

# DATA MATION 84

NOVEMBER 15 \$3.00 U.S.A.



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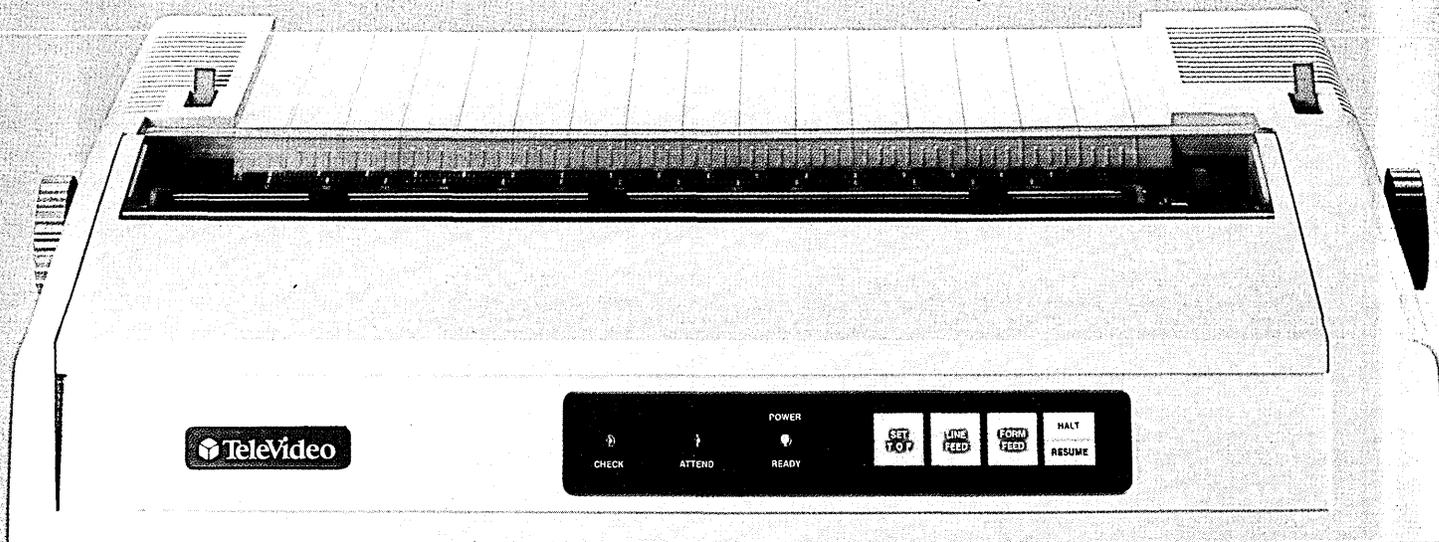
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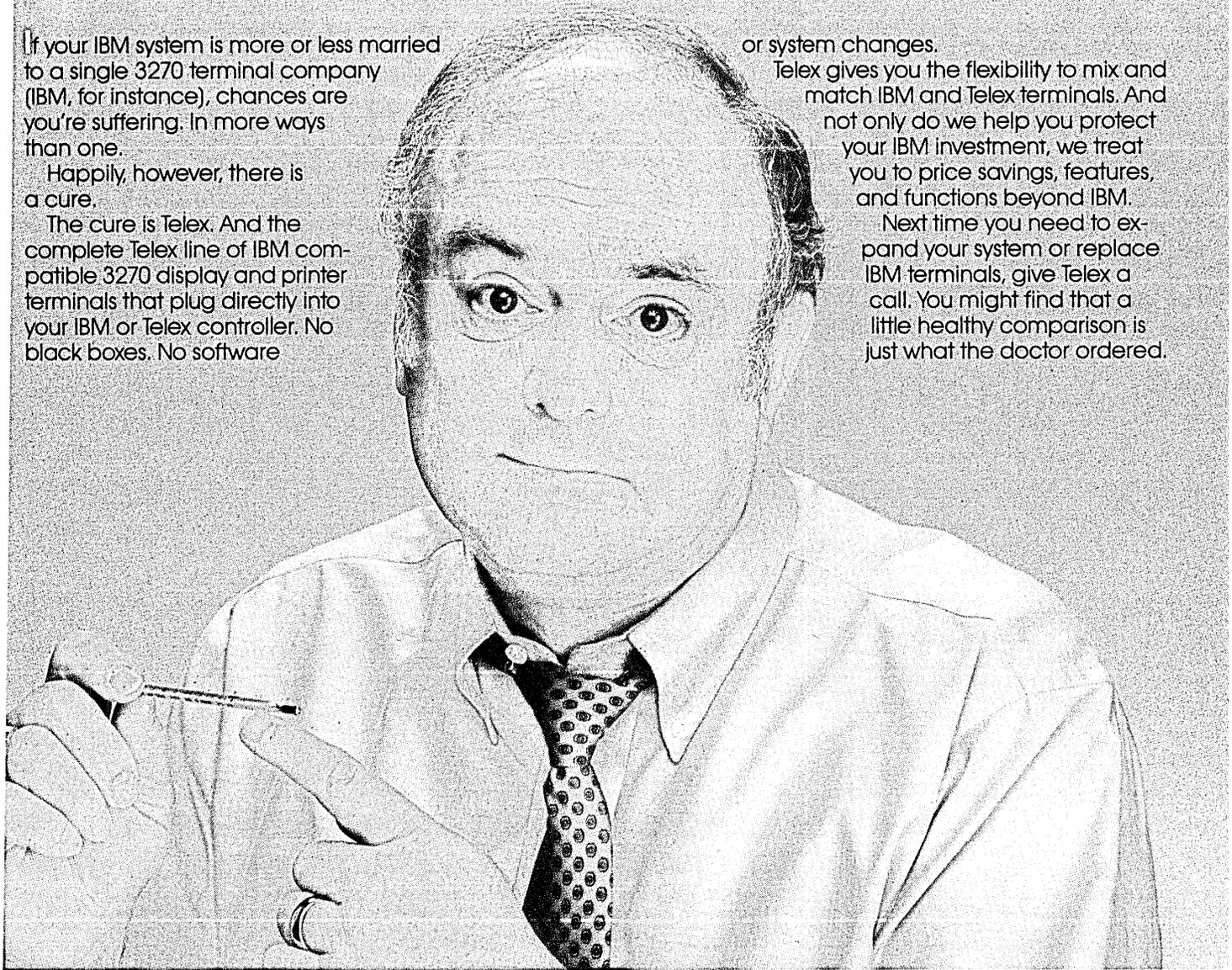
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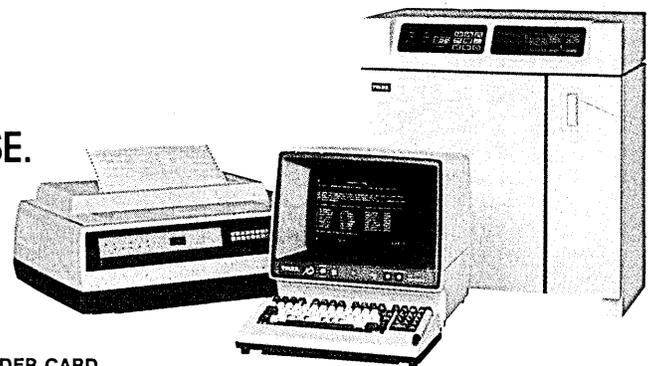
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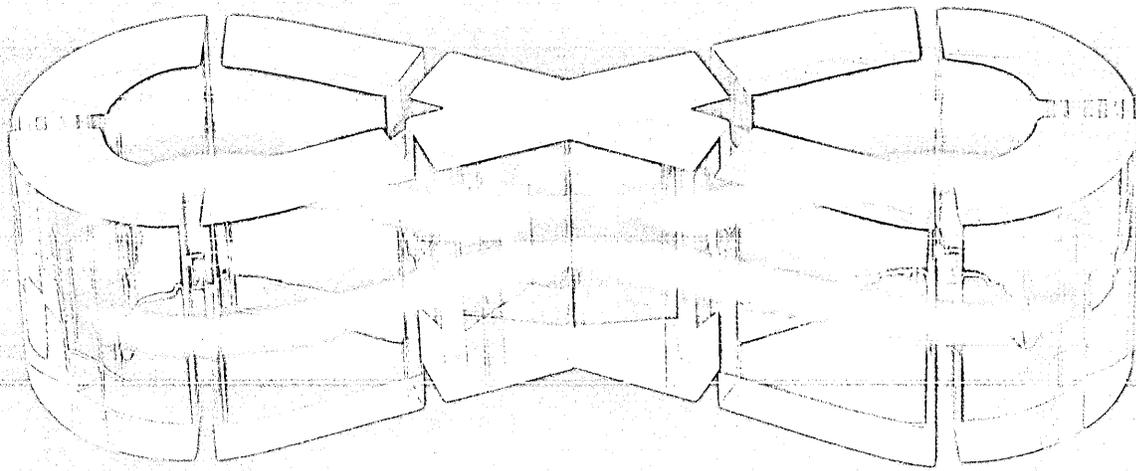
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CIRCLE 4 ON READER CARD



# DATA MATION

NOVEMBER 15, 1984/\$3.00 U.S.A.  
VOLUME 30 NUMBER 19  
This issue, 181,798 copies

## FEATURES

### 34 IN FOCUS

New small computer users are increasingly choosing micros over minis as their entry vehicles to the small systems market. John W. Verity reports on that and other trends in this year's "Mini-Micro Survey."

### 104 BRANCH OFFICE MICROCOMPUTING

**Perry Petersen**

The result is an effective blend of local autonomy and central control at one company where branch offices "hire" the main office's dp staff to help set up their micro operations.

### 113 MANAGING THE PC REVOLUTION

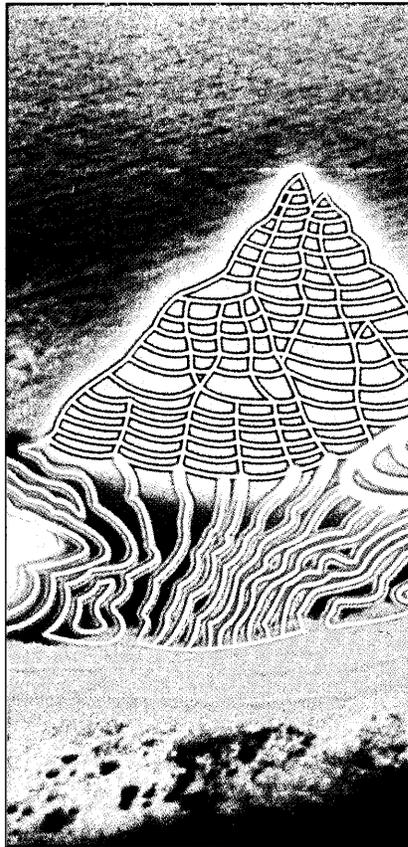
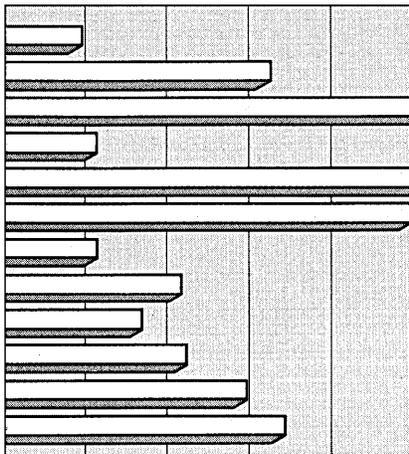
**Eric E. Vogt**

To do it, dp managers must evolve from the master chefs of the main-frame-oriented shops of yesterday to the short-order cooks of user services of today.

### 119 BUSINESS GRAPHICS TRENDS

**John A. Lehman, Doug Vogel,  
and Gary Dickson**

Despite recent enthusiasm for business graphics, little is known about its current or potential use. A new survey has some answers.



### 127 THE KING OF MALAPUTA

**Sol Yurick**

Was his threat to the world real? Or was it just monetary? Was there a difference?

### 141 IS PROGRESS WHAT IT SEEMS TO BE?

**David F. Noble**

In an excerpt from his new book, a controversial historian of technology explores the destructive ramifications of technological progress, and accuses scientists and engineers of being its servants, not its masters.

### 159 LEADERSHIP IS CRUCIAL

**William C. Kimmerly**

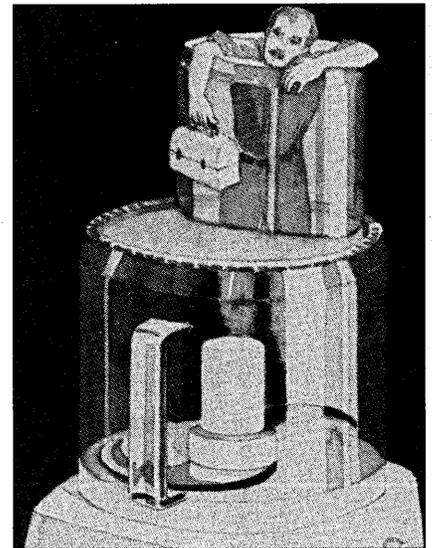
The effective dp manager must be particularly adept at developing and maintaining a balanced control framework.

## NEWS IN PERSPECTIVE

- 56 **EXPORTS**  
Back to ground zero.
- 58 **SOFTWARE**  
A game without rules.
- 66 **TELECOMMUNICATIONS**  
We want Unix: MITI.  
Japan bets on fiber.
- 80 **DATA CENTERS**  
Quake and shake.
- 96 **SAFETY & HEALTH**  
Toxic shock troops.
- 100 **BENCHMARKS**

## DEPARTMENTS

- 8 **LOOKING BACK**
- 13 **LOOK AHEAD**
- 18 **CALENDAR**
- 23 **LETTERS**
- 31 **EDITORIAL**



- 173 **HARDWARE**
- 182 **SOFTWARE**
- 192 **ON THE JOB**
- 194 **MARKETPLACE**
- 197 **READERS' FORUM**
- 202 **ADVERTISERS' INDEX**

## OEM SUPPLEMENT 169-1

- 5 **PRINT UP A STORM**
- 14 **STAYING ALIVE: HOW TO  
WRITE A CONTRACT**
- 17 **DENTISTS NIBBLE  
AT OFFICE AUTOMATION**

COVER PHOTOGRAPH BY STEVE COOPER

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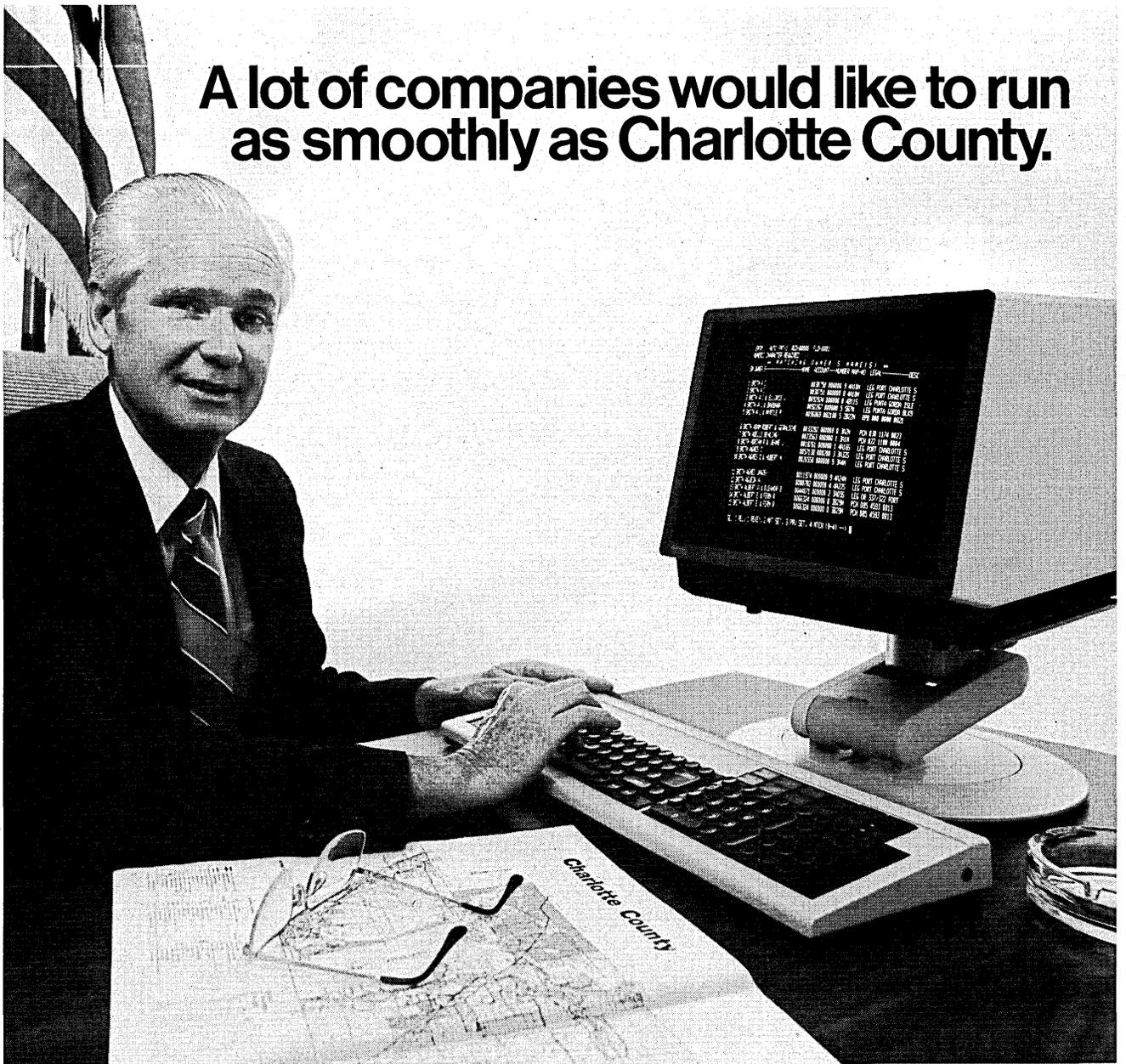
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The Nixdorf system handles the complete range of the county's administrative functions from property appraisal, tax collecting, license and registration renewals, payroll,

and mosquito control to a number of law enforcement requirements.

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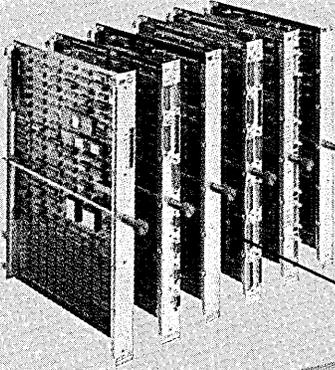
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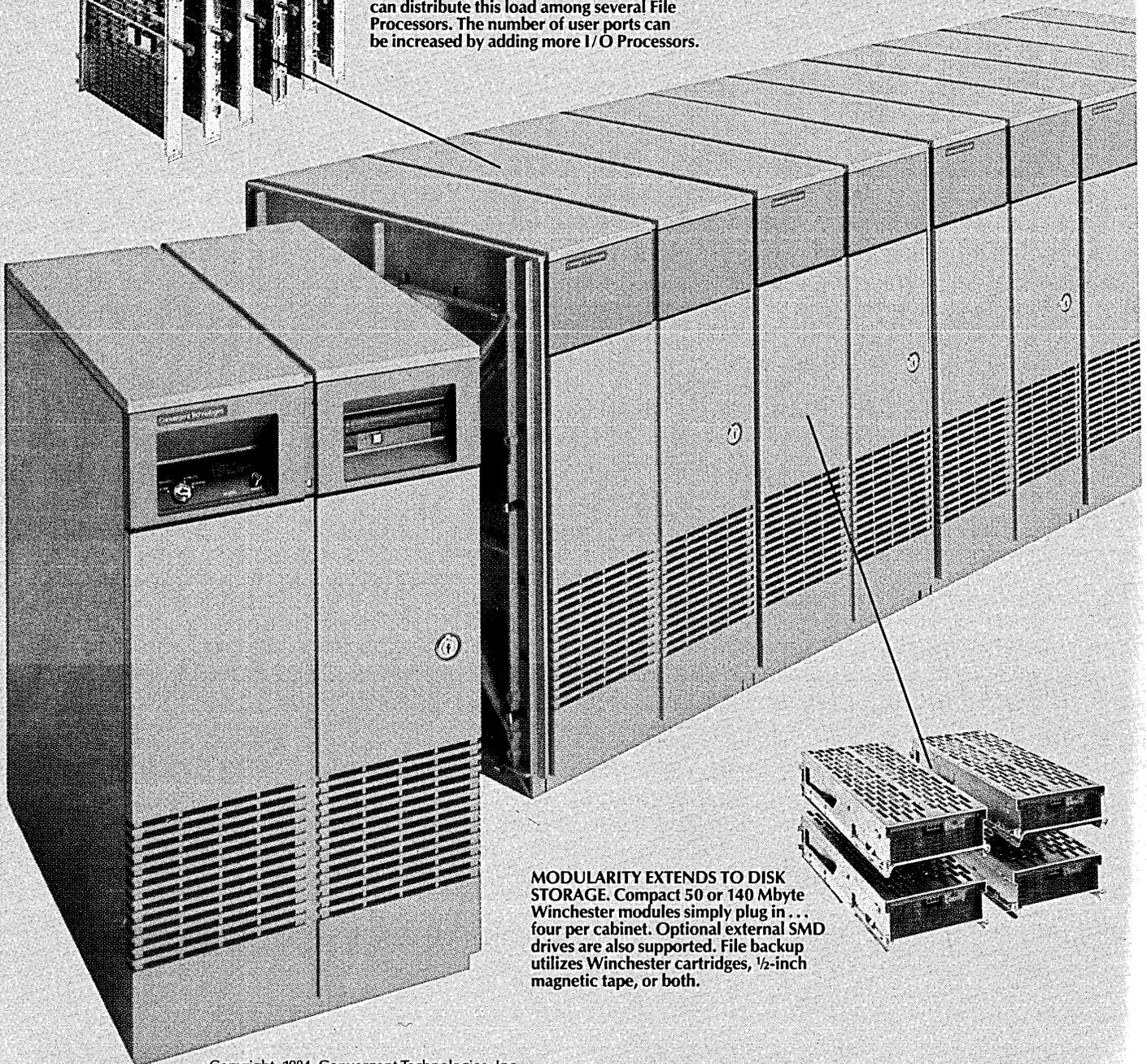
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MegaFrame's virtual memory Applications Processors each have a 32-bit CPU, up to 4 Mbytes of RAM and run a demand-paged version of UNIX System V. Up to 16 of them can operate in parallel.

The File Processors effectively function as back-end machines providing DBMS, ISAM and other disk-related services. Up to six File Processors each with four disks can operate in parallel.

Terminal and Cluster Processors can also be added—the latter serving front-end communications needs. They off-load communications from the other processors by running protocols such as SNA and X25 networks.

MegaFrame's daisy-chained cabinets offer total expansion potential of up to 36 slots. OEMs configure the system needed for specific applications simply by adding the correct number/combination of processors.

**Flexibility in applications development.** Inclusion of one or more Applications Processors allows running UNIX System V. All standard UNIX tools are provided, along with COBOL, FORTRAN-77, BASIC interpreter and compiler, plus Pascal.

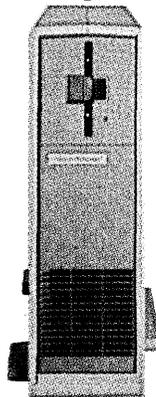
The "least-cost solution" to serving a wide range of UNIX-systems needs, MegaFrame has won acceptance from OEMs in the U.S. and abroad. The uniqueness of its modular design, its versatility in providing upgrade-path options and its price/performance advantages give it market-share potential of outstanding dimensions.

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**Convergent Technologies, Data Systems Division, 3055 Patrick Henry Drive, Santa Clara, CA 95050. Phone: 408/980-0850. Telex: 176-825.**

## MiniFrame™: the entry-level multiuser UNIX system.

Starting at under \$5,000 for a single-user system, Convergent's MiniFrame offers outstanding capabilities for small to medium sized organizations running large UNIX-based applications. Utilizing an MC68010 microprocessor operating at 10Mhz, with no wait states, it provides impressive CPU speed—comparable to VAX™-11/750 running the AIM™ Benchmark. MiniFrame features virtual memory management, with demand-paged implementation of UNIX System V. It runs as many as eight terminals, with up to 50 Mbytes of integral mass storage. MiniFrame and MegaFrame are object-code compatible, allowing OEMs to offer a *complete family* of systems unrivaled in price/performance characteristics.



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# LOOKING BACK

## D.C. DEALS

*November 1964:* Washington was in the news again this month, described as a hotbed of activity for the computer industry.

There was seemingly no shortage of new business for computer makers like Philco, which received a \$31.4 million award from the Defense Communications Agency to supply special purpose computing gear for its 10 new AUTODIN overseas message switching centers.

Honeywell chalked up another major deal, with the Air Force, by making an agreement to lease eight 800/200 systems, replacing the obsolete equipment in use at major air commands. That meant about \$1.5 million in annual revenue for Honeywell.

Meanwhile, Control Data cracked the ice in what was considered staunch IBM territory—the U.S. Weather Bureau. CDC managed to sell the bureau a 6600 that would replace a STRETCH and a 7094 mod II (the bureau had another 94, which would remain for the time being). The 6600, which rented for about \$150,000 a month, was expected to eventually take over all the chores that were then handled by the three IBM systems (renting for about \$350,000 a month).

The deal supposedly underscored what many considered to be the vulnerability of remaining IBM lease installations in the government. They would have been in even bigger trouble had the Defense Department not made its mammoth \$230 million purchase of leased machines the previous winter (the majority of which were 1401s, 90s, and 94s). "We didn't realize then just how seriously this action would affect our market," said one D.C. computer sales exec. Were it not for that purchase, a great many more IBM systems would now be in serious trouble."

There were still quite a few 1401s on lease in government agencies, and reports of replacement constantly swirled about these. The Navy was said to be readying specs for bids to replace a fleet of its 1401s, and the Post Office had the same intentions for 12 of its 1401s. The big question, however, was whether IBM would be able to defend its vast corps of

purchased 1401s when they became eligible for replacement in 1966 and 1967.

## SOURCE CODE TAKES OFF

*November 1974:* The unexpected surge of source marking for supermarket products promised to open up a potential \$7 billion market for systems that would scan the Universal Product Code (UPC) at check-out counters.

The proliferation of the funny little bar code symbols surprised even its sponsors. Selected in April 1973 as the standard by the industry, the UPC was finding its way on to more and more grocery shelves. Distribution Code Inc., the Washington, D.C., firm that was implementing and administering the code, whose springtime prediction that 50% of all supermarket items would be marked by the end of the year, now thought 65% to 75% might be a better figure. Three firms, Hunt Wesson, Green Giant, and William Wrigley Jr., anticipated 100% source marking of their products by year-end.

Chairman of the grocery industry's UPC Council, John Strubbe of Kroger Co., in Ohio, gave a more conservative estimate of 65%. In the beginning, however, he was a bit more skeptical, "It's going much better than we expected in terms of source marking and in terms of the amount of equipment being offered by responsible computer companies. When we started this effort we weren't even sure there'd be one company offering equipment. Now there are eight or nine."

Everyone involved with the project was happy. Excepting Sen. Frank E. Moss (D-Utah), chairman of the Senate Subcommittee on Consumers, that is, who had asked President Ford's Economic Summit Conference to "investigate the potential inflationary effect of this substantial investment at a time of high interest rates, tight money, and marginal profits." He was concerned that the costs to the grocery industry for implementation of the code would run as high as \$3 billion, and would then be passed on to the consumer.

—Lauren D'Attilo

CIRCLE 8 ON READER CARD.



S O F T W A R E A G

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In the 1970's we developed a system to provide data independence—before there was such a thing as a relational data base.

Next, we introduced a high productivity programming language for developing applications in an on-line data base environment—before there was such a thing as a fourth generation programming language.

In both cases we anticipated a trend, and delivered a product to meet a need before it was even defined by the industry.

We didn't just stop there.

We recognized the importance of maximizing worker productivity at a time when others were concerned about the high cost of machines. That's why we are the first to present an integrated series of products that use the same language.

We identified the need for a high volume product for VAX machines—while most still considered the DEC-VAX equipment only for low volume, low capacity applications.

We saw the necessity of having many machines working in coordination and

developed our family of networking products to support this trend.

We realized the requirement for true distribution of data, so we carefully integrated data communication capabilities with our data base software.

By listening to our users, we anticipated the growing importance of 24-hour-a-day access to data. As a result, we now offer the first nonstop data base.

Today, while others are busy putting labels on our innovations, we are quietly moving on to our next innovation. And, that's the proper plan for the world leader in advanced systems software.

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# Takes their without



**The Displayphone-Plus Terminal**

# terminal's place the space.

It's important that the Displayphone-Plus\* terminal can fit with an existing information management system, offering download emulation of virtually any cursor addressing conversational CRT and plug-and-play compatibility with the VT-100.

But what makes the Displayphone-Plus amazing is that it does it all while still fitting comfortably on a desk.

Inside the Displayphone-Plus terminal is a 212A compatible auto answer modem with selectable 300/1200 BPS transmission rates and full automatic log-on. So it can meet the needs of managers and other occasional data users, while emulating such terminals as the Digital Equipment Corporation

VT-100™ and VT-52™, ADDS Viewpoint®, Regent 25®, and many more.

On the outside is a full-stroke keyboard and easy-to-read amber screen which allows the Displayphone-Plus terminal to match the performance of large, conventional terminals. Its sophisticated telephone capabilities allow it to surpass them with a 90-number directory, automatic dialing, and handsfree speaking. And it's as easy as a telephone to use.

To find out more about the Displayphone-Plus terminal, call 1-800-328-8800, or write to Northern Telecom Inc., Advanced Communications Terminals Division, P.O. Box 202048, Dallas, TX 75220-9990.



# IDMS/R is proving to be what most people expected it to be: Simply the best.

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With IDMS/R, people whose only data processing experience is an encouraging "you can do it" from the dp department are finding themselves able to create their own customized applications. They're doing it quickly, easily and, best of all, *independently*. And that comes as a welcome relief for overburdened dp personnel.

As for complex, high-volume production applications, IDMS/R is without peer. With an exclusive Cullinet feature called "Relational Fastpath," data processing can tune the database and thereby benefit from a dramatic boost in performance. Moreover, IDMS/R has the most sophisticated back-up and recovery capability of any dbms—an absolute must for on-line applications.

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Applications  
Database

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# LOOK AHEAD

## AT&T EYES DRI

After months of working together on Unix applications software, American Telephone & Telegraph is negotiating with Digital Research Inc., Pacific Grove, Calif., to acquire that company outright or to buy a significant part of it. Inside sources say that the two companies have found their current joint venture to be quite comfortable and that working together as one company would solve a lot of problems. AT&T needs to have a stronger presence in applications software while DRI needs the kind of financial backing and marketplace presence that AT&T offers. Expect some sort of equity move by year-end.

## OA STANDARDS POWWOW

As the international debate on a common networking standard heats up, is the office automation equivalent of the MAP standard now on the way? Ten of America's largest international computer suppliers have been invited by Bull, the nationalized French computer company, to a major workshop on open systems interconnection (OSI) standards to be held in Paris Dec. 12. Among the likely attendees are Honeywell, AT&T, Xerox, DEC, Wang, Hewlett-Packard, Sperry, and Burroughs. Bull's intention is to explain to the 10 U.S. majors why 12 of their European counterparts--including Britain's ICL, Germany's Siemens, Holland's Philips and Italy's Olivetti--committed to the OSI networking standard earlier this year. That OSI standard is now being adopted in factory automation schemes planned by major U.S. users like General Motors and E.I. DuPont.

## BUY PCS, GET FREE TXP

Tandem Computer has a novel scheme for marketing its new personal computer cum workstation, the Dynamite series. For each order of 500 or more units, the Cupertino, Calif., company will throw in a free top-of-the-line TXP processor. How can the company make money offering \$500,000 systems for free? Simple--the company knows the pcs will create a huge workload for the processors, on the order of 1MIPS per 10 pcs. So 500 pcs will move 50MIPS worth of TXP processors.

## HP, DEC IN CAE MARKET?

Engineers around the world will be glad to hear that their favorite vendor is entering the computer aided engineering workstation market. Hewlett-Packard will introduce next spring a CAE system based on its 32-bit 9000 workstation, though the special software for designing chips and other electronic components won't be available until later in the year. The early HP software

# LOOK AHEAD

## OPTICAL DISK SYSTEM FOR IRS

will offer schematic tools only, with the more advanced CAE features such as timing verification and logic simulation not appearing until 1986. Wall Street analysts Laura Conigliaro and Christine Chien at Prudential Bache add that DEC's new desktop VAX will also be adopted by oems as a CAE workstation machine, adding to the woes HP may cause the trio of red-hot Silicon Valley CAE startups, Valid Logic, Mentor Graphics, and Daisy Systems.

Northern California tax returns sent to the local Internal Revenue Service office next year will be scanned and stored on an optical disk system from Integrated Automation, Berkeley, Calif., as the first part of a nationwide switch to the optical storage of returns. If successful, the \$3.7 million deal for the first box may be replicated for the other nine IRS offices.

## PHILIPS TO REVAMP DP

After years of corporate indecision, Philips is finally reorganizing itself in the hope of getting its computer and communications operations to work together. Starting in January, Philips will merge its data systems division, which sells its dp and office hardware and software products, and its telecommunications division, which produces the private networking products like PABXs and local area networks. This corporate move follows Philips stated intention to bring computer and communications technologies together under the banner of Sophomation, the Dutch company's dp and OA networking concept. The company realized it is losing ground in the marketplace and must cut through its bureaucracy.

## RUMORS AND RAW RANDOM DATA

The American Civil Liberties Union is going to try to reverse a last minute decision by Congress to make it a crime to break into a government computer system. . . . Watch for Verbex Corp., Bedford, Mass., to bring out a continuous speech system at this week's Comdex show. The Series 4000 machine, which will sell for less than \$5,000 in oem quantities, will maintain a 100-word fixed vocabulary and be designed for controlling other machinery and entering data in noisy industrial environments. Verbex's original Series 3000 system was priced at \$24,000. . . . Several major vendors are looking into ways of using the new cellular radio technology as a transmission vehicle for data from portable computers. Salesmen with portables would be able to exchange data with a mainframe without having to leave their cars. Introduction is a year away.

**DIGITAL  
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TO LARGE  
SCALE  
COMPUTING.**



# INTRODUCING THE VAX 8600 SYSTEM.

Your applications can do exactly what you want them to on Digital's new VAX™ 8600 computer system. They can expand.

User population can increase. Scientific problems can become more complex. Transaction volume can intensify. And data storage requirements can grow exponentially.

The VAX 8600 system gives you unprecedented capacity for applications growth. It's the first of a new generation of large scale VAX processors, with memory expansion to 32 million bytes and online storage up to 160 billion bytes. Yet the VAX 8600 system maintains complete architectural compatibility with every other VAX processor – including the new desktop-size

MicroVAX I™ system. Every system in the family gives you the same VMS™ operating system software, with the same set of proven development tools, communications options and data management facilities. Quite simply, there's not another computer family in the world that can match the growth path you get with Digital's VAX systems.

---

## **YOU GET UP TO 4.2 TIMES THE PERFORMANCE.**

---

We've engineered the VAX 8600 system to deliver more than four times the processing speed and performance that the industry-standard VAX-11/780 system is known for. We've achieved this performance increase

through the use of ECL gate array technology and several advanced engineering techniques.

Specifically, the VAX 8600 system incorporates four-stage pipelined processing that increases throughput by allowing the system to execute one instruction while it simultaneously decodes a second, generates an address for a third and

fetches a fourth. There's also a floating point accelerator that speeds floating point operations.

Even with all its power, the VAX 8600 system conserves floor space. The CPU fits into the same size cabinet as the VAX-11/780 CPU. Power consumption and air conditioning requirements are similar, too.

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## **VAX 8600 SYSTEM HIGHLIGHTS**

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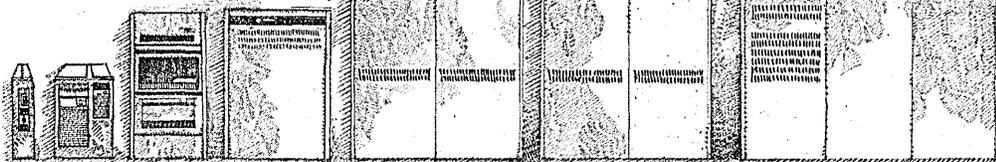
<b>MAXIMUM MAIN MEMORY SIZE</b>	32 Million Bytes
<b>MAXIMUM STORAGE CAPACITY</b>	160 Billion Bytes
<b>MAXIMUM COMMUNICATION LINES</b>	512 plus Local and Wide Area Networks
<b>PROGRAM ADDRESS CAPACITY</b>	4 Billion Bytes
<b>BUS SUPPORT</b>	Availability includes 6 UNIBUS,™ 2 SBI, 4 DR 780, 3 CI and 4 MASSBUS™
<b>PHYSICAL DIMENSIONS</b>	60½" x 73½" x 30"
<b>POWER CONSUMPTION</b>	6.5 KW (10 KVA)
<b>AIR CONDITIONING REQUIREMENTS</b>	22,200 BTU/hr
<b>ACOUSTIC LEVEL</b>	60 dBA

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LET YOU SHARE  
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OF VAX RESOURCES.**

The large-scale storage and multi-user support you get with Digital's VAX 8600 system can be increased many times over with VAXcluster™ systems. This



multi-processing capability, which is unique in the industry, lets you combine the resources of several VAX processors and manage them as a single system. VAXcluster systems enhance data integrity and increase system availability, with complete user transparency.

VAXcluster systems can be configured with up to 16 processors and storage servers in a variety of combinations. You can boost computing power in an existing VAXcluster configuration by adding a VAX 8600 system. Or you can build a new VAXclus-

ter using a VAX 8600 system as a compute server.

The wealth of resources available to all VAX systems includes VAX Information Architecture, which offers a CODASYL-

compliant database - VAX DBMS; and a relational database - Rdb/VMS. This software, together with the RMS hierarchical file manager which is part of the VMS operating system, can all use the DATATRIEVE™ user-friendly query language. And they all benefit from a Common Data Dictionary that eliminates data redundancy and permits record-, field- and user-specific security controls. What's more, you can automate your office with Digital's ALL-IN-1™ software.

All VAX systems give you a complete set of program debuggers, editors, and screen man-

agement utilities to work with. You have a choice of 15 programming languages. And you can combine different languages in a single application through the common calling standard.

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The VAX 8600 system is engineered for the reliability your large-scale applications require. Self-diagnostic intelligence simplifies maintenance.

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COMPUTERS  
IN THE WORLD.**

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# CALENDAR

## NOVEMBER

### **Systemotronica '84.**

Nov. 22-30, Moscow. For more information contact Düsseldorf Messgesellschaft mbH-NOWEA, P.O. Box 32 02 03, D-4000 Dusseldorf 30, Fed. Rep. of Germany, tel. (0211) 4560-729, telex 8 584 853 MED D.

### **Los Angeles Computer Showcase Expo.**

Nov. 29-Dec. 2, Los Angeles, Calif. Contact the Interface Group Inc., 300 First Ave., Needham, MA 02194, (617) 449-6600.

## DECEMBER

### **Great Southern Computer Show.**

Dec. 6-8, Tallahassee, Fla. Contact Laurel Netzer, Great Southern Shows, 1222 Shacleton Rd., Jacksonville, FL 32211, (904) 743-8000.

### **Washington, D.C. Computer Showcase Expo.**

Dec. 6-9, Washington, D.C. Contact the Interface Group Inc., 300 First Ave., Needham, MA 02194, (617) 449-6600.

### **DEXPO West (Sixth National DEC-Compatible Industry Expo).**

Dec. 11-14, Anaheim, Calif. Contact Natalie Kaye, Expoconsul International Inc., 55 Princeton Heightstown Rd., Princeton Junction, NJ 08550, (609) 799-1661.

### **Fifth Generation and Super Computers.**

Dec. 11-13, Rotterdam, The Netherlands. Contact Fifth Generation and Super Computers Symposium 1984, c/o Rotterdam Tourist Office, Stadhuisplein 19, 3012 AR Rotterdam, The Netherlands, tel. (010) 14 14 00, telex 21228 vvvnl.

## JANUARY

### **PC FAB Expo.**

Jan. 9-10, Orlando, Fla. Contact Frances Stewart, PMS Industries, 1790 Hembree Rd., Alpharetta, GA 30201, (404) 475-1818.

### **Asian Aerospace Expo & Conference.**

Jan. 18-22, Singapore. Contact Gerlad Kallman, Kallman Associates, 5 Maple Court, Ridgewood, NJ 07450, (201) 652-7070.

### **Communication Networks Conference & Exposition.**

Jan. 28-31., Washington, D.C. Contact William R. Leitch, Gen-

eral Manager, Communication Networks, P.O. Box 880, Framingham, MA 01701, or call (800) 225-4698 or (617) 879-0700.

### **Microcomputer '85.**

Jan. 29-Feb. 3, Frankfurt, Germany. Contact Philippe Hans, German American Chamber of Commerce, 666 Fifth Ave., 21st fl., New York, NY 10103, (212) 974-8856.

## FEBRUARY

### **1985 Office Automation Conference (OAC '85).**

Feb. 4-6, Atlanta, Ga. Contact Marty Byrne, American Federation of Information Processing Societies Inc., 1899 Preston White Dr., Reston, VA 22091 or call (703) 620-8940.

### **APAC '85.**

Feb. 11-14, Riyadh, Saudi Arabia. Contact World Computer Graphics Association Inc., 2033 M St. NW, Suite 399, Washington, DC 20036, or call (202) 775-9556.

### **1985 IEEE International Solid-State Circuits Conference.**

Feb. 13-14, New York, N.Y. Contact Lewis Winner, 301 Almeria Ave., Coral Gables, FL 33134, or call (305) 446-8193.

### **AFIPS-ASIA '85.**

Feb. 14-March 2, aboard the mv Worldwide Expo, to Japan, Taiwan, Hong Kong, Singapore. Contact AFIPS, 1899 Preston White Dr., Reston, VA 22091, or call (703) 620-8926.

### **International Computer Graphics Users Show and Conference (CGU '85).**

Feb. 19-21, London, England. Contact World Computer Graphics Association Inc., 2033 M St. NW, Suite 399, Washington, DC 20036, (202) 775-9556.

### **INFO/Central.**

Feb. 20-22, Chicago, Ill. Contact Show Manager, INFO/Central, 999 Summer St., Stamford, CT 06905, or call (203) 964-8287.

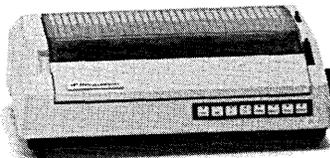
### **Computer Business Graphics.**

Feb. 20-23, Ft. Lauderdale, Fla. Contact Carol Every, Industry Representative, Frost & Sullivan, 106 Fulton St., New York, NY 10038, or call (212) 233-1080.

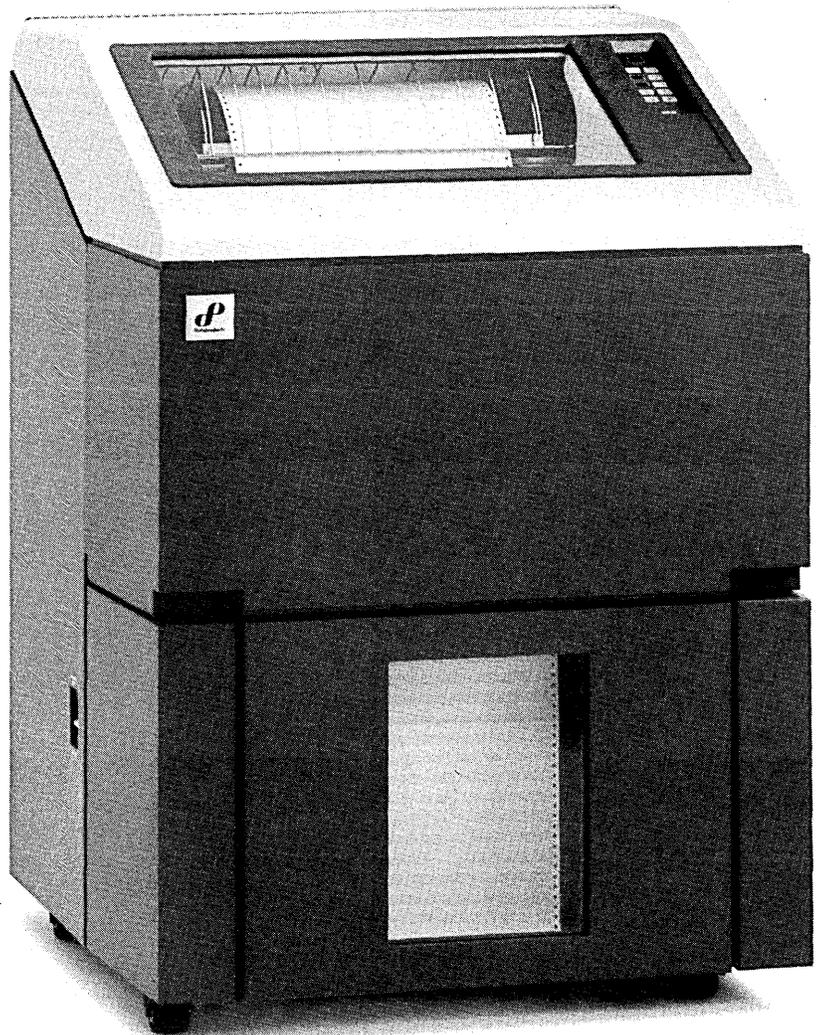
### **MICAD'85.**

Feb. 25-March 1, Paris, France. Contact World Computer Graphics Association Inc., 2033 M St. NW, Suite 399, Washington, DC 20036, or call (202) 775-9556.

**From**



**, to**



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If you're using your printer with a personal computer, you probably need one that can handle a variety of functions.

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In fact, we make more different kinds of computer printers than any other independent printer company in the world.

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### Extended file management facilities.

Among its many new features, SPSS<sup>X</sup> lets you handle complex files simply, and simple files with greater ease. You can match mountains of data from different files. Combine, split, sort and summarize with a few simple commands. And

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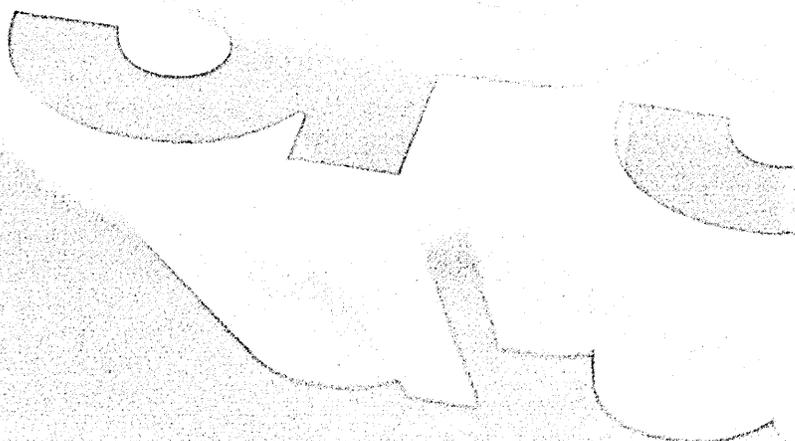
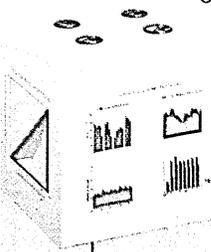
Like all SPSS Inc. products, SPSS<sup>X</sup> is designed to run on a wide variety of computers. So as you add or change hardware over the years, you won't have to change software or retrain your people.

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charts, bar charts and line charts appear at your command. Ponderous summaries and reports automatically turn out presentation-perfect. And complex SMF and RMF performance evaluations become routine.

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from Perkin-Elmer.

Unprecedented system responsiveness makes our XELOS<sup>™</sup> operating system the finest port of UNIX System 5.2 worth considering.

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XELOS runs on a full range of compatible, high-performance hardware. With a friendly, simplified user interface called the MenuMaker.<sup>®</sup> And a strong family of application software for office automation, decision support and data processing. All adding up to a highly productive programming and multiuser environment.

So if you're serious about the UNIX system standard, why not go for the finest: XELOS, from Perkin-Elmer.

To find out more, call us toll-free. Or write to The Perkin-Elmer Corporation, Two Crescent Place, Oceanport, N.J. 07757. In N.J. call (201) 870-4712.

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CIRCLE 14 ON READER CARD

# LETTERS

## MISSOURI, THE STATE OF THE ART

Your Sept. 1 In Focus (p. 26) is offensive to a minority group, "simple country boys from Missouri."

To suggest that "out there in the Ozarks somewhere, somebody will be using a number 10 tomato can and a string" shows how out of date you are with current backwoods technology.

Everyone knows a number 10 can yields too much talker echo. They were phased out through the '70s and current technology is number 303 cans for local distribution and number 2½ cans for long distance. Also, the string you cite has been replaced by 20-pound test monofilament line.

Your magazine is informative and usually current. Maybe your Kansas City bureau chief needs a week in the Ozarks to catch up.

GORDON G. HILL  
Maryville, Missouri

## SWEET TALK

Frank Sweet deserves five stars for his article, "What, If Anything, Is a Relational Database?" (July 15, p. 118). This article should be required reading for all database designers. I haven't read such an exciting and lucid description of any data processing topic in years. And it's all done in just four pages!

JIM THOMAS  
Programmer/Analyst  
Royal Alexandra Hospitals  
Edmonton, Alberta

## FAULT TOLERANCE

The "Rumors and Raw Random Data" section of the May 1 Look Ahead (p. 10) suggested that our NonStop TXP system was not selling well and that Tandem had improperly recognized revenue. Neither is correct.

First, customer demand for the NonStop TXP has more than met our expectations, both from within our installed base and from new accounts, and demand

continues to grow. The TXP system currently handles some of the largest and most critical applications for on-line transaction processing systems and, coupled with Tandem's recent price reductions for our NonStop 1+ and NonStop II systems, enables Tandem to provide to the entire transaction processing marketplace solutions having excellent price-performance.

Second, the suggestion that we acted improperly in recognizing revenue is totally incorrect. We conform to our revenue recognition policy, which is in compliance with generally accepted accounting principles.

GERALD L. PETERSON  
Vice President  
International Marketing  
Tandem  
Cupertino, California

## SOLO AND EASY

I would like to correct some information in an otherwise excellent article on "Front-end Programming Environments" (Aug. 15, p. 80).

The article states, "... the SOLOstation handles only separately compilable modules, rather than modules linked with multiple CALL statements. It also does not simulate mainframe data structures. Thus, it is the programmer's responsibility to supplement CALLS or I/O statements with stubs."

First, an important feature of the 1116 SOLOstation is that an individual module (or even a program segment) can be tested using the microscope-like Verifier facility, without requiring that called modules be linked together.

Second, while it is technically true that the SOLOstation does not simulate VSAM files, etc., per se, the SOLOstation does offer the capability to extract user-selected records from a host data file and transfer these data to the SOLOstation, where it can then be used as input for program testing.

Third, another feature of the

SOLOstation is that it automatically provides stubs (and user prompts or test data attachment, by the way) for CALLS or I/O statements, thus freeing the programmer from the tedious task of generating and then removing stub routines when the called programs or data structures are not yet available.

JOHN WHITESELL  
Director of Product Marketing  
SOLOsystems Inc.  
San Jose, California

## QUICK PROTOTYPING

Quick prototyping with Unix as performed by a skilled practitioner is a joy to behold.

An original, multifaceted, subject classification scheme created for the free intra-Mensa (high IQ society) expertise sharing service languished for years because the processing was too complex to ask volunteer PL1 and FORTRAN programmers to do. Edits, sorts, massive extracts, and formatting were all necessary to display its full potential for clustering a subject with all the disciplines to which it related. A casual mention of the long cherished dream to the owner of a micro with Unix resulted in one hour of his work and a lovely demo!

Might it be possible to simply replace a large, expensive, inflexible MIS, which can only perform the operations foreseen by its designers, with a database plus one very good Unix programmer who could really respond rapidly to the ever-changing needs of top management?

REBECCA C. PRATHER  
Falls Church, Virginia

## RENAISSANCE PERSON

I was cheered and buoyed by your editorial in the Sept. 1 issue. I am an operator with a master's in music, a long-standing interest in the Renaissance, and a desire for a job as a programmer/analyst, and your editorial spoke right to me. DATA-MATION was recommended to me as the best magazine on computing, and I read



# The HP 3000 compu

However much you change, you're going to need both office automation *and* distributed data processing. Fortunately, one company gives you both in a single system.

Hewlett-Packard's HP 3000 is a fully compatible family of computers, ranging from a new system that handles as few as two users to a distributed mainframe that connects up to 400. You can run the same software right up the line.

And our systems can change and grow as you do. When you're ready for upgrades and additions, you simply plug your existing programs into the new systems. No recompiling. No time and money wasted

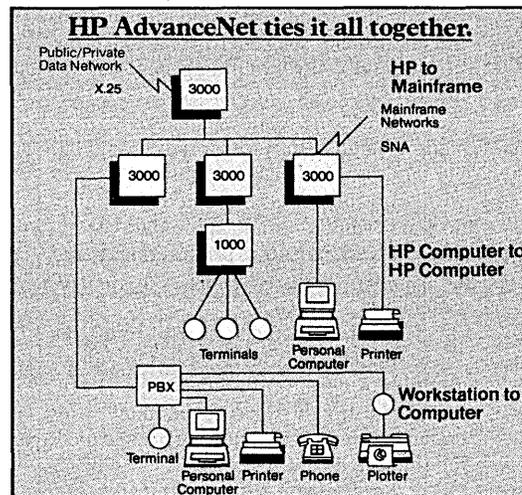
on conversion.

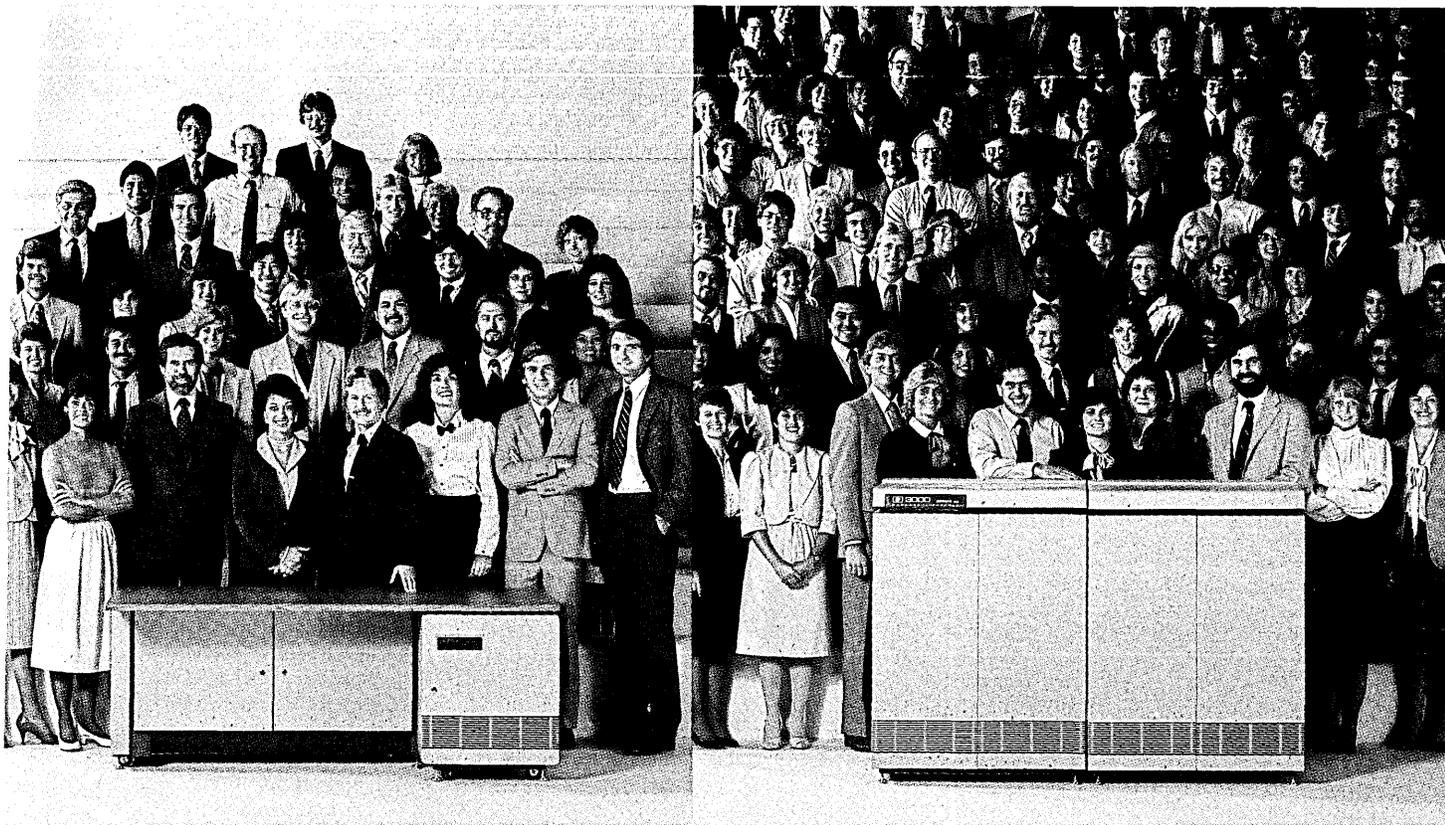
## A small, but mighty, addition.

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So now you can afford to give your branch offices and departments their own systems. And they'll still remain part of your overall DP picture with links to other systems.

In the office, the HP 3000 is the heart of our Personal Productivity Center. This integrates the information people need to get their jobs done more productively.





# ter. One family fits all.

It provides an interface for a wide range of workstations, peripherals and personal computers, including our Touchscreen Personal Computer and The Portable, as well as IBM PCs. And it allows them to interact directly with the HP 3000. So your people won't have to learn DP commands.

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Our communications go well beyond this office network. With HP Advance Net, they extend to links with other HP 3000s, in the same building or on the other side of the world. And to your mainframe computers, ours or IBM's.

Currently, more than 10,000 HP 3000 systems are working in networks so effectively that our communications were voted #1 in a national survey.

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#1. So you get more than office automation and data processing in a single system. You get all the support you need from a single company.

For a demonstration of the single solution for both sides of your company, contact your local HP office listed in the white pages. Or write for complete information to Susan Curtis, Hewlett-Packard, Dept. 004203, 19055 Pruneridge Ave., Bldg. 46T, Cupertino, CA 95014.

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## LETTERS

each issue very carefully. I consider it an important part of my ongoing education.

ANN RUSSELL  
New York, New York

### CRAY AND UNIX

I very much enjoyed the timely and well researched articles on Unix in your Aug. 1 issue. There was, however, an inaccuracy on page 97, regarding Unix and the CRAY-1 computer. Dennis F. Barlow and Norman S. Zimbel report in "Unix—How Important Is It?" (p. 90) that "Cray and Sperry offer Unix on the Cray-1 and Series 1100, respectively." This is not accurate. We do not currently support Unix on any CRAY system. We are, however, developing an operating system for the CRAY-2 that is based on AT&T's Unix System V.

