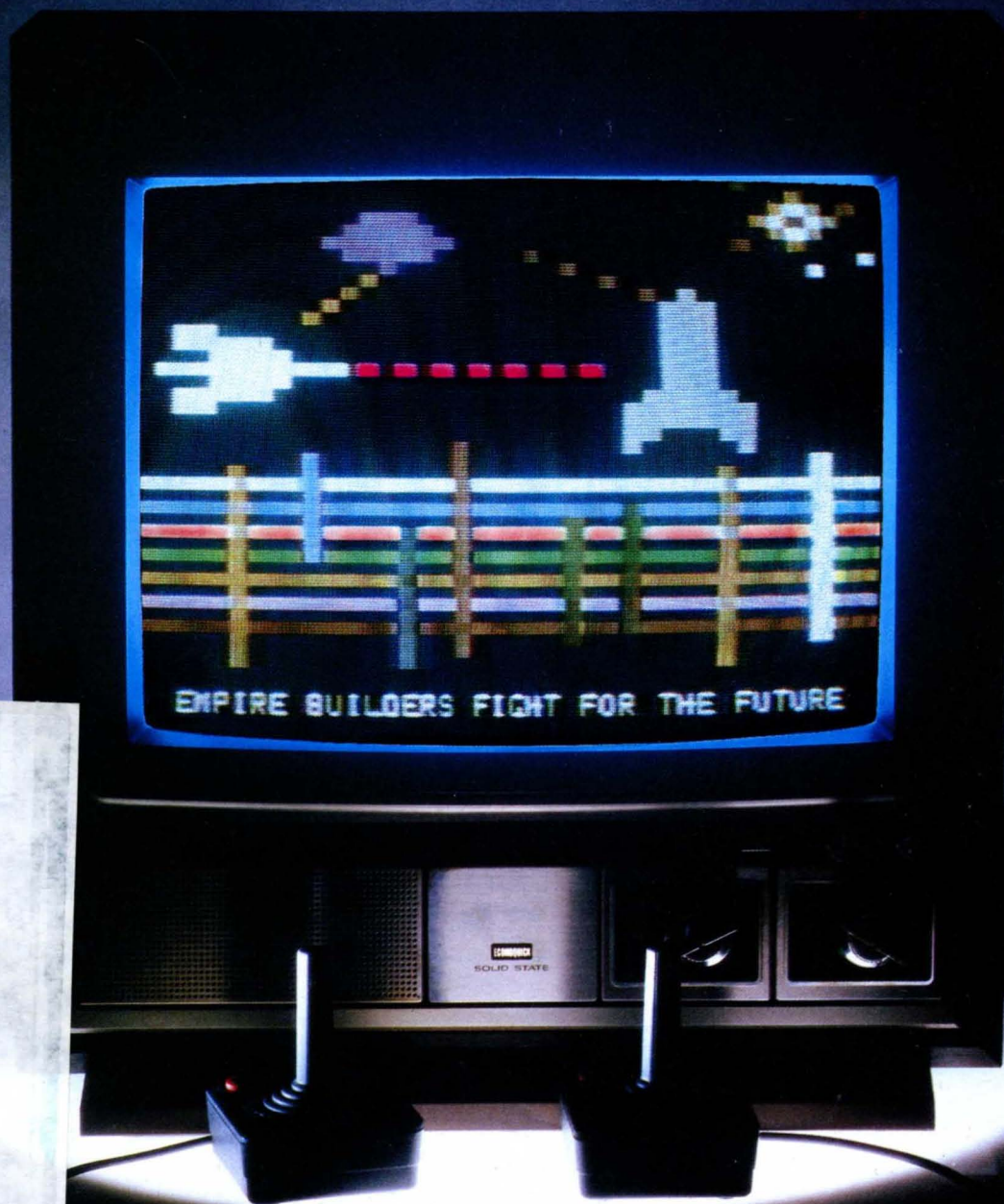


BATTLE OF THE NETWORKERS

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THE CARE AND FEEDING OF USERS



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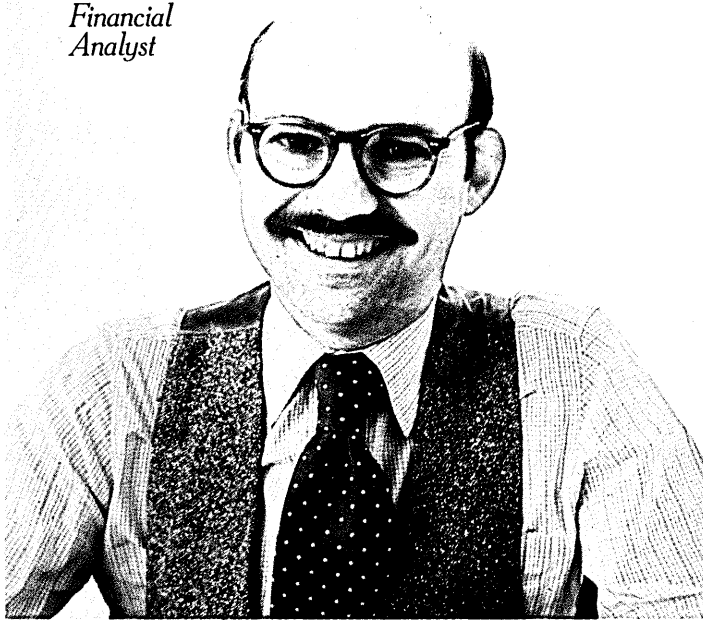
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V.P., Human Resources



Financial Analyst



Plant Manager

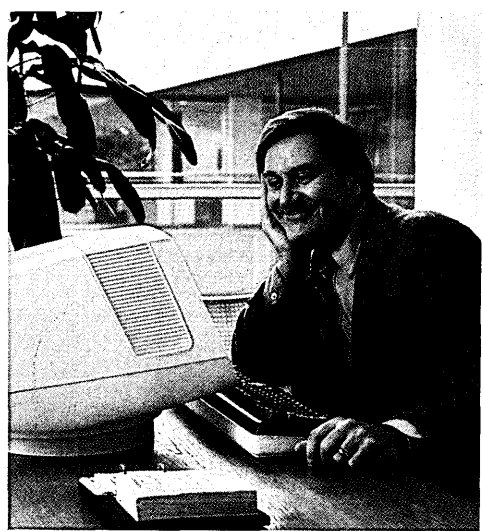
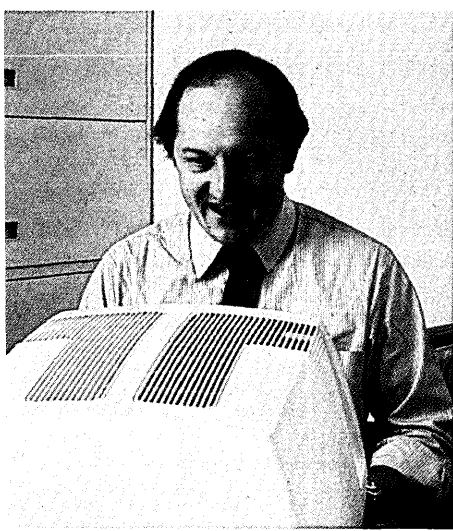


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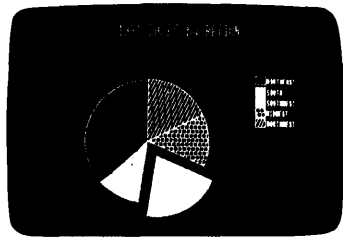


Manager, Information Services





DG/DBMS database. The PRESENT software facility has relational-like capabilities that let users select, project and join information in databases to perform queries not considered when the database was initially designed. It provides the user with computing, interactive query, report writing and comprehensive office graphics capability.



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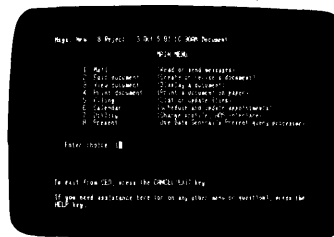
CEO also offers an exclusive "Interrupt" feature that lets users put a given job on hold, attend to something else and then return to it without disruption. There's a "Help" button to provide users with simple operating assistance when needed. CEO may be customized to fit the existing structures and practices of your company—by individual, department, or the entire organization. And CEO has ample provisions for system security, allowing you to restrict access to the system to those whom you designate.

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If you're interested in more information on office automation, we'd be happy to supply you with further details. Just write to "CEO"3, Data General Corporation, 4400 Computer Drive, Westboro, Massachusetts 01580.

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CIRCLE 1 ON READER CARD



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CEO ELECTRONIC MAIL lets users create and distribute messages locally or remotely. Users can identify themselves by name, title, or any alias chosen. "Memorial" aliases are maintained to identify employees who are no longer on the system. And "E" mail includes features like certification that mail has been received by the intended party and provisions for urgency through a blinker on the display message counter.

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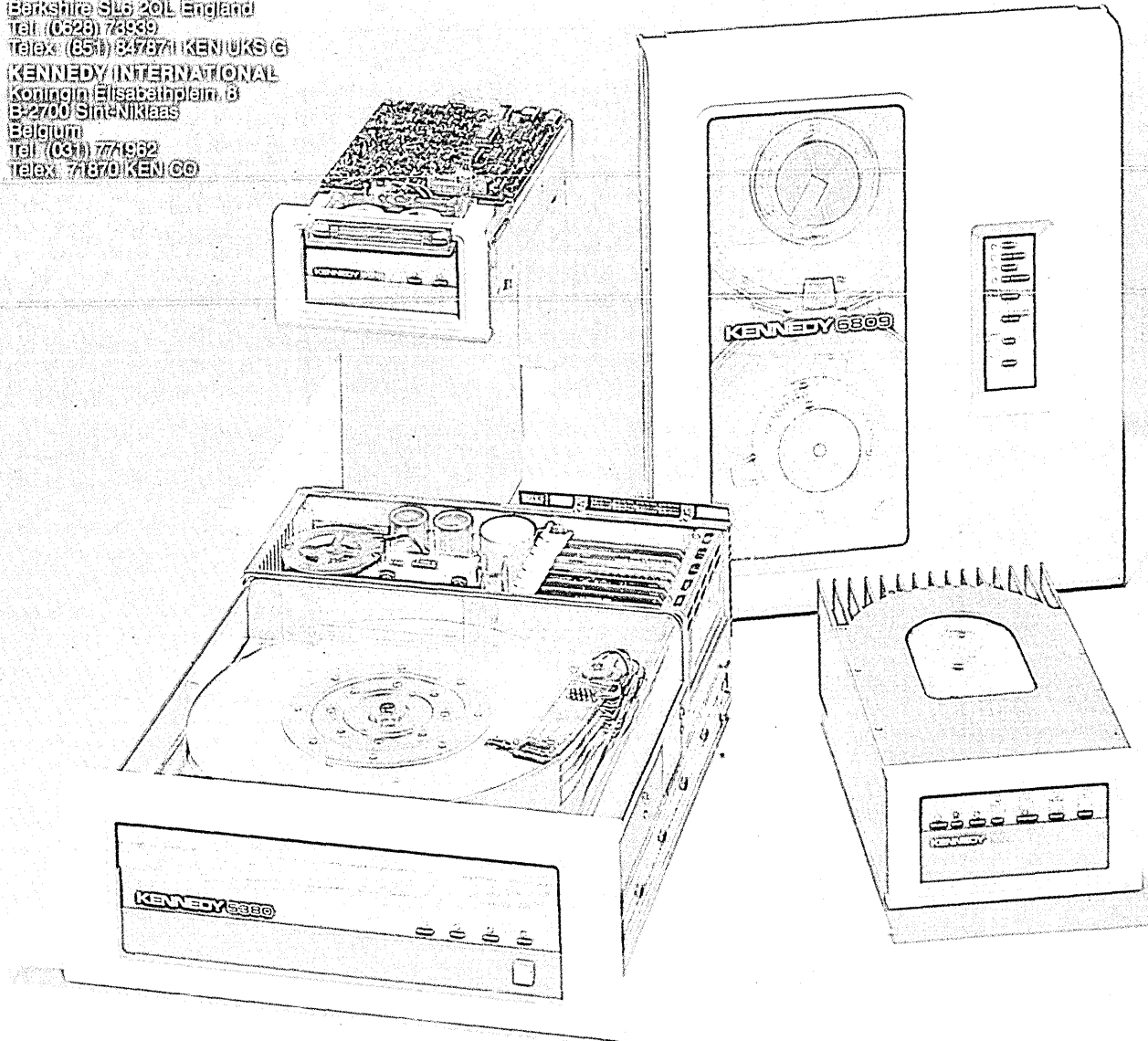
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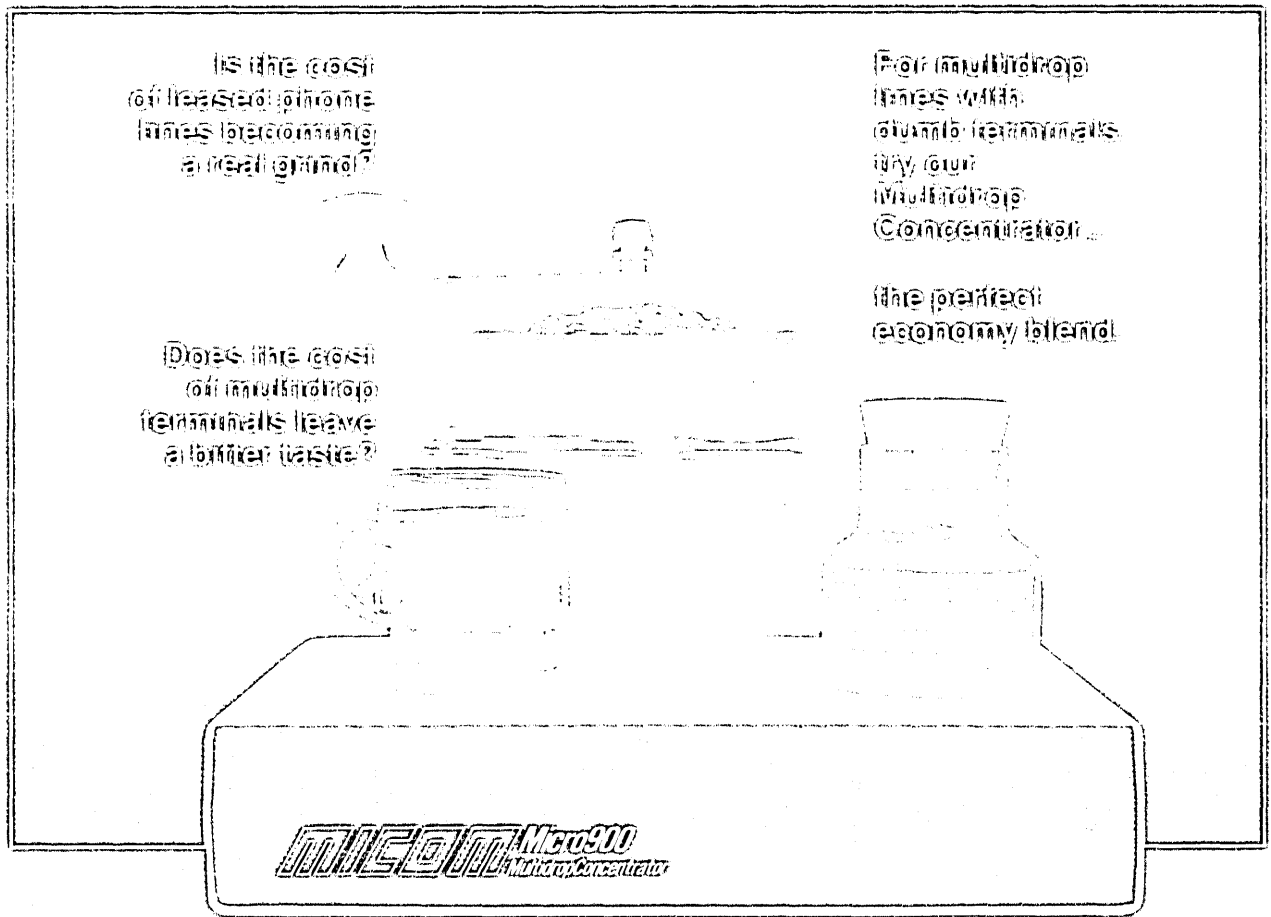
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VOLUME 28 NUMBER 3
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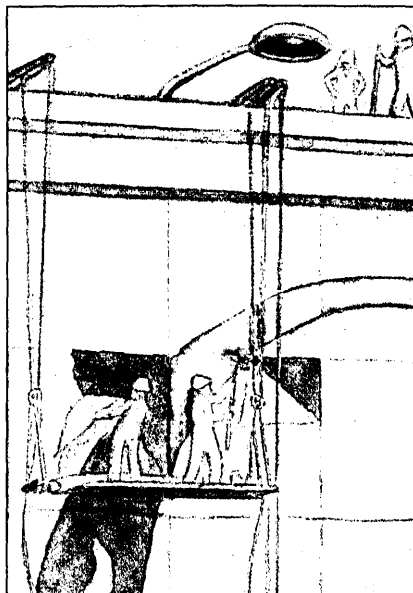


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COVER PHOTOGRAPH BY STEVE COOPER
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EDITORIAL OFFICES

Headquarters: 666 Fifth Ave., New York, NY 10103. Phone (212) 489-2588. **New England:** 1 Chaucer St., RFD 2, Sandwich, MA 02563, (617) 888-6312. **Midwestern:** 3607 Garfield Ave. S., Minneapolis, MN 55409, (612) 827-4664. **Western:** 1801 S. La Cienega Blvd., Los Angeles, CA 90035, (213) 559-5111; 2680 Bayshore Frontage Rd., Suite 401, Mountain View, CA 94043, (415) 965-8222. **International:** 6605 Burlington Pl., Springfield, VA 22152, (703) 569-3383. **European:** 221 Blvd. Raspail, 75014 Paris, France, (331) 322-7956. **New York, N.Y. TELEX 640-229.**

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Circulation Manager Joseph J. Zaccaria
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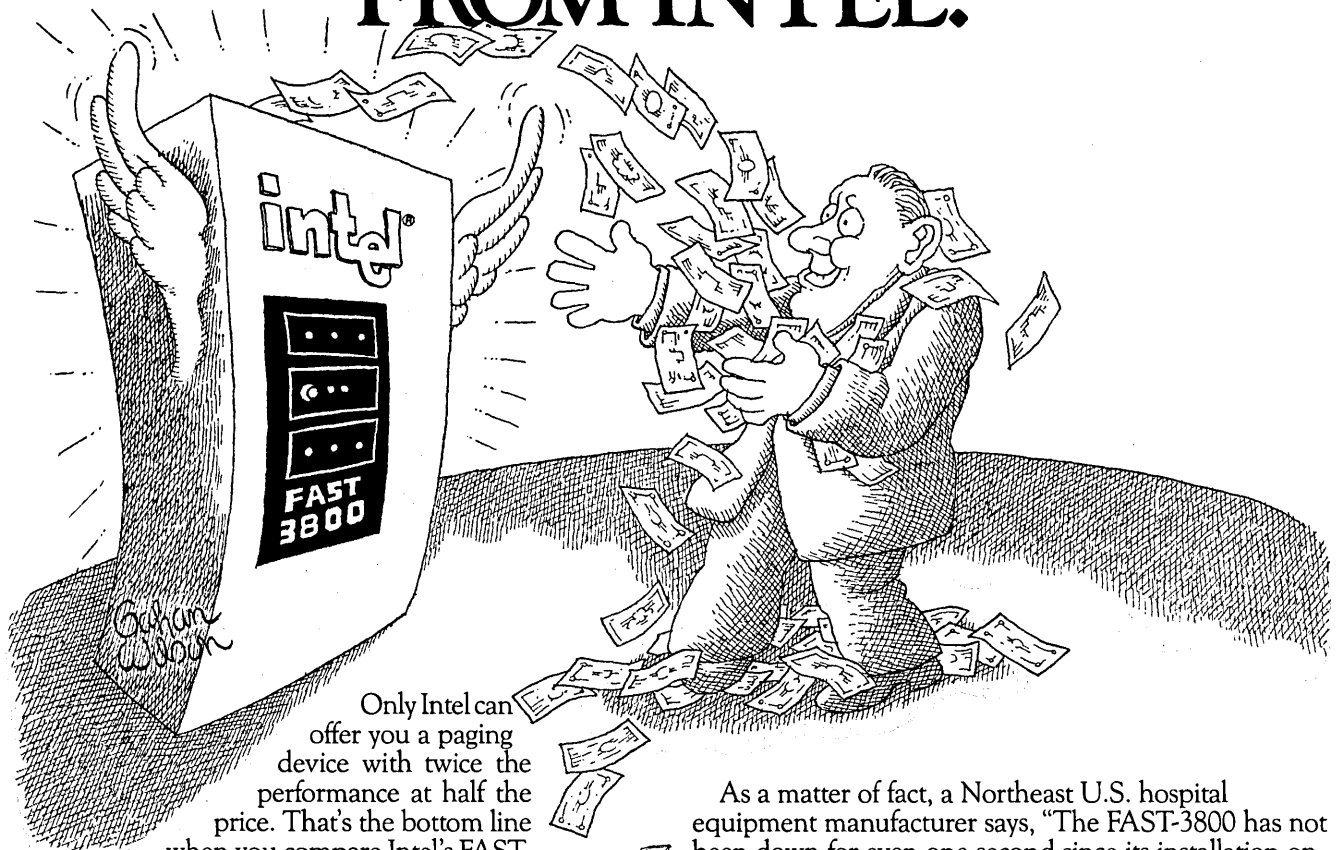
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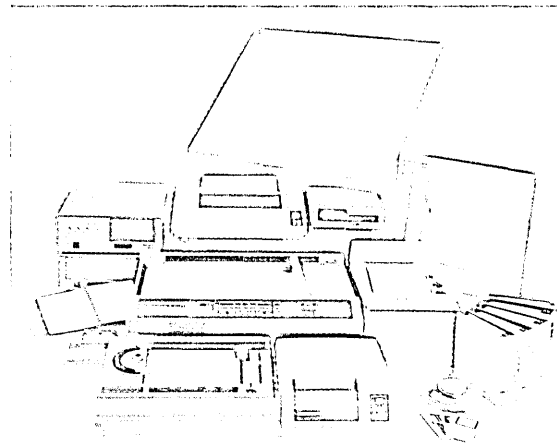
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CIRCLE 10 ON READER CARD

8 DATAMATION

Twenty Years Ago/Ten Years Ago

LOOKING BACK

YOUNG DATACOM

March 1962: In the beginning, or at least by 1962, there was DDT—alphabet soup for digital data transmission, not bug spray. Justin Perlman, former secretary of the Data Transmission Study Group, said “. . . the time to guide growth toward desired ends is early; and in DDT, that time is now.” His article, “A Survey of Needs and User Requirements in Data Communication,” contained a brief summary of user needs, a general description of how users could fulfill those needs, and a detailed list of user options.

First, and most obviously, the DDT equipment had to meet the specific need at the time of installation, plus be flexible enough (either in itself or by modification) to accommodate the users' changing needs over a “reasonable” period of time. Each user, of course, was entitled to a different definition of “reasonable.” The DDT equipment also had to be capable of accepting data in the format and coding it was transmitted in, and of delivering it to the receiving point in the same form or another desired configuration. The user should not have to make modifications or design special “marriage-box” gear in order to feed data into his new DDT equipment.

Some other basics listed were a minimum need for human attendance and maintenance, error detection and correction capabilities suited to the usage, minimum transmission link bandwidth, and economic utilization of the link.

These requirements were considered vital to the success of a company's new datacom efforts. Perlman also mentioned an area that would not be of particular concern to industry users. Transmission security, he figured, was important in many military endeavors but was not likely to matter much in typical civilian applications.

MISERIES, MAJOR AND MINOR

March 1972: Year after year, data processing industry members grumbled about sev-

eral major problems that continued to plague them. The problems were always the same, but the order of importance depended on who was doing the complaining.

Fred Gruenberger decided this confusion had existed long enough. Armed with advice and opinions from numerous gripe artists, he compiled a list of the top 10 bones of contention. Here are some highlights from his article, “Problems and Priorities.”

First, and least important, was the idea of industrywide standards. A couple of key phrases: “Everyone seems to follow the same old reasoning—let's standardize my way.” “Far more energy is burned up in standards work than the results seem to warrant.” A suggestion from Bob Bemer was to simply “register” all standards, and let vendors announce which of the many standards they would be using.

Choice of language, and schools and curriculum were also examples of dp topics that received more debate than they merited. However, the specific area of business dp training (business dp accounted for approximately 70% of the available machines, money, and people in 1972) required serious thought. According to Gruenberger, most programming managers repeatedly asked for well-educated MBAs, not the computing science majors they so often received.

“What should we compute?” was also a pressing topic. The two facets of this problem: does the dper's “daily work appear to him as socially acceptable?” and “what sort of problem constitutes intelligent use of a computer?”

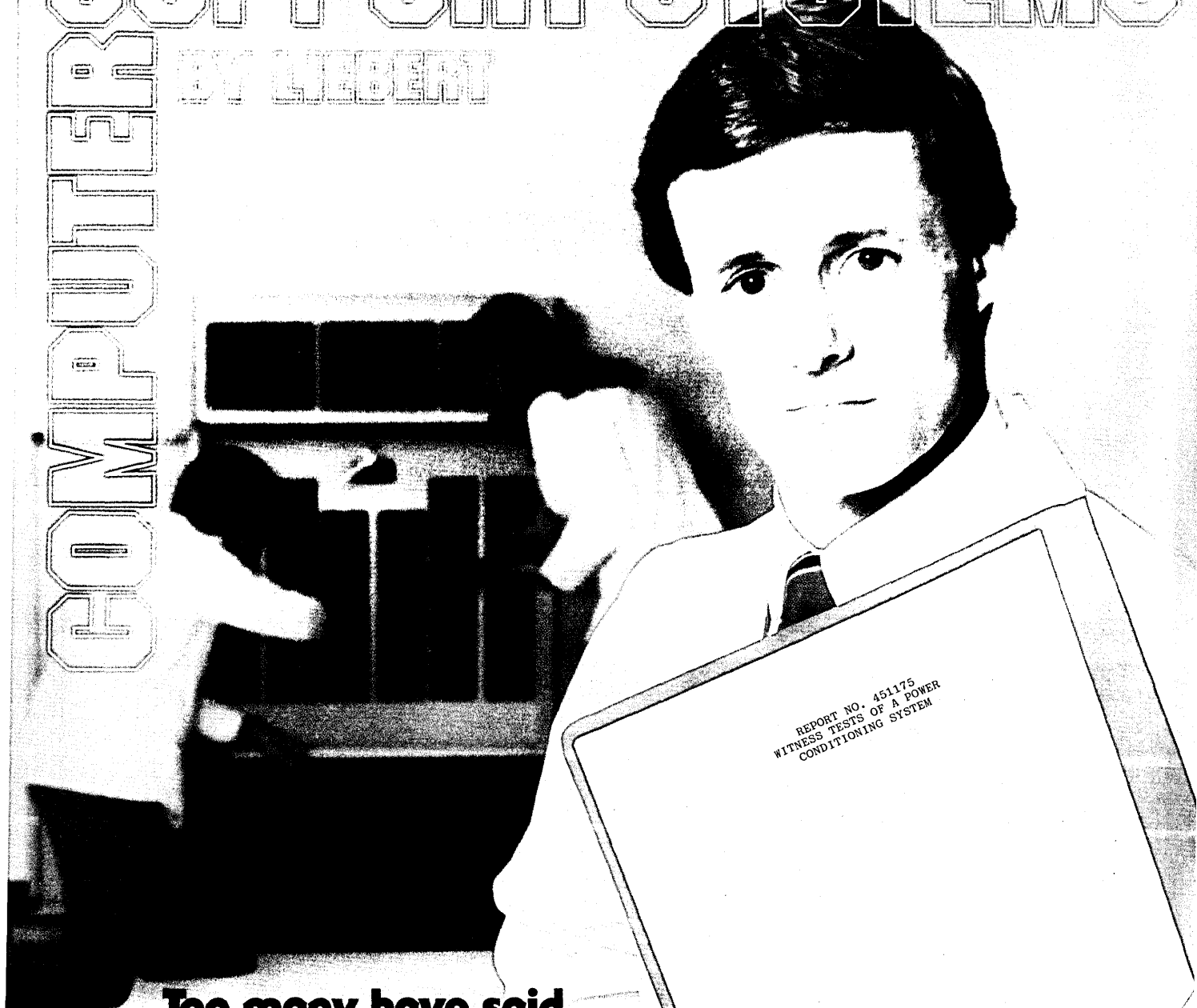
Gruenberger's choices for the top two dp problems were an interesting duo. The runner-up was the image of the data processing industry, which he describes as “tarnished,” and the winner was IBM. The fact that one company could dominate such a large industry, Gruenberger said, did not enhance that image at all.

—Deborah Sojka

SUPPORT SYSTEMS

BY LIEBERT

COMPUTER



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CIRCLE 11 ON READER CARD

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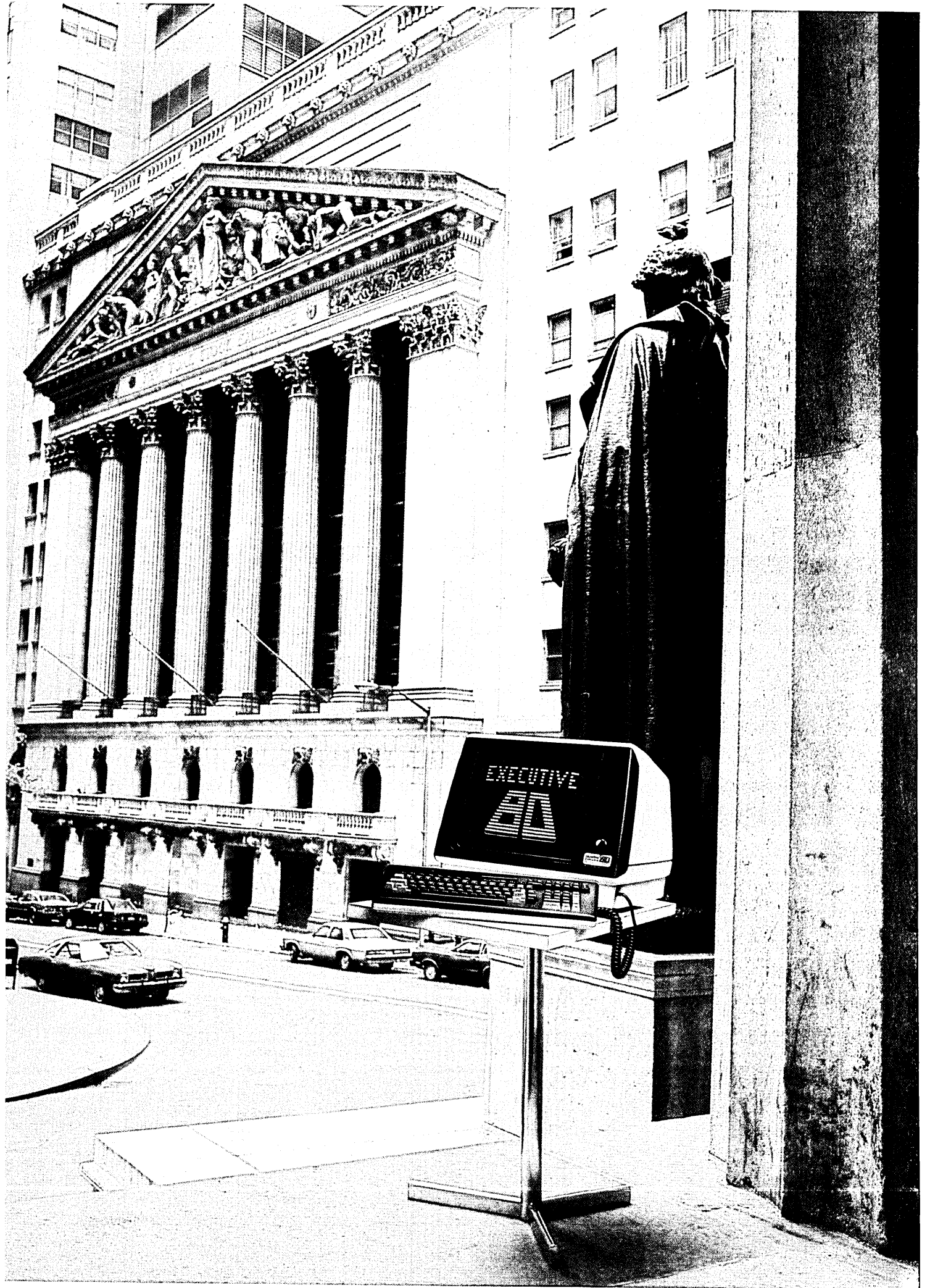
Company: _____

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City: _____ State: _____ Zip: _____

Have a salesman call

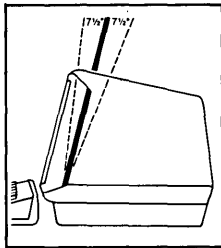
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What are the costs of owning and operating a display terminal? Certainly purchase price is one of them but perhaps not the most significant. There are also annual operator costs which can be ten to fifteen times higher than the purchase price. Then there is maintenance expense which, over the typical lifespan of EDP equipment, is often equal to the purchase price. And finally, there is downtime expense which is admittedly difficult to estimate but which could prove to be the biggest cost of all. As an experienced businessman, you know your terminal investment has to be weighed against all these classes of expense. And when you consider all these expenses, you'll find that the Hazeltine Executive 80™ is one of your best investment opportunities.

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Because the Executive 80 is based on powerful 8088 microprocessor technology, a variety of operating modes can be selected to match the type of

work. And there are as many as sixteen programmable function keys which can reduce laborious keyboard routines to a single keystroke. With all these features, we believe the Executive 80 can achieve higher throughput — and therefore lower costs — than any other terminal on the market.

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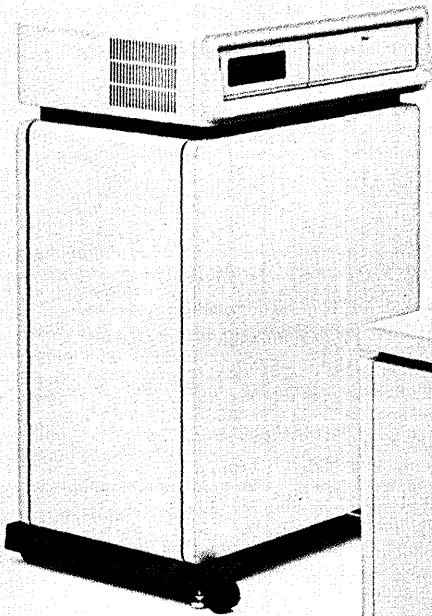
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The HP3000 Series 40SX.

Now, for little more than half of what you'd expect to pay for a high-powered business computer, you can get the new HP 3000 Series 40SX from Hewlett-Packard.

Consider the advantages:

- power to accommodate users at up to 56 terminals, each doing everything from word processing to data entry to business graphics.
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- easy-to-use features that will make your users feel comfortable after just a few hours training.

But the Series 40SX doesn't stop there. As a compatible member of the HP 3000 family, it has all the features managers need to help them do their jobs better. Need yesterday's sales figures right away? That's the job of our award-winning data base manage-

ment system. How about getting critical information from computers in other locations? No problem with the 3000's advanced communications links. Even if the other computer is your IBM mainframe.

Less in. More out.

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For more information, send for our new brochure on the HP 3000 Family. Write Hewlett-Packard, Attn: Bob Bond, Dept. 04123, 11000 Wolfe Rd., Cupertino, CA 94015. Or if you'd like to see our systems in action, call 800-227-9750 (in California call 415-857-7257) for the date and location of the Productivity '82 Seminar coming to your area.



Included for \$46K is a system processor with 256 Kb memory, 4 terminal ports, the HP 2382 terminal and 27 Mb disc storage with cartridge tape backup.

47205

CIRCLE 13 ON READER CARD

LOOK AHEAD

INTEL READIES HARDWARE DBMS

Ever since Intel bought MRI Systems of Austin, reports have pointed to a hardware database product. That product, designed to appeal to oems and systems houses, is on its way in the form of a unit which will sell for under \$20,000, according to those who have seen it. While not a true associative processor, the Intel box is expected to speed up file searches by improving the indexing portion of database management. A formal introduction from Intel's Commercial Systems Operation is expected in time for NCC.

INCH-WORM TO SURFACE

New products out of Xerox's Office Systems operation are expected in the near future. Included will be what has been nicknamed Inch-worm, a low-end personal computer designed to complement the model 820 introduced last spring; software development tools, such as the Cusp and Mesa languages, for the Star workstation; and enhancements to the Memorywriter electronic typewriters. Xerox plans to sink \$600 million into R&D this year, much of it going into the fledgling office systems effort.

IBM MOVES IN ON SERVICE BUREAUS

We hear IBM is lining up established service bureau companies such as Comshare to sell hardware systems to on an oem basis. The machines would be used as intelligent terminals to tie into the service bureaus mainframe. Who knows -- maybe in the future they'll tie into IBM's Information Network.

AETNA'S OWN CASUALTY

Aetna Life & Casualty made big headlines last year when it decided to pick IBM's Series/1 as the machine it would package and sell to its independent agents. Sources close to the software development effort say the machines are "locking up" under stress. It's due, sources claim, to the uncommercial nature of the EDX operating system Aetna chose: much of its facilities have been "shoe-horned in" and aren't viable in a commercial, transaction processing environment. The problems have been severe enough for Aetna's marketing effort to be hindered. It has to spend too much time fixing EDX problems in the field, say sources. And, because the software has been developed using a Series/1-specific language, it looks as if Aetna will have to stick with the machines it chose.

DEC PRODUCTS TO DEBUT

Many new products are expected from DEC this year, including a board version of the 32-bit VAX machine, fail-safe versions of VAX and perhaps the PDP-11, and a 16-bit personal computer aimed at IBM's product.

LOOK AHEAD

CITIBANK'S EASY WITHDRAWAL

Citibank is experiencing some "serious rip-offs" at its automated teller machines, an inside source says. But the big bank doesn't want to report the crimes because of bad publicity and the fear that regulations might be passed to restrict ATM use.

In an unrelated matter, we hear Citibank is about to award a "big contract" to Datapoint for local networking needs throughout its banking system.

DIGITAL RESEARCH RUMORS

Could Digital Research, the Pacific Grove, Calif., developer of the CP/M operating system, be thinking of getting into hardware? Its recently expanded headquarters facility includes 7,000 sq. ft. of "manufacturing space" and the company is close-mouthed about what it's going to do with this. There's some talk about "nodes for a network." On the software side, the company is readying for introduction a multifunction version of CP/M called Concurrent CP/M.

IT'S CAD/CAM FOR CDC

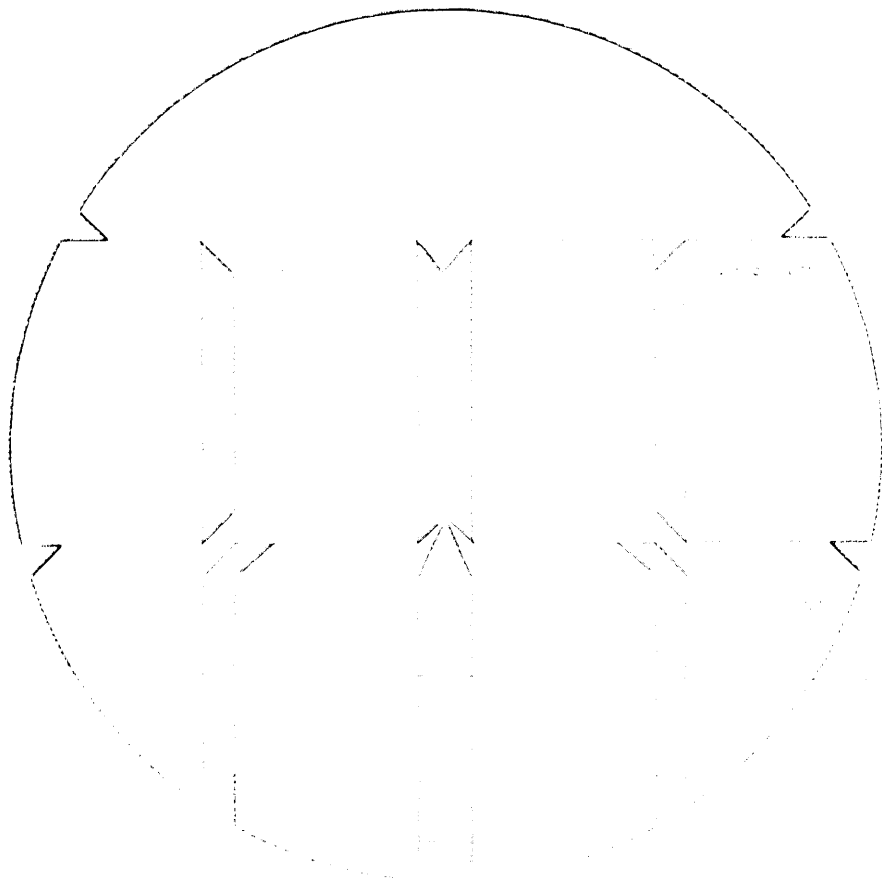
Control Data is making "a bigger investment in CAD/CAM than in any other application area," a CDC source confides. The company has made headway in developing an integrated approach that will take a user from the design stage through modeling and analysis to numerical control output -- all using a common database. Plans are to double its CAD/CAM business by year-end, says the CDC source. One strategy calls for introducing a smaller, turnkey CAD/CAM system, but there's no word on when.

THE COURTING OF SOFTWARE FIRMS

More and more hardware vendors are courting software companies with an eye towards joint marketing arrangements. David R. Black & Associates, a Pittsburgh, Pa., software house, has long had such an arrangement with Prime Computer; now it says it's being wooed by Honeywell. And Tektronix is said to be considering setting up a group of joint marketers to enhance its software offerings.

RUMORS AND RAW RANDOM DATA

Hustling to get business software on its 110, CDC is working with Open Systems, a Minneapolis-based software house that did several of the programs for the Cado CAT....Capex Corp., the Phoenix-based software house, is readying an educational barrage to bring customers and prospects up to speed on what the Economic Recovery Act of 1981 can mean for software purchases and tax credits.... Local service bureaus will be springing up everywhere, predicts Info-dyne Inc., a Minneapolis market research firm, which expects a number of new local on-line/timeshare service bureaus created to serve only those users in its local operating telephone company area....



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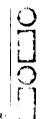
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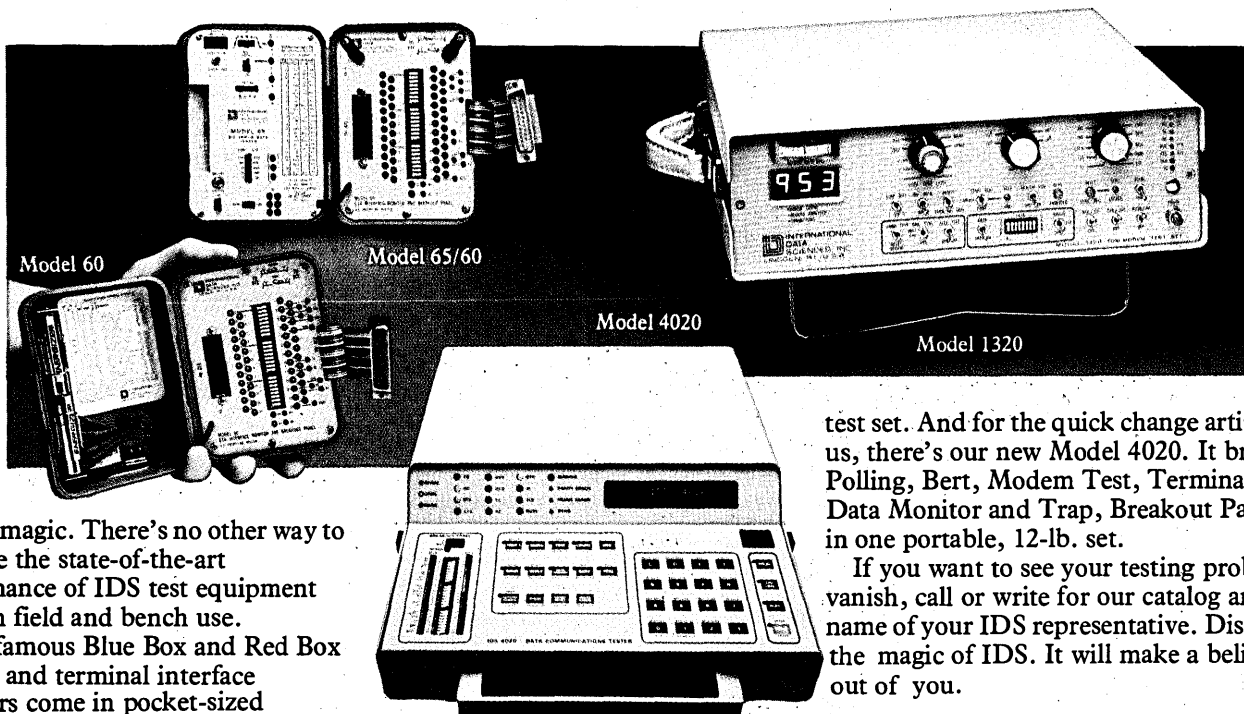
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Only one OCR scanner can pass this literacy test.

See spOt run.

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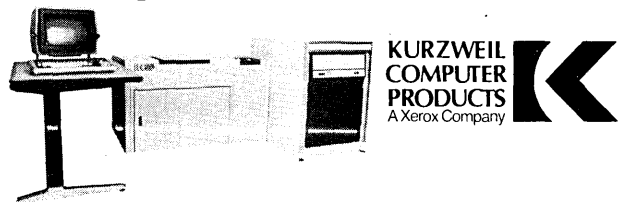
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have it available for ready reference. Or for use in a word processor. Or even a phototypesetter. Which saves everybody in your office a lot of time and trouble.

Including Dick in Legal and Jane in Research. To learn more about the Kurzweil Data Entry Machine, please call Peter Atwood at 617-864-4700.



CALENDAR

MARCH

Interface '82, March 22-25, Dallas.

This is Interface's 10th annual appearance, and once again the conference will be devoted to data communications, ddp, and networking. Contact the Interface Group, 160 Speen St., P.O. Box 927, Framingham, MA 01701, (617) 879-4502.

National Conference on Information Systems Education, March 22-24, Chicago.

The conference is sponsored by the Education Foundation of the Data Processing Management Association (DPMAEF), an organization established in 1975 to "expand the educational opportunities for system professionals and to conduct research and programs to benefit dp industry, educators, government, and the public." Contact the Conference Manager, USPDI, 12611 Davan Dr., Silver Spring, MD 20904, (301) 622-0066.

CAD '82 March 30-April 1, Sussex England.

The entire project development cycle, from concept to manufacture, will be discussed at this international conference and exhibition on computers in design engineering. Contact Alan Pipes, Conference Organizer, IPC Science and Technology Press, P.O. Box 63, Westbury House, Bury St., Guildford GU25BH, England.

APRIL

OAC '82, April 5-7, San Francisco.

The third annual Office Automation Conference provides a showcase for products and services that are dramatically changing today's office environment. This year's program theme is "The Human Connection." Contact Betty Lou Cooke, AFIPS, Inc. 1815 N. Lynn St., Arlington, VA 22209, (703) 558-3612.

Viewtext '82, April 13-15, New York City.

The second conference focuses on "Business Applications of Videotex." Contact Ellen Bond, Information Gatekeepers, Inc. 167 Corey Rd., Suite 111, Brookline, MA 02146, (617) 739-2022.

International Symposium on Local Computer Networks, April 19-21, Florence, Italy.

Sponsored by IFIP. Conference topics are operating systems, performance evaluation, architecture, protocols, integrated voice and data, VLSI technology, and applications. The program includes a product exhibition. For openers, there will be a welcoming party in the Palazzo Vecchio. Contact Terry Parsons, Olteco-Olivetti Telecommunications, 10062 Miller Ave., #204, Cupertino, CA 95014, (408) 996-8128.

Hanover Fair '82, April 21-28, Hanover, West Germany.

Over 5,600 companies from 50 different nations will be exhibiting at this year's fair, which features an energy theme. Contact Hanover Fairs Information Center, P.O. Box 338, Salem Industrial Park, Whitehouse, NJ 08888, (800) 526-5978.

Info/Manufacturing '82, April 27-29, Chicago.

Called the "Information Management Exposition and Conference for Manufacturing," this show is billed as the only event devoted exclusively to manufacturing corporations. Contact Clapp & Poliak, Inc., 245 Park Ave., New York, NY 10017, (212) 661-8410.

MAY

Computer Aided Quality, May 11-14, Baltimore.

This conference and expo is dedicated to the application of mini, micro, and mainframe computers as well as microprocessors and programmable controllers to improved manufacturing quality. Contact Robert Waterbury, CAM-I Inc., 611 Ryan Plaza Dr., Suite 1007, Arlington, TX 76011, (817) 265-5328.

Graphics Interface '82, May 17-21, Toronto, Ontario.

The National Computer Graphics Association and the Canadian Man-Computer Communications Society cosponsor this conference and exhibition. Contact Rich MacKay, DataPlotting Services, Inc., 160 Duncan Mills Rd., Don Mills, Ontario, Canada M3B 1Z5, (416) 447-8518.

Europe Software '82, May 25-27, Utrecht, The Netherlands.

The show is limited to software and services, with hardware only permitted to demonstrate the software. Again this year there will be a separate U.S. exhibition. Contact John Ferchak, U.S. Department of Commerce, International Trade Administration, Foreign Commercial Service, American Embassy, Lange Voorhout 102, 2514 EJ, The Hague, Netherlands.

Trends and Applications 1982: Advances in Information Technology, May 27, Gaithersburg, Maryland.

This one-day symposium will be held at the National Bureau of Standards in Maryland, and will be cosponsored by the Institute of Computer Sciences and Technology, NBS, and two branches of the IEEE. Contact the IEEE Computer Society, P.O. Box 639, Silver Spring, MD 20901, (301) 589-3386.

JUNE

NCC, June 7-10, Houston.

More than 600 exhibiting firms and 80 technical sessions will be found this year at the Astrodome. Pioneer Day will honor the developers of FORTRAN. Contact AFIPS, 1815 N. Lynn St., Arlington, VA 22209, (703) 558-3610.

COMDEX/Spring '82, June 28-30, Atlantic City.

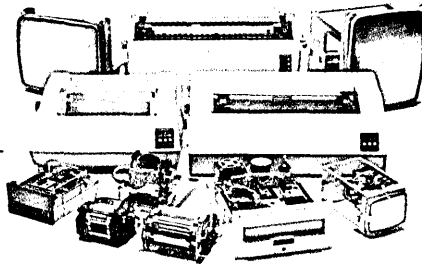
This annual event is especially geared toward the needs of small system vendors and their ISOs (independent sales organizations). Contact the Interface Group, P.O. Box 927, 160 Speen St., Framingham, MA 01701, (617) 879-4502.

A whole world. Because our parent company, C. Itoh Co., Ltd. (pronounced "C. Eetoe") is a multinational organization with resources and subsidiaries located in every corner of the globe.

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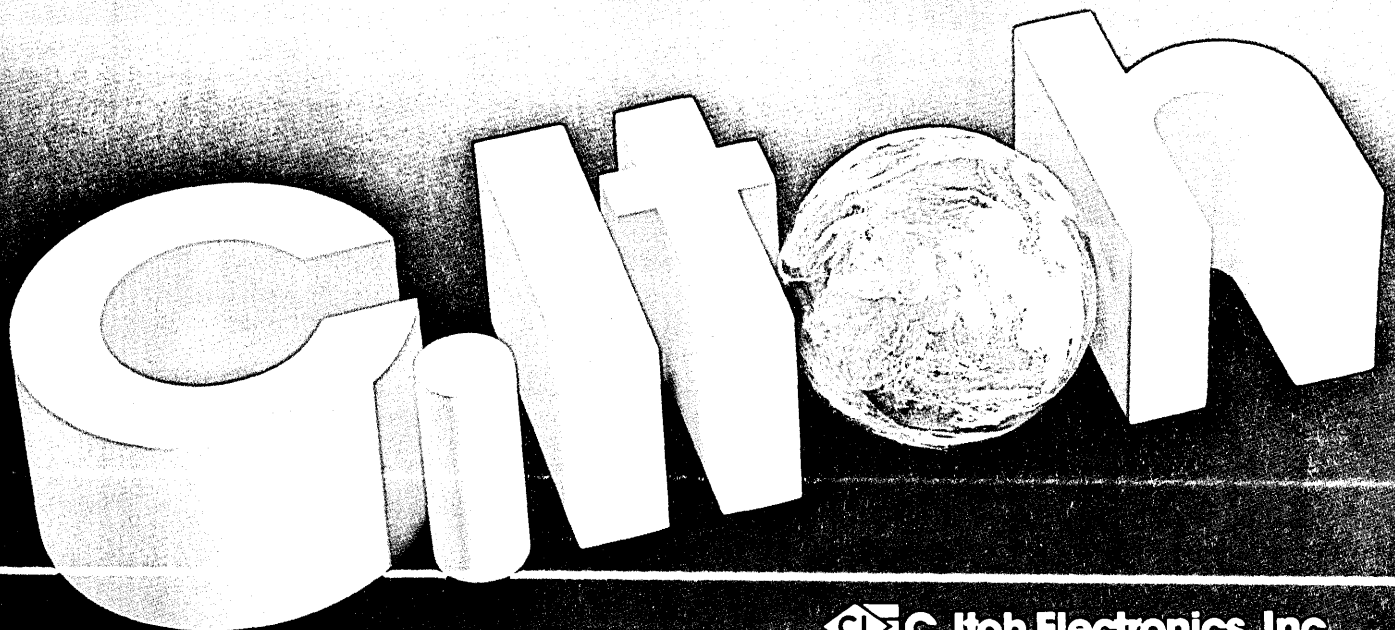
So when you deal with us, you can be sure you're doing business with people who are dedicated to the OEM. And a company whose parent organization has been around since 1858.

Our goal? To become the best OEM peripheral source in the country. Because with all our international connections, we haven't forgotten what our motto promises: One world of quality.

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A world of quality.

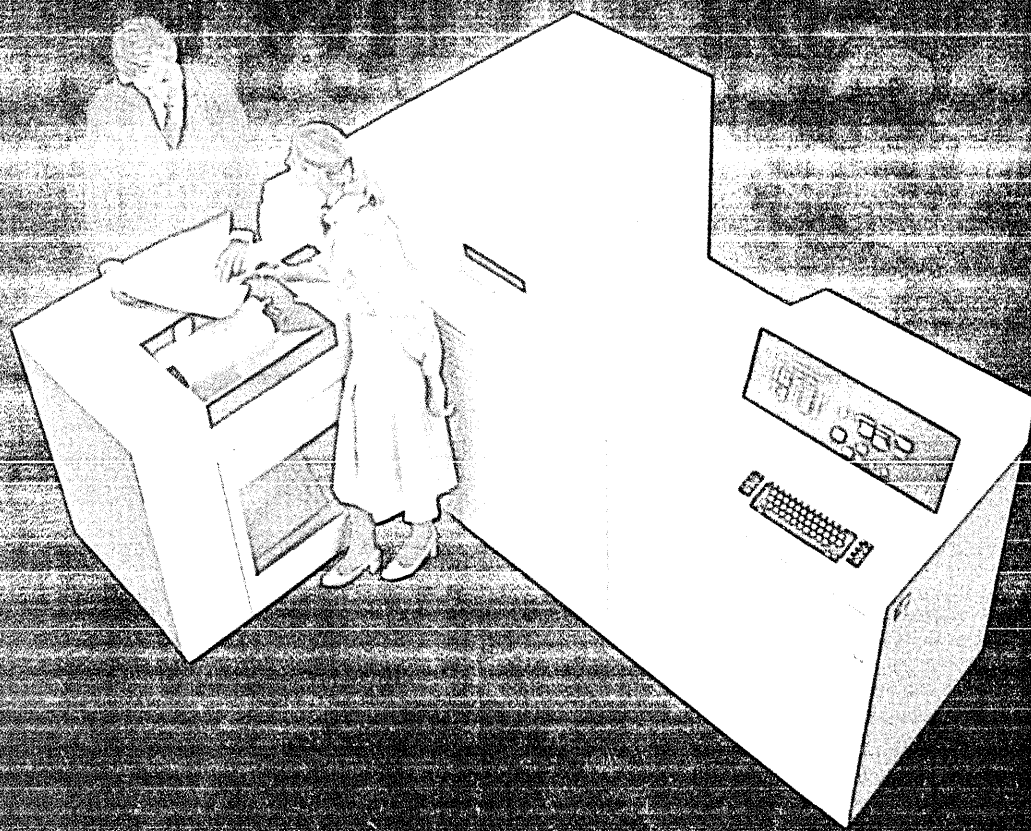


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IBM System/38

It will make
you re-think
your concept of
price/performance.



When managers compare the cost of computers, they often leave out the biggest factor—"people cost."

That's why standards like price/performance only begin to measure the potential productivity of IBM's System/38. This innovative system can help programmers generate more programs, sales reps generate more sales, and management generate more decisions.

But what traditional price/performance ratios can't tell you about System/38, its users can. Here's what they're saying:



"Our programmers are excited about System/38's data base capability. Their productivity has greatly increased. Complex programs that used to take three weeks to write, we now do in three or four days. And System/38's Remote Testing Service let us test our programs before delivery, which made conversion easier."

Dave Bye, DP Manager
Border States Electric Supply Co.
Fargo, ND



"We've found that both the hardware and software of System/38 are remarkably comprehensive and powerful. And with the Remote Testing Service, we were able to train our programmers, system operators and terminal users on the 38 before it was even delivered."

Patrick A. Doman, VP
Chas. A. Strand Company
Detroit, MI



"With the System/38, we can do applications we'd never have dreamed of doing before. For instance, we've come up with coaching reports in just minutes that previously would have cost a lot of time and money. It gives both our coaches and management information they never thought possible."

Charles Reckenberg
Director of Data Processing
St. Louis Football Cardinals
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What makes System/38 so versatile and so productive? It offers large computer features integrated into a compact, easy-to-use system. Plus new features rarely found in any computer, large or small.

For a better idea of what the System/38 can do for your business, call us toll-free at 1-800-241-2003. (In Georgia, 1-800-282-7994.) Or write us at P.O. Box 1385, Atlanta, GA 30055.



CIRCLE 22 ON READER CARD

Prime.
One line of compatible
systems. A whole spectrum
of powerful solutions.

Just a few years ago, advanced technology and system compatibility were mutually exclusive. But when Prime began making computers, technology and compatibility became one.

Big. Better. Best. The Prime 50 Series includes the Prime 250-II, 550-II, 750, and the new Prime 850. The Series is so flexible, it can handle virtually any application you have. And so powerful, it can meet your most demanding needs.

If you're in a start-up mode, the perfect way to begin building your system is with the Prime 250-II. If you need more power, you'll find the solution in the Prime 550-II or the Prime 750. And if you're looking for maximum performance, the Prime 850 is the most powerful mini available today.

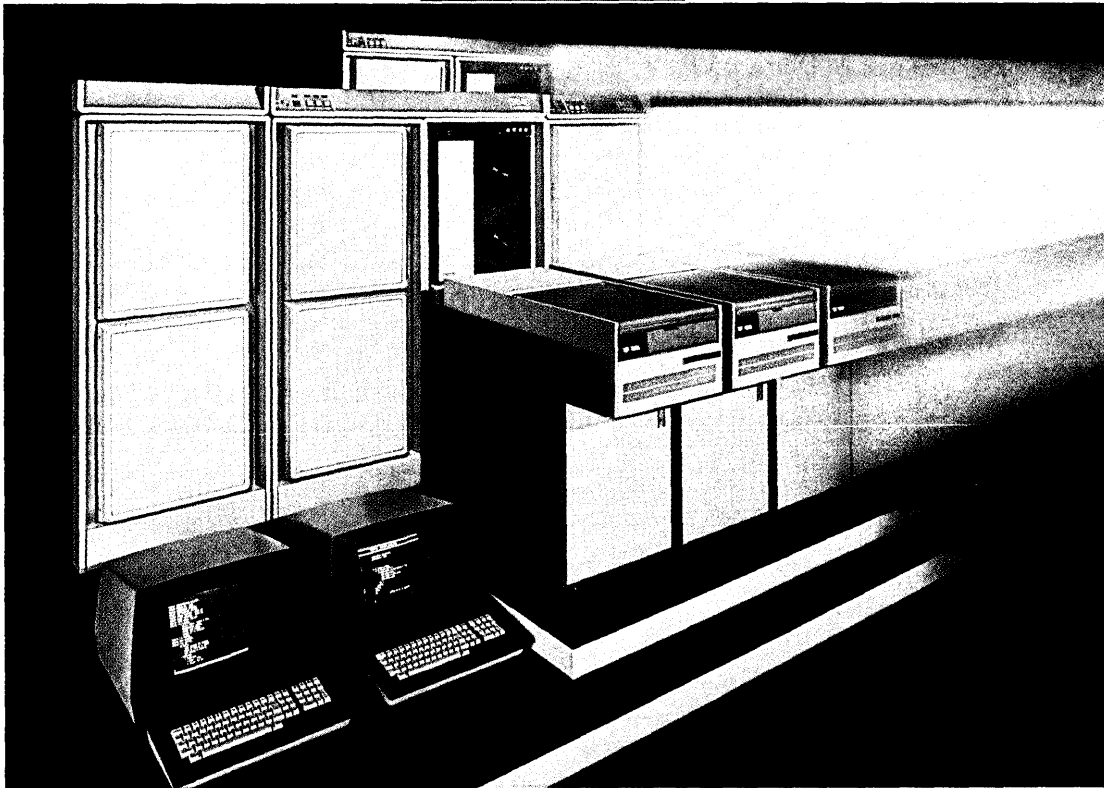
You should know too that any 50 Series system can be networked with any other. They can also communicate directly with mainframes. And all Prime systems support a broad band of industry-standard languages.

The economy of compatibility. The Prime 50 Series is designed around a single operating system, which makes all systems compatible with each other. So you can easily and economically move up to a larger system, or expand to any number of small, remote systems. And you'll have nothing new to learn because the same software goes with you.

A spectrum of solutions. The 50 Series was designed to provide a broad spectrum of solutions for just about any application you might have, including manufacturing, financial, education, utilities, engineering, energy, automated office, you name it.

Consider Prime first. Today, more than ever before, you need the compatibility and the spectrum of solutions that only Prime can offer. For more information, write to us at Prime Park, MS 15-60, Natick, Massachusetts 01760. In Europe, write Prime Europe, 6 Lampton Rd., Hounslow, Middlesex, TW3 1JL, England. Telephone: 01-570-8555.

PRIME
Computer



LETTERS

BETTER SAFE THAN SORRY

I don't think "Coping With Computer Criminals" (January) placed sufficient emphasis on the potentially catastrophic situation currently existing. A tv show on PBS last year stated that four of the eight largest U.S. banks currently have no communications security protection and the other four have protection for only a few applications.

As a consulting firm specializing in developing security procedures based on the U.S. government approved Data Encryption Standard (DES), we have been in contact with hundreds of companies in the past two years. Most of them prefer to gamble on the loss of millions of dollars rather than implement security procedures. The same procedures that provide communication security can easily be adapted to prevent software piracy, facilitate edp audit, and prevent unauthorized access to databases. Perhaps additional articles on security will alert users to the consequences of ignoring this situation.

MARVIN SENDROW

Advanced Computer Security Concepts
Annandale, Virginia

DDC SETS THE RECORD STRAIGHT

"Banking On Old Markets" (November) deals with the drum and disk refurbishment business of Southern California Refurbishment (SCR), a startup company employing some former employees of Digital Development Corp. (DDC).

That article refers to DDC a number of times and contains the following statement attributed to Mr. Lindberg, a former DDC employee and now of SCR: "We have with us [SCR] probably the only three people in the world who know how to make Bryant and General Instrument heads."

The clear thrust of the article is that DDC, as the successor to the General Instruments and Bryant head technology, lost its capability to perform this function with the termination of those of its employees who went to work for SCR.

Nothing could be further from the truth. The fact is that DDC continues to own all the technology acquired from General

Instruments Corp. and Bryant, including that for the making of heads, and DDC continues to utilize this technology in servicing its customers.

Furthermore, since DDC considers its technology to be proprietary for which no rights have been granted to SCR or to its associates, DDC is appalled by the false implication in the article that SCR is in lawful possession of DDC know-how. In fact, there is and was on file at the time your article was published a complaint in the Los Angeles Superior Court by DDC against SCR, Mr. Till, and other related parties alleging among other things misappropriation of DDC trade secrets.

Needless to say DDC is quite concerned about the false conclusions its customer base can draw from your article and requests that you take immediate action to set the record straight.

DAVID B. LLOYD

General Counsel
Digital Development Corp.
San Diego, California

OVERLY FRIENDLY?

You heard it here first?

We all know what computer software runs in the "native mode." We all know what computer software is "user friendly." But, what computer software is a "friendly native"?

ROBERT A. SINCLAIR

Head, Data & Information Management
Illinois State Water Survey
Champaign, Illinois

You got us.—Ed.

MORE POWER TO YOU

In reference to the story "Don't Get Burned by Brownout" (News in Perspective, December), two statements about motor generators need clarification—one by Mr. Ken Dreger of Westlands Bank and one from an anonymous spokesperson at Xerox Computer Services, El Segundo, Calif.

Mr. Dreger stated that he turned off his motor generator because it consumed too much power. The article failed to mention that while the motor generator was op-

erating at only 60% of full load, it was providing clean power at 85% efficiency. This is a higher efficiency rating than many UPSs operating at full load.

Secondly, the story mentioned that Xerox Computer Services went down for more than four hours because its motor generator had died. This reference is not attributed to anyone in particular and our records do not indicate such a situation occurring with one of Computer Power Products' motor generators. We have five motor generators installed at Xerox, some of which have been in continuous operation for over seven years without failure.

Nothing is free in the power conditioning field and the astute dp manager must consider the efficiencies of various solutions when making a purchase decision. In those areas where power glitches are more prevalent, a 10% to 15% increase in utility costs is insignificant when compared with the hardware damage and loss of operating time caused by utility power quality problems.

R. N. BOWYER

Vice President, Marketing/Sales
Computer Power Products
Los Angeles, California

GIANT DISAPPOINTMENT

I am highly disappointed in the article "IBM Compatible Giants" (December). It neglected to take into account the announcements of October 1981 and was very subjective in both content and presentation. The article was far inferior to your usually comprehensive, accurate, and technically sound journalism. Please do not give us "quite a few," "greatest amounts of," these "more than a slight" sayings or "maybe" we will leave.

JOHN S. CAVALLINI

Office of ADP Management
Department of Energy
Washington, D.C.

MUCH TOO MUCH

"Too Much to Read" (Editor's Readout, December) stops far short of the mark. It probably is the case that there's too much to

THE DATAMATION INSTITUTE

APRIL

April 5, Financial Management's Use of Computer Graphics, Cambridge, MA, Faculty Club

April 5-6, Project Management, Houston, Meridien Hotel

April 12-13, Strategic Planning for Office Automation, San Francisco, Holiday Inn Financial District

April 12-13, Applications Software Packages, Cambridge, MA, Faculty Club

April 12-13, Computer Graphics, Cambridge, MA, Faculty Club

April 12-13, Management of Software Engineering, New York City, The Harvard Club

April 14, Electronic Communications, San Francisco, Holiday Inn Financial District

April 15-16, DP Fundamentals for Management and Users, San Francisco, Holiday Inn Financial District

April 15-16, The CAD/CAM Revolution, Cambridge, MA, Faculty Club

April 19, Business Graphics, San Francisco, Pacific Plaza

April 19-20, Integrating Word Processing and Data Processing, Chicago, Sheraton Plaza

April 19-20, Improving Your Leadership and Management Skills, New York City, The Harvard Club

April 19-20, DP Center Operations, Cambridge, MA, Faculty Club

April 19-20, Distributed Systems: Concepts/Management Overview, Toronto, Sheraton Centre

April 21-22, Management Skills for First-Line DP Supervisors, Chicago, Sheraton Plaza

April 21-22, Writing Skills for DP Professionals, Toronto, Sheraton Centre

April 22-23, Measuring and Improving Programmer Productivity, New York City, Vista International

April 26-27, Administration and Control in a Data Base Environment, Atlanta, The Southern Conference Center

April 26-27, Systems Analysis, Chicago, Sheraton Plaza

April 28-29, Data Dictionary/Directory Systems (DD/DS), Atlanta, The Southern Conference Center

April 29-30, Strategic Planning for Information Systems, Seattle, The Park Hilton

MAY

May 3-4, Strategic Planning for Information Systems, Chicago, Sheraton Plaza

May 3-4, Computer Graphics, Seattle, The Seattle Hilton

May 3-4, Local Area Networks, Cambridge, MA, Faculty Club

May 4, Business Graphics, New York City, The Harvard Club

May 6-7, The CAD/CAM Revolution, Seattle, The Seattle Hilton

May 6-7, Administration and Control in a Data Base Environment, New York City, Vista International

May 7, Financial Management's Use of Computer Graphics, New York City, The Harvard Club

May 10-11, Systems Analysis, Cambridge, MA, Faculty Club

May 11, Management's Use of Computer Graphics, Atlanta, Southern Conference Center

May 11-12, Data Dictionary/Directory Systems (DD/DS), New York City, Vista International

May 13-14, Management Skills for First-Line DP Supervisors, Washington, D.C., L'Enfant Plaza

May 13-14, Measuring and Improving Programmer Productivity, Washington, D.C., L'Enfant Plaza

May 13-14, Integrating Word Processing and Data Processing, Washington, D.C., Sheraton Washington

May 13-14, Integrating Word Processing and Data Processing, Washington, D.C., Sheraton Washington

May 13-14, Integrating Word Processing and Data Processing, Washington, D.C., Sheraton Washington

May 13-14, Integrating Word Processing and Data Processing, Washington, D.C., Sheraton Washington

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LETTERS

read; and it certainly would be helpful if everything published were concise, pertinent, and readable. My experience as a consultant who helps people improve their abilities to organize and control information, however, compels me to believe that DATAMATION should view the problem differently:

1. "Without more knowledge we are lost, and with more knowledge we are overwhelmed," O.L. Reiser reminds us in *The Integration of Human Knowledge*.

2. The need to know and the arrival/acquisition of information do not always coincide.

3. No human's biologically given memory can adequately cope with all the information that comes his or her way (that's one reason humans invented the library).

4. What we need is a system that remembers for the collector, accommodates the collector's personal behavior toward his or her collection, and points precisely to the places where needed information is stored.

My suggestion to the editor is to include the following items with each published article:

1. An abstract or summary of the article.

2. A list of index terms such as keywords and phrases that appear in the article.

3. Other bibliographic data (e.g., title of article, author's name, date of issue).

The policy I recommend would be an immense improvement over the present one which yields scanty bibliographic data once a year.

ROBERT M. GORDON
The Information Organizer
Irvine, California

I am fully in agreement with the Editor's Readout. As a consultant, I must keep up with a vast amount of sometimes confusing and often highly technical material. I was amused that you chose my "Three Relational DBMS" article (September, 1981) to cut up and use as information confetti in the illustration accompanying your article. This article was indeed technical in nature and assumed a good deal of knowledge on the reader's part.

I wish it were possible to write broad, informative articles, such as mine, which could reach a wide audience. Unfortunately, such an effort usually expands into a book or at least a monograph.

Here's hoping that we continue to cope successfully with the technological information explosion and at the same time maintain a sense of humor and perspective about it.

E. M. DIECKMANN
Arthur D. Little, Inc.
Cambridge, Massachusetts

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LETTERS

A VOICE FOR DECENCY

The Story "In Loco Parentis" (December) was offensive to working parents, computer users, organized people, and gifted children. Did I leave anyone out?

DANIELLE R. BERNSTEIN
No address given

UNIDENTIFIED OBJECT

Would you please explain the picture used to accompany the article "Computing in Kuwait" (December). No reference or description was given!

R. D. MACFARLAND
Data Processing Manager
CallInk
Berkeley, California

Those are water towers in Kuwait City—Ed.

"AN "A" FOR PERKIN-ELMER

Perkin-Elmer deserved somewhat higher marks in your "Annual Mini-Micro Survey" (November), particularly in the area of hardware reliability/maintenance. There have been times when our 3242 has run with such "disgusting regularity" that we have had to initiate "controlled crashes" (i.e., users are given 60 seconds to sign off) to keep users alert to the inevitable—to the real crash that comes, from time to time, without warning.

I have nothing but praise for Perkin-

Elmer's ceo. He's good, but he's not afraid to call in a product specialist when he runs into something he can't handle alone. He views his job as "seeing that it gets fixed" rather than just "fixing it." We also have an IBM computer being serviced out of the same city as our Perkin-Elmer (Richmond, Va.—65 miles away). When it comes to service calls there is no contest—Perkin-Elmer wins.

It has been my experience that you don't see too much of the marketing representative after the sale, and in most cases it's just as well. But this isn't the case with our Perkin-Elmer marketing representative. He has been extremely helpful before and after the sale. And he doesn't always wait to be asked for help: when we have a problem, he's right there.

I agree with the survey that Perkin-Elmer's weakest area is software support. The problem is that there aren't enough analysts to handle the growing customer base, particularly at the local level. But even in this trouble area, things are better now than they were 18 months ago and they will continue to improve as the existing software becomes more and more reliable.

DR. RAY A. GASKINS
Director

J. B. Fuqua Computing Center
Hampden-Sydney College
Hampden-Sydney, Virginia

HERE TO STAY

Dave Gardner's article, "Route 128: Boston's Hotbed of Technology" (November), was a splendid bit of nostalgia. His reference to Cambex Corp., formerly Cambridge Memories, as a tough-minded company with great staying power is most apt, since the company is growing nicely again after a few flat years. But Cambex *never* went bankrupt, as was reported. It's just too tough for that.

ROBERT G. STRAYTON
President
The Strayton Corp.
Wellesley, Massachusetts

OUT OF FOCUS

Strike two! The "Systems Software Survey" (December) was the second survey article last year (the first was the "Database Systems Survey," in September) that omitted FOCUS, our DBMS and Information Control System. While I realize that every package cannot be surveyed, I seriously question the awareness of these authors with regard to the trends and leaders in the software industry, whether it be DBMS systems, system management aids, or utility software. I sincerely hope that you will improve the editorial review process in this area, to ensure your readership an accurate and factual presentation in the survey articles you publish.

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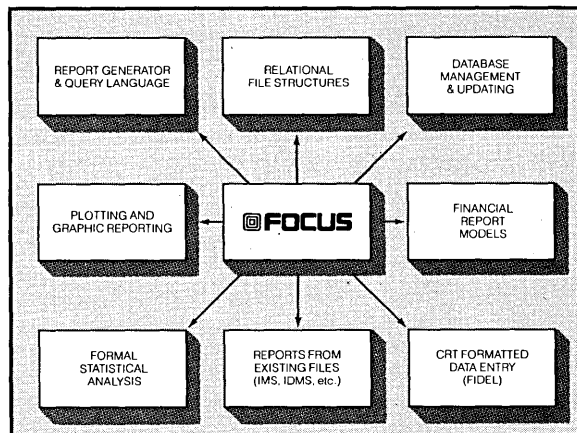
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LETTERS

Thanks on behalf of over 500 (and growing daily) worldwide FOCUS users.

DONALD J. WSZOLEK
Marketing Manager
Information Builders, Inc.
New York, New York

MUSICAL NOTES

This is an appropriate time for the article "Give Tchaikovsky the News" (October) because some musical instruments are now going digital. The hardware and software ideas basic to computers can now be applied throughout the audio field. Dare I hope that progress in music will resume after so long a slumber? Since the early 19th century, the divorce of science from art has been almost complete.

The piano reached its zenith a century ago and could not be improved with the technology of the time. Its obsolete wooden machinery and restriction to the 12-tone equal temperament, unfortunately, have been designed into electronic instruments and even computer programs—thereby holding back inventors as well as composers. I have felt this restriction keenly throughout my 50 years of composing and designing and building instruments.

Composers are entitled to the same status as painters and sculptors, that is, being heard directly by listeners without interpreters. The recording studio, computer,

and electronic instrument make all this possible. Leave the symphony orchestra in the concert hall to the dead composers who have monopolized it.

IVOR DARREG
Composer and Electronic Music Consultant
Glendale, California

It's bad enough that they put Chuck Berry in prison, but now you're misquoting one of his most famous lines in your October issue. C'mon! It's "Tell" T. the news. As Letter-to-the-Editor types always conclude: you've marred an otherwise excellent piece by Mr. Froehlich. Now, did Tchaikovsky plug a soldering iron into an electric guitar for sonic kicks or was that just Lou Reed?

IZZY MANUEL
Hubris & Chutzpah Agency
New York, New York

TO MODIFY OR NOT TO MODIFY

With reference to "Modified Top-Down Design" (November), I do not believe that Mr. Samid has a good understanding of what top-down design and structured methodology should be. His representation of the personnel problems that result from the use of the "classic top-down method" seems to ignore the possibility that poor or inadequate project leadership could be a cause. As a method, top-down design is only as good as the leadership implement-

ing and maintaining the method.

Management and user support, and moreover, participation in the system's life cycle, are the essence of a good structured methodology. What better feelings could exist for systems project members than knowing that management and users have participated in and approved each phase of the systems life cycle. Ms. Samid's multiple stage approach, however, would seem to erode this support by causing management and users to doubt the overall capabilities of the project team. To assume that no single phase can be completed in a single stage is to assume that the project members involved are incapable of doing their jobs.

Samid's analysis that a classic methodology's "phase-after-phase approach loads the development team unevenly, particularly at the early stages," once again ignores the possibility of using good project leadership to eliminate this problem. Programmers do not have to be assigned to the project until the programming phases begin.

Project management and control, with emphasis on human resource management, are the keys to a successful systems development project. The various methodologies are not substitutes for leadership.

LARRY FOUTS
W. L. Gore & Associates, Inc.
Flagstaff, Arizona

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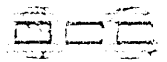
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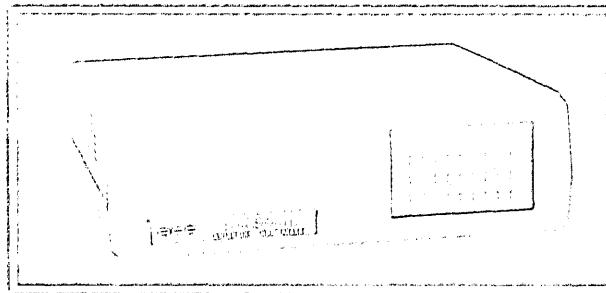
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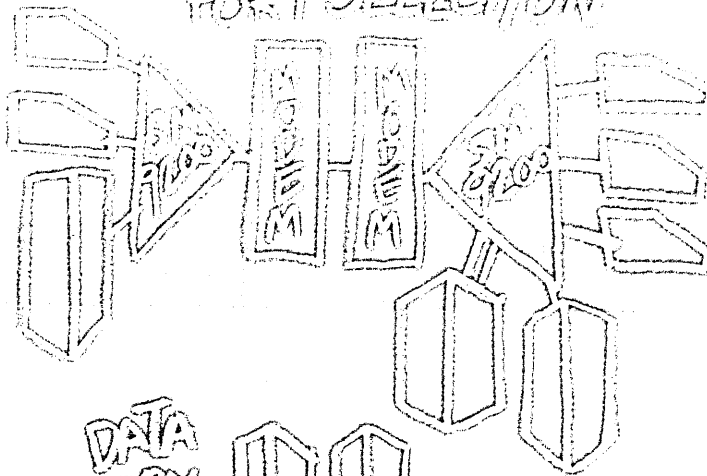
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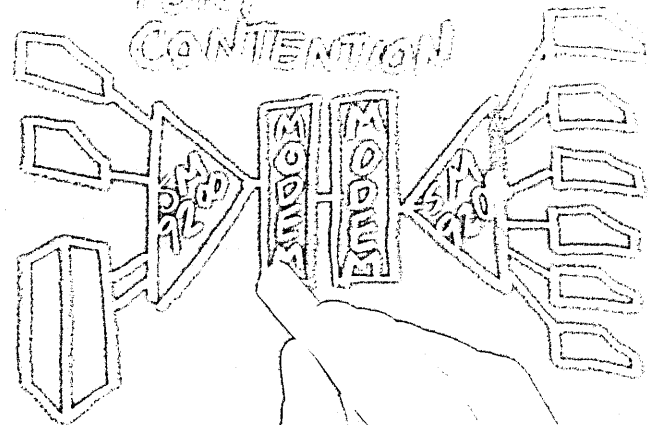
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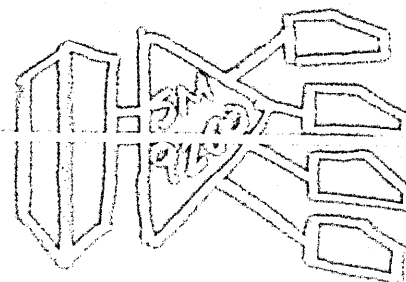
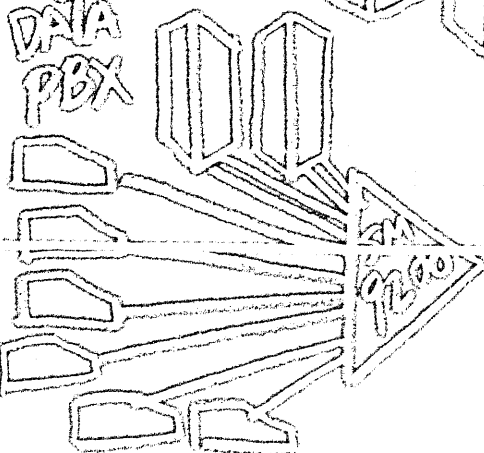
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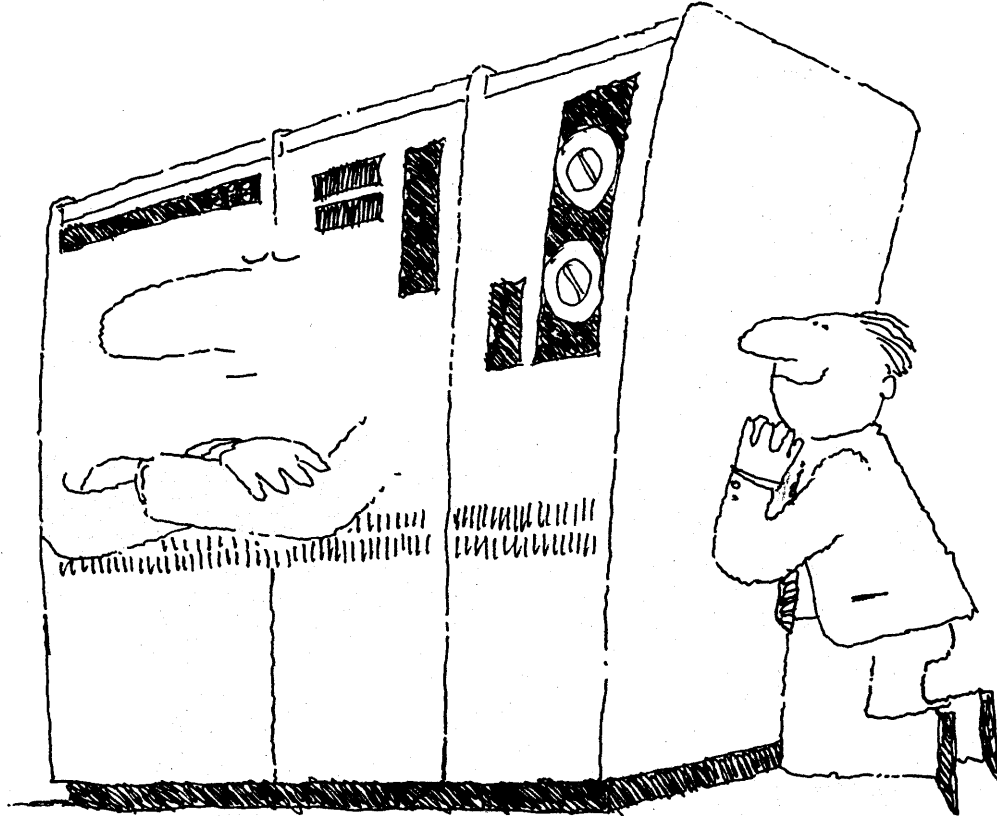


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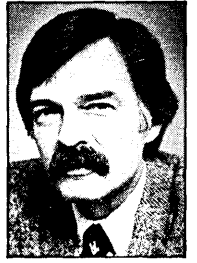
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EDITOR'S READOUT



THE PIED DP MANAGER

The changing role of the dp manager has become an oft-discussed and much debated subject in these pages. In January we ran a comprehensive article which talked about the new role of the dp professional and the changes he must make to succeed in the new corporate information environment.

We have received good feedback on the article. And we've met people who are making the transition. Understandably, it is tempting to lapse into sweeping generalities about this new, more prestigious role the information processing professional is to play. Just as it is easy to praise companies that recognize the importance of dp, it is also easy to criticize those that appear to view our profession with disinterest if not downright hostility.

Luckily, this magazine has a band of intelligent and opinionated advisors who delight in reminding us that generalizations are dangerous, that glibness obscures reality, and that the data processing world is complex enough to contain within it (to employ Gerard Manley Hopkins wildly out of context) "All things counter, original, spare, strange;/Whatever is fickle, freckled (who knows how?)/With swift, slow, sweet, sour, adazzle dim."

One of them, commenting on the MIS manager's role, takes a view that we think is worth reporting here.

The MIS director, he says, is in the following dilemma: he's supposed



to be the champion of his technology while at the same time balancing what's right for the company with the demands of his management and the users.

For example, he is supposed to lead his corporation into the wondrous world of word processing, electronic mail, local nets, and personal computers. All the media are on the bandwagon, hyping the goodies, tracking AT&T's and IBM's next moves, and exhorting the MIS manager to be in the thick of the fray when, any moment now, the next millenium arrives.

Well, says our dour advisor, beware. Many of the new technologies are not very effective, some are quite effective but only in limited applications, and all require far more training and support than expected.

Plus, to accomplish all this, you need lots of skilled people—a necessity that puts disruptive pressure on salaries, titles, and perks once you've accomplished the almost impossible task of finding them. He also warns that if

pushed too fast, the hot new technologies may fail and widen the rift between MIS and the user.

But, he asks subversively, suppose your company were a year behind the technology? Or five years? Would it show on the bottom line? If you had the newest and best widgets how much would this gear really impact the organization and how soon? People are the limiting factor in installing new technology and they can be mighty slow.

Forget the hype, says he. The role of the MIS director is no different than it has ever been. He has to know the technology and the business, and balance out speed, costs, and results.

"Sure we feel unappreciated" he says. "We ought to have bigger, larger titles and cars. But we won't get them by crying about how important we are, and that we ought to report to the president. Results are what it's going to take, and even that may not do it. After all, no function has a general lock on the corporate hierarchy. Accountants run technology firms, marketing runs many firms, engineers run a few, manufacturing a few. MIS is not going to run many more. In each business there are major skill requirements—marketing, legal, technical, financial, what have you. MIS is the key in only a few businesses today. Sure, the number is growing, but not nearly as fast as the number of aspirants.

"Timing, balance, and a realistic view of the needs and capabilities of the company are what lead to growth, not noise making about 'I ought to be treated better.'"

Another voice, another point of view. Do you agree, disagree? Do you have another perspective? Let us know; we'd like to print your replies in our Letters or Forum section. Like Hopkins, we, too, are fond of diversity. *

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After listening to the most demanding EDP needs of our customers, Sperry Univac designed a non-impact laser printer that can print a wide variety of typefaces and graphics on a page with simple programming. In fact, all the text on this page was originally printed on a Sperry Univac Laser Printer and then reproduced. This superior quality printing is done page by page, rather than on the traditional line by line approach. And the laser printer is so fast, you get 206 8½-inch pages per minute...

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THE SPERRY PRINTERS

IBM 3800 users to run print jobs on it without conversion, in either on-line or off-line modes.

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SPERRY  UNIVAC

The computer people who listen.

CIRCLE 31 ON READER CARD

SCIENCE/SCOPE

Application of magnetic fields during the growth of crystals from molten sources may control irregularities in single-crystal semiconductor materials. In experiments at Hughes, a magnetic field was applied for the first time to the float-zone growth of gallium-doped silicon crystals. The magnetic field substantially reduced the amplitudes of striations due to crystal rotation and thermal convection. It also made for more orderly rotational striations.

Better windows for infrared sensors may be forthcoming after more research into a new fabrication process. Hughes scientists have made discs of fluorohafnate and fluorozirconate glasses by pressing glass pieces under low pressure (1024 psi) and high temperature (340°C). The process offers two important benefits. First, infrared glass compositions, which tend to crystallize when large batches are cooled from the melt, can now be formed into large optical elements up to 30 centimeters in diameter. Second, because the discs are cast into their final form, they have neither surface strains due to grinding nor polishing impurities, both of which reduce infrared transparency.

A communications system for U.S. Army troops will be one early demonstrated use of Very High Speed Integrated Circuits (VHSIC), the "super chips" that will give military electronics systems a tenfold increase in data processing capability. As one of six firms involved in the tri-service program, Hughes will put VHSIC chips into a brassboard demonstration processor for the Army's Battlefield Information Distribution System (BIDS). This portable, two-way high-data-rate system is slated for operation in the 1990s. It will allow troops to communicate among themselves and find and report their positions. BIDS data rate will automatically increase when there is little or no jamming, or decrease to provide maximum jamming protection for critical messages or communications links.

An ultramodern facility spanning 1.75 million square feet will be the showcase where outstanding Hughes engineering will combine with advanced manufacturing techniques and production processes. Our complex is nearly completed, so we're looking for experienced and graduating engineers to work on such programs as: infrared thermal imaging systems, laser rangefinders and designators, and missile launching and guidance systems. Send your resume to Dan O'Daly, Hughes Electro-Optical and Data Systems Manufacturing, Professional Employment, P.O. Box 924, Dept. SE, El Segundo, CA 90245. Equal opportunity employer.

A new SCPC (single channel per carrier) modem, by being packaged on a single printed circuit board, takes up less space and is more versatile than previous devices. The Hughes HS 732A modem can be used in earth terminals with low, medium, or high traffic volume service. It serves frequency plans employing either preassigned or demand-assigned operations. As many as 96 modems, with AC or DC power supplies, can be accommodated in a standard 8-foot rack. Some 2400 modems are being produced for customers throughout the world.

