by general business users.

8. All the previous examples have involved producing reports from previously loaded data. NOMAD also has facilities for loading and maintaining data bases. The LOAD command can be used both to enter data into a data base initially and to maintain an existing data base. In either case, the external file is not required to have been established with this purpose in mind, and need not have been written by NOMAD.

For an example in our context, suppose we have a file containing today's prices for certain stocks. For simplicity, we'll assume that this update information is identified with the same three-character stock code we use here. We begin with a CSS FILEDEF command to identify the file, which could be a tape, card deck, sequential or ISAM file, or whatever, regardless of the type of program that wrote it. Then the LOAD command specifies that the STOCKMASTER master is to be updated: when the code in the external file matches that of an instance in STOCKMASTER, LATESTDATE is to be given today's date and LATESTPRICE is to be changed using the value from the external file. Nonmatching updates are simply to be ignored. For items in the external file that are in a different format from the way they appear in STOCKMASTER, we specify the necessary format data.

NOMAD's report that 67 transactions were rejected means that the external file contained data on stocks not in STOCKMASTER.

An ISAM file containing market update information is, in fact, commercially available. Since it contains data on tens of thousands of stocks and bonds, it would be

```
6  define valuechange as $999,999 heading 'value:change' -
    expr = (price - purchprice) * noshares

select owner among('fred', 'martha')

list by code -
  min(purchprice) heading 'lowest:price' -
    with purchdate heading 'as of' as date'mm-yy' -
  max(purchprice) heading 'highest:price' -
    with purchdate heading 'as of' as date'mm-yy' -
  sum(marketvalue) total -
  sum(valuechange) total -
  title 'fred and martha's stocks as of' -
    &date as date'dd mon yy' -
  nopageno
```

FRED AND MARTHA'S STOCKS AS OF 03 FEB 80

CODE	LOWEST PRICE	AS OF	HIGHEST PRICE	AS OF	SUM MARKET VALUE	SUM VALUE CHANGE
AMC	\$97.50	02-72	\$115.75	08-74	\$9,776	\$1,246
CFI	\$37.88	06-79	\$37.88	06-79	\$1,077	\$320
CTE	\$32.97	12-78	\$34.19	06-78	\$3,690	\$-668
OFF	\$0.88	02-72	\$1.88	02-76	\$1,080	\$240
USC	\$220.00	03-78	\$301.50	07-79	\$22,710	\$7,052
					=====	=====
					\$38,333	\$8,190

```
select clear
```

```
7  list by symbol -
    stockname -
  reject matching code -
  title 'stocks in stockmaster not held by jones family'-
  nopageno
```

STOCKS IN STOCKMASTER NOT HELD BY JONES FAMILY

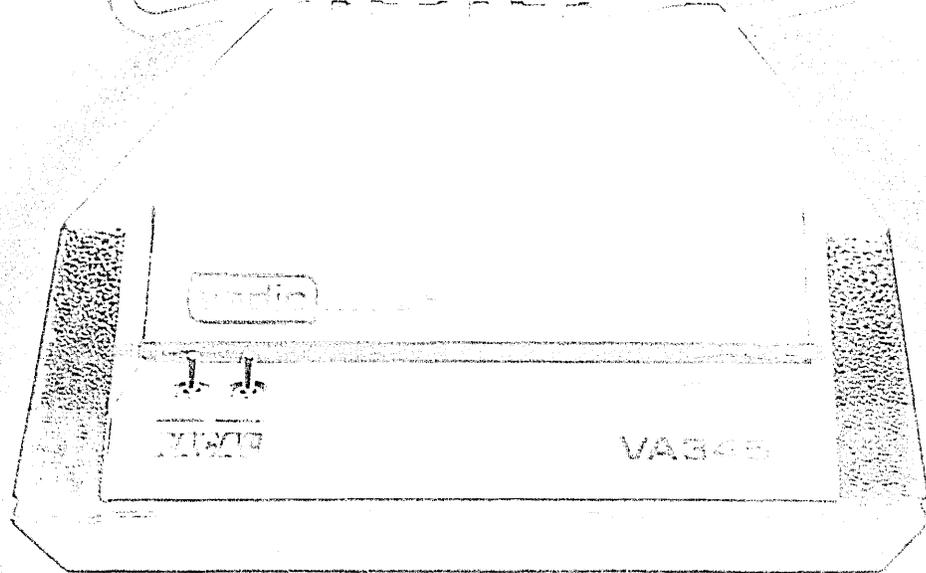
STOCK CODE	STOCK NAME
AHG	AMALGAMATED MERCURY
DDD	DIGITAL DATA DISTRIBUTORS
RLD	RETAIL LUMBER DEALERS

```
8  css filedef infile dsk updates data

load stockmaster -
  onmatch change latestdate = &date -
    latestprice -
  nomatch noinsert -
  read infile -
  set -
    &symbol -
    space -
    &latestprice form n5.2
```

```
LOA340: 67 INPUT TRANSACTIONS REJECTED.
NOMAD:
>quit
```

Triple Modem



Dear Ma,

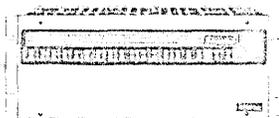
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We have a chance to see the implications of the proposed changes before making them.

inefficient to read the entire file with the LOAD, only to reject all but a tiny fraction of the total records. Instead, we would use DEFINE EXTRACT to obtain only those records that match stocks in our data base, which can be done rapidly.

9. We want to enter some new data shortly, and we're not happy with the data base design and organization. We would like to be able to identify the exchange on which each stock is traded—which requires a new item in STOCKMASTER—and we want to delete the certificate number item from HOLDING since it has not turned out to be as useful as we expected.

Getting out of NOMAD by typing QUIT, we invoke the text editor and make these changes in the schema.

10. Now we recompile the schema using SCHEMA, adding the optional word REORG to specify that the data base should be reorganized to reflect these changes, which of course impact the existing stored data as well as future data entry. Since adding one item and deleting another changes the entire contents of the data base, which could cause a great deal of pain if done incorrectly, NOMAD gives us a chance to see the implications of the proposed changes before making them. We could also have changed item lengths, added new aliases, headings, or DEFINES, brought in entire new masters, etc.

The REORG option is a powerful feature, responding, as it does, to the routine need to make changes long after systems are up.

11. We ask to see the first instance of STOCKMASTER. The newly added data item EXCHANGE has automatically been given the NOMAD value for missing values: "N/A", which is used to designate "not available" or missing—data. Using the interactive NOMAD CHANGE command, we change the N/A for stock exchange (EXCHANGE) to AMEX, move to the NEXT instance of STOCKMASTER and make its exchange NYSE, and move to the third instance and make its exchange OTC. We won't bother to change the others.

12. Now we want to enter some new data. We choose to have the program prompt us for the values of each STOCKMASTER item.

13. We want to enter data about three new purchases, all made by Fred. We give values to an & variable corresponding to the item for owner, then ask the program to prompt us for the other item values in STOCKMASTER three times. Getting impatient, we try to enter a date where we should have been entering a lot size; since the formats don't match, the value is rejected. Two impossible dates are likewise rejected.

Note, incidentally, that dates were entered here in four different formats, without any special notification to the program; with minor changes we could have entered dates in

```

9 13.28.34 >edit jonestok schema
EDIT:
>locate /stockname/
ITEM STOCKNAME A25 HEADING 'STOCK NAME';
>insert item exchange a8;
>locate /certno/
ITEM CERTNO A10 HEADING 'CERTIFICATE:NUMBER';
>delete
>file

10 13.29.19 >schema jonestok reorg
INTENDED CHANGES:

MASTER STOCKMASTER
ADD ITEM EXCHANGE

MASTER HOLDING
DELETE ITEM CERTNO

DO YOU WANT TO MAKE THE ABOVE CHANGES?(YES/NO)>yes

13.29.55 >nomad
NOMAD version 6 04JAN80
>database jonestok
11 >first stockmaster
AHG AMALGAMATED MERCURY N/A $255.88 01/02/80
>change exchange = 'amex'
AHG AMALGAMATED MERCURY AMEX $255.88 01/02/80
>next stockmaster
AMC ACME MANUFACTURING N/A $122.22 02/03/80
>change exchange = 'nyse'
AMC ACME MANUFACTURING NYSE $122.22 02/03/80
>next
CFI COMPUTING FUTURES INC. N/A $53.88 02/03/80
>change exchange = 'otc'
CFI COMPUTING FUTURES INC. OTC $53.88 02/03/80
12 >prompt stockmaster
SYMBOL=>ssf
STOCKNAME=>special situations fund
EXCHANGE=>otc
LATESTPRICE=>23.98
LATEDATE=>jan. 24, 1980
SSF SPECIAL SITUATIONS FUND OTC $23.98 01/24/80
13 >&owner = 'fred'
>prompt code noshares purchprice purchdate do 3
CODE=>ssf
NOSHARES=>50
PURCHPRICE=>23.98
PURCHDATE=>24 january, 1980
SSF FRED 01/24/80 50 $23.98
CODE=>cfi
NOSHARES=>100
PURCHPRICE=>53.88
PURCHDATE=>24 jan 80
CFI FRED 01/24/80 100 $53.88
CODE=>usc
NOSHARES=>1/24/80
PRO157: 1/24/80 - INVALID FORMAT
NOSHARES=>10
PURCHPRICE=>369.50
PURCHDATE=>1/32/80
DAT190: INVALID INPUT DATE '1/32/80'
ASG239: EXPRESSION CANT BE EVALUATED FOR &PURCHDATE
PURCHDATE=>2/29/81
DAT190: INVALID INPUT DATE '2/29/81'
ASG239: EXPRESSION CANT BE EVALUATED FOR &PURCHDATE
PURCHDATE=>2/29/80
USC FRED 02/29/80 10 $369.50

```

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2000 Position Char/Display	STD	—	—	—	—	STD
25th Line	STD	—	—	—	—	STD
15-Inch Diagonal Screen	STD	—	—	—	—	—
128 Display Symbols	STD	—	—	—	—	STD
Reverse Video	STD	—	STD	STD	—	STD
UP/DN/RH/RET Cursor Positioning	STD	—	STD	STD	STD	STD
Selectable Cursor Blinking	STD	—	STD	—	—	STD
Detachable Keyboard	STD	—	OPT	—	—	STD
Program Function Keys	STD	—	—	STD	OPT	STD
Numeric Key Pad	STD	OPT	—	STD	OPT	STD

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A procedure can send user-specified error messages for unacceptable data.

other formats as well.

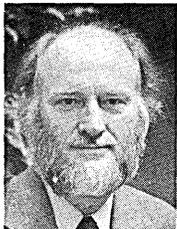
14. Here, we'll prepare a report in decreasing sequence of average purchase price for each stock, showing also the number of lots, the number of shares, and total market value.

A report like this, along with some of the others, would probably be needed on a routine basis. It would be poor practice to require that such requests be typed in each time the reports are needed, which is slow and error-prone. NOMAD provides a procedural mode in which we can prepare a file containing the procedure; its name then becomes—for us—a new command. A procedure is in effect a user "program" written in NOMAD commands; any command that can be issued interactively can also be issued from within a NOMAD procedure. A procedure can prompt for input, send user-specified error messages for unacceptable data, call other procedures, INCLUDE prewritten procedure sections, and use DO-groups in IF-THEN-ELSE constructions, among other things.

In running this example we begin by invoking the text editor to create a procedure named AVRPRICE to carry out the needed actions. After entering the text we print the file to check for errors, then file it and execute it by typing its name as a (new, for us) command. Observe that in a procedure hyphens are not needed, since each command is terminated with a semicolon.

The procedure begins by creating a temporary data base containing the information needed for the report, using an expression in a CREATE command, modifying headings, employing report functions, specifying formats (the AS 9999), and naming some of the created items for simplicity in the following LIST. The LIST then produces the report. Note here the departure from prior indentation conventions: five item names appear on one line. All such conventions are at the discretion of the user. *

DANIEL D. McCracken



Daniel D. McCracken is an author and consultant who has been a frequent contributor to DATAMATION. He is currently

completing his two-year term as president of the Association for Computing Machinery (ACM). His latest book is *A Guide to NOMAD for Applications Development*, (Addison-Wesley, Reading, Mass., 1980).

```

14 >edit avrprice
NEW FILE.
INPUT:
>define lotprice as 999999 expr = purchprice * noshares;
>
>define exch as extract'exchange
>   from stockmaster key code'
>;
>
>create by code
>   first(exch) heading exchange
>   (sum(lotprice) / sum(noshares)) as $999.99
>   heading 'average:price' named averprice
>   number(stock) as 9999 heading 'lots' named lots
>   sum(noshares) heading 'shares' named shares
>   sum(marketvalue) heading 'value' named market
>;
>list from temp
>   by averprice desc
>   code exch lots shares market
>   total all
>nopageno
>;
EDIT:
>top
>print 99
DEFINE LOTPRICE AS 999999 EXPR = PURCHPRICE * NOSHARES;

DEFINE EXCH AS EXTRACT'EXCHANGE
FROM STOCKMASTER KEY CODE'
;

CREATE BY CODE
FIRST(EXCH) HEADING EXCHANGE
(SUM(LOTPRICE) / SUM(NOSHARES)) AS $999.99
HEADING 'AVERAGE:PRICE' NAMED AVERPRICE
NUMBER(STOCK) AS 9999 HEADING 'LOTS' NAMED LOTS
SUM(NOSHARES) HEADING 'SHARES' NAMED SHARES
SUM(MARKETVALUE) HEADING 'VALUE' NAMED MARKET
;

LIST FROM TEMP
BY AVERPRICE DESC
CODE EXCH LOTS SHARES MARKET
TOTAL ALL
NOPAGENO
;
EOF:
>file
NOMAD:
>avrprice

AVERAGE
PRICE CODE EXCHANGE LOTS SHARES VALUE
-----
$276.46 USC N/A 5 70 $26,495
$106.63 AMC NYSE 2 80 $9,776
$45.15 CFI OTC 4 220 $11,853
$33.52 CTE N/A 6 390 $11,070
$23.98 SSF OTC 1 50 $1,199
$1.68 OFF N/A 2 500 $1,080
=====
20 1310 $61,473

NOMAD:
>quit
13.50.15 >

```

With Kodak film... get it on, get it out. Faster, cheaper.

These days, every impact your printer makes on paper makes an even bigger impact on your budget.

Consider that in 1978 you had to pay about \$18.64* for 1000 pages of 3-part computer paper.

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That's why it makes more sense to use a Kodak Komstar microimage processor. This dry laser printer doesn't use *any* paper. It prints on microfilm, instead. Rather than spending \$29.00 to print a 1000-page, 3-part report, you'll spend only about \$1.00—the price of 9 microfiche.†

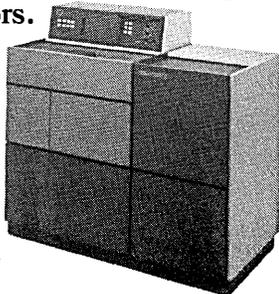
A Kodak dry laser printer works on-line *or* off-line. It's 6-8 times faster than an impact printer, which means you'll save more on time and labor. Decollating, bursting, binding, and packaging a 1000-page report takes almost 50 minutes against only 9 minutes to print, duplicate, and package the *same* report on microfiche.

If savings like these interest you, send us the coupon for more information. Or ask your Kodak representative for a demonstration of Kodak Komstar microimage processors.

Better do it soon, though. Because you'll never know how much you can save on paper until you start using a printer that never needs any.

*Prices vary with geographic location and grade of paper purchased.
† Includes one original set and two duplicate sets.

Kodak Komstar microimage processors.



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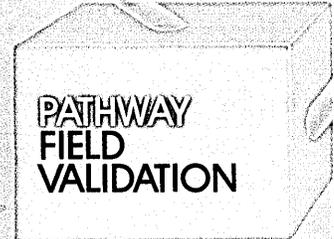
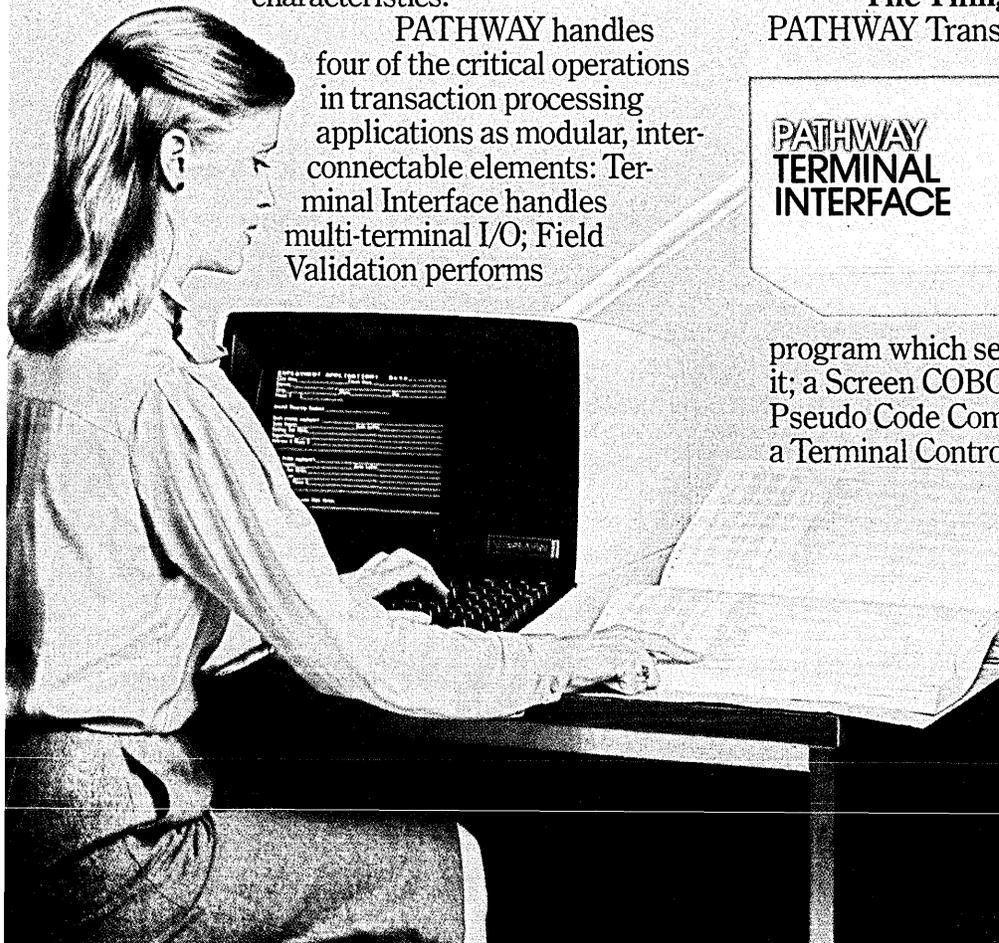
data consistency checks; Data Mapping controls data conversion and formatting; and Transaction Control covers application and transaction flow. Each resource is partitioned, with well-defined interfaces between them. This is the secret to a modular systems' success. It allows optimized utilization of all the resources and permits additional resources to be dovetailed into the system as needed—without rewrite, without redesign and without degrading system performance.

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The Things You Can Forget. The PATHWAY Transaction Processing System capabilities include an Interactive Screen Builder which builds the screens interactively at a terminal, independent of the application

program which serves it; a Screen COBOL Pseudo Code Compiler; a Terminal Control

Program to interpret the pseudo code library and



AS BATCH.

check the flow and content internally; the Applications Monitor which has power to create, track and alter the application run time environment; and finally the Application Monitor Control Language which lets an operator communicate with an active Application Monitor. It's a powerful system, easy to use and inexpensive. With everything you need to get your on-line transaction applications up and running, with all the benefits of a NonStop™ System, in record time.

Dynamic Load Balancing. It comes from taking logical advantage of the multi-processor environment. There is no need for the programmer to consider load balancing with the PATHWAY Transaction Processing System. It's handled automatically; with additional copies of PATHWAY applications started in designated CPUs as needed. And deleted when no longer required. Dynamic load balancing—built into the system's resource management capabilities.

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PATHWAY DATA MAPPING

Because terminal mapping translates physical into logical characteristics, programmers can forget about code signal conversions and call on terminals by name. And there's one more major advantage of the PATHWAY Transaction Processing System: one

PATHWAY TRANS- ACTION CONTROL

system can be used for convenient development, testing and production of application packages.

The Tandem NonStop™ System. Even when it wasn't this easy, it was miles ahead in the on-line world. With immediately available alternatives in all hardware and software elements, the NonStop™ System can go right around any failed element and never skip a beat. Even when a failure occurs in a processor, an I/O Channel, a disc, or a disc controller. Remarkable.

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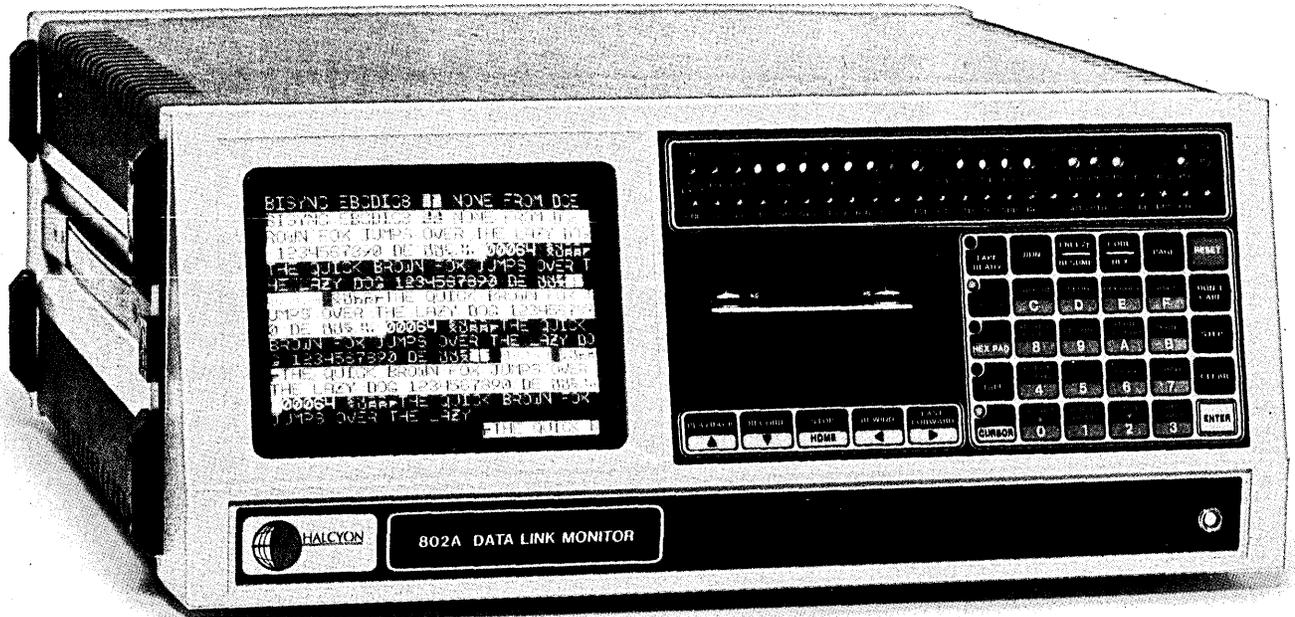
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When you consider the instrument's extensive timing, counting, and trapping capability, that 500K

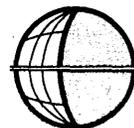
represents a lot more than raw data. A relatively inexperienced technician can collect the data, then bring it back for expert analysis: Everything from the efficient solution of transmission problems to the accumulation of statistics on response time, block lengths, and so on.

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And don't forget transmitting capability. You can poll terminals, send a block of just-received data to a terminal or printer, or perform bit error rate tests (BERT). Not many monitors can do that.

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A user tries to get his malfunctioning new microcomputer system to work, but falls between two vendors.

DIARY OF A MULTI-VENDOR PURCHASER

by **Ronald S. Lemos**

July 2, 1978

The School of Business received a Motorola 6800 microcomputer system today. It has 32K of memory, a dual floppy disk, and a printer. The entire system can fit on one desk and supports not only BASIC, but FORTRAN and COBOL as well. It was acquired in connection with some governmental contract work, but we teachers have been encouraged to use it for instructional purposes. Since students will be using these systems in the future, it makes sense to incorporate microcomputer systems into our programs. I'll look into this further.

Sept. 2, 1978

After using the microcomputer in my classes during the past quarter, I am convinced it is an effective instructional tool. Students deal with the actual hardware, work directly with the system software, are directly involved in computer operations, and learn maintenance responsibility. The biggest problem is that a single-user microcomputer is not enough to handle the volume of students in our course (1,200 students per year in our introductory computer courses alone). We need more microcomputer systems, preferably with multi-user access capabilities. These resources could also be used to handle some of the instructional workload of the almost saturated minicomputer.

Oct. 18, 1978

After some heated discussion, the department has decided to use 1978/1979 equipment allocations to purchase another microcomputer system. About \$15,000 is available. The opponents of this decision felt that the money would be better spent buying additional terminals to hang on the current minicomputer. They also felt the department was inviting trouble by "going into the computer center business." While these are valid points, I have become partial to the microcomputer. In any event, I have been given the responsibility of developing the proposal.

Jan. 3, 1979

What a hectic winter quarter! Writing the proposal was tough—revision after revision. After evaluating seven microcomputer systems, I found only one that had multi-user capabilities and could be configured with four crts and a printer for around \$15,000. However, just as the proposal was completed, it was brought to my attention that requests for microcomputer purchases could be expedited if the cost estimates were under \$10,000. Some quick rewriting resulted in two proposals. One proposal was for the microcomputer system with 128K and dual floppy disk drive—\$8,900. The other proposal was for the four crt terminals and printer estimated at \$6,465. I hope both proposals are approved.

May 27, 1979

Both proposals approved. Invitation For Bids have been sent out.

June 7, 1979

Found out (Vendor A called me) that the bids have been awarded—to two different vendors. Vendor A will supply microcomputer system and Vendor B will supply the four crts and the printer. I am pleased. I might get the chance to use this equipment this summer and then in my classes this fall.

June 14, 1979

The purchase order for the four crts

and the printer have been sent to Vendor B.

June 25, 1979

The crts and the printer have arrived. They look just great. I can hardly wait to get them hooked up.

June 27, 1979

The purchase order for the microcomputer system has been sent to Vendor A. Soon the system will be ready to go.

Sept. 25, 1979

The microcomputer system has finally arrived. It would have arrived earlier if there hadn't been a misunderstanding on the purchase order which necessitated redoing the memory configuration. However, after the field engineer set the system up he could not get the printer to work. He has promised to get a more experienced hardware and software person to come out and solve the problem.

Oct. 3, 1979.

The field engineer returned with the maintenance contractor used by Vendor A. He then ran the maintenance checks on the printer that are described in the manual. He could find nothing obviously wrong with the printer. Then he started in on the microcomputer system. For several hours he made changes to the system files and the microcom-

After the field engineer set the system up, he could not get the printer to work.

puter hardware (clipping leads, changing cables, taking meter readings, etc.). I tried to keep out of the way. All combinations of adjustments were to no avail. He finally got the printer to work by adjusting the system software and the hardware switches to run the printer at 300 baud. I had been told that the printer would be able to run at 2,400 baud; this is what we need. After more attempts to get the printer to run at higher baud rates, the technician concluded the problem had to be in the printer since the microcomputer had been checked out by Vendor A, and in rechecking it he could find nothing wrong. The "official" line was that the printer was not handshaking with the computer.

Oct. 4, 1979

Called Vendor B about the printer problem. It checked its records and told me that while there was a 90-day warranty from the peripherals manufacturer, the warranty from the vendor (a different firm) was for 30 days. Since we had received the equipment on June 25, the warranty period had expired and service requests were to be directed to the manufacturer.

I understood his position, but told him that our particular circumstance precluded testing the equipment when it arrived since we did not receive the microcomputer until four months later. My argument of keeping with the spirit of the warranty instead of the letter was not successful. However, he did offer to troubleshoot for me over the telephone. After directing me through several hardware tests of the printer, he concluded that the problem was not in the printer but in the computer system (hardware and/or software).

Oct. 5, 1979

Vendor A reaffirmed its belief that the problem was with the printer, but did invite me to bring the computer and printer to its store (about 10 miles away) for further testing. I declined for the time, deciding to learn more about the system so I could communicate effectively with both vendors.

Oct. 18, 1979

After working with the system for almost two weeks, I learned quite a bit but could not get the system to work properly. To settle the question once and for all, I decided to take the printer to Vendor A to see if the printer would work on its computer system. (The system was running the exact printer we had purchased.)

I was positive the printer was going to work perfectly on Vendor A's system. However, when we set it up, it refused to work. Vendor A conceded something might still be wrong with our microcomputer system, but suggested that we get the printer fixed as a first step.

A request for service on the printer was then initiated and sent through the necessary administrative channels.

Oct. 30, 1979.

The service order was finally approved and the manufacturer of the printer contacted.

Nov. 1, 1979.

The service man came out to look at our printer. After several tests he concluded that nothing was wrong with the printer. He emphasized that if the printer worked at 300 baud, it should also work at 1,200 or 2,400 baud. Although he was unfamiliar with our computer system, he felt the problem was probably in our interface port. After telling him I had been assured by Vendor A that the computer system had been set up correctly, he telephoned his main office to describe our problem.

After talking with them and rechecking our computer, he said that in addition to having the wrong lead cut on the computer's I/O board (by Vendor A), the problem was that we did not have an option known as a "buffer board." According to him, this buffer board allowed the printer to work at higher baud rates. It cost \$205.

The next order of business was to find out why we didn't receive this important option. It did not make sense that a high performance printer would be sold (\$1,791) to operate at only 300 baud.

The following question was asked: Should we have received the buffer board from Vendor B? Here are the responses:

Printer Manufacturer: We don't know. It is hard to keep track of how all the distributors of our products conduct their business.

Vendor A: All we know is that when we sell that exact printer model, we make no modifications to it and it always works perfectly. It appears to come from the manufacturer ready to go.

Vendor B: If it wasn't specifically mentioned in the purchase order, then it was not sent. (It wasn't, since I hadn't heard of it before and it is not even mentioned in the manufacturer's sale literature.)

Nov. 10, 1979.

Resigned to the fact that we had a high-priced, 300 baud printer, I decided to carry the microcomputer back to Vendor A to set it up for operation at the slower baud rate (it had initially been set up for 2,400 baud) until I resolved the problem of the buffer board. In addition, my familiarity with the system indicated that the configuration of the 128K of memory was not ideal for our needs. Therefore, I asked that it be reconfigured to my specifications (a very nontrivial task). It would be ready in a week.

Nov. 17, 1979.

The computer is not ready. Vendor A is having trouble reconfiguring the system. The printer manufacturer is being very helpful and following up on my problems.

Nov. 19, 1979.

A technician from the printer manufacturer gave me a call. The problem is *not* the buffer board. The buffer board is only necessary for another vendor's equipment.

What is the problem? Is it the computer hardware, computer software, printer, or some combination of these three? At this point, I can just hear my colleagues who were not in favor of purchasing a microcomputer reemphasize the dangers of going into the "computer center" business.

Nov. 20, 1979.

Called the computer manufacturer to remind it of our problems. It will call Vendor A and try to resolve the problems.

Nov. 26, 1979.

The computer manufacturer's systems analyst can't get a hold of Vendor A's technician, so he called me. He knows what the problem is. To get our printer to work properly, the correct leads on the I/O port cables need to be cut and a jumper on a circuit board in the printer has to be positioned correctly. Its conclusion is that there was never anything wrong with either the computer or the printer. The system had just not been set up right.

Nov. 27, 1979.

Contacted Vendor A to relate my conversation with the computer manufacturer. The technician appeared to be surprised about the directions for clipping the I/O port cable leads, indicating that things must have been changed. He agreed to do the work.

Nov. 29, 1979.

Went to Vendor A to pick up the computer. I asked to see the work that had been done, since I was somewhat knowledgeable. I observed that the ports were still set up wrong. After I called this to the attention of the technicians, they set them up correctly.

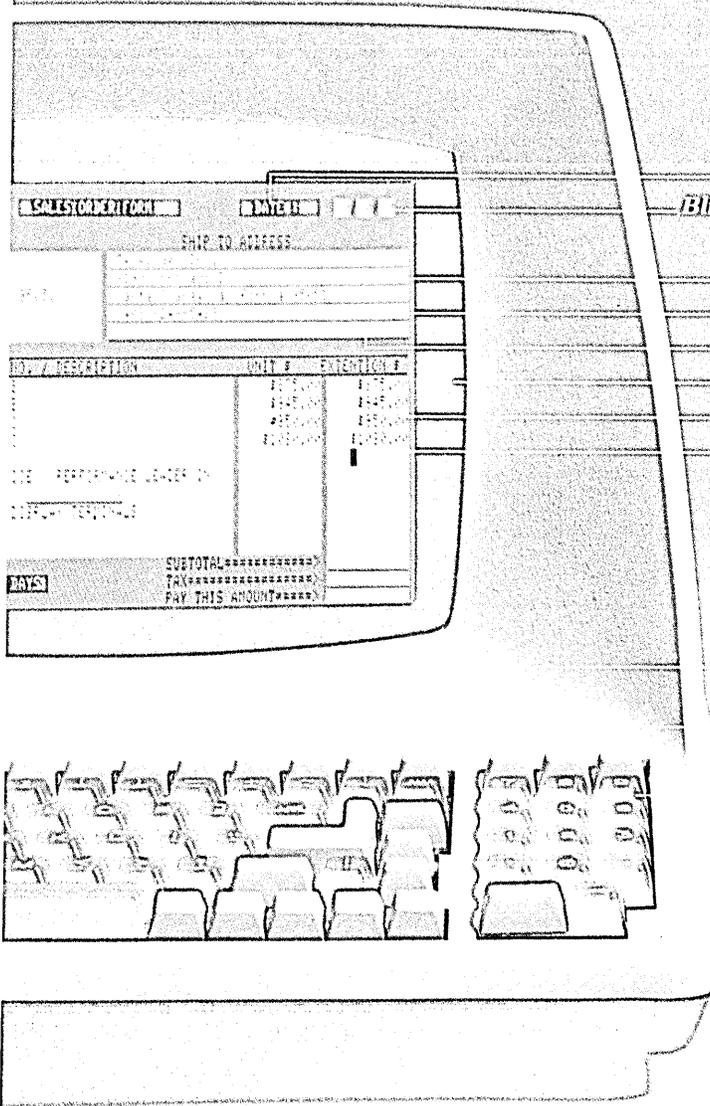
I took the computer back to school and set it up (2,400 baud), held my breath, and initiated a PRINT command. The system worked perfectly. At last, the "turnkey system" was working.

Nov. 31, 1979.

After the jubilant feeling of seeing the printer actually work, I decided to figure out exactly what had gone wrong.

The printer has several strappable options for the processor board. For example, the EIA (serial data) interface, the DNB (data terminal not busy) function is selectable. The position of a jumper determines if the DNB function is ON LINE or ON LINE AND NOT BUSY.

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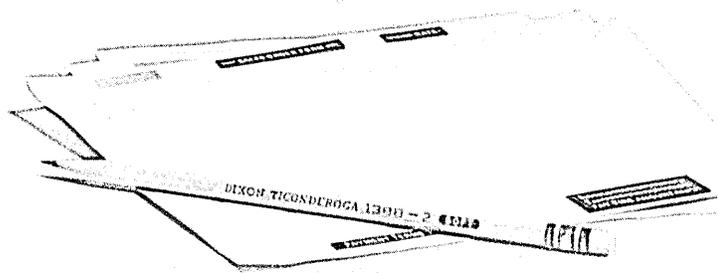
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CIRCLE 117 ON READER CARD

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The vendor said the problem was not in the printer but in the computer system.

When we received the printer, the jumper was in the ON LINE position. However, the jumper must be placed in the other position for the printer to function at 2,400 baud; otherwise, the printer will only work at 300 baud.

In addition, the serial interface signals are defined so that two pin numbers, Reverse Channel (Pin 11) and Data Terminal Ready (Pin 20), need to be coordinated with the jumper. Vendor A had set up the microcomputer hardware and software system as if handshaking was being done through Pin 11, while in reality Pin 20 was involved. Unfortunately, it had made two errors—one of omission and one of commission. It had not checked the jumper and had clipped the wrong lead (for Pin 11). When questioned further, Vendor A said that all its systems were shipped the way ours had been initially set up and it had never had problems before.

In any event, there was never anything physically wrong with the computer system or the printer. The system had not been interfaced correctly. It seems that Vendor A and/or Vendor B should have been able to correct our problems from the start. A lot of inconvenience and frustration was caused and the system could not be used as planned for

the entire quarter.

At least this experience can serve as firsthand lecture material on the problems of dealing with two vendors. In case there is difficulty, each will have a tendency to point to the other, and it is very difficult to determine the problem.

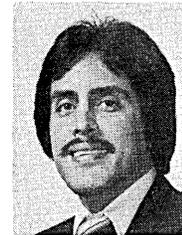
Is there any solution? Yes. Just do as Vendor A suggested—deal with only one vendor. This is sometimes easier said than done. In a university situation, the department doesn't have any control over the vendor that is awarded the contract. The award, based on price competitiveness, is made by a centralized procurement group. Yet price is not the most important factor to the end user, especially when dealing with small firms. Service should be a main consideration. In addition, the potential problems of dealing with multiple vendors should be acknowledged. While service contracts can be purchased, they are usually very expensive and hard to justify to budget-minded administrators. However, experience may show this to be the best approach to the problem.

Dec. 1, 1979.

I give up! Today I hooked up all four

terminals. Crts 1, 2, and 3 came up perfectly. Crt 4, however, failed to come up. It appears to be communicating with the microcomputer but the video screen remains dark. It is of course out of warranty. This time, however, I am sure the problem is that Vendor B sent us a defective terminal. Of course, there is still the possibility. . . . *

RONALD S. LEMOS



Dr. Lemos is an associate professor of business information systems at California State Univ., Los Angeles. His computing interests include programming language learning, system design, and microcomputers, and he has written articles on these subjects for major computing periodicals.

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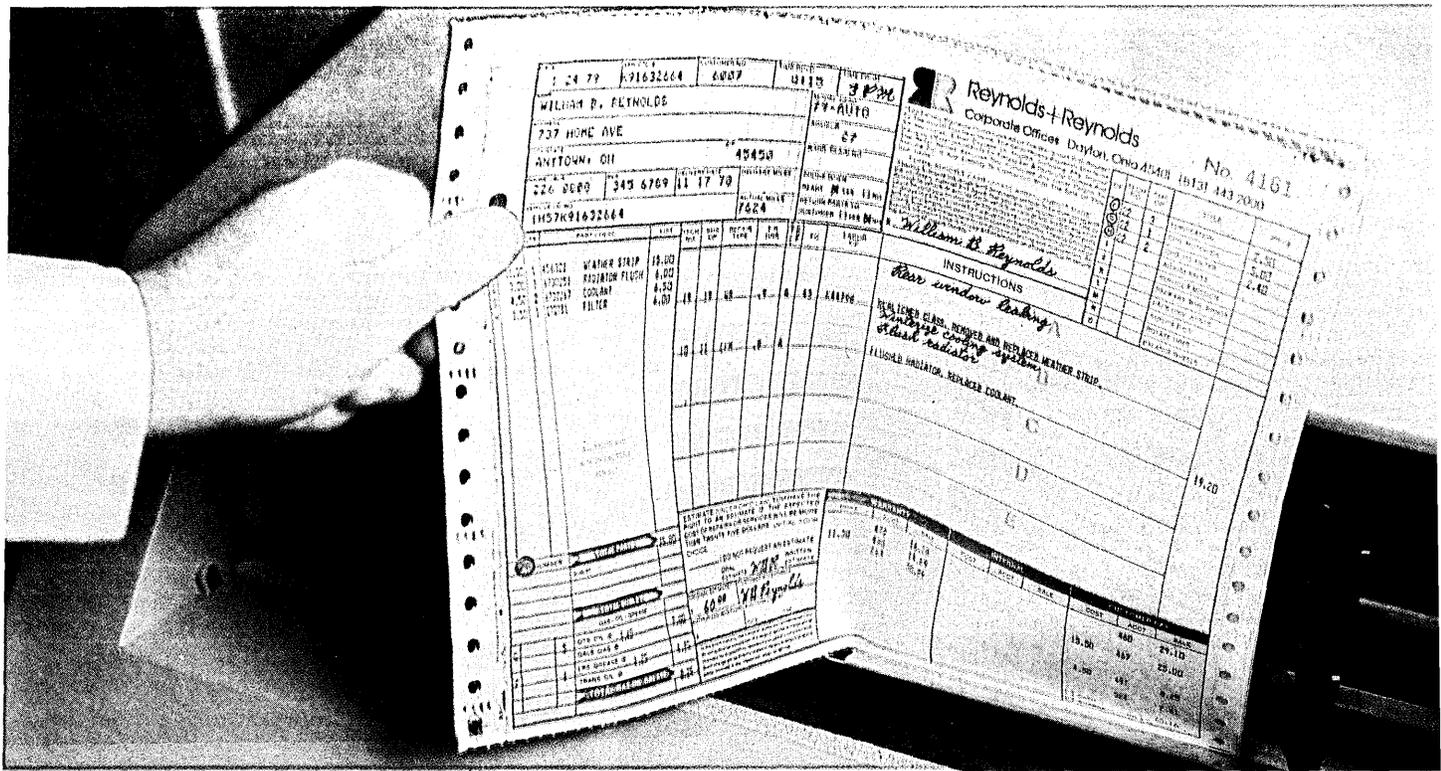
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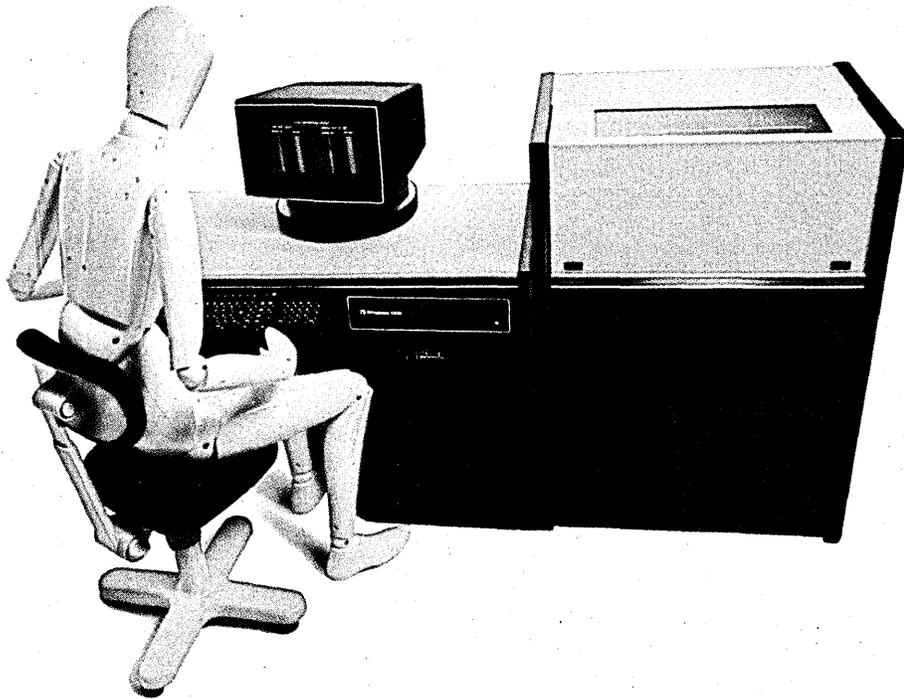
Name _____

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Using this method, a manager can get an accurate picture of how his shop measures up in terms of management effectiveness.