KENNETH JOPP  
Cray Research  
Minneapolis

### ANYONE FOR PFISTICUFFS?

In "The PBX: What Matters, What Doesn't" (Aug. 1, p. 121), George M. Pfister states that "completely nonblocking architecture is practically impossible," and he goes on to say that a large

system of 2,000 to 4,000 lines "would require a Cray processor to control the system."

Pfister then picks Rolm as one of two manufacturers that meet his criteria for PBX vendors.

On pp. 138 and 139 of the same issue, Rolm claims to have a 10,000-user PBX that has "no blocking at any time, ever." There seems to be a slight contradiction evident here.

RICHARD SIMMONS  
Dallas

### BETTER GRADS?

David Feinberg (Reader's Forum, Aug. 1, p. 167) hit the proverbial nail dead center with his comments on educational quality in the computer arena today. In our surveys of data processing managers (as a means of improving course content), the majority seem to echo Feinberg's sentiments regarding a need for greater emphasis on system fundamentals. Too many students, they say, are capable of writing perfect structured COBOL, for example, but haven't the slightest inkling of how to accomplish a dump analysis when a nontrivial bug appears.

We would like to assure Feinberg

that Troy State University is just one of a growing number of institutions in the South that have taken steps to turn out well-rounded computer graduates who can just as easily analyze a hex dump or write an assembler macro as they can code an application program.

F.H. (BUZZ) WOOD  
Chairman  
Computer and Information Science  
Troy State University  
Dothan, Alabama

### MORE ON BENCHMARKING

We read with interest the April 1 News in Perspective article on supercomputing, "Cray and CDC Meet the Japanese" (p. 32).

We agree that the data thus far indicate that the Japanese computers run roughly the same as the X-MP. However, with regard to benchmarking and workload characteristics on the machines, the Benchmarking Section of the Computer Research and Applications Group at Los Alamos National Laboratory has a continuing project to define a characteristic workload for our supercomputers.

We are now collecting usage statistics on the large codes that run on these supercomputers. Based on the results of the study, we will include additional codes that represent this workload in our expanded benchmark code set. Using this expanded set, we hope to benchmark both vector and parallel architectures, American and Japanese, and to relate the results we obtain to our present and future needs at Los Alamos.

Those persons who urge potential users of supercomputers to assemble their own set of relevant applications codes are quite correct; workload characteristics may vary widely from one installation to another.

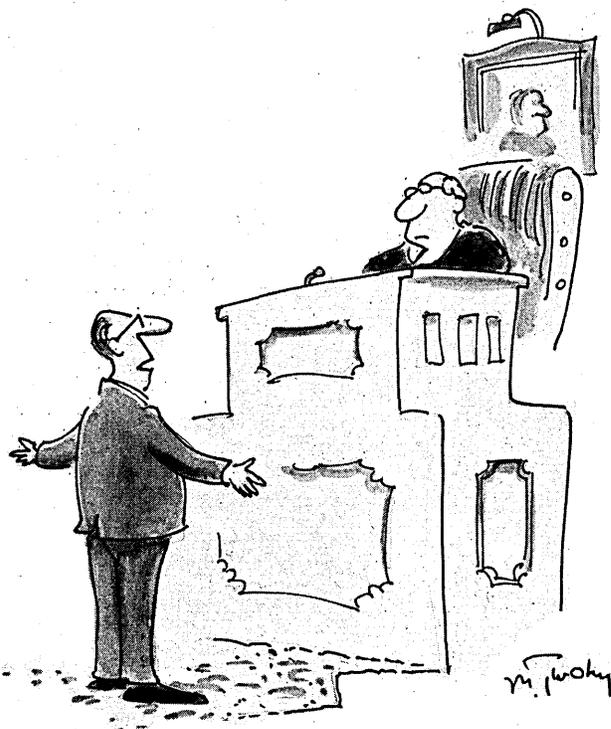
It is therefore essential that someone else's benchmark results not be used to predict one's own future needs.

ANN H. HAYES  
MARGARET L. SIMMONS  
Computer Research and Applications  
Group  
Los Alamos National Laboratory  
Los Alamos, New Mexico

### CORRECTIONS

Apparently, we're not on a first name basis with the new head of Citibank: in our Aug. 1 News In Perspective story on Citibank ("Citi's Techno Boss," p. 32), we referred to John S. Reed by his last name only.

In "New Life for FORTRAN" (Sept. 1, p. 166) we unaccountably moved author Gerald M. Berns's company, Science Applications Inc. The correct address is 2361 Jefferson Davis Highway, Arlington, VA 22202.—Ed.



"Your Honor, please take into account that these crimes were all committed prior to the law-and-order backlash."

CARTOON BY MIKE TWOHY

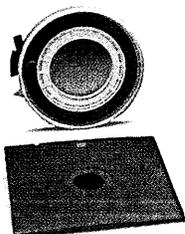


# ACCES unifies the Ethernet Game with the most comprehensive network software in the field.

Now you can access information or applications across a network of different computers from different manufacturers. You no longer have to learn commands particular to specific hardware or operating systems. That's the idea behind the ACCES Network Products from ACC.

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**Easily Integrated.** OEMs looking for layered protocols and end users incorporating industry and international



standards can easily integrate ACCES Network software and supporting hardware in a very straightforward manner — saving development time and operational dollars.

**Designed for Multi-Vendor Networks.** From inception, the ACCES Network Products were designed for multi-vendor and multi-operating system networks based on industry and international standards. ACCES products don't rely on the operating system to provide protocol services. Protocols and operating systems are separated from each other to increase portability and to anticipate protocol evolution.

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- Application level network services which include file transfer, file maintenance, file access, and virtual terminal service.
- Proven operation on Digital's VMS, IBM's VM & MVS, Data General's AOS, Charles River's UNOS, Apollo's Domain, and UNIX operating systems.

**True Distributed Processing.** ACC has focused on creating a single integrated system — a system designed to incorporate today's protocol standards and to provide for tomorrow's advancements in distributed processing technology and techniques.

As your networking requirements become more sophisticated, you need more sophisticated solutions.

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**Interactive processing: VISION®** — For creating custom applications from order entry to transaction processing. It provides a high level of functionality that can be used in any distributed environment. And VISION is easier and faster to program than COBOL.

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**When they want PC's, you've got them!**

If your end-users are like most these days, they're clamoring for their own personal computers. We play that

# MFE

**The action starts with the Multifunction Executive.**

The key to the Series 4000 game plan is the Four-Phase Multifunction Executive (MFE). This unique and powerful control program monitors each multifunction terminal in your system. Its ability to run multiple software programs allows your users to perform 16 different tasks from any terminal on the system. And each of your users can access all of our software packages with one keystroke. You get maximum distributed processing capability and control.

Plus, MFE dynamically allocates selected peripherals so that each device can be used by more than one program. The result—MFE eliminates the need for multiple processors, duplicate terminals and other peripheral devices at installations that require concurrent execution of software.

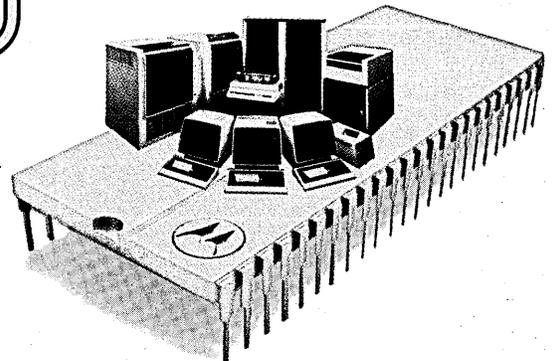
game, too. Because at the flick of a switch, our multifunction terminals suddenly become stand-alone PC's. So now you can give your users the distributed processing capabilities they need, AND the personal computers they want. All in one integrated system.

**2,000 winners can't be wrong!**

Four-Phase was the first company to introduce the integrated approach to multifunction distributed processing. Today, there are more than 15,000 installed Series 4000 systems, helping people like you manage the information needs of over 150,000 end-users. And every machine is backed by our Customer Support Operation and over 1,000 field service people to provide continuing support and reliability at every level.

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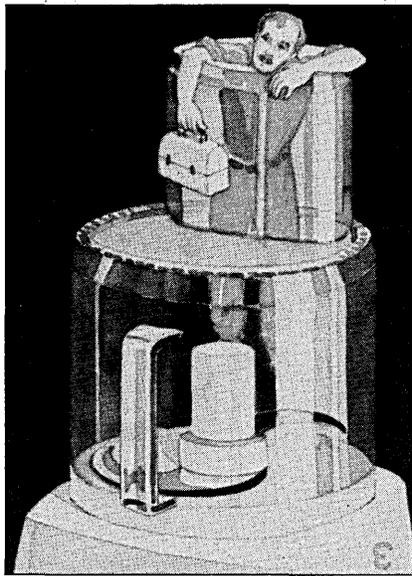
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**CIRCLE 18 ON READER CARD**



# EDITORIAL

## WHICH MASTER: MAN OR MACHINE?



Several years ago a friend was offered one of those food processors that threatened to become standard equipment in the bourgeois kitchen. He turned it down—dicer, french fry blade, dough kneader, and all. “I’d rather have a cook,” he said, reminiscing about that once ordinary and very human aid to middle class dining.

Now, the food processor does what used to be done by a salaried human being. Aha, shrieks the Luddite, automation puts another body out of work!

But the logic doesn’t bear out. Professional cooks had vanished from the American home at least two decades before Cuisinarts and Robot-Coupes began “replacing” them. It was the apparent dignity of alternate jobs in factories and retail stores that made the cook extinct.

But now those factory jobs are under threat. It all seems part of the same apparently inevitable story—cheaper labor is irresistible, whether supplied by nonunion workers in the sun belt, by hungry populations in emerging nations, or by automation.

The widely praised pact between General Motors and the United Auto Workers suggests that some progress is being made: the contract sets aside a billion dollars to retrain workers who lose jobs to machines. But Harley Shaiken, an automation expert who teaches at MIT, says that “In essence, GM has paid a billion for an unlimited license to automate and outsource.”

Automation, particularly in the form of machines that do work that could not be done without them, is certainly inevitable. But how our society responds to automation is as yet largely unknown.

David Noble, an historian of technology, a curator of machine tools, and an MIT professor, suggests that we should have known all along that technology was going to come out badly for blue-collar workers. His controversial new book goes to great lengths—100,000 words—to prove a point about technology: that it is not the neutral, value-free institution that so many technologists believe it to be. Instead, says Noble in *The Forces of Production: A Social History of Industrial Automation*, technology follows the interests of those who pay for its development. This doesn’t come as a complete shock; in an essentially market-driven economy, it seems only natural.

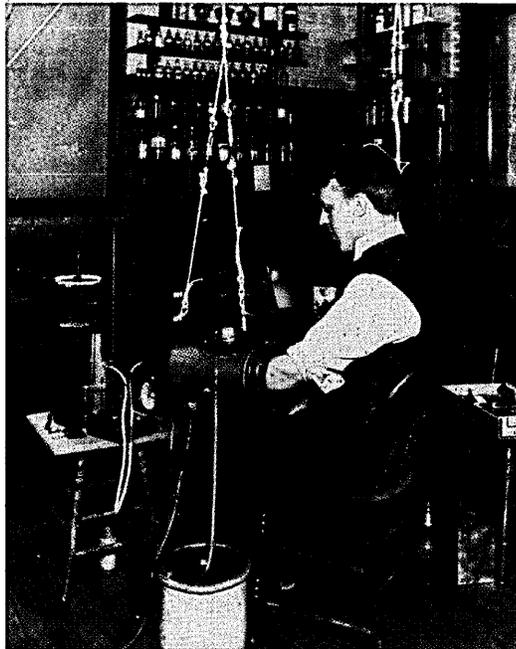
Noble is convincing when he shows how the career paths of certain MIT scientists helped determine the specific directions in which numerical control manufacturing systems have developed. But he’s less convincing in his suggestion that labor saving devices are really labor controlling.

Nonetheless, Noble has brought technology to the attention of people who usually manage to ignore it. His book was published by Alfred A. Knopf, a house whose imprint lends almost automatic respectability. With all its reviews by big name critics, the book may well be one of the very few dealing with the application of high technology to American business that will be read by nontechnical types.

They are in for a stiff read; the book’s academic, closely argued tone may put people off. But those of us in the computer business could be in for some tough questions. Historian Noble is most comfortable when he uses class antagonisms to analyze how society functions, how it divvies up the hard work, how it parcels out the income. His argument is that technology does not lead; instead, it is led. It has developed to serve the desires of the already powerful, to concentrate control, and to lessen workers’ ability to disrupt production. According to Noble, automation, having been created at the behest of owners and managers, is bad news for the blue-collar worker.

Noble offers a politically loaded analysis but no solutions. But if his conclusions make us think twice before lightly bandying the term “industrial revolution,” he will have performed job enough.

Oddly enough, most offices  
are better equipped for the future than  
the people who will create it.



The MIT Museum

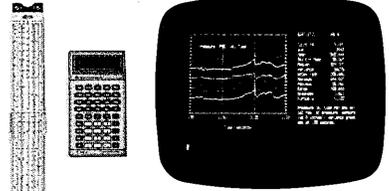
According to recent reports, this last year, businesses spent over \$10.5 billion successfully automating America's offices.

Meanwhile, do you realize what many of the scientists and engineers are using to design and develop America's new products?

Hand calculators.

Which is just preposterous.

Especially now that there's computer-aided analysis software designed specifically to do what all technical professionals spend most of their time doing: analyzing data.



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It's called RS/1™. And it's from BBN Software Products Corporation.

RS/1 is fully capable of making technical professionals 4-5 times more productive. Which in turn, will allow them to create considerably better, considerably more reliable new products. In a fraction of the time it now takes.

And it will do so without turning them into hackers. RS/1 works like a research assistant. Not a computer.

Lest you doubt the significance of RS/1, we would hasten to point out that a single copy of RS/1 running on a single computer has already saved one company over \$7 million. In one plant. In one year. Without any additional investment in new equipment. They did it simply by allowing their technical professionals to explore alternatives they never had the time to before.

And if you think RS/1 may be something you should look into in the future, you should know that many leaders in American industry are already using it to get their new products out into the marketplace faster.

Don't expect them to tell you about it, though. They'd just as soon you continue spending your money only on getting your letters out faster.

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# INFOCUS

## UPSTARTS OUTSHINE THE STARS

**The personal computer, in its many guises, is taking most of the glory away from traditional minicomputers.**

**by John W. Verity**

Driven by strengthening user interest in office systems and workstations, the personal computer continues to gain importance at the expense of the traditional minicomputer. More than ever, new applications are being written for micros rather than minis. What's more, the IBM PC has apparently become the main element of that company's low-end business, working as a strategic vehicle for gaining new customers for all product lines.

These and other important trends were revealed in the 1984-85 Mini/Microcomputer Survey conducted last July by the stock brokerage firm Cowen & Co., Boston, in conjunction with DATAMATION. The survey is based on 6,264 unduplicated responses from individual user sites in the U.S., who reported a total of 26,778 minicomputers installed. As with previous surveys in this series, the respondent population is weighted heavily toward user sites where mainframes are installed. Almost nine out of 10 respondents, moreover, were end users, as opposed to oem/system resellers.

Among the special issues focused upon this year were the emergence of AT&T as a minicomputer and personal computer supplier, the use of local networks, and corporate use of personal computer software products. Additionally, measurements were made of users' loyalty to prime vendors, future spending on processors and peripherals, and their interest in the Unix operating system.

New users of small computers are increasingly choosing micros as their entry vehicles to the small systems market, which is not surprising, given the recent boom in personal computer manufacturing and marketing. The usage of workstations, measured explicitly for the first time in this year's survey, also took away from minicomputer growth. Whereas five years ago the eight-year compound annual growth rate for minicomputer shipments was measured at 23%, this year it stayed at the same 16% level as last year.

The two vendors showing the strongest growth in terms of purchases by users new to the mini industry were Apol-

lo Computer Inc., Chelmsford, Mass., maker of engineering workstations, and Altos Computer Systems, San Jose, Calif., which makes microcomputers. In terms of new users of small systems, the office systems and workstations categories showed the most pronounced growth, while the rate for traditional minis dropped once again.

Despite the incursion of the personal computer, however, minicomputer shipments during the year ending June 1985 should grow by 25% in dollar terms compared with the previous year. This is almost double the comparable figure recorded in last year's survey, 13.9%, and is attributable mainly to strength in the oem/systems house segment of the market. (These figures are adjusted for new user expansion of the marketplace.) Growth prospects for individual suppliers relative to the overall average are a function of product positioning within the industry. Thus, traditional minicomputer suppliers will see only nominal shipment growth, small business systems suppliers a 21% rate, office systems vendors 34%, and workstation manufacturers 110%.

Personal computers, of course, will far outpace the minicomputer in terms of near-term growth: pcs should enjoy a rise in dollar shipments of 63% for the year ending June 1985, Cowen says. In fact, in the context of the survey, pcs will account for 32% of the dollars spent

**The eight-year compound growth rate of minicomputer shipments has stayed at the 16% level.**

on small systems by respondents from July 1984 through June 1985, compared with 27% recorded for the same period a year earlier.

Looking further ahead, however, to the 12 months ending June 1986, a rising percentage of respondents indicated that their minicomputer spending would probably be less than during the previous year. That fits a general long-term pattern of moderating minicomputer shipment growth foreseen in the past several years. The slowdown is most pronounced at the high end of the minicomputer spectrum but is partially made up for in the low end, where workstation and personal computer business will be far more upbeat. For instance, three times as many respondents are planning to spend more rather than less on personal computer purchases in the 1985-86 period.

The rate of new sites joining the ranks of personal computer users dropped off dramatically, showing only 55% growth this year compared with 130% the year before, but it is still a substantial source of new business for vendors, given the fact that many more



SCENE FROM "ALL ABOUT EVE"/PHOTOTEQUE

billions of dollars are now involved. Apple Computer and Tandy Corp., two early entrants in the pc business, showed new user growth rates markedly lower than later arrivals like IBM and DEC. In the corporate marketplace, IBM has established a commanding lead of 58.4% of first-time users, compared with Apple's 7.4% and DEC's 8.1%. Just two years ago, Apple's share of new users was 26.7%.

Once again, those respondents buying pcs are turning more often than not to centralized control of their buying processes. Among organizations whose annual revenues exceeded \$250 million, for instance, almost 70% said they centralized purchase of pcs. Among those same respondents, 45% buy direct from the manufacturer and 45% buy from independent computer stores.

In terms of sites, the independent store is the primary channel of distribu-

tion to respondents, but in terms of units purchased, the leading channel is direct from a vendor. Sales through independent stores were heaviest for portables from Compaq Computer Corp., Houston. Independent stores also figured heavily in hardware maintenance, particularly in the Apple and IBM-compatible segments of the market.

While the reselling of personal computers was present at only 9.4% of all responding sites, sites whose primary suppliers were Texas Instruments and Data General showed particularly heavy activity, an indication that TI and DG are focusing their attention on the value-added reseller and oem channels rather than on the more difficult direct confrontation with IBM and Apple.

As in surveys past, the availability of quality software is by far the most important criterion cited by respondents in choosing a personal computer vendor.

Following that are the issues of compatibility (a close second), product reputation, price, ease of learning, and memory capacity.

Pc software purchases continue to be limited largely to a small number of popular packages. The 1-2-3 integrated spreadsheet and database from Lotus Development Corp., Cambridge, holds a commanding lead in popularity among users of IBM PC-type equipment, followed by Wordstar, dBase II, and VisiCalc, in that order. For the most part, users tend to rank the quality of packaged pc software above that available for their minicomputers. The ranking of types of applications run by users—word processing, spreadsheets, etc.—are relatively consistent across all major vendors' lines. Except in the case of DEC, whose users spend more time on word processing, spreadsheets are the leading application, followed by word processing, remote ter-

## IN FOCUS

minimal emulation, database management, and graphics.

The heaviest actual use of the personal computer was found in educational sites, where approximately 6.1 hours a day were put in on each machine. The average across all pc sites was 4.8 hours a day. The educational market continues to grow, with an average of 29 machines purchased at each such site (the overall average was 16 machines per site). Apple seems to have lost its lead in the educational sector in this survey population, showing a 28% share compared with IBM's 38%.

One of the most notable trends seen in the low-end computer marketplace is the ground swell of standardization on the IBM PC and work-alike

### Workstation suppliers are among the most vulnerable to user defections from their customer bases.

products. No matter which vendor is cited by users as their primary minicomputer supplier, they more often than not list IBM as the primary supplier of personal computing equipment. In the context of the survey, in fact, IBM is on the verge of achieving a majority of market share for sites with PCs installed, Cowen reports. The company shows a 48.7% share of those sites, followed by Apple with 13.4%, DEC with 5.9%, Compaq with 4.7%, Hewlett-Packard with 4.1%, and Tandy with 4.2%. Just three years ago, Apple's share of the sites was 42% and Tandy's 26.1%.

As for machines planned to be purchased through the end of next year, IBM was cited as the primary supplier at 55% of the sites, followed by Apple at 8% and DEC at 7%. In a related development, DEC and Data General's pc sales seem to go mostly to their installed customer base. Whereas IBM will ship 64.5% of its PCs to respondents who don't use its minis, DEC's and DG's comparable figures are only 7.5% and 7.7%, respectively.

Apple has apparently done well with its Macintosh product. Of those 1983-84 Apple computer purchases mentioned by respondents, 42% of the units were Macs and 34% Apple II class machines. Those two models account for 55% and 29%, respectively, of units planned to be purchased through the end of 1985. The more expensive Lisa machine, however, shows a small and shrinking importance in Apple user buying plans.

Turning to minicomputers, the survey found that the mix of technical vs. business/commercial applications on minicomputers is a source of continuing strength for Digital Equipment Corp., the

FIG. 1

## TOP DOZEN MINICOMPUTER SYSTEMS 1984/85

### A. BASED ON NUMBER OF RESPONDENTS ACQUIRING SYSTEMS (7/84-12/85)

MANUFACTURER	SYSTEM	HOW MANY SITES ACQUIRING	AV. UNITS/SITE
DEC	VAX-11/750	181	1.5
IBM	System/36	173	2.6
DEC	VAX-11/780	131	1.4
DEC	VAX-Unspecified	80	5.9
IBM	Series/1	70	3.3
DEC	VAX-11/785	65	1.6
HP	3000-Unspecified	57	1.6
DEC	PDP-11/44	40	1.5
IBM	System/38	40	1.1
HP	3000/68	37	1.1
DEC	PDP-11/23, 23-Plus	31	9.4
DG, DEC	MV/4000; VAX-11/730	30 each	4.0, 1.7

### B. BASED ON NUMBER OF UNITS BEING ACQUIRED (7/84-12/85)

MANUFACTURER	SYSTEM	HOW MANY UNITS BEING ACQUIRED	EST. VALUE (\$ MILLIONS)
Apollo	Unspecified	3,621	\$181.4
DEC	VAX, Unspecified	469	62.6
IBM	System/36	451	27.7
Burroughs	B20/B25	366	2.7
Data General	Eclipse, Unspecified	308	40.7
DEC	PDP-11/23	292	4.1
DEC	VAX-11/750	275	40.5
NCR	Tower	273	3.8
IBM	Series/1	230	16.3
DEC	PDP-11/73, 78	184	1.7
Honeywell	DPS-6, Unspecified	184	14.3
DEC	VAX-11/780	181	60.5

FIG. 2

## INDUSTRY PRICING TRENDS

Query: How big a price concession (above and beyond any normal quantity discount) did you receive when acquiring your last minicomputer system(s)?

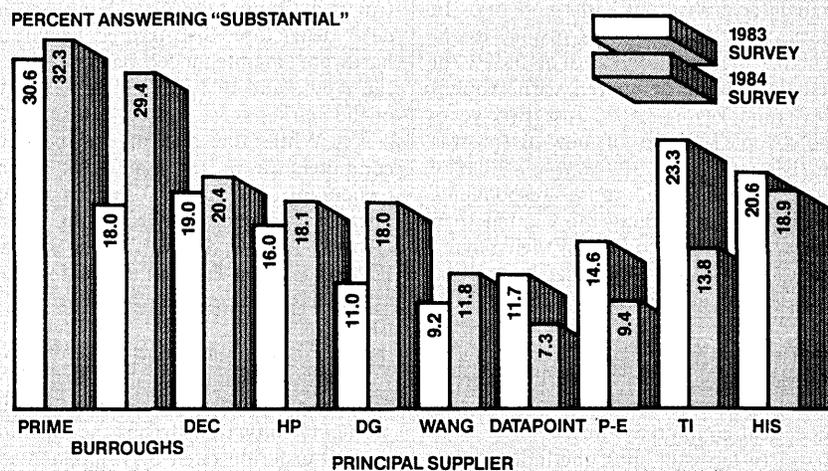


FIG. 3

### MINICOMPUTER SELECTION CRITERIA

Query: Which of the following factors were most important in your choice of a mini vendor?

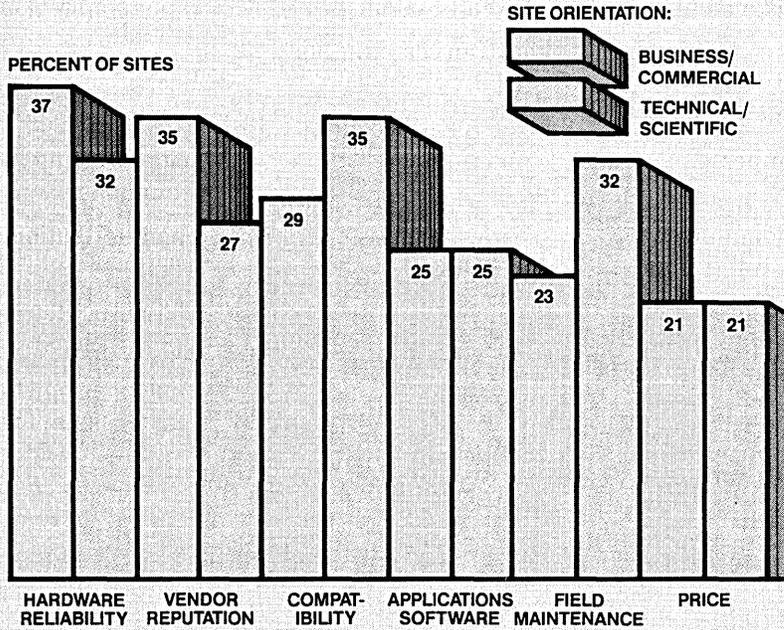
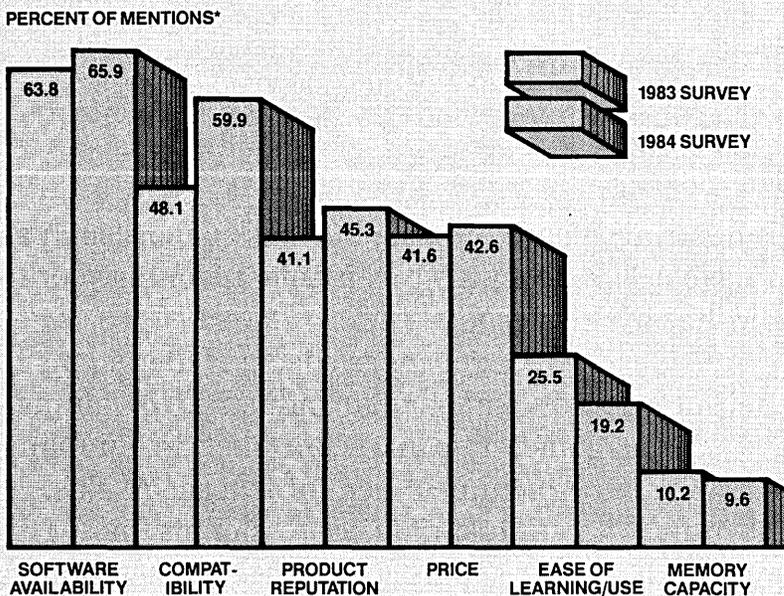


FIG. 4

### PC SELECTION CRITERIA



\*Each respondent asked to specify no more than three criteria

leading mini supplier, in technical markets. This connotes, however, a disappointing showing by DEC in the faster-growing commercial mini market: the Maynard, Mass., company showed little if any additional penetration of the commercial sector and it continued to rank below the industry average in several subcategories. DEC's business continues, moreover, to be strongly dominated by minicomputers and not by the faster-growing personal computer.

AT&T, which formally entered the merchant minicomputer market this year, was found to have its strongest market penetration in shops doing software development systems, which follows from the Unix orientation of its hardware. It also showed strongly in education and timesharing markets.

When asked about the availability and quality of minicomputer applications software packages, DEC and Hewlett-Packard were most highly rated by respondents; Perkin-Elmer and Sperry were lowest.

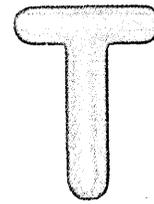
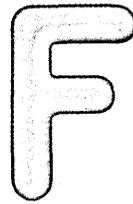
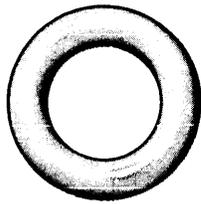
As in the past four surveys, hardware reliability was named by users as the most important factor in choosing a minicomputer. This was especially true in commercial and business-oriented users. Technical and scientific sites were more likely to name field support and prior systems compatibility as the key factors. Other factors taken into consideration were vendor reputation, availability of ap-

### Tandem and Apollo users are most heavily into networking.

plications software, and pricing. Users of IBM minis most often cited vendor reputation as the main criterion in their choice, while those using AT&T's 3B machines found the machines' strength in Unix most important. Wang Labs scored high with users looking for a "full systems line."

Asked over the years if they expected to change primary vendors of minicomputers, about four fifths of the respondents have said no. This year was no exception: 83.9% said no, 7.3% said yes, and 8.8% (down from as much as 11.3% in previous years) said they were seriously considering a switch. The vendors most likely to see users leave their fold, according to the survey, are Basic Four, Datapoint, and Four-Phase.

IBM and HP seem to have the highest loyalty among users, with only 9.1% of their users planning or considering a switch. Tandem Computers Inc., Cupertino, Calif., however, this year showed 14.3% of its users planning a switch, up dramatically from the 5.9% figure in last year's survey and a 0.0% rating in 1981. Also vulnerable, according to this year's



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School-Financial  
Management

Scientific Subroutine  
Package

Sort/Merge

Strategic Profit Model

Structured Query Lan-  
guage/Edit

Subscription Fulfillment  
Trade Association

Supermarket System-Host  
Support

Surgery Reporting  
(Patient Care System)

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Office Management  
System

OFFICE/38 Text  
Management

Online Membership  
System

Operator Communica-  
tion Control Facility

Order Entry and  
Invoicing

---

Fastdraft System

File Transfer Program  
(FTP)

Fixed Asset Accounting  
and Control

Forecasting and Time  
Series Analysis

FORTTRAN

---

Tape Library Control  
System

Telephone Toll  
Data Collection-Central

Teleprocessing Network  
Simulator

The Information Facility  
(TIF)

Thesaurus Retrieval  
(STAIRS/VS)

Time Sharing Option  
Extensions (TSO/E)

# If none of these meets your needs

Whether your company is an industrial giant or a cottage industry, if you have a need for software, chances are IBM has a software solution.

After all, we've been writing computer software for more than 30 years.

Software for almost every industry and almost every kind of application. From manufacturers and banks to lawyers and doctors. For our largest computers and our smallest.

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care of basic business needs, such as accounts receivable, inventory control or sales analysis.

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Most data professionals know IBM for our sophisticated system-level software. And high-productivity packages such as DB2, a full-function relational data base. And Information Center products that

# W

Wideband Communication Program  
 Workstation Search Facility (WSF/38)

# A

Advanced Communication Facility/VTAM (ACF/VTAM)  
 Adventures in Math  
 Apparel System-Order Allocation  
 Application Development Facility (ADF)  
 A Programming Language-2 (APL2)  
 Audio Distribution System  
 Auto Dealer Accounting  
 Automated Information Management Development

# R

Railcar Location and Reporting System  
 Realtime Programming System  
 Remote Job Entry Facility  
 Remote Spooling Communication Subsystem (RSCS/SNA)  
 Resource Access Control Facility  
 Restaurant Management-Financial Management  
 Retrieval/36

# E

Education Information System-Grading  
 Electronic Spread Sheet  
 Energy Management System  
 Engineering/Scientific Support System (E/S<sup>3</sup>)  
 Executive Data Link to IBM Personal Computer  
 Expandable Level Interactive Application System (ELIAS)

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help computer users help themselves.

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\*Programs available as of 9/12/84.

## IN FOCUS

survey, are workstation supplier Apollo Computers and microcomputer vendor Altos, with 33.3% and 40%, respectively.

Software support, or the lack thereof, was cited most often by end users as the reason for considering a switch of vendor, while oem/systems house respondents cited faults in the vendor's sales and service organization.

The past trend toward single-supplier procurements has seen a reversal, suggesting a reintensifying of competition in the small business and office systems market segments. In other market segments, however—namely, traditional minis and intelligent terminals—more single-source procurements indicate a consolidation favoring established suppliers. Respondents indicated they enjoyed discounts from vendors when they were

### Users rated Hewlett-Packard and DEC highest for availability of quality applications software.

able to call in more than one supplier on a procurement.

A key measure of industry performance in the mini and personal computer markets is the purchasing plans users have for peripherals. This year's survey found 20MB to 100MB hard disks and tape drives to be the most active peripherals segments in terms of planned shipments. Disk storage capacities were found to be growing at better than 30% a year on a six-year compound basis. The average attached minicomputer disk storage is 344MB, compared to 275MB last year. Tandem cpus are equipped with the most disk storage, over 1GB, at the time of shipment. In the tape drive arena, Cipher Data Products, San Diego, will enjoy a 21.4% share of planned purchases for the 18 months ending December 1985.

Main memory for minicomputers among survey respondents has grown even faster than disk, at over 50% a year on a six-year compound basis. The average main memory size of minicomputers is now 1.396MB, compared with 950KB last year. This obviously reflects the continuing drop in semiconductor memory prices. Tandem machines are shipped with the most main memory, some 2.9MB.

Growth of main memory on personal computers is even sharper, hitting 61% on a four-year basis, compared to a 45%, four-year rate for minis. The average pc is shipped with 287KB of main storage, compared to 186KB last year. It seems safe to say that growth in this segment will be even stronger now that more powerful micros are coming into the market, and many vendors are now bundling 256KB as a minimum configuration for their pcs.

Looking at minicomputers that re-

FIG. 5

### NEW CORPORATE PC USERS CHOOSE IBM

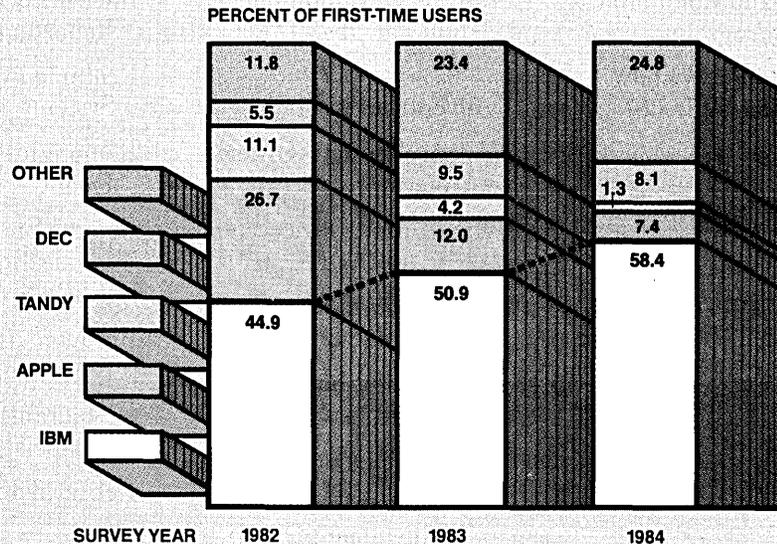
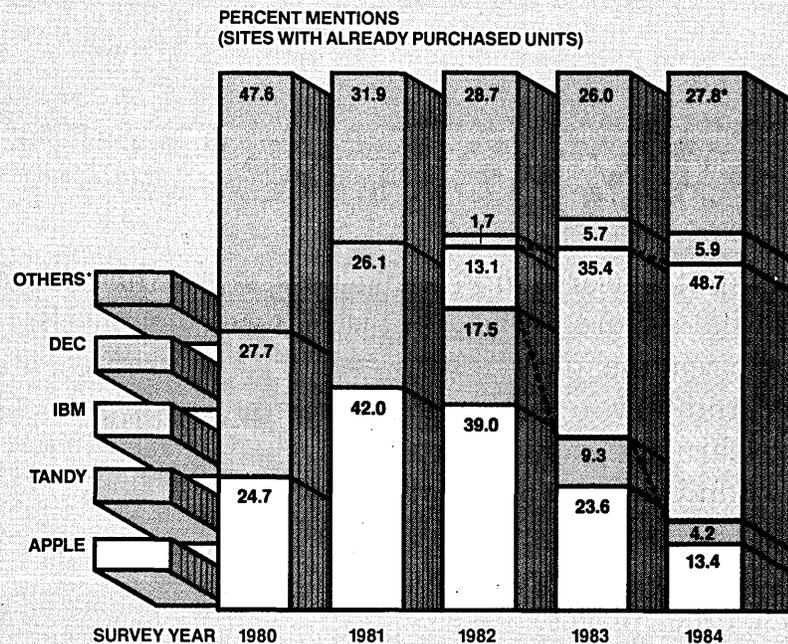


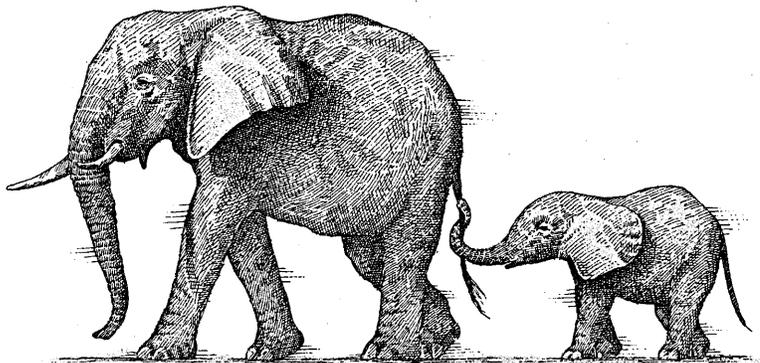
FIG. 6

### IBM PC LEAD STRENGTHENING



\*Included in "Others": Compaq 4.7%, HP 4.1%, Wang 2.3%, Zenith 1.4%, Kaypro 1.2%, TI 1.2%, Commodore 1.1%, etc. (the rest all less than 1%)

# WHEN IT COMES TO LINKING PC'S TO MAINFRAMES, ONE COMPANY IS A MILLENNIUM AHEAD.



You don't have to look hard to see why McCormack & Dodge has linked more PC's to more mainframes than any other business software vendor.

It's a classic case of a superior product leading to superior sales. A product that lets your PC access all company business applications, no matter who designed them—not just applications designed by McCormack & Dodge. A selective system that lets you pinpoint and summon exactly the portion of data you need.

And when you've made your selection and massaged the numbers the way you want them, our link lets you upload the new material back to the mainframe (assuming you have the proper security clearance). You do it yourself on the spot—in real time. Without keyboard operators or programmers. So the entire company has the benefit of the latest information immediately. Not days later.

The M&D PC link is one of several products in our highly acclaimed Millennium family of borderless business software. One more reason why we're a Millennium ahead.

## WHEN YOU THINK ABOUT TOMORROW, MILLENNIUM MAKES SENSE TODAY.

### McCormack & Dodge

**DB** a company of  
The Dun & Bradstreet Corporation

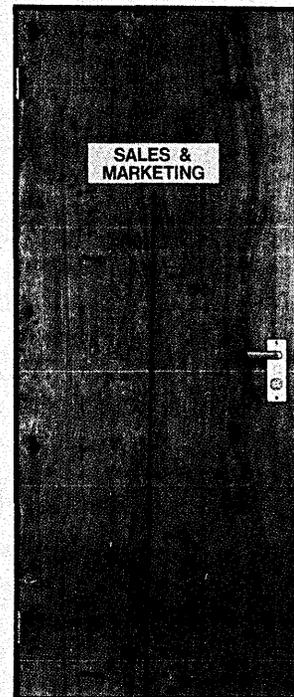
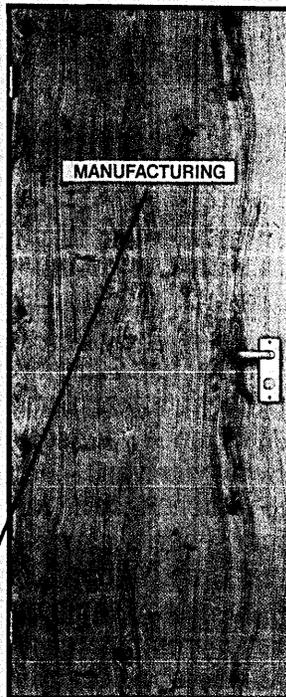
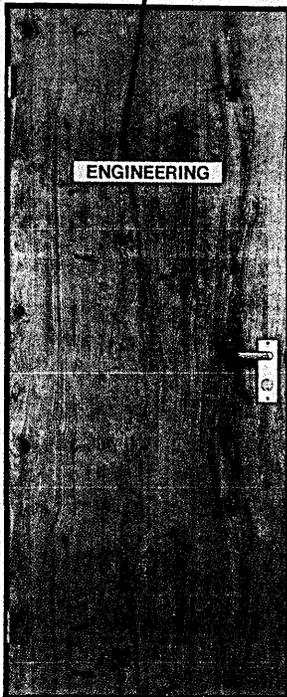
McCormack & Dodge Corporation, 1225 Worcester Road, Natick, MA 01760  
Sales and support offices throughout North and South America, Europe, Asia, Australia and Africa. 800-343-0325. Telex: 710-325-0329

CIRCLE 20 ON READER CARD

# The computer for companies who want everything.

Before you buy another computer system, listen to every department in your company. You don't need a lot of different computers to solve all their problems . . . just one family of versatile Prime® computers.

"Instead of one computer for design, one for database management, and one for text processing, why can't we get all our engineers to use a single system?"



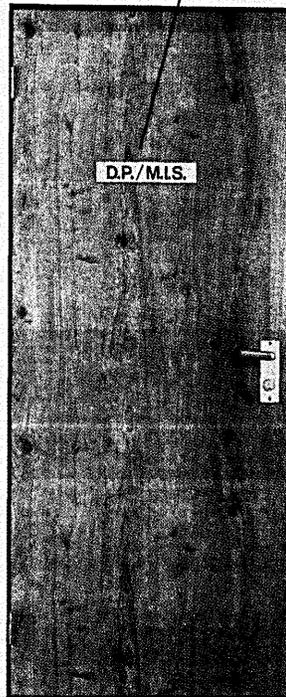
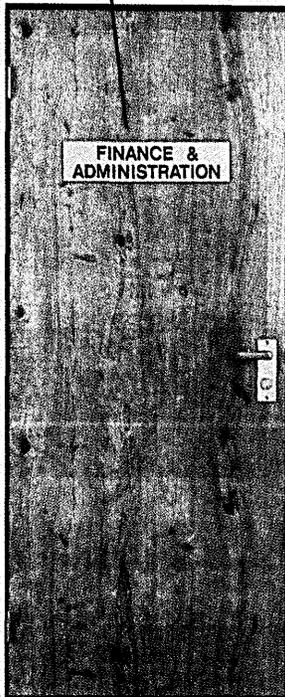
"Before I put one more computer on the shop floor, I want one powerful system that puts it all together reliably: inventory control, shop scheduling . . . even shipping!"

"This company's marketing decisions are too big for one little spreadsheet. I need total decision support if I'm going to meet my revenue goals. And I need it now. Or after lunch, at the latest."

"Don't tell me about applications backlog . . . my receivables are aging! I need a comprehensive accounting system that uses all our data, from branches around the world."

"I'm building an information system for the whole company. That means real compatibility. User-transparent communications between all departments. And plenty of proven software."

"I want everything they want. And I want it all from an established company that's going to be around tomorrow."



You can do more with a Prime system. We're a Fortune 500 company with worldwide support. With a family of high-performance computers so compatible, you can interchange hardware and software. With complete networking and communications. And with over 1,000 software solutions, for every imaginable need.

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Find out what you can do with our versatile systems. Call 1 800 343-2540 (in Mass., 1 800 322-2450) or your local office. Or write: Prime Computer, Prime Park, MS 15-60, Natick, MA 01760. In Canada: 416-678-7331; Prime Computer of Canada Ltd., 5945 Airport Road, Mississauga, Ontario, L4V1R9 Canada.

**We're versatile, so you can do more.**

CIRCLE 21 ON READER CARD

## IN FOCUS

spondents reported having purchased during the past 18 months; the survey found some interesting patterns in price discounting. Price cuts were much more severe among the oem/systems house side of the market than among end users. The former received an average discount of 18.8% (above and beyond normal quantity discounts), while end users received only 10.7% breaks on the average. Altos came out as the heaviest discounter, offering an average of 57.1% off "normal" list prices. It was followed by Gould/SEL, Fort Lauderdale, (42.9%) and Convergent Technologies, Santa Clara, (40%). IBM and Tandem were the least likely to discount their machines.

Based on the number of sites that acquired a particular machine during 1983-84, DEC's VAX-11/750 was the most popular minicomputer: it was acquired by 232 sites, followed by IBM's System/36, which was acquired by 217 sites. Based on the number of machines acquired, Apollo earned the top spot with its Domain system, of which 1,411 units were acquired during the period.

With an eye to the next 18 months, oems and systems houses estimated their average on-hand supply of hardware was good for about 3.6 months, compared to the 2.8-month figure reported last year. That change may mean an eventual cooling off of order trends among these respondents. So far, however, few order delays or cancellations have been seen.

The most popular machine to be acquired by respondents in the coming 18 months should be the DEC VAX 11/750, which is in the purchasing plans of 181

### Respondents cite the availability of quality software as the most important criterion in choosing a personal computer vendor.

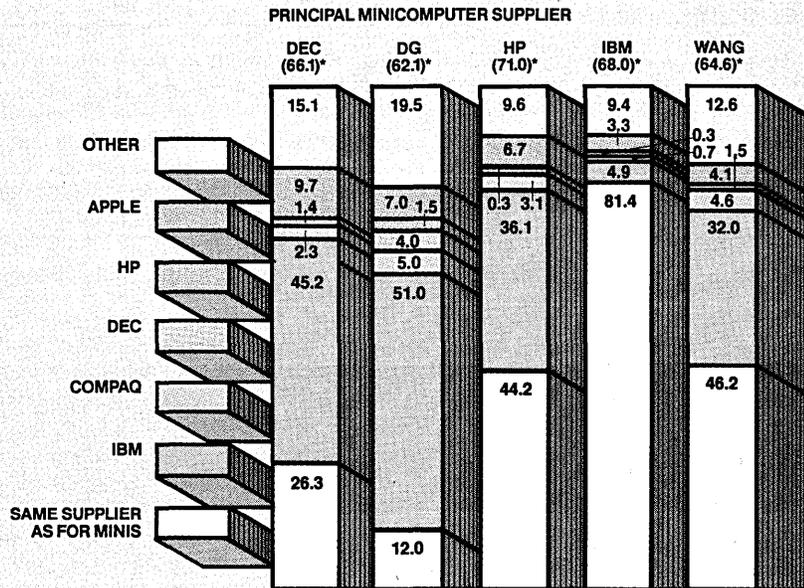
sites, followed by IBM's System/36, being acquired by 173 sites. Based on the number of units being acquired during the same period, the Apollo workstation is the most popular—including one particularly large order calling for 3,621. The runner-up is the DEC VAX, with 925 machines of various models to be installed.

Digital Equipment still relies heavily on the VAX family of 32-bit processors, but the stage appears set for a sweeping product cycle transition. Industry watchers generally expect new VAX models to begin appearing this month or next, particularly the long-awaited Venus, which would top off the line. In fact, survey respondents indicated that 5.5% of their planned purchases of DEC equipment would be for the Venus model, compared to 22% for the model 11/785, 35% for the 11/780, and 23% for the 11/750.

FIG. 7

### IBM PC STRENGTH AT MINI SITES

WHOSE PC(S) PLANNED FOR PURCHASE IN 1984/85

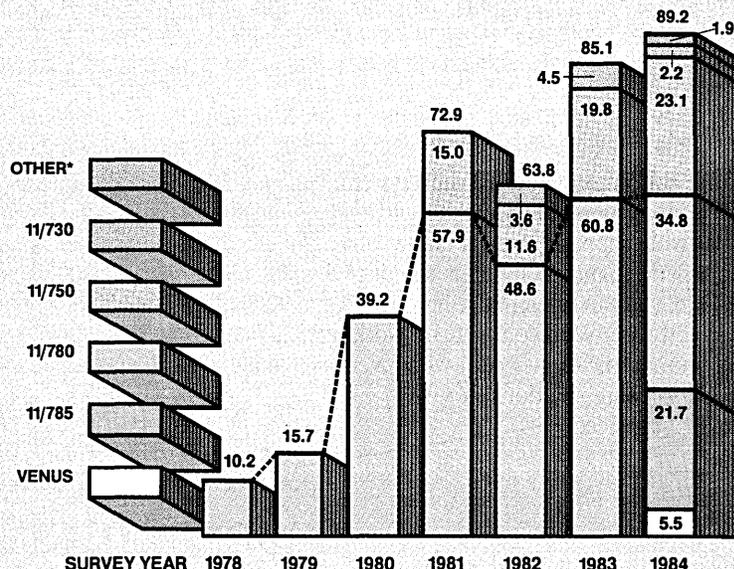


\*Figures in parentheses represent percent of sites planning personal computer purchase during 1984/85

FIG. 8

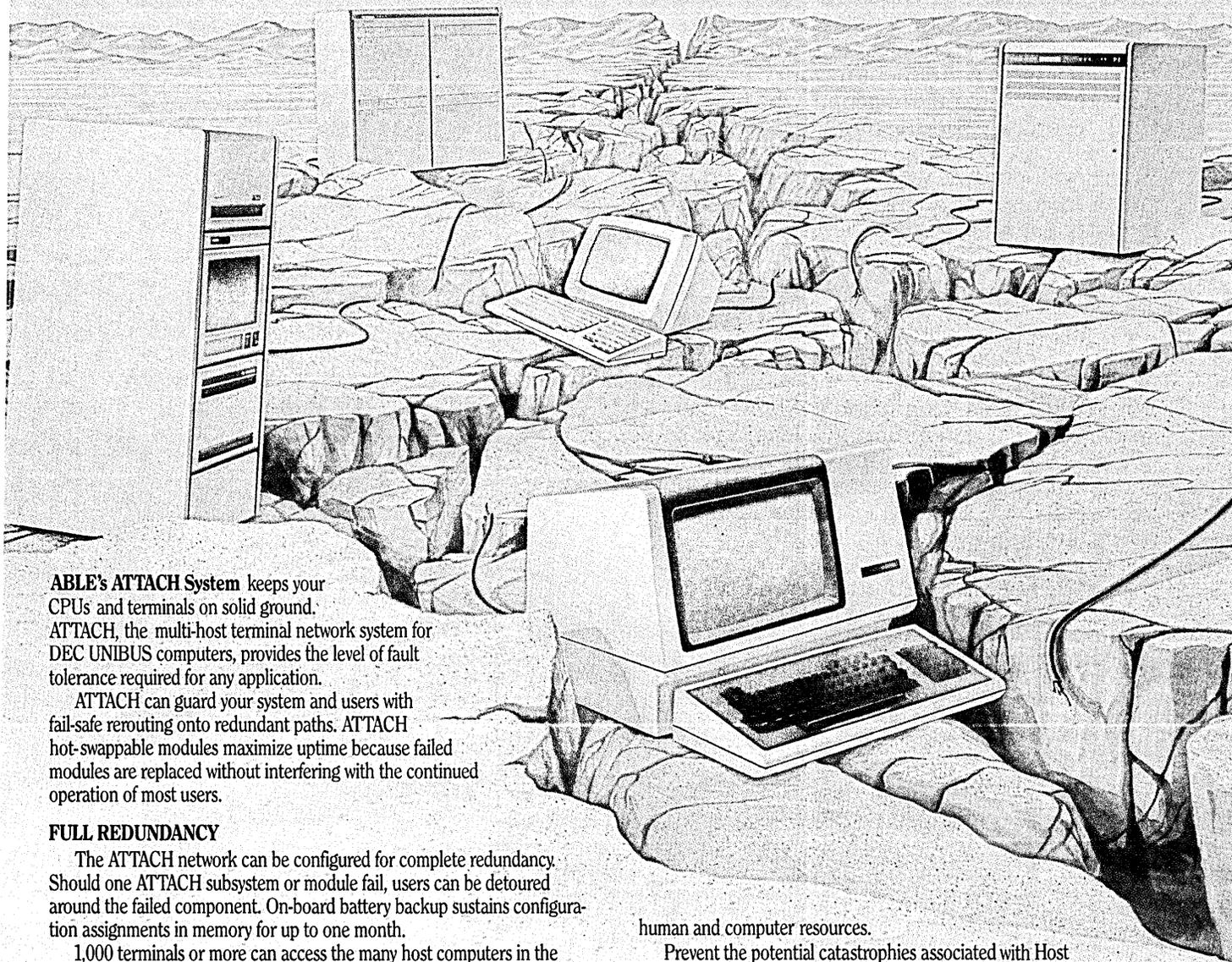
### VAX-11/780 STILL IMPORTANT TO DEC

VAX AS A PERCENTAGE OF PLANNED DEC SHIPMENTS (DOLLARS)



\*11/725, MicroVAX.

# Where will your network be after the fault?



**ABLE's ATTACH System** keeps your CPUs and terminals on solid ground. ATTACH, the multi-host terminal network system for DEC UNIBUS computers, provides the level of fault tolerance required for any application.

ATTACH can guard your system and users with fail-safe rerouting onto redundant paths. ATTACH hot-swappable modules maximize uptime because failed modules are replaced without interfering with the continued operation of most users.

## FULL REDUNDANCY

The ATTACH network can be configured for complete redundancy. Should one ATTACH subsystem or module fail, users can be detoured around the failed component. On-board battery backup sustains configuration assignments in memory for up to one month.

1,000 terminals or more can access the many host computers in the ATTACH network, with each computer requiring only a single host interface and single cable to support 128 terminal users in remote or local sites.

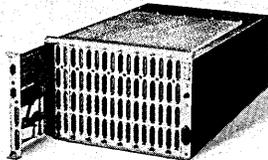
## ATTACH HELPS MAXIMIZE RESOURCES

In an ordinary multi-host environment, if one host computer goes down, lots of users could be left sitting idle. The ATTACH network system eliminates user down time, by allowing users to switch to a working CPU, maximizing

human and computer resources.

Prevent the potential catastrophes associated with Host Dedicated terminals—buy ATTACH.

For more information on ABLE's ATTACH System, contact the ABLE representative near you, or call ABLE toll-free at 800/332-2253.



The Communications Specialists

3080 Airway Avenue, Costa Mesa, CA 92626 In the Costa Mesa area: (714) 979-7030. Or TWX 910-595-1729

DEC, PDP, UNIBUS and VAX are trademarks of Digital Equipment Corporation. ATTACH is patent pending.

CIRCLE 22 ON READER CARD

Getting a group of five or six personal computers networked isn't that big a deal. But it gets complicated when the group gets bigger. And in case you hadn't noticed, the groups are getting bigger. Fast.

Experience may have already taught you that low-end PC networks run out of steam in a hurry once you have more than five or six stations connected. If your plans include several PCs or several hundred, high performance isn't a luxury. It's critical.

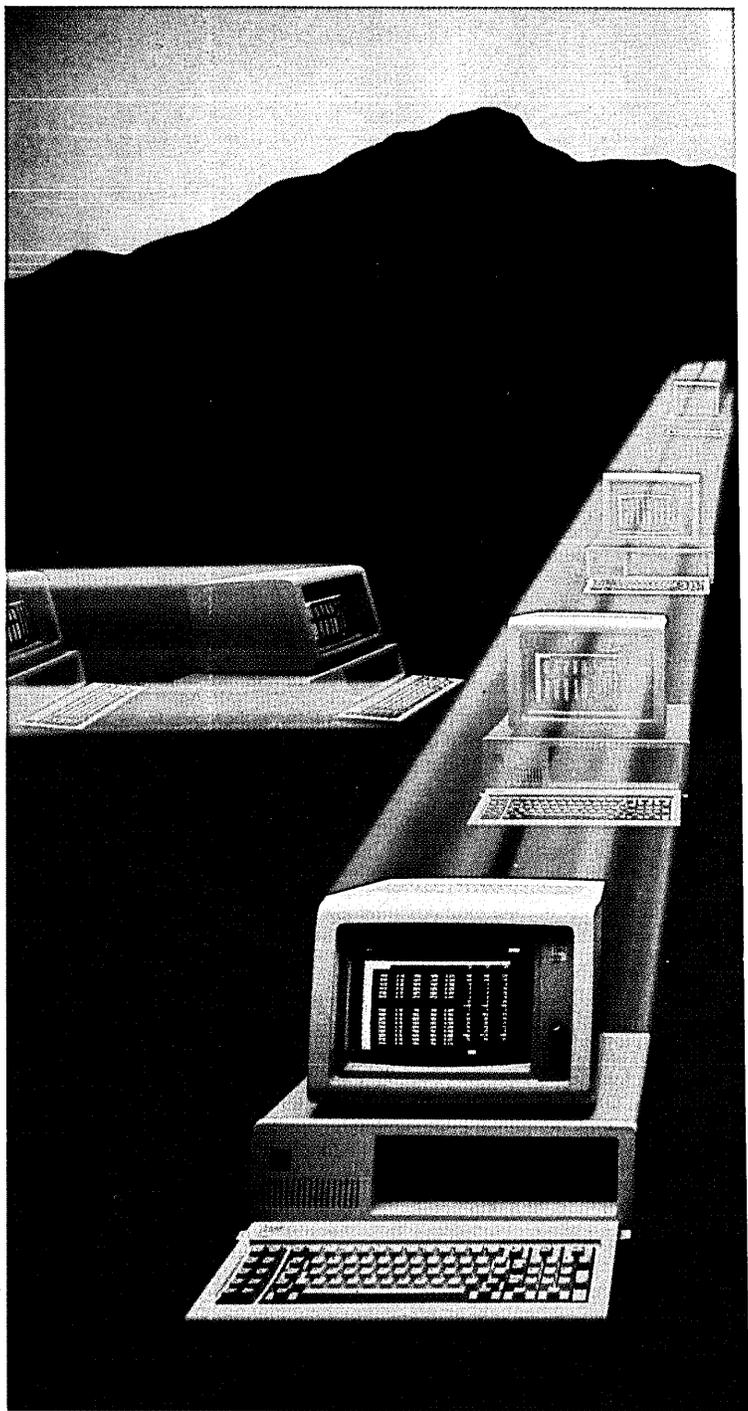
#### WHY YOU SHOULD BUY YOUR PC NETWORK FROM A COMPANY THAT UNDERSTANDS HIGH PERFORMANCE.

If you want the PCs in your company working in concert with the rest of the information processing equipment in your company, it makes sense to talk to people who have a track record networking more than just PCs.