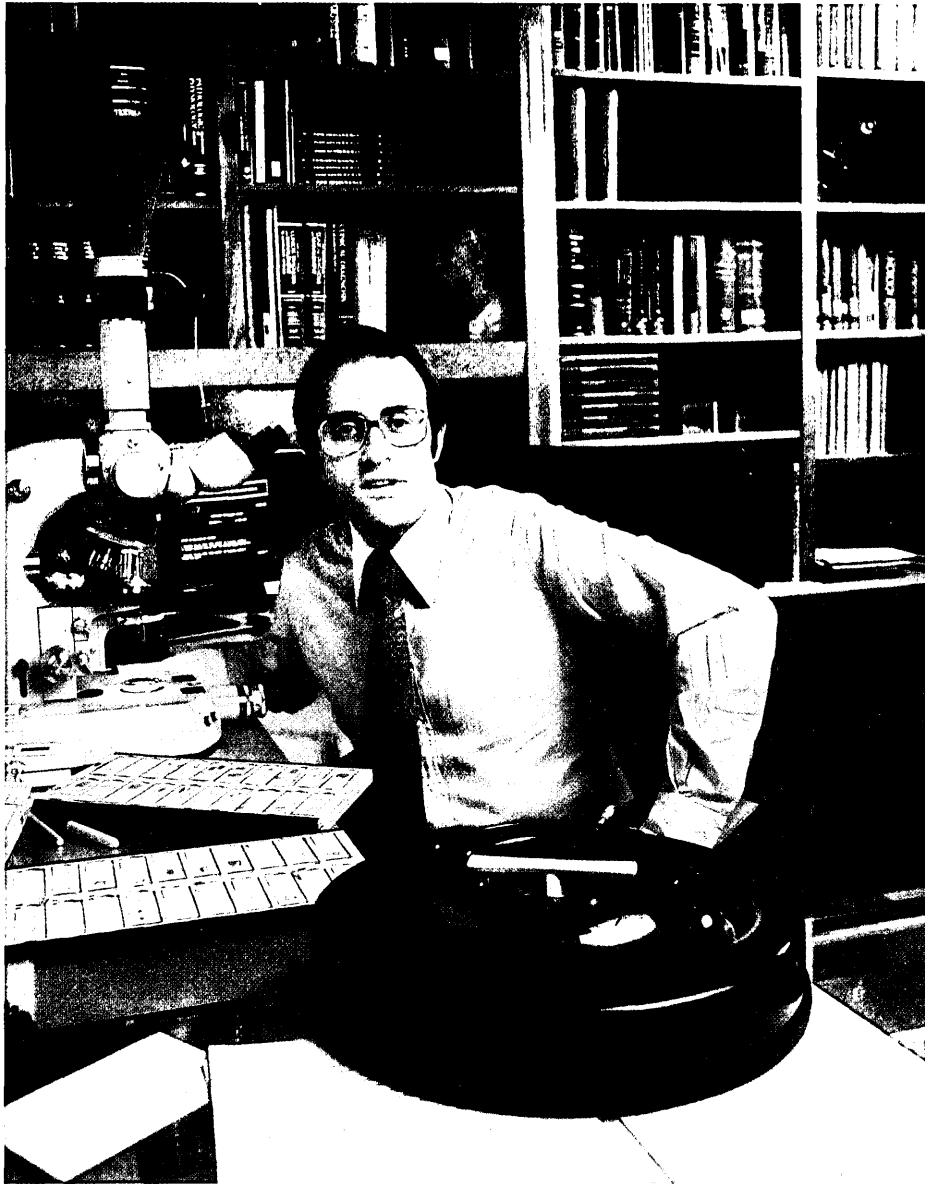
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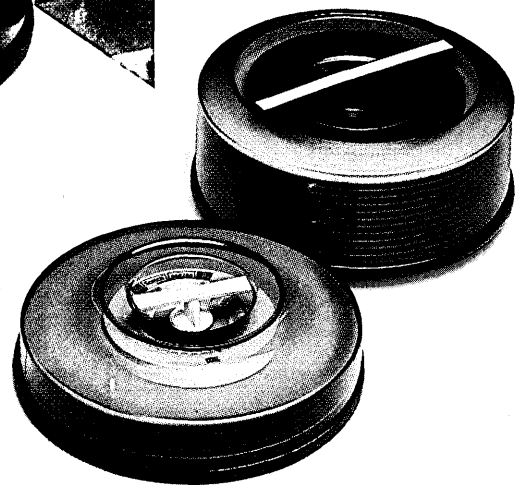
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CIRCLE 35 ON READER CARD

INFOCUS

BEHIND THE SCENES

by Edith Myers

The razzle-dazzle seen on the screen hardly reflects Hollywood's real attitude about the computer.

You've had a hard day at work.

You're watching the six o'clock news and a commercial comes on. You try not to watch and you really believe you're not. An attractive commercial actress is selling lawn chairs, and it's January. Next thing you know, you're talking to your friendly local lawn chair salesman.

You were a victim of the "Looker Effect."

The motion picture industry has long made imaginative use of the potentials of technology, particularly computer technology. Computers have been doing unbelievable things on the silver screen since the mid-50's. Hollywood, it would seem, has infinite faith in the computer's abilities.

Maybe yes, maybe no. For entertainment value, Hollywood has been attributing amazing abilities to the computer for quite some time. Behind the screen the attitude has been different.

"I think entertainment is truly the last frontier for automation," says Suzanne Landa. "People in the movie business are

conservative and are in an industry that changes slowly." Landa, international marketing director for Interactive Systems, Inc., Santa Monica, Calif., has been following computers in the movies for the past three years. She has given numerous talks on the subject and has what is probably the only collection of pictures, artifacts, and written material on the subject in existence.

She thinks the movie industry's resistance to computers is diminishing. The "Looker Effect" may be symptomatic.

It all began with a far out movie, Michael Crichton's latest, called *Looker*, from Warner Bros. It wasn't a rousing success following its release last fall, but in critics' opinions, that had more to do with the plot of the story than with the way technology was used.

Like many movies before it, *Looker* attributes powers to the computer it doesn't yet have. Or, in this case, that it doesn't quite have. It's about a company called DMI, run by actor James Coburn. DMI's business is marketing communications, and it makes television commercials.

"People in the movie business are conservative and are in an industry that changes slowly."

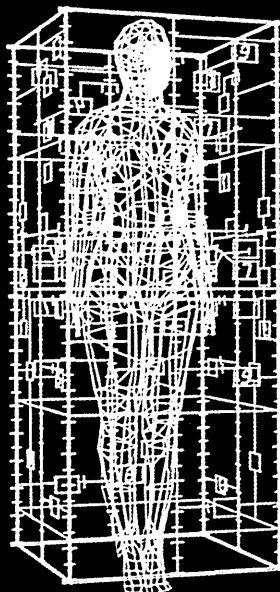
In the movie, DMI hires live actors for its tv commercials, but it doesn't use them live. It digitizes their images and stores them for use in commercials employing the "Looker Effect." That is, a beam which has a subliminal effect and which comes from the eyes of the computer-generated actors. That's why you bought that lawn chair in January.

(What many reviewers objected to was that most of the live models end up

DMI

PARALAX 2:3

COMPOSITE x83.2
APEX ANALOG 0:01
MM SYSTEM UP
ASPECT RATIO 1:1



CINDY
BODY MODEL
CONFIRM 1.0

BODY DAT: 1.042

MATRIX INDEX

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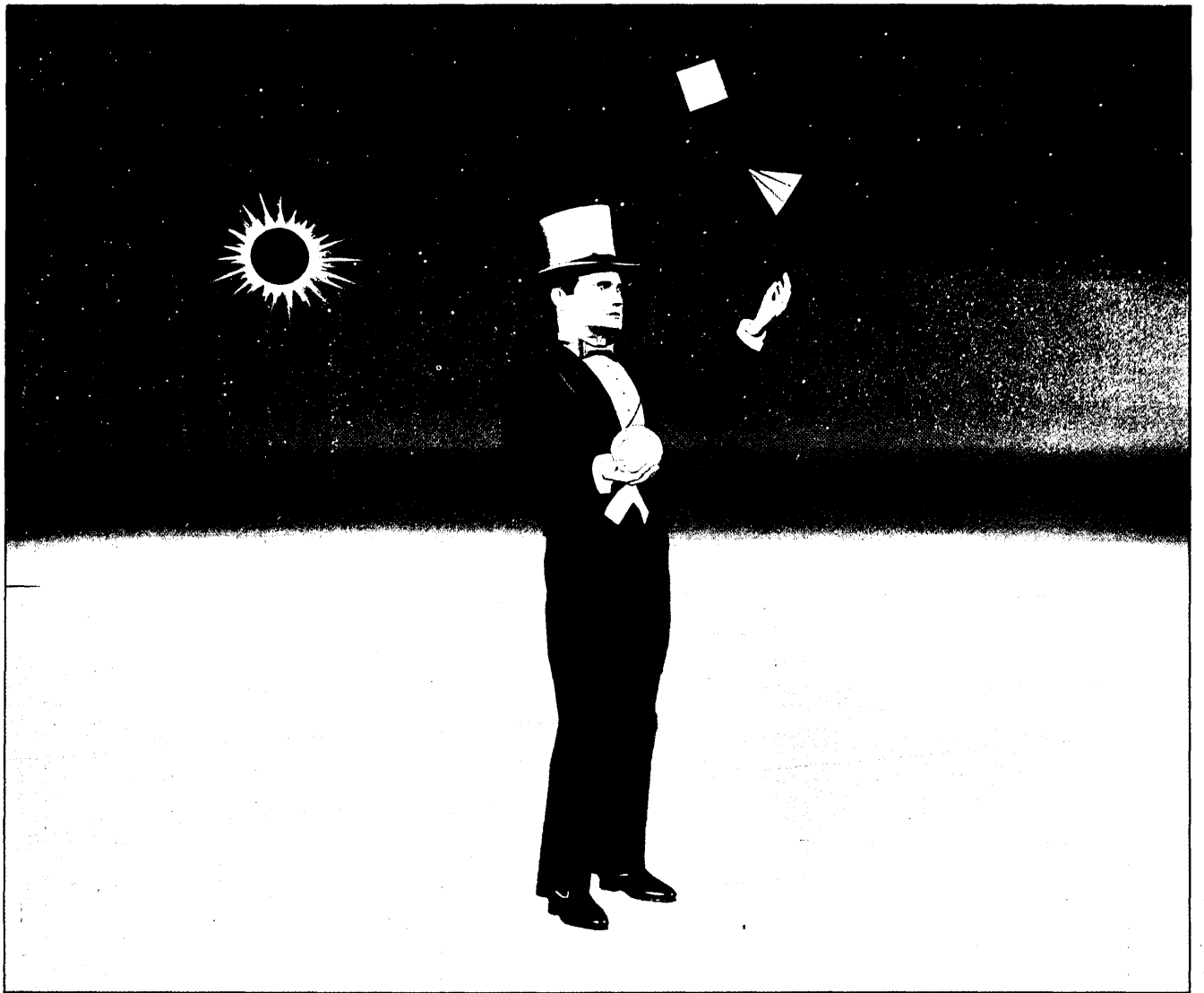
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ABOVE: Adam Powers, a digitized juggler, was created by Information International Inc. to duplicate the actions of a real live juggler.

CINDY MODELS: To have a three-dimensional database, you have to render an object in three orthogonal directions. You have a reference point in the center of the object, unlike engineering drawings where the reference point is off to the side. Facial curves are treated as discrete planes, and positions are encoded for each point of intersection. Only one-half of the face and the body are digitally reproduced.

SOURCE: INFORMATION INTERNATIONAL INC.

DM1

PARALAX 2:3

COMPOSITE x63.2
APEX ANALOG 0:01
MM SYSTEM UP
ASPECT RATIO 1:1

CINDY
BODY MODEL
CONFIRM 1.0
BODY DAT: 1.042

MATRIX INDEX

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3	03707	40764
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IN FOCUS

dead, with little or no explanation for this strange turn of events.)

As for the technology implied, it's carried pretty far. Near the end of the movie, real live people go through DMI's headquarters, walking past commercial sets. TV viewers at home are watching the commercial where, unknown to them, computer-generated images are peddling products. But then they see the live people charging by the sets in the background, ignored by the commercial "actors." At that point, the tv audience gets suspicious.

Storing a human being on computer? Far out, yes. Impossible, no. For this movie, at least, the producers (Ladd Co. with Howard Jeffrey as producer and John Lugar, assistant producer) were dealing with the possible. In fact, part of their digitizing of a human form was real.

Early on in the production phases, Michael Crichton and his company called upon Information International Inc., Culver City, Calif., to help them show an actual digitization of a human being. It was not the first time III had worked with Crichton on such a thing. The first time a real person was simulated on film was a III effort for Crichton's *Futureworld*, from American International, in which a masklike image of Peter Fonda's head is seen spinning through space.

For *Looker*, however, the digitization involved more than a head; it was a whole body. In the movie, many actors are digitized and stored, but III did only one for the screen, actress Susan Dey, and even then it wasn't the whole Susan Dey. They used her head but another model for the body.

"It was because of the time involved," said Mark Jaffee, part of the III effort at the time, and now an independent consultant on computers and their applications in movies. To have paid Susan Dey's salary for the time it would have taken to digitize her whole body would have made a serious dent in the producer's pocket. Not to mention the fact that they needed her time spent for filming the live form.

Like many movies before it, *Looker* attributes many powers to the computer that it doesn't yet have.

To have a three-dimensional database, said Jaffee, you have to render an object in three orthogonal directions. You have a reference point in the center of the object, unlike engineering drawings where the reference point is off to the side. Facial curves are treated as discrete planes, and positions are encoded for each point of intersection. Only one-half of the face and the body are digitally reproduced. The other half is created by a mathematical mirror, which means, Jaffee concedes, that an inexact replica of the person is being digitized.

A TALE OF TAUNTAUNS

To most moviegoers, talk of computers and motion picture production calls to mind special effects, like those in *Star Wars*.

While *Star Wars*' (20th Century Fox) special effects were spectacular, to say the least, they were not the product of computers. Hardwired machines were used to control cameras and models in this and other recent movies, including *2001: A Space Odyssey* (MGM).

More recent movies, including *Buck Rogers* (Universal), *The Black Hole* (Disney), and *Star Trek* (Paramount) did use computers in the creation of special effects.

Computer control, says computers-in-movies buff Suzanne Landa, is a solution to the problem of repeatability of camera movements for long, intricate shots and movements of a model or objects being photographed. In addition, the automated camera is expected to make some effects possible which were neither physically nor

"But it's very close."

For the movie *Looker*, Susan Dey was photographed in a special environment with mirrors at right angles and grid lines on the floor. There was a box around her head and tubes to provide reference points. Her head was shot from several different angles. The same procedure was followed for the body, but using a different model. "We called the composite Cindy," said Jaffee.

He said it took half a day to get each model prepared and do the shooting. It took another several weeks to actually translate the photos onto paper. Then came the tedious task of translating from paper to the computer. "Each individual polygon—and there were thousands—had to be labeled so the artist would know where he was."

The digitized image of Susan Dey, alias Cindy, was not animated in *Looker*, but that could have been done, Jaffee explained.

Prior to its work on *Looker*, III had created a digitized juggler (which the company named Adam Powers) to duplicate the actions of a real live juggler. In this case the body was a composite and its parts were digitized separately—lower legs and upper legs, lower torso and upper torso, and the head was separate. "But we used the same database with Cindy, and one general program could do arbitrary displacements of any objects so that waists could be moved in or out, shoulders could be widened, etc."

Jaffee says that while what was presumed to be done in *Looker* is in theory technically feasible today, it is a bit beyond the state of the art. "They purported to digitize a whole person, clothes and all, and even with hair." Hair, he said, is difficult to do now without creating a plastic look.

Another current problem is that "we don't yet have the capability to animate a face, to synchronize mouth move-

economically feasible before.

Input to a microcomputer-based system, she said, could be from a walk-through with a camera or from stored data previously entered via keyboard. "At Disney, a cameraman will either manually or electronically operate a camera through the initial shot using a handheld or small console control unit. Subsequent shots will be repeated automatically from the stored data.

"It's a way of doing things faster and better," said Landa. "It adds to creativity."

She noted that Tauntauns, the creatures ridden in the film *The Empire Strikes Back* (20th Century Fox) and which looked as if they were made up of camels, kangaroos, and somebody's imagination, were painstakingly built—manually. Some day, she said, such things will be created from digitally stored images on an interactive basis. —E.M.

ment with speech." Jaffee said there is promising research being done in this area, particularly by Norm Bacler at the University of Pennsylvania.

Jaffee believes the kind of technology *Looker* pretended to use will actually be possible within five years, "but not in real time. It still will take six to eight hours

Michael Crichton called on Information International Inc. to help show an actual digitization of a human being.

to do a one-minute scene."

As for real-time implementation, he feels that will come "soon" with the increase in available computer power. "The biggest constraint now is memory. The computer can't handle a whole picture at one time and things have to be done in slices. But the Japanese have come up with a 256K RAM, and that's a step. All we'll need to do is take custom software and rework it to deal with additional memory."

He said the Digital Equipment Corp. VAX 11/70 is best equipped for this kind of work right now. III uses a proprietary DEC-like system.

Jaffee believes digital simulation is a growing factor in the film industry. In addition to III, he cited three other firms doing work in this area: Lucas Films, which is building its own digital simulation facility in California's Marin County; and Digital Effects and Magi Communications Inc., both in New York City.

Digital simulation is one of the newer uses of computers in motion pictures. Others have been around longer but still have not reached full potential. There are many reasons, among them artistic resistance and union problems.

But cinema is an industry born out

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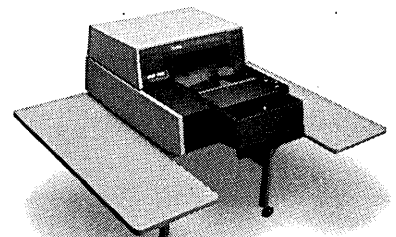
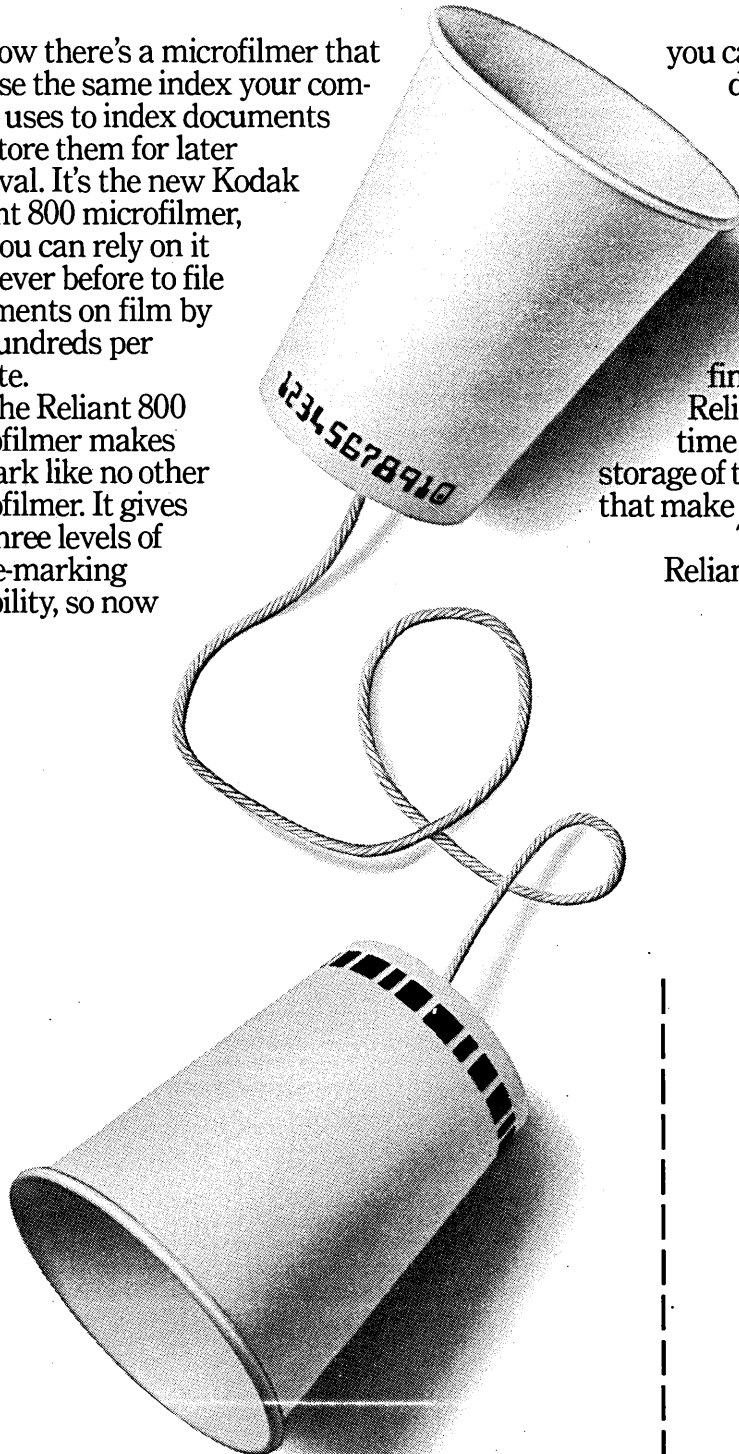
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IN FOCUS

of a marriage to technology, and it can't resist newer technology forever. What's more, technology is making movies more widespread. "Today," says Landa, "movies are a very small part of the GNP, but with cable and satellites..."

Among the uses of computers in movies subject to union pressure is animation. Today, in many places, computers have replaced the middleman, the person who fills in transition frames between key animation drawings. Few studios want to talk about the use of computers here because the assistant animators do this task manually and are members of a strong union.

For a first-rank animator, the computer is making the job easier, and the artistic resistance has been somewhat overcome. The artist can input for key frames using a light pen and a tablet and can paint

Ill had created a digitized juggler (which the company named Adam Powers) to duplicate the actions of a real live juggler.

stored frames interactively with the light pen and color selectors. Systems store and permit retrieval of colors by picture elements to achieve consistency. The artist is given as much artistic freedom as he had before, but now through software which in effect provides paintbrush, pencil, and spraygun options.

As an aid to live action filming, computers have been used in such movies as *The China Syndrome* (Columbia), where a microcomputer was used to make sure the 2,500 instrument panel lights on the control board of a simulated nuclear power plant synchronized with the live performances of Jane Fonda, Jack Lemmon, and Michael Douglas.

Landa strongly believes that the advent of the microprocessor is going to accelerate computer use in movie-making. She notes that the movie *Bonnie and Clyde* (Warner Bros., late '60s) previously held the record for the greatest number of randomly released bursts of catsup to simulate bullet wounds. This was done with wires and remote controls.

In the filming of *Heaven's Gate* (United Artists), a woman on horseback was rigged up to an Intel 8748, which she controlled, to release 100 bursts of catsup. "Maybe that's why the film failed," she quipped, though admitting she's not sure that scene ever made it into either of the two released versions of the movie. (Neither version was a big hit at the box office.)

Computers are also being used to digitally generate mattes, opaque silhouettes long used in the film industry to mask out an area on a film frame. A scene is shot with the area masked out. Then the film is rewound and a replacement, usually a

painting, is filmed, corresponding to the masked out area.

Computer control of cameras is another big part of automation in the film industry. The first automated camera system at Walt Disney Productions was constructed in late 1970 for filming passes over held art work for the Hall of Presidents show at Walt Disney World. It consisted of a 30 ft. long overhead track upon which the camera was mounted. A large square plate at one end of the track held the art work to be photographed. The plate could be moved vertically and horizontally. Autofocusing was achieved with a cam driven off the truck axis. The system controlled a total of three axes, and was not computer operated. It would scan a strip of white paper. When a black line was detected on a particular track, the axis controlled by that track would begin to move until another line was detected. When all axes halted, the shutter would be tripped automatically and the system would move on to the next frame. It operated in stop-motion mode only.

The project got a late start, and there were problems with sensitivity and consistency. With a deadline looming, the studio resorted to traditional means to finish the job. The man responsible, Ub Iwerks, planned to convert from white paper tape to punched paper tape, but he died before he could implement his plans.

SOUNDING IT OUT

In movie watching, what you hear conveys as much as what you see.

In movie making, computers are helping with this too. Most movies have a musical score, and while computer generated music has not yet been used in a theatrical release, proponents believe the computer will make it possible for musicians to create scores not otherwise obtainable, and that these scores, like computer synthesized images, will expand the medium of film-making.

Music is not the only sound in any film, and sound editing, when done manually, can be tedious. An editor views a reel of film, noting sounds and footage required. From a library index, a tentative list of sounds is selected. The editor cuts and modifies. If the sound he needs is too short, he creates a physical loop of the tape so the sound repeats. Synchronizing the sound to the film is a cut-and-dried process. Assembled edited cuts are mixed down onto a final track and mixed with music and dialog. Sound quality is degraded with each transfer from library master to work copy to final mix.

Mini-Micro Systems, Anaheim, Calif., has developed a system it calls ACCESS (Automated Computer Controlled Editing Sound System), which cuts away the tedium and improves quality.

Mini-Micro president William R. Deitrick calls it "the biggest technical ad-

In 1976, the studio faced the prospect of producing *The Black Hole*, involving hundreds of matte paintings and a tremendous workload of special effects processing. Dave Synder, manager of scientific programming, reexamined the idea of shooting held art automatically. The result was the Matte-Scan system, a high-precision numerically controlled stop-motion camera crane. The system moves along a 71

Digital simulation is one of the newer uses of computers in motion pictures.

in. truck axis, with 50 in. east/west and 26 in. north/south. Positioning accuracy is a thousandth of an inch in each axis. The camera is capable of exposure times from infinity to shutter speeds of more than 24 frames per second. The system also provides automatic focusing. It is used to photograph a matte painting or a projected image. The projector frame advance is controlled automatically. There also is an auxiliary output channel which can be used for special effects devices to be synchronized with the operation of the rest of the system. The entire system is operated automatically by a programmable controller designed to convert nonnumeric control machine tools to numeric control.

This system was an unqualified suc-

vance in the postproduction sound editing field in 50 years."

The ACCESS hardware consists of eight 200 megabyte moving head, removable disk pack disk drives. There are two microcomputers, a disk drive controller, two auxiliary memory banks, three sound data channels, and a two-channel independent high-speed memory bus which interconnects all the other devices.

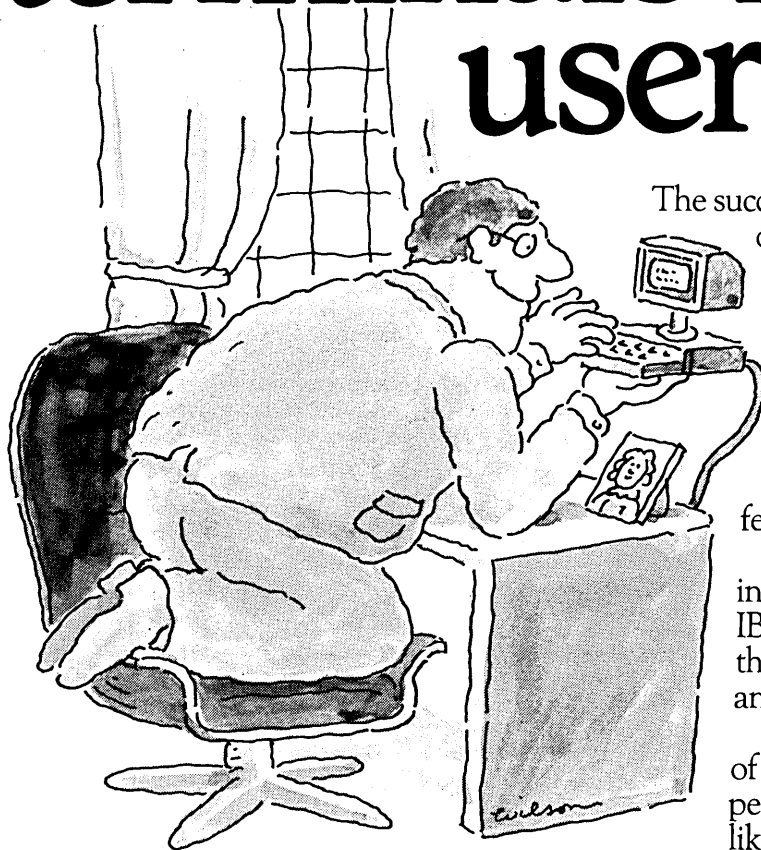
A number of peripheral devices are used to interface and control external equipment, such as video tape record/playback units, magnetic tape recorder/players, sound amplifiers, level monitors, and code conversion units.

In use, a crt terminal with keyboard, a 300 line per minute printer, video monitor, speakers, and an operations console which contains switches, indicators, and sound modification controls all are located in an operations room some 60 ft. from a computer room where all other equipment is located. The system provides immediate availability of sound effects which have been digitized and stored. Sounds can be modified via computer assisted controls.

Dietrick said sounds can be stored from literally any source on 280 megabyte disk packs.

Industry observer Suzanne Landa says use of ACCESS cuts sound editing time by 80% and improves the quality of sound produced. —E.M.

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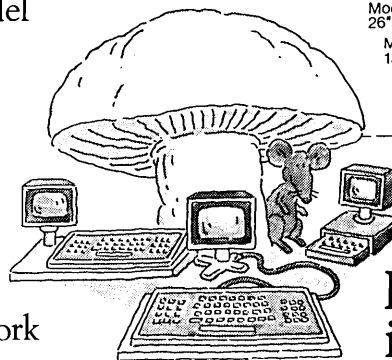
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CIRCLE 37 ON READER CARD

IN FOCUS

VIDEO VERSUS FILM

Computers are far more compatible with electronic-based video technology than with optical-based filmmaking, and that's why more is happening with video and computers than with film and computers.

Consultant Mark Jaffee points out that real-time animation, which is a ways off with film, has been here for some time with video. An experimental video system for interactive creation and manipulation of simple cartoon-like graphics and animated imagery was designed and built at Xerox's Palo Alto Research Center in 1973.

That system, dubbed SuperPaint, was further developed as a research tool, and in 1978 was used in the NASA Pioneer Venus mission for visualization of spacecraft maneuvers during the encounter with Venus, for showing activities of the scientific experiments on board, and for illustration of early results.

More recently a number of companies have developed digital art/paint systems for the tv broadcast industry. These include: Ampex AVA, Aurora's Digital Videographics, Digital Effects' Video Palette, Logica's Flair, MCI/Qantel's Digital Fine Arts, N.Y.I.T/Computer Graphics Lab's IMAGES and Xiphias' Videograph.

"So far nobody's installed more than two or three systems," said Peter Black, president of Xiphias, Santa Monica, Calif., "but it's one of the fastest growing businesses around."

Xiphias is a one-year-old company that has developed digital art/paint software and implemented it on a Ramtek 6214 co-

lorgraphic microcomputer system. This system can operate at either 30 MHz or 60MHz memory refresh rates and offers resolution of 640 x 480/512 pixels. Four refresh memory planes under the control of a software loadable video lookup table support up to 16 displayable colors from a palette of 64: eight colors plus either an alphanumeric overlay or a "blink" function.

Black said he selected the Ramtek system primarily because of price. Since it costs under \$30,000 a user can obtain a system with the Xiphias software for under \$50,000. Other factors in the choice, he said, were the fact that Ramtek meets the NTSC (National Television Standards Committee) video broadcast standard and the unit's colors are completely compatible with tv broadcast colors.

But, Black emphasized, he intends to implement his software on other hardware. "It's written in UCSD Pascal for portability."

Xiphias will sell its software to distributors who also will buy the hardware and sell systems to end users. Its only distributor in early January was Video Systems Network, Inc., Culber City, Calif., but it was negotiating with others on the East Coast and in Australia and South America.

"All the capabilities of a system like this have not yet been explored," said Black, who has one system installed that will be used by an artist to create animated drawings to enhance live coverage of the 1984 Olympics in Los Angeles.

He told of another user who foresees

using it for live, on-the-air annotation of a football game, diagramming actual plays over a real football field. "It permits things to be done that no artist could ever accomplish," he said.

Black's Xiphias is aiming at the low end of this new market, what he has termed the "short turnaround's short burst." In newsroom applications, images could be created and displayed within minutes.

Aiming at the higher end, the high resolution, high quality graphics markets for tv broadcasting, is Aurora in San Francisco. Its systems sell for more than \$100,000. Aurora's president, Dick Shoup, was part of the early Xerox PARC effort.

Video is a low resolution medium, generally. A monochrome video image is created by a tiny electronic beam rapidly scanning a picture tube, from left to right, from top to bottom. In Europe and many other parts of the world, the number of scan lines, or rasters, is 625. In the Americas, the standard calls for 525 lines. This process is repeated 60 times per second, with alternating lines, yielding 30 frames per second.

Higher resolution is possible. Academy award-winning film producer Francis Ford Coppola believes videotape could produce film in movie making as soon as tape technology makes a fine-grained image possible. Another director, Sidney Lumet, suggests that for this to happen, movie-quality tape would use something like 25,000 lines per frame.

—E.M.

cess and led to the development at Disney in 1978 of the Automatic Camera Effects Systems (ACES). This system is permanently installed on a sound stage at Disney Studios. It consists of a camera stand mounted on a 68 ft. long fixed two-rail track and a minicomputer and servomotor controllers

Computer aided restoration has been successfully applied to films transferred to tape.

located in an air-conditioned computer room within the stage. Devices used in conjunction with ACES include a process projector, a video camera, two video monitors, a video tape recorder, a 16 ft. by 25 ft. high frequency blue screen, a 38 ft. by 72 ft. DC blue screen, and other effects devices that can be wired up to ACES to achieve some special purpose. The computer is a Data General Nova 3/12.

Computers can even be cost cutters in filmmaking. One approach to cutting down on scenery costs is to inset actors into miniature sets. Magicam Inc., Hollywood, has developed a system which automatically maintains a real-time perspective match between scene components under dynamic conditions. The unit, in essence, simulates

a 6 degree-of-freedom pantograph coupling two cameras at different scene scale factors.

In the very near future, as data compression techniques are improved, computer technology will be used to digitally encode and store old films, making current archival worries about the decay of negatives a thing of the past.

Computer aided restoration has been successfully applied to films transferred to tape. *Gone With the Wind* (MGM) was reconstructed on videotape from a 1956 Technicolor dye transfer print by Image Transform Inc. The minicomputer-based system resolved outlines, restored color intensities, and reduced noise.

Computers have starred in many movies. Initially they were seen as whirling tape drives or card sorters or flashing terminals, but studios are changing and the latest computer stars do look like computers.

Other uses of computers in movie making are more mundane and of longer standing. They include scheduling, payroll, market research, and word processing.

Interest in all aspects of computer use in making movies seems to be growing. Landa points to a recent demonstration at Disney Studios for the Society of Motion Picture and Television Engineers (SMPTE),

which drew an unprecedented attendance of 400.

When she first became interested in computers and films, she said, "I was told, 'you'll find us very unsophisticated.' I found them to be unsophisticated in some senses and more sophisticated than they thought in others."

She envisions a future where films will be made totally by computer—without actors or cameras—but she emphasizes that

Studies are changing, and the latest computer stars do look like computers.

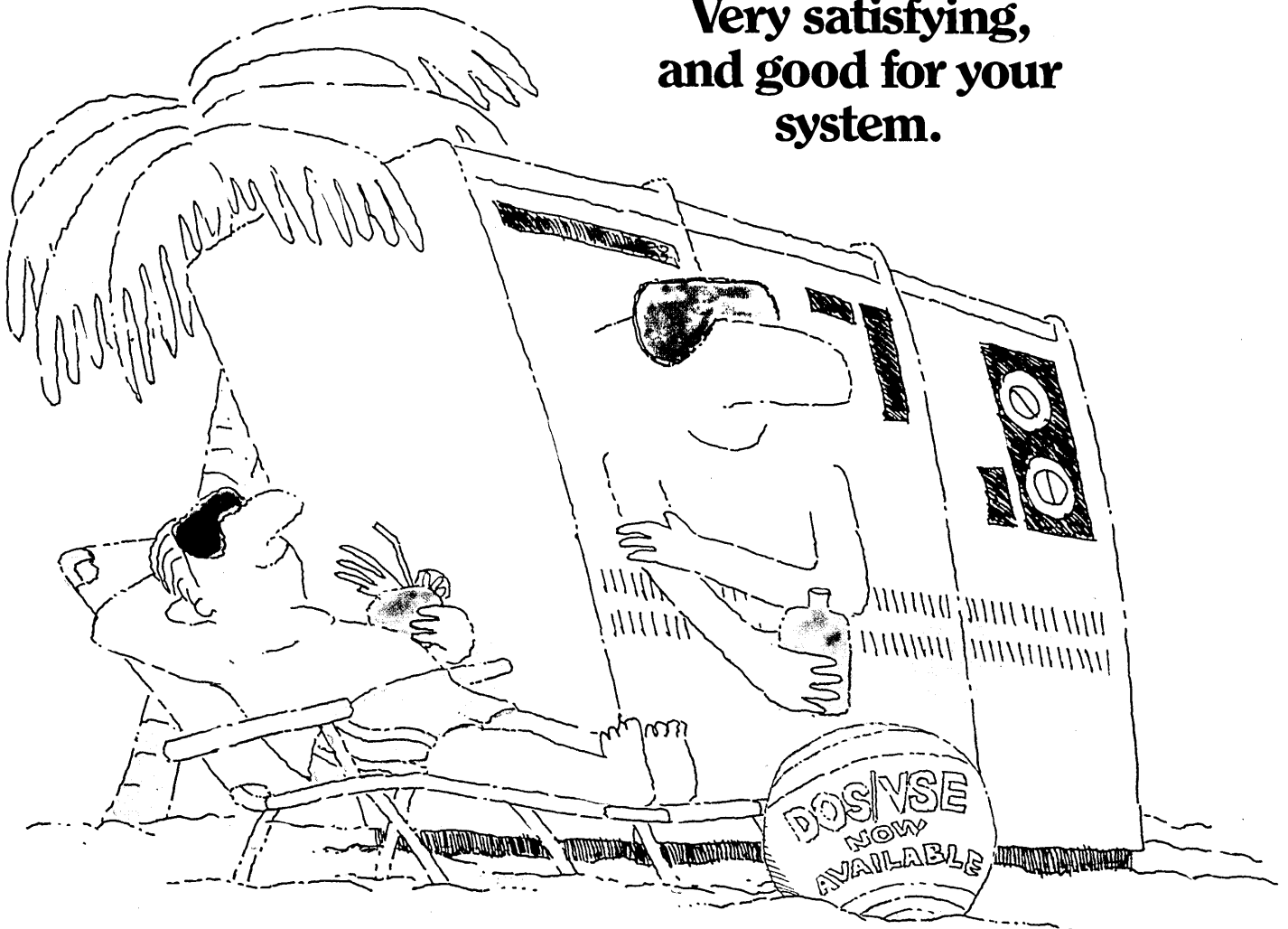
these will be "a new genre, like animated films, live films, etc. They won't replace anything."

And way down the line, she muses, there's the possibility of "preserving" the talents of some of today's best actors via digitization of the human form, maybe even combining the best of one or more. "Can you see a Bissett-Bacall combination?" The legal problems could be horrendous.

As for the actual "Looker Effect," there's no indication that kind of thing is possible today or ever will be. So much for selling lawn chairs in January.

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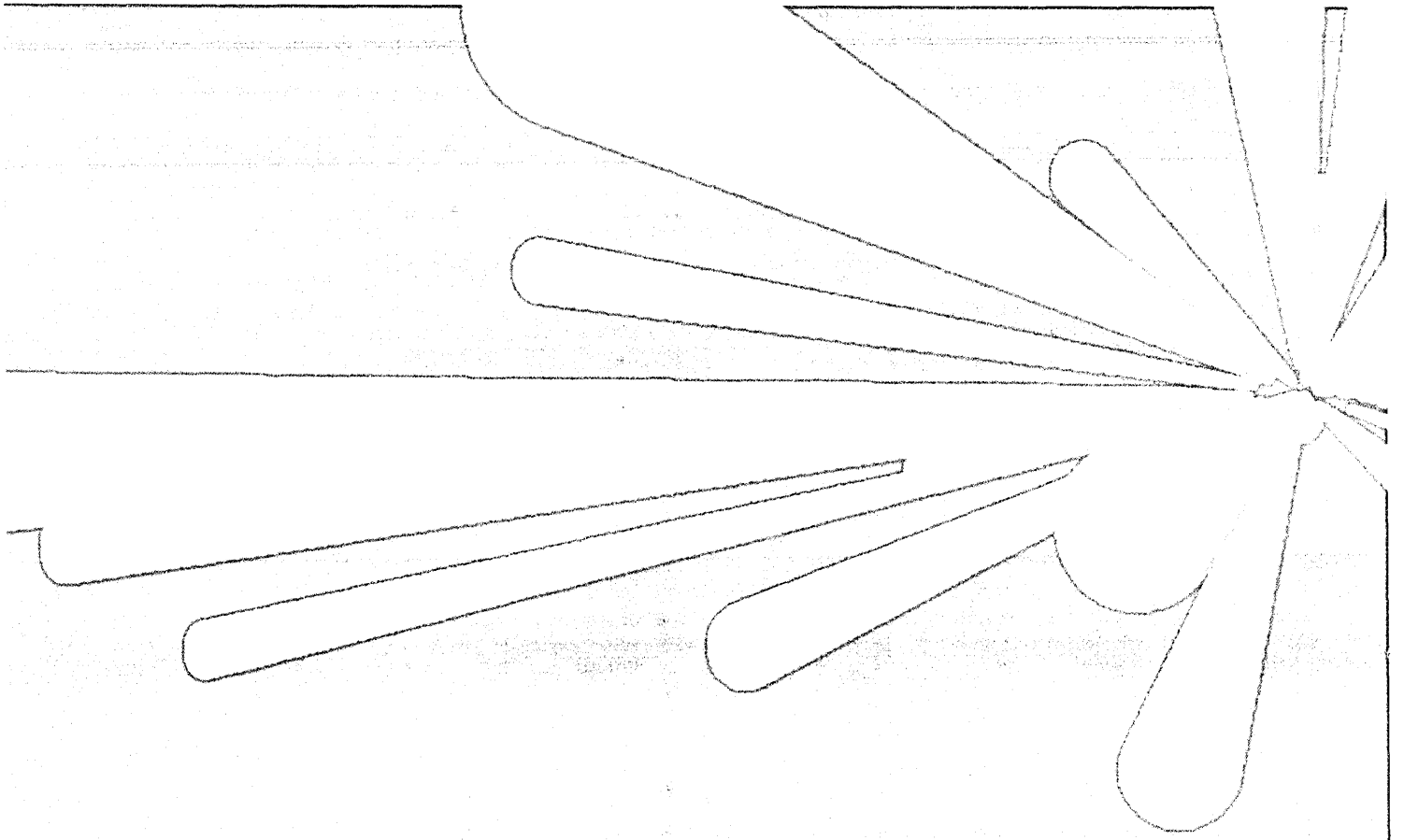
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SAD SAGA: SLASHED SERVICES

Political infighting is said to be one reason IBM's reentry into the U.S. services business is but a "vanilla" offering.

Behind the announcement of the new coast-to-coast IBM Information Network lies a saga of lost opportunities and political infighting that have delayed the giant's reentry into the U.S. "bureau" business by some two years.

The question of why IBM didn't immediately return to the U.S. computer services business after its "forced retirement" ended in 1979 has puzzled many people.

During its 1973 antitrust settlement with Control Data Corp., IBM agreed that it wouldn't reenter the U.S. data services business for six years—though it continued to provide these services overseas.

Now reliable sources reveal that an IBM task force voted some time in the fall of 1979 for an immediate return to the U.S. data services marketplace. The group recommended, almost unanimously, that IBM use its European Data Center Service (DCS) model to jump straight back into the U.S. business.

The sources claim that this recommendation was overruled by IBM technical divisions which favored starting afresh with a more ambitious approach based on the VM interactive operating system.

Though IBM top management's bureau conception calls for an SNA implementation so that satellites can eventually be tied into a multifunction host, the company decided to go along with the VM solution, sources claim.

Said one source, "The decision to implement an SNA ideology through VM didn't make any sense. The two don't work well together. In order to use VM with SNA you have to go through a piece of software called VCNA [Virtual Communications Network Application] which degrades the performance of both by about 25%.

"It makes much more sense to use the IBM Europe timesharing system, VSPC [Virtual Storage Personal Computing], which was designed specifically for use with SNA/VTAM," he added.

The task force urged IBM management to bring VSPC to the U.S. and get its bureau operation off the ground. "Their reasoning was that if IBM had to do the VM thing, at least they could have the bureau up

and generating revenues while they were developing it," said one insider.

This idea also was squashed, and the VM development effort began in earnest.

As earlier revealed in these pages (September, p. 46), IBM had begun to move large numbers of VM programmers and technical staff to the site of the bureau's central computer complex in Tampa. The target date for completion of the VM applications package and the service bureau's launch was October 1981, according to insiders.

"Even a year ago things didn't look good for the VM people," said one source of the Tampa setup. "Though it's generally agreed that VM is probably the best interactive system ever written for programmers, they were having problems with its conversational monitor [CMS]."

The source continued: "It's very difficult for noncomputer people to go through CMS; it was designed for computer people. This makes it difficult to develop end-user applications.

"Another problem," said the source, "is that when you work with a virtual machine, it's like being in a padded cell with high walls. Your data is secure and you won't easily corrupt or steal someone else's, but by the same token you'll have difficulty sharing files."

According to one expert, end-user applications and file sharing are crucial to

Though IBM top management's bureau conception calls for an SNA implementation, the company opted for a VM solution, sources claim.

any full SNA implementation. "The real money in the service bureau business comes from addressing canned applications to non-dp professionals.

"Probably less than 20% of revenues come from the pure language processing [i.e., user writes his own programs] that CMS handles so well," he concluded.

By June of last year, it became clear to IBM that the VM applications package, though complete in some areas, would slip its October deadline, said one inside source.

"So, two years after the task force recommendation, IBM management decided to bring over the VSPC timesharing package from its Netherlands center in Europe and install it in Tampa," he revealed.

"One major reason for the move has been the success of a piece of software designed by IBM in England to generate end-user applications through VSPC. The software is known as AS [Applications System]."

"IBM has tried, so far unsuccessfully, to get AS to run under VM/CMS—and they'll probably keep trying," said one source.

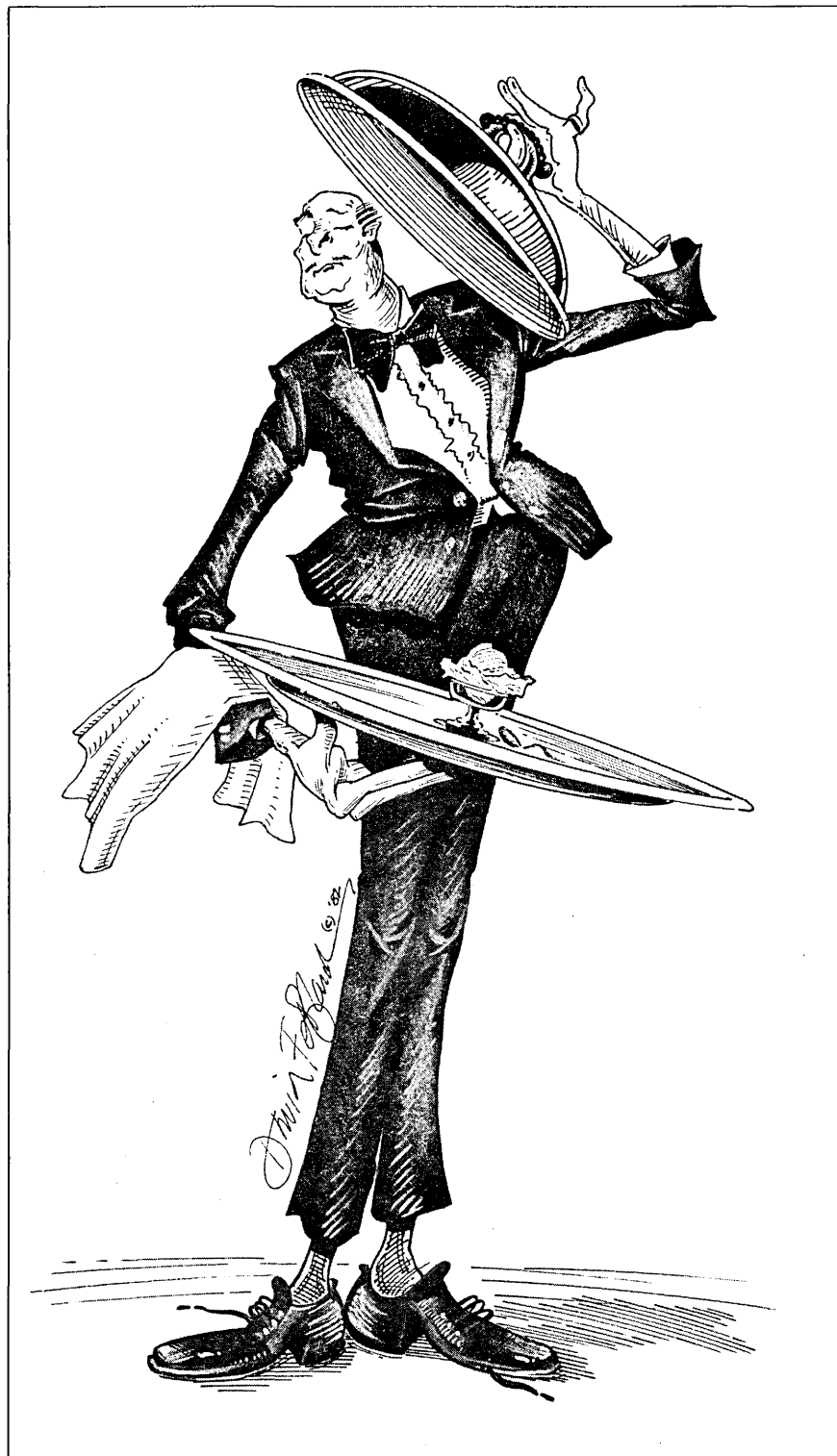


ILLUSTRATION BY DAVID FEBLAND

At press time, IBM had not confirmed that the VSPC/AS combo had been up and running in Tampa since the summer. But information received from within the complex over the past few months indicated that IBM was gearing up to go with the AS applications front end.

"The plan," said one source, "is to put a 3705 controller in each of the local centers—Atlanta, Chicago, Dallas, New York, San Francisco, and Washington. The

customer simply dials up his nearest center and is presented with a 'menu.' In effect, he can go one of two ways—either into the MVS stream or into the VM stream, depending on his application."

Though this arrangement is implied by the IBM announcement, there is another key element in the plan which was not announced by IBM. Sources say that alongside 705s will be Series/1 front ends, each running a special program written at Yale Uni-

versity. This Yale program, called the IUP, will allow any user with inexpensive ASCII terminals to do full-screen work as if he had a 3270 in his hand. "As far as I know," said one source, "no other bureau service offers such an innovation."

According to one source, IBM told its Tampa personnel at the end of last year that in addition to the Series/1 boost, VSPC/AS would be included in the offering so that the MVS branch could work through it.

"But they [IBM] said that when the Information Network System was announced, it would only be described as an MVS/VM arrangement. There was to be no mention of VSPC and the AS applications front end," said the source.

Then just before announcement of the service bureau came a bombshell. IBM made a complete about-face and decided to

An IBM task force recommended that the company use its European Data Center Service model to jump straight back into the U.S. business.

drop VSPC/AS, sources say. There are conflicting accounts from these sources about why the company took this course, and because IBM still hasn't confirmed just exactly what does lie at the heart of its Information Network, no one is certain beyond doubt that AS won't be offered.

IBM would neither confirm nor deny that VSPC/AS had been or would be present in the Tampa complex. The company declined to add further details about the Tampa configuration and would only reiterate its earlier announcement that it is MVS/VM based. An IBM spokesman said the company would not speculate on whether AS would be made available in the U.S. at some future date.

The best information available at press time pointed to a reluctance by the European DCS—which has now blossomed into an international data services network—to allow AS to be used in the U.S. IBM management has made it clear to major U.S. customers that all software used by the service bureau will eventually be made available for the customer's own use.

This has not been the case with AS in Europe. Though big users like Philips of the Netherlands have attempted to get the English-developed software on-site, the Dutch DCS has resisted. An arrangement was worked out with Philips whereby it looked to them as if AS was on-site, but in fact it was resident in the IBM bureau.

Clearly, if AS is as good as the Europeans claim, major IBM customers in the U.S. will want to get their hands on it. One of these customers, Control Data, which acquired IBM's former U.S. Service Bureau Corp., SBC, could be especially interested, say observers. Though this hasn't been con-

NEWS IN PERSPECTIVE

firmed, CDC is believed to use VSPC—a licensed program product available to all IBM customers—in its SBC operation.

Sources believe that IBM Europe is afraid that Control Data would get hold of AS and offer it back to the timesharing marketplace as part of its own offering.

The European bureaus have paid untold millions to develop AS as a propri-

Sources say that alongside the 3705s will be Series/1 front ends, each running a special program written at Yale.

etary product and apparently are unwilling to allow it to be freely available in the U.S. In addition, IBM Europe's management is thought to be peeved that IBM didn't follow the task force recommendation and use their DCS two years ago.

"They [IBM Europe] may want to control the whole bureau operation from Europe and link satellites into their expanding worldwide network—after all, they've made AS and they've made the bureau thing go," said one European source.

Clearly, IBM wouldn't be in this embarrassing position if it had managed to develop the VM applications front end. Maybe one of the reasons it went for the seemingly

illogical SNA/VM meld was so that the service bureau strings wouldn't be pulled from Europe, but this is all source conjecture at this time. At any event, what IBM seems to be left with presently is an emasculated bureau service, for one reason or another.

"Now when you go through your menu to MVS you'll only get TSO-driven applications," said one insider. "The only applications worth mentioning are in the VM area, and could result in greater sales of small 4300s for remote use. But I can't see them making any money out of TSO."

Said another observer: "They're entering a timesharing business that is at least 10 years old, with a product that isn't very innovative. Without AS I don't see how they can make any money."

As one source said when he reflected on the task force recommendation, "It could have all been so different. They could have been in business in the U.S. for two years already, with maybe \$200 million in sales."

It's strange that this whole saga should hinge on an "ugly duckling." One VMer with characteristic wit said, "VSPC is probably the best thing to come out of California since Howard Hughes's flying Spruce Goose."

—Ralph Emmett

VSPC: A POLITICAL FOOTBALL

VSPC's story is as fascinating as it is strange. This fat and rather unwieldy piece of software was developed in California (both at San Jose and Palo Alto) using IBM World Trade funds.

"The development was started in early 1974—some months after IBM pulled out of the U.S. data services business—so its only obvious applications at that time lay overseas," said one insider.

Only one month before the product's announcement in 1975, its name Personal Computing Option (PCO) inadvertently carried the initials of the French Communist party. "Soon after it was made available in OS, VS1, and MVS versions during 1976, IBM's users reacted to it as if it were the French Communist party," said one observer. "Though they made good use of it in Europe, it bombed over here."

The OS and VS1 versions quickly died. "Its big hangup is that it is the only IBM product that has to run under SNA/VTAM, which makes it big and expensive to install," the observer explained.

Despite this, the fat "ugly duckling," though clearly inferior to VM/CMS and the MVS Time Sharing Option (TSO) in its initial release, has been consistently improved over its three releases and has begun to attract a small but devoted following. Although the bulk of its estimated 300 users are in Europe, some 80 or so are here in the states, including banks, insurance companies, and airlines.

Said one devoted fan, "VSPC has

been a political football from the beginning. At first it was loathed by the MVS/TSO faction in Poughkeepsie because it challenged TSO as the timesharing system for SNA.

"Now that VM/CMS has emerged as clearly superior to TSO in timesharing benchmarks, the 'ugly duck' is seen as a potential threat to the VMers," he said.

"By some interesting twist," the source continued, "the TSO people now see VSPC as a potential ally against VM's growing dominance and are looking to forge a more effective marriage between the two."

Of course, the VMers have a different story to tell. Said one former IBM employee, "It wasn't a question of fearing VSPC; the product simply wasn't good enough, and the marketing people didn't want to touch it."

He went on: "IBM has not actively marketed VSPC in the U.S. for the past two years—it's as if it didn't exist. It's clear that the product has been slimmed down and improved, and it's also clear that it has one major thing going for it—it was designed for both SNA use and bureau use from the start."

One VSPC devotee said that in some areas the improvement has been startling. "There was one university benchmark using a FORTRAN application that showed that MVS/VSPC managed 225 terminals to 150 on VM/CMS.

"And we all know how much better VM is than TSO," he added.

—R.E.

LOCAL NETWORKS

LOCAL NETS' GENESIS?

Ready or not, IBM's about to bare its own local networking scheme.

A heady and elated IBM, finally free of its antitrust shackles, will unveil a networking program over the next few months that could transform the computer industry.

Details of two key elements in the program, namely, new front-end communications controllers (Feb. 1981, p. 40) and a new service bureau (September, p. 46; also, this issue, p. 46) have already been revealed in these pages.

Now a third element, IBM's long-awaited local networking system, is slated for release late next month, sources reveal. All these developments, and others in the pipeline for the near future, are being credited to IBM's distributed processing machine—the 4300.

And as with the "Hydra" remote diagnostics project (August, p. 38), it is to the 4300 technology that IBM has turned for answers.

Like Xerox's Ethernet, IBM's challenger will initially use a baseband link, sources claim. But that's where the similarity ends. IBM's local net for 4300 computers will use the opposing "token ring" design with twisted pair cables and completely different protocols, sources tell us. The IBM "ring" data rate is believed to be somewhat less than the Ethernet mark of 10 megabits per second.

"If IBM *does* do something," says Yankee Group Research director Dale Kutnick, "the hype will be over."

Said Kutnick, "The Ethernet development has attempted to capitalize on five years of talking about local nets—but no doing. More recently Wangnet has attempted to do the same thing with its even more embracing broadband solution."

Kutnick stressed that with IBM in the market, local nets would start to become a reality.

Though rumors have persisted over the past year that IBM was developing a baseband local net to challenge Ethernet, the view of many experts, such as Arthur D. Little's Frederic G. Withington, is that IBM is uncertain of its users' exact networking needs.

One source agreed, adding, "The move is a protective measure. IBM has been preparing a more comprehensive local

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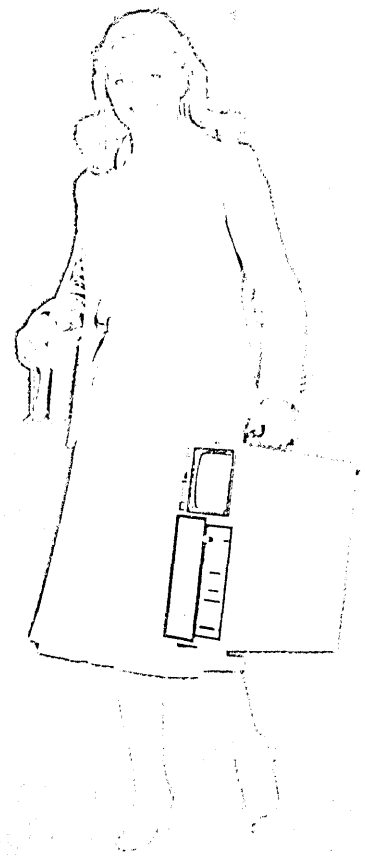
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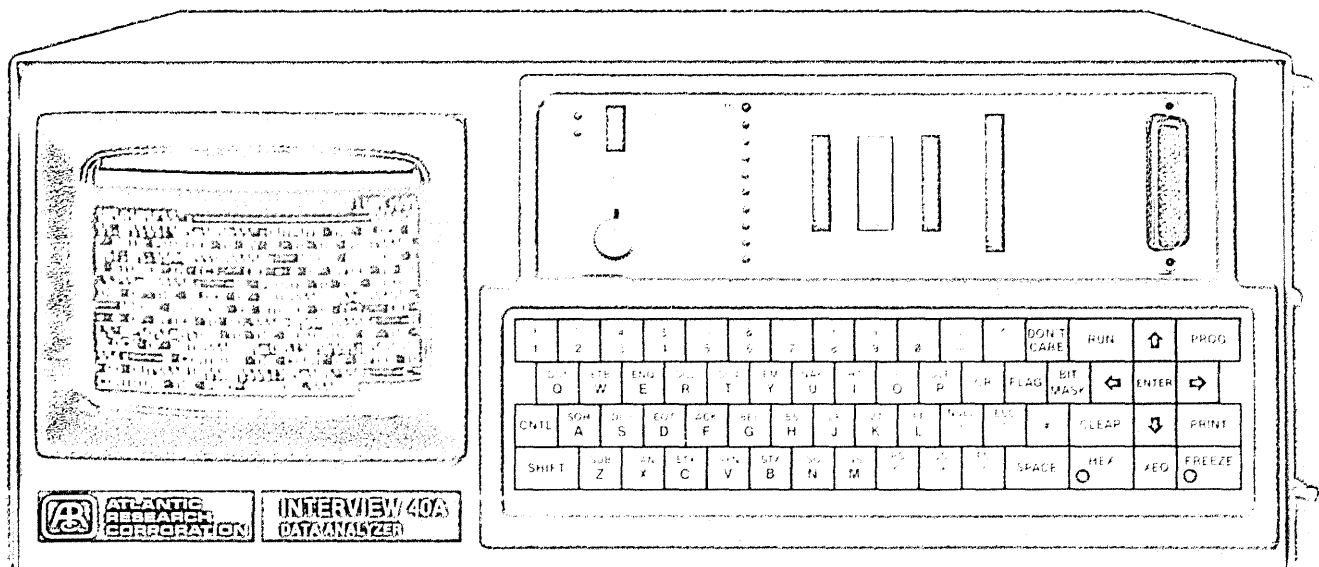
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networking package, including a broadband ring." He said the baseband ring was a "torpedo. They want to sink Ethernet as a standard before it gets a chance to float."

As for users' more "exact" networking needs? "They're definitely broadband," says, quite naturally, Wang's chief designer of Wangnet, Bill Rosenberger. "If IBM is bringing out a baseband ring at this time, it is simply to hobble Ethernet.

"We've been tracking IBM's user base for some time, and demand for our product convinces us that these users want a broadband solution," he adds.

Many analysts agree that broadband is the way of the future, and that the capability to carry voice, video, image, fax, and

Like Xerox's Ethernet, IBM's challenger will initially use a baseband link, sources claim.

the like is essential. But, says Yankee Group's Kutnick, "Demand won't grow until we have the right storage facilities and relational databases to handle such a flow of unstructured information."

A Yankee Group study shows that at least until late next year baseband markets must grow. This is why IBM must counter Ethernet, says Kutnick.

It's perhaps understandable that Xerox has been nervously anticipating such a move from the industry's giant. Though its "partners" DEC and Intel were in on the original Ethernet specifications, so far only Xerox has gone out on a limb. The impression, say observers, is that DEC is holding back. Other vendors whose users have called for local network solutions have watched and talked—but so far not acted.

It's clear that whatever its feelings are, and whatever it believes the issues to be, Xerox will not talk about the threat—real or imagined—that IBM poses.

A spokesman for the company would only say that "Ethernet will survive anything IBM offers."

One other company that has been associated with the Ethernet lobby, namely West German mini maker Nixdorf, seems to be backing away from outright support to a position of ambivalence, say insiders. Asked how an IBM versus Xerox baseband confrontation would turn out, the U.S. subsidiary's director of product planning and marketing, Mike Backler, said, "You have to look at who is buying."

In a pointed reference to IBM, Backler explained that "the guy who is going to sign the check is still wearing a blue suit." Backler, like many other observers, stressed that the runaway demand for distributed data processing (ddp) has come from 360/370 central sites and has been fueled by the 4300.

"But most local networking, even what we've seen so far in offices, is dp

driven and is still controlled from the central site where IBM is dominant," Backler explained. He added that terminal, word processing, and other peripheral companies have little experience of selling to this "core" of control.

"Many MIS managers have been reluctant to commit themselves to local network schemes without knowing what IBM will do," said Nixdorf datacom manager Bob Coch. "Now the outcome will lie in their [MIS managers'] hands."

Asked about Nixdorf's own posture, Backler would only say that it would give its users what they want. "If they want both, they'll get both."

The feeling at Nixdorf, one shared by a recent MIT Sloan School study, is that the current dp driven demand for local networks, which IBM is moving to meet, is only the tip of the iceberg.

The Sloan study shows that on the surface the central site shows a dp applications backlog of some two to three years which users are currently tackling with the 4300. The important thing the study shows is that underneath this central site demand, and largely suppressed by it, is 10 years' worth of pent-up demand for "unstructured" applications—such as text, voice, and image processing.

This potential torrent of information currently has no suitable outlets, Nixdorf's Backler points out. "Currently it can only trickle out on dp machines such as the 4300, and over dp links such as baseband."

"This is why the whole local network thing has been such a hype over the years," says Yankee Group's Kutnick. "The best that can be done at the moment [because the demand for local nets is dp driven] is to give IBM's users a way to hook their terminals and Displaywriters and other devices to 4300s."

This is what the new token ring net will endeavor to do, sources say. "As with the earlier ring system on Series/1 machines, the 4300 user will get an LCC [Local Communications Controller]—a hardware interface board, if you like—which will either slot into the terminals or reside in a separate black box arrangement," one source claimed.

Kutnick contended that if it weren't for the fact that Xerox has been lobbying MIS managers at IBM sites, Big Blue probably wouldn't announce a baseband local net this year.

"There's really no money to be made wiring buildings," said the Yankee Group specialist. "IBM probably won't sell that many more 4300s, though it will sell lots of terminals."

"The real reason IBM would do this is that it wants to maintain control of the remote workstation site, and that's also why it would choose its most successful processor, the 4300, for the net," Kutnick concluded.

One source said that IBM is worried that some of its workstation sites could pass into the hands of the 32-bit mini makers such as DEC and Data General, which have been mounting a powerful challenge in recent months. "So far no useful local nets have been offered with their machines, so if IBM can get its users wired to 4300 nets, it will have a tremendous advantage, and shut these companies out," he ventured.

The workstation is one of the three aspects of the so-called office of the future (OTF)—the big payday application for all computer companies in the 1980s. Put another way, OTF is what happens when the 10-year backlog of unstructured information identified by the Sloan study gets the outlets that enable it to flow.

In addition to the workstation, OTF will be comprised of the communications link and the information storage point. As Kutnick points out, a 4300 workstation linked to a baseband net only provides the first step—the applications generator.

He and other experts, including Wang's Rosenberger and Nixdorf's Backler, say that for OTF to be the key application, the 4300 must give way to a more relational database workhorse, such as IBM's System/38. And the baseband link must give way to broadband so that voice, video, and the like can be carried.

As Burroughs is trying to demonstrate, the growth of electronic filing cabinets and powerful optical devices will take care of the storage side. But if Kutnick's

"The move is a protective measure; [IBM] wants to sink Ethernet as a standard before it gets a chance to float."

right, they will be attached largely to IBM central mainframe sites and will be centrally controlled. Backler suggests that before OTF becomes a reality, local dp networks will have to go through a process of fine tuning.

Sources suggest that a separate and near-term announcement from IBM of new 4300-based communications controllers to replace its aging 3705 could clarify the company's overall networking strategy. These controllers, internally called Mirage/Mistral (Feb. 1981, p. 40), will allow IBM's large users to build more efficient multihost networks. Though initially 370 compatible, they will allow these users to work outside IBM's proprietary SNA nets and in other network modes.

If sources are correct, a crucial thing about the new controllers could be their price—somewhere around the \$30,000 mark for an entry-level controller. This would make them acceptable not only to IBM's big mainframe club but to medium-sized users as well.

The fine tuning that Backler talked of could be handled through the Mirage/

NEWS IN PERSPECTIVE

Mistral front ends, which would become gateways to all facets of IBM's business and to higher operating levels.

One source pointed out that many of IBM's small/medium customers don't have enough data volume to justify rewiring for local networks through the token ring twisted pair. "They'd much rather use their telephone system to drive data terminals through a PBX, he claimed. One new company, Zitel (January, p. 50), is building a ring network to handle both voice and data through a PBX. The new Andover, Mass.,

"Most local networking...is dp driven and is still controlled from the central site where IBM is dominant."

concern talks of big savings to be made by combining voice and data over existing telephone lines.

The source added that he believes IBM will add such a PBX-driven voice capability to its ring network next year. The feeling within Wang is that IBM will go even further and add a full broadband capability to the baseband ring—possibly next year.

Whatever way you view these insights, says Nixdorf's Backler, the real trick will be to bridge these 370-compatible networks to the System/38—or bridge structured dp to the unstructured OTF.

One IBM source said that the company is designing a new 4331-type machine to do this. He said that since the reorganization, the GSD influence has become much more pervasive in senior management. "The System/38 has been GSD's pet and OTF its target. They are now pushing for more of its functionality to be built into the 4300s."

The source said that IBM wants a 4300 with a distributed micro architecture and with each I/O processor having its own bus and memory. He also said that although IBM was expected to come out with a larger 4341 (a big attached processor version) later this year and was trying to build a "4311" to sit on a desk, these two developments were just extensions of the 370 set while the demand is there.

Regardless of how IBM decides to handle the System/38 bridge of two to three years from now, its more immediate problem is to offer the local net that will get the applications ball rolling. This is just a small step for IBM, admittedly, but it could mean a huge shift for everybody else.

As one industry wag exclaimed, "Small moves in the corporate heavens have big consequences here on earth."

Maybe after five years of talk about local networking, the hype is finally over. Maybe this is the beginning.

—Ralph Emmett

PERSONAL COMPUTERS

TANDY TO TEST DP WATERS

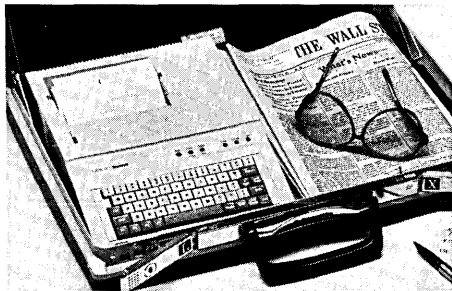
The splashy announcement in January was more than a product introduction.

When Tandy Corp. unveiled in January its first 16-bit microcomputer, the Model 16, it also revealed a new marketing strategy. Tandy is taking its wares direct to the doors of dp and MIS managers.

The news left professional analysts speculating on whether, this time, high-riding Tandy hadn't grabbed hold of more than it could handle. After all, the professional dp market isn't exactly uncharted territory. In many ways, Tandy is face to face with IBM: its marketing organization, its image, and its comfort factor.

"They have jumped into a very substantial competitive arena," said Bill Meserve, senior management consultant with Arthur D. Little Inc., Cambridge, Mass.

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"It will be quite interesting to observe how someone who comes at this from a merchandising, low-cost perspective will satisfy the kind of comfort factor and service the dp professionals expect from their traditional computer vendors."

Some see Tandy's march on IBM's turf as a way of protecting its interests in large corporations from an IBM onslaught. "A lot of people brought micros in through the back door. Now that IBM has a personal computer, dpers can get their come-uppance," said Jean Yates, senior analyst with Gnostic Concepts, Menlo Park, Calif. Their source of newfound power is networks and the need to control what goes on those networks.

What some see happening is the evolution of the dp manager into an objective in-house consultant on the application of microcomputers. "The old bits and bytes guys whose main focus is hardware will be bypassed by those who think in terms of broad scope solutions. Those are the dp professionals who will survive," predicted ADL's Meserve.

Trouble is, dp types don't know much about micros and even less about Tandy microcomputers, discovered Tandy executives after talking with a group of Ft. Worth-based computer center managers. Dp managers in the Midwest and on the West Coast were no different, Tandy found.

"I've thought about micros for one reason or another, but never considered Tandy," said Riley Jackson, a regional data center manager for Electronic Data Systems Corp. Sara Read, director of corporate computer services and communications for the Pillsbury Co., said she makes a distinction between personal computer vendors and vendors of distributed processing equipment. She associates Tandy with personal computers and "as a dp person, I probably am not going to make a concerted effort to sponsor them among potential personal computer users in the company."

Without question, in the dp world

Some see Tandy's march on IBM's turf as a way of protecting its interests in large corporations from an IBM onslaught.

Tandy has an image problem. But the company is convinced it has a future selling to dp managers in large corporations. "This has been an evolutionary process," stressed Jon Shirley, Tandy vice president of computer merchandising.

"We did not just wake up one morning and jump in. Initially, we put an awful lot of machines out there, learned what they [the market] wanted, and laid plans for how to provide what they wanted. We wouldn't be

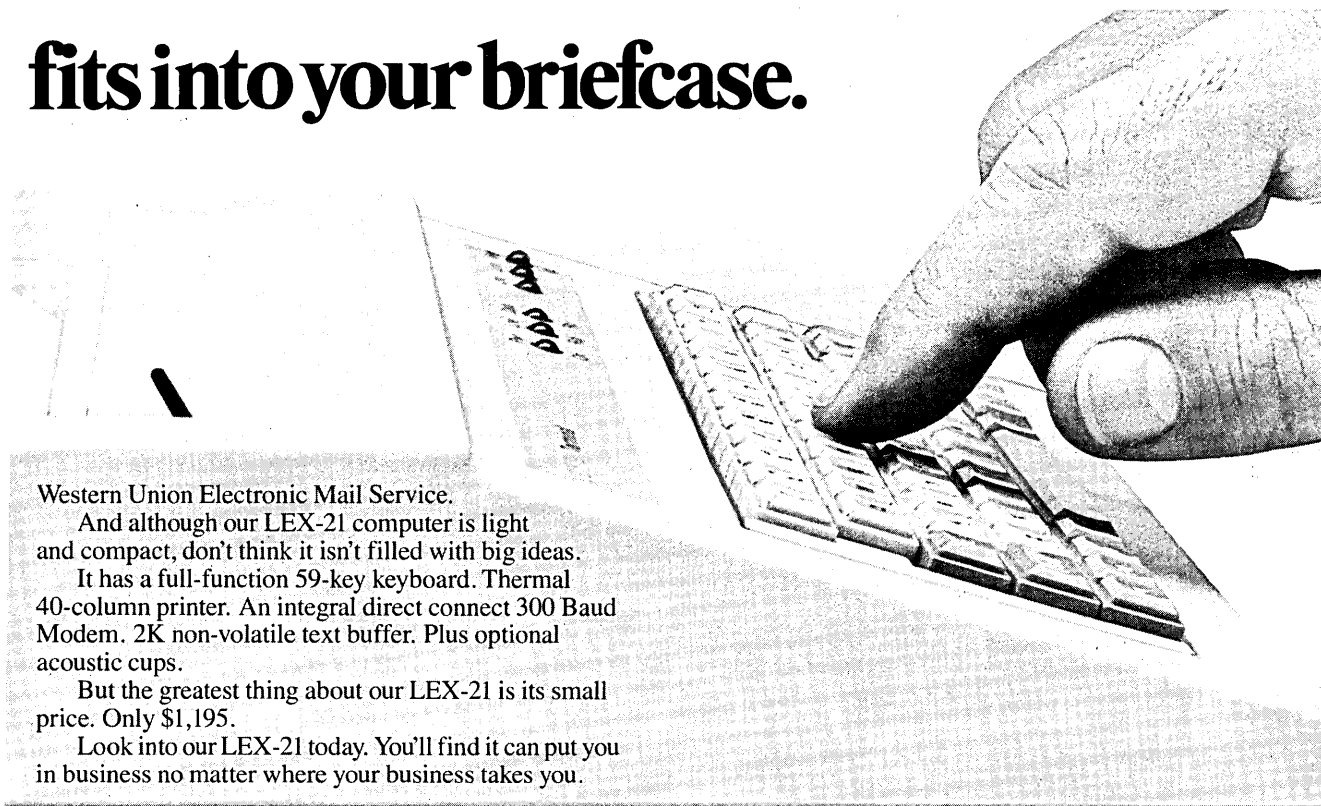
offering bisync and communications packages if we didn't think there was a reason to do so."

As part of its new marketing strategy, Tandy has put in place over the past nine months a field sales force. It is also creating a seminar program aimed specifically at educating dp professionals on Tandy's role in their market. The sales force, which numbers about 20 and is growing, has a heavy helping of former mainframe company salespeople, many of whom came from Honeywell.

Said Charles Phillips, senior vice president of special markets: "Retail people don't know how to talk to national accounts. That's why we hired salespeople from the mainframe companies; they already know how to talk that language. These people saw microcomputers coming over the horizon and saw a new marketing opportunity. A lot of them came to us; we didn't seek them out." Addressing the "comfort factor," the company claims to have "close to 200" service center locations, including service people located at computer centers as well as regional repair shops.

To better fit its products to the office environment, Tandy has switched from the gray color of its TRS-80 cabinet to a cream color for the Model 16. It also added a green-tinted monitor screen; to the right of

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NEWS IN PERSPECTIVE

the screen are mounted one or two thin line, 8-inch doubled-sided megabyte disk drives made by Tandon Corp. Two additional floppy drives, each with a 1.25 megabyte capacity, can be added externally. The detachable keyboard is laid out the same as in the Model II. Internally, there are two mi-

Trouble is, dp types don't know much about Tandy microcomputers, Tandy execs have discovered.

croprocessors, an MC68000 16/32-bit processor capable of handling two additional dumb terminals, and a Z80A 8-bit processor, providing full compatibility with all Model II programs. Maximum internal memory is 512K, starting at 128K and expanding in increments of 128K. While the 68000 chip is capable of addressing much more memory, the Model 16 box cannot hold more than 512K. A basic configuration of Model 16—a single disk drive, 128K RAM memory, and two serial communications ports, one of which offers bi-synchronous—goes for about \$5,000. For just under \$10,000 the Model 16 would provide 256K RAM memory, 8.4 megabytes of hard disk storage (the hard disk is made by Shugart), and a single 1.25 MB floppy for backup. Initial deliveries are slated to begin in March.

"Most people who make computers in the \$40,000 range are in competition with Tandy whether they like it or not," pronounced Rich Gochman, vice president with the investment firm of J & W Seligman & Co. Added Gochman: "There goes another definition out the window. Personal computer, didn't it used to mean one man, one computer? Next year the term is not going to be valid." Meanwhile, most mini-makers making any money at all have moved up to the 32-bit machine. Sales for the 16-bit minis were flat, say analysts.

John Roach, Tandy president and chief executive officer, has targeted a couple of markets for the Model 16: first, "as a relatively high performance, small business machine to do jobs that the mini people possibly couldn't reach in the past because of cost. Also, we think that in larger corporations, because of the communications capabilities, it makes a high performance workstation. Distributed data processing is certainly a possibility."

The consensus among the analysts seems to be that the Model 16's biggest success will be among the largest of small businesses, or those in the \$500,000 to \$10 million range. For now, said Esther Dyson, a microcomputer industry analyst with Oppenheimer & Co., New York, Tandy stands at the top among the big hitters in the micro market. "There are others out there with

more sophisticated systems, but they don't have the market share."

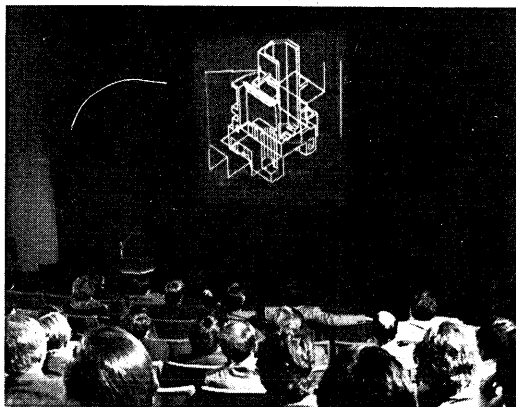
Software is the product's weakest link, observed Seligman's Gochman, but in the past year "Tandy has demonstrated an excellent ability to develop company-labeled software."

The Apple III is expected to suffer the most as a result of the Model 16 announcement. Since Apple can't afford to withhold the model IV, the Apple III may claim title to having one of the shortest product histories around, industry sources suggest. The Apple IV, which also is a MC68000-based system, has been described as a low-cost system resembling the Xerox

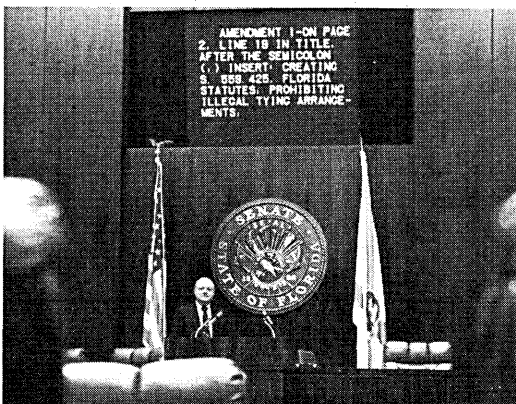
Tandy's new sales force has a heavy helping of former mainframe company salespeople, many of whom came from Honeywell.

Star executive workstation. So, says Gochman, "There may or may not be a market there, and it may or may not work."

Meanwhile, Tandy is going after a known market and selling a \$20,000 to \$40,000 computer system for \$15,000, and even has a leg up on IBM. While IBM purchases much of its Personal Computer hardware and all of the accompanying software outside, and markets through Sears and oth-



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er outlets. Tandy controls almost 50% of its manufacturing costs, carries its own labels in most of its software, and controls 100% of its distribution network. How's that for a turn of events on OI' Blue?

The potential for a competitive clash with joint venture partner Datapoint doesn't seem to be an issue among Tandy executives. "We have different approaches," pointed out Tandy senior vice president Phillips. "What is low end for them is high end for us. And I don't think they have the same ability to sell. As far as I know, the whole Datapoint thing hasn't

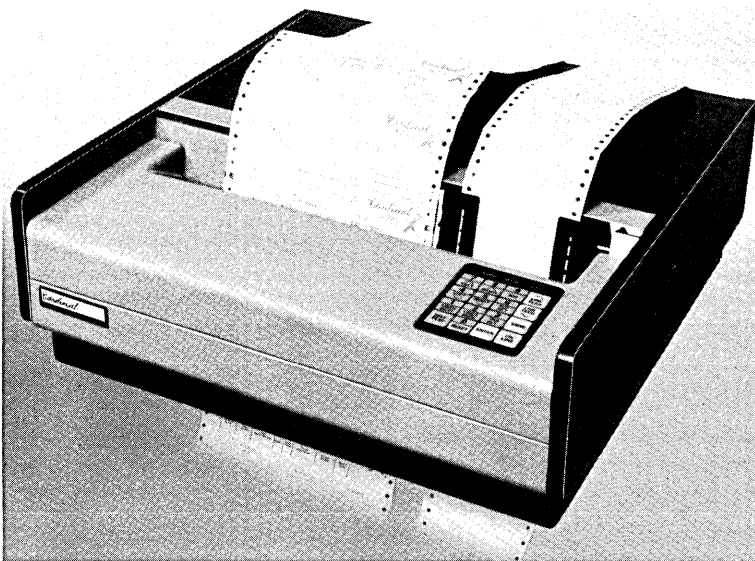
been defined yet, but I don't see it as a problem. We're not structuring our strategy with other people in mind. Instead, we're taking what we've learned firsthand from this business, and building on our strengths and talents and distribution network."

Roach agreed. "Clearly, there will be some overlap between our latest offering and the offerings of some traditional mini-computer people. If [Datapoint president] Harold O'Kelly were asked about this issue, I'm sure he would say that his is better and mine is cheaper."

—Jan Johnson

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THE PCMS

MAGNUSON BESEIGED

In the wake of a series of embarrassing events, Magnuson Computer must try to make good on the promises inherent in its product design.

"The product is more than good enough to meet the needs of the users for the next couple of years. It can meet what the competition offers and bring the company good gross profit margins."

The words are those of corporate director and computer designer Carlton Amdahl. The product in question is the Magnuson Computer Systems line of small-to medium-sized mainframes, which competes directly with IBM's 4300 series of systems. Few observers of the young mainframe company would disagree with Amdahl's statement. Yet the company's future hangs in the balance, its most pressing problems reflected in its balance sheet.

The past several weeks have been rife with disconcerting news for users and investors alike. On Jan. 26, Joseph Hitt, Magnuson's chief executive officer, departed. His legacy: a \$10 million write-off of the company's presumed assets. The

The company's board, chaired by founder Paul Magnuson, named director Charles R. Cole as acting president.

company's board, chaired by founder Paul Magnuson, named director Charles R. (Chuck) Cole as acting president.

Cole was shocked by what he found: "A lack of discipline and control from top to bottom, in every part of the company."

Cole is there because the board, including famed financier William Hambrecht, has no intention of letting Magnuson fall apart. Cole has been meeting with employees, investors, and everyone else with a stake in Magnuson's future. As for money, Cole says that while it's clear the tough times have not yet passed, "if we can show the company bottoming out and getting the orders to flow back in, we can get money. And we can do it very quickly."

At noon of the day before Cole took over, Monday the 25th, Storage Technology Corp. (STC), IBM's most artful adversary in the peripherals business and an intended mainframe rival, jilted Magnuson Computer at the acquisition altar. The official explanations were that Magnuson's future and STC's interests were incompatible. The underlying truth is more elusive, but

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NEWS IN PERSPECTIVE

the speculation is that STC was not satisfied with Magnuson's plans for future machines, with its corporate infrastructure, and with its relationship to customers.

The day before Cole took over, Storage Tech jilted Magnuson at the acquisition altar.

Chuck Cole agrees that there are problems in all these areas, but he was not the ceo at the time the talks were held, and he feels he can replace the unstable structure Joe Hitt had built.

Wall Street, often inhospitable to IBM's rivals (and generally less than loving toward IBM itself), is downright hostile toward Magnuson, when taken off the record. On the record, everyone is more polite, but there are no bulls yet visible.

"Plug-compatible manufacturing is a risky business, and everyone knows that," says Harry Edelson, stock analyst at First Boston Corp. "The concept is legitimate and it has a long history. Amdahl Corp., for instance, has made it; others haven't. Right now, things look rough for Magnuson, particularly since the merger

with STC was called off."

Even the company's most unsympathetic critics acknowledge the virtues of Magnuson's product design. There are an estimated 400 Magnuson mainframes in the field now, and many of them have been enhanced from the performance level of the original model 3 to that of the larger models in the 4/40 group. The computers give a lot of bang for the buck, and once brought up properly, they seem to stay up. All this is what the manufacturer intended to do from the first. But, observers add, the ideas behind Magnuson Computer were never challenged; the company's execution of its plans is the source of investor disdain and of user recalcitrance.

Magnuson shipped its larger models late compared to its promises, but early in terms of its in-house testing. The company has had a devilish time getting all the bugs out of the machines, reflecting a failure, quietly acknowledged, of its engineers. Did this lead to a slowdown in marketing? Apparently not, which in itself is not so unusual. But in some cases users may have been led to an excessively optimistic view of their likely delivery dates. In any event, customers for the larger machines were shipped smaller units and given assurances that the units would be upgraded as soon as possible.

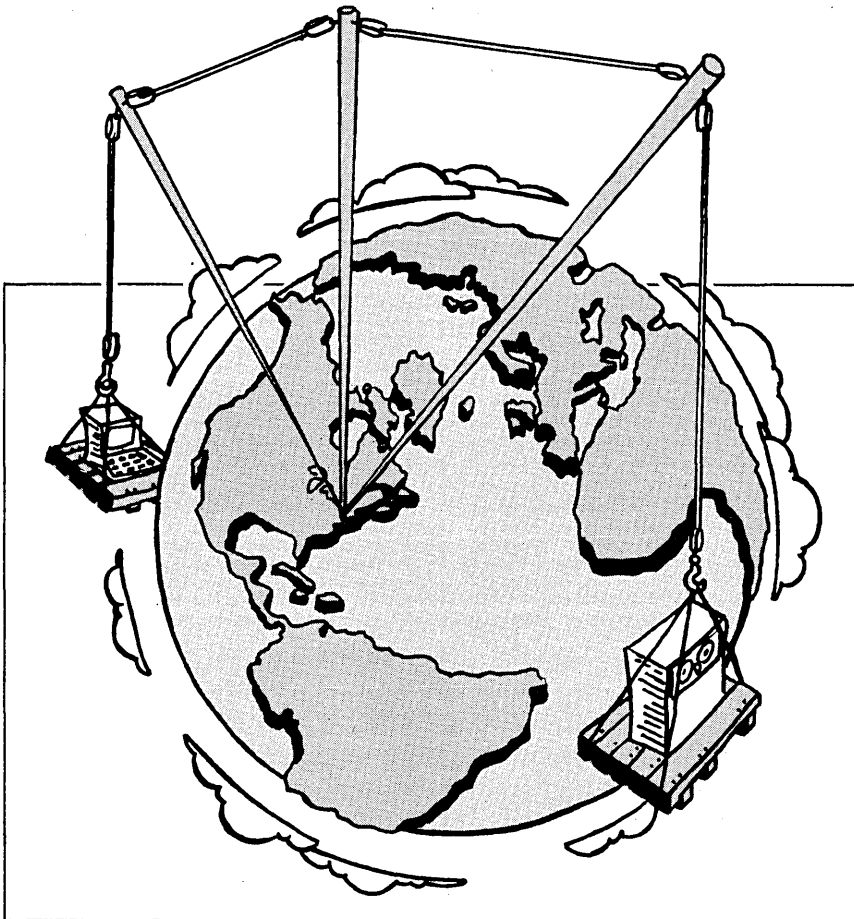
This put a lot of pressure on the manufacturing department. It also reduced the company's revenues and created a substantial obligation to users. By the time all the known engineering kinks were straightened out, the pressure on Magnuson's man-

Magnuson shipped its larger models late compared to its promises, but early in terms of its in-house testing.

ufacturing group had become almost unbearable. Circuit boards were pushed through assembly and testing at an excessive rate. Resources initially mustered to make new systems of all sizes were applied to the upgrading effort. Salesmen were pressed into service as diplomats. As if this wasn't enough, hastily assembled boards put in the field were subject to an unwarranted number of flaws and failures, some of them attributed to shortened burn-in schedules. The details are buried deep within the company, but a visible record of Magnuson's struggle does appear in the company's financial statements.

Magnuson had been doing better each quarter until the end of 1980, about six months after it was brought public by Hambrecht & Quist and Blyth Eastman Paine Webber. The financials for 1981 show Magnuson on an accelerating slide downward.

Along the way, some users lost patience, some investors lost faith, and some employees—including Carlton Amdahl—



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found exits. Nevertheless, as Magnuson entered 1982, it seemed, for a time, that the worst had passed.

This was not the case. Early in the year, the true magnitude of the company's problems was revealed.

Merger discussions had been under way between Magnuson and Storage Technology. STC was familiar with Magnuson's products and had chosen a Magnuson computer as the hub of its Virtual Storage System. (Part of the agreement includes a granting to STC of manufacturing rights in the event Magnuson cannot make good on

"Plug-compatible manufacturing is a risky business, and everyone knows that."

its delivery promises.) If Magnuson was having trouble, as it had already acknowledged, a proven competitor of IBM was, at the time, still confident in the company's fundamental worth.

But then the negotiations were called off. Both STC and Magnuson made it clear that no deal would ever be struck. The next day, chief executive Joseph Hitt left and Magnuson owned up to enormous financial miscalculations. The company's receivables and inventory were to be reduced by some \$10 million, and the results for the quarter would include a loss larger than that amount. In financial terms, Magnuson would now have a debt as large as its reduced shareholder equity, by itself only a caution. Translated from accounting into English, the write-off meant that formerly firm orders had softened or disappeared and that electronic assemblies that had been presumed to be in inventory were all in the field—or on scrap heaps.

All this fostered doubts among the big money types that the company could recover . . . unless there is an infusion of capital, closing of the communications gaps that contributed to the management mess, and development of a sound plan for meeting the demands of the moment, as well as those set by the inevitable next generation of systems.

In trying to sort out the situation, management has encountered a good deal of backbiting. Some fault lies with the engineers, some with manufacturing executives. But the prime target of critics, including those within the company, is right at the top, in the office formerly occupied by Joseph Hitt. The buck stops there, with the chief executive, when things go wrong, and there is no question that things went wrong. The problem for Magnuson's directors, who chose Chuck Cole from their ranks to run the show, is to separate style from substance, to not only find out why things went awry, but to reexamine the company's situation so that it can avoid future pitfalls.

Customers aren't waiting for Mag-

nuson computers now; IBM is in the catbird seat. While Magnuson's small systems were well received from the first, one of their key attractions was the promised but poorly executed upgrade path. The sales force will have to get a bunch of larger machines out the door in order to attract users who might want the smaller units. In the meantime, Chuck Cole has to get the engineering and manufacturing people in sync. There may yet be some snags with the top of the Magnuson range, and the proof of Cole's competence may well be the way he faces any remaining technical problems.

Then there's the matter of money. The typical behavior of new management is to write down everything the accountants will allow when you take over; this minimizes the impact of undiscovered difficulties. But running a computer company after orders have collapsed will cost money anyway. There is no way to say how long the red ink will continue to flow, but it is likely that shareholders will have to be patient for at least another quarter or two. So will the banks, which will no doubt be asked to exercise patience with Magnuson's debt, and suppliers, who will be asked to extend credit as the shaken company tries to regain its balance.

All told, Magnuson could require \$5 million to \$10 million in cash and credit, although unofficial estimates by management place the figure below that range.

Where's the good news? In an unlikely spot. The sales force, sometimes viewed as a relatively opportunistic organ,

Customers aren't waiting for Magnuson computers now; IBM is in the catbird seat.

is sticking with the company. This, in a dog-eat-dog world, is telling. None of the key sales personnel have defected even though they face the prospect of living for months on a draw that is well below their expected commission levels.