TAKING MANAGEMENT'S MEASURE

by Jack Ewers

Some dp shops seem to have everything under control. Work is done logically, at the proper time and in the right sequence. In other shops, everything seems to be going on at once. Nothing is planned or integrated, and users and dp personnel are equally frustrated.

Managers usually make some comparisons of their shops against other shops. The comparisons provide a hazy idea of strengths and weaknesses but are not a formal evaluation technique. A better measure of the effectiveness of dp management is required. A method is needed to produce a documented measure of current performance and a means to plan and track improvements. Finally, the method should allow a manager to measure his own effectiveness and plan for his own improvements independent of assistance from internal or external auditors.

The effectiveness of dp management can be measured against the following major functions:

- Organization
How well are people resources organized and managed?
- Management planning and control
How well is the work of the department managed?
- Accountability
How well are the results geared to the needs of the organization?
- Security
How well are physical assets managed?

The first major management function is organization. This function is made up of the following elements:

- Mission statement
Does the department understand what its role is?
- Department structure
Are people correctly organized to carry out the department's assigned missions?
- Personnel management
How well are the people managed?

Mission Statement. The first requirement of organization is a clear understanding of the

organizational role of the dp department. This understanding is expressed in a mission statement. The mission of the dp department should be written and clearly defined. It must be approved by higher management (does management agree?) and it should be well understood by all users and dp department personnel (is department authority/responsibility clear to all employees?). In addition, the mission should be reviewed periodically to determine if it should be changed.

Agreement among all interested parties on the mission of the department is critical so that management and users know what to expect from the department, dp has a clear understanding of its role in the organization, and meaningful audits can be conducted to determine if the mission is being accomplished.

Department Structure. Second is a well-defined department structure. Limits of authority and responsibility within the department should be evident so that dp personnel are aware of the authority and responsibility of their position, understand their reporting relationships, and are able to work with the rest of the department.

Clear lines of authority and responsibility help management and users to understand the department and work effectively with it.

An organization chart is a good vehicle for displaying the department structure. It should be complete and current. The department must have a structure appropriate to its defined mission.

Personnel Management. The third requirement of proper organization is personnel management. Here are some of the indicators of the quality of that management.

Job descriptions. A job description should be written and approved for each position in the department. Well-developed sets of job descriptions offer the following advantages:

- Allow dp personnel to understand the content of their job.
- Outline a step-by-step advancement

process, recognizing that there are degrees of knowledge, authority and responsibility that must be traversed. The employee then knows that he is not expected to comprehend all facets of dp in the early years of his career.

- Provide career paths so that employees can look forward to recognized advancement steps.
- Allow jobs to be slotted into a salary scale consistent with the organization and dp market.

PERFORMANCE REVIEWS

A manager must know the quality of the resources available to perform the department's mission. Periodic performance reviews provide a formal, rational, structured method for making that assessment. Informal appraisals are often based more on emotion and personality than on a careful analysis of the facts.

Performance reviews also make employees aware of how their performance is viewed. They provide a basis for equating pay and performance, and provide an opportunity for managers to help employees improve their performance and career development.

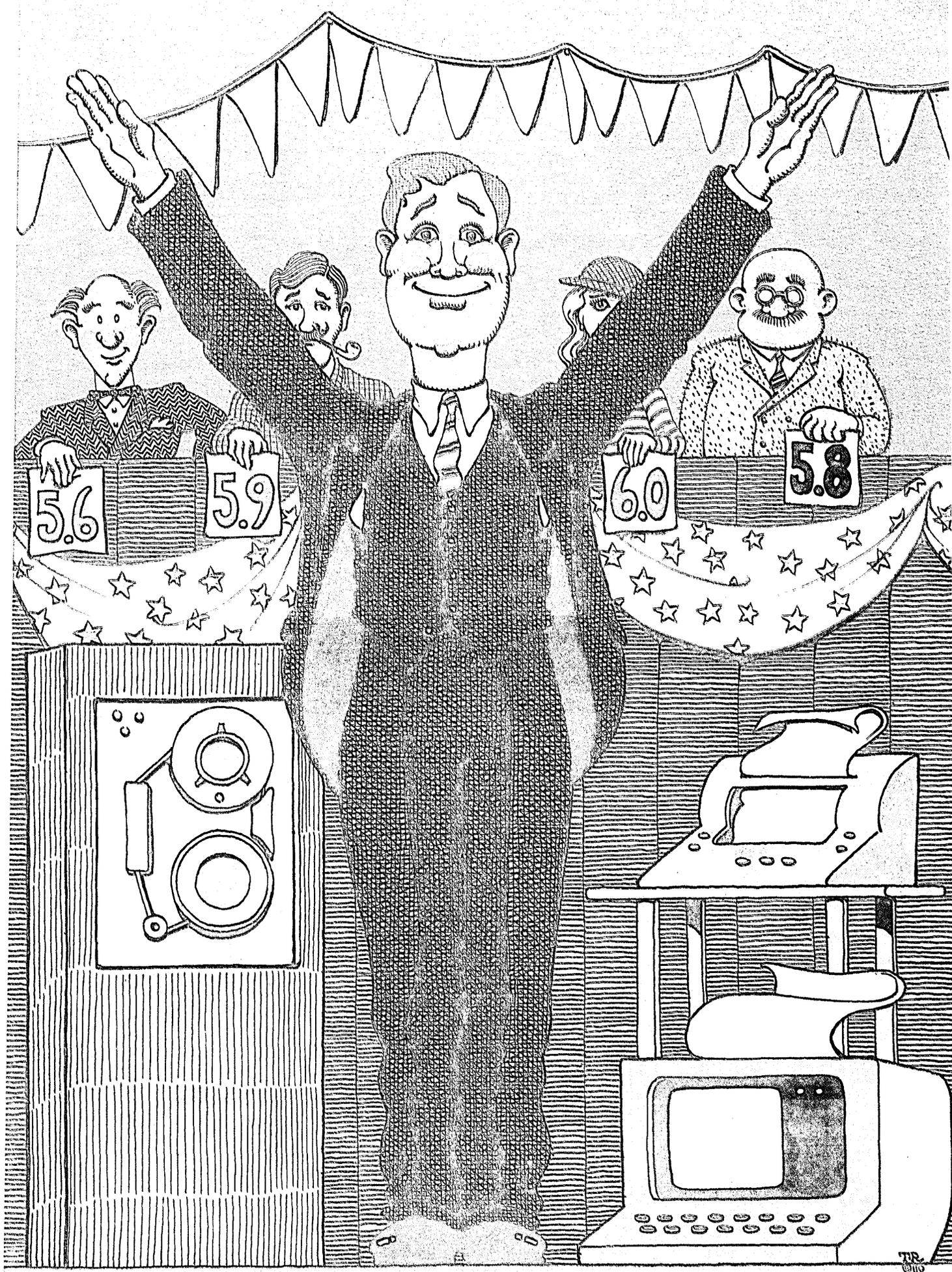
Finally, reviews establish a documented history of performance for use by appropriate organizational managers.

Short-term objectives. Short-term direction is needed to ensure that sufficient effort is applied to stated goals. Short-term objectives are continual reminders of what is important and keep the department on track.

Quarterly reviews are appropriate for managers and supervisory personnel. Analysts and programmers should have a monthly review of objectives since their jobs tend to last less than a month. Certain situations may dictate weekly reviews.

Short-term objective reviews establish agreement on what can be accomplished in the time frame under consideration, answer the question "Are people working on the right things?" and keep managers informed

ILLUSTRATION BY TIM RAGLIN

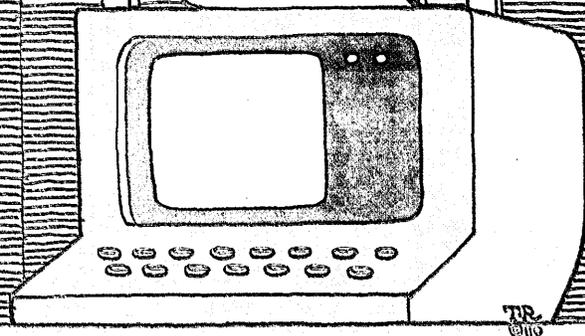
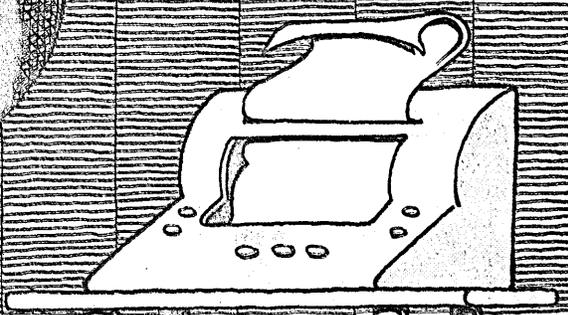
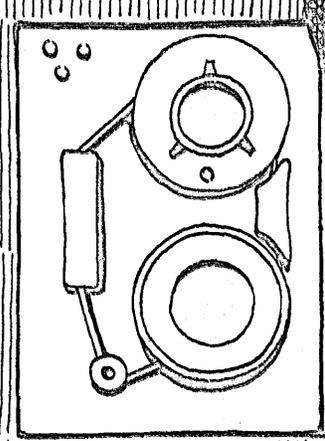


5.6

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A manager must know the quality of the resources available to perform the department's mission.

of progress, slippages and problems.

Training. A training program should be developed yearly and kept current with ongoing project requirements. It should support the technical needs of projects and personnel needs identified in the long-range plan. A training history by employee and subject should be maintained. Proper training also ensures that new, effective technology is introduced into the organization and that costly redesigns, reprogramming, extensive debugging, testing, and inefficient systems do not come about because of a lack of technical knowledge.

Training is also needed to introduce more efficient methods, e.g., on-line program development, structured analysis and programming, into the dp department.

Turnover. Turnover can be an indicator of the quality of management. An excessively high turnover may indicate poor personnel management. High turnover is costly because of the retraining required and lessens productive effort while training is taking place.

Contract employees. The number of contract employees may be another indicator of the quality of department personnel management. A consistently high level may mean that more attention should be paid to increasing head count. The hourly rate for contract people is usually higher than in-house rates, and contract people charge a premium rate for overtime. In-house overtime is available at a lesser rate.

Technological and application experience gained by contract people is lost when their work is completed. In-house people must learn how the new system operates.

No use of contract resources, how-

ever, may indicate a lack of flexibility; i.e., head count is kept high to accommodate project peaks.

MANAGEMENT PLANNING

The second major function against which management effectiveness is measured is management planning and control. This function is concerned with how the work of the department is managed.

Dp Long-Range Plan. The first element of management planning and control is a long-range plan. A long-range (three-year) plan should be developed and updated yearly. Any complex, meaningful action requires a plan, and the direction of an dp department is no exception. A formal, approved plan is necessary to ensure that department efforts will support organizational goals (how do I coordinate departmental goals and organizational goals?) and to ensure that resources will be available when needed. (What resources are needed and when?)

An effective plan helps to guarantee that scarce resources will be committed to the most productive actions. (What are the most productive actions? Why? What resources do they require?)

A long-range dp plan should be developed in concert with user department plans so that it will support user plans and also aid user participation in decisions regarding the allocation of dp resources. (What are user department plans/goals? How can dp help?)

The plan must be approved by management so that it agrees with the allocation of resources. (What does management expect dp to be doing?)

It must be rewritten, or updated, year-

ly to adapt to changing requirements and interface with yearly budget planning (will the dp budget support the plan?) and it must indicate how transitions to new technology will be made. (When will the upgrade occur? How long will it take? What will it cost? What is the best way to do it?)

The long-range plan should include the following elements:

- Organizational and user department goals and strategies
- Strategy for transition to new equipment
- Master event schedule for all major projects
- Forecasted operating costs
- Forecasted personnel requirements
- Hardware inventory, present and planned
- Software and operating system requirements
- Data transmission requirements
- Forecast of educational requirements
- Resources required to change computer facilities
- Personnel requirements by application
- Personnel requirements summary

The long-range plan should also report current year actual accomplishment against last year's plan.

Management Control. Management control means that a manager is in control of the resources at his disposal and can measure their performance. Control of the resources implies that the manager is aware of how the resources are being consumed (what are the people and machines doing?) and that the work of the department is directed towards departmental goals (are they doing the right things?).

Control also implies that plan can be compared to actual (are we on schedule?) and that plans and resources can be shifted prior to disaster (should I put more people on project X?). Finally, control means that the effect of resource shifts can be predicted. (Should I move employee A or B to project X? What will be the effect of either move?)

Project control, the first requirement of management control, implies that projects are properly selected, developed and managed. Projects should be selected and given priorities in a rational, formal, documented manner. They should support organizational and user department goals. The project selection process answers the following question: "How do I know that the right project and priorities are selected?"

An independent evaluation of the relative and absolute value of projects by those who benefit from and pay for the projects is an excellent method of selection. The group must be able to make informed decisions. Establishing the group at a high level can be risky.

"In most large organizations, top management, top user management, steering



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Projects should be selected and given priorities in a rational, formal, documented manner.

committees, and such groups are so far removed, in sheer organizational distance, from the specifics of any proposed project or operation that they are effectively prohibited from applying analytical criteria to the edp decisions they must make.

"The sheer technical merits of the project have little relevance at this point, since neither time nor expertise is ordinarily available at these levels for such considerations. This clearly suggests that the guts of the resource-allocation process cannot be managed just by assigning responsibility for it to decision-making groups at the top of a company.

"But it does suggest that these groups must pay attention to the process by which new project ideas are generated at the technical levels of the organization. They should carefully consider this question respecting lower organizational levels.

"Does the planning process adequately involve the people who have sufficient understanding and credibility to both develop a new dp application idea and evaluate its worth?"¹

The council should meet often enough to deal with new projects and changing requirements.

OTHER METHODS

Other methods of project selection make use of cost/benefit criteria. Whatever method is used, no project should proceed until it has written user approval.

Project development process. Each project should proceed through an orderly development process. A standard development process should be in place so that efforts can be concentrated on the problem, not on the method. The development process should include a formal project request. The request should include objectives, benefits and user signature.

A phased approach to development is essential. Responsibilities and documentation for each phase should be spelled out, review points should be established, written user approval should be required before each major phase is started, and costs and schedules should be recalculated at the end of each major phase. Programming and documentation standards and an abbreviated process for small and/or maintenance projects also should be established.

Project planning and control system. A major part of the mission of the dp department is the development and enhancement of application systems. The dp manager must know how this responsibility is being carried out.

Systems development and enhancement also represents a major commitment of

edp resource. These resources need to be planned, monitored, and controlled. A project planning and control system is a vehicle for evaluating dp's performance in application development and for planning, monitoring and controlling the resources committed to this function.

The project planning and control system should ease the matching of requirements and available resources.

The system should simplify shifting of resources and development of new plans. (What would happen if I moved analyst A and programmers C and D to project X in February? What is the completion date for project X if I assign only programmer E based on his current assignments? What other resources are available in February?)

A project planning and control system should enhance the planning, scheduling, and monitoring of numerous activities within one project (what are the dependencies? What is the critical path? If activity A is delayed one month, what effect will it have on the rest of the project?) and should assist in the measurement of cost vs. plan, and milestone accomplishment vs. schedule. It should also contribute positively to project reviews and critiques, and finally, should identify expected resources. The project control system should be integrated with the time reporting and computer utilization systems.

Operational control, the second requirement of management control, is part of the dp mission and is the stewardship of the production environment, i.e., the timely, accurate, and efficient handling of those systems in a production status. User operations depend on these systems and so the dp manager must have effective control of this environment.

Operational control includes application maintenance, computer operations, data entry, and output distribution. These activities should be controlled through standard instructions, run books, etc. (How does the operator initiate/run this job? What input does it require? Who should receive the output? What control totals should be logged/analyzed? What should be done if the job aborts?)

Weekly and daily schedules should be a standard operational tool. (When should this job be run? What are the relationships to other systems? What is the data entry cutoff time? What is the effect of a rerun?)

Another requirement of good operational control is an ongoing analysis of schedule vs. capacity (will everything get done on-time? If not, what schedule adjustments must be made? Do we need more capacity? When? How much?) as well as a forecast of load vs. capacity.

Operational control also implies an analysis of machine downtime (should some

hardware be replaced/repaired? Is downtime excessive? Should maintenance policies be revised?) and measurement of operations performance (are schedules met? Are reports delivered on time? How productive is the operations environment? What standards are used to measure productivity?).

The following operational questions should be asked:

"Is there a concise, objective performance reporting system that embraces turnaround time, rerun time, hardware-software component utilization, and user complaints in such a way as to permit both senior dp management and top management, itself, to quantitatively monitor performance?

"Have the scheduling and control procedures been modified to become consistent with the technical options made possible by the most recent generation of machines acquired by the department?

"Does the manager of computer operations have commensurate salary, management, and technical background with the manager of systems and programming?

"Is there a managerial career path with an opportunity for advancement in operations which is commensurate with that in systems and programming?"²

Budget, another measure of control within the edp department, is a formal method of planning and controlling costs. Good control over costs is indicated by adherence to budget. Budget reports should:

- accurately reflect costs
- measure actual vs. planned costs
- be published at least monthly

ACCOUNTABILITY

The dp manager is responsible for a large expenditure of funds. He should account for the use of those funds. Accountability has two basic elements: identification of expenditures by source, e.g., manufacturing or order entry, and allocation of those expenditures according to some rational basis.

Chargeout system. A chargeout system is a key element in establishing accountability for the dp function.

"Concern for the 'chargeout issue' signals the transition from informal to formal data processing management control. Chargeout usually spearheads the data processing management control program, and is used to bring users/managers into the control realm. Since it introduces user/manager to formal accountability for data processing, it is often met with volatile reactions."³

In another view,⁴ "If one compares the arguments for overhead accounting and

1. McFarlan, Warren F., "Management Audit of the EDP Department, *Harvard Business Review*, May-June 1973.

2. McFarlan, op. cit.

3. Nolan, Richard L., *Management Accounting and Control of Data Processing*, July 1976.

4. McFarlan, op. cit.

HOW TO GRADE THE MANAGEMENT TEST

The scorecard below can be used to compute a reasonable estimate of dp management effectiveness and to plan and track improvements. A rough "grade" can be calculated by using the formula:

TOTAL YES ANSWERS
67 (total possible answers)

<i>Percentage</i>		
93 - 100	= EXCELLENT	- don't mess with it
85 - 92	= ABOVE AVERAGE	- improvement needed but not critical
77 - 84	= AVERAGE	- allocate resources for improvement in next year's budget
69 - 76	= BELOW AVERAGE	- lay out improvement plans now
below 69	= NOT ADEQUATE	- improvement plan should start with a new manager

DP MANAGEMENT EFFECTIVENESS SCORECARD

Organization

Mission Statement			
• written	YES	NO	
• approved	YES	NO	
• understood	YES	NO	
• reviewed	YES	NO	
Department Structure			
• organization chart			
• complete	YES	NO	
• current	YES	NO	
• appropriate for mission	YES	NO	
Personnel Management			
Job Descriptions			
• written	YES	NO	
• approved	YES	NO	
• complete set	YES	NO	
Performance Reviews			
• periodic	YES	NO	
• formal	YES	NO	
• documented	YES	NO	
Short-term objectives			
• M.B.O. for managers and supervisory	YES	NO	
• monthly objectives for analysts and programmers	YES	NO	
Training			
• yearly forecast	YES	NO	
• support planned projects	YES	NO	
• history by subject and employee	YES	NO	
Turnover			
• appropriate (10%)	YES	NO	
Contract Employees			
• moderate usage	YES	NO	

Management Planning and Control

Dp Long Range Plan			
• yearly	YES	NO	
• support organizational/user dept. goals	YES	NO	
• approved	YES	NO	
• feedback on last year's plan	YES	NO	
• complete	YES	NO	
Management Control			
Project Control			
Project Selection			
User/Management Council			
• appropriate management level	YES	NO	
• timely meetings	YES	NO	
Other Selection Methods	YES	NO	
Project Development Process			
• standard development process	YES	NO	
• project request	YES	NO	
• phased approach	YES	NO	
• review points	YES	NO	
• phased user approval	YES	NO	
• phased cost/schedule calculations	YES	NO	
• program and documentation standards	YES	NO	
• appropriated for small projects	YES	NO	
• maintenance projects	YES	NO	
Project Planning and Control System			
• match requirements and resources	YES	NO	
• shift resources and develop new plans	YES	NO	
• coordinate project activities	YES	NO	
• predict problems	YES	NO	
• measure	YES	NO	
- cost vs. plan	YES	NO	
- accomplishment vs. schedule	YES	NO	
• project reviews/critiques	YES	NO	
• identification of resources expended	YES	NO	
Operational Control			
• standard instructions, run books	YES	NO	
• weekly/daily schedules	YES	NO	
• analysis of schedule vs. capacity	YES	NO	
• forecast of load vs. capacity	YES	NO	
• analysis of machine downtime	YES	NO	
• measurement of operational performance	YES	NO	
Budget			
• accurate	YES	NO	
• actual vs. planned	YES	NO	
• monthly	YES	NO	
Accountability			
Chargeout System			
• accurate accumulation	YES	NO	
• rational allocation basis	YES	NO	
• accurate allocation	YES	NO	
• understood by users	YES	NO	
• allows acquisition of new hardware	YES	NO	
User Requirements			
• user satisfaction	YES	NO	
• project backlog	YES	NO	
Security			
• policy statement	YES	NO	
• risk analysis	YES	NO	
• responsibility assigned	YES	NO	
• contingency plan	YES	NO	
• physical/logical security	YES	NO	
• off-site storage	YES	NO	
TOTAL YES ANSWERS ÷ 67 = SCORE			

A measure of accountability for dp expenditures is how well user requirements are being met.

those for chargeout accounting, it is clear that chargeout frequently offers the more significant advantages where management is vigorous or the edp department is becoming mature."

A chargeout system should accurately accumulate all resources consumed; e.g., disk space, core, programmer time, data entry time, and have a rational basis for allocation of costs. The system may be changed to pro-

mote different objectives. For example, production, maintenance, or new systems development can be encouraged or discouraged through adjustments in the chargeout system. New systems development may be partly or wholly subsidized, charged on a fixed cost basis, or charged for resources consumed.

The chargeout system must accurately allocate costs according to an approved

method, be understood by users, and adequately provide for the acquisition of new hardware.

User requirements. Another measure of accountability for dp expenditures is how well user requirements are being met. The dp department exists to service users. If user requirements are not being met, the dp department is not fulfilling its mission.

Here are some indicators of how well users are being served:

- User satisfaction. How do major users rate dp service in terms of cost (production systems, new development), time performance (production systems, new development) and quality (maintenance, new development)?

"Are users satisfied with speed and quality of service? If not, why not? If they are, have operations procedures and capacities been studied to ensure that this is not being achieved through highly inefficient procedures which are hidden by the existence of excessive computer manpower and machine resources?"⁵

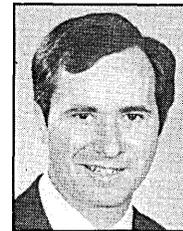
- Project backlog

Security. The dp department is responsible for the security of the hardware and information entrusted to it. This program should include a general policy statement outlining the objectives and scope of the security program and an analysis of risks and exposures to determine the position of the dp facility regarding security. Overall responsibility for the security program should be assigned to one person.

Development of a contingency plan on how to respond to and recover from emergency situations should also be a part of the security program. *

5. Ibid.

JACK EWERS



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Minneapolis, Minn. He provides consulting services for Honeywell on data processing technology and management and office automation. He is currently chairman of a special interest group on programmer productivity at the University of Minnesota Management Information Systems Research Center.

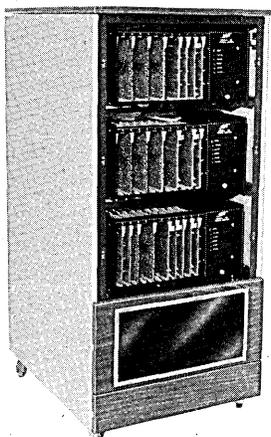
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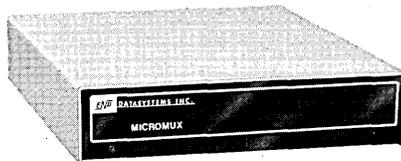
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BEYOND THE COMPUTER

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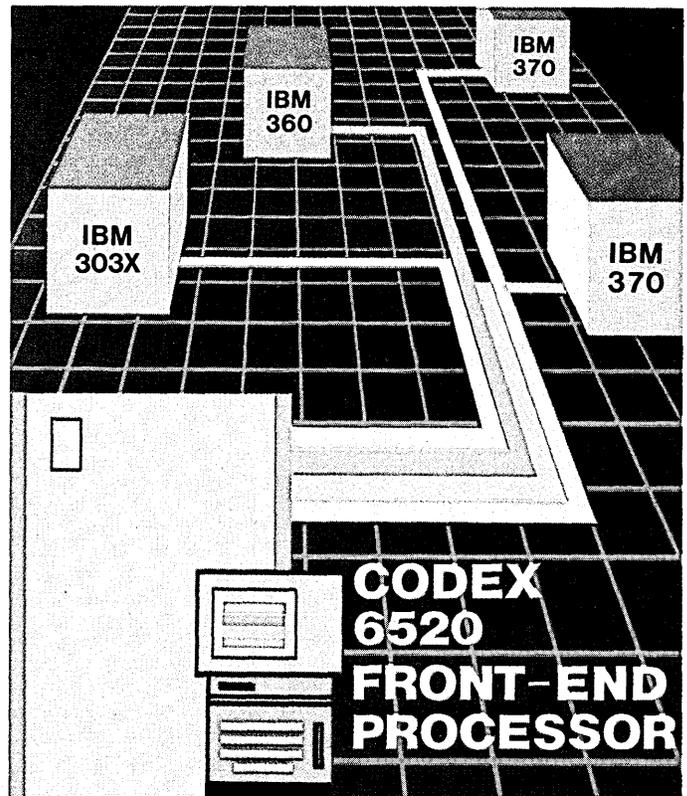
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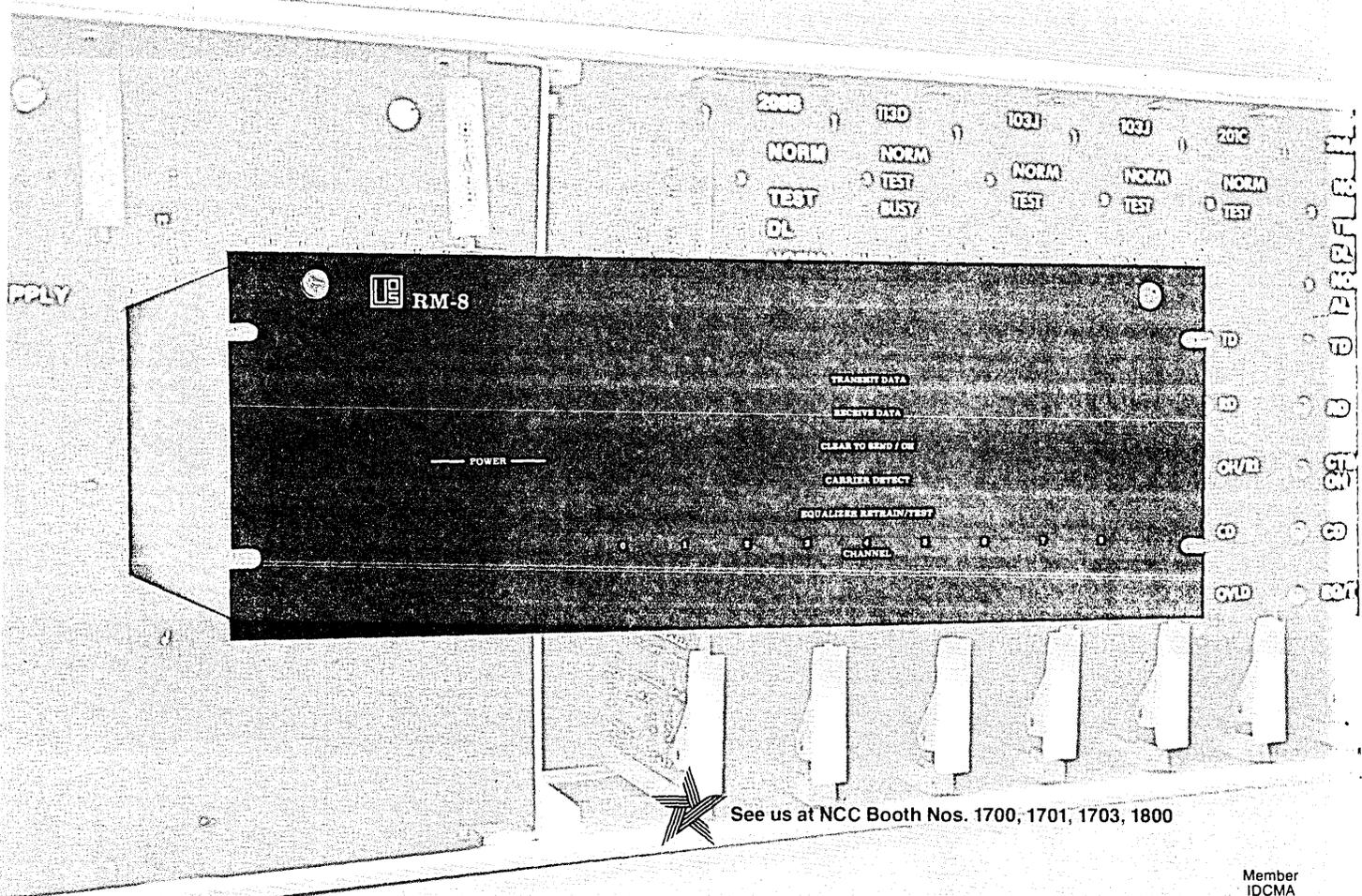
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End users and dp professionals must understand each other's responsibilities to achieve successful application development projects.

NARROWING THE GAP

by Dave Mollen

Not too long ago, my wife and I decided to remodel the kitchen in our home and went to a firm specializing in this work. The salesman there is paid when he has made a sale, not for any suggested plans he draws up. So, after many months—my wife and I do not make remodeling decisions easily—he gave up on us.

We started with another salesman, and it was 15 months before we indicated we were satisfied with his final proposal. He drew a final "picture" of the proposed job, a detailed schematic, added two straight lines under these drawings, and asked both my wife and me to sign, with these words: "That's exactly what you're going to get, for the cost we've agreed on, and the time of completion. If you want to make any changes, they will affect the cost and the time of completion."

He made it clear that if we failed to sign, there would be no agreement. In short, he was prepared to see 15 months' effort go down the drain—because he knew from experience that if he did not get our signed agreement, the potential problems could outweigh any benefits the job would bring.

There is an analogy here to a dp professional, representing his department on an application development project, and an end user. The dp professional is the salesperson and the end user the customer. Note, however, what usually happens when the "salesman" asks the "customer" to sign on the dotted line: the end user refuses, for any number of reasons, including the simple fact that the end user sees no purpose to it and refuses to be tied down.

The result is predictable. System designers need quantities of information that appear endless to the end user, who doesn't understand why such detail is required. Without advance agreement on the level of detail needed, dp people do not get the information they need; without such detail, the designer's system does not work as it should and the end user is dissatisfied. His propensity to make changes after a basic design is agreed on, without understanding why the changes

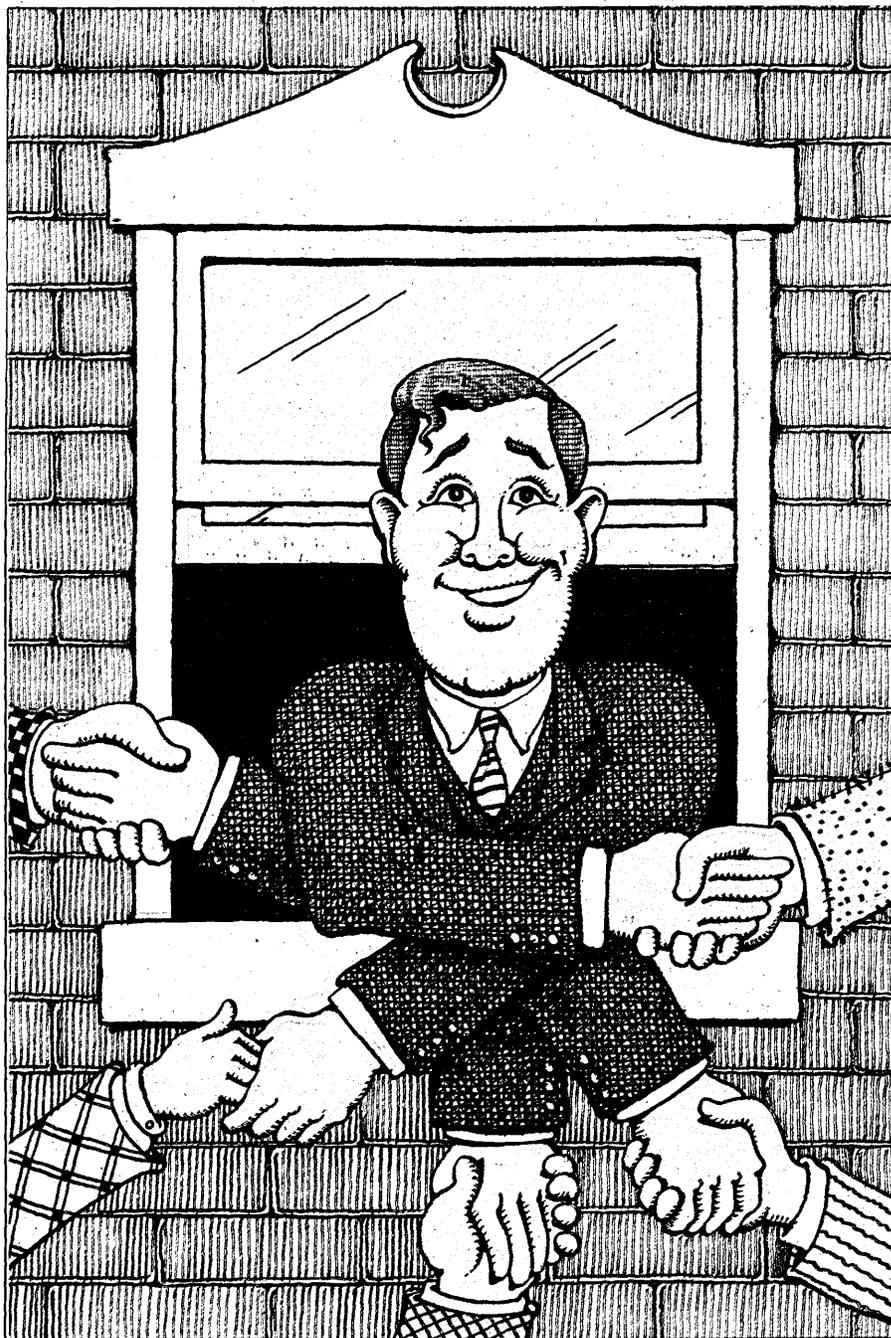


ILLUSTRATION BY TIM RAGLIN

should create any great difficulties, increases the potential for complications.

A "signed and sealed" agreement could prevent much of this, but the dp representative finds it difficult to convince the user that such an agreement (and the considerable work for the user that it implies) is necessary, and that it is reasonable for the dp professional to expect to have one.

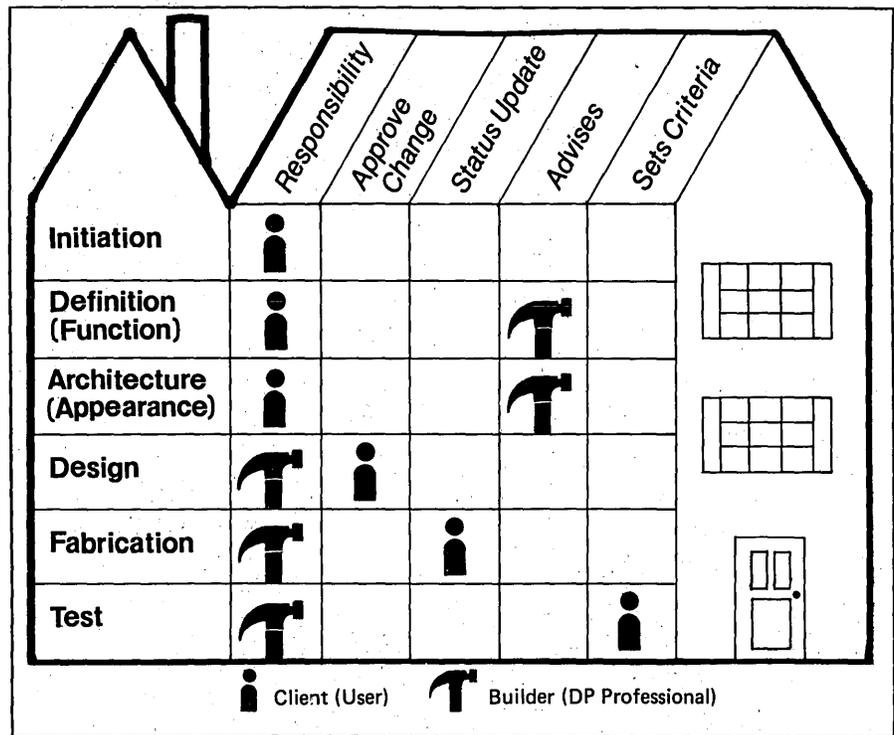
I am convinced, on the basis of many years' experience with end users and dp professionals, that the dynamics described here are behind some of the most important criticisms of dp commonly held today by users and dp professionals alike: first, we in dp are able to implement only a small fraction of the applications users want, and, second, when the applications are implemented, they frequently do not meet users' needs, necessitating a great deal of rework and upheaval to the business while the reworking is being done and the resulting bugs are straightened out. The shortage of dp professionals is serious and is expected to remain so for years to come. This is a compelling reason to improve the quality of applications development so that end-user projects do not have to be redone, and dp time is used at maximum productivity levels.

One IBM study suggests that improved dp and end user interaction can boost dp productivity by as much as 400%, getting the application up and running to the end user's specifications that much faster. So, while we are unquestionably dealing with a shortage of trained people, it is equally evident that narrowing the communications gap between dp professional and end user can go far toward easing current backlogs.

DP A MYSTERY TO USERS

Basically, this communications gap goes back to the earliest days of the computer. Unfortunately, dp has been seen by end users as a forbidding mass of difficult-to-understand technology, which could be made to serve their business needs solely through the efforts of a "new breed" of person, the dp professional, who was somehow magically imbued with all the requisite knowledge. Equally unfortunate, dp professionals themselves tended to believe this image. From one point of view, therefore, it might be said we're just dealing with the same old problem, but that would be a dangerous simplification—dangerous in that it could keep dp and end user management from appreciating the true dimensions of the current problem, and the steps that must be taken to solve it.

In the typical commercial establishment of 25 years ago, the person in charge of the computer operation was the financial officer, perhaps the controller. The dp manager reported to the controller. Whatever their



backgrounds, they could achieve a meeting of minds without too much difficulty. The dp manager was running a set of well-defined applications, narrow in scope, applied to a narrow segment of the business. The company's customer, whether another business organization or a consumer, had superficial contact with the new technology, perhaps only through an invoice or an accounts receivable statement. When something went wrong, however embarrassing it may have been, it was easily resolved.

Today, we are dealing with end users who rely on terminals to interact directly with customers; with end users who rely on the system to assure that their customers' requirements can be met; in short, end users rely on systems to support people on the "firing line," those who are judged by the customers they gain or lose, or by customer complaints.

Now, when the end user's system doesn't function properly, the reverberations can be heard all the way up in the ceo's office. There is a great deal more at stake, and if "blame" is to be apportioned there is plenty to go around for everyone.

Let's start with some basic definitions. The end user is the person—actually the only person—who can perceive, or confirm, that a given application will lead to certain benefits which can be defined and usually measured. He, or she, alone can make ultimate decisions concerning a given application, because that person alone has the immediate responsibility and the experience that can lead to sound judgments.

By definition, therefore, the end user must have the critical role in the decision to invest in the application, in its design, and in its implementation. The dp manager is a purveyor of technology, supplying a service for the money the end user will pay. He, or she, should be a consultant on the most effective use of dp technology in helping find solutions

to business problems and needs, and the governing authority on such matters as data security and system recoverability. The dp manager should never be the person to decide the next application to be implemented; making implementation decisions is the function of the ceo. To the extent that the dp manager does make implementation decisions, it is usually by default.

In discussion after discussion we have found the issue is not what dp is all about, but what the business is about. The end user is not bothered by the cost of application development but by application effectiveness—the extent to which it delivers, or fails to deliver, the services that in turn impact customer relationships. The assumption, implied in the late 1950s, was that technicians "drove" the new dp technology. Today, that is not enough. Neither dp professionals nor the financial department "owns" end-user data; to the extent that both utilize it they are custodians. The "driver" today is the end user, and there can be no satisfactory services without successful dp-end user relationships.

SUCCESS STORIES CITED

The proof of this basic fact can be seen in successful application development projects. Among the heaviest early dp users were insurance companies, and perhaps it's no accident they were among the earliest to adopt the project team approach to applications development, with heavy end user involvement.

Until recently, even insurance companies with extensive dp experience shied away from "automating" group medical and dental claims handling. The data required is vast, each group contract written with an individual customer is separate and distinct, and the claims processing operation itself is complex. A medium-size insurance company based on the East Coast was among

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System designers need quantities of information; end users don't understand why such detail is required.

the first to break through the difficulties and develop a distributed claims processing application. The project leader was a headquarters claims manager, with working field experience; the majority of the project team members were actual claims administrators; a working relationship was established with the dp department that enabled this first-time, highly customer-sensitive application to be installed on time with a level of success that saw end users eager to cooperate in follow-on applications.

An end user manager for a Southern newspaper utilizing an advanced computerized classified advertising system credits a good part of its success to his people's involvement in the system design. Testing an application system can take up to one-half of the dp organizations's development resources, and a significant portion of that time is in redesign and retesting of user specs that were poorly communicated to begin with. Prevent the need for such rework, and you will make a significant impact on total productivity.

An end user coordinator in a manufacturing company found that so-called dp "overruns" were something quite different: they were actually the costs, in time and money, that resulted from the difference between the information the end user provided the dp department in the system proposal stage, and what the end user demanded of dp prior to considering the project complete. With a better understanding of dp requirements, and improved people interaction, the coordinator's end user systems did come in on time and within acceptable cost limits.

Similarly, managers at a New En-

gland bank that had upwards of 65 new applications in development every year found that increased analysis time devoted to the design phase of a project before actual coding resulted in much less test time and signoff difficulties at the end, with project dates being met. More and more, bank end users and dp people are speaking the same language.

Any number of additional examples could be cited. From long experience with both dp professionals and end users, I am absolutely convinced the most important single factor affecting applications development is how well the participants fulfill their roles. When dp managers are asked what problems they've experienced with development projects, they overwhelmingly (70% to 80%) respond: lack of proper user involvement. Statistics reveal the bulk of programmer/analyst time is spent on design, which is largely a matter of getting a good spec from the user—or, more importantly, getting it into test. "Test time" is largely redesign and recoding made necessary when user requirements are inadequately stated at the beginning of the project.

HOW TO NARROW THE GAP

The "bottom line" question is: what can be done to narrow the communications gap between dp professionals and end users?

Dp professionals should view and treat end users as clients who want services performed. They must focus on solving their client's real business problems.