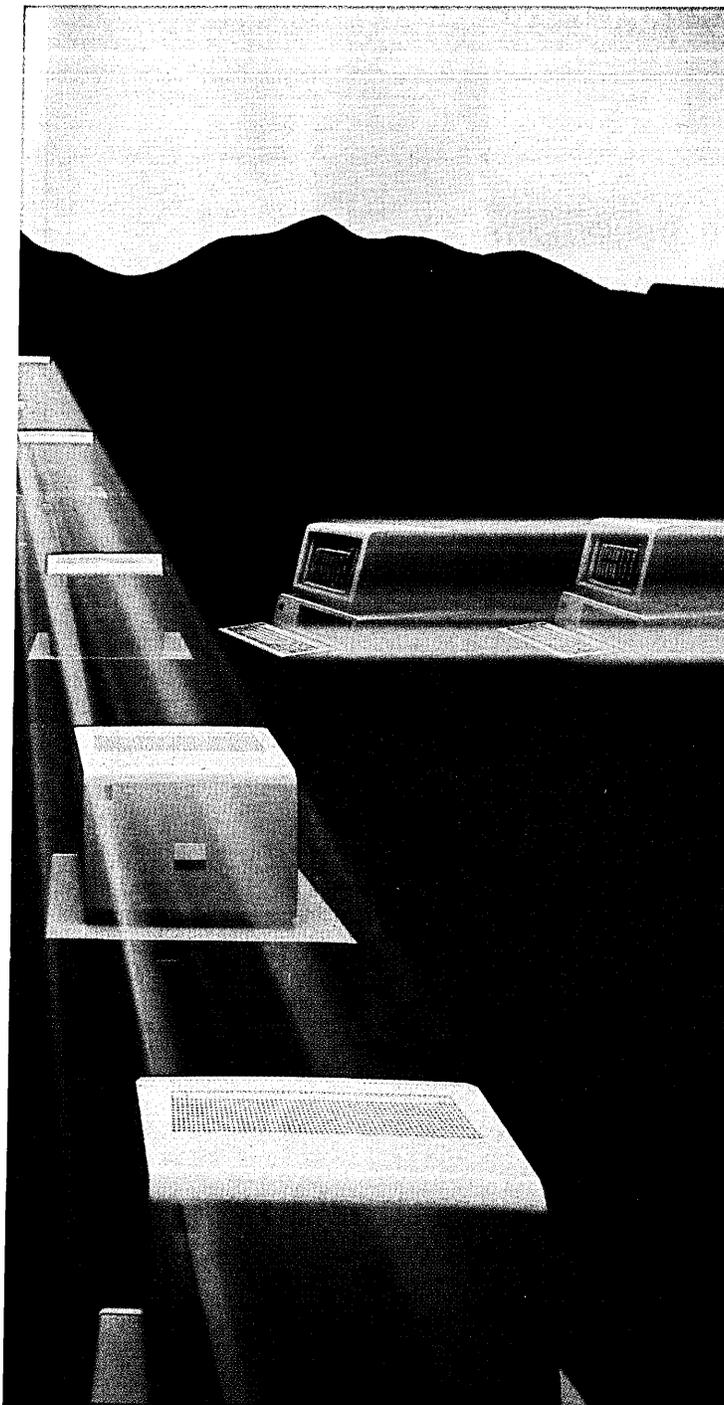
Like us. The expertise we've gained from developing the widest range of interfaces and protocols in the data communications industry has allowed us to build PC networking products with the muscle necessary for quick responses even in heavy traffic.

The Net/One Personal Connection™ is a high performance, high speed network system that can take your PCs as far, and as fast as you want in the corporate network. With the Personal Connection's SNA server software, a PC can emulate a 3278 and get a direct SNA route to the top. With Diskshare™ and Printshare™, PCs can share information and expensive peripheral resources, and Mailshare™ gives you complete electronic mail service.

It's a far-sighted solution, even if all you want to do now is hook up a few PCs economically. And it's the *only* solution when PCs need to be mixed cost effectively into a high-speed corporate network with devices from different manufacturers.



# In heavy ne high performan



HERE'S A CASE WHERE  
A BIGGER ENGINE IS ACTUALLY  
MORE ECONOMICAL.

The Net/One Personal Connection system packs the microprocessing power to offload all networking functions, so it doesn't eat up the host CPU's resources. That frees up a work station that other systems require simply to do their network's work.

WITH TWO BOARDS TO CHOOSE FROM,  
THE COST GOES WAY DOWN.

We now have two Personal Connection interface boards, with two levels of intelligence and two prices. At stations on the net where this additional offloading intelligence isn't required, plug our newest, most economical Personal Connection board into the PC, and bring your cost-per-connection down to where it would be tough to justify buying anything less. The full network functionality is all there with either of the two interface boards; they can be used interchangeably on the network and it makes no difference to network users. But now, with the option to pay for only as much intelligence as you need at each station, we've made it possible to have a real network at PC network prices.

IT'S POSSIBLE BECAUSE THESE ARE  
NET/ONE® PRODUCTS.

They are the newest extension of Net/One, the general purpose local area network system that can turn *all* the equipment you have now, no matter who makes it, into a fully functional, high performance network. Broadband, baseband, fiber optics. Main-frame to mini to micro. Local to remote.

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California 95050. Telephone (408)496-0111.

Net/One from Ungermann-Bass 

work traffic,  
ce isn't a luxury.

## IN FOCUS

A decline in 11/780 installations is apparently being offset by rising 11/785 shipments.

Interestingly, Data General's standing in the overall minicomputer market seems to be on the rise. Whereas in the previous 18 months its hardware accounted for only 10.4% of the respondents' total spending on minicomputers, it expects to capture 12.4% of their dollars in the following 18 months. The warm reception given its line of 32-bit minis may be enough for it to gain market share from archrival DEC. Data General users indicated a planned increase in orders of MV/10000 32-bit machines at the expense of the MV/8000, while the MV/6000 has dropped almost completely out of the picture.

At Prime Computer, a sharp fall-off in shipments of the models 550, 750,

### IBM and HP seem to have the highest loyalty among users.

and 850 was foreseen, but those machines have been superceded by the 2250, 2550, 9750, and 9950. Prime users said they would spend 44% of their budgets through the end of next year on the 9950 and 21% on the 750.

The use of AT&T's up-and-coming Unix operating system was found to be growing quickly, albeit from a small installed base. Only 7.6% of the respondents, most of them in the technical/scientific sector, said they were using Unix as their primary operating system at the time of the survey, but another 6.2% said they would have it installed by the end of next year. By that time, also, 18.2% of the respondents said Unix would have at least secondary status at their sites. Among those using Unix as the primary operating system, those sites involved in so-called artificial intelligence, communication, and CAD/CAM were the heaviest users of Unix. Over half the primary Unix sites said they used the software on DEC hardware, but by next year substantial showings were expected on IBM, HP, and even Wang computers.

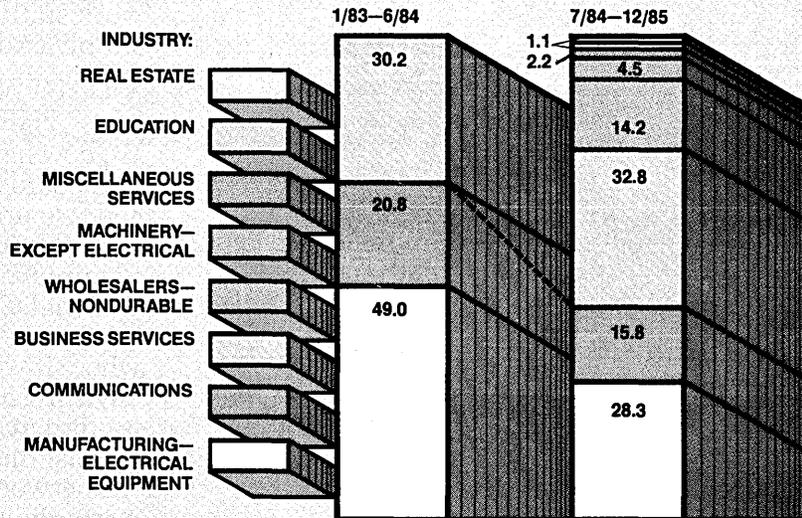
Use of remote minicomputer networks will grow substantially this year among respondents, 30% of which have such facilities installed and 18% of which will be making their first installations in the coming 18 months. And, as might be expected from the nature of their hardware, Tandem and Apollo showed top rankings in the usage of remote and local area networks, respectively.

Asked who their local area network suppliers were, respondents indicated that Ethernet was leading the pack, with 25% of the current and 44.5% of the planned installations, followed by Wangnet and DECnet. Interestingly, the local

FIG. 9

### AT&T 3B SERIES SHIPMENTS

DISTRIBUTION OF 3B PURCHASES BY INDUSTRY



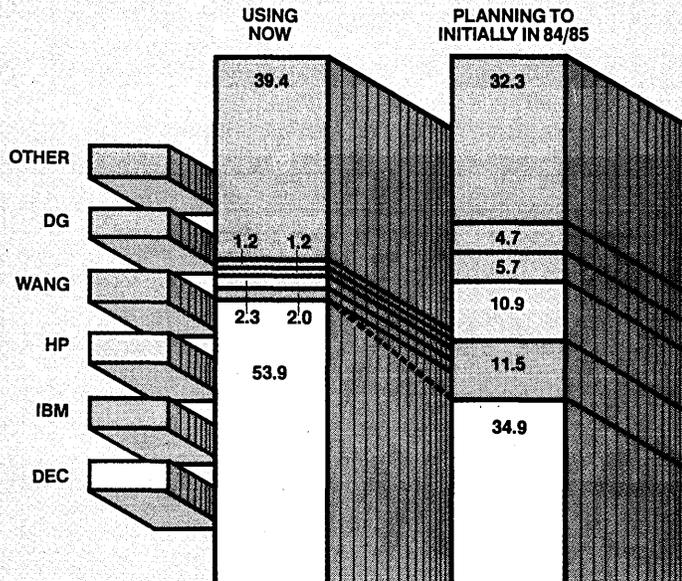
- Manufacturing—Electrical Equipment SIC includes old Western Electric
- Communications SIC includes the old Bell Operating Companies
- Business Services includes computer and data processing service (i.e., much of systems house population)
- Machinery—except Electrical includes office machine suppliers (e.g., hardware OEMs)

FIG. 10

### UNIX USAGE BIG ON DEC SYSTEMS

Query: What if any plans do you have for the use of Unix (Ulrix, Xenix, etc.) as your primary or secondary operating system?

PERCENT OF SITES ANSWERING "PRIMARY"



# The right network isn't a matter of choice. It's a matter of fact.

**Fact: You can't buy smarter than an OMNINET™ Network.**

Whether you have 2 microcomputers or 200, you bought them to handle information. If each micro has to handle it separately, both your equipment and your people are working inefficiently.

Because they could network with OMNINET. Sharing information — as well as the printing and data storage equipment that really puts information to work.

Add CORVUS' SNA Gateway, and you can link your entire network directly to your mainframe.

That's why an OMNINET Network uses simple, telephone-type line. Even relocating the system to a whole new building is just a move. Instead of a construction project.

**Fact: OMNINET Networks offer unmatched compatibility.**

From Apples to Zeniths, OMNINET handles more varieties of computers than any other network.

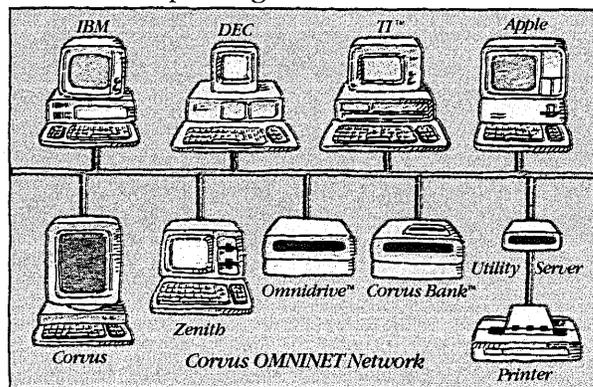
So keep the DEC's in Data Processing and the PC's in Purchasing. OMNINET will keep them all on speaking terms.

The price? At under \$500 per hookup, OMNINET is the most cost-effective network you can install. Or expand.

**Fact: This network was designed for microcomputers.**

Micros get moved. Businesses expand.

Your network should be able to grow and change just as fast as your business does.



**Fact: The experts network with OMNINET.**

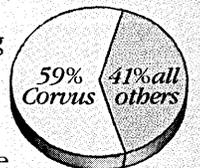
Over 30 of the major computer companies have licensed OMNINET for networking their micros. So you don't have to worry about support tomorrow for the system you pick today.

And OMNINET already has the most software options around — over 500 programs to choose from, according to your people's needs. Not their network's limitations.

**Fact: The facts have made us #1.**

CORVUS pioneered local area networking for microcomputers, and we've never stopped working on ways to improve it.

Just give us a ring at 800-4-CORVUS to find out more.



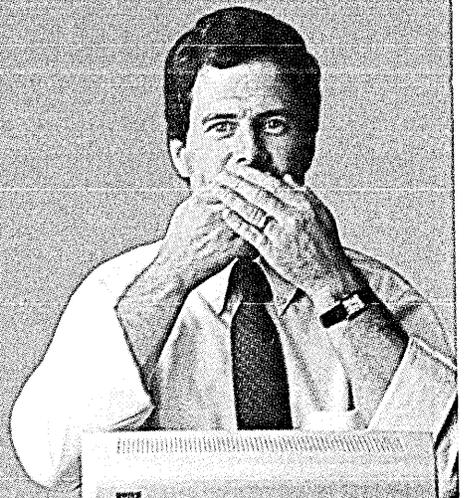
Because while calling ourselves the best is a matter of opinion, telling you that 3 out of every 5 locally networked micros work on a CORVUS network is something else.\*

It's a matter of fact.

**CORVUS**  
The Networking Company.

\*59% of all locally-networked micros operate in a CORVUS network, according to InfoCorp. CORVUS, THE NETWORKING COMPANY, OMNINET, OMNIDRIVE and CORVUS BANK are trademarks of CORVUS SYSTEMS, INC. IBM PC is a trademark of International Business Machines. APPLE is a trademark of APPLE COMPUTER INC. DEC is a trademark of DIGITAL EQUIPMENT CORPORATION. Zenith is a trademark of Zenith Corporation.

IRMA™ introduces a  
CICS file transfer  
system that will end  
PC-to-mainframe  
monkey business.





Far be it from DCA, the makers of the original PC-to-mainframe communications link, to close down the very same information flow we created.

But that doesn't mean we aren't fully aware of the mess that unauthorized use of a PC can cause.

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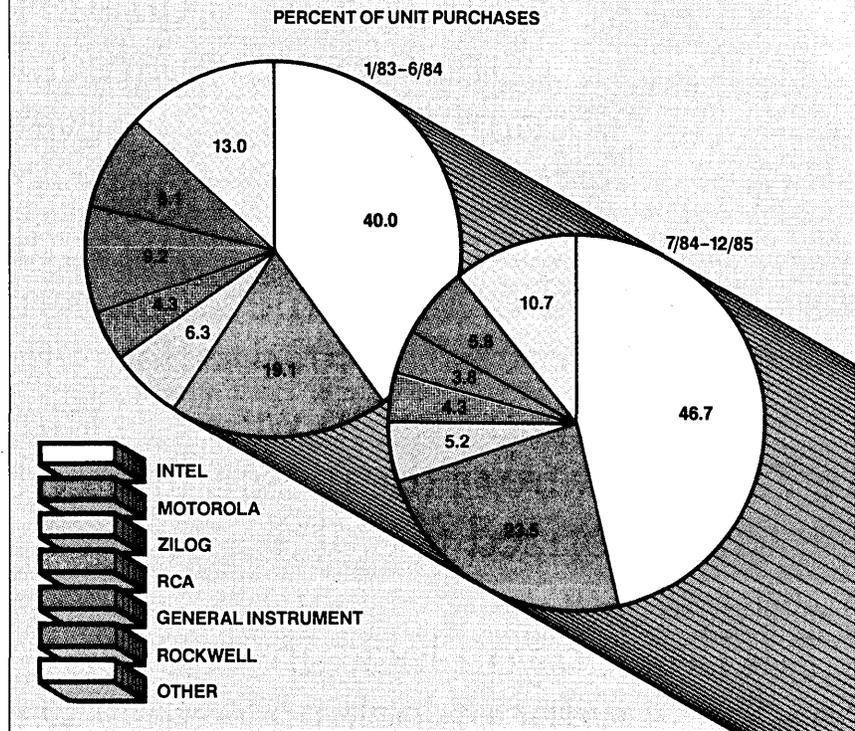


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**IN FOCUS**

FIG. 11

**INTEL LEADS IN MICROPROCESSORS**



network appears to be ahead of the private branch exchange in popularity among minicomputer users, particularly among defense contractors. This may mean the Defense Department will have a standard-setting influence on this area of data communication.

The Defense Department-dictated Ada language is being used at only 1.7% of all respondent sites, but at 4.3% of DEC

**The most popular machine to be acquired by respondents in the coming 18 months should be the DEC VAX 11/750, which is in the purchasing plans of 181 sites.**

sites and 5.2% of defense-oriented sites. By the end of next year, however, those numbers will have grown to 6.6%, 15.9%, and 25%, respectively.

The AI language Lisp was found to be in use at only 3.7% of all sites, 9.9% of DEC sites, and 19.6% of education sites; by the end of 1985 those numbers are expected to have changed to 6.3%, 15.6%, and 28.2%, respectively.

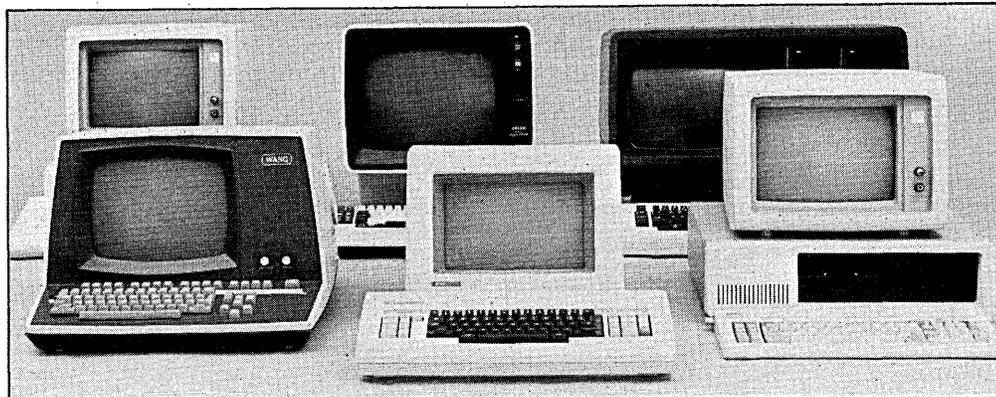
The fault-tolerant computing market, pioneered by Tandem Computers and now targeted by many recently started companies, is still drawing fairly high interest from users, but that's topping off, Cowen contends. For instance, almost 40% of the respondents said they would

not be interested in fault-tolerant systems even if compatible with their current minicomputers; 11% said yes to the same question. This suggests a much narrower market potential than might otherwise appear for new proprietary fault-tolerant systems suppliers.

In the "raw" microcomputer chip arena, where IBM has established itself as a de facto standard, Intel not surprisingly was found to be the leading supplier. Intel, of course, supplies the 8088 and 80286 chips to IBM and many other pc makers. In terms of unit purchases of individual chips, Intel supplied 40% through June 1984, followed by Motorola supplying 19%. As for the following 18 months, Intel is slated to get 47% of the respondent purchases, with Motorola obtaining a 24% share. In both cases, the runners-up were Zilog, RCA, General Instrument, and Rockwell. The 8088, which forms the heart of the IBM PC and its software-compatible clones, accounted for just over 30% of the Intel micro chips respondents will buy through the end of next year; the 8086 has an 18% to 19% share. According to survey results, Motorola should see an ongoing shift by users to its new 68010 and 68020 chips from the 68000. ©

To order the complete 1984-85 Mini-Micro Survey results for \$795, please call Cora Zaboly at (212) 605-9593.

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**CIRCLE 26 ON READER CARD**

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"I FOUND I WAS ISOLATED FROM MY COLLEAGUES.."



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GAVE ME THIS  
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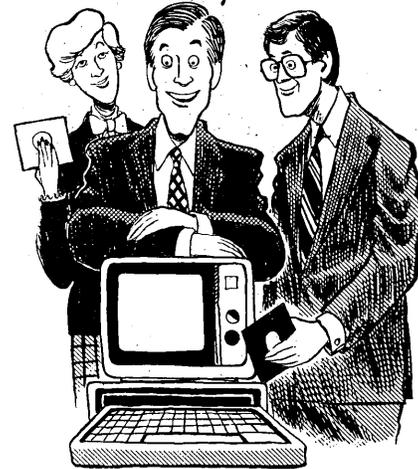
"IT  
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WORKSTATION."



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# NEWS IN PERSPECTIVE

## EXPORTS

# BACK TO GROUND ZERO

**The Export Administration Act never made it through Congress but it may next year.**

by Willie Schatz

If cowards die a thousand deaths and the brave but one, put the Export Administration Act (EAA) somewhere in between. "I feel like Adlai Stevenson after one of his election defeats," says Rep. Don Bonker (D-Wash.), chair of the House Subcommittee on International Economic Policy and Trade and the EAA's main man during the two years of the 98th Congress. "I'm too old to cry and it hurts too much to laugh."

Officially, the EAA expired last Feb. 29, when Congress failed to renew it. But House and Senate conferees met 14 times during the ensuing eight months to try to revive it. The EAA was dead and alive several times during the chaos that characterizes all congressional attempts at adjournment. Then, just when it seemed all was well, the EAA succumbed on the next to last day before the 98th Congress came to an end.

"We're back to ground zero," sighs Hugh Donaghue, Control Data's vice president of international trade programs and government relations. "This whole thing has been weird. First the bill was alive, then dead. But when the Senate picked up the House version and dropped [section] 10g, I thought we had it."

So did many other people. Until the very end, it had been a classic case of the irresistible force meeting the immovable object. The Senate, led by Jake Garn (R-Utah), chair of the Banking, Housing and Urban Development Committee, and John Heinz (R-Pa.), his chief lieutenant, would not drop 10g from the EAA bill. That provision, probably the most contentious in the entire bill, would have allowed the Secretary of Defense, with the concurrence of the Secretary of Commerce, to review applications for exports to Western allies and reliable end users. When the two secretaries disagreed, as they almost always would, the President would break the tie. (See "EAA Bugged Down," Sept. 1, p. 52).

The disagreement led to some rather colorful rhetoric. "All I hear about is how bad DOD is," Garn complained at

one of the few conferences he attended. "It's just dump on DOD. I don't hear about what a sieve DOC has become. It's a one-sided discussion. DOC has been a failure in this area for years. I'm not going to deal with all this b.s. that goes on in DOC."

Sen. Heinz was not far behind, calling the DOC "paranoid about anything that smacks of 10g," only to be reminded by undersecretary for international trade Lionel Olmer that "some paranoids have real enemies." Heinz also accused the business community of being misled by "two or three zealots in the high-tech community who don't understand what the Senate offers in 10g. These companies have either totally misread the Senate section on 10g or been bought off for other reasons by people who needed their help." Whether the high-tech community was as uncomprehending as Heinz charged proved moot. After the Senate conferees voted 4-1 to reject the House's bill, the House returned the favor, with Bonker's subcommittee voting 15-2 to kill the bill rather than accept the Senate's version.

"Why should we recede? We've already given up absolutely everything," said Rep. Toby Roth (R-Wis.), the subcommittee's ranking minority member.

But that was merely the first of many deaths. The same forces that seemed so anxious to bury the EAA tried

**"All I hear about is how bad DOD is," complained Garn. "I don't hear about what a sieve DOC has become."**

to revive it four days later. There was no life after that death, though, since the conferees could not even agree to have a conference. Bonker then pronounced the bill "as dead as a doornail."

Miraculously, a spare hammer was found and the coffin pried open once again. The redeemer was none other than the previously unyielding Sen. Garn. He surrendered his dearly beloved section 10g while simultaneously dropping a U.S. ban on bank loans to the government of South Africa, a provision dear to the House. The finished document, actually an amendment to a previously passed House extension of the EAA on which the Senate had never acted, reached the House floor the morning Congress was scheduled to adjourn.

After a complicated rules vote followed by some emotional debate, the House approved the Senate's amendment 269-62, but reinserted the ban on bank loans.

The House then sent the measure back to the Senate, but it could have saved the postage. A combination of



White House pressure, including four phone calls from Cabinet officials to majority leader Sen. Howard Baker (R-Tenn.) telling him to kill the bill, and Garn, taking offense at what he considered a stab in the back, signaled the final death of the EAA.

"I've never been in a conference where everybody was so unwilling to yield," Garn said on the Senate floor. "The House was never able to come through and perform on any tentative agreement it made. There will be no bill this year. I hope the House has learned a lesson.

"I'd love to take this dead cat back to the House door and see what further mischief they can perform, but my colleagues won't let me at this late date."

"This is a total humiliation for the administration," Bonker charged. "It's supposedly an administration that believes in free trade and represents the business community. It sure didn't do that this time.

"Nearly every group comes out the loser in this kind of stalemate. U.S. exporters will still be perceived as being unreliable suppliers. For those who worry about delays and uncertainty in applying for export licenses to ship high-technology products or who fear an expanded

DOD role in the licensing process, there is no hope in sight."

What is looming on the horizon is starting all over when the 99th Congress convenes next January. Since the EAA was not extended and no new law was enacted, export policy will continue to be administered under the International Emergency Economic Powers Act (IEEPA), as it has been since Feb. 29. That

**Miraculously, a spare hammer was found and the coffin pried open once again.**

law allows the President to declare an economic emergency and invoke the authority he would otherwise have under the EAA.

That authority has been challenged in a lawsuit in federal district court in Seattle, however. The court upheld DOC's denial of an export license application, but where that case came, others are sure to follow.

The question for 1985 seems to be who will get there first—Congress, with a new EAA, or disgruntled exporters, denied a license and all too ready to tell it to the judge?

"We need another law. This is an untenable position," says Rep. Ed Zschau

(R-Calif.), a former Silicon Valley executive and chair of the Republican Task Force on High Technology. "Next year we're going to have the same issues. But the reality in the spring of 1985 is going to be different than it was in the spring of 1983, when we started all this. Getting another bill is going to be difficult. The turf battle between Commerce and Defense isn't going to go away. It's probably going to get worse.

"But I think this has been a victory for the high-tech industry. By raising these issues as we did, some changes have been made. Delays are down dramatically. Turnaround time has been reduced sharply. I think that can only get better."

"This is a win," agrees a leading export attorney for computer trade associations. "But it's a limited one. We had a chance of having a terrible bill shoved on us, and we avoided that. But there wasn't much good or valuable in the bill anyway, so it's just as well we don't have one. It's kind of a wash.

"I think we're exactly where we were when we started."

Perhaps. But they won't be starting exactly where they left off. The composition of Congress is bound to change, which means the committee and subcommittee members won't be the same. Their

ILLUSTRATION BY RON LOGAN

## NEWS IN PERSPECTIVE

depth of understanding of the issues may differ from that of their previous colleagues.

"We'll be in better shape to get what we want next year," says a government relations executive for a major computer company. "We'll be starting at a higher level just because these issues have been discussed so much over the past two years. And Garn has already conceded on 10g. He got away with it the first time because we rolled over and played dead. That won't happen again."

"To come this close after two years of good faith effort is really disappointing," Bonker says. "There's no way I'm going to work hard again on a bill that's as overloaded as this one was. We started off in an adversarial position. Then it got worse. We need to work on a consensus before we start the next time."

Don't hold your breath. ©

### SOFTWARE

# A GAME WITHOUT RULES

**IBM's entry into the PC software business has raised the stakes for even the most successful independent vendors.**

by R. Emmett Carlyle

The volatile IBM PC industry has come to resemble a high-stakes gambling game without rules. IBM set the game in motion around the central principle of one person, one machine, but it offered few guidelines for using the PC in business automation and sold no applications software of its own.

"The machine merely permits an individualistic answer to such problems," Peter Labe, an analyst at Smith Barney Harris Upham & Co., New York, points out.

Of course others, notably the independent software vendors (ISVs), have been more than willing to come up with solutions to determine a few rules of play. But so far such companies have sprung up for the duration of one product, only to fade away. Some highly publicized ideas don't even make it to the market—so-called vaporware.

"One IBM estimate I heard is that a new software product for the PC is created every 11 minutes," says Robert Fertig, president of Enterprise Information Systems, Greenwich, Conn., "but most of

them quickly vanish without trace."

Currently there is talk in the industry of a software shakeout since several companies have experienced layoffs and bankruptcy proceedings. But for every software company in the doldrums, a newcomer springs up offering renewed hope and a new idea.

One good idea in this industry can be worth \$50 million or even \$100 million, as Lotus showed when it integrated a database, report generator, and spreadsheet into one package to produce its best-seller, 1-2-3. But even for the top micro software companies, that second lucky roll has so far proved elusive.

Thus for all its explosive growth, the PC industry is an industry that is spinning out of control, bursting into thousands of fragments without order or design. "There are some 10,000 companies and 32,000 products," claims Fertig, who is writing a book on the shakeout.

The fragmentation is no less apparent within businesses and corporations because of the nature of the PC buyer, but experts believe the individual buyer is giving way to the collective or corporation as purchaser. "Two years ago the mentality was standalone. Today it's shifting to some form of multi-user and the whole central principle of the PC industry is shifting from personal data to the shared database," says Ruthann Quindlen, an industry analyst at the investment research firm, Alex. Brown, Baltimore.

"The PC has proliferated as a personal productivity tool. Like a calculator, which is uniquely yours, it has had nothing to do with the organization," adds Quindlen.

"But all these individual purchases collectively constitute a huge investment by a corporation," stresses David Wilson, a director at the New York-based accounting, tax, and management consultant firm, Arthur Young & Co., "and so the emphasis has now swung to controlling and integrating the PCs and migrating to multi-user extensions."

With this fundamental shift in the industry, IBM is ready to come off the sidelines and make its move. "IBM has announced the multi-user PC hardware but won't provide the software until a market develops for the machine. Its first order of business is to prepare its base of PC customers for migration, and it can't do that without imposing standards," Fertig explains. He estimates IBM will have some 3 million PCs of various types installed by the end of next year.

So far the creation of PC software has occurred in a chaos of sorts. The only creative framework provided by IBM has been its generic hardware and PC/DOS operating system; but, through a few months of aggressive announcements,

IBM has changed all that and imposed its will, direction, and standards on a free but wayward young industry.

IBM's open architecture is being replaced by a closed architecture: PC/DOS, following details of Release 3.1, is now largely proprietary. A higher-level program to control applications and shared resource management, TopView, has been introduced "to herd the ISVs into a form of commonality at this level," as Laura Stuart, an analyst at the Boston-based Yankee Group puts it.

Some top micro software companies—Microsoft, Digital Research (DRI),

**"There are some 10,000 companies and 32,000 products," says analyst Robert Fertig.**

and VisiCorp, for instance—have attempted to forge their own standards at this level, their so-called windowing software, but these could now go the way of the dodo, experts feel.

More recently, IBM took aim at the ISVs with its first internally developed applications software for the PC in a drive to tie the micro into the IBM mainstream. Two business software lines developed over the past two years to provide host access, spreadsheets, financial analysis, and word processing were revealed—31 programs in all.

Everywhere there is a sense of IBM bringing order to an emotionally impelled young industry—a kind of cooling maturity. A recent survey of the large U.S. companies illustrates this shift: there is a move toward greater control of the process by MIS departments and IBM rather than by the PC buyers. According to Computer Intelligence Corp. (CIC), La Jolla, Calif., IBM now has 60% of the PC business, by dollar value, at large corporations. Taking into account the 75% or so of the mainframe business that IBM has secured in Fortune 1,000 accounts, the scene is set for a fusion of the two bases through increased control of the DBMS and communications links between them, experts explain.

What's becoming apparent is that IBM's indispensable partners for the first phase of the PC industry's growth—the retailers and ISVs—will be diminishing factors in the second, or multi-user, phase. The CIC figures show that retail stores currently supply 40% of the PC family, but that percentage is shrinking. And most third-party software firms have neither the size nor Fortune 1,000 connections to be much of a factor in the years ahead, observers point out.

During the first phase IBM ardently courted the ISVs. Fertig believes that the computer giant currently has oem deals for over 200 products, and is being

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D 5

## NEWS IN PERSPECTIVE

careful not to "kill the goose that laid the golden eggs." But as software becomes more of a factor in total PC industry revenues—20% of the total this year, 30% next year, and so on—it is believed IBM will begin to crowd out the independents.

When IBM disclosed the new applications software, it announced in conciliatory tones that ISVs would still play a big role in the years ahead. "They'll provide more than half of the applications software," said John Steuri, general manager responsible for IBM's independent

business unit, Information Services, which created the new software.

"I'd take all this with a pinch of salt," urges Maureen Fleming, editor of *Download*, a newsletter published by International Resource Development, Norwalk, Conn., which deals with PC software issues. "IBM is now using its much vaunted handholding as a sales tool to relieve both PC retailers and IBM direct sales from fully supporting IBM's new software.

"This gives retailers an incentive

to sell IBM software over software from independents, who typically expect retailers to be the first support point after a problem," she adds.

IBM is also undercutting the leading third-party software firms on price, according to Fleming. "For \$400 a user gets a DBMS that rivals if not surpasses Ashton-Tate's dBase III, while for \$400 or \$550 customers can buy one of IBM's new packages instead of 1-2-3."

To ensure a smooth migration to future multi-user PC systems, IBM has apparently made sure that user programs written under market-leading software—1-2-3, dBase III, and Multimate, for example—can run under its new Personal Decision Series (PDS).

While IBM is not going to come in and take over the market overnight, Fleming and other experts believe third-party software developers will see an almost immediate slowdown in ordering as retailers assess the IBM software announcements.

For instance, the market leader, Lotus, is having trouble expanding its constituency of users to embrace new first-time customers, and its 1-2-3 extension, Symphony, is being discounted heavily to attract buyers.

IBM has avoided this trap, Fleming points out. "Though TopView runs with

**IBM's PC architecture is seen as closing after a long period of being open to all vendors and users.**

the PDS series, it is not bundled in with it. And PDS was created as a series of functional modules sharing a database—all of which, as well as being integrated, are low priced and easy to use."

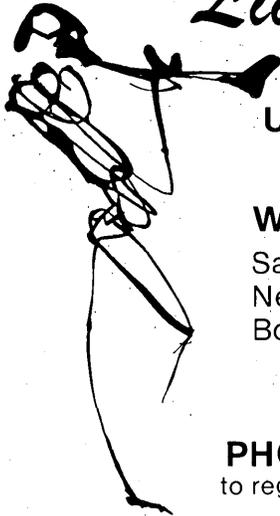
Most of IBM's programs run in a minimum 256K of RAM. Packages from independents are often pushing the upper limits of a PC's range, some at more than 700K.

There may be some weaknesses in the IBM announcements for Lotus and the other ISVs to take advantage of. The most visible, according to Fleming, is the requirement for disk swapping on a floppy-based system. "Users will have to come to terms with buying a hard disk for efficient use of the software, which they may not find cost-effective." Yankee Group's Stuart adds that the word processing module is not very good—"no more than a memo and form letter generator, and presently incompatible with the PC's existing Displaywrite II software developed by IBM." This deficiency will be corrected soon with a new format module, sources say.

The other major weakness of IBM's new software is that it is limited to single-user PCs. Versions will be written for the multi-user PC AT and the PC local area net-

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CIRCLE 29 ON READER CARD

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CIRCLE 30 ON READER CARD

## NEWS IN PERSPECTIVE

work, IBM insiders explain. "But, as usual, IBM will wait for this market to mature. It likes a \$1 billion game before it starts to play," says one source.

### IBM is being careful "not to kill the goose that laid the golden eggs," says Fertig.

Though the independent software vendors have been bracing for the IBM announcements, their reaction was generally one of shock—a numbed silence. This

fact is reflected in their press relations. Only months ago, Lotus for example, had an easy rapport with the media. Today its attitude is more cautious—even suspicious.

When asked for its perspective on the IBM moves, Lotus declined comment. Others have been less hesitant, but have said publicly only that it's too early for a sensible overview.

One Cambridge, Mass., challenger of Lotus did speak. "A shakeout seems inevitable," says Phyllis King, New En-

gland regional sales manager at Mosaic Software, supplier of the Integrated 7 package. "Software companies will either be forced out, or into vertical customized niches with IBM taking the horizontal cross-industry business." King said Mosaic has prepared for IBM's entry into the applications business by writing its programs in the portable C language. "We can move to PC Net and Unix multi-user applications when the market matures," she confides.

Other independent software companies, not just those focusing on micros, have also come under pressure following the IBM announcements. Along with its PDS series, IBM unveiled a family of accounting programs, the Business Management Series, that could hurt big names like Management Science America (MSA) and Informatics. But perhaps IBM's most interesting maneuver is the increased mainframe control it brings to bear with its new software. Soon after the IBM product announcements, MSA said it was trying to sell the Peachtree Software subsidiary it had made so much noise about for the last two years (see Benchmarks).

Using the new packages, the central MIS department can take requests for data from its end users and download them to virtual disks on the host that

### Though the independent software vendors have been bracing for the IBM announcements, their reaction was generally one of shock—a numbed silence.

have been allocated for personal computer use. PC users are able to query the virtual disks for their data and download to the PDS software. Each PC can access up to eight 10MB virtual disks, 80MB in all, IBM claims.

IBM is happy because it will sell many disks. Central MIS is happy because it will increase its control over end users while maintaining control of the central database. And, of course, IBM should sell a lot of PDS software.

Taken as a whole it's clear that the changing nature of the PC buyer is forcing a change in the supplier. As a result, the first phase of the personal computer software business, which began with VisiCalc six years ago and got into high gear with the announcement of 1-2-3 in October 1982, may be drawing to a close.

Some observers feel that IBM may have been a little too aggressive over the past few months, or at least heavy-handed. IBM for its part is telling the industry that law and order is preferable to chaos. It is now telling vendors that they can be creative within a framework, thus allowing more focus for their efforts. ©

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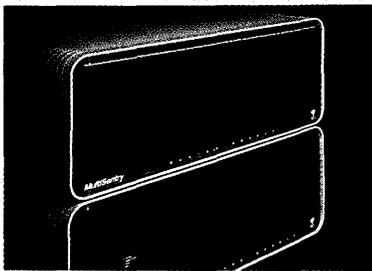
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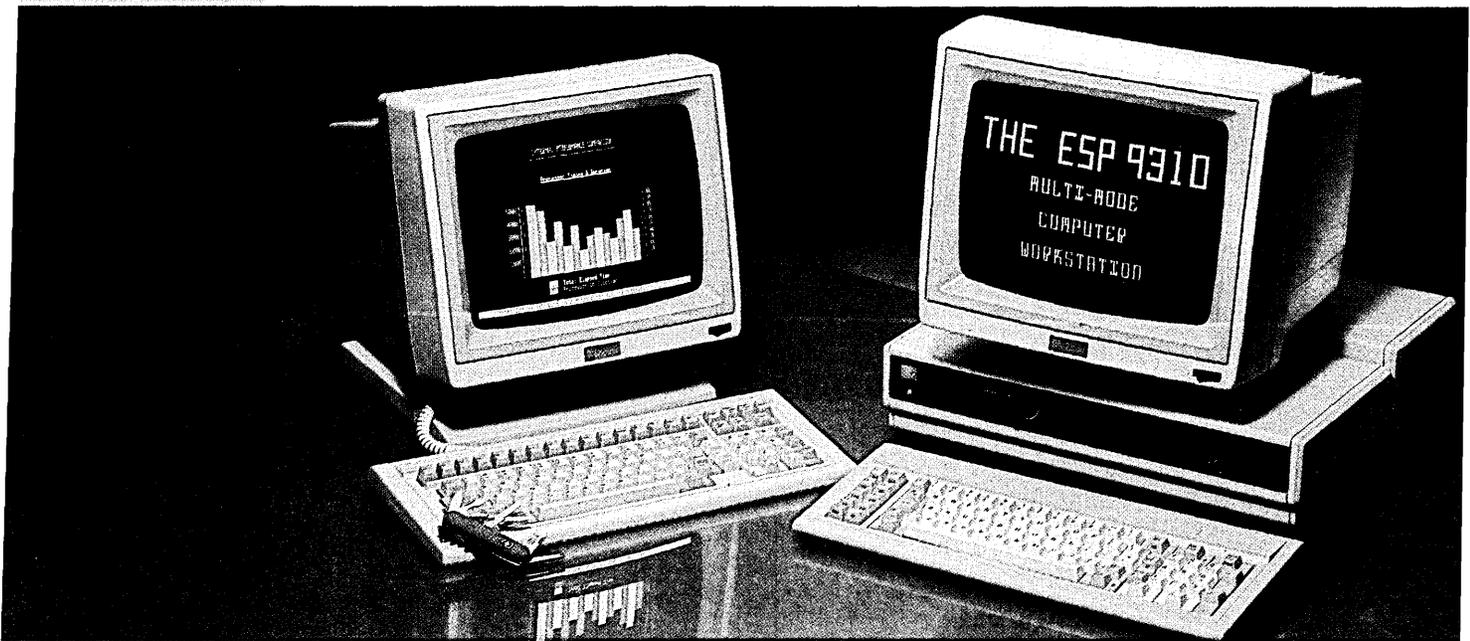
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## NEWS IN PERSPECTIVE

### TELECOMMUNICATIONS

# WE WANT UNIX: MITI

**Japan has signed a deal to get AT&T's help in furthering local Unix development.**

by Tom Murtha

A planned tie-up between AT&T International and Japan's Ministry of International Trade and Industry (MITI) may assure Unix a long life in Japan, perhaps at the expense of IBM.

"It's a deal that benefits everyone involved," says Akito Yanai, assistant managing director for AT&T International (Japan) Ltd. "The Japanese industry gets the Unix source code as a basis for software development. AT&T moves toward establishing Unix as a standard for the world's second largest market for software."

The deal was disclosed in early

### AN ALTERNATIVE TO UNIX

Japanese companies are looking for an alternative to operating systems made in the U.S. and Europe. They may have found it at the University of Tokyo.

Ken Sakamura, an assistant professor at the prestigious University of Tokyo's department of information science, is the creator of a real-time operating system architecture called TRON (from The Real-time Operating System Nucleus).

Before the end of the year, NEC Corp. plans to begin domestic shipments of a real-time control system for industrial applications dubbed I-TRON. "The I-TRON system is designed to control microprocessing units for industrial robots, telephone switching, and other real-time tasks," says Kenji Kani, manager of the system design department at the VLSI development division of NEC Corp. "Unix was inadequate for real-time applications. American companies didn't provide an efficient real-time OS, so we decided to develop one ourselves. When we learned about Sakamura's system a year ago, we decided to use it with our own interface."

NEC will implement a ROM version of I-TRON on its V-20 microprocessor that is "second-sourced" from the Intel 8086. More grandiose plans are in store, however. According to Kani, NEC intends to of-

fer a 32-bit version within two years. Sakamura and his development team are working on operating systems for business and home use dubbed B-TRON and H-TRON, respectively.

The B-TRON version is planned to feature a 32-bit data bus and built-in dictionaries for processing written Japanese and translation applications. "The response time of TRON will be the fastest in the world," claims Sakamura. "The system calls are open and standard. Concurrent multitasking is made possible by a virtual software data bus. A TRON nucleus will be common to all models. The H-TRON will be designed as an independent man-machine interface as well as for dynamic coupling into large scale systems."

In addition to NEC backing the TRON project, Fujitsu, Hitachi, and Mitsubishi Electric are considering joining the effort. "American firms are free to license the system," states Sakamura. "There already have been more than three inquiries from Americans, but none to date from Europeans."

Officials at MITI say they have no connection to the TRON project. If TRON catches on with private industry, it could dampen enthusiasm for developing Japanese Unix productivity tools. ©

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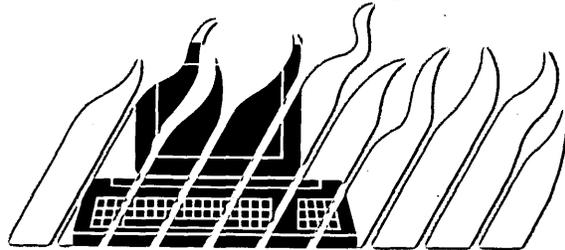
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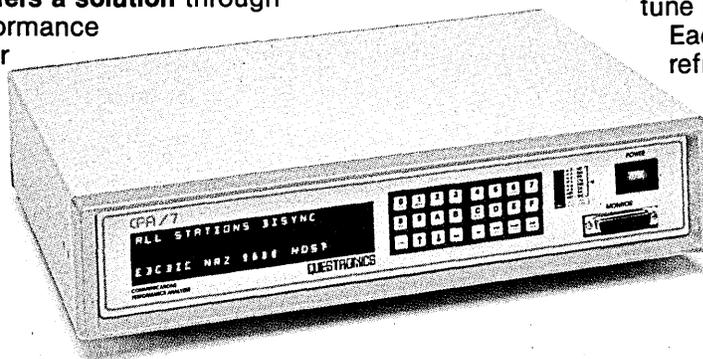


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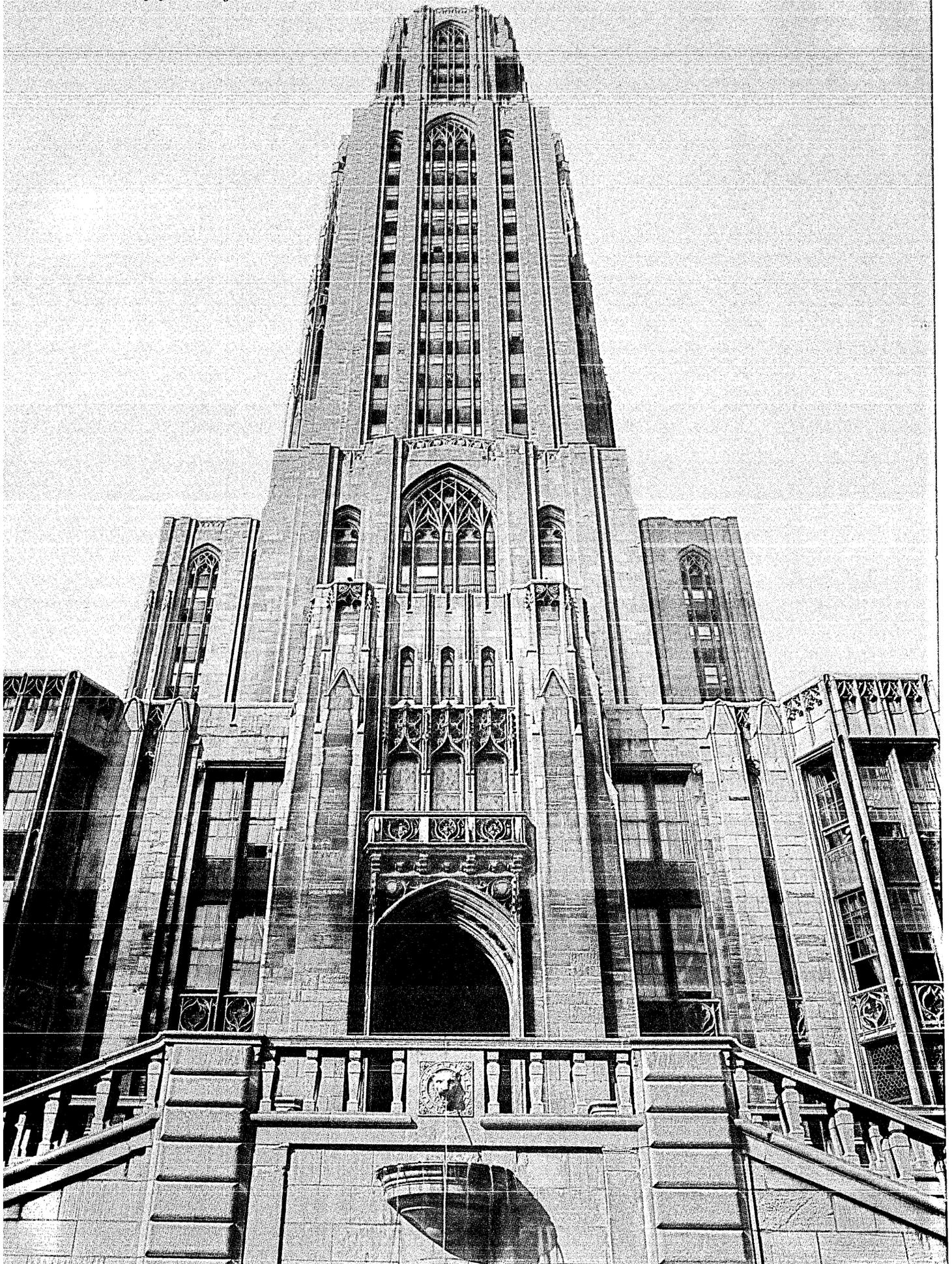
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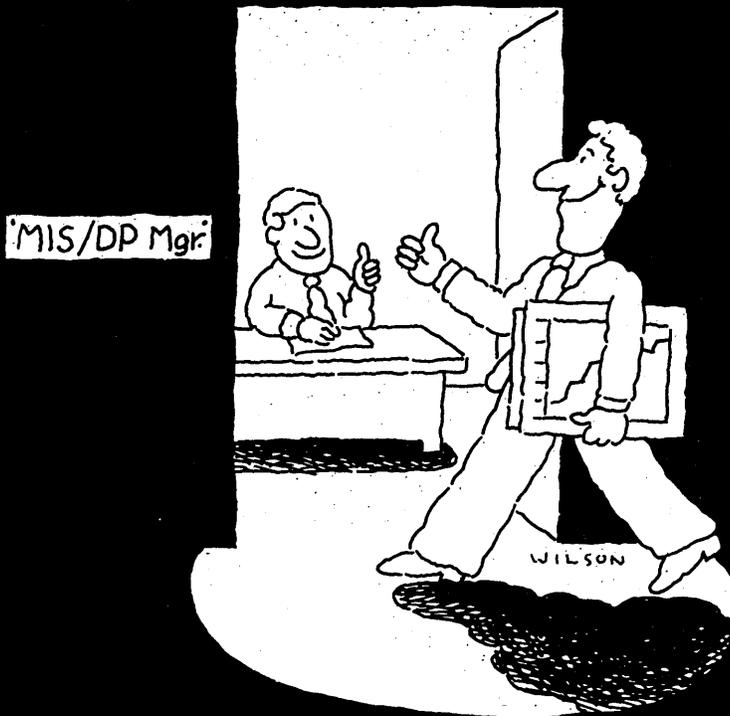
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## NEWS IN PERSPECTIVE

September and calls for AT&T to help MITI develop Japanese versions of the up-and-coming operating system. Unix is expected to be central to Japan's determined effort to bolster its flagging software development and help it penetrate international markets.

Of course, what bodes well for AT&T presents IBM Japan with some uncomfortable choices. IBM can go against the trend and develop its own Japanese version of Unix at considerable expense. Or it can make a deal with Microsoft Corp. of Bellevue, Wash., for supporting Xenix on IBM hardware sold in Japan. The successful Model 5550 workstation that IBM sells in Japan should soon have available another Unix variation called Venix. All these choices, however, involve licensing indirectly or directly from rival AT&T, something IBM most likely doesn't want to do but is not totally opposed to.

"It looks like it's IBM Japan vs. AT&T and MITI," concludes Masanobu Hirano, president of Nippon Venturcom Inc., a company developing a Japanese

**It is estimated that there are more than 700 Unix installations in Japan.**

version of Venix for the IBM 5550.

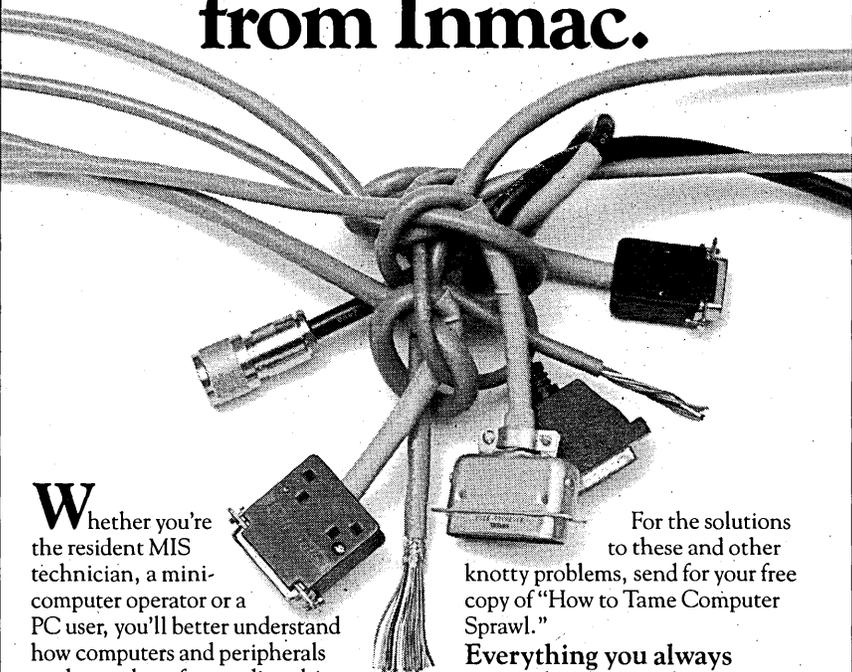
MITI's choice for the five-year, \$125 million software development project assures a continuation of Japan's Unix boom. Since opening its Tokyo office last January, AT&T has sold more than 25 Unix source code licenses to Japanese companies for a cool \$43,000 each. The Japan Unix Society estimates Unix is implemented at more than 700 installations in Japan, more than double the number two years ago.

The total installations in Japan is hard for even AT&T to estimate. One source code license can spawn dozens of individual computers using Unix. "We can't keep track of multinationals moving their Unix implementations across borders," says Jiro Monden, manager of the Unix support group at AT&T's Tokyo office.

AT&T's pricing scheme contributes to the proliferation of Unix. Educational institutions pay only \$800 for handling and copy charges to obtain source code, regardless of the number of copies. According to AT&T's Monden, the pricing scheme for Unix is uniform worldwide. Relatively low-priced sublicensing has helped push Unix in Japan. A penchant for improving the operating system has also created a smorgasbord of incompatible Japanese language variants of Unix.

AT&T is helping Japanese industry create a standard Unix approach to processing the ideographs of written Japa-

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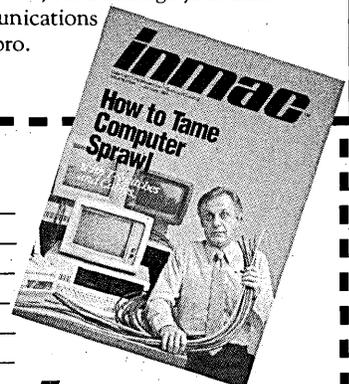
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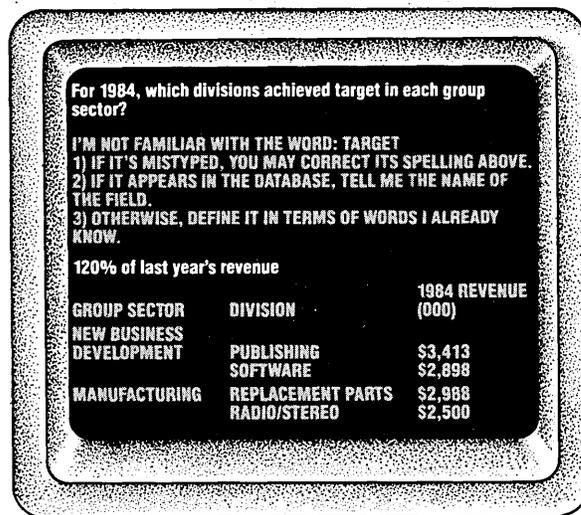
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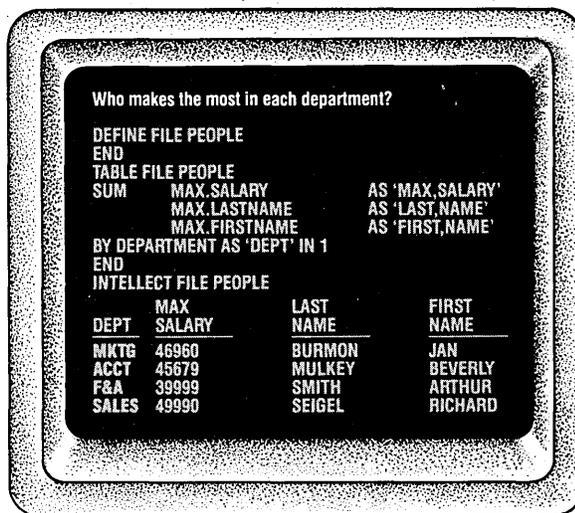
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## NEWS IN PERSPECTIVE

nese. Since Sept. 1 of this year, MITI and the stars of its dp flock—Nippon Telegraph and Telephone (NTT), Fujitsu, NEC, Hitachi, Toshiba, and Oki—each send a representative to AT&T's office once a week to work out a standardized Japanese language version of Unix.

Conspicuous by their absence from the club are subsidiaries of the BUNCH mainframe companies, although MITI says everyone is invited to the party. When foreign competitors come knocking, as surely they will, MITI's open-door policy will be put to the test.

"Our approach to the Japanese market is very different from IBM's," declares AT&T's Yanai. "We are a relative newcomer to Japan. It's only appropriate that we ask Japanese users how AT&T can contribute to the development of this [software] market. I think MITI appreciates our efforts. Few, if any, U.S. computer companies have ever had regular meetings with people from both Japanese government and industry."

While MITI has rushed to embrace AT&T's offerings, the motives of both sides are far from transparent. According to MITI, the purpose of its project is to increase the productivity of Japanese programmers. About 10% of Japanese software writing is now automated. With-

in five years, MITI hopes to raise this figure to 80%.

Although the project is still in the planning stages, a priority is the establishment of a nationwide computer network for access to software productivity tools based on Unix. The project is still contingent on funding approval from the Ministry of Finance. MITI officials—although they've been wrong before—say that all the groundwork is complete for a go-ahead in December.

Some industry observers speculate

### "We might think about using AT&T's Net 1000 for our software distribution network," hints Masataka Nakano.

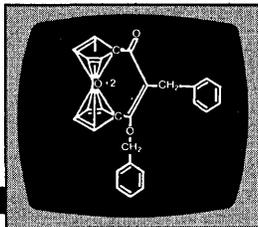
that the MITI move is an attempt to sabotage AT&T's long-range plans to market Unix. Once centralized interactive programming systems are in place, MITI will no longer need AT&T as the sole agent and distributor for Unix source code. The MITI Unix derivative may be a stronger and more appropriate tonic for the ripening Japanese software industry.

Other nations are making efforts to create centralized depositories for bolstering nascent software industries. In a move that may foreshadow MITI's machi-

nations, the government of Brazil is negotiating to be the sole distributor of Unix source code within its borders. China has reportedly already approached AT&T about licensing Unix on special terms. A Unix standard for processing the ideographs used for both Chinese and Japanese will open up an enormous potential Asian market for Japan's computer industry. China and other developing countries are closely observing MITI's policies to promote software.

AT&T may be after a quid pro quo for cuddling up to MITI. "We might think about using AT&T's Net 1000 for our software distribution network," hints Masataka Nakano, director of MITI's Data Processing Promotion Division. "I originally approached AT&T because it had the experience we needed in using computer networks. We didn't intend to use an existing system but Unix turned out to be the best candidate."