Another bit of cheer: Carlton Amdahl, whose family name is almost magic in the computer business, has been meeting with Bill Hambrecht and other board members. He is not about to leave Trilogy to resume his executive career at Magnuson, but he does appear to be making a contribution. Under prior management, Amdahl (in his polite fashion) fled the company.

Even if things do not go smoothly at first, Magnuson appears to be a possible target for acquisition by some larger technology company. Chuck Cole was entertaining informal suitors even before his new chair got warm. And if no munificent offer comes in, the corporate flirtations should help hold the line on Wall Street as hopeful investors sit tight. For the time being, Cole is in no position to discourage speculation about a takeover.

—Hesh Wiener

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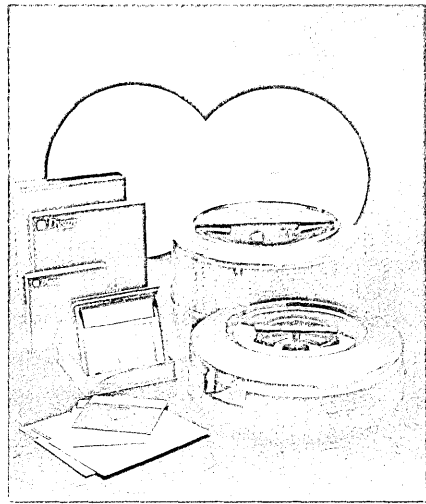
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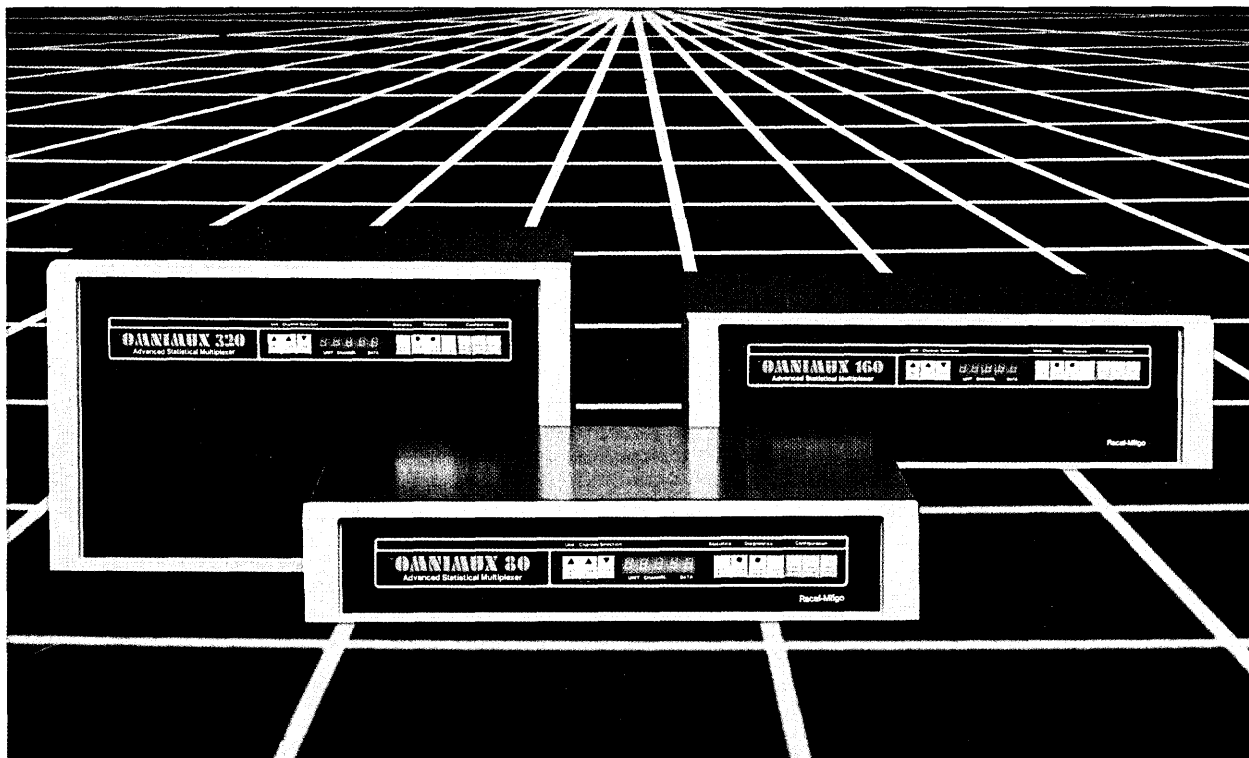
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NEWS IN PERSPECTIVE

DATABASE MANAGEMENT

OEMS FIND USES FOR DATA BOX

The Intelligent Database Machine developed by Britton Lee gets high marks from users.

When Lew Williams took over North American Title Services in 1975, he acquired a database that consisted of 10 million IBM punched cards weighing some 25 tons. That database, now consisting of 15 million property records in Harris County, Texas, one of the largest counties in the U.S., has been reduced to a stack of microfiche that stands about 10 inches tall, some 1,100 cards in all. But Williams, whose database grows by some 4,000 records a day, is now putting it all on disks controlled by an Intelligent Database Machine (IDM).

Of his voluminous records, Williams says, "It's like fine wine. The older it gets, the more valuable it becomes."

Williams is one of a number of oems of Britton Lee Inc., the Los Gatos, Calif., developers of the database processor. The company began shipping evaluation units about a year ago to oems and to sophisticated end-user organizations with

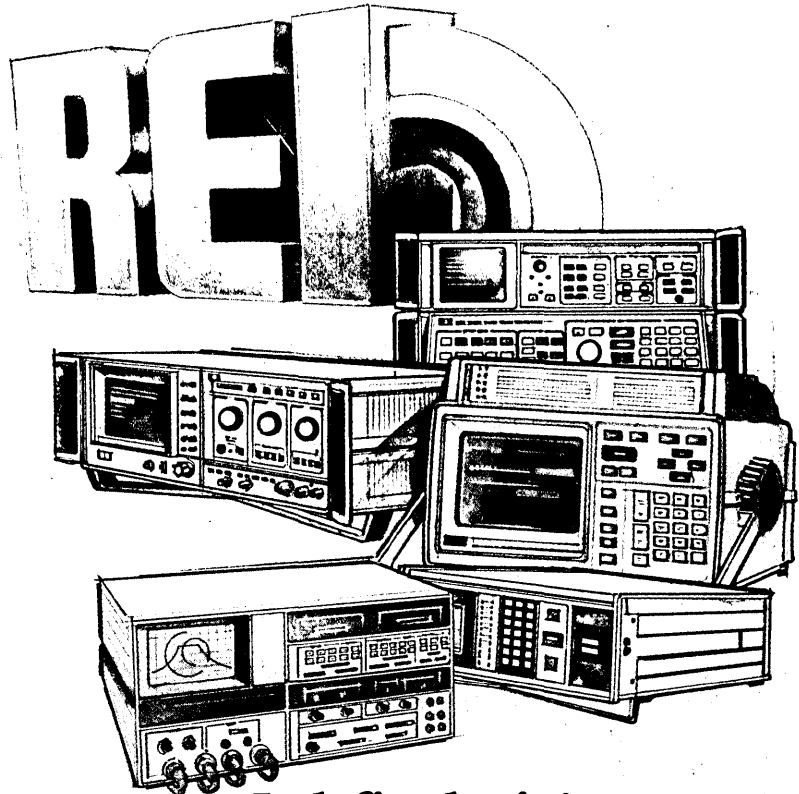
B/L expects to have some 500 IDMs installed by year-end '82.

the capability of developing their own applications. At the end of last year, upwards of 50 units had been shipped and the company was beginning to get repeat orders. Said cofounder and executive vice president Geoffrey Lee at that time, "We've been sowing seeds for nine months."

That makes the current calendar year important for B/L, for it must not only continue to ship evaluation units to those people developing new applications but also begin getting and filling orders for multiple units from those whose applications have gone on-line successfully. B/L president Dave Britton says he expects to have 10 times as many IDMs installed by the end of the year, or some 500 machines. It's the kind of growth rate also experienced by Tandem Computers in its early stages.

An oem that hopes to be placing those repeat orders soon is HDR Systems Inc. of Omaha, Neb., which installed its first IDM system in the Pentagon in January. In this system, the database machine is another resource on the ARC network of Data-

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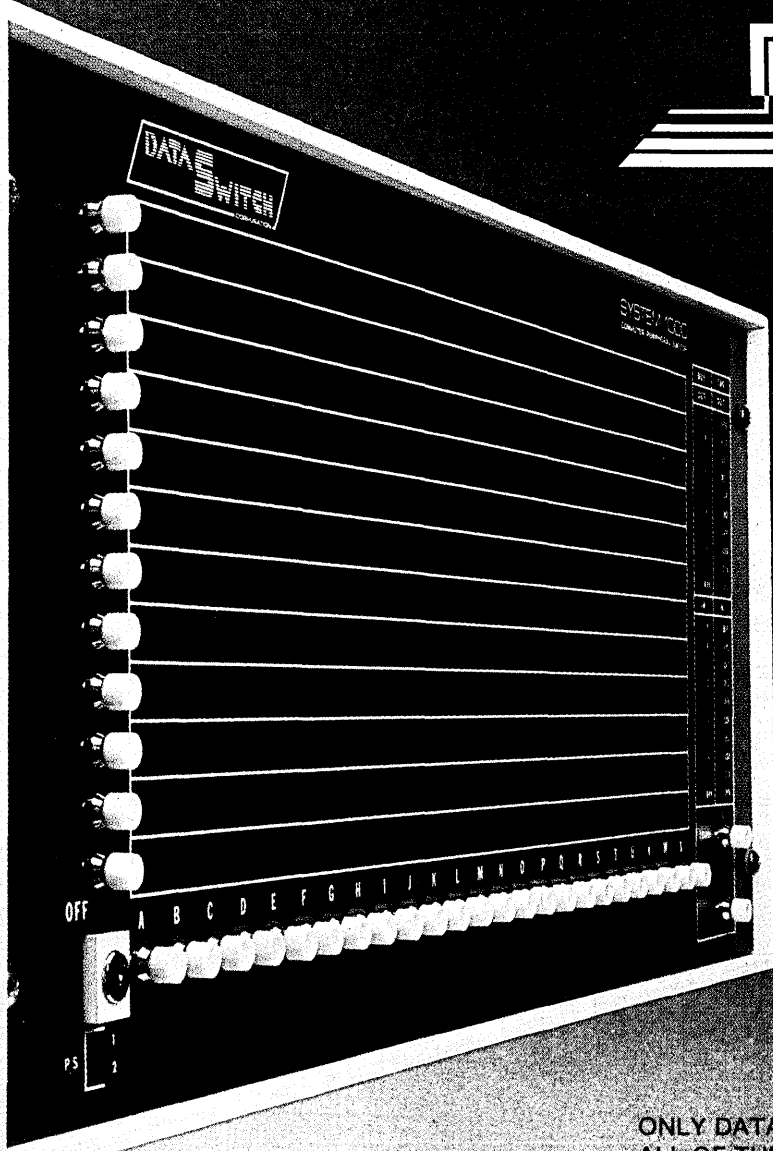
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NEWS IN PERSPECTIVE

point Corp., for which HDR Systems is also an oem. In the local network, the IDM becomes a resource usable by all processors in the net, the Pentagon system being a 100-processor network.

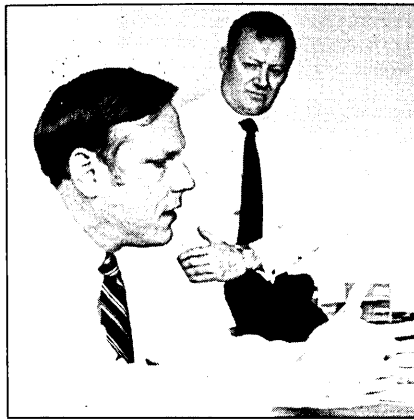
"Our approach is that the relational database structure is easy for users to learn to use to make their own databases," explains Dr. George Haddix, vice president and general manager of HDR Systems, the subsidiary of a large architectural/engineering firm. The IDM will be shared by all those 100 users, "and the users on those processors will build their own databases." Eventually there will be larger shared databases on the IDM for all to use. Interestingly, the IDM in this system is not a back-end machine to some host, but rather a resource on the network like a printer or disk.

"We feel that in the network application, the handling of queries can become a processor-intensive bottleneck," Haddix continues. "So we're making a query processor." It consists of a number of Z80-based processors, each with a PROM with HDR's query language SQL. When a query comes in off the network, a control board sends it to any available query processor on the multiprocessor board.

"In a network where there are smaller processors, query processing can be pretty intensive on the processors, and we're taking that load off," Haddix explains. "Our concept really offloads all the database functions from the so-called host, because we're making a query processor to sit in the same box as the Britton Lee IDM." To this extent it is a different approach from just hooking the IDM into, say, a VAX. The query processor, of course, not only relays queries to the database processor but also accepts results from database accesses, formats them, and puts them back on the network.

Last June the New York law firm of Davis Polk & Wardwell took delivery of an IDM to use as a back-end DBMS serving a network of 120 in-house terminals and four DEC PDP-11/70 computers. The database includes time and expense disbursements organized by client and legal matter for the more than 400 lawyers and paralegals. The system generates billing information, profitability reports by type of law, lawyer, and client, as well as expense reports that detail phone, copier, travel, and other supporting expenses.

Dave Britton says he thinks computing for business applications "is probably all database management." Suppose one is running an MRP job or general ledger or whatever, "if you look at what that is, it is database management. That's all it is," he says. There's no high-level mathematics involved, no Fourier Transform or number crunching, but just the storage and retrieval of information, the updating, collating, merging of information. It's an intrinsic part of CAD/CAM processing, the people at



DAVID BRITTON and GEOFFREY LEE say they're ready for the competition, whoever it may be.

Britton Lee were surprised to learn, and even part of process control.

Converts to the approach of using a special-purpose DBMS processor claim that response times are four times faster than running a DBMS program on a host (general purpose) processor, and yet cpu usage is only about 5%. "So we give you better performance, but then we turn right around and give you back your cpu," enthuses Terry D. Willis, a consultant in Corpus Christi, Texas.

While unable to provide any results

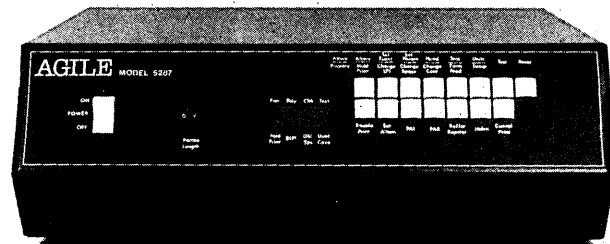
of comparison runs, Willis remains convinced that users can get better performance from a special-purpose DBMS processor than from a large mainframe running IMS, which could be eating up most of a 370/158's cycles.

Willis thinks 90% of minicomputers going in are being used to solve ordinary business dp applications. "An increasing percentage of them are using DBMS," he avers. "The rationale for that is they increase programmer productivity. A Britton Lee machine is no different from any software DBMS in that regard. You're going to get programmer productivity and flexibility. We're comparably priced to software DBMS . . . but we give you back some significant fraction of your cpu in a high, multiuser environment."

Coming to the market with that same idea is Freedom Systems, a systems house in Westlake Village, Calif. This group of independent consultants who've been working together for the past six or seven years says it has spent the last several years trying to come up with a hardware and software combination that would be a user-friendly computing system for the non-professional. They saw the solution in a relational DBMS ("because every report I ever got across my desk consisted of rows and columns," explains Robina Meehan) and then directed their attention to hardware

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CIRCLE 53 ON READER CARD

NEWS IN PERSPECTIVE

to support that ("because we all know how slow relational runs"). Their search was cut short when the Britton Lee IDM appeared.

"So we put our software and our concepts and our ideas of a user-friendly system together with Britton Lee's box," says Meehan. "And we built an interface for the Data General Eclipse line, all of them under AOS and AOS/VS." The idea of their product is to enable anyone with mini-

Some estimate that 90% of minis going in are being used to solve ordinary business dp applications.

mal training and no technical knowledge to get information out of the database. Adds Geoffrey Courtright, the product today is at a level where "at least an administrative assistant, any administrative assistant, can sit right down and start getting information out."

Meehan describes a long-time client with a large database. "They needed a very large survey of their entire database. They needed to analyze that data in many, many ways." From previous experience with them, the systems house figured it would require 150 man-hours to do the analysis and programming in preparation for a run, plus an additional 100 hours of run time. "That's dedicated cpu time."

The database was thus transferred to a disk running under the IDM. One of the technical people from Freedom Systems then sat at a terminal with an executive of the client company. Two and a half hours later, the executive had what he wanted, two of those hours having been used to run the whole report on the database.

"The key here is that a lot of the problem with the Eclipse is the I/O degradation to the disk," Courtright adds. "But this IDM is built specifically to handle that efficiently, and it did. It just cut a hundred hours' run time down to something like two hours' run time. But the DG cpu time involved was practically nothing. All it had to do was pass the information to the IDM."

The client initially thought it would be limited to 16 to 20 users on its system, but now thinks it could easily accommodate 200. "The programmers in an existing shop can still program in the way they've always programmed," Meehan says. "They don't have to be retrained in order to interface with the IDM. As they feel able and comfortable, they can begin to use the new commands." Freedom Systems, which only recently completed its new system, has only now begun sending salespeople out.

The same is true with Lew Williams in Houston. Doing business as Products Diversified Inc., Williams intends to sell his system to title companies and to county

clerks, offering a full-blown capability from data entry using OCR typewriters and readers to document preparation and check cutting at the other end. Williams says people have expressed interest in a variety of configurations, ranging from small stand-alone systems for use in a small office or a small county up to a fairly large turnkey system serving 15 to 20 users.

One significant advantage of his system stems from the propensity for error in the preparation of original documents by attorneys and others. If all the data filed at a clerk's office were without errors, he says, there wouldn't be too many problems. "But when we get a film copy of each document that's filed at the courthouse, we have to assume that every part of that document could contain errors—all the way from the

Converts to the approach of using a special-purpose DBMS processor claim that response times are four times faster than running a DBMS program on a host cpu.

spelling of the buyer's and seller's names to the property description." Thus, even if they key-verified all the data, there would still be errors in the stored data.

"With the IDM, we now have the capability of doing an historical search into the files simultaneously with data entry," he explains. "What we have is on-line database verification, rather than merely key-verification." As the data are being keyed in, the old property record is retrieved (for as long a period back as one chooses to allow), and mismatches can be spotted—where, for example, a piece of property is identified in some instances as block 7 and in others as block 6. These inconsistencies can be spotted and adjudicated.

Not all of this, of course, was foreseen by the founders of Britton Lee. As noted, many applications under development came as surprises. But Dave Britton also notes the company's first product is designed for the middle segments of the marketplace, between the largest mainframes and the minis and micros. "We didn't expect the IBM customers to hound us," he says, explaining that those users needed solutions to problems they were experiencing with their DBMS. But, conversely, in the small-business systems marketplace and among supermini users there was "total disinterest or lack of understanding of what a database was." The latter phenomenon, he adds, has begun to change, and so B/L has come out with its second IDM, a smaller machine to serve as an entry-level processor. Presumably the next announcement will be a larger machine, which Britton says is what people in the company want to build.

Mention the parallels between the growth of B/L and Tandem Computers and

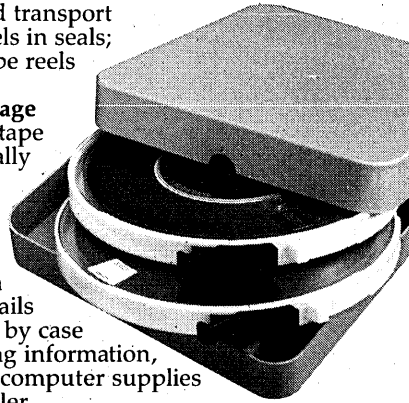
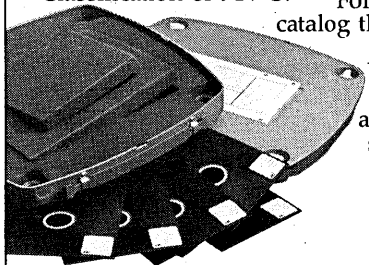
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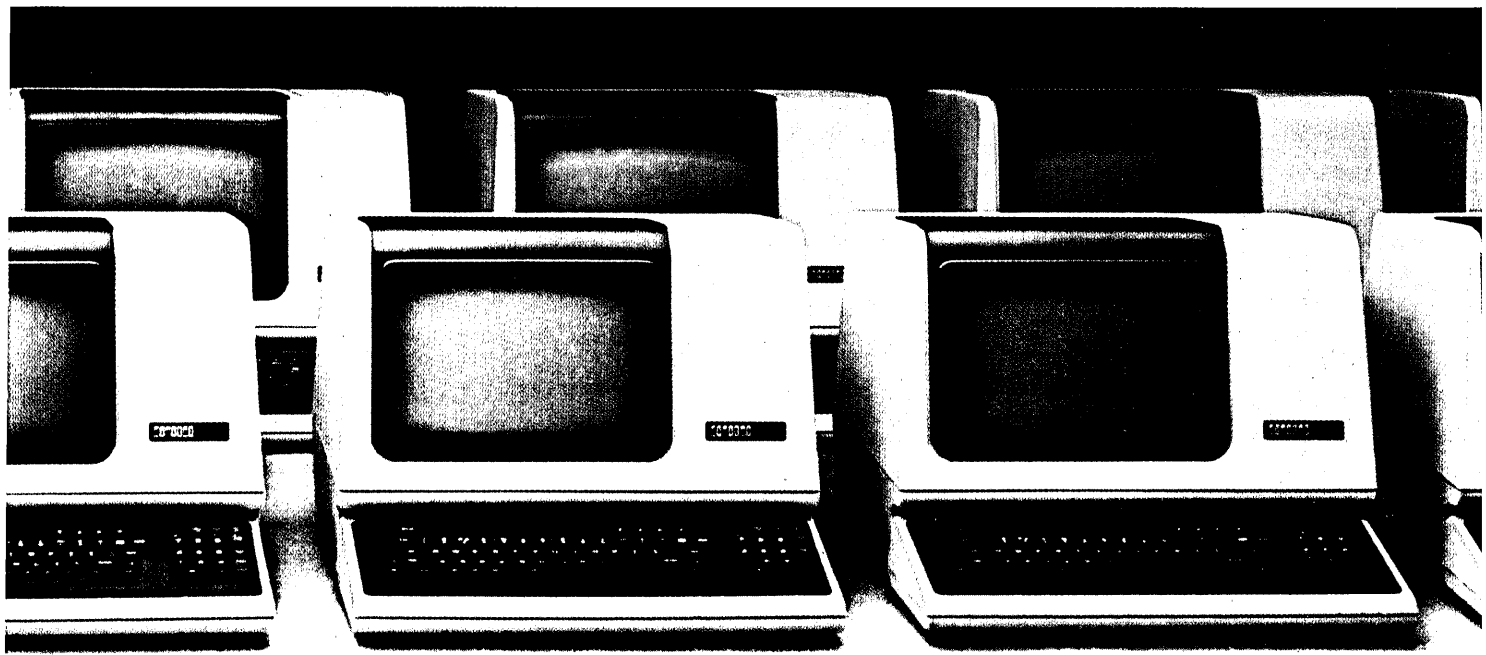
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CIRCLE 57 ON READER CARD

NEWS IN PERSPECTIVE

Geoff Lee observes the advantage that the latter company had—several years without a competitive fail-safe system in the marketplace. Lee says B/L has to recognize the possibility of someone entering the database machine business by leapfrogging B/L's product. That means B/L would have to be able to leapfrog that competitor in turn.

"You gotta go two better," he says, "and it takes money to do that." Lee also thinks B/L will have competitors in the next two years. One has to believe that Intel Corp., long rumored to have a machine near completion, would be among them. "We're ready for 'em," whoever it may be, Lee says smiling.

—Edward K. Yasaki

COMPUTER GRAPHICS

A FIX ON EXECS' KICKS

Two firms—one big, one small—think they've got just what every information-hungry ceo is looking for.

First there was the database—that microcosmic collection of corporate information from which the manager could take momentary snapshots of his company's performance. Then came color graphics—a flashy, showbiz technology that made even the drabest numbers come alive in a technicolor display of bars, pies, and grids. Now a system combines the two into what may be the biggest executive suite craze since the automatic putting machine.

Touch-Track, a system combining the talents of Boston-based Computer Pictures and nearby Cullinane Database Systems, gives the ceo of the future fingertip access to as many as 2,000 prestored color charts extracted from an IDMS database. The two firms have agreed to comarket the \$50,000 system in an effort to tap what they think is a lucrative market—the ceo who wants to evaluate pictures, not numbers.

"It's the final link in getting information to the executive in the most useful form for decision-making," says Philip Cooper, president of two-year-old Computer Pictures. "The effectiveness of graphic analysis is clear."

The system is essentially an updated version of Computer Pictures' Trend-Spotter system, a turnkey machine programmed to help translate numerical tables into a wide variety of color graphs. A touch-sensitive menu screen that gives the harried ceo

easy access to prestored charts prepared by his staff has been added. In addition, a new interface for Cullinane's popular IDMS database management system, it is hoped, will spur sales for both companies.

Trend-Spotter is based on a Chromatics color video screen attached to a special graphics-creating keyboard and an Altos microcomputer. The system, is aimed at financial and marketing analysis, performance monitoring, project management, consulting, and the manufacturing user who needs to get away from monochromatic printouts without resorting to costly manual

services. The developers claim the machine can create a color chart in as little as 30 seconds, depending on the complexity of the chart's format and the amount of data.

"It's the final link in getting information to the executive in the most useful form for decision-making."

Computer Graphics, still privately held, has been around for about two years and is valued "in the low eight figures," a spokesman says. It is the brainchild of Coo-



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CIRCLE 58 ON READER CARD

MARCH 1982 71



THE RIGHT TOUCH by John Cullinane brings up an executive review of analytical business charts, one feature of Computer Pictures' Trend-Spotter color graphic management information system.

per, a former Madison Ave. advertising manager, and chairman David Friend, a bow-tied software whiz-kid. The two combined resources in 1980 to bring out a machine each had wanted in previous jobs. So far they've installed about 40 systems and claim to be a major factor in selling Xerox

6500 color printers.

"It's well known that humans can assimilate graphic output much faster than printed matter, so our systems are designed to generate colorful, precise, and informative charts and graphs that the user can understand, interpret, and act on instantly."

claims Cooper.

The Trend-Spotter is designed to automatically calculate ratios, trends, averages, variances, forecasts, and "what if" scenarios at the touch of a button. Firmware designed by the company is called into action by function keys, as are a variety of

The touch-screen uses infrared beams to locate the user's finger on the screen and is separate from the color video display.

color and video attributes that speed the whole process, the company says.

Finished graphs can be shown to others on video displays, stored on a floppy disk for transference to other machines, or routed in one fashion or another to a color xerographic system such as the Xerox 6500. If transparencies are required, the system interfaces to a camera supplied by other vendors.

The connection to Cullinane is expected to give Computer Pictures a boost in selling to large companies where IDMS has been installed and where a large base of computerized information is already available. Usually, input data to Trend-Spotter are entered through a keyboard, but the new interface should speed things up by giving Trend-Spotter direct access to files through



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the IDMS query function. The two firms are said to have worked jointly on software and will also market the system jointly to their respective clients.

John Kurcanes, vice president of sales at Computer Pictures, says the system's obvious visual appeal by itself is not enough to sell systems. "The immediate attraction wears off real soon," he says, adding that ceos in particular want to see how the system can help them make better decisions. Trend-Spotter doesn't get far as a status symbol, he says.

Nevertheless, Cullinane officials said privately that the system will open a new range of potential users for its IDMS system's services, namely providing corpo-

The connection to Cullinane is expected to give Computer Pictures a boost in selling to large companies where IDMS has been installed.

rate information in the best possible format to those who need it. Top executives, it was noted, are reluctant to learn computer commands, no matter how easy to use they are. Besides that, many executives are even hesitant to be seen with a keyboard on their desks.

To counter that problem, Touch-Track was developed by Computer Pic-

tures. It is a facility that enables a large network of up to 2,000 prestored Trend-Spotter graphs to be stored and selected according to a series of menus displayed on a touch-sensitive screen.

The busy ceo, it is said, will be able to browse through the charts on his nearby video screen much more easily than if they were supplied in paper form. His staff, Computer Pictures suggests, will prepare the charts using standard Trend-Spotter techniques and then compile them into a sequence that follows, say, the organization of the corporation. Then, for instance, the ceo can quickly compare profit and loss statements for the overseas marketing division against those for the domestic one. The touch-screen uses infrared beams to locate his finger on the screen and is separate from the color video display.

Computer Pictures said that very few of the ceos in large corporations currently have crt terminals on their desks, but that a system that can provide colorful, eye-catching graphs at a finger's touch should prove more popular.

In fact, an official said, one large firm is planning to install a Trend-Spotter color display in the walls of its corporate boardroom for all to see. And guess who gets the touch-screen mounted next to his elbow.

—John W. Verity

STRATEGIES

BACK IN THE SADDLE

Once again CPT chairman Dean Scheff has cleaned house. This time it was because he wanted his old title back.

With alarming regularity, Dean Scheff, founder and chairman of CPT Corp., has come back from winter vacation and deposed members of his executive management team. In January of 1980 it was his vice president of marketing and his vice president of production. He also deposed himself, passing the title of president to an outsider, Gary Holland.

This past January Scheff did it again. He returned from vacation to replace his vp of marketing and, in a surprise move—one that surprised even members of his board of directors—he deposed Holland. Scheff wanted his old title back.



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NEWS IN PERSPECTIVE

While Holland's departure did not send the company into a tailspin, a mass exodus of director-level people could. And there is speculation that January's change of guard could precipitate that very action.

It's no secret that Scheff is a "very difficult man to work with," says a well-placed CPT source. Holland's departure makes a tense situation worse, the source adds, for he served as a buffer between the management staff and Scheff. A major upheaval in staff over the next year could knock the wind out of a new product strategy and marketing effort to gain a foothold in the nation's 500 largest companies.

CPT will soon announce its integrated office concept, revealing a product strategy that industry analysts have been eagerly awaiting. "CPT is one company, like NBI, where I don't see any office automation strategy in place," commented Amy Wohl, president of Advanced Office Concepts Corp., Bala Cynwyd, Pa. "If CPT wants to sell only to the little guys, I can understand what they are doing. If not, then they have to change their game plan. Both are companies that make great word processors, but

most of my clients, the majority of whom are large companies, are looking for office automation systems."

Meanwhile, office automation announcements from IBM and Xerox knocked two or three points off CPT's market share rating, said Mark Bergman, vice president of the office automation/telecommunications group for Creative Strategies, Inc., Menlo Park, Calif. He estimates CPT has

There's speculation that January's change of guard could precipitate a mass exodus of director-level people.

about a 6% share at present, compared to industry leader Wang with a 10% or 11% share. "CPT is still moving at a fast clip, but its share of the market will continue to decline unless it fills the product gap and moves toward a more integrated office solution," advised Bergman, whose group recently completed a report on the office automation market.

CPT says it has been working on the concept, code-named Phoenix, for "a long

time." The handful of analysts and consultants who are aware of Phoenix, however, have only hints as to what's coming. Bergman, hesitant to estimate where the company will be at the end of this year, said he believes a lot depends on the joint ventures CPT is presently considering. "I know they are looking into producing a local area network."

Bergman is right; the Phoenix strategy includes an open local area network scheme. On that subject, Scheff had a lot to say: "I think people who build a network that is restricted to a particular product are crazy. No vendor is going to be able to provide the kinds of software or hardware that will meet everybody's needs. That to me says we are going to have a mixed bag of equipment, and those pieces of equipment better be able to talk to each other."

CPT is licensing the technology it needs from a small (under 20 employees, Scheff guessed), 10-year-old German company, which Scheff refused to name.

CPT's concept also calls for a sophisticated database manager, electronic mail, graphics capabilities, and a wide range of peripherals including facsimiles, laser printers, and videodisks used as mass storage devices. One application Scheff envisions for the Phoenix is providing a quick, easy, and useful solution to the problem of locating records in archived material. Key components of that particular application would be a terminal, a database manager, a videodisk mass storage unit, and, perhaps, a laser printer. The company has no intention of "reinventing the wheel," said Scheff. Plans are to acquire many of the features and peripherals for Phoenix from outside vendors. Phoenix, in some form, will be unveiled at the Hanover Fair in West

SCHEFF SAYS DOWN WITH MBAS

If you're looking for a strategic planner, stay away from the Harvard MBA types, warns Dean Scheff, the fiercely independent entrepreneur who founded and still runs CPT Corp., a Minneapolis-based word processor maker. Those are just classroom-seasoned kids still dragging their books behind them, he asserts. Why, for the first year or year and a half, they probably will spend most of their time wandering lost around the office in search of the basic four—the boardroom, the bathroom, the president's office, and the coffee maker, not necessarily in that order.

"I figure after a year or two they might be able to find their way to the men's or ladies' room, except maybe not even then because they perceive themselves as so damn smart they won't ask directions."

Strategic planners, Scheff maintains, aren't worth their salt till they know the company, the product, the marketplace, and the industry. Otherwise, what do they have to rely on but calculators, printouts, and consultants' reports? "Three years ago," recalls Scheff, "I had a zillion consultants tell me if I didn't build an electronic typewriter, I was not going to stay in business." Well, Scheff didn't go into electronic typewriters and his company grows 50% or better each year.

The trouble with American business managers, Scheff claims, is that they don't get out and walk and talk enough. "They've got to get to know their customers and their employees better." Do you think, he muses, the Japanese bopped American business by letting some committee sitting atop Mount Fuji tell them how to penetrate the American market?

"The Japanese didn't do that at all. At first they sent some very shoddy products over here. But then they listened to their salespeople, their customers, their mechanics—all of whom told them what they were doing wrong. That happens to be my approach to strategic planning."

Exasperated with the business environment he sees around him, Scheff says he sometimes feels like the mainstream of American business theory is telling its followers to go find a blanket, sit on top of it crosslegged, and, ahummmm, see where the industry is going. "I think that's a bunch of bunk!"

At CPT it's a no-nonsense, get out there and press the flesh, look 'em in the eyeball approach. And when Scheff's not out there among 'em, there's always the telephone. And his dealers use it, he claims. Constantly. "That dealer invests his own money, and if he perceives we are going in a direction we shouldn't be, or putting out a product that is not the quality he thinks it should be or is not what the customer will demand, or the software's not working, he is right on the horn. Often times you won't get that kind of feedback out of a branch organization."

If managers knew their customers and employees better and spent less time diddling with a calculator and more time talking to their people, "the Japanese wouldn't be doing the things to us that they are doing."

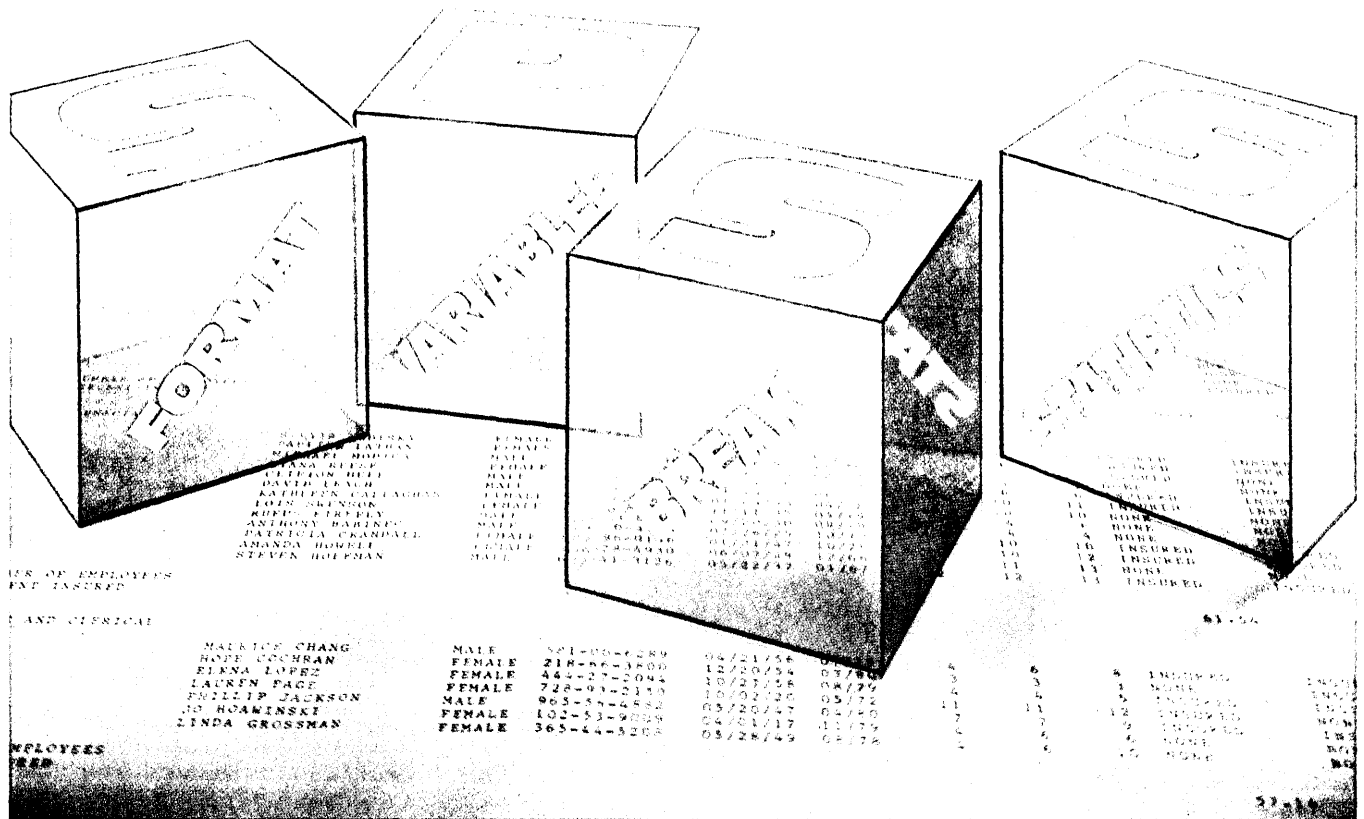
So what is Scheff's bottom line theory? "The demise of American business happens to be directly correlated with the ascendancy of MBA programs in America."

—J.J.



DEAN SCHEFF: "I think people who build a network that is restricted to a particular product are crazy."

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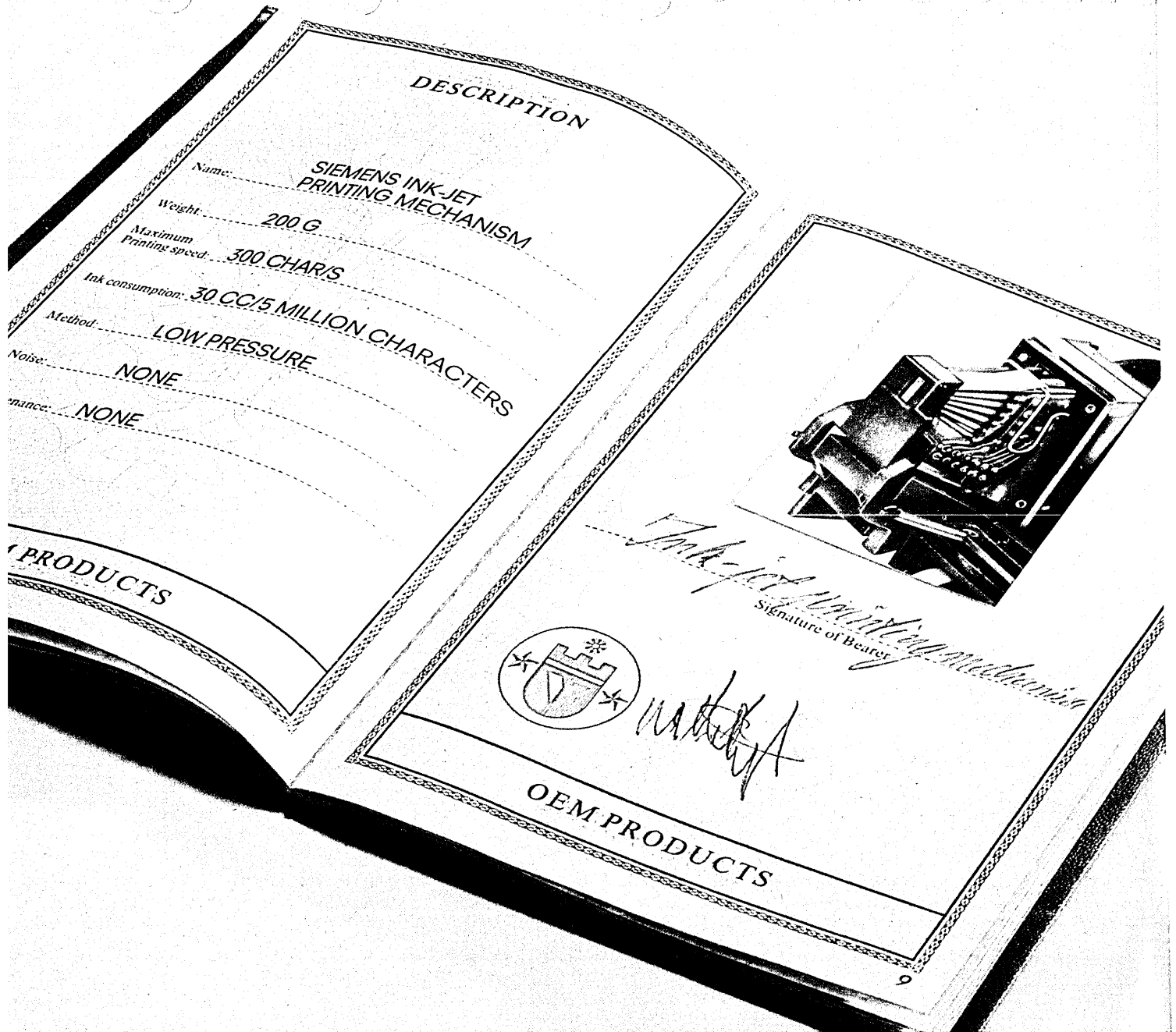
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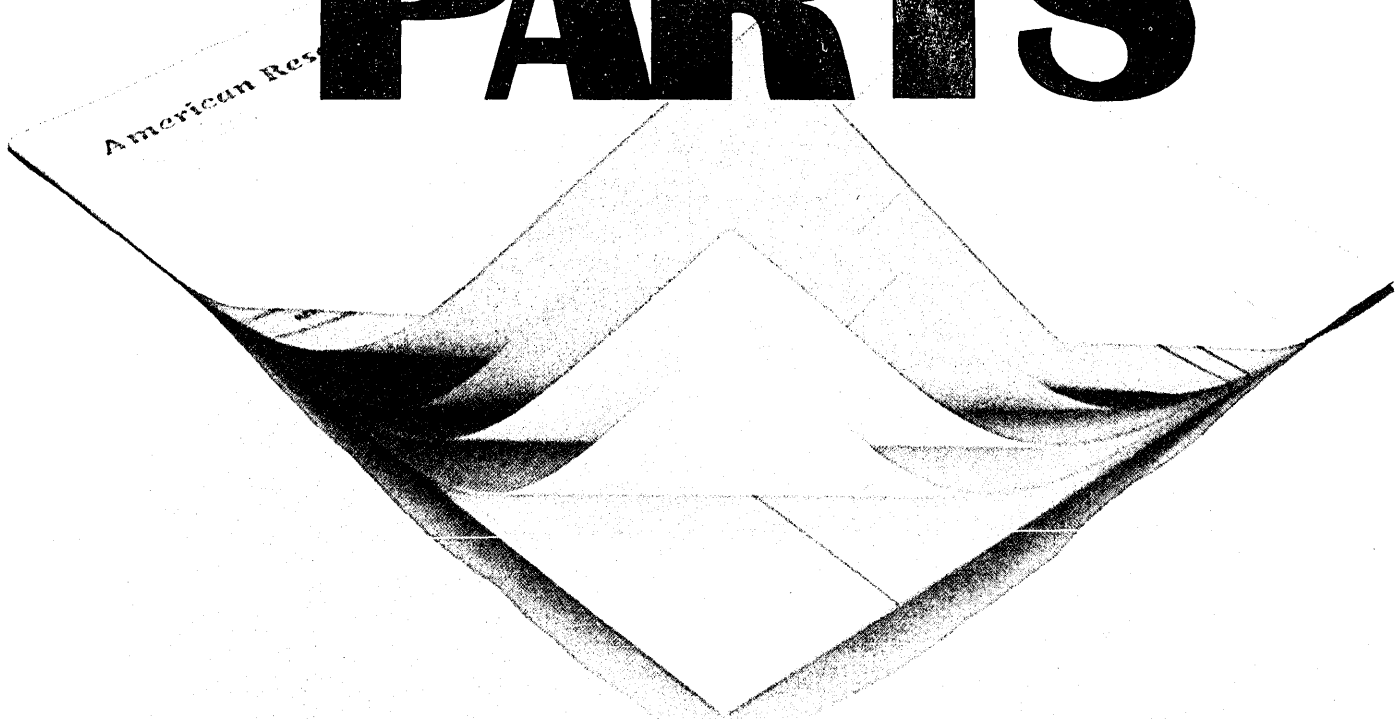
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NEWS IN PERSPECTIVE

Germany next month.

Breaking into that new market will take all the talent CPT can muster. The staff can't afford many distractions, and it's already weathering one—Holland's departure and the related disruption of having to work directly with Scheff. Holland was considered easy to deal with and was respected for his predictable, evenhanded management style. In contrast, Scheff is regarded as a tough manager, but one who has an uncanny ability to pick product winners. Even those who have left the CPT fold are quick to praise his product "genius." But his management style is consistently described as "unpredictable," "abrasive," "aggressive," often even called "abusive." Yelling bouts from Scheff are expected occurrences among upper level management. They happen so often, in fact, the incidents have their own shorthand code in lunchroom gossip. They're called "earning your stripes." Other tactics include wandering through the building, talking and picking up details here and there. Word has it that when Scheff runs across something he doesn't know about, he throws those details back at the respective manager, accusing him of not doing his job and of withholding information from Scheff. Needless to say, with all the demands on Holland's time and his tendency to look at the big picture rather than get tied up fighting the day-to-day fires, he and Scheff had more than a few such confrontations.

Playing devil's advocate games was another of Scheff's traits. Its effect was to keep project managers off balance, making it difficult to keep everyone in the same direction, observed a CPT veteran. Basic-

"CPT is one company, like NBI, where I don't see any office automation strategy in place."

ly, "he operates in a negative frame of mind," concluded one well-placed source. "Most of the time you can deal with him on a rational basis."

No one implied, however, that Scheff always rules with an insensitive, iron hand. On the contrary, the man is famous for treating a secretary like a vice president, nurturing his dealer network into a fiercely CPT-loyal group, and keeping an ear to that group. Dealers regularly troop through CPT headquarters or talk to Scheff on the phone. "He listens to his dealers," agreed one local analyst who has followed the company since it went public in 1975. He is so open to outside comment, said the analyst, "that it used to be the wind blew a different direction in the company depending on whose telephone call he had just taken."

Although Scheff's capricious qualities are said to be mellowing with time, he still has a reputation for "shooting from the



GARY HOLLAND: "I would be very happy with another computer industry company."

hip." Staff members and product directions have swept in and swept out of CPT because of Scheff's inclination to make snap judgments based on first impressions or instincts. Simply put, if CPT managers want to

stay CPT managers, they have but one route to follow: learn to work *with* Scheff's kind of personality and to work *around* it, quipped the well-placed source.

Holland, in comparison, is a professional manager, the type that evaluates performance before casting his vote. When Holland came to CPT two years ago in January, CPT was in desperate need of a professional manager and Scheff knew that. Not only was Scheff gearing up for an assault on the international market, but back on the home front he was under pressure from his board of directors to get his botched-up mess of a company under control. CPT was in terrible shape, worse than most realize, confided the well-placed source. The company was understaffed and unstructured. It lacked controls in almost every aspect of operation: no quality control on incoming components, no quality control on outgoing products; no well-defined procedures for billing, bill paying, parts shipping, or inventory; and no formal method of planning or performance evaluation. At the same time, the "rush-to-retail" wave was just breaking over the word processing market. CPT had yet to articulate a product strategy in either the lower end of the market or the integrated office arena.

Part of the reason for CPT's apparent waffling was that Scheff didn't have a good fix on market direction himself. Explained

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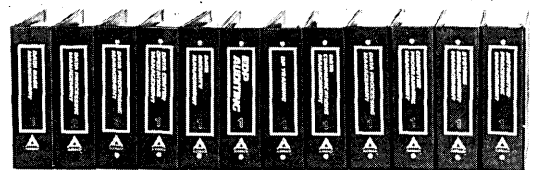
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NEWS IN PERSPECTIVE

Scheff: "[Two years ago] I was convinced word processing was becoming more and more of a consumer item. I was right. Word processing became a consumer item; it's just that the rest of the world got there first—IBM, Wang, Tandy, Apple, Commodore. A big crowd was there, so why go that way? Let's go somewhere else." As it turns out, the company was hedging its bets all along with project Phoenix. Instead of duking it out against the Apples, Tandys, Displaywriters, and Wangwriters for shelf space in the retail race, CPT would deliver a sophisticated centerpiece around which it could build an integrated office.

Into this "mess of a company" dropped 37-year-old Holland, boy wonder of Toro Co., a Minneapolis-based maker of lawn mowers and snowblowers. At first it was hard to fathom what Holland could offer CPT. After all, snowblowers and word processors aren't of the same ilk. Rumor was that Scheff was being forced by his board to find a president. It wasn't his idea, so he was looking for someone young, someone he could dominate and control. That's way off the mark, replied the well-placed source. Fact is, Holland had a lot to offer CPT and its particular set of problems.

For starters, Toro was one of the more successful companies marketing through an independent dealer network, a network very similar to CPT's. Within Toro,

Holland was vice president and general manager of the international division, the fastest growing division in Toro at that time. He had already taken one Toro business from nothing to \$50 million, and another from \$20 million to \$70 million by the time Scheff found him.

The board did not play a role in bringing Holland in, insisted the well-placed source. "It was Dean who matched up [Holland's] qualities with his company's needs." Scheff wanted his company

CPT's office automation project, code-named Phoenix, will be unveiled in some form at next month's Hanover Fair in West Germany.

brought under control, and Holland did just that, with great skill and success, according to several people close to the company, including Scheff himself. He restructured the company along 10 functional lines, each with its own vice president, and doubled the number of employees, going from 451 people at the end of '79 to 994 people at the end of '81. Everyone reported to Holland, except for Dale Clift, vice president of finance, who was hired by Holland but reported directly to Scheff.

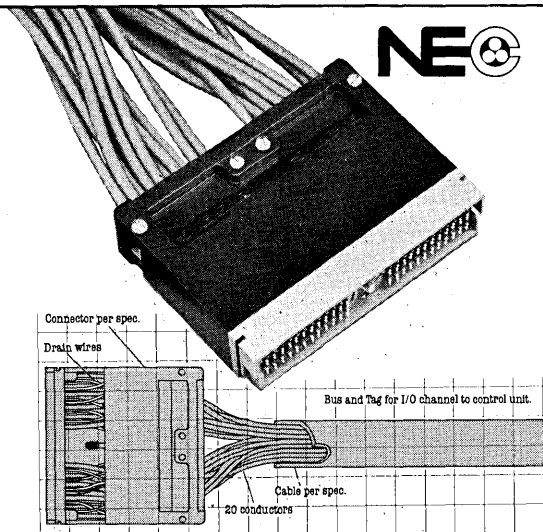
Controls sprang up everywhere—in accounting, marketing, sales, and especial-

ly production. Quality control programs at the front end, checking incoming parts, resulted in large shipments being sent back, recalled a former staff person. Quality control at the back end, checking a product before it left the floor, in addition to a well-run parts supply program, eventually won Holland the respect of the CPT dealers.

Holland's record speaks for itself. As CPT Corp. moved into 1982, the company looked like a model of success: revenues were up 71%—\$101 million for 1981 compared to \$59 million for 1980, while shareholders' equity was up 61%. Forecasts for 1982 peg the company with a healthy growth rate in the 50% range, meaning that '82 revenues could hit the \$150 million mark. Not bad in a recession economy.

Some CPT-watchers speculate that Holland did such a good job Scheff couldn't take sitting on the sidelines any longer, watching someone else reap the glory. Although Scheff was involved in the day-to-day operations of engineering—an area Holland did not get into—"it was hard for Dean to sit back and watch someone else restructure his business," suggested a well-placed source. "Dean likes to make all the decisions. He needs to feel in control and run it as his business. He sat back and watched for two years."

Now he's decided he wants it back, saying: "I'm too young to retire."



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CIRCLE 66 ON READER CARD

NEWS IN PERSPECTIVE

On Jan. 20, CPT publicly announced that Holland had resigned—"worked himself out of a job" is the company line—and that Scheff would "permanently reassume the responsibilities" of chief operating officer. Holland, meanwhile, said he is taking a "little bit of a breather" before looking for another chief executive job. "I would be very happy with another computer industry company," he said.

So, is Scheff's return to the helm a bad sign for the company and its stockholders? "I'm not so sure it is," was the measured reply of Marvin Geisness, vice president at Piper, Jaffray & Hopwood, Inc., Minneapolis. The same guarded concern was expressed by the well-placed CPT source: "I don't know what will happen. I hope [Dean can handle it]. That has to be proved. He has a tremendous amount of drive and desire to succeed, and I think over the past couple of years he has actually developed into a ceo. He seems to be more aware of the need for planning, quality and inventory control, asset management, and the need to bring in good people."

Reaction from CPT's dealer network couldn't be more calm. All that commotion from corporate won't affect them, they said. "Dean has run the company before and has a strong handle on it. If we lost Scheff, then we might have problems."

—Jan Johnson

TERMINALS

GAMES PEOPLE PLAY

Human engineering techniques developed in design of computer-based games are applied to remote data entry.

The toy business, flush with profits gleaned from the same computer technology that was developed for business, science, and industry, is giving something back.

This month a Culver City, Calif., company will introduce a device it believes will be to people-to-computer communications what the telephone has been to people-to-people communications.

The company, IXO Inc., calls the device the TC 101 telecomputer. It's a computer terminal and is considerably smaller than a breadbox. With it, users can access many databases from a telephone with the touch of one button.

Principal founders of IXO are presi-

dent and chief executive officer Jeffrey A. Rochlis, formerly president of the Electronics Division of Mattel; Dr. Robert O. Doyle, vice president and chief scientist; and Dr. Holly T. Doyle, vice president and senior scientist. The Doyles had a long-time consulting relationship with Parker Brothers in electronic games development and were instrumental in development of the game Merlin, which Rochlis describes as "the best-selling computer game of them all."

The Doyles began work on the project which led to the IXO telecomputing system three years ago. In mid-1980, they approached Rochlis to find out if he knew anyone who might want to turn the project into a business.

"We'd shared platforms at many conferences," said Rochlis, "and respected each other's knowledge and ability. I myself had wanted to see this kind of work being done and when I did, I decided I wanted to be part of it."

Rochlis left Mattel in mid-1980 and went to work raising venture capital to get the company started. He managed to get \$2 million from five venture capital firms. The company was officially formed in March 1981 and currently is into its second round of financing which it hopes will bring in some \$5 million.

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The system architecture of the CompuStar is based on four types of video display terminals, each of which can be connected into an auxiliary hard disk storage system. Up to 255 terminals can be connected into a single network! Each terminal (called a Video Processing Unit) contains its own microprocessor and 64K of dynamic RAM. The result? Lightning fast program execution! Even when all users are on-line performing different tasks! A special "multiplexor" in the CompuStar Disk Storage System ties all external users together to "share" the system's disk resources. So, no single user ever need wait on another. An exciting concept . . . with some awesome application possibilities!

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or inquiry/response application. And if your terminal needs are more sophisticated, select either the CompuStar Model 20, 30 or 40. Each can be used as either a stand-alone workstation or tied into a multi-user network. The Model 20 incorporates all of the features of the Model 10 with the addition of two, double-density mini-floppies built right in. And it boasts over 350,000 bytes of local, off-line user storage. The Model 30 also features a dual drive system but offers over 700,000 bytes of disk storage. And, the Model 40 boasts nearly 1½ million bytes of dual disk storage. But no matter which model you select, you'll enjoy unparalleled versatility in configuring your multi-user network.

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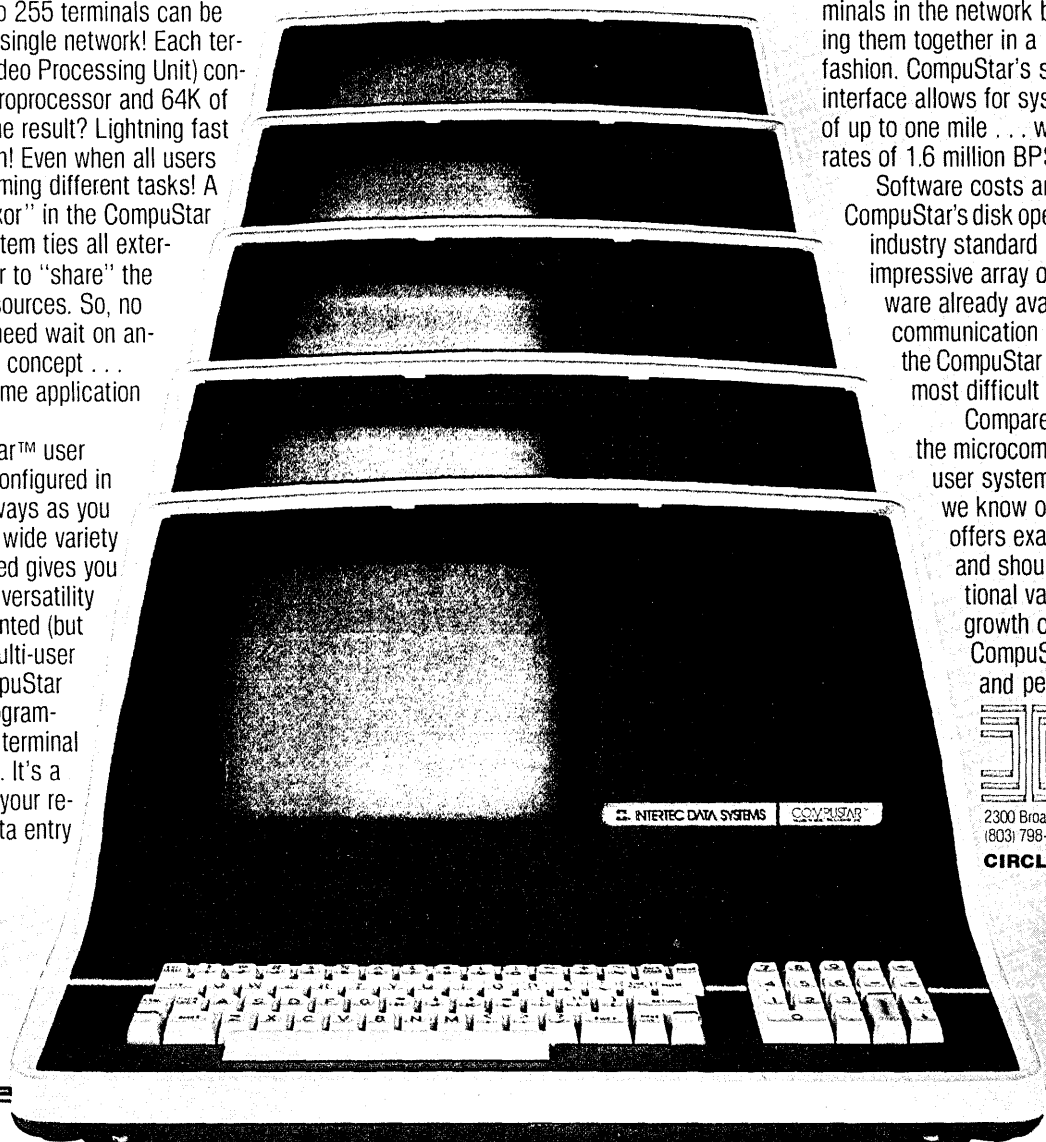
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SPACE-SAVING DESKTOP DESIGN	✓	✓			✓
BASIC LANGUAGE	✓			✓	✓
UNATTENDED NETWORK CONTROL SYSTEM	✓		✓		✓
WORD PROCESSING	✓		✓	✓	✓
EASY-TO-READ FULL 15" CRT			✓	✓	✓
SIMULTANEOUS DUAL TASK OPERATION	✓	✓	✓		✓
PROGRAMMABLE OPERATOR HELP KEY					✓
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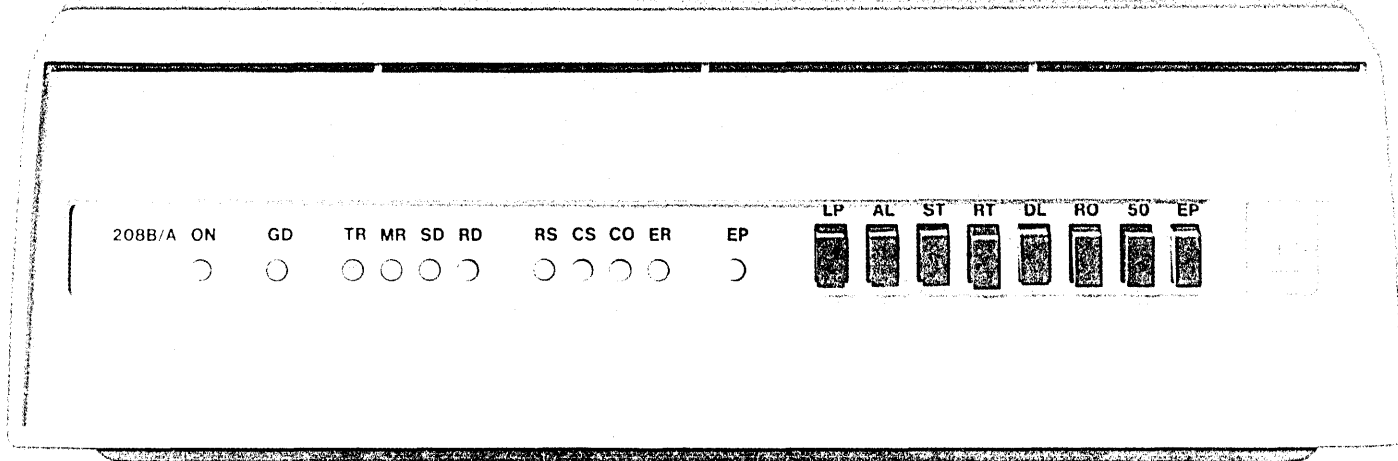
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The 503 from Northern Telecom.

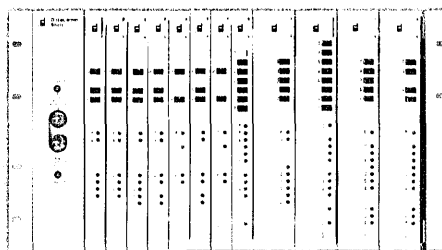
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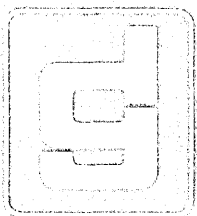


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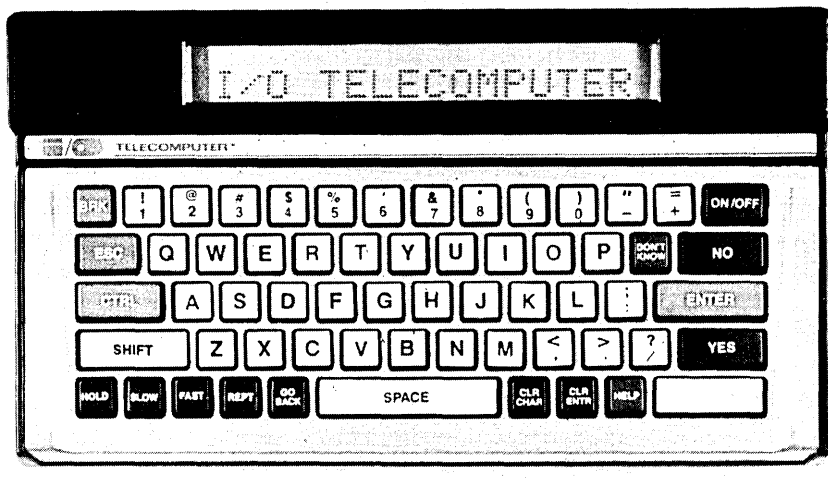
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NEWS IN PERSPECTIVE



THE TC 101 TELECOMPUTER can access many databases from a telephone with the touch of one button. It weighs less than one pound.

into the hands of a lot of people," said Rochlis of his and the Doyles' days in the computer games business, "and the key was human engineering."

They're hoping to use the same key to popularize computer use in other areas, particularly remote access to databases. "The remote data processing world today is an unfulfilled business," said Rochlis, "an unfinished business."

He said the IXO terminal makes accessing a database as easy as picking up a telephone or changing a channel on a tv set.

One of the development objectives was to keep the device small, and it is that. It measures 7¼ in. by 4 in. by 1¼ in., and it weighs less than one pound. Another objective was low cost. The TC 101 will sell for \$300 in quantities of 1,000 or more.

But the major objective was to keep it simple. Log-on to a number of databases

"We put a lot of computer power into the hands of a lot of people."

can be accomplished with a single key-stroke instead of the 50 or 60 usually required.

Rochlis said the TC 101 is compatible with any ASCII system, anywhere in the world. It features a 16-character dot matrix, liquid crystal (LCD) supported by a unique display management system; a full typewriter keyboard with plain English response keys, constituting the IXO standard English keyboard and supporting the IXO standard English dialogs; a one-button, automatic repertory rotary and tone dialer; an automatic log-on and disconnect system; a 300 baud Bell 103 compatible telephone modem; an individual telecomputing identification number; a sophisticated security and encryption system; and ports for peripheral expansion.

The TC 101 plugs into any standard modular phone jack. Where no mod plug is

available, an acoustic interface (\$65 in quantities) can be used. A hardcopy 20-column dot matrix printer is available for \$150 in quantities, as is an RS232 interface to other, larger printers. A video interpreter permitting the device to be hooked up to a crt or a tv can be had for \$150 in quantities.

Core of the IXO telecomputing system is the company's Access Center in Culver City. Based on two Tandem nonstop computers, the Access Center (called via a

local Tymnet number) downloads complex log-on procedures for various databases, both public and private, into a user's TC101. Thereafter, the user simply presses a single button to access those services directly. Rochlis said the Access Center also will provide databases with the tools necessary to replace complicated operating commands with IXO standard English dialogs to achieve a plain English interface between people and computers.

With these dialogs the system currently offers such services as checkbook, pay bills, stock market, airline tickets, tv schedules, phone book, and IXO sales—but

Services such as checkbook and stock market will soon be available.

all in simulation, game-playing mode. Rochlis believes such services will be available "for real" in a very few years. For now, they're fun to play with.

More practical are the real databases to which the system is actually linked—Dow Jones, The Source, and Compuserve. More will be added, says Rochlis. The user, of course, makes his or her own subscription arrangements with the database providers.

During the three years of development of the TC 101, he said, hundreds of

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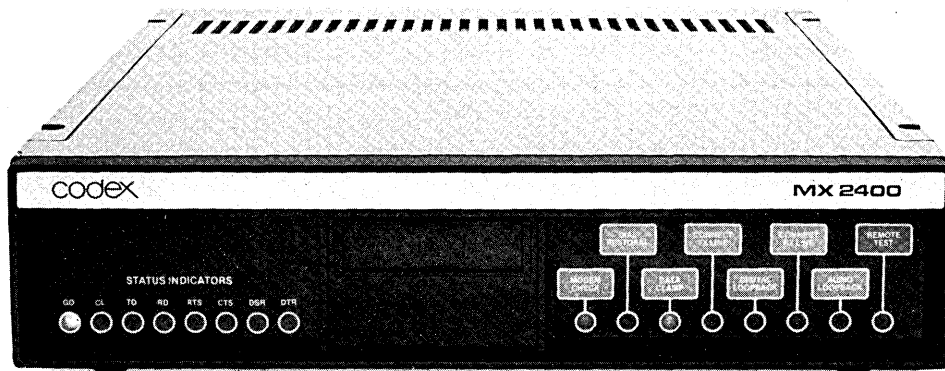
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JEFFREY A. ROCHLIS: "The remote-data processing world today is an unfulfilled business, an unfinished business."

prototypes were used and tested in the field. "There have been 46 revisions to the software in that little box.

"We focused on human need. Today's adult grew up before the fact of computers and has a resistive mind-set against them. In fact, today's typical adult may be characterized as computer illiterate and computer intimidated. Industry participants should not expect to change the mind-set, for it will not be changed. Rather, the solution lies in creating a system that compensates for this barrier by relegating the technology to virtual transparency as has hap-

Log-on to a number of databases can be accomplished with a single keystroke instead of the 50 or 60 usually required.

pened with the telephone, television, and other technology-intensive but mass-market accepted systems."

The system takes user-friendliness to its extreme. Once a user is registered, the system will always respond using his or her name and will intersperse its responses with friendly chit-chat. A user impatient with this chatter can press a fast-forward key to get past it to the hard data. Another key will stop the display, and still another will back it up.

The company will initially market to very large companies, seeking large quantity orders. For smaller orders it will use distributors, probably two big ones. Store sales, said Rochlis, are a possibility for the future.

And that's not all. Technical development continues. While the company's marketing, production, and administrative groups are doing their things in California (an offshore production facility is planned for the middle of next year), the Doyles head up a development group in Cambridge. "Their front-end design group will keep us innovative."

—Edith Myers

DATA COMMUNICATIONS

NETWORK UP TIME CRUCIAL

Intertel believes that local data networks will have to take on advanced capabilities that are designed to prevent malfunctioning.

Users are so preoccupied with implementing local data networks that little thought is being given to what happens if these systems malfunction. That's the view of Jerry H. Holsinger, president of Intertel Inc., Andover, Mass., who believes that local data networks will have to take on advanced capabilities that are designed to keep them running.

Users are doing the same thing with local networks today that they did with on-line systems eight or nine years ago, according to Holsinger. "They build them with the implicit assumption that they work. They never think about what happens if they don't work."

The addition of control and management functions to local networks can be an important business for the privately held communications equipment company that began in the late 1960s by making modems for network users. In 1973, Intertel pioneered the idea that corporate communications networks had to be monitored and controlled if network reliability was to increase.

From crude beginnings which saw "tech control centers" established by grouping communications test sets in a single room to monitor network lines, today's nets use computer-controlled network management centers that allow users to fine tune their communications systems. These network management centers like the Intertel 90/10 enable telecommunications managers to tailor network activity statistics in color graphics formats for use by MIS and other company managers.

The 90/10 is the first of the 90 Series that will provide an upward migration path for network users who want increasingly advanced levels of management and control, according to Charles R. Robbins, manager of product marketing at Intertel. Additional models in the series will be announced during 1982, he said.

Intertel has built its business by gradually phasing standalone modems into integrated and centrally controlled network communications systems that perform a variety of advanced functions. This transition

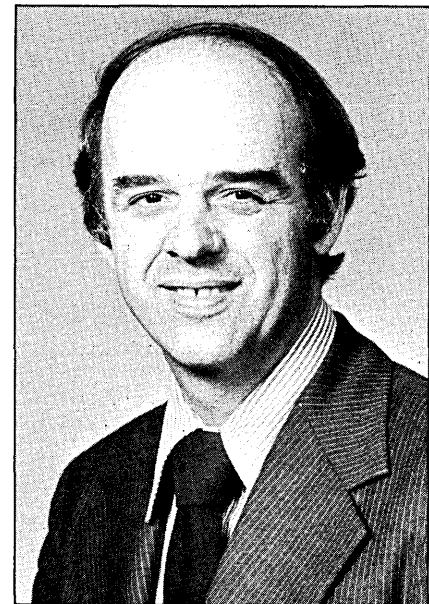
is part of an increasing awareness among major corporations that the company network represents much more than a monthly phone bill, Robbins said.

More firms realize that the network is a vital corporate resource, and Intertel is providing the tools to keep that resource running and to collect data from its operation that can be useful to planners and other members of top management. "The leading-edge companies realize that the network is the guts of really being able to run the business," Holsinger explained. "You could almost go so far as to think that the computer and terminals will become peripheral to communications. Those will just become little things everybody makes—little chips—and you plug them into the communications network, which will be the tough part and the big part," he adds.

While somewhat surprising, Holsinger's views are not ignored by his competitors. He began Intertel as a spin-off from Codex, and today the privately held company competes handily with other communications vendors that have long since consolidated. Stating that fiscal 1981 revenues were "in the mid-20s," Holsinger sees as his major competitors what he calls "the traditional three"—Paradyne, Codex, and Racal-Milgo. "Paradyne has traditionally been the big one for us."

Robbins admits that the original idea behind tech control centers, and later network control centers, was to sell modems. But in the process of phasing the data sets into devices that could be monitored and controlled from central sites, the system became more important than the functions of individual modems.

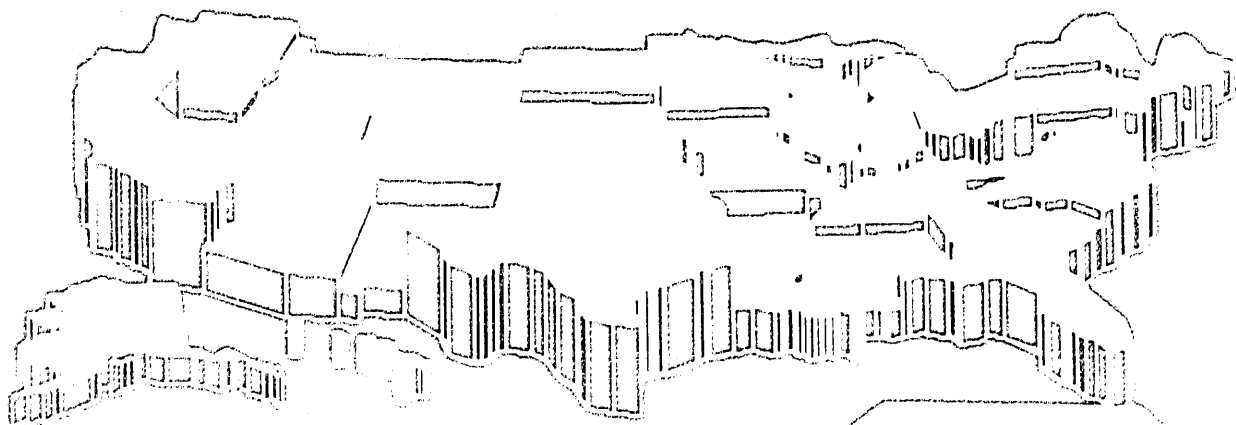
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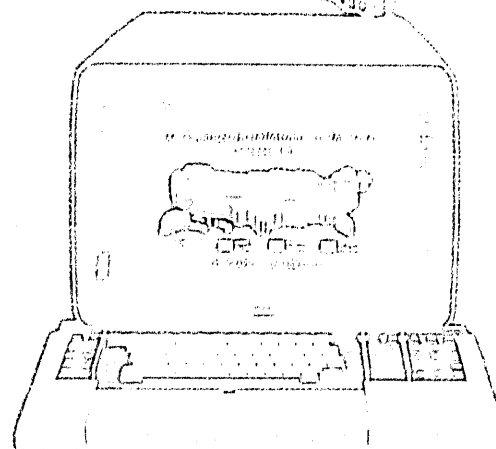
JERRY H. HOLSINGER: "The leading-edge companies realize that the network is the guts of really being able to run the business."

SAS Product Installations in the USA

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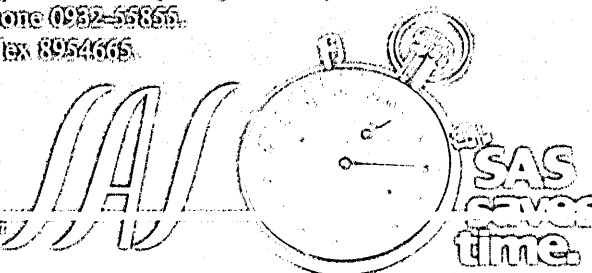
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NEWS IN PERSPECTIVE

as a systems integrator that can oversee the entire spectrum of needs for data communications equipment. To this end, Robbins said, Intertel is exploring the possibility of supplying statistical multiplexors—an element the firm does not make—and incorporating them into total systems. This would require a tie-in with another communications supplier that makes multiplexors, but Intertel would provide customers with maintenance for the whole system, Robbins explained.

In another systems approach, the company has set up industry marketing con-

cepts to better understand the specific needs of major client groups. According to Thomas J. Mercer, manager of industry marketing, 52% of Intertel's business comes from financial institutions. Other key areas are transportation, including airlines; retailing; and manufacturing. Although it is too early to say that Intertel will develop specific network management systems tailored to these key industries, there is an indication that specialized applications software might be incorporated into its computer-controlled network systems. While Mercer would not identify the special needs of his target in-

dustries, he said that encryption and security are the "hottest topics" in banking.

Although other suppliers in the communications equipment industry may have broader product lines and larger resources, Intertel seems to have carved out its own specialized niche by turning network devices into integrated systems. Robbins said the company more and more is selling its systems to members of management who are taking a greater interest in the functions of their telecommunications managers.

If Intertel begins to manage the operations of local nets and other now separate communications functions, as predicted by Holsinger, it will go a long way toward solving the network problems faced by many users. As management relies more on network functions, up time becomes crucial. Intertel hopes its approach will help to keep those corporate communications systems from malfunctioning.

—Ronald A. Frank



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EDUCATION

SOLVING THE EE SHORTAGE

Cooperative efforts between industry and government are aimed at upping the facilities and faculty available to prospective engineering and computer science students.

Through the year 1985 there will be a shortage of electrical engineers and computer science grads amounting to some 20,000 to 25,000 annually in the U.S., according to Pat Hill Hubbard, vice president of the American Electronics Assn. She says a study by the AEA of 313 electronics companies in California shows there is a need through '85 for 4,000 EEs and CSs each year, yet fewer than 3,000 of them graduating from all public and private colleges in the state each year.

Speaking at an AEA meeting, Hubbard said California schools last year had to cut enrollment because of a lack of space or staff. To achieve this reduction at nine of 13 state campuses, applicants with a grade point average (GPA) below 3.8 were rejected. One school, University of California, Davis, turned down students with an almost perfect 3.9 GPA. And at two state campuses, it now takes six years to get an engineering degree, again because of a shortage of classroom space.

"Right now there is an adequate

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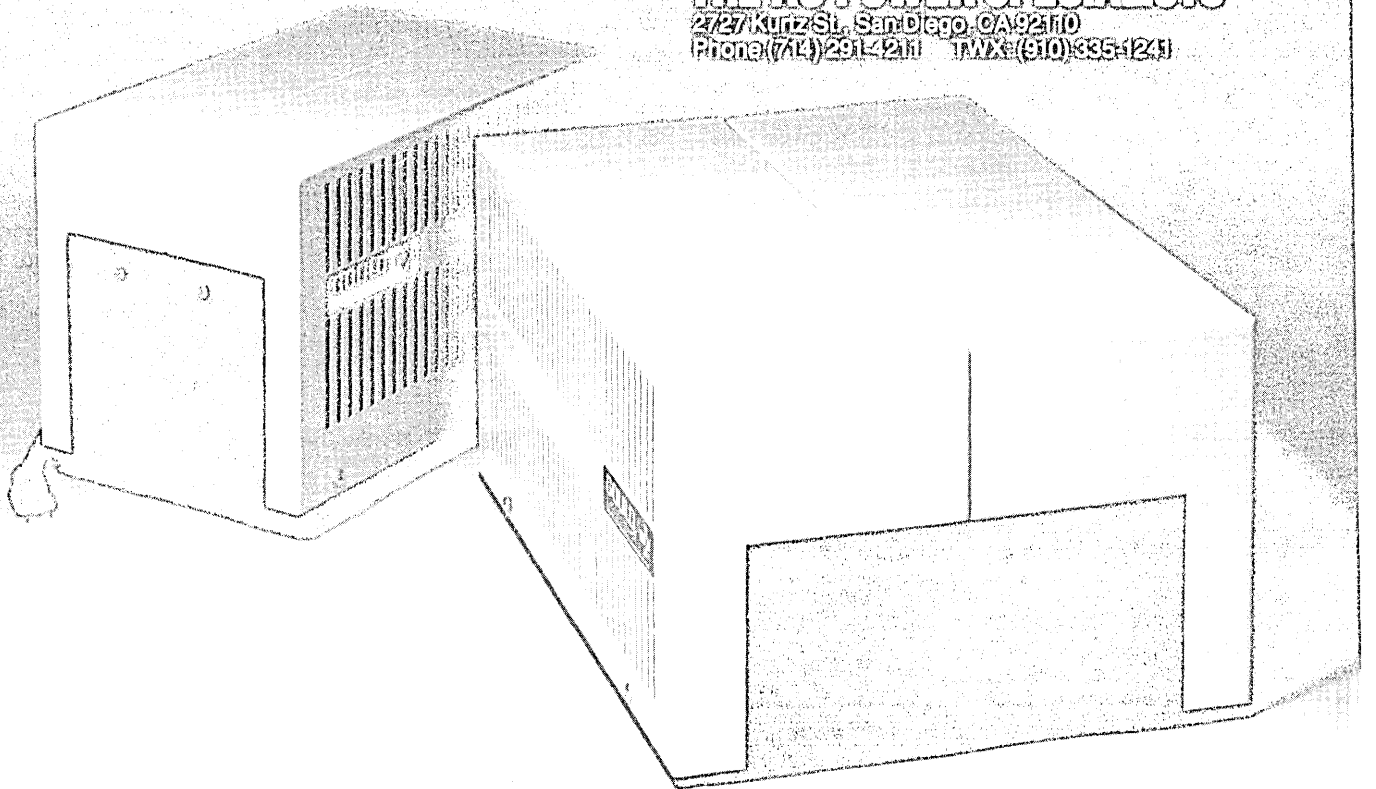
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NEWS IN PERSPECTIVE

supply of extremely competent students who want to study engineering," Hubbard said. "Engineering is the second most favored career choice of high school students in this country. The first is business." The purported skills in math and science possessed by these youngsters seems to contradict those who say schools have been ineffective in teaching such subjects. Nevertheless, Hubbard adds, while there is no lack of candidate students at the undergraduate level, there is a severe lack at the graduate level.

Electronics companies and their trade associations have lately been sounding the tocsin on this issue, expressing a growing concern over a shortage of trained technical personnel in the U.S. But the whole thing is deemed a nonissue by those who see this as a move to increase the sup-

"Engineering is the second most favored career choice of high school students in this country. The first is business."

ply of engineers in an effort to keep a lid on the salaries that must be paid to them. In support of this thesis, they point to studies that purport to show that salaries in recent years have not kept pace with inflation.

But the AEA and the Semiconductor Industry Assn. (SIA) have set out to attack what they see as the source of this problem—the educational institutions. Accordingly, the AEA has formed an engineering education program, led by Pat Hubbard, and the SIA has developed a semiconductor research cooperative. The two efforts are said to be complementary, not competitive.

Hubbard cites the dean of engineering at the University of Illinois, who says it will take a billion dollars a year just to maintain engineering education equipment—and that doesn't even include the capital outlay required to bring the equipment up to the current state of the art. The same problem, unfortunately, applies to the physical plant, each 20 and 30 years old at a minimum.

"The most serious problem, aside from equipment and facilities, really has to do with faculty shortages," Hubbard says. "In solid-state electronics and digital systems engineering, the faculty vacancy comes close to 50%." In computer science, maybe 16%. Ten years ago, about 50% of Stanford's graduating class of PhDs chose to go into teaching. Last year, it was 8%. People don't go into teaching at the college level for the money, she explained, but mostly for the chance to do research in a relaxed atmosphere.

"Yet today universities account for only 40% of research, as opposed to 80% ten years ago. Industry has 60% today, as opposed to 20% ten years ago," she said. All this forces the faculty to carry heavier academic loads, and teaching becomes less

fun. "It's generally agreed that people will still choose teaching if the salary disparity between university and industry is no more than 10%," she continued. "Nationally, it's between 20% and 50%." In California, a new electrical engineer or computer science BS holder can get his or her first job at \$5,000 to \$7,000 more than his or her prof.

To support its new program of aid to education, the AEA is asking all member companies to contribute 2% of their R&D budgets. This includes cash contributions, the donation of equipment for use in school labs, and the loan of employees to serve as part-time faculty. In addition, the AEA will contribute \$50,000 to get things started, plus 2% of annual member dues each year thereafter.

With this money, it would like to create engineering faculty chairs with the objective of increasing faculty salaries, provide adjunct (part-time) and visiting professorships to engineering colleges and universities, provide graduate fellowships to qualified engineering students who wish to pursue careers in education, fund AEA engineering faculty fellowships, and promote appropriate legislation at both state and federal levels.

An example of the latter activity was support for action taken earlier this year by the regents of the University of California. In this action, the regents ap-

proved special salary scales for profs in engineering and business schools, as was already done for those in medical and law schools.

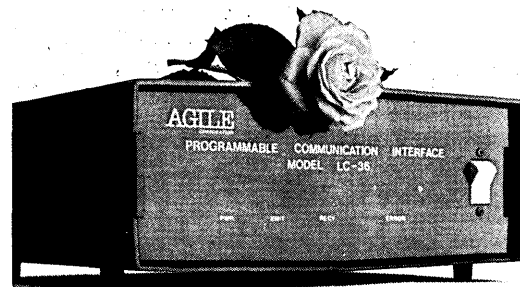
Putting this into perspective at the same AEA meeting was William J. Perry, who served as Under Secretary of Defense for Research and Engineering in the Carter Administration. He said the technological

The American Electronics Assn. and the Semiconductor Industry Assn. have set out to attack what they see as the source of the problem—the educational institutions.

leadership position of the U.S. during "the lifetime of everyone in this room" might cause some to believe that the role is provided for in the U.S. Constitution. Actually it was achieved with some struggle "and is by no means guaranteed."

He attributed it to a migration of great scientists and engineers to the U.S. from Europe prior to World War II. "Their coming to this country, blending with the American scientists and engineers who were here, created a sort of critical mass, which put us in a position in science and technology which we hadn't been in before," he said. There was also the establishment by the government of R&D labs,

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NEWS IN PERSPECTIVE

after the start of the war, for work on military weapons. And there was the G.I. Bill, which produced a new generation of engineers who led the country into the period of

"Today universities account for only 40% of research, as opposed to 80% 10 years ago. Industry has 60% today, as opposed to 20% 10 years ago."

world leadership in general and in microelectronics in particular.

The resulting microelectronics revolution, he added, produced new companies, new jobs, new wealth, more taxes to the government, and a favorable balance of trade.

"We are today on the threshold of the second wave of this revolution, a VLSI revolution," said Perry, now a partner in the investment banking firm of Hambrecht & Quist. "The benefits that accrue to this country if we maintain our leadership will be even greater than the benefits that accrued in the last revolution."

Perry cited recent examples of cooperation between industry and the government, such as Stanford University's Center for Integrated System. This microelectronics R&D facility is supported by 15 companies that have formed a consortium, each

contributing \$1 million over a three-year period. The \$15 million will build the facility, and the Department of Defense will fund the research. A similar facility has been proposed for the University of California, Berkeley, with the money to come from the state and from industry. Perry described these efforts as the U.S. answer to the Japanese government's way of funding VLSI research.

"We do not have to emulate the technique the Japanese use," he said, "but clearly we have to provide the R&D funding to stay abreast of them."

The speaker lamented industry practice of hiring graduates with bachelor's degrees before they can enter graduate school, saying it cuts the supply of students who will become the faculty that turns out

To support its new program of aid to education, the AEA is asking members to contribute 2% of their R&D budgets.

more students. He noted that AEA's Pat Hubbard calls this "eating the seed corn." But Perry observed that industry has also begun hiring away the faculty itself. He said this is like eating the farmer, a practice that cannot continue much longer if the nation is to maintain its leadership position.

—Edward K. Yasaki

SUPERCOMPUTERS

ILLIAC OUT, CRAY COMES IN

Researchers at NASA's Ames Research Center say the Illiac IV supercomputer can hardly be called a failure.

After more than eight years of crunching numbers, the Illiac IV supercomputer has been retired by its users at NASA's Ames Research Center at Moffet Field, Calif. It has been replaced by a one-megabyte Cray 1-S, one of the two fastest commercially available computers around. But for users at Ames, this is not necessarily a step up in computing power.

"While the Cray is more powerful internally than the Illiac, it doesn't have the memory and the bandwidth available to the user," says Marcelline C. Smith, who heads the Advanced Computation and Management Office at Ames. "The result is that the machine is not as powerful as the Illiac in the total problem domain."

For the most part, the "problem domain" at Ames has to do with computational fluid dynamics, the study of air flowing around bodies and over and under wings. Researchers there are trying to find ways to model the flow so that such models could be used as a design tool by aeronautical engineers. But the Illiac was also used for some seismic work, not in the predictions of earthquakes but rather in the flow of shock waves through various kinds of materials. Those are described as the two largest "drivers," although some image processing of data from the Landsat and other satellites was also performed.

In the early stages of the installation in 1973, the word was that the one-of-a-kind Illiac was continually down. But Smith says the amount of productive work they got increased continually. "For the last three years," she notes, "we ran in excess of 80 hours of good time for the users, sometimes as many as 110 or 112 hours." That figure, the number of error-free hours they were able to provide to the user community each week, was a continually growing curve. But operating and maintaining the hardware was a manpower-intensive activity. Costly, too. There were no spares for some parts, and when these parts failed it sometimes became necessary to redesign the parts at the board level. It just became too expensive to continue running the Illiac.