Dp people should not discuss technical subjects with their user-clients. Most dp professionals simply take it for granted the

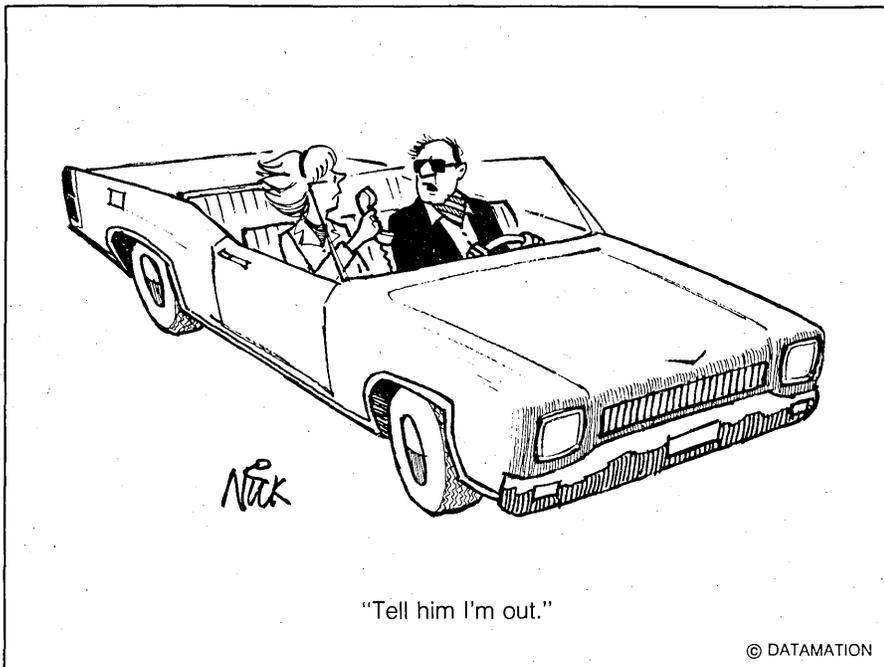
end user must know about access methods, programming languages, operating systems, etc. Not true. The dp professional does not have to go beyond a few technical terms such as character, field, record, file, code, bug, debug. The end user wants to be told in basic English the same things any client must know: when the end product will be ready, its cost, quantity, and quality. In dp terms, quantity is capacity, i.e., the number of transactions in a given time frame, and quality concerns reliability and related factors.

End users should understand their project development roles in terms that are meaningful to them. Dp professionals should be viewed by themselves and their users as project members, not as antagonists dealing in an arcane art, capable of solving all problems with a wave of the hand or seeking to ride roughshod over the end users' operations.

To help both dp professionals and end users understand their roles, I have found an excellent device is using the analogy of building a house—or remodeling a kitchen, which really did happen. The house analogy is essentially foolproof. End users grasp their roles instantly; they understand they must specify, in the required detail, just exactly how they want the house built and what they want it to contain. Similarly, dp professionals understand their roles in providing guidance, advising on the practicability of different approaches, and the various tradeoffs.

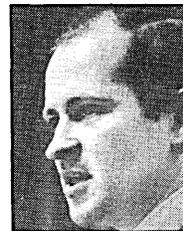
Both groups understand it's only right and proper that a prospective home owner be required to sign a contract with the builder before the house is built, and only right that any changes will entail reopening the contract. It's also only right that the builder be held to the promised completion date, built-in features, quality and cost.

The house analogy works. End users and dp professionals understand it. It is successful in the effort to improve communications between dp professionals and end user clients. *



© DATAMATION

DAVE MOLLEN



Mr. Mollen is a senior instructor at IBM's Systems Science Institute, responsible for "Project Planning and Control for Users," a course designed to solve

the end user, dp professional communications gap. Mr. Mollen was also a systems engineering manager at IBM, managing the implementation of many software contracts for IBM's customers.

CARTOON BY NICK HOBART

"Protection is my business... My ISOREGTM Computer Power Modules PUT AN END TO POWER-RELATED COMPUTER PROBLEMS"

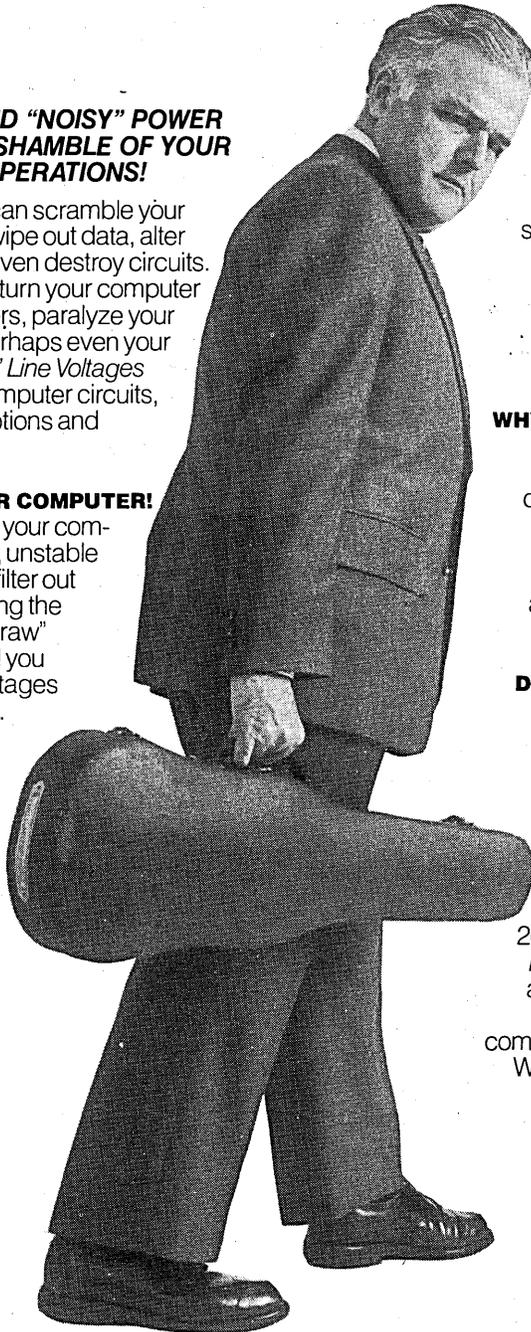
Says Emil Rechsteiner, President of Frequency Technology, Inc.

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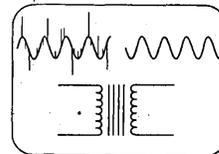
PROTECT YOUR COMPUTER!

You can protect your computer from noisy, unstable power. You can filter out spikes by isolating the computer from "raw" utility power and you can regulate voltages within tight limits.

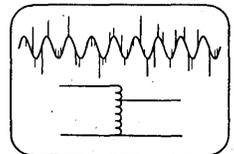


WHY ISOLATE?

With an isolation transformer you can electrically separate the computer from the utility power and filter out voltage spikes that scramble computations, wipe out data, even destroy circuits.



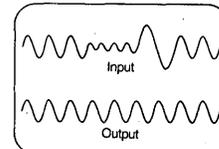
Line-to-load isolation shields computer from sharp, destructive voltage spikes.



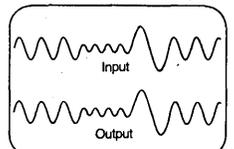
Without isolation computer is exposed to spikes even when power is supplied by voltage regulator.

WHY REGULATE?

With a voltage regulator you can power your computer with stable voltage *automatically* and *indefinitely*



Voltage regulation ensures stable voltage during brown-outs or voltage surges.



Without regulation, voltages sag and surge even when power is supplied by isolation transformer.

even when utility voltages drop to brown-out levels.

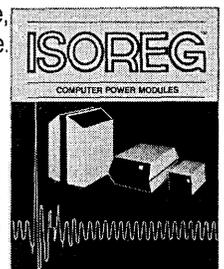
DON'T SETTLE FOR HALF PROTECTION!

An isolation transformer filters out spikes but does NOT regulate voltages; a voltage regulator stabilizes voltages but does NOT filter out voltage spikes. Don't spend a penny on half-protection! Be prudent, get full protection!

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Many dp managers seemed to intensify other departments' resentment and apprehension by using technical jargon whenever possible.

EFFECTIVE IN-HOUSE TIME-SHARING

by Dan Walkovitz

Managers have recently begun to recognize the value of time-sharing as a conversational problem-solving tool as evidenced by the growing stature and recognition of the decision support system that has interactive computing as its foundation. At the same time as managers begin to understand the concept of DSS and to achieve the benefits from its proper application, outside time-sharing is becoming more expensive.

In response to the concern over rapidly increasing outside time-sharing costs, many organizations have installed time-sharing facilities in-house, and hired people to support them. Unfortunately, in most of these organizations, users will still select outside time-sharing vendors in lieu of an in-house service, and frequently will pay premium prices for work not necessarily superior.

To understand this circumstance, it is helpful to look at the history of non-dp managers and their relationship to the world of data processing.

Having no basis for comprehending most aspects of dp 20 years ago, but unable to deny its potential benefits, most managers accepted computers begrudgingly. Where they controlled their own domain, they now were forced to rely on an information source they did not understand. This early suspicion was amplified by credibility losses suffered in the early days of dp due to failures in developing accurate, comprehensive, and useful systems on a reasonable schedule. Managers accustomed to living with budgets and complying with time schedules witnessed consistent failures by dp organizations, yet the function seemed to become more dominant. Before

long, dp organizations functioned not as staff operations but as the department in control of all others—the tail wagged the dog. This growing importance fueled the resentment and apprehension of other departments.

Rather than attempting to reduce this concern, many dp managers and employees seemed to intensify it, using technical jargon whenever possible. (So prevalent is this attitude that it was the subject of satirical treatment in *DATAMATION*, April 1979, p. 135, where Dr. Oscar P. Babel says, "Boy, oh boy, do you owe me. Who do you think it is that's been keeping you in your job all along, helping you convince those suckers outside the industry that you really know what you're doing down there in the computer room?") Because of this, a lack of rapport between dp and other managers remains. Even younger managers not involved in the evolutionary development of this gap have been affected by it.

TIME-SHARING'S APPEAL

In the face of this situation, it is easy to understand why time-sharing appeals to managers. Aside from offering the opportunity to satisfy dp needs, it enables the manager to retain control. Through time-sharing, the manager is, once again, the master. He need not wait months for a project to be developed; he can do it at his own pace and even design it to his own specifications without constraints imposed by dp.

In response to the new freedom and control offered to managers in the early 1970s, time-sharing blossomed in business. Then, when managers began recognizing the conversational problem-solving value of

time-sharing and its usefulness for interactive evaluation of alternative situations time-sharing use surged, and outside time-sharing costs skyrocketed.

Aided by declining hardware costs, many organizations retained time-sharing dollars by installing in-house time-sharing operations. Foolishly, most of these organizations simply folded the new computers into existing dp operations, used dp professionals to support the new systems, and awaited the savings.

Yet this seemingly simple solution neglected the major source of the problem—the attitude of managers. Through the use of time-sharing, managers had freed themselves of the dependency on dp and improved the responsiveness of systems at the same time. They were by no means interested in relinquishing control by placing the source of their independence in the hands of the people from whom they finally had wrested it. As should have been expected, in-house time-sharing was tarnished immediately by association with in-house batch processing.

Given this state of affairs, it is difficult to understand why managers even attempted to use in-house time-sharing offered under the auspices of data processing. For a number of reasons, however, including a sincere desire to cooperate in cutting costs as well as corporate pressures, they did. And, as a result of such attempts, they usually convinced themselves of the sheer absurdity of the idea; the response resembled that of a batch operation and differed dramatically from the approach employed by outside time-sharing vendors.

To present the difference in approach, let's assume that the director of planning

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In-house time-sharing was tarnished immediately by association with in-house batch processing.

needs a system for financial forecasting. He contacts his in-house time-sharing organization on Monday. He probably will be scheduled to meet with his in-house time-sharing representative on Thursday or Friday.

During this meeting, the director of planning will convey his desires to a computer technical representative, possibly going into detail to explain to this in-house analyst the basics of the financial statements he wants to forecast, the relationships between the statements, the reason why depreciation appears as a cash inflow on the cash statement but as an expense item on the income statement, and other fundamentals of finance and accounting with which the systems analyst may have little or no experience.

Following this half-day meeting, the systems analyst will return in perhaps three weeks with a schedule of two to three months for completion, including a number of additional meetings with planning people, and a cost for development of about \$35,000. The director of planning is faced with a one-month delay from the point of his interest before he even knows whether the application is feasible from a cost or time standpoint, and then an additional two or three months before he will be able to use the system. (And this assumes realistic estimates by the systems analyst, a source which the director of planning already considers suspect, based on previous experience.)

Compare this with the approach followed by a reputable time-sharing vendor. The call placed on Monday would probably elicit a visit by the analyst no later than Tuesday. The analyst would probably have at least a basic familiarity with finance and planning and, quite possibly, would be able to offer a strong background with varied experience in the area. As a result of this, the manager can shorten his initial meeting to maybe two hours and reduce the need for additional training of the analyst to a minimum.

Most likely, the analyst will call the director of planning by the end of the week to indicate that the system can be developed and available for preliminary use in about 10 days at a cost of around \$3,000 to \$7,000.

Now, truly, this will not be the same system which would have been developed by the in-house time-sharing group; it will, however, serve the needs of the manager just as well. And, while it may cost more to run on a monthly basis, the costs of development are lower. But, most importantly, *the director of planning will receive a usable system two or three weeks after his realization of the problem, quickly enough so that it complies with the immediacy of his need.* Furthermore, he knows that he can trust the ability of the outside analyst to perform, since he will not be in business in the competitive time-sharing market if he does not.

IS THERE REALLY A CHOICE?

Now, is there really any choice? In the face of an existing concern by management about dp, the in-house time-sharing organization performs just as management predicted. And, as an alternative, the manager has the outside vendor who performs exactly as he would like. No contest.

This is not to say the systems analyst is to blame. He is accustomed to designing, developing, and implementing large scale, integrated systems; he simply applies this familiar approach to interactive applications without any knowledge of management expectations. Here, the responsibility rests with the individual who assumes that an effective batch operation provides the ingredients for a successful time-sharing operation. The fact is *batch processing is as different from interactive computing as marketing is from accounting.* The functions are different, the computer hardware and operating systems are different, the attributes of the support representatives are different, and the user needs are different.

In true batch applications dp experts are essential; managers do not have the expertise nor the access to requisite facilities. Not so with interactive computing; if managers do not already have the knowledge required, time-sharing companies will gladly provide it or teach it, on the manager's terms. Typical dp professionals are not only expendable for these applications, they are not desired.

The parameters describing the typical interactive computing project are entirely different from those underlying the batch project. First of all, precision is usually of no consequence in interactive applications inasmuch as the product is used to provide improved information in anticipation of a decision, and much of the input is estimated anyway.

Typical interactive systems may run on a regular basis, but they just as likely will run quarterly, annually, or irregularly, as needed. A system may be developed for one specific project and may never be run again. Or, significant modifications to the system may be required each time it is utilized.

For the most part, these applications are not well defined in advance since the capabilities of interactive computing broaden the spectrum beyond what may have been done before. Frequently, turnarounds of more than a few hours are totally unacceptable in the interactive environment because by that time the decision point will have passed. (Consider, for example, a last-minute change in the approach to an acquisition to be presented to the board of directors for approval in two hours.)

The systems are usually straightforward, oriented to a specific task, and do not

require the interrelationships and complexities inherent in large batch processing systems. And, when the need for a system arises, lengthy development times will neither satisfy the immediacy of the need nor be financially justifiable in light of potential infrequent use and potential for change.

Obviously, this environment requires an entirely different approach. At this point, the solution is obvious. When designing an in-house time-sharing organization, do not incorporate it into the in-house batch processing organization; do not model it after the in-house dp organization; do not select people that would be successful in a batch environment, either as systems analysts or managers; and, do not address the community of users as you would address those using in-house batch processing services.

A LESSON FROM WINNERS

Instead, style the in-house time-sharing organization after those who are now successfully capturing the preponderance of time-sharing expenditures—the time-sharing companies themselves. Anyone anxious to become a great artist will study under a master. In the same way, to establish an effective time-sharing operation, take a lesson from those who have shown themselves to be winners.

For the most part, successful time-sharing companies attempt to incorporate the following ingredients:

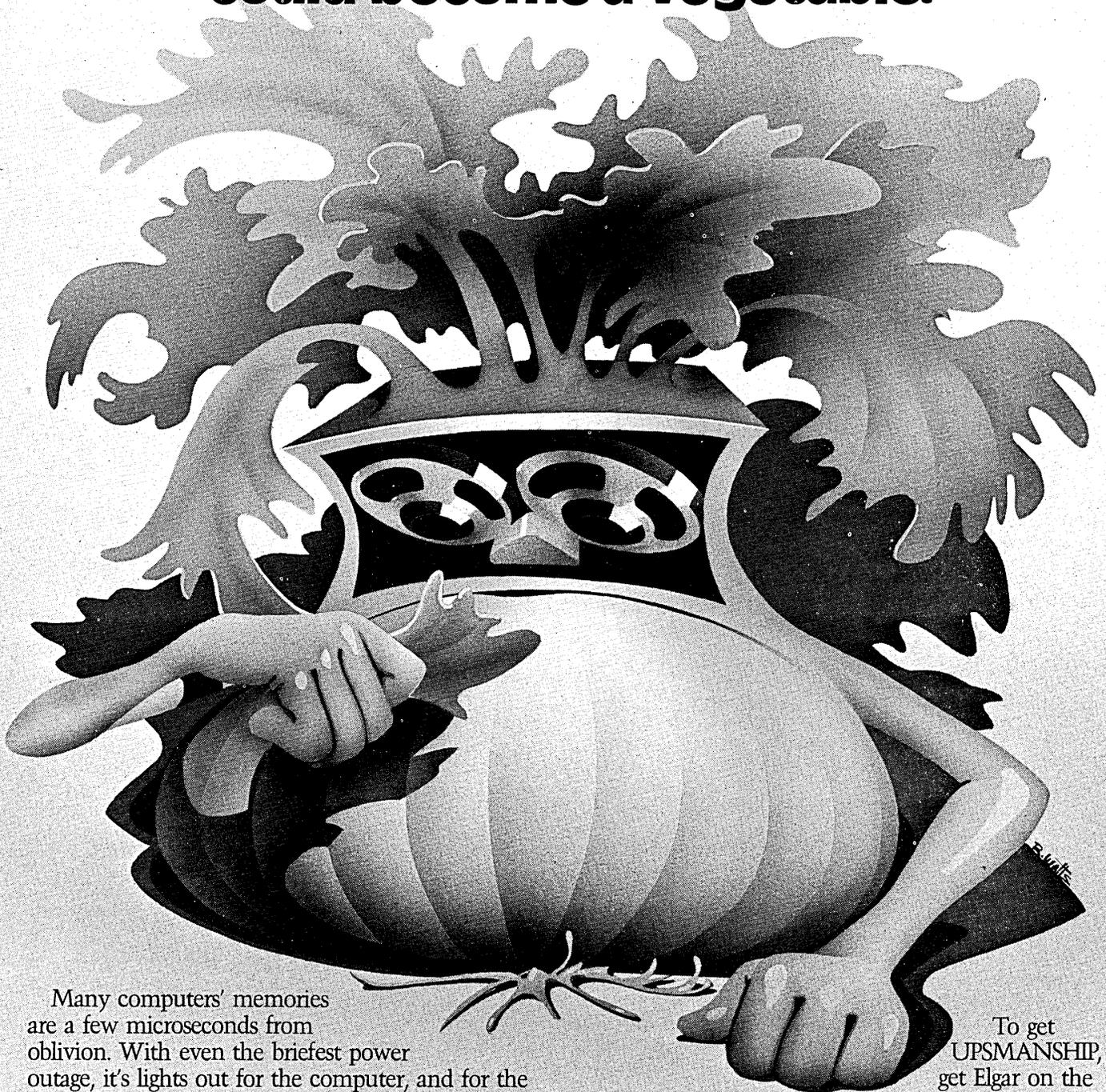
1) *Proper personnel selection and orientation.* Individuals who are able to relate to the management environment, the decision-making process, and the interpersonal relationships impacting managers; individuals with solid understanding of the conceptual areas to which they respond; individuals who are marketing oriented and profit motivated; individuals with sufficient knowledge of interactive computing to understand its application to management problems and to utilize the tool in developing and supporting such applications; in sum, individuals with the ability to bridge the gap between management's needs and the capabilities of interactive systems, and to implement the applications within this overall scheme.

2) *Incentive compensation.* Includes an approach designed to reward salespeople and support analysts based on the business they generate and support, and managers based on the profits they earn; stock ownership and bonuses for performance.

3) *User-oriented philosophy.* A basic orientation toward easy to use systems and assistance in complete and successful implementation of systems.

4) *Quality product.* Offers responsive hardware and flexible software designed specifically for time-sharing, user-oriented application packages designed to en-

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Batch processing is as different from interactive computing as marketing is from accounting.

able novices to learn the system quickly and to allow trained users to implement applications rapidly and with ease.

5) *Autonomy*. Independently managed subsidiaries of major organizations or publicly owned companies.

In light of current conditions, the only constraints inhibiting creation of an in-house time-sharing organization in the image of these successful time-sharing companies are those engendered by the organization itself—its policies, attitudes, and philosophies. Techniques and organizations exist to assist in selection of appropriate personnel to fill management, marketing, and support positions; outstanding application packages and languages are available for installation on in-house systems at very reasonable prices.

Through a unique new approach now being offered, in-house time-sharing organizations can begin operating without the initial expense of their own hardware and yet offer time-sharing to in-house users at competitive rates, retain 50% of revenue internally, and be able to upgrade to an in-house system when the time is right. There is really nothing external to a corporation spending \$20,000 to \$25,000 a month or more in outside time-sharing which would prevent them from instituting an effective in-house time-sharing operation.

In order to proceed, the first step is to determine more about who within the organization is doing time-sharing, with whom it is being done, what applications are being performed, and on what vendor-proprietary packages. The end result should be an inventory of how much outside time-sharing is susceptible to conversion to an in-house system and what will be required to support the various applications.

Where users are involved, all aspects of the survey must be handled with sensitivity to avoid inducing the dp threat; under no conditions should the in-house batch processing organizations be involved in this research. As a matter of fact, it might be wise to use an outside firm with background in time-sharing to conduct the investigation.

PREPARE COMPLETE PLAN

Based on the results of this survey, an evaluation should be made to determine whether in-house time-sharing is realistic. If it appears reasonable, a complete business plan should be prepared to consider competition, opportunities, strategies, policies and philosophies of the organization. Facilities should be defined, prices established, and a forecast of anticipated results prepared. The plan should be designed just as if the organization were totally independent and profit motivated since it must be if it is to provide the proper atmosphere for employees and users alike. The or-

ganization should be structured as an independent subsidiary, if reasonable, or, at the very least, a profit center. Employees must see themselves as employees of a time-sharing company competing in a restricted market for the maximum profits; only in this way will the concept be effective.

Next, an appropriate manager for the organization should be selected. Most importantly, this person should have experience in management, if possible in a variety of operations, and have the ability to relate to managers, understand their environment, and be aware of the pressures which are imposed upon them so that he can structure his organization to respond to this environment. He should also have knowledge of interactive computing, perhaps as a user. Ideally, this individual will have been employed by an outside time-sharing company in a managerial capacity so that he can understand the way these companies operate. Finally, he should be humanistic, be able to understand users as well as employees, and be capable of selecting wisely those people who will most aptly fill the required roles.

Once a manager is selected, a decision must be made regarding the method of providing time-sharing resources. As an example, the associates plan offered by some time-sharing vendors provides a way for companies to evolve into an in-house time-sharing operation with little risk. For about \$10,000, the vendor offers time-sharing to in-house organizations at 50% of competitive retail rates. Once the in-house organization becomes established, gains confidence and attains a monthly revenue figure sufficient to justify it, the vendor's system can be licensed in-house, enabling instant conversion to an in-house computer with no retraining of users.

Not only does this approach limit risk, but it also offers the opportunity to benefit from the high incremental margins available in time-sharing once the risk is no longer a factor. In addition, it eliminates many typical expenses of in-house operations since the vendor accepts all responsibility for maintenance and enhancement of the operating system—thus no system programmers or expenses are required.

The next step is to develop a compensation scheme designed to attract aggressive sales and support people, most likely from outside time-sharing companies. The best people are those who are most likely making substantial incentive income working for an outside vendor. In order to attract them, competitive incentive compensation is necessary.

There is no need to institute a large staff immediately. Certainly an associates plan enables the in-house organization to satisfy demand with far fewer people, but no matter what approach is used for acquisition

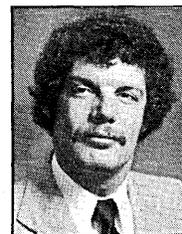
of resources, it makes the most sense to build slowly, establishing credibility with users first with a select number of qualified people and then adding personnel as business expands. The need is for quality, not quantity. As Michael Scott Morton and Peter Keen say in the book *Decision Support Systems: An Organizational Perspective*, the need is for a "system designer who is currently hard to find, one who is technically competent but views her or his role as supporting the manager and understanding the manager's world." It is the ability to find and retain this person that will determine the success of the in-house approach.

The organization should have an extremely aggressive user-oriented marketing approach. Salespeople should actively solicit business from in-house users, support representatives should respond vigorously to appropriate requests from users and attempt to encourage additional use of the system, and user orientation and documentation should be provided with each application.

Of course, it is mandatory that system response be maintained at a high level, that user-oriented application languages are provided so that all hardware and software aspects will be competitive where this is desirable.

Now is the time to implement in-house time-sharing. We know the traditional approach does not work. In the face of its failure, however, time-sharing companies continue to generate increasing amounts of business, even in organizations with unsuccessful time-sharing operations. To the extent possible, new in-house time-sharing organizations should follow the lead of time-sharing vendors and apply the approach they employ. The payoffs are high and the risks are low. *

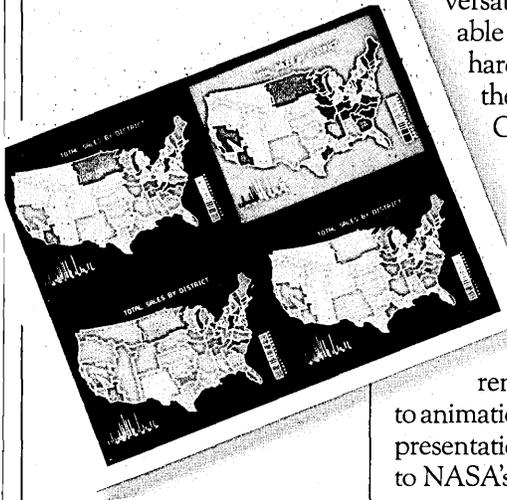
DAN WALKOVITZ



Mr. Walkovitz is president of Corporate Management Systems, Inc., Englewood, Colo., management consultants specializing in the development and implementation of decision support systems. He was previously a marketing vp of Computer Sharing Services, a national time-sharing service vendor. Mr. Walkovitz has an MBA in finance from Stanford Univ. and spent eight years in corporate finance.

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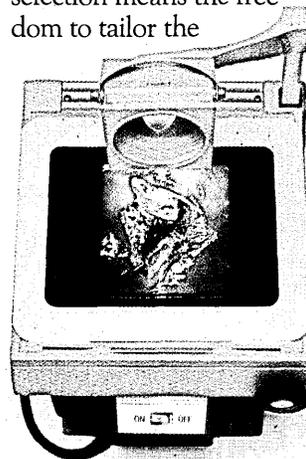
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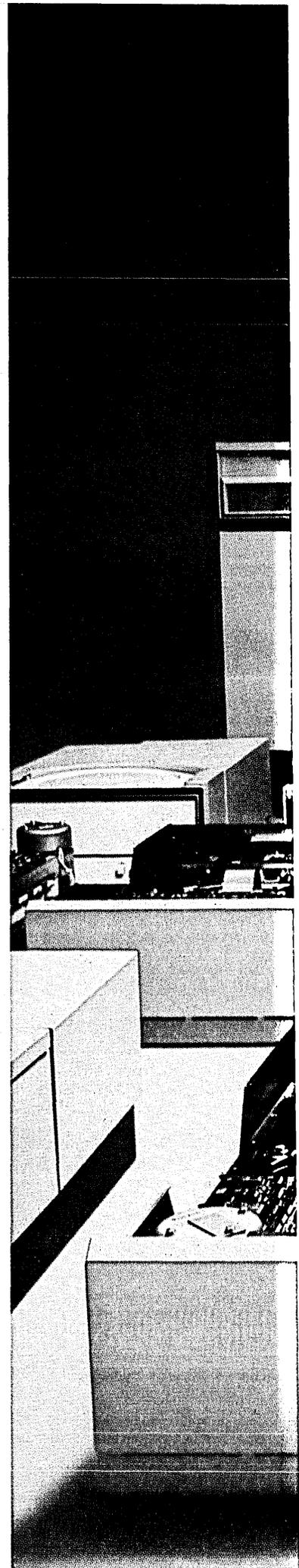
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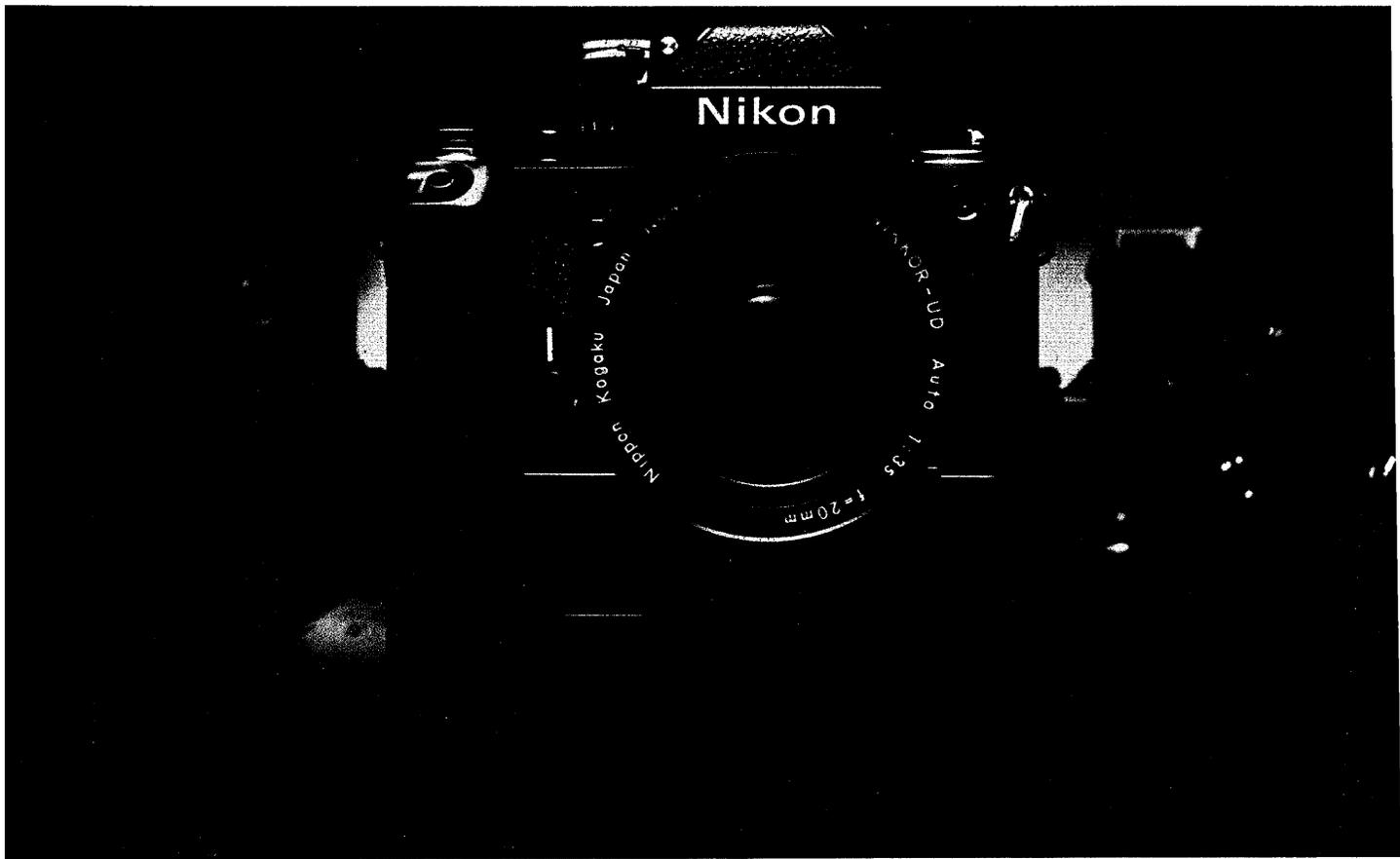
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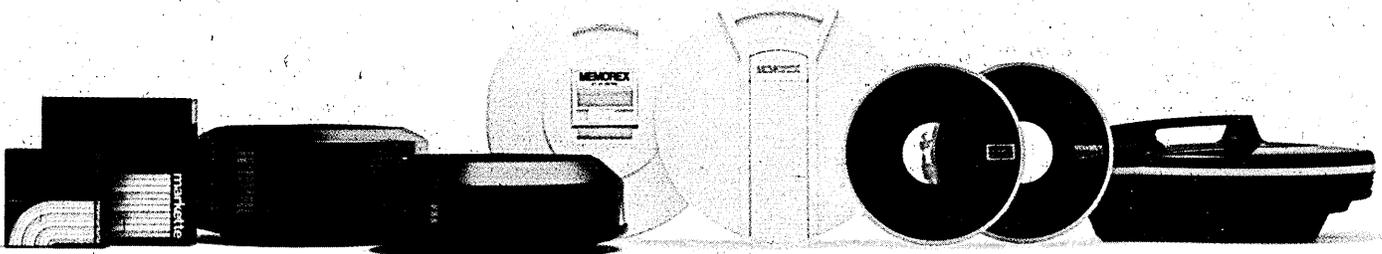
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An executive support system achieves the coupling of an individual's intellectual resources with those of the machine.

OPTIMIZING DECISION SUPPORT SYSTEMS

by G.R. Wagner

Certain tools are commonly used as extensions of the human mind. An architect's ideas take shape on a sheet of drawing paper. An engineer works out a design with a sketch as his fingers fly over the keys of a calculator. Such tools can become as much a part of the mind as a tennis racket can become an extension of the body.

Computer-based decision support systems have been rather slow to arrive in the world of business management. The approach represents a radical departure from traditional business applications of computers, as executives are indeed augmenting mental powers in ways reminiscent of computer-aided design and interactive data analysis. In some cases, a manager sits at a terminal, although more often the same effect is achieved through an intermediate staff assistant. The process is not merely data compilation and reporting as in traditional mainstream applications; neither do users serve essentially as operators directing the system. Executive support is more—it is a system that achieves a coupling of an individual's intellectual resources with those of the machine.

The recession of 1973-74 was the most important single stimulus in recognizing a manager's need for fast information updates and fast answers. By contrast with our former relative stability, it is now essential that business managers anticipate probable changes, detect change as it occurs, and take appropriate action—all very quickly. Managers also think strategically, using change and uncertainty to their advantage by planning to influence the future instead of performing reactively. The cycles of product life, competitive action, and other business realities are too short to allow the manager to have a wait-and-see attitude; the natural process is often too slow for business survival.

Decision support systems for executives can be categorized as corresponding loosely to the faculties of memory and reasoning. For example, certain data base management systems, providing the ability to retrieve information in such a way that meaningful patterns and correlations may be discerned, augment the memory. Simulation-based systems can be seen as extensions of an executive's reasoning powers. Models of the business environment help an executive envi-

sion possibilities for the future, foresee consequences, and identify and select alternative solutions. Most decision support systems contain elements of both data base management and modeling, but typically one element is dominant in a particular situation.

Most important innovations in computer-based modeling are financial planning languages—programming languages that enable non-dp people to become competent in building and solving models in an

interactive, exploratory manner. For purposes of example, we will refer to one such language, called IFPS (Interactive Financial Planning System); however, most of what we will say applies to other languages of this type. The ways in which such a planning language are used are indicated by a survey of clients.¹ Among the results was the finding

1. Wagner, G.R., "Enhancing Creativity in Strategic Planning Through Computer Systems," *Managerial Planning*, July-August 1979.

TABLE I

10	COLUMNS 1980HALF1,1980HALF2,1981HALF1,1981HALF2
20	* THIS MODEL IS FOR SIX MONTH PERIODS
30	* EXPENSE SECTION
40	PAYROLL=19000*NUMBER OF SALESPERSONS, PREVIOUS*1.05
50	NUMBER OF SALESPERSONS=4
60	TRAVEL AND ENTERTAINMENT=15000 * NUMBER OF SALESPERSONS
70	PROMO SUPPORT=11000 * NUMBER OF SALESPERSONS
80	ADMINISTRATIVE SUPPORT=53000,PREVIOUS*1.05
90	COMMISSIONS=15%*SALES REVENUE
100	TOTAL EXPENSES=SUM(PAYROLL THRU COMMISSIONS)
110	* REVENUE SECTION
120	SALES REVENUE=NUMBER OF SALES*SALES PRICE
130	NUMBER OF SALES=5*6*NUMBER OF SALESPERSONS
140	SALES PRICE=4350 FOR 2,4695
150	* SUMMARY SECTION
160	GROSS CONTRIBUTION MARGIN=SALES REVENUE-TOTAL EXPENSES
170	EXPENSE RATIO=TOTAL EXPENSES/SALES REVENUE

TABLE II

?SOLVE	1980HALF1	1980HALF2	1981HALF1	1981HALF2
ENTER SOLVE OPTIONS				
?ALL				
EXPENSE SECTION				
PAYROLL	76000	79800	83790	87980
NUMBER OF SALESPERSONS	4	4	4	4
TRAVEL AND ENTERTAINMENT	60000	60000	60000	60000
PROMO SUPPORT	44000	44000	44000	44000
ADMINISTRATIVE SUPPORT	53000	55650	58433	61354
COMMISSIONS	78300	78300	84510	84510
TOTAL EXPENSES	311304	317754	330737	337848
REVENUE SECTION				
SALES REVENUE	522000	522000	563400	563400
NUMBER OF SALES	120	120	120	120
SALES PRICE	4350	4350	4695	4695
SUMMARY SECTION				
GROSS CONTRIBUTION MARGIN	210696	204246	232664	225552
EXPENSE RATIO	.5964	.6087	.5870	.5997

that 44% of the models were actually built by middle- or upper-level managers. By contrast, middle- and upper-level managers, performed only 21% and 9%, respectively, of the "what-if" analyses. Apparently, managers want to be involved in the building of their models—but once a model has credibility, they turn the mechanics of using a terminal over to a staff assistant. The key persons actually performing "what-if" analyses tend to be intermediaries such as secretaries and MBA assistants—after the model has been aligned with the thinking processes of the executive.

For a model to provide true decision support, its statements must resemble the business person's vocabulary and track unstructured and continually changing thought processes. Furthermore, the model must react in real time, while the person's attention remains focused on the subject. Decision support is further promoted by permitting the model statements to appear in any order—to this extent, the language is "nonprocedural." This example is not intended to be complete or even realistic, but it does demonstrate that anyone who understands English or any other natural language can understand our model. Building a real model for a real company involves a more thorough description but not any more complex programming.

The model as it would appear after being typed into the terminal in interactive fashion appears in Table I.

To get an automatic report the user need only type the command SOLVE, and receive the report depicted in Table II.

To answer "what-if" questions, the user types in the command WHAT IF along with the questions he wants to consider, as shown in Table III.

What sales price would result in an expense ratio of .57? To answer this type of question, the user can use the GOAL SEEKING command (see Table IV).

USING RISK ANALYSIS

One particularly noteworthy aspect of decision support is that Monte Carlo risk analysis is being applied to business models through the modeling language. Although the classic paper on the Monte Carlo method was published in 1964,² this technique has been slow to reach its potential in routine planning. To see how the Monte Carlo technique is implemented in IFPS, the foregoing model has been modified to include the uncertainties shown in Table V.