For Japan, Unix happened to be the only candidate other than the conventional mainframe environment. Kouichi Kishida, president of the Japan Unix Society and executive vice president and technical director of Software Research Associates Inc. in Tokyo, says, "In 1981 when I chose Unix for developing productivity tools for a MITI-sponsored soft-



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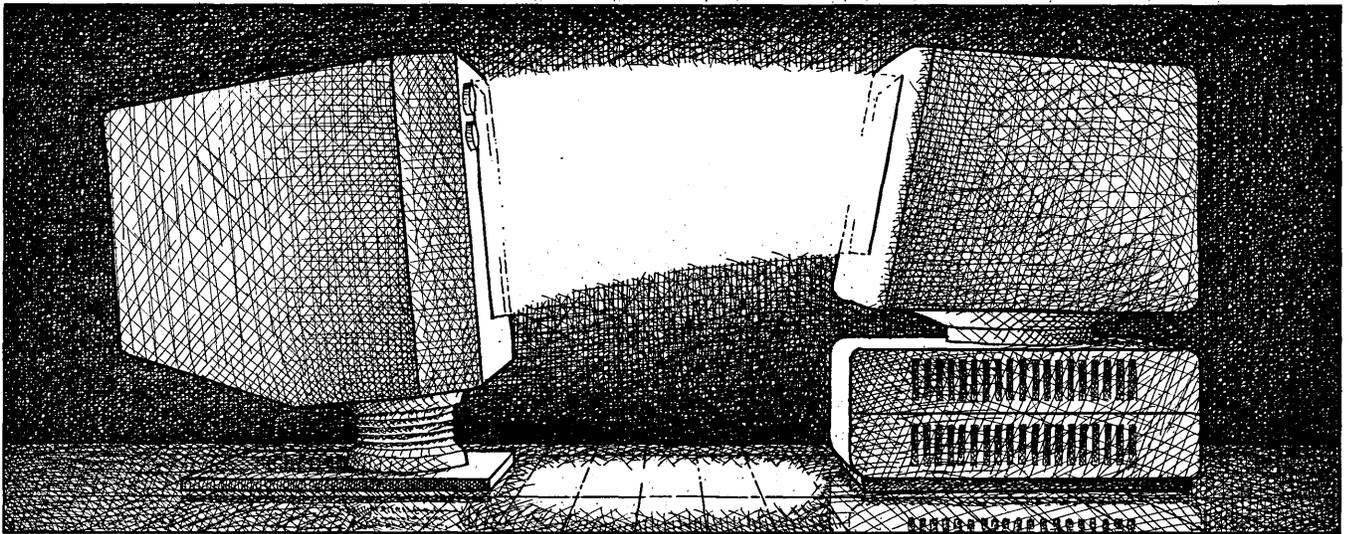
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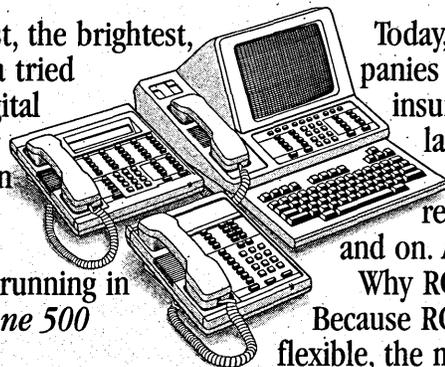
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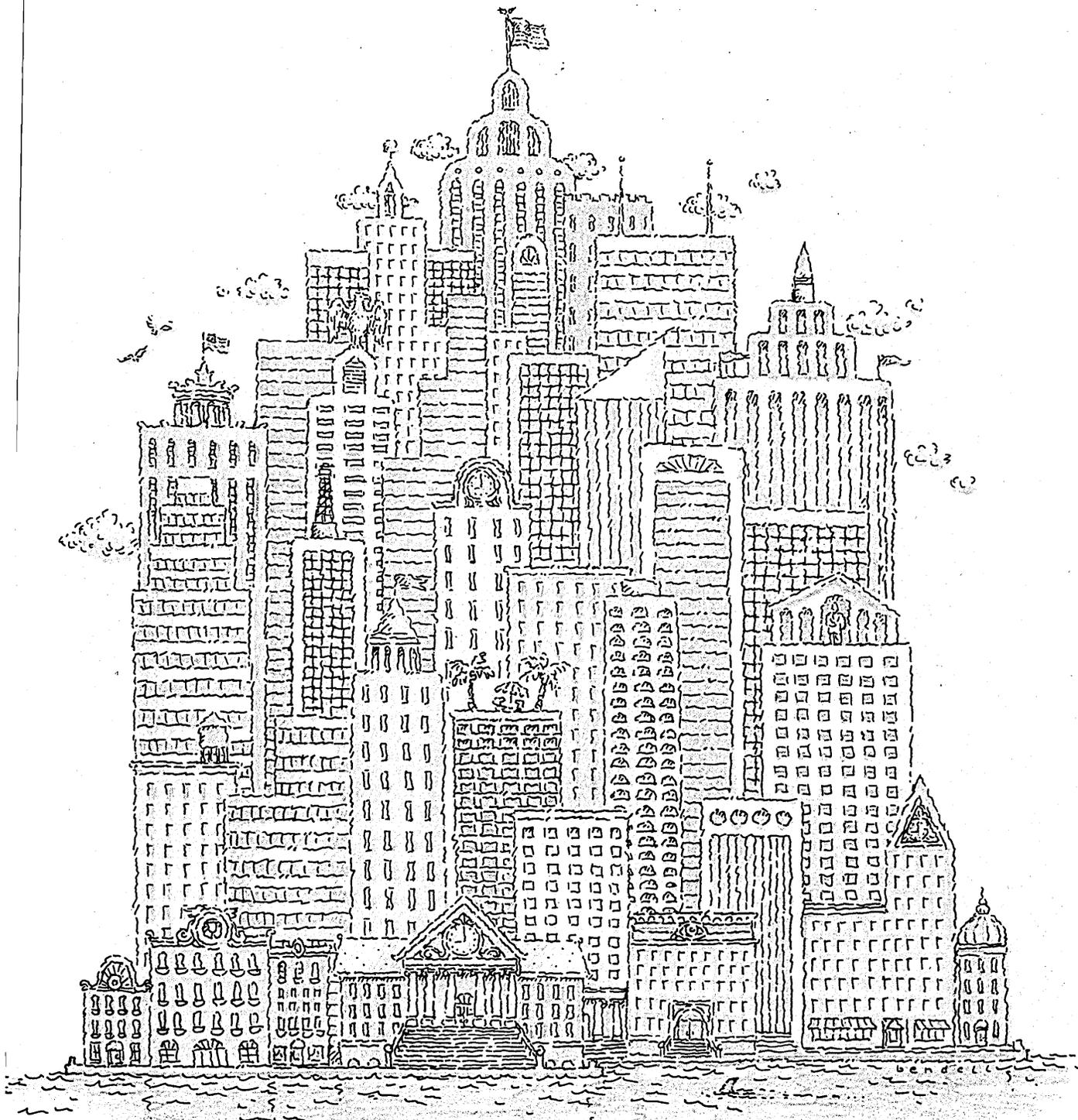
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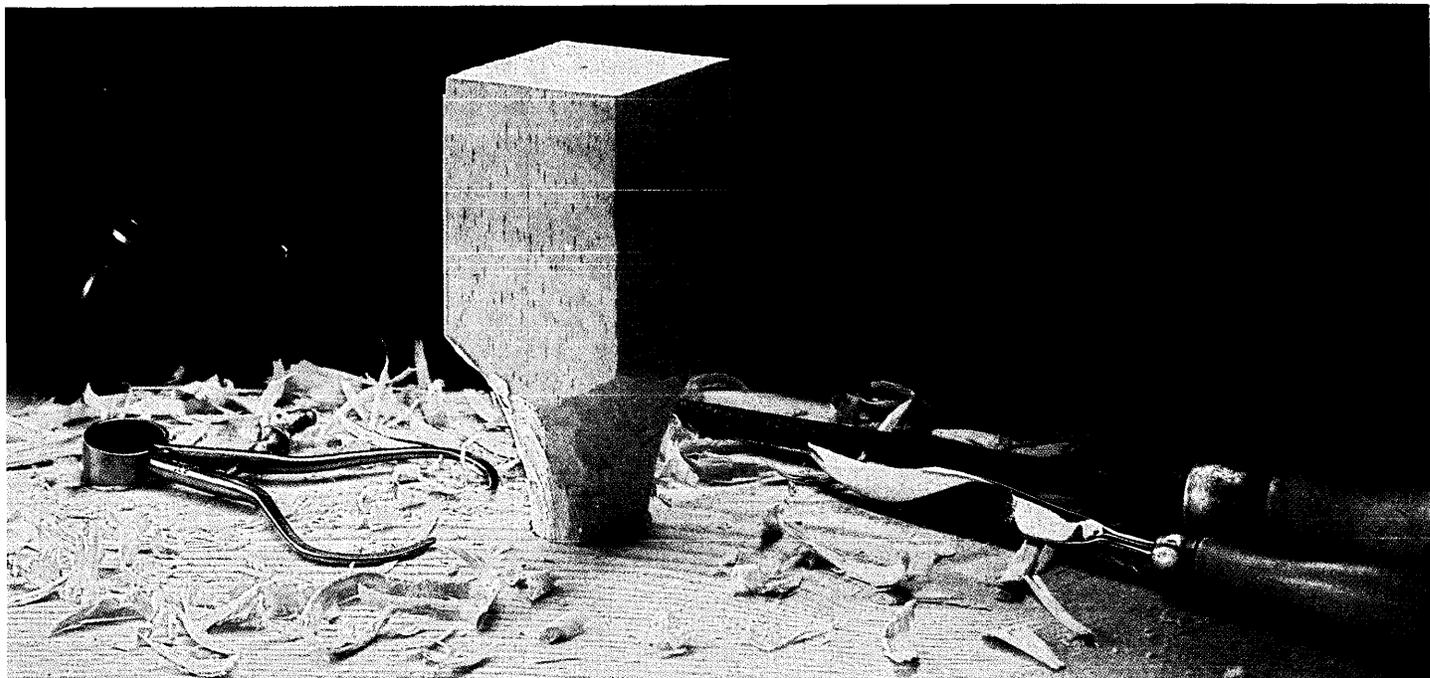
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## NEWS IN PERSPECTIVE

ware maintenance engineering facility, people said I was crazy.”

Kishida stresses that even today “there is no other viable alternative to Unix in spite of the inadequacy of its file system and the ASCII character representation for Chinese characters. We need to develop a new operating system, but for now Unix has become a de facto standard in Japan.”

At the annual Data Show in Tokyo this past September, each major Japanese hardware maker was selling its version of Unix for the domestic market. The same companies now each indicate plans to market a 32-bit Unix personal computer sometime next year.

Except for a few proprietary operating systems in Japan, all have been imported and modified. The MSX standard operating system for 8-bit home computers, MS/DOS, and different versions of CP/M are all U.S. imports. Japan has made only one serious effort to create an alternative operating system of its own (see box).

Software development and support systems for Japanese supercomputers is another feature of MITI's Unix plans. NEC Corp. is reported to be developing a Unix front end for its SX series of supercomputers.

Unlike Hitachi and Fujitsu, NEC has not followed the path of IBM compatibility for its mainframes and supercomputers. A Unix bridge would help NEC

**“There is no other viable alternative to Unix in spite of the inadequacy of its file system and the ASCII character representation for Chinese characters.”**

convert programs from general purpose mainframes to supercomputers. The centralized software development support system envisioned by MITI will employ several supercomputers. A Unix front end for NEC supercomputers would make a perfect candidate for the hub of MITI's network.

The MITI approach to national software development is a tangle of strange bedfellows and powerful adversaries. For AT&T, helping the Japanese government initiate a comprehensive project aimed at bolstering the country's industry is a gamble.

“Obtaining technical cooperation from AT&T seems to be a good format for our project,” declares MITI's Nakano. “However, our doors are open to the many Unix users in the U.S. who have experience we need.”

When AT&T is no longer giving away expertise desired by MITI, how long before it too shares IBM's outsider status in the Japanese industry? ©

# JAPAN BETS ON FIBER

**The country's phone system is leading a 20-year experiment to develop a nationwide fiber optics telecom network.**

by Tom Murtha

Nippon Telegraph and Telephone Public Corp. (NTT) has begun an experiment in digital telecommunication services that initiates use of what may be the most ambitious commercial optical fiber network in the world.

It is hoped that within 20 years, NTT's Information Network System (INS) will be a comprehensive communication trunk line spanning the Japan archipelago. “We are digitizing information transmission so we can explore all possible combinations of communication,” says Norio Yamamoto, assistant general manager of the corporate planning department of the Mitsubishi Research Institute (MRI) in Tokyo.

NTT has virtually completed the optical fiber trunk line, which runs from the city of Sapporo in the north to the city of Fukuoka in the south. Japanese manufacturers of data communication equipment are going after the market created when NTT opened the Tokyo optical fiber line for service last month. This line accounts for 70% of Japan's domestic data traffic. “Outsiders have been lulled into thinking the line would be open in mid-1985,” says Bernard Key, general manager of Jardine Fleming Securities Ltd. in Tokyo. “The Japanese manufacturers are now preparing major marketing efforts for network multiplexors, PBXs, video response systems, high-performance faxes, and digital telephones.”

The 30-month-long INS experiment, which began Sept. 28, is taking place among 1,266 individual telephone subscribers living in the Tokyo suburbs of Mitaka and Musashino. More than 700 business offices and 140 showrooms are also participating. At present 98 companies are providing digital information services through digital telephones, videotex terminals, fax machines, as well as an assortment of other prototype equipment. By next spring, the number of companies providing information is expected to swell to 360. The equipment will be rotated to different households every six months for the duration of the experiment.

Japanese manufacturers are test-

## NEWS IN PERSPECTIVE

ing equipment for future commercial production. When the experiment ends, NTT will decide what kind of digital terminals to develop for commercial use and the type of functions it will incorporate into INS.

The old "NTT family" of NEC, Fujitsu, Hitachi, Oki Electric, and Mitsubishi Electric is already positioned for a big stake in INS. Newcomers outside the family, such as Toshiba and the consumer

### Japanese manufacturers would like to combine home electronic services into a single data stream.

electronics giants Sony and Matsushita, are poised to offer hardware and services as well. The large Japanese trading companies, such as Mitsui and Marubeni, are also getting into the software and services act.

"It's a dream approach to telecommunications," says Willem H.C. Kooij, managing director of Promotec International, a consumer and educational software firm based in Tokyo. "Although no one yet knows exactly what 'new media' are, Japan is rapidly moving toward combining everything into one unit in the home. The project is significant because it

provides Japanese companies with hands-on experience determining the next direction for home services in Japan, services that merge computers and telecommunications."

By gathering and evaluating consumer reactions, Japanese industry can determine the difference between technical and commercial feasibility for home services through INS. NTT and other companies due to be unleashed under Japan's new partially deregulated telecommunications environment—slated to begin in April—are carefully monitoring the NTT-sponsored experiment.

"A key factor to determine is whether INS participants are willing to pay the actual cost of services that are technically feasible," says Yamamoto of MRI. "INS is still a huge white elephant that people are just beginning to appreciate."

White elephant or not, the INS represents a considerable long-term investment for Japan. The present experiment in the suburbs of Tokyo cost 20 billion yen (\$81.3 million) for the two years of construction and preparation that began in September 1982. The national implementation of INS—mostly through replacing old analog lines with optical fiber—is planned at the rate of 1.7 trillion

yen (\$691 million) per year over the next 20 years. About \$418 million of this expense is to be financed from depreciation allowances for NTT with the remainder from the issue of bonds.

Implementation of the project is currently on schedule, as it develops into one of the world's most comprehensive digital networks. The convergent computer and telecommunications industries of Japan are likely to get plenty of practice on their home turf before taking on the rest of the world. ©

## DATA CENTERS

# QUAKE AND SHAKE

## Scientists at Stanford seek to soften earthquake damage at dp and manufacturing sites.

by Diana Diamond

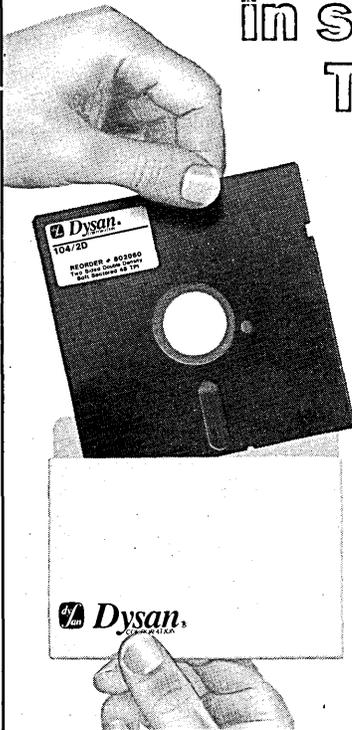
It doesn't take a seismologist to know that the San Francisco Bay Area is vulnerable to earthquakes. In fact, users and vendors of computer gear are beginning to worry about what will happen to their dp installations when the long-expected "big one" finally hits.

Prompted in part by this concern, researchers at Stanford University are studying ways for users of sensitive equipment to cope with damaging earthquakes. What follows is a scenario based largely upon the computer industry's current state of vulnerability.

An earthquake with force approximately equivalent to the one that rocked Northern California in 1906 strikes, and Silicon Valley is the hardest hit. Many older buildings are demolished, while the interiors of newer ones are cluttered with broken light fixtures, shards of glass, and shattered plaster. Water mains are broken. Some vendors estimate that it will be two months before the industry becomes operational again. In adjacent areas, data communication networks of telephone lines and microwave installations are also knocked out.

Within days the economic impact of the quake is felt all over the world. A firm in Taiwan cannot assemble computers because Silicon Valley is technologically dead. Some 30 miles to the north, in San Francisco, major banking houses sit incapacitated. Domestic losses are estimated at up to \$200 billion, for northern California is home to many of the nation's

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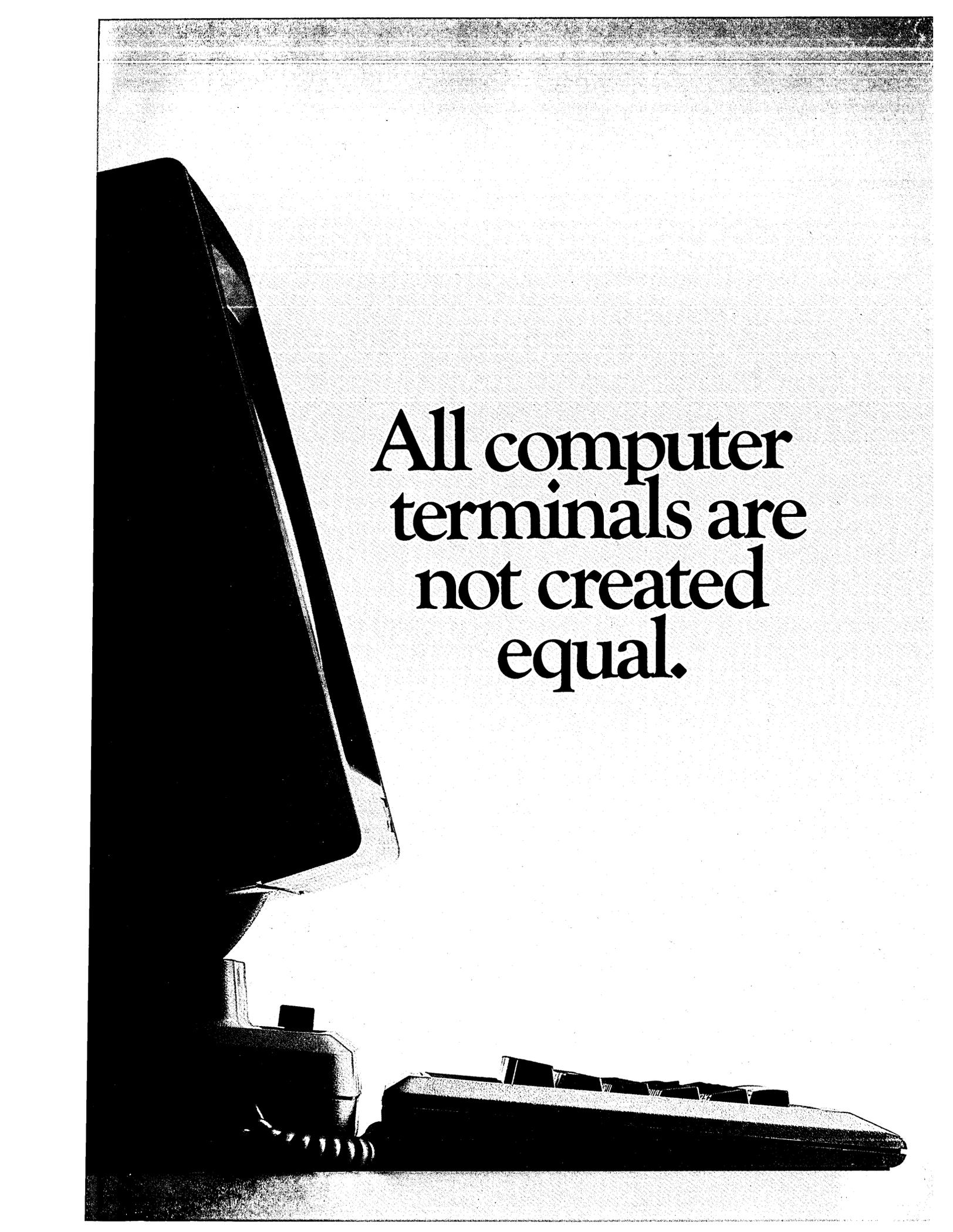
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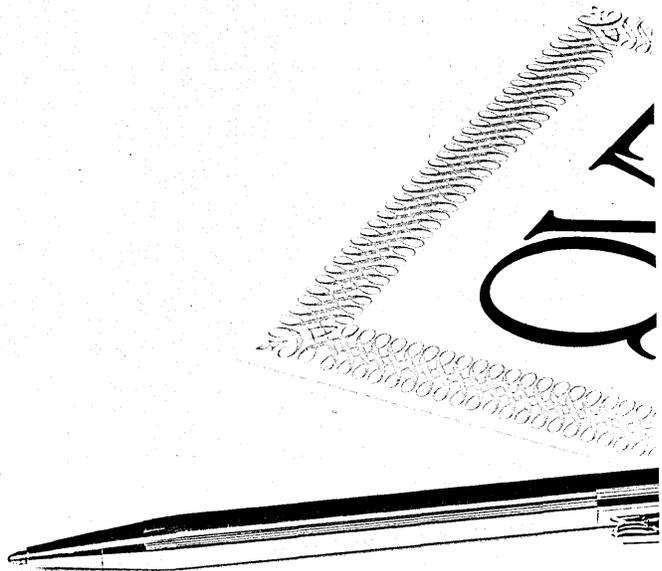
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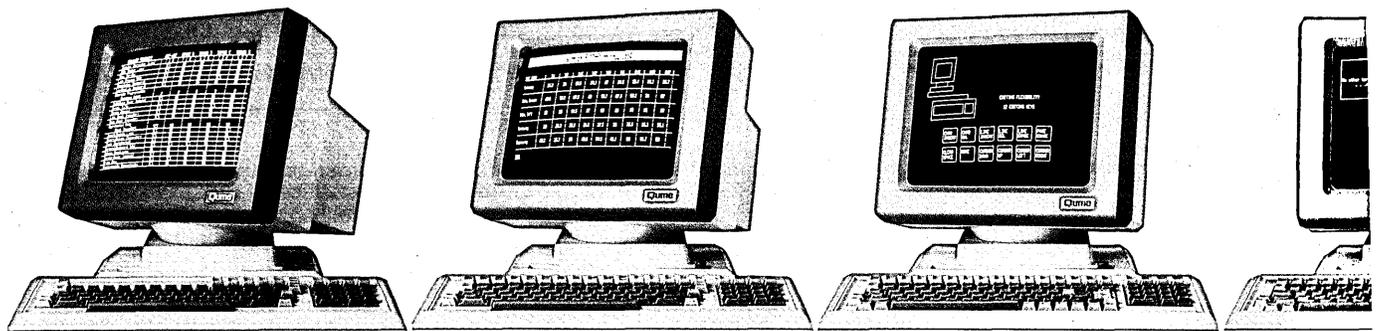


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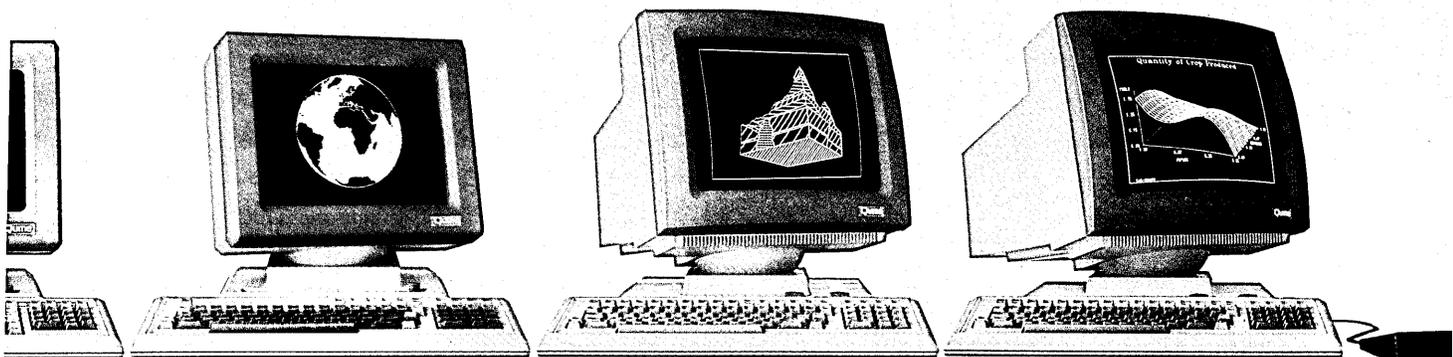
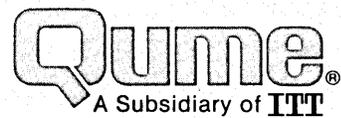
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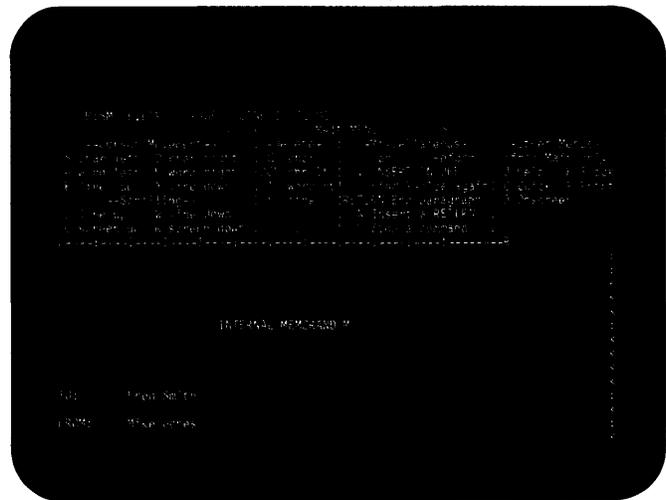
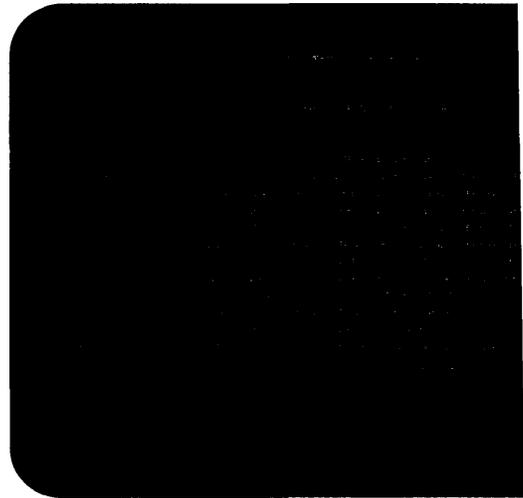
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104	X 01-05-84	Bayside Telephone	Phone	57.01		859.86
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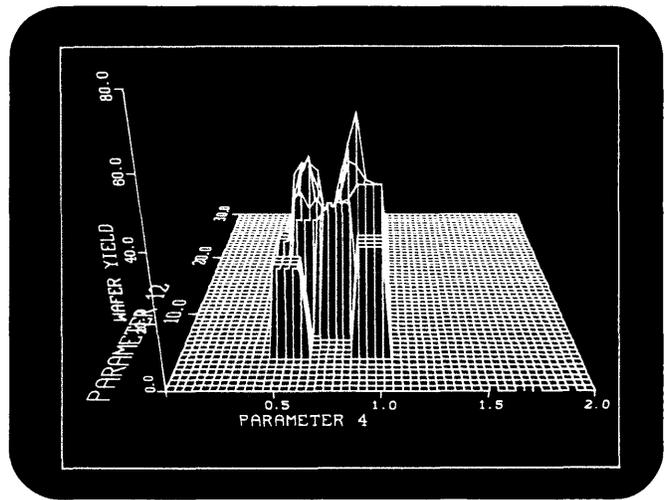
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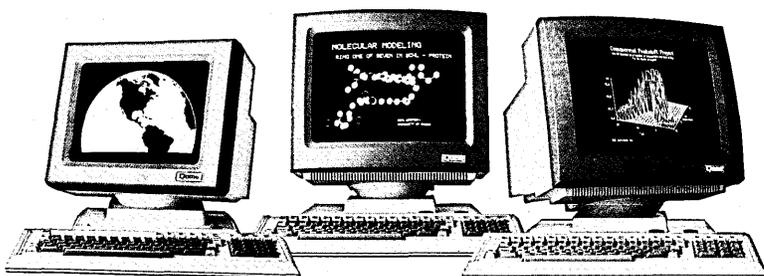


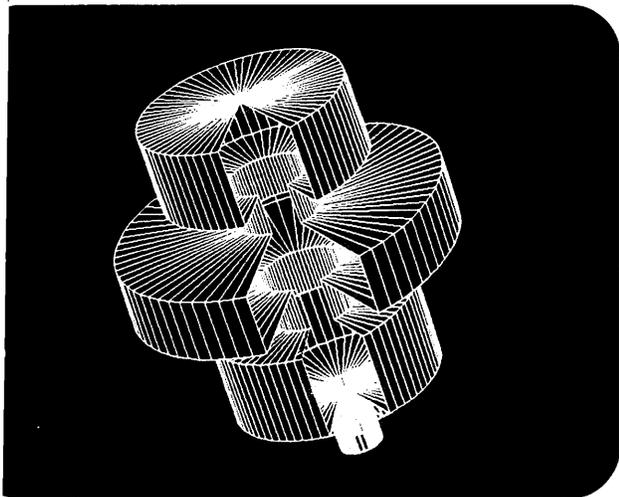
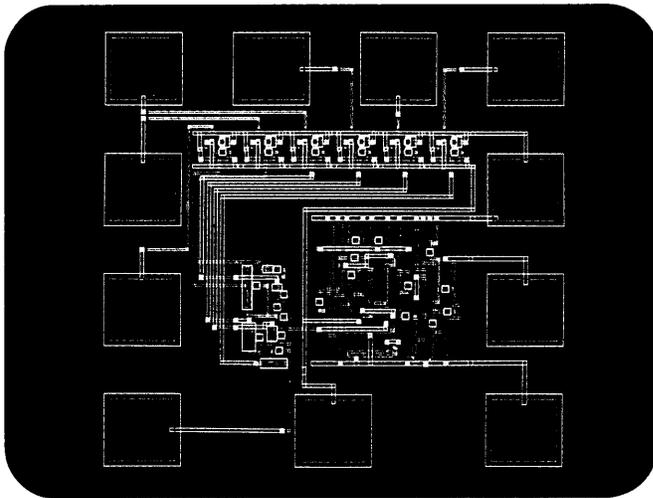
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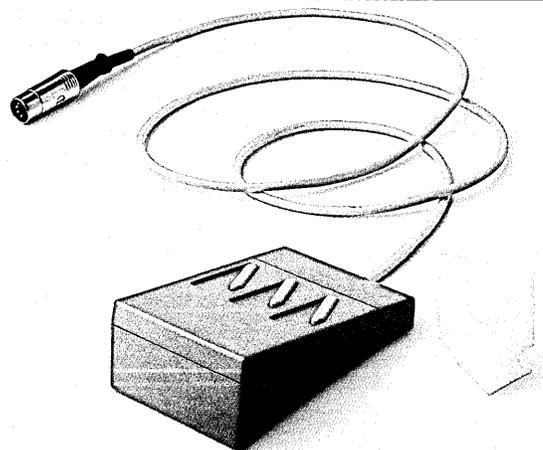
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Display Resolution:	640 x 480 pixels 4 shades of gray
Graphics Printer Compatibility:	Digital LA 30, Epson FX 80 and MX 80

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## NEWS IN PERSPECTIVE

largest defense contractors, not to mention major banking and brokerage houses whose lifeblood is data processing.

Japan tries to step in to fill the void, and within weeks accelerates its manufacturing and shipping of vital parts and peripherals. Silicon Valley manufacturers start to worry about their own future, for even a temporary Japanese capture of the market could be disastrous.

Meanwhile, life in the Bay Area is a shambles. Even the smaller companies cannot operate without their computers. Simple transactions like buying groceries or cashing a check are not occurring because the machines used for these operations simply won't work. Even the disaster relief checks handed out quickly by the federal government can't be cashed.

"Our technological life depends now more and more upon the computer," says Professor Haresh Shah of Stanford University's Civil Engineering Department. Shah has spent the bulk of his lifetime studying earthquakes and their effects. "No bank would be able to transfer any money if its computers were down. The Federal Reserve Bank in San Francisco could not open the next day if its computers were down. The West

### IBM's customers are asking what it can do.

Coast banking community would be unable to function," he says.

Fifteen years ago, corporate reliance on computers was not as great, so it is not as though this problem has been shunted aside for years. And since there have been no major earthquakes in the U.S. during that time, problems do not appear to be imminent.

Shah and his associate, Professor James Gere, have both received many inquiries from corporations about what could be done to avert such a computer disaster. Research is now being conducted at the John Blume Earthquake Engineering Center at Stanford to find some answers.

"I've gotten several calls in the last year or two from strangers, people who don't know me but are calling from their Silicon Valley companies to see what can be done," Gere says.

"It's a major problem, and a new concern. People finally are addressing the issue of protecting their electronic data processing equipment," Shah observes. "The issue is coming more and more into the forefront. We realize we have not done very much."

And right now there really isn't much that can be done.

IBM and Hewlett-Packard, who have a great deal of money invested in

computer equipment, are asking questions, and IBM is funding some of the research at Stanford. For the past year, IBM has loaned Stanford one of its experts, I-Kwang Chang, to help research the problem. Chang remains a full-salaried employee of IBM while working with Shah, and the firm has paid for all his research expenses to date.

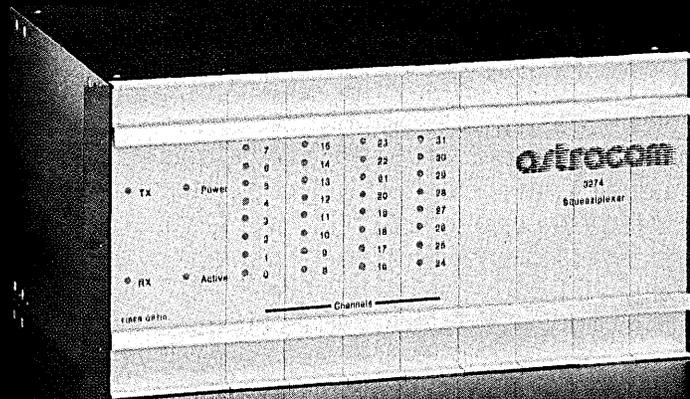
"IBM's customers are asking what it can do," Chang says of the earthquake research. Others with pressing questions include the Federal Reserve Bank in San

Francisco and Chevron, he notes. "We are also being asked not just to upgrade building codes, but to evaluate what the potential dangers are.

"Ways to protect computers are still limited. No one can guarantee the functioning of a given computer system after an earthquake."

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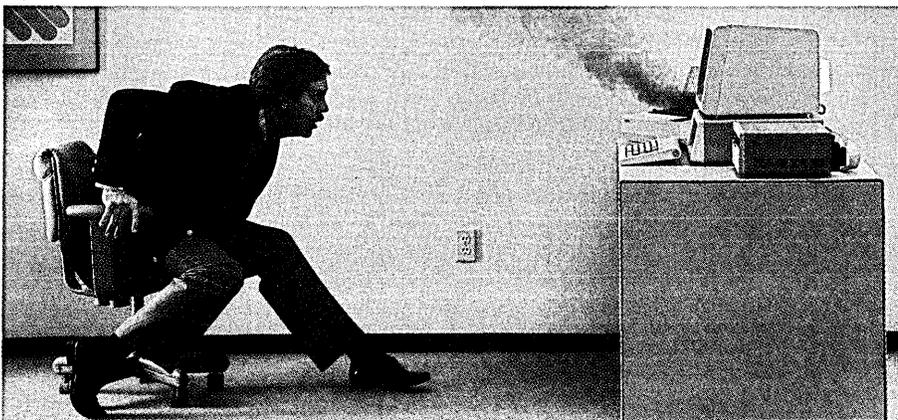
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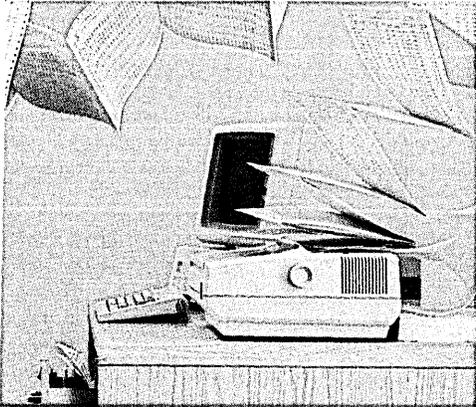
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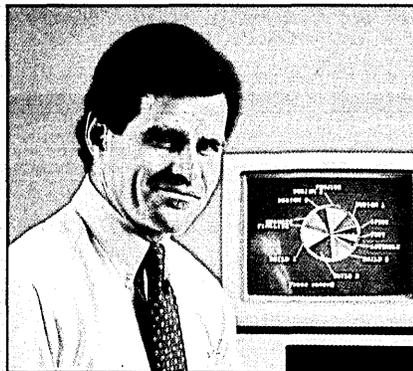
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CIRCLE 49 ON READER CARD

## NEWS IN PERSPECTIVE

In fact, this was a hot topic for the more than 1,500 engineers from 43 nations at the Eighth World Congress on Earthquake Engineering held in San Francisco this summer. The congress meets once every four years. One of the ideas discussed was protecting large buildings and their interiors from earthquake damage by mounting the buildings, in effect, upon large shock absorbers. The idea is finally being tried on a large scale, the engineers reported. The concept is called "base isolation," with a variety of versions proposed that rely on sliding pads, flexible inserts of laminated rubber and steel under building pilings, and even hundreds of stainless steel ball bearings. The thought is that as the ground shakes from an earthquake, the shock absorbers can absorb most of the energy before it reaches the building.

Researchers at Stanford have also been looking at the problems of protecting computer equipment, disk drives, the operations rooms of nuclear power stations, and the like. In recent months part of the focus has been on magnetic disks and tapes, since research shows that they are especially vulnerable.

If a major quake were to occur and its epicenter were near an installation of removable disk packs, many disk packs would crash to the floor. In most instances, the plastic hook holding disks on a rack would break off, sending the plastic case onto the floor with a tremendous force, most likely cracking the case so that the magnetic storage medium would be exposed and contaminated. Sometimes the force of hitting the floor creates nicks in disks or unrolls and scratches tapes, so that much of the stored material becomes unusable, according to Shah.

Companies like Hewlett-Packard or IBM have literally tens of thousands of these tapes stored in this manner, as do the IRS and the Social Security office. Usually, a rack holds about 100 to 150 stored disks. The strength of the racks seems to be adequate, but they can overturn in an earthquake if not bolted down; and even if the racks are bolted down, the vibrations from an earthquake may cause the hooks to break off, says Shah.

"So far there are two ways we think we can solve the problem of protecting the computer equipment, or for that matter, the central control room of a nuclear power plant," Shah says. "First, we can put an isolator under each computer." This approach involves isolating each piece of equipment from the floor through a set of springs that would be activated if an earthquake were to occur. The springs between the floor and the flat surface or false floor on which the equipment sits would absorb most of the shock from the earthquake.

"This approach, however, would be very impractical and uneconomical for large computer systems, such as those at banks and large businesses," Shah admits. "Also, it would become a major problem every time a person decided to move the equipment."

The other approach is to isolate the entire room, especially the floor upon which the computer equipment is sitting. The room, in effect, would be suspended and protected by isolators on the top and bottom—the top being the bottom of the

next floor up. "It would be like a big cage sitting in isolation," Chang says.

Earthquakes can cause three-directional movement: vertical, north-south horizontal, and east-west horizontal. So the problem is to design a system that will protect the equipment not only from the up-and-down motion, but also from sliding. A report prepared by Chang and Shah outlines the basic requirements of isolation systems for floors where computers and other types of equipment are supported:

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## NEWS IN PERSPECTIVE

- The floor isolation system should isolate the induced vibrations from the three directions.
- Both the acceleration and displacement response problem should be dealt with.
- The floor system should maintain a constant level and should not sway under normal operating conditions.
- A trigger should activate the isolation system only when a sufficiently strong motion in the horizontal and/or vertical direction starts.
- The floor system must be capable of dealing with large variations in loads carried during normal operating conditions.
- The isolation system should be effective for such variations in loads during a strong vibration.
- Service space below the floor should not be reduced or hampered.
- The cost of manufacturing and maintaining such floor isolation system should be competitive when compared with individual isolation systems required for each particular computer or ancillary equipment.
- The operational requirements of the floor must be met during and after the strong motion.

"It's a self-compensating system we are trying to come up with—one where the more the load, the more the springs come into action," Shah says.

In their laboratories at Stanford, and in association with IBM and the Ishekawayema Harema Heavy Industries Research Institute in Japan, Shah and Chang have been working to test the system they hope will work. What they are developing is a room isolation system. The isolators are placed on a subfloor grid, which supports the foundation of the raised floor system. The vibration isolators consist of fixed spring and damping systems for vertical vibration isolation, and are enclosed in a steel column. There is one unit assembly for every 100 square feet of floor area.

"The unit absorbs and neutralizes most of the vertical seismic shock," says Chang. To counteract horizontal motion, each unit has a mechanism that allows it to slide freely. This consists of a Teflon-coated steel shoe at the base of the unit.

"Normally, to prevent sliding, the steel plate is secured by four horizontal springs around it that are anchored to the fixed floor. To prevent the floor from responding with spring action to persons walking in the computer room and other loads, the floor grid bears on steel rods housed inside the modules. The floor is released from these rods by a spring trigger under the impact of a vertical or horizontal shock. The floor's weight then is transferred to the springs and dampers," Chang says.

There also is a set of horizontal

springs attached to each isolator to control horizontal movement. "All three isolation systems seem to work well for motions in three dimensions," Chang says.

Shah claims that it may be possible to actually design this kind of computer protection system. IBM will fund the next stage of the project to try to answer whether such a system actually works and whether it is economically feasible to build. Shah is also applying to the National Science Foundation for funding, adding that this organization is interested in the project.

Japan is working on some of these same problems, and different kinds of isolation devices are being installed there. Japanese firms have expressed more interest in earthquake protection devices, says Shah, "because they have more earthquakes there.

"We really haven't had a big earthquake in the United States in years," he continues, "and protecting electronic dp equipment is really a new baby." ©

## SAFETY & HEALTH

# TOXIC SHOCK TROOPS

**Silicon Valley chip makers have formed a group to aid in the cleanup of toxic wastes.**

**by Charles L. Howe**

Pioneers coming to California learned that the best way to fend off attacks from hostiles was to hire a wagon master, travel in large numbers, and make their stand in a tight circle to deflect arrows. Many of Silicon Valley's electronics firms are doing much the same thing in response to charges of toxic waste pollution of the earth and water, and the result is called the Industry Clean Water Task Force.

The new organization represents four electronics trade groups whose members include some 1,200 chip makers and suppliers in the San Francisco Bay Area. Funded by the industry with \$100,000 for its first six months of operation, the task force pledges to:

- Establish a library of technical information to aid firms that have little or no experience in toxic waste cleanup in getting on with their efforts;
- Develop for public dissemination a "scorecard" that will show which electronics firms are making cleanup efforts,

and just how these efforts are progressing;

- Lobby for state and federal help in cleanup efforts.

The group will not gather or exchange medical information on toxic waste problems as they relate to persons who may have imbibed contaminated drinking water, nor will the group collect and exchange medical information on industry employees who claim that they were injured while working with toxic chemicals.

"We have already seen extensive and very effective actions taken by area firms," says task force spokesman Peter B. Giles, president of the Santa Clara County Manufacturing Group. "However, until now little has been done to coordinate these projects. The Industry Clean Water Task Force has been formed to fill that void" (see "Poison in Paradise," Aug. 15, p.30).

Giles's announcement at a press conference came one day before the federal Environmental Protection Agency added 225 national hazardous waste sites to its Superfund cleanup list. Nineteen of the sites are in Silicon Valley. Of these, the EPA cited Van Waters & Rogers Inc. of San Jose as having the most serious problems. The firm distributes solvents including acetone, chloroform, toluene, and other chemicals used in the manufacture of semiconductors.

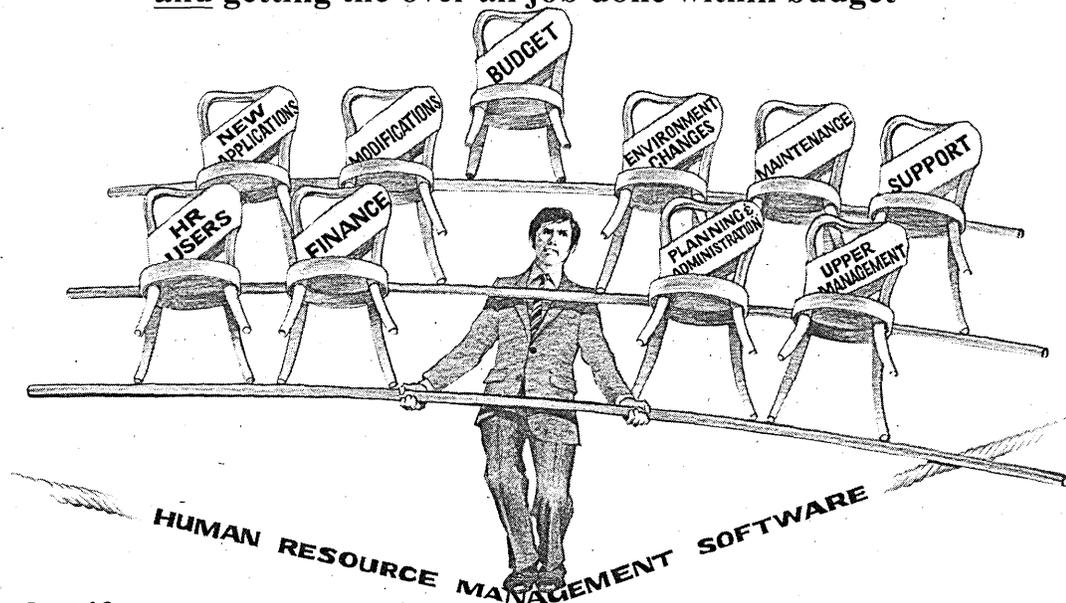
Cleaning up Silicon Valley spills has so far cost the industry at least \$70 million. Federal officials gave no estimates on what it would ultimately cost to clean up the area, noting that the \$1.6 billion in the Superfund was either spent or pledged for efforts at other locations around the nation before the agency released its latest list of contaminated sites. For now, the EPA will allow the semiconductor industry to continue its voluntary efforts in Silicon Valley. In any case, the sites are only proposed for Superfund assistance, and must go through many bureaucratic machinations before any money is seen.

Giles told reporters that the industry recognizes it has a problem and wants to put all its cards on the table, face up. "If nobody was concerned, this task force would not be operating," he says. Another spokesman adds, "This is not an industry cover-up of the problem, and there never has been one."

The organization will be headed by Megan Taylor, who was a member of the Toxic Assessment Group, a private consulting firm in Sacramento that conducted research for the state legislature. The Industry Clean Water Task Force will operate from the offices of the Santa Clara County Manufacturing Group, 12 South First St., Suite 1220, San Jose, CA 95113. ©

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# The New Cincom: 10 the only software ve

Finally, there's one software vendor offering a sophisticated software information network capable of meeting all of your corporate, departmental and personal information software needs—The New Cincom Systems. Organizations around the world are discovering that working with Cincom's integrated family of products enables them to greatly improve both performance and productivity. Here are just 10 of the many reasons why you should be considering the New Cincom software information network for your company:

## #1 Relational Data Management Technology

Powerful relational data management technology forms the "nucleus" of our software information network. Using a unique "Logical View" concept, all applications operate directly with "derived relational tables." As a result, we can provide complete data structure independence, as well as the high performance needed for today's production environments. This relational technology is the nucleus of both our TIS™ family of information products for IBM users and our ULTRA INTERACTIVE DATA BASE SYSTEM™ for DEC™ VAX™ users.

## #2 Fourth Generation Application Development

The perfect complement to our relational data management technology is our industry acclaimed 4th Generation application development system, MANTIS™. In more than 1,500 complex production environments, MANTIS is dramatically reducing the application backlog through its powerful ability to "prototype," refine and commit the application to production in one interactive sitting.

## #3 Manufacturing Control Software

CONTROL: MRPS is our sophisticated manufacturing control system that is fully integrated with our relational data base

You should know how our integrated family of software technologies meets all your information processing needs.

The New Cincom is an integrated family of information management software solutions created over 15 years of satisfying more than 5,000 users. From this experience, we've gained a keen understanding of the kinds of information handling problems facing the business world today.

Our approach to information processing identifies three different needs levels in today's corporate, departmental, and personal. And we've developed a comprehensive, integrated network of software technologies that satisfy those needs through three levels of implementation: Strategic, Tactical, and Local.

The New Cincom's family of software technologies provides the optimal, integrated solution for all three levels of your company. And when used individually, they completely satisfy your specific requirements and provide a flexible foundation that will adapt to your future information processing needs.

### The New Cincom's Integrated Family of Software Technologies

The New Cincom's family of information management solutions comprises five integrated mainframes for environments from the micro to the mainframe:

- Relational Data Management
- Application Data Management
- Decision Support Applications
- Business Support • Network Management

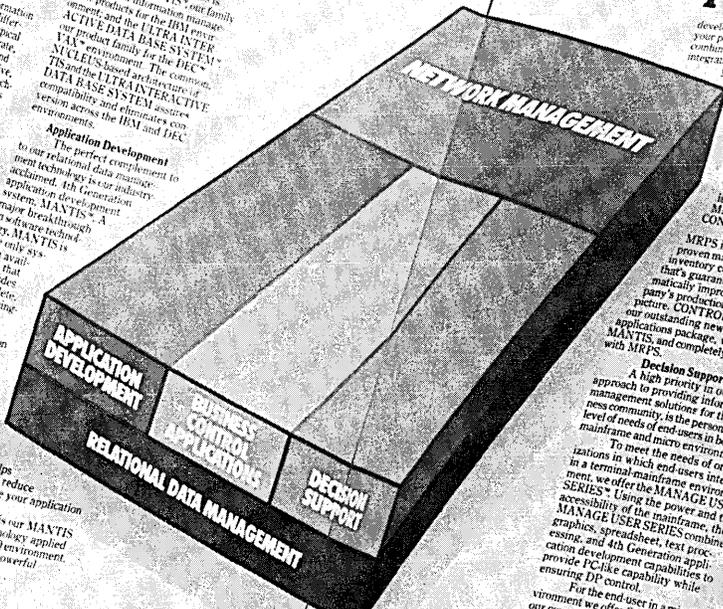
**Relational Data Management**  
The foundation of our product line is the Nucleus relational data management system. It provides a logical view of data that insulates programs from the DBMS, data structures, accessing and navigation strategies, and physical environment.

CRICKET™ is our MANTIS 4th Generation technology applied to the IBM PC/XT-370 environment. It provides the same powerful

True data structure independence and the high performance needed for today's production environment. The power of Nucleus is integrated within TIS™ our family of information management products for the IBM environment and the ULTRA INTERACTIVE DATA BASE SYSTEM™ for the DEC™ VAX™ environment. The common NUCLEUS-based architecture of TIS and the ULTRA INTERACTIVE DATA BASE SYSTEM assures compatibility and eliminates cross version access to the IBM and DEC environments.

### Application Development

The perfect complement to our relational data management technology is our industry acclaimed, 4th Generation application development system, MANTIS™. A major breakthrough in software technology, MANTIS is the only system available that provides complete, beginning-to-end, on-line application development—all in one sitting. By using high effective methodologies such as prototyping, MANTIS helps you dramatically reduce development time and even eliminate your application



development tools as MANTIS for your personal computer. And when combined with PC CONTACT™, our micro-mainframe link, you can use CRICKET™ to interact directly with the mainframe.

### Business Control Applications

Also integrated with our data base technology and used in both IBM and DEC VAX environments is CONTROL: MRPS and CONTROL: FACs™.

CONTROL: MRPS is our industry-proven manufacturing and inventory control system that's guaranteed to dramatically improve your company's production and profitability. CONTROL: FACs is our outstanding new financial applications package, written in MANTIS, and completely integrated with MRPS.

### Decision Support

A high priority in our needs management solutions for the business community, is the personal/local mainframe and micro environments.

To meet the needs of organizations in which end-users interact in a terminal-mainframe environment, we offer the MANAGE USER SERIES™. Using the power and the accessibility of the mainframe, the graphics, spreadsheet, text processing, and 4th Generation application development capabilities to provide PC-like capability while ensuring DP control.

For the end-user in a micro environment we offer Series OnePlus™, our comprehensive package of interactive programs that satisfies a variety of end-user information-handling

needs, including: writing reports, analyzing data, and consulting and managing data. And when combined with PC CONTACT™, our micro-mainframe link, and our Series OnePlus programs can incorporate both mainframe and personal data. Intelligent Query (IQ) is a powerful, fully integrated, relational Query facility that's based on Arranged hoc requests. Easy-to-use ad hoc requests, but also routine, repetitive requests that can occur within end-user departments.

### Network Management

NETMASTER™ is the foundation of our network management technology. It's a comprehensive approach to managing computer networks, distributed data, and distributed processing. NETMASTER is an advanced network management application program that lets your company realize the full potential of its multiple terminal, multiple application, and multiple-CPU investment.

Another primary component in our network management technology is PC CONTACT™, its our micro-mainframe, on-board/download link that completes the information loop in your company.

### The New Cincom: Excellence in Software Technology

The balance of this brochure provides a more detailed overview of our five integrated software technologies. Look closely at what we believe that our new product line (every product either begun or completed in the 1980's) provides the highest degree of reliability, integration, and performance in the industry.

When you see for yourself what the New Cincom Systems is all about, you'll understand why the words "Excellence In Software Technology" fit so well under our name.

# reasons why we're number one you'll ever need.

technology. A complete closed-loop system, MRPS is improving the productivity and profitability of over 125 IBM and DEC VAX manufacturing environments around the world.

## #4 Financial Control Software

**CONTROL:** Financial is our sophisticated financial accounting and control system which molds to the way you do business. Integrated directly with MRPS, **CONTROL:** Financial includes Accounts Receivable and Credit Management systems with Accounts Payable soon to follow.

## #5 Advanced Network Management

**NET/MASTER™** is one of the most recent additions to the New Cincom family of integrated products. Very simply, **NET/MASTER** is an advanced network management system that takes the complexity out of managing a sophisticated IBM computer network and lays the groundwork for distributed data base processing.

## #6 The Interactive Mainframe—Micro Link

Further expanding the capabilities of our software information network is **PC CONTACT**, our mainframe-micro link which enables users to interactively upload/download data between the mainframe and IBM PC's. **PC CONTACT** gives the PC user the ability to access multiple file types stored in the corporate data base for Decision Support manipulation.

## #7 Micro Decision Support Software

For comprehensive micro-level Decision Support we offer **SeriesOnePlus™\***. **SeriesOnePlus** includes file management, spreadsheet, graphics, reporting and word processing components that are all integrated through a unique "BUS" architecture. Because the system is designed exclusively for business situations, **SeriesOnePlus** complements any mainframe-micro network strategy.

## #8 Mainframe Decision Support Software

The recently introduced **MANAGE USER SERIES™** provides powerful Decision Support capabilities for the mainframe user. The **MANAGE USER SERIES** combines graphics, spreadsheet, text processing and application development tools to enhance the use and display of corporate data.

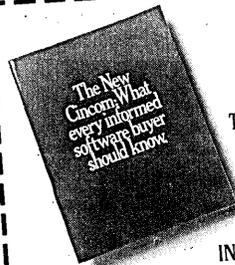
## #9 Client Support

The one thing that isn't new about Cincom is our unrivaled commitment to service, support and user education. When you choose Cincom you can be assured of the highest caliber of support.

## #10 Software Excellence

Why the New Cincom? Well, we like to think of ourselves as the New Cincom because every product in our software information network has been released since 1981. And, quite frankly, we

believe our new products provide the highest degree of reliability, integration, performance and value in the industry. As proof, just look at our sales. From 1982 to 1983, **TIS** sales rose 136%, **MANTIS** sales rose 50%, and **MRPS** sales rose by 45%. For even more proof we invite you to personally compare our products with what our competitors are offering. Then you'll understand why the words "Excellence In Software Technology" fit so well under our name.

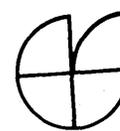


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Excellence in software technology.

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## NEWS IN PERSPECTIVE

### BENCHMARKS

**FILES CHAPTER 11:** Beehive International, a Salt Lake City crt terminal manufacturer, was forced by troubles at its main bank to file for reorganization under Chapter 11 of the Federal bankruptcy code. The troubled Continental Illinois Bank of Chicago, which was Beehive's main lender, demanded that a \$2.5 million loan to Beehive from another source be paid to Continental instead of to Beehive's suppliers. Beehive said its lack of working capital was so severe it was forced to file for Chapter 11 protection when it was unable to use the loan as planned. The manufacturer's debt to Continental was reported to total \$6.5 million. Beehive also laid off 20% of its staff, leaving about 300 persons on board.

**PERTEC SOLD:** The Applied Digital Data Systems (ADDS) subsidiary of NCR Corp. agreed to purchase Pertec Computer Corp. for an undisclosed sum of cash from its current owner, Triumph-Adler North America of Windsor, Conn. ADDS, based in Hauppauge, N.Y., was said to be particularly interested in Pertec's strengths in small business systems based on the Pick and Unix operating systems. ADDS already sells its own Mentor line, which uses the Pick software, but Pertec's machines are lower priced and would enhance the ADDS product line. Moreover, ADDS said it needs an entrée into the Unix marketplace. Triumph-Adler put the Pertec unit up for sale because it thought the Pertec computers would compete too directly with a line of small systems the parent plans to introduce shortly. Pertec Peripherals, a related but separate subsidiary, is not going to be sold, according to Triumph-Adler.