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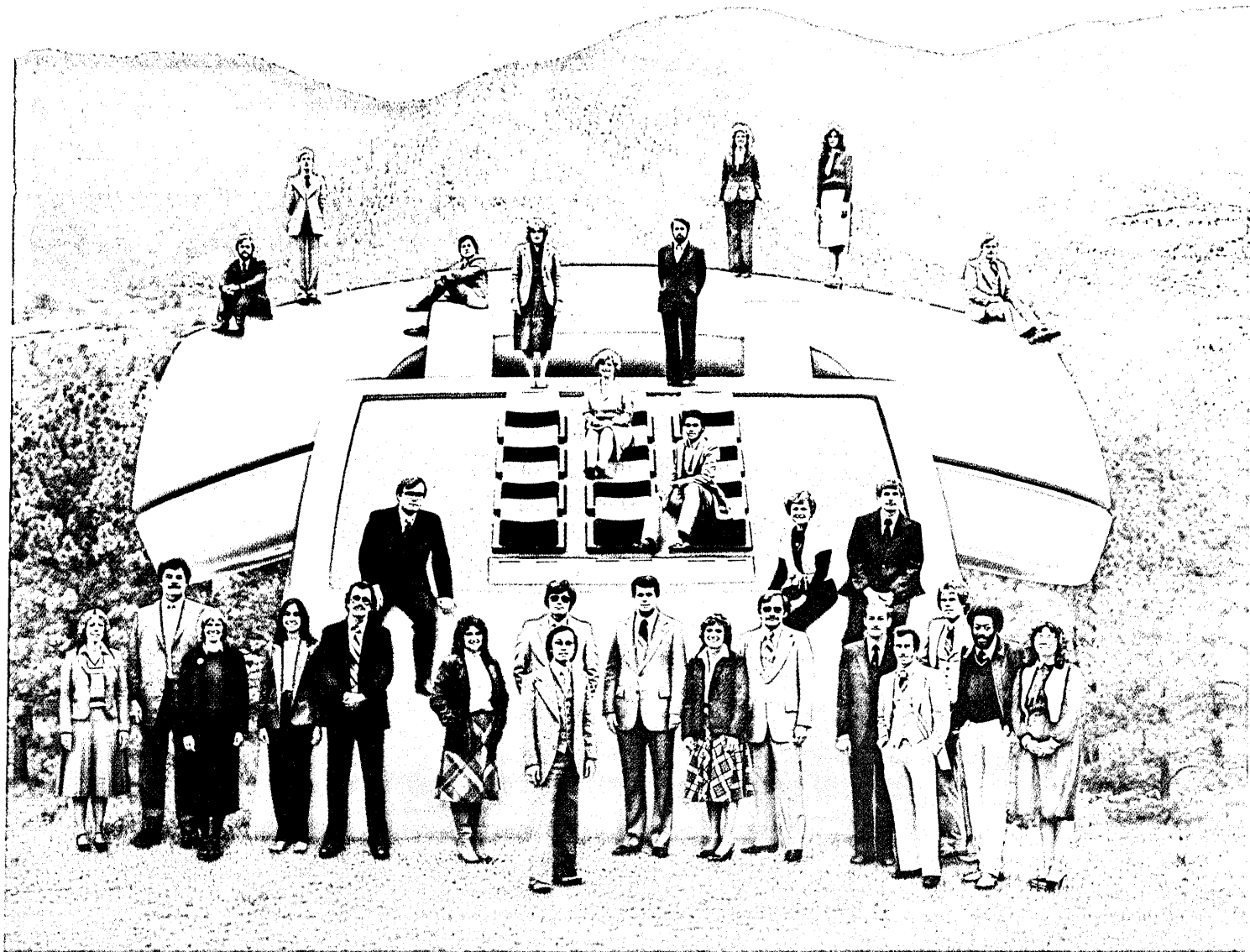
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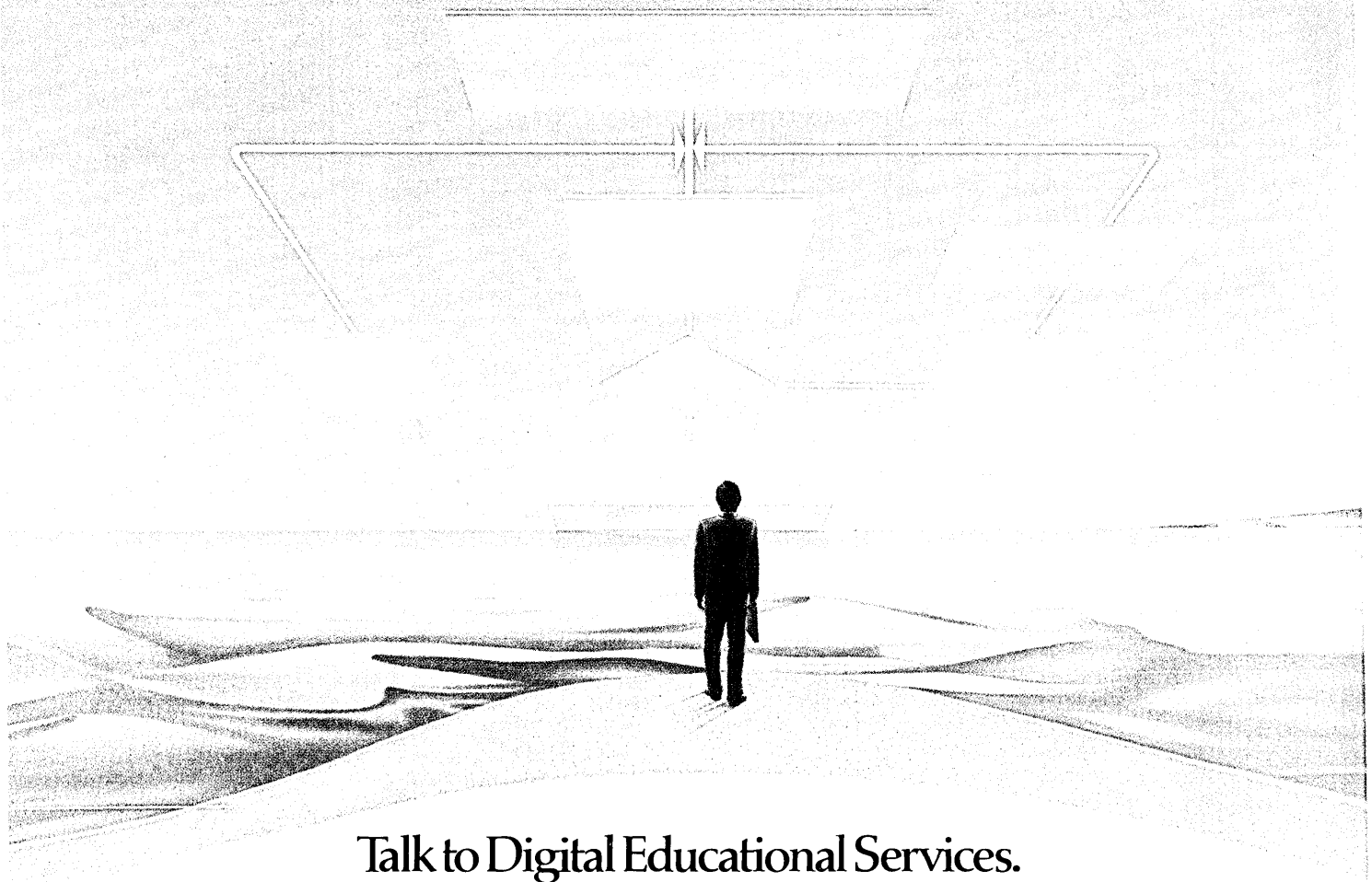
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ognize is that the Illiac was designed as a research tool to pursue the feasibility of parallel or vector processing," Smith explains. "It wasn't designed as a production machine." As a result, the Illiac had no error detection or correction circuitry. There were no diagnostic tools, the 64-processor computer having been designed for use in a university environment where researchers could study things like the design of algorithms for parallel processing. "So when

In the early stages of the installation in 1973, the one-of-a-kind Illiac was continually down.

people say it was a bad machine, yes, for a production environment. But that was because it was in a role it wasn't designed for."

Smith adds that the lack of a good language for this production environment was a major failure. "I think there was a lot learned about what a compiler has to be for unique architectures. The users at Ames wrote the compiler they ended up using." The computational fluid dynamics people at Ames wrote a language called CFD, which became the main language on the Illiac for years. They wrote vector extensions to FORTRAN and made it possible to bring those extensions down to the applications programmer, which then let the user deal with an array, with mapping the disk, and with the myriad of things that had to be done to make that system usable. After that experience, someone else wrote a similar language called Vectoral, which is now being implemented on the Cray.

If the Illiac proved anything about parallel processing, Smith continues, it was the need for researchers to develop algorithms that take advantage of a parallel or vector structure. When such improved algorithms were found, it was discovered that they were also effective on a serial machine. "Any vector processing needs to have specialized algorithms," Smith says, "and that kind of development pays off even in the serial machine."

She says they also learned the importance of having a balance among a machine's many facilities, including not only its speed but also its memory size and transfer rate. Each of the Illiac's 64 processors, for example, had only 2K of memory, and everyone agreed that that was inadequate. "The only thing that made it feasible at all were those high-speed disks," Smith says, referring to a head-per-track drive that was capable of transferring up to a half-billion bits per second.

"I think when the chips are down, the people who make optimum use of any vector machine and any vector language will have to get down to the nitty-gritty level at some point." The reason is that the computational speed of these machines is so

much greater than the memory size and the memory transfer speeds that there's a need to optimize the movement of data. They have to know how many cycles it takes to do a function and make sure the data is there when it's needed. "What you want to do is to provide tools to make that easy," she explains. "But it's problem dependent and the researcher who knows the problem is probably the person who can do it best." That means in order to overcome system imbalances it will always be the research scientist, who knows the applications, who must also learn enough about the hardware to perform this timing task.

But because the Illiac had no parity, lacked error detection and correction, runs were limited to only two hours at a stretch. They would then run diagnostic checks to be certain the machine was performing correctly before continuing for another two-hour run. It was an inconvenience, to be sure, but lengthy jobs were still accommodated, some running for upwards of 30 hours.

Despite the intrinsic design weaknesses of a machine that was out of its element, Smith considers the Illiac a successful computer. "To consider the amount of research that got done and the driver it became to the computational fluid dynamics people in spite of that," she says, "I think it can hardly be called a failure. In that sense, I think it was highly successful."

—Edward K. Yasaki

GOVERNMENT

FOUR INTO ONE WILL GO

If Commerce consolidates a number of computer sites, the incumbent vendor could be the victor.

Message to vendors from the U.S. Department of Commerce: the whole is no longer equal to or greater than the sum of its parts. It is less. At least when it comes to costs.

The DOC has proposed, and Deputy Assistant Secretary Joseph Wright last month was expected to approve, a consolidation of Univac sites at four DOC agencies—the National Oceanic and Atmospheric Administration (NOAA), the Economic Development Administration (EDA), the National Telecommunications and Information Administration (NTIA), and the National Bureau of Standards (NBS)—into a single computer center located at NBS headquarters in Gaithersburg, Md.

That's not all, folks. Commerce is also consolidating five IBM 360/65 sites into one site with two 4341s at the National Telecommunications Information Service (NTIS) headquarters in Springfield, Va. Currently on the street are two Requests for Proposal (RFPs) for a total \$40 million acquisition of scientific adp equipment by NBS and NOAA. Those RFPs have been temporarily grounded by Rep. Jack Brooks (D-Tex.), chairman of the House Government Operations Committee, who requested the General Accounting Office (GAO) to review the proposed acquisition and asked—or demanded, depending upon one's perspective—the General Services Administration (GSA) to withdraw Commerce's authority to procure, pending the results of GAO's study. The Texas Democrat has even hinted that he may not go along with any further consolidation procurement.

The plan to consolidate Univac sites calls for replacing existing 1108s (acknowledged in DOC's report to be "obsolete") at

"This will be an atrocious deal for users."

NTIA, EDA, and NBS with an 1100/82. NOAA's current 1100/44 would take on an additional workload as its contribution to the consolidation. An 1100/60 would be added to allow NTIA to perform its classified data operations. Plans call for a subsequent upgrading to an 1100/84 at the end of the life cycle of the admittedly "interim" or "bridge" life cycle of the 1100/82. That mainframe, delivered the second week of February, is expected to expire 18 to 24 months thereafter.

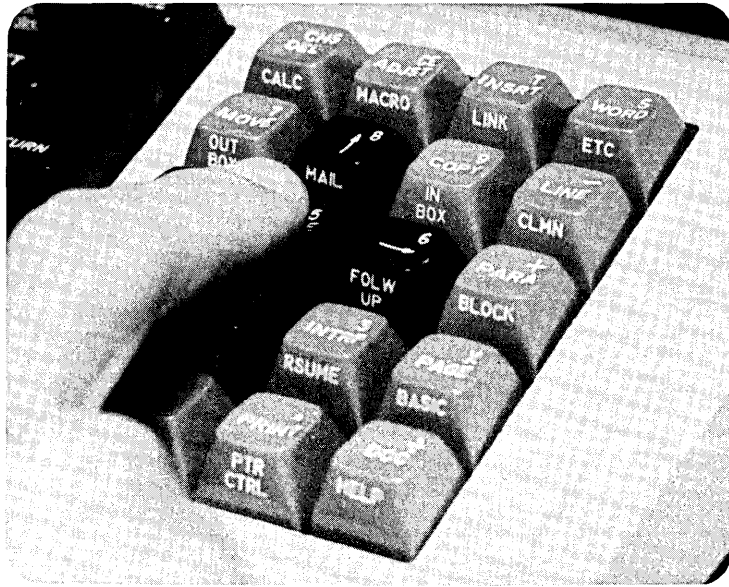
The 1100/84 will have 6 million words of main memory and a smaller number of tape drives than that currently used at the four separate facilities. It will also use 8470 disk drives, a product which has been such an embarrassment to the company that Univac officials publicly acknowledged the difficulties at their own users meeting last October. According to DOC, the question of I/O standards, with which the 8470 does not comply, will be resolved prior to the issuance of procurement authority.

"We do not agree with the theory that computer centers are less desirable than independent shops," contends Phil Ladd, acting director of DOC's Office of Information Management. "We want to consolidate. We're interested in saving the government money."

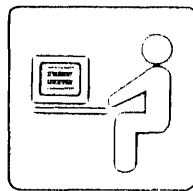
This melding would apparently do so. The current cost for the four agencies' dp operations is \$7.974 million. NOAA is the most expensive at \$3.004 million, followed by NBS, \$2.524 million; EDA, \$1.606 million; and NTIA, \$840,000. The consolidation is estimated to cost \$6.356 million for a five-year life cycle and \$7.409 million for a shorter span.

"I'm sure some vendors are upset

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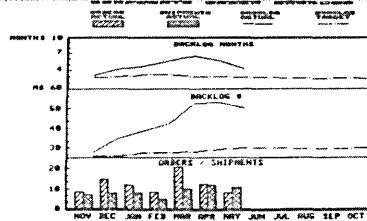
The 2623 has two independent memories—for graphics and alpha- numerics—so you can talk to your computer without disturbing your

graphics display. And if you need hard copy, the thermal printer can dump it out in less than 40 seconds.* The HP 2623 works with computers from most major manufacturers. But no matter what system you use it with, HP's worldwide service organization can provide you with the advice, documentation and support you need.

If you'd like to see an eye-opening demonstration, contact your local HP sales office listed in the White Pages. Or just return the coupon.

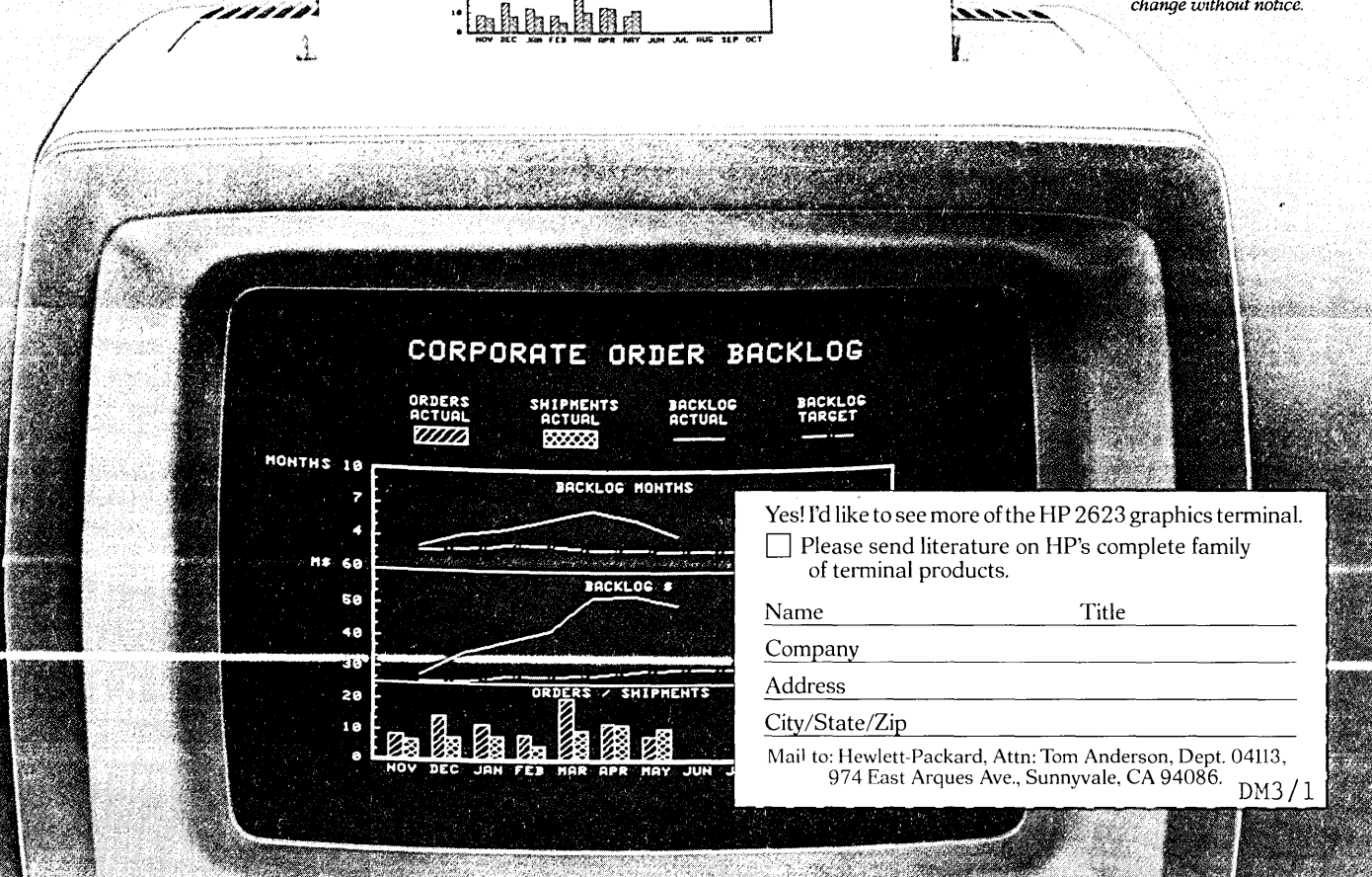
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*The HP 2623 is available without hard copy for \$3750.



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DM3/1

UNITED STATES
BANKRUPTCY COURT
SOUTHERN DISTRICT OF
NEW YORK

In re
**O.P.M. LEASING SERVICES,
INC.,**
Debtor.
Reorganization No.
81-B-10533 (BRL)

In re
**CALI TRADING INTERNATIONAL,
LTD.,**
Debtor.
Reorganization No.
81-B-11203 (BRL)

In re
O.P.M. LIFE INSURANCE FUND,
Debtor.
Reorganization No.
81-B-11749 (BRL)

In re
**O.P.M. COMPUTER SERVICES,
INC.,**
Debtor.
Reorganization No.
81-B-11850 (BRL)

In re
**O.P.M. LEASING SERVICES
(CANADA), LTD.,**
Debtor.
Reorganization No.
81-B-12193 (BRL)

**NOTICE OF ENTRY OF ORDERS REQUIRING
CREDITORS TO FILE PROOFS OF CLAIM**

TO ALL PERSONS ASSERTING A CLAIM AGAINST ANY OF THE ABOVE REFERRED TO DEBTORS:

PLEASE TAKE NOTICE, that the United States Bankruptcy Court for the Southern District of New York has entered orders requiring all persons who assert a claim against any of the Debtors arising, with respect to such Debtor, prior to the following respective dates:

- O.P.M. Leasing Services, Inc. - March 11, 1981
- Cali Trading International, Ltd. - June 26, 1981
- O.P.M. Life Insurance Fund - September 3, 1981
- O.P.M. Computer Services, Inc. - September 22, 1981
- O.P.M. Leasing Services (Canada), Ltd. November 9, 1981

whether such claim is fixed, liquidated, unliquidated, contingent or disputed, to file a proof of claim in accordance with the instructions set forth below with James P. Hassett, Trustee, on or before **MARCH 30, 1982.**

Exceptions: Persons who assert claims solely as co-debtors, sureties or guarantors, must file a proof of claim as required herein on or before April 30, 1982. Persons who assert claims solely by reason of the recovery by any of the Debtors' estates of money or property or the rejection by such estate of an executory contract or unexpired lease shall file a proof of claim in accordance with the Court's orders within thirty (30) days of the recovery of the money or property by the estate or the rejection by the estate of the executory contract or unexpired lease.

A creditor may, for cause shown, apply to the Court prior to the expiration of the bar date for an order extending the bar date as to such creditor. Any such application must be on three days prior written notice to the attorneys for the Trustee.

ALL PERSONS WHO FAIL TO FILE A PROOF OF CLAIM IN ACCORDANCE WITH THE COURT'S ORDERS SHALL BE FOREVER BARRED FROM ASSERTING A CLAIM AGAINST SUCH ESTATE.

Proofs of claim should be filed in conformity with Official Form 15 to the Bankruptcy Rules of Procedure with: James P. Hassett, Trustee, in care of O.P.M. Leasing Services, Inc., 71 Broadway, New York, New York 10006, ATTN: Claims Department (not with the Clerk of the Court).

Further information may be had from the Trustee or his attorneys listed below.
Dated: New York, New York
January 11, 1982

BY ORDER OF THE COURT
BURTON R. LIFLAND
UNITED STATES BANKRUPTCY
JUDGE

JAMES P. HASSETT, Trustee of
O.P.M. Leasing Services, Inc. and
Cali Trading International, Ltd.
71 Broadway
New York, New York 10006
(212) 747-0220

ZALKIN, RODIN & GOODMAN
Attorneys for Trustee
750 Third Avenue
New York, New York 10017
(212) 682-6900

UNITED STATES
BANKRUPTCY COURT
SOUTHERN DISTRICT OF
NEW YORK

In re
MYRON S. GOODMAN,
Debtor.
81-B-10681 (BRL)

In re
MORDECAI WEISSMAN,
Debtor.
81-B-10673 (BRL)

**NOTICE OF ENTRY OF ORDERS REQUIRING
CREDITORS TO FILE PROOFS OF CLAIM**

TO ALL PERSONS ASSERTING A CLAIM AGAINST MYRON S. GOODMAN OR MORDECAI WEISSMAN ARISING PRIOR TO MARCH 27, 1981:

PLEASE TAKE NOTICE, that the United States Bankruptcy Court for the Southern District of New York has entered orders requiring all persons who assert a claim against Myron S. Goodman or Mordecai Weissman arising prior to March 27, 1981, whether such claim is fixed, liquidated, unliquidated, contingent or disputed, to file a proof of claim in accordance with the instructions set forth below on or before **MARCH 30, 1982.**

Exceptions: Persons who assert claims solely as co-debtors, sureties or guarantors, must file a proof of claim as required herein on or before April 30, 1982. Persons who assert claims solely by reason of the recovery by the estate of Myron S. Goodman or of Mordecai Weissman of money or property or the rejection by such estate of an executory contract or unexpired lease shall file a proof of claim in accordance with the Court's orders within 30 days of the recovery of the money or property by the estate or the rejection by the estate of the executory contract or lease.

A creditor may, for cause shown, apply to the Court prior to the expiration of the bar date for an order extending the bar date as to such creditor. Any such application must be on three days prior written notice to the attorneys for the trustee of such estate and Zalkin, Rodin & Goodman, 750 Third Avenue, New York, New York 10017, attorneys for James P. Hassett, as Trustee of O.P.M. Leasing Services, Inc.

ALL PERSONS WHO FAIL TO FILE A PROOF OF CLAIM IN ACCORDANCE WITH THE COURT'S ORDERS SHALL BE FOREVER BARRED FROM ASSERTING A CLAIM AGAINST SUCH ESTATE.

Proofs of claim should be filed in conformity with Official Form 15 to the Bankruptcy Rules of Procedure with respect to Goodman with Daniel McColley, c/o Garrity, Connolly, Lewis, Lowry & Grimes, 605 Third Avenue, New York, New York 10158 and with respect to Weissman with Albert F. Reisman, c/o Otterbourg, Steindler, Houston & Rosen, P.C., 230 Park Avenue, New York, New York 10017 (not with the Clerk of the Court).

Further information may be had from the respective attorneys for the Trustees of the estates of Myron S. Goodman and Mordecai Weissman listed below.
Dated: New York, New York
January 11, 1982

BY ORDER OF THE COURT
BURTON R. LIFLAND
UNITED STATES BANKRUPTCY
JUDGE

GARRITY, CONNOLLY, LEWIS, LOWRY & GRIMES
Attorneys for Daniel McColley
Trustee of the Estate of
Myron S. Goodman
605 Third Avenue
New York, New York 10158
(212) 687-9090

OTTERBOURG, STEINDLER, HOUSTON & ROSEN, P.C.
Attorneys for Albert F. Reisman
Trustee of the Estate of
Mordecai Weissman
230 Park Avenue
New York, New York 10017
(212) 661-9100

NEWS IN PERSPECTIVE

because they want to have separate bids," Ladd concedes. "That would obviously increase their business, but we're not going that route. We're saving a lot of money this way, and I know the Brooks committee supports us. I've talked to them about it and they're 100% behind us."

"We haven't heard a thing about this consolidation," counters a member of the committee, which reviews GSA procurement authorizations greater than \$500,000. If Brooks' boys don't complain, GSA proceeds post haste. If there are objections, activity ceases until the committee sees what's happening.

"We've had extensive discussions regarding the scientific proposal, but I don't know a thing about NTIA and EDA," the Brooks Committee source says. "Nobody's said a word. I hope Commerce isn't getting into this sole source garbage again. All agencies have a tendency to do that when they have to go out into the real world. We've consistently opposed that sort of b.s."

While the proposal blooms, procurement requests lie fallow. None of the four agencies are being permitted to acquire hardware. NTIA recently requested assis-

"We do not agree with the theory that computer centers are less desirable than independent shops."

tance from a consultant to develop hardware and software specs, but Ladd refused to approve the hardware piece of that pie.

"We're not going to sole source," Ladd argues. "This has been competitive all the way. We know the rules and we know how GSA and the Brooks committee work. We're not about to cross them. We've kept this thing open all the way."

Well, almost. Bidding for the initial upgrade to the 1100/82 was open to all. The ensuing upgrade is open to none. Unvac is in. All others are out.

"Any economic upgrade will obviously freeze out other vendors," admits Univac's Ed Hogan, branch chief for DOC marketing. "If you're the incumbent, it's to your advantage. If you're not, there's not much you can do."

"We're neutral on this. It's entirely Commerce's decision. We've had no input. If it's approved we'd lose four sites, but we'd make up for it in volume on the 82 machine. This isn't that radical an approach to procurement. Commerce does it all the time. The only thing that really affects us is the general trend toward economic upgrading of installed equipment. But you have to remember that a wide spectrum of activity is not being affected. Only a small portion of the inventory is being consolidated."

True. But it is the increasing tendency toward making the whole less than its parts—at least in terms of money—that is

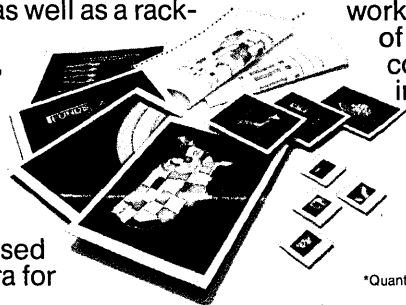


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NEWS IN PERSPECTIVE

causing raised eyebrows and skeptical glances among others in the marketplace.

"NBS has been working on an RFP for the last two years to replace that 1108," says Terry Miller of Government Sales Consultants, one of Washington's most influential and knowledgeable firms on procurement matters. Miller may well be more familiar with federal procurement regulations than the folks who wrote them.

"They wouldn't have a difficult time justifying a sole source upgrade," he says. "And Commerce might be on the right track to save money. Univac actually might end up behind, because it could lose business.

"But it [the consolidation] is going to play havoc with the missions of the bureaus. The ultimate step this will lead to is GSA buying 500 machines and everybody running to GSA for their adp jobs."

Indeed. The scenario is not one concocted by Isaac Asimov or the late Rod Serling. Today, four machines. Tomorrow, five. Next month?

"What's to prevent them [Commerce] from consolidating more than four? Or as many as they want?" asks Dan Sarrano, adp group head at GAO. "Once they get their foot in the door, there's nothing that says they can't do this whenever they want."

GAO's prime quarry at the moment is the proposed scientific acquisition. Although Brooks wrote that "a unique oppor-

tunity exists to (1) establish for the first time a shared scientific processing capability that meets the needs of both agencies, (2) ensure the efficient and effective use of scientific adp equipment, and (3) save the government \$20 million," He nonetheless called in his adp detectives. When GAO completes that report, which it must do by March 7, it will cast a judicious eye on the Univac consolidation.

"What are they getting? How feasible is it?" GAO's Sarrano wonders. "Are they saving money? Can they arbitrarily

NTIA originally did not want any part of this whole.

combine the four Univacs or should they get something else? This could be a scheme. We'll be looking at it very critically." So are the subjects of the intended marriage.

"This will be an atrocious deal for users," warns a well-placed source at one of the four agencies. "We [users] are very concerned about this. Nobody's asked us what we think or what we'd like to see happen.

"While the rest of the industry is decentralizing to cut down communications costs, these guys are shifting four sites into one. What if the computer goes down? Four agencies will be off the air. Users won't have control like they do at their individual agencies. They'll have a harder time making deadlines. And they're talking about

cutting staff [by 52] when they can't handle the workload they've got now."

NTIA originally did not want any part of this whole. It objected vehemently when DOC first sought its input.

"NTIA's current software system is nearly 20 years old, doesn't comply with Federal Information Processing Standards (FIPS), and is generally technically obsolete," said Donald Jansky, NTIA's associate administrator of the Office of Federal Systems and Spectrum Management, to Dennis Boyd, executive director of DOC's Office of Information Management.

"There does not appear to be any significant cost savings available to either NTIA or the department by including NTIA in the proposed consolidation. It also appears that including NTIA in the consolidation results in the purchase of excessive hardware capacity that cannot be adequately utilized and significantly increases the costs of the proposed consolidation center."

NTIA officials refused to comment on whether those concerns had been mollified. Suffice it to say they won't be independent much longer.

It is due only to NBS' wisdom that there is any plan at all. As originally outlined, the 1100/82 was to be installed in January or February. EDA would begin to use the interim system in March. The upgrade to an 1100/84 and 1100/62 would occur in July, with NOAA and NTIA using the upgraded system the following month. Consolidation would be complete by October.

"That schedule cannot be attained and is totally unrealistic," Glenn Ingram, associate director for NBS's Computing Center for Applied Mathematics, wrote in a November letter to the chief of adp planning and management at NBS. So Ingram offered an alternative. Acquire an 1100/60 to process NTIA's classified work. Carry out the initial consolidation on NOAA's 1100/44, with either EDA or NBS (which includes NTIA) administrative computing as the initial customer. NBS would install the interim 1100/82 system on schedule in early 1982, then proceed with the fully competitive procurement of a long-term replacement for scientific computing. "Continuing the well-advanced, fully competitive procurement would defuse the potential for vendor protests, and the 1100/82 could be transferred to a consolidated facility when the replacement [i.e., the 1100/84] was installed," Ingram concluded. DOC followed the suggestion to the letter.

"There was opposition at first," Ingram admits. "But we studied the matter and we now support consolidation. We want to help it succeed. If it doesn't, we'll just go our own way and so will the other agencies. We'll be back on the street again."

Which is where all but Univac would like them to be.

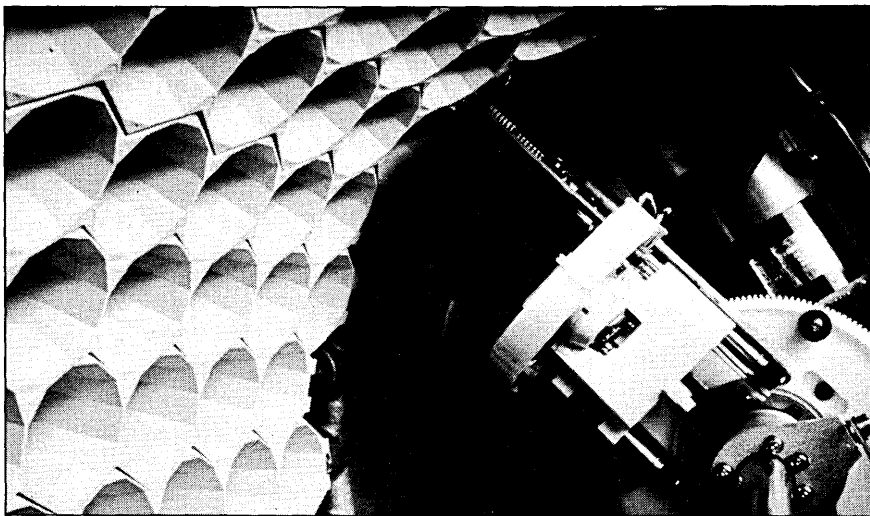
—Willie Schatz

MASS STORAGE

M860 DEBUTS

Here's an inside look at Masstor Systems' new M860 mass storage device (October, p. 56), an updated version of IBM's 3850. Designed to appeal to medium-sized and large dp shops, the device uses hardware from Nippon Peripherals Inc. to store 55 billion bytes of on-line data while occupying only 10.8 square feet of floor space. Masstor has signed an oem deal to supply the M860 to Control Data for use with its mainframes

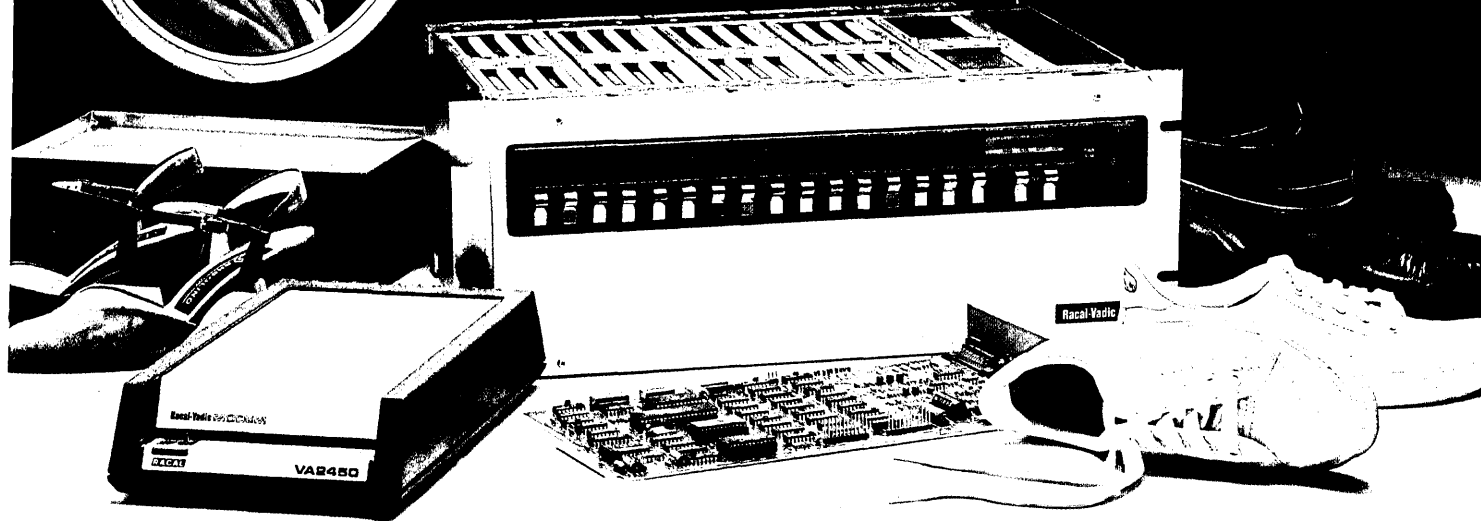
and will also market the device directly to end users. The company said the machine uses standard 3850 data cartridges which are recorded upon with higher densities than in IBM's system. As can be seen, the cartridges are stored in semicircular fashion instead of on a flat panel as in the 3850, a method that improves retrieval time and saves space. The first unit has been installed at Brookhaven National Labs, Long Island, N.Y. Prices begin at \$450,000.





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The retail stores install the VA2450 modems. They're compact, low profile and the telephone can sit on top, conserving space. An important feature of the VA2450 is the VOICE/DATA/MANUAL switch on the front panel which eliminates the need for a special telephone. During the day, the switch is positioned so the phone can be used for normal incoming and outgoing voice communication. At night, when rates are lower, the modem is engaged.

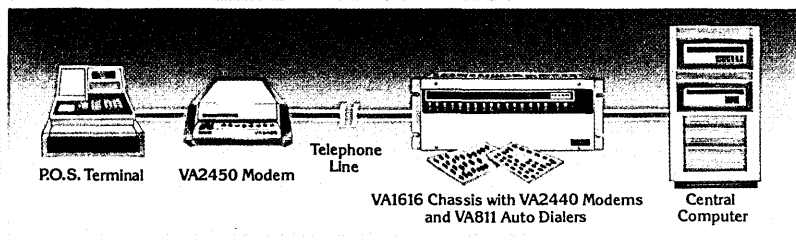
so the central computer site (using the VA2440 modem and VA811 dialer) can poll each retail store collecting sales, inventory and other data.

Up to eight VA2440 modems and VA811 auto dialers can be mounted in Racal-Vadic's 7-inch high rack chassis. The auto dialer(s) operate either in a singleline mode (one modem per dialer) or in Racal-Vadic's exclusive Multiline configuration where up to 60 modems can be accessed from a single RS366 or RS232C computer port. That's a tremendous savings in space and hardware.

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NEWS IN PERSPECTIVE

BENCHMARKS

RED INK: Xerox's push into the office automation market has made for greater-than-expected losses at its Office Products division, according to company officials. Estimated to be in the \$50-million-plus range, the losses were attributed to the reorganization of marketing and sales operations, software delays on the 8010 Star workstation, and heavy R&D spending. Earnings for the corporation as a whole grew 6%, to \$598.2 million, compared to the previous year's \$564.9 million. President and chief operating officer David T. Kearns said last year's reshaping and resizing of the company cost some \$63 million and resulted in the reduction of overall staff by 2,754 persons. "Huge investments" in OPD product development were promised for the next two years, although only new products and not an immediate bolstering of profit margins would result. The firm as a whole expects to spend some \$600 million in R&D during the coming year. Kearns declared that no divestment of office systems or electronic printing operations would be made to boost earnings. OPD isn't expected to reap profits until 1983, he noted.

BLACK INK: Digital Equipment, defying the trend towards sagging bottom lines that have plagued other computer makers, reported second quarter income up 42% and operating revenues up 27%, compared to last year's second quarter. Income stood at \$99.1 million, or \$1.79 a share, up from \$70 million, or \$1.43 a share during the comparable period last year. Revenues were up to \$966 million. Nevertheless, the firm said it has cut back on hiring and expenditures as it, like its competitors, feels the effects of a sluggish economy. Income for the first half totaled \$188 million, compared to \$126 million for the first half of last year. DEC is said to be experiencing strong orders for its 32-bit VAX computer line, a dual-processor version of which was introduced in late January. That system is pegged at 1.8 times the performance of a single-cpu model 11/780.

TRANSFUSION: Financially lackluster Centronics Data Computer Corp., once a leading maker of printers, has had to resort to a helping hand from Control Data. CDC's Computer Peripherals Inc. (majority-owned by CDC, but a joint venture among CDC, NCR, and International Computers Ltd., the British computer firm) has agreed to give Centronics its printer business and \$25 million in cash in exchange for a 45% stake in Centronics. As part of the agreement, Robert Howard, chairman and ceo of the CDC division, will step down and be replaced by Thomas Kemp, president of the CDC division. The events are the latest in a series of management shake-ups, financial losses, and product shortcomings the

Hudson, Mass., printer manufacturer has suffered in recent years. Industry analysts attribute the firm's poor performance to increasing competition from foreign vendors, as well as the company's own poor management. If the proposed deal goes through, Centronics' board would gain three CDC appointees, who would replace Centronics members. All three CPI joint venture partners have been Centronics customers.

TURNAROUND: In an effort to keep customers and old machines under its wing, Hewlett-Packard has formed a "Systems Re-Marketing Operation" in Sunnyvale, Calif., to refurbish and resell used HP machines. Headed by David E. Sanders, formerly product marketing manager for the HP Computer Marketing group, the operation plans at first to concentrate on retired HP 3000 series machines such as the 30, 33, and III. The machines will come in from customers seeking credits, from expired leases and internal demo sites, a spokesman said. He noted that a model 3000 Series 30R will carry a U.S. list price of \$39,490 for a typical configuration, compared to the original list price of \$70,275. Refurbished systems will carry standard HP warranties and installation services, effectively giving the company a new, lower-priced line of systems to market, the spokesman claimed.

BYE-BYE: Another layoff, the third in six months, was made at Honeywell where 1,150 workers were let go. Much of the impact was to be felt at the firm's Billerica, Mass., plant where small systems and terminals are manufactured. Some 450 persons were let go there. The computer company attributed the layoffs to a shortfall in orders and rising operating costs. Some 700 people were let go from the U.S. Marketing and Services group in Waltham, Mass., where the firm's Information Systems operation is headquartered. Many of the layoffs were said to be engineering personnel, a fact that prompted analysts to suggest the firm is leaning toward automated systems that can cut costs. The latest cutback brings to 1,800 the number of persons let go from Honeywell since last summer.

URGE TO MERGE: A record \$766 million worth of mergers and acquisitions in the computer software and services business took place last year, announced ADAPSO, the industry's trade association. The 118 separate transactions were well ahead of the previous year's 87 deals worth \$688 million, according to Broadview Associates, a Fort Lee, N.J., consulting firm that has been tracking the upward trend in mergers for ADAPSO over the past few years. Most of the deals were seen as helping software and services firms expand marketing bases and giving hardware firms a footing in the software business. Some of the biggest deals were General Electric's pur-

chases of Software International, Banking Systems, and Energy Enterprises; National Data's takeover of Rapidata; and Schlumberger's buy-out of Applicon. As for buys by hardware vendors, Burroughs bought Systems Research, Hewlett-Packard picked up two software firms, and McDonnell Douglas Automation bought two divisions of Bradford National. Automatic Data Processing, always on the most active acquirer list, last year picked up three firms—two in the financial market and one in health care, according to ADAPSO.

SUPERMICROS: Still another new label is being applied to microprocessor-based systems with low, microcomputer price tags but power, in some instances, approaching that of a DEC PDP-11/45 or 11/70. These so-called supermicros, not including personal computers and dedicated word processors, represent a worldwide market this year of \$447 million. And that's just U.S.-made iron. By the end of 1986 it will grow to a value of \$5.53 billion, according to a study by ITOM International Co. The company's Omri Serlin says more than 50 U.S. companies already offer supermicros. They include IBM, HP, Intel, and Zilog, as well as a clutch of little-known firms that are taking advantage of the availability of 16-bit processor chips, 64K RAM chips, and Winchester and floppy disk drives. The study finds a significant number of manufacturers offering the Unix OS or a look-alike, along with in-house operating systems. But few are said to be enthusiastic about offering a local area network. The 225-page study is priced at \$995, from P.O. Box 1415, Los Altos, CA 94022.

DOING BUSINESS: The first fruits of the SESA-Honeywell merger completed in 1980 are two contracts worth \$5.5 million to install private data networks for Lincoln Telephone and Telegraph Co. and Honeywell itself. SESA, the Paris-based specialist in packet-switching technology, is majority partner in SESA-Honeywell, which is based in Washington, D.C. The firm says the Lincoln Telephone network will be based in Lincoln, Neb., while the Honeywell corporate data network will connect terminals and computers throughout the U.S. and eventually in Canada and Europe. The contracts are the first major ones for the U.S. joint venture, it says.

BIG BUCKS: The hardcopy graphics market is heading for the \$2 billion mark, according to Venture Development Corp. Printer/plotter devices are the leading market segment with a compound annual growth rate of over 40%, the Wellesley, Mass., market research firm says. Those devices currently account for about a quarter of all shipments. Although no radically new technologies are expected by 1986, established ones will be put to some new uses.

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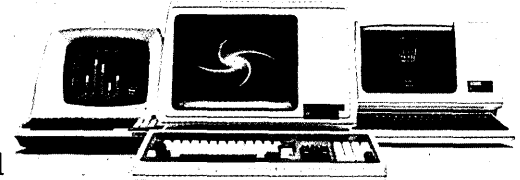
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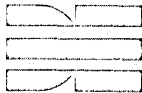
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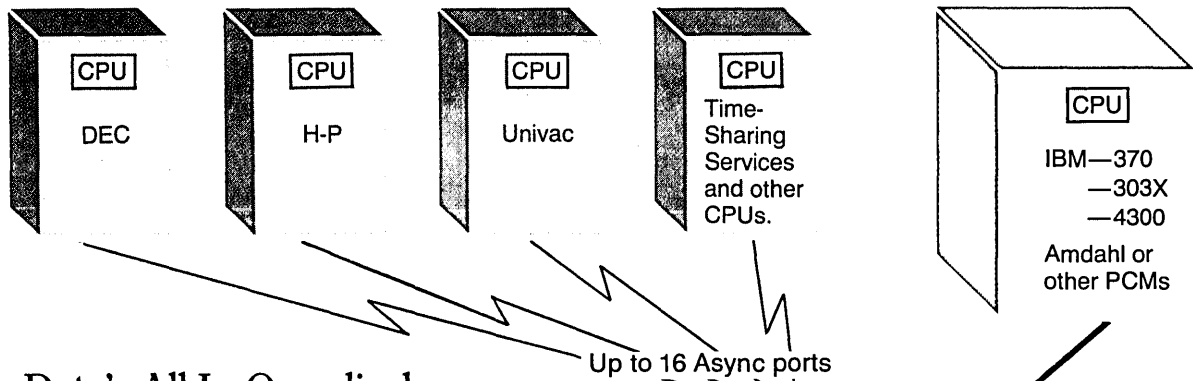
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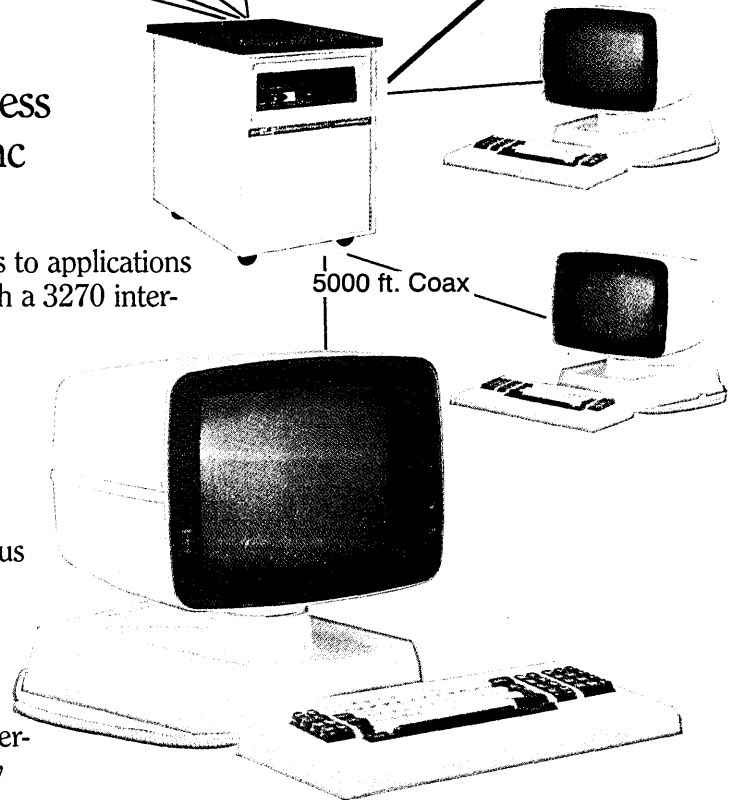
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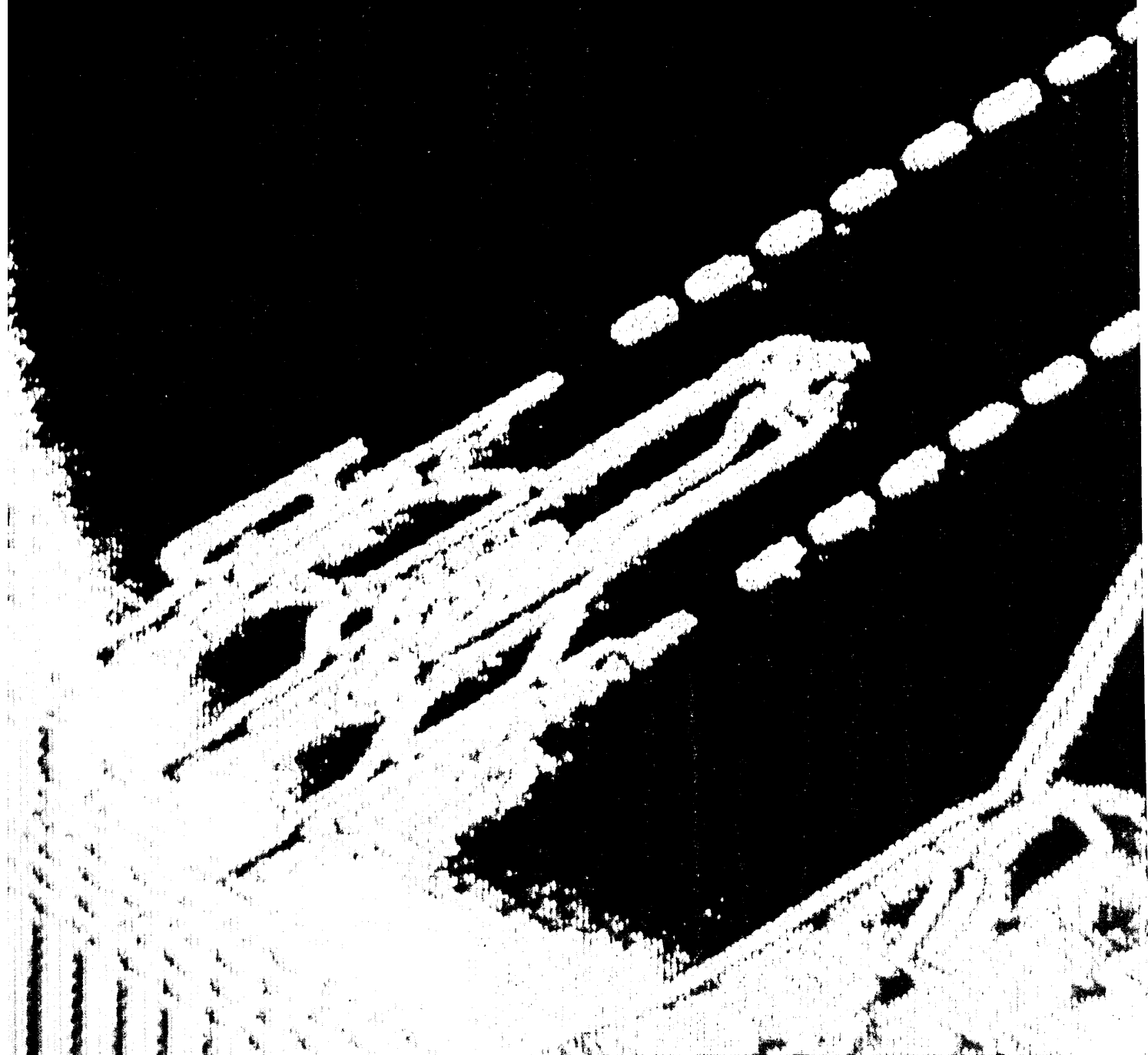
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BATTLE OF THE NETWORKERS





by **Kenneth Klee and
John W. Verity with
Jan Johnson**

You almost expect to find cabbies talking about it: you've just hopped into the back seat of a Checker at O'Hare, say, and the driver turns around and offers, "Yeah, so me and the wife talked it over and we decided baseband is the way to go. None of this CSMA/CD line access, though; it won't do the job if the net gets busy. We're working on token passing. We'll probably announce it by late second quarter. It looks very promising."

At this point the dispatcher sticks his head in the window. "Oh yeah?" he says. "What are you gonna do about voice, then? What are you gonna do five years down the pike when you wanna videoconference? You can go ahead and lock yourself into the office of the past if you want, but count me out. My money's on broadband."

Things haven't gone quite that far yet, but you wonder if they might. Local networks—or local area networks, or local area communication networks—are generating more arguments than Reagan's new federalism, and are being marketed with the kind of zeal once reserved for toothpaste. Network vendors abound, and new networking schemes are apparently being born at the rate of about one a month.

So, local nets are selling like hotcakes, right? Dozens of vendors are flipping them off the griddle as fast as they can, and productivity-hungry corporations are wolfing them down, right? Well, not exactly. It's more like this: the griddles are hot, and there are some potential customers who have been looking at the menu so long they're getting restless, but the crew of short-order cooks is still trying to perfect the various batters. This has tended to make the customers somewhat skeptical about what it says on the bill of fare, and the technical perorations issued by this abundance of cooks haven't done much to reassure them.

The indecision stems from the fact that the world of local networkers has apparently broken down into two warring camps: broadbanders and basebanders. The broadbanders warn that baseband is limiting, and the basebanders counter that broadband is expensive, complicated, and not ready yet. Who's right? The question is far from academic because there are some exceedingly large stakes involved. Networking is the key to office automation and just about everything else listed under the "Trends for the '80s" heading in the average conference schedule.

Davis Foulger, a local net specialist at International Resource Development (IRD), Norwalk, Conn., says that combined base-

PHOTOGRAPH BY LARRY GARTEL

Overnight, everyone had something to say about local networking.



"Wang announces the most important step in managing information since the computer: Wangnet."

band and broadband shipments will break \$200 million by 1986 and \$400 million by 1990. Marketing Development, a Concord, Mass., research firm, looks for the market to hit \$950 million in 1986. And Jim Cockrum, vice president of the telecommunications industry service at Cupertino, Calif.'s Dataquest, believes the market for all kinds of local nets will be \$200 million in 1982 and \$800 million by 1985.

In any event, we're talking big bucks. But you can't help noticing that, as is often the case with these rosy technomarket prognostications, you're going to have to wait a few years before that curve gets nice and steep.

How great is the demand for networks right now? That's a different matter. "The market is fledgling at this point," says IRD's Foulger. "The market just isn't ready," echoes Ted Withington, an Arthur D. Little analyst. "There's certainly more smoke than fire right now," says Ralph Berglund, a Cherry Hill, N.J.-based telecom consultant, adding that "some of the criticisms we've heard have been really unprofessional."

That last remark helps explain why local nets, for all their vast potential, seem stalled. Listen to John Connell, director of the Pasadena, Calif.-based Office Technology Research Group, an association of corporate dp types charged with automating their companies' offices:

"We had a meeting on this not long ago, and what came out was the extraordinary lack of knowledge. We're just not getting the leadership we need from the telecommunications people. Vendors are shouting back and forth about which technologies are the best, but users don't have strong opinions. It's strange, when Data General and DEC go out to sell minicomputers, they don't knock each other so much. They just sell them.

"But it seems that in this case the marketing guys are the ones up front and they're not that knowledgeable about networks. So they make their presentations and then the charges start to fly."

"The debate has gotten so loud," Connell continues, "because it's recognized that telecommunications is at the heart of the automated office. But a potential user has to evaluate his requirements internally."

So, to Ethernet or not is not the question. As Ralph Berglund puts it: "The way to look at this is not to say, 'What networking scheme do I like?' but rather to ask, 'What problem do I need to solve? Do I need word processors? Do I want a Star?' Then you look at the networks that support those products."

For the big players, then, the fight isn't really about bandwidth or line access methods at all. Networking itself won't net them much. And therein, as they say, lies a tale.

HISTORY OF THE BATTLE

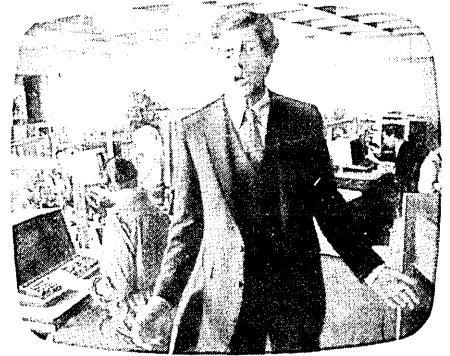
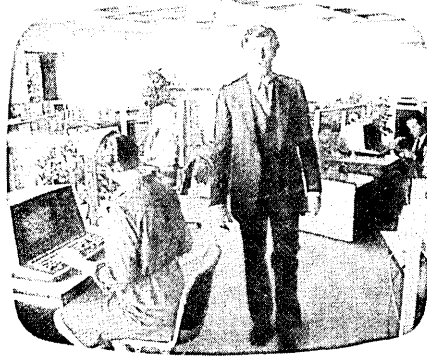
The opening shot in the local networking battle was fired in May 1980, when, just days before the National Computer Conference, Xerox, Digital Equipment, and Intel told the world they would jointly support the Ethernet scheme that Xerox had developed over the previous few years. For a small fee, they said, licenses to Ethernet would be available to one and all.

Several small and not-so-small firms had introduced office nets prior to this: Data-point, San Antonio, Texas, for example, had been in what it called the dispersed data processing business for years, and in 1977 had introduced its proprietary ARCnet. But the combined weight of the triumvirate immediately established Ethernet as a system against which all others would have to be measured. Overnight, it seemed, everyone had something to say about local networking. It was the hottest thing on the NCC cocktail circuit since punched cards. Soon, even IBM, usually mum on such matters until it has a product to sell, proclaimed its intention, "over time," to let its various office systems exchange documents. Best of all for Xerox, however, was that overnight it apparently had leapfrogged its biggest competitors.

"It was clearly a direct challenge to Wang [Laboratories, Inc.] and IBM," recalls George F. Colony, senior analyst with The Yankee Group in Cambridge, Mass. "Xerox



"After seven years and millions of dollars, Xerox has developed the ultimate socket. It's called the Information Outlet."



"Wangnet is the electronic connection that gives everyone in your office any kind of information they need—instantly."

was inviting everyone into the same boat with it, but was keeping its hand on the tiller."

Indeed, it was a crucial victory for Xerox, which seemed to have knocked the wind out of several sails. It also marked the beginning of Xerox the underdog's go-for-broke struggle to become a serious contender in the lucrative office automation market. The copier company's word processing efforts had been relatively unsuccessful and it needed to gain at least a psychological edge over Wang and IBM, who between them controlled as much as two-thirds of the office systems arena. So, Xerox spent millions promoting Ethernet in the trade press, on prime-time tv, and between the fur ads in the *New Yorker* magazine. For the most part, Ethernet was still on the drawing boards, but it was appearing everywhere.

That advertising apparently paid off well because, through its sales force, the company heard that big customers were going to other vendors and asking, "What do you have to offer?" recalls one Xerox executive.

"We tried to create that kind of back pressure," says Dave Liddle, vice president of the office products division, with key marketing responsibility for Ethernet and other products. "Given that, I shouldn't be so surprised by the bad press we got later."

It shouldn't have surprised anyone, given the stakes involved, the power of the

players, and the ignorance of users about local networking in general. Upstart Xerox was attempting to define what a local net could be in the face of bigger, more established competitors. The company fleshed out its product line with a personal computer, a family of electronic typewriters, and the Star professional workstation, and managed to draw support from as many as 60 companies that said they'd develop Ethernet gear or at least make their systems attachable to the Xerox net. In response, more than a year after the Ethernet triumvirate made its NCC debut, Wang Labs revealed plans for its Wangnet, a scheme designed to beat Ethernet at its own game.

THE REAL BASIS OF THE FIGHT

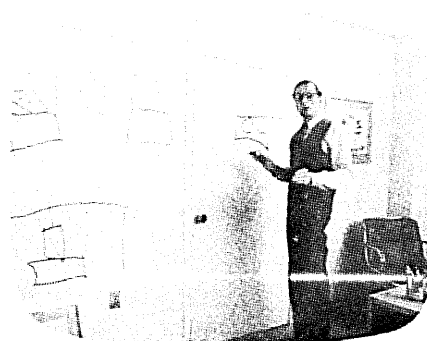
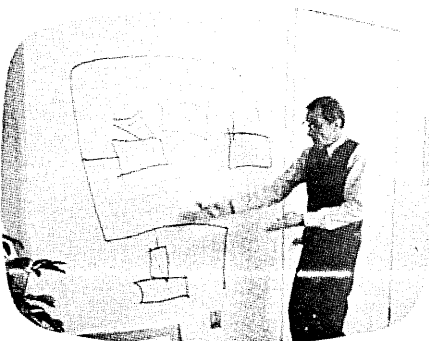
The argument that subsequently developed was apparently about technical issues. It boils down to differences in the way signals are transmitted through so-called baseband systems like Ethernet and broadband systems like Wangnet. Baseband systems are digital, passive, and offer a single channel for transmission of information. Devices attached to the net use a set of rules to contend for the right to speak; in Ethernet and several other systems those rules are called "carrier sense multiple access/collision detection" (CSMA/CD), which means, roughly, "listen before talking/listen while talking."

Broadband schemes are analog, usually require a controlling device, and offer many channels. Devices attached to the net communicate with the network controller via an interface unit that includes a radio frequency modem. The controller then transmits the signals to their destination. With the introduction of microprocessors into broadband modems, it's possible to implement baseband access strategies (like CSMA/CD or token passing) on one or more channels of a broadband system.

Both systems have advantages and drawbacks, but if you listen to the proponents of each you might conclude that neither is worth pursuing. Behind that controversy, which has been fueled by a horde of market researchers, industry analysts, and journalists who know a good fight when they see one, is the fact that the local network battle is only a small piece of a much larger action.

"Looking at the future, you can easily see that local area networks are the cheapest part of the [office] system," says IRD's Foulger. "There's eight times more money to be made in the workstations you attach than in the network equipment itself." Foulger projects a total market for office workstations of about \$14 billion by 1992. Compare that to Foulger's projection for the networks themselves, and you see what the fight is really about.

Xerox, with a small installed base of



"Behind this outlet, there's a Xerox Ethernet cable that links all kinds of different office machines."

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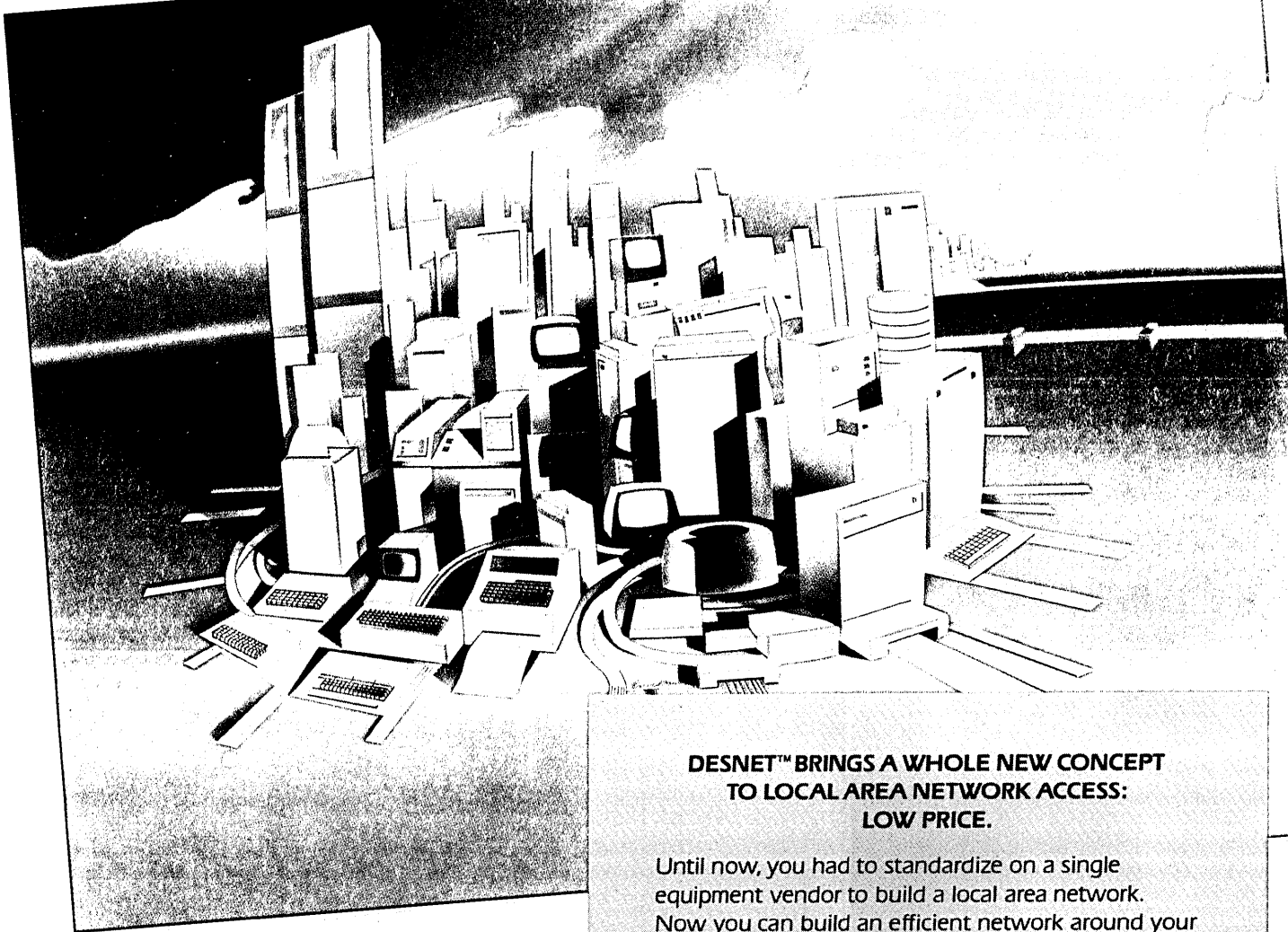
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CIRCLE 94 ON READER CARD

Both systems have advantages and drawbacks, but if you listen to the proponents of each you might conclude neither is worth pursuing.

office electronics (copiers so far are primarily electromechanical devices), clearly needs to rush users into installing office networks so that it may follow up with sales of workstations, word processors, file servers, and electronic printers. Wang on the other hand has a substantial installed base of systems, and must be cautious in opening up that base to incursion and replacement by other vendors. Control of the network, at least to the degree of choosing between an open net like Ethernet and a closed one like Wangnet, is the crucial issue as systems are interconnected and combined into truly distributed systems sharing resources.

Wang had hinted at a broadband network product as early as December 1980, but it wasn't until six months later that Wangnet was formally introduced. Claimed to be capable eventually of handling "all types of office automation—including data, text, and video," Wangnet tried to match Ethernet spec for spec and then some. For example, its primary channel, the so-called Wang band, was designed to provide communications between Wang computers—and only Wang computers—at 12 million bps, just ahead of Ethernet's 10 million bps rate. Wang's press release included a thinly veiled criticism of Ethernet: "Baseband, after all, is a seven-year-old technology already—hardly the ideal foundation on which to build the office of the future."

BATTLE BECOMES VICIOUS

It was at about this time that industry attention began to focus heavily on the relative merits and defects of baseband and broadband local networks and that the overall marketing battle took on an increasingly vicious tone. "Yellow journalism," is the how one less-than-casual observer remembers some of the coverage. Almost weekly, it seemed, someone was quoted as taking a shot at Xerox or Ethernet or both. Obviously, the copier firm was an open target as it gathered momentum in its drive for market share and the establishment of Ethernet as a de facto standard. Several small companies offering broadband equipment—Sytek and Amdax, for instance—joined Wang in its attacks on baseband, while various market research houses cashed in with negative reports on Xerox's future. Datapoint started to run ads for its baseband ARCnet, pointing out that, unlike Ethernet, its product was well beyond the drawing board. The chorus of anti-Ethernet epithets grew to a crescendo in November when Strategic, Inc. of San Jose, Calif., declared, in a heavily publicized study of Xerox, that its bid for the office systems market was doomed, largely because of flaws in Ethernet. Only those who paid \$1,200 were given a look at Strategic's actual report, but a mass mailed promotion piece generated

many gloomy headlines. Several more favorable market studies, observers say, captured less, if any, ink.

"That was a particularly ugly episode," recalls Bob Metcalfe, coinventor of the original Ethernet patent and chief executive of 3COM, a Mountain View, Calif., venture specializing in Ethernet-compatible gear. "November was the low point. Our orders dropped off significantly because people got confused. They were analyzing, not acting."

In December, Xerox's Liddle took the opportunity of a New York press conference, ostensibly called to publicize the release of additional Ethernet specs, to counter many of the charges previously leveled against the Xerox scheme. He also leveled a few of his own against Wangnet and broadbanding in general as well as against the negatively slanted research reports. It was all dutifully reported by trade weeklies, along with rebuttals from Wang's director of networking, William Rosenberger.

"The debate is not nearly as much an issue now as it was six months ago," Rosenberger said in mid-January. "Large, leading-edge companies and most consultants have come to the conclusion that baseband is limited in its capabilities and is not the best choice in most circumstances."

Besides, he adds, "If Ethernet doesn't work, then Xerox has failed. Ethernet is more significant to Xerox than broadband is to Wang. We aren't betting the company on our network."

"I'm surprised that Wang [Labs] would go so far and promise so much [in Wangnet]," counters Liddle. "It's usually hard to get Dr. Wang to overextend himself like that. We saw them turn the discussion to modulation techniques because we could deliver and they couldn't." Indeed, he sees the broadbanders' campaign against baseband as similar to Scope mouthwash's "medicine breath" attacks on Listerine. The debate, he says, has been a "mixed blessing" for Xerox's office products division. "It wasted a lot of time for our sales force but it also put us on the map as a force to be reckoned with. It also forced some competitors to promise perhaps more than they can deliver." And on it goes.

ETHERNET TAKES THE LEAD

Currently the Ethernet camp seems well ahead of Wang in terms of user experience and installations. Wang was scheduled to begin field testing of its product in January with deliveries of certain Wangnet components stretching out through the second half of 1982. Xerox, on the other hand, has been playing with Ethernet in the lab for several years. The company installed limited Ethernets in government offices in the late '70s and is currently shipping

networking products to commercial users, officials claim. As of January, according to Dave Liddle, Xerox Ethernets had been installed at 35 customer sites and over a hundred more had been ordered or were in some stage of installation. Additional Ethernet installations have been made by small, independent suppliers, giving Ethernet a substantial lead over its many competitors in terms of hours of usage. Only Datapoint, having introduced its ARCnet in 1977, has had comparable experience with what it claims are 2,500 installations.

Many observers say that Ethernet's lead, along with the commitments of other firms, large and small, will ensure the network of success as an established standard in spite of any technical shortcomings it may have in comparison with broadband nets. "Wang Labs won't be a factor [in the local networking marketplace] until late 1983," says the Yankee Group's George Colony. "Datapoint and Xerox are the only choice now in terms of large installed bases."

But even if Xerox does lead Wang in installing networks, it has much work to do in developing applications that can take advantage of the network and in publishing specs for others to interface products to Xerox systems. So far, little software is available to permit a non-Xerox device to deal with a Xerox printer or file server, for instance. Liddle says specs for the file server interface and electronic mail services will be available publicly later this year, to be followed by additional such details as they are debugged and field proven. But even then, Xerox will have a long way to go in capturing a big enough piece of the office systems arena to assure it of future growth.

Xerox has moved aggressively in recent months, introducing a wide range of new systems and promoting Ethernet as an open network for all to use. It has entered the electronic typewriter business in an effort to replace IBM Selectrics and "capture desks while they're cheap," as office products division chief Don Massaro puts it. The moves are part of a large gamble, much of which hinges on the acceptance by users and other vendors of Ethernet as the office network of choice.

While Xerox's advertising and public relations budget has made it the loudest proponent of Ethernet, several other firms have a stake in its future. 3COM, for instance, is hoping to tap the huge Digital Equipment mini-computer market by selling networking products that will attach Unix-based DEC systems to Ethernet. "We've tried to swear off inventing new protocols," says chief executive Bob Metcalfe. "We're going to ride on a choice of standards as they emerge." Metcalfe suggests that Ethernet may provide the largest plug-compatible market ever because

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Large users are evaluating their communications needs and then looking for technology—whether broadband, baseband, or marching band.

Xerox has established the network as a stable, publicly available standard with few options left to the user's discretion. Customers will benefit from the large amount of research that has gone and will go into the network and related products, and from the large choice of products to mix and match from, he says. 3COM, a private firm currently bringing in less than \$10 million a year, is finding most of its installations are pilot projects by large users that are testing the local net waters in preparation for big plans in the future.

Another independent Ethernetter is Ungermann-Bass, Santa Clara, Calif., organized by two ex-Zilog founders and in the local networking business well before Xerox introduced its network as a formal product. According to James Jordan, vice president of marketing at Ungermann-Bass, the company has been capitalized to the tune of \$13.5 million and is expecting revenues of about \$12 million this year. It makes Ethernet interface devices that are programmable to enable customers to attach virtually any type of device to the network. While much of the company's business has been in the baseband and Ethernet area (including an oem contract to supply Xerox itself with Ethernet controllers), it plans to offer broadband networking equipment in the near future. Ungermann-Bass, too, says many of its first installations have been for pilot projects, and it lists such firms as ITT, Bell Labs, Boeing, International Harvester, and Monsanto among its first customers.

Jordan says that while the company has been forced to defend its baseband approach in recent months, a more important issue for customers is to define networking applications well: "If I were a customer then I'd be more concerned with the applications I needed to implement than looking at the technology used. Broadband vs. baseband is a

football the different manufacturers are throwing back and forth at each other."

Although the firm has supported Ethernet as a baseband standard, it does not currently have plans to support Wangnet, said Jordan.

SMALL FIRMS JOIN IN

If some small companies are taking positive advantage of Xerox's advertising and hitching a baseband wagon to Star, others are using the publicity in different way. One such is Amdax, of Bohemia, N.Y.

Amdax began life in 1973 as Intech Labs, a modem maker. Two years ago Fred Adler, a noted venture capitalist who also owns a piece of Ungermann-Bass, bought in, and Ivan Socher was hired as president. Pat Ullrich, public relations manager at Amdax, says that Adler is the company's largest single investor and that there are two people from his firm on the board.

Amdax joined the packet-switching club last spring when it introduced Cablenet, a broadband networking scheme. It had previously offered only the older point-to-point technology. The company's principal products are the DAX, its network interface device, and the Executive, its network control device. Amdax's small size and lack of any network-attachable devices to sell give it a different perspective from a Wang or a Xerox. "We have to strive to support a lot of vendors," says Ullrich. Cablenet found its first customer last fall, when Dow Chemical placed an order for 20 systems, valued at over \$1 million, Ullrich says.

Amdax's different market role hasn't prevented it from gaining attention by attacking Ethernet. One brochure opens with the proclamation that Cablenet is a "utility, not a liability," and concludes with a table com-

paring Cablenet and Ethernet. The table gives "attachment cost" figures for both systems. Cablenet's is listed as \$3,950, and Ethernet's as \$13,000, a figure considerably larger than the one Xerox gives out. Asked about the difference, Peggy Karp, Amdax's vice president for market development, says that both numbers refer to four-port connections, and that the Ethernet number is the price of an Ungermann-Bass network interface device. Asked if that made sense to him, Harvey Freeman of Architecture Technology Corp., a Minneapolis company that publishes the LOCALNETter newsletter, replied that "a good rule of thumb is that it costs about \$1,000 per port to attach to either kind of network." He also pointed out that attachment costs tend to be set for marketing reasons. All of this probably goes to show that in the battle of the networkers numbers can sometimes require a bit of interpreting.

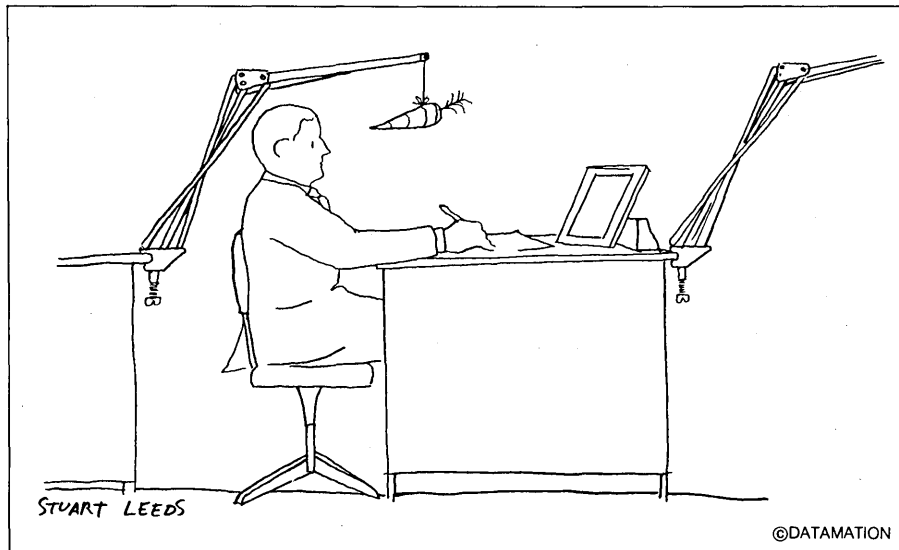
"If Xerox continues to cause this to be some kind of confrontation between baseband and broadband, it will lose," warns Wayne Martson, vice president of marketing for Sunnyvale, Calif.'s Sytek Inc., maker of the broadband Localnet. "It would be much wiser to say that Ethernet has its capabilities—for short runs, special purpose networks, primarily Xerox products, custom applications."

Sytek was founded in 1979 as a "knowledge factory," and in 1980 acquired Network Resources Corp., a data communications firm specializing in broadband. In 1981 General Instrument bought 20% of Sytek, giving the young firm access to the millions it will need to compete in this market, as well as to the resources of Jerrold Corp., a division of General Instrument and the largest supplier of coaxial cable distribution devices. Sytek's products include interface units like the Tbox and Tmux, the Tverter cable head, and bridges for providing gateways between channels. Sytek boasts 80 installations at 22 sites, mostly universities, government complexes, and large business campuses.

"The market for broadband is in large facilities—high-rise office complexes, military bases, anywhere you have a lot of information flowing over long distances," says Allen Edwin. "Baseband is suitable for smaller facilities with low terminal counts."

Edwin is project manager for Interactive Systems/3M in Ann Arbor, Mich. Interactive is something of a veteran in this young business, having been around since 1969. In June 1979 the company was acquired by 3M.

Interactive's Videodata network comes in two versions—frequency division multiplexing, which uses the 900 series modems, and time division multiplexing, which uses the 800 series—and the company says it has installed some 300 systems worldwide. In February of this year Interactive intro-



CARTOON BY STUART LEEDS

Onyx CEO Fred Bialek: "We're one to two years ahead of the competition in UNIX™ Systems"

*An interview with Fred B. Bialek,
Onyx Systems CEO, in San Jose,
December, 1981.*

Q. Mr. Bialek, is it true that Onyx has more experience with the UNIX operating system than any other microcomputer manufacturer?

A. Yes. In fact, Onyx is the only microcomputer company with any production experience with UNIX systems. We have over 1,000 UNIX systems installed. Indeed, many are installed with the company that developed the UNIX operating system.

Q. Could you explain that, please?

A. Certainly. Onyx was chosen by AT&T Long Lines, a department of AT&T, the developer and largest user of UNIX, to provide microcomputers for development, office automation and other applications. We worked with AT&T Long Lines to bring up UNIX System III on our C8002 machines for their internal use.

Q. That gives Onyx an edge in UNIX experience, doesn't it?

A. You're absolutely right. We know UNIX systems better than any other microcomputer manufacturer. Wouldn't *you* rather buy UNIX hardware *and* software from a company that has been shipping and supporting UNIX systems for more than a year and a half?

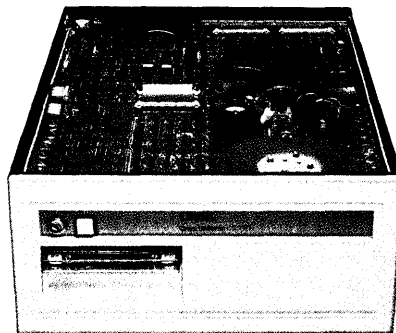
Q. Western Electric has just announced UNIX System III, a "commercial" UNIX system, with a new lower pricing structure. Won't this bring a lot of competition into the UNIX arena?



A. Of course. The UNIX operating system is becoming recognized as the operating system of choice for 16-bit microcomputers, something that we anticipated more than three years ago when we began development of the C8002, specifically for the UNIX operating system. We're one to two years ahead of the competition in UNIX systems.

Q. Why is Onyx so far ahead?

A. Many companies are announcing new 16-bit UNIX systems for



delivery next year. A year and a half of selling and supporting UNIX systems has given us a head start, not only in better support of existing products, but also a significant lead in the development of the next generation of equipment.

Q. Would you like to say some more good things about Onyx Systems, Mr. Bialek?

A. Not in an interview. I suggest that you read our ads, or, better yet, talk to some of our customers.

Advertisement

UNIX System III has been running on the Onyx C8002 for over a year inside AT&T Long Lines. Onyx was AT&T Long Lines' choice in microcomputers.

The C8002 is a powerful 16-bit system from Onyx. It features expandable memory up to 1 Mbyte and disk storage up to 160 Mbytes on-line. The C8002 also has a number of "big system" features, such as cartridge tape back-up with cyclical redundancy checking on every back-up, and over a year and a half of field proven reliability.

Onyx Systems Inc. manufactures a full line of business microcomputers, from the new integrated 8-bit Sundance™, running under CP/M® or OASIS™, to the C8002 16-bit machine, running the UNIX operating system.

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CIRCLE 96 ON READER CARD



What the heck
is Electronic Mail.

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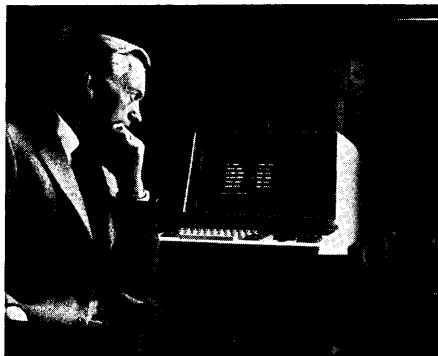
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CIRCLE 97 ON READER CARD

AN ABUNDANCE OF NETS

The business of connecting local computer systems has attracted a large number of vendors. Their products use every sort of technology—baseband, broadband, and computer-based branch exchange—and range in price from hundreds to tens of thousands of dollars.

What follows is a list of companies and their local networking products as verified in mid-January by Architecture Technology Corp., Minneapolis, Minn. Although they don't qualify as full-fledged networks, CBXs have been included because they can handle some of the essential requirements of a local net. The list divides the products by technology and speed: low speed, defined as less than 1 megabit per second; medium speed, up to 20 Mbps; and high speed, more than 20 Mbps. Architecture Technology plans next month to publish a LOCALNetter Designer's Handbook, from which this list was extracted. The company also publishes a monthly newsletter, the LOCALNetter.

BASEBAND: LOW SPEED

A. B. Dick

Magna III
Minneapolis, Minn.

Corvus Systems

Omninet
San Jose, Calif.

Digital Microsystems

HiNet
Oakland, Calif.

General Electric

Energy management local network
Warwick, R.I.

Nestar Systems

Cluster/One Model A
Palo Alto, Calif.

Ohio Scientific

Level 3 Net
Aurora, Ohio

Pragmatronics

Comnet
Boulder, Colo.

Personal Micro Computers

Downloader
Mountain View, Calif.

Protex Industries

Starnet II
Denver, Colo.

Software Dynamics

SDNET
Anaheim, Calif.

BASEBAND: MEDIUM SPEED

Apollo Computer

Domain system
N. Billerica, Mass.

Datapoint

Arcnet
San Antonio, Texas

Gould-Modicon

Modway
Troy, Mich.

Hasler A. G. Ltd.

Silk
Croyton Surrey, England

IBM Data Products Div.

Series/1
White Plains, N.Y.

Logica VTS Ltd.

Logica VTS Polynet
London, England

Network Systems

Hyperbus
Brooklyn Park, Minn.

Proteon Assoc.

Pronet
Waltham, Mass.

Prime Computer

Primenet
Wellesley Hills, Mass.

Prolink Corp.

Prolink systems (on Proloop)
Boulder, Colo.

Sperry Univac

Shinpads (shipboard integrated dp systems)
St. Paul, Minn.

Ungermann-Bass

Net/One
Santa Clara, Calif.

Xerox

Ethernet
Dallas, Texas

Zilog

Z-net
Cupertino, Calif.

BASEBAND: HIGH SPEED

Control Data

Loosely Coupled Network
Minneapolis, Minn.

Litton Amecon

UBITS (Universal Bus Information Transfer System)
College Park, Md.

NEC

N6770 (32 mbps fiber optic data link)
Lexington, Mass.

Network Systems

Hyperchannel, S720 Satellite Link (in conjunction with SBS)
Brooklyn Park, Minn.

BROADBAND: LOW SPEED

ICC

The Intelligent Cable (TIC)
Bethesda, Md.

Interactive Systems/3M

Videodata TDM Products
Ann Arbor, Mich.

Printer Terminal Communications

LADD (Local Area Data Distribution)
Ramona, Calif.

Sytek

LocalNet 20
Sunnyvale, Calif.

BROADBAND: MEDIUM SPEED

Amdax

CableNet (7 or 14 MBps)
Bohemia, N.Y.

Interactive Systems/3M

Videodata
Token Passing Net (unnamed as of January)

Sytek

LocalNet 40
Sunnyvale, Calif.

Wang Laboratories

Wangnet
Lowell, Mass.

CBX LOCAL NETWORKS: LOW SPEED

Anderson Jacobson

10X-1000
San Jose, Calif.

Gandalf Data

PACX IV
Wheeling, Ill.

Infotron Systems

TL 460 (Intelligent Data PBX)
Cherry Hill, N.J.

InteCom

IBX (Integrated Business Exchange)
Dallas, Texas

Mitel

SX 200 (digital PBX), Superswitch
Dulles Intl., Washington, D.C.

Northern Telecom

SL-1 (integrated data/voice system)
Richardson, Texas

Rolm

Release 7 local network, REMS
Santa Clara, Calif.

Seiscor

Panda II (voice/data PBX)
Tulsa, Okla.

Ztel

AXIS (Advanced Exchange Info System), PBX-type local network switch
Andover, Mass.

NETWORK PRODUCT SUPPLIERS

AMD

Ethernet components (VLSI, MOS-VLSI)
Sunnyvale, Calif.

Aph Technological Consulting

Ethernet interface for the DEC LSI-11
Pasadena, Calif.

Bridge Communications

High-level communications services
Ethernet board
Sunnyvale, Calif.

Canoga Data Systems

Fiber optics systems
Canoga Park, Calif.

Codex

Network support products
Mansfield, Mass.

Computer Energy (CEI)

3270 Local network wiring products
Coleman, Wash.

For the moment, at least, the two middleweights will probably continue to slug it out.

Computrol

Megalink, modems, Comptrol Systems
Ridgefield, Conn.

Concord Data Systems

CCITT switching telephone network
products, IEEE 802 token passing
products
Lexington, Mass.

Datastream Communications

Network access systems (T7 IBM gate-
way)
Santa Clara, Calif.

Envax Corp.

Envax 500 (intelligent box to interface
an LCN to Telex/TWX/others)
Irving, Texas

Harris

A single chip military standard serial in-
terface
Melbourne, Fla.

Hewlett-Packard

HP 12050A fiber optic, HP-IB link
Cupertino, Calif.

ITT

Optic fiber digital modules
Roanoke, Va.

Intel

Ethernet 432 based systems, Multibus
boards, development systems
Santa Clara, Calif.

Interlan, Inc.

LCN controller boards and software
Chelmsford, Mass.

Lee Data

Coax Eliminator (for 3270-based prod-
ucts)
Eden Prairie, Minn.

Masstor Systems

Shared VSS (virtual storage system)
Sunnyvale, Calif.

Mostek

Ethernet components (VLSI, MOS-
VLSI)
Carrollton, Texas

MuSYS

NET/82 S-100 Z80A single board com-
puter to provide networking
Tustin, Calif.

National Semiconductor

LC-8545 intelligent communications
controller board
Sunnyvale, Calif.

TCL

Plug-compatible Ethernet (PCE) trans-
ceiver
Santa Clara, Calif.

3COM

Plug-compatible Ethernet (PCE) trans-
ceiver
Mountain View, Calif.

Valtec Corp.

Fiber optic data transmission links
West Boylston, Mass.

Western Digital

1 MBps token passing LSI chip and
chips supporting the X.25 standard
Irvine, Calif.

duced a new line of intelligent local network-
ing equipment which will compete with Sy-
tek's and Amdax's latest offerings.

The list goes on and on (see box), and
new products come onto the market every
month. There are companies whose mission
is to link micros; Network Systems' Hyper-
channel links mainframes; and digital PBX
makers like Rolm are also able to handle
some networking applications. "It's very
hard to figure out what's going on right
now," says Architecture Technology
Corp.'s Harvey Freeman. "That's why our
company is doing so well."

WHAT DO USERS THINK?

right now are the large users with immediate
communications needs—banks and insur-
ance companies, for example. They are not
impressed with the quality of the debate—
"there's been a lot of misinformation put
out" was a common complaint—and seem to
proceed on the sensible and obvious course of
evaluating their communications needs and
then looking for technology—whether base-
band, broadband, or marching band—that
meets those needs.

The IEEE's 802 committee plans to of-
fer three standards, and standards efforts are
also under way at ANSI and NBS. Meanwhile
the market marches on, and what it may
eventually arrive at is a set of de facto stan-
dards. As that comes to pass, users are be-
coming more demanding about the openness
of systems. As Sheldon Blauman, chairman
of the Network Users Association, puts it,
"Totally locking people into your equipment
is passé."

Xerox makes much of the fact that
Ethernet has been open since its inception.
Wang has said that its network will accept
attachments from foreign vendors; in a recent
conversation, William Rosenberger, the
firm's director of networking, said Wang ex-
pects to "encourage" such compatibility but
provided no further details.

Datapoint also seems to be getting the
point. The San Antonio company had kept
its net to itself until late last year when at-
tachments for Radio Shack TRS-80 personal
computers were announced. According to
Victor Poor, Datapoint's executive vice
president for R&D, there's more to come:
ARCnet, he says, will be made available pub-
licly. The company intends to disclose how
the net works at the physical level, and to
work with a semiconductor house to make its
network interface chip available. Why didn't
they do this sooner? "It wasn't until Ether-
net," explains Poor, "that it dawned on us
that it would be of interest to the industry as a
whole."

Of course there's a big question that
any discussion of standards, especially the de
facto kind, must attempt to address: what will
IBM do? Users and vendors alike wish they
knew. IBM has so far been silent on the sub-
ject except for a characteristically vague di-
rectional statement in June 1980. The popular
Displaywriter word processor has been given
3270-emulation capability, but that implies
the use of a mainframe. Speculation on IBM's
plans centers on a twisted pair, token-passing
product to be introduced in the near future,
followed by a broadband offering. (For more
on IBM's plans, see p. 48.)

The recently unleashed AT&T, another
heavyweight with a large stake in the office
systems market, is also conspicuous by its
absence from the local net scene. Several
years ago the company spoke to the financial
community about an office networking prod-
uct under development, but when queried on
the subject recently, a company spokesman
said he could find no information to release.
Bell Labs' work on the human-machine in-
terface is expected to result in workstations for
office use that will probably be manufactured
by its Teletype operation.

But for the moment at least, the two
middleweights—Xerox the basebander and
Wang the broadbander—will probably con-
tinue to slug it out. The argument as to which
technique is better in a given situation will
ultimately have to be settled by user experi-
ence, a commodity that remains in rather
short supply.

As users gain experience with net-
works, as they begin to understand the socio-
logical ramifications of networking and think
of applications they'd like to design for, the
controversy should abate. By then, it is gen-
erally agreed, all types of networks will have
flourished. Indeed, several broadband nets
are already being sold with the promise of
being able to incorporate, in the fairly distant
future, Ethernet-type nets on a small portion
of their overall bandwidth. Ethernet might
thus become an industry standard of second
choice, but a standard nevertheless. Xerox's
Liddle hints that such a scheme would not be
totally abhorrent to the company since it
would retain a market for its office products.
Some observers have suggested, in fact, that
Xerox will eventually offer a broadband ca-
pability upon which Ethernet is but one layer.

One thing seems certain: the office
systems planned for tomorrow will depend on
networks, and a great many manufacturers
with varying motives and strategies will try to
meet that demand. There will probably be
room for all kinds of nets—CBX, baseband,
broadband, fiber optics, and perhaps even
some unheard of technology that is gestating
right now in the mind of a young engineering
student who works part-time as a cabdriver.
Who knows? *

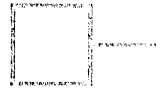
OUR BIG INVENTION FOR BIG BUSINESS

DCA. We're the ones who pioneered host selection with our 355 Master Network Processor—a system especially helpful to larger companies with many terminals accessing several computers. As a result of the 355, costs are reduced because unnecessary

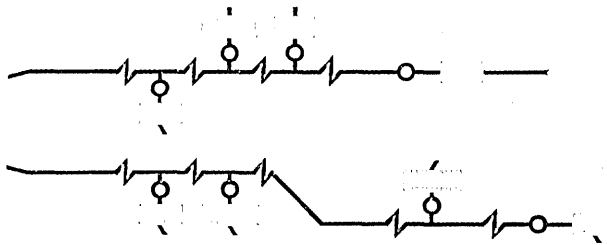
equipment is eliminated. And any terminal user can tie in with any host computer in the network.