Now the decision-maker can express intuitive patterns of uncertainty and immediately gain insight into how much various outcomes might swing. For example, with the

TABLE III

```
?WHAT IF
WHAT IF CASE 1
ENTER STATEMENTS
?COMMISSIONS = 16%*SALES REVENUE
?SALES PRICE=4450 FOR 2,4750
?SOLVE
ENTER SOLVE OPTIONS
?SALES REVENUE THRU EXPENSE RATIO
WHAT IF CASE 1
2 WHAT IF STATEMENTS PROCESSED
1980HALF1 1980HALF2 1981HALF1 1981HALF2
SALES REVENUE 534000 534000 570000 570000
NUMBER OF SALES 120 120 120 120
SALES PRICE 4450 4450 4750 4750
SUMMARY SECTION
GROSS CONTRIBUTION
MARGIN 215556 209106 232574 225462
EXPENSE RATIO .5963 .6084 .5920 .6045
```

TABLE IV

```
ENTER SOLVE OPTIONS
?GOAL SEEKING
GOAL SEEKING CASE 1
ENTER NAME OF VARIABLE TO BE ADJUSTED TO ACHIEVE PERFORMANCE
?SALES PRICE
ENTER COMPUTATIONAL STATEMENT FOR PERFORMANCE
?EXPENSE RATIO = .57
GOAL SEEKING CASE 1
1980HALF1 1980HALF2 1981HALF1 1981HALF2
SALES PRICE 4623 4751 4885 5026
EXPENSE RATIO .57 .57 .57 .57
```

TABLE V

	Low Value	Most Likely Value	High Value
TRAVEL AND ENTERTAINMENT	\$12,000	\$15,000	\$18,000
PROMO SUPPORT	9,500	11,000	13,000
ADMINISTRATIVE SUPPORT	45,000	53,000	62,000
NUMBER OF SALES	4	5	5.5

Each of these variables will be represented by a triangular statistical distribution which in a picture looks like the following:

```
PROBABILITY
PESSIMISTIC VALUE
MOST LIKELY VALUE
OPTIMISTIC VALUE
```

The IFPS word to represent the triangular distribution is TRIRAND. It is used as follows:

VARIABLE NAME = TRIRAND (LOW VALUE, MOST LIKELY VALUE, HIGH VALUE)

All that's needed is to replace lines 60, 70, 80, and 130 in the IFPS model with the following:

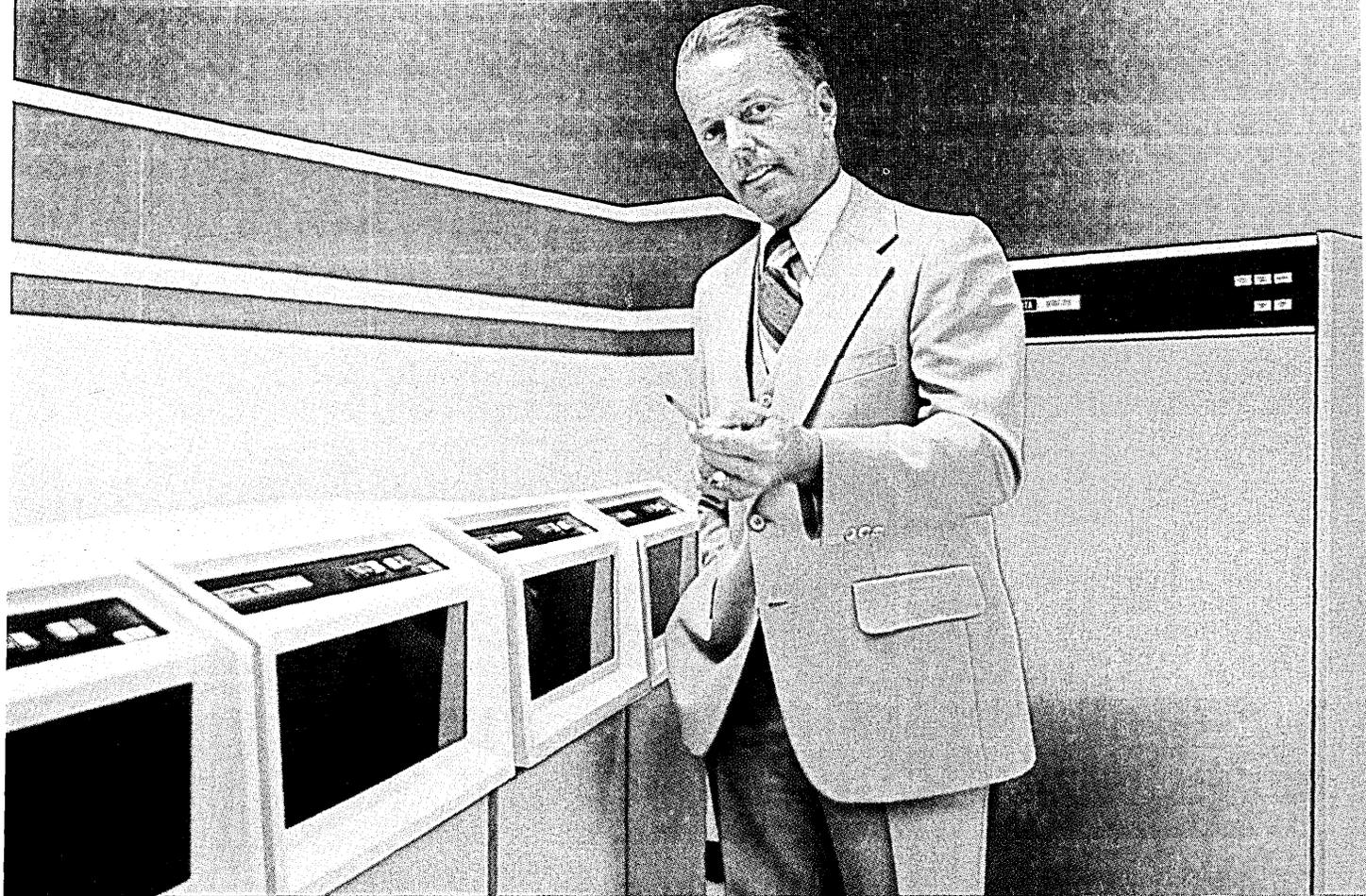
```
60 TRAVEL AND ENTERTAINMENT = TRIRAND (12000, 15000, 18000)*
NUMBER OF SALESPERSONS
70 PROMO SUPPORT = TRIRAND (9500, 11000, 13000)* NUMBER OF
SALESPERSONS
80 ADMINISTRATIVE SUPPORT = TRIRAND (45000, 53000, 62000), PREVIOUS
*1.05
130 NUMBER OF SALES = TRIRAND (4, 5, 5.5) *6* NUMBER OF
SALESPERSONS
```

The user gets probabilistic answers by typing the command MONTE CARLO:

```
?MONTE CARLO
ENTER MONTE CARLO OPTIONS
?ALL GROSS CONTRIBUTION MARGIN, ALL EXPENSE RATIO
ENTER MONTE CARLO OPTIONS
?NONE
```

2. Hertz, David B., "Risk Analysis in Capital Investment," *Harvard Business Review*, January-February 1964.

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FREQUENCY TABLE

PROBABILITY OF VALUE BEING GREATER THAN INDICATED

90 80 70 60 50 40 30 20 10

GROSS CONTRIBUTION MARGIN

1980HALF1	152753	165740	179519	190729	196567	203796	211951	220087	230485
1980HALF2	146302	159248	173053	184261	190067	197160	205534	213886	224032
1981HALF1	170571	184433	198993	211024	217528	225132	234254	242984	253822
1981HALF2	163526	177291	191806	203841	210500	217800	227201	235877	246707

EXPENSE RATIO

1980HALF1	.576	.586	.596	.604	.613	.621	.632	.649	.688
1980HALF2	.588	.598	.608	.617	.625	.634	.646	.662	.682
1981HALF1	.567	.577	.586	.595	.603	.611	.622	.638	.657
1981HALF2	.579	.589	.598	.607	.616	.624	.636	.652	.671

given assumptions, it is reasonable that the expense ratio in the last period could swing between 57.9% and 67.1%. Probably the most important tool in the operations research/management science kit is optimization. Optimization is now available; it may be applied interactively to an IFPS model through an optimization system called IFPOS.

The following example is simple but realistic. It represents a project or activity module that could be included in an overall corporate planning model. This particular module entertains possible expansions of a company's field sales force and its customer support group (consultants). First, IFPS is used to describe expenses, revenues, billing ratios, fees, and other variables, as shown in Table VI.

For the present example, this separate and standalone model will be optimized. However, in practice this would be just another activity added to the total corporate planning model and the total model would be optimized. The point of the demonstration is to show how easy it can be to use optimization without the hindrance of complexity, jargon, and other distractions.

After building the IFPS description of the business the user accesses IFPOS, and using its language he constructs a set of "directives" or rules. The objective of the exercise is to maximize cumulative corporate contribution as defined in the IFPS model. This is indicated as follows:

10 MAXIMIZE CUM CORP CONTRIBUTION (1981HALF2)

This means we want to maximize the cumulative contribution in the last period. This is a resource-allocation problem, where we want decisions for (1) when and how many new salespersons to add, and (2) when and how many new consultants to add. These decisions and their limits are expressed as follows, where the total number of new salespersons over the two-year period cannot exceed 10 and the total number of consultants over the two-year period cannot exceed 15.

15 DECISIONS

20 SALES HIRINGS (ALL) BETWEEN 0 AND 5

25 CONSULTANT HIRINGS (ALL) BETWEEN 0 AND 5

The management constraints on the decisions are:

(1) Financial contribution in any period cannot be negative;

(2) No more than five new consultants per period, where a period is six months;

(3) No more than five new salespersons per period, where a period is six months.

These limitations or constraints are expressed as follows:

30 CONSTRAINTS

35 NUMBER OF SALESPEOPLE (1981HALF2) .LE. 10

TABLE VI

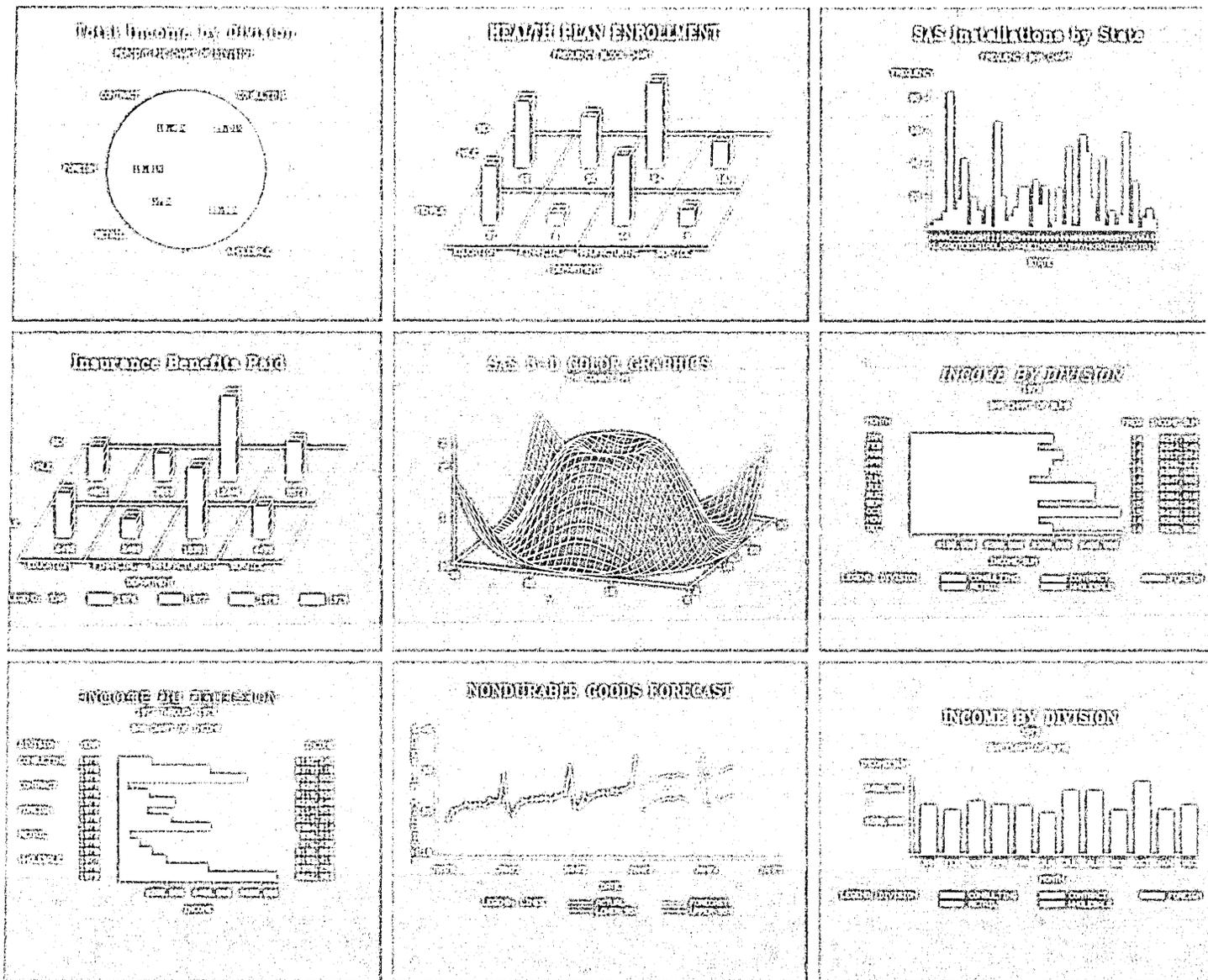
10 COLUMNS 1980HALF1,1980HALF2,1981HALF1,1981HALF2
 20 * PROPOSAL FOR NEW SALES PEOPLE
 30 SALES HIRINGS=5,0
 40 SALARY=19000,PREVIOUS*1.05
 50 FIELD OFFICE EXPENSE PER PERSON=22000,PREVIOUS*1.05
 60 NUMBER OF SALESPEOPLE=PREVIOUS+SALES HIRINGS
 70 PAYROLL=NUMBER OF SALESPEOPLE*SALARY
 80 FIELD OFFICE EXPENSE=NUMBER OF SALESPEOPLE*FIELD OFFICE EXPENSE PER PERSON
 90 COMMISSION=18%*TOTAL REVENUE
 100 TRAVEL AND ENT=L60*10000
 110 OTHER EXPENSES=L60*6000
 120 TOTAL SALES EXPENSES=SUM(PAYROLL THRU OTHER EXPENSES)
 130 INITIAL SALES QUOTA=50000
 140 SUBSEQUENT SALES QUOTA=120000
 150 TOTAL REVENUE=SALES HIRINGS*INITIAL SALES QUOTA+ PREVIOUS NUMBER OF SALESPEOPLE*SUBSEQUENT SALES QUOTA
 170 CONTRIBUTION MARGIN NEW SALES FORCE=TOTAL REVENUE-TOTAL SALES EXPENSES
 180 CUM CONTR MARGIN SALES=L170,PREVIOUS+L170
 190 EXPENSE RATIO SALES=TOTAL SALES EXPENSES/TOTAL REVENUE
 200 * PROPOSALS FOR NEW CONSULTANTS
 210 CONSULTANT HIRINGS=10,0
 220 CONSULTANT SALARY=19500, PREVIOUS*1.07
 230 FIRST PERIOD BILLING RATIO=0.45
 240 SECOND PERIOD BILLING RATIO=0.48
 250 THIRD PERIOD BILLING RATIO=0.52
 260 FOURTH PERIOD BILLING RATIO=0.54
 270 FIRST PERIOD PER DAY RATE=600
 280 SECOND PERIOD PER DAY RATE=650
 290 THIRD PERIOD PER DAY RATE=700
 300 FOURTH PERIOD PER DAY RATE=750
 310 NUMBER CONSULTANTS=PREVIOUS+CONSULTANT HIRINGS
 320 PAYROLL CONSULTANTS = NUMBER CONSULTANTS*CONSULTANT SALARY
 330 TRAVEL AND ENT CONSULTANTS=NUMBER CONSULTANTS*5000
 340 MISC EXPENSE=NUMBER CONSULTANTS*3000
 350 ADMIN SUPPORT CONSULTANTS=22000,PREVIOUS*1.05
 360 CONSULTANT REVENUE=CONSULTANT HIRINGS*L390*FIRST PERIOD BILLING RATIO* FIRST PERIOD PER DAY RATE+PREVIOUS L210*L390*L240*L280+ PREVIOUS 2 L210*L390*L250*L290+PREVIOUS 3 L210*L390*L260*L300
 390 DAYS AVAILABLE FOR CONSULTING=120
 400 TOTAL EXPENSES=SUM (L320 THRU L350)
 410 CONTRIBUTION MARGIN CONSULTANTS=CONSULTANT REVENUE-TOTAL EXPENSES
 420 CUM CONTR MARGIN CONSULTANTS=PREVIOUS+L410
 430 CORPORATE CONTRIBUTION=L170+L410
 440 CUM CORP CONTRIBUTION=PREVIOUS+L430

40 NUMBER OF CONSULTANTS (1981HALF2) .LE. 15

45 CORPORATE CONTRIBUTION (ALL) .GE. 0

Once again, these natural language

"directives" were built using the IFPOS language, and the user is now on-line using IFPOS. He retrieves the stored IFPS model and simply types in the command SOLVE, thereupon receiving from IFPOS the standard re-



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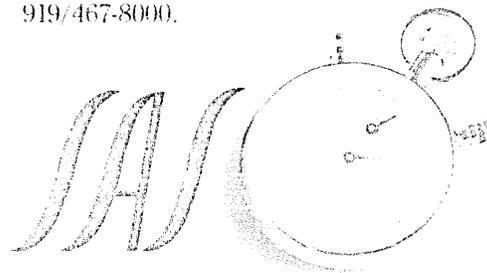
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Financial planning languages enable non-dp people to become competent in building and solving models in an interactive, exploratory manner.

ports that he is accustomed to seeing from IFPS, as depicted in Table VII.

Thus the optimal strategy is no new salespeople in the first and last six months, two in the second period, and five in the third period. The optimal strategy for consultants is to add five in each of the first three periods and none in the last period.

The constraints are typical of those which might be suggested by management. An important aspect of mind support in this example was the intuitive or subjective constraints expressed in the IFPOS language, yielding immediate answers that reside within these constraints. This can be especially useful if nonobvious answers lead to more insight to the problem. For example, an interesting "what-if" question or sensitivity analysis might be to permit a negative corporate contribution of up to \$100,000, but not change any other constraints. This would be done as shown in Table VIII.

This relaxation to allow a negative contribution of up to \$100,000 significantly changes the optimal strategy. Instead of making only one pass to get "best" answers, the manager can see the results of multiple scenarios and gain more confidence and knowledge to support decision processes.

Of course, interactive optimization within the scope of a planning language will not necessarily supersede classical large scale optimization systems such as those applied to complex distribution problems and allocation of production capacity. These and similar historical uses have usually been for the optimal utilization of already-committed plant and people resources. On the other hand, optimization in decision support has its greatest potential in the allocation of resources among a diverse variety of alternative futures—that is, strategic planning: doing the right things as opposed to doing things right. After all, the strategic issues are where executive minds excel, and it is there that support will be the most fruitful. *

G. R. WAGNER



Dr. Wagner is president of Execucóm Systems Corp. in Austin, Texas. He has been professor of operations research at the University of Texas, vice president of MRI Systems Corp. and corporate director of operations research for Swift & Co. He is founder and a board member of Planners League, a professional planners group.

TABLE VII

```
?SOLVE
ENTER SOLUTION OPTIONS
?OPTIMAL
ENTER SOLVE OPTIONS
?SALES HIRINGS, CONSULTANT HIRINGS, CUM CORP CONTRIBUTION
```

	1980HALF1	1980HALF2	1981HALF1	1981HALF2
SALES HIRINGS	0	2	5	0
CONSULTANT HIRINGS	5	5	5	0
CUM CORP CONTRIBUTION	2500	3850	65694	455063

TABLE VIII

```
?WHAT IF
WHAT IF CASE 1
ENTER STATEMENTS
?LIMIT CORPORATE CONTRIBUTION .GE. -100000
?SOLVE
ENTER SOLUTION OPTIONS
?OPTIMAL
ENTER SOLVE OPTIONS
?SALES HIRINGS, CONSULTANT HIRINGS, CUM CORP CONTRIBUTION
```

	WHAT IF CASE 1			
	1980HALF1	1980HALF2	1981HALF1	1981HALF2
SALES HIRINGS	5	5	0	0
CONSULTANT HIRINGS	5	5	5	0
CUM CORP CONTRIBUTION	-77500	66450	526887	1021068



"But, then again, I can't say the assertiveness training course was a total loss."

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CARTOON BY CHUCK VADUN

The Computer-Assisted Instruction System of the 80's:



**“When Phoenix goes up,
CPU costs go down.”**

(By 60 to 75%)

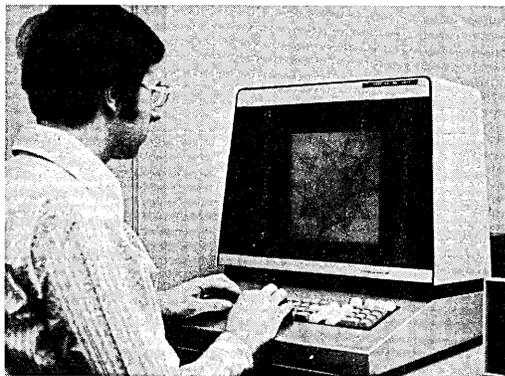
A pretty heavy claim, you'll have to admit.

Heavier still is that it's more than a claim: it's a proven fact. And a direct quote from a Phoenix customer.

Another user said that after the installation of Phoenix in his 100,000-student school district “it was like getting half my CPU back.”

And that's just the tip of the Phoenix iceberg. Where existing computer aided instruction (CAI) systems are in effect, Phoenix can replace them and be running in *two days*.

And just so you don't get the idea that Phoenix is a step in the direction of controlling the lives of our students with a computer, let us point out that Phoenix users assert over and over that Phoenix provides *better* rapport between instructor and student, thanks to the instructor's increased ability to know the students' weaknesses and strengths, and the students' instant, favorable reaction



to their new learning tool.

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Phoenix will run under VS1, SVS and MVS on any IBM 370 or compatible computer. It currently interfaces with BTAM, VTAM, TCAM, CICS and TSO. Interfaces for DOS, CMS and IMS soon will be announced. One copy of Phoenix can interact simultaneously with any combination of interfaces listed. Installation of Phoenix and new releases require *no system generation*.

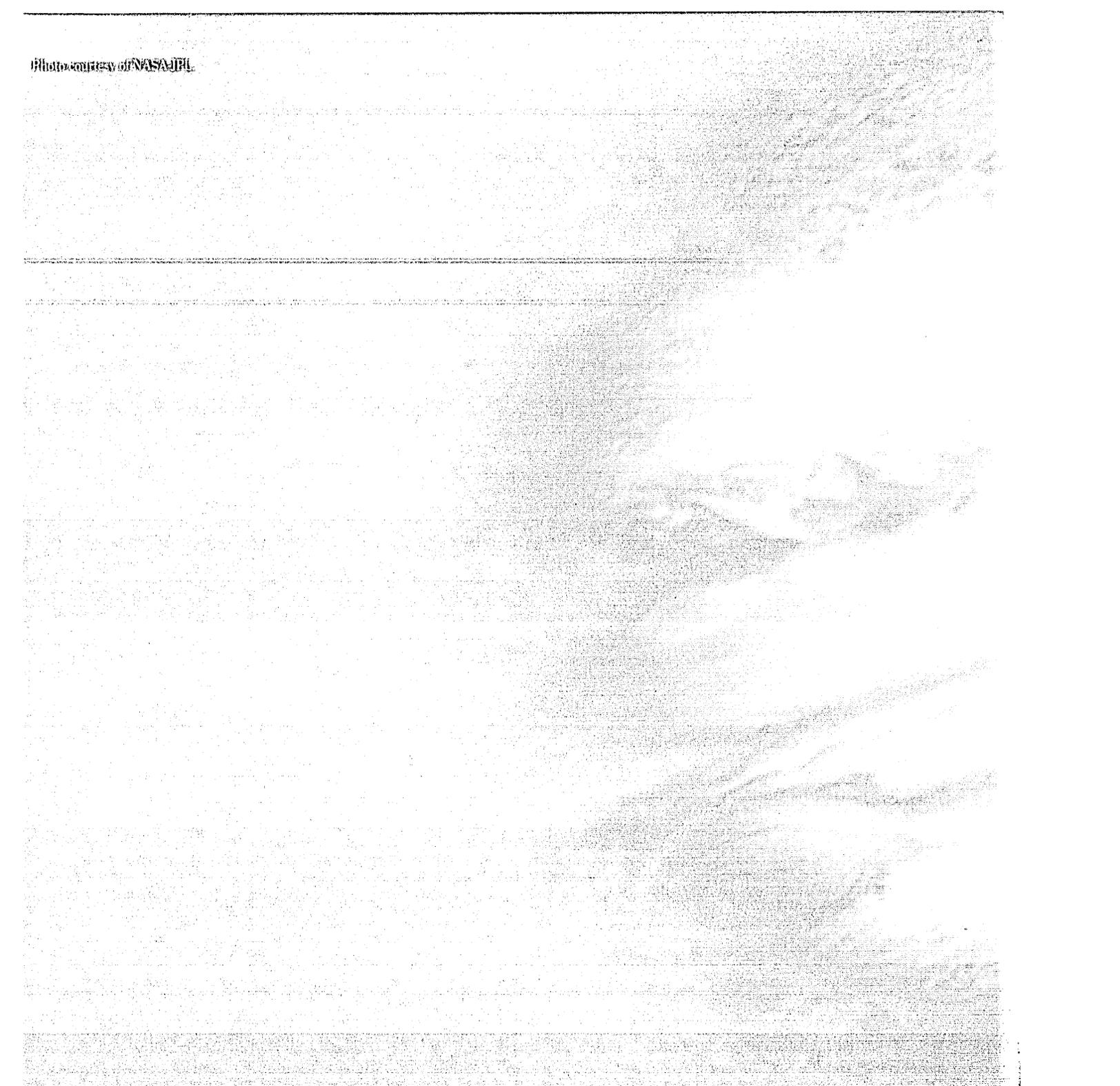
Why not get Phoenix up in *your* system, and watch your CPU costs go down. All it takes is a phone call or a note.

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CIRCLE 135 ON READER CARD

Photo courtesy of NASA/JPL



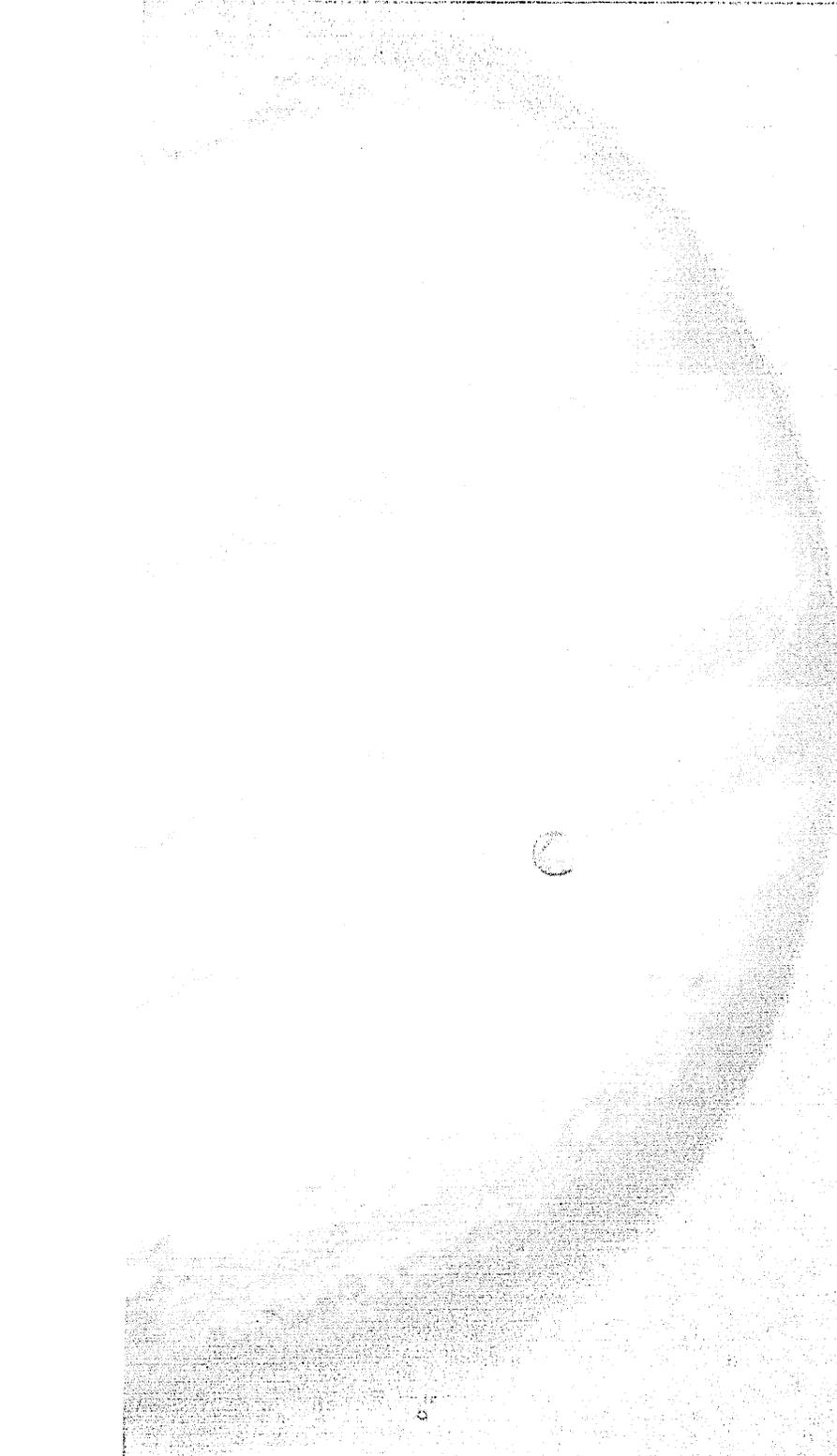
The only limitations are

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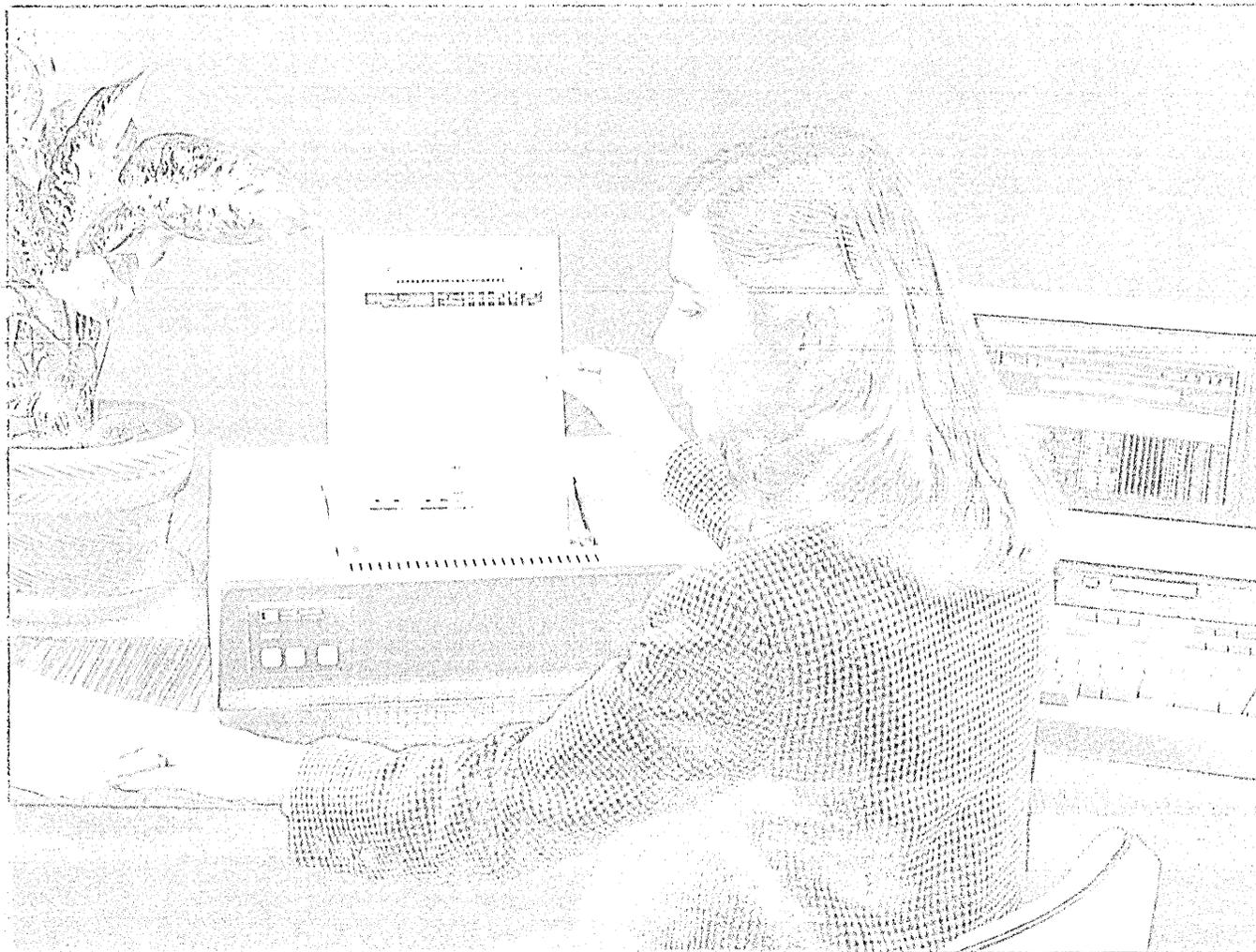
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The perceptive computer professional's very early summer guide to literary one-upmanship.

THE RIGHT BOOKS

by Robert Hard

It must be conceded by even the worst Pollyanna amongst us that our time on this planet is limited, and that our time is intellectually squandered by inhaling technical manuals for the new micro this and the high speed that. What few remaining moments we have the unspeakable audacity to call our own are relentlessly assaulted by business magazines, trade journals, and revised mil specs.

Given this incursion by the Grim Reader into the outposts of our private life, it is never too early to start composing one's summer reading list. Although now, in the dead of early spring, some of the more small-minded may equate such a composition with dressing before retiring for the evening, the fact remains that a well-chosen book list can avert the folly of reading the Wrong Books.

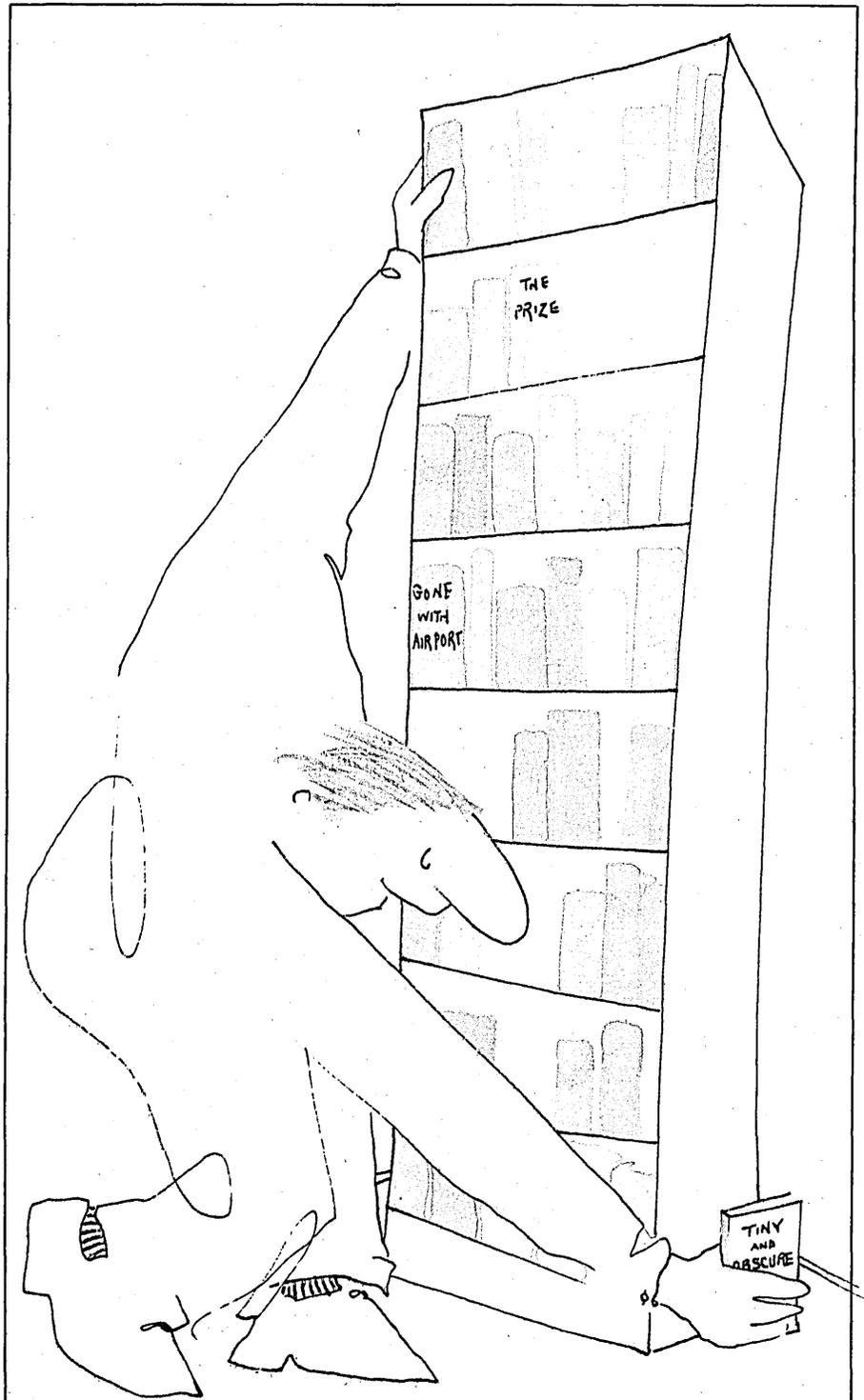
Confronted with the reality that some 100,000 works of fiction are published every year, the uninitiated may blanch at the Herculean task awaiting them. That anxiety may be swiftly dispelled, however, if it is borne in mind that virtually all the recent offerings are without even the pretense of artistic merit, and the rest, like fine wines, are better left to mellow.

Before drawing up a compendium of the Right Books, consider the nature of the Wrong Books. Beautiful, expensive, four-color, cloth-bound editions extolling fusty architectural triumphs are plainly out of the question. While the accompanying photographs are diverting, the *delict* here lies not in the generally callow text, but rather in the volume, as it were, of the volume.

Unless a reader intends to spend an inordinate span of the summer indoors, kneeling like a supplicant at the feet of the coffee table, books of this kind should continue their role as tasteful graft in the form of Christmas presents for business associates.

Another class of so-called literature that may be profitably eschewed is the entire family of whopping tomes with two-syllable titles (such as *Shogun*, *Thorn Birds*, *Airport*). The only comment that can be made with pride upon reading one of these piles of cotton candy is that you finished it in only 10 days. Such a remark is tantamount to letting drop you have just completed painting the garage—a worthy task, but not perhaps of more than passing interest.

As a further test, if the book in ques-



ILLUSTRATIONS BY BRUCE CAYARD

One must know how to insert one's literary accomplishment into the pompous discussions of apostate English graduates.

tion was easily converted into a blockbuster motion picture with no apparent dilution of quality, chances are excellent it was not of the Right sort.

The garnering of a polished reputation, however, is a necessary but not a sufficient condition for the august status of Right Bookdom. For example, we may ask ourselves, rhetorically, what *War and Peace* and *Finnegan's Wake* have in common. Are they classics? Undoubtedly. Are they timeless? Without question. Are they memorable? Who can forget the months invested in even a superficial gloss of their major themes? And here, we heave nigh to the point: the aforementioned works are of such staggering length as to require not only a vacation, but a protracted sabbatical just to dust them off.

The truth, gentle reader, is that a Right Book is a Short Book. The proper attitude to strike when the boorish humanities graduate seated next to you prattles on about the cetacean imagery of *Moby Dick* should be akin to the smile of kindly pity bestowed on an investor who dumped his gold last year. Keep firmly in mind that simply because an author was too obsessed to shut off his roaring hydrant of a mouth is no reason to dally slavishly over his every gushing phrase. A little appreciated fact is that most writers spend the same amount of time on every book—large, medium, or small—and consequently, the short book is more likely to have received the careful honing and buffing that makes every clause a burnished gem.

Whether or not the pseudo-cognoscenti on the Perrier circuit care to admit it, high-sounding small talk about books remains the most ubiquitous fixture in our tatty

inventory of social chatter. Now, imagine the awkwardness of those unfortunates who have put all their leisure reading eggs in the *Ulysses* basket; five minutes of mixed attention is their only reward. Moreover, in answer to the oft-repeated and always tedious "Read any good books lately?" there will be a depressing uniformity of response.

THE TURN OF THE CAITIFF

Thus, feeling himself a conversational ne'er-do-well, the literary Sisyphus sinks deeper into despair as our master of short books ticks off the list of six or eight titles consumed in the last week.

Purists may protest it is impossible to know an author's concerns unless a number of his (or her) works are studied and compared. These are the same people who imbibe an entire bottle of Chateau Yquem before deciding whether or not to send it back.

Most writers, of course, address the same themes over and over from transparently similar points of view. Therefore, it is bootless to subject oneself to the unremitting trip-hammer of one author when the same effort could be expended in a considerably more seemly sampling from the smorgasbord of published works.

A useful guideline in composing an appropriate reading list is concentration on fine writers; while many of the Right Books are also well known, most are the lesser hailed writings of deservedly famous authors.

A superior example is *Seize the Day*, by Saul Bellow. As in *Henderson the Rain King*, and the Nobel Prize-winning *Humboldt's Gift*, *Seize the Day* illustrates Bellow's preoccupation with the pathos of the innocent individual confronted by his own inadequacy in an indifferent world. However, the 128 paperbound pages of *Seize the*



Day contain more than enough pathos for even the most earnest of dabblers.

Critical here, also, is the effective implementation of the theory of Right Books; it is not only imperative to spend the brief moments required to read them, but one must also know how to insert this accomplishment into the pompous discussions of apostate English graduates (AEG) who assume a systems analyst (SA) has read nothing beyond Weinberg. The scenario to master is as follows: AEG: Bellow's maturity from *Augie March* to *Humboldt* is apparent in the subtleties of characterization, don't you agree?

SA: I've always thought the crux of Bellow's humanistic philosophy was best defined in *Seize the Day*.

AEG: *Seize the Day*?

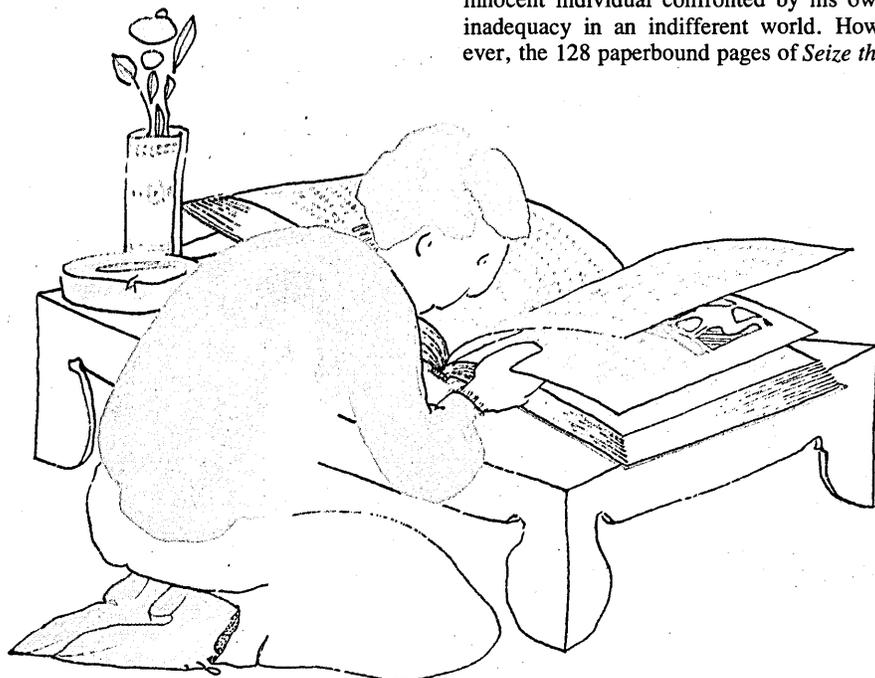
SA: Oh, you're not familiar with it? Perhaps its intensity was the reason for its lack of commercial popularity.