**IBM FIELD MERGER:** The industry leader, which has long had a reputation for superior service, melded its Information Systems Group's two main field maintenance organizations and formed a new staff organization to improve product serviceability. The new National Service division, which combines most of the previous Customer Service and Field Service Divisions, is hoped to provide more efficient and effective maintenance of installed products, the company said. Field Service generally handled large computer products while Customer Service concentrated on office systems and small computers. Heading National Service as president is Charles P. Biggar, formerly president of Field Engineering. Ronald F. Casella, former president of Customer Service, was named assistant group executive for service. Both will continue to report to C.B. Rogers Jr., senior vice president and Information Systems

Group executive. The new staff operation, reporting to Casella, will work to incorporate more maintenance related thinking into the corporation's strategic planning process, a spokesman explained. For example, product designers will now get more advice from the maintenance staff when planning future products.

**ZENITH TEMPESTIZES:** Zenith Data Systems, Glenview, Ill., won a \$99.8 million contract to supply 10,500 specially certified personal computers to the Air Force, Navy, and Marine Corps. The five-year deal, which Zenith won over several other contractors including Delta Data, Wang, and Burroughs, calls for delivery of pcs that are protected against electronic surveillance. The military's Tempest requirements call for special shielding of digital electronic gear, which prevents unauthorized detection of the circuitry's operations through FM signals emitted by digital components. Zenith will supply its model Z-150 IBM-compatible pc for the high-security military applications. It was reported that the contract may expand to as much as \$320 million for 30,000 of the machines.

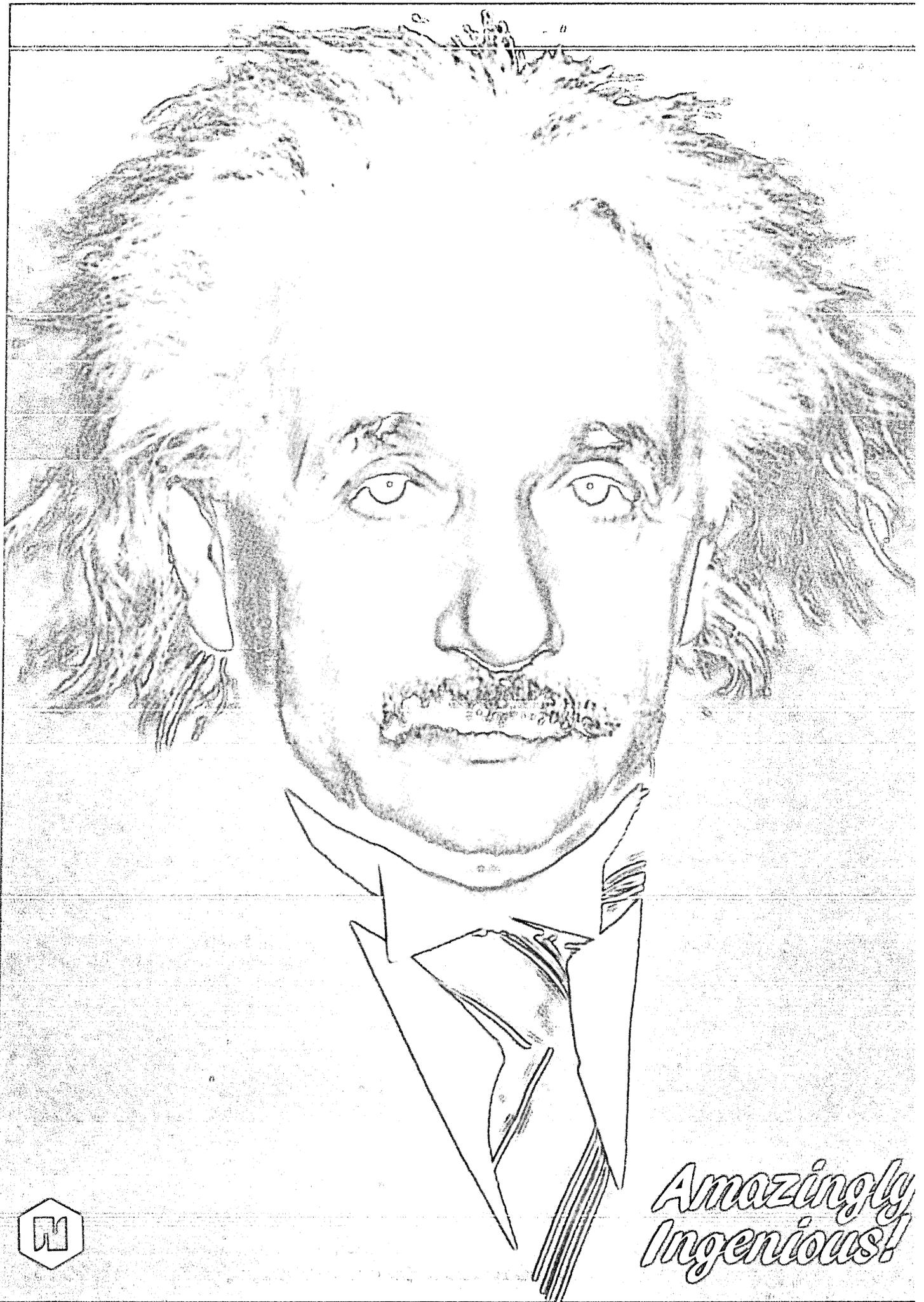
**TI ENTERS LISP MARKET:** Aiming for what it expects will be a large market for so-called artificial intelligence applications, Texas Instruments introduced a computer designed to run the Lisp language. The Explorer machine, using a Lisp programming environment licensed from Lisp Machine Inc., Culver City, Calif., is designed for use by a single user. It is based on a TI bit-slice processor with tagged architecture, which facilitates run-time data typing and hardware-assisted memory management. The machine uses TI's NuBus, which was developed at the Massachusetts Institute of Technology and licensed to TI via Western Digital. Scheduled for shipment beginning next April, the new computer's list price begins at \$52,500. Marketing will be handled by a dedicated sales force. Lisp Machine Inc. will distribute the TI machine as part of its product line and has obtained nonexclusive manufacturing rights to the new system.

**OEMS IBM DISK:** IBM grabbed another big piece of the large-capacity disk drive business with a deal to sell Honeywell Information Systems an oem version of the 3380 disk and 3880 controller for use on DPS/8 and DPS/88 mainframes. The contract, with a value estimated as high as \$20 million and lasting two years, comes on the heels of Control Data's disclosure that it will leave the IBM-compatible disk market because the stakes have grown too high. Honeywell is a partner with CDC in Magnetic Peripherals Inc.,

Minneapolis, but CDC's withdrawal from the IBM-compatible market meant Honeywell had to go elsewhere for large capacity disk drives. The deal marks the second known oem agreement IBM has signed for its 3380 drive, which can store 2.5 gigabytes of data; it signed the German firm Siemens as a 3380 customer early this year and is thought to have been in discussions with Digital Equipment and NCR.

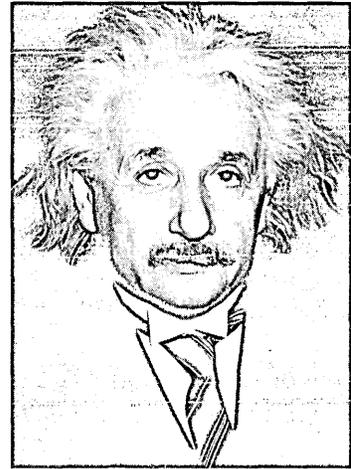
**PEACHTREE FOR SALE:** Management Science America Inc., an Atlanta software house, has put its Peachtree Software and three other microcomputer software subsidiaries up for sale due to slow sales. Evidently affected by a general slump in retail microcomputer software sales, MSA also said it would report a loss in earnings of 11 cents a share in the third quarter, despite a rise in revenues. MSA is interested in selling Peachtree in Atlanta; Peachtree International of Britain; Eduware in Agora Hills, Calif.; and Designware in San Francisco. The companies produced software for IBM PCs, Apple IIs, and other machines. MSA said it had received inquiries from several interested parties but it declined to name them. In an apparently-related development, MSA was hit by an \$11.6 million suit by Eduware's founder, Sherwin Staffin, charging violations of an acquisition agreement and securities fraud.

**NEW BURROUGHS CPUS:** The Detroit mainframer expanded its A series of mainframes with the A3 family and entered the Unix market with a Unix-based oem system designed around Convergent Technologies hardware. The new A3 comes in three models, two uniprocessors and one dual processor, and is designed to compete with midrange systems like IBM's 4361 and System/38. Burroughs said the A3 is completely software compatible with the larger A9 series it introduced earlier this year and with its older B5000, B6000, and B7000 series mainframes. As a result, the company boasted, it can offer machines ranging from the smallest A3 to the biggest B7900 with a performance span of 26 times. The A3 uses TTL gate-array chips supplied by Texas Instruments and 256K RAMs from unidentified Japanese suppliers. Main memory ranges from 3 to 48 megabytes and disk capacity from 123 megabytes to 6 gigabytes. An entry-level model D carries a list price of \$95,500. Burroughs also came out with a new version of the MCP operating system, which is claimed to offer many enhancements including Inter-Pro, a menu-driven facility for configuring and operating its mainframes. The new Unix system, dubbed XE 550, uses the Motorola 68010 and Intel 80186.



*Amazingly  
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# “Frankly, gentlemen, their capabilities astound me.”

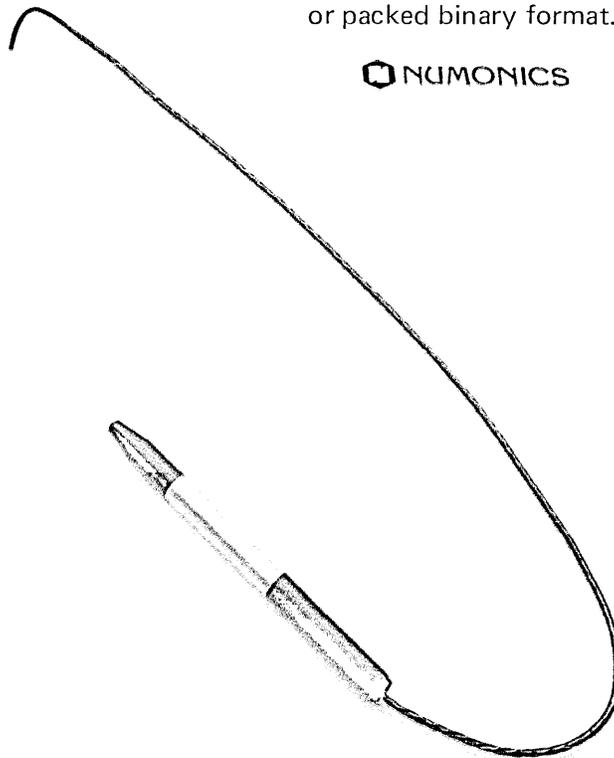


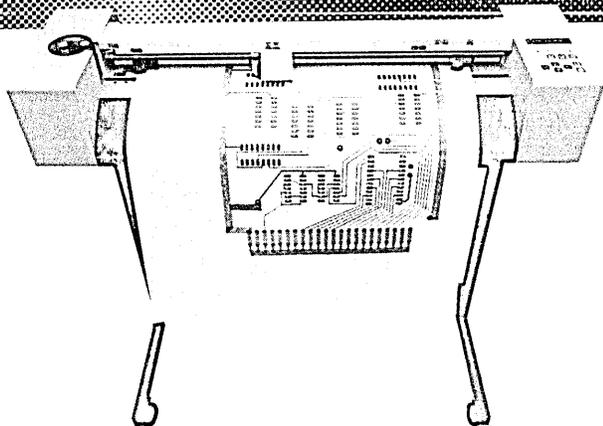
“Thank you, sir. We’d like to mention their reliability as well; Numonics is rather famous for that. And their high resolution. And the flexible range of sizes and capabilities. Would you like to know more?”

**The # 2200 Tablet** has a user-specified resolution as high as .001”, with standard features including versatile firmware for self diagnostics, HOST override of switch-settable functions, and matrix menuing. It operates in six programmable modes: point, stream, switch-stream, incremental, polled, or timed, and interfaces in RS232, IEEE, or byte parallel, with packed binary or standard format. Sizes range from 6” x 6” to 36” x 48”.

**The # 2210 Tablet** is a simplified version of the 2200 and also comes in sizes from 6” x 6” to 36” x 48” and, like the 2200 all sizes have identical control electronics. A single card works for all. It digitizes up to 200 points per second, in the 6 programmable modes. It accepts downloads for changing default operating conditions. Standard pen; optional 1, 4 or 16 button cursors. This low-profile, self-diagnostic tablet interfaces with RS232, IEEE, or byte parallel, in standard or packed binary format.

 NUMONICS

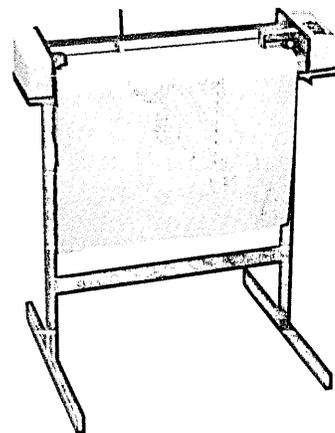




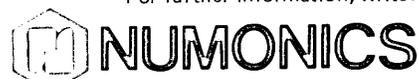
**The # 5624 Plotter** with stand, uses a grit-roller transport system that produces smooth, accurate, controlled plots on D size cut-sheet paper or mylar. The new synchro-belt drive is quiet and fast, plotting almost 10" per second to a variety of commands for vectors, line types, circles, arcs, ASCII characters, symbols, hatching, etc. The ultimate machine for sophisticated plotting. Four turret mounted, self-capping pens.

**The # 6412 10-pen Plotter** is designed for business graphics or any application needing a wide range of colors, and line types, comprehensive command structure, accuracy, and high speed - almost 18" per second. Pens have soft-landing and automatic-capping systems, with automatic speed control for different pen types. Accepts 11" x 17" medium. Rugged, industrial quality construction.

**The # 5424 Plotter** with stand, also uses the grit-roller system, is a lower cost, single pen plotter that accepts non-sprocketed cut-sheet paper or mylar, 22" to 24" wide. Plots at almost 6" per second, is extremely accurate and has a similarly comprehensive command structure. It is designed and constructed for high durability.

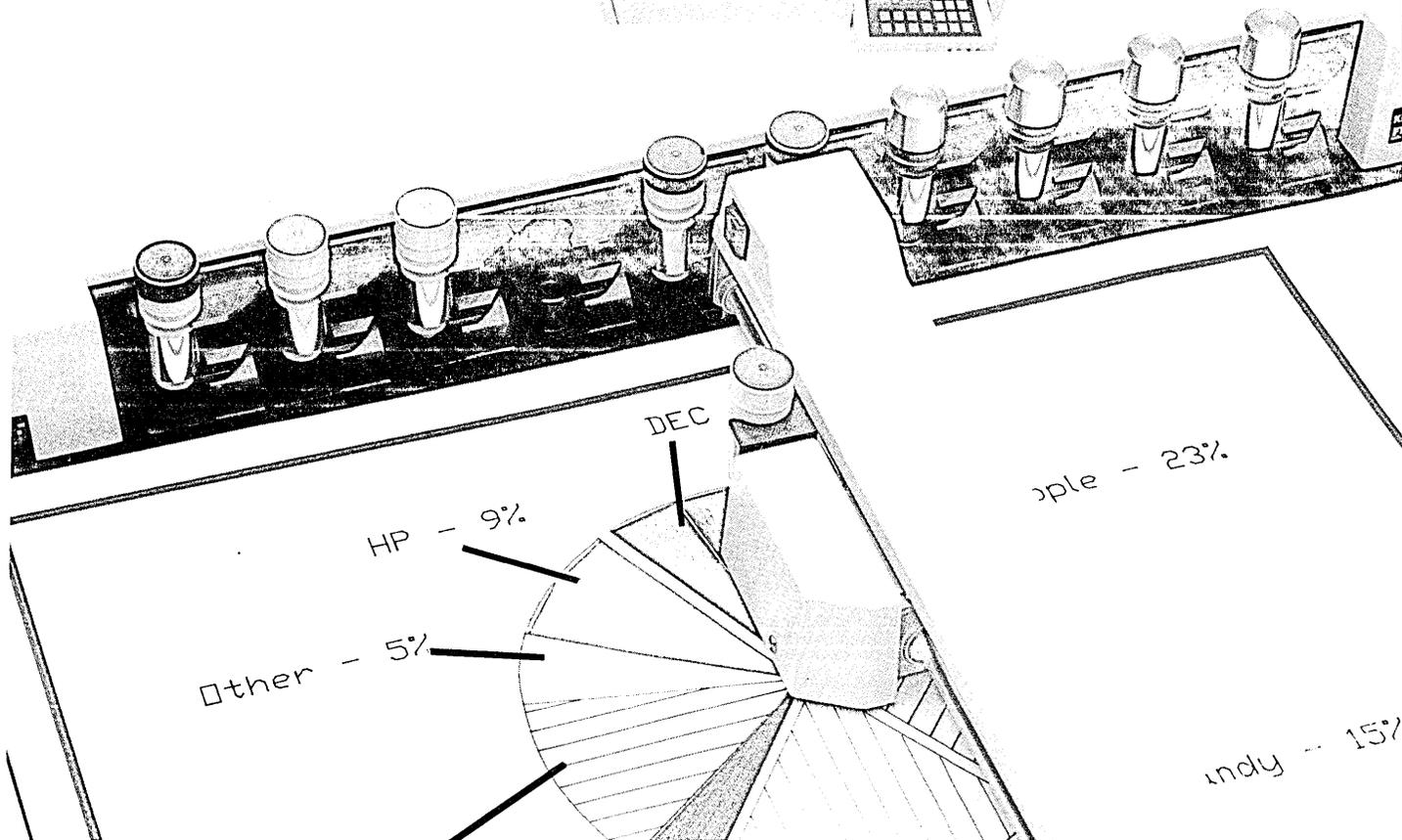
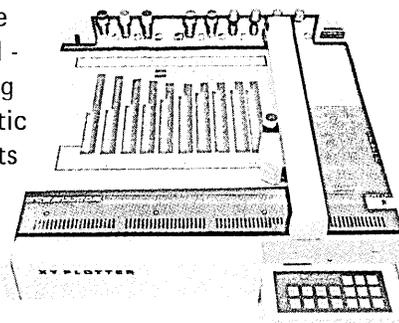


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CIRCLE 54 ON READER CARD



The hardware, and some software, are standard, but how they're used is a matter of local choice.

# BRANCH OFFICE MICROCOMPUTING

by Perry Petersen

At many corporations, end users acquire micros and the dp department struggles, after the fact, to manage them. Personal computing at Sverdrup/SPCM is managed in a different way: branch offices "hire" the main office's dp staff to help set up their microcomputing operations. The result is an effective blend of local autonomy and central control.

Sverdrup/SPCM is the construction management division of Sverdrup Corp., a St. Louis-based engineering, architecture, and construction management firm. SPCM manages design and construction projects on the order of \$50 million to \$100 million for clients who want tight control of cost, quality, and schedule. SPCM's Oakland office provides central support for construction management projects throughout the U.S. Some projects are managed from an office set up for that purpose; others are based in established Sverdrup facilities.

SPCM's IBM S/34 host and its data center staff are dedicated to the project and construction management tasks that concern the local offices; payroll and similar functions are provided by the parent company. Most applications are performed locally on IBM PCs at branch and project offices. These PCs communicate with the S/34, and branch offices can access applications that are available only on the host or that require larger amounts of storage and processing. The various offices are also linked by electronic mail.

The goal is to help all offices work together. For the sake of compatibility, all local offices use the following:

- IBM PCs. This standard makes communications straightforward and keeps users in the mainstream of available software.
- A standard set of utility software packages, which the branch can use in any way its manager feels is appropriate. The current standards are Lotus 1-2-3, Multimate International's Multimate, and Microstuf Inc.'s Crosstalk.
- IBM 4800-baud modems for communica-

tion with the IBM host, and Hayes 300/1200 baud modems for communication with the other regional offices.

These standards (see Fig. 1) provide some advantages: the IBM PC hardware is compatible with the host and with other locations; remote sites can use both local and central software; data files, correspondence, and spreadsheets can be sent both upward and downward; and host communications make large network service bureau applications available.

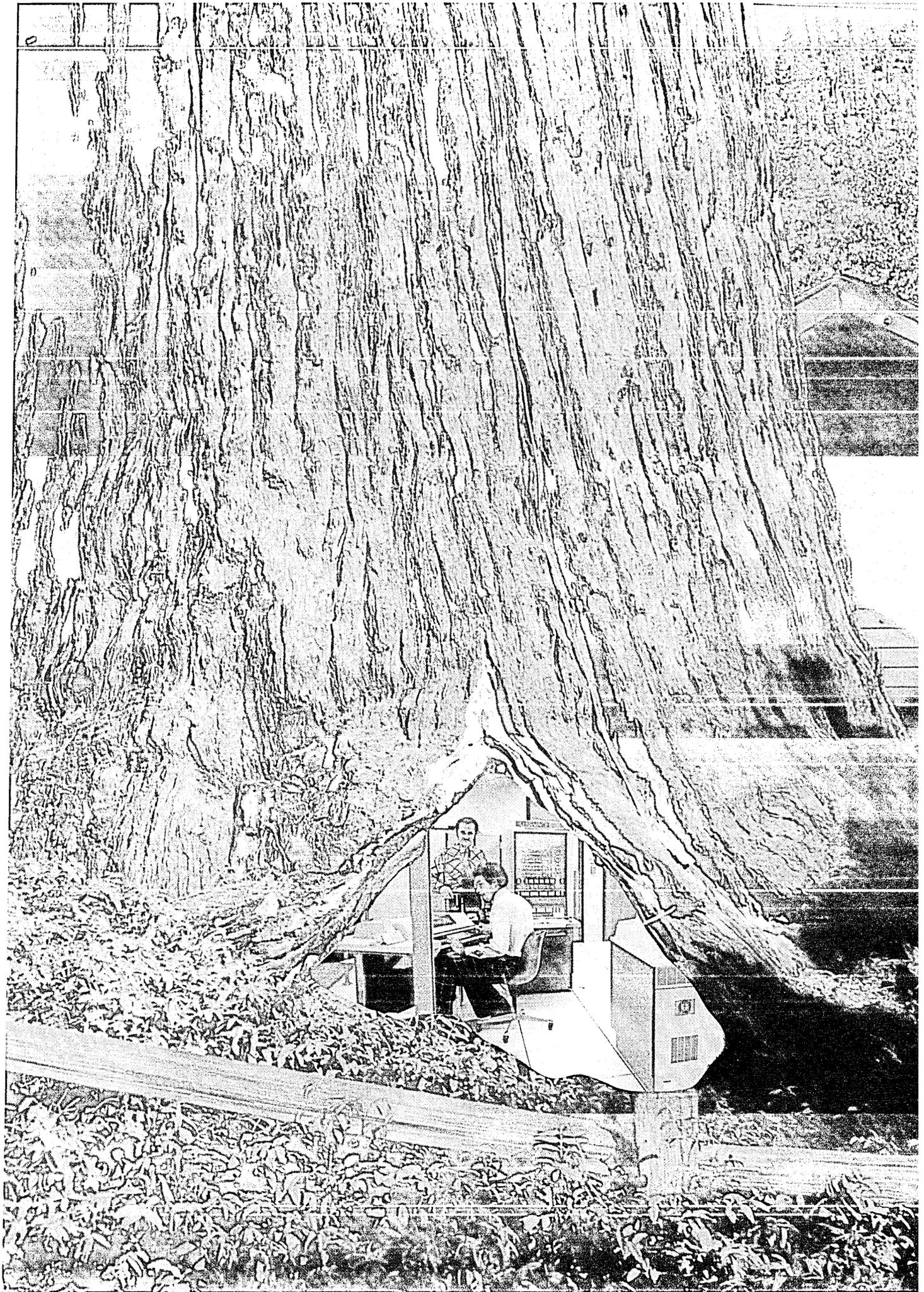
The data center staff delivers this hardware and software to the local sites, sets it up, tests it, and trains users in its operation. This is efficient. The central staff is expert in these tasks and the local staff remains free to concentrate on work specific to the project. Technical skills at the branches improve over time, but central office consulting remains available.

The local office managers have primary responsibility for the day-to-day mix of activity on the equipment. Most of these managers had little or no training in the use of computers until the PC configuration was selected and delivered.

Some of the factors that contributed to success became evident during implementation. For instance, since the branch staff is under steady pressure to produce for their projects, they schedule a fast startup for the equipment. In fact, during the day of delivery, setup, and training on the PC, the local staff typically starts turning out letters and reports. In some cases, training has been conducted—at the branch's request—on weekends, so that day-to-day work will not interrupt the process.

The branches begin to take control even before delivery of the equipment. The branch manager confers with the central staff manager about what configuration is needed, what kind and amount of work will be done, who will do it, what volumes of processing and file sizes are involved, and when delivery is desired. Because the branch manager is responsible for his own budget, and because equipment and central staff time come directly out of that budget,

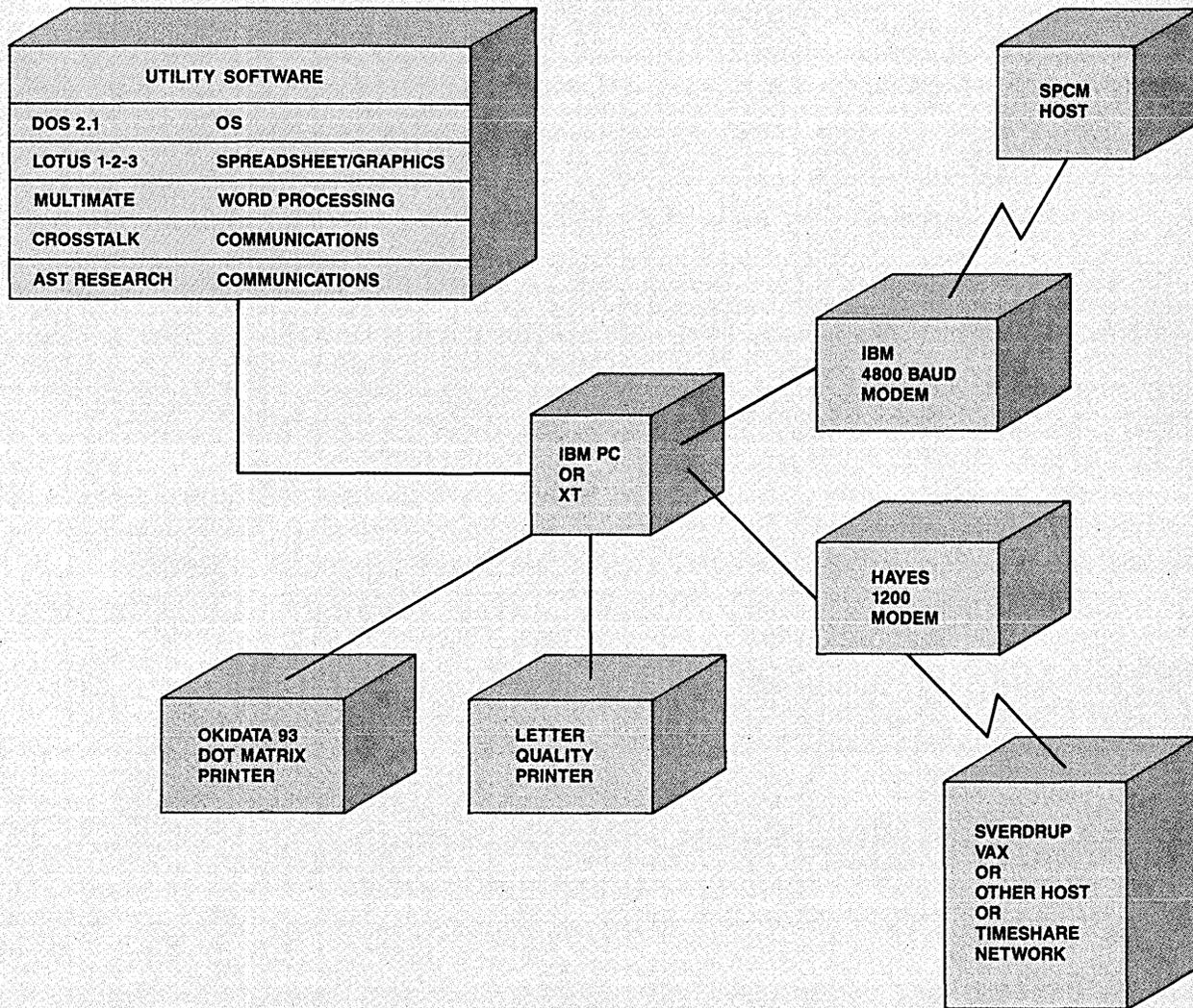




**Once the staff sees what can be done, they want to use the equipment immediately.**

FIG. 1

**A TYPICAL LOCAL SITE**



the branch is, in effect, hiring the central office in a consulting role—to buy, test, deliver, and install the PCs, and to provide training and host support (see Fig. 2).

In locations with larger, more complex projects to control, the branch specifies batch-input database systems it wants the central staff to create. This makes it possible for the branch to get customized reports based on more extensive processing of larger files. In this way, the branch can make cost-effective use of staff and high-capacity hardware. With batching of input, the communication expense is also small.

Let's examine how these policies have worked in three Sverdrup/SPCM

branch offices: Nashville; Eugene, Ore.; and Anchorage, Alaska. The business plan for the branch project in each case included a budget for computer support. The details of the support—how the local manager wanted to use that budget—were worked out during the creation of the management plan for the office's multiyear assignment.

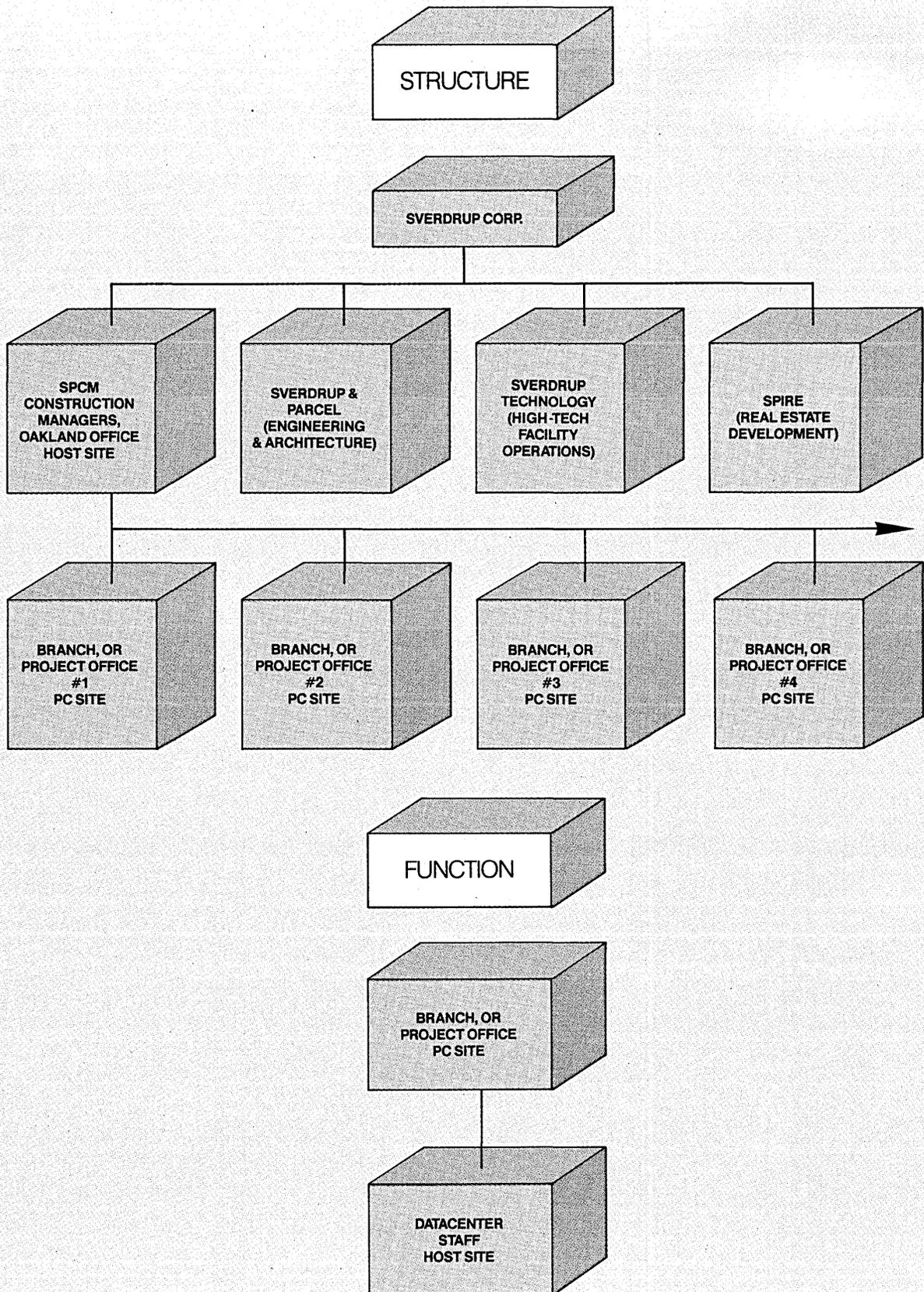
The management plan is created by the local manager in concert with a central staff planning specialist, who reports to the local manager during this process. The plan includes the scope, schedule, and cost of the work, and indicates how the computer is expected to support it. Typical applications are word processing, critical path

method (CPM) scheduling, cost control systems, cash flow, document control, graphics, and communications. Each office, however, has a somewhat different mix.

*Nashville office: custom database support.* Sverdrup's Nashville office handles project management of a \$100 million design and construction program for the city. Before program startup, Dr. Jim Irvin, the program manager, requested an outline and budget for functions that a terminal or PC could perform. At startup, the planning team from SPCM's data center worked with him to review what he wanted; the management plan showed the scope, schedule, and cost of the design and

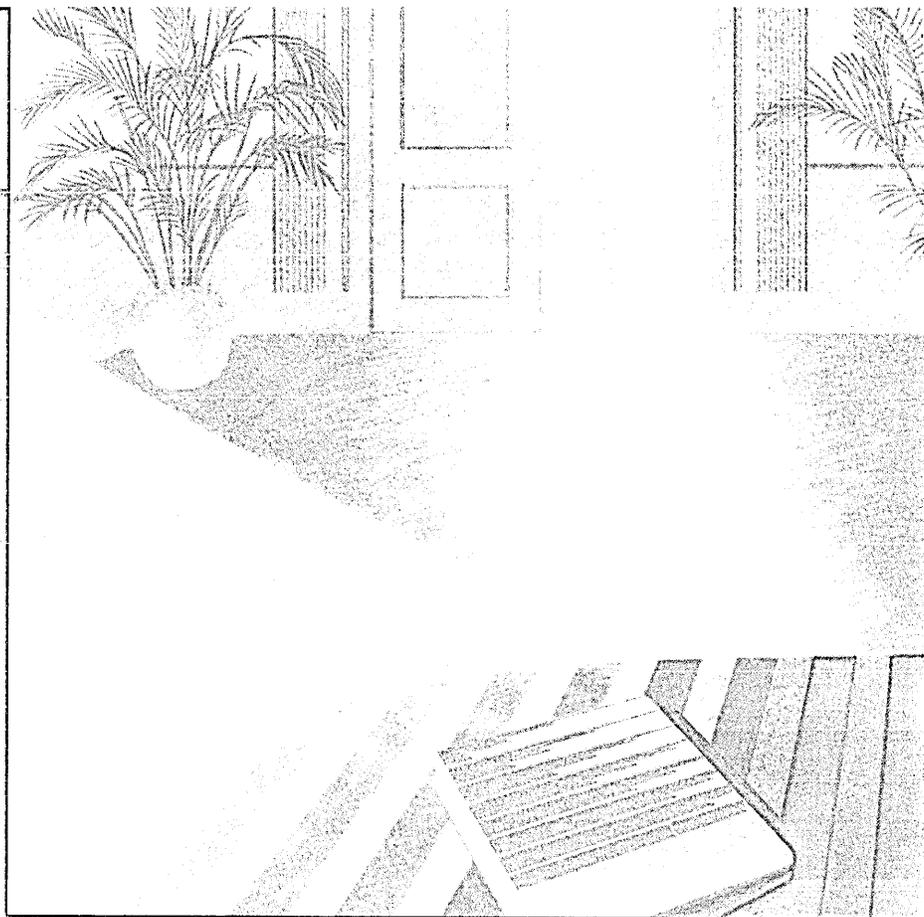
FIG. 2

**LOCAL OFFICES ARE STRUCTURALLY SUBORDINATE, FUNCTIONALLY INDEPENDENT.**



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## The managers are becoming more aware of the need for security as more tasks are done on computer.

construction work Sverdrup would manage for the city.

Initially, the office handled CPM scheduling, cash-flow analysis, document control (computer indexed retrieval of project documents), and cost control via a terminal connected to the host. Soon, however, Dr. Irvin saw that more status and control information was needed to manage the 88 separate projects that were to be completed over a three-year period. He asked his project control manager, Gary Hyatt, to work with the data center staff on a plan for quickly setting up a database. Custom reports were required, and the system had to be easily operated by local staff. Hyatt created lists of data to be kept and report formats desired. Within days, he and the data center reached agreement on the plan, including scope, cost, and schedule. The budget was promptly accepted, and pilot reports for three projects were produced in Nashville within the week; within three, the entire database was loaded and active.

### MOVE TO PC CUT COSTS

The system expanded and got more use as project personnel recognized the value of a convenient source for key project data. Next, the Nashville office asked for help in moving to a PC, which would enable them to batch data and to do spreadsheets locally. This move has cut communication costs and increased the office's capabilities. Lotus 1-2-3 is used to prepare input data and for spreadsheets. Less time is required for training efforts, since one package can be used for multiple purposes.

*Eugene office: PC augments data center.* SPCM is working (in a joint venture with Brown and Caldwell) to manage a \$105 million wastewater design and construction program for the cities of Eugene and Springfield, and Lane County, Ore. When the project began in 1978, the data center and the local office sent forms and reports back and forth by courier. Later, the project manager, Arl Altman, found that cash-flow requirements and document-control status were required for more rapid turnaround. He asked the data center to provide an estimate for hardware, training, and support to make available locally the host programs and some new tasks. On his approval of the budget and scope, a PC was installed to provide these functions. The less time-critical processing continues to be handled cost-effectively through overnight delivery.

An ancillary benefit has been found in that the data center can rerun reports immediately, if Eugene desires changes. All input is controlled by the Eugene office.

*Anchorage office: experience makes users more aggressive.* The Anchorage SPCM office has for several years been equipped with an IBM PC and all the utility software applications. John Klepac, the manager, started using the equipment at the outset, and trained other personnel in PC applications himself, with only limited support from the data center. In the past two years, however, he found he could cope with an increasingly heavy workload by making use of the data center staff and other central office specialists via communications and shared files. CPM schedule input, processing, and revision, for example, require expertise in scheduling and in operating the applications software. Since the company has employees with these skills at the data center, Klepac can request short-term assistance to help ease peak workloads.

This process works for several other applications as well. Spreadsheet analyses done on Lotus 1-2-3 are sent back and forth for manpower and cost estimating reviews, and can be manipulated in either location for what-ifs by central or branch managers. In this instance, the experience in PC-host operations at the branch level has initiated a workload-sharing arrangement.

SPCM has been using micros at remote locations for several years, and some trends are apparent. Training is the initial challenge, but users become comfortable and proficient with the machines surprisingly quickly. As they become accustomed to the machines, they start to think of different ways to get results. The trend is clearly toward users determining their own destiny, within the scope of the local manager's control and budget.

Local managers want the best re-

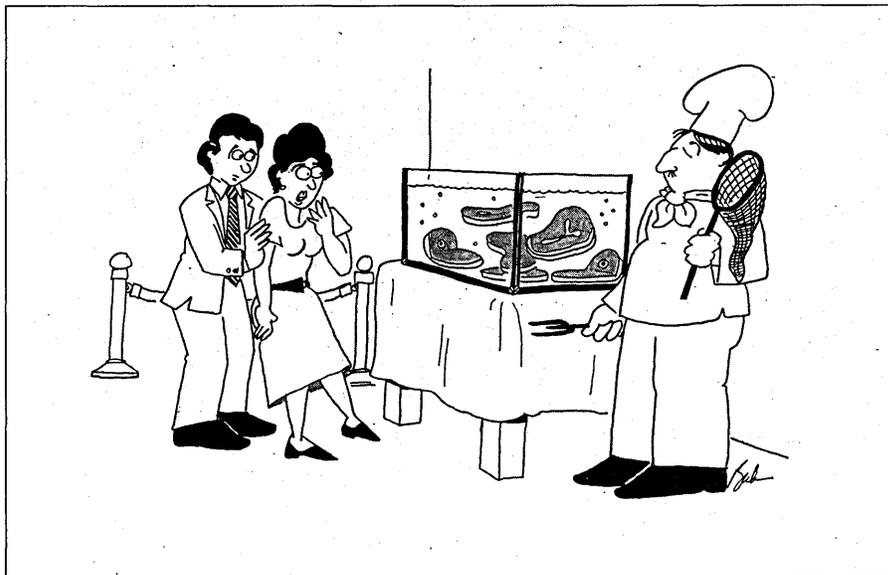
sults they can get within their budgets, and make good use of the data center staff in planning and using equipment.

Last but not least, all the managers are becoming more aware of the need for security—particularly as more tasks are done with the computer. Realizing that the data center has procedures that include routine backups of programs and data, they are taking similar steps to ensure that their operations have the same level of security.

SPCM's experience indicates that branch and project managers are able to plan and manage their own computing operations, particularly when they can take advantage of central data center support. The computing environment includes some fixed parameters, but most of the business decisions are left to the local manager. The manager is constrained by his budget and this is probably one of his main motivations for communicating with the data center. The local manager uses the data center's knowledge and ability to help with planning, to confirm the validity of plans, to help acquire hardware and software, to test the hardware and software before delivery, and for continued support when he needs more knowledge or manpower. ©

Perry Petersen is a vice president at McGuire & Hester, a general contracting firm in Oakland, Calif. He was previously chief planner, western region, for Sverdrup/SPCM. He managed planning, project controls, and dp support activities for clients' design and construction programs, and assisted in business development and acquisition. He has a BSCE from Cornell University and an MBA from the University of Santa Clara.

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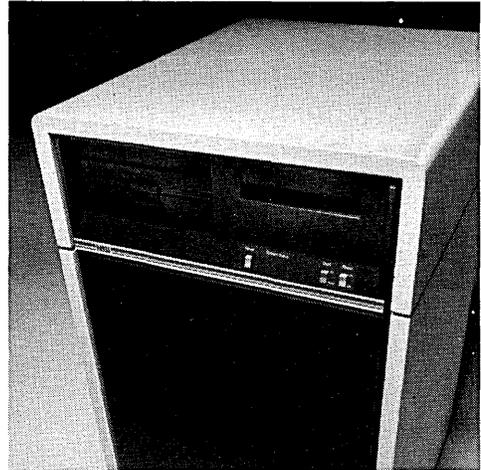


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CIRCLE 57 ON READER CARD

Peacefully blending these small computers into the corporate world is one of the dp manager's greatest challenges.

# MANAGING THE PC REVOLUTION

by Eric E. Vogt

The personal computers owned by major corporations are possibly America's most underutilized asset. Brought in for their ease of use and the promise of higher executive productivity, pcs have fallen far short of their potential. The reasons for this include a paralyzing proliferation of productivity software, a dearth of applications-oriented user education, and a dramatically new user environment that challenges the job description of the traditional dp manager.

The emergence of thousands of new pc users has transformed the dp manager's marketplace from one characterized by large cost-plus contracts to a mass consumer product market.

A culinary analogy might serve to underscore the magnitude of this transition. In the past, the dp manager might have been viewed as a master chef, charged with preparing state dinners for the White House. Today, this same chef has been re-assigned to operating a regional franchise of 12 fast-food restaurants. The refined set of skills that guaranteed success for the elaborate dinners are anachronistic for delivering cheeseburgers in high volume.

Organizational success in this revolutionary environment will accrue to those data processing managers who adapt rapidly to these new challenges. Tomorrow's successful dp manager will have to operate with a new set of axioms:

- There are not enough resources to evaluate and specify the proper software to meet diverse corporate requirements.
- Your corporate users represent a new breed of customer whose needs must be researched and met on a mass market basis.
- Your users will become experts in applying the software to business problems, and will create specific applications that move well beyond your current understanding of operational business details.
- Fundamentally, rather than being the

source of computer knowledge, dp managers must become the hub for exchange of personal computer knowledge and applications.

- Business-oriented educational programs tailored to various corporate user segments will facilitate the transition.
- The focus of your technical expertise is now systems requirements—due to the need to share accurate corporate databases. Networking and interconnecting to the mainframe are the new frontiers of measurable performance for dp managers. Interaction with experienced users and a general understanding of their business applications will be a prerequisite for successful design of these networks.

The development of business-oriented applications has always been a difficult area for the dp manager. The inability of operating managers to communicate their information needs precisely, coupled with the inexperience of many systems people in the intricacies of the day-to-day business, has led to frustrating delays and cost overruns in many seemingly straightforward projects.

While some observers of the pc revolution predict that these difficulties will be exacerbated, I believe costly misunderstandings can be avoided by helping this new class of users implement its own business applications. The dp manager of tomorrow must manage the flow of information between experienced and inexperienced users. In the near term, the dp manager's technical expertise will be required to upgrade the accuracy of mainframe databases and to provide limited access for those users who need timely information for critical business decisions.

Traditionally, dp managers have needed little formal business background or expertise. Until recently, they were responsible for selecting hardware and software, overseeing their installation and, when necessary, processing data in response to management's requests. These

projects, when funneled through the data processing department, provided dp managers with a rudimentary knowledge of sophisticated financial analyses or marketing segmentation concepts. Raw data and a modicum of instruction were considered sufficient background for dp to successfully complete the computerized report.

## MANAGERS WERE IN A FOG

Conversely, executives hadn't the vaguest idea what data processing entailed. Certainly, they knew a computer could compile data and perform calculations faster than any human possibly could—but they often forgot that humans were still responsible for the entry of data and the ultimate understanding of a project. The obvious communication problem was the absence of any discussion of project goals between dp and corporate management.

Before introduction of the pc, differences in the way a dp manager and an executive viewed computer capabilities caused many budgets and tempers to be blown. Misinterpretations and assumptions sometimes caused managers—when they received a long-awaited report from dp—to declare that the whole thing would have to be done all over again.

"Doesn't the data processing manager know," the executive would ask, "that all market segmentations are broken out by SMSA rather than by zip code?"

The introduction of the personal computer to the executive suite has altered this familiar scenario radically. Rather than passing on projects to dp managers, the business executive is suddenly grappling with hardware and software that had once been found only within the confines of the systems room. Meanwhile, the dp manager has discovered that end-user applications, not memory and operating system requirements, are primary considerations for choosing software. This orientation has brought about new and sometimes overlap-

## Corporate managers may now expect the dp manager to manage pc growth.

ping responsibilities for which there are no established guidelines.

Corporate managers, perhaps arbitrarily, may now expect the dp manager to manage pc growth. Certainly, the uncontrolled proliferation of pcs in a corporation is unhealthy. It is a threat to the continuity and security of a corporation as well as to the dp manager's effectiveness. The real issue, though—the one that causes executives to bring in pcs over the transom to begin with—is buried deeper. Executives want hardware and software they can use independently, effectively, and efficiently.

Rather than try to wage a war single-handedly, a dp manager should "enlist the troops" to maintain effectiveness and control within the corporation. This means not only serving as a manager but as a support mechanism as well.

The key here is the ability to listen and communicate. This means getting feedback from experienced users. It might mean choosing representatives from each department to form a software recommendation committee. While the dp manager is technically the best qualified to select software, there are other considerations—such as features and ease of use—that affect the user and therefore deserve his or her evaluation. While this process may seem tedious or circuitous, it will cut back on the amount of hardware and software brought in by frustrated executives.

Communication can be taken a step further by providing users with a format to talk among themselves with a dp manager acting as counsel or group leader. Newsletters, hot lines, and user groups all work toward this end. The bottom line is that users are often confused but find it difficult to explain their problems. A support group, made up of data processing and business managers, will provide the best of both worlds for an understanding, problem-solving forum.

Support groups, communication, and sharing of applications are an integral part of a corporation's successful pc integration. Without proper executive education, however, effective communication and an exchange of ideas cannot take place.

The challenge is, of course, for a dp manager to choose an appropriate pc education program in a market where there are as many training methods as there are software manufacturers. As with the selection of pc software, the most effective approach is always geared toward the individual executive.

Training manuals, disks, and other generalized training methods will introduce the executive to basic hardware and software commands and capabilities. The

next question is, "Now that I am computer literate, what shall I do?" Executives may find they can easily bring up the system and load the software, but they don't know how a personal computer can solve their business problems.

### BEYOND COMPUTER LITERACY

Customized education, on the other hand, allows the executive to understand how a market segmentation for refrigerators can be performed using Lotus 1-2-3. It takes executives beyond functional computer literacy by showing them how personal computers can improve their productivity and decision-making abilities, whether they are in insurance, real estate, banking, or industrial marketing.

Ideally, a custom-designed pc education program should feature case studies that cover the problems of a particular industry and company. The value of this approach is apparent as soon as the executives use hardware and software as troubleshooting tools, swiftly determining the best solution based on fresh information they could not previously have obtained on their own.

While some dp managers believe the executives who think software is spelled "softwear" will be slower students than the fast-track types who installed pcs in their living rooms, the customized approach tends to make them all equals. When the learning process calls for industry expertise, the technophobe proves to be just as fast a learner as the basic computer literate. Interestingly, age does not appear to affect a manager's capacity to master personal computers. The popular view of young executives overtaking their senior counterparts is not borne out when observing the dynamics of a pc education class. More often than not, the seasoned executive is better able than his young, inexperienced colleague to grasp and apply the concepts of an electronic spreadsheet package.

Once a dp manager has troops that are properly educated, happy with the software and hardware they're using, and who have a forum where they can voice their pc-related problems, the manager is free to turn to the more critical areas of networking and database management. At the same time, establishing the necessary support systems for new users will make business managers more open to allocating additional funds for systems development and database management. This attitude and the availability of adequate resources are key to the dp manager's success over the next five years. As they gain experience, pc users soon demand more data to work with. This

need for business information will establish high priorities of systems development in several areas:

- mainframe database accuracy,
- communications software for high-speed file transfer,
- database subsets with multi-user access and one-way limited transfer rights to the mainframe for periodic data refreshing.

These are the challenges most likely to occupy the dp manager's creative technical talents—not the development of specific applications.

Once dp managers have established the necessary support mechanisms, they'll find they're putting out fewer fires, hardware and software aren't being brought in over the transom, and executives are more open to allocating funds to office automation. The additional funds and corporate support will allow the dp manager to explore new technologies—such as networks and micro-to-mainframe links.

### BRIDGING CORPORATE-DP CHASM

The old roles are changing, and work on a support system to bridge the gap between data processing and corporate managers must begin. The challenge is large, but the productive potential of personal computers is immense. The revamped job description for a valuable dp manager will look like this:

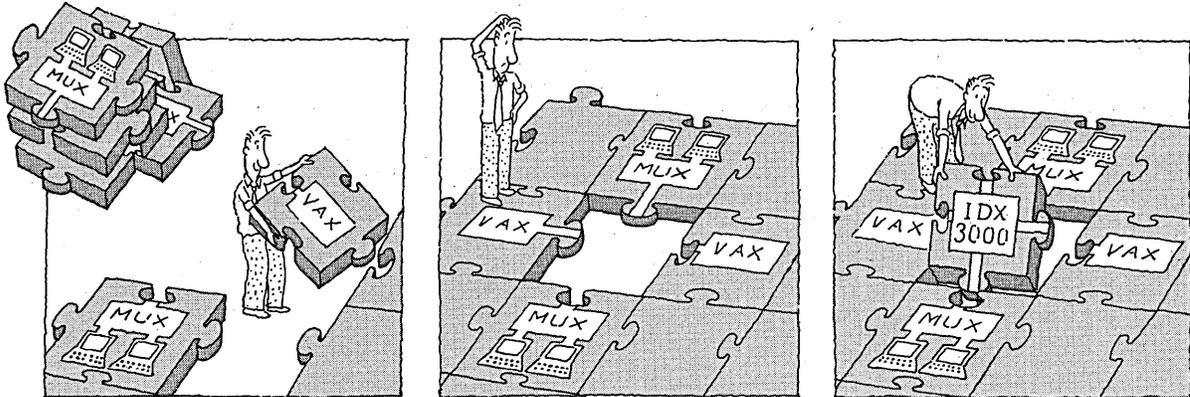
- Solicit evaluations from experienced users.
- Provide applications-oriented educational programs via hot lines, newsletters, user groups, and so forth.
- Delegate maintenance responsibility to users who develop the models via two methods: first, have them embed a description of what the spreadsheet model does and how it operates within each model; and second, encourage internal user groups to share ideas and approaches to problems.
- Develop procedures for the controlled, one-way access to mainframe data.

Ultimately, the bridge built by means of communication, business understanding, and, most important, proper training will span the dp-to-executive chasm, joining the two on a common ground where the personal computer can be used effectively and efficiently by everyone. ©

Eric E. Vogt is president and founder of Micro Mentor Inc., Belmont, Mass., a personal computer education service. Before he started the company in 1982, Vogt was a manager with the Boston Consulting Group, a lecturer at the Harvard Business School, and an independent software strategy consultant.

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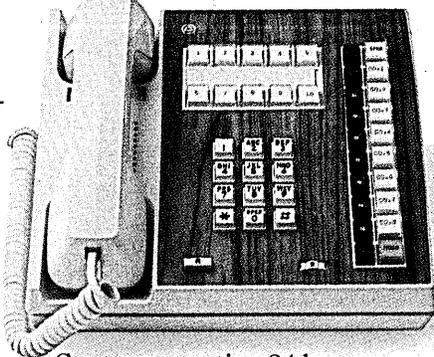
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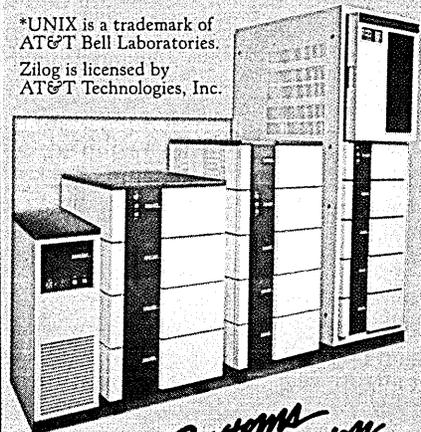
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**Current users of this technology are early leaders in an area that still offers somewhat limited capabilities.**

# BUSINESS GRAPHICS TRENDS

**by John A. Lehman, Doug Vogel, and Gary Dickson**

Computer graphics is forecast as one of the fastest growing areas within the computer industry. Sales of graphics equipment are increasing, national graphics conferences such as ACM's SIGGRAPH and the National Computer Graphics Association's annual meeting are attracting record crowds, and industry pundits are predicting that future computer systems will be graphics-based. The use of computer graphics for managerial communication and analysis, what we shall call "business graphics," is predicted to be one of the major growth areas.

In spite of the outpouring of enthusiasm for computer graphics in general and business graphics in particular, we have little empirical evidence as to how organizations are using business graphics, what they are using them for, and how they anticipate using them. We have initiated a large-scale project, the Minnesota Management Graphics Project, to conduct research in these areas. This article reports the results of a survey that we recently completed to help answer these questions. The survey was intended to ascertain which members of the responding organizations are using business graphics, what they are doing with them, and how they have managed the process.

Our survey had 36 questions. It was pretested on a sample of Twin Cities companies, revised, pretested on a different group of companies, and revised again before being sent out. None of the original respondents were included in the final mailing (although some of the same organizations were represented).

The survey was sent to the dp managers of 789 organizations around the United States. All were members either of the Society for Information Management, Chicago, or affiliates of the Center for the Study of Data Processing at Washington University, St. Louis. The organizations we sent questionnaires to were selected by eliminating individual members, academic institutions, consultants, and other non-institutional users from the lists. We had a 25% response rate; just under 200 questionnaires were completed and returned.

The respondents were predominantly managers (32%), directors (30%), and vice presidents (14%) from MIS/IS, representing corporate headquarters (64%) as opposed to divisions (34%). Most of the responses came from manufacturing organizations (42%), followed by financial services organizations (14%), retailing (6%), and utilities (6%); other services including engineering, transportation, government, education, and communication each made up 5% or less. The responding organizations ranged in size from eight to 200,000, with an average of about 11,000 employees. Full-time employees in the MIS/dp area ranged from zero to 15,000, with an average of about 440.

We identified nine trends that involve:

- technological capabilities
- motivation for use
- functional area use
- end users
- applications profiles
- organizational responsibilities
- user satisfaction
- impediments to increased use
- forecasts for the future

These trends can be divided into four major categories:

- existing situation
- user satisfaction
- impediments to increased use
- the future

The existing situation trends reveal where the respondent organizations stand with respect to technological capability, motivation for use of business graphics, functional areas using business graphics, end-user characteristics, business graphics applications, and responsibility within the organization for computer graphics.

## **90% HAVE COMPUTER GRAPHICS**

*Technological capability.* The respondent organizations have a strong technical computer capability. Almost 90% of the respondents already have computer graphics capability as well as high levels of other advanced technologies such as databases, interactive debugging, telecommunication, very high level languages, and extensive use of microcomputers. The only technical area in which

less than half of the respondents are involved is the ability to link microcomputers to mainframes (other than as dumb terminals).

While most of the respondents have business graphics facilities, almost a third of them have had these facilities for a year or less. Well under half of the respondents have had business graphics facilities for three or more years.

Investment in existing business graphics hardware and software capability is small relative to the size of the organizations and spread over a wide variety of vendors. SAS/GRAPH, from the SAS Institute Inc., Cary, N.C., is the most widely available mainframe package, and Lotus 1-2-3, by Lotus Development Corp., Cambridge, Mass., dominates among the packages that run on microcomputers (Figs. 1 and 2). Personal computers with graphic displays outnumber other graphic devices available in organizations. Respondents generally noted that the few existing graphics workstations were distributed throughout the organization.

*Motivation for use.* User demand was the major factor influencing the decision to buy computer graphics, followed by a desire to explore use of the technology (Fig. 3). Vendors offering graphics technology at a good price and/or with good support were almost never the major influential factor. Top management was only occasionally the first to voice a need for computer graphics. Graphic arts areas were almost never the first to voice a need.

*Functional area use.* In most responding organizations, only information systems, finance, and marketing are regular, heavy users of computer graphics. Personnel, operations research/management science, and production are notably weak users (Figs. 4 and 5). Few functional areas are using graphics simply on a trial basis. Of those that are, information systems, marketing, and accounting predominate, while strategic planning, production, and operations research/management science exhibit little trial use.