But that's just part of the story. Since the beginning, we've been the innovators in the field. We were the first to make it possible to interface with X.25 standard proto-

cols. This offers you low-cost access to public data networks, and worldwide networking through satellites using X.75 protocols. Our 355 is now so advanced it can handle a network with three times the capacity of its nearest major competitor —and provide the fastest



55 MASTER NETWORK HOST SELECTION.

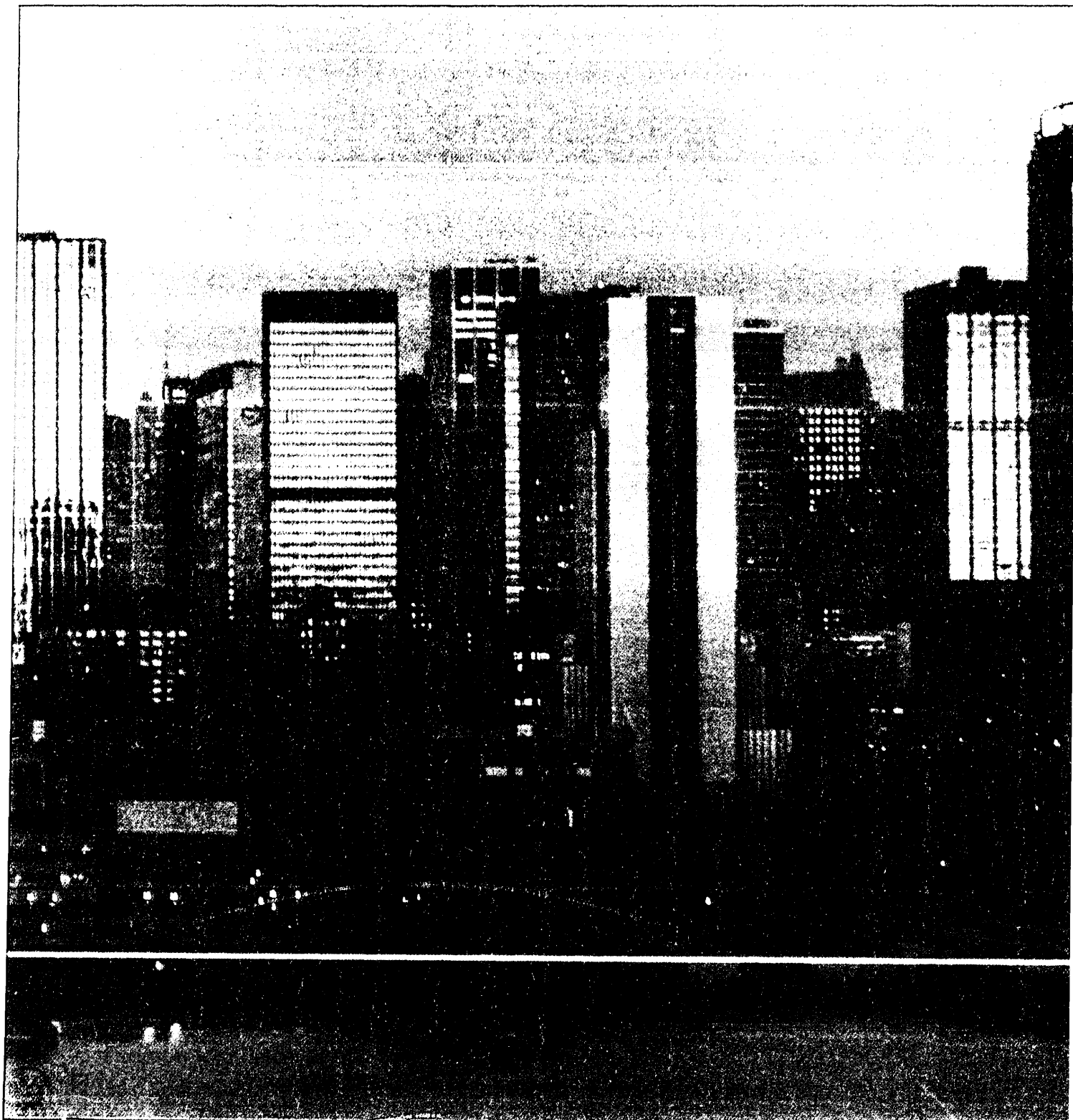


response time in the industry. In short, we have the most advanced, most efficient network processing systems available on the market today. And we'd like to tell you how we can help you run your business more efficiently. Let us hear from you. Write to: DCA, 303

Technology Park/Atlanta, Norcross, Georgia 30092. Or call us at 800-241-5793. In Georgia, call 404-448-1400.

CIRCLE 98 ON READER CARD

Digital Communications Associates, Inc



That automated systems improve productivity is widely believed but hard to prove. Here's a report on an experiment designed to test that hypothesis.

INVESTIGATING THE ELECTRONIC OFFICE

by Don Tapscott

Intuition and early experience indicate that integrated office systems can have a strikingly positive effect on office productivity. The integration and application of computing, telecommunications, and information technologies in the office environment is already beginning to transform the ways in which people and organizations work. Moreover, it appears that the greatest benefit lies not in cost savings from increased clerical efficiency but in the augmentation of the abilities and effectiveness of "knowledge workers"—the managers and other professionals who work in processing, managing, retrieving, and communicating information.

Until recently, however, little work has been done to measure how new technologies can improve the effectiveness of office workers. The product planners, system designers, and market analysts producing the systems, along with the implementors, users, and choosers in the office, have all been forced to work in a vacuum. Without valid measures and data that quantify what these systems can achieve, producers have difficulty planning, designing, and marketing them. Those considering using office systems have had problems measuring their needs, customizing systems to their environments, and measuring the systems' effects. As a result, many systems have been inappropriate and have failed. Others, lacking a hard-dollar cost-justification, have never left the lab.

To measure the effects of office systems four different types of research can be used: 1) laboratory experiments; 2) true experiments in office settings; 3) quasi-experiments in office settings; or 4) nonexperimental designs.

Case studies, which fall under the nonexperimental design category, comprise most of the research conducted to date. Case studies can aid hypothesis formulation, but can rarely test hypotheses adequately because of their limited scope.

A number of laboratory experiments that examine the effects of integrated office systems, particularly computer conferencing

systems, have been conducted. Although these experiments have produced interesting results, at present they are of limited value in office system research. They cannot re-create important parts of the office environment and their results often cannot be validly generalized. Research into the effects of office systems on productivity is still in its infancy; precise hypotheses that can be tested either in the laboratory or in the field are rare. Test groups typical of knowledge workers are not readily available for lab tests and the systems themselves cannot be mastered overnight.

The most appropriate research designs at this time fall under the category of quasi-experimental designs in field settings. These designs include some experimental controls but lack a random assignment of subjects to the studies.

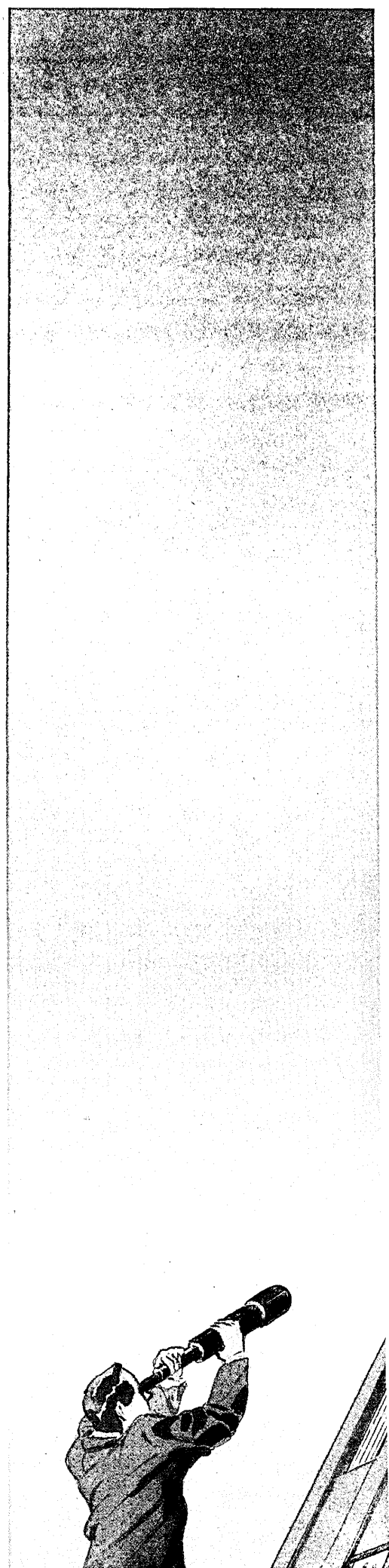
Research that uses a quasi-experimental design can eliminate many threats to the validity of a study. It may possibly show how poststudy differences between test and control groups were caused to some degree by the system use.

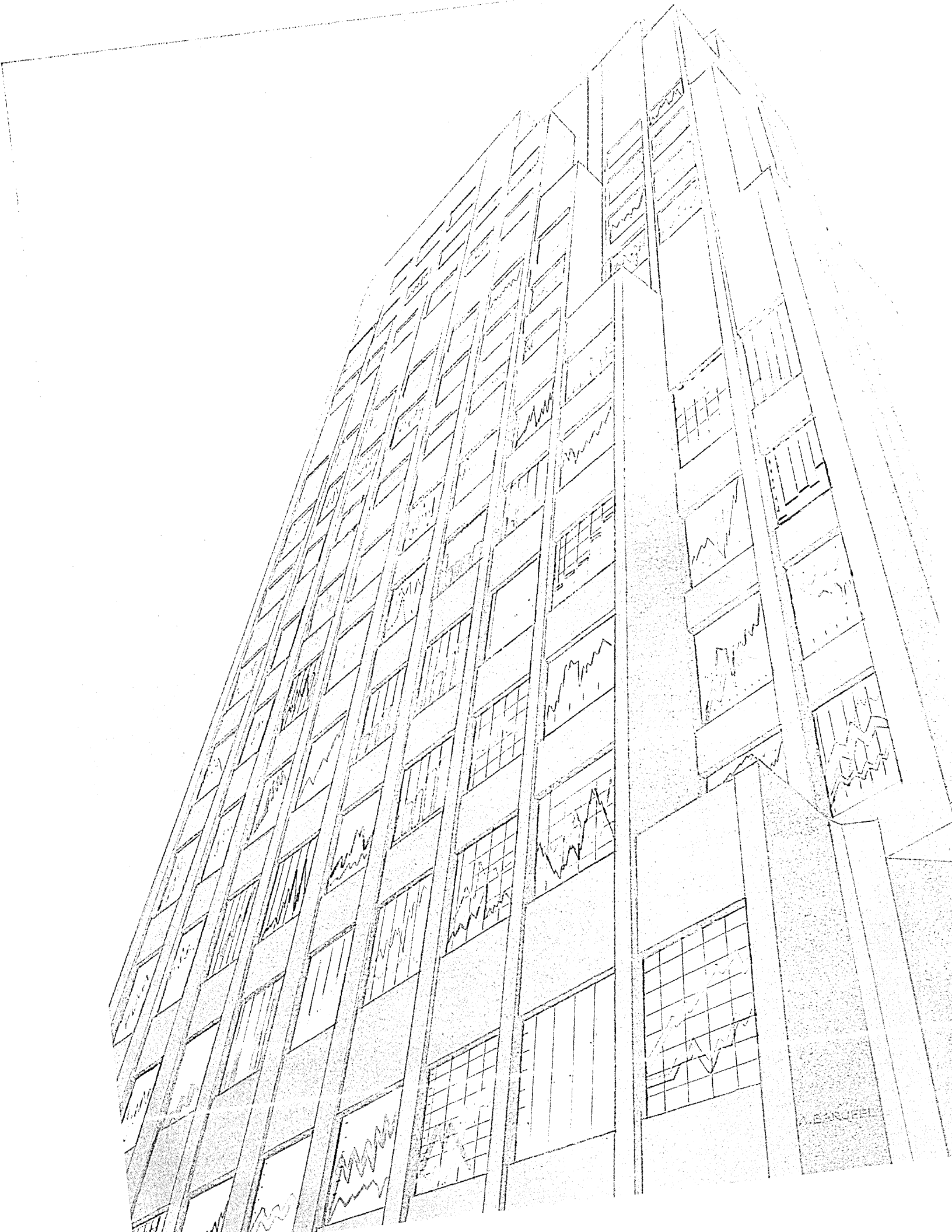
For example, post-test changes in effectiveness of the test group might be due to events other than the introduction and use of the system. Such events should also affect the control group in a similar manner. If they do not, the changes may be attributed to the use of the system.

If observations of control and experimental groups are made only after testing, the observers cannot determine whether differences between the groups are caused by the experimental treatment or by initial differences between the groups. By using a pretest, however, this problem can be eliminated.

THE BELL CANADA STUDY

In 1979, Bell Canada began funding a project at Bell-Northern Research (BNR) to develop techniques for measuring and collecting data that could be used to assess the effects of electronic office systems on their users. The research is being conducted by a multidisciplinary team in the custom systems division with help from behavioral scientists at Bell-North-





BEANDEEL

The pilot system improved the users' communications, time use, access to information, and quality of working life.

ern Research and BNR INC.

In a pilot study using a quasi-experimental design, 19 knowledge workers were given electronic workstations on an integrated office system that provided electronic mail, information retrieval, word processing, administrative support, and data processing. These workers' attitudes, time use, communications patterns, etc. were compared with those of a control group of 26 in a pretest-posttest, quasi-experimental research design. The subjects' activity on the system was monitored daily.

Both groups were pretested in August 1979. The test group went on the system in September and a post-test of both groups was conducted the following May.

Three members of the research staff were also members of the test group, learning the system and doing their work on it. Pretest and post-test measures confirmed that they did not differ significantly from other members of the test group.

The activities of the test group were continuously recorded. Measures built into the system recorded log-in hours, commands used, applications used, communications patterns, etc. There is, in fact, a record of all activity on the system. To ensure the users' privacy, and thus their trust and cooperation, the content of messages, text, and files generated by the test group was not examined.

Before the researchers embarked on the pilot project, they conducted a survey of divisional managers to determine managers' views on what changes would constitute improvements within the organization. This survey facilitated the design of both the pretest instruments and the office system itself.

Structured interviews were held mid-way through the pilot project. These interviews helped the researchers to determine the users' initial progress in learning the system, what extra training they required, and what modifications to the system were needed.

The measurement instruments developed for the pilot included a prestudy questionnaire on organizational effectiveness, an extensive survey questionnaire, a form for determining with whom respondents communicated during a typical specified time period, an activities/communication log, a method of system monitoring, and structured interviews. The relationship of these instruments to the research design is indicated in Table I.

The test group consisted of seven managers, eight professionals, and four administrative staff. While this group cannot be said to represent typical office workers, it did contain a variety of different kinds of employees. The managerial group contained one executive, one administrative manager, and managers involved in systems development, research, and consulting. The professional

TABLE I

Measurement instruments

PRETEST

1. Questionnaire 1 examined
 - system requirements
 - communication in the organization
 - information use, access, and problems
 - attitudes to technology
 - job design
 - quality of working life
 - demographic data
2. Network interaction analysis
 - examined the communication network
3. Activities communication log
 - a detailed account of time use and communications patterns

POST-TEST

1. Questionnaire 1 again, plus items on attitudes towards the pilot
2. Same
3. Same, plus data compared to No. 4 below
4. Data generated from the system, e.g.,
 - kinds of applications used
 - system use over days, weeks, months
 - learning curve
 - commands used
 - computer communications patterns
5. Post-test interviews of experimental group
 - examined problems with system, training, documentation and features desired

group was made up of a psychologist, a management science specialist, two programmers, and two engineers. Most of the administrative staff were secretaries.

The control group consisted of nine managers, 11 professionals, and six administrative staff.

As previously mentioned, office populations can rarely be randomly sampled for study subjects. Consequently, the test group was selected by using other criteria. Some of these had more to do with the internal needs of the company than the needs of the study. To be successful, a good research design and system must correspond to genuine needs of the workers and organization involved.

In an attempt to make the findings more representative, similar research projects are now being conducted in offices in a variety of different companies.

SPECIALLY DESIGNED SYSTEM

The Office Information Communication System (OICS) used in the pilot was designed specifically for the study, not for the marketplace. The system consisted of an integrated set of application programs running on the Unix operating

system. Users logged onto the system through display terminals hardwired to a DEC PDP 11/70 computer. The terminals did not have any special function keys or other intelligence. Once the user had logged on, he had access to any part of the system by typing the command name associated with the desired facility. (The office system architecture is shown in Fig. 1.)

The pilot system was composed of the following subsystems: electronic messaging, text processing, information retrieval, administrative functions, and analytical tools.

The COCOS electronic mail system, developed by Bell-Northern Research, lets users compose, send, forward, reply to, and file electronic messages. For paper correspondence, users were prompted by a program that automatically generated formatted memos and letters. The mail log system permitted tracking of paper mail in, out, and within the office. With the synchronous messaging function, a user could permit short messages to be sent to him by other system users while he was working at his terminal.

Several text editors were available; a line-oriented editor with a terse user interface was used most. A powerful text formatter



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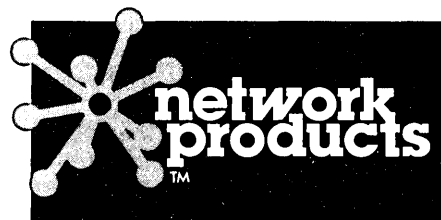
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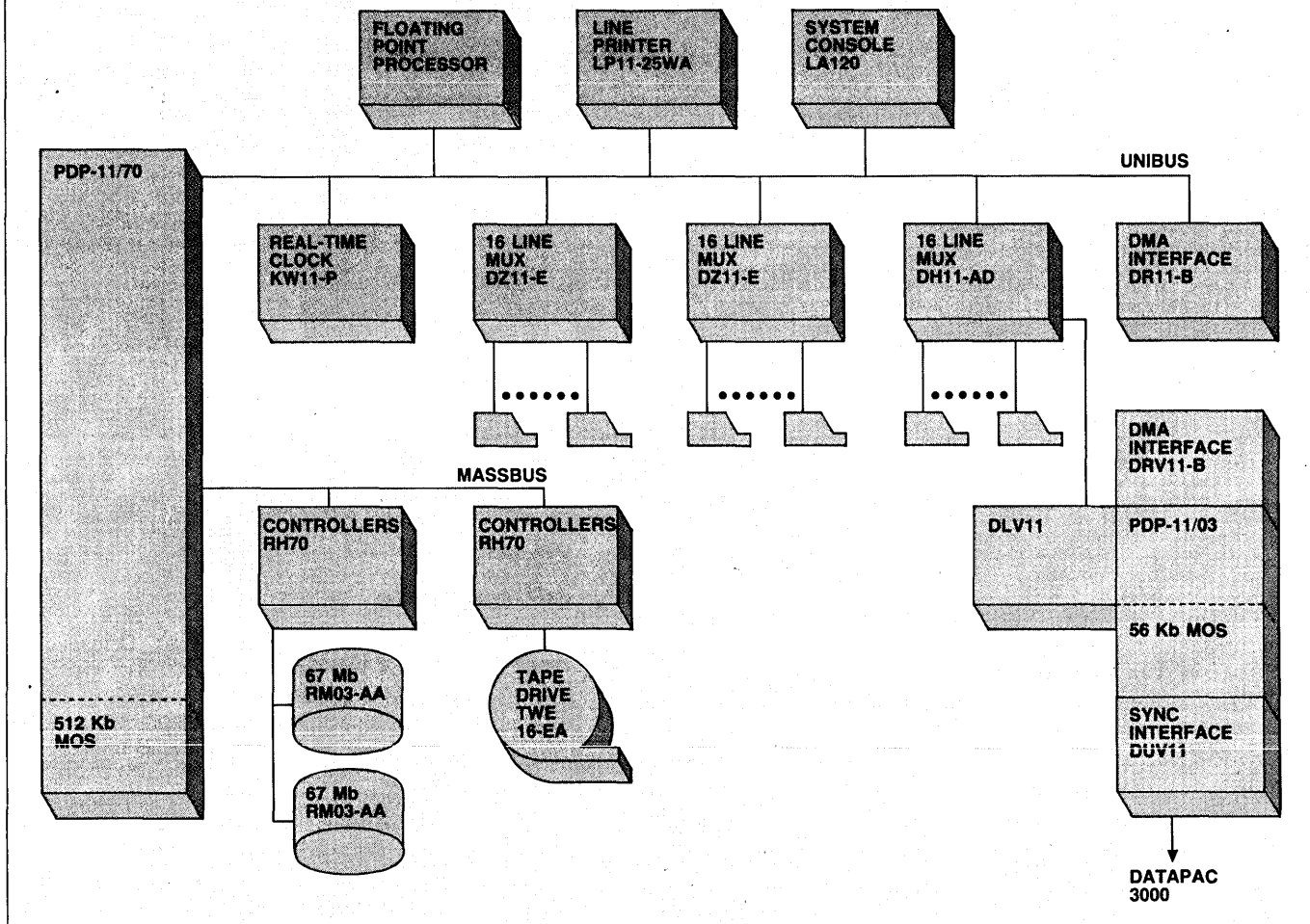
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CIRCLE 99 ON READER CARD

The most appropriate designs are those that fall under the category of quasi-experimental designs in field settings.

FIG. 1

ARCHITECTURE OF THE OFFICE INFORMATION COMMUNICATION SYSTEM



could be used to structure texts to produce reports with pagination and numbering, hyphenation, justification, page numbering, point numbering, and a table of contents. Automatic spelling checks, which use three dictionaries as databases, were provided on the system, as were readability indices for examining the content of text. Other features included sorts, merges, text and data manipulations, and some table, figure, and graphics abilities.

The office system provided an information retrieval subsystem to maintain and query databases for any type of information. A project bibliography and a conference and seminar schedule were among the first databases put on this facility.

The OIC system provided several administrative tools:

- personal log (what was done when)
- to-do file
- cost tracking
- schedules

- coming events
- time reminder
- phone lists and telephone area codes
- acronyms
- desk calculator

Among the analytical tools on the system was an interactive statistics package. This package could handle a variety of statistical applications with simple graphical output that ranged from calculation of means to regression analysis. For basic arithmetic and scientific operations, a simple calculator was provided. Data processing facilities were also incorporated into the system.

Tests of selected data conducted by researchers at the University of Waterloo indicated that the Bell-Northern Research pilot study had extraordinarily high data reliability. Still, like most studies, this one had its limitations. They consisted of the difficulties involved in performing field studies in general and office system field studies in particular; the unique nature of the office environ-

ment where the study was conducted; organizational changes; staff turnover; and changes in the content of work in the office environment over the 10-month pilot study period.

These limitations hampered the ability of the researchers to generalize the findings to broader populations of office workers. The pilot study findings are best viewed as an investigation into the impact of one electronic office system on a particular office. Viewed in this manner, they can be used to generate more detailed and solid hypotheses for verification in other situations.

FINDINGS OF THE STUDY

In general, the pilot system apparently improved the users' communications, time use, access to information, attitudes toward office system technology, and quality of working life.

Between January and June, the members of the test group who participated in the study from its inception averaged 3.7 hours

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As access to information improved for the test group, expectations increased, as did perceptions of what was required.

of log-in time each day. The whole test group, including members added to compensate for attrition, averaged a daily log-in time of 3.1 hours.

Use of the computer messaging facility steadily increased over the time of the pilot study (see Fig. 2). During the first seven weeks of the study, users sent an average of two messages a day. The last seven weeks saw an average of eight messages a day.

The research team attributed this increase to several related factors. A simpler and more powerful messaging system was installed in the eighth month of the study. New features added to the system encouraged employees to use it more. The messaging network was expanded to add new users inside and outside the company. Though users could learn the technical aspects of the system quickly, it took some time before they learned how to integrate the system into their work habits.

Changes made in the messaging system appear to have had the greatest impact. More messaging tools were made available, such as the ability to forward and annotate messages to various distribution lists. The messaging system was made more "friendly," able to recognize spelling errors or prompt the user for more information if the name entered was not in the corporate directory.

Messaging system use varied widely both between users and over time. Over the last nine weeks of the pilot some users sent an average of only three messages per day, whereas others averaged 12 per day. There was, however, less variation among users during the last period. Moreover, the research staff had expected system use to fluctuate greatly, for users were often out of the office, involved in meetings, and so on.

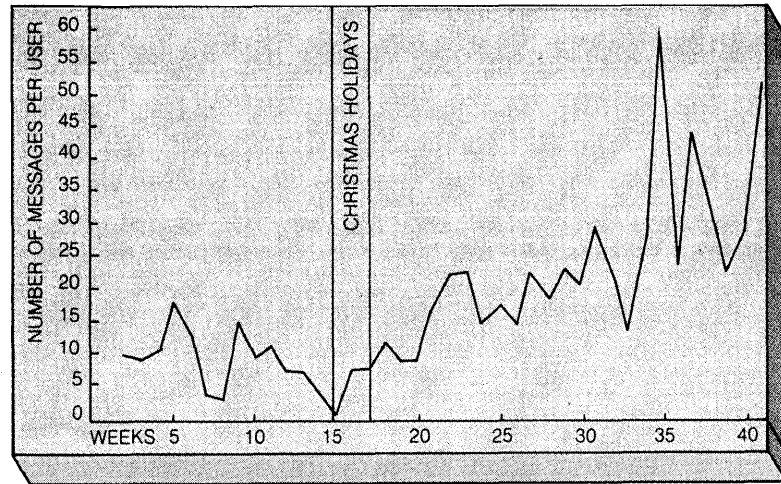
The number of commands used by each user per week fluctuated considerably but showed no marked increase over the time of the study. The number of different commands used by each user per week, however, slowly increased over time.

The main uses of the system were text editing and messaging. During the first four months of system operation, the average user generated upwards of 400 pages of text. This extensive use of the text editing tool lends weight to the hypothesis that managers and professionals will use keyboards and text editing if they are provided with useful features, intrinsic rewards, and training.

The percentage of the day spent by the test group in communications activities increased from 53% to 58%, whereas the figure for the control group decreased from 51% to 45%. The reason for the latter's decrease is not clear. The increase for the test group is likely due, in part, to reduced time spent in administrative noncommunication activities.

FIG. 2

USE OF THE COMPUTER MESSAGING FACILITY



Post-test results indicated a reduction in telephone use and in one-on-one meetings for the test group. These results support the hypothesis that computer messaging will reduce not just the volume of paper mail, but also the use of other forms of communication.

The percentage of time an employee spent daily in activities not considered an interruption increased for the test group. These data are important for the cost-justification of office systems, for a reduction in interruptions can result in quantifiable time savings and more or better quality work. Time spent in communication among peers also increased, a change company management had deemed desirable.

The percentage of attempts to contact fellow workers that failed (for example, from busy phone lines) decreased. Reductions in such shadow functions carry measurable cost-benefit implications. In this case, there were average time savings of almost 10% of the employee's day—savings resulting from improvements in the communications process alone. In most cases, these time savings appeared to have been reinvested in producing more or better work. In addition to measures of actual time savings, most employees expressed the opinion that the system had saved them time.

GROUPS JUDGE RESULTS

The results of the test group's subjective evaluations of time use were mixed. The amount of time that users judged to be useful increased, but the amount of time they judged to be important did not. The amount of time judged to be time effective increased for both groups, but attitudes toward other employees

and communications with them improved for the test group only.

The research group hypothesized that the disparity between perceived "information needed" and perceived "information received" indicated by the pretest would decrease for the test group. This did not occur. There were a number of improvements between the pretest and post-test in the perceived "information received." But the perceived "information needed" increased correspondingly. These findings suggest that as access to information improved for the test group, expectations increased, as did perceptions of what was required.

The increases in information received may have been due to a variety of system-related factors: users' access to the information retrieval system, on-line access to previously written reports, access to previous messages, and better communications with other employees (for example, supervisors) who had the desired information.

Employees in both groups estimated that they could save a substantial amount of time if they had access to specific information such as relevant publications, upcoming conferences, management policies, minutes of meetings, etc.

Though projected time savings are completely subjective and likely overestimated, two findings stand out. Both groups thought, first, that they had received inadequate information and, second, that better access to information could have saved them about half the time they spent looking for it. Surprisingly, the test group members indicated that they could have saved more time than the control group if they had had better access to information even though they had already

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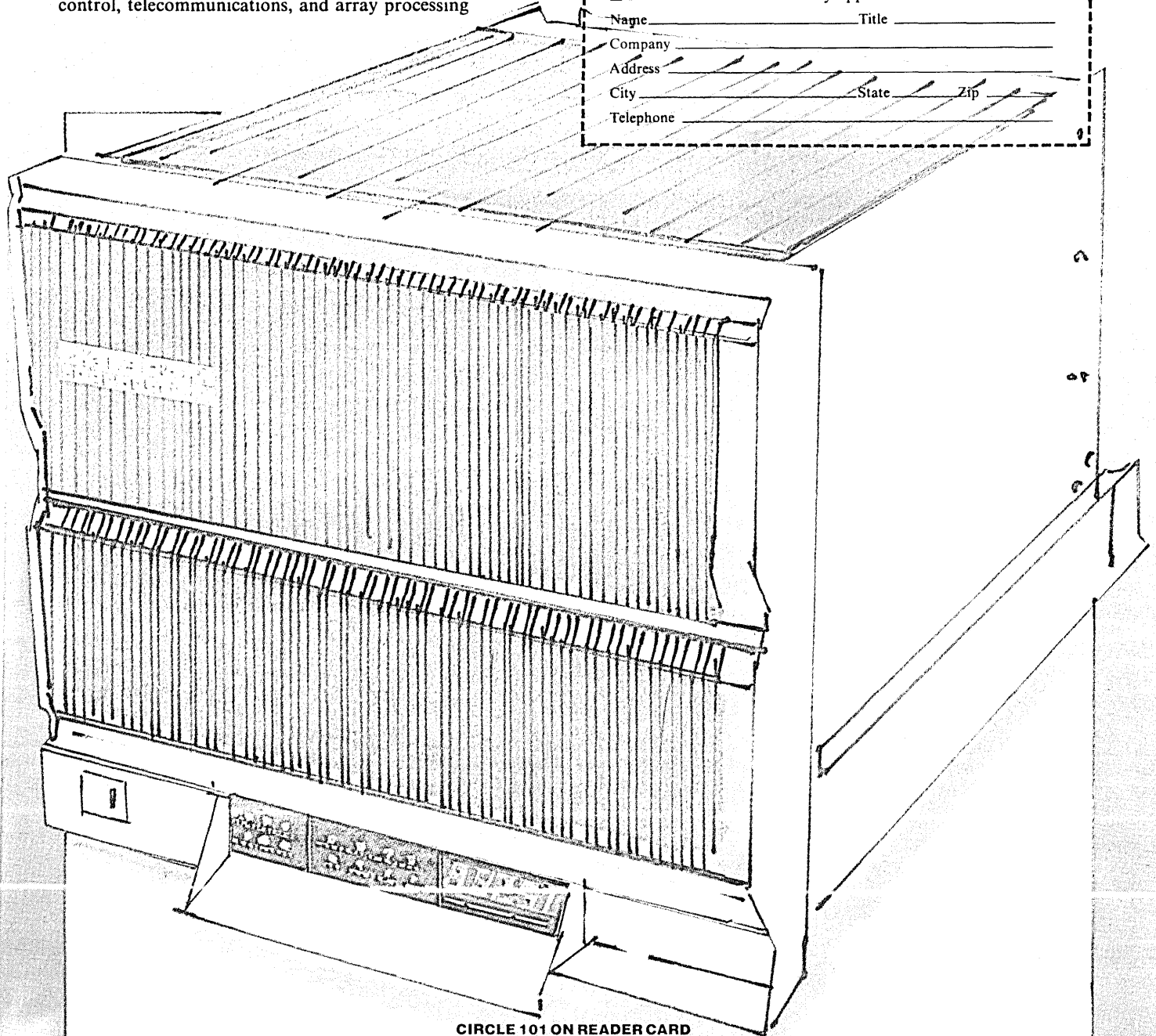
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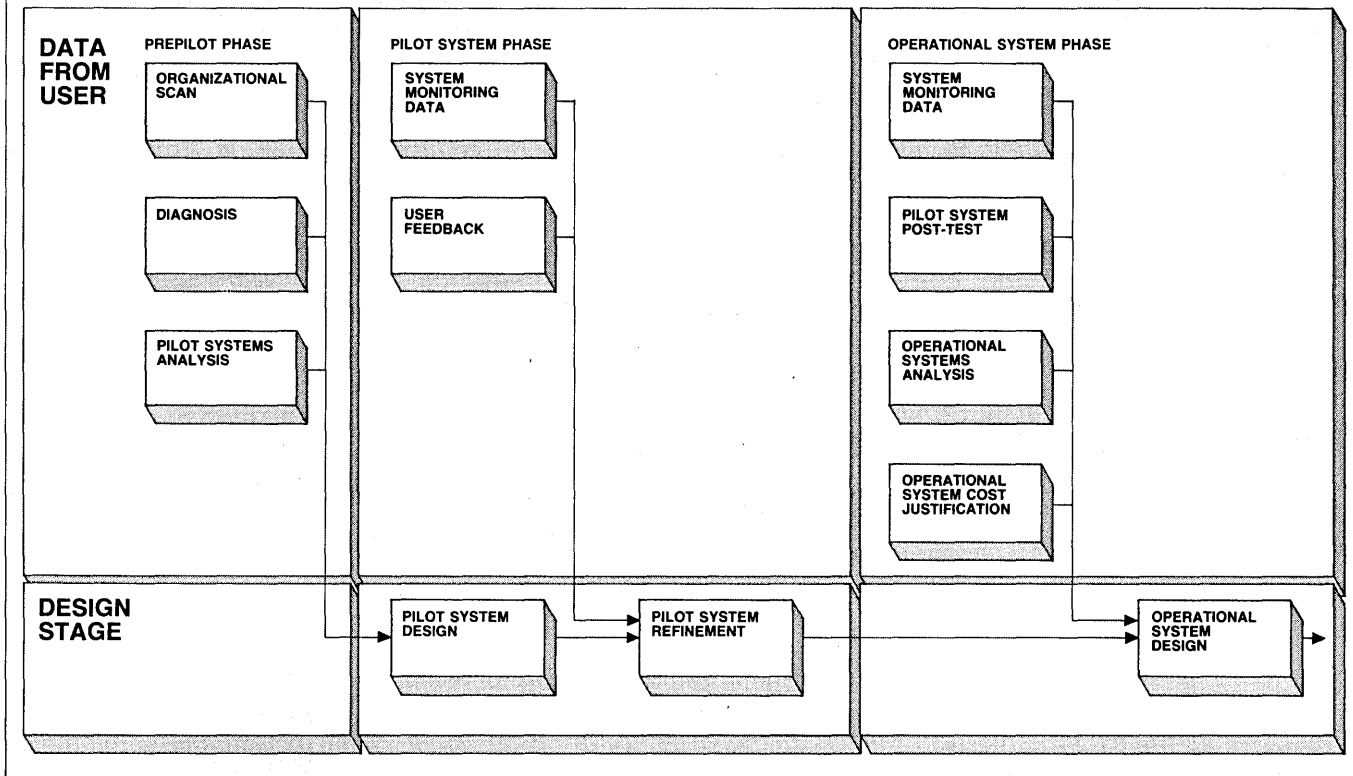
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CIRCLE 101 ON READER CARD

FIG. 3

THE USER-DRIVEN DESIGN METHODOLOGY



been using an information retrieval system. One possible explanation for this attitude is that since test group members had experienced the benefits of an information retrieval system, they expected that still better access to information would yield still better results.

The test group's attitude toward technology and its potential benefits became more positive with system use. Preferences for the use of a keyboard to compose written material grew to the point where users indicated that they themselves typed and edited 75% of what they composed. There was an increase in users' positive opinions of the abilities of fellow workers to use an on-line office system in their day-to-day work. Attitudes regarding the greatest potential benefits of office systems shifted from an emphasis on clerical, typing, and administrative tasks to an emphasis on professional time savings and improvement of the quality of decisions.

Attitudes toward the office system itself were on the whole positive. Users generally indicated that the system was not difficult to use, that they felt comfortable typing at a terminal, and that the system was not down too much.

The test group generally felt that a better users' manual was needed, that the system's error messages were of little value, and that the system should be more tolerant of users' mistakes. The group also found access to printers inadequate and system services degraded during peak workload periods.

Most users felt that the system had improved their ability to do their jobs. Improvements were seen in communications, information access, preparation of written

material, and worker collaboration. In fact, most users felt that both the system functions and the size of the user community should be expanded. The functions that users wanted most to see were automatic project accounting, computer conferencing, and memo and letter templates.

SYSTEM IS EXTENDED

Using the results of the pilot study, the research group was able to present a business case to management to extend the project to an operational system covering most of the custom systems division. Managers, project leaders, administrative personnel, and other employees are now being placed on the system.

The operational system has added several features to the ones provided on the pilot system. User profiles tailor the system's user interface to the skill level, requirements, and preference of each employee. For example, some users prefer a menu-based interface. The user calls the menu, which appears on the screen. He then chooses the function he needs by typing in the function number listed in the menu. Users who run into trouble are assisted by a computer-aided instruction facility.

An information management facility will be introduced this year. It will handle a set of basic functions that enables users to create and manipulate databases. With this feature users will also be able to generate and display forms on the screen and use them to capture and update information. Another application being introduced is a project control system based on the custom systems divi-

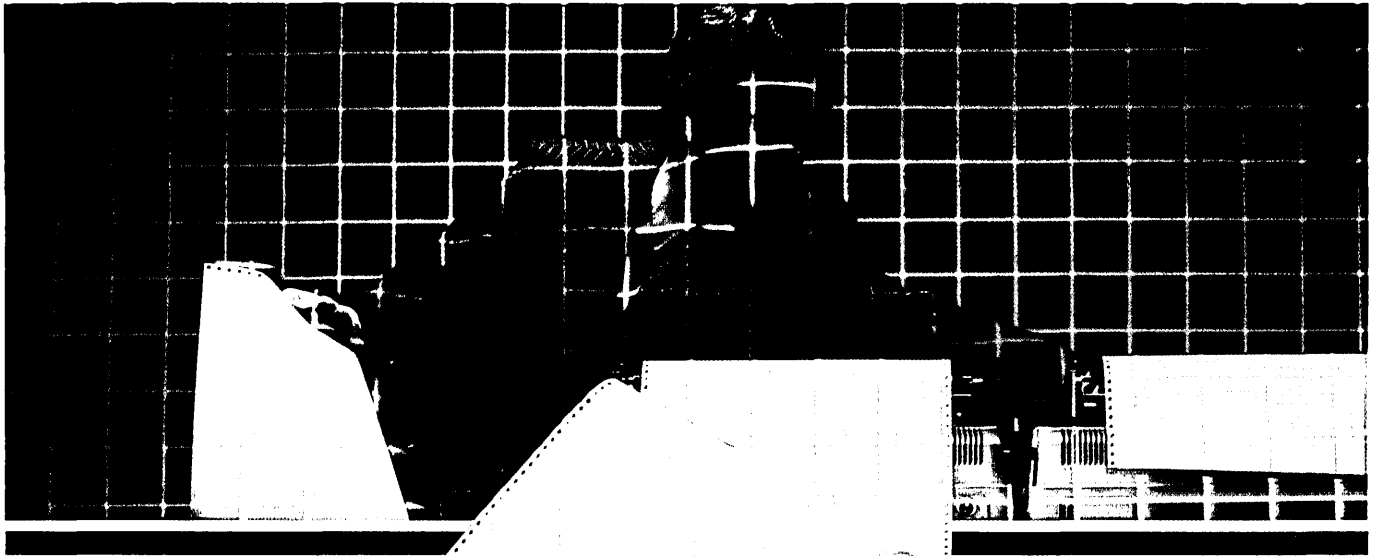
sion's project management methodology. This subsystem will assist employees with status reports, financial accounting, and tracking for projects.

The methodology developed for and used in the OICS project is now being used to evaluate the impact of office systems in other environments. The method divides customizing into three phases. During the prepilot phase, data are collected to design the best pilot system possible. During the pilot phase, information is drawn from the users and from the system itself to help evaluate and refine it. And during the operational office system phase, post-test and system monitoring data are combined with systems analysis data to enable the specification and cost-justification of a full operational system for the whole organization. This process is illustrated in Fig. 3.

With subsequent tests Bell-Northern Research's ability to collect valid evidence will grow, as will the evidence itself. This will help to provide the information needed for useful product design, successful marketing, and successful implementation of the new technology. The result should be better designed office systems—used, accepted, and enjoyed by more office workers. *

Don Tapscott is vice president, Trigon Systems Group Inc., a Canadian firm that conducts research and consulting on integrated office systems. He had worked at Bell-Northern Research and became manager of its Office Information Communications Systems research program.

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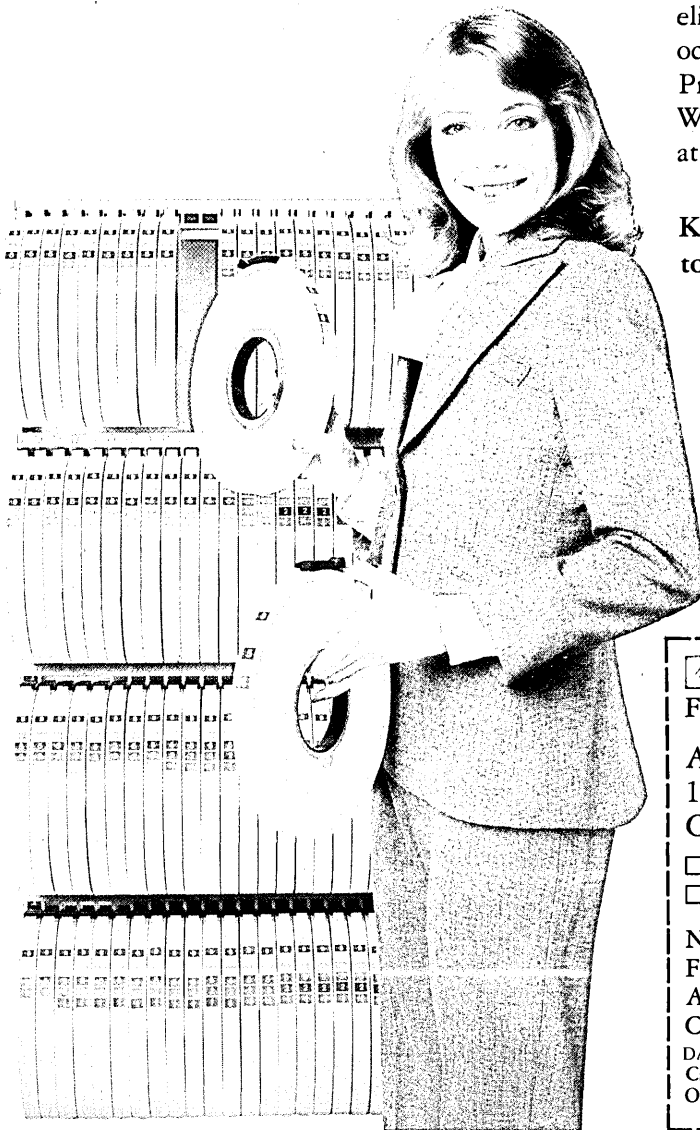
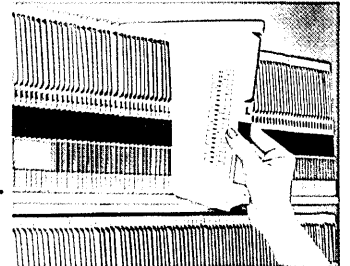
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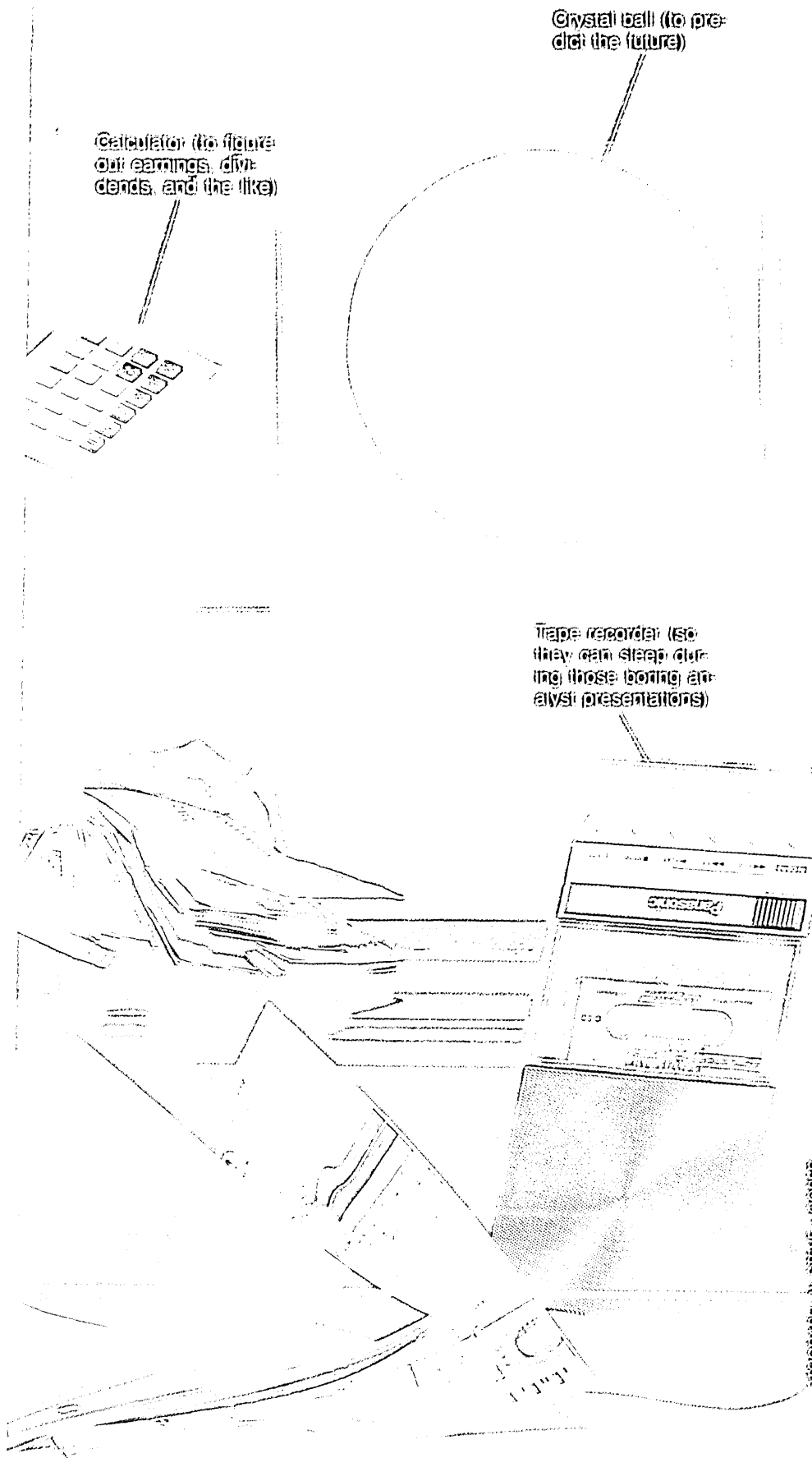
by Margaret L. Duffy

The S&P manager with a large midwestern company spent months choosing a mini-computer manufacturer. In a presentation before his firm's senior management he outlined his reasons for recommending the particular manufacturer: "technically, the product was excellent, the manufacturer's software and service were top-notch and the price was right." But when asked for earnings, the president of the S&P exec's firm asked, producing a report from one of the brokerage houses: "The analysts don't think the stock is such a terrific buy right now."

The S&P manager tried to explain he was "having a midwinter" in stock, but it was too late. He is back shopping.

Nowadays, every time you turn around you seem to run into analysts. You pick up the *Wall Street Journal* to read about IBM's latest moves and you find one or two analysts explaining their significance. You glance through a trade paper and notice that analysts seem to be the authorities for a number of startling predictions. When you ask, who are these people, you are told they are small-creamed firms from the computer industry.

Well, so they are. The number of firms of this type has risen from a few in the late 1960s to more than 100 today. The computer industry is a highly competitive one and its diverse commands high salaries. The analysts' considerable bulk of the securities



PHOTOGRAPH BY STEVE SCHLES

An analyst's negative or positive recommendation can have a dramatic impact on a stock price.

The basis of the analyst mystique and power lies in their chief function: recommending stocks. Analysts are retained by the brokerage houses and investment banks in order to alert clients (individuals as well as institutional investors like insurance companies, banks, and the like) when stock prices are about to rise or fall so that they can make the maximum amount of money out of the movement.

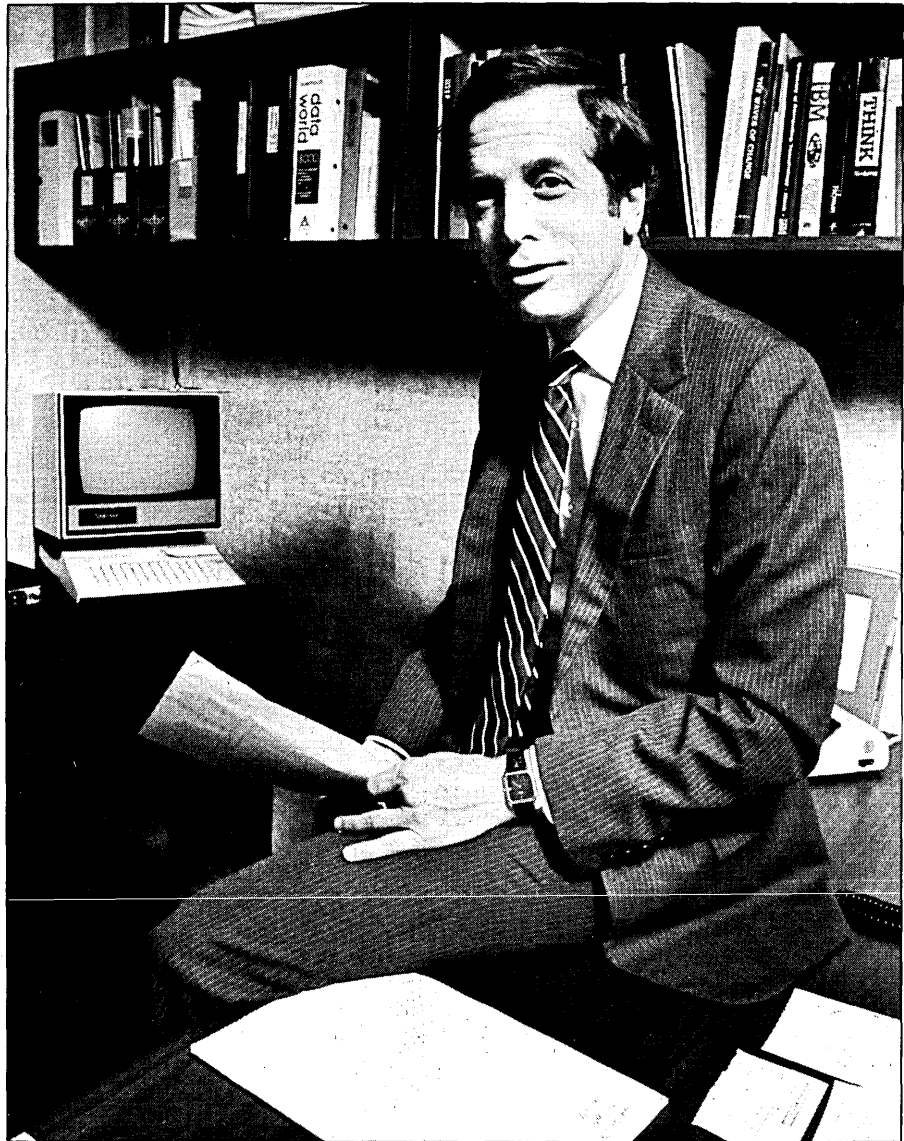
An analyst's negative or positive recommendation can have a dramatic impact on a stock price and may even make or break a company that's just starting up.

In order to fit the qualities of a seer to the demands of Wall Street, most analysts attempt to become experts on the companies they cover. "I read anything I can get my hands on about my companies," says Stephen McClellan, a vice president who covers computer services and other speciality companies for Salomon Bros. "I also analyze a lot of information such as product announcements and specifications."

An equally important part of the process is getting to know the people who manage the companies. "Each company has at least one person whose mandate is to communicate with Wall Street. I get to know them and other executives at the companies," notes Eugene Collins, research director at Laidlaw Adams & Peck Inc. Through visits to the companies, analysts attempt to pick up information that will help them to assess the firms' merits.

Being likable and articulate is obviously a plus as far as getting to know companies, and in fact those qualities are almost a prerequisite for entering the profession. In addition to winning the confidence of company managements, analysts are also often called upon to be salesmen of a sort. Since recommending stocks does not, by itself, bring money into the firms that employ them, many analysts are expected to convince clients of the wisdom of their advice, prompting them to trade through their firms. "You can't have everyone hate you and expect to have much credibility," notes McClellan from Salomon Bros.

More important than being liked, however, is being right. Most analysts keep a running mental tally of how often recent recommendations have been right and how often wrong. Tied in with this is a keen sense of status within the analyst community. Most are very much aware of who falls where in two polls that rank analysts and their firms. *Institutional Investor*, a publication whose title is a fairly accurate indication of its subject, ranks analysts in various industries into an All-America Research Team twice a year (see box p. 152). Although analysts complain that the publication does not explain how it arrives at its choices, they all seem to know



Notes Salomon Brothers vice president Stephen McClellan, "I read anything I can get my hands on about my companies."

who made first, second, and third "team." Another survey, published by Greenwich Research Associates, ranks firms by various investor criteria and gets equally close reading from most analysts.

One reason for all this attention to detail is that the number of times an analyst is right or wrong, and how he or she is ranked in such polls, can figure largely in the money he or she takes home. "It's all part of a game you play to keep up," notes Frank Kline, a former analyst who left Wall Street to start a venture capital firm. "You get the institutions to vote for you and each vote amounts to a monetary amount."

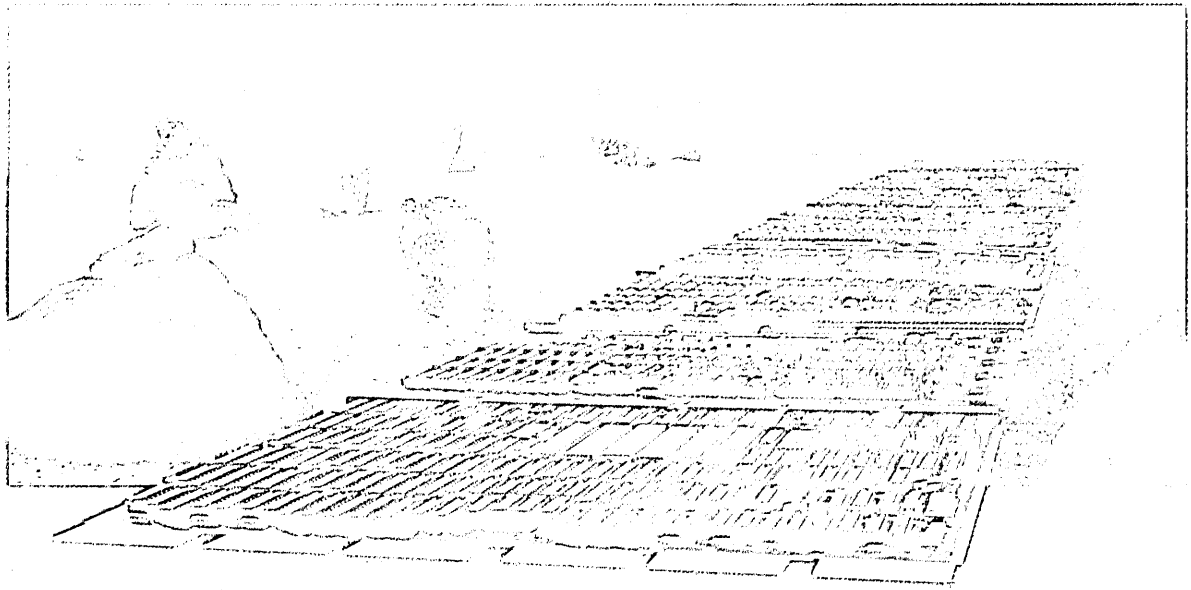
As a group, technology analysts are highly paid. Most well-regarded analysts earn over \$100,000 per year and some sala-

ries go as high as \$250,000. In part, such high figures are due to the increasing demand for analysts who know something about technology. Brokerage firms need at least one technology analyst to prove to clients that they are on top of new investment opportunities, and they are willing to pay for them. For instance, one firm recently wanted a particular analyst so much that it agreed to his demand that his entire research staff be hired along with him.

Despite their efforts and the money riding on their opinions, analysts are not right all of the time. They themselves admit that they are often too late to sense that a company is in trouble. "In the mid-1970s Burroughs was a Wall Street darling," notes Gideon Gartner, the president of the Gartner Group,

PHOTOGRAPHS BY MARC WEINSTEIN

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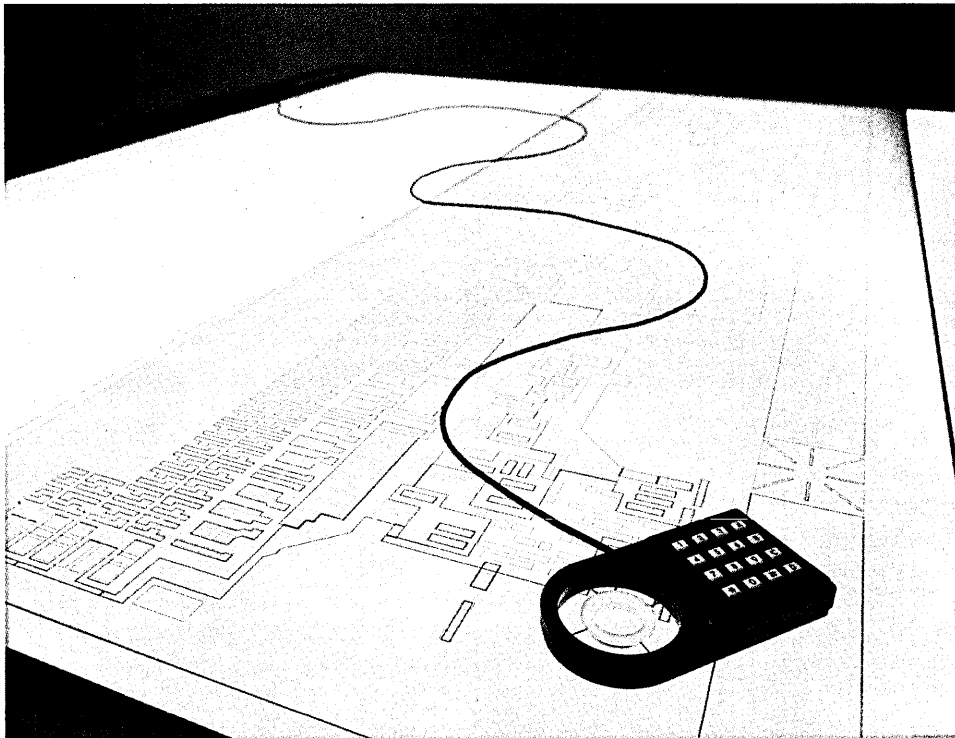
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CIRCLE 106 ON READER CARD

Analysts admit they are liable to make mistakes.

a Stamford, Conn., stock research company. "It was only after the problems at Burroughs became apparent that they turned negative on the stock."

Critics of the breed point out that analysts' records on at least two other companies show the same tendency—to give a warning after the fact. They maintain that most analysts continued to give favorable reports on IteI, the now defunct computer leasing company, long after its position warranted them. Many make the same claim about Centronics, the financially ailing computer printer company. "All you had to do was look at the fundamentals," says one observer. "It was only common sense to see that the stock would plunge, but almost nobody on Wall

Street saw it in time to get their clients out." Centronics stock has fallen from a high of 32 $\frac{7}{8}$ in 1967 to a high of 19 in 1981.

ANALYSTS CAN MAKE MISTAKES

Analysts admit that they are liable to make mistakes. "We're not infallible and we're not auditors," notes Ulric Weil, a vice president who covers various computer stocks at Morgan Stanley & Co., the New York investment bank. "Certainly a skillfully managed hoax can escape the analytical acumen."

But some outsiders take a more stringent view. They feel that analysts are more easily manipulated than they realize by the companies they cover. "In general, analysts

are technically superficial and that makes them susceptible to the unsupported claims of companies that are trying to con them," notes J. Bradley Stroup, director of public affairs at Data General Corp. Adds an individual who has worked for several analysts in the past: "Analysts seem to think that their sources are unique and privileged. But I can't believe that some of the large companies don't carefully feed them the information that they get. Most of it is too much alike."

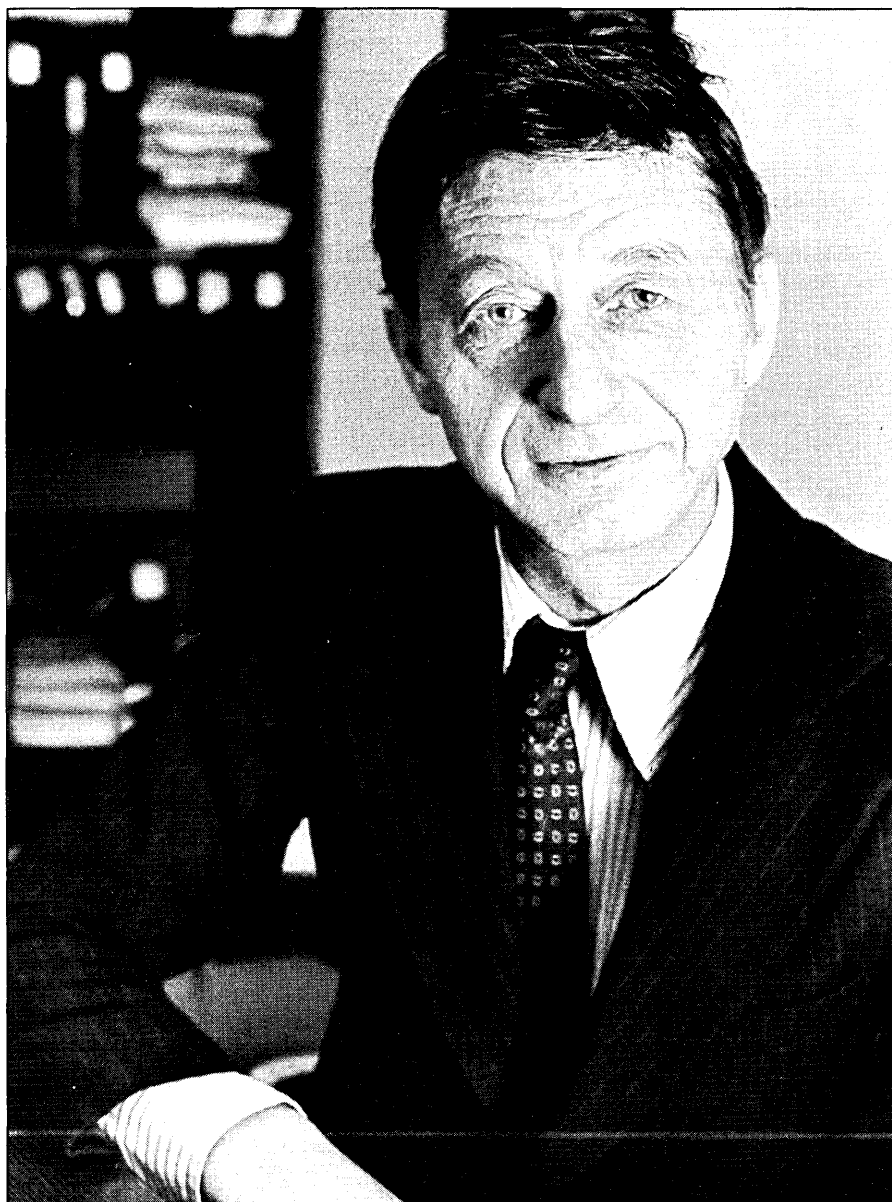
The fact that analysts often seem to reach very similar conclusions about the companies that they cover is another criticism often levelled at the profession. "They tend to be sheep," adds DG's Stroup. "They ride on fads and are buzzword collectors of the worst kind."

Analysts admit that there is often too great a consensus among them. "It's the nature of the beast," says William Easterbrook, a vice president who covers mainframe computers at Kidder Peabody & Co. in New York. "Five or 10 really good analysts do their homework, and 20 or 30 just take the consensus view." Indeed, some analysts take the situation as given and work around it. "It's part of the ball game," says Laidlaw's Collins. "It is only when you differ from the consensus and you're right that you make a significant contribution."

In general, analysts attribute the fact that they often reach the same conclusions to the circumstances in which they work. In New York, where most of them are based, they are a tightly knit group. They attend the same meetings, go on many of the same trips, talk to the same executives, belong to the same professional group—the Computer Analysts Splinter Group—and have access to much the same information.

This consensus adds to the impact that the views of financial analysts have, an impact that goes far beyond the price of a company's stock. The close scrutiny of analysts who are chiefly concerned that a company return a reasonable profit each quarter has helped make U.S. companies more concerned with short term earnings than they probably should be as far as the long term good of the company is concerned, critics claim. "Companies are under moral pressure to look to the long term, but there is a more immediate pressure to show good earnings every quarter," notes Esther Dyson, a vice president who covers software companies for Oppenheimer & Co. in New York.

There are other effects as well. "What Wall Street thinks about a company determines its ability to raise capital, and ability to raise capital determines whether a company can grow or not," explains Collins at Laidlaw. A company's standing with the financial community often weighs with executives who are thinking about joining that



"We're not infallible, and we're not auditors," notes Ulric Weil, a vice president at Morgan Stanley & Co., the investment bank.

"Even if analysts are not always right, they provide some information about what is happening in a company."

company, another factor that contributes to the success of a business.

Many users take note of Wall Street opinions before investing heavily in equipment from an unfamiliar company. "We use analysts in the planning process," says the data processing manager at a major insurance company. "Even if they're not always right, they provide some information about what is happening at a company."

Certainly the companies that find themselves under the watchful gaze of analysts appreciate the power of their opinions. "The Wall Street investment fraternity's attitude often becomes a major influence in the final decision to buy," says DG's Stroup. Adds Edward Gistaro, executive vice president of finance and corporate development at Datapoint Corp.: "We cater to them a little bit. We try to make them comfortable with the company so that they don't go off on wild goose chases. I guess that's a way of saying we think they're important."

The people who wield all this power are a diverse group. Although they are all trying to achieve the same ends, they vary widely in age, education, and approach. Perhaps the basic dividing line is their backgrounds. Computer analysts split into two groups: those who worked in the computer industry before moving to Wall Street and those who did not. Not unnaturally, those who worked in the industry believe that the experience has given them added insight. "It's a major asset," says Kidder Peabody's Easterbrook, who worked for five years at IBM early in his career. "It helps because you understand products better, you have sources in the industry you can call up and bounce things off, and you can relate to management better because you speak their language."

Like Easterbrook, many of the analysts who came from the computer industry started out at IBM. "Ten years ago IBM was the industry. It was very difficult to understand the industry without coming from IBM," acknowledges Laidlaw's Collins, although he himself did not come from the industry.

Two of the most prominent members of a subset of analysts known as "IBM watchers" came from the company; in fact, they came from very similar positions at IBM. Ten years ago, Morgan Stanley's Ulric Weil left IBM's competitive analysis department after 15 years with the company to move to Wall Street. After two years at another firm, he moved to Morgan Stanley. He covers about 18 companies, including computer mainframes, the major minicomputer manufacturers, and specialized companies such as Wang Laboratories, Tandem, Datapoint, Cray, and Computervision.

Weil, who has tied for the third team on the *Institutional Investor's* All-America Research team for several years, is one ana-

THEY'RE ONLY HUMAN

Despite their efforts, research analysts, like most of us, cannot win them all. A look at how the recommendations that some of them have made in recent months have fared reveals mixed success.

Stephen McClellan, vice president at Salomon Bros., did reasonably well with some buy recommendations that he made on Sept. 16. Storage Technology, which was then at 32% had risen to 34% by the week ended Jan. 8, 1982. Wang had moved from 27½ to 33%.

Two other stocks did not do quite as well, however. Electronic Data Systems rose a mere ⅓ during that time to 22%, while Digital Equipment fell from 89% to 83%.

Peter Lieu, vice president at Furman, Selz Mager Dietz & Birney, also showed mixed predictive powers with some analyses made on Oct. 13, when he was still with Arnhold and Bleichroeder. He noted then that Prime Computer, Burroughs, Sperry, and Managements Assistance all looked vulnerable to further retrenchment. Since that time Prime has dropped from 24 to 21¼, and Management Assistance has fallen from 12 to 10¼. But Burroughs and Sperry have risen from 29 to 34½, and from 33 to 34, respectively.

Lieu also had varied success with

the stocks that he described as attractive. NCR fell from 49 to 43¼ between Oct. 13 and Jan. 8., Digital from 95 to 83%, and Data General from 53 to 52%.

Ulric Weil, a vice president at Morgan Stanley, also recommended buying IBM. He made his recommendation on Nov. 16 when the stock was at 67. It closed the week ended Jan. 8 at 56%.

Harry Edelson, a first vice president at First Boston, recommended selling mainframe stocks at the beginning of October and reiterated that warning on Nov. 12. He was right on Honeywell, which fell from 80% to 67% by Jan. 8., and on Control Data, which dropped from 39% to 34¼. He was not so close on Sperry, which rose from 31% to 34, or Burroughs, which rose from 31½ to 34½.

The analysts' job has not been simplified by the Stock Market of late. Technology stocks have not, on the whole, been performing as well as they have in the past.

It should also be added that these analysts may well have amended or repeated their recommendations to many clients by telephone.

On the basis of their written reports, though, it looks as though it is just as hard for analysts to be perfect as it is for the rest of us.

lyst who claims that he does not worry overly much about how often his predictions are correct. That may be because he is more often right than wrong, but he says: "Clients are less concerned about your record of right or wrong than they are about the thinking that went into the conclusions."

Gideon Gartner earned much of his reputation from his flamboyant—and not always accurate—pronouncements about IBM. He left a position similar to Weil's at IBM about 12 years ago, moved through several firms, and then started his own business in 1979. In addition to the stock research the Gartner Group provides for Dillon Read, the investment banking firm that is the group's main client, it also supplies information about some 200 companies to other firms and computer users. "Analysts on Wall Street have to be more timely because they are dealing with investors, and applying that time mentality makes us somewhat different from other consulting firms," he says.

EX-IBMERS MAY BE BIASED

Of course not everyone believes that an industry background is an unmixed blessing. Those who do not come from industry point out that many of the analysts who come from IBM had a

tendency to regard IBM as a good investment—even when it was not. "Some analysts have recommended IBM wholeheartedly over the years," says one observer, "and they must have lost their clients billions." IBM's stock price hit a high of 67¼ in 1981, compared to a high of 387* in 1970.

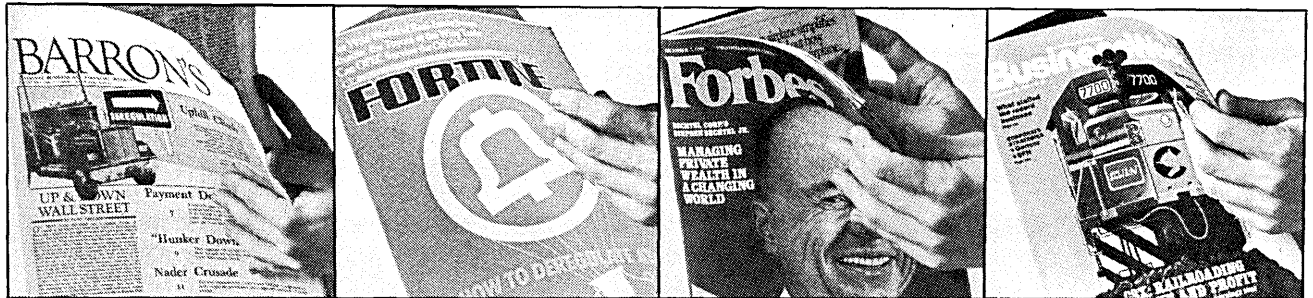
It comes as no surprise that analysts with financial rather than technical backgrounds see numerous advantages to their position. "I think it's an advantage not to be from IBM," notes Salomon Bros.' McClellan. "It gives you a broader perspective, makes you a little more unique."

McClellan came to Wall Street 10 years ago after a stint as an office equipment analyst for the Department of Commerce. Now at Salomon Bros. he monitors 15 to 20 companies, including Electronic Data Services, Storage Technology, and Wang. "I try to be very company oriented and very recommendation oriented rather than provide industry overviews," he says. "Clients today want specific stock recommendations."

A few years ago many analysts provided what is known as maintenance research rather than specific buy and sell suggestions. Working on the assumption that the large in-

*Adjusted for stock splits, the high was 77½.

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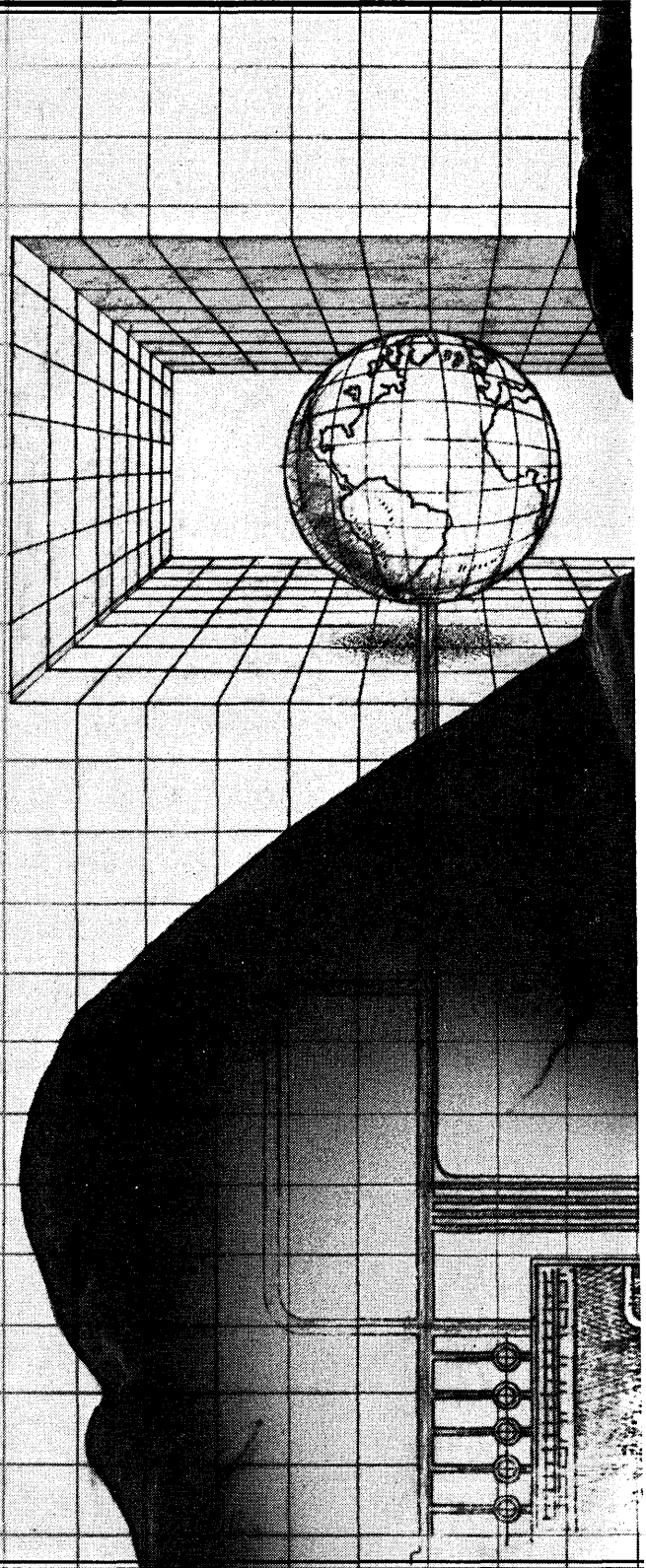
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CIRCLE 108 ON READER CARD

Ten years ago most analysts followed the mainframe companies. While some still keep an eye on them, others ignore them in favor of newer fields.

stitutions that account for two-thirds of the volume on Wall Street could make their own decisions if given adequate information, some analysts set out to do just that. They tried to know all there was to know about the companies they followed and to pass that knowledge on to clients.

The two analysts who consistently rank on the first and second teams in the *Institutional Investor's* list both work for a company that does not make recommendations, Grumman/Cowen in Boston. The analysts at that company, like many of their counterparts, shun publicity on the grounds that their information becomes less valuable if it is widely disseminated, and they respectfully declined to take part in this article.

Most firms now try to combine some maintenance research with stock recommendations. Easterbrook at Kidder Peabody, for instance, tries to write reports to let investors know what is going on at the dozen or so companies that he covers anywhere from two to six times a year, depending on how closely he is watching them. But he also recommends stocks for his companies, which include mainframes and some speciality firms such as Storage Technology and Datapoint.

Peter Labé, a first vice president at Smith Barney Harris Upham, operates in much the same way. Labé has been an analyst in various industries for 22 years. He now covers some 20 companies including traditional mainframes, major minicomputer companies, and IBM-compatible and specialty companies such as Cray, Tandem, and NBI. "You can't be everywhere at once," he says, "but I try not to stay out of touch. What I spend my time on depends on what's going on in the industry and what's going on in the stock market."

How They Rank

According to the most recent ranking of *Institutional Investor*, a magazine that focuses on the investment and money management business and names an annual All-America Research Team, the top two office equipment and computer analysts in the country both work for G.S. Grumman/Cowen, an investment research firm in Boston. Picked for the first team, Barry Rosenberg was cited for the "depth and breadth" of his knowledge of the minicomputer field as well as his accurate earnings and dividends projections. Second Teamer Stephen Weber, Rosenberg's colleague, follows the mainframers and was praised for his realistic and on-target projections regarding Burroughs, Sperry Univac, and the like. Daniel Mandresh of Merrill Lynch, Pierce Fenner & Smith, and Uric Weil of Morgan Stanley & Co. tied for the third team.



"Companies are under moral pressure to look to the long term," notes Esther Dyson, a vice president at Oppenheimer & Co.

Ten years ago most computer analysts followed the mainframe companies for the simple reason that there was little else to follow. Now analysts at the larger firms still keep an eye on those companies, but others are ignoring them in favor of newer fields. "I realized that there was no point in being the 25th voice on IBM," says Oppenheimer's Dyson. "I decided that the area of the business that was fascinating was software and the small computers that are basically bypassing the data processing departments."

At 30, Dyson is one of the younger members of a group in which most people seem to be in their 40s. Her background is atypical as well, since, prior to joining the small investment firm where she worked before moving to Oppenheimer a year and a half ago, she worked as a journalist at *Forbes* magazine. Now she covers Electronic Data Systems, Automatic Data Processing, Informatics, Cullinane, Triad Systems, and Tandy, as well as Computer Sciences, Commodore, and Tymshare.

Another analyst who prides himself on moving into new investment areas early is Harry Edelson, a first vice president at First Boston Corp. Edelson, who moved to the Street from the telecommunications industry 10 years ago, claims that he was the "world's first telecommunications analyst." His name became something of an industry byword when his monthly predictions about the coming of IBM's H Series failed to materialize, but he claims that although he often goes out on a limb with his stock recommendations, he is seldom wrong. "I'm not afraid to make waves," he says. "Too many analysts are afraid to say sell."

Laidlaw's Collins, an analyst for 17 years, also decided early in his career not to concentrate on mainframe companies. Instead, he chose to specialize in computer peripherals companies such as Dataproducts, Centronics, Storage Technology and Telex. Since he is of the school of analytical thought that holds that it is better to spot a good investment than to become an expert, he keeps tabs on some 100 companies, only focusing when events warrant closer attention. "That's always the way I've worked," he explains. "I look at the big picture and make a conscious decision to concentrate."

Peter Lieu, a vice president at Furman Selz Mager Dietz & Birney Inc., takes this philosophy further than most. His firm is an investment company with a relatively select group of clients. "We don't like companies per se," says Lieu, who doesn't subscribe to the practice of becoming an expert on the firms he follows. "If we think that a company's stock will go up, we buy it. If we think it's going to go down, we sell it. Stocks go up and down based on a few variables, rather than on details," he adds.

Lieu cites the history of Wang's stock as proof of his argument. He recalls that when Wang first entered the word processing market, most of the financial community took a dim view of the company's prospects because it was not only bucking IBM but was tightly controlled by Dr. Wang, its founder. Lieu decided that a company that was doing \$78 million in sales could hardly be controlled by one individual, thought that the product looked competitive, and recommended the stock. Adjusted to take stock splits into account, Wang's stock rose from a

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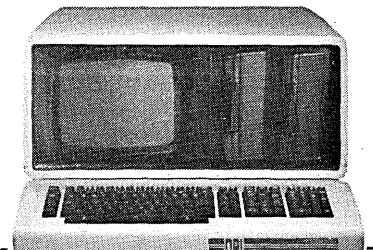
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CIRCLE 110 ON READER CARD

Some analysts take advantage of the consensus that often exists in the investment community by moving against it.

high of \$1.98 in 1977 to a high of \$45 in 1981. "That's the kind of thing we try to look for," says Lieu.

SOME GO WITH THE FLOW

Analysts like Lieu and Collins try to take advantage of the consensus that often exists in the investment community by moving against it. And analysts who operate outside of New York claim that their geographical distance enables them to do the same things. "We don't tend to think alike because we're not interacting on a day-to-day basis," notes Tom Niemiec, a vice president at Piper Jaffrey & Hopwood in Minneapolis.

Like many regional analysts, Niemiec tends to concentrate on computer companies that are in his area, such as Honeywell, Control Data, Cray, and Network Systems. He notes that the company may soon start looking at firms in other parts of the country. But until then, Niemiec will continue to divide his time between his computer stocks and a variety of others such as Datacard, a credit card machine manufacturer, and St. Jude Medical.

Sy Kaufman, an analyst at Hambercht & Quist in San Francisco, covers 32 mini-computer, data communications, office automation, and software companies around the country. In addition to recommending stocks, a large part of his job is assisting his company in providing financing for promising companies, a function that he believes give him an edge over Wall Street analysts.

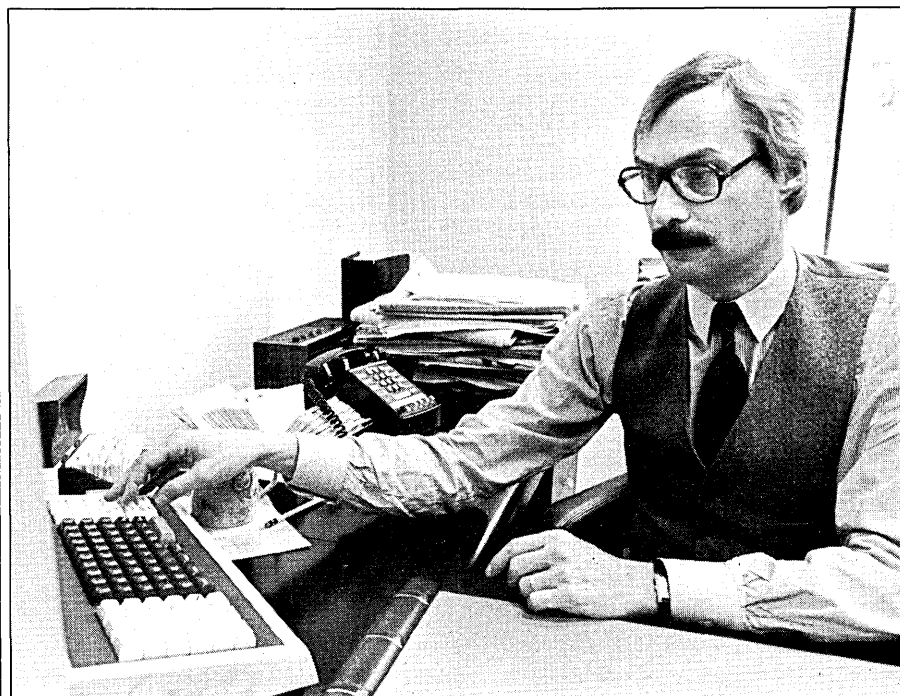
"Exposure to venture capital gives us tremendous insights at the grass roots of what is happening in our industries," he says.

All of these analysts, and most of those who are known to the public, are what is known as "sell side" analysts, so called because their recommendations can prompt trades. But there is another group of analysts operating on Wall Street called "buy side" analysts. They are the individuals who cover stocks for just one institution and recommend when to buy. As a group they positively shun publicity. Only one would agree to speak in very general terms about what he does.

Joseph Bellace, a vice president at the Bank of New York, follows some 20 companies in 10 broad industry segments. He notes that he relies greatly on sell side analysts in his work. "Brokerage people do a more intense job of following a smaller group of companies," he says. "On the buy side, we have a broader coverage with more of a focus on investment strategy."

Whether they are on the buy side or the sell side, analysts trade on one thing: information. Some people may question the quality of that information or the judgments that result. Others believe that analysts do the best job that they can in an industry that keeps as much information secret as possible. But few would argue that the intelligence that these analysts provide carries considerable clout. *

Margaret L. Coffey is a New York-based free-lance writer.



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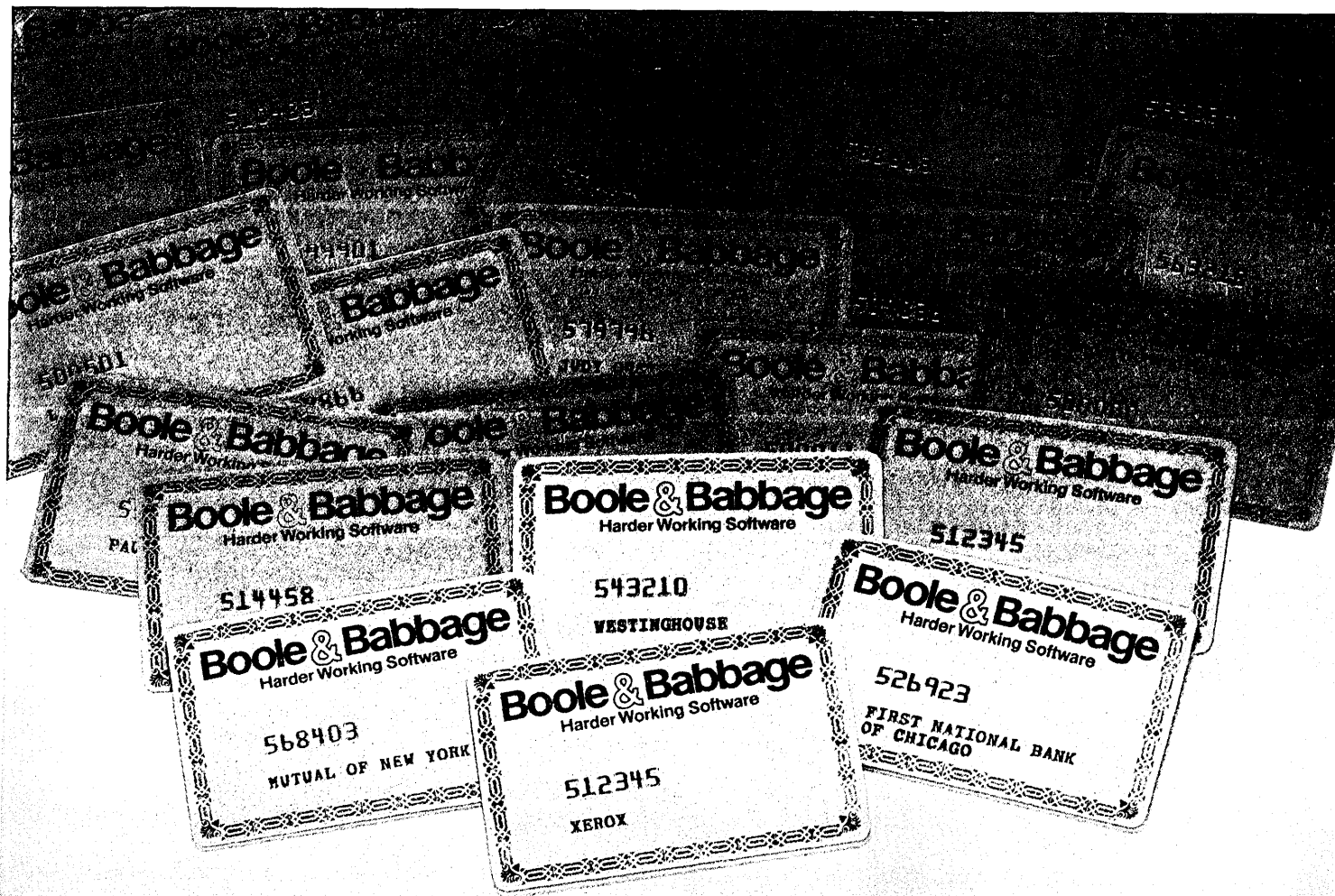
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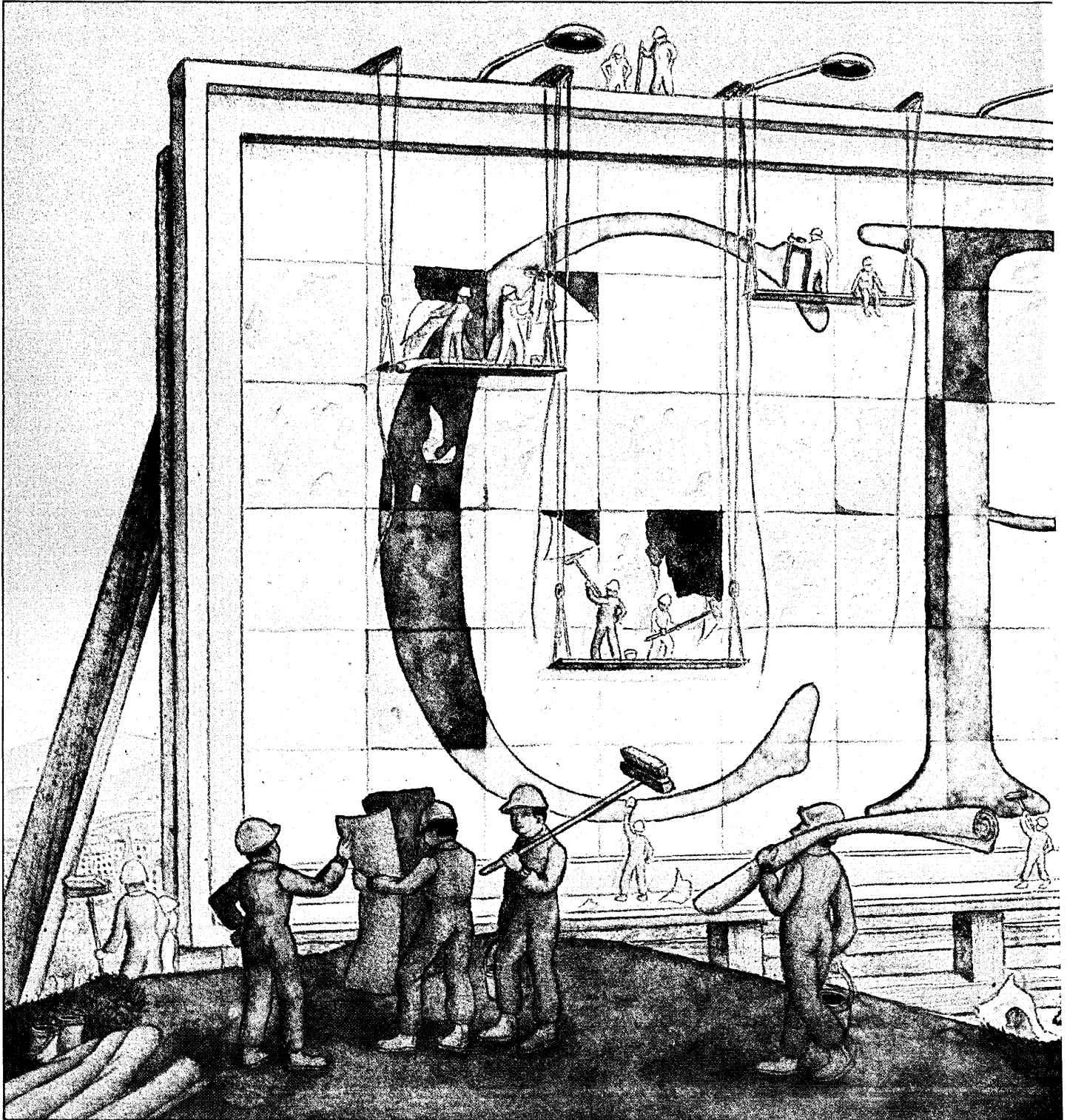
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CIRCLE 55 ON READER CARD

TRANSFORMING AN OPERATING SYSTEM

How module ownership
and other management
techniques were used to
upgrade the CP-V
operating system into
the CP-6.

by Pat Crisman
and G. Edward Bryan



In July 1975, Xerox suddenly and dramatically announced its exit from the mainframe computer business. In February 1976, Honeywell agreed to take on the sale and maintenance of Xerox hardware and software. In July 1976, Honeywell established the Los Angeles Development Center (LADC) to create an operating system, associated language processors, and data management facilities that would provide a growth path for the approximately 150 CP-V systems running on Xerox hardware.