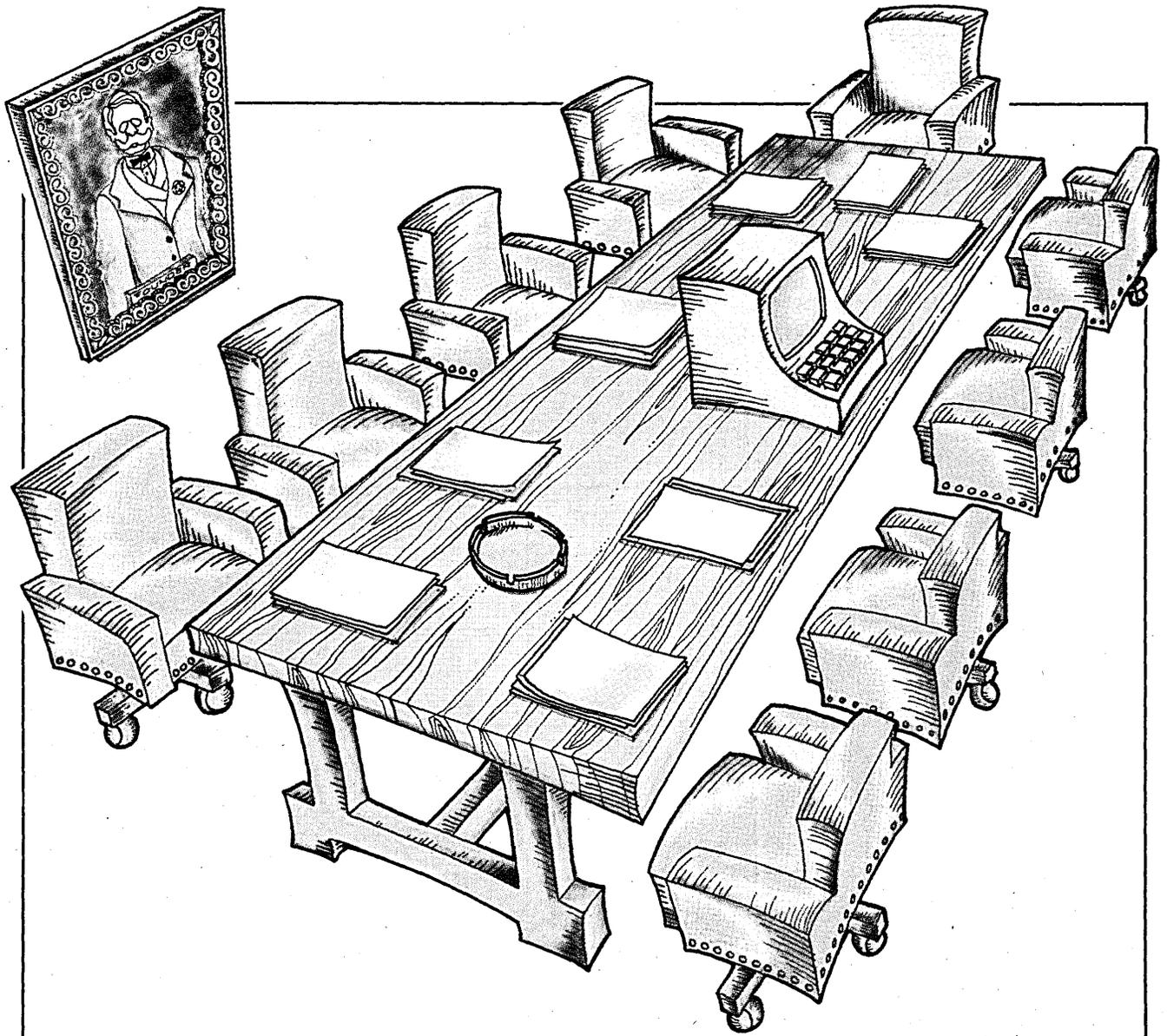
USE THE OBSCURE

As illustrated, a basic ploy in the reading of short books is also to read obscure books, thereby exploiting the assumption of your opponent in colloquy that *if you have read the obscure works, it is a certainty you have read the celebrated ones.*

Another appetizer plucked from the usual menu of entrees is Joseph Conrad's *Heart of Darkness* (111 pages), which, despite its forbidding title, is a truly funny book by the Dalai Lama of cosmic comedy. Conrad's principal preoccupation with the conflict between good and evil can be even more efficiently encountered by perusing *Typhoon*, which at 95 pages is not only shorter than *Heart of Darkness* but has the distinction of having recently escaped cinematic bowdlerization by Francis Ford Coppola.

The bizarre universal concepts of Thomas Pynchon can stun even the most pretentious of literary conversants, and, while the 492 pages of *V* and the 887 pages of *Gravity's Rainbow* are widely acclaimed, all one really needs of Pynchon's contagious paranoia can be found in the 138 pages of *The*



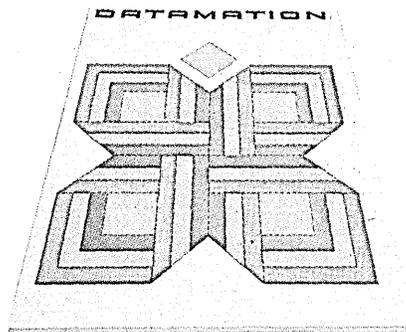


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Crying of Lot 49.

Continuing the list of authors seldom read voluntarily is Fyodor Dostoyevsky. Following the force-feeding of *Crime and Punishment* in high school, where the crime was waiting until the last minute, and the punishment was trying to cram it all in before the exam, few of us are tempted by the lugubrious prospect of more of the same. We are pleased to recommend, therefore, *Notes from Underground*, well worth a cursory glance, and, at 116 pages, takes only a cursory glance to reduce by one your list of unread authors.

Further required to achieve an impressive stock of acknowledged masters is a swig of Nabokov. Although the suggested *Pnin* and the longer *Lolita* (190 pages and 288 pages, respectively) are slightly more bulky than other mentioned selections, both can be read so rapidly as to hardly dent an otherwise indolent weekend. And while *Lolita* (a book written in French by a Russian who was best known in America before dying in Switzerland—a series of facts easily memorized) is probably the more enjoyable of the two, *Lolita*'s theme of masculine vanity shines clearly through the much shorter *Pnin*.

Nathanael West is a rare, cherished writer known exclusively for short works; if his *Miss Lonelyhearts* (78 pages), a bitter pill of a book ornamented by some of the most hilarious passages ever committed to paper, is insufficiently massive for consideration, content yourself with the knowledge that the 87-page *Day of the Locusts* is considered by some critics to be the most perfect novel ever written in English. (Still, one hardly needs to be reminded that a quest for perfection usually leads to a paralysis of action.)

For a philosophical turn of mind, Russell's protégé Ludwig Wittgenstein should not be placed guiltlessly on the shelf. *Remarks on the Foundation of Mathematics* is not only the shortest (204 pages) but also the most accessible of his works.

Completing the panoply, and included under protest for those with an incurable modernist orientation or a dedicated pursuit of Lost Hip (are you continually playing catch-up ball with the post-adolescent publications everyone else read while you were learning COBOL?), there is Richard Brautigan's *Trout Fishing in America* (112 pages). Although Brautigan's central contribution to the art of the novel is a multivolume demonstration that an author with the gall to write like a 10-year-old can sell several hundred thousand copies, none of his books are ill-treated by being skimmed in the milliseconds one spends waiting for the terminal to respond.

Additional listings of eminent works would dilute the vital thrust of the theory. Suffice it to say, the theory can be easily extended to all of Western culture; we dedicated dilettantes have endured for decades on the natural corollaries of small paintings and the *Minute Waltz* standard of music appreciation.

Mr. Hard is an editor with the Matthew Bender Co., New York City.

"TWO WORDS TURNED OUR MANAGEMENT'S ATTENTION TO IN-HOUSE COMPUTER OUTPUT MICROFILM."

DP Officer, Mr. William Mengel of Guarantee Bank in Atlantic City, N.J., met with DatagraphiX recently and spoke about his role in convincing upper management to acquire an in-house COM system.

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MENGEL: "When you talk to management about new equipment that gets the job done efficiently, easily and quickly, two words immediately come to mind—*time* and *money*. A DatagraphiX Computer Output Microfilm system saves plenty of both."

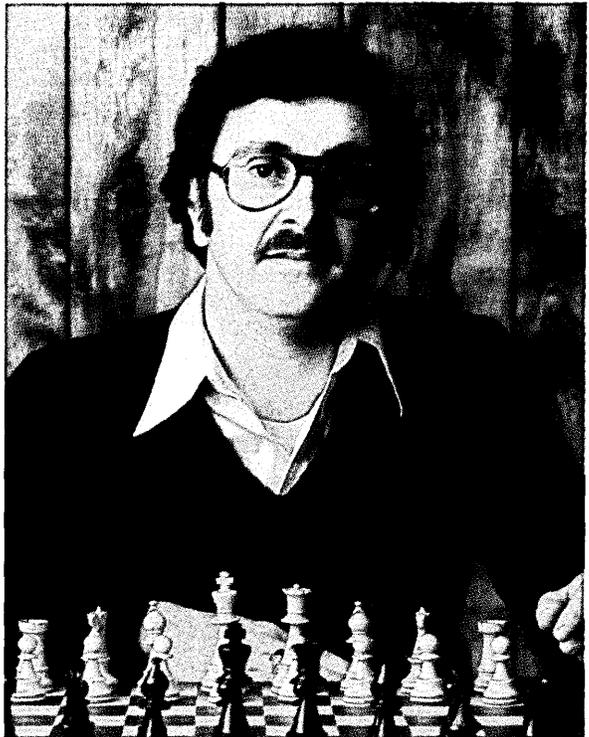
DATAGRAPHIX: "How do time and money relate to an in-house DatagraphiX system?"

MENGEL: "When you use an outside service, your performance depends on their ability to ferry your microfiche and tapes back and forth, day after day. When your COM system is in-house, you've got a lot more control. You don't miss deadlines or waste money because of lost time."

DATAGRAPHIX: "Was the cost of the equipment a major factor?"

MENGEL: "Sure, but we hit the break-even point almost immediately. And with growth projected over the next five years, in-house Computer Output Microfilm will not only pay for itself, but save us a lot of money. After mapping out the past, present and future, it's definitely cost-effective."

DATAGRAPHIX: "What were the other advantages?"



MENGEL: "First, the system was very simple to incorporate into our DP operation.

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CIRCLE 151 ON READER CARD

Statistical techniques can help dp managers and systems analysts determine the success or failure of a system.

PREDICTING RESULTS WITH STATISTICS

by Richard T. Dué

"Statisticks—That part of municipal philosophy which states and defines the situation, strength, and resources of a nation. This work is of very recent date in our language."—*A Dictionary of the English Language* by Samuel Johnson, 1756.

The initial application of statistical techniques was made when governments realized that anything that could be counted could be taxed. During the last 200 years the gathering and analyzing of statistics has become important in all of the sciences and most of the arts of man.

The subject of statistical analysis arouses emotions ranging from suspicion to dread in most dp personnel. Yet understanding statistical techniques is of fundamental importance for dp managers and systems analysts, who must be able to describe and to control, to forecast trends and to assign the probability of success or failure to the systems they design or manage. The Institute for Certification of Computer Professionals, recognizing the importance of mathematical statistics, has included a section on statistics in its Certificate in Data Processing examination. It is unlikely that all dp personnel will become expert statisticians, but at least it is possible for the majority of managers and analysts to become aware of how to use statistical techniques effectively.

There are four levels of data measurement: nominal, ordinal, interval, and ratio. Nominal measurement means that the data (a number or symbol) is used for identification purposes only. An example of the nominal level of measurement is a social security number. It is used to identify a specific account; no one number is any better or worse than any other number.

The ordinal level of measurement is used when the data values can be ranked in some order of preference. An example of ordinal measurement is the horse race. Horses crossing an arbitrary finish line can be ranked in the order of their finishing. How-

ever, no standard scale of measurement is used. It would be impossible to say, for instance, the horse that placed first was twice as good as the horse that finished second. Also, it would not matter if the horse coming in second was behind by a nose or by a furlong; it would still be the second-place horse.

The interval level of measurement is reached when the data values can be ranked in order on a standard scale. An example is the measurement of temperature on a thermometer. Each degree on the scale represents a uniform unit of measurement. For example, 5 degrees C is warmer than 1 degree C by four equal degrees. However, there is no absolute scale of measurement used—it is not possible to say that 5 degrees C is five times warmer than 1 degree C.

The ratio level of measurement is attained when the data can be ranked on a standard scale with a true zero point. An example is the measurement of mass in pounds. An item can not weigh less than zero pounds. An item weighing 5 pounds is heavier than an item weighing 1 pound by 4 equal pounds. The first item is also five times heavier than the second item.

The importance of the four levels of measurement is that the same type of mathematical statistics cannot be used to analyze data measured at different levels. Data recorded on nominal or ordinal measurement scales (including opinion polls) must be analyzed by the nonparametric family of statistical techniques. To analyze data recorded on interval and ratio measurement scales, the parametric family of statistical techniques should be used.

Parametric statistical techniques, such as the t test or the F test, are used when the researcher knows certain facts about the group of data from which a sample has been taken. Basically, the researcher must be working with data that has been taken independently and without bias from a group of items. The data must come from normally distributed populations which have the same variance, and the data must be measured at

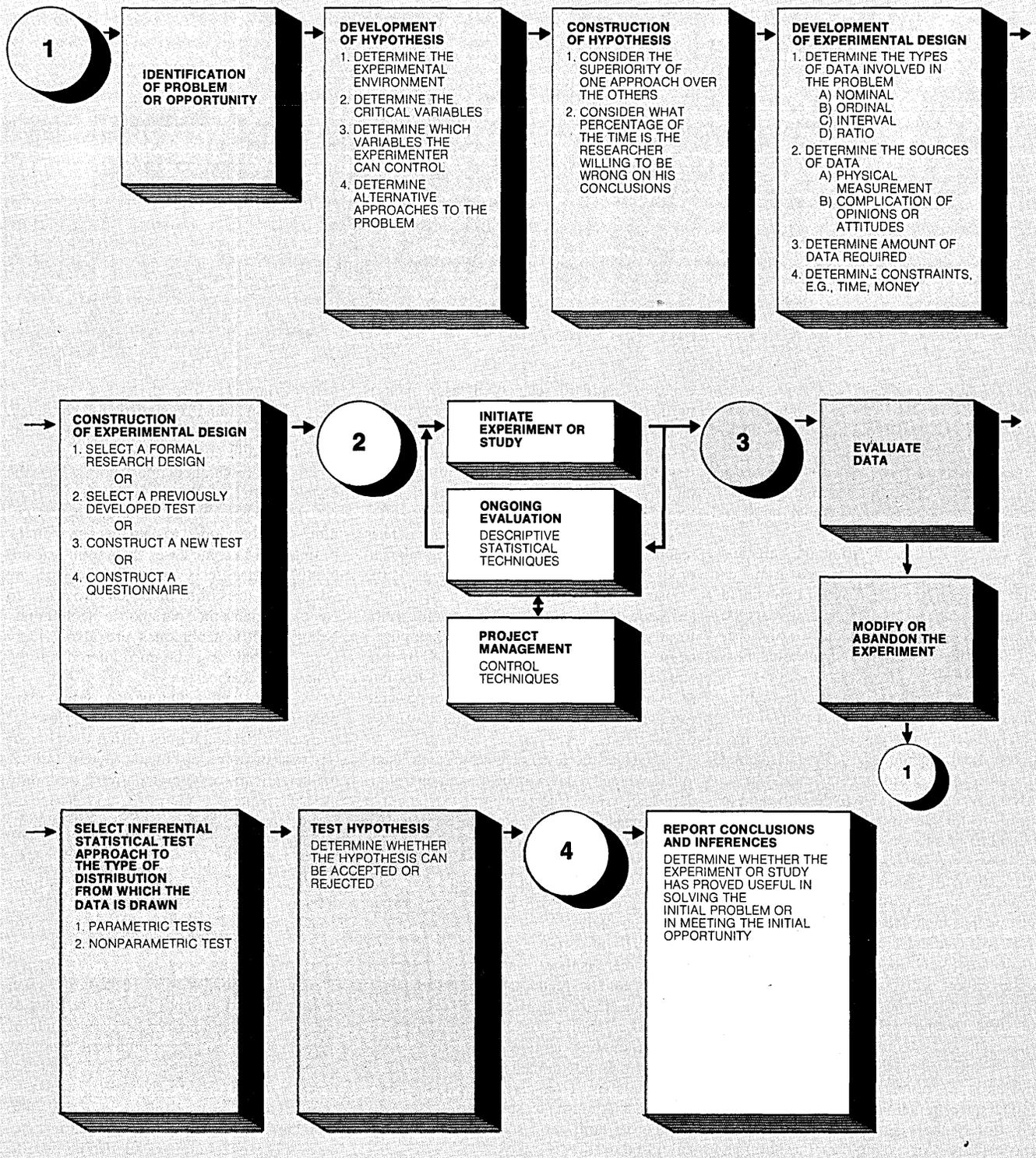
least at the interval level.

Nonparametric statistical techniques, such as the Mann-Whitney U test or the Kruskal-Wallis analysis of variance, are used when the researcher does not know the characteristics of the group of items from which he has taken his sample. These techniques can be applied to data measured on the ordinal and in some cases the nominal scale. Nonparametric tests are useful for working with small sizes of samples and are easier to calculate than the parametric techniques. Nonparametric techniques are also widely used to analyze data encountered in the behavioral sciences.

Statistical techniques serve two main purposes, description and inference. Descriptive statistical techniques define the characteristics of a group of data items either mathematically or graphically. Commonly used descriptive statistics include the mean, mode, median, range, standard deviation, variance, and skewness. Examples of descriptive graphical techniques are Cluster Analysis and leaf and stem analysis. At times a known pattern of distribution can also be used to describe a group of data items. For example, the Poisson distribution may be used to describe the occurrence of rare events. Inferential statistical techniques can then be used to predict the characteristics of the total group of items based on a sample of the items. Inferential techniques are used, for instance, in conducting a survey. The characteristics of a small group, collected at random, can be used to determine the characteristics of the entire population.

These techniques can also be used to determine the probability that two or more samples came from groups having similar characteristics. Examples of this situation are found when a group receiving treatment is compared to a control or untreated group before and after treatment. Commonly used inferential techniques include the standard error of a difference, t test, Mann-Whitney U test, analysis of variance, regression, and analysis of covariance.

STATISTICAL RESEARCH METHODOLOGY FLOW CHART



FOUR-PHASE STUDY METHOD

The flow chart shown here depicts a structure that can be used either as a framework for designing new statistical studies or as a checklist to evaluate whether ongoing or completed studies have been appropriate or effective.

The setup phase includes the operations of problem identification, hypothesis

development, hypothesis construction, development of experimental design, and the construction of the experimental design. The setup phase is the most important of the four phases. It is also the phase most often either overlooked or poorly carried out, perhaps because it requires a balanced application of creativity, experience, and technical ability. In this phase the answers must be determined

to the basic questions of why the study is being done, how the study could best be accomplished, how accurate it must be, what kind of data measurement is involved, where the data is coming from, and how the data is to be captured.

The second phase of the method involves the monitoring of the study or experiment throughout its duration. The study must



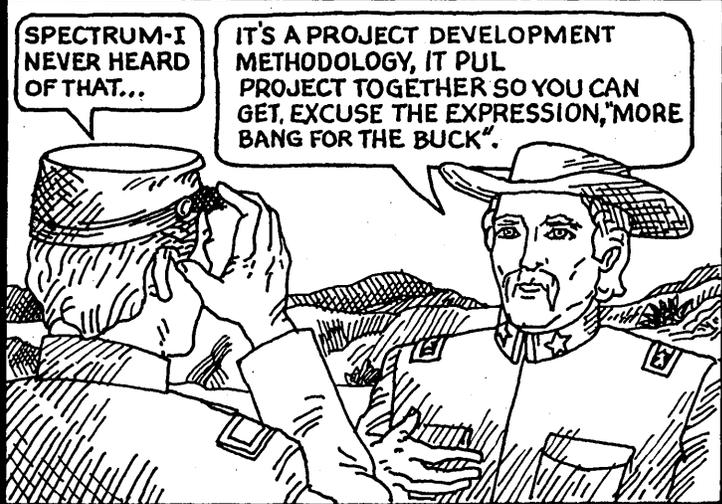
NICE LITTLE HILL
HERE, MAJOR.

YES, GENERAL CUSTER,
YOU COULD STAND OFF THE
WHOLE INDIAN NATION
FROM HERE!



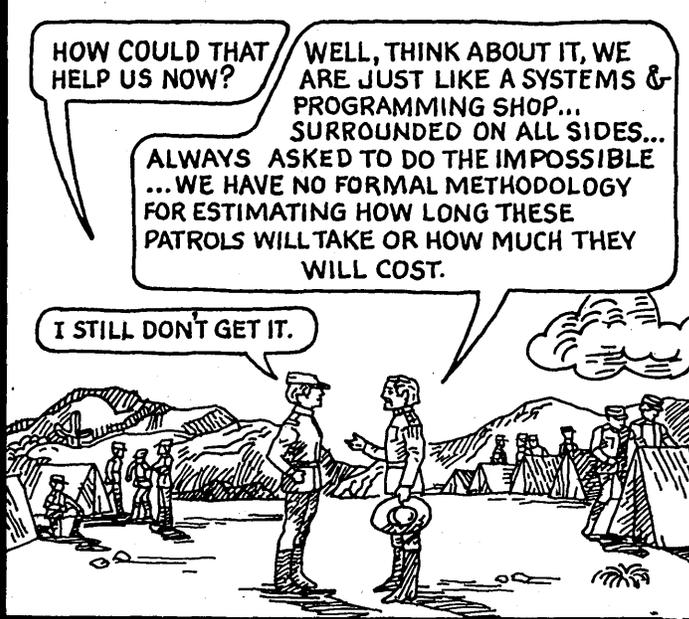
IT'S OBVIOUS THERE
AREN'T ANY INDIANS
AROUND HERE.

O.K. IF YOU THINK
SO... BUT I SURE WISH
I HAD SPECTRUM-I
PLANNING THIS
PATROL.



SPECTRUM-I
NEVER HEARD
OF THAT...

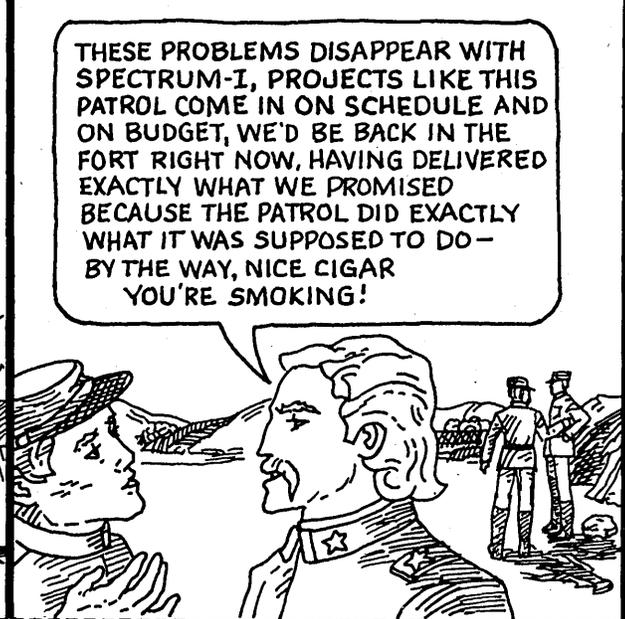
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METHODOLOGY, IT PUL
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BANG FOR THE BUCK".



HOW COULD THAT
HELP US NOW?

WELL, THINK ABOUT IT, WE
ARE JUST LIKE A SYSTEMS &
PROGRAMMING SHOP...
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... WE HAVE NO FORMAL METHODOLOGY
FOR ESTIMATING HOW LONG THESE
PATROLS WILL TAKE OR HOW MUCH THEY
WILL COST.

I STILL DON'T GET IT.



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ON BUDGET, WE'D BE BACK IN THE
FORT RIGHT NOW, HAVING DELIVERED
EXACTLY WHAT WE PROMISED
BECAUSE THE PATROL DID EXACTLY
WHAT IT WAS SUPPOSED TO DO -
BY THE WAY, NICE CIGAR
YOU'RE SMOKING!



I'M NOT SMOKING...
YOU SMELL SMOKE?

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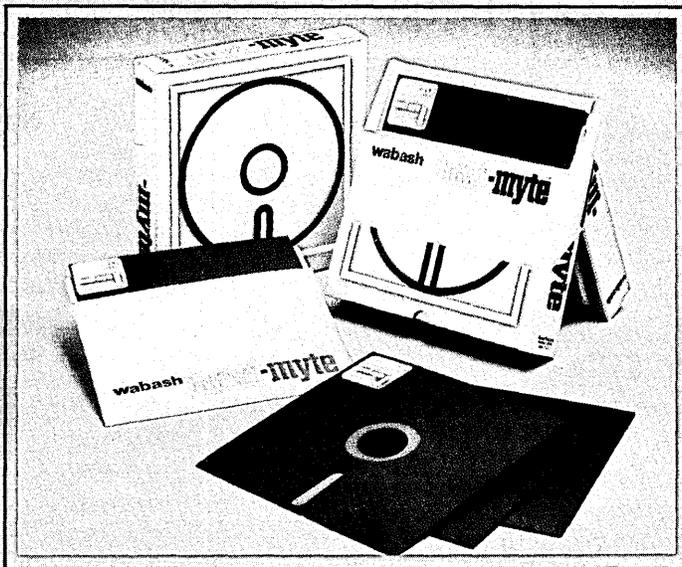


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be monitored to ascertain whether the data is being collected according to plan.

The third phase, the evaluation of the data, starts with the decision to either statistically test the results of the study or to modify or abandon the study. When factors uncovered during the study show the original design to be unworkable or when there have been major unforeseen changes in the study environment, the study must be modified or abandoned. If the decision is made to continue and to test the hypothesis, the appropriate statistical test or tests are applied to determine if the hypothesis can be accepted or rejected. Usually, researchers say their results are significant if they can accept their hypothesis with 95% accuracy. Results can be considered highly significant if the hypothesis can be accepted with 99% accuracy.

The final phase involves writing a report describing the researcher's activities and findings for each step of the method. The report then presents the conclusions arrived at in light of the original purpose of the study. A well-documented report is necessary so that other people working on similar problems can attempt to replicate or expand upon the study.

A dp manager or systems analyst who uses this framework and who knowledgeably seeks out the advice and assistance of a consulting statistician should be able to carry out or at least evaluate the reliability of a statistical study. As a checklist, the framework can be used to find out why studies are (or are not) being carried out, what kinds of controls and monitoring procedures are being used, and what deviations are being encountered in the data collection processes. The manager should be able to ascertain from the researcher what the reasons are for using a specific type of statistical analysis and what the probability is of obtaining accurate results. Further, the researcher should be able to explain to the manager why any of the steps in the method were modified or omitted.

When evaluating statistical studies, even using this method, it is probably best to always keep in mind this warning from Benjamin Disraeli: "There are three sorts of lies—lies, damned lies and statistics." *

RICHARD T. DUÉ

Head of the systems design and data analysis branch of the Alberta, Canada, Department of Agriculture for 11 years, Mr. Dué is presently supervisor of management consulting services with the accounting firm Ernst & Whinney. He also teaches at the University of Alberta in the computing certificate course, a two-year adult program.

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The computer people who listen.

An eminent Chinese sociologist attributes the great changes in the U.S. in the past 35 years to the high level of electronic technology.

GLIMPSES OF AMERICA

by Fei Xiaotong

This article is based on excerpts from articles by Professor Fei Xiaotong in Dagongbao, a Hong Kong newspaper, and in Shanghai's Wenhuibao newspaper. Professor Fei Xiaotong is the president of the Chinese Sociological Research Association. His impressions of America have been formed by comparisons between his visit in the spring of 1979 and his last visit to America in 1944. The translation of his articles was done by Professor Martin Whyte of the sociology department at the University of Michigan, Ann Arbor.

There is a saying, "If you visit a place for a day you can talk of it forever; but if you live in a place forever, you can't say a word about it." People love to see and hear unfamiliar things; it is a common experience for people coming back from abroad to use new impressions to try to reach new explanations. So a person who has no intention to write a travelogue can be urged to do so and not be able to refuse—or at least that is the motivation behind my presentation, "Glimpses from America."

I call them "glimpses" because my observations of America were brief, and my understanding superficial. Boarding planes and disembarking from planes is like a dragonfly skimming across the water.

In all, our group traveled for a little over a month, beginning on America's East Coast, at Washington, D.C., moving around the Northeast, into the middle, and then to the West Coast. We stopped in Hawaii, and then traveled via Tokyo back to Peking. The delegation in which I was participating was sponsored by the Chinese Academy of Social Sciences, and by the American Council of Learned Societies, the Social Science Research Council, and the American Academy of Sciences.

I can compare the changes I saw between my two visits to America in terms of

the development of automobiles and highways. This comparison can help us understand many phenomena. For example, if there were no popularization of automobiles and no high-speed highways spreading out, of course there would not be a large number of people who originally lived in the cities moving out to the suburbs, and therefore, there would not be the current style of residential areas and supermarkets, and such things that typify the new face of America. But automobiles and superhighways, in the scale of American history, were already known to the previous generation. How is it then that suddenly in the last decades these things have developed such functions and have led to such great changes?

In originally looking into this question, I noticed that some new things, not too visible on the surface, play a great role here. These are automatic control systems that electronically transmit information—or for short, electronic systems. If you have them, then many complex relationships between objects, between men and objects, and among people which earlier people had no means of controlling, can be under human control, at man's beck and call.

HIGH SPEED SOCIETY

Everyone who has visited America has to admit that it is a high velocity, high efficiency society. High velocity means that people and objects are in rapid motion. High efficiency means that events are completed quickly. The higher the speed of activities, and the broader the connections among people and objects, then the more complex organizational work must be.

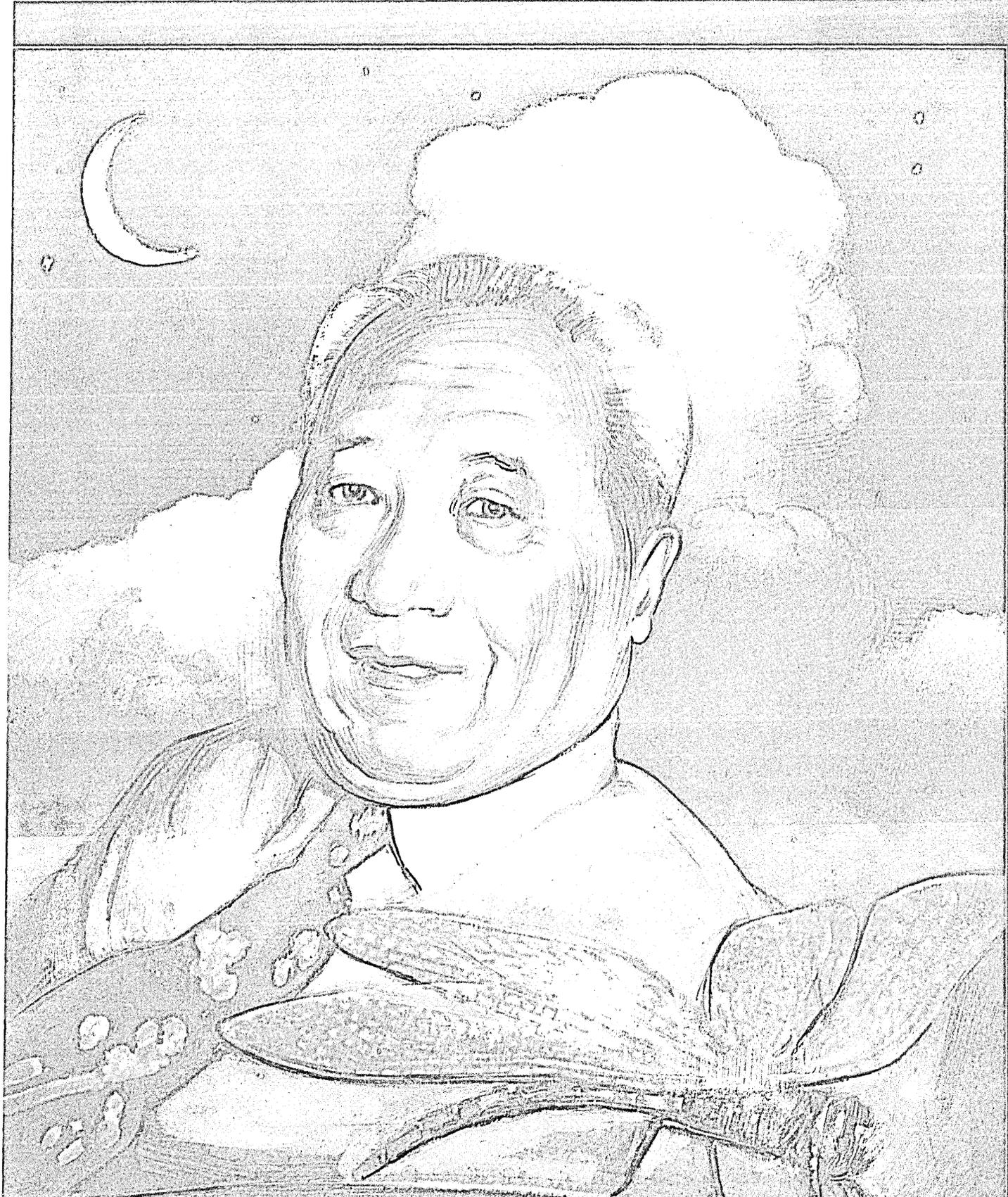
American airports constantly have planes landing and taking off, with thousands and tens of thousands of passengers going in and out and up and down. Carrying out such complex activity in an orderly manner is not an easy matter. The central pivot where this airport activity is controlled is not visible to the ordinary traveller. Here, there is an elec-

tronic system called a computer which helps human minds to control things.

Let me give an example from my personal experience. Another member of the delegation and I went to visit the University of Pittsburgh. We agreed that after our separate activities we would rejoin and fly to New York. The airplane tickets had been reserved long in advance, but specific seat assignments are made at the entrance just before you get on the plane. That day I got there early, and had already received my seat number, and my friend got there 10 minutes later. When he went to get his seat assignment, he said to the attendant that the two of us wanted to sit together. When the attendant heard this, she instantly typed up some symbols on a fluorescent screen right next to her; on the screen, the answer came glowing out, and she took my seat number back and gave us two seats together. The whole procedure took less than a minute; there were no arguments and it was not necessary to get angry, as the attendant smilingly satisfied our request. It was not that we had entered a "country of gentlemen." It was that through this electronic system, the attendant could, in an orderly way, find out that the plane still had these adjacent seats, and it was very easy for her to assign them to us. It really was not that these attendants are especially capable, but that they have the help of a computer, so their efficiency is high, and the matter was arranged quickly and orderly. It is therefore easy for people to enjoy and present a good service attitude.

As another example, every hotel wants as much as possible to fully utilize its space so that when somebody leaves, someone else arrives, and people don't have to wait with no room, and also rooms don't remain empty. In Honolulu every day there are about 50,000 tourists arriving and leaving. These 50,000 people are not organized like an army; they come from the five lakes and the four seas, strangers meeting like patches of duck weed, and every place's hotel management is in perfect order, with coming and

ILLUSTRATION BY DANIEL MAFFIA



W. H. H. H.

F E I X I A O T O N G

The computer has greatly increased man's control over complex activities, making possible America's modernized society.

going freely. This looks simple because there is an information system which includes telephones and computers that help attendants carry out their work.

The airport we saw was the epitome of the entire American society, since tasks involving countless high speed elements united together are a characteristic feature of a modern society. Due to the constant improvement of electronic systems, the speed of human activities and the efficiency of work are constantly being raised, and as more and more people are engaged in mutual relationships, their relationships are constantly tightened.

Now, the whole world's people are increasingly being absorbed into closer and closer contact, brought into a big network, and formed into a large society. The American airport I mentioned is one corner of this large society. There, each person and each airplane does not rely on its own customs to operate, but each behaves according to advance agreements. The method of their agreed relationships can also be altered due to the change in any single element, so it is not inflexible and static, but can be constantly changed, and so is a dynamic system.

In this system, if the activity of each element is rapidly increased, the mutually agreed and adjusted organization of activity can also become more complicated. If you want to carry out things promptly, when the things get to a certain level, one cannot manage well by relying on human brains. The human brain cannot remember so many elements in rapid motion which are constantly changing, and so there is not time to consider their mutual relationships and implications. The results are that things can't be controlled, management is poor, accidents are common, efficiency low, and activities may even cease completely. The invention and popularization of the computer has greatly increased man's control and management over complex activities, and this is what makes possible a modernized society like America's to come into being.

When one talks about the changes in American society now, one unavoidably has to talk of the electronic technology. I am quite ignorant of this technology, and, as an illiterate in regard to modern science and technology, I am vexed. Not to talk about it is to miss the central part, but if I talk about it, I am like a blind person groping for an elephant.

I was told that the large and increasing use of electronics to organize, control, and raise levels of efficiency stems from the needs of technical and scientific research itself. In 1957, when America discovered that the Soviet Union had flown in space first—and that this was a major problem for national security—it resolved to catch up with and surpass the Soviet Union, and raised the goal of landing on the moon.

CHANGING MOON MYTH

America diligently changed our myth about the goddess flying to the moon into a reality; it didn't do what we do—let the goddess go off and not return, to live a lonely life away in the moon palace. After America sent man to the moon, it also wanted to get him back to earth. This was a very tall order, and there were countless technical questions to solve, and if even one of them was solved, the moon goddess might not fly to the moon, or, flying there, might not be able to get back. Each problem was interrelated with the other; for example, how heavy the "moon goddess" is, how long it will stay there, how much of the various food items have to be prepared—these all play a role in deciding the weight of the moon ships, and the size of the rocket that sends it into space.

These are all elements that are interconnected and can change. If any single element is changed slightly, the others all have to be adjusted accordingly. You have to do experiments to discover the laws governing the changes in each element, and the research that is conducted separately on each element has to be related to the research results on the other elements. Thus, this huge research plan itself led to an extremely complex exchange of information and a need for close coordination. The all-around management work could certainly not have been done using only human brain power. In the reality of carrying out research, electronic systems of communication were fully utilized. And out of this developed systems engineering—involving the constant arrangement and coordination of many constantly changing elements. The completion and realization of America's plan to land on the moon was not only a symbol that America had caught up with the Soviet Union, but, in terms of scientific, technological, and organizational methods, it was a great leap forward.

The new scientific field of systems engineering was rapidly used in other productive processes, and greatly increased the efficiency of production. Computers became a living treasure. This unavoidably led to marvel, and to the boast that a magical mechanized human had appeared and that computers can replace brain power. These are, of course, exaggerations, but we should definitely not underestimate this new tool. Modern production cannot do without it. It is not a tool for manufacturing a particular product, but a tool that is needed in the management systems of all complex production processes—to control an airport, to control a guided missile. It is helping humans' brains arrange things all over, reorganizing the activity of men and of things to produce the possibility of a fast, high efficiency society.

There are people who use the quality

and quantity of computers in a country to judge that country's strength. Now, among the American authorities there are people who in regard to the conflict between the U.S. and the U.S.S.R. have a confident attitude. This is because they believe that in the quality and quantity of computers, the U.S. is far ahead of the U.S.S.R., and that in science and technology, the Soviet Union will be left behind.

Some people say that in the past you compared production enterprises in terms of their capital and size; if their capital was large and they had many workers, they were powerful, and a big fish could eat a small fish. Now, it is different. You compare innovations and compare knowledge, and whoever occupies the lead in technology can break through obstacles, and produce new things and eliminate the old.

COMPUTER HAS SHRUNK

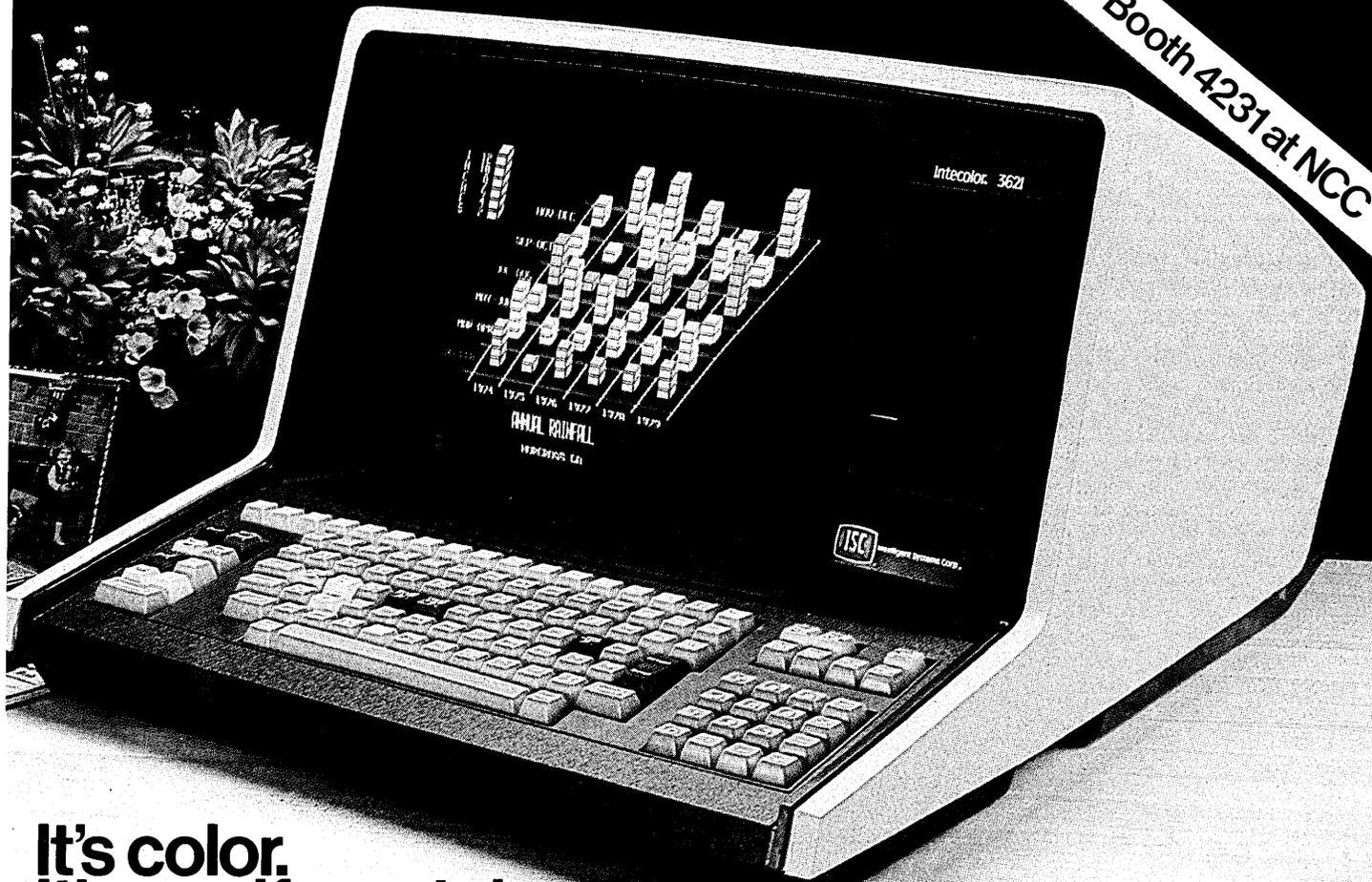
In regard to the computer itself, we in our country have, in recent years, seen the type that occupies several rooms, but in America, this type has long ago become an antique. The body of a computer has gotten smaller and smaller, and there are changes with each passing day.

Once, when I was talking with a famous professor who does research on the relationship between technology and society, he said to me, "Now is an era of constant technical innovation. In history, when technology made a breakthrough, there have been a series of other new changes, followed by a period of stability. But it seems that now we have overcome this rule. We are having constant breakthroughs and constant innovations. In this situation, to catch up to the advanced technological levels, it is not enough to rely only on borrowing from abroad, since from the time of borrowing to the time of putting things into operation requires some period of time, and by then, the technical things are already outmoded. It would be better to use some small-scale, multiple experimental borrowing, and, in the process of borrowing, establish your own corps of scientific and technical people who can produce constant innovation. When you have such a corps of people, you will then be able to talk about entering the ranks of advanced countries."

When I heard these words, I was much aroused. Scientific and technical knowledge must be acquired to become self-reliant; otherwise, if we talk of borrowing from behind the masses of other people, we cannot avoid selecting outmoded trash. We cannot solely blame other people for ill will toward us; we don't make a good showing. If we want to make a good showing, we still have to rely on our own efforts.