*End users.* Very few end users have business graphics experience. Those who do are generally professionals or managers. In many of the organizations, almost no

FIG. 1

**COMPUTER GRAPHICS SOFTWARE AVAILABILITY**

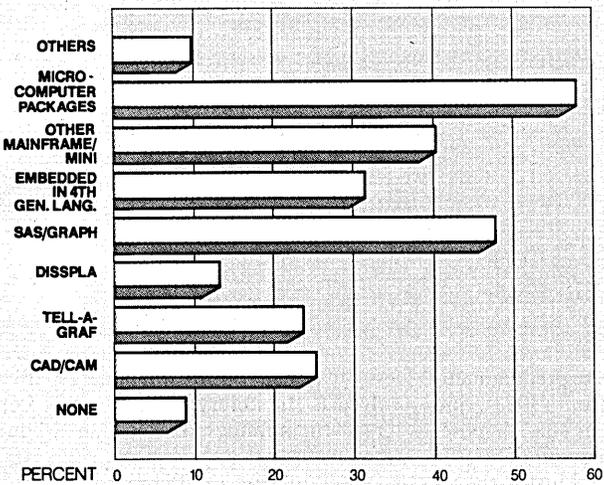


FIG. 2

**MICROCOMPUTER SOFTWARE PACKAGES**

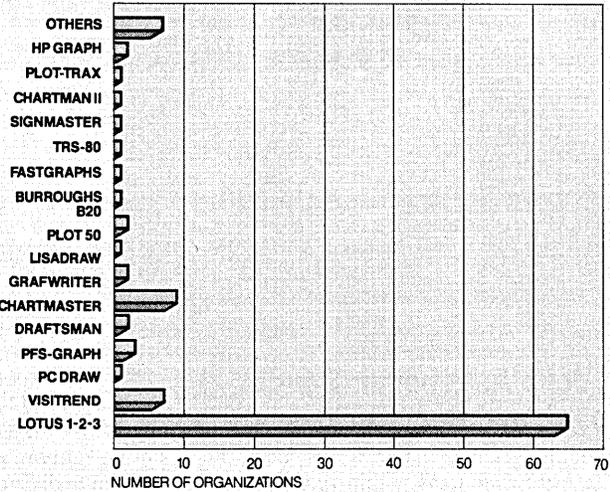


FIG. 3

**MAJOR FACTORS INFLUENCING PURCHASE OF GRAPHICS TECHNOLOGY**

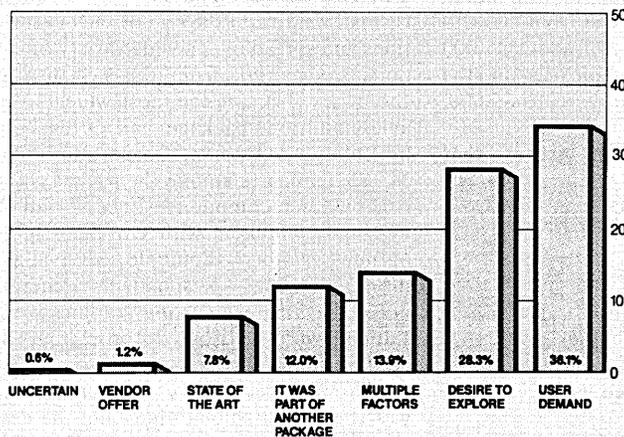


FIG. 4

**FIRST IN ORGANIZATION TO VOICE NEED FOR COMPUTER GRAPHICS**

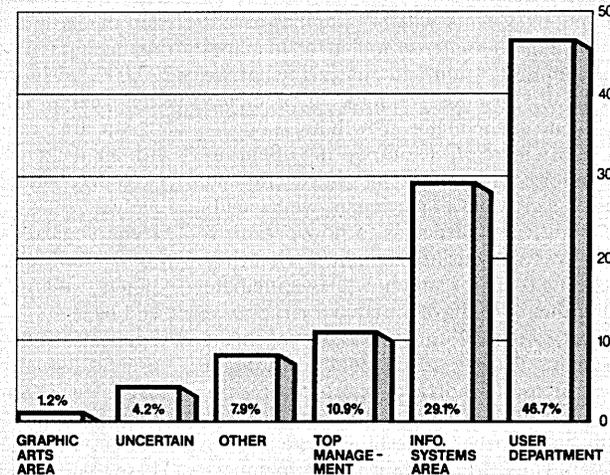


FIG. 5

**FUNCTIONAL AREAS USING COMPUTER GRAPHICS**

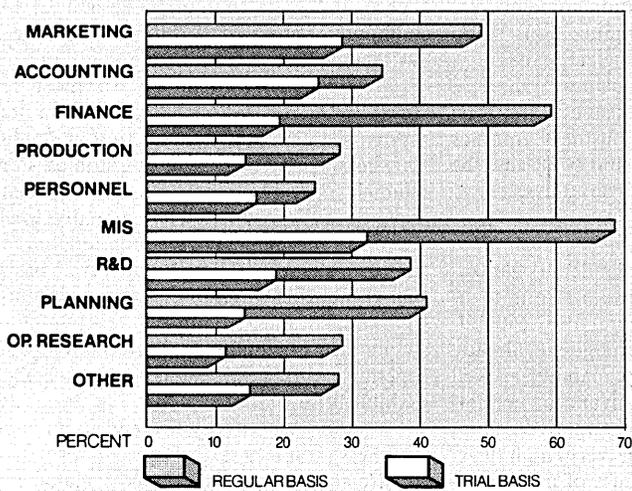


FIG. 6

**PERCENT OF INFORMATION SYSTEMS USERS WITH COMPUTER GRAPHICS EXPERIENCE**

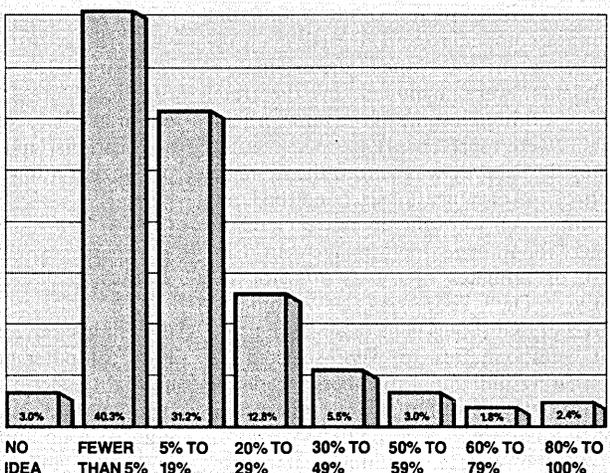


FIG. 7

**USE OF GRAPHICS AS A DECISION SUPPORT TOOL**

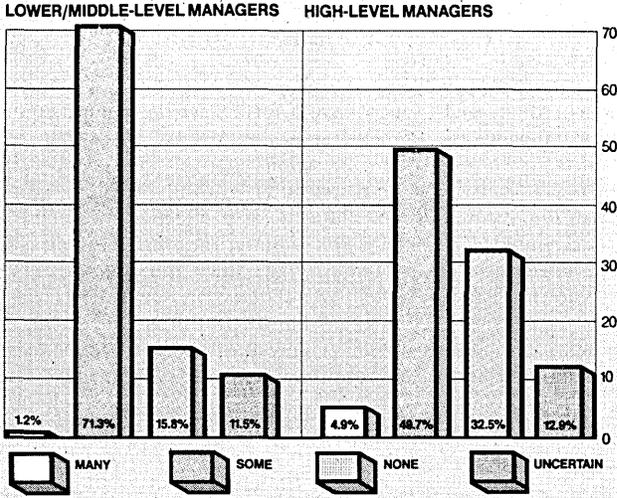


FIG. 8

**SUPPORT FOR BUSINESS GRAPHICS**

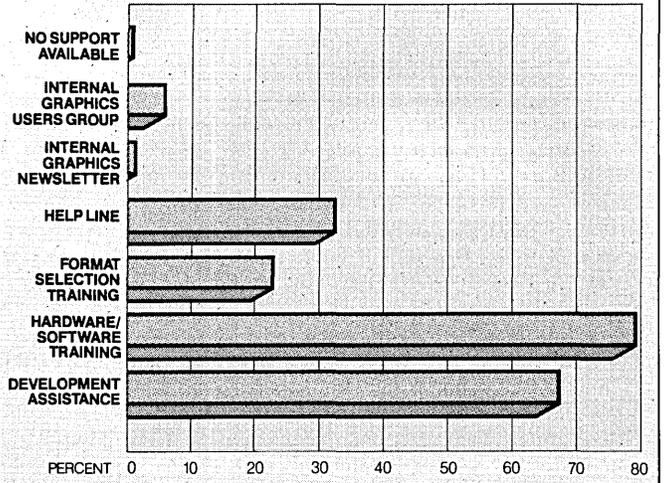


FIG. 9

**USER SATISFACTION**

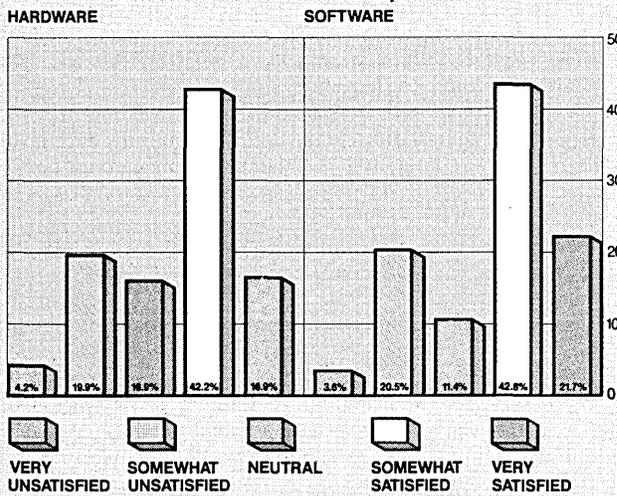


FIG. 10

**IMPEDIMENTS TO INCREASED COMPUTER GRAPHICS USE**

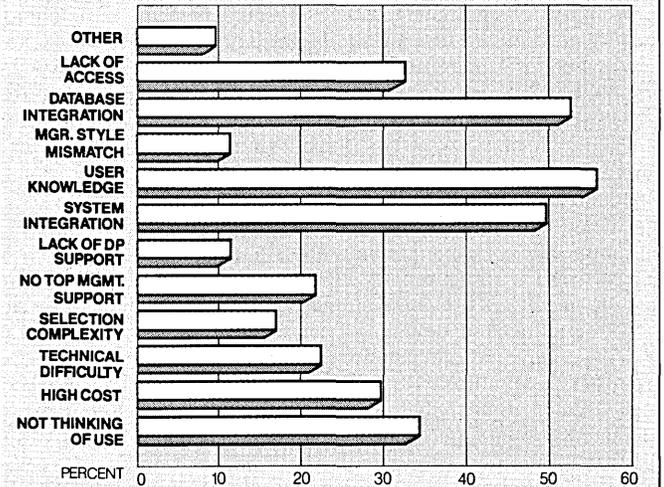


FIG. 11

**ANTICIPATED GROWTH OF COMPUTER GRAPHICS FOR BUSINESS APPLICATIONS**

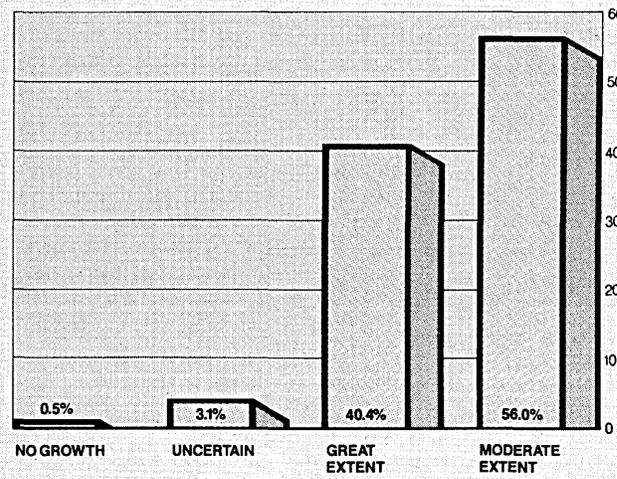
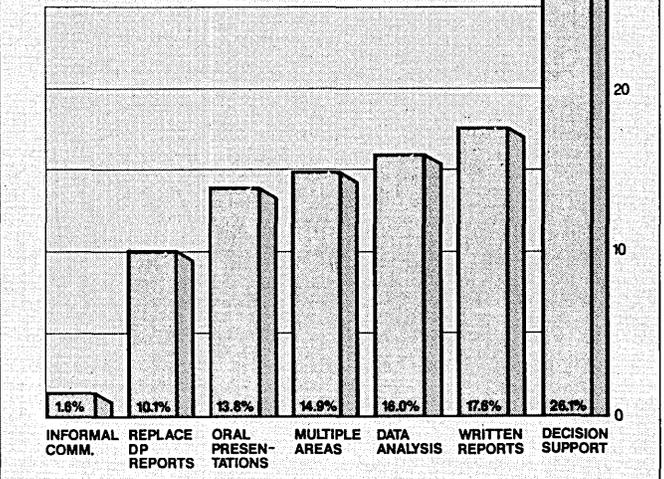


FIG. 12

**MAJOR GROWTH AREA OF COMPUTER GRAPHICS USE**



# The movement of graphics into organizations is like a series of waves. The first has already crashed on the beach.

end users have business graphics experience; organizations where half or more of the end users have such experience are a small minority (Fig. 6). Professionals (34%), managers (23%), and managerial assistants (21%) generally interact with graphics software to develop or print charts and graphs. Executives (9%) generally do not.

**Applications profile.** In a rank ordering of computer graphics applications, support for written reports and oral presentations slightly outrank data analysis and decision support. Replacing or supplementing standard dp reports and informal communication of ideas rank lowest. Some low- and middle-level managers are using graphics for decision support, but only a handful of high-level managers are doing so (Fig. 7).

**Organizational responsibility.** Responsibility for computer graphics within the organization resides primarily in the MIS/dp and information center areas (quite often in both). Some of the respondents reported that formal responsibility for computer graphics has not been specified. In a bare majority of the organizations, no support staff is dedicated to computer graphics. Development assistance and training on the specifics of using graphics hardware and software are often provided. Relatively few organizations provide training on the art of selecting and designing charts and even fewer have internal newsletters or user groups (Fig. 8).

**User satisfaction.** User satisfaction is similar for graphics hardware and software (Fig. 9). In both cases, just under half the users are somewhat satisfied and about a quarter are somewhat dissatisfied. More users of graphics hardware are neutral than are software users. Only a few are very dissatisfied with either hardware or software; about a fifth of the users are very satisfied with both hardware and software. Differences as a result of years of business graph-

ics experience, availability of dedicated support staff, and degree of training and assistance remain to be examined.

## USER KNOW-HOW LACKING

**Impediments to increased use.** Most responding organizations cited insufficient user knowledge and poor integration of computer graphics with databases and other systems as impediments to increased use of computer graphics as a decision-support tool. Roughly one third of the respondent organizations noted that people just don't think of using computer graphics, and that sufficient access to computer graphics was lacking. Fewer organizations noted technical difficulties or lack of top management support as impediments, and even less felt there was a lack of support for computer graphics by the dp area or that computer graphics were inconsistent with managerial style (Fig. 10). Forced to select the major impediment, organizations responses were in about the same order as above.

**The future.** Most respondents felt that use of computer graphics will increase to a moderate extent and almost half expect it will increase to a great extent (Fig. 11) over the next three years. Three quarters of the organizations expected increases in computer graphics use for decision support, support of written reports, data analysis, and support of oral presentation. Most also foresaw an increase in its use to replace or supplement standard dp reports. A substantial minority expected increased use of computer graphics for informal communication of ideas (Fig. 12). Again, when asked to select the major area of growth in use of computer graphics over the next three years, organizations responded in the same order as above.

Half of the organizations are considering expanded use of business graphics as part of the formal information systems planning process. Only a few (12%), how-

ever, have a formal written plan for computer graphics.

Responses to a query concerning what computer graphics features would contribute most to effective future use of the technology were dominated by pleas for integration capability with databases and systems. Ease of use and lower cost, particularly of hardcopy output devices, were noted, as were flexibility and better terminal resolution. Only 2% of the suggestions address graphics standards, which indicates that business users of computer graphics are much less concerned about this issue than the traditional graphics community.

The movement of business graphics into organizations is somewhat like a series of waves. The first has already crashed on the beach. Organizations are increasingly involved in business graphics. The next wave is swelling around integrating business graphics with existing databases and systems.

Still out in the ocean waiting to form is the wave that will introduce a substantial number of organizational personnel to business graphics. Present users are early leaders in areas where existing, somewhat limited capabilities can be used effectively.

As the next step in this research, we shall be carrying out an in-depth follow-up survey to learn more about organizations that heavily use management graphics. In particular, we want to learn more about what specific attributes of business graphics are being used, what attributes relate to successful use, and how present graphics systems should be changed to better accommodate both technical and human factors perspectives.

The results of this inquiry will give direction to forthcoming experimental and field research that is part of the Minnesota Management Graphics Project. These studies are intended to provide prescriptive knowledge about which graphical techniques are best suited for which applications. The series of studies will be coordinated and will use a limited set of dependent variables so that cumulative results can be produced from the individual experiments. ©

John A. Lehman, assistant professor of MIS, and Gary Dickson, professor of MIS, are both employed at the University of Minnesota's Department of Management Sciences. Doug Vogel is a PhD student at the university. All three are involved in the Minnesota Management Graphics Project, which began in 1983 and will continue for another four or five years.



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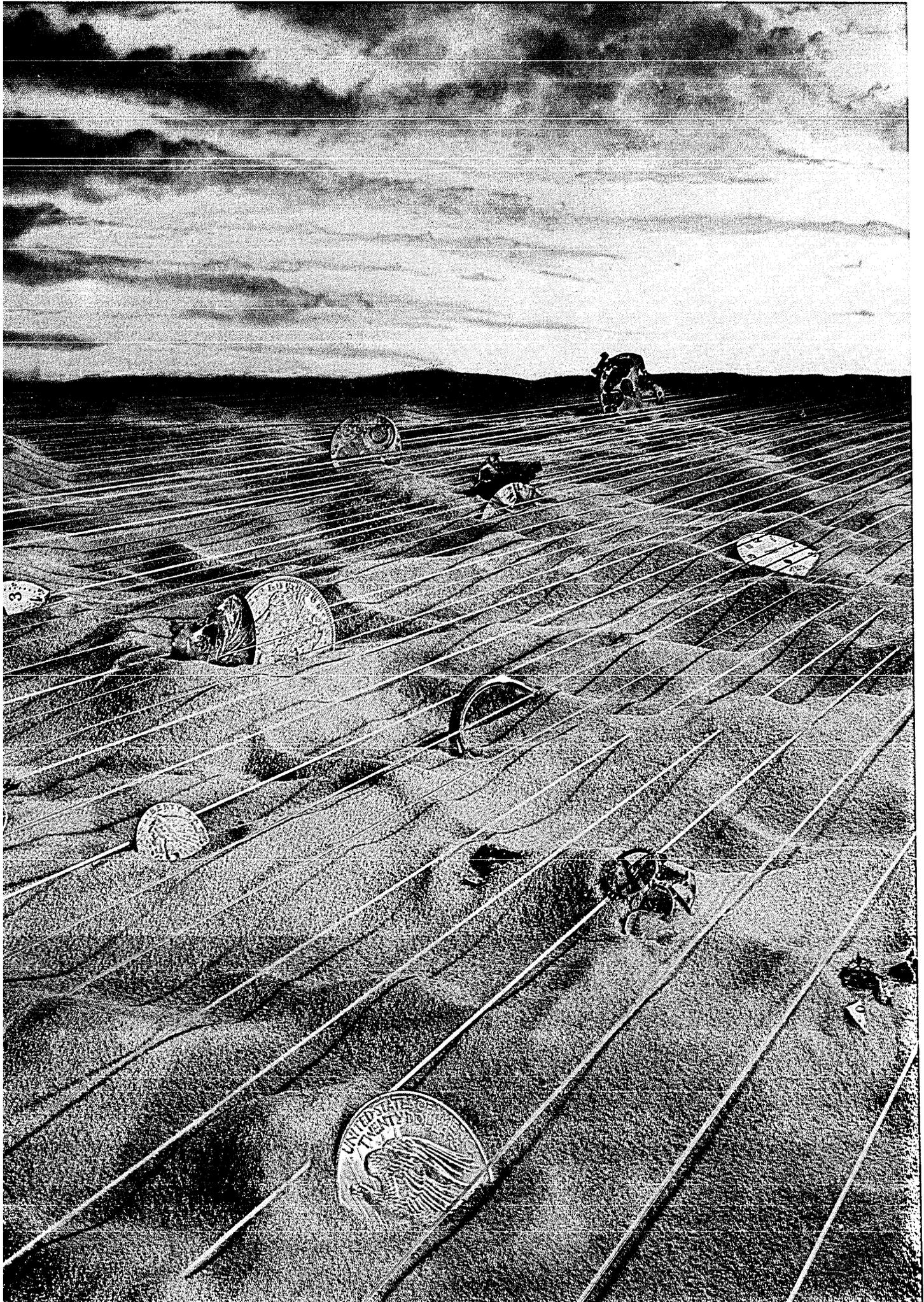
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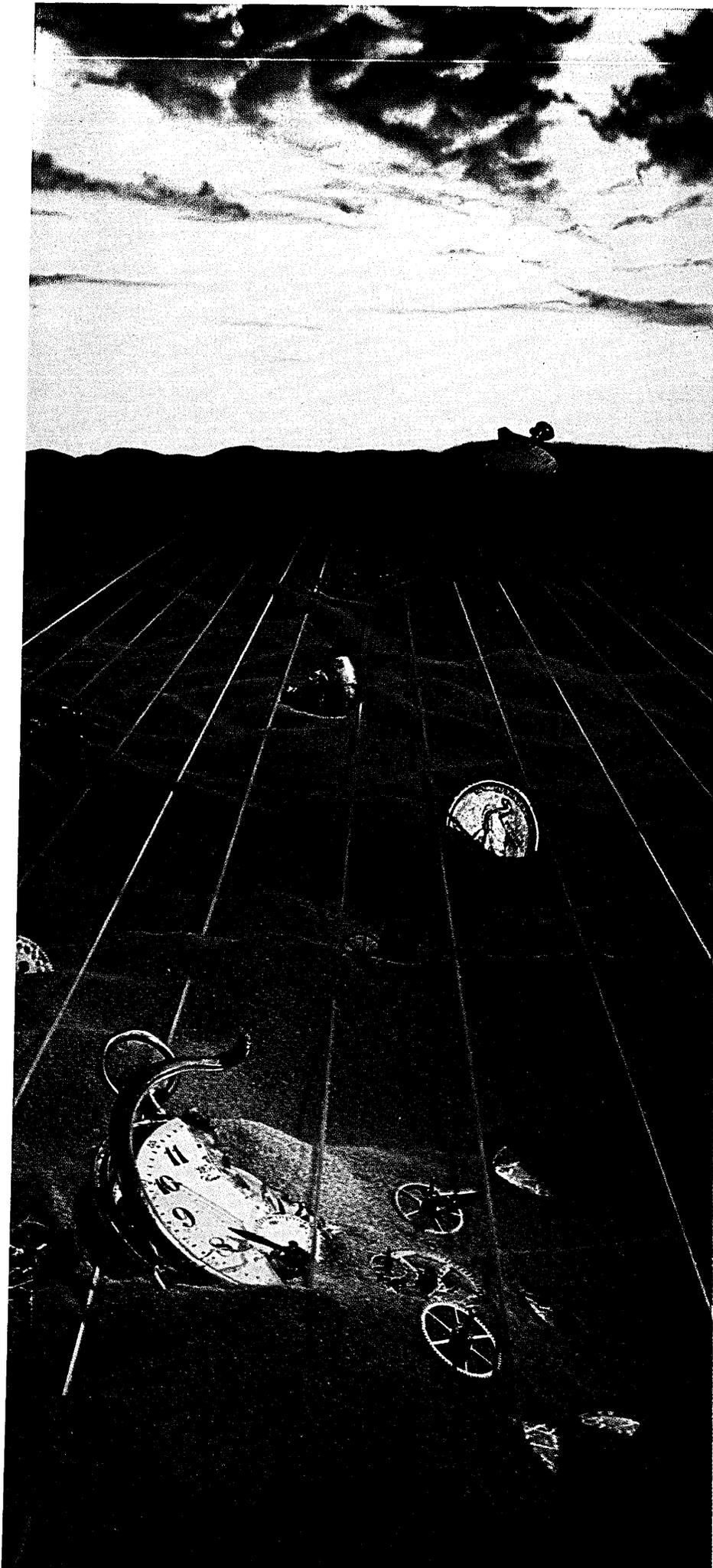
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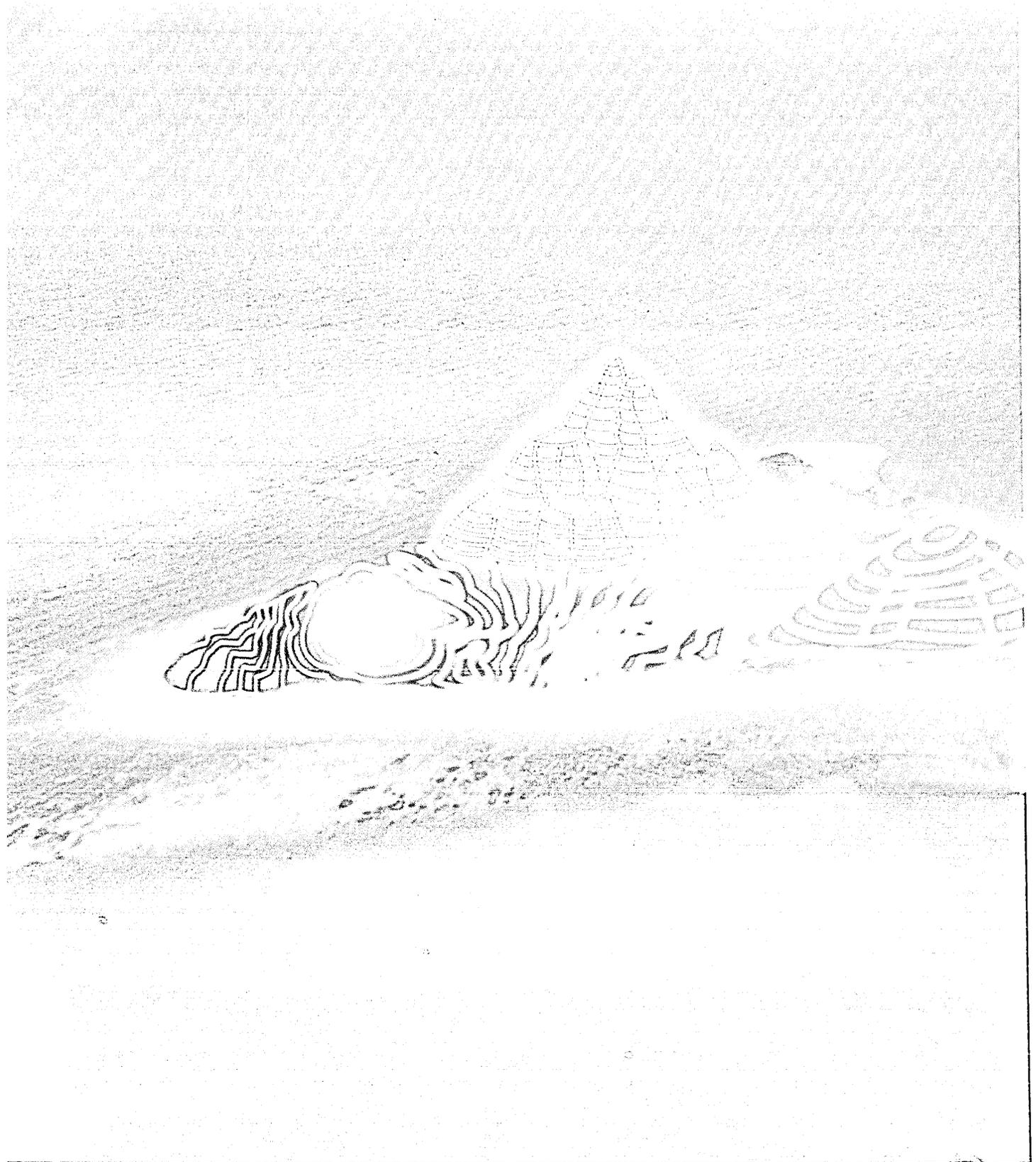
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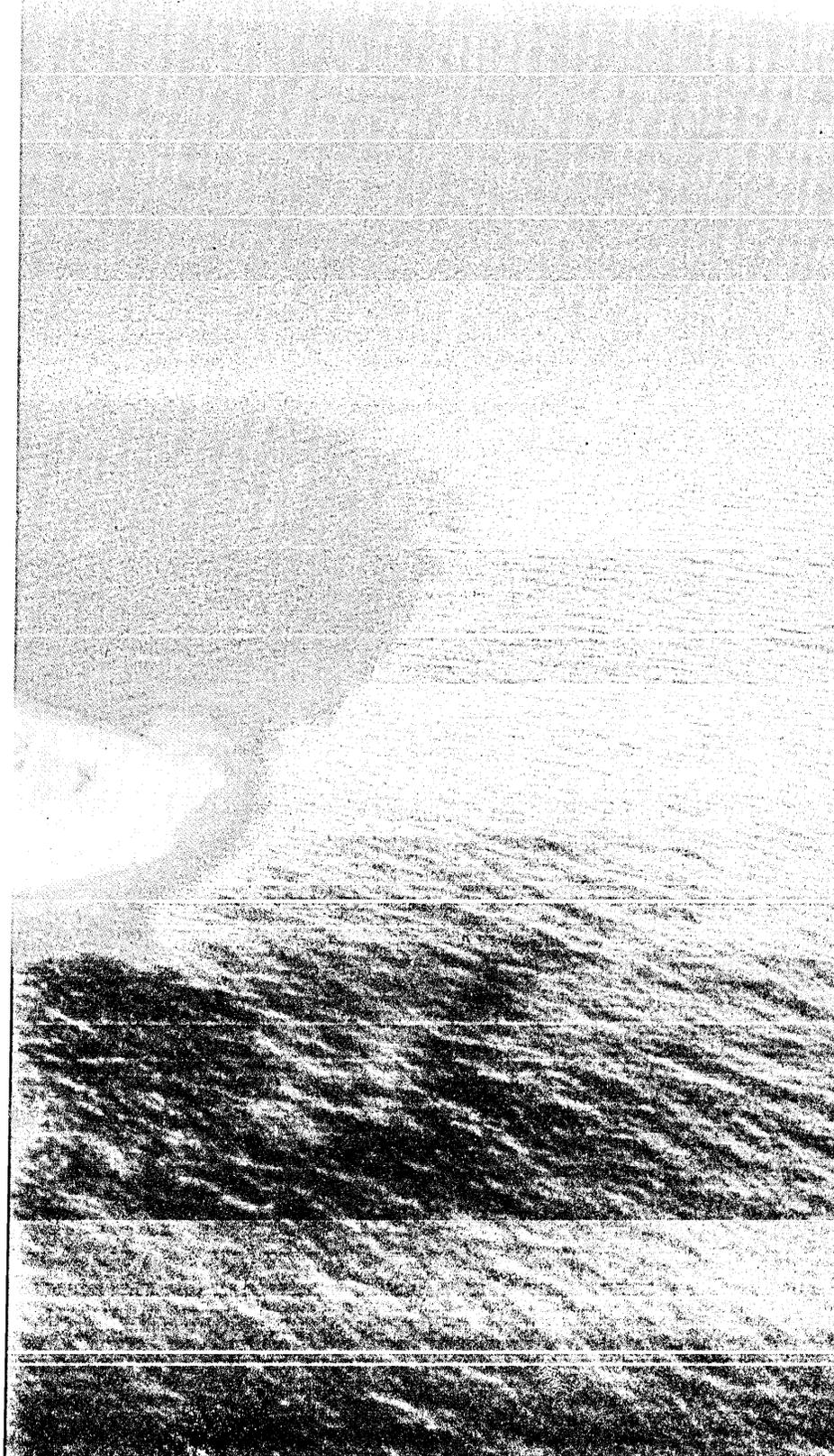


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# THE KING OF MALAPUTA

by Sol Yurick

It was the last Thursday of the Greenest Month, 1985. Eighty of the world's leading central bankers and finance ministers were traveling in secrecy from New York, Washington, Basel, London, Paris, Luxembourg, Tokyo, Hong Kong.... They were on their way to the paradisaical island of St. Cunegonde to play the Balances Game.

The Balances Game is played twice a year. It's a situation-room scenario modeled on real-world, real-time financial crises. In 1981 and 1982 the game was nicknamed "Pulling the Third World Out of the Black Hole." In 1983, it was called "Emerging Out Through the White Hole" or "Coming Up with a Rose and Smelling Sweet." This year, whether they knew it or not, the bankers were going to play "The King of Malaputa."

St. Cunegonde, which is close to Sardinia, is, in a sense, totally artificial: the whole island is gardened. The bankers, having flown into such assembly points as Rome, Naples, Milan, and Marseilles, were helicoptered for the last miles to the barge that serves as a landing platform for the island. From there it was a short ride—15 minutes—to the island. They were met by servants who took their baggage and escorted them to the island's one building, a chateau incongruously topped by a large dish antenna. There they assembled for the first of many ceremonial cocktail parties. Drinks were served on a marble terrace, beside a neatly trimmed lawn that sloped down to the sea. Flanking the lawn were two tree-shaded walkways along which the bankers, in twos or threes,

PHOTOGRAPH BY STEVE COOPER

## "We are more than banks: we are communications companies, we are clocks."

promenaded. Concealed speakers filled the air with music.

High technology notwithstanding, these meetings had ancient ritualistic conventions said to have begun with Renaissance bankers. They all knew one another, and each player made sure he talked to every other player. According to protocol, they began by asking about one another's families, then they traded financial gossip, and then they moved on. "A frank and open exchange of views" was the rubric they used. Pumping one another for information was another way of looking at it. It was possible to be honest—well, about 75% honest. While they all had a common interest, their theories about the way the world's monetary problems should be solved and their competitiveness ensured exciting play. Roughly speaking, they could be divided into two factions: free traders and regulators.

Mr. Clitson of the Cividei Group, in contention for the title of largest financial institution in the world, gravitated to Mr. Sasagawa of the Rōichi, who, seeing his old friend, turned away from Mr. Portinari of Banco Spirito del Valore e Lavoro, to greet him. They had met under regrettable circumstances 42 years before.

"How's your health?" Mr. Clitson asked, for Sasagawa had been wounded on Guadalcanal.

"Except for minor complaints, it's fine. How's yours?" For Mr. Clitson had also been wounded on Guadalcanal. It was their conceit that they had personally duelled and wounded one another. That they were now talking in these luxurious surroundings was a sign of the world's progress, the ability of commerce to heal all wounds and do away with more primitive ways of contention. Indeed, there were those whose Balances strategy was to make large-scale war impossible: one or two points of interest can dampen the weapons market considerably.

They talked for a few minutes about investing in a mining consortium in Colombia. Clitson wondered if Sasagawa's bank wanted to participate. Mr. Sasagawa said he found the proposal curious, considering Colombia's debt. Did Clitson know something he didn't?

"Such a beautiful place," Mr. Sasagawa said.

"Very much like Malaputa," Mr. Clitson replied.

"I've never heard of it."

"You will. That's peculiar music to be playing."

"I'm not familiar with it."

"Wagner. *Die Götterdämmerung*."

They separated and moved on.

### COMPUTERS NOT ON ISLAND

Beneath the mansion on St. Cunegonde, a huge cave has been converted, lined, and made into a conference and game center. There are no computers on the island itself. The terminals the bankers use are connected to an array of Crays run by the National Security Agency, which uses data from the world's banking system. Since eminent people do not operate terminals, technicians are flown in every morning. They follow verbal instructions from the main players, who remain free to wander around and make deals and feverish adjustments between sessions.

After an afternoon of medical and psychological examinations (the game is stressful) the 80 players assembled at 10 a.m. the next day in the auditorium, where the briefing was to take place. They sat in comfortable chairs that could recline or swivel. At the side of each chair was a microphone and a small monitor. There was a huge screen behind the speaker's podium upon which charts, illustrations, films, or the latest quotations could be displayed. As they settled into their seats, most of the bankers were conspicuously relaxed, as if they were athletes conserving their energy for the main event.

The first speaker was Herr Von Alberich, the new director of the Bank For International Settlements (BIS), the central banker to the central banks. The players expected him to merely review the usual problems: world debt, political unrest, the danger to international economic stability, the alarming growth of the noncomputable underground economy. They were a bit bored.

The director was a tall, spare man. He was taciturn, and his black eyes glowed with the fervor of the convert. It was rumored that in his youth the director had been a Marxist, perhaps even a terrorist, dedicated to the overthrow of capitalism. No one was sure what had changed his mind. In fact, it was technology that had converted him. At a young age, Von Alberich had learned much of what there was to know about financial networks. One night, from London, he penetrated the SWIFT wires and had a golden, blinding insight. He saw the world's financial condition, laid out like a spreadsheet patient etherized on a table. It was an experience similar to Paul's on the road to Damascus. He saw the light; he understood the ineluctable ways of the Invisible Hand. He defected, changed names and sides. Using connections—his was a prestigious, ancient Teutonic family—he got a job in a bank and worked his way up the ladder quickly.

Von Alberich began with a dry statement, clearing his throat frequently: "Gentlemen. I don't have to remind you of the wondrous works we have wrought in the past 20 years. We are well on the way to solving the mysteries of matter, energy, and life. We have made the transition from a primitive to a modern financial system. The financial markets are indissolubly linked, seconds apart. In a few more years we would have escaped earthly time and had universal, 24-hour trading."

There was a murmur. "We would have?"

"We are more than banks: we are communications companies, we are clocks. And while very few of us are mere computer technicians, we know that the world's financial system is like some vast BIOS. And the accidental conjunction of the acronym BIOS and the word bios, meaning life, is perhaps very much to the point. We—not the politicians, the soldiers—are life itself, the blood, genes, hormones, nerves of the global political economy. And yet our world body is at war with itself."

He shuffled his papers, looked up into space, and cleared his throat. The bankers were getting restless. Mr. Petta-compt, the retired, eminent, and revered emeritus, a man who loathed high technology, muttered to himself. He hated these windy and speculative discussions. You did deals with people, not machines. He wondered if the BIS man had ever really divested himself of his Marxist and regulatory ways.

### "WHAT WE DREAD HAS HAPPENED"

"We live with third world debt from day to day. We face the danger of default. We make technical adjustments and hope they will get us out of this morass. We have stabilized instability: a holding action. But the thing we have feared the most is an intrusion—a break-in by someone who understands finance and computers. Well, what we have all dreaded has happened."

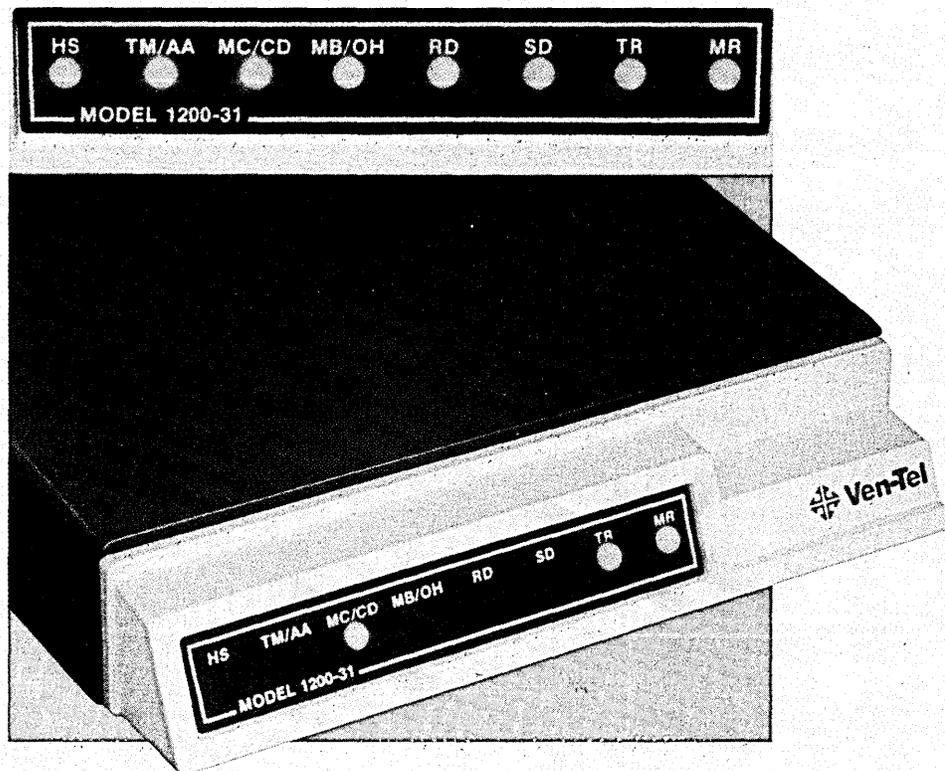
The bankers were no longer bored.

"Like some virus, invading a body and changing the DNA microcode, our electronic body has a new Black Plague, a cancer. There is an invisible presence among us today, an intruder, an unholy ghost. A serpent has been sent among us to eat of the apple of our knowledge."

"*This is not a game!* We have a presentation today. You're ready?" he asked someone offstage. An indistinct reply came, and the back screen lit up.

The first image was that of the head of a man. No one knew who he was. "Meet King Mellon."

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## Was Von Alberich, known to favor a regulated world system, setting them up?

The second was of a false-color Landsat image of an almost circular island. "This is the island of Malaputa as it looked three years ago. It is in the Indian Ocean—there's India, and Madagascar. You will not find Malaputa in your atlases. You may, however, find its presence, concealed under many names, in your portfolios. If you tried to buy this image from the EROS center in South Dakota, you would succeed.

"Malaputa is the ultimate free-trade zone, the final offshore platform, the last lawless frontier, haven for the wildest of wildcat bankers. Mr. Mellon has anointed himself King of Malaputa. It also may be said that Mellon *is* Malaputa."

That brought some murmurs, and a clear voice asking, "What the hell is he talking about?" One of the bankers had forgotten to turn his microphone off.

The third image was a spreadsheet whose numbers kept changing so fast that no one could really follow the figures. A frozen frame showed the bottom line, and

produced a gasp from the audience. A \$120 billion deficit! "This is Malaputa's debt as of half an hour ago."

Another image. Malaputa had grown and was occupying a good part of the Indian Ocean. "This was the island's position as of 1984."

"What position?" demanded one of the players.

"The presentation isn't finished. A little patience," the director of the BIS said. "We have a guest speaker who will brief us further: Mr. Macey from the U.S. Central Intelligence Agency. He joins us via satellite, to give us a little background on this King of Malaputa, Mr. Mellon the First—and let us hope the Last."

The head of a man appeared on the screen behind the director of the BIS. The man was in his fifties, blandly good looking, with one of those intelligence operative's faces that is hard to remember. His eyes were turned downward and he seemed to be reading from a paper, or courting anonymity.

"The information I'm about to give you," he began, "is, of course, highly confidential. It's been collated from a variety of agencies around the world: Interpol, FBI, Deuxieme Bureau, NSA, British Signal Intelligence, CIA . . . ." He paused. "KGB . . . ."

There was an outraged murmur.

"We would like to acknowledge the cooperation of the Union of Soviet Socialist Republics and the People's Republic of China in this emergency situation.

"Delbert Mellon is 42 years old. He's six feet, one inch tall, has black hair. Mellon has a doctorate in philosophy from the University of Texas, specializing in symbolic logic and semiotics.

"Instead of becoming an academic, Mellon went into the Foreign Service and became a low-level intelligence agent, doing economic analysis. His task was to investigate and evaluate the delicate and troublesome offshore banking question from a diplomatic perspective. . . ."

### OFFSHORE BANKING NOT GAMED

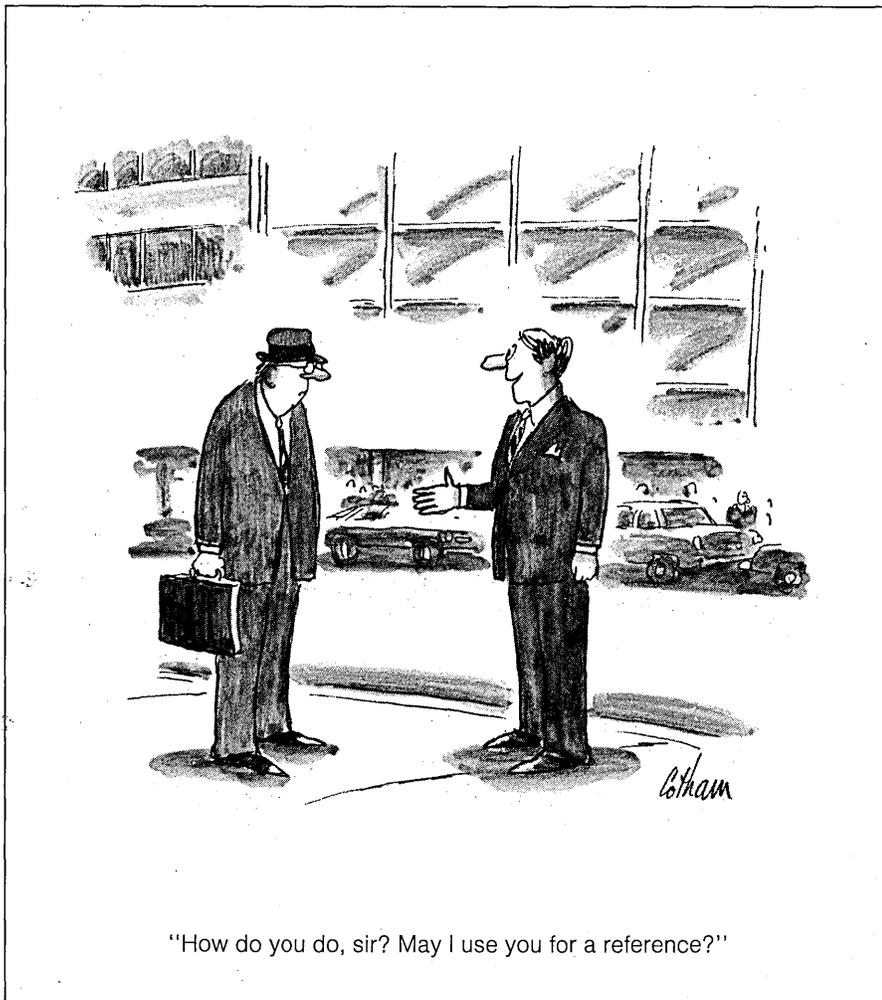
More murmurs. Offshore banking and flight capital were not gamed. Who knew how much money passed through these centers? And after all, some of the players had their own money to consider. Was Von Alberich, known to favor a regulated world system, setting them up?

"He was fairly promising. How promising we didn't realize. Mellon might have risen to be a high-ranking Foreign Service officer, even an ambassador, but one day, in 1980, he was invited to play in the twice-yearly political component of your game, which, as you know, is called the Game of the Four Corners. We're assuming that his participation gave him strange and interesting ideas.

"Playing the game Mellon learned that false information could count as real, if people believed in it. He also seemed to understand that at a deep level, machine code could represent any discipline, all knowledge. Simulations of bodies, the cosmos, bank statements, and real estate become the same. Everything converts to everything else. No need to tell you gentlemen."

Some of the bankers had participated in the political game. The results of the Game of the Four Corners created interesting nonbank risks and constraints every banker had to be aware of.

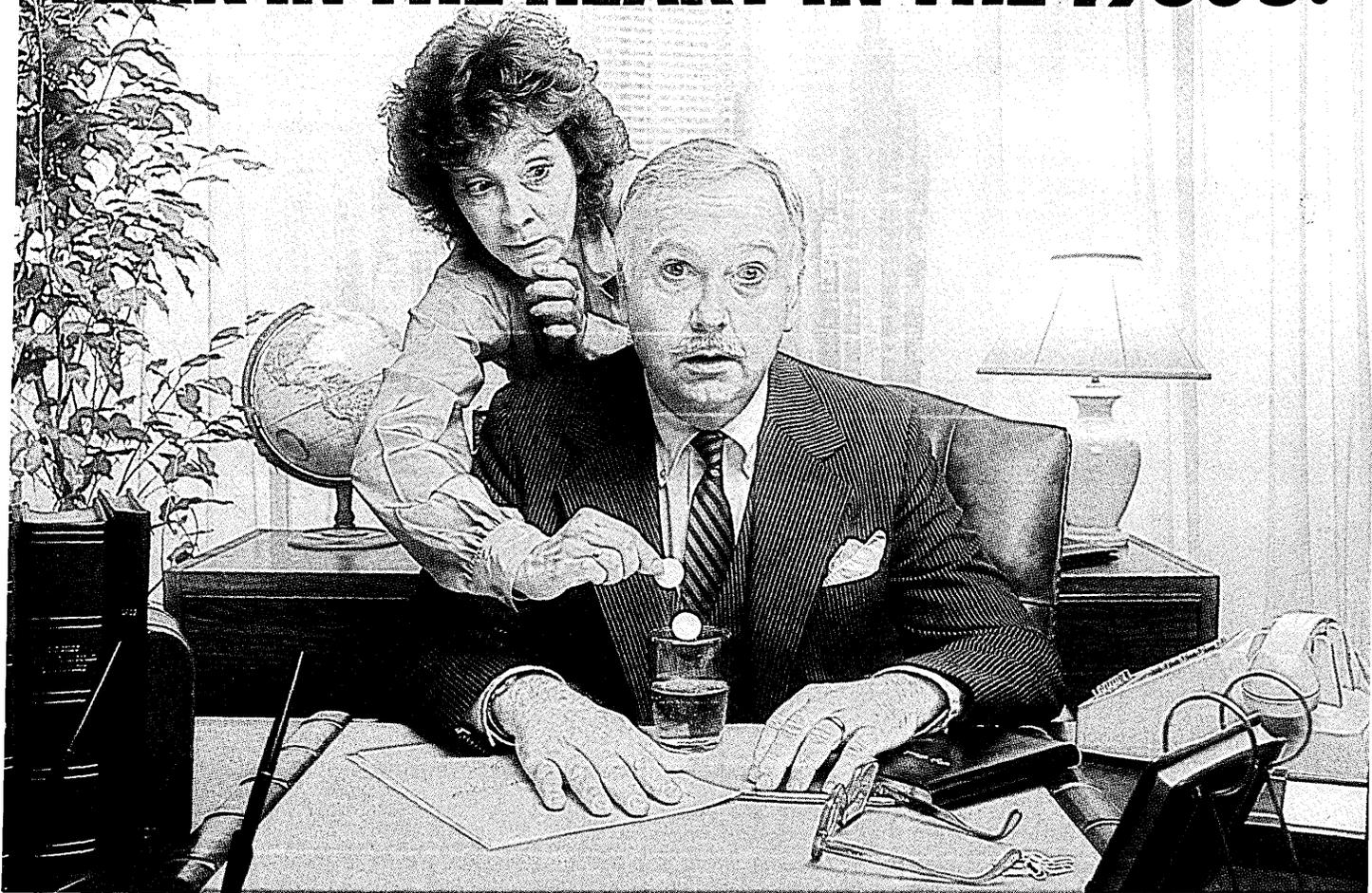
"Mellon quit the service and went to work for a small investment bank in New York. What happened next we're not sure; we don't know what was on his mind, or exactly what he did. But I can offer you a reconstruction.



"How do you do, sir? May I use you for a reference?"

CARTOON BY FRANK COTHAM

# FOUR LITTLE WORDS THAT STRIKE FEAR IN THE HEART IN THE 1980'S.



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PRICE PERFORMANCE	\$ 3,571	\$ 7,079	\$ 6,840	\$ 5,999

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\*Computerworld, August 20, 1984

All systems are comparably configured with identical amounts of memory, disk space, and communication lines. But, only the Stratus price includes fault tolerance.

redundancy is in expensive software, this is true. But Stratus has hardware-based fault tolerance that takes advantage of the extraordinary advances in chip technology. The result - price drops. The fact of the matter is, our hardware redundancy adds a mere fraction to our cost, and absolutely nothing to your purchase price. What's more, in overall price/performance comparisons against the top computer names, including IBM, DEC, and Hewlett Packard, Stratus was at the front of the pack, despite the fact that it included fault tolerance, while the others didn't.

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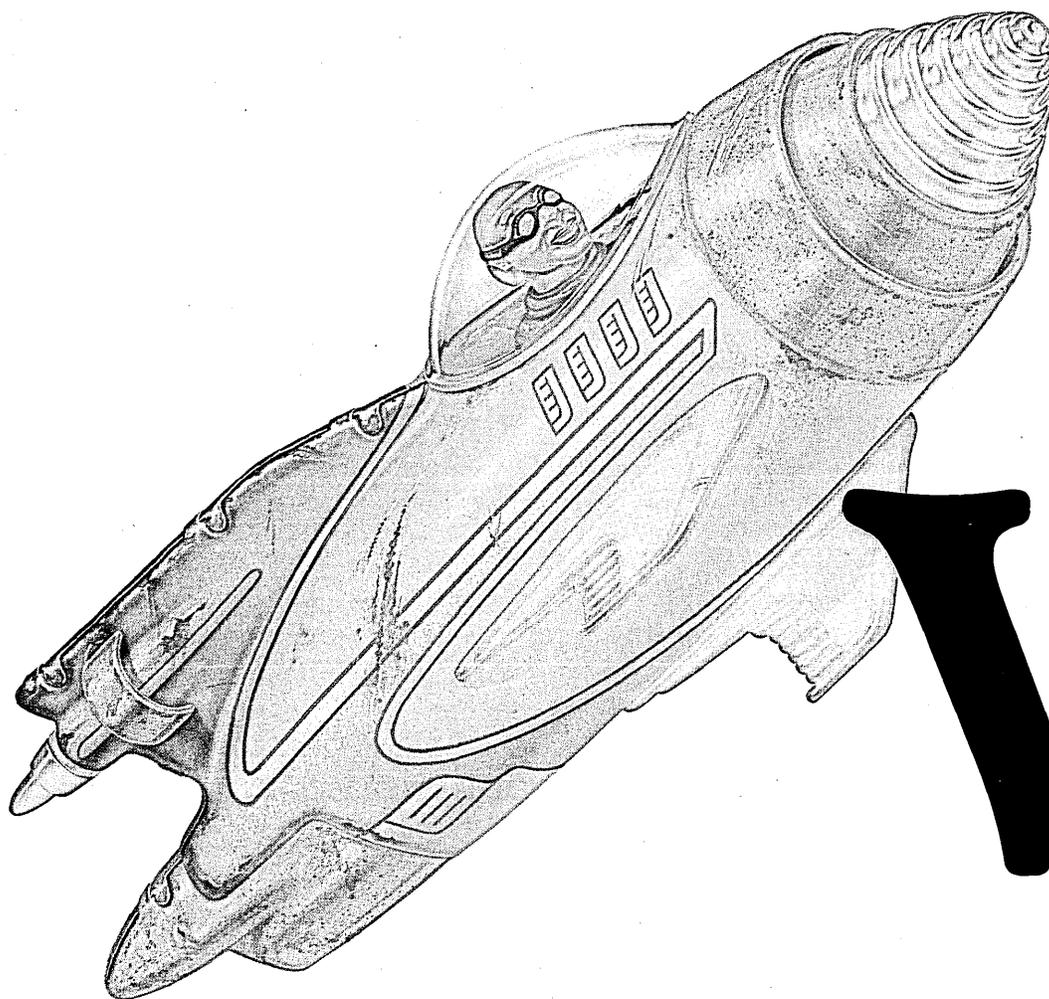
Considering its showing in overall price/performance comparisons against the most successful computers, Stratus must be considered. And when you take into account the added

efficiency and security of fault tolerance, and the fact that it is the world's most powerful fault tolerant transaction processing computer, Stratus truly becomes impossible to ignore. In the 1980's Stratus simply is the right computer, at the right price. For information, contact your local Stratus sales office, or call Keith Johnson in Massachusetts at (617) 460-2188, or toll-free at 1-800-255-1515.

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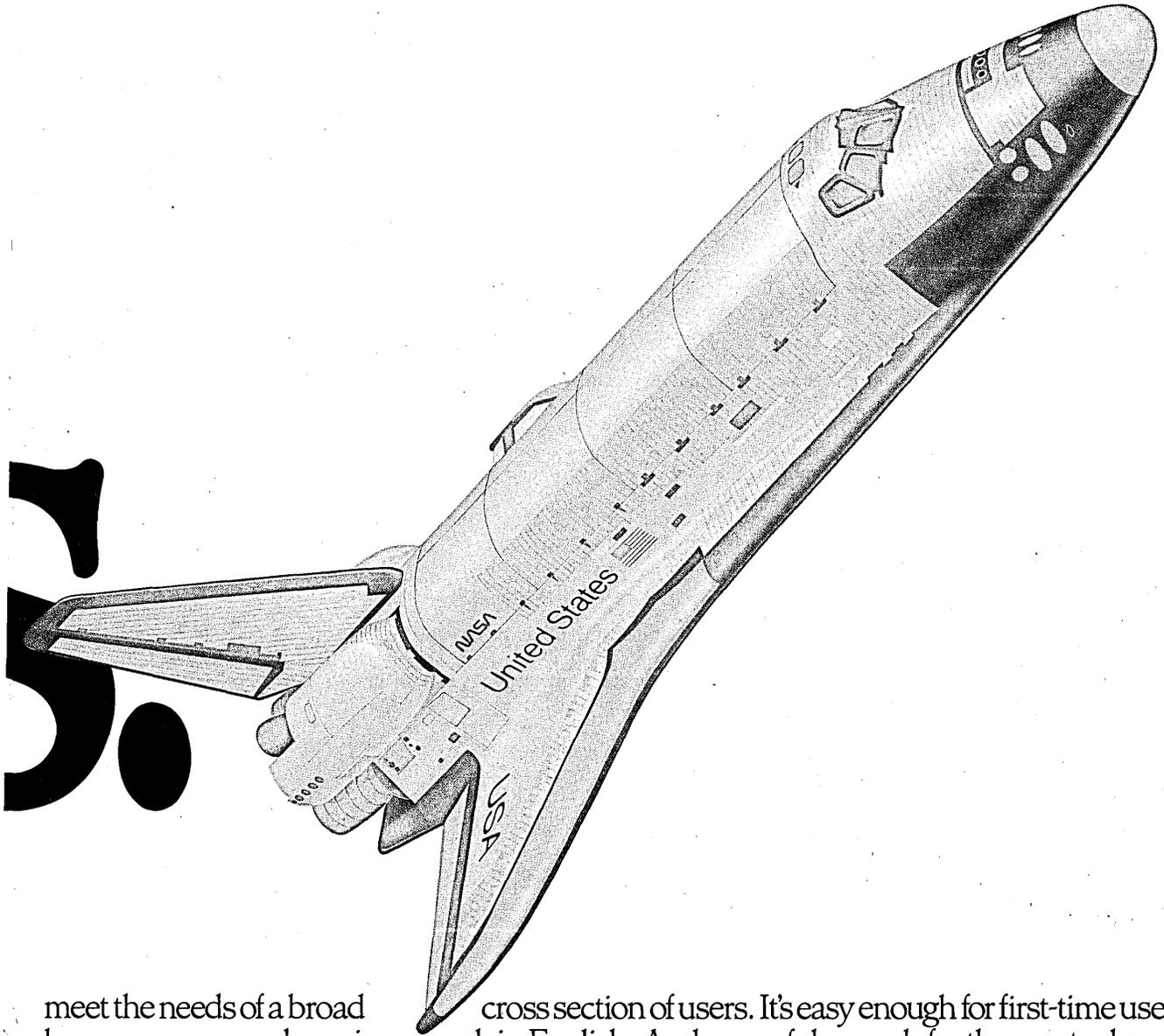
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## Mellon sought safety in debt, believing that if he could acquire enough he would be safe.