Although Honeywell examined several other alternatives, the unique qualities of

the CP-V system and the unusual loyalty of its users ultimately convinced management that building a new system modeled after CP-V and hosted on standard Honeywell hardware was the most logical course of action to take. Recently, a new direction was taken when Honeywell announced its plan to market CP-6 outside the Xerox community.

CP-6 is unique in many ways. First, it used CP-V as a model; though many improvements were made (and weaknesses corrected), the existence of a fundamentally correct working model saved much design time and even more discussion and argument. Second,

the CP-6 system was completely rewritten in a new high-level language, PL-6, designed and built expressly for that purpose. It now seems clear that an assembly language choice would not have been merely harder but impossible; the complexities of modern virtual addressing hardware (such as that in Honeywell's DPS 8 line) can be practically managed only with a high-level language. Finally, Honeywell was fortunate to acquire the core of its new CP-6 development staff intact from Xerox Data Systems—people who not only carried much of the unwritten portions of the system design with them, but also had an

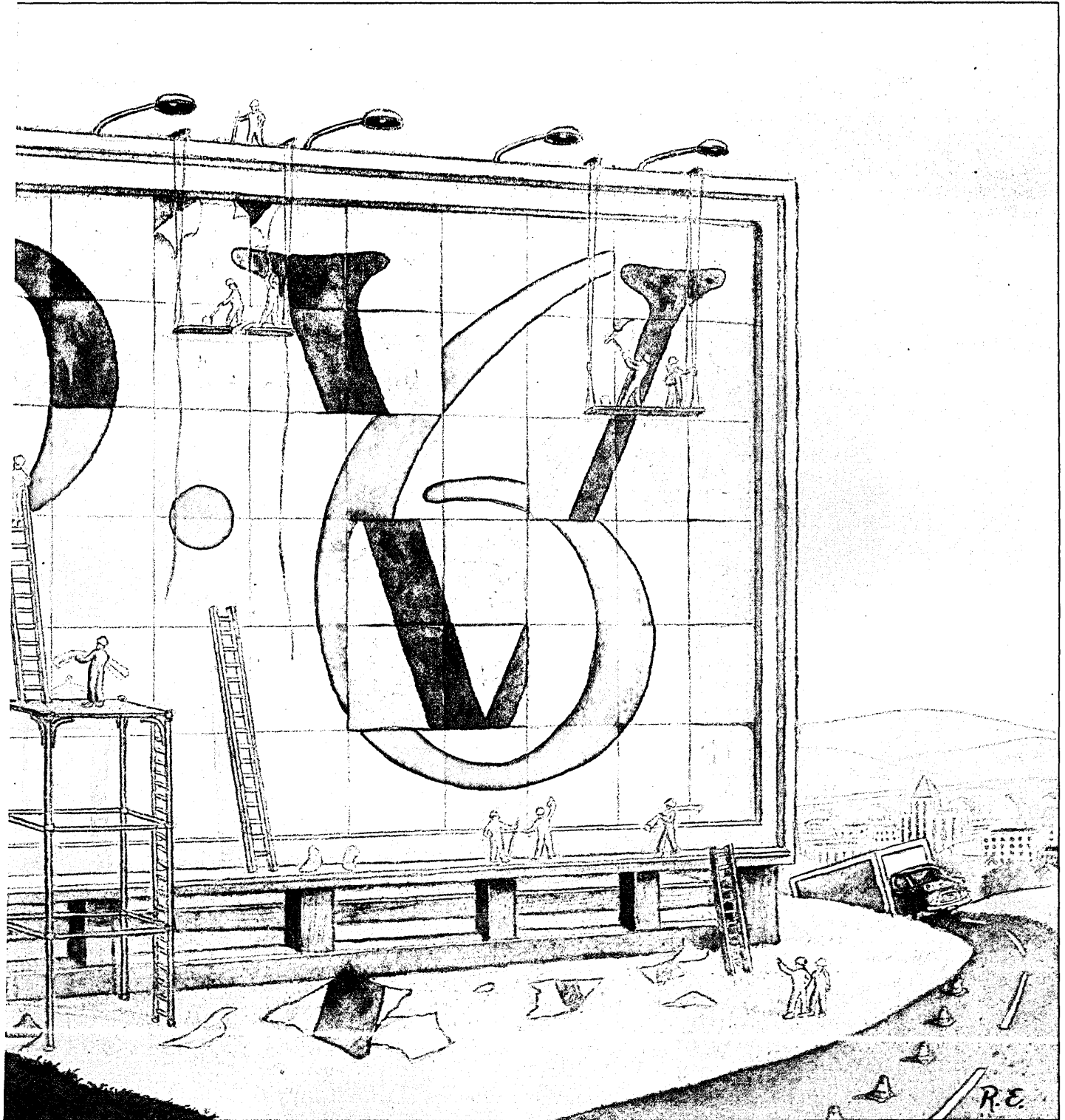


ILLUSTRATION BY RICHARD EGIELSKI

The existence of a fundamentally correct working model saved much design time and even more discussion and argument.

established method of working together. LADC is a clear example of the value of organizational goodwill.

CP-6 is a modern, full-service, large-scale operating system. It follows CP-V in having five access modes: batch processing, remote batch, timesharing, transaction processing, and real-time processing. CP-6 offers multiprogramming and uses multiple cpus. Unlike CP-V, it uses communications and terminal interfaces through Level 6-based front-end processors, connected locally, remotely, or in combination.

CP-6 fully supports a set of language processors: APL, BASIC, COBOL, FORTRAN, RPG, IDP, IDS, SORG/MERGE, PL-6, GMAP, and a TEXT formatting program. Commonly needed software packages (Pascal, SNOBOL, LISP, SPSS, BMDP, IMSL, SPICEII, and SLAM) have been made available through the efforts of the first CP-6 customer.

Unique to the CP-6 design is an integrated file management system. Files are equally and compatibly available to programs executing in any mode: batch, timesharing, or transaction processing. They are organized for access in four ways: indexed, keyed, relative, and consecutive. The CODASYL database manager I-D-S/II is also available.

Intersystem access between CP-6 systems and between CP-6 and CP-V and to and from IBM and other HASP protocol systems provides communication, job submission, and file transfer among systems with common interests. CP-6 is especially suited to a computing requirement for a full line of services, together with a need for a highly interactive mode of on-line terminal access.

HISTORY OF CP-6

During the six months following the formation of LADC, the principal architecture of CP-6 was laid down—in particular, the matching of the CP-V design to the architecture of the Honeywell hardware. At the same time, the PL-6 implementation language was designed, based on work started elsewhere in Honeywell. By mid-1977 PL-6 was ready for use; the parallel development and periodic integration style of LADC development then began in earnest. Early development used a software factory based on CP-V where the source files were maintained and where cross-compilers and simulator-debuggers were housed.

By January 1978, enough basic facilities had been put in place (including the terminal interfaces in the Level 6 communication processor) so that the system could be tested and used by its developers via on-line terminals. By June of the same year, the system had progressed far enough for a public demonstration at the EXCHANGE meeting of Xerox computer users. In January 1979, sufficient operational reliability and functional

completeness had been achieved to permit CP-6's software factory to be committed to CP-6 itself. The factory and the files of work in progress were moved in stages from the CP-V-based factory to CP-6. By June 1979, the system was ready for customer testing. The first system was installed at Carleton University in Ottawa, Canada, at the end of that month.

By December 1979, the system had been installed and tested at four sites throughout the United States and Canada—not only universities, but also a service bureau and the engineering center of a major corporation. CP-6 was released for general use at CP-V sites in December 1979. Development continued through 1980 to improve performance and to add transaction processing access to the existing timesharing and batch processing access. By the end of 1981, 21 CP-6 systems were installed worldwide and an equal number were on order.

Before we discuss CP-6 development methods in detail, we should give some idea of the size of the system, which comprises the operating system, 14 language processors, and various run-time libraries. The operating system is divided into host and front-end communication processor portions. The deliverable code for all these parts combined totals 2 million lines of source divided into 4,000 modules. Over 80% of the code is in PL-6 with another 15% in PL/I and the remainder in miscellaneous other high-level languages.

New code is almost entirely in PL-6. All the PL/I and significant portions of the machine language are in products moved to CP-6 from the GCOS operating system, of which the principal items are COBOL, IDS, TEXT (from MULTICS COMPOSE), and the GMAP assembler. Machine language code is needed only in selected areas: the mathematical subroutine library, the subroutine-call interface routines, certain I/O handlers, and system boot time hardware initialization routines.

Originally we had thought more machine language might be needed for operational efficiency, but experience has shown otherwise. In the second release of CP-6, a significant portion of the I/O system was recoded from machine language into PL-6, almost doubling the system's speed. This confirms our initial belief that speed is achieved through algorithm design, not clever machine language coding.

Additional code is required to support the development process. Tools, test cases, and scaffolding code used in the development process amount to about 2 million additional lines. The 100 programmers, managers, and support staff who have worked for 4½ years on CP-6 have produced either 4,500 or 9,000 lines per man-year, depending on whether the tools, test, and scaffolding code are included

in the production count. In either case, this is significantly better than the industry average.

Since CP-6 is maintained by its developers, internal documentation is placed in the code. Volume of comments varies somewhat but averages about 25% of the source lines.

DESIGN OF CP-6

Many of the techniques used in support of CP-6's design are conventional. We maintain an architecture file of documents that serve to record the principal designs. Peer discussions followed by formal design reviews are held by the CP-6 staff, led by a design review chairman. Several reviews are often necessary before a satisfactory design is completed.

Our design approach incorporates three unusual features:

1. A technically outstanding, personally engaging, and highly respected chief architect, who serves as leader and arbiter of technical content and technique.

2. The opportunity to define standards and conventions from scratch. Another unique person saw that these were kept useful and that they were used.

3. The practice of module ownership, carried over from CP-V. This means that each programmer is 100% responsible for his or her product (design, implementation, debug, test, documentation, and maintenance) for its lifetime.

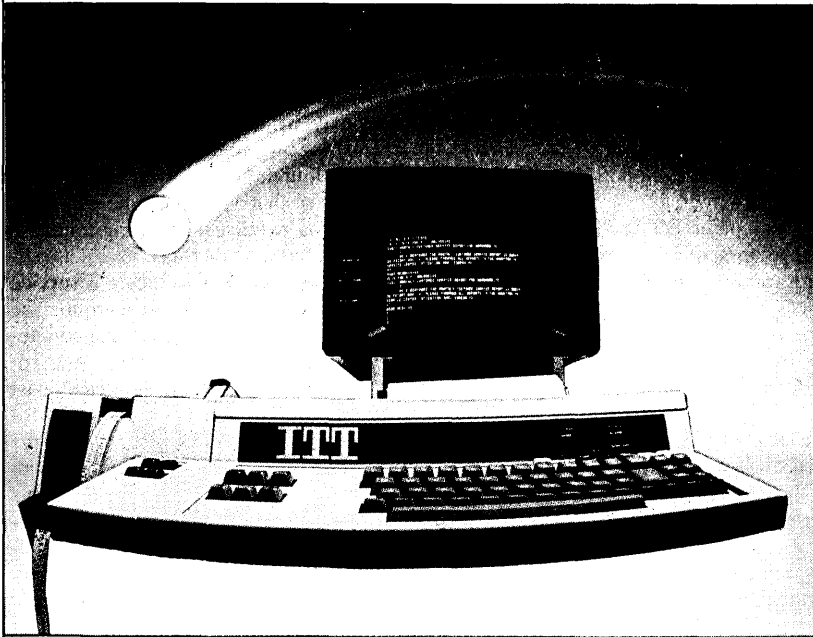
Module ownership is the key phrase. It creates pride of accomplishment as well as accountability, and pins the blame directly when things go wrong. Responsibility remains where it belongs; there is no place "over the wall" to throw the product. There is no quality assurance group and no maintenance group; the first and last words about the documentation are the module owners' responsibility. Module ownership assures feedback throughout the development cycle, with the product improving with each iteration.

In the area of standards, we knew from our CP-V experience of some features that had to be designed and developed coherently and be incorporated throughout the system and its processors. Examples include a single calling sequence, one object unit language, a command parsing routine, and common error message format and reporter. This early work has paid off many times in maintaining a uniform user interface and reduced development costs.

One of our folk heroes said that three things can be manipulated in the management of a project: manpower, content, and schedule. Any two may be dictated by upper management, but the third must be correspondingly adjusted to accomplish the task. We were fortunate that all three were frozen. We were required to develop CP-6 with full CP-V functionality in three years with less than 130

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Module ownership creates pride of accomplishment as well as accountability, and pins the blame directly when things go wrong.

people. These tight constraints may have been a factor in our avoiding the "second-system effect."

While some staff members developed a working software factory on CP-V, others divided the operating system into its functional parts. Next the minimum functions for each area were defined and a schedule was established to indicate the sequence in which the parts had to be assembled.

The result of this exercise was a well-staged development process. We knew what features had to be developed in what order and we were able to assign the manpower accordingly. As many as five projects were under development at any one time. Every six to eight weeks, all development code was integrated into one base. Then all development went forward on that base. The three-year schedule was laid out in eight-week increments, which meant that everyone on the project knew what features were being implemented at any given time. It was almost self-managing: few surprises, few lost functions, and very high visibility. Parallel development of small periodically integrated segments assured that the project was tracking according to schedule. Parallel development was achieved not only in the compiler projects and in the operating system but also in CP-6 as a whole.

No small credit for the success of each integration in the parallel development process is due to the person designated "integration honcho." This technical expert (usually a developer of one of the major parts being integrated) assures that all the steps in the integration succeed; the honcho is responsible for initial testing, identification of problem areas, and recruitment of the developer who will carry out the fix.

The key terms in development are staging and schedules.

CRITICAL SOFTWARE TOOLS

PL-6, the system implementation language for CP-6, is syntactically similar to PL/I's application-oriented services. The use of a high-level language like PL-6 was critical to the development of CP-6, since the former significantly improved productivity over machine language by providing a shorthand for algorithm expression. A line of high-level code can express an algorithm or a fragment of one, while a line of assembly code cannot. Compilers provide for complete and accurate data definition, including data type, which is perhaps the most important ingredient in software design. Once data and algorithm are written, the compiler can aid significantly in the debugging process. A program that has cleanly compiled has a good chance of sensible execution, while a clean assembly means very little. Finally, PL-6 isolates the program-

mer from the complex details of machine operation, allowing him or her to concentrate on the program itself. This is especially important on modern machines with complex virtual memory addressing and protection mechanisms.

A second critical tool is the system itself. CP-6 is an excellent software development tool; in fact, we moved our factory from CP-V to CP-6 as soon as we had enough tools working on CP-6 to do the job. The system benefited in several ways. It was tested in real life before release, and functions were added or improved as the developers found they needed them.

The computer center operates as a software development laboratory. Two factory systems run 24 hours a day, seven days a week. One system runs the latest software release; the other runs the next developing release. A third system serves the need for hands-on development.

As part of the development effort, we also built a superior debugger, DELTA, which can be used to debug the running monitor, a dump of the monitor, processors, or programs written in any of our languages such as PL-6, FORTRAN, and BMAP. DELTA allows display and modification of data or program using the symbols of the source program. Execution breakpoints, data breakpoints, and several levels of tracing are provided. DELTA is used to apply patches to all parts of CP-6 in assembly-like language, eliminating the following difficulties: octal patches, manual bookkeeping of patch space, branching out to a patch area without reexecuting the replaced instruction, applying an old patch to a new version, or replacing the wrong instruction.

From the days of CP-V we have had tool crib known as account X. Tools in the X account must be submitted in source form and have a HELP file of user documentation. For example, one X account tool, EXTRACT, extracts CNF (Crisman Normal Form) commentary from source files to create error message files, manual appendices, the *Monitor Services Reference Manual*, and maintenance documentation. The LISTER and EDGEMARK programs copy listing files to the line printer with the module name and version printed on the paper perforation so that it can be read from the edge. LINECOUNT is a management tool that tracks every module in CP-6, including the module owner, language, number of lines of source, lines of comments, and number of lines changed since the last version. There are now about 90 tools in the X account.

Tool building is a process that continues today. There is no tool building group; tools are created as needed by the developer who sees the need and carries out the implementation. One tool was built by a developer and offered as a birthday present to his grate-

ful manager. It is difficult to overstate the importance of good tools in the software development process.

NEED FOR STRONG CONTROL

By now you may be suspecting that we've neglected to tell you about something that went on behind the scenes. True. There are two problems with producing enormous amounts of code: how can many programmers work on a project simultaneously without interfering with each other, and how can programmers be prevented from squirreling their code away in some unknown place so that at release time you don't know what you're releasing? Strong control is needed. Without it, code rots.

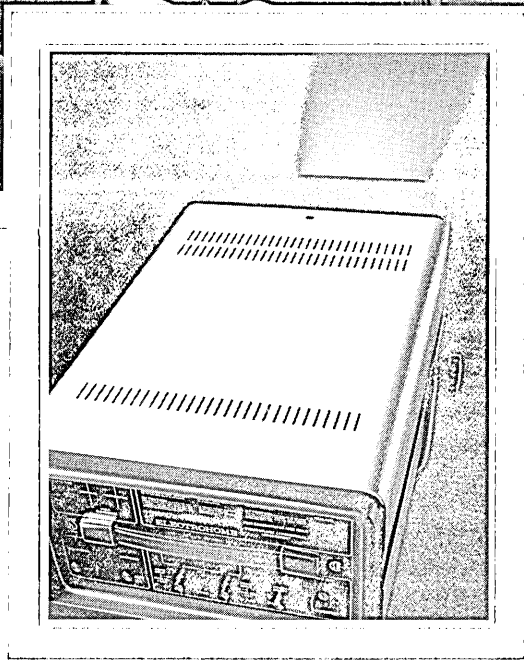
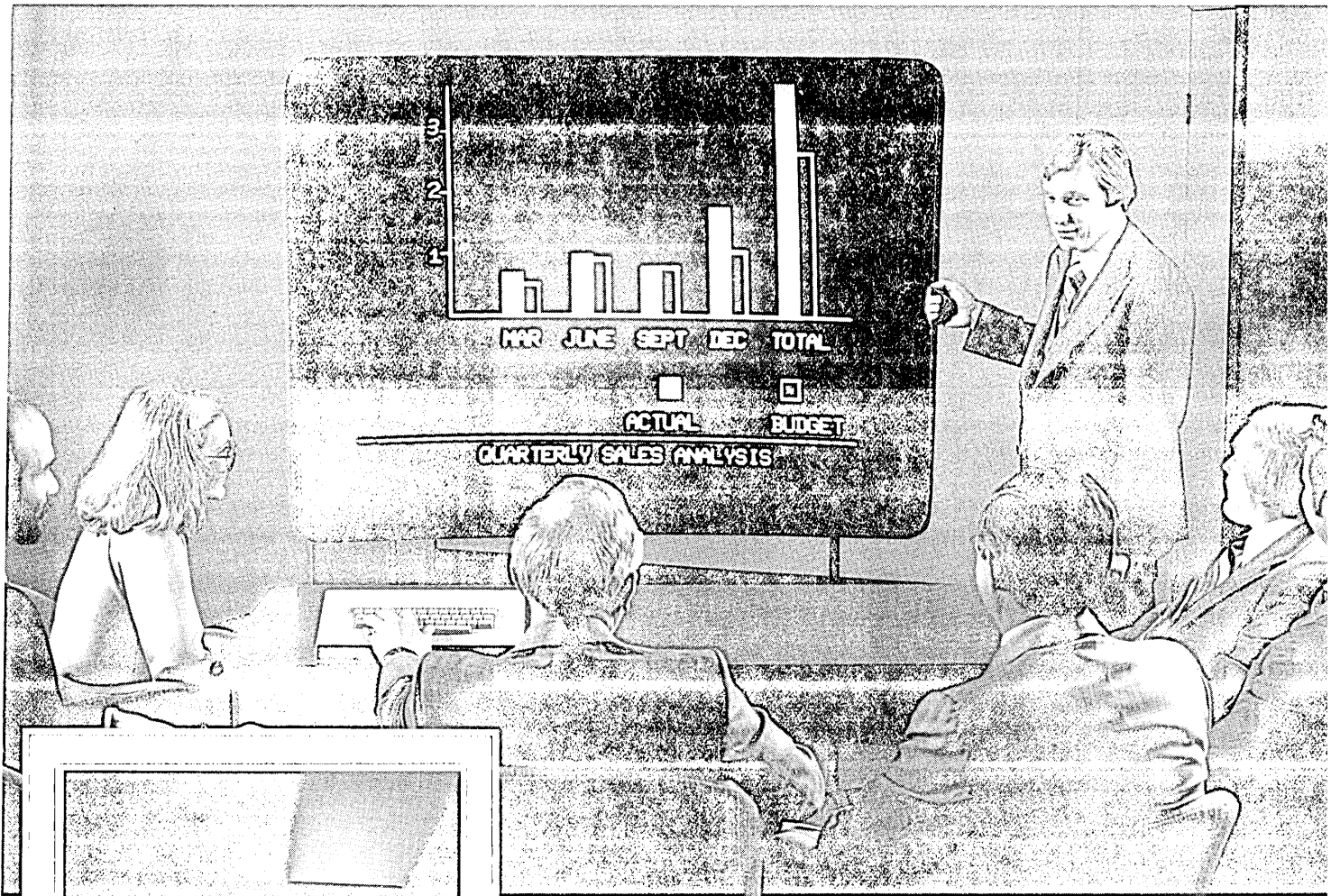
Our solution was to create a service organization known as the control group. The paragraph describing staging mentioned integration. Actually, it's integrations. According to an integration schedule defined at least six months in advance, development code for each and every product is gathered by the control group into controlled accounts. From there it is compiled and processed into its final form as run units, which are then returned to development for testing and installation on our data center machines. Only code coming from the controlled accounts is ever installed on our production system or released. Every product evolves by means of major and mini integrations. Each product has a mini integration each week to incorporate fixes into a version to be tested in a production environment. These mini integrations are performed overnight so that the product is available the next morning and the developers don't have to wait.

With each release all controlled accounts are archived for historical purposes by the control group, so that after a release we know what was released.

Once a module is moved into a controlled account, its source can never be directly modified. We use the old useful tool of update files to effect changes for both development and maintenance. Each update is identified by the programmer's initials and date (and problem report number if a fix). Each access to the update file is further noted in a tracker file. In this way, several programmers can work on the same module and know exactly what each has done. Bad updates can be removed easily; new updates indicate what testing might be appropriate.

All of the development people know the control procedures, so programmers can move from one project to another without having to learn new methods. Another advantage is that everyone knows where to find any needed module, even if it belongs to someone else. (Note also that module ownership is transferable so that programmers can move to other projects.) Innovations can be added to

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CIRCLE 120 ON READER CARD

If you're going to develop a releasable product, you should plan the support tools and requirements from the beginning.

these standard procedures without difficulty. For each major integration, the control group creates all the listings, cross references, microfiche tapes, maintenance documentation, error message files, report of STARS closed in source, and so forth. That group is also responsible for intersystem dependencies that could not be managed conveniently by the developers themselves (e.g., whenever a new version of one product is created, the control group remembers which other products must be recompiled or relinked.)

The key phrase is control and service.

The primary testing is done by in-house use of the products by the developers. For example, a new version of the operating system is installed each week on the machine that is used by the operating system developers as their factory. This creates peer pressure for fixes.

For formal regression testing, we use tools, standards, module ownership, and a service group instead of an outside agency or quality assurance group. We have developer-produced test cases, library standards and tools that effect the principle "If the test succeeds, there is minimal output." The developers are responsible for providing tests ac-

ording to these standards. The testing tools automatically generate a final report describing which tests were run, when they were run, and whether they were completed successfully. A very small test group provides test case tool and library maintenance, controlled accounts, and final regression test runs before release.

The key phrase: "There is no authority without responsibility."

PLAN SUPPORT FIRST

If you're going to develop a releasable product, you should plan the support tools and requirements from the beginning. To effectively support the system, we use the same tools used during development—module ownership, debugger, patches, error logger, remote operator's control, and error analyzer. Supporting the system in our data center is no different from supporting it in Canada. We debug and fix remotely and electronically using LADC experts, with no need to send people to the ailing site.

An additional support tool is STARLOG, the on-line error reporting and tracking system that allows customers to report diffi-

culties and get solutions without recourse to paper forms or the U.S. Postal Service. We are able to respond to severe problems with installed fixes within hours. The current fixes are automatically sent to all customers on a weekly basis via our intrasystem file transfer over a synchronous communications link.

In conclusion, it seems worthwhile to reiterate the five most significant aspects of our development technique:

1. Module ownership: This focuses responsibility from design through coding, test, documentation, and maintenance, and also assures that there is full feedback in the development process and eliminates "open loop" development.

2. Parallel development and integration: Development tasks are broken into independent units for concurrent implementation, but frequent integrations assure that the independent developments play together and that management and developers see clearly the progress of the overall project.

3. Factory of development tools: This should be continuously expanding. High productivity requires identification and construction of new tools throughout the development process. High-level language development is imperative for productivity and does not hinder performance.

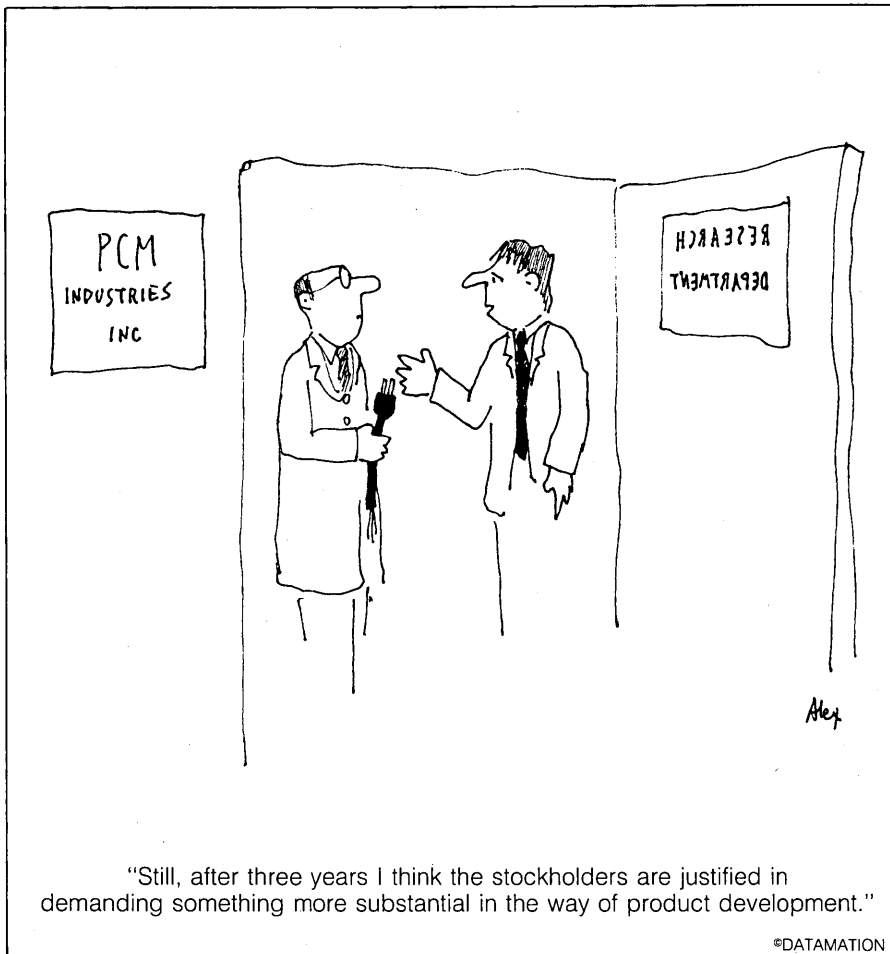
4. Evolving system: This should be used in the process of system development. For identifying bugs, no amount of static testing can replace actual use. One may sometimes have to search hard for an application to involve each product.

5. Control group: This service organization is a capture point for official versions of the software—provided at LADC. Developers retain responsibility, but their product is stored in a secure place.

No brief list of techniques can adequately represent a successful system implementation. Each technique we have recommended here is essentially a service that makes the individual developer's job easier. Systems are built by people working together; the value of the techniques they use will be reflected in the system they create. *

Pat Crisman is a consulting staff engineer at the Los Angeles Development Center, Large Information Systems Division, Honeywell, Inc. Ms. Crisman went from analog computers to digital in 1955, and has been working on large general purpose operating system development since 1960.

G. Edward Bryan is also a consulting staff engineer at LADC. His recent work involves the design and development of UTS, CP-V, and CP-6, successor systems in the multipurpose operating system field.



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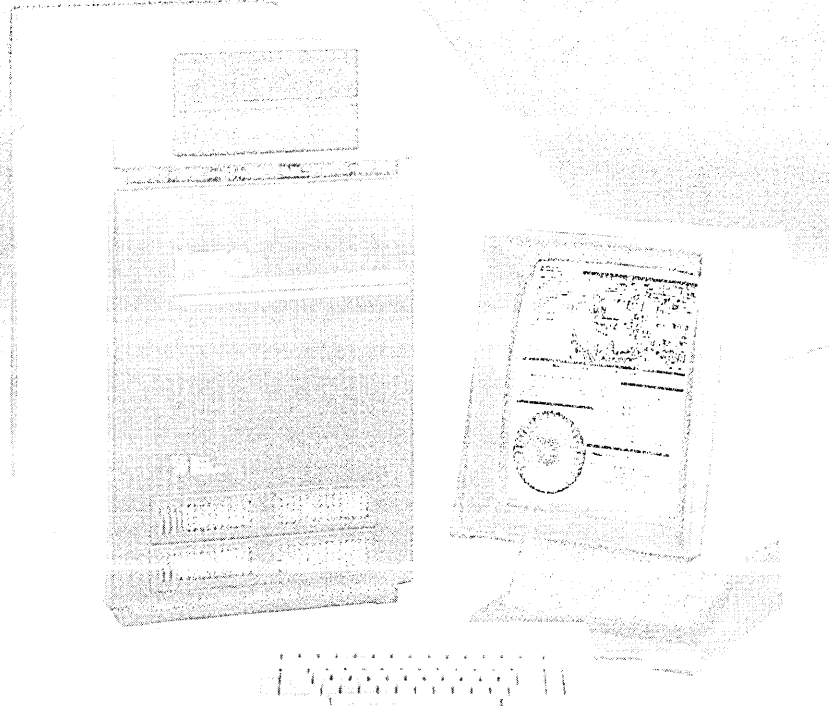
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CIRCLE 122 ON READER CARD

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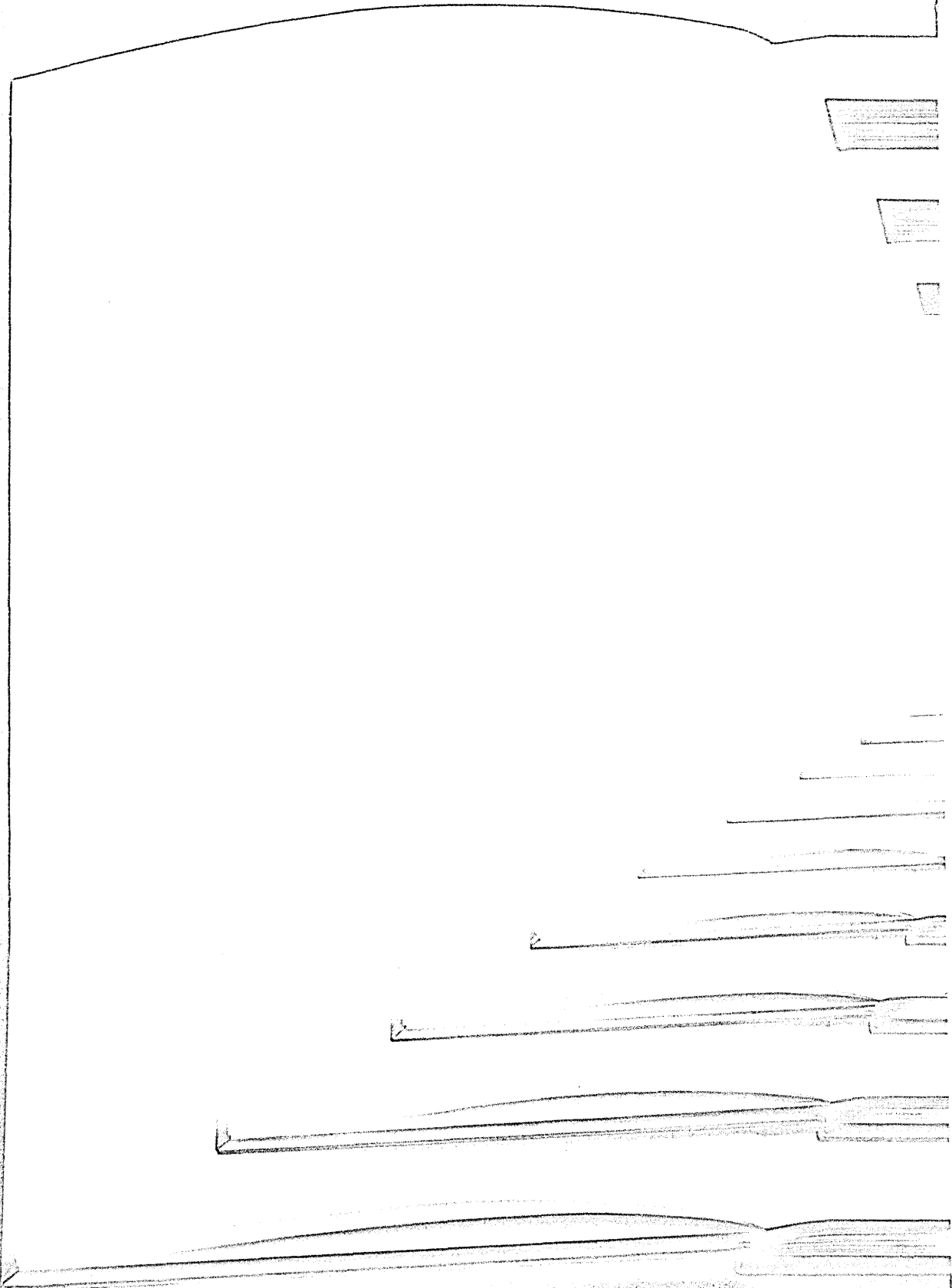
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An important choice
faces us: let the
computer perpetuate
archaic methods of
publishing, or use it to
vault our minds into a
hyperspace of thought.

A NEW HOME FOR THE MIND

by Ted Nelson

Simplicity almost never happens by itself; it must be designed. There are many computer programs for dealing with complexity. Unfortunately, as a rule, they generate more complexity. Many systems that start out simple, like order processing or invoicing, are appallingly complex in their full-blown computer regalia. As a result, many computer people see their jobs as the management and preparation of this complexity.

An alternative to this care and feeding of ever more complex systems based on simplistic frameworks is to seek a framework that holds and deals with ideas and their relationships in their natural form and structure, in their full and exact intricacy. To face squarely and early the natural implications of a process brings simplicity in the long run.

A situation where this choice can be made is upon us now with the arrival of cheap word processing systems. These machines help create, manipulate, and store people's ideas in the form of written documents. Many of these documents relate to

COMPUTOPIA SOON?

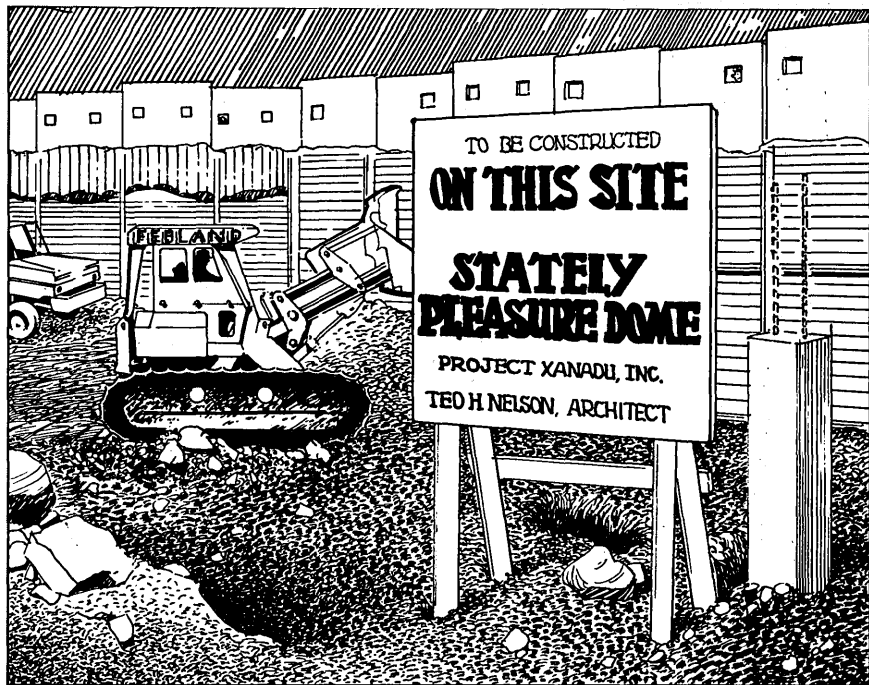
Is Xanadu worth waiting for?
That depends, doesn't it,
on the value of the hand-bush
differential bird utility ratio.

Ted Nelson's idea for a hypertext publishing system was 14 years old when that Xanadoodle appeared in the now classic *Dream Machines/Computer Lib*, his 1974 manifesto for computerdom's underground. Now, after several years of intensive, meagerly financed effort, the wait is over. Xanadu appears to be a reality.

Demonstrations of a limited, single-user Xanadu system were slated to begin by early winter as the start of a marketing plan that will bring the system before the waiting eyes of the many Xanadu followers and, it is hoped, some potential customers. No contracts have been signed yet, the system as envisioned by Nelson is far from complete and financing continues to be a problem, but the door into the world of Xanadu has opened for all to see. Two companies, one owning the software and another chartered to market it under a nonexclusive license, have been set up in Ann Arbor, Mich., the site of much Xanadu activity in recent years. Nelson himself has left Swarthmore, Pa., for San Antonio, where he's working on future office automation products for Datapoint. He's left the day-to-day Xanadu operations to Roger Gregory, chief technician on the project.

So far, all that has been developed is the Xanadu back end, described by Nelson as a large-scale indexing system in which a huge number of documents can be stored, linked, and retrieved according to parameters submitted to it by a front end. The latter, a version of which was scheduled to be completed and shown by press time, will likely be up to the user to supply. It will probably be a standard word processor or intelligent terminal programmed to move messages to the back end and to display documents as formatted by the user. Currently, the software is written in the C programming language running under Unix on a Motorola 68000-based Onyx desktop computer, according to Gregory. The group is looking for a larger machine, he notes.

Project Xanadu, Inc., owns the system software and will continue development of it, Gregory says, while Xanadu Operating Co. will look for customers and market the system in various forms; licenses for oem use of the software in object code form and access to a Xanadu service over dial-up and eventually over public network lines are the main offerings planned. Also, custom front-end programming will be undertaken for those customers not up to doing it themselves, says Gregory, noting that front-end work may become a substantial growth path once central Xanadu sites are in place. He is reluctant to talk about financing, claiming legal restraints, but outside



venture capital has not been discounted as a future source of revenue. Meanwhile, money is being invested by the firms' principals. "We're sort of struggling," says Project Xanadu president Gregory, noting that much of the development effort so far has been donated. He adds that experienced marketing personnel will be required but hiring has been delayed by the money situation. "We know there's a lot more we need. We're going to have to get some high-powered business help."

What makes Xanadu work within tolerable processing and real-time limits, Nelson claims, is a new method for indexing very large numbers of documents and their criss-crossed links and windows. The system manages to maintain and navigate through the otherwise uncontrollably large number of pointer values using a proprietary scheme partially inspired by the Dewey Decimal library system: an accordionlike notation—using numbers, "humbers," and "tumblers"—grows to accommodate document links as they are made without wasting space on unused values. In his most recent (1981) book, *Literary Machines*, Nelson explains much of the thinking behind the Xanadu scheme and delves into the potential legal, marketing, and philosophical aspects of a full-blown Xanadu system. (The book can be obtained from Nelson at P.O. Box 128, Swarthmore, PA 19081. Project Xanadu's address is P.O. Box 7615, Ann Arbor, MI 48107.)

Applications for Xanadu are expected to be "high end," says Gregory, who cites documentation of large-scale engineering or programming projects as a likely area. "We want to sell expensive systems at first in order to fund the dial-in services," he notes. "As soon as we can demonstrate the system, we have a long list of people to show it to." He declines to name any prospects, but Bell Labs is understood to be an interested party. No

contracts have been signed as of Feb. 1, 1982, and only a single-user front end has been developed. Multi-user versions, additional security, and backup/recovery features are next on the development list, he said. Those features are necessary to sell the system to corporate users.

In *Literary Machines* Nelson says prices for a VAX Xanadu installation for in-house use will be on the order of \$25,000. Front-end development work will be extra, but could be handled by the customer. He also discusses collaborating with established corporations to run his futuristic Silverstands franchises, similar to McDonalds hamburger shops (complete with golden Xs to "welcome the mind-hungry traveller") in their efficient on-line Xanadu hookups: "We would not mind working with Sony, Xerox, Disney, Cromemco, Storage Technology, Apple, Datapoint, BBN, Lucasfilms, American Zoetrope, *Whole Earth Catalog*, *Rolling Stone*, *Playboy*, McDonald's, or Holiday Inn, to name a few."

So far, Nelson claims in *Literary Machines*, he has shunned financial support from "a variety of shallow creeps who did not share our vision." Thus, Xanadu has been a long time coming, even in its current no-frills form. Nelson is quick to credit the many Xanadoers who have volunteered their time to the effort. In the meantime, he has published some of computing's most enlightening and entertaining volumes and papers. His next book, he says, will be *Computopia Now!*, "my most fulminating and free swinging so far." For many, he epitomizes irreverence to the computer establishment. "Aren't you afraid that writing a flippant book will keep people from taking you seriously?" he asked himself in *Dream Machines*, answering, "I do not want to be taken seriously in some quarters until it is too late."

—John W. Verity

Hyperworld: a vast new realm of published text and graphics, available instantly; a grand library that anybody can store anything in.

each other, quoting in part or whole, referencing through footnotes and bibliographies, or merely sharing similar ideas. It is often necessary to store many copies of one document to assure safety from accidental deletions, provide a means for backtracking through successive states of the document, and for repeated use by other documents.

The safety of documents should be taken care of automatically; that it is still a problem shows the low state of the art. Backtracking is an important consideration. Although we do not need to go back through previous material often, we should be able to do it right when we do. Here is what doing it right entails:

Suppose we create an automatic storage system that takes care of backtracking automatically. As a user makes changes, they go directly into the storage system, filed chronologically. The user may then refer not merely to the present version of a document, but may go back in time to any previous version. He must also be able to follow a specific section of a document back through time, studying its previous states. We need not go into technical details here, but it is obvious that such a system departs from conventional block storage. It would store material in fragments under control of a master directory which indexes by time and other factors.

This same scheme can be expanded to handle alternative versions, more than one arrangement of the same materials, a facility that writers and programmers could certainly use. Alternative versions are important in many boiler plate applications, such as law and public relations writing, where the same materials are churned out repeatedly in different arrangements and variations. A master indexing scheme could greatly reduce storage requirements in these applications, and make the relations among documents much clearer.

Of course, a facility that holds many versions of the same material and allows historical backtracking is not terribly useful unless it can help intercompare different versions in detail, unless it can show you, word for word, what parts of two versions are the same.

Lawyers could use this facility to compare wordings. Congressmen could compare different draft versions of legislative bills. Authors could see what has happened to specific passages in their writings between drafts. Biologists and anatomists could compare corresponding parts of animals using a graphical database of physiology that shows evolving structure.

By creating such a capable storage system, we have greatly simplified the life of the text user. The nuisance of backup, and the spurious nonsense-task of finding names for backup files, is eliminated. More important-

ly, we have unified all versions (previous and alternative) in a single structure for ready reference. The user could scroll through any two versions to see corresponding parts, and much more.

ADDING A LINK FACILITY

So far we imagine a new reading-and-writing box that behaves pretty much like a high-power word processor. Let us add one more facility, links.

To begin with, let us think of a link as simply an opportunity to jump away from some point in the text. A conventional footnote is a good example. An asterisk, say, signals that "there's something to jump to from here." If you point at it with your lightpen (or mouse or whatever), bingo!—you're now at the footnote, or whatever else the author took you to. If you don't like it there, hit a return button and you're back to where the asterisk appeared. No harm has been done.

This simple facility—call it the jump-link capability—leads immediately to all sorts of new text forms: for scholarship, for teaching, for fiction, for poetry.

Marginal notes, like those scribbled in books, are another simple and important type of link. (Where the "margins" of the computer screen are—that is, how to show them—is a matter particular to your own screen setup.)

The link facility gives us much more than the attachment of mere odds and ends. It permits fully nonsequential writing. Writings have been sequential because pages have been sequential. What is the alternative? Why, *hypertext*—nonsequential writing.

Many, perhaps most, writers have been frustrated by the problem of choosing a sequence for the ideas they are presenting. Any sequence is generally arbitrary, and what is right for one reader may be wrong for another. Indeed, many writers have experimented with nonsequential forms—one of my favorites is Nabokov's *Pale Fire*—and I think such forms have proved gratifying. They are not necessarily easy to work with, however. That is because existing mechanisms push us toward sequency. Even the best of commercial word processors.

I have so far presented several new capabilities that I think are important: alternative versions and historical backtrack, both with sameness display, and links.

These work together; they have to. The links allow the creation of nonsequential writings and jump-structured graphics of many kinds. But if you are going to have links you really need historical backtrack and alternative versions. Why? Because if you make some links on Monday and go on making changes, perhaps on Wednesday you'd like to follow those links into an updated ver-

sion. They'd better still be attached to the right parts, even though the parts may have moved. And the sameness display allows the complex linked alternatives to be studied and intercompared in depth.

Let us call this Stage One: a system of computer storage that holds small pieces of a document, not big blocks, and instantly assembles them into any part of whichever version you ask for. That allows you to create links of any kind you want between any things you want, and shows you which parts are the same between related versions. Let us call such a storage system a hyperfile.

Electronic publishing is coming; this much we all agree on. Just what it will be is not so clear. For some five hundred years the public has been reading from books and magazines of paper. Now all that may change.

As computer crt screens become more and more available, there is less and less reason for printing on paper. The costs of wood pulp and gasoline, the long lead times of editorship and production, the increasing divergence of specialized interests, and the lowering cost of computers with screens, of disk storage, and digital communications, all suggest this.

Beginning thinkers in this area often suppose that what will be offered to the screen reader will be merely individual stored documents, available on-line quickly, but based somehow on conventional documents nestling in conventional sequential computer files. My view is quite different.

Consider the hyperfile we just finished expounding. Why can't we extend it into a full publishing system? Once the package allows linkage and backtracking, why not extend it? Why not allow anyone to create links between documents, allowing jumps straight from one to another? If documents can be reached and used on-line by anyone, all we need additionally is the ability to create links among them—to make our own bookmarks and marginal notes, to quote from them by direct excision. And why not, indeed, allow users to assemble collections of documents into larger ones?

Royalties will have to be paid, of course. Since there is no controlling what happens at the user end, this royalty should be automatically recorded and largely based on *transmission time*. An hour, five minutes, or one second of a thing, each contribute proportionally to the copyright holder's account. I will bypass the question of whether different rates of royalty should be allowed.

ORIGINAL DOCUMENT REMAINS

The logic of such compound documents is simple and derives from the concept of document ownership. Every document has an owner. The integrity of this document is maintained; no one

THE LEADING EDGE

#2 in a series of reports on new technology from Xerox

Few inventions have proved more versatile than the laser.

It has been used as a super signal lamp for space communications. It has found a role in exotic metal-working applications, and the incredible precision that it offers has made new kinds of brain and eye surgery possible.

A system for playing TV shows from phonograph-like disks uses a laser to "read" the recorded program material.

Lasers are used in various forms of measurement and information handling systems. For example, one version of the bar-code reader used in supermarkets employs a laser scanner.

The Hologon Laser Scanner is one of the latest developments in practical applications of laser technology. It was invented by Xerox optical physicist Dr. Charles Kramer who wrote this article.

Lasers In Electronic Printing

At Xerox we use lasers in electronic printing systems that are based on xerography. Instead of making copies of existing documents, such printers create documents, drawing on information stored in a computer. In such a system, signals from the computer pulse the laser beam as it scans across a light-sensitive drum or belt that serves as the "camera film" in xerography. The image recorded in this way is then developed and transferred to

paper as in a copier.

Laser electronic printers offer the quality of offset printing with significant versatility compared with conventional computer printers. There is virtually no meaningful limit to format or to type style or size. Pictorial or other graphic material can be printed as easily as text. Arabic, Greek or Russian alphabets—even Oriental ideograms—are within its capabilities, provided appropriate programming is fed into the printing system.

Equally significant is the fact that, with electronic printing, documents originated in one location can be printed simultaneously at a number of different locations.

Xerox currently offers three such systems. The 9700 electronic printing system turns out almost two pages per second and has almost unlimited flexibility when it is used with the Xerox Integrated Composition System program. The 5700 electronic printing system is up to 40 times faster than conventional word-processing printers, which it can replace, and it can also be used for electronic mail and remote computer printing. A similar printer is offered as part of the Xerox 8000 network system. Designed for lower-volume applications, it is twelve times faster than a conventional word-processing printer.

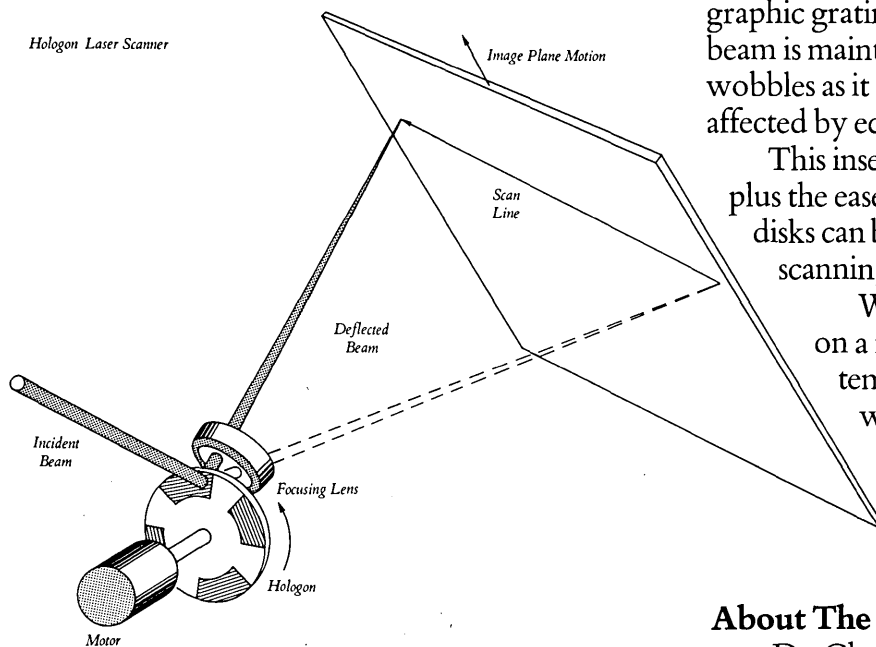
In these printers, the scanning action of the laser beam is created by a relatively complex opti-

cal system that is based on a rotating, polygonal prism. Extremely high precision is required in such a system. This complexity and precision make such a laser scanner relatively expensive.

The Hologon Laser Scanner

To simplify laser scanners and reduce their cost, we considered holography to perform the functions of costly lenses and prisms.

Holographic recordings, best known for their reproduction of three-dimensional images, take the form of gratings—corrugated or ridged patterns on a transparent medium, having a spacing of approximately twenty millionths of an inch. In pictorial holograms, these gratings contain the recorded cross section of the wavefront of light



that had been reflected from the pictorial subject. When coherent light—usually from a laser—is transmitted through such a hologram, a true three-dimensional image of the subject is reproduced.

However, the holographic gratings used in a Hologon scanning system do not contain pictorial information. Only the optical diffraction properties of the gratings are utilized.

The Hologon System is one of several holographic approaches to scanning. But the others tend to scan in an arc-like pattern which is unsuitable for electronic printing, which requires a straight-line scan, much like the raster pattern used in television to create an image. The Hologon approach gets around this problem through a

novel configuration.

In a Hologon, a series of holographic gratings are formed around the circumference of a transparent disk. A laser shines through these gratings as the disk rotates. The gratings diffract the laser light, and the rotating action causes it to scan across the surface on which it is focused, as shown in the accompanying diagram. Focusing is done by a simple, inexpensive lens.

The laser beam in this system is aimed so that it forms a nominal 45° angle to the Hologon's surface as it enters a grating and a 45° angle as it emerges from the grating. In other words, it is diffracted through a right angle by the gratings. This angling results in a straight-line scan.

Because of the optical properties of the holographic gratings, the 90° diffraction angle of the beam is maintained even if the Hologon surface wobbles as it rotates. The beam angle is equally unaffected by eccentricities in the rotating disk.

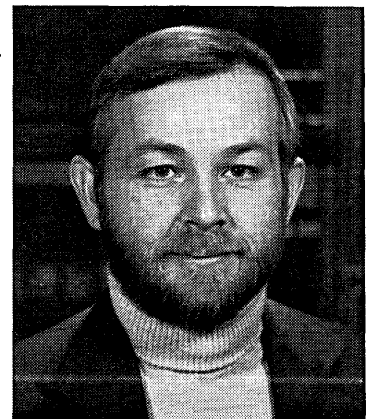
This insensitivity to mechanical variation, plus the ease and low cost with which Hologon disks can be produced, make a Hologon laser scanning system relatively inexpensive.

Work is currently underway at Xerox on a new generation of laser printing systems utilizing the Hologon laser scanner with all its attendant benefits. This should enable Xerox to make the advantages of electronic printing more widely available than ever before.

About The Author

Dr. Charles Kramer is the inventor of the Hologon Laser Scanner. He is an optical physicist specializing in electro-optical reading and printing devices at the Xerox Joseph C. Wilson Center for Technology in Rochester, New York.

He holds a Bachelor's degree and a Master's degree in Physics from Fairleigh Dickinson University and a Master's degree and Ph.D in Optics from the University of Rochester.



Not many people have noticed that the crt is an ideal two-person device. Every computer screen should have a jump seat.

may change it but the owner.

Someone else, however, may create a document which quotes it or revises it; this document, too, retains its integrity. That means you can indefinitely create new documents from old ones, making whatever changes seem appropriate. Originals remain unchanged.

What's more, since the copyright holder gets an automatic royalty, anything may be quoted without permission. That is, publishing through such a net requires implicit permission for your work to be quoted ad lib. You publish something, anyone can use it, you always get a royalty automatically. Fair. Especially if the reader can always say, "Show me what this was originally."

But this means a whole new pluralistic publishing form. If anything which is already published can be included in anything newly published, any new viewpoint can be fairly presented. For example, my great-grandfather, Edmund Gale Jewett, believed that one word in *Hamlet* was incorrect. It should have been "siege," not "sea of troubles," in the well-known soliloquy, he thought.

Very well. If *Hamlet* is on the system, then E.G. Jewett could publish his own *Hamlet* very easily: a quote-link to the whole original, except for "sea," which is changed to "siege."

Now, the obvious rules of the road should be as follows:

1. Shakespeare's *Hamlet* is of course unchanged and available instantly.

2. Jewett's modified version of *Hamlet*, composed almost entirely of the original, is also available instantly. Jewett may give it any title he wants.

3. Shakespeare—or presumably some Needy Author's Fund—gets the royalties for the portion of Shakespeare's *Hamlet* summoned by readers.

4. When people read Jewett's *Hamlet*, the author's fund still gets the royalty on Shakespeare's behalf almost all the time. But Jewett gets a minute proportion of the royalty for the change he has made, whenever a reader encounters that part.

5. Anyone reading Jewett's version can say, "Show me the original of this next to it," or just, "Take me to the original."

6. Anyone reading Shakespeare's *Hamlet* can say: "What documents have links to this?" or "Are there any alternative versions?" and get a list that includes Jewett's version.

Note also the modest cost to Jewett should he "publish" his text: the storage cost for a few hundred bytes to hold ID, pointers, and changes. Also, note that this arrangement is fair, orderly, and simple. These seem to me very important features.

The overarching vision I propose, then, we might call a "hyperworld"—a vast

new realm of published text and graphics, all available instantly; a grand library that anybody can store anything in—and get a royalty for—with links, alternate versions, and back-track available as options to anyone who wishes to publish them. It is a world:

- whose documents window and link freely to one another;
- where every quotation may be traced instantly, and seen in its original context;
- where minority interpretations and commentary may be found everywhere;
- where any point of view disagreed with may at once be restated "in the margin," with only minor changes, by any commentator; thus good explanations of everything soon become available;
- where a collage of parts can be assembled by anyone into a new unifying vision, but the doubtful reader may wander off into a constituent part and not return;
- where an article published on Wednesday is festooned with disagreements by Friday, widely windowed the following week, forgotten the next year, rediscovered in a decade.

Scholarship becomes piled high with popularizations. Good quotations, good diagrams, propagate through this electronic literature like wildfire, as everybody uses them.

The tangle of links will grow. Professional indexers will create directories of what they think we'll want to see, and collect a whiff of royalty every time you veer through their directory. (The system must not have an official directory; that implies an official set of categories—a bias best left to users.)

Is this chaos? Not at all. Because at any one time you are within one specific document, the work of a specific author. If this work is windowing to other documents, nevertheless you are still not "in" the others, but viewing them through the present author's textual filter.

Think of the present document as a sheet of glass. It may have writing painted on it by the present author; it may have windows to something else, but these windows may have, as it were, colored cellophane or opaquing on them. It is only when you step through the window—which you may do at any time—that you reach the original. But stepping through the window means turning one glass page and going on to the next. Now you are in another work.

SIMPLE AND ORDERLY

Now reconsider what we said before about simplicity. Simplicity must be designed, but it should reflect the true inner structure of something. Many approaches to electronic publishing are very complicated. But that can't work on a broad scale: the word publishing itself suggests use by the public. Meaning simplicity. For thou-

sands of years we have had a tradition we call literature. Its inner structure has been that of documents, each with an owner/creator, which quote and refer to one another in an ever-growing snowball. All I am proposing here is to electrify and hasten access to this very traditional structure—but with suitable enhancements arising from available software techniques.

The result is a seemingly anarchic pool of documents, true, but that's what literature has been anyhow. Yet I see this new world as orderly in two ways. Its orderliness is not, as some would suppose, imposed by the computer or its administrators, but by something which arose long ago in the natural structure of literature, and which we are merely retaining.

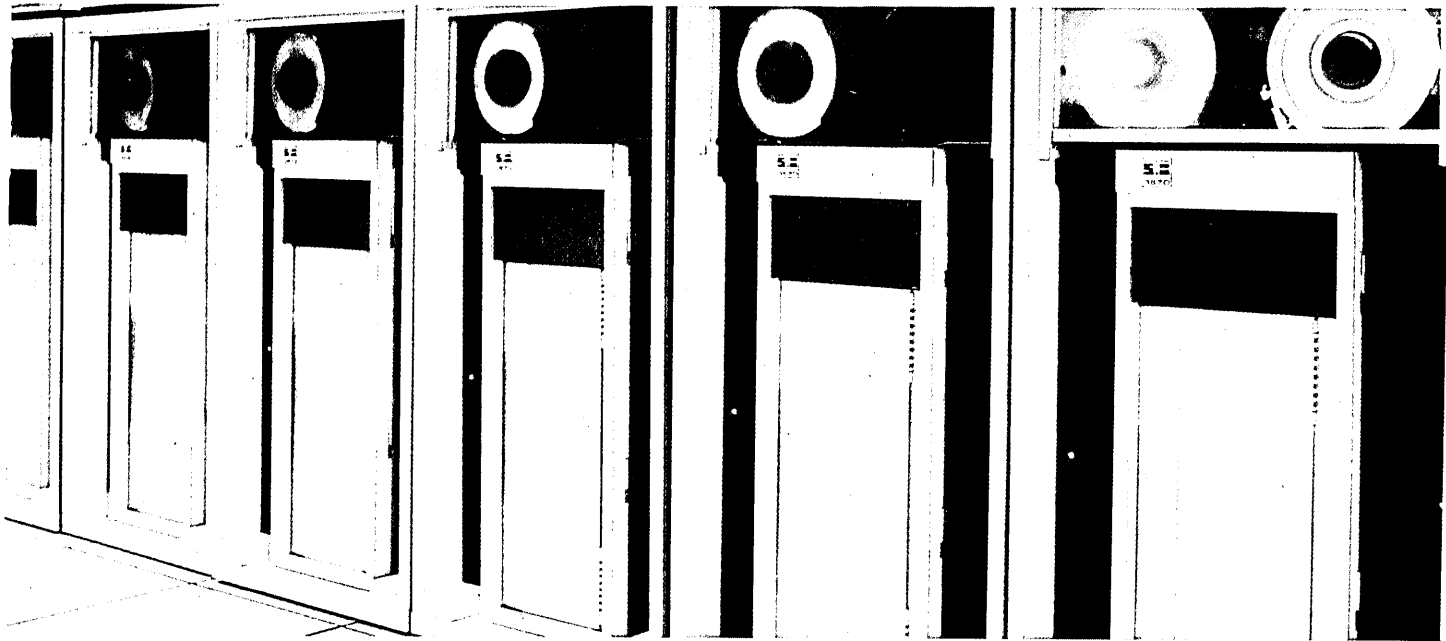
One kind of order, order on the small scale, is simply the distinction between documents and the enforcement of ownership. You know who created whatever you're looking at; despite the staggering pluralism, each thing is kept separate and intact because only its author, or publisher, controls it. No one can ever be misquoted except by making a copy, rather than a quotation-link, and that can be easily recognized as suspicious.

The other form of order is the long-term orderliness of ideas, which is ever created and re-created by commentators, paraphrasers, anthologists.

I see a world where people are brought together by the computer, rather than driven apart by television. The computer screen is really a very social instrument. Not many people have noticed that the crt is an ideal two-person device. Sure, much of the time there's only one person at it, but often there are two. And when there are two people, the situation is socially interesting: they are usually in a colleague relationship. Two people sit, chat, exchange ideas as they browse, decide together what to do next. Bossy authority does not fit well when two people are looking at a tube and chatting. "Suppose we try this," one will say, or, "Let's do that." One may be officially the other's boss or teacher, but the relationship is softened, made more sensible and open to ideas from both. One moral is that every computer screen should have a jump seat. As crt furniture and mountings are better designed, the computer and screen will no longer be a stack of boxes to be placed on a wooden desk, but an integrated piece of furniture with suspended tube, coordinated work surfaces, and bucket seats. Or rather a pilot's bucket seat and a colleague's less comfortable pullout seat. Kibitzers will have to stand.

As explorable graphics and simulations are added to our hyperworld, the computer screen will be more and more a new kind of shared social environment. I see little kids at play in spaceships and far galaxies, but with characters on the screen that they've

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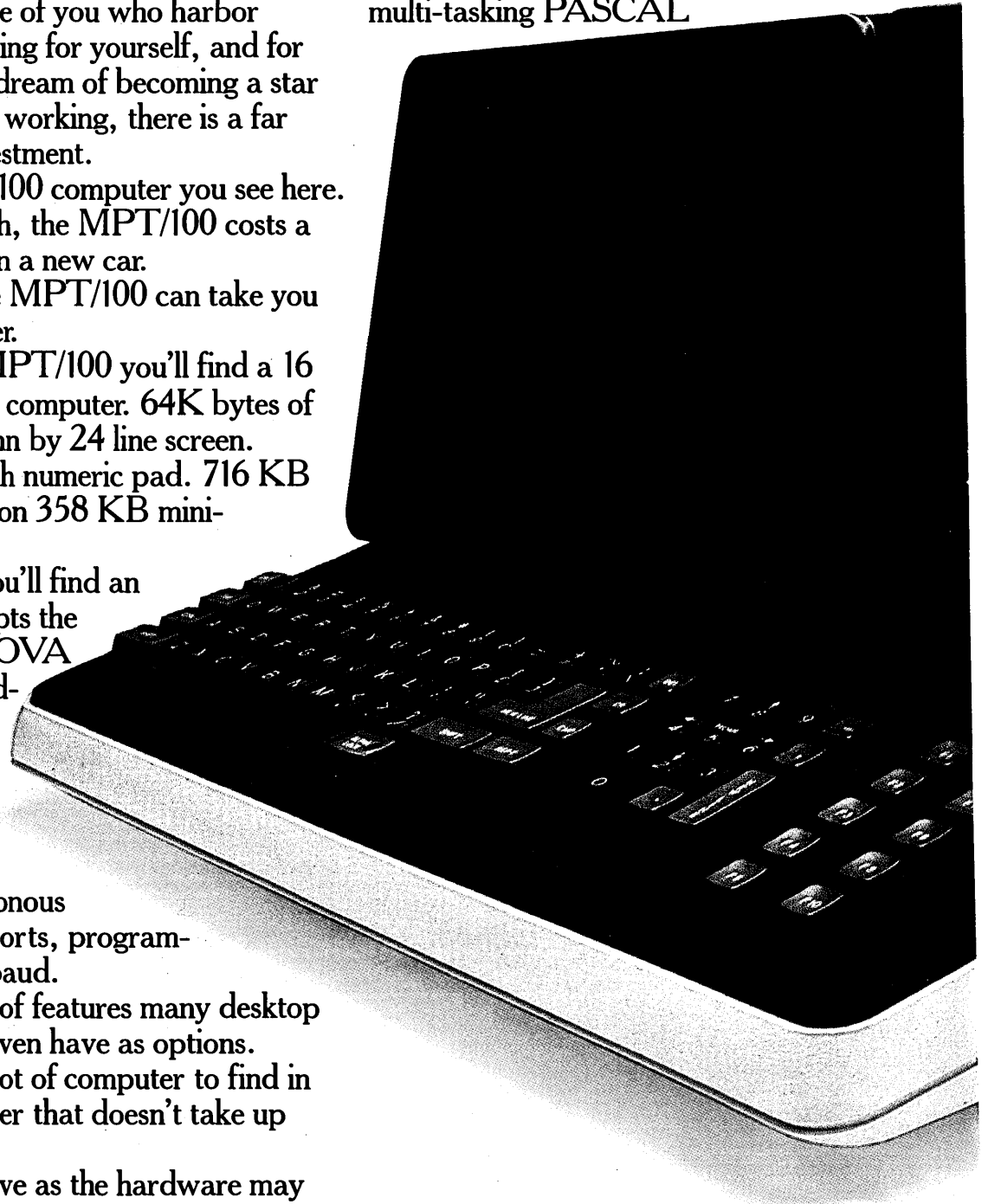
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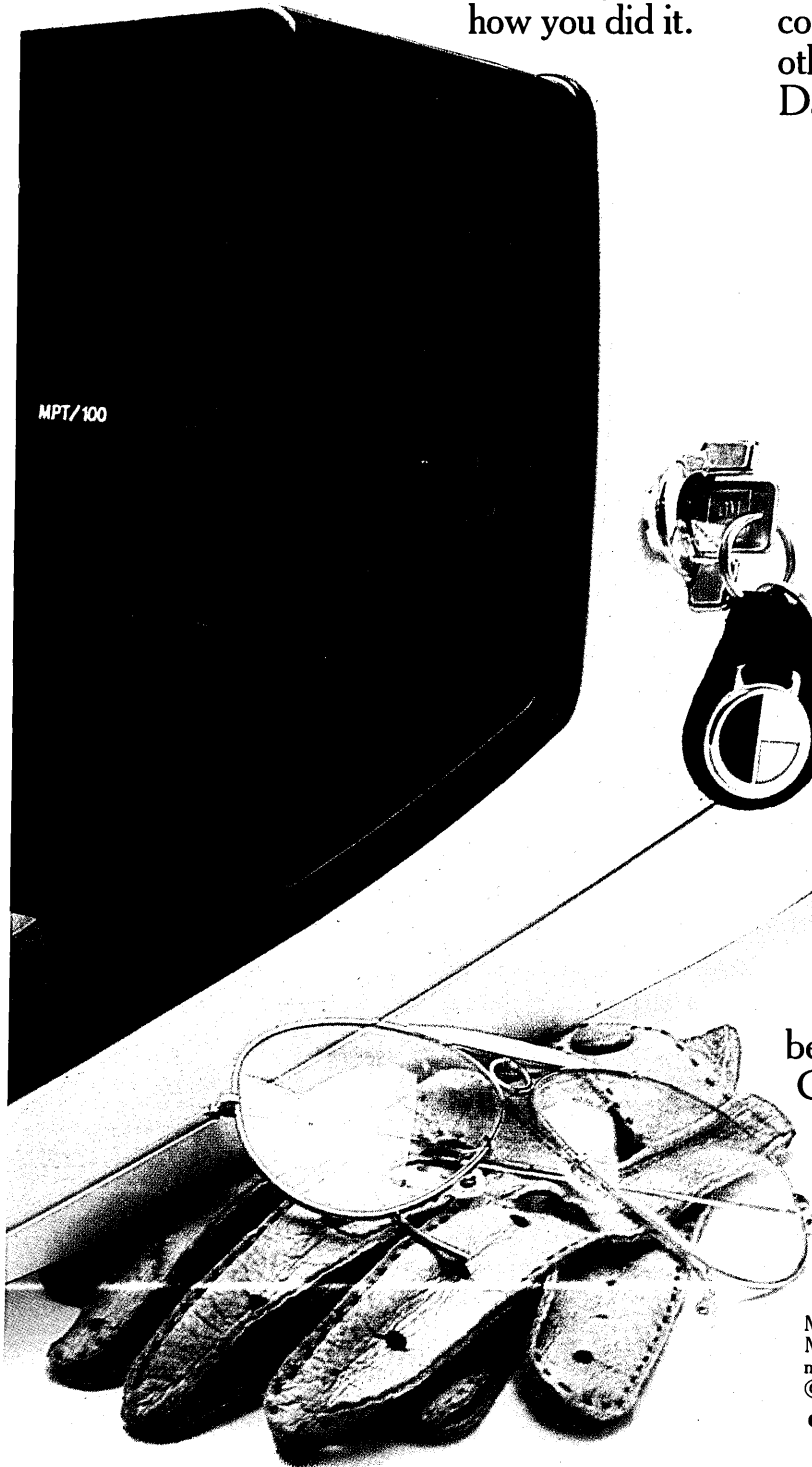
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CIRCLE 126 ON READER CARD

In compound hypertext, you are free to write marginalia of disagreement anywhere—which everyone else is in turn free to ignore.

borrowed from here and there. Barbie, the Wizard of Oz, Captain Midnight, and Shaft can be toys in Eriador or the palace of Ming the Merciless, because graphical pieces may be drawn from everywhere. The kids build worlds and castles in two-dimensional collages, which can always be there when they come back, unlike wooden blocks that clutter the living room. Later, as 3D imaging systems like CHARGE become available, the hyperworld can include three-dimensional data-spaces.

I see adults who were "afraid of science" learning physics at the wheel of a video game, combining one author's graphics with another's simulations and still another's sound synthesis; where dings and roars and acceleration make the ideas come alive.

I see families together again, actively sharing. Imagine a kid and her father browsing through an illustrated hypertext:

"Gee, daddy, a brontosaurus! Let's animate him!"

"Like this?" The father finds several animations that have been published for this brontosaurus. Choosing one, he makes the brontosaurus walk and eat.

"I wonder what the bones of the dinosaur look like while he's walking," ruminates the child.

Father links to bones while maintaining the animation. Now the skeleton walks inside its outline, still munching from trees.

"Oh, save that, daddy!"

Daddy hits a button and a private link is created to the original dinosaur picture, the animation frame, and the skeleton—all of

which may be brought together again, with time and date, when the child wants to see her "dinosaur picture."

Hey, here we are in *Snow White and the Seven Dwarfs*. A Disney vision. Shall we jump sideways on links to older illustrations? Yikes, the 19th century engravings are too sinister. Let's see if this passage has a corresponding part in the Donald Barthelme version.

Once we can have full and independent linking and windowing, scholarship changes dramatically. A commentator or critic can underline precisely what he is referring to at any time, and gather together whatever pieces support his thesis. Intercomparison and exegesis become easier to do and easier to follow. Detailed annotations to existing writings may easily be published, anthologies of related materials can easily be put together.

Perhaps most important, this richness and completeness becomes available to students who before have had to deal with simplified, bowdlerized, and gutless materials.

Consider schools. From the one-room schoolhouse, a cooperative endeavor fostering individual goals and abilities in a sharing atmosphere, we went to a batch-processing system with inane fixed curricula, arbitrary and meaningless standards of success and failure (what in hell does a "B" in geometry mean?), and teaching as a platoon-control process. Human mentality, even for the "well educated," has been kept by the educational system and popular outlook far below the levels we can, and ought to, attain.

Why is it that schools are by their nature boring and oppressive, yet museums, which may cover the same subjects, are liberating and exciting to kids? The answers are fairly simple: one is dull, the other is vivid; one is confining, the other is free.

Now there ought to be a way—there's going to be a way—to combine the freedom of a museum with a reasonable criterial system for monitoring achievement.

Aside from the merest basics, it is not important *what* you learn, it is important *that* you learn, and if there are a lot of choices then you are going to choose for yourself and succeed for yourself; thus you feel gratified from the learning process and competent to continue it, and those are two outcomes the schools have studiously avoided.

How to bring out the excitement, controversy, drama, of all the world's subjects, put this in a voluntaristic and uncontrolled framework, and keep it orderly? By creating, I think, a whole new hyperworld where we fly our crts through text and graphics of every kind, and a social world built around it—where ideas become important.

There are several key problem areas.

1. *Curriculum*. It is unfathomable to

me, when so little education is cumulative, and when adults say over and over that they don't remember what they "learned" in school, why curriculum is assumed to be of any importance, thought to be anything other than a pointless and painful charade. Nobody learns it anyway; it's simply an administrative runaround. ("Curriculum" originally meant "racetrack.")

2. "*Subjects*." There are no "subjects." Everything is deeply intertwined. Supposed subjects are arbitrary divisions in the infinite tapestry of human ideas and concerns. The true interconnectedness of knowledge, as well as the sweeping disagreements that make scholarship interesting, should be available to students at all levels.

3. *Personal conflicts*. The problems between teacher and student of personality, authority, and outlook often swamp whatever else is supposed to be going on. There has got to be a way around this.

4. *Cognitive style*. Different people learn best in different ways, and anything could be taught in any style—but much energy is wasted on promoting cognitive style as well.

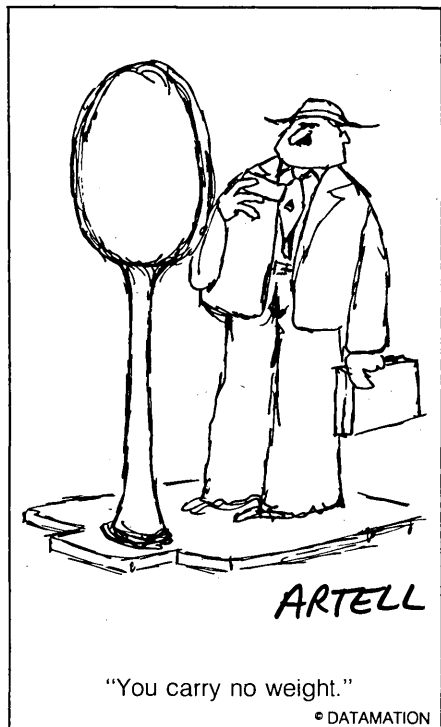
There is a crucial distinction between hypertext and computer assisted instruction. It is simply one of freedom. In computer assisted instruction, the author can lock you into a specific situation and there you are—constrained to do the task that has been set for you, however long it takes, however oppressive and stupid it may be. And there is typically no way to register a disagreement.

In compound hypertext, however, we retain one of the great traditions of Western literature: freedom to turn the page or close the book. You are free to write marginalia of disagreement anywhere—which everyone else is in turn free to ignore. I believe that the rigidity and narrow-mindedness of today's computer assisted instruction will open out into the freedom of hyperworld exploration.

And the two-seat hypertext screen may just restore the convivial qualities of bygone education and of personal tutoring, as the teacher drops into the jump seat at the student's computer and makes suggestions rather than gives orders.

If there is a published, widely pluralistic tapestry of writings on all topics, then each reader, old or young, can find the style that best suits him or her for pursuing a specific topic.

One of the dullest subjects I took in school was "history." It was a tiresome enumeration of names, wars and dates with no particular meaning. But I loved historical movies; they had heroes with a purpose. Now in fact historical scholars are often vitally concerned with heroes and their purposes. How do the schools manage to make these things dull?



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If all this seems like a wild idea, that means you understand it. These are times wild with possibility.

Why shouldn't the students have access to material that makes the motivating controversies, the heroes and high spots of history come alive—and then link sideways between documents to the more factual material? By what paths did the tribes reach Europe? (What universal rules of tribalism are there, if any?) Was the legend of Valhalla really inspired by the Roman colosseum? What really happened before the Thera/Atlantis explosion? What did the Tower of Babel look like?

AN EVER-WIDENING TREE

and I'm sure other kids would love it too.

Imagine: Hyper-poetry—collages of pieces of text that cleverly intertwine, or even rhyme.

Hyper-valentines—send a loved one a picture with little doors that open into all kinds of wonderful places in the hyperworld.

Minority voices—every viewpoint should be easily heard. Of course, this does not mean people will listen. But the problem of "media coverage," a chafing-point for

minorities who feel that their views cannot be heard, is in a sense solved.

High ideals—what passes for high ideals often isn't worth a gumball. The drabness of most computer ideals is a downer, like being sprayed with wet concrete: "New tools for management," "Better throughput," "Instant file cards for libraries." This is worth spending your life on? With word processing and shoot-'em-up arcade games, interactive computing and graphics have at last reached The People, and indeed threaten to transform society. But is this the kind of transformation we ought to be thinking about?

Those of us who grew up believing passionately in ideals that made our country great, such as liberty and pluralism and the accessibility of ideas, can hardly ignore the hope of such an opening-out. Libertarian ideals of accessibility and excitement might unseat the video narcosis that now sits on our land like a fog. I want to see the writings of Herodotus, Nostradamus, and Matthew Brann as accessible as those of Rod McKuen, along with the art of the Renaissance and movies of tomorrow—an all-encompassing picture-book encyclopedia tumult graffiti-

land, the Whole Works.

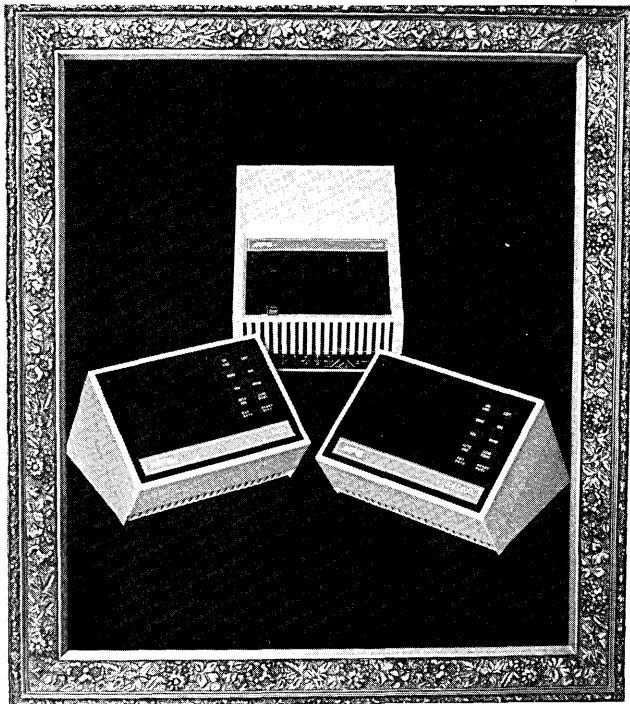
If this all seems like a wild idea, that means you understand it. These are times wild with possibility. In an age of pocket calculators, the Pill, hydrogen bombs by rocket, and soap opera by satellite, we can try to create whatever wildness we want in our society.

And when the kids start being born up in the space colonies—do we want them to lose touch? Paper's too heavy to send up, but hypertext might be about right.

I say these worlds are possible soon. We need them, and they will make lots of money. The software is on the way. But what is really lacking are the visionary artists, writers, publishers, and investors who can see the possibilities and help carry such ideas into reality. *

Ted Nelson began subscribing to DATAMATION in 1960. He has been by turns designer, consultant, and professor. He is best known as the author of *Computer Lib*, and, until recently, as the editor of *Creative Computing* magazine. This article is adapted from his book *Literary Machines*.

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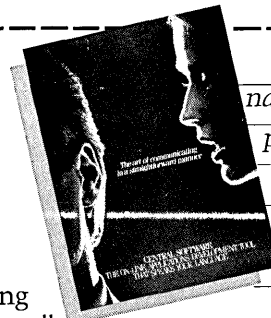
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Three networking solutions for users who find their datacom line charges are out of line.

MAINFRAME-STYLE DATACOM FOR MINIS

by Steve Frankel

Don't feel sorry for the minicomputer user who spends more on his telephone bills than on his terminals—or even on his cpu. Chances are, it's his own fault.

Even with rising charges for data-carrying lines, developments in multiplexing are driving data communications costs down faster than phone rates are going up. In fact, multiplexing is one of the fastest developing segments of the data communications industry, and there now exist excellent solutions to what used to be "worst case" problems in supporting remote terminals.

As a result, when a user's data communications line charges are out of line, it's very likely because he hasn't been paying attention to what's going on in the field. This is especially true for the user who decided early on that his terminals were too widely scattered to benefit from multiplexing. While he wasn't looking, multidropped data concentrating changed the rules of the game for minicomputer data communications.

The arguments for plain old point-to-point multiplexing have always been clear. Through the use of multiplexors, the number of telephone lines required for the support of a remote cluster of terminals can be drastically reduced—usually to a single telephone line.

Moreover, where data traffic from several terminals continues through much of the working day, there is usually no valid argument against multiplexing. Today's multiplexors can pay for themselves in less than a year's worth of telephone bill savings. On top of that, the add-on intelligence available in all but the most primitive of multiplexors automatically corrects for telephone line glitches, yielding another dimension of savings by avoiding reruns.

Statistical multiplexing, or data concentrating, by further expanding the number of terminals that can be served by a single phone line, has further reduced communications costs beyond what conventional time-division multiplexing could yield. But not every user has found it possible to take advantage of the savings, because the solution for those worst case situations of scattered

rather than clustered terminals was not available until a short time ago.

As a typical case consider what we'll call Makeshift Enterprises, Inc. Based in Los Angeles, with offices in San Diego, San Francisco, Denver, and Phoenix, Makeshift is in the not-so-unusual situation in which each field office has only a single terminal. Point-to-point multiplexing cannot be applied here at all.

If each of its field offices had two or three terminals, then point-to-point multiplexing could yield significant savings in telephone line charges. Makeshift, however, would still be left with separate leased lines between each field office and L.A. and two modems for each line. Overall, this would not be a bad solution for those mini clusters, but it would be a somewhat expensive one. But things have changed.

In fact, for the mainframe user things changed long ago. At least as early as the announcement of the IBM 3270 series of terminals, mainframe users became familiar with the twin concepts of "polling" and "multidropping." It became common to find communications networks composed of a front-end processor at the central site linked to Model 3271 "cluster controllers" at each remote site and to Model 3275 controller/terminal combinations where only a single terminal was needed (see Fig. 1).

That was—and still is—fine for large IBM-stature mainframes. Unfortunately, however, none of this was made available to the minicomputer user who had remote terminals to support. The mini lacked the front-end processor, cluster controllers, and communications protocol through which the mainframe implemented its polling.

Enter the intelligent data concentrator. Beginning in 1980 with Micom's Micro900 Multidrop Data Concentrator (which was joined less than 12 months later by units from Codex and General Datacomm), the user of a mini or mini-based system was offered the same line-saving facility.

Some two years later, however, the majority of those users continue to regard the new concentrator from an outdated perspective—as a device that doesn't work well for scattered terminal populations. Users who

consider the following examples and the savings that can be realized may quickly change their minds.

COMPARE THE OPTIONS

Consider old Makeshift Enterprises again. Let's say that its San Diego office has two 1200bps terminals, its San Francisco office two, and Denver and Phoenix one each. Here are three ways for the firm to provide data communications links between those terminals and its Los Angeles headquarters. All are feasible, and the costs presented are all realistic for these solutions (see Table I).

Solution 1, individual leased lines: Clearly the worst case solution for Makeshift's application would be to connect each terminal separately over common four-wire leased lines using Bell 202-type modems. This solution requires four intrastate leased lines, two interstate leased lines, and 12 modems.

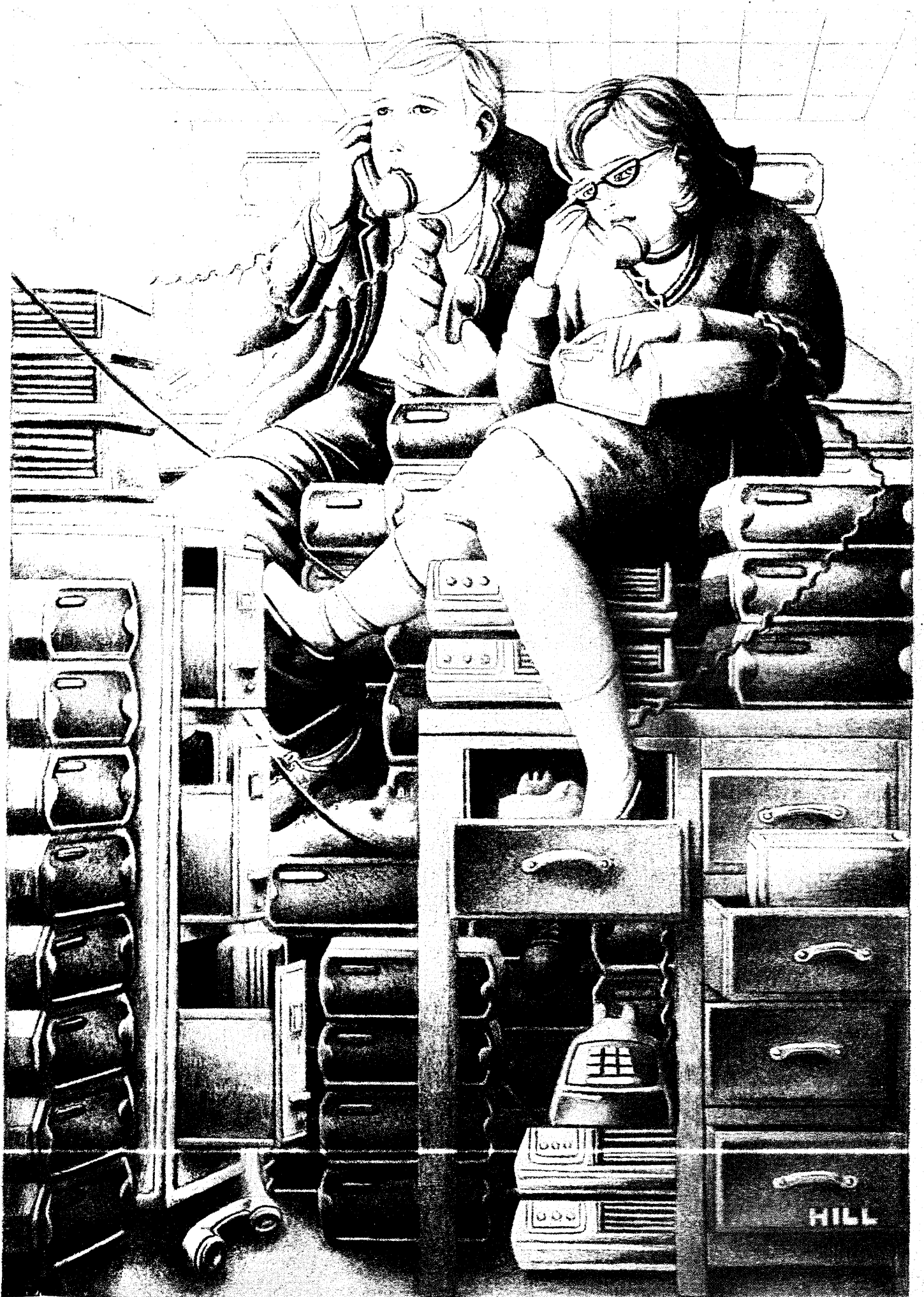
If line quality is sufficiently high that line conditioning is not required, this network will cost Makeshift just under \$57,000 per year for lines and for modem rental, after any one-time charges levied by the local telephone companies (see Fig. 2a). That's a big enough cost to drive the firm back to batch processing.

Solution 2, point-to-point data concentrating: Point-to-point data concentrators could be installed for the San Diego and San Francisco offices. This would allow for using four fewer modems and two fewer lines. (We will assume statistical multiplexing, so that leased lines and modems between Los Angeles, San Diego, and San Francisco need not be upgraded to handle two terminals each.) This solution therefore requires two intrastate leased lines, two interstate leased lines, eight modems, and four data concentrators.

The telephone charges in this solution are a much greater factor than the data concentrators, so that the multiplexors will pay for themselves within three and a half months in telephone bill reductions. Then, compared to worst case solution 1, they will continue to provide annual savings of more than \$16,000 (see Fig. 2b).

If Makeshift actually had to convert

ILLUSTRATION BY AMY HILL



ARAB CAPITAL AVAILABLE

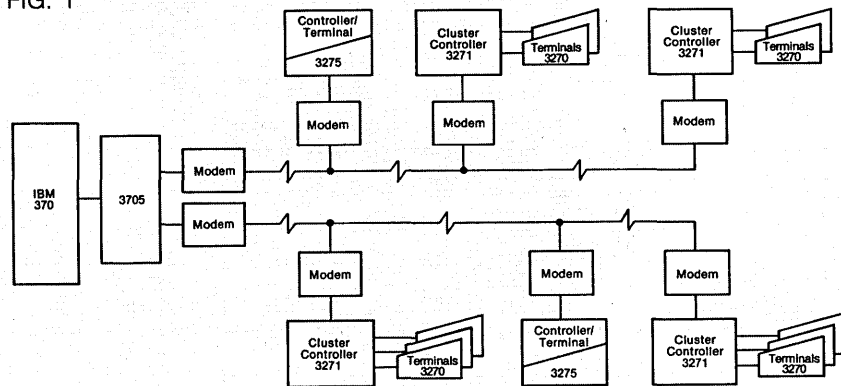
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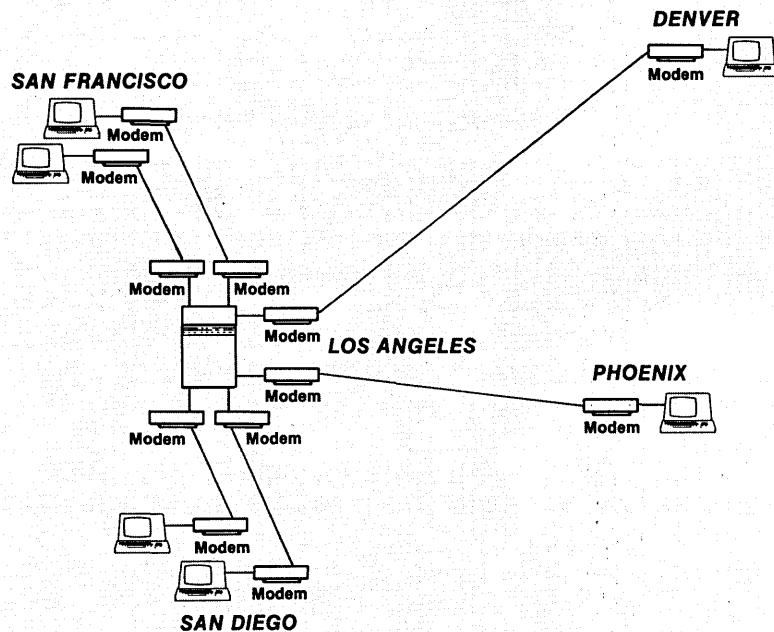
Mini- and micro-system users continue to regard the intelligent data concentrator from an outdated perspective.