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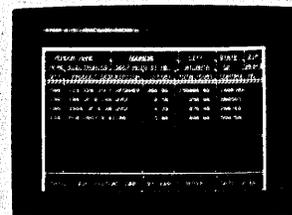
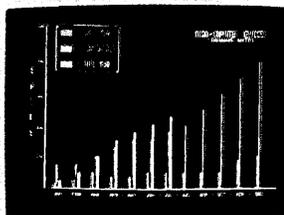
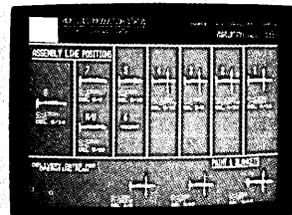
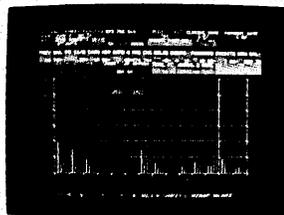
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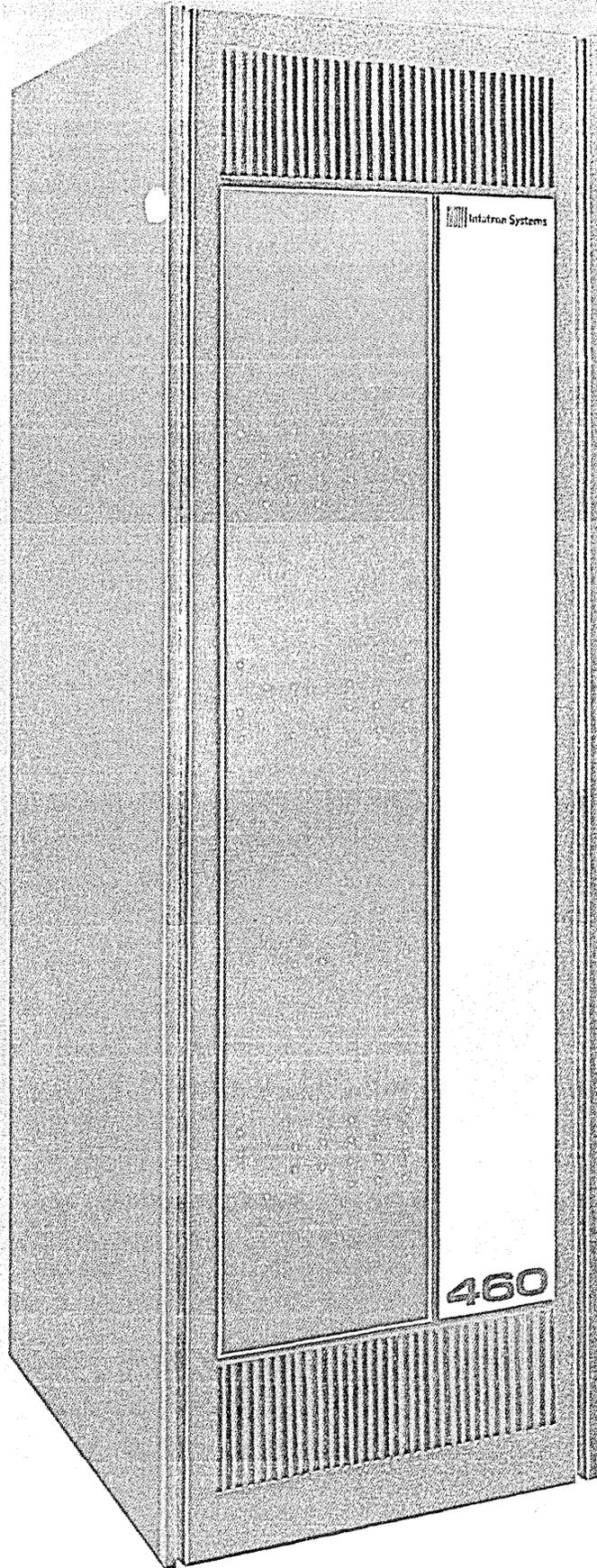
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The network manager will find the TL460 flexible enough to meet ever-changing conditions. It handles up to 2000 simultaneous connections, even if all are operating at 9600 bps, and provides 256 different classes of service. System parameters, such as class assignments, busy messages, connect criteria and disconnect criteria, all can be changed from the console!

The TL460 is not limited to certain data types or speeds either. Any combination of synchronous and asynchronous inputs from 30 to 19,200 bps is perfectly okay. To help guarantee good service, the TL460 provides a wealth of statistics such as successful and unsuccessful access attempts, line port and user CPU time in queue, etc.

The modular TL460 is economical enough for the smallest installation and yet powerful enough for the largest PBX application.

For more information, contact Infotron Systems, Inc., 10000 Wilshire Blvd., Suite 1000, Beverly Hills, CA 90210. Tel: (310) 206-1000. Telex: 151110. Fax: (310) 206-1001.

The TL460 is available in a rack-mountable version. For more information, contact Infotron Systems, Inc., 10000 Wilshire Blvd., Suite 1000, Beverly Hills, CA 90210. Tel: (310) 206-1000. Telex: 151110. Fax: (310) 206-1001.

The computer is helping humans' brains arrange things all over.

had read in what book, which volume, and in what chapter, and all without making a mistake. Everyone swore that this was an incredible effort, and that very few people could match him.

When I was meeting at the University of Pittsburgh sociology department, they demonstrated for me how they use the computer to find documents and materials. They knew I had researched Chinese rural society, so they requested the computer to say how many important articles there had been on the Chinese rural society in the last three years. The computer's fluorescent screen showed one by one the authors and topics of such articles, what journal they were published in, in which issue, and on which pages. And then I asked it to supply me with an abstract of a particular article, and the screen immediately displayed the abstract. After reading this, if you think the article would be worth examining, you push a button and the computer prints a copy of the abstract which you can take home.

You can also go on and ask the computer for some data on the Chinese rural family, for example, the average size over a number of years, or for some figures on peas-

ant family income. As long as the data on a topic is stored away, you can get it displayed on the screen in an instant, and, if needed, you can get it immediately copied.

This demonstration opened my eyes, and aroused deep feelings. Just think, if I want to write an article myself, just using the materials that I have clear memory of, I have to go to the library and borrow various books, and I don't know how much explaining and time that will take. Sometimes I lose my temper, and the article falls through. If we had such a convenience as American scholars have, think of how much effort we could save! And I am old, my memory gets weaker and weaker, and sometimes when I try to think of a person's name, or a particular year, I have to ransack my brain, and can't find where they are hiding. People's brains can get decrepit, but computers do not suffer from the maladies of age.

Computers, of course, are not some sacred thing in life. They don't produce knowledge, and what they can display depends on what people have stored in them. The computer is a docile tool, one which is loyal but cannot be creative.

If it takes only encyclopedic knowl-

edge to contribute to learning, then we could use the computer to do academic work for us. In regard to the encyclopedic part, there is no human brain that can store up the materials from a whole nation, and in the future, from the whole world. And for the memory part, where is there a human brain that cannot forget? But human knowledge is constantly having the old weeded out and replaced by the new. The computer can only store things and cannot create things, and in this respect, the human brain and the computer are basically different.

In learning it is always a matter of breaking through the old and creating the new to push the development of knowledge forward. Relying on encyclopedic memory will not do, even though encyclopedic knowledge is a vital prerequisite for scholarship.

The computer greatly helps the development of mankind's knowledge, and it liberates one from the limits of human memory, so that human brains can concentrate on creative activity. To underestimate the computer, and say "garbage in, garbage out" is incorrect, but to have superstitious faith in computers and believe that mankind's thought can use machines to replace labor is also in error.*

A gripping computer espionage thriller

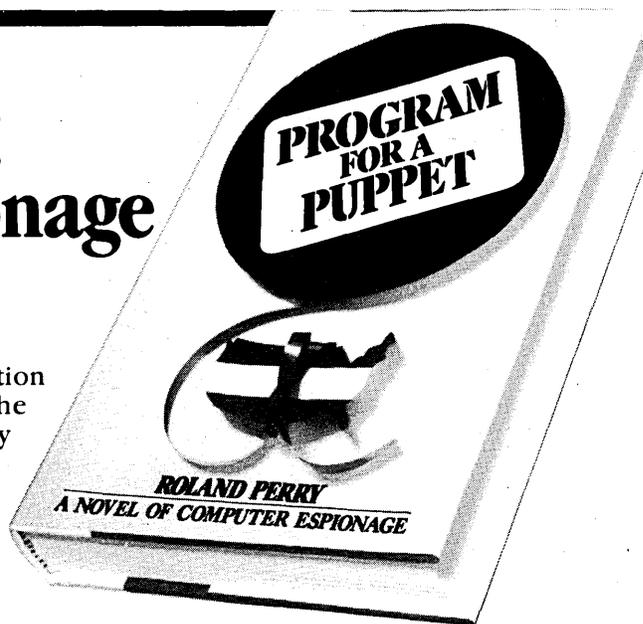
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And so is this new machine: The Xerox 860 Information Processing System.

It can rearrange paragraphs, change margins, correct misspellings and type out a virtually endless series of text revisions at the speed of hundreds of words a minute.

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But it also does something you might not expect from a word processing system.

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Because in business today, Word People have to manage numbers. And Numbers People have to manage words.

And everyone, but everyone, has to manage information.

XEROX



Good news for Numbers People.

In business, there are basically two kinds of people.

Word People. And Numbers People.

If you're a Numbers Person, this ad is for you.

And so is this new machine: The Xerox 860 Information Processing System.

It can compute, do statistics and perform the routine work that's essential in managing records, measuring work performance and so on.

And it remembers everything it's done for future reference. Or additional changes.

But it also does something you might not expect from a numbers processing system.

It processes words.

Because in business today, Numbers People have to manage words. And Word People have to manage numbers.

And everyone, but everyone, has to manage information.

"I give it a 10."



XEROX

CIRCLE 161 ON READER CARD

PEOPLE

AUDITORS NEEDED

"Internal audit procedures as they relate to computer operations are probably the most rapidly expanding facet of the accounting field," said George W. Turkull, vice president and corporate auditor for Los Angeles Federal Savings, Los Angeles.

Turkull, a longtime accountant and internal auditor, has been close to edp auditing since the late '60s. In 1968 he was one of the founding members of what is today the EDP Auditors Assn. It was then but a handful of Los Angeles area edp auditors organized on a local basis.

Turkull was elected president of the Los Angeles chapter at the association's national conference last summer in Denver. He set about to increase membership participation in the chapter's activities. Meetings now, he said, are attracting up to 85 attendees, whereas attendance last year was running at 30 to 35.

He has done this, he said, by working with his program chairman to attract top speakers on relevant topics. A recent speaker was Dick Richards of Arthur Anderson, who talked on "EDP Technological Advances and their Impact on the EDP Auditor's Profession."

"There are enough fully qualified edp auditors to go around," said Turkull. "Technology is advancing so rapidly that quite a few of us who came from the ranks of internal auditors are finding our technical knowledge is lacking."

He feels the EDP Auditors Foundation, the publishing and educational arm of the EDP Auditors Assn., is doing a good job of tackling this problem. He himself has taken a number of the foundation's courses in addition to courses on edp given by the Institute of Internal Auditors.

The EDP Auditors Assn. has grown from a small nucleus in Los Angeles to a 4,500 member organization with chapters



GEORGE W. TURKULL—"Technology is advancing so rapidly . . ."

in a number of countries. Turkull believes the profession is growing even faster than the association.

"All kinds of regulatory requirements are forcing all different types of companies to hire edp auditors as such." He feels that while the earliest edp auditors came from auditing ranks, there has been a shift to the point where they are now 60% from edp and 40% from auditing.

A native of Warsaw, Poland, Turkull received a BA degree in accounting from the University of Warsaw. "Fortunately," he said, "accounting is accounting, but none of my other courses have done me any good."

He came to the U.S. 29 years ago, moving first to Michigan, where he worked for six years as an accountant for a retail store.

Weather lured him to California 23 years ago. He worked first for Home Savings & Loan as an internal accountant and 18 years ago went to Los Angeles Federal Savings. He was a general accountant for the first three years and then moved into internal audit.

20,000 MOVIES

When D. Richard Baer, 34, was an undergraduate student in business administration at UCLA, he had to complete a production and operations management simulation problem for one of his classes.

Unlikely as it seems, this was the first step toward the most ambitious compilation of information on movies and the motion picture industry every undertaken.

"I had the best score of the 90 students who did the problem," he recalled. He likes to add that the second-best score went to tennis star Arthur Ashe. "I'm a frustrated athlete." His best athletic achievements were in pole vaulting.

Baer had written a FORTRAN program to complete the simulation problem. He didn't immediately become enamored with the things a computer can do. "I sold my FORTRAN manual back to the book store and later regretted it."

He began to envision other applications for computer simulation, particularly some related to his own interests. First it was sports, then horse racing, and later politics. Politics and government were his greatest interests in the mid-'60s, he said. "All my lower division electives were in political science." Now, he says, "I guess I've lost some of my early idealism."

Even before he was graduated from UCLA in June 1967 with a degree in business administration, he had embarked on a number of personal computer-related projects. He wanted to learn more about data processing. He worked for three major Los Angeles area firms as a programmer analyst, the last being Columbia Pictures.

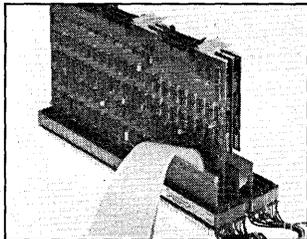
A longtime movie enthusiast, he became perplexed in the late '60s at the lack of comprehensive information about the older movies which appeared on television and began compiling a computerized list of movies for his personal use. By 1972, he

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CIRCLE 162 ON READER CARD



PEOPLE

become convinced that publication of his list was commercially feasible. He founded Hollywood Film Archive and published its first book, *The Film Buff's Bible* (1915-1972). This was phototypeset with a monospace typeface. Despite aesthetic drawbacks, said Baer, the initial hardcover printing of the book sold out, and the book went into a second print run.

Baer said letters he received from people who had purchased the book convinced him that much additional information was needed and that more sophisticated typesetting was necessary. He set about designing a new system that would include provision for virtually every conceivable kind of film reference information.

It took three years just to get the system tested and operational, he said. "In addition to needing the capacity to handle 20,000 or more films kept in alphabetical order, it was essential to be able to add, delete, or change information for any existing film as well as new films, and the system had to be capable of producing a cross-reference of actors and major production personnel.

Baer said the final program had to have the capability of excluding any specified type of information from being printed. The idea, he explained, was to be able to produce editions with different degrees of completeness, at different selling prices.

"We figured that an extremely complete book with casts, production credits and plots for thousands of films might seem a real bargain to libraries and film buffs, but a lot of casual moviegoers don't want to spend the better part of a day's pay for any movie book, so we'll eventually publish a less expensive edition with less information in it."

As a first step toward publication of a complete motion picture reference to be published, hopefully, some time next year, Baer has published *The Film Buff's Checklist of Motion Pictures (1912-1979)*, an alphabetized list of some 19,000 film titles from the early silent days through the end of 1979. The majority of the films are U.S. and British theatrical features, but the book also lists many foreign films, documentaries and tv movies. Information includes leading actors, year of release, running time, studio, color or black and white, country of origin, and alternate titles.

Baer said the publication of the *Checklist* marked the first time any film reference book has contained a list of seemingly or actually defunct film companies and what happened to the film properties they owned.

"If a movie of the 1920s was released by Fox Film Co., most people familiar with the movie industry know that it's probably still owned by Twentieth Century-

Fox. And almost as many people know that Famous Players-Lasky Corp. became Paramount. But what about Monogram, a company which produced hundreds of 'B' pictures in the 1930s and 1940s? And what happened to Republic Studios?"

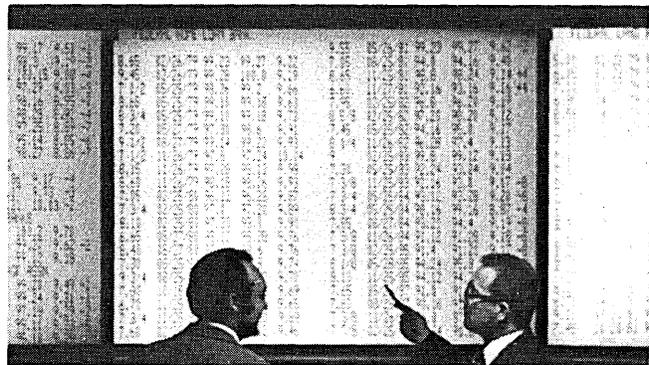
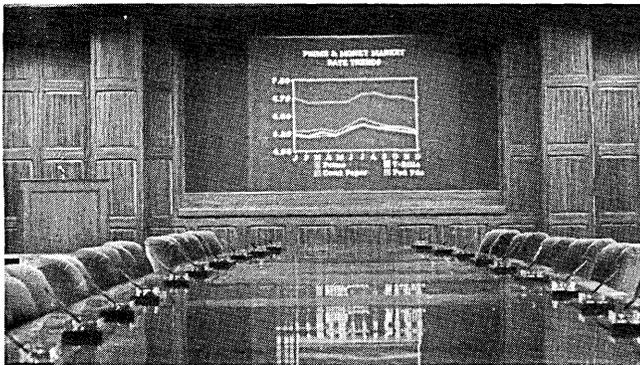
Baer is not alone in his efforts. First to join him, in 1973, was Mark A. French, then a premed student at the University of California at Irvine. French is now a senior editor with Hollywood Film Archive, viewing films and summarizing plots. Following French came Jack D. Bowman, who is in charge of computer processing.

Baer explained that his original system was card based. Then he went to OCR scanning. As his research became more complex, he said, it became obvious the system had to be completely rewritten. So he advertised for a programmer anayst via a UCLA bulletin board and got Bowman.

Last to join was the film's research editor, Bill Warren, who had done motion picture research for other publications.

Baer's data base is on an IBM 360 on the UCLA campus. He has a small word processing unit in his cluttered bedroom/office in Hollywood, which he uses experimentally.

The *Checklist* sells for \$19.95 plus \$1.75 for shipping from Hollywood Film Archive, 8344 Melrose Ave., Hollywood, CA 90069. *

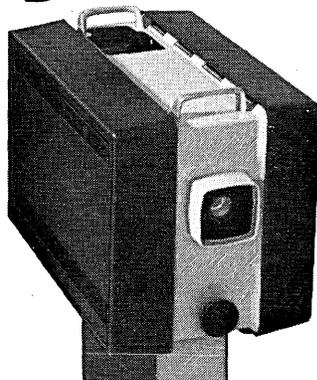


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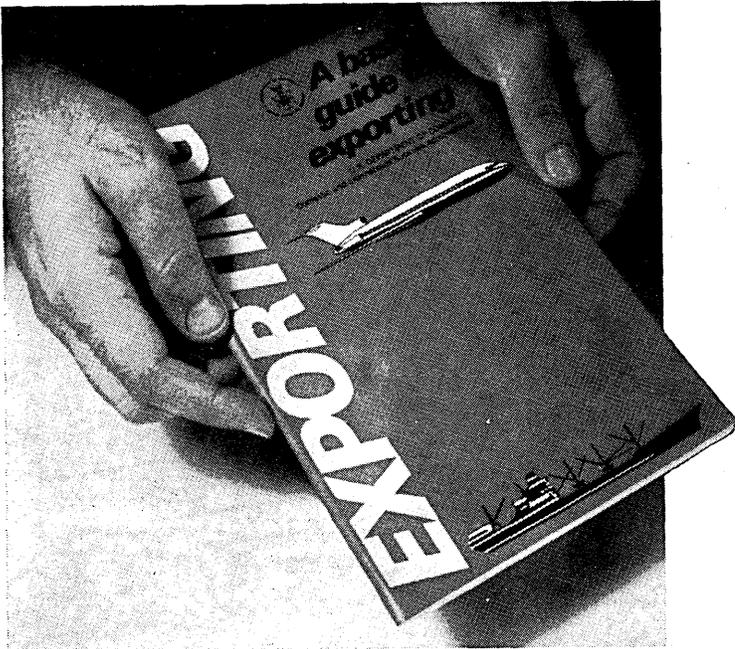
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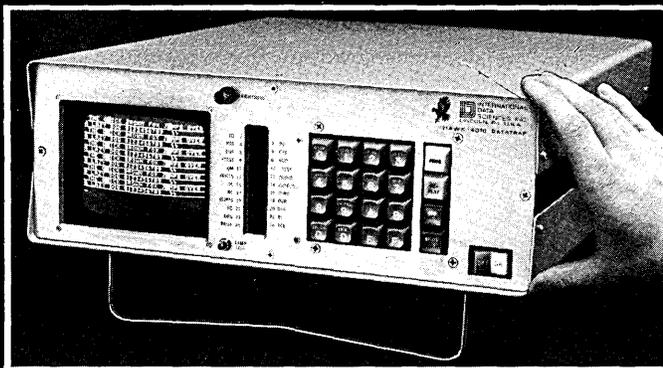
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- ASCII, EBCDIC, Hex, Octal, Baudot, EBCD, IBM Selectric, PARS/IPARS and Transcode formats are standard.
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CIRCLE 165 ON READER CARD

Model 204 DBMS

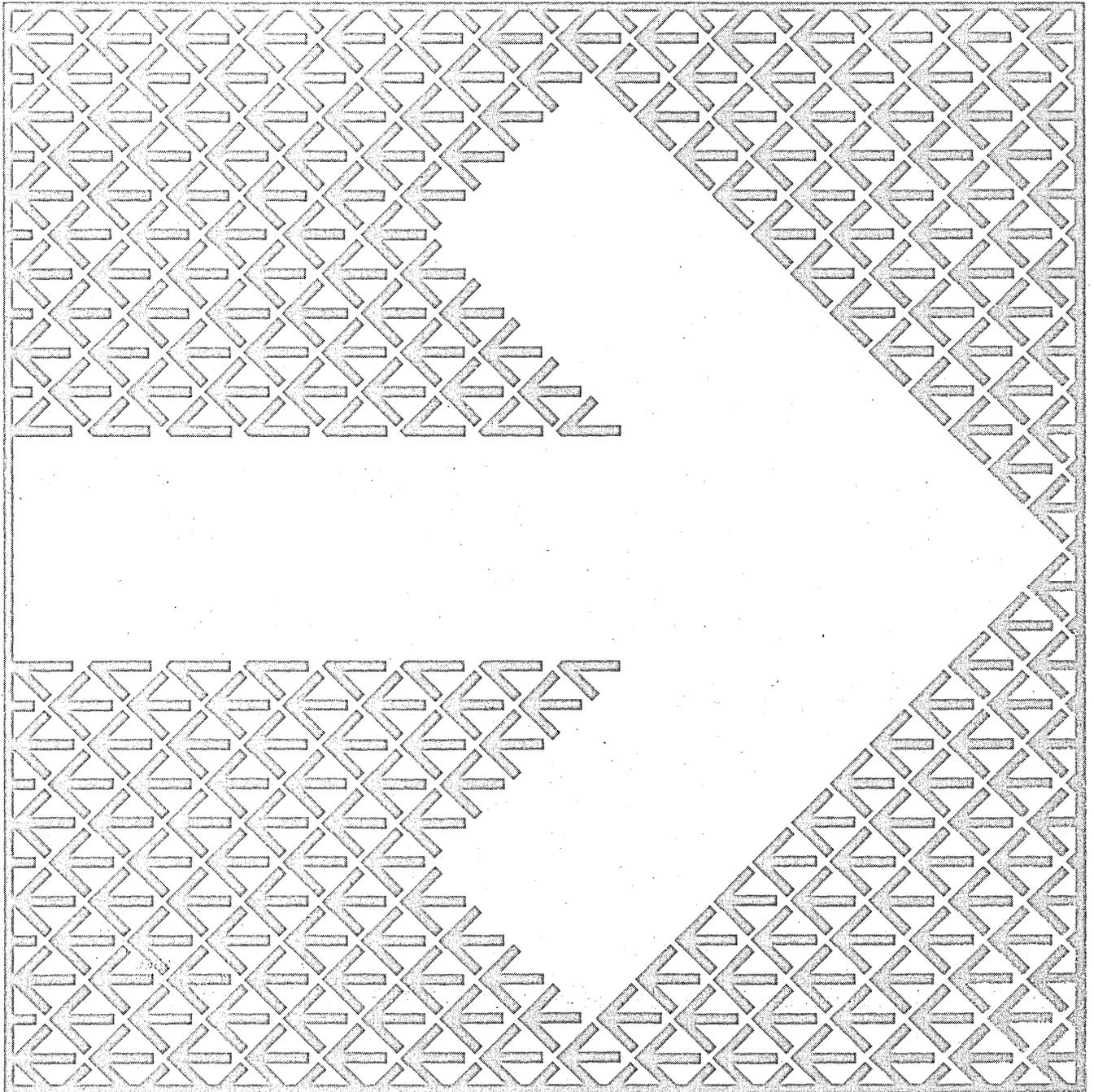
What happens when you need to change your existing database to meet new information requirements—new data, new reports, new structures?

With CCAs interactive Model 204 database management system,

it's easy.

Our unequalled data independence makes any modification quick and simple. And our high-level user language holds your development time to a minimum.

For a complete system description, with case histories, clip your business card to this ad and send to Computer Corporation of America, 575 Technology Square, Cambridge, MA 02139. 617-491-3670.



BECAUSE MANAGING DATA MEANS MANAGING CHANGE

Computer Corporation of America

CIRCLE 285 ON READER CARD

HARDWARE

OFF-LINE

The market for portable terminals has increased by more than a factor of 10 in the past decade, and can be expected to increase at a similar rate over the next decade, according to International Resource Development, Inc., the Norwalk, Conn., market research firm. In a 168-page report, the firm projects 1980 shipments in excess of \$200 million and 1990 shipments worth more than \$3 billion. Greater microprocessor-based intelligence, higher production volumes (with incumbent price erosion), and new distribution channels will result in the market changing towards the consumer.

If portable terminals, including the handheld and radio units covered in IRD's aforementioned report, do indeed become major consumer products, then it's time to begin speculation on possible societal impacts of a wired society.

Computer/Communications Networks of the Future, a report from Strategic Business Services, of San Jose, Calif., takes a look at the merging of computers and communications over the next 20 years. The report covers not only data communications, but message, voice, audio and video land mobile, and tv broadcast communications. The report discusses (including economic details) the formation of a nationwide network comprising numerous community networks. The government's role also receives attention, with the report pointing out that the feds (for better or worse) "will continue to be a predominant factor in either network development.

Editor's note: Several of the products in this section will be on hand at the NCC. Unfortunately, the information reached us after our deadline for the product preview (see pp. 131-138). Chances are that if you recognize any of these vendors as NCC exhibitors, you'll be able to see the described products on the show floor.

COLOR COMPUTER

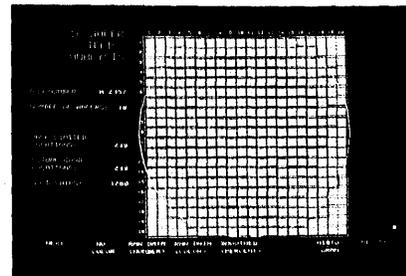
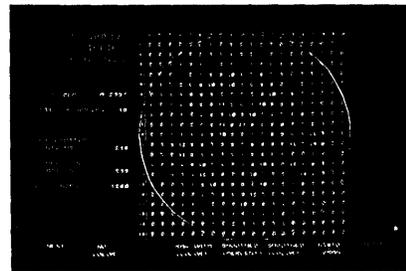
From this vendor's Fort Collins, Colo., Desktop Computer Div. comes the Series 9800 System 45, the new top of the line in the vendor's desktop family. Third in the System 45 line (inaugurated in the fall of 1977), the 45C features color graphics and a light pen to increase the efficiency of the user/machine interface. In its standard configuration, the BASIC-speaking computer provides 187KB of user RAM, 152KB of ROM containing system software, color crt and associated color graphics firmware, light pen, two 217KB cartridge tape drives, and an 80-column, 480-lpm thermal printer that can reproduce grey-tone graphics.

Just as the addition of graphics can increase comprehension over tables of numbers, the addition of color can help a user more readily visualize solutions. Imagine this first image (of chip yields in a semiconductor fabrication plant) on a monochrome display; chances are that the color speeds you on the way to identifying high and low yield areas. This second display, created by reprocessing the data in the original display, even more vividly shows yields at a glance.

The 45C's color display and graphics firmware provide the programmer with 4,913 displayable colors (that's 17 cubed; there are 17 steps between the three primary colors). The programmer can choose colors using either a cube or cylinder color model; both require specifying three values. The cube model maps directly onto the hardware, requiring the user to specify values for each of the three color guns. The cylinder model maps hue onto height, saturation onto radius, and luminosity onto angle; these variables are independent, and can be linearly interpolated. The light pen can be used for menu selection and real-time tracking (actual drawing on the screen). Firmware allows the system to color-fill a region drawn by the user with the light pen; language extensions include RECTANGLE and POLYGON statements.

To attain the display quality desired,

the vendor uses a derivative of a standard television picture tube. The derivation is incompatible with standard color tvs (unfortunate for those wanting to use a video projector), and has smaller dot spacing (about four times denser than broadcast television's), and 60Hz refresh (to avoid flicker). If you've noticed the tendency for



movie credits on your home tv to show a bit of a rainbow fringe around the characters at the corners of the screen, you'll appreciate the 45C's convergence electronics and magnetic shielding. The machine will prompt the user through convergence adjustments (setting the guns so all three converge on the same point) on 13 screen points, including the center and four corners. Once the convergence is set, magnetic shielding is said to make recalibration an infrequent job.

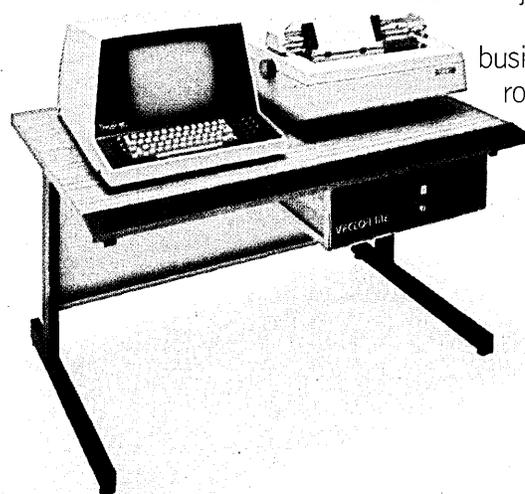
The 45C is upward-compatible from the monochrome 45B (still offered). The 45C uses the IEEE-488 standard bus for attaching to peripherals and instrumentation. Additional system software ROMs support mass storage, data communications, and assembly language programming. User memory can grow to 449KB. The standard 187KB 45C configuration sells for \$39,500. A stripped version, with 56KB of user memory, one tape, no light pen, and no integral printer, sells for \$31,500. HEWLETT-PACKARD CO., Palo Alto, Calif.

FOR DATA CIRCLE 344 ON READER CARD

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The way we figure it, our computers don't take up much space, so why should our ads?

With Economy Sized Computers, you get data and word processing capabilities you only expect from much larger computers. All for the price of a new copying machine—just \$10,463 suggested retail price.



There's no longer any reason for a small business computer to be kept in a computer room. All by itself. Now you can keep it on a desk top.

Visit your nearest computer dealer and ask to see the Economy Sized Computers from Vector.

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CIRCLE 167 ON READER CARD

HARDWARE

COMMUNICATIONS CONTROLLER

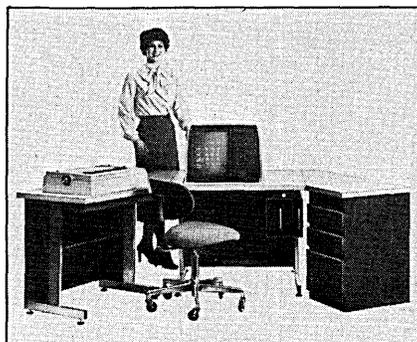
An intelligent communications controller, DIOS (DMA I/O Subsystem) provides direct memory access between the main memory in the vendor's line of 32 bit processors and its hardware communications adaptors. DIOS allows data transfers without processor intervention, and it is said to enhance the vendor's recently announced Reliance data management and transaction processing package. The communications controller is offered in two versions. The first, an asynchronous protocol version supporting Reliance applications, sells for \$6,000. The second version, priced at \$7,500, handles asynchronous, character synchronous, and bit-oriented protocols, such as SDLC, HDLC, and ADCCP. Bisync is supported by DIOS, making the hardware transparent to the vendor's 2780/3780, RJE emulation, and HASP software packages. Data rates can run to 56Kbps per line, with a peak throughput rate of 100Kbps. PERKIN-ELMER, Computer Systems Div., Oceanport, N.J.

FOR DATA CIRCLE 347 ON READER CARD

WORD PROCESSING

Designed for the needs of customers in businesses of all sizes, the 1800 standalone word processor features a full page display, dual diskettes, and a daisywheel printer. The microprocessor-based 1800 is said to have extensive software support in the form of the vendor's Information Management System. The software system comprises four major modules: the Document Formatting Package, the Records Processing Package, the Document Assembly Package, and the Mathematics Package. Formatting capabilities include repagination, page numbering, and justification. The Records Processing Package allows the user to maintain a data base, and retrieve records through a new "selection by criteria" process. The Document Assembly Package lets the operator build new documents using previously stored paragraphs or documents. The Math Package handles extension calculations and basic arithmetic. The 1800 supports communications with other 1800s, mainframes, and the Telex system. The 1800 sells for \$13,700. VYDEC INC., Florham Park, N.J.

FOR DATA CIRCLE 345 ON READER CARD



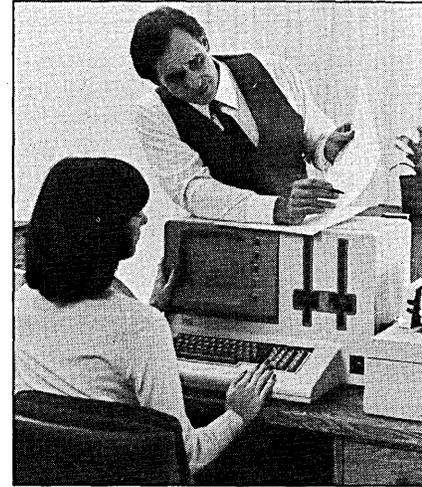
DESKTOP COMPUTER

The desktop computer line IBM inaugurated in 1974 with the 5100 has entered its third iteration with the introduction of the 5120 computing system. The 5120 system uses a new 5110 processor, the model 3, with two integrated diskette drives, each capable of packing 1.2MB of data on an 8 inch floppy. The new processor features a larger, 9 inch crt display, and the same choice of language processors in firmware as earlier units: BASIC, APL, or both. Existing 5103 models 11 and 12 bidirectional matrix printers (80 cps and 120 cps) are supported, as is the 5114 diskette unit. Six licensed programs and an Atlanta-based Installation Support Center (for telephone access to support) were announced in conjunction with the 5120.

The new system is compatible with earlier versions; 5120 options include a ROM-based diskette sort accessible from either supported programming language, a serial I/O adaptor, and bisync and asynchronous communications adaptors. The licensed programs include general ledger, accounts payable, payroll, billing, inventory reporting, and accounts receivable. Pricing for the 5120 ranges from \$9,340 to

\$23,990, with a typical configuration of a 32KB BASIC-speaking processor and 120 cps printer, priced under \$13,500. Off-the-shelf availability is planned for customers shopping at any of the company's 50 Business Computer Centers. INTERNATIONAL BUSINESS MACHINES CORP., General Systems Div., Atlanta, Ga.

FOR DATA CIRCLE 348 ON READER CARD

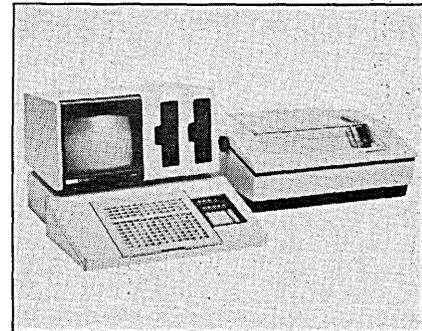


HARDWARE SPOTLIGHT

SMALL COMPUTER

The BC-5000, already in use in Japan where it was developed, bears careful consideration for applications in small businesses and distributed processing networks where relatively untrained users need a machine that's easy to use. Once it's been programmed (still a job for a professional), the BC-5000 can be operated by just about anyone who can read. It features a unique, program-definable keyboard that allows a single keystroke to generate a character, word, line, or page of information. This keyboard consists of 48 function keys with status lights and 96 item keys. An exchangeable cartridge (with machine-readable identification) contains 24 pages of legends on plastic sheets resembling pull-down window shades. Under program control, the keys are defined, and the proper sheet of legends pops into position (the physical movement of legend pages takes less than a second). A fixed numeric pad, with several other fixed function keys including "yes" and "no" keys, is provided to enter numeric data.

We saw an order entry demo where the user could touch one item key identifying the customer and the machine filled in the customer info. The item keys were then redefined so the salesman could be entered, again with one keystroke. Then another page popped into place with inventory items. Again, one keystroke displayed the item name and price, the user went to the numeric pad to enter quantity, and the ma-



chine handled the extension. Yes/no keys were used to indicate if the order form was complete. Throughout the demo, the programmer anticipated and trapped erroneous entries; the operator couldn't credit a San Francisco salesman with a sale to a customer in Hoboken.

The BC-5000 is a desktop unit with dual integral, double-density, double-sided floppies. Additional diskette drives and a printer can be added. The computer has two RS232 interfaces, allowing asynchronous or synchronous communications at speeds ranging from 110bps to 9600bps. Software includes an operating system, assembler, and a compiler called MUST. The vendor currently is in the process of setting up a network of distributors; the BC-5000, with 120cps dot matrix printer, has a targeted end-user price in the neighborhood of \$15,000. PANASONIC, Secaucus, N.J.

FOR DATA CIRCLE 322 ON READER CARD

Business graphics sell your story better

You can create exciting, effective business graphics on-the-spot with your computer or computer service and the new EXECUPORT® 4000G portable terminal.

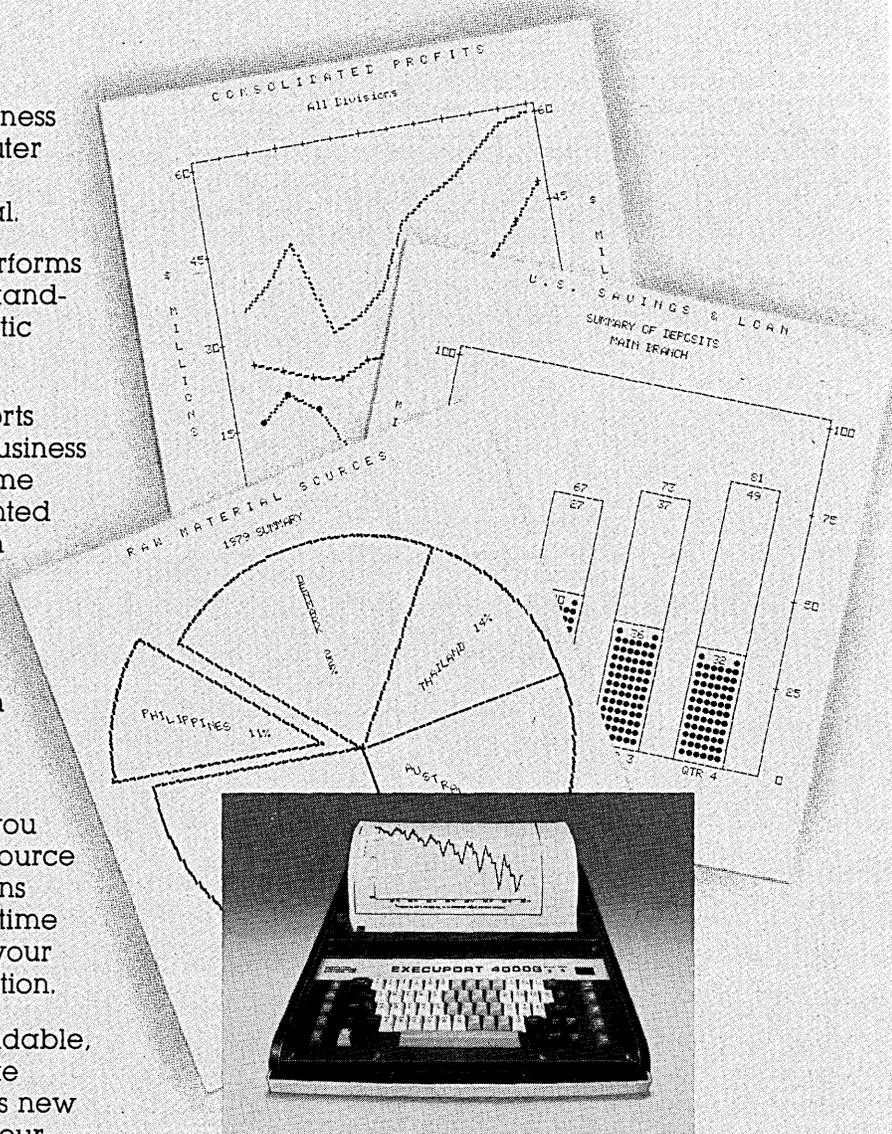
The 17 lb. EXECUPORT® 4000G performs like a heavyweight. It functions as a standard terminal, and it can draw dramatic pictures with precision and speed.

For the first time, wide format reports (up to 136 characters per line) and business graphics can be produced on the same portable terminal. Output can be printed either on paper or on transparent film for projection. The charts shown here were produced from The Service Bureau Company's PICTURE-PAC via telephone in less than three minutes each. You can tailor your own in-house software to create similar graphs.

With the EXECUPORT® 4000G all you need are a telephone and a power source to:

- Prepare customized presentations
- Demonstrate your services
- Save time by preparing reports and graphs in your office, at home or at any remote location.

The EXECUPORT® 4000G is dependable, versatile and quiet. Let us demonstrate how business graphics created on this new portable terminal can help you sell your story better.



Execuport 4000G

CTS Computer Transceiver Systems Inc.
Manufacturers of Execuport® Terminals

P.O. Box 15 • East 66 Midland Avenue • Paramus, NJ 07652 • Phone: (201) 261-6800

CIRCLE 168 ON READER CARD

HARDWARE

COMMUNICATIONS PROCESSORS

Intended to link remote processing operations between similar network nodes or upwards to a large host, this vendor's CP Series of communications processors provides a communications path to equipment from other vendors. The series initially consists of two members: the CP 9400 and the CP 9500. The 9500 uses four independent processing elements: one provides operating control, another manages data files, a third compiles and executes user application programs, while the fourth is assigned to data communications. All four processors operate concurrently for maximum throughput.

Both the CP 9400 and CP 9500 can function in networks of this vendor's systems, or with systems from other sources; both support local peripherals and processing. Either can function off the network in a standalone mode. Both run a system software package known as the Transaction Control System (TCS), which ties together the Master Control Program (MCP), Network Definition Language (NDL) for generating communications control programs, Generalized Message Control System (GEMCOS) for message handling, and Message Programming Language (MPL) for communications applications programming. Current users of the Communications Management Systems (CMS) application software and Computer Management Distributed Information Software can move these programs without change from current B 80, B 90, B 800, B 1800, and B 1900 systems.

CP Series systems range in main memory sizes from 96KB to 640KB, support disk storage capacities ranging from 6MB to 520MB, and handle two to 32 communications lines. A typical CP 9400 with 96KB of memory, a 1MB Super Minidisk (floppy media) drive, 18MB of cartridge disk, two data communications lines and an operator's console, sells for \$26,500. The same system leases for \$736 per month on a three-year term. A CP 9500 with 384KB of main memory, 6MB of flexible disk storage, 77MB of fixed disk, four communications lines, and a console sells for \$36,029; this system leases for \$1,092 per month over three years. BURROUGHS CORP., Detroit, Mich.

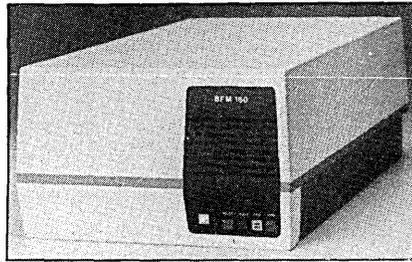
FOR DATA CIRCLE 346 ON READER CARD

WINCHESTER DISKS

This vendor's Centennial series of 14 inch Winchester disk drives come in 90MB and 158MB capacities. The sealed, fixed head/disk assemblies have either three or four disks. Five printed circuit boards contain all electronics, including power supply, LED fault display, and SMD interface (enhanced with a "set sector" tag for rotational position sensing). Bytes-per-sector and sectors-per-track are selected by DIP switches on the interface card. The Centennial BFM 90

(90MB) sells for \$6,000, and the BFM 160 (158MB) is \$7,500; oem discounts are offered. BALL COMPUTER PRODUCTS, Sunnyvale, Calif.