"Mellon began to dream two dreams. The first was the perfect offshore facility, the ultimate free-trade zone. Not offshore in the usual sense, on, let us say, an island in the Caribbean. No; Mellon asked himself, 'Why must a financial center be in a place?' He conceived of a facilitation, a financial entity that is pure information in constant motion, one that never comes to earth. The second dream, which was integral to the first, was to penetrate various financial networks and use them as an insider."

"We think he tried to sell his concepts to organized crime. The trouble was that his ideas were too advanced, too abstract. These people are still bound to earth. They carry suitcases full of money. Mellon needed something to show. He found a man named Milton Bimstein, a man who, as far as we can tell, is a kind of information hustler, an ex-poet, a futurist."

A picture appeared. Bimstein was unruly looking, bearded; he wore glasses, a green jumpsuit, and a cap with the word cat on it.

"Bimstein ran a small simulations and consulting company called DBM, for Digitized Byzantine Mosaics. He had contacts in the computer underground, the world of hackers, penetrators, freaks, password thieves, planters of Trojan horses. Among their number were some very sophisticated programmers—people who know their way around many networks as if they were suburban backyards. Bimstein had a different agenda from Mellon's."

Mr. Macey went through a compendium of Mellon's moves. How, after Bimstein had placed the simulation of Malaputa in the EROS files, Mellon bought copies of the island's image and used it to raise money. How the organized crime people, always on the lookout for the perfect laundry, believed they had found it in the Central Bank of Malaputa. How Mellon created a maze of holding companies, trading firms, joint ventures, consortia, all of them apparently based in real places but ultimately dependent upon Malaputian charters seen only by a few data entry clerks.

### MISSION: HACK INTO NETWORKS

Mellon bought equipment—VAXs, IBM mainframes, a Cray—and situated it in a dusty town in Kansas, Josephson's Junction. The complex was staffed by this underground riffraff, this detritus of renegade programmers, communications specialists—even, I regret to say, a few ex-government intelligence employees. The pay was good but the enticement was even better. We all know that the freaks seek recognition of their genius.

They were persuaded that the NSA had been interdicted by the Soviets, and that the Russian electromoles were using the NSA to destabilize the West's financial networks. The mission of the pseudo-NSA staff was to hack its way into our complex, build up a vast library of access codes, and hunt for signs of the Soviets' work. They insinuated their way into such networks as SWIFT, Fedwire, Euronet, the telex complexes, Intelsat, Citicorp's system, the Bank of England, and many others.

"By this time, Mellon had attracted a great deal of money; you would be surprised at the names of some of the people who invested in his schemes. He traded currency, commodities, everything imaginable. He invented wild new instruments. Mellon was moderately successful, but the scam remained essentially a pyramid scheme, and couldn't continue forever. . .

"Bimstein knew this. He also thought he had a solution to the problem, and that the solution would give him power over Mellon. So he secretly started work on the most daring of all these schemes: the perfect automated account, a wise and prescient self-trading portfolio. He put his pseudo-NSA operatives to work on the project.

"Now, the time when all markets—stocks, bonds, futures, commodities, real estate, indices, options, insurance, CMAS, time deposits, money markets, treasuries, currencies—will be linked up hasn't come yet. Bimstein had a problem. How could the portfolio trade if it came across barriers? You have to identify yourself to the institution you do business with. A *human* initiates transactions.

"So Bimstein had his people create intrusive devices—to penetrate other machines, to alter and destroy other programs. Since some financial establishments now accept data instead of actual currency or certificates, Bimstein could move data that were both funds and instructions. What's more, all the verification and paperwork could be done automatically. His programs worked their way from complex to complex, altering them as they traveled. But the trading programs had bugs. Mellon began to lose money at a greater rate. Strange glitches and crashes began to appear. Bimstein had to tell Mellon what he was doing.

"Bimstein disappeared from the face of the earth.

"Now the Malaputa complex faced imminent collapse, which led Mellon to attempt his boldest gambit yet. He sought safety in debt, believing that if he could acquire enough he would be safe. For the really big debtor metamorphoses into a

partner! Therefore it was 'discovered' that Malaputa, which had grown enormously, and was almost a continent, had valuable minerals. Minerals? Mellon had the Landsat photos to prove it, and he borrowed development funds to build an infrastructure. Because Malaputa possessed a viable bank, did business all over the world, paid its interest on time, made loans, had a track record, Mellon could borrow in Hong Kong, Tokyo, Moscow, New York—wherever he wished.

"Still, the day of reckoning was to come, for the penetrative programs that Bimstein had set loose couldn't be stopped. I should say, can't be stopped. They have mutated out of control, and no one knows what they are, where they are, or how they function. . . ."

There was a long pause after the presentation. The image of Macey faded from the big screen.

### ANARCHY, CHAOS AHEAD

Von Alberich spoke into this cathedral hush. "It would take auditors, programmers, and engineers a hundred years to straighten things out—if the situation were stable. We face a crisis of confidence, anarchy, destruction, a black hole, an interregnum that will last much longer than the Middle Ages." Von Alberich intoned the historic and ritual words, "What is to be done?"

Pandemonium reigned. Solutions were yelled out. Some were for getting out from under. Others were for battling this person, this Mellon, this island, this entity, this whatever it was, through the game. There were those who were for letting the free market forces work. Everything would balance out. The weak would go under. Survival of the fittest.

Some of the bankers got up and started to leave. Others followed. It became a panic. It was as if they were fleeing the room, the game itself, as if, somehow, they could be seen, overheard, spied on through the terminals by an omnipresent Mellon. Some ran as far as the sea, and stopped. There was nowhere else to go.

The sunlit air of the Mediterranean calmed them. They began to cool down and stroll, in twos, in threes, in fours, talking the situation over. Von Alberich was surrounded by a vociferous group of 10.

"Why weren't we protected? Why do we hire all these ex-spooks, anyway?"

"Shouldn't we put hunter programs to work?"

"Those measures have been implemented, but what about now?"

"What's the problem? We can always adjust the books."

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**CIRCLE 66 ON READER CARD**

## His fingers summoned up this New World, raising it from conceptual crypts.

"How long would that suffice?"

"We should never have left the gold standard," Pettacompt said.

"We need a new Bretton Woods, a new currency. We need to start from scratch..."

"Yes, but in the meantime, who's going to bear the weight of this debacle?"

"There must be a technical solution," Clitson said.

"Let me remind you: technical solutions got us into this problem in the first place. That's what comes of placing secrets in the hands of mere technocrats," Pettacompt said.

"A few years of belt tightening and it's all over," Sasagawa told them. "My people are always willing to make sacrifices..."

"We have a golden opportunity before us," Von Alberich said.

"Golden? Seems more leaden to me," Pettacompt said.

"We depose the king... Well, in fact he's dead," Von Alberich said.

"Dead?"

"Those in organized crime are notoriously short of patience. They don't restructure debt: they restructure bodies."

"Then there's no problem."

"His ghost is the problem; it's haunting the financial networks. But that, too, can be remedied. Gentlemen, I suggest that we freight the world's finances to the blessed island of Malaputa."

"What are you talking about? There is no Malaputa," Pettacompt said.

"There is now. The Central Bank of Malaputa can become the central bank of the world—free at last, free at last from national constraints. It will take time, to be sure, and persuasion, but think of the rewards! One world currency..."

Pettacompt started to object, but Von Alberich anticipated him. "And in the meantime, we, us, those of use who are

here, being in constant touch with one another, might hold things together for a few years until the solution takes..."

"More of your computer..."

"No, sir," Von Alberich said. "By telephone, by personal conferences..."

"Are you suggesting we abandon the technology, go back to primitive ways of doing business?" Clitson asked.

"No. This is, however, an opportunity to retool. A new generation of equipment, new and impenetrable standards..."

"There's always a golden lining," Portinari said.

"At the slightest sign of a break in ranks, everything will descend into chaos," Von Alberich said.

Von Alberich returned to his house overlooking Lac Lemman on Sunday. He had a good meal, talked to his wife, then retired to his office to smoke a cigar before turning in for the night.

Progress had been made. It had taken some doing but the players were finally facing it. They would rise to the occasion. Danger would bring them together, but there was much hard work to be done.

After finishing the cigar, he rose, stretched, and thought he might go to bed. But he turned and sat down at his keyboard. "Let's see how you're doing tonight, King Mellon," he murmured. He began to key. His fingers summoned up this New World, raising it from conceptual crypts.

The vast continent appeared to him in topographic relief. Malaputa. How it had grown. Growing even as he looked—eating money, eating information, eating energy.

Seated in front of the console, Von Alberich looked, as if into a mirror. He saw himself, if a spreadsheet could be said to reflect his living, shifting thoughts. A vast, thriving, amoeboid form, coruscating in color, growing, growing, ever expanding, working to fill the world's informatics system, to become it. Yes, you and me, you, myself, he thought, we'll bring them to their senses, won't we?

The old financial system had died. The new had risen from its ashes. He looked upon his work and pronounced it good. ©

Sol Yurick is a novelist living in Brooklyn, N.Y. He is the author of *The Warriors* and *Richard A.*; among other books, and is a Guggenheim Fellow. This story is adapted from his forthcoming novel, *The King of Malaputa*, which will be published by The Dial Press, Doubleday & Co., New York.



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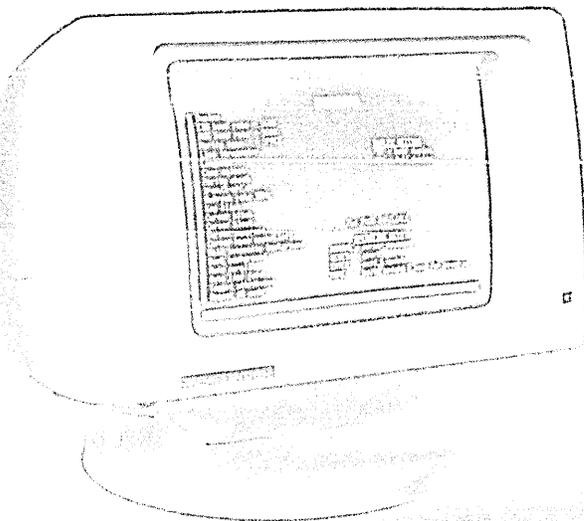
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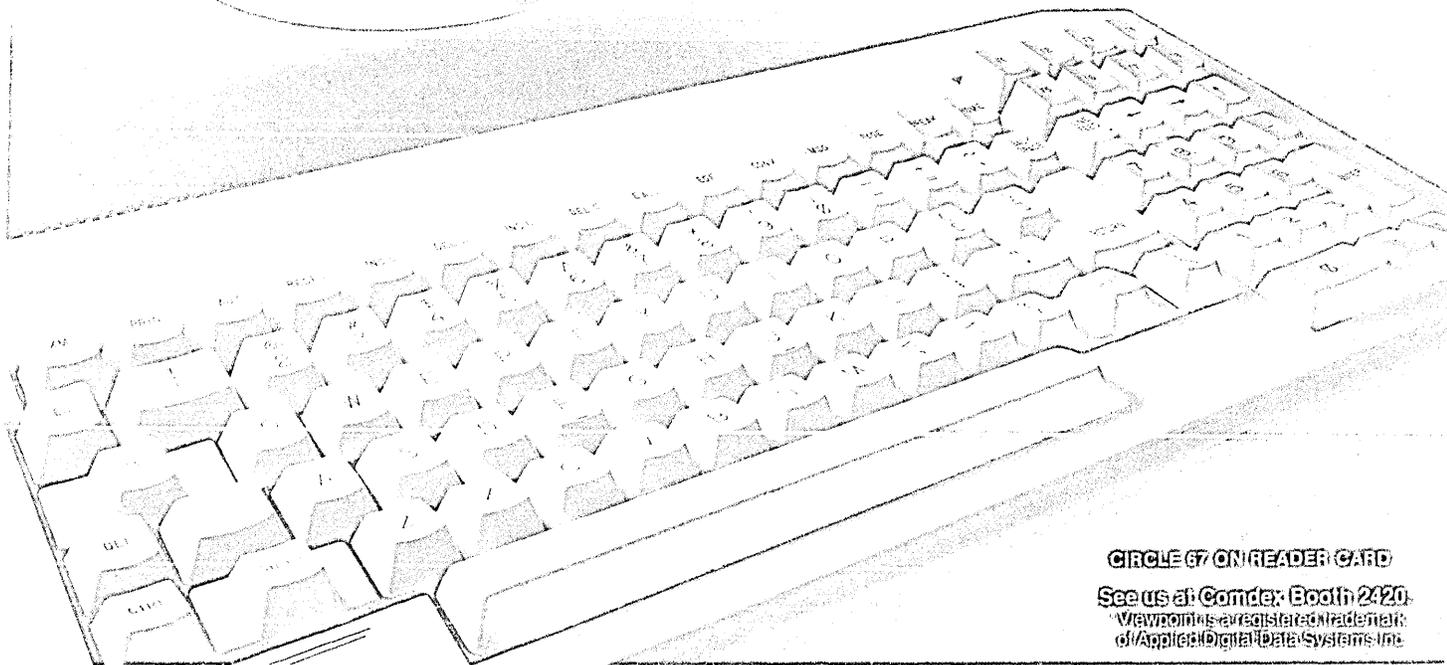


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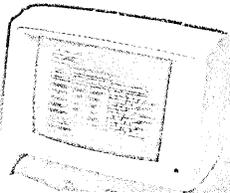
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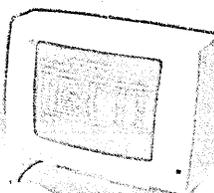
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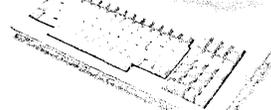
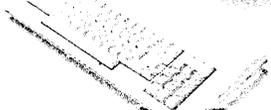
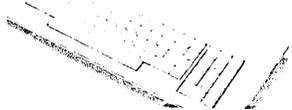
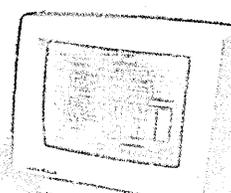
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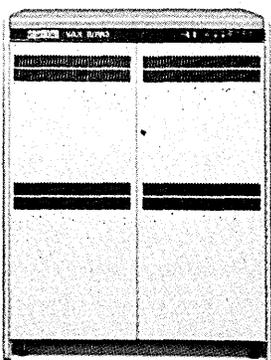
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FOR THE VAX-11/750...

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FOR THE VAX-11/780...

V-Master/780—A mass storage adapter that houses one or two SC780 disk controllers, TC7000 tape controllers

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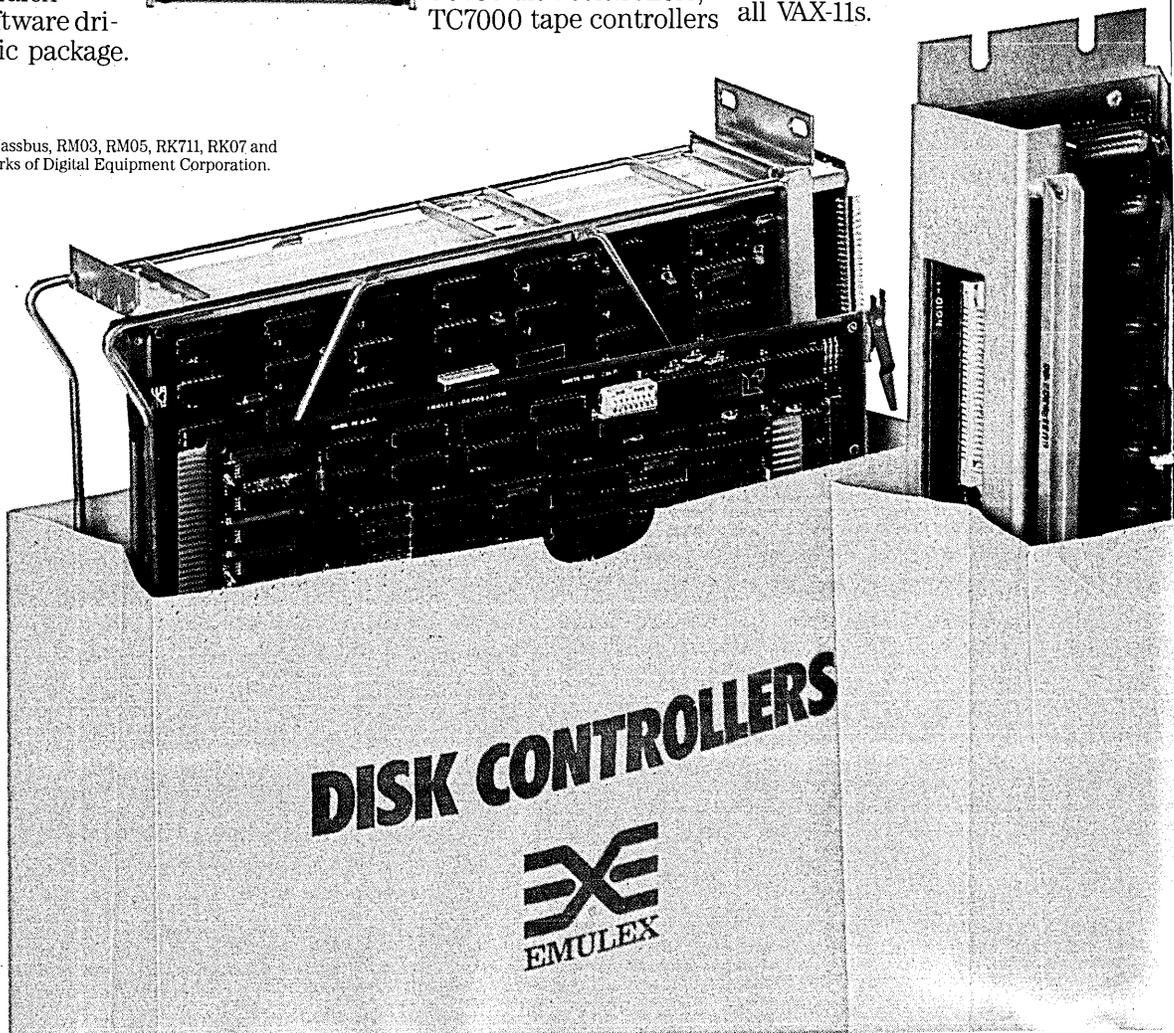
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**The genuine alternative.**



**A controversial historian of technology says scientists and engineers haven't really considered the results of their investigations and inventions.**

# IS PROGRESS WHAT IT SEEMS TO BE?

by David F. Noble

Practitioners of science and technology, in following their own Muses, have always claimed to be servants of society as a whole. Dogged pursuers of Nature's truth, they customarily renounced all politics to demonstrate their disregard for power and influence, aspiring only to advance their disciplines selflessly.

To defend their position and justify their costs, they insisted that inevitably their combined understanding and know-how would enlarge society's supply of goods and services, lessen the burden of human toil, reduce pain, increase comfort, and expand the horizons of human freedom. Thus, as an essential part of their work—their public relations, so to speak—they successfully cultivated and fostered the mythology of technological progress, the idea that all scientific and technological advance was good for society, and that it should thus be encouraged without constraint as rapidly as possible. Whatever the consequences in the short run, they preached, ultimately everyone will be a beneficiary of progress.

But upon closer examination, it becomes readily clear that scientists and engineers are not really autonomous agents of some disembodied progress at all. This posture they have assumed serves merely to insulate them and their activities from political scrutiny and to insure public support for their efforts (and, of course, to guarantee the "objective," intersubjective validity of their insights, their value-neutrality). For, in reality, they too are members of society and are moved, like everyone else, by a myriad of motivations—some large, some small, some unique to their calling, some quite ordinary and common.

They are influenced, for example, by the currents of the larger society around them and by their particular place in it—that is, by their own self-interest, as indi-

viduals and members of a community, a self-interest that inescapably reflects also the interests and concerns of their patrons. Second, they are moved by the currents within and unique to their own overlapping communities, upon which their careers rest. Central to these currents is an understanding of and enthusiasm for the latest, increasingly interrelated scientific and technological advances.

Invariably, these two sets of concerns must converge, complementing and reinforcing each other, and ultimately collapse together to chart the single course of progress. Progress, therefore, rather than being an autonomous process, must inevitably reflect at least these two interwoven concerns and enthusiasms. It is not difficult to understand why this happens—since both are the preoccupations of the same people—only precisely *how* it happens.

## SCIENCE & SOCIAL POWER

First and foremost, the very fact that scientists and engineers are in a position to learn about the properties of matter and energy and to use their knowledge for practical ends, to make decisions about the design and even the use of new technologies, indicates their close relationship to social power. Such ties to power afford them access to the social resources that make their achievements possible: capital, time, materials, and people. Thus, it is no accident that technical people are often allied so closely with the owners of capital and the agencies of the government; the connection is the necessary prerequisite of scientific and technological development, given the social relations of American capitalism; technical people strive continuously to anticipate and meet the criteria of those in power simply so that they may be able to practice their calling. It is no wonder that, in subtle and not so subtle ways, they tend to internalize and even consciously adopt the outlook of their patrons, an outlook translated into professional habit through such mechanisms as education, funding, reward structures, and peer pressure.

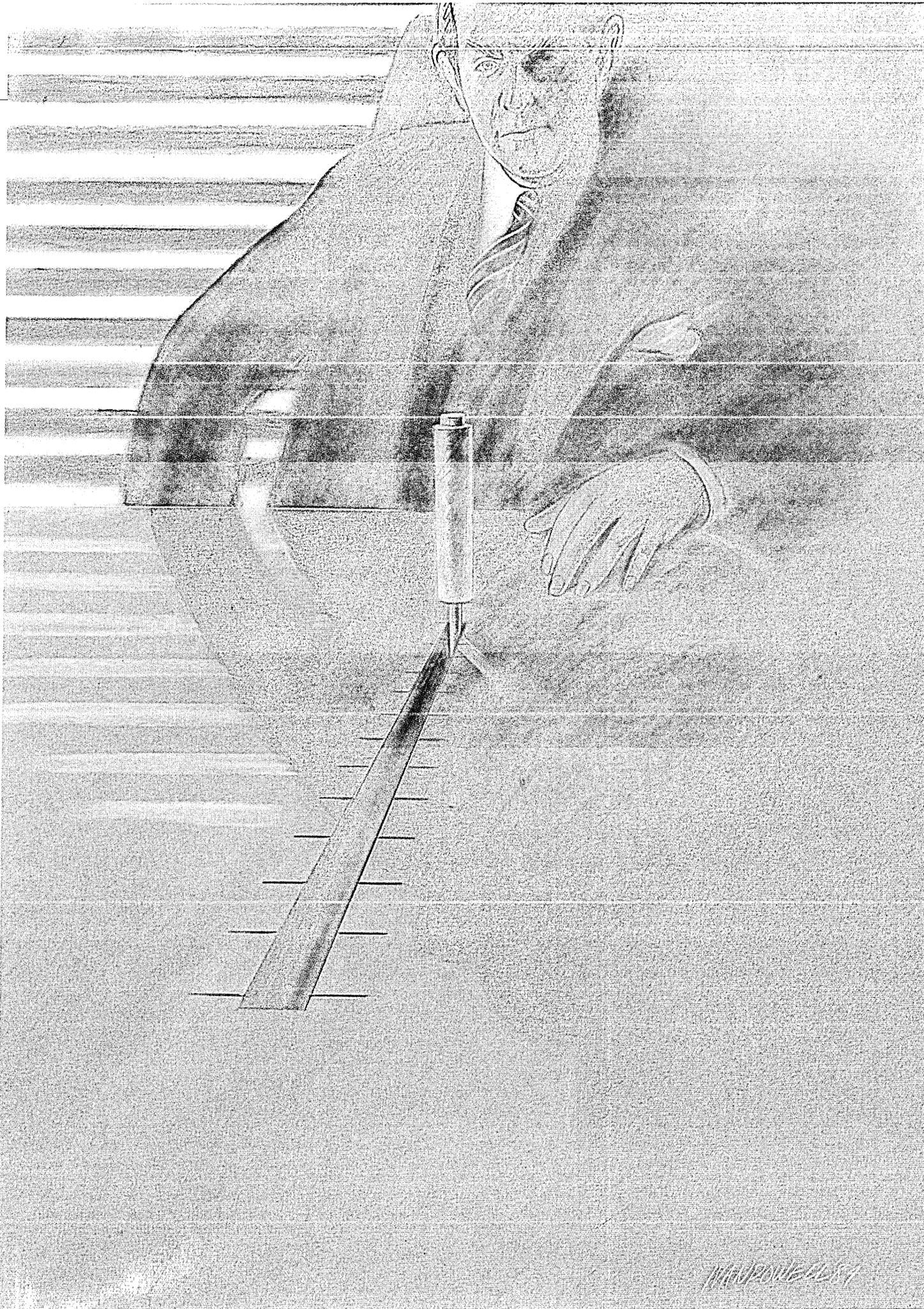
In various ways, this professional habit comes to inform technical and scientific work itself, affecting not only the lives of technical people but their imaginations as well, their notion of what is possible. For example, if an engineer were to come up with a design for a new technical system that required for its optimal functioning considerable control over the behavior of his fellow engineers in the laboratory, the design would perhaps be dismissed as ridiculous, however elegant and up-to-date its components. But if the same engineer created the same system for an industrial manager or the Air Force and required, for its successful functioning, control over the behavior of industrial workers or soldiers (or even engineers in their employ), the design might be deemed viable, even downright ingenious.

The difference between the two situations is the power of the manager and the military to coerce workers and soldiers (and engineers) compared with the engineer's own lack of power to coerce his fellows.

The power relations of society, and the position of the designer within them, define to a considerable extent what is technically possible. Most industrial and military systems are designed with the expectation that such power will be forthcoming, and this social power thus underlies the technical person's own power as a designer of "practical" systems. Technical people rely upon their ties with power because it is the access to that power, with its huge resources, that allows them to dream, the assumption of that power that encourages them to dream in an expansive fashion, and the reality of that power that brings their dreams to life.

On the whole, technical people come to share the perspective of those who wield power rather than those over whom the power is wielded, with managers rather than labor, with officers rather than soldiers. If for no other reason, this happens simply because technical people do their work almost exclusively with the former rather than with the latter, with officers

Excerpted from *Forces of Production: A Social History of Industrial Automation*, by David F. Noble, published by Alfred A. Knopf, New York, 1984. Reprinted by permission of the publisher.



MANPOWER/457

# The technical person does not understand why his best designs tend invariably to satisfy the requirements of those in power.

rather than soldiers. They have very little, if any, contact with the others, and typically remain woefully ignorant of them.

Again, this is not a matter of choice, but an institutionalized tendency, and rarely does the technical person understand that his professional wariness of uncertainty and his educated drive to concentrate control and reduce the chance for "human error" (his term for all judgment and decisions made by those without power) reflect, in part, his habit-forming relationship to power. Nor does he understand why his best designs, fashioned according to the highest standards of his discipline, tend invariably to satisfy the particular requirements of those in power (and, in so doing, to dignify them as scientific and technical necessity).

Such an institutionalized tendency has long existed but it was perhaps at no time in recent U.S. history more pronounced than during and immediately after World War II. This was the result not only of the unprecedented degree of integration at the time between the worlds of power and science but also of the unusual degree of complementarity between the seeming requirements of a new global power and the technical possibilities engendered by a powerful intellectual synthesis within science and engineering, based upon new theories of information, communication, and, most appropriately, control. The power of these ideas became coupled to the power of some people, enabling them not only to maintain that power but to enlarge it.

As already indicated, American leaders at the close of World War II stood astride a military and industrial apparatus that had become global in scale. The military command confronted enormous communication and control problems in managing the far-flung operations of armed forces now permanently deployed around the world. Preoccupied as well with the unprecedented speed and destructive power of modern weaponry, military strategists sought ways to alert themselves to enemy air attack, to guarantee a perpetual state of readiness, and to enhance the weapons in their own arsenals.

## AMERICAN COMPANIES DIVERSIFY

At the same time, U.S. corporations, taking full advantage of America's military and economic position in the world, were becoming increasingly diversified and internationalized. Their planners too were faced with a management challenge of overwhelming proportions, trying to bring these expanded operations under centralized control.

Finally, the paranoia about Russia

abroad and labor at home that seized the leaders of the new military industrial complex in the postwar years intensified what had already become a virtual obsession with the problem of control.

Partly prompted by these military and industrial problems, the technical community was simultaneously developing and refining new means of control. And the technical people's new theories and techniques not only satisfied the compulsions of military and industry planners but added similar compulsions of their own. Technical people are moved, first and foremost, by technical things, and much of what they do contains a large element of control.

Science and technology, of course, have always entailed control. Through sufficient understanding of the properties and relations of matter and energy, scientists and engineers have strived to intervene in and manipulate the processes of nature for their own ends, and to construct devices that would extend the range of human power over events. Genuinely fascinated by and caught up in the process of discovery and invention, moreover, technical people are driven by a powerful impulse to push their new gadgets to see if they will actually "work." And this impulse, propelled by enthusiasm and a will to power, is fostered by their formal logic of analysis and systematic procedures of investigation and development.

By the middle of the twentieth century, this fundamental orientation had yielded awesome results. The atom had been successfully assaulted and its energy had been turned to human, if not humane, ends. And the earnestness with which the atomic scientists and engineers committed themselves to this challenge was only partially explained by their patriotism. For they too had a stake in the outcome, to see if what they themselves called "the gadget" would actually "work"; if it did, it would validate their theories and thus prove their own power, confirm their own control.

By the middle of the twentieth century, this traditional and fundamental orientation of science and technology had become stark, at once awe inspiring and terrifying. More important perhaps, it had also become explicit and formal, elaborated theoretically and mathematically in new theories about the communication and control of information and embodied in a whole host of new devices.

Control, formerly the underlying, prereflective habit of the scientific and technical mind, had now become conscious, a new focus of attention and the basis for a new synthesis of technical understanding.

The new computer-based ideology of total control proved contagious, and it was not alone due to the seductive power of its own forceful logic. Beyond the military proper, it took hold within industry, especially within those industries tied closely with the military and the military-sponsored technical community. And here the new outlook was promoted by an army of technical enthusiasts, peddled by the vendors of war-born gadgetry, subsidized by the military in the name of performance, command, and national security, legitimized as technical necessity, and celebrated as progress.

Industry managers were themselves soon caught up in the enthusiasm associated with fashion, prestige, and patriotism as well as profitable contracts. Here too it was coupled both to the traditional belief that superior efficiency resulted from work simplification, the substitution of capital for labor, and the concentration of management control over production, and to the postwar preoccupation with controlling labor as an end in itself, in order to safeguard and extend management "rights."

The impulse behind the postwar push for automatic control was not entirely new or modern, however. In addition to the ideological, technical, economic, military, political, and psychological forces at work was a primitive human enchantment with automaticity and remote control.

## EXTENSION OF HUMAN CONTROL

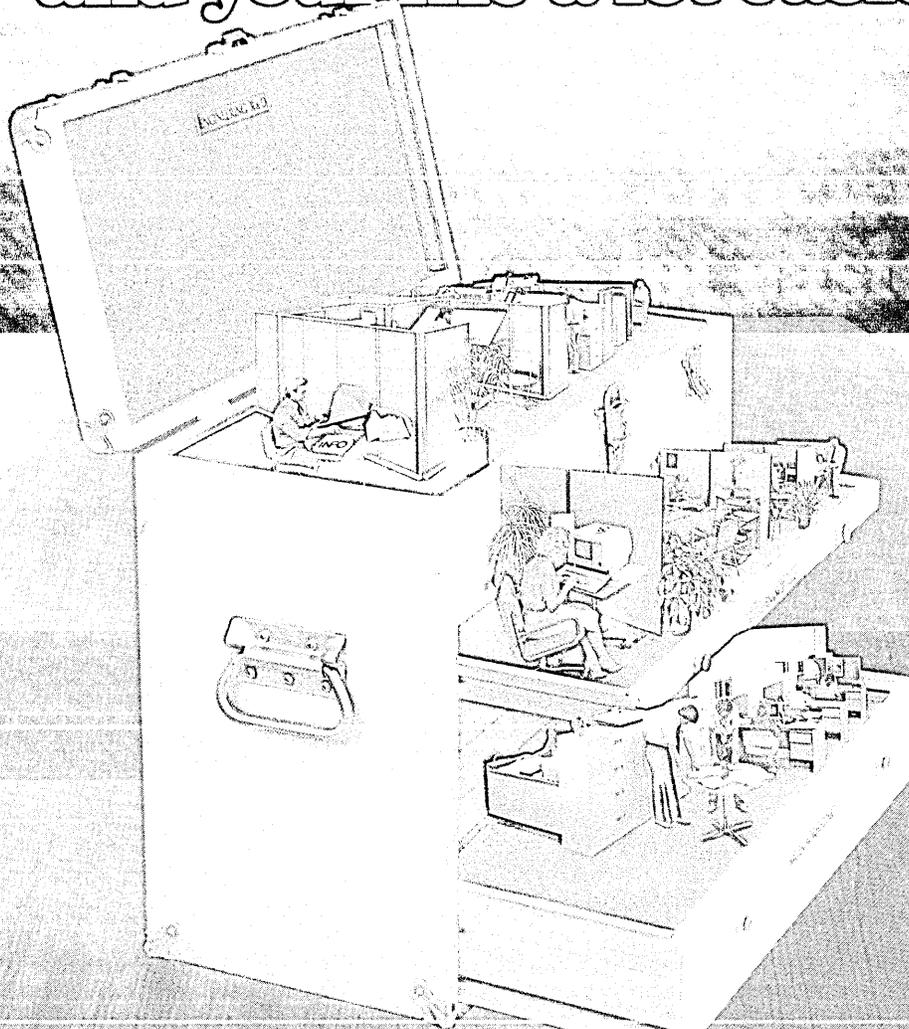
As historian Silvio Bedini has pointed out, "The first complex machines produced by man were automata, by means of which he attempted to simulate nature and domesticate natural forces." Such automata, which date back to ancient Egypt and which reached an extraordinary level of ingenuity and craftsmanship in the seventeenth century, "constituted the first step in the realization of his dream to fly through the air like a bird, swim the sea like a fish, and to become ruler of all nature." And this will to power, this godlike effort to "imitate life by mechanical means," this delight in automaticity as an extension of human control, resulted in the development of mechanical principles and devices that were subsequently used to reduce or simplify human labor.

Moreover, this ancient enchantment with automation ultimately became interwoven with the emergent logic of capitalism, which had given rise to a peculiar, new, second meaning for the word "labor."

In addition to the traditional meaning of work or toil, under capitalism the mass of people themselves also became rou-

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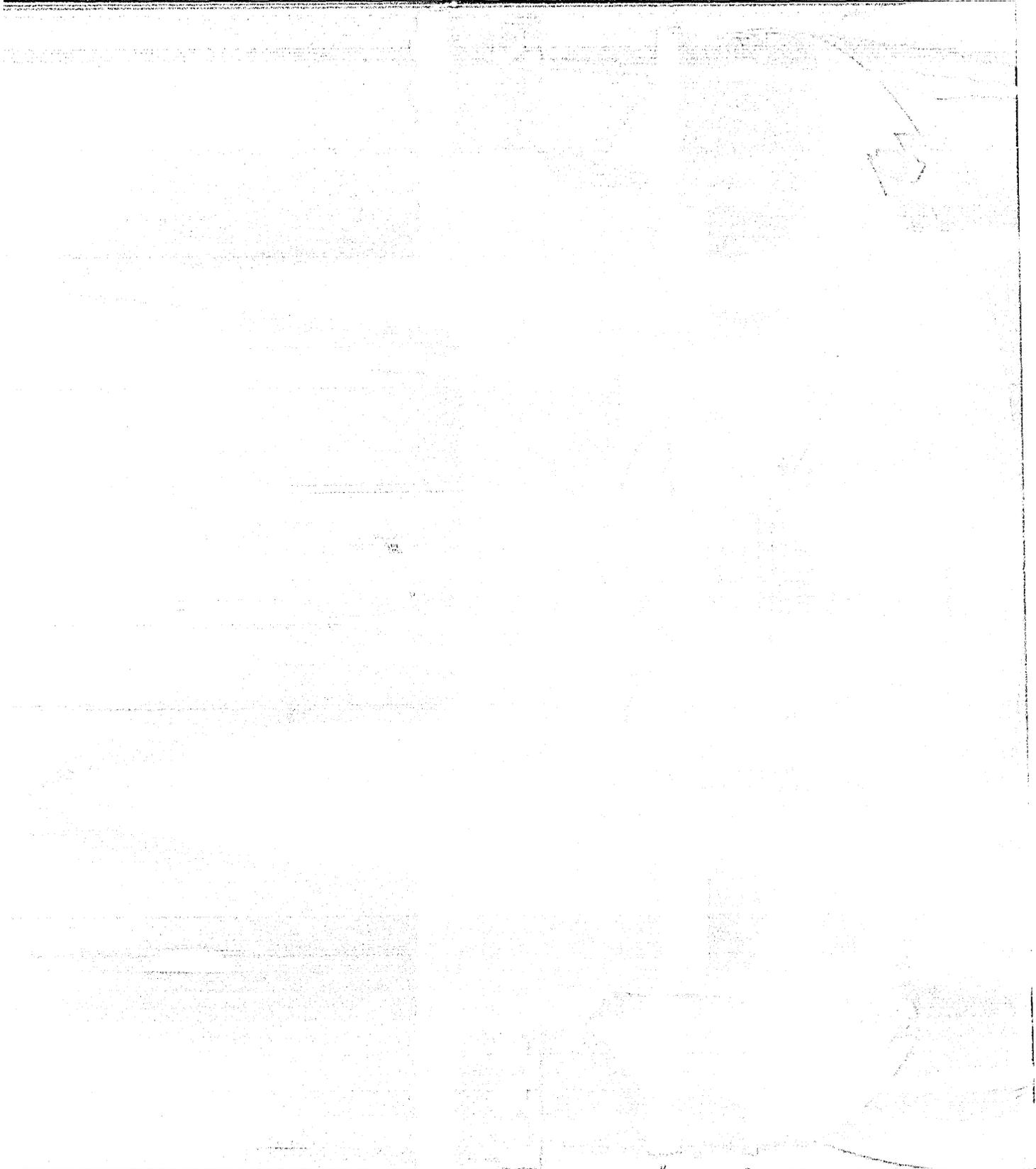
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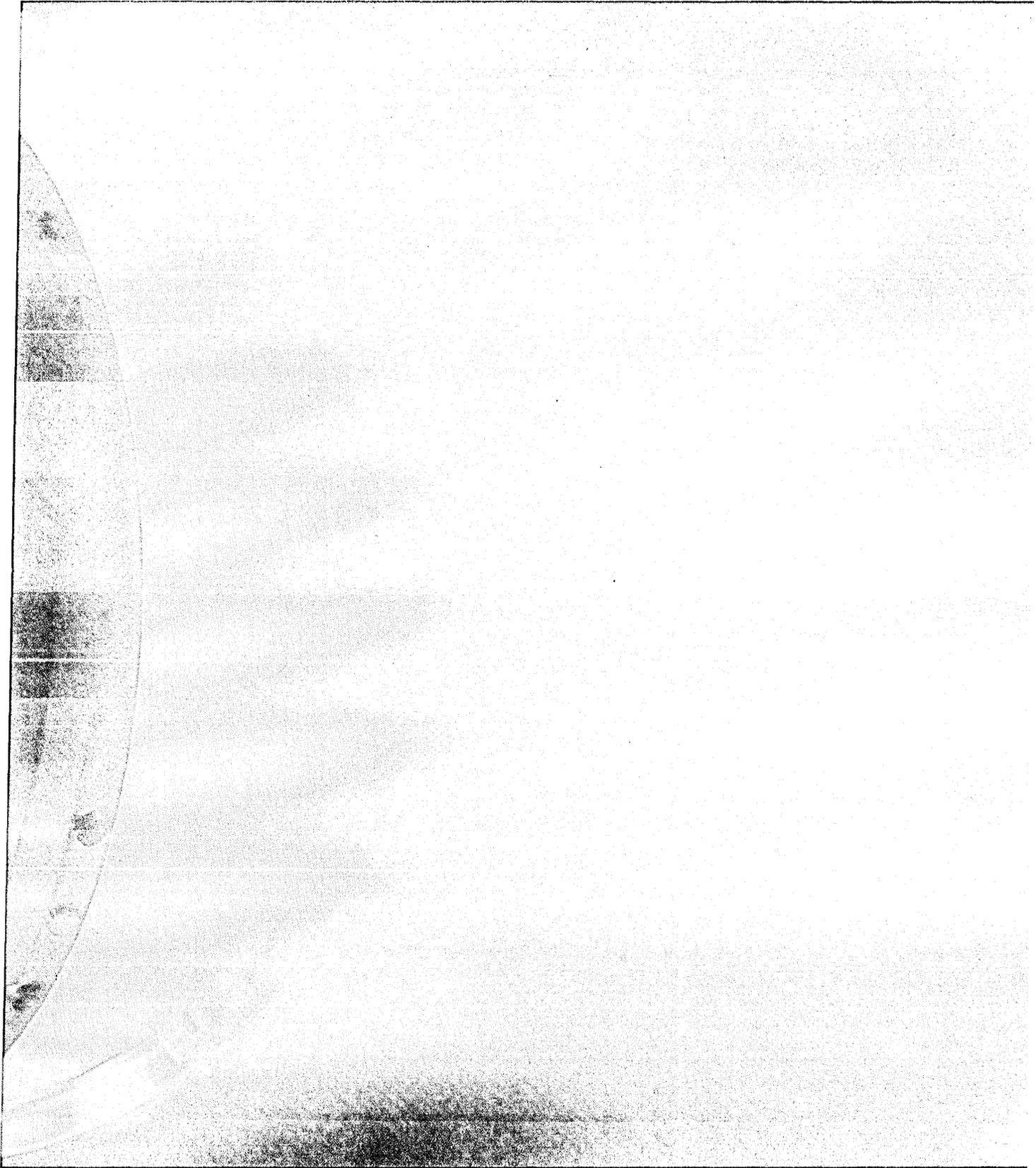
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## The capitalist mentality appropriated the primitive enchantment with automation and turned it to practical and pecuniary ends.

tinely identified as a commodity called "labor," to be priced, hired, and fired through the mechanism of the "labor market." As a result of this double meaning, and the ideological confusion it generated, the reduction of labor through so-called labor-saving devices came to mean not only the lessening of drudgery for working people (a traditional and noble human impulse to liberate, uplift, and dignify human beings), but also the elimination of working people themselves by their employers—for narrow economic ends but still in the name of improving the human condition.

In short, once working people came to be seen as mere factors of production rather than as constituent members of society in their own right, progress could proceed in spite of their sacrifices and in opposition to their legitimate needs and protests: a morally blind yet socially sanctioned compulsion to reduce human labor by eliminating working people's means of livelihood and their social identity.

Thus did the capitalist mentality appropriate the primitive enchantment with automation and turn it to practical and pecuniary ends, where it then fueled fantasies not of automatic birds and musicians but of automatic factories.

Long a staple of utopian thinking, such fantasies of the automatic factory were lent a measure of respectability and authority by such early industrial theorists as Charles Babbage and Andrew Ure who, in their treatises *On the Economy of Machinery and Manufacturers* (1825) and *The Philosophy of Manufacturers* (1830), respectively, described the factory as the physical embodiment of mathematical principles and as a giant, self-acting machine. Thus, primitive enchantment and capitalist greed assumed the severely logical appearance of technical necessity.

A century later, as the postwar ideology of total control gained hegemony, these same compulsions, now clothed in scientific garb, assumed the appearance of rationality itself. And in the name of that rationality, informed by self-interest and buttressed not only by the accumulations of wealth and authority but also by an arsenal of automatic contrivances, the rulers of American industry undertook to extend their own power and control with a technically long-delayed rush to the automatic factory.

The automatic factory began to take shape in reality first in the continuous-process industries, in the shift away from traditional batch methods. Here the new automatic measuring, monitoring, and control devices made their first dramatic appearance, as a substitute for human

oversight and manual operations.

Automating manufacturing processes entails rendering automatic not only each production operation but also the transfer of product-in-process from one work station to another. For this rather straightforward reason, integrated automatic control of an industrial process first appeared in the continuous-process industries, which were undergoing a shift from discrete batch to continuous-flow operations.

### SYSTEM CONTROLS EMERGE

Automatic industrial control mechanisms for measuring and adjusting such variables as temperature, pressure, and flow rates during production had long been used in the batch processes of the tobacco, canning, dyestuff, rubber, and paper industries, and were based upon the fluid-tube diaphragm motor valve and hydraulic, pneumatic, and later electromechanical devices. The development of automatic industrial controls, from the 1920s on, reflected the shift to continuous-process production in many industries and the emergence of systems control methods in the electrical power field.

All continuous-process production demanded unprecedented devices—sensors and effectors (actuators)—for carefully monitoring and adjusting operations too complex for complete human oversight and manual control. These devices were constantly being refined by such firms as Brown Instrument, Taylor Instrument, and Foxboro.

The dairy industry was one of the first to go into continuous-process production. The industry had developed ways of carefully controlling the temperature of its product in process, to comply with the federal pasteurization laws introduced in the 1920s. In the next decade, following the invention of the "flash" technique for quickly heating raw milk to the required 160°F and rapidly cooling it down again, the industry developed sophisticated continuous-flow controls that would automatically divert and recycle all milk that had not reached the required temperature.

In 1925, the Carbide and Carbon Chemicals Company began experiments with the fractionation of natural gas to produce synthetic chemicals such as ethyl alcohol and ethylene glycol (Prestone). Since they were working with gases, which were more volatile than liquid chemicals, they moved into rapid continuous-flow-process production, and necessarily developed automatic controls to monitor and control the operations. The rest of the chemical industry quickly followed suit.

The petroleum refineries shifted from batch cracking to continuous cracking in gas-fired furnaces, and later continuous-catalytic cracking, and thus developed automatic control systems as well. In the electrical power industry, which was a kind of continuous-flow operation itself, electric network analysis gave rise to mathematical modeling of network dynamics and other complex systems, in the work of pioneers like General Electric's Gabriel Kron. By the 1930s, electric network theory, with its loop-and-node and window-mesh equations, had begun to give way to electronics, and the state-space approach to analyzing and optimizing complex systems—the basis for analysis and control in communication and servomechanisms.

Three wartime projects contributed tremendously to the development of industrial controls: synthetic rubber involved the production of butadiene from alcohol by means of "pure product fractionation" and required the closest kind of temperature control; the volume production of high octane aviation gasoline (between 1940 and 1945, production increased from 30,000 barrels a day to nearly 500,000 barrels a day); and the atomic bomb project, with its vast gaseous diffusion plants and totally new standards of accuracy, which required eleven miles of control panels with 10,000 instruments per mile.

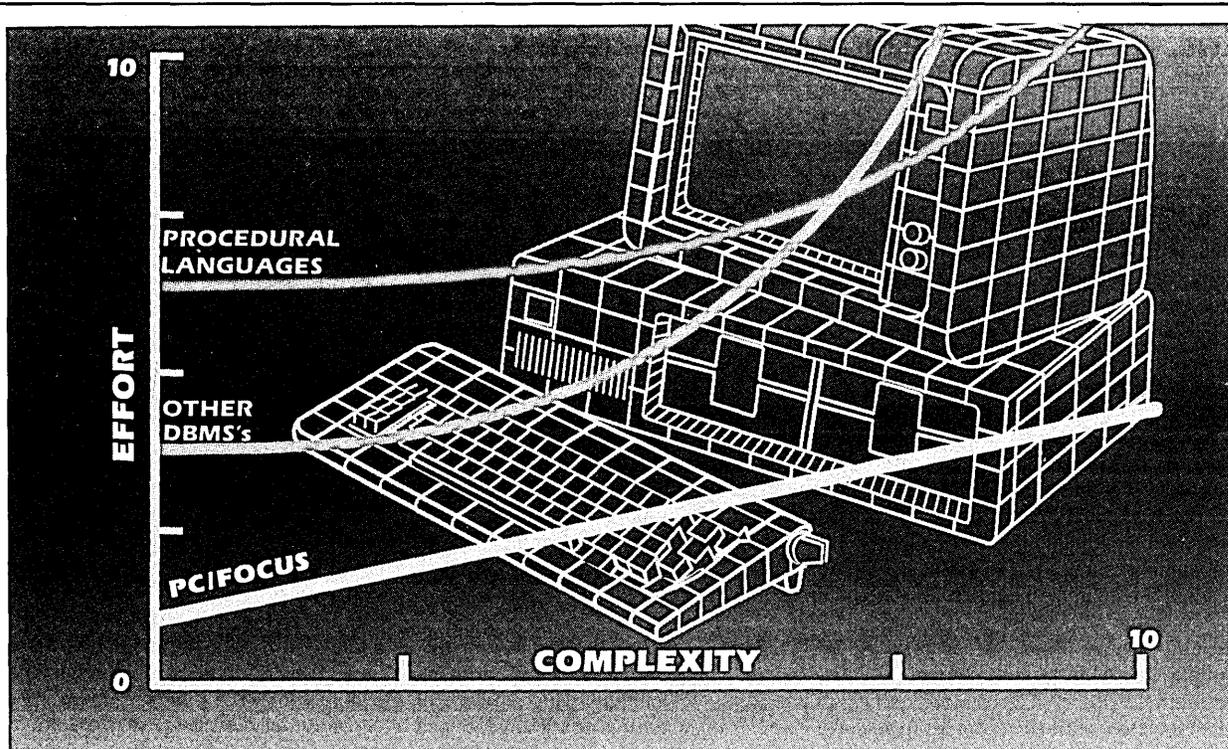
Among the key wartime advances in industrial controls were quicker, more reliable electronic monitoring devices, electromechanical servo systems for moving valves to make rapid adjustments, and procedures for designing industrial processes "around the instruments."

In 1946, *Fortune* waxed eloquent about the vast array of new devices and the promise of automatic control. The magazine pointed out, however, that there was a darker side to these exciting developments, the danger of a chain reaction failure due to a single error, and control panels that "mystify their own operators, balk even the understanding of engineers, and absolutely terrify the layman. . . . What really goes on there to produce a 24-hour record of temperature or pressure may never appear in popular print," *Fortune* concluded, warning of the twin dangers of mystification and alienation, and also of workers now free to "argue politics" and "join unions."

### POSTWAR CADRE OF ENGINEERS

Industrial control development gave rise to a cadre of experienced and enthusiastic engineers who, at war's end, sought new applications for their wares, new ways to ply their trade. Again, the military proved the largest and

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Also, industrial control know-how penetrated the foods, textiles, steel, printing, automobile, as well as electric, rubber, chemicals, and chemical process industries. By the 1950s, the first analog computer-controlled industrial operations appeared in the electrical power and petroleum refinery industries. Computers were used to monitor performance, log data, and instruct operators. At Texaco's Port Arthur refinery, production came under full digital computer control in 1959. A year later, Monsanto went to digital computer control of its Louisiana ammonia plant, as did B.F. Goodrich with its vinyl plastic facility in Calvert, Ky. Soon, steel rolling mills, blast furnaces, and various chemical processing plants around the country came under full computer control.

The experience of the petroleum refineries and chemical processing plants is instructive as to the social consequences of large-scale continuous-process industrial automation. The introduction of the new control technology in the process industries was given strong impetus, between 1949 and 1951, by IBM's promotional Industrial Computation Seminar campaign. Small analog computers were installed in a number of plants almost immediately thereafter.

In 1955, the first application of large-scale analog computers to a process problem—in this case, chemical distillation—was carried out, significantly, under the auspices of the Air Force at Wright Field, Ohio. (A few years later, containerization, the mechanization of dockwork, was similarly spurred by the military, this time by the Navy.) During the late 1950s, digital computers were introduced, beginning with the aircraft industry.

In March 1959, the first digital computer designed specifically for plant process control, by TRW, was installed at the Texaco Port Arthur refinery. By 1964, there were some 100 digital computers either in operation or on order in the petroleum refining industry; they were used to control the industrial processes in the production of ammonia, ethylene, synthetic rubber, and acrylonitrile, as well as hydrocarbon oxidation operations.

The computers were first used in an open-loop control system. Linked to measuring devices and sensors throughout the plant, the computers monitored all processes, performed calculations, and printed out "operator guides." The operators who followed these guides, not the computers, actually made the indicated adjustments in plant operations.

By the 1960s, refineries began to move into closed-loop feedback control systems. Here the computers were linked not only to sensors and measuring instrumentation but also to servocontrol valves, and they were used to monitor operations, perform calculations, and make the necessary adjustments automatically. By the end of the 1960s, a "modern" plant was one in which 70% or 80% of operations had come under such closed-loop control. But such systems proved inflexible, hard to adapt to changes in the plant. Thus, in the 1970s, plants were specifically designed for better application of computer control, carrying one step further the wartime innovation of designing uranium enrichment plants "around the instruments."

## THE DRIVE BEHIND ALL THIS

The drive behind all this automation was complex, encompassing a range of economic, technical, and political motives. A major ingredient was the enthusiasm of the systems engineer, reflecting human enchantment with automaticity and remote control. "Digital Computers—Key to Tomorrow's Push-button Refinery," ran a headline in the *Oil and Gas Journal* in the heady days of 1959. By 1964, in the wake of a rush toward computer control, the same trade journal, surveying the recent history of automation in the industry, projected an even bolder future. From control of a single unit, there had evolved "horizontal control" of entire refineries. "Finally, there will be control of more than one refinery by a central computer," the writers proclaimed. Two process engineers, writing in *Hydrocarbon Processing*, were more sober about the realities of the computer revolution overtaking their profession. "Because of the general purpose nature of the digital computer," they pointed out, "it is possible to perform a wide variety of process calculations and functions—limited only by the ingenuity of the engineer and . . . the memory size and arithmetic speed of the computer."

These engineers recommended that the use of computers in process control "must be based on fundamental knowledge and understanding of the process and its economic environment," stressing the point that "computing hardware and computer programs should be kept as simple as possible, commensurate with the immediate job at hand."

Not all designers heeded this advice. System complexity increased, along with the potential for breakdown.

To guard against the likelihood of an accident, designers installed alarms to alert operators of danger, but these too suc-

cumbed to the drive toward complexity. According to one GE applications engineer, "there were so many of these [alarms] that occurred so often, the operators quickly disregarded them entirely. In so doing, they often disregarded really important messages"—an anticipation of the problems confronted in nuclear power plant control.

As *Fortune* observed in 1946, system complexity and automatic control itself contributed both to mystification and alienation, with possibly dangerous results. This was seconded by the *Oil and Gas Journal*, usually more sanguine about computer control, in a story on the IBM-computer-controlled Atlantic catalytic cracker refinery in Philadelphia. "As degrees of freedom [and inefficiency] such as spray water, torch oil, low regeneration temperature and excess oxygen are taken away from the unit operator," the journal observed, "the task of providing steady and safe operation becomes very much greater. Minor upsets erode unit capacity, while major upsets are potentially disastrous."

The other side of the computer-controlled refinery coin was the removal of that control from the allegedly inefficient work force—and the actual removal of the work force itself. "There are no benefits to be gained from labor saving, at least now," observed the authors of an *Oil and Gas Journal* "Special Report on Refinery Instrumentation and Control." "In fact, the important problem in computer control is not the elimination of the operator, but how to use him in the most effective way." The authors acknowledged the importance of the operator—the underlying reason for using open-loop systems. "We will always want the practical judgment and inherent common sense and sharpness exhibited by the good operator," they maintained. "The operator must have control over certain contingencies and be able to modify the computer behavior as required."

There were limits to such worker control, however. "Along with this degree of control exercised by the operator comes the problem of providing insurance against mistakes. . . . Technical know-how," after all, arises not from the operators but rather "from process engineers, who must reduce their knowledge of a process to a mathematical description, and from mathematicians, who must transform this description into a method for finding optimum operating position."

Accordingly, as operators moved from the outside, and manual monitoring and control of operations, to the inside central computer room and automatic control, "a detailed check and balance procedure" was "built into the computer system," to

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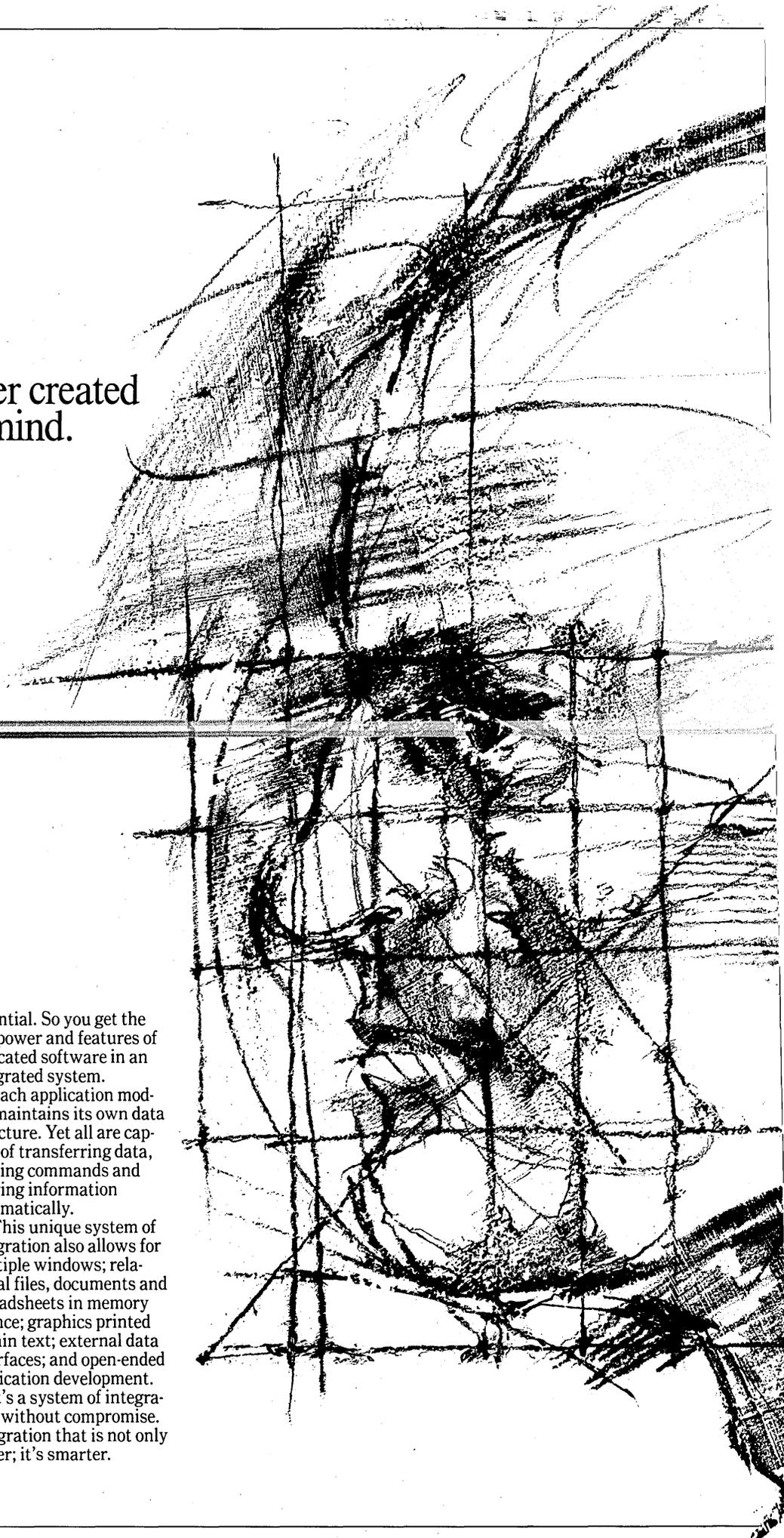
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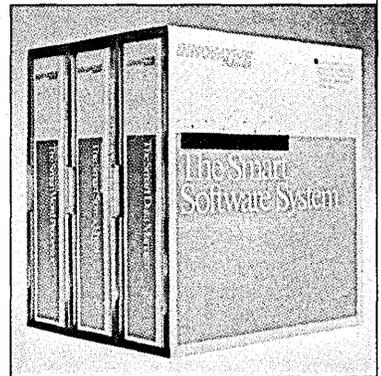
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# The computer, as the extension of supervision, now monitors not only the chemical processes taking place but the human activity of the operators as well.

automatically supervise and override operator decisions. "Changes made by the operator . . . must pass reasonableness tests," the authors noted, "which have been determined in advance by the plant supervision and recorded in the computer's memory."