FIG. 1



Multidropping and polling have been familiar terms since the introduction of IBM's 3270 Series of terminals and cluster controllers. At first, this line saving capability was reserved for mainframe users. But no more.

FIG. 2a



- 4 Intrastate Leased Lines
 - 2 Interstate Leased Lines
 - 12 Modems
- Total Communications Costs \$4,750/Month

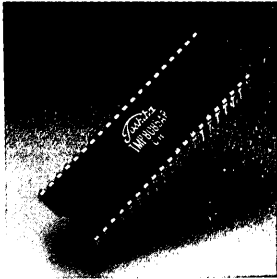
Sparsely populated computer terminals connected in "worst case" manner

from solution 1 to solution 2, the change would be an easy one. The conversion requires no hardware or software changes within the cpu or terminals. In addition, the conversion would provide several additional advantages as no-cost extras. These include (in most vendor's hardware) easy-to-use diagnostics like loopback tests and stored test messages, flexibility in reconfiguring the lines from use by one type of terminal to use by another, automatic data rate detection (autobaud) on terminal lines, statistics gather-

ing, and much more. Most important, the data concentrators can add error correction to the transmissions going over the phone lines. All for "free," once the multiplexers are in. Overall, a valuable cost-saving solution, but there's more!

Solution 3, multidrop data concentrating: Fortunately for Makeshift, and for most real users, there's an even better solution in multidropped data concentrating. Performing the same data communications tasks with this kind of multiplexing requires only

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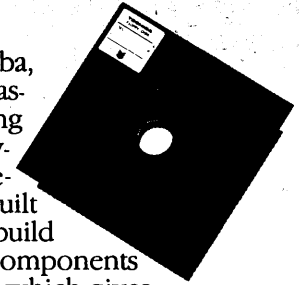


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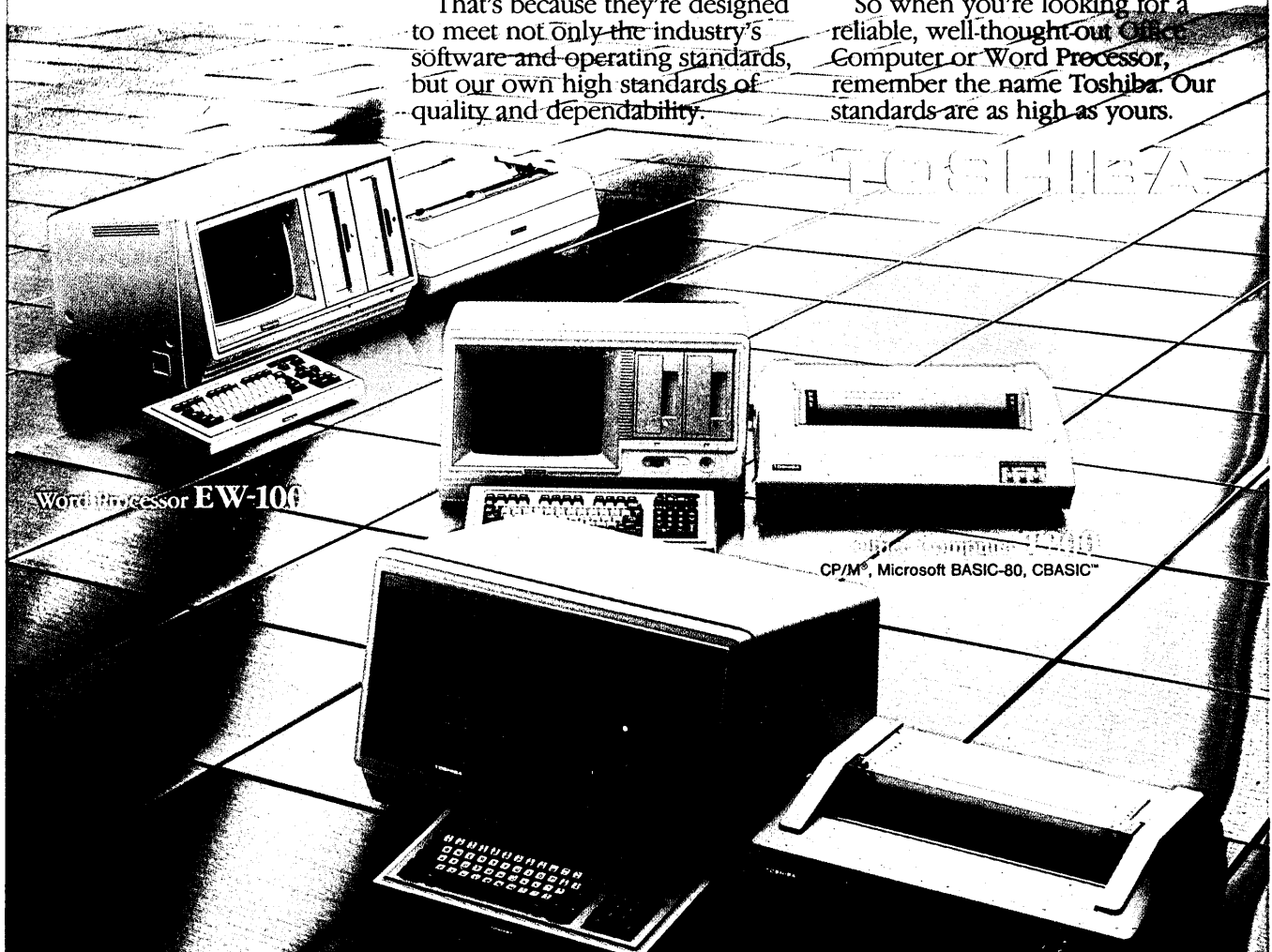
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Another benefit is that terminals may be added to or removed from the mix at one concentrator site without fuss.

TABLE I

SOLUTION 1	Monthly telephone charges	\$4,415	One-time telco charge	\$ 610
	Modem charges (12 × \$26/mo.)	312		
	Total monthly charges	\$4,727		
SOLUTION 2	Monthly telephone charges	\$3,179	Concentrator cost	\$4,600
	Modem charges (8 × \$26/mo.)	208	One-time telco charge	430
	Total monthly charge	\$3,387		\$5,030
	Monthly savings rate	\$1,340	Months to pay off	3.3*
	Annual savings rate	\$16,080		
SOLUTION 3	Monthly telephone charges	\$2,050	Concentrator cost	\$7,750
	Modem charges (5 × \$42/mo.)	210	One-time telco charge	313
	Total monthly charge	\$2,260		\$8,063
	Monthly savings rate	\$2,467	Months to pay off	3.0**
	Annual savings rate	\$29,604		

*MONTHS TO PAY OFF: (months × \$4,727) + \$610 = (months × \$3,387) + \$5,030

**MONTHS TO PAY OFF: (months × \$4,727) + \$610 = (months × \$2,260) + \$8,063

one interstate line, five modems, and five data concentrators.

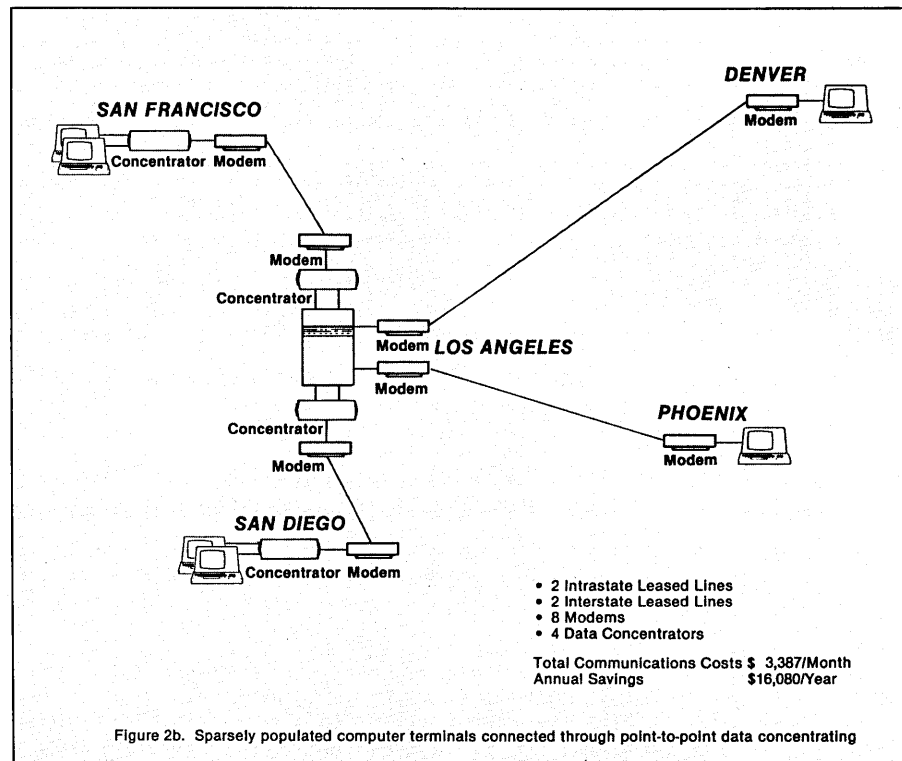
Compared to all-leased-lines (solution 1), the multidropped data concentrators pay for themselves in about three months in telephone bill savings; annual savings thereafter would be accrued at a rate of almost \$30,000 per year (see Fig. 2c).

Compared to point-to-point data concentrating (solution 2), multidropping pays off as quickly or more quickly, and costs \$13,500 less per year (see Fig. 3). While it is true that some of the modems must be more expensive models—and this has been taken into account in the calculations—recurring costs are much lower for this solution.

Again, no changes must be made in other hardware or software, in either of the systems, or in applications variety. All of the polling and answering involved in multidropping are handled by the data concentrators themselves, transparently. And all of the error correcting and other advantages of statistical multiplexing are still there.

Other big benefits also result from the multidropped configuration, not the least of which is that once this single leased line crosses those state borders, all of it, even the links within California, is tariffed at interstate rates, which are almost always lower than intrastate.

Another benefit is that terminals may be added to or removed from the mix at one concentrator site, taken on-line or off-line, without fuss. The conversation that takes place between the master data concentrator in Los Angeles and the node concentrators elsewhere includes the passage of information pertaining to the specific devices connected. If a user anticipates growth at a particular remote site and installs a node concentrator



and a master concentrator with more channel capacity than will be initially used, he can later connect his new terminals without taking down the system—without even taking the node multiplexor off-line.

This benefit is especially helpful in growing networks. Before a remote site has the traffic to support its own node, it can dial in to the nearest data concentrator site for its data transmissions. When its traffic makes dial-up inefficient in terms of cost, the net-

work can grow a branch to that remote site, “dropping” a multidrop node concentrator there.

WHEN THE NETWORK EXPANDS

One more very important benefit is worth discussing. This involves what happens when the network must be expanded unexpectedly. Assume for a moment that Makeshift Enterprises decides to diversify by acquiring Chicago-based

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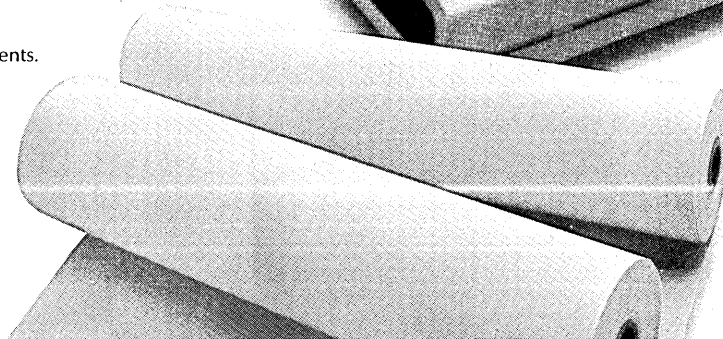


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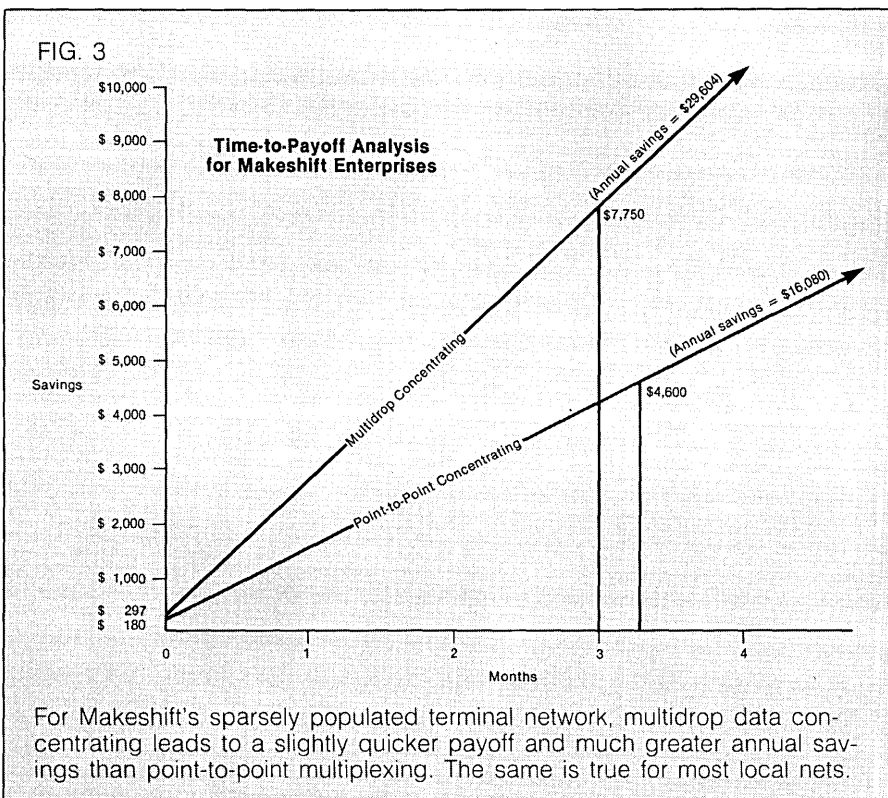
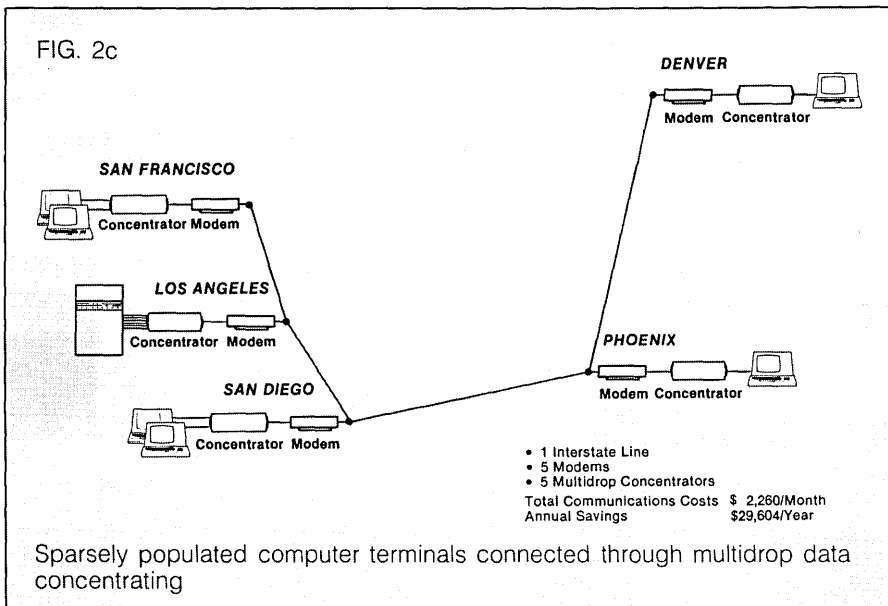
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In effect, Bell has forced the issue, and multidropping will become much more popular, very soon.



Amalgamated Industries, and also wishes to tie Amalgamated into the network. The multidropped network can frequently accommodate that change more easily than other networks can.

In the worst case approach of installing individual lines for each terminal, adding two more 1200bps terminals in Chicago would involve two more expensive leased lines to Los Angeles plus four more modems.

In the point-to-point data concentrator example, the expansion would demand two more modems, two more concentrators, but only one long and expensive line.

Multidropping again saves the day. The new link to Chicago would require only one node concentrator, one modem, and one short and relatively inexpensive line between Chicago and Denver, the closest points in the existing circuit.

Depending on traffic, it may also be necessary to upgrade modems. In any case, two additional channels to the central site master concentrators must be used. Fortunately, these are small expenses compared to the other alternatives.

If multidrop data concentrating is so advantageous, why hasn't it caught on more strongly? There's a multidimensional answer to this. One part has to do with the education of the prospective customer: to most minicomputer users, polling and multidropping have been foreign concepts that had something to do with mainframes.

Another part has to do with the fact that many potential users were forced to install other hardware—additional minicomputers, point-to-point multiplexors, etc.—in the absence of a better solution. These users are understandably reluctant to convert. Should they choose to convert today, they would probably find that their existing modems work just fine in multidropped roles, and that their separate minicomputers can now be linked into a distributed processing network.

Still another part of the reason can be found in the telephone companies' tariffs for local calls. Not all minicomputer networks stretch between major cities and across state lines. The majority may reach out only a dozen miles or so to local warehouses, plants, and offices that are all located within one toll area. This has meant that until recently the dial system was an adequate mechanism for accessing the minicomputer site. The remote sites could dial the central site and remain connected all day at relatively little cost in terms of telephone billing.

But all good things come to an end, and Bell has decreed that the Single Message Rate Tariff (SMRT) shall go into effect for such local calls, raising their cost substantially and thereby forcing the use of the telephone network to return to its original form of many calls of short duration.

In effect, Bell has forced the issue, and multidropping will become much more popular, very soon. Although vendors that offer both point-to-point and multidropped data concentrators have seen the former predominate by a very large margin in terms of sales, this picture is already changing. Sales of multidrop systems have nearly doubled since last year, and at least one-third of all statistically multiplexed networks will probably be of this variety within five years. *

Mr. Frankel is vp of marketing and development for Micom Systems, Inc., a Chatsworth, Calif., manufacturer of datacom products for minicomputer users. His 120-person staff is responsible for product planning, marketing, and development engineering.

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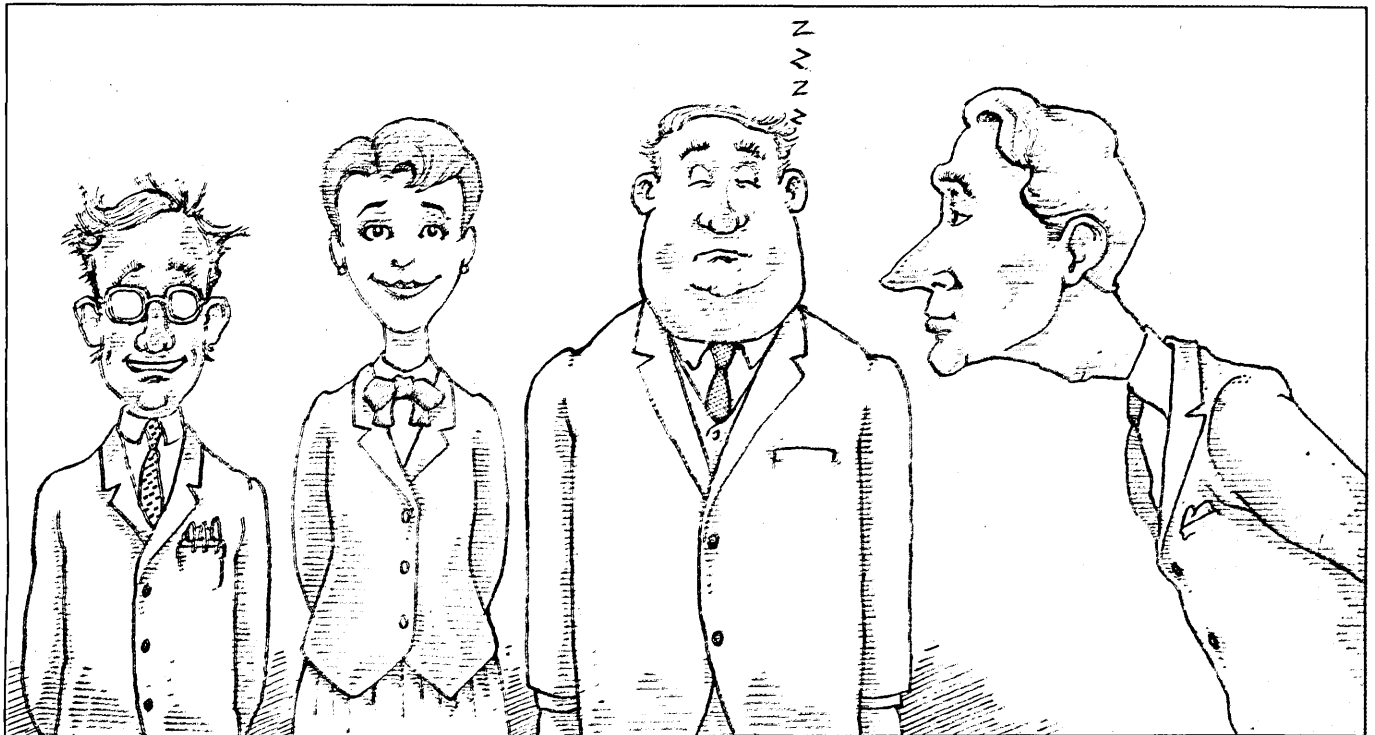
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An excerpt from a new book offering practical yet innovative management techniques for MIS execs.

THE CARE AND FEEDING OF USERS



by William R. Synnott
and William H. Gruber

Many organizations do an excellent job of managing technical resources while doing a dismal job in user relations. The inadequacy in this area has, in fact, caused the demise of many an information manager over the years. It is one of the most difficult challenges faced by information managers the world over. Why? The answer is not simple, by any means. High demand and expectations, a shortage of resources, the rapid pace of technological (and business) growth, the long lead times needed for equipment planning and systems development, constantly changing requirements, technical obsolescence, commu-

nications problems, interpersonal relationships—all of these are contributing factors.

Yet there are executives who are knowledgeable in both business and computer use. How do they do it? Many develop or follow strategies designed to integrate the information management (IM) function with user businesses more effectively. Among these strategies:

User measurement. We must first know who our users are and how well we are doing in both service and responsiveness to the needs of the organization.

User involvement. Picking up on the notion that *shared* management will probably be increasing through the 1980s, we look at some ways to augment user involvement information resource management.

User service. Finally, we focus on several techniques aimed at improving user service levels and performance.

We start our user assessment with an

inventory of users, an analysis of user automation penetration, user satisfaction surveys, and a determination of the backlog of work to be done.

The IM function sells services to corporate and division users. In inventorying users, we have discovered a wide range of user characteristics. There are *passive users* who will almost never ask for assistance from the IM function regardless of the opportunities for improved management effectiveness or operational efficiency that can be achieved with information systems applications. There are *overly active users* who want IM to produce systems solutions even when such applications cannot be cost-justified. This kind of user tends not even to think about costs and benefits when requesting such services. Then there are the *half-informed users* who consider themselves systems-wise and tend to insist on their right to make decisions about information services and equipment, a frequent

ILLUSTRATION BY TIM RAGLIN

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Systems professionals often spend most of their time serving junior-level people, neglecting the needs of top management.

cause for the serious difficulties that have given information systems a bad reputation in some companies.

Note that users can range from the chief executive officer to an assistant controller to a junior clerk. Often, systems professionals spend most of their time serving junior-level people, neglecting the needs of top management. An inventory of users provides an important guide for assessing just who is being served in the organization. This user inventory might include such information as:

1. Current level of automation relative to state of best business practices,
2. Competence of user staff in utilizing information services; evaluation of key people in a user division,
3. Attitudes toward future systems opportunities,
4. User satisfaction with current IM services,
5. Actual quality of services, as defined by information managers (which may vary significantly from user perception),
6. Degree of business systems planning performed in the user division.

Inventories of users frequently provide such important information for IM management as:

- The users who contribute most to corporate profits are receiving very little from the IM function.
- Users who contribute little to corporate performance may be consuming the bulk of the IM budget.
- Users who are receiving high-quality services may be unaware of their good fortune and may be dissatisfied with IM performance (a perception control problem).
- IM may be delivering poor service to important users who may not (yet) be aware of this weak performance.

The evaluation of IM performance and plans for improved user relations clearly should begin with a current-status user inventory.

This inventory can be maintained in an on-line computer system or in a simple user-inventory notebook. It can be expanded to include information developed in several of the other strategies presented, such as business information planning, perception management, user satisfaction surveys, and the user IM penetration. An example of a user inventory form is presented in Table 1.

HOW USERS VIEW IM SERVICES

What is the perceived image of IM in the organization? Is it a cost service bureau? A dictatorship? Or an enlightened instrument of change? How can an information manager—and more importantly, top management—find out for certain how users view the service and the support received? By asking them! This can be

done informally, of course, but it can also be done through a formal user-satisfaction survey. The survey can be conducted by the IM division itself, but this approach might tend to inhibit frank and candid responses. As an alternative, management can initiate such a survey, through either some other function (like auditing) or the appointment of an ad hoc committee. Or, finally, the survey can be conducted by an outside consulting firm. The value of the latter approach is that it assures objectivity and, in some cases, allows outside comparisons. That is, if the consulting firm has done similar surveys for other companies, it can provide a general indication of how one company compares with other companies similarly surveyed. Obviously, a positive report validates user satisfaction ratings and is meaningful feedback to top management.

The findings from a user satisfaction

survey performed for a commercial bank are presented in Table II. This survey provided a benchmark for measuring future performance in achieving user satisfaction. One by-product of this survey was the discovery that divisions which had some in-division systems capabilities had a higher level of satisfaction with the corporate IM function than the divisions without even one systems staff professional. User satisfaction surveys should provide guidance for actions to improve the effectiveness of IM utilization. User satisfaction is also an input to the inventory of users.

As noted earlier, most IM organizations are already overloaded with work. If the user penetration strategies suggested here are successful in allocating scarce IM resources where they will do the most good for the company, then it stands to reason that the workload must be given priorities. Some us-



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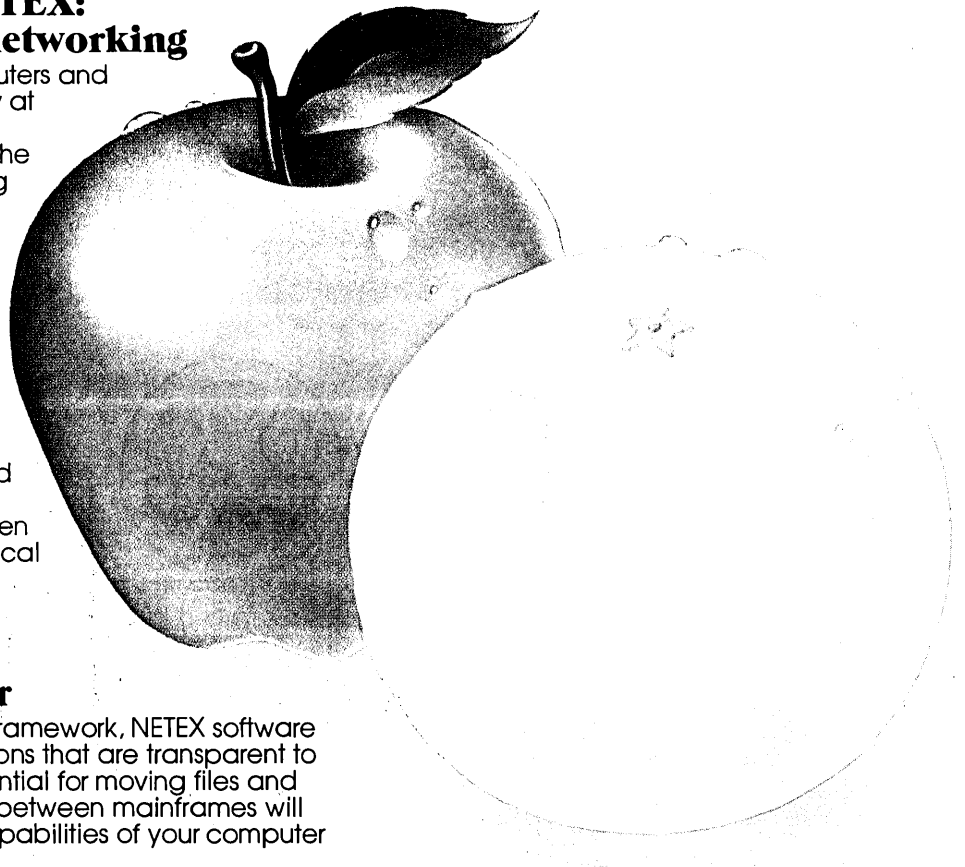
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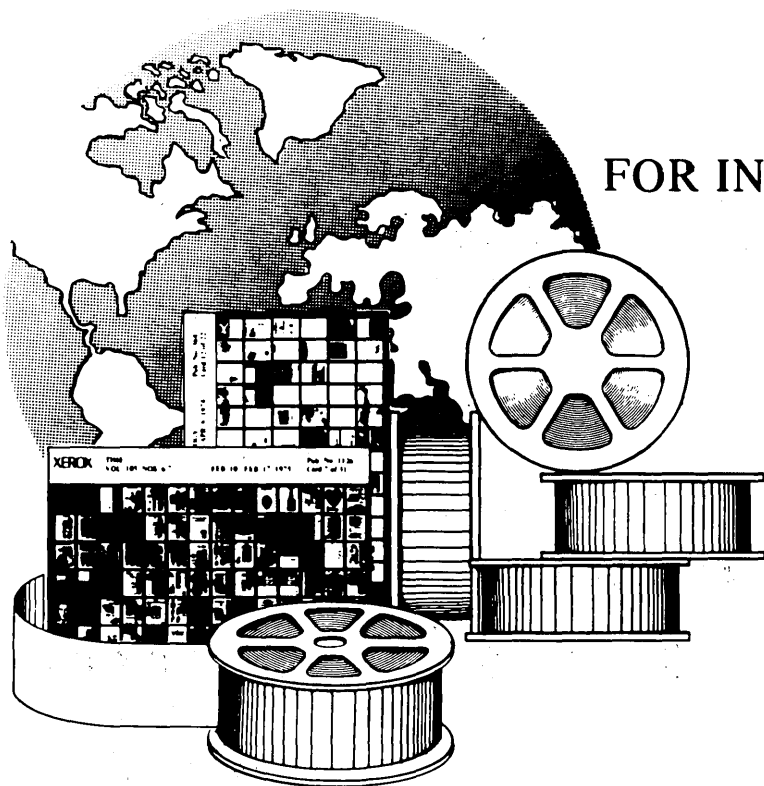
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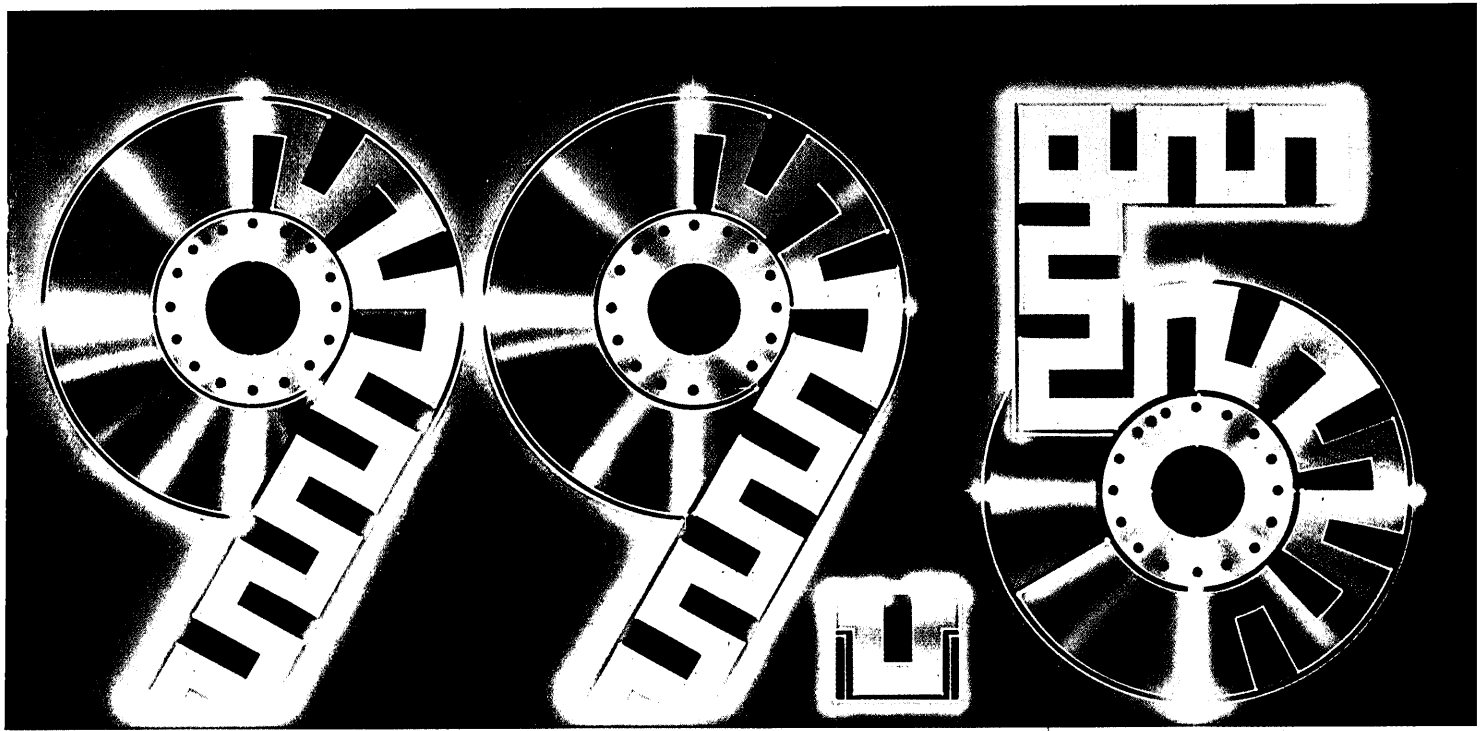


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The knowledge business



Involvement of users in their own projects has been a demonstrated success strategy for years.

ers should get more resources, some less, some none. Yet, this very allocation process is likely to result in cries of unresponsiveness in management's ears. These are likely to have an adverse effect on user relations and on the influence of the IM function. How then, are we to manage this problem? By taking the monkey off the information manager's back and putting it on management's through a backlog task force.

Task force management and ad hoc task forces, formed to address specific problems, are well-known techniques which have been used successfully in business for some time. One application of this technique which we have found particularly effective has been a task force organized to address the "user backlog" problem. A task-force backlog study involves extensive interviews with all users to determine what work is currently outstanding, what is pending, and what is planned or needed in the future. Thus, the task force pulls together in one place *all* existing and future systems workloads. This evaluation can then be matched up with the available manpower to calculate the total systems backlog. A backlog goal can be established (e.g., one rule of thumb for backlog goals might be three to six months for existing systems and two to three years for new development depending on the industry). If the task force comes up with a workload exceeding this goal, a case is built for additional resources or, at the very least, for a reprioritization of the workload. A task force can give such a study greater credibility and legitimacy than would be the case if IM were to make one alone.

A study team including people from outside the IM function is likely to be viewed by management as being more objective and as having no vested interest in systems per se. To be effective, the task force should probably be kept small, perhaps to five or six people, at least half from outside of the IM function. The participants should preferably have a broad knowledge and understanding of the business, should be capable of assessing needs and priorities in a broad context, and should have the respect of management. This respect is important because their recommendations to management should not only be an accumulation of the systems backlog, it should also include an assessment of the urgency, the criticalness, and the priorities on which resource allocations are to be based.

The task force report can establish the total systems backlog, identify the priorities within the organization of user divisions competing for systems resources, and contain specific recommendations as to supplemental staff needs, the use of outside resources, the suggested allocation of resources, and the cancellation of low-priority projects, if ap-

TABLE I

SAMPLE USER INVENTORY FORM

1. User division (filing system will frequently be coded by user divisions).
2. Name, position, address, and phone number of user.
3. IM representative (an IM representative should be assigned to all senior-level executives in user divisions).
4. Key user-division staff people involved with IM: name, position, address, phone, and relationship to user.
5. IM systems/services currently provided.

Perceived Satisfaction of Users

System/Service	System Design Features	Operations	Quality of Systems/Service (IM Judgment)	Date System Installed	Last Major Upgrade	Est. Future Life
----------------	------------------------	------------	--	-----------------------	--------------------	------------------

6. Overall potential contribution of IM to this user (summed across several key users to produce potential IM contribution to the user division). This would include potential for cost reduction through automation, better decisions, etc. Perhaps a simple coding for Items 6 and 7 could be used, such as high-moderate-low.
7. Overall actual contribution of IM to this user.
8. Relative importance of this user in division and company (key measures include user responsibility for dollars of sales and profits, number of people reporting to user).
9. User IM knowledge and experience with systems.
10. User attitudes about IM potential (range from a user who enthusiastically seeks opportunity to utilize new IM capabilities to a strong rejection of all suggestions for additional IM activities).

11. Quality of in-division IM support (could range from a strong IM professional, to the user division that actively supports this user, to no in-division IM competence directly relating to systems professionals in the IM function).

12. Ratings user gives to IM function:

Rating _____ 1 (low) 2 3 4 5 (high)

Overall evaluation _____

Timeliness of reports _____

Accuracy _____

Cost _____

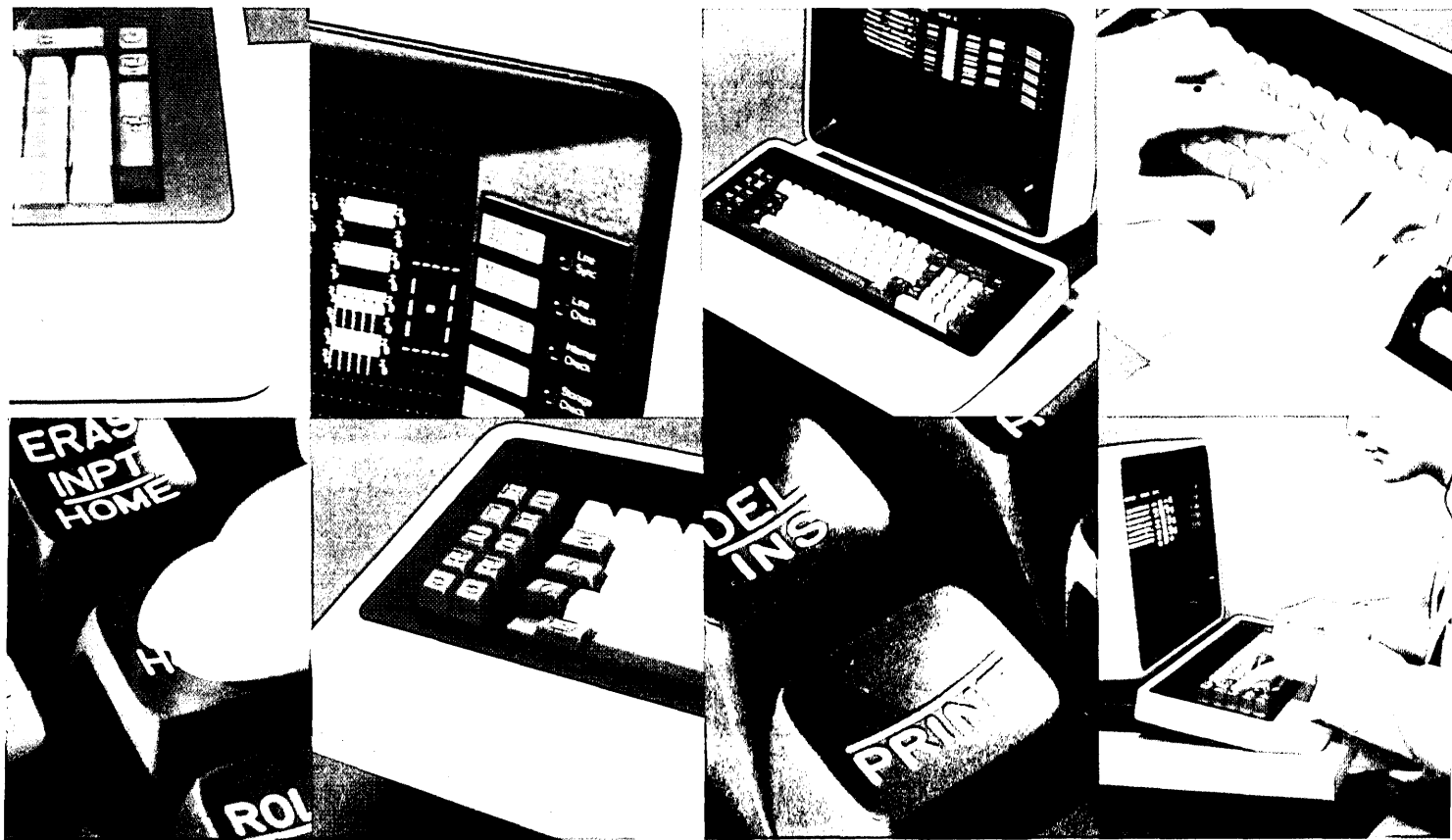
Responsiveness to requests for assistance _____

propriate. Management can then make the decisions on staffing, prioritization, and resource allocation. The task force, called into being either on a one-time basis or every five years or so, can be an effective agent for focusing management attention on user needs, resource needs, and the balancing of supply and demand through the maintenance of a proper workload/manning ratio in the systems organization. At the same time, the task force can take the onus off the IM func-

tion, which cannot be accused of unresponsiveness, because management is deciding what's best for the company, and IM is only responding to management's direction.

GETTING USERS INVOLVED

If shared management of information resources will be the trend in the 1980s, we will need some strategies to get IM involved with users and users involved with IM. The following strategies



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It's not enough to perform well; one must also publicize that performance.

cover this process, from getting started through systems development, to the entire information management activity of the user.

Sometimes, through business information planning or some other planning activity, one uncovers an opportunity to get into an area where there has been low use of IM resources. At this early stage, something of value must be demonstrated quickly to convince the potential user of the merits of a proposed system or project so that the user will continue to use IM services. One way to do this is thru the foot-in-the-door strategy.

It is frequently a strategic error to attempt a major improvement in the utilization of IM resources when the potential user has had little experience with modern technology. Such a user is ill prepared to cope with a massive infusion of new technology. Even if IM specialists see a very favorable benefits-to-cost ratio for a big investment in IM technology, a cautious strategy may be warranted for several reasons: a big proposal may frighten management in the user division; the user may not be prepared to assimilate a major change in its way of doing business; and the user's lack of knowledge of systems and technology could result in communications difficulties and misunderstandings. In such cases, a foot-in-the-door strategy might be useful. Let us cite two examples.

Case 1: Foot-in-the-Door Proposal.

In this first example, the IM function was interested in finding ways to provide support to a multinational corporation's fast-growing international activities. The company had three data centers overseas, but no master plan for central automation was being made to coordinate growth. The IM organization called management's attention to the need for such a master plan to avoid splintered, incompatible, and redundant operations, and it proposed conducting a simple front-end study to address this issue at a cost of \$10,000. The modest funding involved was the foot in the door which led to approval of the study. Result: the company ultimately implemented a distributed international system in their overseas offices, providing local automation coupled with central control and consolidated management information on overseas activities. The simple foot-in-the-door proposal resulted in an automation master plan, as well as major systems support and penetration in a previously low user of IM services.

Case 2: Quick Prototype. In another example, the IM function wished to extend its support to the marketing managers of the company, which had traditionally been a low user of IM services. The IM people began by interviewing marketing managers to learn their information needs. Rather than attempting to patch up systems to provide this information, or building a major new information

TABLE II

USER SATISFACTION SURVEY

This typical survey represents satisfaction by users as perceived by data processing users in divisions of a large commercial bank with and without an in-division systems capability.

Question	Average Satisfaction Scores from Users in Divisions	
	With an In-Division Systems Capability	Without an In-Division Systems Capability
Overall evaluation	4.3*	2.4
Accuracy	3.6	3.5
Timeliness	3.9	3.2
Ease of use	4.1	3.1
Responsiveness to requests for change in functions, outputs, etc.	3.9	2.0
Support by data processing—answers to questions, user assistance	3.1	3.4
Integration with other applications	3.1	2.2
Average all questions for each application	3.7	2.8
Number of responses	7	18

Source: Report to the senior management committee of one of the largest commercial banks in the U. S. W. H. Gruber and J. S. Niles, *The New Management: Line Executives and Staff Professionals in the Future Firm*.

*There were 8 user divisions with a systems capability and 12 user divisions without a systems capability. The findings are based on a calculation of the average scores in the two categories of user divisions. A score of 5 is very satisfied, 4 is satisfied, 3 is neither satisfied nor dissatisfied, 2 is dissatisfied, and 1 is very dissatisfied.

system, it was decided simply to draw on various information sources to produce several quick prototype reports as a first step in addressing these managers' information needs. Because these reports were assumed to be throwaway programs requiring several iterations, they were produced through an information center using a report generator language. Result: the managers were delighted with this quick promise-deliver approach. They became more interested, participation increased, and a good working relationship was fostered. Here again, a small and experimental foot-in-the-door approach was successful in promoting penetration into the managerial ranks of the company.

Involvement of users in their own projects has been a demonstrated success strategy for years. As far back as 1965, McKinsey & Co., the management consultant firm, reported on user involvement in a study of successful and not-so-successful computer users. The study showed that companies that involved line managers in project planning and development were more successful than those that did not by a factor of 3 to 1. This joint systems-development strategy

includes the involvement of users in the following four facets of systems projects: planning, project team organization, systems development, and postreview.

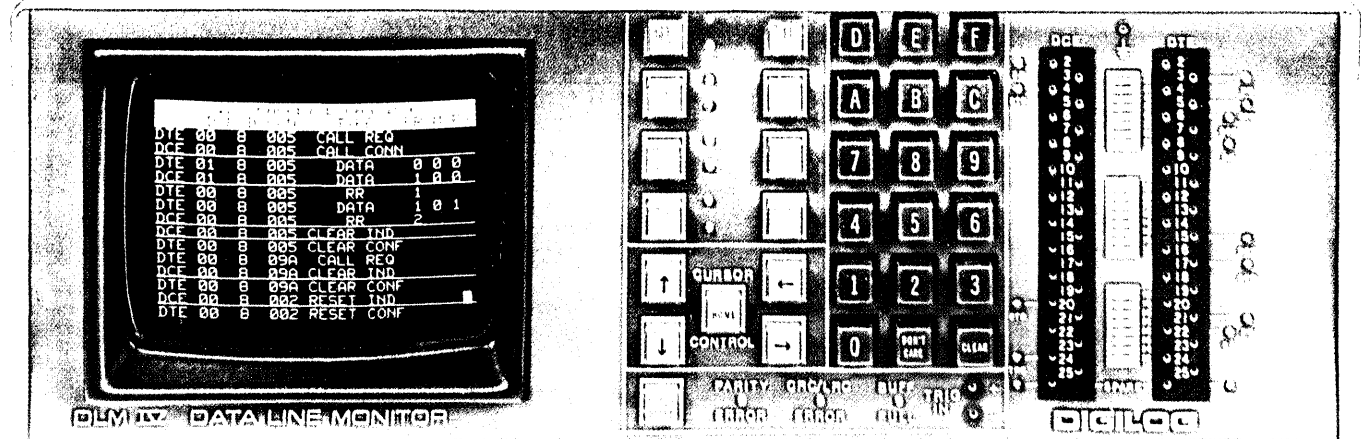
An action plan for the implementation of this strategy in each of these four facets of systems development is described below.

Planning. The planning phase deals with business systems planning, that is, the determination of needs and the identification of systems projects that will solve the users' business problems. This phase would be more accurately described as systems involvement with the user, rather than the other way around.

Project Team Organization. We suggest that in every organization, it should be a matter of company policy, endorsed and supported by top management, that high-level user representatives with a thorough grounding in their business be assigned full time to every major systems project for the duration of the project. The user's representatives on the project are responsible for ensuring that the system delivered is, in fact, what is wanted and needed. This means they are responsible for defining the functional requirements

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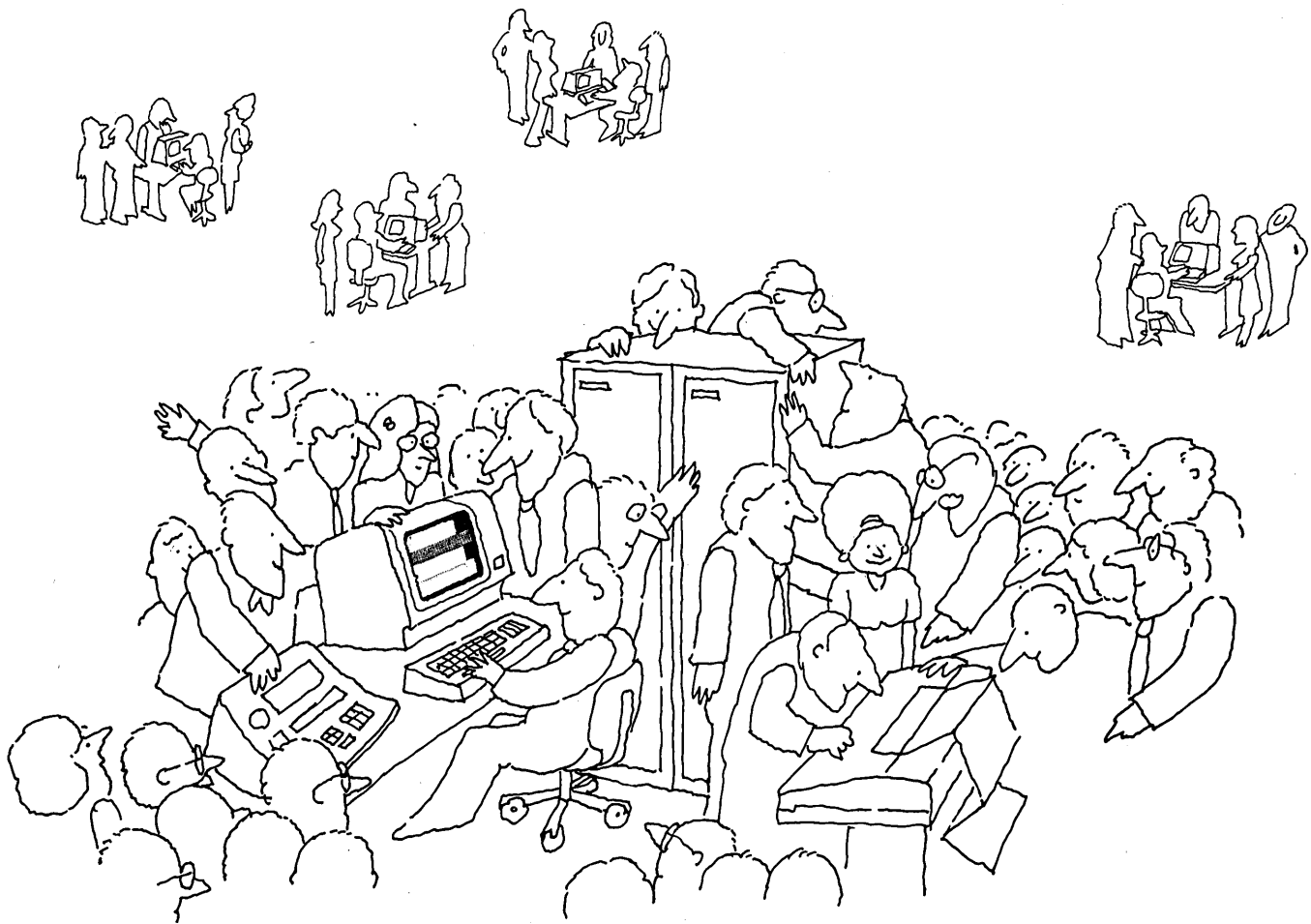
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Winning over users to the belief that the IM function has quality management is a matter of attitude.

of the system, not the technical development.

Systems Development. As noted above, the user should be committed throughout the project. User management must also be involved in periodic project reviews and approval processes. The user's representatives on the project look out for the user's interests by seeing that systems specifications accurately match needs. Systems development must not simply be left to the systems people; it is the user's responsibility as well.

Postreview. Finally, when the project is completed, a postreview (or postaudit) should be conducted to determine whether the project met its goals and projected benefits, what problems were encountered, what lessons were learned, etc.

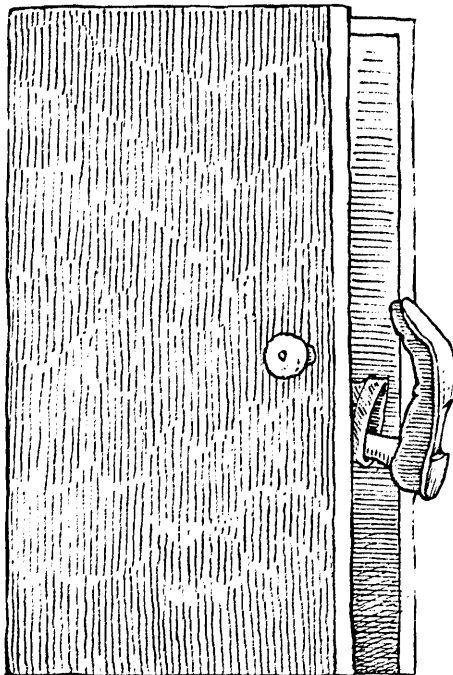
IMPROVED USER SERVICE

In this final section on user relations, we present several ideas on how to improve user service levels or, at the very least, to put users and IM on the same wavelength in assessing true performance.

We live in an imperfect world. To paraphrase Gilbert and Sullivan, skim milk frequently passes as cream. Good performance may be unrecognized and unrewarded. Poor performance also may not be recognized. A high-performance IM function should include the measurement of the *actual delivery* of IM services relative to senior management's and other users' perceptions of the quality and usefulness of these services. Performance standards and objectives should be established against which users can compare the quality of delivered services.

Winning over users to the belief that the IM function has quality management is a matter of attitude and perception formed through positive feedback and good communications. In other words, it's not enough simply to perform well; one must also publicize that performance. If all management ever hears is the bad news, it will end up with a negative image. For instance, every time the computer goes down, user management hears about it, but when it's up, users hear nothing. (No news is good news?) The fact is that when the computer has been 2% down for the month, it has also been 98% up! Users often prepare internal trouble reports for their management which list every incident of down time but say nothing about the 98% up time. That's why every dp shop needs its own performance measurement reports, to communicate both the 2% down and the 98% up.

The second reason that IM experiences negative perception problems is unrealistic expectations. If IM is providing a 98% service level but the user is expecting 100%, he will consider service poor. Some perception control should be applied in the form of



education in the realities of service level and cost trade-off. If a user perceives that the service he or she has paid for is, in fact, 98%, then this becomes the standard, not 100%. All performance measurement reports can then measure actual service against this standard, and realistic expectations will once again bring about proper perception.

Establishing a service contract between data processing and users is another useful strategy for creating a proper perception of dp service levels. What is a user service contract? It is a three-step process:

1. Negotiation of mutually agreed-upon performance objectives or standards of performance.
2. Development of appropriate tracking tools for measuring performance.
3. Implementation of a reporting system showing how performance measures up to standard.

The negotiation of standards begins with a definition of what constitutes good data processing service levels. At minimum, this definition might include 1) a deadline for the delivery of standard reports; 2) the turnaround time needed for special requests; 3) system availability (down time, response time); and 4) the quality of the work.

In connection with deadlines, one should distinguish between critical and non-critical reports. These should have different performance objectives, such as 100% of critical reports, 95% of noncritical delivered on time. Also, the actual time the report is needed should be established. Not all reports are needed at 8:00 a.m. every morning; some can wait until 10:00 a.m., noon, or later. Establishing realistic delivery times also

helps immeasurably with production scheduling.

Standards should be agreed upon for the other service functions, such as 2% down time, three second response time 95% of the time; 12 hour turnaround for special request reports; and 2% reruns. Different standards will also apply to different users; since their requirements are not the same, response times may differ by transaction type, for example. This negotiation of standards takes a lot of initial education, discussion, and negotiation, but cooperation with users is usually good because it is being done for the purpose of improving their overall service levels.

Developing tracking tools may initially be a manual effort, particularly the recording of the numerous regular and special reports by function, time of delivery, etc. We cannot offer much on this point, as data tracking is unique to each installation's operating problems. Once established, however, the data can usually be collected semiautomatically through established logs and other records and can often be automated, if desired. Systems down time and response time records are often maintained anyway, for internal purposes, reducing the amount of collection work necessary to produce the reports.

Implementing the reporting system follows the establishment of standards of performance and the tracking of performance. In general, the simpler the reports, the more useful and effective they will probably be. People are turned off by too many numbers.

As long as IM meets its performance objectives, it has satisfied its user service contract. If it fails to do so, it must take immediate remedial steps to get back to its service goals. What remedies do users have for breach of contract? The usual: appeal to a higher court (i.e., complaints to senior management). But if and when the user does complain, it will be no surprise, since everyone will be working with the same facts. The advantages of a user service contract are as follows:

- It promotes better service to users by focusing attention on service and on negative trends.
- It aids production scheduling by establishing more realistic report deadlines.
- It creates more realistic expectations from users and hence better perception of service level.
- It establishes total performance over time, rather than focusing on specific service problems (they see the 98% up, not just the 2% down).
- Priorities are known and agreed on ahead of time.
- Everyone deals with the same facts and figures; there are no misunderstandings or misinterpretations.
- It provides management information.

The customer service center cannot be an ineffective user interface.

Another interesting example of an IM performance measurement system is one marketed by Mathews & Co., Stamford, Conn., called Performance Appraisal Reporting Service (PARS). PARS provides a systematic and objective rating of dp performance. A subscriber distributes performance appraisal forms to each user department to complete each month. Users grade IM performance from poor to exceptional in eight different categories: accuracy of reports, timeliness of reports, distribution of reports, meeting implementation schedules, on-line availability, response time, solution of problems, and attitude and cooperativeness. After the user departments complete their appraisals, the appraisals are forwarded to a liaison officer who tabulates and summarizes the ratings and comments. These can then be measured against predetermined objectives as well as against the ratings of other subscribers to the service. The price of the service is a one-time fee of \$75 to set up a PARS user on the system, and \$500 for a 12-month subscription for in-house (or off-premise) service ratings. The fee entitles the subscriber to three comparative performance reports each month.

The comparative performance report is prepared monthly for each PARS subscriber. It is designed especially for IM managers and other corporate managers in the subscriber organization.

CUSTOMER SERVICE CENTER

A simple strategy for improving user satisfaction is the establishment of a customer service center within the data processing department. It works the same way as the complaint department in a department store or as making service calls to a vendor to report hardware problems. The responsibility of the service center is to keep apprised of both production and output distribution problems so as to keep users informed when down times, reruns, or backlog problems will affect on-line operations, report deliveries, and the like. The service center gives users a single telephone number to call about service problems. A specific individual can be left in charge of the service phone, with backup to cover lunch hour and other absences. If there is a quality assurance function in place, the service center could be part of that function, or the people who prepare user service reports might also staff the service center. It's not important who does it; it can even be a part-time assignment, depending on the size of the organization. The important thing is to give users a single place to call for information on production status or problems that are affecting them, or simply to register complaints about service, late reports, etc.

Channeling service calls in this manner provides a central log of user complaints

and problems so that they can be more efficiently followed up and resolved. It is less frustrating to users than being shuffled around from place to place trying to get answers, and it is less disturbing to the data processing staff, who can concentrate on solving problems rather than on handling phone calls about them. When one calls the telephone company to report a problem, it's nice to have one service number to call, and even nicer to know the individual to whom one is reporting the problem; one gets answers and feels she or he is getting service responsiveness. The customer service center can do the same thing for users. The benefits include:

- Higher user service levels through an increased services orientation.
- Quick response to and resolution of user problems.
- Provision of a single data-center interface for users with service problems.
- Assistance to users so that they use the data center more efficiently.

A note of caution, however: the customer service center cannot be an ineffective user interface. It needs a good in-place information system that provides intelligent answers to users' questions. If the customer service center really has no information and must chase it down in every instance, users will soon lose confidence in its efficacy. So, an information system must be developed and put in place *before* the customer service center is established so that responses to customers will be rapid, accurate, and creditable.

Information centers can do two valuable things: 1) they can provide quick response to special information requests from users; and 2) they can reduce maintenance programming. Both of these are highly desirable goals. Our information center strategy suggests combining two ideas into one: quick-response reports and user information centers.

The quick-response report (QRR) group is an information center established within the IM function. It can be either a team of systems professionals or a single individual on each project team trained in the use of query language/report writer capability. There are a number of these languages around today (e.g., DPL, QBE, RAMIS, FOCUS, etc.) that could be selected as an installation standard for this purpose. The function of the QRR people would be to handle one-time requests for information, data analyses, special reports, etc. that are contained in data files maintained on the company's mainframe computer.

Today, there are many huge systems application databases. The standard reports from these application systems frequently do not provide answers to the current problems of users. The modification of a large applica-

tion system is often a tedious task that requires days, weeks, and sometimes even months to program. When a user has a problem that is not solved by a standard report, the IM response can often be a QRR program that produces a specific analysis from data stored as part of an existing application system.

High-level query languages and report writers enable quick response to special user requests for information. These high-level languages frequently combine report writer, query, analysis, and database management capabilities. They are very effective when programmed by competent IM professionals who have been trained to use them. These high-level programs tend to be not as efficient in the production of ongoing systems, which are usually written in more standard languages such as COBOL. For quick-response, one-of-a-kind reports requested by users, however, these programs provide an extraordinary resource for fast IM responsiveness—usually an overnight turnaround.

A user information center is a similar idea, except that here the QRR capability is placed directly in the hands of users. That is, one or more users are trained in the query language/report writer capability so that they can provide the same quick extraction and/or manipulation of data for themselves without requiring IM function intervention. Separate information centers could be established in as many user areas as desired.

The main distinction between QRR groups and user information centers is that the former generally reside in the IM function and use a standard query language to access mainframe data files to satisfy quick turnaround information needs. The latter reside in a user area and usually work with extract files that have been down-loaded from the company's central mainframe computer to a minicomputer located in the user area. The query language/report writer capability is usually a utility program provided by the minicomputer vendor.

At a recent GUIDE (IBM users group) meeting, the authors were struck by the number of companies discussing their use of information centers and the excellent response of the management people who were beneficiaries of this quick-response capability.

Performance sells, and senior executives and other users may be astounded by the fast response time that is possible with such high-level report generation groups. We expect such centers to grow rapidly in the next few years as more and more companies acquire minicomputers in user areas that come with built-in query language utilities.

The other side of the delivery of services is the payment for such services. There is nothing worse for a dp company than to be perceived as providing poor service and overcharging for it as well. It helps if the user at

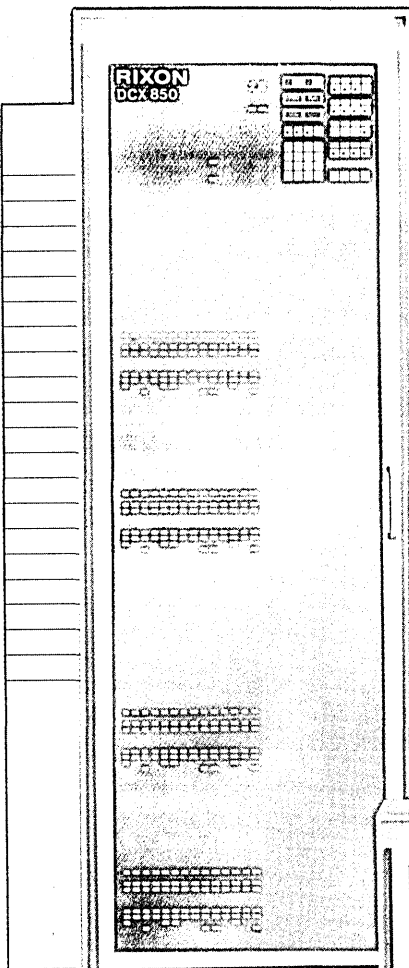
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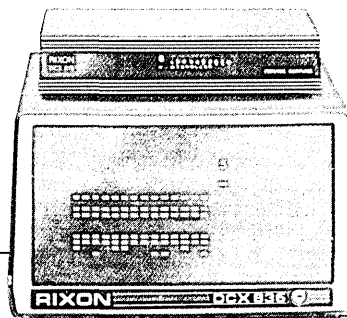
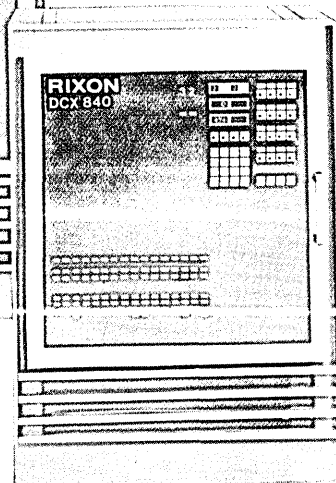
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One advantage of transaction pricing is that the user can understand the basis for assessment.

ing poor service and overcharging for it as well. It helps if the user at least understands the charges for data processing services. The problem is that most charge-out systems for dp services are based on computer resource pricing; that is, all costs are reduced to unit rates expressed in cpu seconds, memory occupancy (bytes/sec), tape and disk I/Os (input-output operations), etc. The main problem with such systems is that they are expressed in data processing terms and not in user terms. Hence, users do not really understand the charges and find it difficult to forecast their costs. Frequently, users distrust the fairness of the charge algorithm. For a charge-out system to be truly effective, it must be easy to communicate and easy for a user to understand. From a user standpoint, this means stating dp costs in familiar terms. A user-oriented charge-out system, then, is one which translates dp costs from computer resource pricing to transaction pricing.

One advantage of a transaction pricing, user-oriented, charge-out system is that the user can understand the basis for assessments for dp services. A second advantage is that productivity improvement from one year to the next can be measured in terms that have meaning for users.

Transaction pricing converts dp costs to some unit of measurement that is appropriate to the user's business. For example, charges may be based on number of accounts (checking account application), number of items in inventory (inventory control), etc.

The standard cost to be applied to unit pricing, however, should be established once a year (preferably at budget time) and should not be adjusted each month. That is, the total charge to the user should vary only with the volume processed, not with changes in the cost per unit. For example, a checking account application in a bank being charged 50 cents per month per account would vary according to the number of accounts on the file each month, but the 50 cents per account would remain unchanged for the year, even if actual costs were different. This procedure is consistent with most standard cost systems in manufacturing. Given an estimate of standard costs and a forecast of sales volume, companies then set a price that will return the desired profit margin.

If, after some period of time, the profit margin proves unsatisfactory, the company may choose to increase the price, but usually it will not increase the price from month to month just because manufacturing costs fluctuate. In the same way, the price per unit given the user for dp charges should be established at the beginning of the year based on estimated costs and usage rates; then it should be left undisturbed until the following year. If total costs are not recovered, the rate can be adjusted upward.

The main weaknesses of this strategy:

1. Not all applications are easily adaptable to unit pricing, so some combination of units may have to be used.
2. Some applications may require establishing both a fixed charge (where costs are insensitive to volume) and a variable charge, complicating the charging system.
3. Unit pricing is not entirely accurate since it does not charge for the actual work done (e.g., on-line inquiries, special report requests, and transactions of varied complexity).

On the other hand, the benefits of a charge-out system in user terms include these:

1. The user is better able to forecast dp costs and to rely on the charges for the entire year.
2. Because the system is simple to understand, there will be fewer complaints

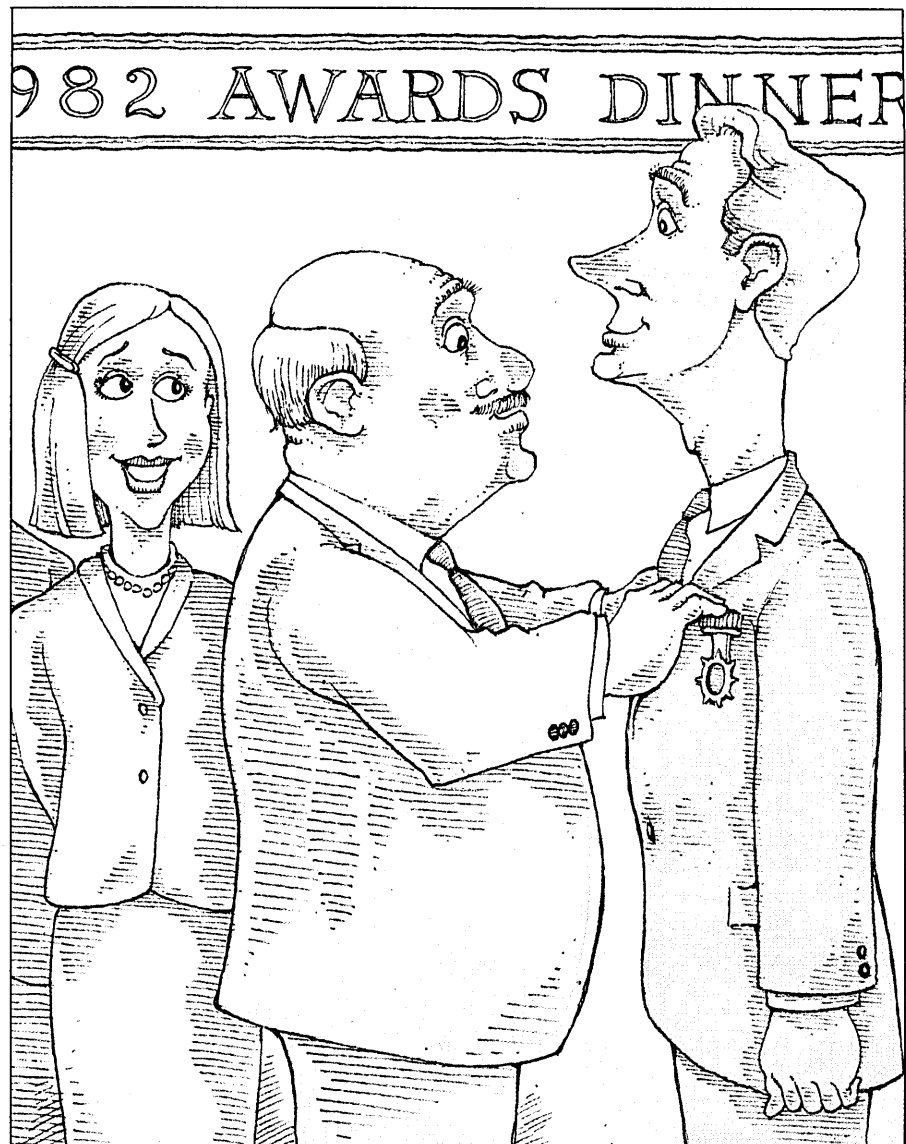
and less user dissatisfaction with the charge-out system.

3. Productivity gains can be more easily demonstrated when the unit price is later lowered (with improving power/cost ratios, this should be the case, over time).

We believe the benefits outweigh the weaknesses; thus, a user-oriented charge-out strategy warrants careful consideration. *

William R. Synnott is the senior vice president of the First National Bank of Boston and head of its Information Systems and Services Division.

William H. Gruber is president and co-founder of Research & Planning, Inc., a management consulting company specializing in information management and development of computer-based management systems.





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Programmer Analyst—Management Training. Rapidly expanding Seattle suburban data processing organization seeks a professional having at least two years of IBM OS COBOL experience to work on a variety of accounting and financial information systems. Continued expansion provides excellent opportunities for upward mobility. To \$25,000.

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Systems and Programming Manager—Financial. Highly profitable Seattle suburban organization has outgrown its present system and seeks a proven Manager capable of planning for expansion. Experience in IBM OS preferred. To \$50,000.

Sales Representative—New Position. Rapidly growing Seattle suburban branch office of a nationwide computer services organization seeks experienced sales professional. Requires executive level selling ability. Outstanding new territory opportunity. Expected first-year earnings \$60,000.

Mini Programmer Analysts—Marketing Support. Seattle OEM firm has openings for individuals who enjoy customer interface roles and have one to two years of experience with HP3000 COBOL. Some travel and an informal work environment provided. To \$24,000.

Consultant. Seattle office of a Big 8 CPA firm seeks a professional capable of directing its systems consulting activities. Exposure to a broad variety of commercial applications desired. To \$35,000.

Oregon

Senior Analyst—Project Manager. Dynamic Oregon based firm seeks a key individual to assume responsibility for major projects in manufacturing, marketing and distribution applications areas from conceptualization through implementation. Organization growth will provide additional management opportunity. To \$30,000.

Marketing Representative—Hardware and Software. Portland branch of a rapidly growing firm offers a unique opportunity to expand an Oregon territory. Knowledge of general business applications and proven sales background required. Excellent training and technical support provided. First year earnings potential \$40,000.

Programmer Analysts—New Systems. Continued growth of Fortune 500 company headquartered in Portland has created new openings for Programmer Analysts in manufacturing, financial and human resource applications areas. Requires minimum of two years OS COBOL and good interface skills. Provides good growth potential. To \$28,000.

Network Analyst—Telecommunications. Diversified Portland organization seeks a professional to join a new group in state-of-the-art environment supporting a large terminal network. Requires at least one year of OS/VS1 or MVS internals and good knowledge of evaluation tools. To \$30,000.

New Data Center—State-of-the-Art Hardware and Software. The establishment of a large IBM based data center within a Portland based manufacturing firm has created opportunities for Telecommunications Systems Programmers (to \$35,000), MVS Systems Programmers (to \$35,000), Network Analysts (to \$32,000), Performance Specialist (to \$37,000), Programmer Analysts (to \$28,000), and more.

Software Engineer—Systems Designer. Will work on the design and development of new hardware and software for interfaces to new computer systems using high speed circuits, multiprogramming and multiprocessing techniques. Excellent growth potential exists with this rapidly expanding manufacturer of computer supported products. To \$37,000.

Consultant—Big 8 Firm. National consulting firm seeks a broadly-based individual to provide consulting services to a wide variety of clients including both private industry and governmental agencies. Engagements range from high level audits to detail systems design and project management of development projects. To \$35,000.

Systems Analyst—New Data Center. Ground floor opportunity exists within a well-funded subsidiary of a major Portland energy firm which is virtually recession-proof. Three years of experience in general business applications, large-scale IBM and data base preferred. To \$30,000.

Northern California

Programmers—Travel to Europe and the Orient. San Francisco Bay area based corporation is in the early stages of development on a worldwide order processing system and seeks professionals having at least two years of COBOL experience. Will participate in the design, implementation and installation of this network including travel to facilities located in Europe and the Orient. To \$28,000.

New Development—Project Manager. Leading San Francisco based firm seeks a professional to lead one of the largest projects it has ever undertaken. Requires prior successful implementation of a large-scale, on-line data base system and good management skills. To \$45,000.

Massive Data Center Expansion. Major San Francisco based company is dramatically expanding the staff of its new data center. Current new project efforts include both large-scale OS systems development as well as a significant effort in distributed processing. Openings currently exist at virtually all levels including Programmer Analysts, Systems Analysts, Project Leaders and Systems Programmers. Experience on either minicomputers or large-scale 370/OS equipment required. Starting salaries range from \$18,000 to \$45,000.

DOS Systems Programmer. Nationally known San Francisco based firm seeks a professional initially to support the existing technical effort and then move into a technical long-range planning position. Requires four years of IBM DOS/VS experience with good knowledge of internals and ALC. To \$35,000.

North America's largest specialized computer recruiting firm. We currently maintain facilities in nine West Coast locations and represent organizations in all parts of California, Oregon and the State of Washington. These firms are diverse in size and industry and offer the

broadest possible range of career opportunities available to computer professionals. Among them are some of the most sophisticated computer users, manufacturers and services firms in the world. A sampling of our current West Coast openings is presented below.

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If you are actively interested in pursuing a new position on the West Coast or just want some basic information about opportunities there, simply call Wayne Emigh today, tonight or this weekend at 1-800-821-7700 x124. (Missouri residents please call 1-800-892-7655 x124.) Our special toll free lines are open twenty-four hours a day, seven days a week including Saturdays and Sundays. As soon as we receive your inquiry, we'll get back to you with information about specific opportunities that may be of interest to you and how you may explore any or all of them in confidence. If unable to call, please contact Wayne Emigh, Source EDP, West Coast Regional Headquarters, 2081 Business Center Drive, Dept. 2081, Irvine, California.



lines are open 24 hours a day, 7 days a week.

Scientific Programmer Analyst. One of the most advanced technical firms in San Francisco seeks a professional with FORTRAN experience and engineering systems background. To \$35,000.

Telecommunications Project Leader. San Francisco peninsula company, one of the fastest growing micro computer manufacturers in the world, is seeking an individual with extensive telecommunications experience to assume a leadership position in the development of telecommunications software. This position will include the responsibility for project planning, project development and project management. To \$40,000.

Programmers—Learn IMS. Rapidly expanding San Francisco area organization provides a unique opportunity for experienced Programmers to learn new skills in a major new IMS project. All program development is on-line in an IBM 3033/MVS environment. To \$35,000.

Southern California

New Corporate Data Center—Orange County. Fortune 500 organization is undergoing a major expansion and is in the process of centralizing all systems planning, programming, software and computer operations into a new corporate data center. The center, which is located in a highly desirable suburban Orange County area, will house the latest in IBM computer hardware and software technology including advanced data base, telecommunications, and distributed processing applications. Current openings include Programmer Analyst, Systems Analysts, Project Managers, EDP Auditors, System Programmers and Hardware/Software Planners. Starting salaries range from \$18,000 to \$35,000.

MI Director—New Data Center. Progressive firm in the electronics industry seeks a proven Manager capable of building a data processing organization from the ground floor. Will select equipment, hire staff and set direction for successful and growing firm. Suburban Los Angeles community. To \$45,000.

EDP Audit Specialist—Extensive In-House Training. Fortune 500 organization headquartered in Southern California seeks an EDP Audit Specialist experienced in designing accounting applications in an IBM OS environment. Training in auditing techniques and advanced computing provided. To \$25,000.

Sales Representative—High Income. Orange County office of a leading computer manufacturer is seeking a Marketing Representative with a proven track record of selling business systems. The average income of its sales force last year was over \$50,000.

Software Development—Minicomputers. Successful Orange County minicomputer manufacturer seeks professionals with operating system, compiler, data communications, data base or microprogramming experience. Company is committed to developing and sustaining a complete line of state-of-the-art systems software products. To \$40,000.

COBOL Programmer—Newport Beach. Well-known diversified financial services firm seeks a professional with a minimum one year COBOL programming experience. Outstanding work environment overlooking Pacific Ocean, CICS, MVS training provided. To \$28,000.

Programmer Analysts—Santa Barbara. Fortune 500 company located in a beautiful coastal setting two hours north of Los Angeles needs both mini and large systems Programmer Analysts. The organization provides excellent benefits including an exceptional relocation package. To \$32,000.

Minicomputer Programmers—World-Wide Network. Prestigious organization near Santa Monica beach seeks experienced, on-line real-time Minicomputer Programmers to participate in the development of a world-wide financial communication network. To \$40,000.

Senior Minicomputer Systems Programmer. Manufacturing company headquartered in San Diego has a requirement for an experienced PDP-11 Programmer who has worked on RSX-11M, RT-11 or IAS. Will be involved in a major effort to develop a state-of-the-art real-time system. To \$26,000.

Systems Analyst—Move into Sales. Opportunity exists for a Systems Analyst or Programmer Analyst to move into the challenging role of a Sales Representative for a fast-growing computer services organization. Qualified applicants must have the ability to work independently and interface with various levels of technical and management people. San Diego location. Estimated first-year earnings \$35,000.

Systems and Programming Manager—San Diego. One of the fastest growing companies in its industry is seeking an experienced professional to direct its systems and programming functions. Qualifications should include experience in project management in a large-scale systems environment. In-depth knowledge of financial systems preferred. To \$35,000.

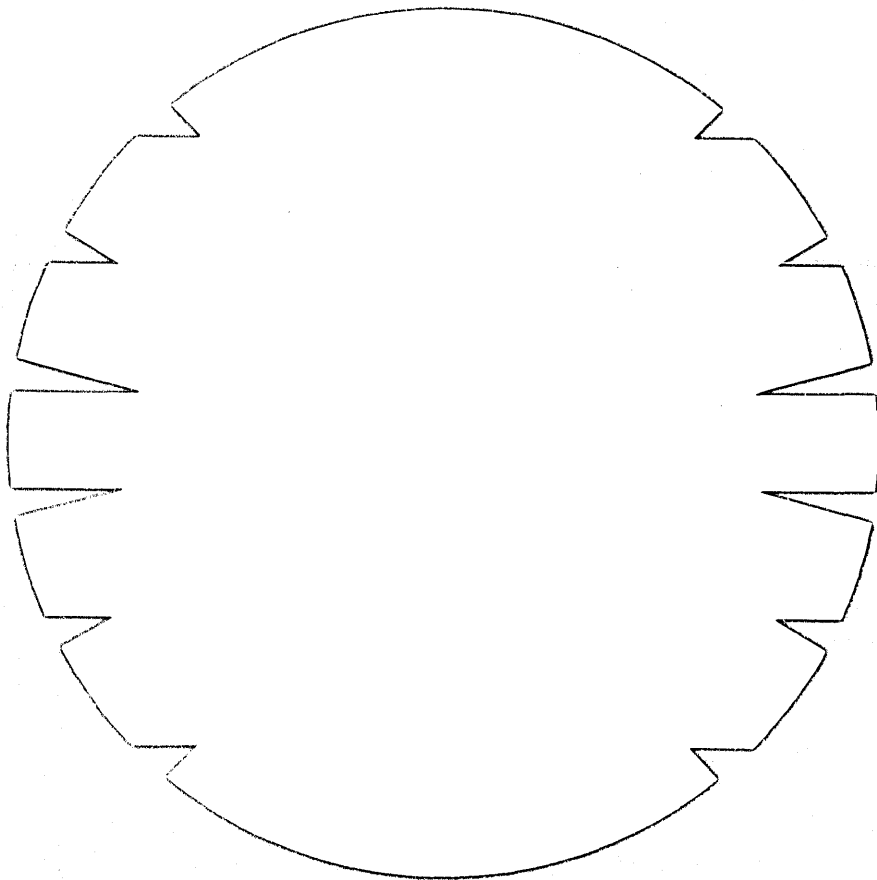
On-Line Programmers—OS Environment. Major San Diego based organization has several openings for On-Line Programmers to participate in a system utilizing a large network of terminals tied to one of IBM's latest computers. Selected candidates will work in an OS/MVS CICS, IMS environment. To \$30,000.

CAD/CAM/Graphics Programmers. National firm in the process of expanding its software development staff in San Diego has an immediate need for several individuals with graphics and/or CAD/CAM experience using minicomputers. To \$40,000.

Programmer Analyst—Learn Data Base. Growing Los Angeles energy company seeks OS/COBOL Programmers who want to learn IMS and manufacturing applications. Presently developing new IMS systems for plant and building maintenance and shop floor scheduling. To \$30,000.

FORTRAN Programmer—Business Systems. Fast-growing Los Angeles suburban financial firm seeks a professional with FORTRAN experience. Company is installing dual computers for on-line transaction-driven systems. To \$35,000.

Minicomputer Programmer—San Diego Suburb. Division of a Fortune 500 corporation seeks a Programmer Analyst proficient in any high-level language (e.g., FORTRAN, PL/1, ALGOL, or PASCAL) to work on a variety of minicomputers (including PDP-11 and HP computers). To \$26,000.



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HARDWARE

OFF-LINE

Just be thankful you weren't the first kid on your block with a shiny new IBM Personal Computer. It seems that after shipping better than 1,000 to Computerland and who knows how many to Sears, the Gray Giant found that -- Underwriters Labs or no -- the early machines had a very slight but nasty potential for giving their users a shock -- of the electrical variety. But, true to form, the Gray Giant attacked in full force, throwing technicians into the fray. Taking whatever space happened to be available locally -- motel rooms, warehouses, and the like -- the men and women from Big Blue cracked each and every unit shipped, inserting additional insulation into the possibly faulty power supplies. Hopefully the retrofit will ensure the continuing patronage of the lucky many who didn't get the last, and greatest, shock of their lives.

How do U.S.-produced 16K RAMS stack up against those made in Japan? According to HP, the two countries are now running neck and neck, with the contest now primarily on a company-by-company basis, rather than country-by-country. HP says that in the 140,000-plus ceramic 16K RAMS from six vendors it tested in the first nine months of 1981, failure rates ranged from seven to 30 per 10,000 units. Although HP won't name the vendors, it notes that both the best and worst failure rates went to the Japanese. HP also checked 3 million or so plastic 16K RAMS, which had failure rates ranging from 12 to 33 per 10,000. Of these suppliers, five were Japanese, and the lone American source fell into the middle of the pack.

MULTIPROCESSING

From its existing offering of a dual Symmetric Multiprocessing (SMP) option for its DECsystem-10 mainframes, Digital Equipment has gone a step beyond. It now offers triple SMP, which allows three DECsystem-1091 processors to act as a single system, letting current users upgrade as workloads increase. A triple SMP configuration can handle up to 250 jobs. It requires three DECsystem-1091 cpus, at least 1024K 36-bit words of main memory, three high-capacity disks, and SMP software; up to 512 terminal lines can be attached to such a configuration. An upgrade option, from dual SMP to triple SMP, starts at \$440,000, and includes all necessary hardware and software. In a triple configuration, all processors run under a single copy of the TOPS-10 operating system. Resources are saved because only one copy of the operating system is needed for all three processors.

In the event of a cpu failure, SMP software can reconfigure the system dynamically; reconfiguration is also possible in the event of channel, controller, or disk port failures. SMP software also handles processing load balancing. DIGITAL EQUIPMENT CORP., Maynard, Mass.

FOR DATA CIRCLE 301 ON READER CARD

PORTABLE IMPACT PRINTERS

Computer Transceiver Systems, best known for its trademark of Execuport for portable terminals, has extended its technology from thermal dot matrix printing to impact printing. Known as the Execuport 400 series, the new line comprises three models, each occupying only 12 by 14 inches of desktop surface.

The model 430 is a keyboard printing terminal with both RS232 and current loop interfacing. Operating modes are selected from the keyboard, allowing the user to specify data rate, data pacing, disconnect, and a 20-character answer-back message. Operating parameters are held in non-



volatile memory. The terminal carries a \$995 price tag.

The model 440 extends 430 functionality by including an integral Bell type 103 modem for direct connection to the phone system via a modular jack. It sells for \$1,195.

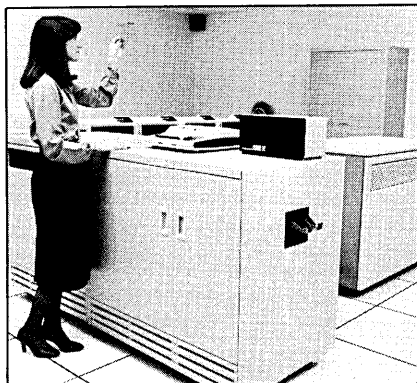
The 420 is a receive-only printer (no keyboard) which can be used as a remote printer or as a slave to a crt terminal. It sells for \$795. COMPUTER TRANSCIEVER SYSTEMS INC., Paramus, N.J.

FOR DATA CIRCLE 303 ON READER CARD

COM

Datagraphix has expanded its Computer Output Microfilm (COM) product line with the introduction of the Advanced Remote Imaging System (ARIS II). ARIS II uses raster scan laser imaging and dry heat development, obviating the need for a separate developer or supplying chemistry to a COM unit with internal developing capabilities. The only caveat with dry film processing is that it fails to meet standards for archival storage—but then Datagraphix sees the machines' primary applications in program development and in the production of rapidly changing output that will not be saved over a long term (archival copies could be made by duplicating the output fiche in a wet-process duplicator).

HARDWARE



ARIS II generates fully titled and indexed fiche at print speeds of up to 12,000 lpm. The system's MicroCOM software is compatible with all current COM software from Datagraphix, and it allows simulation of other manufacturers' COM software. Designed for use with IBM-compatible mainframes, from the 360-25 on up, the ARIS II connects to a host's I/O channel, appearing as a 3211 printer. The system can also be

configured for off-line operation with the addition of a suitable tape subsystem. The basic price for an on-line ARIS II COM system starts at \$112,000. DATAGRAPHIX, INC., San Diego, Calif.

FOR DATA CIRCLE 304 ON READER CARD

SHORT-HAUL MODEM

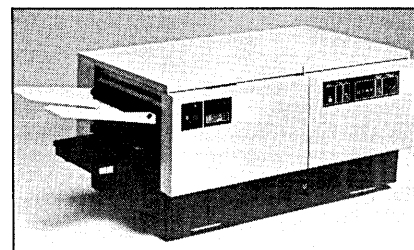
The Tin Can, as its name implies, is an inexpensive device for point-to-point communications. Also known as the Model 71 short-haul modem, the Tin Can supports full duplex or simplex communications at asynchronous speeds of up to 9600bps over twisted pair links covering up to two miles, or 1200bps operation over links extending up to 10 miles. Communications occur over nonloaded twisted pairs: full duplex operation requires two twisted pairs, while simplex operation requires only one twisted pair. The units are switch-selectable for DCE or DTE operation, and derive their operating power from the attached device. RS232 interfaces are used. A single Tin Can sells for \$87, with discounts offered for quantity or-

ders. REMARK DATACOM INC., Woodbury, N.Y.

FOR DATA CIRCLE 306 ON READER CARD

LASER PRINTER

Three Rivers Computer Corp. has added high-quality hardcopy output capabilities to its PERQ single user workstations by interfacing a Canon LBP-10 laser printer to the workstation. Three Rivers maintains Canon's part numbering scheme, calling the laser printer the LBP-10. The PERQ interface provides dot addressability, allowing the



production of multifont text, lines, half-tones, and other graphics. Resolution is 240 dots per inch, horizontal and vertical, and the unit can print up to 10 pages per minute on standard NP plain paper. The LBP-10 comes with simple text printing and "screen dump" software, all cables, and a starter set of consumables. The unit, including interface, sells for \$15,000. THREE RIVERS COMPUTER CORP., Pittsburgh, Pa.