FOR DATA CIRCLE 329 ON READER CARD



DESKTOP COMPUTER

One of the early and most popular entrants in the personal computer market, this vendor has come out with a refined version of its PET computer with features making it more attractive to the business user. The 8000 series business computer has an 80-column by 25-line display, typewriter-like keyboard (the early PETs received criticism for their small keyboards), and numeric keypad. Like earlier PETs, the 8000 series speak BASIC and use the IEEE-488 general purpose instrument bus. The 8000 series can display 64 ASCII characters and 64 graphics characters. Screen editing is supported by full cursor control, with character insert and delete, overstriking, and reverse video fields; hitting "return" sends the entire line, regardless of cursor position. The 8000 series consists of the 16KB 8016 (\$1,495) and the 32KB 8032 (\$1,795).

Dual 5 1/4 inch floppy and a modem were announced with the 8000 series. The dual floppy CBM 8050 has a capacity of nearly 1MB and sells for \$1,695. The modem, which interfaces to the IEEE-488 bus is compatible with Bell 103 and 113 modems; it operates at 300bps in full- or half-duplex. CCITT compatibility is also available in the \$395 modem. COMMODORE BUSINESS MACHINES, INC., Santa Clara, Calif.

FOR DATA CIRCLE 326 ON READER CARD



MODEM

Need a low-speed (up to 300bps) modem at a low price (\$195)? Then check out this vendor's model 103 LP, a pint-sized Bell 103-compatible modem that provides full-duplex operation over an ordinary two-wire telephone circuit. The originate-only modem is FCC approved for direct connection to the phone network. It has RS232 and current loop interfaces for your terminal equipment. And here's the kicker: it hasn't got an AC power cord, because it gets its juice directly from the phone line. A front-panel rocker-switch allows the phone to be



used for voice communications or data; an indicator LED lights when the unit is in data communications mode. UNIVERSAL DATA SYSTEMS, Huntsville, Ala.

FOR DATA CIRCLE 324 ON READER CARD

TERMINALS AND DISK

A pair of crt terminals and a 20MB Winchester disk are the latest offerings from this vendor. The Emulator crt can emulate the terminal control codes of four popular crts: Lear Siegler's ADM-3A, DEC's VT-52, Hazeltine's 1500 series, and Soroc's IQ-120. It features a 12-inch screen, auxiliary RS232 printer port, and numeric keypad. The Emulator displays 24 lines of 80 characters, and communicates at data rates ranging from 50bps to 9600bps. It is priced at \$895.

The Superbrain QD is an enhanced version of the vendor's Superbrain smart terminal. Like the Superbrain, the QD has dual Z80 microprocessors, a 12 inch screen, ASCII keyboard with numeric pad, and the same packaging. It goes beyond, in having dual-density, dual-sided mini floppy drives (good for 715KB of formatted data, as opposed to the Superbrain's 320KB) and 64KB of RAM (opposed to 32KB). The popular CP/M disk operating system is provided to support the \$3,995 terminal.

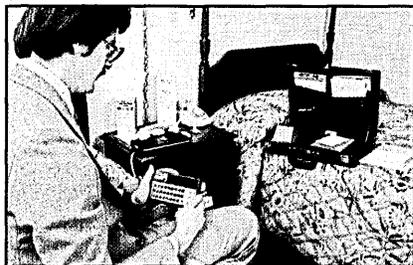
The Compustar 20 is a 20MB Winchester disk for use with the Superbrain family. It mounts in a terminal stand, and with an optional multiplexor, can be shared by up to 32 independent users. The basic Compustar sells for \$5,000, and the multiplexor adaptor is \$1,500. INTERTEC DATA SYSTEMS CORP., Columbia, S.C.

FOR DATA CIRCLE 321 ON READER CARD

TALK TO YOUR COMPUTER FROM ANYWHERE—BY PHONE!



Nixdorf's amazing, new, portable terminal is designed for the person who needs quick, accurate communications with a computer from a variety of locations.



Ingenious microtechnology has packed all the features of a standard terminal into a battery/AC-operated unit the size of a book. With full computer telecommunications capability, it weighs just three pounds. And it's so inexpensive, you can buy one for every member of your team for far less than it would cost to lease!

The compact unit communicates via its acoustic coupler over standard telephone lines with any computer system, using standard RS 232 telecommunications (used on most mainframes). No special programming is needed.

To operate, just dial your computer or computer operator. Place your telephone handset into the acoustic coupler and you're ready to go! Just key in a line (up to 80 char-

acters), review on the 16-character display via scroll keys, then transmit. The speed of computer response is easily set for your own viewing pace.

EXECUTIVES: From home, road, or out-of-town, you can still have access to the vital information you require. Check operational data, sales figures, even pick up electronic mail. With automatic telephone pickup, you can call when it's convenient for you, regardless of time zones.



FINANCE: Dial from a client's or prospect's office to access complex programs on the spot. Enter client's data, and get results immediately. All the portability of a pocket calculator with the total capability of your home-base computer.

FIELD SERVICE: On the road, use any phone—even a pay station—to log hours, parts, with complete accuracy; then receive messages and schedule changes. Easy-to-read display eliminates handwritten or verbal errors.



SALES: Now you can check inventories from your customer's office. No need to guess on supply availability. Plus, you can place your orders directly with your central computer to speed shipment.

PROGRAMMING: You can scan or modify software from any telephone. Full-feature keyboard allows you to debug or even write short routines for fast response to urgent needs. At three pounds, you won't mind carrying it everywhere!

Rechargeable batteries give up to four hours life; charger/adaptor included. Baud rate and parity set from keyboard. 16-character LED display scrolls to show full 80-character buffer.

I would like to order the following:

Quantity	Model	Price	Total Price
_____	Nixdorf #LK3000 keyboard	\$139.95	_____
_____	Nixdorf computer module #LK2010	\$195.00	_____
_____	Nixdorf telephone coupler #LKCouplr	\$175.00	_____
_____	INS., SHIPPING And Handling Charge	\$3.50	_____
TOTAL	(Mass. Residents add 5% Sales tax.)	_____	_____

Payment: Visa MC Check Corporate P.O. No.: _____
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HARDWARE

VOICE INPUT

Designed specifically for use with Lear Siegler's ADM-3A crt terminal, the Vocon 5000 is a limited vocabulary, isolated utterance voice recognition device. It consists of a noise-canceling microphone and a user-installable printed circuit board that is plug-compatible with the ADM-3A and fits within the terminal's cabinet. The unit allows voice control of any application being run on a computer with input from the ADM-3A. The microprocessor-based Vocon 5000 can recognize up to 64 speaker-trained isolated words or phrases; additional vocabulary can be stored at the computer and down-line loaded under the user's control. The Vocon must be trained before use. During training mode, the vocabulary specific to the given application is displayed on the crt screen, along with instructions to the user. The Vocon 5000 sells for \$2,000 (ADM-3A's go for less than \$900 in singles). HEURISTICS, INC., Sunnyvale, Calif.

FOR DATA CIRCLE 331 ON READER CARD

MULTIPLEXOR

The Sprint multiplexor accepts four asynchronous data streams and multiplexes them onto a synchronous composite channel operating at up to 19.2Kbps. The four asynchronous channels all operate at one quarter the composite channel speed.

Terminal idle time is used to sync the composite channel. RS232 interfacing is used all around, and the Sprint accommodates virtually any character size on the asynchronous input channels because multiplexing is performed on a bit-by-bit basis, as opposed to character-by-character. The Sprint sells for \$975. COMPRE COMM, INC., Champaign, IL.

FOR DATA CIRCLE 327 ON READER CARD

DEMULPLEXOR

Instead of requiring the user to spring for a 19.2Kbps line, this vendor's Lineplexer splits high-speed traffic into two streams which are then sent over two voice-grade phone lines. A Lineplexer Transmission System (LTS) consists of a Lineplexer II unit, M9600 modems, cables, and enclosures. An LTS is required at each end of the circuit, and provides operation at data rates of 19.2Kbps, 14.4Kbps, 9600bps, and 4800bps. Line degradation causes the system to automatically fall back to a slower data rate; if one line fails, the system can drop back to single line operation. Where high reliability is required at data rates of 9600bps or less, the system can send identical data streams over two independent channels, providing redundant communications. The system is priced at \$15,500, quantity one. TIMEPLEX, INC., Rochelle Park, N.J.

FOR DATA CIRCLE 323 ON READER CARD

TERMINAL

The Micro 4400—offered to both oems and end users—emulates Burroughs TD 700/800 series terminals. For the oem, the terminal offers the capability to support special application-dependent protocols and variations of existing protocols. An extension to the vendor's DM-series of smart terminals, the Micro 4400 comes with 16KB of RAM, expandable to 32KB. This memory allows the user to scroll through up to 120 lines of text. The 4400 supports both serial and parallel printer interfaces; the printer address can be shared or independent of the terminal group address in a polled environment. Features include background printing, line drawing capabilities, programmable function keys, and a numeric keypad. The Micro 4400 has a list price of \$3,295. BEEHIVE INTERNATIONAL, Salt Lake City, Utah.

FOR DATA CIRCLE 325 ON READER CARD



TERMINALS

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DESCRIPTION	PURCHASE PRICE	PER MONTH		
		12 MOS.	24 MOS.	36 MOS.
LA36 DECwriter II	\$1,695	\$162	\$ 90	\$ 61
LA34 DECwriter IV	1,295	124	69	47
LA120 DECwriter III KSR ...	2,495	239	140	90
LA180 DECprinter I	2,095	200	117	75
VT100 CRT DECscope	1,895	182	101	68
VT132 CRT DECscope	2,295	220	122	83
DT80/1 DATAMEDIA CRT	1,895	182	101	68
T1745 Portable Terminal	1,595	153	85	57
T1765 Bubble Memory Terminal	2,795	268	149	101
T1810 RO Printer	1,895	182	101	68
T1820 KSR Printer	2,195	210	117	79
T1825 KSR Printer	1,695	162	90	61
ADM3A CRT Terminal	875	84	47	32
QUME Letter Quality KSR ...	3,195	306	170	115
QUME Letter Quality RO	2,795	268	149	101
HAZELTINE 1410 CRT	875	84	47	32
HAZELTINE 1500 CRT	1,195	115	64	43
HAZELTINE 1552 CRT	1,295	124	69	47
DataProducts 2230 Printer ..	7,900	757	421	284
DATAMATE Mini Floppy	1,750	168	93	63

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208B/A DataSet	\$3,275	\$110
201C DataSet	\$1,150	\$ 40
202S/T DataSet	\$ 565	\$ 20

DECwriterIII LA120	\$2,295	\$ 80
DECwriterIV LA34	\$1,295	\$ 45
DECwriterII LA36	\$1,895	\$ 65

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VT52 Compatible	Hazeltine 1552	CALL	\$ 45

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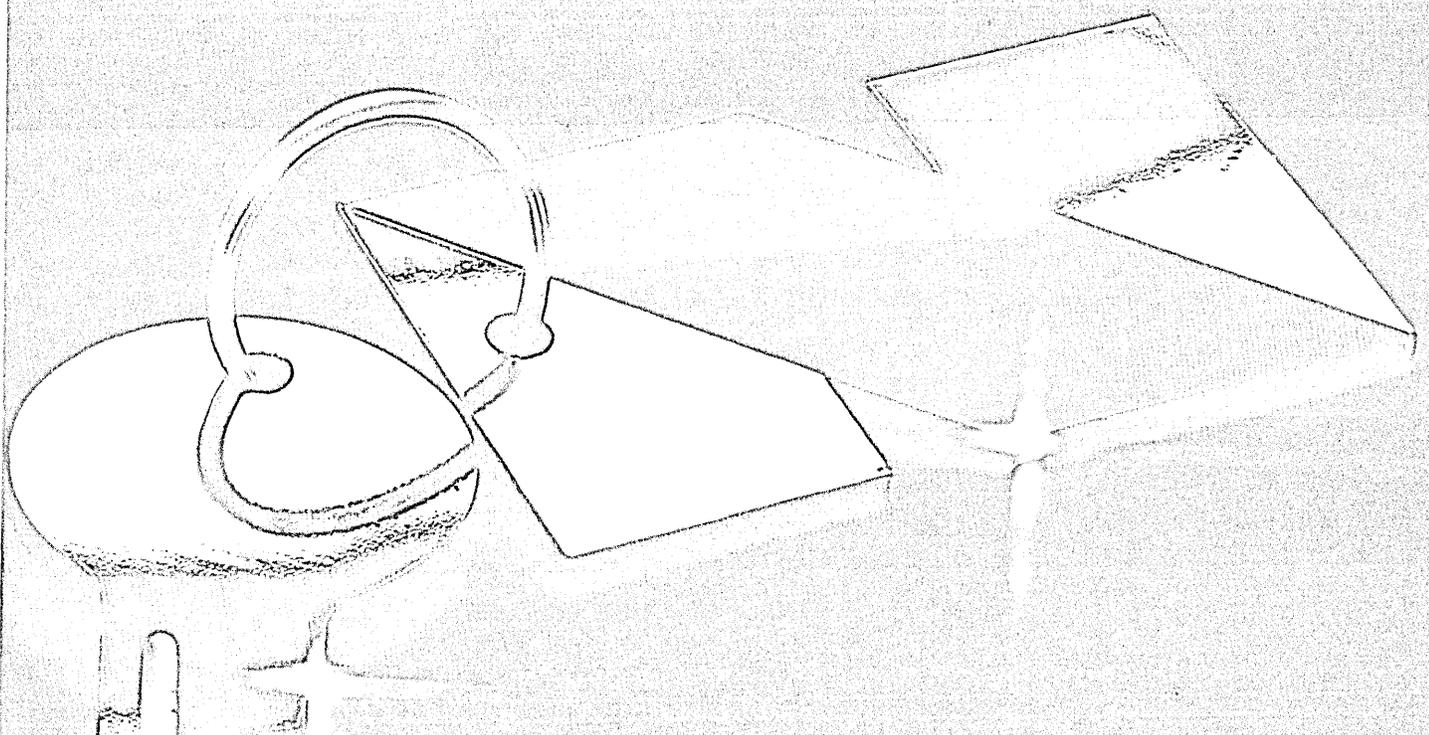
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CIRCLE 171 ON READER CARD

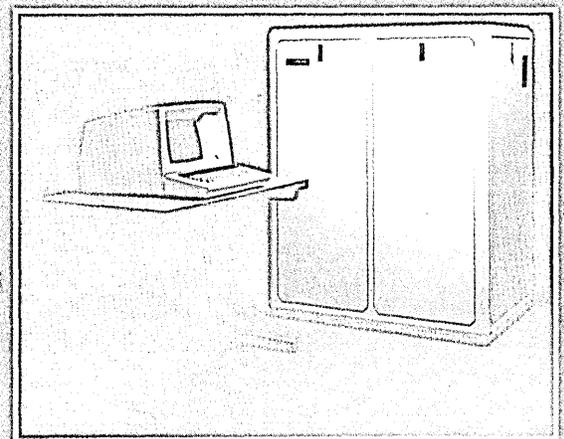
Nanodata QMX 6300

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CIRCLE 172 ON READER CARD

HARDWARE

PLOTTERS

The CPS 14/15 is this vendor's latest line of plotting systems. The four-pen plotters come in two widths: 22 inches (CPS 14) and 34 inches (CPS 15). The microprocessor-based digital plotters can operate on-line or in a time-sharing environment; they accept serial data at speeds to 9600bps through either an RS232 or 20mA current loop interface. The CPS 14 and CPS 15 each are offered in two versions. Those suffixed 5 include firmware to generate 64 characters, circles, and standard 90° rotations; models with 6 suffixes have additional firmware for generating a 172 character set, rotations at arbitrary angles, and an enhanced vector format. Plotting speeds are switch-selectable at 10ips or 15ips, and a thumb-wheel



selector allows the operator to scale the plot size up to nine times the original. All models have self-test capabilities and buffers of 1,536 bytes. A CPS 14/5 sells for \$9,950, and a CPS 14/6 is \$10,450. The CPS 15/5 is \$12,950, while the CPS 15/6 goes for \$13,450. HOUSTON INSTRUMENT, Austin, Texas.

FOR DATA CIRCLE 333 ON READER CARD

VAX DISK SYSTEM

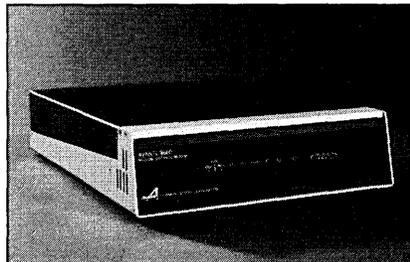
Emulating DEC's RH780 hardware (and compatible with RM03 software at the operating system level), this vendor's large-scale disk system for VAX 11/780 operating system level, this vendor's large-scale disk system for VAX 11/780 computers provides a 50% increase (per spindle) in capacity over DEC's offering. Each spindle accommodates up to 300MB of data. The system comprises a model 9400 controller, up to eight 300MB SMD-type disk drives, a synchronous backplane interconnect (SBI) adaptor, and all connecting cables and hardware. The controller also offers a multiple cpu option, allowing up to four VAX 11/780s, PDP-11/34s, or 11/70s (in any combination) to share a large data base of up to 2,400MB. A single drive system lists at \$36,500, a dual drive system at \$53,600. SYSTEM INDUSTRIES, Sunnyvale, Calif.

FOR DATA CIRCLE 330 ON READER CARD

MODEM

Intended for local and medium distance (up to 100 miles) communications, this vendor's model 9600 provides synchronous 9600bps operation over voice-grade telephone lines. The dual-microprocessor-based modem features CCITT V.29 compatible modulation, fall-back rates of 7200bps and 4800bps, local and remote loopback, a built-in eye pattern generator (for troubleshooting communications with an oscilloscope), and a line quality display. The 9600 is packaged on a single card that can be housed in a desktop cabinet or a rack-mountable card frame. Provision is made for connecting a multiplexor, and a four-channel mux is expected later this year. A desktop 9600 modem sells for \$3,250 in singles, and the board alone is priced at \$2,900. AVANTI COMMUNICATIONS CORP., Newport, R.I.

FOR DATA CIRCLE 332 ON READER CARD



Even Webster's Knows About QUEST

QUEST (kwest). v. 1. To make a search; to go on a quest.

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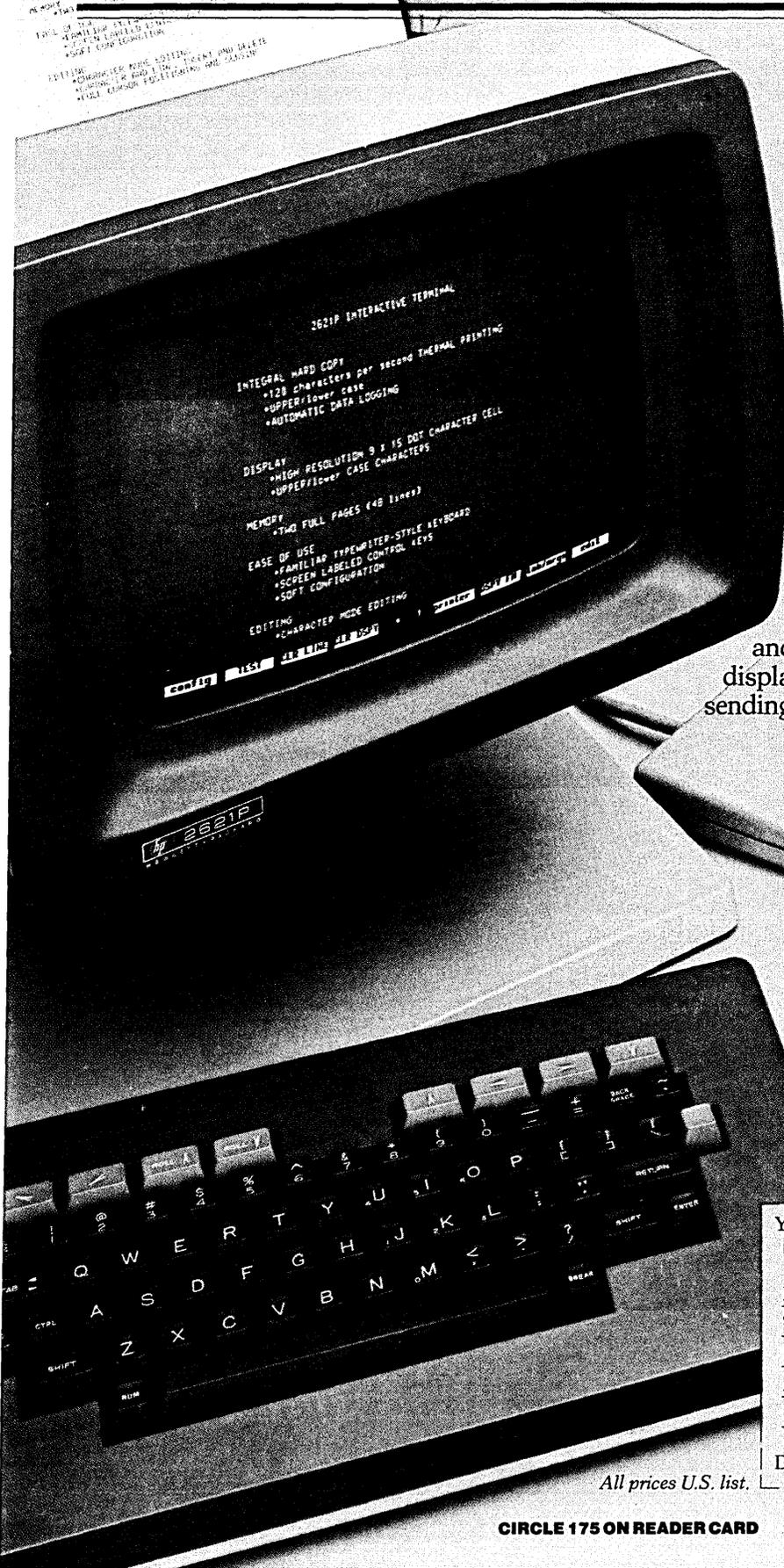


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CIRCLE 174 ON READER CARD

What you see is what you get.



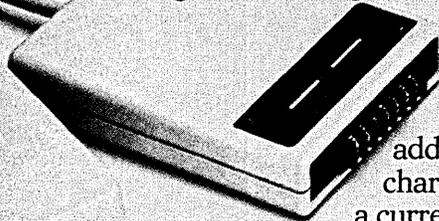
When you like what you see on the screen, simply press a key and presto! you've got it all on paper.

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CIRCLE 175 ON READER CARD

SOFTWARE AND SERVICES

UPDATES

Apple Computer, the Cupertino, Calif., personal computer maker, has given more than \$120,000 worth of hardware and software to researchers developing medical and general education materials using micros. The awards, made under the aegis of the Apple Education Foundation, include six systems -- valued in the neighborhood of \$28,000 -- for medical education and training. An additional 17 grants were made for general education research. The foundation was set up to further organizations and individuals exploring the use of microcomputers in education (one of the corporation's early target markets). The Cupertino-based foundation's board of directors consists of Dr. Gail Fullerton, president of San Jose (Calif.) State Univ.; Dr. Joseph I. Lipson of NSF; James M. Miscoll, senior vp of Bank of America; Dr. Robert N. Noyce of Intel; and Apple executives A. C. Markkula and Dr. Thomas M. Whitney; executive director is G. Gregory Smith. The Foundation has an advisory board of computer scientists and educators from across the nation.

Arbat Systems, Ltd., the international firm that develops minicomputer-based money transfer systems for banking, will install the firm's SWIFT interface package and intellex message switching system for use in several branches of the Hong Kong and Shanghai Banking Corp. Arbat has offices in London, Hong Kong, and New York, and a customer base spread through the U.S., United Kingdom, Europe, and the Far East.

MICROCOMPUTER OS

For 8080, 8085, and Z80-based microcomputers, the I/OS Disk Operating System is said to be a "greatly enhanced" version of the vendor's TSA/OS Disk Operating System. I/OS is said to be compatible with Cromemco's CDOS operating system, as well as the well-known CP/M system (versions 2.0 and earlier). The vendor says I/OS supports a broader range of hardware and handles more files than competing microcomputer operating systems. Users can mix both hard and floppy disks in their configurations; I/OS has a total file capacity of more than 268MB. I/OS supports up to 15 disk units; the file directory is structured for better access, using "system" buffers to speed disk access. I/OS also has a print spooler, allowing printing of a disk file concurrently with other processing. The operating system also has autostart capabilities and a number of utilities, including a symbolic debugger, text editor, disk copy and file transfer programs, diagnostics, and a print-out formatting facility. The package will be marketed through microcomputer dealers for a retail price of \$150 plus a nominal dealer configuration fee. INFOSOFT SYSTEMS, INC., Westport, Conn.

FOR DATA CIRCLE 356 ON READER CARD

COMMUNICATIONS FACILITY

Any teleprocessing monitor can be used with any (unmodified) applications program using this vendor's IDMS data base management system and the newly announced Universal Communications Facility (UCF). The vendor says UCF users can expect better performance, backup recovery, and ease of development when using UCF, while at the same time protecting the installation's investment in a teleprocessing monitor such as CICS, Taskmaster, Intercomm, and Shadow. Programs using UCF are said to execute faster because data base service requests are handled directly by the IDMS Central Version, bypassing interrogation communications with the TP monitor except for terminal I/O. UCF uses COBOL-like verbs for both data base manipulation and terminal operations, simplifying programming. UCF has a license fee of \$40,000, with a 10% annual renewal fee. CULLINANE CORP., Wellesley, Mass.

FOR DATA CIRCLE 355 ON READER CARD

MICROCOMPUTER COMPILERS

This well-known microcomputer software house has developed TRSDOS-compatible COBOL and BASIC compilers for Radio Shack's TRS-80 Model II (not to be confused with Level II) microcomputers. Intended for in-house or commercial software development projects, both compilers come with the vendor's standard macro assembler and linking loader.

COBOL-80 is based on ANSI-74 COBOL, and features interactive screen handling via ACCEPT and DISPLAY verbs. Indexed and relative files are supported, as is an optional packed decimal format said to "significantly" reduce mass storage requirements. Also supported are COMPUTE, INSPECT, STRING, UNSTRING, and SEARCH verbs, three-dimensional arrays, and a full COPY facility. COBOL-80 has a single copy price of \$750.

The BASIC compiler generates optimized object code that executes from three to 10 times faster than interpreted BASIC. WHILE constructs are supported, assembly language subroutines may be CALLED, long variable names and variable length disk records are allowed. User error trapping, PEEK and POKE, and nested IF-THEN-ELSE statements also are supported. THE BASIC compiler sells for \$395. MICROSOFT, Bellevue, Wash.

FOR DATA CIRCLE 349 ON READER CARD

PERFORMANCE MODELING

Best/1, the capacity planning tool originally released for IBM mainframes, now is offered for Univac 1100 EXEC systems. Best/1 for 1100 EXEC systems with batch, demand, and transaction processing, collects input data from SIP/PAR, and, optionally, commercial hardware and software monitors. Based on queueing network theory, Best/1 can model priorities at the cpu, memory queues for timesharing and transaction processing applications, and I/O delays caused by missed RPS reconnects or dual channel switching. The user builds models based on workloads, transaction volume, and I/O channels or devices; the mathematical details of the model are used internally by Best/1 and need not concern the user further. Best/1 is a modeling package for capacity planning, and can be used to predict the effect of altering system parameters.

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3. ASI/INQUIRY Provides Complete Security.

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SOFTWARE AND SERVICES

Fifteen reports are available listing throughput, response times, utilizations, and other relevant factors for capacity planning. The 1100 EXEC Best/1 package is priced at \$24,500. BGS SYSTEMS, INC., Lincoln, Mass.

FOR DATA CIRCLE 350 ON READER CARD

LANGUAGE PROCESSOR

The string processing language SNOBOL4 has been implemented in native mode for the VAX 11/780; the translator, dubbed VAX/SPITBOL, is said to exploit the extended addressing and virtual memory capabilities of the VAX. The source language reportedly is strictly compatible with other implementations of MACRO SPITBOL (including those running on CDC 6600 and Cybers, PDP-11s, and other computers). Most SNOBOL4 and SPITBOL programs written for IBM 370s will be accepted without modification. Versions of VAX/SPITBOL are offered for both VMS and UNIX operating systems. A perpetual license goes for \$1,195 (or \$795 for educational and nonprofit organizations). DISC, Oak Park, Ill.

FOR DATA CIRCLE 351 ON READER CARD

DEBUGGER

This vendor's Applebug is a debugging aid for checking out code at the machine language-level on Apple Computer Co.'s Apple II personal computers. The package can operate standalone, or with other offerings from this vendor, such as its six-character label editor/ assembler. Applebug has three operational modes: STEP, TRACE, and RUN. It also has I/O commands to save or load the label table to or from disk or tape. The user can single-step through a program in STEP mode. Each executed instruction and the contents of associated registers will be displayed. User-specified memory locations (either hexadecimal addresses or label names) also can be displayed. Breakpoints can be specified. TRACE mode also displays each instruction and register; subroutine calls and returns are logged, with the TRACE terminating with the final subroutine return (or when the user halts the TRACE). RUN mode simply allows program execution without displaying any instructions or data. Applebug is provided on diskette for \$29.95. MICROPRODUCTS, Redondo Beach, Calif.

FOR DATA CIRCLE 353 ON READER CARD

WORD PROCESSING

Written in Business BASIC for Data General computers (from the micronOVA up through the Eclipse line), THE Word Processing System is a multiple workstation version of this vendor's existing single-user word processing package. Capable of supporting up to four simultaneous users, the package can be used as a standalone system, or in conjunction with other processing activities. English-based commands and standard office terminology simplify the operator inter-

face. An overlay is provided to label the function keys of a Data General 6053 workstation; the overlay also provides a legend of the single-character commands used by the system for such functions as overprinting, centering, and setting tab stops. Function keys allow insertion or deletion of characters or lines, roll up or down, and other functions. The multistation word processing package is priced at \$2,950, with discounts offered to OEMs. TECHNICAL ANALYSIS CORP., Atlanta, Ga.

FOR DATA CIRCLE 352 ON READER CARD

POS COMMUNICATIONS

The Advanced Point of Sale Communications System allows an IBM mainframe to communicate with remote IBM 5260 Retail Systems. The software package has the ability to both send and receive data on the diskette contained in a store's 5265 shared media terminal (a controller in the 5260 system). The host can pick up data gathered by the 5265 from satellite 5266 POS terminals during the course of a day's business. The host also can send data, generally price lookup and negative credit information, to the 5265.

The communications software is a multiline BTAM program that can run under DOS, DOS/VS, DOS/VSE, OS, OS/VS1, and OS/VS2. The multiline feature allows the host to communicate with multiple 5260 systems concurrently. A communications controller (270X, 370X, or an ICA) is required at the

host. Communications run at 2400bps. Transmissions can be made to unattended remote POS systems, and the 5260 can be powered down after the communications have taken place, allowing after-hours operation. The Advanced POS Communications System is priced at \$8,000. COMPUTER DYNAMICS, INC., New York, N.Y.

FOR DATA CIRCLE 341 ON READER CARD

PROGRAM MAINTENANCE

Currently written to run as an application under the Westinghouse WESTI teleprocessing system, Prompt is an interactive terminal-oriented product for program development, library maintenance, data entry, and job submission. A CICS version reportedly is under development.

Prompt includes an editor supporting full screen editing and variable split screen formats. Commands may be strung together, and a Prompt procedure facility is available. The package also has a POWER/VS interface that lets the user submit jobs, examine output, and alter or delete jobs. Prompt can maintain any source, relocatable, procedure, or core-image library. Functions can be protected by passwords. Terminal support covers any 3270/80 character screen size from 960 to 3,440. For DOS/VS WESTI installations, Prompt leases for \$60 per month; permanent license goes for \$1,944. GOAL SYSTEMS CORP., Columbus, Ohio.

FOR DATA CIRCLE 354 ON READER CARD

SOFTWARE SPOTLIGHT

3270 COMMUNICATIONS

When this vendor announced its Attached Resource Computer (ARC) system several years ago, it made a distinction between "applications processors" and "file processors" connected along the ARC interprocessor co-ax bus. With the introduction of ARCCOM, a family of software communications facilities, a new distinction arises: processors using ARCCOM to link up with remote mainframes become "communications processors," essentially pseudo file processors sans disk.

The first ARCCOM package, ARCCOM 3270, allows applications processors to communicate with 3270 applications on remote IBM mainframes. The ARCCOM software turns an applications processor into a communications processor with which other applications processors communicate using the same protocols as for interacting with a file processor. This makes ARCCOM compatible with the high-level languages (COBOL, DATABUS, RPGPLUS, and BASICPLUS) already available to ARC system users. ARCCOM 3270 allows users to develop new applications for local processing, with operator-transparent mainframe inquiry. The software also permits users to run existing 3270 applications without

mainframe hardware or software modification.

ARCCOM software runs on a 6000-series applications processor; the 3270 package makes the 6000 emulate an IBM 3271 control unit. This communications processor talks to the rest of the ARC system over the co-ax interprocessor bus, and to the mainframe via a communications adaptor, synchronous modem, and leased line. ARCCOM to mainframe communications use EBCDIC character codes, bisync protocol, and communications speeds to 9600bps.

A local printer (emulating an IBM 328X printer) can be attached to the communications processor; a model 6020 communications processor can emulate up to 32 3277/328X devices, while a 6010 can emulate up to eight such devices.

Applications processors use a utility program (part of ARCCOM) to access 3270 applications via the communications processor. Applications processors also can support satellite printers emulating 328Xs.

The software is available without charge to new customers at the time of order; existing customers pay \$500. There is a monthly maintenance fee of \$15. DATA-POINT CORP., San Antonio, Texas.

FOR DATA CIRCLE 334 ON READER CARD

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CIRCLE 169 ON READER CARD

SOFTWARE AND SERVICES

LANGUAGE PROCESSOR

THE TERMINAL PROGRAMMING LANGUAGE (TPL), currently in use on this vendor's small business systems, is now available for the vendor's larger, disk-based DS990 computer family (models 4 through 30). This allows small users to migrate more gracefully into larger DS990 systems, protecting their current investment in software. Conversely, it allows large DS990 users to develop and down-load TPL programs into small systems in the field. Both versions support the same forms development (TPL FORMS) and dp capabilities (TPL Procedures). The new implementation, known as DX10 TPL, provides a large library of functional subroutines and supports an indexed file management system. It also has a general purpose communications interface for RS232 compatible devices. DX10 TPL operates as a task in a DX10 multiuser, multitask environment. A software license for DX10 TPL (supplied on DS10 disk) is \$2,000. First year support is included in the license fee, with renewals priced at \$750 per year. TEXAS INSTRUMENTS INC., Digital Div., Houston, Texas.

FOR DATA CIRCLE 336 ON READER CARD

DATA BASE ACCESS METHOD

Operating in conjunction with Total on this vendor's V-8000 series mainframes, Tran-

Quest simplifies accessing a data base for both non-dp personnel and applications programmers (subject to security constraints, of course). The system comprises a data dictionary, a data manager, and a query processor. The data dictionary can take either an active or a passive role. In a passive role, it serves as a documentation tool describing hardware and software, data base schema, data items, and the like; in this mode it operates as a standalone batch-oriented package. In an active role, the data dictionary provides the data manager and query modules with information about the data base. The data manager provides a high-level language interface to the data base. It locates the data requested by an application, and handles any necessary reformatting of the data. The query processor module operates under the vendor's Tran-Pro transaction processing software (see last month's Software & Services section), and allows the user to make ad hoc free-formatted requests, or to use predefined inquiry procedures. Tran-Quest can be had for a one-time license fee of \$13,000, or a monthly license of \$325. NCR CORP., Dayton, Ohio.

FOR DATA CIRCLE 340 ON READER CARD

C CROSS-COMPILER

The vendor actually calls this PDP-11-based package "cross-software," since it com-

prises a compiler for the C programming language, a code optimizer, a target machine (in this case, the vendor's 16-bit Z8000 micro) assembler, a linker, and an up-load/down-load program compatible with the Z8000 development module. The package runs under the seventh release of the UNIX time-sharing operating system on PDP-11/45s and 11/70s.

Noting that many Z8000 customers also use PDP-11s and have familiarity with C, a company spokesman says that the cross-software will let users "take advantage of the tools of a larger computer system to develop software for their own Z8000-based products." The cross-software package, combined with the UNIX operating system's editors, file system, and software tools, the spokesman said, will provide "an ideal software development environment for the Z8000."

The C programming language, developed at Bell Labs, is a rich, powerful, block-oriented structured programming language with a terse syntax (blocks begin and end with left and right brackets, instead of BEGIN and END keywords; expressions can contain imbedded assignment statements, etc.). Most of the UNIX operating system is reportedly written in C. The cross-software package is priced at \$10,000. ZILOG, Cupertino, Calif.

FOR DATA CIRCLE 338 ON READER CARD

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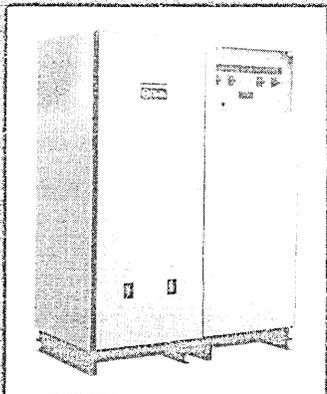
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SOFTWARE AND SERVICES

DBMS

A data base management system based on the 1978 recommendations of CODASYL, an Interactive Query (IQ) facility, and a new version of the vendor's INFOS file management software have been developed by this vendor for its commercial series of Eclipse data systems running the Advanced Operating System (AOS). The data base management system manages up to 4.4 billion bytes of data on up to 16 disk subsystems. Designed for use with COBOL applications programs, the DBMS is designed to handle information in a network data structure; additional access techniques include the more common sequential, random, and multikeyed index sequential methods. The system offers data integrity mechanisms, including transaction rollback, and automatic logging/recovery functions performed along user-defined logical boundaries. The system includes a Data Definition Facility to provide data independence. Data compression is automatic, and, for the sake of efficiency, data are stored in variable length records.

The DBMS consists of two run time monitors, operating as separate AOS processes, and four standalone utilities. Together, the two run time monitors form the Data Base Control System (DBCS), handling all access to and from the physical data base and to an optional log (usually on mag-

tape). The data base monitor, controlled through the operator's console, keeps track of open data bases, current users, and handles major error conditions. It also acts as an agent of the second run time monitor, known as the data base controller. This second monitor interprets and executes all data manipulation commands originating from user programs.

Four standalone utilities support data base operations. The Data Definition Facility (DDF) maintains a description of the data base, in the form of schemas and subschemas. It handles physical allocation of the data base, and provides data independence by providing access in the format desired, regardless of the format in which the data are stored. The Interactive Data Manipulation Language (IDML) is a utility allowing programmers and nonprogrammers alike to read, write, or update data base records without having to write a COBOL program. It can be used to train programmers in data base commands, as well as being used as a tool to batch bad records. A Rebuild utility is provided, allowing reconstruction of the data base from log tapes after a hard crash (such as a disk head crash); most recoveries will be handled by the DBMS's soft crash recovery mechanism. DBSCAN, the fourth standalone utility, allows authorized technical personnel to verify the integrity of the internal data base

and collect statistics.

A fifth separately priced utility, IQ gives read-only access to the data base by authorized personnel using English keyword commands. It can be used for ad hoc requests from terminal users, and to generate reports. A macro facility with parameter capabilities allows definition of frequently used query procedures.

INFOS II is an updated, extended version of the vendor's INFOS file management software. Intended for use on Eclipse C/150, C/350, and M/600 systems, INFOS II supports ISAM, multikey ISAM, and a data base access method (DBAM). It interfaces with PL/1, FORTRAN, RPG II, assembler, COBOL, and the vendor's Interactive Data Entry/Access (IDEA) languages, as well as the systems programming language, DG/L.

The DBMS package licenses for \$9,500 including two training credits, installation, and a one year software subscription service; subsequent licenses are \$6,500. IQ licenses for \$2,500 (including installation and software subscription service), with subsequent licenses going for \$1,500. INFOS II licenses for \$2,500 (with the same installation, training, and support services offered with the DBMS); subsequent licenses are \$1,500. Deliveries of all these packages are quoted at 120 days ARO. DATA GENERAL CORP., Westboro, Mass.

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Ardell Nelson,
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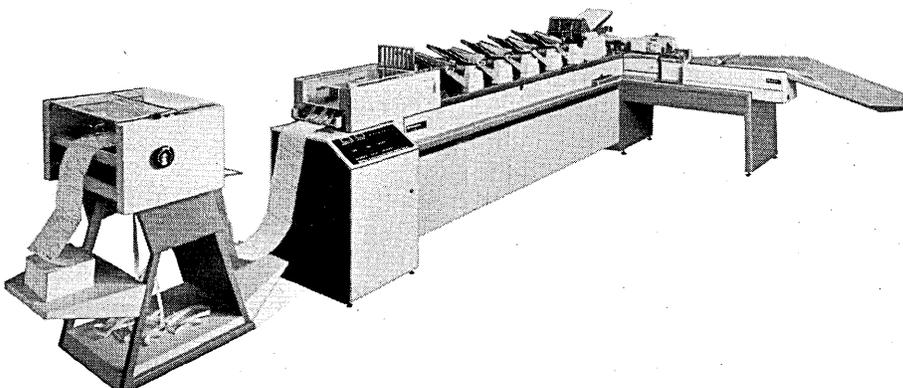
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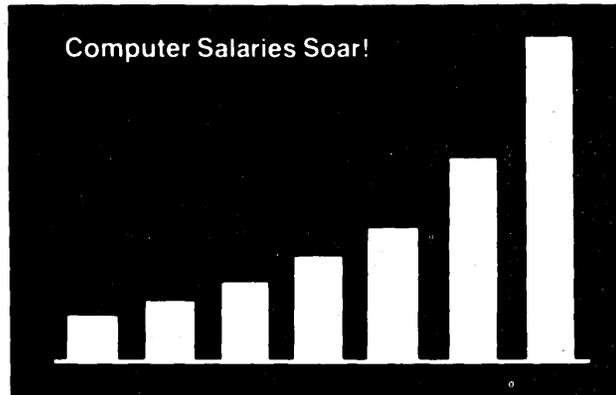
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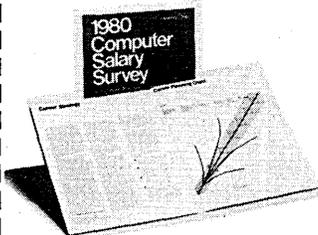
The **1980 Computer Salary Survey** has been expanded to provide specific data for twenty-three new categories. These include positions in data communications, mini-micro programming, data base administration, technical marketing support and EDP auditing in addition to our traditional categories of programming, software, systems design, management and computer marketing.



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BOOKS

THE LASER EXPERIMENTER'S HANDBOOK

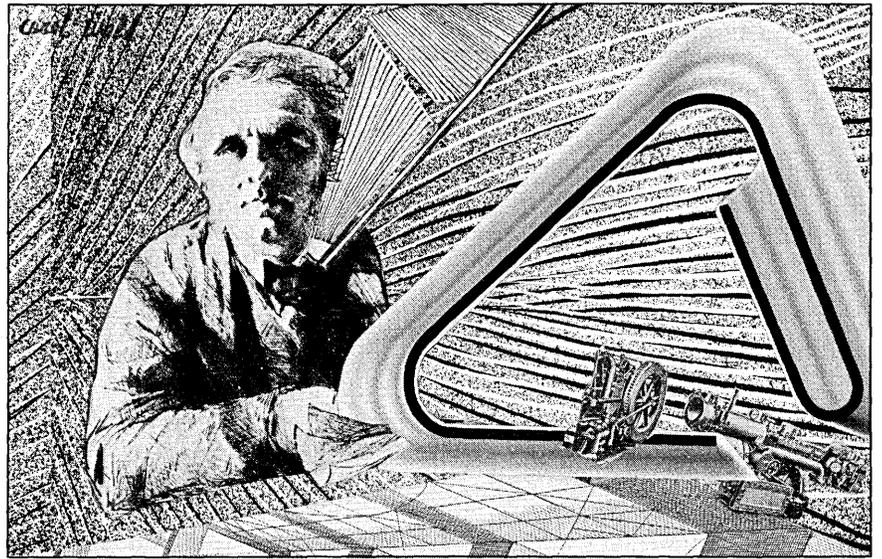
by Frank G. McAleese

Tinkerers have enjoyed a long tradition in America. In Ben Franklin's visionary experiments with turkeys and Leyden jars, in Edison's fiddling with the carbon transmitter (or his later ill-fated efforts to develop rubber latex from domestic weeds), we find all the elements we have come to extol in the experimenter: creativity, perseverance and pragmatic shrewdness. Frank G. McAleese exemplifies the tinkering breed. With the quixotic eccentricity of many earlier inventors, McAleese presents the complicated manufacture of a home laser as if it were nothing extraordinary when actually it requires a lot of time and careful calculations.

Ever since Heinrich Hertz started toying with Clerk Maxwell's electromagnetic theories, around 1886, there have been great advances in light wave theory. Einstein first postulated the likelihood of stimulated emission in 1917. Today, lasers are no longer the domain of high science. McAleese's handbook for the amateur laser experimenter effectively says: build your own. He supplies the diagrams, schematics, parts lists and instructions necessary for the construction of six varieties of lasers (two semiconductors, one Helium neon [HNE], two gas lasers, and one rubyrod). All you need do is buy the parts, clear off a work area and wear a pair of goggles. Or, as the dust-jacket enthusiastically exclaims, "If you'd like to successfully experiment with a modern and exciting technology, this book is for you." At least in theory.

McAleese's book might well be fun and interesting, but it's not all sweetness and light. There are plenty of mistakes. One only hopes he has been more accurate with his critical technical presentations than he was with other information. Charts have been reversed, incorrect addresses supplied, and a distressing number of editorial or typographical errors have remained. Ben Franklin would not have approved.

The inclusive nature of the theoretic-



cal introductory material tends to make it somewhat patronizing. It doesn't seem likely one would require all this theory to build a laser. Any reader technically capable of constructing a laser is not going to need a definition of valences or electrons. Unless the book is used as a text, the plodding theories are out of place.

But the image of the amateur technician puttering around with high voltage instruments in the basement is an appealing one. Cost need not be too high, and power modifications should be minimal. The proliferation of the laser into the American home should prove interesting. Home computers are becoming increasingly commonplace; home lasers are definitely *nouvelle vague*.

What would one use the laser for? Industrial and medical applications are not really feasible in the household. Few people find need to drill holes in diamonds or weld up damaged retinas. Practical applications such as communication, interferometry, long-range security systems, sighting and optical alignment are obvious. Because of the collimative accuracy of the laser, other uses should be considered. Esthetic demonstrations like the Photokina laser display in Cologne in 1976 or the more familiar La-

serium could be within everyone's grasp. Coherent beams of light could lace our skies. The merits of q-switching could be discussed in the corner tavern.

There are other less plausible applications. Death ray weaponry, for instance. Or holography, as a unique form of information storage. Lissajous figures and Lambdonas offer some fascinating possibilities. The LED injection pulsed laser detailed in *Laser Experimenter* has a monochrome beam with an adjustable pulse that can be "visualized" one-half mile away. This could be used, say, to frighten the neighbors. Even newer and more novel uses might be discovered by the intrepid laser experimenter. The future will move us away from the mundane science kit applications for lasers.

Then there's the popular Class IV CO₂ gas laser, which is recommended here for the advanced experimenter only, "because of its inherent power." Twelve thousand volts of direct current running through a set of automotive ignition cables in your basement is "inherent power." There should be enough crank in the CO₂ laser for the most fanatic and wild-eyed of tinkers. Preparing the gas alone would prove enough of a task for most mortals.

SOURCE DATA

The commonsensical mechanic shouldn't have any problem with safety. The Bureau of Radiological Health's Light Product section advises the use of warning indicator light (beams are not always visible) and avoidance of unnecessary contact with the beam (there might be diffusion or leakage). Accidents have occurred with the light generator by reflected radiation. Experimenters putting their arms across the beam have caught hazardous reflections from their wristwatches. However, there have been more injuries reported from the power source than from the laser.

Cost should be considered. In a moment of blithe inspiration, the author muses about the possibility of glassblowing your own spectrum tube, but is reluctantly forced to conclude that glassblowing is an art in its own right. So you have to buy one ready-made. An HNE gas laser spectrum tube LTO5R will run you \$125 FOB out of Pittsburgh. The S-G2000 (not S-6200, as McAleese has it) Series RCA gallium arsenide diodes necessary for the injection lasers come a little cheaper, selling from \$20 to \$30 apiece. A rubyrod pulsed laser does use a polished number 10 tin can as its reflector, but a 3" x 3/8" ruby should set you back around \$900. Utility bills might increase, but that shouldn't be a consideration for the laser experimenter. Would Firestone or A.G. Bell have worried about their fuel bills?

If this all seems like too much bother, or if you're frightened by any direct current voltage registering in five figures, there still remains a chance. If you still think you could develop that death ray, a commercial 0.8 mW HNE glass tube laser (ML-620) can be had for under \$200 from Metrologic Instruments, 143 Harding Ave., Bellmawr, N.J. 08031. Modifications would, of course, be your own, and would be subject to federal regulations. After a few months you should be able to move up to a high-powered laser of Promethean capabilities.

McAleese's book is a good introduction to the burgeoning field of laser and maser technology. Flaws aside, it reads like a comprehensive handbook. It takes some doing to even imagine constructing a general use gas laser in the garage, but stranger things do happen, and possibly, the flash of pulsing lasers will become a common sight in home workshops across the country. Tab Books, Blue Ridge Summit, Pa. (1979, 210pp., \$6.95).

—Lee Froehlich

BOOK BRIEFS

HOW TO COMPUTERIZE YOUR SMALL BUSINESS

by Jules A. Cohen with Catherine Scott McKinney

A "how to" guide, beginning with basic computer terminology, this book is written

in an easy-to-understand style for the person who has just realized his small business could indeed use computerization. Prentice-Hall, Inc. (1980, 171 pp., \$13.95).

FINANCIAL ANALYSIS USING CALCULATORS: TIME VALUE OF MONEY

by Elbert B. Greynolds, Jr., Julius S. Aronofsky, and Robert J. Frame

A highly technical discussion of financial analysis related to the time value of money. Textbook for economics students, and not of general interest, McGraw-Hill Books (1980, 472 pp. paperback, \$10.95).

THE REALITY OF NATIONAL COMPUTER NETWORKING FOR HIGHER EDUCATION

edited by James C. Emery

The third in a series, the book examines current computer networking in higher education and where the potential exists for progress. Includes proceedings from the 1978 EDUCOM Fall Conference. Westview Press, Boulder, CO 80301 (1979, 91pp., \$16).

REPORTS AND REFERENCES

TYMNET SUBSCRIBERS OFFER SERVICES

Tymnet, Inc., the public packet network, is offering a *Subscribers' Directory*. Over 200 data bases offered through the network are described, covering a variety of categories including medical, financial, commercial, and scientific information. Selected customer offerings of interactive computer-based services and software facilities available through TYMNET are also described. The 34-page directory is \$5. Tymnet, Inc., 20665 Valley Green Drive, Cupertino, CA 95014, (408) 446-7000.

4300 ANALYSIS

A 37-page report on the IBM 4300 series has been compiled for "data processing professionals in all segments of the industry." The report features partial listings of hardware and software prices, a general discussion of the 4300 series, a comparison between 370/138 and 4341 configurations, and discussions of hardware and software support. \$55. Applied Management Services, P.O. Box 350, Medford, NY 11763 (516) 654-5398.

SYSTEM SECURITY

A 116-page report entitled *Guide to Database Security with On-Line Systems* provides general information about data integrity and system security including suggestions for the implementation of protec-

tions. The report is intended to serve both dp and non-dp managers.

Concerns about computer-related crime, negligence, physical disasters, and privacy are all included in the opening overview's definition of security. The rest of the report focuses on techniques for strengthening system security without further distinction as to the nature of the protection intended. The next three chapters each address a physical aspect of a system—the terminal, the communications line, and the data base. Chapter four discusses administrative aspects of system security, recommending the assignment of a security officer. \$24.95—payment must accompany order. Infopac Associates, Inc., P.O. Box 591, Lynbrook, NY 11563.

BIBLIOGRAPHY

The 13th annual bibliography of computer oriented books is now available from the University of Colorado *Computing Newsletter*. The editor of the newsletter is impressed by the quality of books in the area of distributed systems and programming languages, noting the addition of the language C as well as four books on MUMPS, but dissatisfaction is seen in the management area, with only seven of the 18 news books on dp management called noteworthy. The bibliography is \$4, \$6 if an invoice is required. *Computing Newsletter*, Box 7345, Colorado Springs, CO 80933 (303) 593-3239.

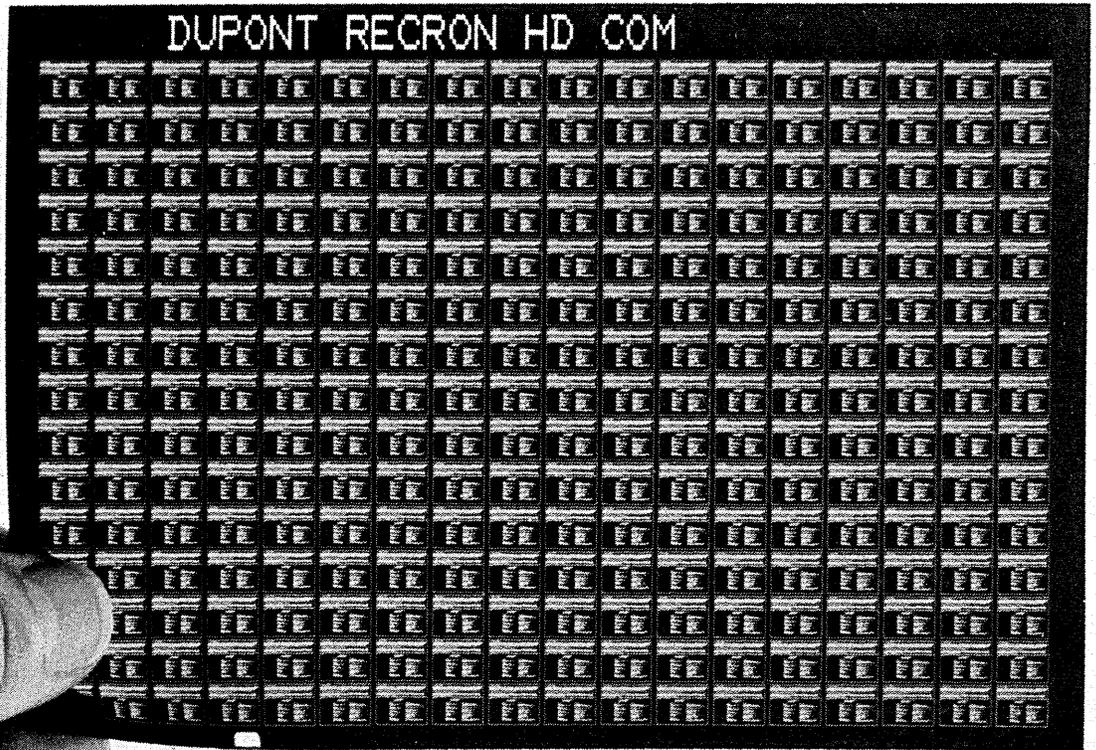
ELECTRONIC MAIL

A new 124-page report on electronic mail begins at the beginning with "What Is Electronic Mail"; it goes on to explain the ways an organization can use electronic mail and details the technology involved. The second section discusses system design, cost evaluation, security and privacy, compatibility, and how to design an electronic mail system suited to your organization. The chapter on designing a system covers survey techniques, transition strategies, and company organization. The final section of the report covers policy and regulation, vendors and potential vendors, and a prediction of how big the market will be. *Electronic Mail: User Alternatives in the 1980s* sells for \$250. Mackintosh Consultants, Inc., 2444 Moorpark Ave., Suite 211, San Jose, CA 95128 (408) 998-4312.

COMPUTER LAW

An extensive bibliography of articles about computer law has been compiled by the Center for Computer/Law, publishers of the *Computer/Law Journal*. References fall into the categories of system design, system procurement, government regulations, tort law, privacy, criminal law, constitutional law, evidence, procedure and discovery, corporate law, labor law, computer use in the legal profession, computer use in government, taxation, audits, computer use industry, jurimetrics, and international law.

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VENDOR LITERATURE

WINCHESTER DISKS

A four-page, photographically illustrated brochure presents this vendor's fixed media Winchester disk drives: Both the SA4000 series of 14.5MB and 29MB drives and the newer 8 inch SA1000 series are covered. Both families are discussed as upgrades for existing systems currently using floppy disks. Reliability is stressed; the brochure's concluding section entitled "We're headstrong about delivering quality products" discusses manufacturing and quality control. SHUGART, Sunnyvale, Calif.

FOR DATA CIRCLE 365 ON READER CARD

COM

An illustrated data sheet describes this vendor's System "715" computer output microfilmer. Font options, media compatibility (reel, cartridge, or fiche), and operator-selectable wet or dry processing are discussed. The data sheet also describes "the latest in COM technology" used in the "715." One full side of the data sheet is devoted to the characteristics of the "715,"

covering everything from character input and output rates, to fonts, to lenses, and finally power and operating requirements. 3M, Micrographic Products Div., St. Paul, Minn.

FOR DATA CIRCLE 366 ON READER CARD

SYSTEMS DEVELOPMENT METHODOLOGY

A four-color wall chart illustrates the system development life cycle from service request to postimplementation review. Shown as a 10-level pyramid, each separate phase is color coded for its primary audience: user, technical, and user & technical. Review, decision, and approval points are identified, as are the stages that should produce "fallout documents" that will be needed to develop user and operations guides. A scale to the left of the pyramid shows uncertainty decreasing as the project nears completion. (A similar scale shows how costs can be expected to increase as the project nears completion.) ATLANTIC SOFTWARE INC., Philadelphia, Pa.

FOR DATA CIRCLE 367 ON READER CARD

WORD PROCESSING

"Always Have the Last Word With AZ-TEXT Word Processing," describes this vendor's recently released word processing software for Eclipse data systems. The beautifully illustrated three-panel foldout

flyer addresses simplicity of operation, increased productivity of office staffs, and versatility. A postage-paid postcard is provided for those wishing further information or a demonstration. DATA GENERAL CORP., Westboro, Mass.

FOR DATA CIRCLE 362 ON READER CARD

TERMINAL ENHANCEMENT MICROCOMPUTERS

The Commander series of terminal enhancement computers is briefly described on a data sheet from the vendor. The data sheet proposes using Commander computers "to convert your simple terminal to a complete computer system." The hardware is described, as is the wide variety of available software, including a text editor, and a number of programming languages including assembler, PASCAL, COBOL, FORTRAN, and BASIC. Interfacing and I/O capabilities also are discussed. A brief table summarizes Commander configurations and common specs. COLUMBIA DATA PRODUCTS, INC., Computer Systems Div., Columbia, Md.

FOR DATA CIRCLE 360 ON READER CARD

VOICE CONTROL

Programming numerically controlled machines using this vendor's voice recognition equipment is explained in a 12-page, illustrated brochure. The technology of speech

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recognition is discussed, with a primary focus on the Voice Numerical Control (VNC) system. Training the voice recognition system to recognize the operator's voice also is covered. Benefits are listed, and several users explain increased accuracy, savings of both time and money, and simplicity of operation. The hardware is pictured, and descriptions are given of the major systems components. Software also is explained. The brochure concludes with comments on the company's commitment to its customers. THRESHOLD TECHNOLOGY INC., Delran, N.J.

FOR DATA CIRCLE 361 ON READER CARD

MAILING SYSTEM

The Speedifold System for large-volume (100,000 pieces or so) mailing of computer-generated correspondence is detailed in a four-color, six-page brochure. The presentation moves from the form to the machine and up to the system. Both form and machine specifications are provided. MOORE BUSINESS FORMS, INC., Glenview, Ill.

FOR DATA CIRCLE 363 ON READER CARD

COST ESTIMATING

A 16-page booklet from this vendor explains how its PRICE modeling software can provide "your window into cost estimating." The brochure introduces the three PRICE parametric cost predicting models:

PRICE, for electronic, mechanical, and electromechanical product development projects; PRICE L, for modeling life cycle costs; and PRICE S, for predicting the costs associated with developing software. Extensive use is made of graphics, block diagrams, and sample outputs. Potential customer benefits, support, reliability, and accuracy also are addressed. Customer satisfaction is covered, and a number of large companies using the software are identified. RCA PRICE SYSTEMS, Cherry Hill, N.J.

FOR DATA CIRCLE 364 ON READER CARD

PERIODICALS

USED GEAR

If the fast changing word processing equipment scene is keeping you from making an investment in a new machine, maybe older equipment is the interim answer. A free catalog of reconditioned wp equipment is available from this vendor, which guarantees the machines will qualify for standard IBM service agreements. A 15-day unconditional return option is also offered. IBM Mag Card, Memory 50 and 100, and MT/ST machines are offered as well as Xerox 800 dual card and dual tape machines. Word Processing Exchange, Inc., 117 N. First St., Ann Arbor, MI 48104 (800) 521-3085; in Michigan (800) 482-3651.

Dataserv has begun offering a free newsletter about their used IBM equipment. The newsletter, called *Overview*, points out that the "second market" for used IBM equipment chalks up at least \$1 billion a year. The first issue is mostly a price list, with some commentary about the vendor's view of market trends, with emphasis on supply and demand. Dataserve Equipment, Inc., 9901 Wayzata Blvd., P.O. Box 9488, Minneapolis, MN 55440 (612) 544-0335.

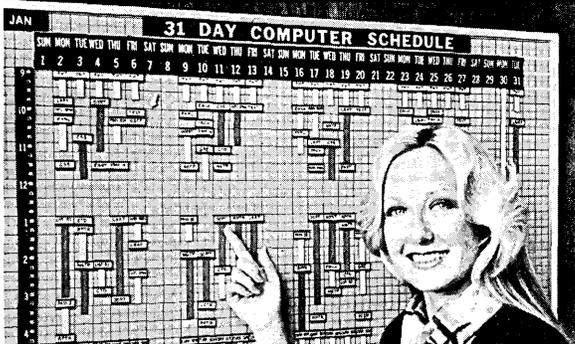
APL PUBLICATIONS

A marketing and consulting company specializing in APL is now offering a quarterly newsletter about APL techniques, services, application descriptions, and news. Subscriptions are \$6 a year, \$10 outside the U.S., Canada, and Mexico. *APL MARKET NEWSLETTER*, Southwater Corp., 2348 Whitney Ave., Mt. Carmel, CT 06518 (203) 288-0283.

CONSULTANT SOURCE

Computer Consultant is a newsletter published six times yearly listing consulting and related services. Consultants listed are all over the country, and represent a variety of specialties by which they are classified in the listing. The largest category in the second issue (Jan.-Feb.) is business applications, followed closely by systems

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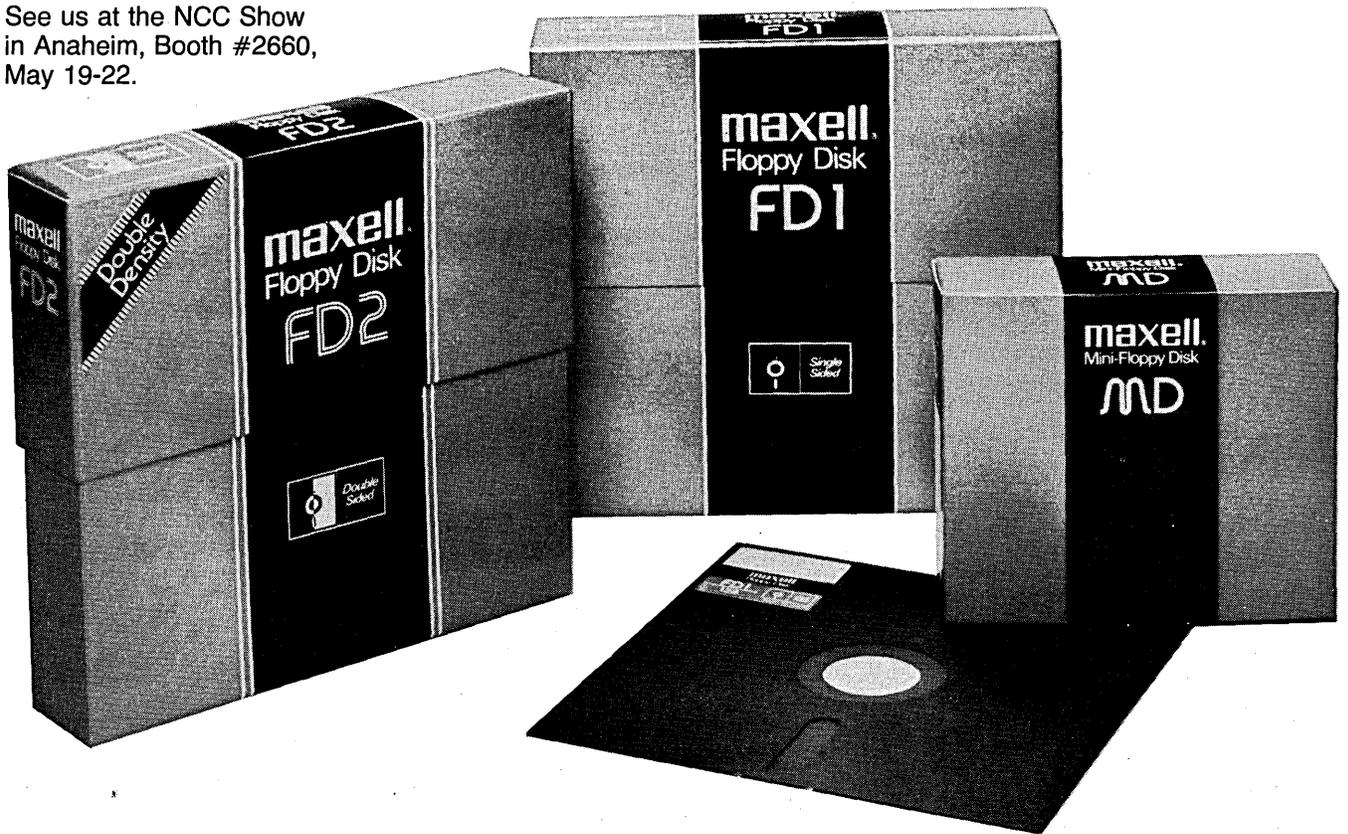
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SOURCE DATA

development. The editor discusses directly relevant tidbits such as tax information, reference to a small business lobby, and retirement and insurance plans available to consultants. Features and other items are being solicited. Yearly subscription rate, including one listing per issue, is \$18. *Computer Consultant*, P.O. Box 30214, Bethesda, MD 20014 (301) 770-2726.

INDUSTRIAL COMPUTING

North-Holland Publishing Co. has launched a new international journal focusing on practical information about automation in industrial applications. The first issue contains articles on computer-aided manufacturing, a general theory of the sequencing of processes, interpolation algorithms for numerical control, and an overview of computer-aided pc board design. The journal will address a wide variety of industrial uses of computing, and includes related international conference coverage. A free copy of the first issue is available from North-Holland/Elsevier, Attn. John Tagler, Journal Information Center, 52 Vanderbilt Ave., New York, NY 10017.

SOURCE SOURCE

TCA now publishes a glossy four-color monthly magazine about its product, *The Source*, a subscription data base for micro-computer users. The magazine, *Source-*

world, features articles, interviews, editorials, and news. A monthly department entitled *The Forum* solicits articles from readers. Forum contributions in the first issue include "Federal Information Management: Is There Any?" "The World Future Network," and "Concerns Within Change." \$2 per issue. Telecomputing Corporation of America, 1616 Anderson Rd., McLean, VA 22102 (703) 356-6790.

ON-LINE DATA BASE NEWSLETTER

IDP Report, which stands for *Information and Data Base Publishing Report*, will be published twice monthly. The first issue is eight pages and packed with news about commercial and experimental on-line information services.

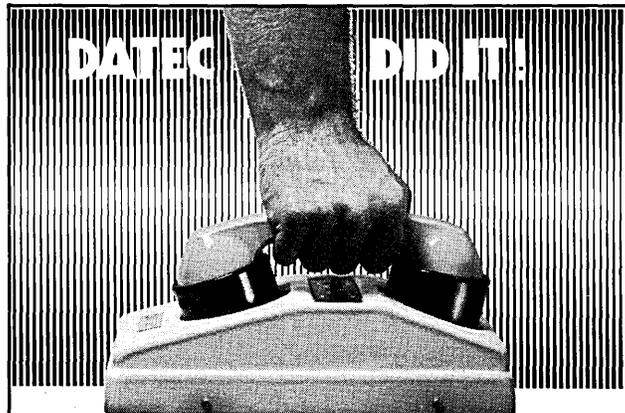
In Columbus, Ohio, a test of home delivery of information via telephone line is planned for this fall in a joint venture by OCLC Inc., a nonprofit corporation that operates a national library network, and Banc One, a bank holding corporation. The system will provide access to a new encyclopedia, bill paying, bill and banking information, a roster of community events and data, and the card catalog of a nearby public and college library.

Columbus is also the home of Qube, the experimental interactive cable tv system. A spokesman for OCLC points out that while only 15% of the population now have

cable, 97% have a telephone. He also points out, however, that tying up the phone to search a data base may be problematic for some.

McGraw-Hill Information Systems, the R&D arm of the publishing firm, reports the development of a new modem they hope to use to deliver the Dodge Report.

Transmission of 2,400 bits per second over telephone lines is being quoted by system consultant Paul Baran, which would mean an average Dodge report of 700 characters would take about three seconds to send. A small test has taken place but the system, it is stressed, is not yet ready for use. The first issue of *IDP Report* also contains reports on TCA's new home information retrieval service, *The Source*, which will be marketed through franchises for a \$100 hookup fee, plus \$15 per hour for prime time use or \$2.75 after 6 p.m. Also covered are plans for the Information Industry Assn.'s survey of the industry, French and British plans as discussed at a recent meeting of IVIPA (the International Videotex Information Providers Assn.), new legal and business indexes, a report on Xerox's acquisition of Kurzweil, and some short financial notes. The newsletter is \$195 per year, multicopy rates on request. Knowledge Industry Publications, Inc., 2 Corporate Park Dr., White Plains, NY 10604 (914) 694-8686. *



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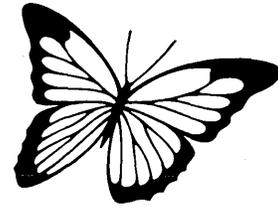
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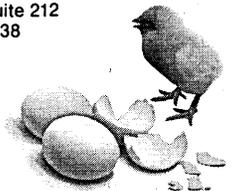
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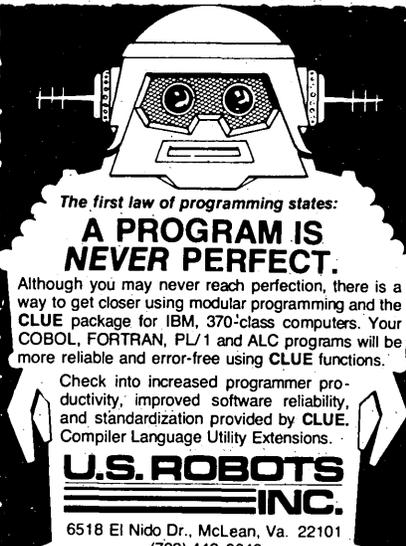
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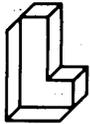
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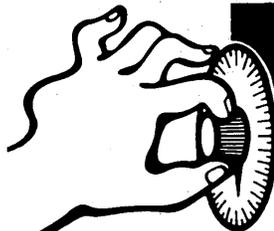
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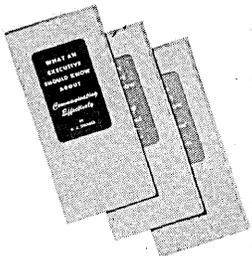
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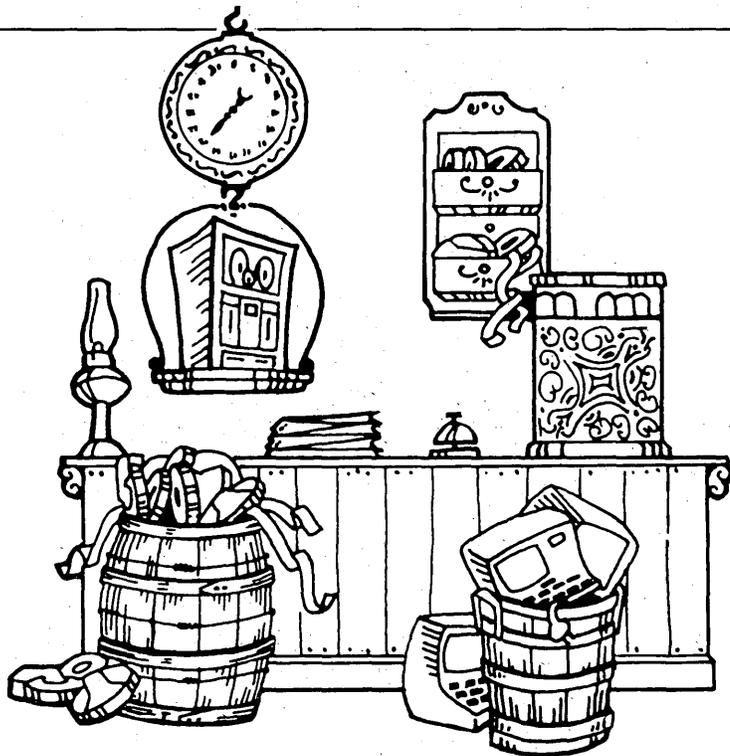
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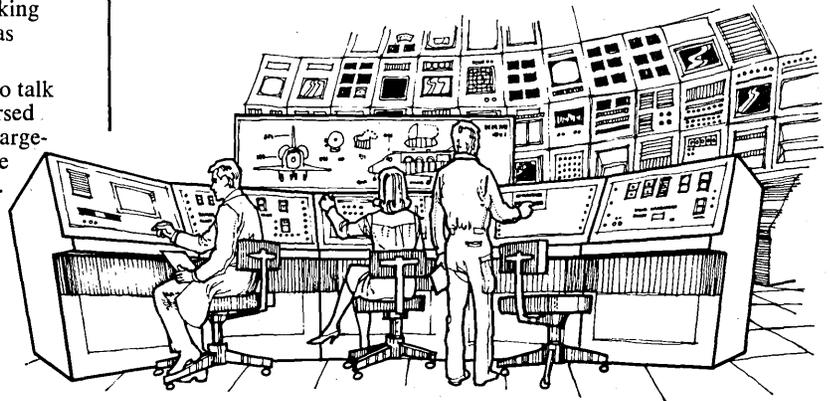
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READERS' FORUM

WHO BELIEVES IN TOP-DOWN DESIGN?

Top-down design is the Applehood and Mother Pie of software development, right? Hardly anyone takes issue with top-down. You start with the requirements, and you design constituent software elements downward, one hierarchical layer at a time.

Well, there is this fringe group—primarily data processing folk—who talk about data-structure-first design. But somehow, just like you know at the gut level that God and Allah and Buddha are all somehow the same, you also know that data structure is just another top-down approach, where the data structure is the top.

So who could possibly take issue with the rightness of top-down? Everybody.

When was the last time you designed a software system? Think back, now, whether it was last week or last decade. Did you design it all from scratch? If your answer is yes, you aren't thinking hard enough. Remember the library routines you used? The utilities? Did you SORT, or SQRT, or REPORT GENERATE, or RANDOM NUMBER GENERATE? Sure, you did. And did you design those elements from scratch? Not if your head was screwed on tight.

The fact of the matter is, you used—somewhere in your design, and often well up in the design structure—some reusable software modules such as common libraries and utilities.

But to the extent that we use preexisting design elements, that's bottom-up design. And we all do it.

Well, there's *one* example of how everybody takes issue with top-down design. Here's another.

Remember again your last design effort. Did you really calmly work your way down the structure one layer at a time? Or were you nervous about the feasibility of some component of the structure, and did you design *it* all the way to the bottom before proceeding with other branches?

Perhaps you were farsighted enough to see through the feasibility problem at a high level. But most of us, having more limited insight, need to work through the details to be sure that our overall design is on track. Software is a business of masses of detail, aggregated in a malleable structure. Somewhere in that detail there all too often lurks a design-wrecking constituent. It is an unusual programmer or a trivial program that is compatible with a top-down, straight-through design approach. Some designers refer to

this tendency as "iterative design." Others call it "ping-pong design." But whatever the name, it is *not* top-down design.

There, now, is my *second* example of how everybody takes issue with top-down design. Isn't this just a semantic game? Well, to some extent. The fact is, top-down is still viable. It's as good a "divide and conquer" approach as any. With today's ever-enlarging software applications, there has to be some way to break a huge design problem into manageable proportions. Top-down does that.

The problem is, there are literalists among us. Top-down means top-down, they say. None of those bottom-up modules. None of those feasibility studies. If the top minds of our theoretical computer science world say that top-down is best, then top-down it is. And out comes a standards manual requiring top-down design, with penalties for those who don't comply. We don't question, we just believe. Thou shalt top-down. The result is structured badness.

There's another reason for this semantic game. There is value in intellectual exercise. There is value in realizing that what we thought we believed in we apparently don't really believe in. There is value in being aware of times when our practice fails to match our preaching. And perhaps, just perhaps, it leads us to progress.

Acknowledging our true needs, can we define a new and better design approach?

—Robert L. Glass
Seattle, Washington

ONLY NONHUMAN

Those who believe that computers can be anything more than tools betray how little they understand the limits of computer power or value the creative aspect of human intelligence. Researchers who develop computer systems pretentiously called STUDENT, ROBOT, "General Problem Solver," "Logic Theorist," or "Knowledge Representation Language"; manufacturers who describe "intelligent terminals" or "subconscious error checking circuitry"; and textbook authors who discuss person-computer "dialog" or "malicious computer errors" deceive themselves and their audiences. Their casual choice of anthropomorphic terminology results in exaggerated impressions of what computers can be used for and fear about computers "taking over."

Scientists, science fact and fiction writers, and moviemakers often distort the capabilities of computers by presenting the impression of lifelike behavior. The public's response is increased apprehension about computer applications, resistance to technology in general, and anxiety which interferes with learning to use computers productively.

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FORUM

Paradoxically, concern about technological advances has often been coupled with the use of technology to simulate human functions. The robots of Karel Capek's play *R.U.R.*, the monster created by Dr. Frankenstein, and the computerlike villains in *Star Wars* generate tension because evil machines take on human forms. The earliest carvings of human figures, the 18th century clockwork-driven dolls that wrote or played music, and Walt Disney's audio-animatronic figures exemplify harmless, but scientifically useless, attempts at fabricating human qualities. Now researchers in artificial intelligence seek to model or replace human performance, but building computer programs that behave like humans only produces museum curiosities for the next century. Progress in developing effective tools depends on taking advantage of the unique features of computers: their extreme speed, ability to repeat operations precisely, capacity to store unlimited amounts of data, and distinctive input/output devices. Building computer systems that behave like people is as foolish as building planes that fly by flapping their wings. The sooner we get beyond this primitive human imitation stage by distinguishing between the basic design principles of computers and the abilities of humans, the sooner we will produce dramatic applications which serve rather than mimic people.

The distorted vision of computers is often accompanied by a distorted vision of human abilities. The behaviorist model in psychology, which deals only with objective measurable physiologic effects, has fostered a machinelike model of human behavior. Some misdirected researchers have been led to conclude that people and machines are so similar that with a few years' effort, they should be able to produce machines that are superior to people. This naive view is useless as a goal and harmful in distorting people's expectations of themselves and of how they will use computers.

Office workers will use word processing computers to become more productive. Students will use computers to do intellectually challenging homework and creative research. Doctors will use computers to retrieve patient histories or choose lab tests and diagnoses. Use of computers will make possible fuel efficient, safer automobiles, planes, and homes. Communication will be made easier by electronic mail, teleconferencing, electronic banking, and eventually electronic newspapers and libraries. These high technology applications have the potential to bring computer resources to the masses and neutralize the advantages that big business and government have had till now. The democratization of technology is generally beneficial, but extreme care must be taken with computer systems to ensure privacy, guarantee access to people at all levels of society, maintain high reliability, and explicitly assign responsibility for failures. Life-critical applications such as intensive care units, air traffic control, and nuclear reactor monitoring require high dependability and force designers to recognize when decision-making can be automated and when human intervention is necessary.

Though it is useful to know which tasks can be performed by machines, we must place greater value on those which cannot. Only people can be empathic, sympathetic, and emotive. Condolence cards sent by a computer are worse than worthless and tears of joy cannot be coded into binary digits. Relationships, shared experiences, and trust are possible only among people. Computerized bank machines that simulate an excessively friendly teller's greeting only make users wonder how else the bank is trying to deceive them. Learning and creativity are such basic human qualities that, like sexuality, they are definable only from a human perspective.

Fifty years from now, we will look back on the early days of computing as a quaint era when some people believed that computers would compete with human intelligence. By that time, anger over wasteful expenditures for fantasies of artificial humans will be replaced by amusing remembrances of the days when computers were thought to be more than ordinary tools. The recognition that computers have no more intelligence than a wooden pencil will be accompanied by the expanded appreciation that, for better or worse, people control their own destinies.

—Ben Shneiderman
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● FAST ANALYSIS OF TAPE SURFACES DETAIL REPORT -- FATS VER 4.0 Z							
● MESSAGE	ID	UCB	LABEL	LOCATION	LENGTH	RETRIES	ACTION
● FATS204	TAPE2	281	987654	1607 FT	4 IN	10	PERM DATA CHECK
● FATS204	TAPE2	281	987654	1607 FT	8 IN	10	PERM DATA CHECK
● FATS204	TAPE2	281	987654	1608 FT	13 IN	10	PERM DATA CHECK
● FATS204	TAPE2	281	987654	1608 FT	17 IN	10	PERM DATA CHECK
● FATS204	TAPE2	281	987654	1608 FT	21 IN	10	PERM DATA CHECK
● FATS204	TAPE2	281	987654	1609 FT	26 IN	10	PERM DATA CHECK
● FATS204	TAPE2	281	987654	1609 FT	30 IN	10	PERM DATA CHECK
● FATS204	TAPE2	281	987654	1609 FT	34 IN	10	PERM DATA CHECK
● FATS204	TAPE2	281	987654	1610 FT	39 IN	10	PERM DATA CHECK
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The length of these bad spots would cause unrecoverable data checks and I/O errors during processing.

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FORUM

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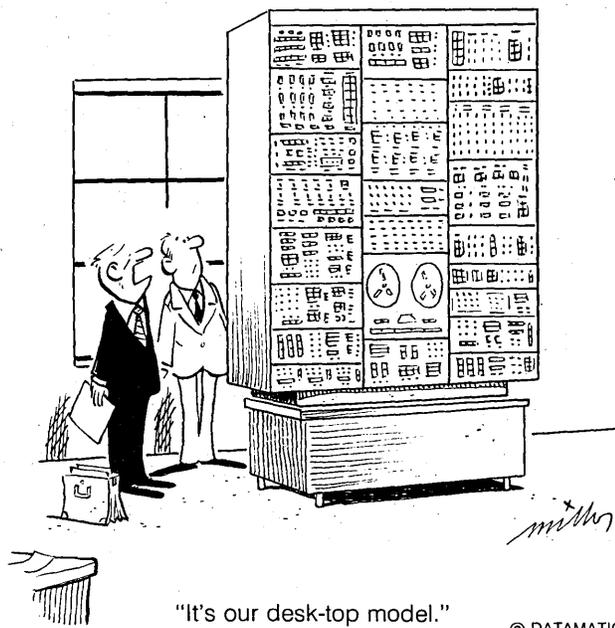
Strange things are done to be number one
In selling the computer.
IBM has their stratagem
Which steadily grows acuter,
And Honeywell competes like Hell,
But the story's missing link
Is the system old at Stonehenge sold
By the firm of Druids, Inc.

The Druids were Entrepreneurs,
And they built a granite box
That tracked the moons, warned of monsoons,
And forecast equinox.
Their price was right, their future bright,
The prototype was sold;
From Stonehenge site their bits and byte
Would ship for Celtic gold.

The movers came to crate the frame;
It weighed a million ton!
The traffic folk thought it a joke
(The wagon wheels just spun);
"They'll nay sell that," the foreman spat,
"Just leave the wild weeds grow;
"It's Druid-kind, over-designed,
"And belly up they'll go."

The man spoke true, and thus to you
A warning from the ages:
Your stock will slip if you can't ship
What's in your brochure's pages.
See if it sells without the bells
And strings that ring and quiver;
Druid repute went down the chute
Because they couldn't deliver.

—Edward G. McManus
Marlborough, Massachusetts



CARTOON BY WALT MILLER

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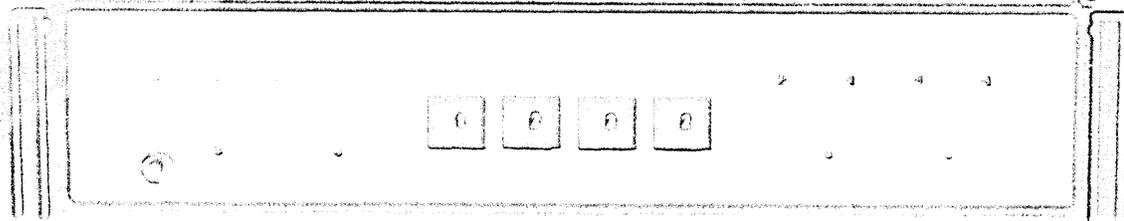
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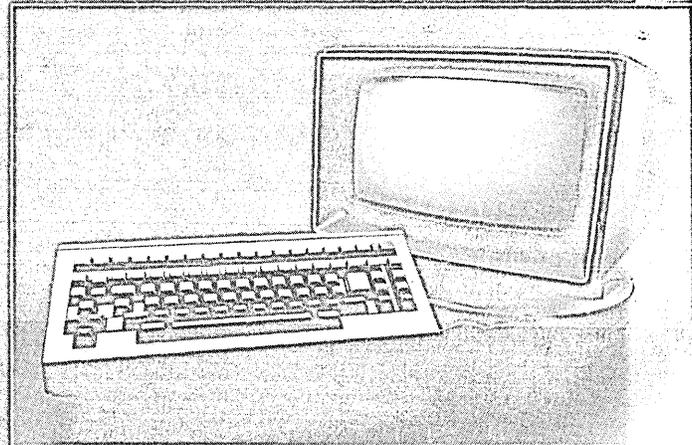
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