FOR DATA CIRCLE 305 ON READER CARD

DESKTOP COMPUTER

Hewlett-Packard has expanded its Series 80 personal/professional line of desktop computers with a new high-end model, the HP-87. The new computer offers a larger screen (80 columns wide for both text and graphics), an enhanced version of HP's BASIC programming language, and internal memory ranging from 32KB to 544KB. HP is offering standard Series 80 software and enhanced packages for the new entry; additionally, a plug-in CPM system will allow users access to the large library of CPM applications currently available. All Series 80 peripherals can be used with the 87, including the recently announced 7470 Graphics Plotter. The computer lists at \$2,495; systems comprising 32KB of user memory and 270KB of mass storage will go for \$4,290, while a configuration of 64KB user memory and 5MB backing store will go for \$8,445. With a complete complement of main memory, the 87 can handle a VisiCalc spreadsheet of 254 by 63 completely full cells. HP is also working with outside software vendors to develop business applications for the 87. Currently available HP packages include Graphics Presentation Pacs, professional Applications Pacs for statistics, AC circuit analyses, financial decision making, and other applications. HP is also offering Super Pacs, discounted offerings of three related packages. Super Pacs go for \$225, about \$85 less than the combined price of the

HARDWARE SPOTLIGHT

REMOTE PRINTING

Digital Associates' Remote Batch Printer (RBP) allows users the economy of having one line printer serve a variety of remote mainframes communicating in a number of synchronous or asynchronous protocols. Available with a choice of four printers—ranging from 300 lpm to 1000 lpm—and four communications configurations, the RBP can operate in more than a dozen communications environments including SNA, HASP, 2780, 3780, Univac NTR, Univac DCT 2000, Honeywell VIP 7700, NCR Poll and Select, Burroughs Poll and Select, Mohawk

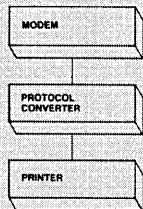
MOSYNC, and RS232 (multiple variants). Digital Associates says it will provide additional protocols as customers require. The four communications configurations are single line, single protocol; single line, multiple protocol; multiple line, single protocol; and multiple line, multiple protocol. Pricing ranges from \$8,320 for a 300 lpm printer and single protocol support to \$26,670 for a 1000 lpm printer with dual protocol converters and switches between converters. DIGITAL ASSOCIATES CORP., Stamford, Conn.

FOR DATA CIRCLE 300 ON READER CARD

RBP CONFIGURATIONS

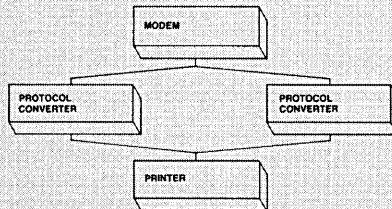
CONFIGURATION I

Single Line
Single Protocol



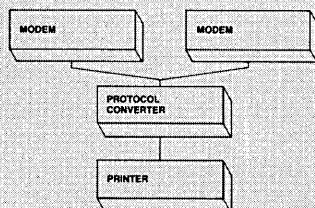
CONFIGURATION II

Single Line
Multiple Protocol



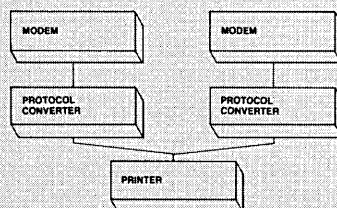
CONFIGURATION III

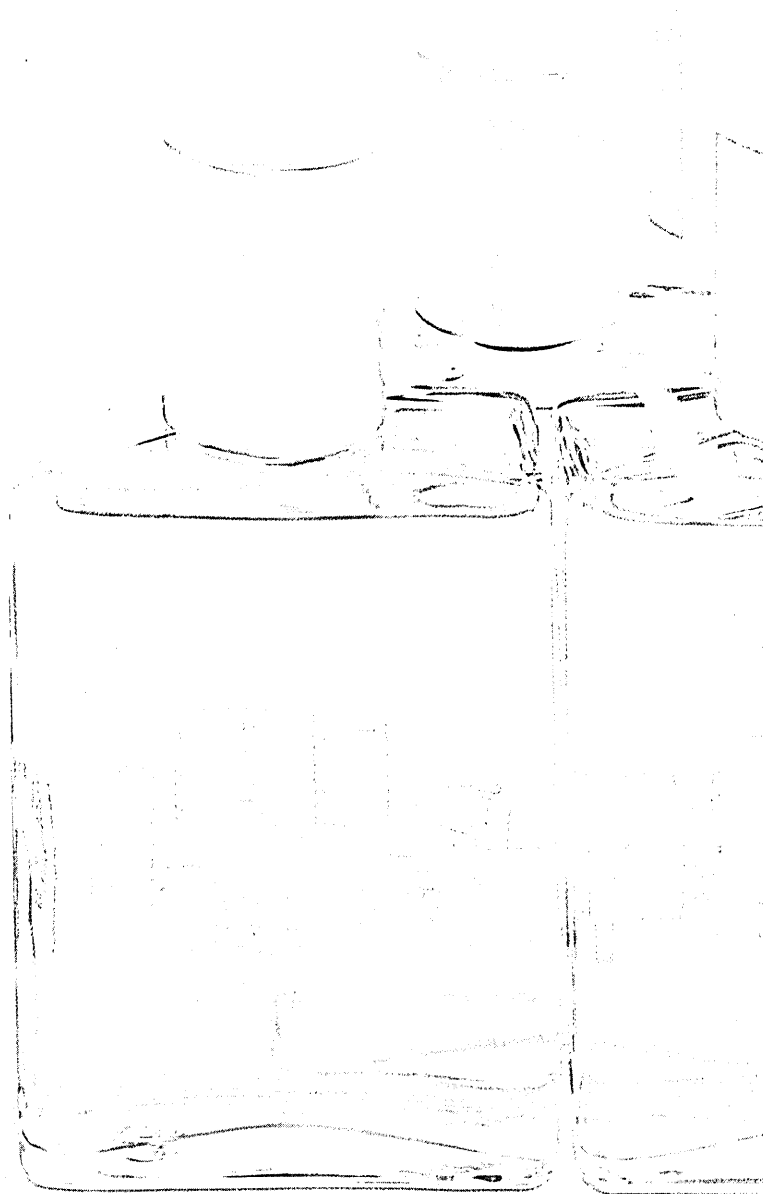
Multiple Lines
Single Protocol



CONFIGURATION IV

Multiple Lines
Multiple Protocols





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HARDWARE

three packages purchased separately. The module that allows use of CP/M is a plug-in unit with its own Z80 micro; it sells for \$495. HEWLETT-PACKARD CO., Palo Alto, Calif.

FOR DATA CIRCLE 302 ON READER CARD

LASER PRINTER

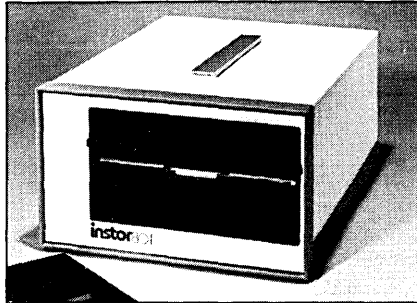
Sperry Univac has adapted its high-speed, high-volume laser printer for use with IBM mainframes in either on-line or off-line modes. Known as the Sperry Univac 0777-95 Laser Printer, the 21,000 lpm (maximum at 12 lines per inch) printer offers IBM 3800 compatibility at the IBM channel interface. In either on-line or off-line operating modes, the 0777-95 is controlled by a Sperry Univac minicomputer. When on-line, the printer is totally under the control of IBM-supplied host software for data preparation and printer management. The printer system comprises a 256KB minicomputer, display console, 10MB cartridge disk, mag tape unit, and optional auxiliary console printer. IBM operating systems capable of supporting the 0777-95 include DOS/VSE, OS/VS1, OS/VS2, MVS, and VM/370. Fonts and line spacing can be intermixed on a page; in off-line mode, up to 255 copies can be produced once the data are loaded into the page buffer of the minicomputer controller. Initial deliveries are planned for September. The 0777-95 can be purchased

for \$389,000 or leased for \$8,254 per month over five years. Maintenance is \$1,000 per month, plus 3.5 mils for each foot of paper used. SPERRY UNIVAC, Blue Bell, Pa.

FOR DATA CIRCLE 309 ON READER CARD

IBM PC 3741 DISKETTE

The Instor/801 is a floppy disk system for IBM's Personal Computer that allows media



interchange using the IBM Diskette I Basic Data Exchange (3741) format. Coupled to the IBM PC via IBM's Asynchronous Communications Adaptor card, the Instor/801 can read and write 8-inch floppies in 3741 format, allowing users to exchange diskettes with any machine supporting 3741 formatted diskettes. The Instor/801 sells for \$2,000, including interfacing software. INSTOR CORP., Menlo Park, Calif.

FOR DATA CIRCLE 308 ON READER CARD

PRINTERS

Centronics is trying to solve as many output problems as possible with the introduction of its Printstation 350 family. The family of industrial-grade dot matrix impact printers is designed to offer a single solution for dp, word processing, and business processing applications. All models share the ability to handle cut-sheet, fanfold, and immediate tear-off demand document forms. The units also have fewer moving parts than their predecessors, an operator-replaceable print head, and a 10-million character ribbon cartridge. Eight character sets are resident in each of the 350 family, and each can be switched from 110 volt to 220 volt operation. Interfaces are switchable between parallel and serial. The Model 350 is the basic building block for the family; its bus structure will allow oems to customize the printer for specific applications. The Printstation 352 is for 200cps dp printing requirements, and it includes a basic communications formatter in its single unit price of \$1,795. At \$2,495, the Printstation 353 has the added capability of producing high-resolution output at 50cps by overprinting. An operator's panel facilitates setting operating parameters. Additionally, the 353 can accept down-line-loaded character sets from a host computer. CENTRONICS DATA COMPUTER CORP., Hudson, N.H.

FOR DATA CIRCLE 310 ON READER CARD

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	DESCRIPTION	PURCHASE PRICE	PER MONTH		
			12 MOS	24 MOS	36 MOS
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	LA34 DECwriter IV	995	95	53	36
	LA34 DECwriter IV Forms Ctrl.	1,095	105	58	40
	LA120 DECwriter III KSR	2,295	220	122	83
	LA120 DECwriter III RO	2,095	200	112	75
	VT100 CRT DECscope	1,695	162	90	61
	VT101 CRT DECscope	1,195	115	67	43
	VT125 CRT Graphics	3,295	315	185	119
	VT131 CRT DECscope	1,745	167	98	63
	VT132 CRT DECscope	1,995	190	106	72
	VT18XAC Personal Computer Option	2,395	230	128	86
TEXAS INSTRUMENTS	T1745 Portable Terminal	1,595	153	85	58
	T1765 Bubble Memory Terminal	2,595	249	138	93
	T1 Insight 10 Terminal	695	67	37	25
	T1785 Portable KSR, 120 CPS	2,395	230	128	86
	T1787 Portable KSR, 120 CPS	2,845	273	152	102
LEAR SIEGLER	T1810 RO Printer	1,695	162	90	61
	T1820 KSR Printer	2,195	211	117	80
	ADM3A CRT Terminal	595	57	34	22
DATAMEDIA	ADM5 CRT Terminal	645	62	36	24
	ADM32 CRT Terminal	1,165	112	65	42
	ADM42 CRT Terminal	1,995	190	106	72
	EXCEL 12 CRT Terminal	1,695	162	90	61
TELEVIDEO	EXCEL 42 Smart Buffered CRT	995	96	54	36
	COLORSCAN 10 Color CRT	3,195	307	171	116
NEC SPINWRITER	925 CRT Terminal	850	82	46	31
	950 CRT Terminal	1,075	103	57	39
	Letter Quality, 7715 RO	2,895	278	154	104
GENERAL ELECTRIC	Letter Quality, 7725 KSR	3,295	316	175	119
	2030 KSR Printer 30 CPS	1,195	115	67	43
HAZELTINE	2120 KSR Printer 120 CPS	2,195	211	117	80
	Executive 80/20	1,345	127	75	49
EPSON	Executive 80/30	1,695	162	90	61
	MX-80 F/T Printer	745	71	42	27
TIMEPLEX	MX-100 Printer	895	86	48	32
	E0400 4 Channel Stat Mux	1,525	147	82	55
	E0800 8 Channel Stat Mux	2,050	197	110	74

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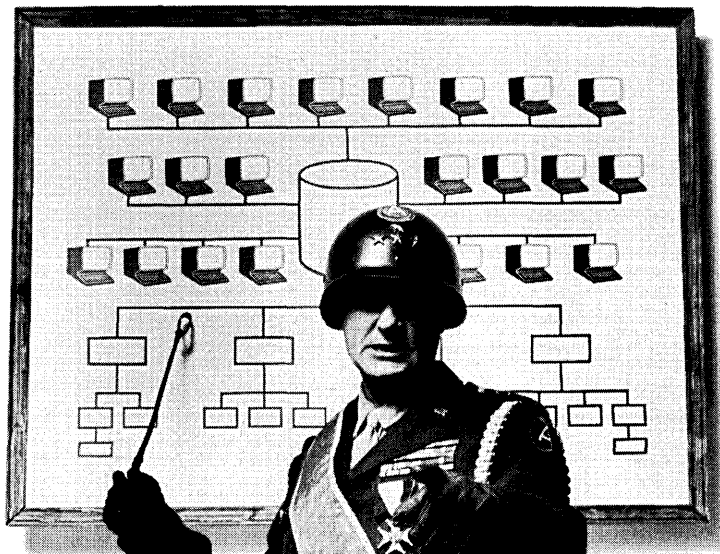
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SOFTWARE AND SERVICES

UPDATES

We just came across what seems to be one of the better efforts at putting a fix on IBM's current and probable position in the mainframe market. A report, IBM Large Systems Announcements -- October 1981, by Martin J. Sprinzen, vp of technical services for Candle Corp., the Southern California software vendors, attempts primarily to assess IBM's recent activity in the MVS environment. The report covers both software and the possible directions IBM is trying to lead its customers. Changes in the organization of large operations, particularly distributed systems, new hardware, and systems software announcements, are analyzed to support the author's position that MVS will continue to be IBM's most important production operating system. Particular attention is paid to the MVS/XA announcement, "the most significant change in MVS since MVS was introduced in 1974." The report is offered by Candle Corp. (10880 Wilshire Blvd., Suite 2404, Los Angeles, CA 90024) for \$400, or \$100 to Candle customers.

We've heard of at least one serious omission in the initial documentation of the IBM Datamaster BRADS package. The applications generator makes extensive internal use of DATA statements, but the manual fails to warn users not to play with DATA and RESTORE instructions in the code they include in the space BRADS reserves for user programming. User DATA statements can cause either erratic results or an outright crash. You may find your DATA statements causing type mismatches upon reading, but that's certainly better than letting BRADS READ the wrong initialization DATA.

SPREADSHEET

Heartened by the skyrocketing success of VisiCalc and similar packages, and noting a dearth of applications packages for shops running systems under Bell Lab's Unix timesharing system, a New York company called Unisoft has developed ViewComp. Designed specifically for a Unix environment, ViewComp uses ASCII data files (allowing manipulation by standard Unix utilities), and includes a macro processor (conceptually akin to the C preprocessor) that lets users define constants, formulas with arguments, and references to elements on the worksheet. In addition to performing spreadsheet calculations, ViewComp offers a number of formatting features, including variable width columns, formats on global, column, and individual elements, fixed position labels and totals. The package also supports windowing on the display screen: the screen can be split both horizontally and vertically, producing up to four windows of different sizes. This simplifies working on related parts of the spreadsheet that are physically too far apart to fit on the screen at the same time. For PDP-11s, ViewComp is priced at \$400; similar pricing is expected for "small" machines, while mainframe

users can expect higher prices. UNISOFT INC., New York, N.Y.

FOR DATA CIRCLE 326 ON READER CARD

C COMPILER

Phase One Systems has developed—for Z80-based micros running under OASIS—a C compiler that reportedly supports all of the language as found in Bell's Unix Version Seven C compiler with the exceptions of floats, doubles, longs, multidimensioned arrays, fields, structure initializers, or type definitions and type casts. The compiler generates Z80 assembler code, and an optimizer included with OASIS C is said to compress object code by 30% to 50%. Phase One says that using pointers results in faster execution than the arrays they replace, and their extensive use will make for dense but easily read programs. The implementation also provides both logical and bit assignment operators, as well as the ability to define new data types comprising differing types of data elements. These user-defined data types can be manipulated in much the same manner as Pascal "record" types. A complete 1/10 library is included. Compiler options allow separate and conditional compilations. Programs may be threaded

SOFTWARE SPOTLIGHT

PROGRAM TESTING

Management And Computer Services (AKA MACS) has come out with a new program, TRACMACS, for testing and maintaining COBOL programs; TRACMACS complements MACS' earlier testing tool, DATAMACS, the automatic test data generator. TRACMACS is intended to help personnel verify the quality and completeness of their program testing efforts. A logic path analyzer, TRACMACS shows, at the condition statement level, which logic paths remain to be checked, and which have been executed and in what sequence. It also charts the number of times each true or false branch has executed. The information that TRACMACS provides the program checkout team tells them whether

or not all paths through a program have been traversed, and it identifies those that have yet to be tested. The program can also help maintenance programmers better understand the operation of the program being maintained. MACS sees the combination of TRACMACS and DATAMACS as a complementary pair, with DATAMACS providing test data and TRACMACS auditing the results. TRACMACS is available for any machine that supports a COBOL compiler. Sold as an option to DATAMACS, the package is priced at \$6,000; as a standalone package, TRACMACS's selling price is \$12,000. MANAGEMENT AND COMPUTER SERVICES, INC., Valley Forge, Pa.

FOR DATA CIRCLE 325 ON READER CARD

SOFTWARE AND SERVICES

together through the use of multiple levels of the "include" directive. If the need arises, the programmer can use embedded assembly code. The OASIS C compiler retails for \$250; a version for the 16-bit OASIS-16 environment is in the works. PHASE ONE SYSTEMS, INC., Oakland, Calif.

FOR DATA CIRCLE 330 ON READER CARD

MARKETING SUPPORT

Intended for manufacturing and industrial concerns where continual sales follow-up is required, MSM/34 maintains a marketing database of qualified prospects and customers (segmented by user-defined codes), handles sales follow-up reporting for prompting sales efforts and tracking sales activity in the field, and processes, tracks, and screens inquiries derived from ads, trade shows, and other promotional activities. The system even generates call reports prior to follow-up visits, in effect providing the salesperson with a computerized date book. These call reports categorize the prospect and include comments from the most recent sales call. When the salesperson completes a call, he or she returns an updated copy of the call report with new comments and perhaps changes in the prospect's categorization. MSM/34 runs on IBM System/34 system with SSP Release 7, DFU, and Sort utility; the vendor also recommends use of the extended disk data man-

agement utility. The package is priced at \$2,000 for a perpetual lease. MARKETING AND SALES MANAGEMENT SYSTEMS, Chicago, Ill.

FOR DATA CIRCLE 328 ON READER CARD

PROGRAM TESTING

Assembler and COBOL programmers working in IBM DOS shops can use Fixit to speed their debugging. Distributed in source code form, the \$500 package detects and corrects three types of errors that do not alter program logic. These errors are data exception, decimal divide exception, and decimal overflow exception. If any of the three types of errors occurs, Fixit provides a snapshot dump and, if possible, corrects the fields causing the exception and resumes program execution. If Fixit can't restart the program, it provides a full storage dump and terminates the job. Fixit corrects a maximum of five unique exceptions during each test run; if an exception repeats itself, only corrective action is taken, and the job continues. THE PRODUCTIVITY GROUP, INC., New York, N.Y.

FOR DATA CIRCLE 327 ON READER CARD

DATA RECOVERY SYSTEM

Written in user mode as a set of callable intrinsic functions for the Hewlett-Packard 3000, Recovery/3000 is a transaction-oriented system that allows both backward and

forward recovery of multiple databases, KSAM files, and standard MPE files in any combination. The package can recover the effect of a single transaction over multiple databases and files. Both disk and tape logging are available. Audit reports may be produced showing activity on a terminal-by-terminal basis. In a backward recovery, the last incomplete transaction or all transactions to a given time can be recovered, for any or all terminals. While backward recovery is a rollback operation, forward recovery lets the user repost completed transactions from an archive tape. The recovery process can be invoked programmatically, allowing an application that uses several files or databases to recover from a failure after partially completing its updating actions. Recovery/3000 has a single-cpu license fee of \$8,500; multiple cpu discounts are offered to end users. ABACUS SYSTEMS, INC., San Francisco, Calif.

FOR DATA CIRCLE 329 ON READER CARD

CROSS-ASSEMBLER GENERATOR

Developed by the Mellon Institute (a division of Carnegie-Mellon University) for Computer Language Investors, MIRAGE (Mellon Institute of Research Assembler Generator) speeds the development of cross-assemblers for new microprocessors. Running under the Unix operating system,



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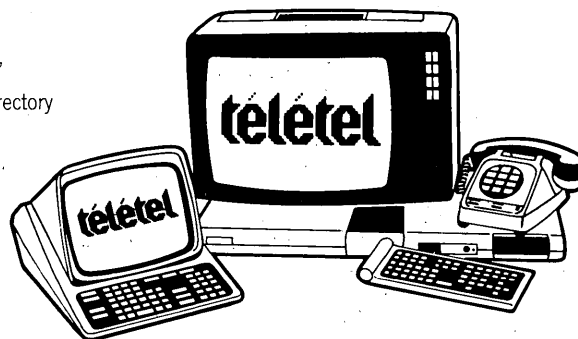
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MIRAGE converts a description of an assembly language—containing parsing directives and actions—into a working cross-assembler. The package comes with assembler descriptions for most micros currently in use, and the user can add to his library as new processors become available. MIRAGE, including assembler descriptions, macro preprocessor, and documentation is offered on tape for \$5,500. COMPUTER LANGUAGE INVESTORS, Pittsburgh, Pa.

FOR DATA CIRCLE 331 ON READER CARD

EDITOR

Patterned after DEC's venerable TECO editor, SI-Edit is a character-oriented text editor for 32-bit Perkin-Elmer minicomputers running under OS/32 with or without P-E's Multi-Terminal Monitor. An alternative to P-E's EDIT32 product, SI-Edit reportedly can perform character manipulations on any OS/32 supported file. Written as a reentrant program, SI-Edit requires 9KB of memory for its pure code, and at least 4KB for each user's text buffer. If the memory is available, users can increase the size of their text buffer, reducing the time required for disk accesses. The editor provides text positioning and modifying commands that let the user position the text pointer between any two characters in the text buffer or alter (delete, modify, add) characters within the buffer. File control commands let the user

open and control both input and output files. Search commands can include "wild card" characters. Move and copy commands also are provided. For frequently repeated operations, SI-Edit allows the definition of macro commands. SI-Edit has a price of \$1,000. SOFTWARE INNOVATIONS, INC., Albuquerque, N.Mex.

FOR DATA CIRCLE 333 ON READER CARD

FILE MANAGEMENT

Data General has added a new file management package to its support software offerings for its micronOVA, MPT/100, and NOVA users. A version also is offered for AOS environments, allowing users to develop applications on larger NOVAs and Eclipse systems, for subsequent use on DG's small computers, including the MP/100, MP/200 and MPT/100. The file management package, intended to run on micros using the MP/OS operating system, comprises two functions: an Indexed Sequential Access Method (ISAM), and a Sort/Merge utility. MP/ISAM file structure consists of a data file and one or more index files; indexes are not required to be a part of the data record. DG suggests that a timestamp index could be useful in applications where users may need to know the chronological order of entries into the data file. Another flexible feature of MP/ISAM is the ability to have variable length data records. Multitasking is sup-

ported by the ISAM package, and there are interfaces to the programming languages MP/Pascal and MP/FORTRAN IV. The Sort/Merge utility can sort in either ascending or descending order, and it has the ability to merge up to 10 sorted files. It also accommodates either fixed or variable record lengths. The MP/OS File Management Package carries an initial license of \$1,250, with subsequent licenses priced at \$400. Versions for AOS and AOS/VS (16 bit) are priced at \$950 for the initial license and \$300 for subsequent licenses. At least 600KB of disk storage is needed to use the package. DATA GENERAL CORP., Westboro, Mass.

FOR DATA CIRCLE 335 ON READER CARD

GRAPHICS

Intel now offers a graphics option for its System 2000 Data Base Management System. The firm has bundled ISSCO's Tell-A-Graf business graphics system into its conversational data base reporting system, Genius. Using the graphics option, users can now pictorially represent their data as pie charts, plots, and bar charts as well as tabular and textual reports. Once a user has selected data from the system 2000 DBMS, the graphics option can represent the information as any of the available types of charts or plots. If the user decides another format will make the data more understandable, the graphics option can redraw the data in

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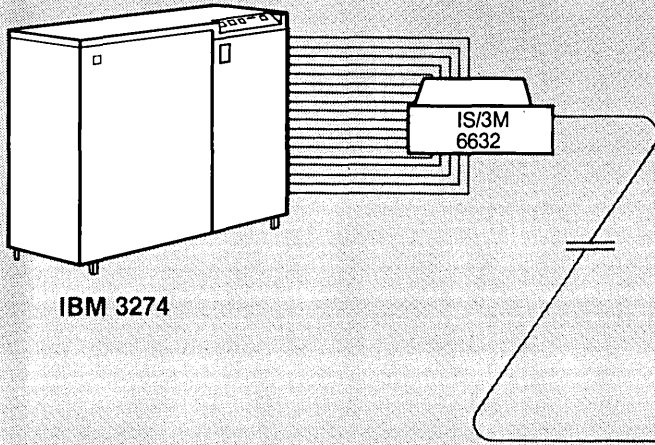
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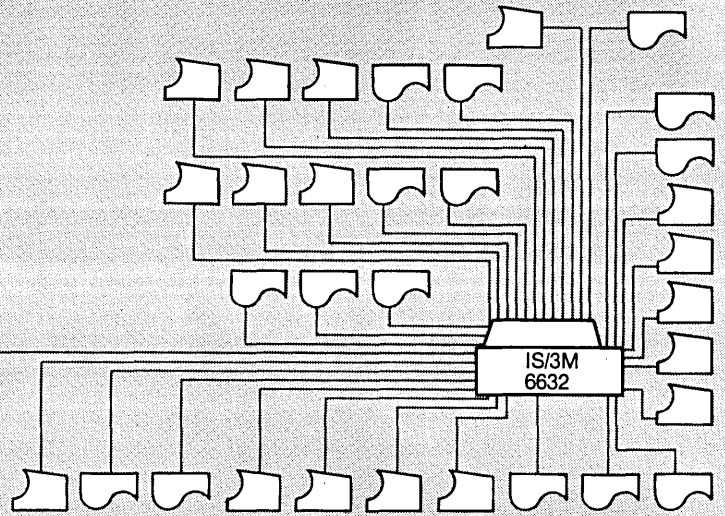
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IBM 3274

In this typical IS/3M "IBM attach" baseband system configuration, one Series 6600 Multiplexer is connected to an IBM 3274 Controller's 32 ports and another is placed near 32 clustered IBM Series 3278/9/87 terminals. A single length of RG-62U cable carries data between the two multiplexers over a distance of half a mile or more.



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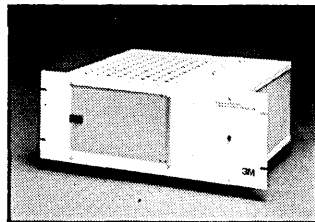
Connect as many as 32 terminals to a distant IBM 3274 Controller with a single existing baseband cable.

Until recently, there was just one way to connect more than one IBM 327X terminal or printer to a 3274 Controller: Install another dedicated cable for each new peripheral.

Now there's another, simpler, and very reliable way to do the same job without pulling long lengths of new cable. It's called the Interactive Systems/3M Series 6600 "IBM® attach" baseband system. And it lets you hook as many as 31 extra terminals or printers onto any existing RG-62/U cable that now connects your IBM 3274 Controller to a terminal.

The method: time-division multiplexing.

IS/3M's new Series 6600 "IBM attach" uses time-division multiplexing (TDM) to squeeze more data channels onto a standard baseband cable. Installation is quite simple. One or more IS/3M Series 6600 head-end multiplexers is attached to the controller. Depending on the model selected, a single MUX



Series 6600 Multiplexer, available with 4, 8, or 32 input/output ports.

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The multiplexed data streams are carried via the existing RG-62/U cable to an identical Series 6600 MUX at the remote location. Local baseband cables connect this multiplexer to its assigned terminals and printers.

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Any combination of IS/3M multiplexers can be used with the IBM 3274 Controller, so long as the total number of channels doesn't exceed 32. For example, three 8-channel

MUXes could be used with existing cables to feed up to eight terminals and/or printers at each of three different sites.

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SOFTWARE AND SERVICES

the new format, without having to make another database access. Genius with the Tell-A-Graf graphics option is priced at \$20,000. INTEL CORP., Austin, Texas.

FOR DATA CIRCLE 332 ON READER CARD

DATA ENCRYPTION

Prime Factors, a software house specializing in security applications, has added a new option to its Psypher data file encryption utility.

Field-mode encryption allows in-place encryption of sensitive fields without disturbing the remaining data fields. File structure remains intact, as the field-mode option performs a byte-for-byte replacement on user-defined fields. The option should offer a number of benefits, including increased efficiency, as many records may contain only one or a few sensitive fields. Since most of the record will remain intact, applications that don't deal with the sensitive data can still run without the possibility of someone inadvertently seeing confidential data.

Finally, an option with the field-mode encryption option allows the user to specify any of eight encryption character sets. If a numeric field, say social security number, is to be the encrypter, Psypher can be told to replace the field with numerics, allowing programmers to use the database to test new applications, again without pro-

viding access to data considered sensitive. The field-mode option is priced at \$2,000 for IBM mainframes running OS, MVS, or VM; implementations for DEC and DG minis are in the works. The option will be provided at no charge to those acquiring Psypher before June 1. Basic Psypher prices range from \$1,250 to \$7,000, depending on the machine. PRIME FACTORS, Oakland, Calif.

FOR DATA CIRCLE 338 ON READER CARD

ELECTRONIC MAIL

Complementing its ETC on-line word processing system, Applied Data Research has released an Electronic Mail System (ETC/EM); the new package operates under DOS or OS and can be used with ADR's word processing system or without it. On-line support can be provided by CICS or ADR's ROSCOE. A version will also be offered for use with ADR's Datacom/DC.

ETC/EM uses simple English verbs and prompt screens to simplify the user interface. Electronic mailboxes, correspondence archiving, automatic message routing and broadcasting, hardcopy printing, and multilevel security are provided. An audit trail is provided which tracks all correspondence, recipient and sender, subject, date and time of delivery. The sender automatically receives notification of the receipt of his message. A Network Definition Fea-

ture allows users to set up distribution lists, making it easier to send copies of a message to many people. Support is provided for 3270 type terminals and dial-up devices. ETC/EM carries a permanent license fee of \$16,500; leases also are offered over varying terms. APPLIED DATA RESEARCH, INC., Princeton, N.J.

FOR DATA CIRCLE 336 ON READER CARD

BASIC PREPROCESSOR

FLOBASIC is a preprocessor that allows use of structured programming constructs, such as WHILE and DO...UNTIL on micros running CP/M. The preprocessor also does away with line numbers, instead allowing the user to use labels to specify locations for jumps and subroutine calls. With the exception of the nestable structured control directives and the omission of line numbers, the FLOBASIC package accepts standard BASIC statements as "opaque" code which will pass through the preprocessor. The only change the preprocessor makes to these opaque statements is the addition of line numbers as required by standard BASIC interpreters and compilers. FLOBASIC runs on 8080- and Z80-based micros operating under CP/M and compatible operating systems; at least 32KB of memory and one disk drive are required to use the \$75 package. TERRASOFT, Rowayton, Conn.

FOR DATA CIRCLE 337 ON READER CARD

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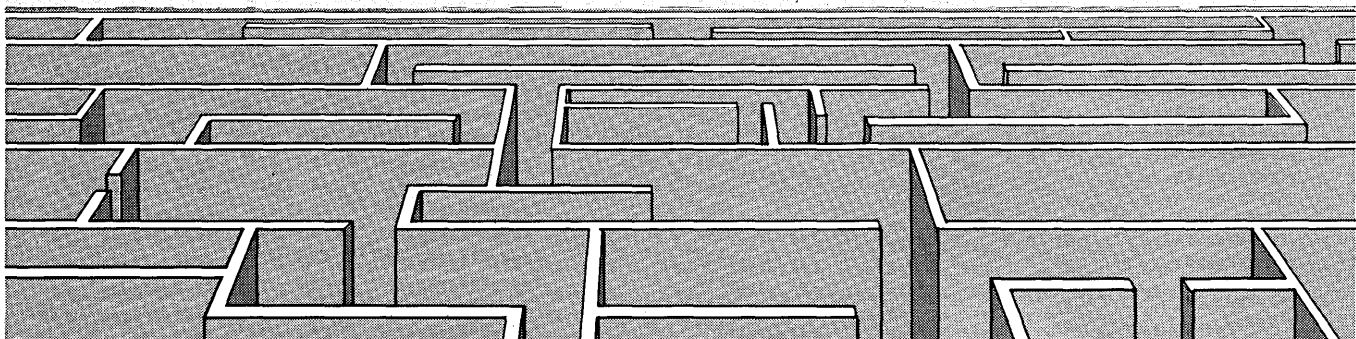
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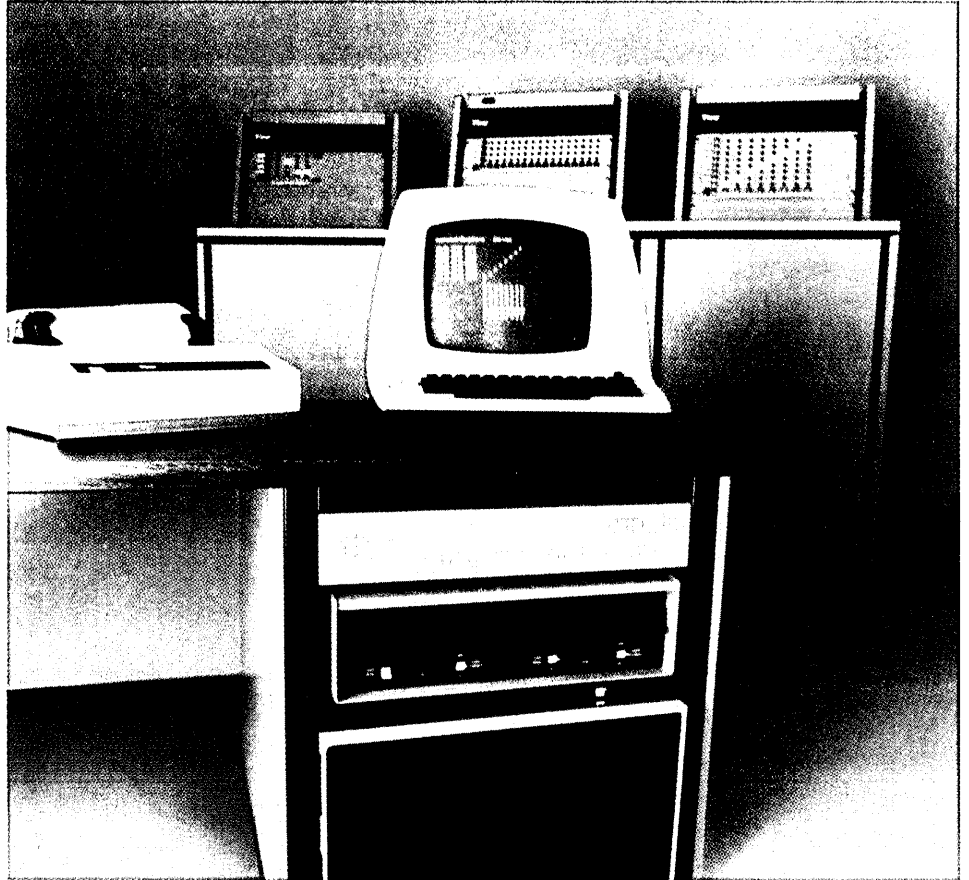


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WHO KNOWS: INFORMATION IN THE AGE OF THE FORTUNE 500 by Herbert I. Schiller

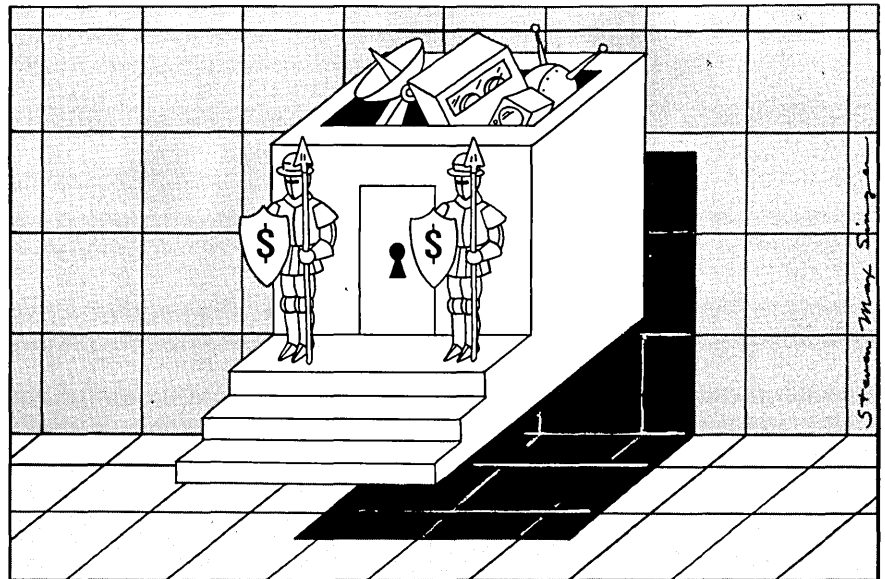
Herbert Schiller's book is an unrelenting indictment of capitalist exploitation of information technology. The author argues that the dominant actors in the market economy are exploiting opportunities created at public expense for their own selfish ends: the rich and powerful are getting richer and more powerful through a system in which everyone shares the risks of investment, but only an elite group reaps the benefits. "If there is an overarching conclusion that emerges from this [book], it is that, contrary to the notion that capitalism has been transcended, long prevailing imperatives of a market economy remain as determining as ever in the transformation occurring in the technological and information spheres. . . .

The elevation of private, corporate over public, social interest is especially transparent in the dynamic communication-information sector. Here the institutional processes are being arranged to enable the already powerful to seize control and direct the new technologies to corporate ends, while the few public structures with potential countervailing influences are progressively weakened."

The villains in this piece are the super corporations of America. Their growing domination of the information communication sector is, according to the author, discernible in the:

1. privatization and commercialization of information, and a corresponding weakening of the government publishing and dissemination function;
2. appropriation of the new communication technologies by the Fortune 500;
3. preeminent position of the Fortune 500 in international data flows; and
4. American hegemony over global resource information through the technology of remote sensing.

Privatization. Although the sale of information is not unique to the present day, Schiller argues that in the past the be-



lief that information is inherently social was stronger and more pervasive. Computer communications technology has opened new areas for exploitation of information for private profit. What is particularly galling to the author is that much of the information (computerized databases, for example) marketed by private companies originates in government-financed research and development projects. Schiller points to massive governmental research and development expenditures (\$36.1 billion requested in the 1981 budget for 31 federal agencies) as evidence of government's major role in generating information and knowledge. He concludes that "the *information itself*, the product of public tax money, . . . is privately appropriated at its point of generation—the Government—and sold at a profit."

A concomitant of the commercialization and privatization of information is the diversion of "huge amounts of government-financed data and information . . . from freely accessible public channels of distribution. Sometimes the findings embodied in this documentation, processed and 'enriched,' are priced prohibitively and become available only to already-knowledgeable and affluent groups and individ-

uals. . . . Less influential and prosperous groups may be excluded and may not even know the information is available."

Schiller claims that this trend is evident in efforts to diminish the domain of the Government Printing Office (GPO), in the growth of the National Technical Information Service as a rival of GPO, and in the ever more precarious position of the national depository library system.

Appropriation of new communication technology. "Information and message-making from private, corporate sources are expanding and reaching new, large, and national audiences." The new communication technologies such as video cassettes, home recorders, video disks, cable tv, computers, and direct satellite broadcasting provide the wherewithal for large corporations to carry their messages directly to mass audiences.

The problem here, as Schiller sees it, is that the diverse groups making up the general public lack the resources, facilities, and hired expertise to effectively counter the special interest propaganda of the corporate giants. Schiller foresees a convergence of direct corporate communications with the commercial media which will "increasingly saturate the national communi-

SOURCE DATA

cation atmosphere, the customary media channels, and the new, direct, nonmedia corporate communications alike." He asks: "Where will the national public go to get differing outlooks and perspectives?"

International dataflows. "It is apparent that international dataflows are of great and growing importance to the operation and maintenance of the TNC [transnational corporation] world business system. The capability of TNCs to utilize productive facilities where the costs are lowest and the profits highest, to penetrate the markets with massive advertising campaigns, to avoid or minimize taxes by shifting production, and to take advantage of fluctuating currencies by transferring funds from one center to another is almost totally dependent on secure and instantaneous global communications."

Schiller points to serious problems of accountability, national responsibility, and the exercise of sovereignty arising from the operations of transnational corporations. Who is responsible, he asks, for the vast integrated global money and capital system, the so-called "stateless money," almost totally outside all governmental regulation? Quoting *Business Week*, he provides a partial answer: "Of all the forces responsible for the creation and expansion of the free Euromarkets and the pool of stateless money, none has been as powerful as the need of the 450 biggest multinational corporations in the world." The combination of unregulated capital and unregulated dataflows makes national decision making increasingly problematic. National policy-making initiatives can be thwarted by the financial manipulations of transnational corporations.

Control of information on planetary resources: Remote Sensing. "The ability to use information relayed by satellite photographing and other processes currently is largely in the hands of TNCs and their powerful allies in the governmental and intelligence bureaucracies. . . . United States computer communication capability, gov-

ernmentally and privately organized serves well the hegemonic strivings of the TNCs." This control, according to Schiller, has serious implications for the less technologically advanced nations: "The information about their own natural resources may be used directly against their interests by TNCs, intelligence services, and ill-disposed governments."

In addition to producing inequities and imbalances, the elaboration of computer communication technology in the market economy serves to rationalize the irrational in American society. By this, Schiller means that obsolete or inequitable arrangements (e.g., the private insurance system) are perpetuated through the use of information technology to increase their effectiveness and efficiency.

Despite the economic power of the Fortune 500 and their dominant position in the emerging information society, the system they now preside over is vulnerable. According to Schiller, this vulnerability has three main sources: 1) competition from Europe and Japan ("the industrially developed market economies have no intention of acceding to an American global information hegemony"), 2) antiimperialist movements in the Third World, and 3) uneasiness in the United States over the impact of information technology on employment, work relations, personal security, and other matters.

Perhaps the principal shortcoming of this provocative book is the author's failure to present clear alternatives to the domination of the information economy by corporate giants. Schiller's arguments reveal a keen awareness of the role of organization, capital, and resources in the effective utilization of information. Yet he does not address the question of what type of socioeconomic organization could make effective use of information in the interest of the general public. Indeed, it is far from clear just what Schiller means by the "general public." Is it limited to United States residents or does it encompass the whole world?

Schiller argues that the interests of American TNCs are at variance with the interests of other countries in the industrialized and developing worlds. Would this conflict of interest disappear if information were less privatized and a wider segment of the American public participated in the control of computer communication technology? Under what conditions of control and participation would the interests of the diverse groups in American society be served best? These questions remain to be answered. Ablex Publishing Corp., Norwood, N.J. (1981, 187 pp., \$17.50).

—Abbe Mowshowitz

REPORTS & REFERENCES

TELECOM STATUS

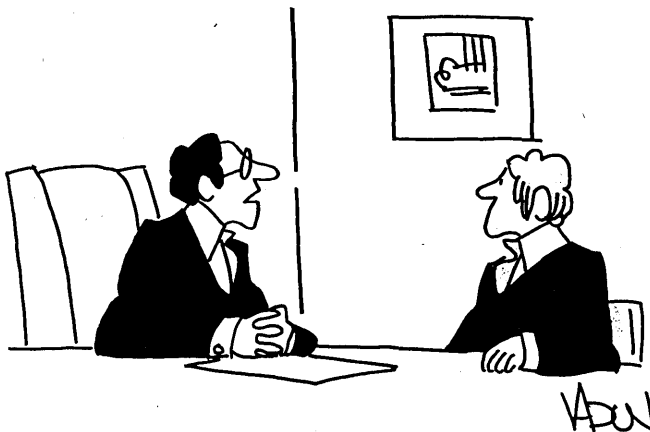
A 700-page report, "Telecommunications in Transition: Status of Competition in the U.S. Telecommunications Industry," is available from Information Gatekeepers, Inc. The report discusses the history, current structure, and growth of the telecom industry. It sells for \$195; outside the U.S., add \$15 for postage. To order, contact Information Gatekeepers, Inc., 167 Corey Rd., Brookline, MA 02146, (617) 739-2022.

SATELLITES: YESTERDAY AND TODAY

The IEEE Press is offering a 392-page volume, "Compendium of Communication and Broadcast Satellites: 1958 to 1980," compiled by the Communication and Broadcast Satellite Systems Committee of the IEEE Aerospace and Electronic Systems Society. Each satellite is pictured, and the communications payload and bands utilized are illustrated. Major transmission parameters are listed for each satellite, along with the date launched and lifetime designed. The Compendium is available in hardcover only for \$34.95, and at a discounted \$26.20 for IEEE members. Contact the IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854, (201) 981-0060.

EXECUTIVE GUIDANCE

Marvin Kornbluh, Information Service and Futures Research specialist with the Congressional Research Service of the Library of Congress, has written an executive's guide to planning, implementing, and controlling services and information in financial organizations, entitled "How to Manage Financial Systems." Published by the Financial Managers Society for Savings Institutions, Inc., the book tells executives "what they need to know" about managing systems to deliver quality services and information. Over 200 checklists and charts summarize various concepts and techniques, while focusing on the environment of savings institutions. The guide is available to FMS members for \$25.00, and to nonmembers for \$34.95. To order, contact



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*DATAMATION

CARTOON BY CHUCK VADUN

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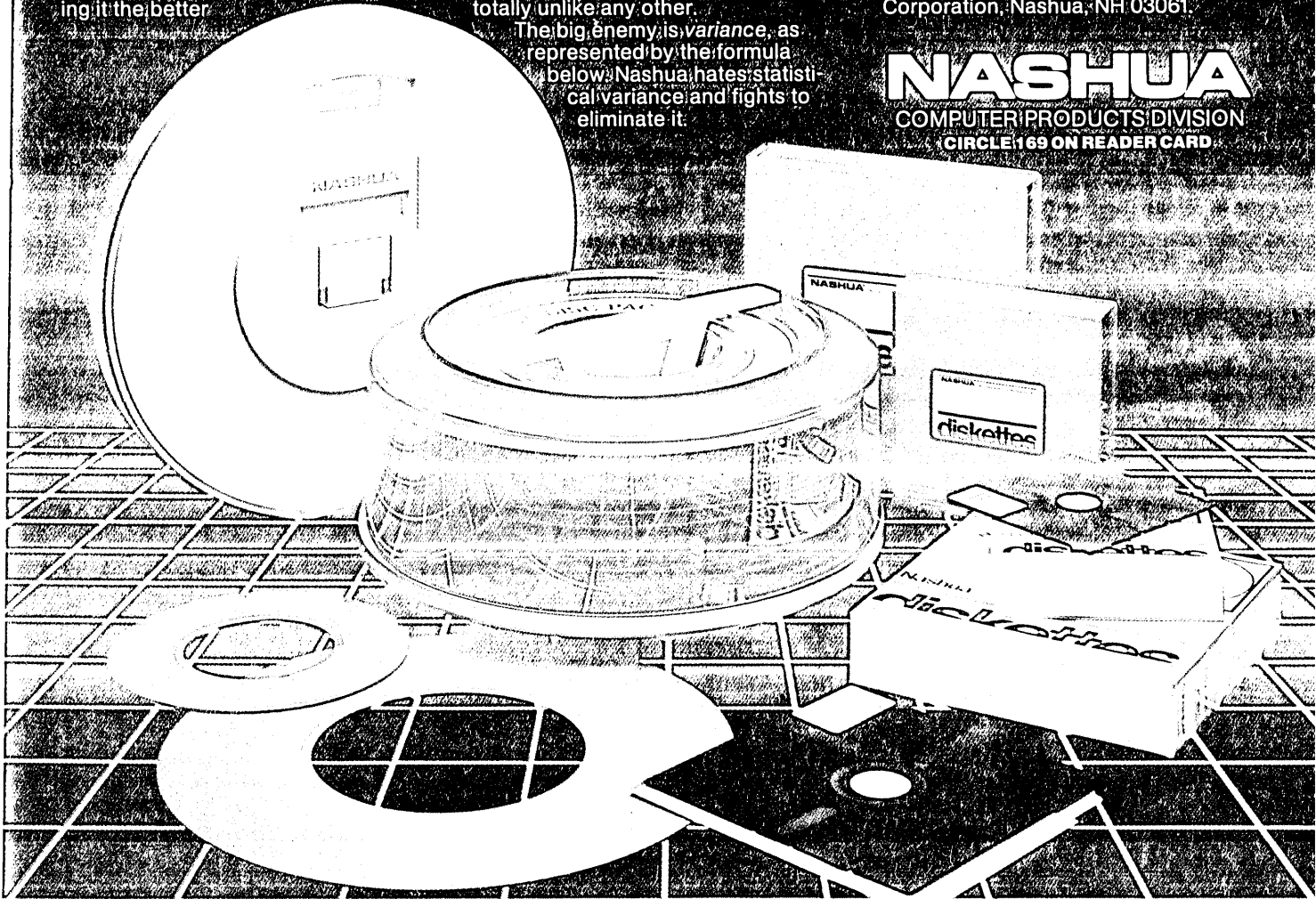
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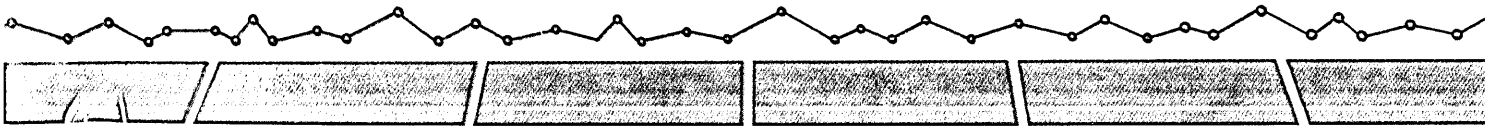


Variance:

$$V(Y|X) = V\left(\sum_{j=1}^K \beta_j X_j + \epsilon\right) = V\left(\sum_{j=1}^K \beta_j X_j\right) + \sigma^2$$

$$= \sum_{j=1}^K X_j^2 V''(\beta) + \sum_{j=1}^K \sum_{l=1}^K X_j X_l \text{cov}''(\beta_j, \beta_l) + \sigma^2$$

(5)



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FMS at 111 East Wacker Dr., Dept. TM, Suite 2221, Chicago, IL 60601, (312) 644-3100.

CONTROL WITH QUALITY

"A Positive Approach to Dp Quality Control/Assurance" is one in a series of reports offered by FTP. Their reports consist of presentations made to groups of MIS and dp personnel, usually in the New York area. In "A Positive Approach," Charles W. Lybrook describes how to begin quality control, how the dp user learns, how value is added by this function, and where quality assurance is headed in the future. FTP reports can be purchased separately (\$25 each) or on a yearly subscription basis (four reports for \$95). Contact FTP, 492 Old Town Rd., Port Jefferson Station, NY 11776, (516) 473-1110.

SEMINARS

DATAPRO EXPANDS

Datapro has added to its already large inventory of seminars for the winter schedule, running from February to May, with presentations in 12 cities across the U.S. Among the new entries are "Data Processing: Fundamental Concepts," "IBM's Systems Network Architecture," "Date Dictionary/Directory Systems: Evaluation and Selection," and "Data Security Implemen-

tation and Management." Datapro offers a free seminar catalog containing descriptions, dates, locations, fees, and instructor profiles, which can be obtained by calling their toll-free number: (800) 257-9406; in New Jersey, call (609) 764-0100. For more information, contact Datapro at 1805 Underwood Blvd., Delran, NJ 08075.

NCC: AGES 10 TO 18

Dr. Michael Zabinski, professor at Fairfield University in Connecticut, is offering two locations—Simsbury, Conn., and Atlanta, Ga.—for this year's National Computer Camp. Dr. Zabinski originated the computer camp in the U.S., and this year marks his fifth anniversary. The camp is in session for four weeks (July 11 to Aug. 6), and the campers will receive small group instruction on both mini and micro computers. Kids with lots, little, or no computer experience are welcome. Contact Dr. Zabinski at (203) 795-3049, or write to National Computer Camp, P.O. Box 624, Orange, CT 06477.

PRODUCTION AUTOMATION PROJECT

The College of Engineering and Applied Science at the University of Rochester will offer two short courses during June: "Geometric Modelling of Rigid Solids," June 21-25; and "An Introduction to PADL-2,"

June 28-29. "Geometric Modelling" deals with the mathematical and computational aspects of solid modeling in mechanical CAD/CAM systems. "PADL-2" is a core solid modeler with spare I/O facilities. This introductory course presents PADL-2 from both user and programmer viewpoints. The fee for the first course is \$700, for the second \$280. For further information, contact Arlene Rosenberg, Production Automation Project, the University of Rochester, Rochester, NY 14627, (716) 275-3106.

THIRD ANNUAL COMPUTER LAW INSTITUTE

The University of Southern California Law Center is sponsoring this year's Computer Law Institute once again. The dates this year are May 20 and 21. On May 20, anti-trust issues, fair trade practices, proprietary rights, trade secrets, software copyrights, and other issues will be discussed. The second day's program will focus on contracts for the procurement and distribution of computer products and services. Reservations can be made for either or both days. Contact Ami Silverman, USC Law Center, University Park, Los Angeles, CA 90007, (213) 743-2582.

SOFTWARE EVALUATIONS

The National Manufacturing Software Evaluation Symposium will be held March



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WIS PROJECT OFFICER

to maintain and further develop the Programme's on line information system (World Food Programme's Information System - WIS) and related data processing actions, identify potential system improvements particularly in respect of meeting cost effectiveness criteria; recommend development steps also with-in telecommunication; assist in the negotiation and procurement of contractor efforts and monitor on-going efforts for quality of product and adherence to cost/schedule milestones; ensure maximum compatibility between word/data processing. The incumbent will be responsible for user training and supervision of project personnel.

ESSENTIALS: ten years progressively responsible professional experience in computer systems with at least seven years in possession of principal responsibilities for design procurement and installation of on line interactive systems and related administrative duties; proven capability to translate end user information problems into effective information/handling systems; the preferred candidate will have a comprehensive knowledge of technical/administrative attributes of telecommunication, IBM 370 equipment, OS/VS-CICS software, and ND-100 hardware/software.

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15-19 at the Fairmont Hotel in Dallas, Texas. The symposium will host 10 software vendors, who will bring their wares to be evaluated. Christopher Gray and Richard Bourke will be the lecturers. The symposium is cosponsored by the North Texas chapter of APICS; the Center for Management Development, SUNY at Buffalo; and the Southern Methodist University's Management Center. For more information call (716) 831-2151.

VENDOR LITERATURE

PERSONAL DISK

To help solve storage problems on HP and other IEEE-488 bus-based personal computers, Microcomputer Systems Corp. suggests its MSC-9800 Series Subsystem. The MSC data sheet lists product specs and options, and provides a one-page detailed description of the benefits and functions of the vendors' Winchester disk drive subsystem. MSC, Sunnyvale, Calif.

FOR DATA CIRCLE 350 ON READER CARD

AMCEE ED

AMCEE, The Association for Media-based Continuing Education for Engineers, is a nonprofit consortium of engineering universities organized to advance education for engineers, industrial scientists, and technical managers. AMCEE offers over 450 video-

tape courses in 26 disciplines from its 20 university members. Brochures describing AMCEE's courses are available free of charge. AMCEE, Atlanta, Ga.

FOR DATA CIRCLE 351 ON READER CARD

MISSING PERSON?

LOCATE, the personnel locator system, can help "revolutionize" your company's directory systems and customer service. So says TeleSciences, Inc., the company offering LOCATE and a free informational booklet on their product. TELESCIENCES, INC., Marlton, N.J.

FOR DATA CIRCLE 352 ON READER CARD

STAR OF WORDS

Word processing software for micros, or more specifically, MicroPro International Corp.'s WordStar, is the subject of this 15-page brochure. WordStar's capabilities, benefits, and options (such as SpellStar and MailMerge) are illustrated in the brochure. MICROPRO INTERNATIONAL CORP., San Rafael, Calif.

FOR DATA CIRCLE 353 ON READER CARD

LEASING CATALOG

Data terminals, microprocessor test and development systems, and telecommunications equipment can be leased or rented from Leasametric, Inc. The company's Data Products Catalog is available free of

charge. LEASAMETRIC, INC., Foster City, Calif.

FOR DATA CIRCLE 354 ON READER CARD

MODEM

Concord Data Systems offers a brochure that highlights its full duplex V.22 modem. CDS claims their modem "commands the highest price/performance ratio of any full duplex V.22 modem available." CDS, Lexington, Mass.

FOR DATA CIRCLE 355 ON READER CARD

BUSINESS SOFTWARE

The Basic Four Information Systems Division of Management Assistance, Inc. (MAI) has released literature describing its Comprehensive Business System, or CBS III. Literature is also available on Basic Four computers and software packages. MAI BASIC FOUR, Tustin, Calif.

FOR DATA CIRCLE 356 ON READER CARD

TOUCH ME SCREEN

"The low cost and ease of installation of this device enables anyone using a computer display to add this feature." And TSD's free four-page brochure will tell you how. The brochure gives the product specs, applications, and principles of operation for this particular touch screen. TSD DISPLAY PRODUCTS, INC., Bohemia, N.Y.

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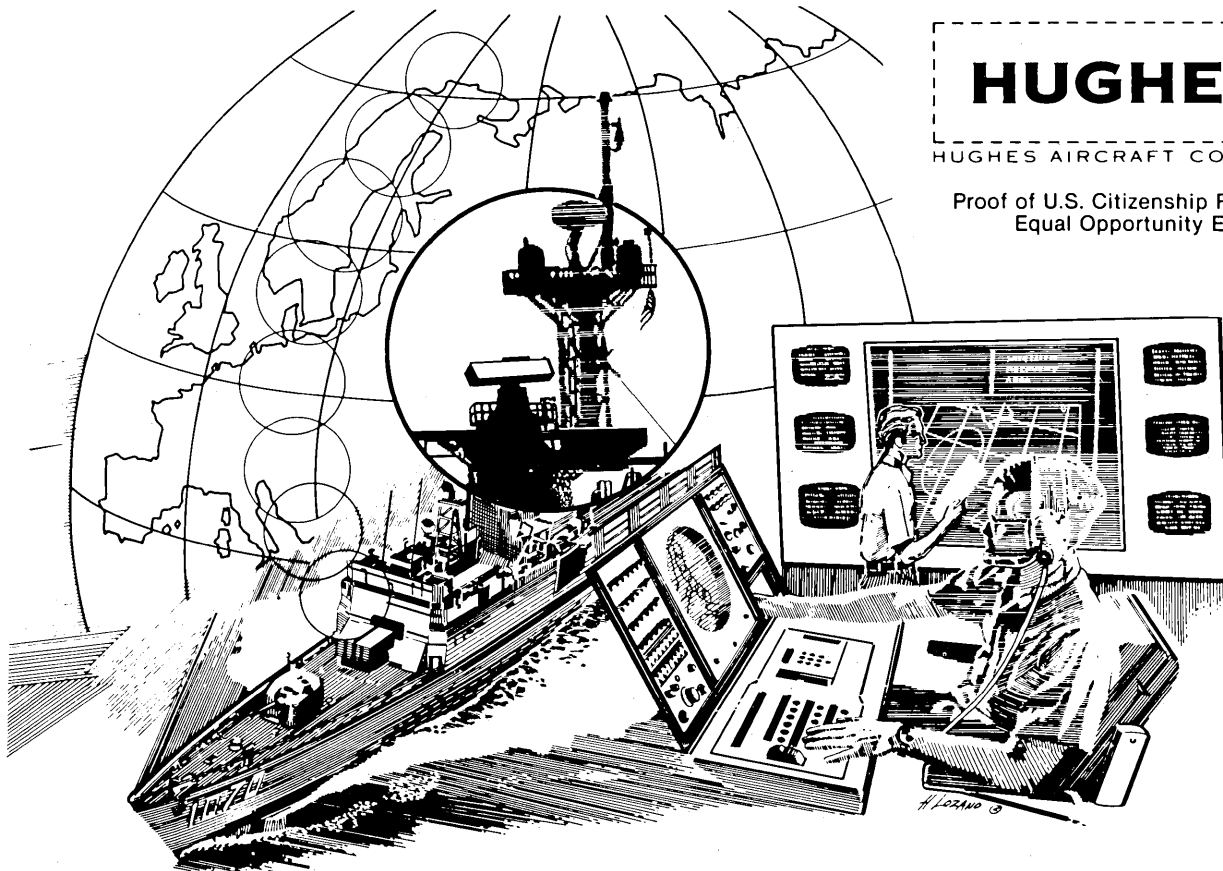
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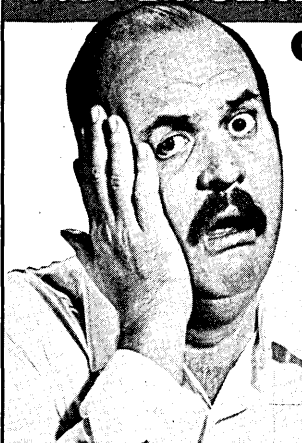


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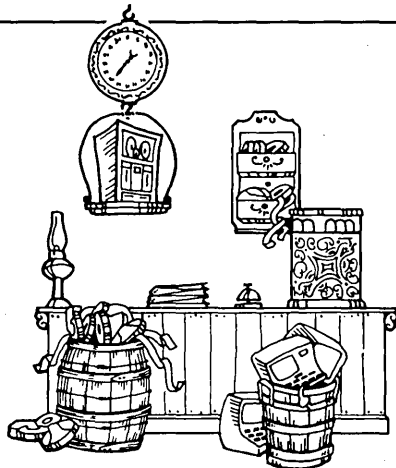
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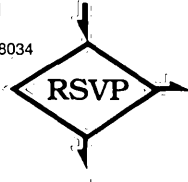
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SNA MYTHS

In the past, DATAMATION has published stories on IBM's SNA, written by staff members and contributing authors. We'd like to present IBM's view this time, authored by IBM Fellow Edward H. Sussenguth. Dr. Sussenguth joined IBM in 1959, and by 1970 his work concentrated on terminal-computer communications systems. As the division director for IBM's Systems Communication Division, he headed SNA development.

One learns at a young age, "Don't believe everything you hear or read" (not intended to be applied recursively). Most articles on Systems Network Architecture in the computer-communications press accurately portray the abilities and limitations of IBM's SNA products, architecture, and general strategy. Occasionally, however, misconceptions, misinterpretations, misunderstandings, or lack of knowledge on the part of the writer confuse the reader. I have collected here 10 of the more common myths and have made a brief comment on each.

Myth: IBM is about to abandon SNA.

Recent communication products from all IBM divisions offer SNA support today. Future plans are also based on SNA. The recent statement of direction on compatibility among office products assumes SNA as a base. The rate of acceptance of SNA systems is ahead of projection.

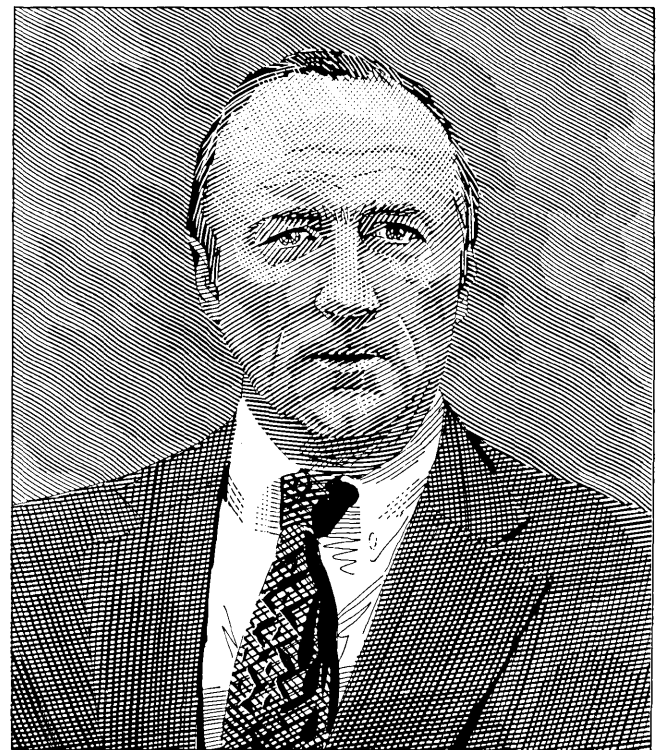
IBM intends to strengthen existing SNA capability and expand upon it. There is no "project X" in planning to replace SNA. *Myth: SNA is unduly complex.*

One must be careful to distinguish between the complexity of the tasks to be performed and the appearance of that complexity to a user.

An SNA network is complex in the sense that it: 1) has the capability to handle many terminal and application types; 2) can be configured from a simple tree orientation to a fully meshed network; 3) is robust under failure and automatically recovers from many error situations; 4) works harmoniously with all available data communication carrier services at speeds up to 230Kbps; 5) can be configured with priority and secure routes; and 6) can be managed from a single point or multiple points using authorized terminals anywhere in the network. The protocols and procedures to do these and other functions are not simple.

The important point, however, is that these protocols and procedures are supplied with the SNA hardware and software; the customer is not required to program them himself as he is in other and older systems. The result is that the complexity to the user is significantly reduced.

Thus, whereas it is fair to state that an SNA network is



internally complex, it is unfair to imply that undue complexity is discernible to users.

Myth: SNA is centered on a single large computer which routes all traffic and has all control.

No data traffic need be routed through a host computer unless that host is the originator or recipient of the data. Avoiding such routing of data through hosts is the purpose of SNA's networking capability. The routing is done by the Network Control Program (NCP) in 3705 Communication Controllers.

To establish a session (a conversation between a terminal and a program or between two programs) either VTAM or TCAM in a System 370 host verifies authority for such a session, checks the routes required and brings them up if necessary, establishes appropriate routing tables, and executes similar system actions. Converse procedures are followed at the end of a session. The programs perform error recovery, restart, and resynchronization when failures occur. In the condition of normal data traffic, however, these programs are not invoked.

In this sense, SNA does have central control, but that is as far as it goes. A customer can configure his system so that system

READERS' FORUM

control is shared by many hosts, each handling a portion of the network. He may also elect to have some hosts backing up others for failure protection; then the loss of one need not affect the system operation at all. Thus, in the operational sense when such characteristics are important, SNA need not be controlled by a single central computer; extensive decentralized management and operation are provided.

Myth: SNA locks users into IBM.

Today, an SNA system supports a wide variety of terminals. IBM's network controller products such as the 3705, Series 1, and the 8100 provide interfaces which match a large number of terminal types not manufactured by IBM; in System 370, TCAM offers interfaces to even more. Many manufacturers now advertise SNA-compatible equipment.

The terminal equipment area is highly competitive and a "lock-in" strategy would be a poor business decision for IBM. Most IBM customers use communication equipment from several vendors today and will continue to do so.

It must be realized, however, that terminals that implement SNA protocols offer, in general, more function, better performance, and better diagnostic capabilities than non-SNA equipment. This can be appreciated by briefly considering how non-SNA terminals attach to an SNA system: the protocols of terminal X are matched in the NCP to allow proper communications link operation. Next, a portion of the NCP called NTO places terminal X's end-to-end protocols and all of its data into an SNA envelope. The remainder of the NCP and all of the SNA network to which it is attached now handle the information in a fully compatible SNA way. When the SNA envelope reaches its destination host, the SNA programming therein "opens" the envelope and passes terminal X's end-to-end protocols and data to the application program which understands and interprets them. Thus, these terminals enjoy the same full benefits of networking, routing, flow control, and recovery procedures as if they were SNA terminals. However, these benefits end at the NCP (which is the surrogate for terminal X), and do not extend to the terminal, as they do with SNA terminals.

Myth: SNA is dead-ended.

SNA capability is expected to grow extensively in the future; the base upon which this function growth is planned is stable and comprehensive.

An original design goal was to provide an open-ended system that could grow as new technologies and requirements appeared. Three examples may illustrate achievement of this goal:

1. SNA networking capability has evolved from a tree structure to a fully meshed network, and it can be installed in either way or in combination. For this evolution, significant changes were made to the key system-control programs, VTAM, TCAM, and NCP without requiring changes in any terminals or cluster controllers (e.g., 3270 display, 3600 finance system, or System 34). Moreover, no changes were required in any operating system (e.g., MVS or DOS) or any subsystem (e.g., CICS or TSO).

2. Display terminals have progressed from a capacity of 24 lines of 80 characters with a single color and little outboard function to models with capacities of 43×80 or 27×132 characters using seven colors with outboard formatting and multiple partitions. Modifications to CICS and similar subsystems were needed to support these new functions, but no changes in networking programs were required.

3. SNA's first release in 1974 supported only analog leased lines. Today, modifications, primarily to the NCP, provide attachment to leased, circuit-switched, or packet-switched services. Analog or digital facilities may be used with either terrestrial or satellite links, and all combinations of the services can be supported simultaneously. No change to any other program is needed and the user need not be aware of which services are used.

Myth: IBM does not support international standards for communication products.

IBM endorses international standardization because of the promise it holds for customer growth and ease of use. However,

IBM does not encourage unique national standards or standardization of technically immature concepts.

To illustrate IBM's support: IBM was the first, or among the first, to deliver support for the major new international communication standards: HDLC (1973), X.25 (1978), and X.21 (1979). IBM was unquestionably the first to deliver capability for all three.

Myth: Other vendors' architectures are compatible with OSI; SNA is not.

OSI definitions have progressed to the point where a seven-level model has been defined, the basic functions within each level have been identified, and some elements of system-to-system protocol have been sketched. Of the seven levels, the many applicable standards for the first three (e.g., X.21, HDLC, and X.25) are well defined and have been implemented by several manufacturers and communications suppliers. IBM has delivered equipment in support of all of them. Protocols for the remaining four levels are not yet precise enough to allow implementation. Thus, it is not possible to state that one's architecture, or more important, products, conform to OSI standards.

The function and structure of the OSI levels are similar to SNA; however, details differ and, for compatibility, details must match. In the vital areas of error recovery and network management, OSI is just beginning its work, but SNA has delivered significant function.

The most important point, however, may be that OSI and SNA have different goals. SNA defines how products work together to form one system. OSI definitions are to allow interconnection between systems; for example, between an SNA system and the communications software system of another vendor. When the goals are met, OSI and SNA will mutually support each other.

Myth: SNA works poorly on satellite circuits.

A terminal-to-host connection that uses a satellite communication link experiences a round-trip delay, about a half-second longer than a terrestrial counterpart. The use of older protocols (e.g., BSC) or mistuning of newer protocols (e.g., improper setting of the SDLC modulus count) can cause severe performance degradation. For example, in some cases a terrestrial-link response time of three seconds can lengthen to 30 when that same application is handled on a satellite link. With proper parameter settings, the performance change of an SNA terminal on a satellite link can be limited to approximately the round-trip delay. At transmission speeds below 20Kbps, an SDLC modulus of eight is adequate; at higher speeds, modulus extensions up to 128 are needed, an extension required in appropriate SNA products.

It is important to note that the overall SNA performance on satellite links is almost always better than a similar operation using a BSC terminal with terrestrial communications.

Several vendors supply satellite-delay compensation units to overcome the performance degradation noted above. These units usually operate by enveloping the terminal data into an SDLC link control for transmission. SNA equipment does not need these delay compensators because SDLC (and other performance enhancement protocols) is already built in.

Myth: SNA and X.25 are competing system solutions and only one can win.

This is wrong on several counts. First, X.25 is an interface; SNA is a system architecture. X.25 defines an addressing and multiplexing procedure to interface to public packet switching networks. SNA not only includes these fundamental features, but also a myriad of higher level functions such as session control, routing and flow control, network management, distributed data synchronization, and data presentation and format control.

Second, existing SNA products provide more function than existing or proposed packet networks with an X.25 interface. This is typified by some of the items noted above. If a vendor were to use X.25 protocols as the starting point for his architecture, he would barely be started on the definition of a total system.

Third, there is an adaptation which enables SNA products to work with most X.25 public packet switching services. These prod-

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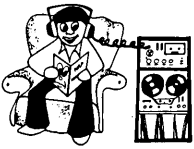
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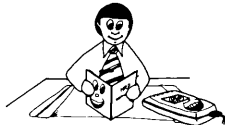
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ucts work well, and customers who so desire can benefit from both SNA and these services. These adaptations do not require significant restructuring of either the architecture or products; the effort approximates integrating a new data link control.

Fourth, most networks with an X.25 interface offer capabilities not otherwise available on public services. Two examples are multiplexing data for several destinations onto a single communication line and tariffing principles based upon traffic volume rather than distance. IBM is pleased to see these developments because they give our customers greater flexibility in configuring distributed data processing systems.

Myth: SNA is perfect.

Ah, were it only so. No, SNA is not perfect; improvements to some existing offerings are needed and new functions should be added. Examples of possible improvements include: more dynamic capability to change system parameters, better facilities to handle networks of 10,000 terminals or more, expansion of attachment capability for more types of non-SNA terminals, extension of the SDLC modulus, and more complete and consistent hardware problem determination, error logging, and statistics gathering. New areas of possible expansion include: connection of otherwise independent networks, terminal-to-terminal capability, expansion of problem determination capability into certain software components, inclusion of SNA text and facsimile terminals, and a delayed delivery facility. These examples are meant to illustrate the types of SNA expansion that are being studied; they are not intended to indicate explicit product plans or imply any commitment thereto.

—Edward H. Sussenguth
Research Triangle Park, North Carolina

MAGIC FOR THINK

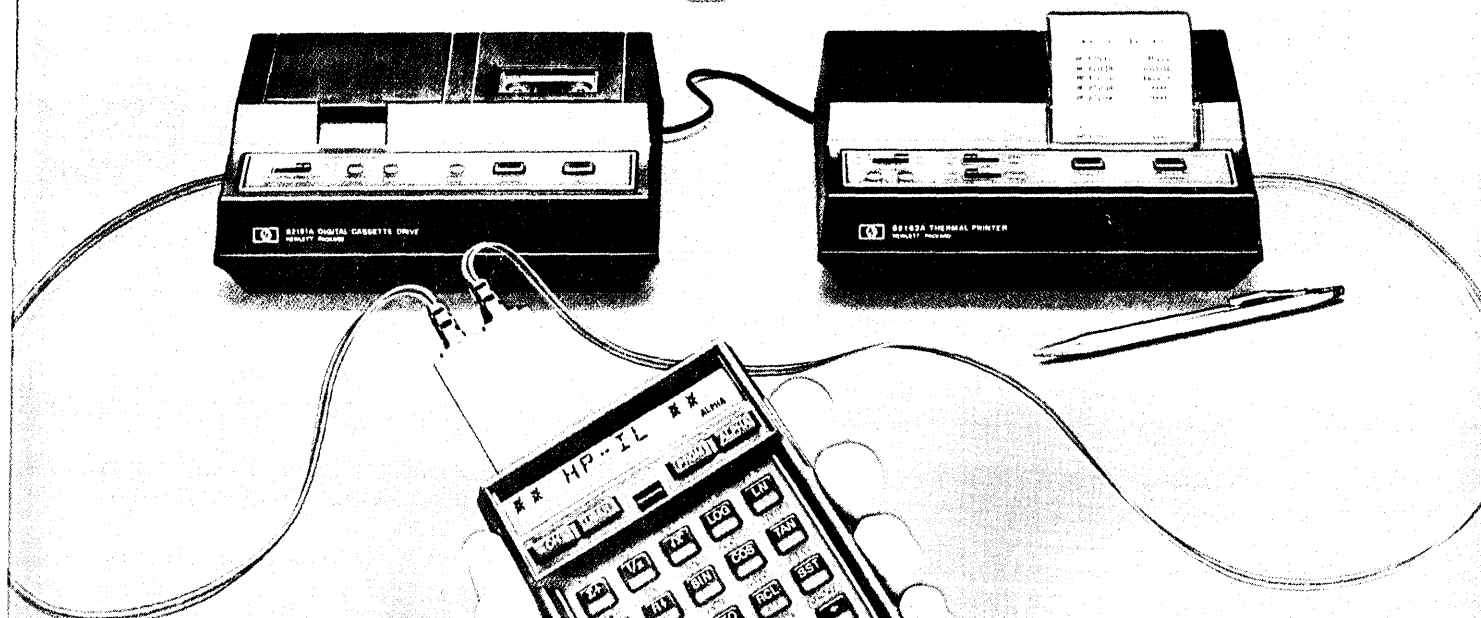
According to current estimates, human beings have existed on earth some 100,000 years, of which 90,000 were spent in hunting and gathering societies. Organized agriculture has existed for about 10,000 years, and the scientific revolution is about 400 years old. Industrial manufacture has been with us for only 200 years. The last 10 years have been labeled the computer revolution. If our brains/minds were formed and are still being formed by evolutionary processes, these time spans suggest that the "primitive brain/mind" is still very much with us. We talk loudly about logic and scientific method, yet we live in the midst of myth and magic. It is not that logic has replaced myth and that scientific method has replaced magic. Rather, myth and magic have reached such a level of sophistication that we label them "logic" and "scientific method." The power of myth is that it provides a conceptual model, be it pictorial or verbal, that allows its believers to handle real contradictions in the world. The power of magic is that, although we are forever ignorant of what lies behind observable phenomena, we are able to manipulate it somehow through technology, be it primitive technology or high technology.

It seems to me that many office workers in Boston handle the arrival of the office computer in the same way that many native people in Papua New Guinea handle the arrival of First World science and technology, including computers. No matter how much we learn about computers, there is still a mystique surrounding them.

Natives of Papua New Guinea face the contradiction of a tribal society that is rapidly receiving high technology. How does one adjust to a world that includes shrunken heads, cannibalism, tribal war, cars, airplanes, and computers? Many of them handle the contradiction with a myth called Cargo Cult.

Office workers in Boston face the real contradiction of an old-fashioned office (a minisociety or tribe) that is rapidly receiving

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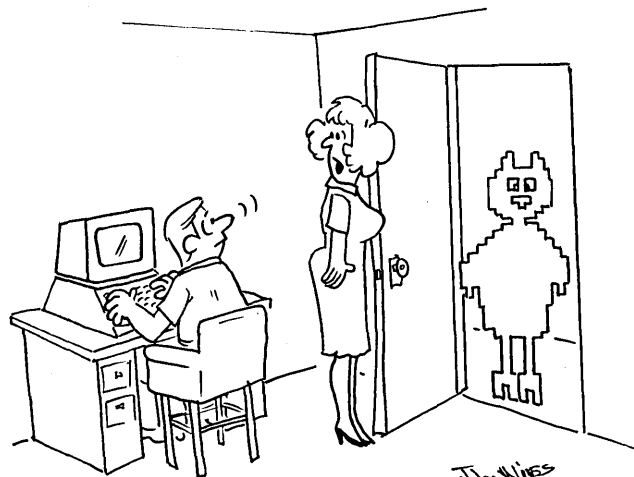
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high technology. How does one adjust to a world that includes the affections, fears, and hopes of human beings, and datacommunications through computers? Many of them handle the contradiction with a myth that I call Computer Cargo Cult.

Most Papua New Guineans have never seen a factory, an engineering corporation, or a scientific laboratory. They have seen Europeans do little work, yet ships and airplanes arrive bringing cargo—guns, radios, home appliances, cars, etc. They know that native people work very hard but get little or nothing. Thus they have come to believe Europeans have "Magic for Think," probably from the Bible, which they use to get the cargo God makes. Heaven is pictured as a large European house, with adjoining warehouse, on a cloud over Sydney, Australia. The door is always open and everyone is welcome. Angels do the cooking. The food is terrific. The bar is well stocked. When supplies run low, God makes more cargo. Jesus uses a helicopter, "eggbeaterflying-Jesus," to ferry the cargo to the docks and airports of Sydney. The crates originally have both native and European names on them, but the Europeans erase the native names. Jesus was crucified because he was about to reveal the cargo secret. To the Papua New Guinean who believes in Cargo Cult, all machines originate with God, and can be obtained through magic. The free-vending machine is the model for all machines. Machines give the native person great prestige by transforming him into the beautiful person—the European. Animism and utilitarianism are combined. Machines have emotions, a puckish sense of humor, and a social class—the divine. The best machines are easy to operate, make all the decisions, and free humans for a life of luxury. Although villages need appropriate technology (e.g., potato-peeling machines, small pumps for wells), native people want "Big Magic" (e.g., canned food, radios, cars, airplanes, computers, nuclear reactors, Concorde).

Many office workers mistake the crt for the computer. Magical entries are typed in and a report appears. Learning to use the office computer is like training to be the sorcerer's apprentice in bygone ages. The computer adds great prestige to jobs. The computer is discussed as if it were only a high-speed moron who does routine tasks quickly and well. This is self-psychotherapy to deal with fears that the computer can think better than humans. The office computer is discussed as if it had the emotions of a manic depressive, a morbid sense of humor, and the social class of the user. No office worker could build or purchase a large computer. Computers are obtained from mysterious computer laboratories.



"Harold, have you been cheating on Space Invaders?"

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Digital Engineering, Techtran, Cipher, Priam, SMS, Western Peripherals,
Epson, Able Computer, Elgar and 3Com.

READERS' FORUM

User-friendly computers will be simple to operate, take over human responsibilities in decision-making, and do all the work. The ideal user-friendly computer is such Big Magic that a press of a PF key formats and prints a report, makes you a cup of coffee, and shines your shoes. It is estimated that almost 40% of all computer applications for office tasks cost more in time and money than they did when done by humans alone.

Papua New Guinea Cargo Cult handles the contradiction of a society trying to combine primitive tech with high tech. Boston Cargo Cult handles the contradiction of an office with precomputer human skills that has added computers. Each kind of cultist believes his myth is empirically verifiable. In Papua New Guinea, the native cultures are very resilient and pervasive. They have absorbed many cultures. Successful churches need both crucifixes and sorcery masks, Cargo Cult affects greatly the teaching of science and technology, the running of businesses, and the government's science and technology policy. The University of Papua New Guinea was built on land-fill in what was originally a prehistoric swamp. In fact, and perhaps in allegory, the corner of the Chemistry Building is sinking into the swamp. Boston Cargo Cult may prove just as pervasive and resilient.

—George Ballester
Boston, Massachusetts

This article first appeared in the November 1981 ACM's Greater Boston Chapter Newsletter.

ASK AN ACCOUNTANT

The microcomputer revolution holds the promise of substantial benefits for the owners and managers of small companies. Significant gains in operating effectiveness appear tantalizingly close.

But, as a recent DATAMATION Editor's Readout (November) emphasized, this promise could well be scuttled by inadequate postsale support for the user, who is often acquiring his first computer. At best, the problem could limit the micro's achievements to simply improving clerical efficiency. But at worst, it could lead to the disruption of user operations and to widespread disgruntlement toward the computer industry in general.

The low selling prices of such systems prevent manufacturers and systems houses from offering the same handholding support that is often provided to users of large equipment. Yet many small companies require support of proportionately greater scope and complexity.

This stems from the fact that most small businesses have been unable to develop advanced information capabilities. Existing manual systems have served mainly to satisfy the clerical necessities of payrolls and receivables. Management information reporting has been geared primarily toward providing the data needed for income tax reporting.

Few small companies have been able to afford employees capable of designing a sophisticated accounting system. Even if such a system had been designed by an outside party, the cost of operating it would have been prohibitive.

The microcomputer makes it possible to operate a sophisticated system at a reasonable cost. But the problems of designing, implementing, and supporting such a system remain to be solved.

Before computer equipment is introduced into a small company, an information structure which reflects the realities of the company's operations should be designed. The design must incorporate suitable methods of administrative and accounting control.

This structure must then be translated into computer software and related manual procedures. Adaptable packaged software can play a major role, but special circumstances will often necessi-

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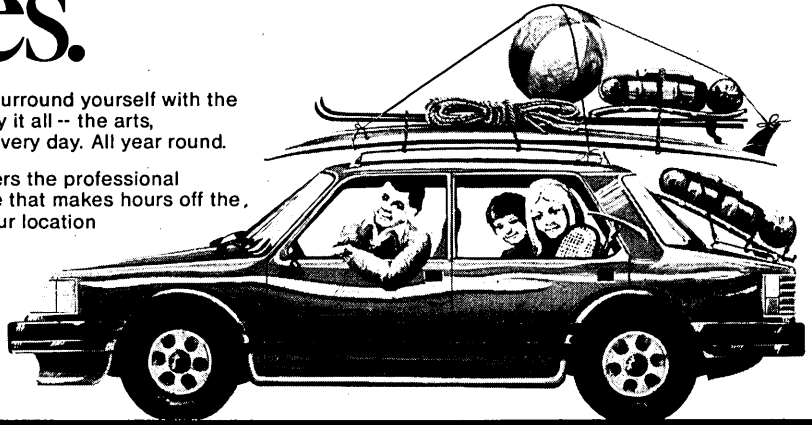
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READERS' FORUM

tate some degree of custom software. Particularly close support will be required during the startup period. Continuing support will be needed as new events alter information needs.

This is, to be sure, a tall order. But it must be met if we are to avoid both outright failure and the limiting of the computer to clerical functions. Several solutions have been proposed, including instruction manuals, toll-free telephone numbers, educational programs, and computer store personnel. While all these approaches have value, they do not fully come to grips with the problem.

A merchant, for example, may conclude that he needs profit contribution information for branches, departments, and product lines, and that these applications are to be integrated with considerations of internal control. A voice at the end of a toll-free line will probably not be particularly useful.

Assume that a small manufacturer is depreciating his facilities under the shortened economic lives permitted by the new tax law. He may decide that, for management purposes, he should also monitor his profitability based on more realistic economic lives. A sales clerk in a computer store is apt to find great difficulty in providing such help.

In theory, instruction manuals and educational programs can train the user himself to solve such problems. But most users simply don't have the time to acquire such expertise. Thus, considerable doubt exists as to the ability of equipment manufacturers, software companies, systems houses, and computer stores to provide the needed degree of small-user support.

A potential solution lies in the local and regional public accounting firms throughout the nation that maintain continuing relationships with a multitude of small business clients. Upon these relationships, and upon the strengths inherent in the accounting firms, an effective channel for the delivery of computer services can be constructed.

Typically, such a firm provides a mixture of tax, accounting, and auditing services. Through these services, it will have gained an in-depth knowledge of the client's operations, its existing manual systems, and the unmet information needs that the micro-computer can bring into the realm of feasibility.

A bond of frank communication and mutual trust will likely exist between the firm and its client. This can be of value to both parties during a period of major change such as the introduction of computer systems into a company.

Expertise in financial accounting, managerial accounting, tax regulations, and internal control will be available within the accounting firm. Each is an indispensable element in the designing and sustaining of a comprehensive information structure.

For most accounting firms, the only missing capability will be computer expertise. But it will be far easier for these firms to acquire such a capability than for computer stores to become knowledgeable in accounting, tax law, internal control, and the like.

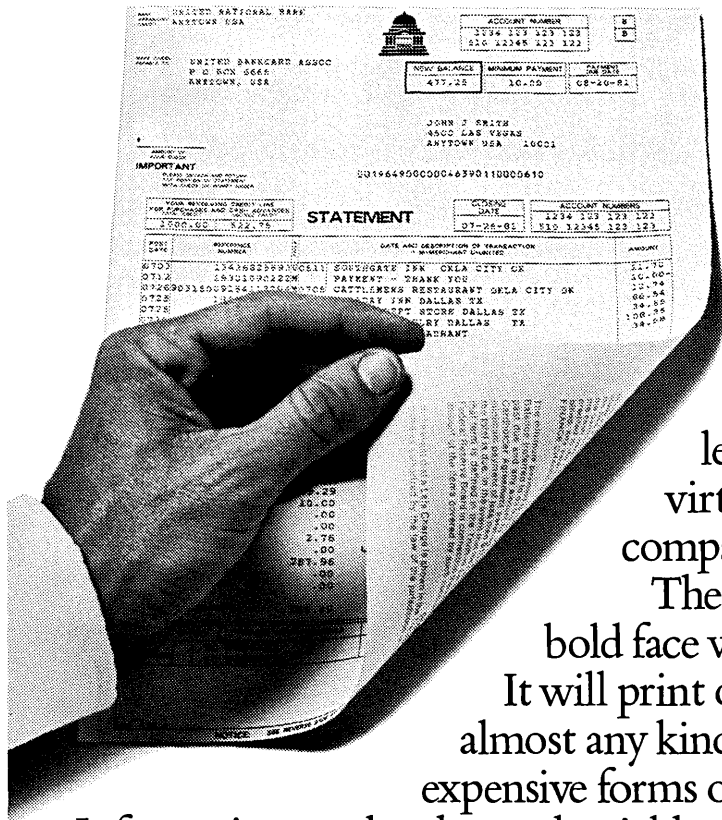
For some accounting firms, the best method will be the development of an in-house capability. Others may choose an association with another accounting firm which has its own computer services base. Still others can work with a company that specializes in providing computer support for accounting firms and their clients.

Information structure design and support services will become more affordable and more effective by being delivered as part of an overall package of accounting services. Thus, small companies can benefit from both the microcomputer and a well-designed information structure. Accounting firms will be provided a new avenue for substantial, challenging, and rewarding growth.

**—Eugene P. Maddox
Johnson City, Tennessee**

If you'd like to share your opinions, gripes, or experiences with other readers, send them to the Forum Editor, DATAMATION, 666 Fifth Ave., New York, NY 10103. We welcome essays, poems, humorous pieces, or short stories.

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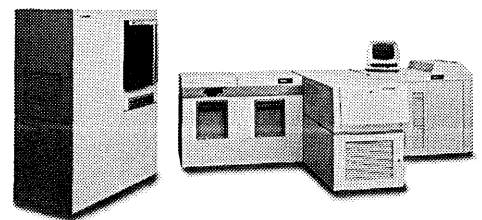
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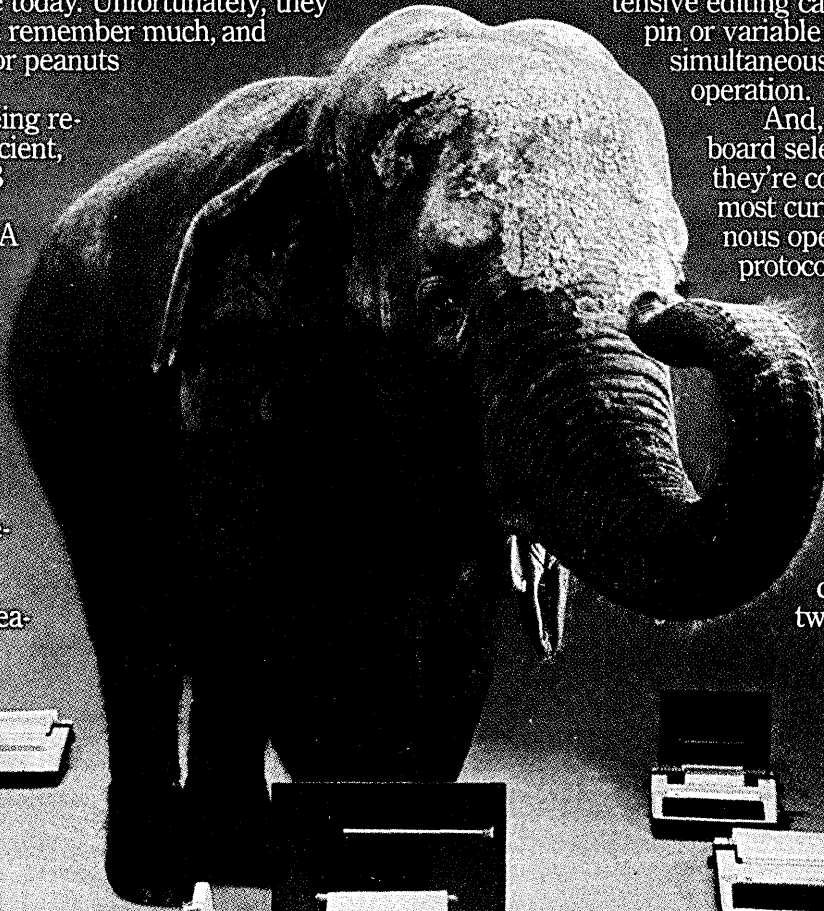
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