## COMPUTERS MONITOR HUMANS

The computer, as the extension of supervision, now monitors not only the chemical processes taking place but the human activity of the operators as well.

The operators resented and resisted this infringement on the control over their jobs. "In the beginning," one control engineer later recalled, "the operators competed with the computer in accomplishing certain goals of closed-loop control, [and] they soon found out that with close attention and applications they were able to do this job as well as the computer." But they also soon learned that they could not do so continuously, or without stress and fatigue.

Thus, perhaps inevitably, they yielded to the computer and turned instead to try to use it to their own advantage.

Maintenance workers were also affected. As the *Oil and Gas Journal* cryptically explained, "scheduled maintenance of some units is being replaced by rational computer decisions." The implication was clear enough: up to now the workers had

somehow successfully run refineries without the aid of reason, but management was no longer willing to rely upon such routine miracles, nor did they have to, given the computer revolution.

Management worked hard to accommodate workers to the new realities. In some plants, "many of the operators' ideas [had] been incorporated into the control logic"—with what compensation or to whose benefit was not specified. "Condition the operator carefully," refinery managers cautioned. "He can make or break the project [of installing computer control]." "It isn't likely that computer control will cost any jobs, at least in the near future," they observed, albeit in a rather guarded way. "The operator needs to be told this and he needs to be challenged to do his best for the success of the project."

But jobs were lost, lots of them. According to the Bureau of Labor Statistics, total employment in the refinery industry rose slightly between 1947 and 1957, to 153,900 from 145,000 workers, owing primarily to an expansion of production, but declined steadily thereafter, to 113,900 by 1964.

For production workers, the drop was continuous, at first slow, then precipitous. Production workers numbered 113,800 in 1947, 112,500 in 1957, and 81,900 by 1964. Production worker em-

ployment as a percentage of total employment decreased to 72% from 78% during the same period, with a corresponding growth in the proportion of nonunion technical and supervisory staff. "Early attempts to use manpower reduction as a part of the justification for digital computer control were almost universally in error," the *Oil and Gas Journal* observed. "Operating personnel may be reduced, but at least as many additional technical people will be needed."

Largely as a result of the new technology, productivity in the industry rose roughly 250%, according to one study of the period from 1947 through 1966. At the same time, and, in part, as a direct consequence, employment of production workers dropped by 31%. "In three out of four cases," this study noted, "high capital expenditures in a given year were followed two years later by a decline in the employment of production workers."

Among the categories hardest hit were carpenters, insulators, machinists, painters, pipefitters, utility riggers, welders, operators, and unskilled laborers. The Bureau of Labor Statistics observed also that "skilled craftsmen in maintenance work may be increasingly affected by the use of computers in engineering, automatic welding, and new construction techniques."

In addition to direct layoffs, there was a pattern of "silent firing"—the cessation of recruitment by the companies of new employees to replace those who leave through normal attrition. This was a less noticeable but significant consequence of the introduction of the new technology. People directly affected by layoffs lost their seniority as well as their wages and benefits. Some were only temporarily displaced, and were later reassigned or were fortunate enough to find other employment.

## DISPLACED MINORITY WORKERS

But there was permanent unemployment for those not so lucky. According to a contemporary study entitled "The Anatomy of a Workforce Reduction," 38% of the workers displaced from one huge refinery—Humble Oil's Baytown plant—entered what sociologists called the long-term unemployment category. Hardest hit were blacks, women, the young (under 22 years old), the old (over 45 years old), and the members of other minorities.

At the Baytown plant, employment plummeted from 6,752 workers in 1948 to 3,816 in 1962, a decrease of 43.5% (twice the drop in total U.S. refinery employment during the same period). "Much of this sharp decline in total employment was centered on production workers," the study in-



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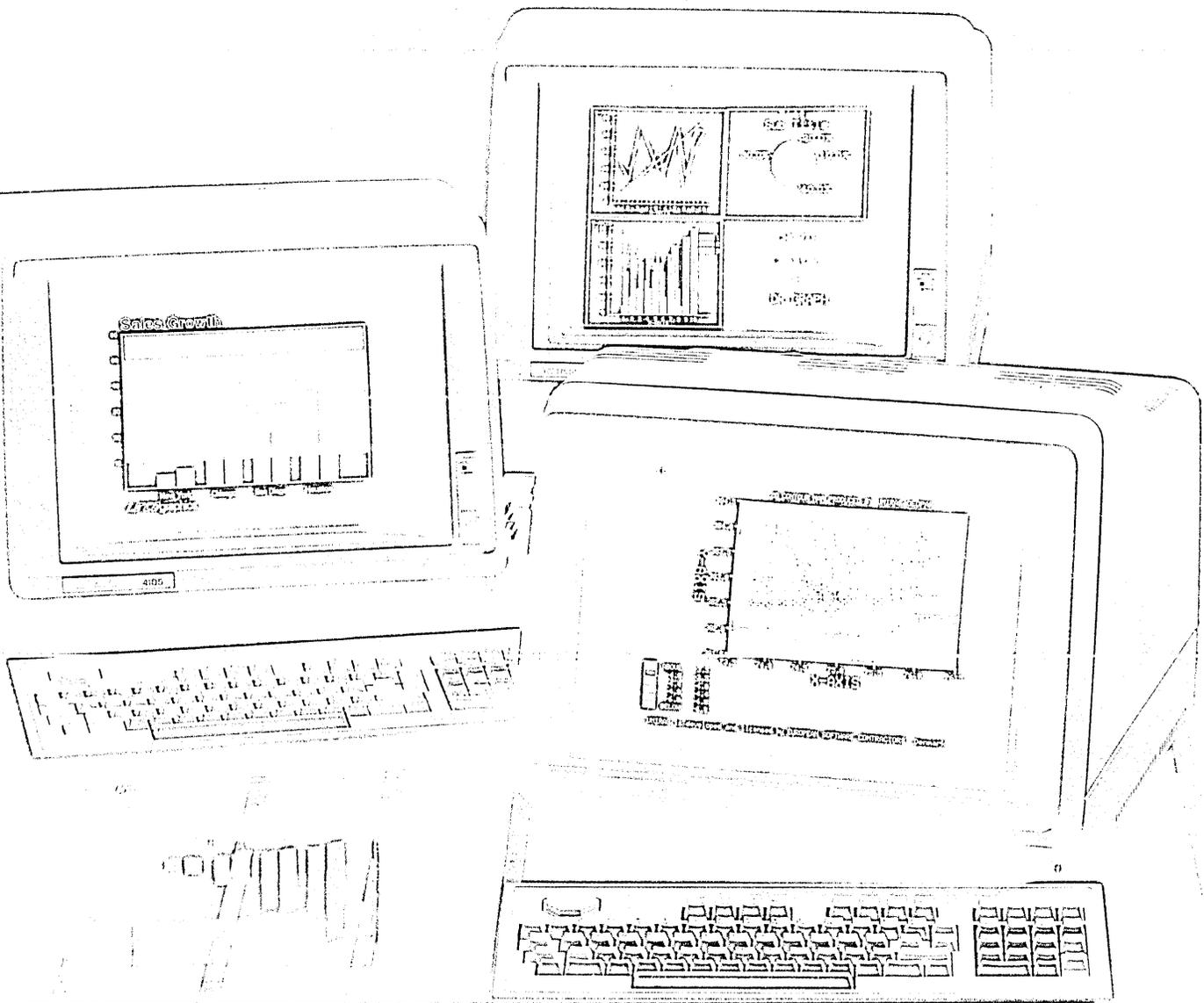
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## People have greeted the second industrial revolution with complacency and even naive optimism.

dedicated. "The decline in production worker employment amounted to about 80% of the total employment reduction in this refinery during the 1948-62 period." And, "while employment in this refinery was declining," the authors pointed out, "a trend toward greater use of superior technology, particularly automation, took place."

Accompanying the introduction of new computer-control technology in the refinery industry, then, was a significant loss of workers and worker control, facts which alarmed the union that represented the vast majority of them, the Oil, Chemical and Atomic Workers. Displacement of workers, and their replacement by exempt technicians, meant lower union membership and thus fewer union resources and less power. And company efforts to use the new technology to gain control over job content and assignment constituted an assault on the traditional work rules guarded by the union to protect the membership.

"Everyone believes the U.S. is in the midst of an economic transformation on the order of the industrial revolution," *Business Week* reported recently.

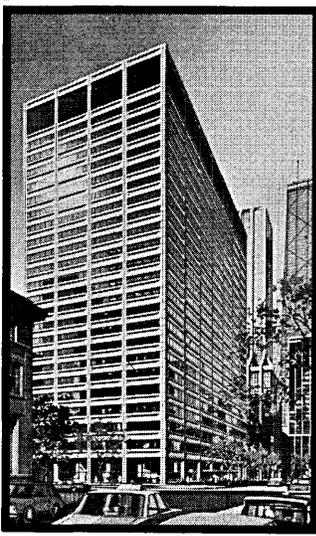
But no one alive today remembers firsthand the trials and turmoil of that first industrial revolution. This explains why people have thus far greeted the second industrial revolution with such complacency, and even naive optimism. Thus, the prospect of another industrial revolution has generated considerable excitement—among those militarists who see a (sur)reality of total control right around the corner, and among those neoprogressive politicians whose rosy rhetoric belies their ignorance of the human trauma and tragedy of the first industrial revolution, and of the mass insurrection that followed in its wake.

The analogy commonly made between the present transformation and that of the early nineteenth century remains only half complete: the catastrophe has been left out. For a fuller analogy would shake the spirit, not stir it, and give thoughtful people pause: What will happen to the dispossessed? What will the consequences be once our world too has been "turned upside down"—as British historian Christopher Hill aptly described the earlier period. To date, few have the right

questions, much less any answers. And, in the meantime, the compulsion to automate (and to dominate)—fueled by newly inflamed competitive fears—continues apace (and resistance grows). As a result, we see, not the revitalization of the nation's industrial base but its further erosion; not the enlargement of resources but their depletion; not the replenishing of irreplaceable human skills but their final disappearance; not the greater wealth of the nation but its steady impoverishment; not an extension of democracy and equality but a concentration of power, a tightening of control, a strengthening of privilege; not the hopeful hymns of progress but the somber sounds of despair, and disquiet. ©

David F. Noble is curator of industrial automation at the Museum of American History, Smithsonian Institution. Until recently he was associate professor of the history of technology at MIT. He holds a PhD in history from the University of Rochester and a certificate in machine-tool fundamentals from the Lowell Institute School.

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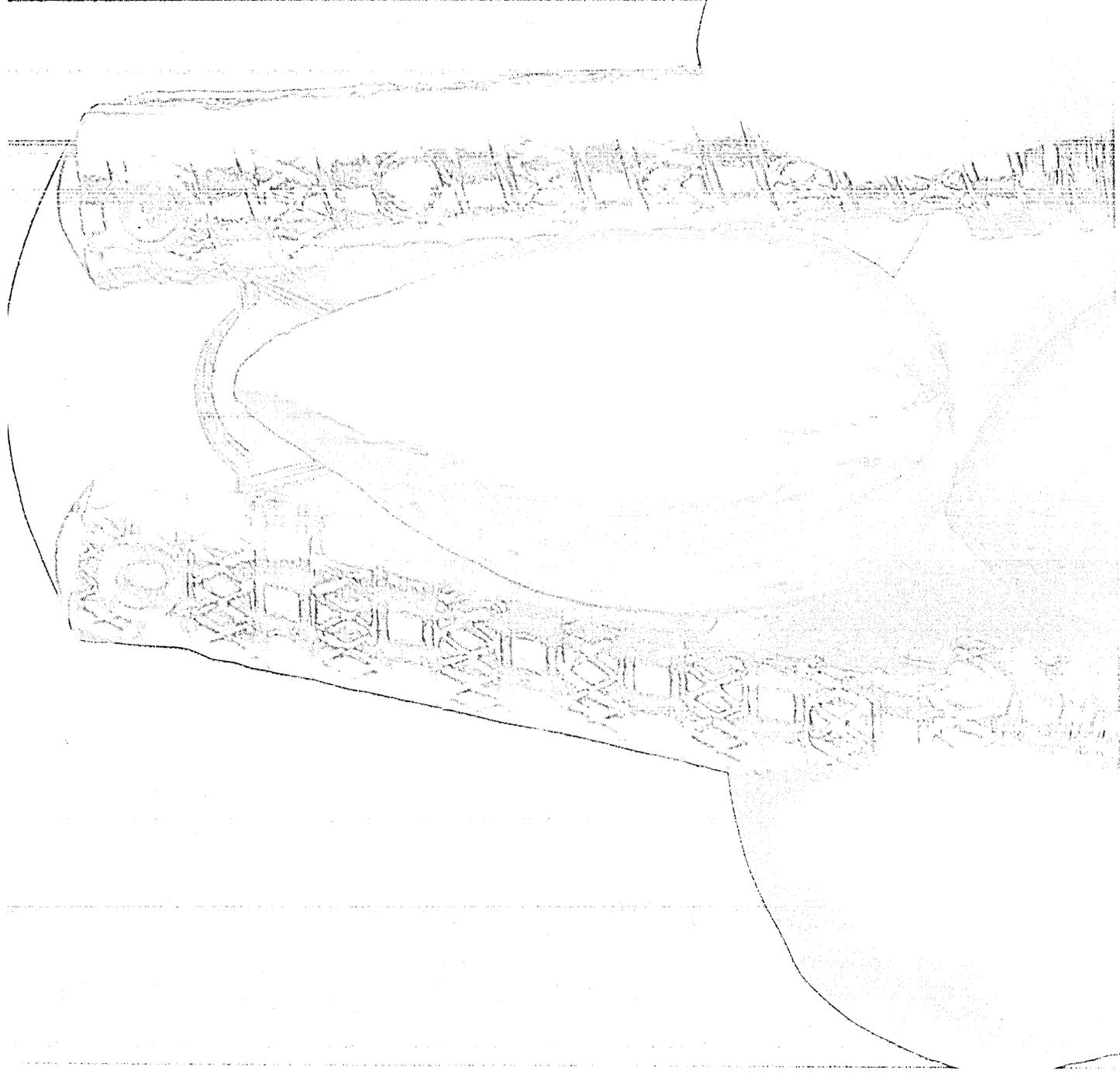
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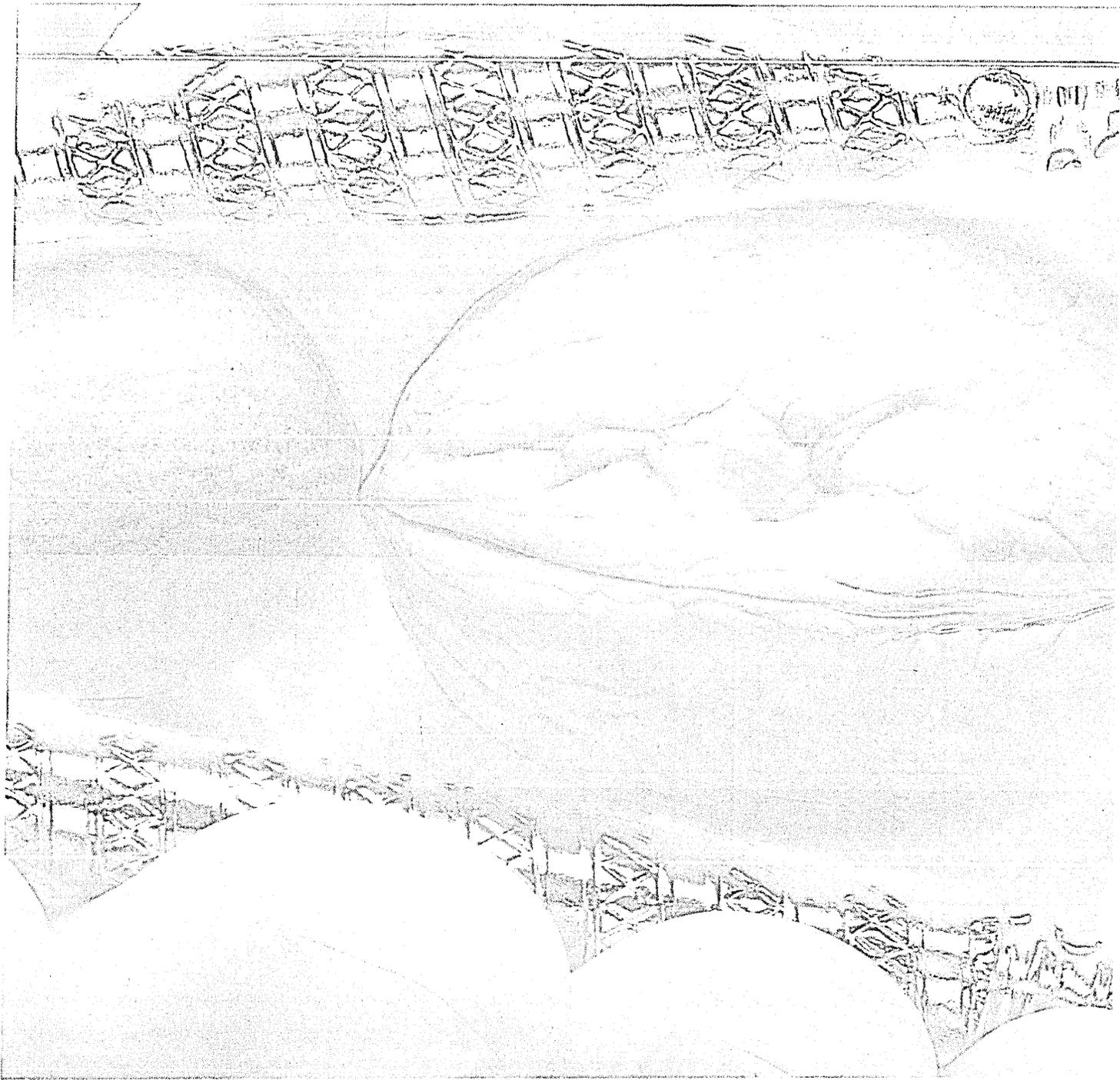
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**No dp group can perform up to its potential without the right mix of controls. Directives are useful, but . . .**

# LEADERSHIP IS CRUCIAL

**by William C. Kimmerly**

Regardless of how well an organization defines objectives, develops strategies, and implements plans, its eventual level of success will depend significantly on the quality and effectiveness of its management control function. This is especially true for the dp organization, which is particularly vulnerable to events and conditions that can complicate the control process.

Organizations exist so that the different tasks needed to accomplish common objectives can be coordinated, and the actions of individuals engaged in carrying out these tasks can be more effectively managed. In the absence of effective controls, people may work toward individual rather than common goals. The full meaning of the concept of control can, however, be somewhat elusive. In one sense, the term suggests the use of quantitative methods to measure the extent to which actual results correspond to expected results, followed by corrective action to redress unfavorable variances. In another sense, control relates to a condition or state of being, within which the overall efforts and direction of an organization remain effectively focused on a common purpose. In other words, there is a sense of overall control. In the first sense, the emphasis is on measurement and comparison; in the second sense, the emphasis is on maintaining an effective level of overall guidance, and suggests reasonable success in leading people to accept this guidance.

I will define control in terms of two distinguishing characteristics. The first relates to the degree of formality associated with the implementation and monitoring of a control measure; the second relates to the extent to which a control measure is required to exist.

Certain control measures are formally stated and rigidly enforced—rules against accessing an organization's sensi-

tive databases without proper authorization, for example. Other controls exist in a very informal sense and receive little or no formal enforcement—e.g., an organizational dress code. Formal controls will be assumed to be either quantitative in nature or grounded in accepted rules or conventions. Informal controls will be assumed to be more qualitative in nature and based upon the individual employee's sense of purpose, commitment, or responsibility.

The second key distinguishing characteristic is the extent to which a control measure is required to be in place. Certain controls are simply an implicit result of formal organization—the requirement to follow Equal Employment Opportunity regulations, for example. Others are largely discretionary, their implementation depending upon the judgment of an accountable manager—e.g., the decision to implement a standard project management system. Given this basis of distinction, there are four general categories of control: implicit formal controls, implicit informal controls, discretionary formal controls, and discretionary informal controls. These distinctions are important because different management approaches and different considerations are often necessary for the effective implementation of each.

Clearly, managers cannot be involved in every decision an employee makes, or monitor every action taken by every employee. The best that can be done is to develop a control framework that leads to the right decisions being made and the right actions being taken most of the time.

Moreover, all decisions and all actions do not have the same degree of importance. The manager must be able to weigh the potential adverse consequences of formal controls in a given area—like employee resentment and lower morale—against the potential adverse consequences of inadequate controls. Common sense usually suf-

fices here, but sometimes the issues will be extremely complex and the correct approach not so obvious. This is particularly true for the dp organization and its complex control environment. Therefore, a systematic approach is needed.

## **VALUABLE, LIMITED RESOURCES**

A key point underlying much of the following discussion is the fact that the time, attention, and influence of a manager are valuable but limited resources. All managers have a number of control objectives for their organizations, but some objectives are much more important than others. The successful manager will not want to waste influence on low-priority objectives. Instead, he or she will ensure that controls relating to these low-priority areas are enforced in ways that do not require continuing, visible management time and involvement.

Typically, the kinds of controls that can be approached in this way fall into either the implicit control category (formal or informal) or the discretionary formal control category. This means that the highest return on the investment of a manager's time and influence will be in the area of discretionary informal controls. This is the area that makes it possible to establish the kinds of normative behavior patterns that move the organization toward its keystone objectives.

*Implicit formal controls.* As indicated above, certain control requirements arise simply as an inherent consequence of formal organization. Because many of these requirements are grounded in legal or other formal considerations, the control measures themselves must be approached in a formal way. For example, Equal Employment Opportunity regulations control the actions of individuals involved in hiring, training, promotion, and related personnel actions. This is a control measure backed by the force of federal law; manage-

## Formal procedures can ensure compliance without visible senior management involvement.

ment has no choice but to implement it in a formal way to ensure the required level of compliance.

Such control requirements do not usually need the ongoing, in-depth attention of the senior manager. This is not to say that the manager will regard these requirements as unimportant. Rather, formal procedures can ensure compliance without visible senior management involvement.

Depending upon the priorities of a particular manager, implicit controls can also be the basis for a discretionary form of control. For example, a manager might feel strongly about the EEO issue and seek to establish an aggressive program and a heightened level of sensitivity to related issues. This will necessitate a more sophisticated and more encompassing form of control than formal regulations might require. Maintaining such a level of control *does* require the visible, ongoing attention and influence of the senior manager.

*Implicit informal controls.* There are implicit controls that permit an informal approach to the definition of specific control measures and compliance requirements. Rules that relate to hours of work are one example. Typically, employees are not completely free to determine where and when they will carry out their assigned tasks, but aside from requirements imposed by wage and hour laws or union contracts (which are actually implicit formal controls), this can be, and often is, an area of relative informality.

Implicit informal controls are obviously an important part of the orderly functioning of an organization. As with implicit formal controls, however, the effective manager will tend to devote little time to enforcing them unless a problem exists. Most management attention is focused on these controls during their definition and implementation.

### FAMILIAR CONTROL CATEGORY

*Discretionary formal controls.* This is probably the most familiar category of controls. The distinguishing feature of discretionary formal controls is the fact that once the decision has been made to implement them, they require formal compliance if they are to be effective. For example, the particular mix of budgets, standards, policies, regulations, and procedures implemented by a manager reflects his or her discretion as to which organizational and individual activities are to be controlled.

A few years ago, the term structured was very popular in many dp organizations (and is still popular in some). The term was applied to a collection of proce-

dures designed to control in a very precise way the actions of individuals engaged in specific activities—systems analysis, systems design, program development, or program coding, for example. These controls were discretionary in that they did not have to be in place in order for the dp organization to carry out its mission effectively; the manager could implement them or not depending upon his or her perception of their worth.

The controls were formal in that once implemented they were highly visible and served to limit the actions and decisions of individuals engaged in a given activity. Thus, structured requirements were unmistakable, unequivocal controls, optional in their adoption but not in their operation.

Because of the impact discretionary formal controls can have on an organization, the effective manager will want to examine their consequences carefully before authorizing them. To help in this examination, the manager will first want to separate the overall control requirements of the organization into key individual control areas.

Just as the concept of control in its broad, generic sense is too vague to serve as a framework for analytical discussion, control as an all-encompassing organizational requirement is too imprecise to serve as a basis for the development of discretionary formal controls. Control areas must first be defined that correspond to each of the key functions the organization must perform. In the dp environment, specific control areas might include software development, capacity management, data resource management, and so on. Each of these must have a central management focus in order to systematically influence behavior toward the key management objectives for that area.

Once control areas are defined and discretionary formal controls are developed or proposed, the relationships among control measures for each control area must be examined to ensure that conflicts are minimized and their collective impact is acceptable. Unless this kind of analysis is performed on a continuing basis, a well-integrated set of discretionary formal controls will be difficult to develop and maintain.

While each dp organization is unique in certain respects, most will want to have discretionary formal controls in place in key areas such as software development (project management and documentation standards or guidelines), data resource management (database modification procedures and data naming conven-

tions), capacity planning and performance measurement (uptime, response time, or throughput standards), and computer security (access controls and usage restrictions). There will undoubtedly be other areas where discretionary formal controls will be required; the appropriate mix will depend upon the specific organization.

Thus, there are two important things to remember in determining the appropriate mix of discretionary formal controls. The first is that the right mix depends upon a careful analysis of the key components of the overall control requirements of a particular organization. This includes a continuing examination of how well the various controls fit with each other and how well they collectively support the overall mission of the organization. Second, the dp manager will want these controls to be well understood and followed without requiring much in the way of his or her continuing involvement.

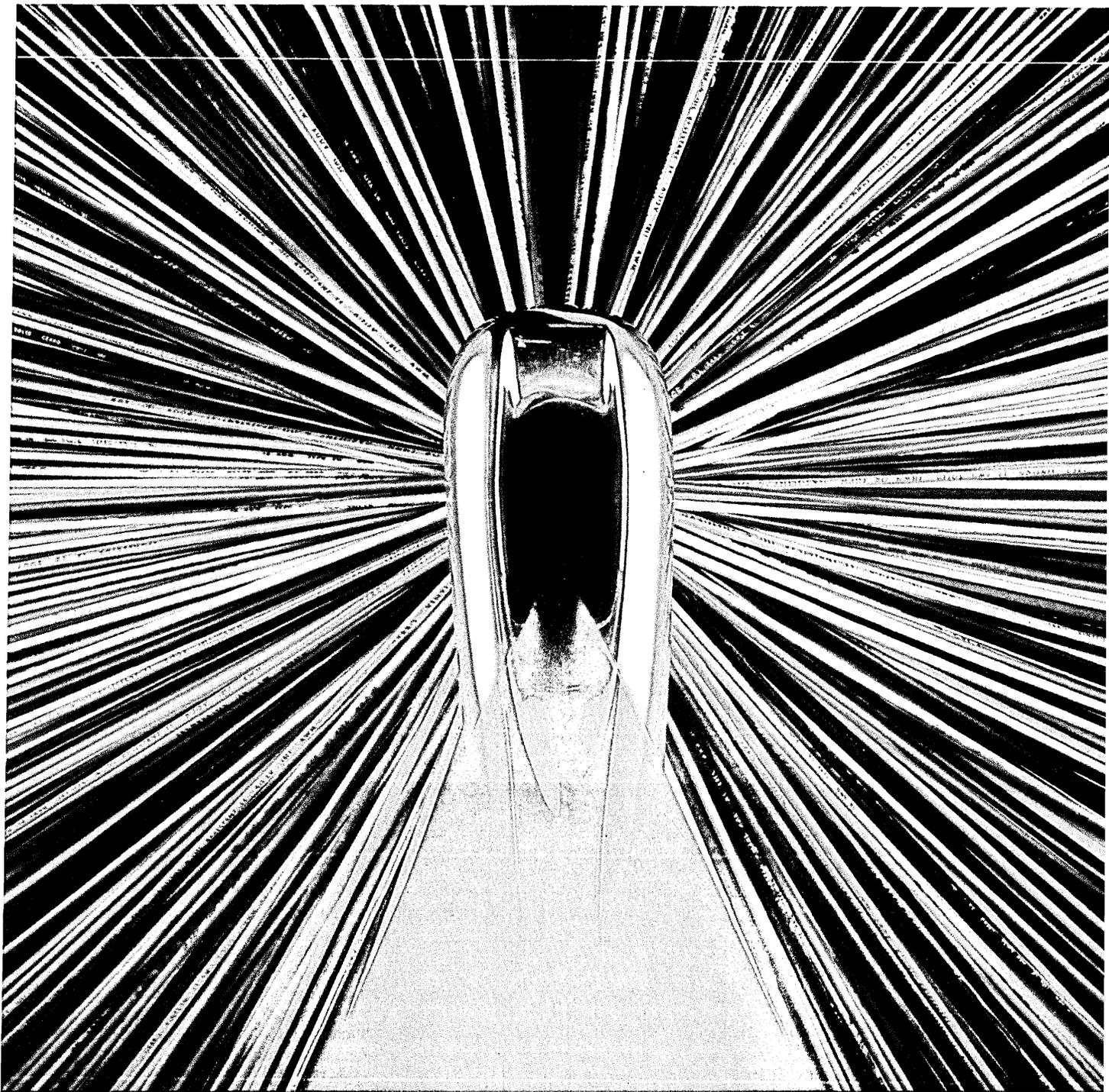
### EFFECTIVE USE OF CONTROLS

*Discretionary informal controls.* The existence of a basic framework of implicit controls and discretionary formal controls provides an organization with enough cohesiveness among task definitions and operating procedures to function in a mechanistic manner. In order for the organization to represent more than a bureaucratic shell, however, senior management must give it substance, vitality, and strategic direction through the effective use of discretionary informal controls.

Perhaps the most important thing a dp manager can do here is to establish an effective level of normative control for the dp staff. The eventual success of the organization will depend upon the extent to which the dp staff is able to internalize the highest objectives of the manager—in effect, to make these objectives their own. For this process to take place, there must be a control environment that continuously and systematically encourages each employee to select from among the available range of actions those which are most supportive of these keystone objectives.

While this process might at first appear to be manipulative, it really is not; it is, in fact, the essence of leadership. Yet it is also more than leadership. It is leadership grounded in a full awareness of the linkages that exist among the various functions of management (such as control and leadership) and the relationships that exist between employee motivation and key environmental and cultural considerations.

Achieving this level of control is more difficult in a dp shop than in other



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## If the organization is to represent more than a bureaucratic shell, senior management must give it substance, vitality, and strategic direction.

organizations. In addition to the fact that the technological ground is moving continuously beneath the feet of the dp manager, the typical makeup of the staff presents additional problems. Unlike most engineering or accounting organizations, for example, which tend to have relatively homogeneous mixtures of skills and training experience represented on their staffs, the dp organization typically contains a wide variety of skills, backgrounds, educational levels, and levels of competence. This mixture of capabilities and interests can generally be divided into two groups, each having its own unique set of interests, loyalties, and motivational (hence control) considerations. I will refer to the first group as technicians, the second as generalists.

The technicians will often be computer science graduates, although not necessarily so. Members of this group are characterized by their strong orientation toward the very technical aspects of the dp discipline. The professional loyalties of this group are typically directed outward toward the numerous societies, associations, and user groups that form the touchstone of professional status and identification for this relatively young discipline. As a result, in the absence of the mitigating influence of an effective control function, this group will tend to focus narrowly on matters of technical interest and ignore larger issues, overarching missions, and, in particular, the practical needs of local users.

The generalist group will usually be made up of a varied collection of skills and backgrounds. I have observed, for example, an eight-person applications programming section that included the following college majors: music, psychology, mathematics, physics, history, accounting, biology, and education. Such mixtures are common. While the skill level of this group will vary much more dramatically than that of the technical group, the best of the generalists will often be as good as or better than any in the technical group. The major control difficulty associated with this group is, of course, its diversity of interests and motivational considerations.

### MANAGER FACES DILEMMA

Thus, the manager is faced with a dilemma in attempting to establish an effective framework of informal discretionary controls. On the one hand, he must establish a framework of normative controls that can guide the organization as a whole; on the other hand, each distinct group has its own set of interests and loyalties that must be effectively channeled.

Assume, for example, that a key control objective of the dp manager is the development of a service-oriented organization that recognizes first-rate user support as the highest performance objective. This means that individuals must be controlled in the sense that their actions and

decisions systematically and continuously reflect the influence of this objective. Simple lip service to this objective by the dp manager will not cause this to happen. The dp manager must demonstrate visibly through continuing actions his genuine interest in this key objective. The question that arises is this: what actions can the manager take that will influence technicians toward this objective without unduly diluting their technical abilities, and at the same time cause the diverse interests of the generalists to cohere around this central objective?

One approach is to systematically identify and publicize each significant accomplishment that demonstrates both the effective use of technology and a deep understanding of user needs. Such accomplishments might include innovations in making systems both cost-effective and extremely easy to use, the development of systems that provide especially useful information for end users, or the development of dp solutions that lead to significant improvements in productivity or otherwise help the organization in an especially significant way.

The key is to concentrate on those accomplishments that require a blend of abilities, those that technicians could not accomplish without an appreciation for and understanding of user requirements, and that generalists could not accomplish without the required degree of technical competence. An effective framework of normative controls requires that the members of each group work to maintain a reasonable balance in their skills or perspectives. Technicians must be constantly alert to the need to relate technology to practical needs, while generalists must realize that without the required technical skills they cannot develop effective solutions for user problems that they might otherwise understand very well.

Specific manifestations of concern and interest on the part of the dp manager can take many forms. For example, a program of formal awards—plaques, pins, bonuses, and other immediate, tangible forms of recognition might help in certain environments. An even stronger stimulus, however, will be the perceived pattern of skills and accomplishments that lead to special recognition or perhaps eventually to promotions.

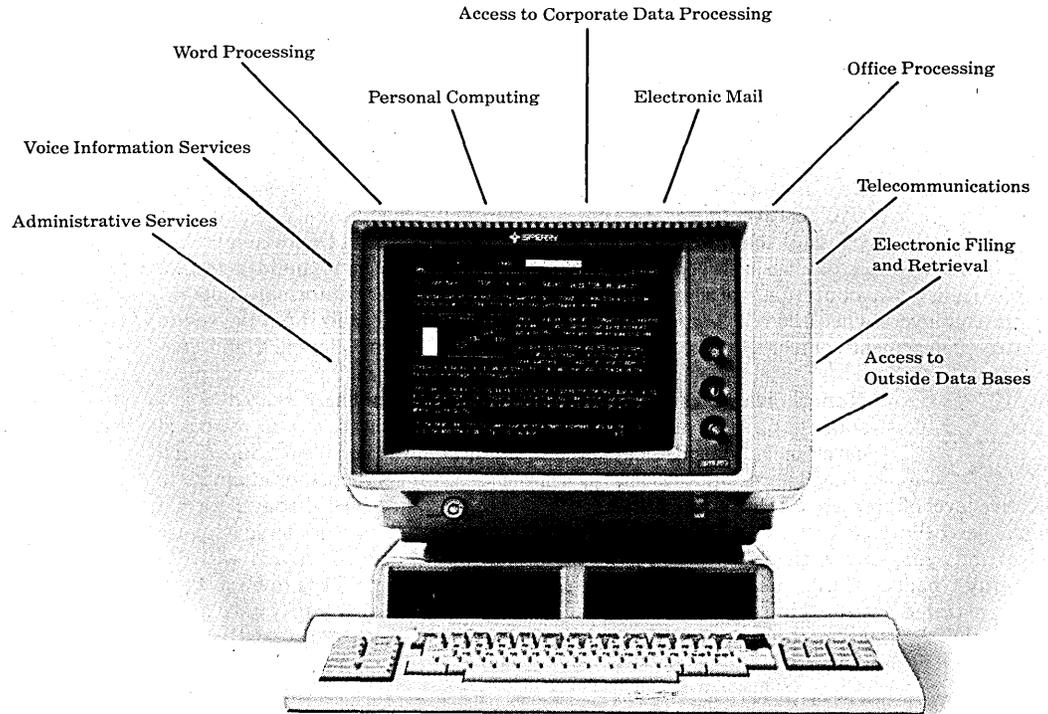
Unfortunately, in many dp environments it is the rule rather than the exception that achievements of a highly technical nature get singled out for praise, and even lead ultimately to promotions to management positions, while the ability to balance technology and user requirements receives



CARTOON BY VAHAN SHIRVANIAN

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## Immediate, tangible forms of recognition might help in certain environments.

much less attention and very little praise. As a result, many of these organizations eventually find themselves in serious trouble because their staffs, which over time contain an increasing number of technicians in supervisory positions, are continuously preoccupied with the unfocused, unorchestrated pursuit of technological achievements, while failing to maintain a balanced perspective relative to the real needs of users. Because of the resulting inefficiencies and lack of focus, this condition often leads to a continuing demand for more employees when the real need is for better management control and direction.

### MUST BELIEVE DEEPLY

Nonetheless, even a sound approach to the development of role models will not result in an effective level of normative control unless the manager believes deeply in his key objectives and demonstrates this belief on a continuing basis. This belief can be demonstrated by the kinds of questions routinely asked, the meetings attended, the kinds of reports requested, and so on. By

doing this, the dp manager will perpetuate a process that leads eventually to a kind of osmotic permeation of his key objectives.

The importance of an enlightened approach to discretionary informal controls in general, and normative controls in particular, extends far beyond the dp organization. For American industry, success in regaining some of its lost vitality and leadership will depend upon the ability to develop well thought out and enlightened objectives upon which to build a framework of discretionary informal controls. But as with the dp organization, the key to real progress is the development and continuation of an organizational environment characterized by genuinely shared objectives and a common sense of purpose based upon high standards and ideals. Superficial enthusiasm, erratic support, or attempts to achieve these objectives through formal controls alone (such as the simple issuance of quality assurance directives) will not work. Each manager, if he is to be successful, will have to work extremely hard at exercising the very highest calling of management, the requirement to lead

through example and personal involvement and, in so doing, to establish a level of normative control that eventually becomes self-sustaining.

Because of rapidly changing dp technology and the diverse mixture of skills that make up the typical dp staff, the dp organization presents a more difficult control challenge than many other organizations. The effective dp manager will therefore have to be particularly adept at developing and maintaining a balanced control framework, giving particular attention to a careful partitioning of the organization's overall control requirements, the development of a consistent set of discretionary formal controls, and the effective use of discretionary informal controls. ©

William C. Kimmerly has over 17 years experience in dp planning and management. His special interests include information resource management and dp strategic planning. He's presently associated with Martin Marietta Energy Systems Inc. in a dp planning and administration capacity.

# DJC

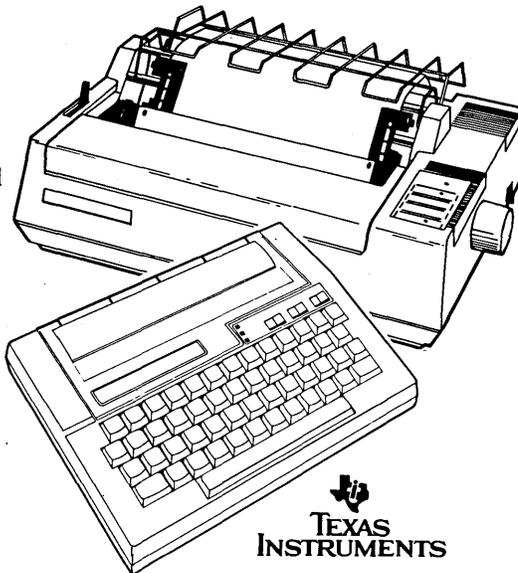
## Recommends Texas Instruments

### Texas Instruments 850/855

The 850 and 855 microprinters are the first products in the TI family of high performance Matrix printers. The 850 microprinter features speed (150 CPS), quality printing, and graphics plus PC compatibility. The 855 adds the dual functionality of letter quality printers to the 850's impressive list of features. Both are price performance leaders with the same reliability that has made the OMNI 800\* series printers the standard in offices around the world.

#### Texas Instruments 707

The newest edition to the Silent 700 series, TI's 707 Portable Data Terminal uses state of the art printing and communications technology to give you all the functions needed to do business in or out of the office.



  
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CIRCLE 82 ON READER CARD

# Finally, an on-line COM printer that isn't a pain in the mainframe.

If there's one thing you don't need, it's an on-line COM printer that makes you alter your host computer's software. Unfortunately, that's exactly what most systems make you do.

But not Bell & Howell. We found a way to eliminate the problem completely: Software control of our Series 6600 COM printers is through an intelligent preprocessor. You won't have to make even a single modification to your host software because the preprocessor's minicomputer takes care of everything.

It can handle microfiche production. Create and maintain job setups. And even produce audit trails. All at the same time.

About the only thing your operators need to do is enter a few simple English language commands on the keyboard. If problems occur, the 6600's software tells them what to do next.

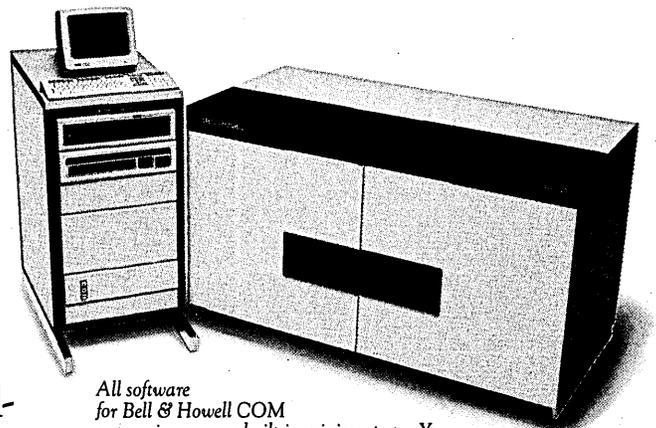
Of course, software isn't the only thing that's convenient with Bell & Howell. Since our systems operate off-line, as well as on-line, they give you total flexibility for job scheduling.

What's more, both our 6600 archival processing system and 6650 dry system run up to twice as fast as other in-house COM printers. And since they both have totally self-contained processors, there's none of the mess you get with other types of systems.

For more information on the COM printer that's a pleasure instead of a pain, call our marketing manager toll-free at (800) 538-4000.

In California, call collect, (714) 660-1050.

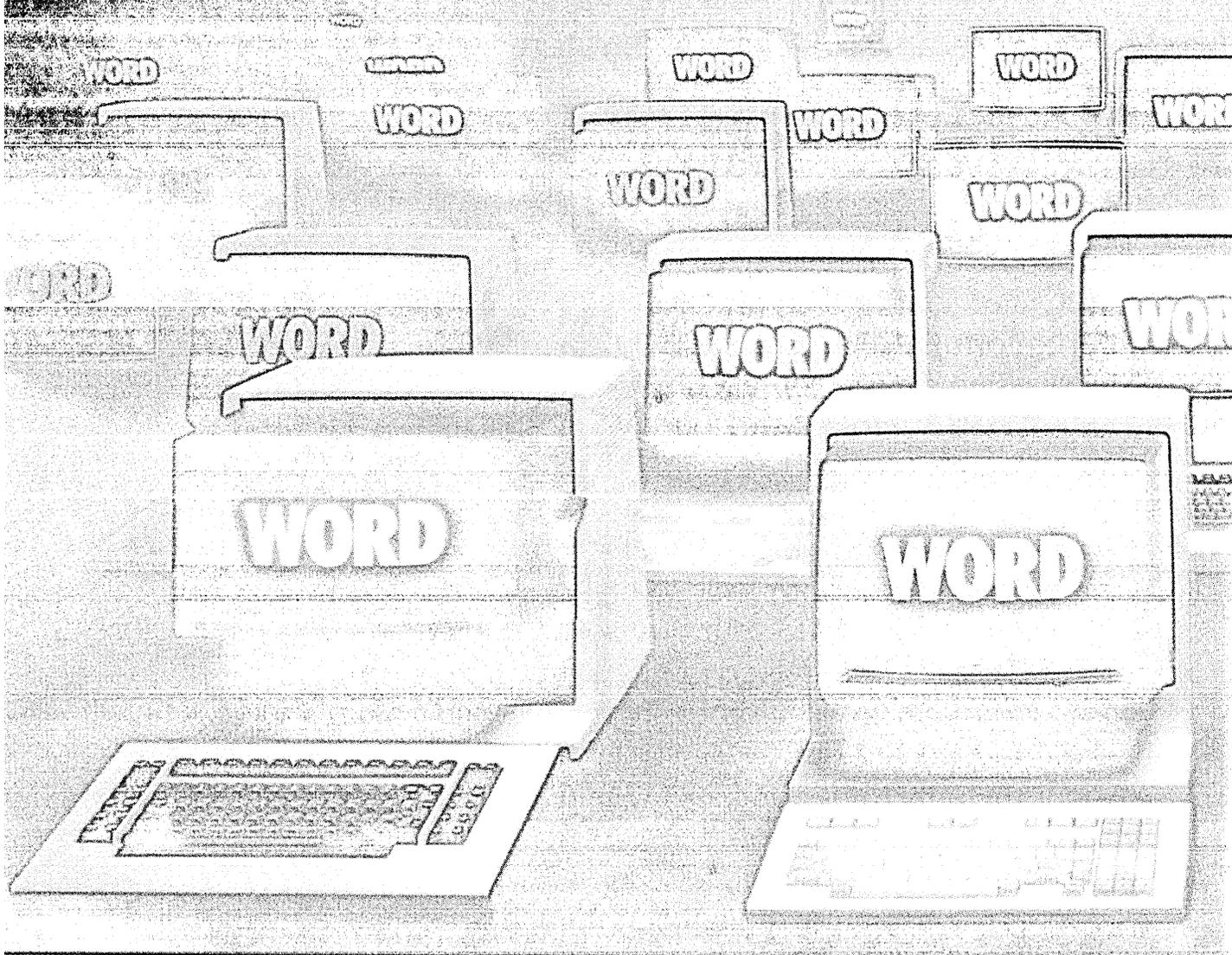
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*All software for Bell & Howell COM systems is run on a built-in minicomputer. You won't have to interfere with your host computer's software.*

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You need hardworking, multi-functional terminals dedicated to improving your productivity.

AT&T Information Systems can help. We have a full line of asynchronous and synchronous data terminal products that enable you to move and manage information quickly. Products designed to get the word around.

Our DATASPEED® 4000 Terminals get along well with people, too.

Non-glare, high-resolution, black background tilt screens, English language options, and lightweight detachable keyboards keep users more productive.

Features like windowing, split-screen mode, 80- or 132-column wide-screen

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## **Conversational and editing terminals that speak for themselves.**

The DATASPEED 4410, 4415, 4420 and 4430 Terminals are asynchronous desk-top workstations with superior features and functionality.

The 4410 is conversational, with graphics and sophisticated display capabilities.

If you need an editing display terminal, the 4415 is one of the most functional in its class. The 4420 is a feature-rich editing terminal. It's especially engineered to help the nontechnical user become proficient.

The 4430 is a conversational terminal for the multi-point, private line environ-

ment. There's no need for the computer to poll and address these terminals. This saves valuable processing time.

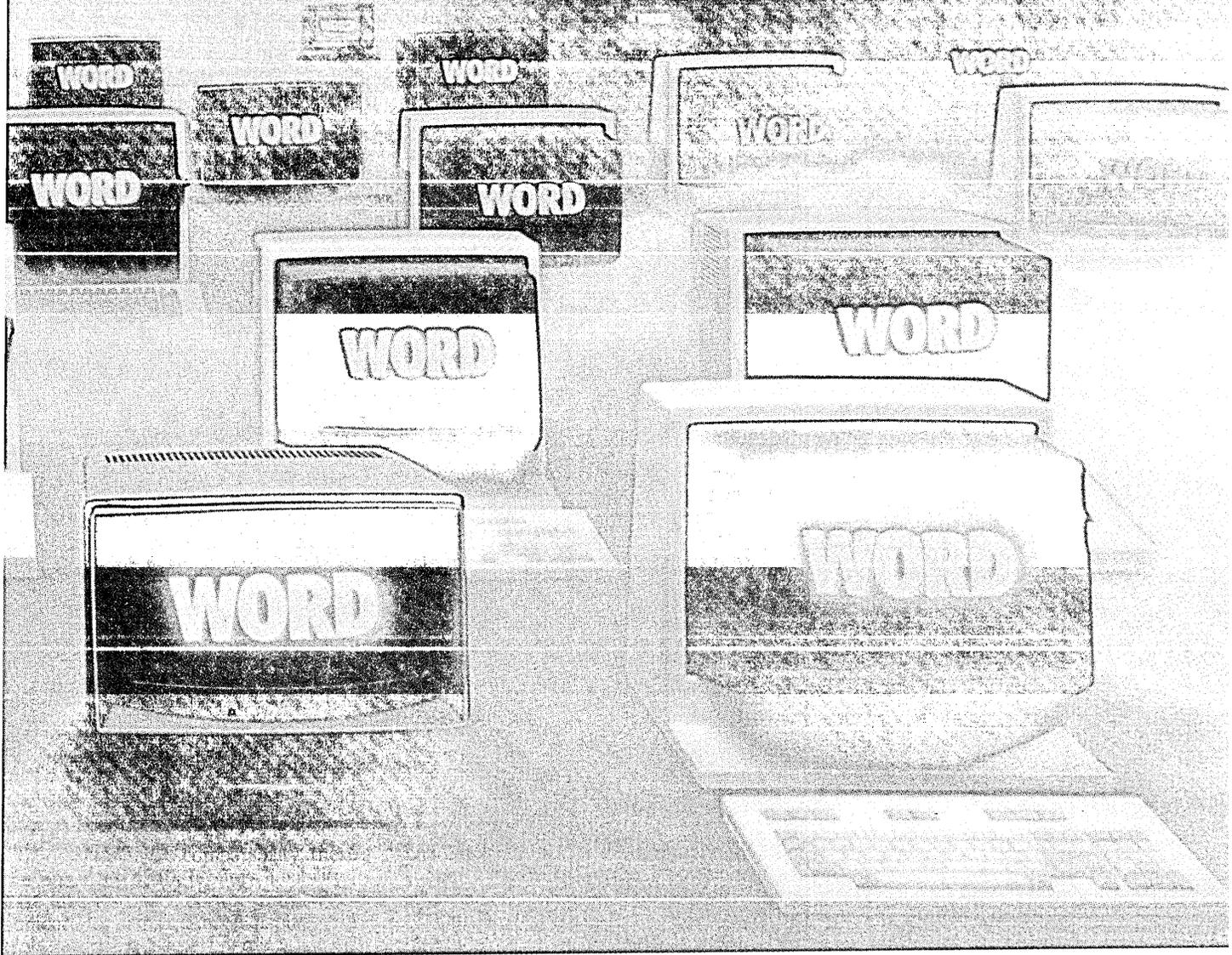
## **Synchronous terminals on speaking terms with IBM.**

AT&T Information Systems' DATASPEED 4540, Enhanced 4540 and 4540 Touch Screen Terminals are designed for a clustered, polled environment.

All of these synchronous terminals are compact, modular and 3270 compatible.

The 4540 and Touch Screen 4540 both support SDLC/BSC line protocols. With one of our new controllers, you can upgrade to SNA protocols by simply changing a diskette.

# TERMINALS. WE SPREAD THE WORD.



For SNA/SDLC compatibility, there's the Enhanced 4540. It offers flexibility, introducing a choice of two controllers, standard- or reduced-sized displays and high- or low-profile keyboards.

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For over a century, AT&T products and service have set the standards for performance and reliability.

Today, 4,000 scientists and engineers from Bell Laboratories are working full time to develop and design new business products at AT&T Information Systems

Laboratories. Products we continue to support by the largest, most experienced sales and service force in the industry.

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To learn how our family of DATASPEED Terminals can increase your profits and productivity, call 1-800-247-1212, Ext. 329.

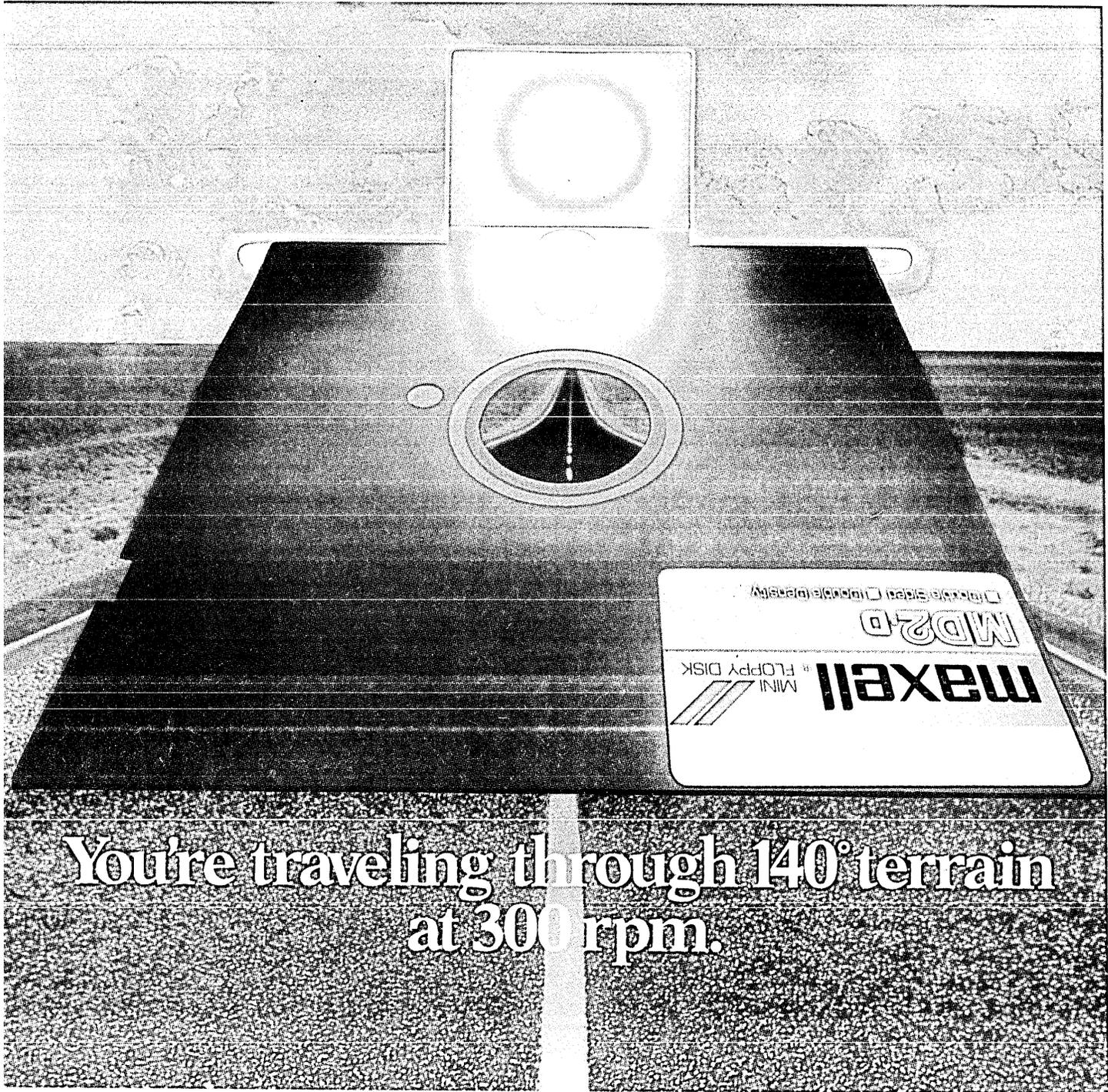
## **WHEN YOU'VE GOT TO BE RIGHT.**



# **AT&T**

## **Information Systems**

CIRCLE 84 ON READER CARD



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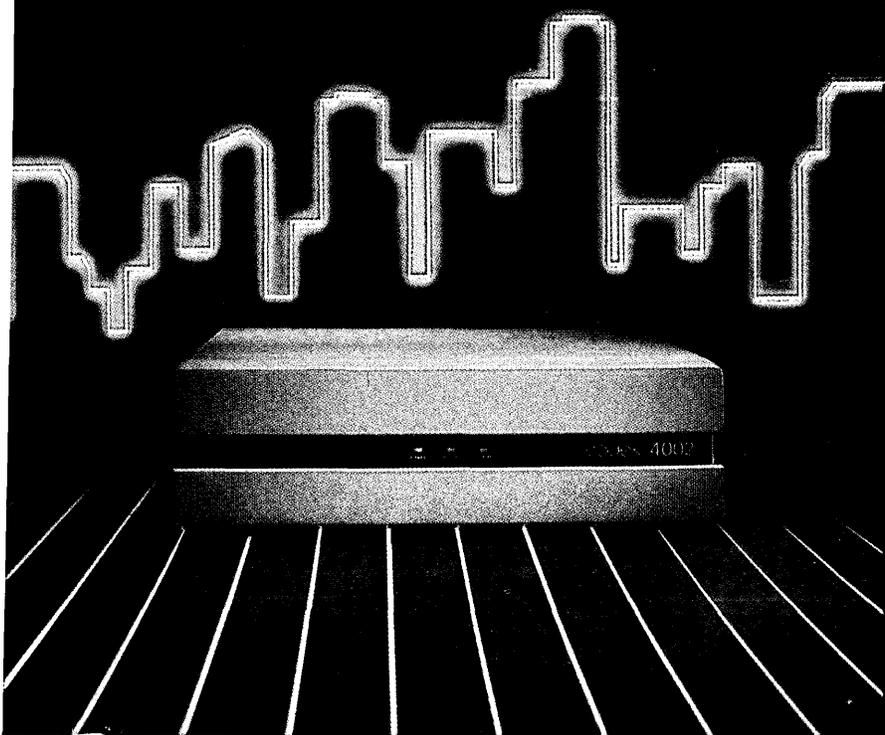
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CIRCLE 85 ON READER CARD

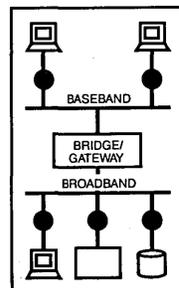
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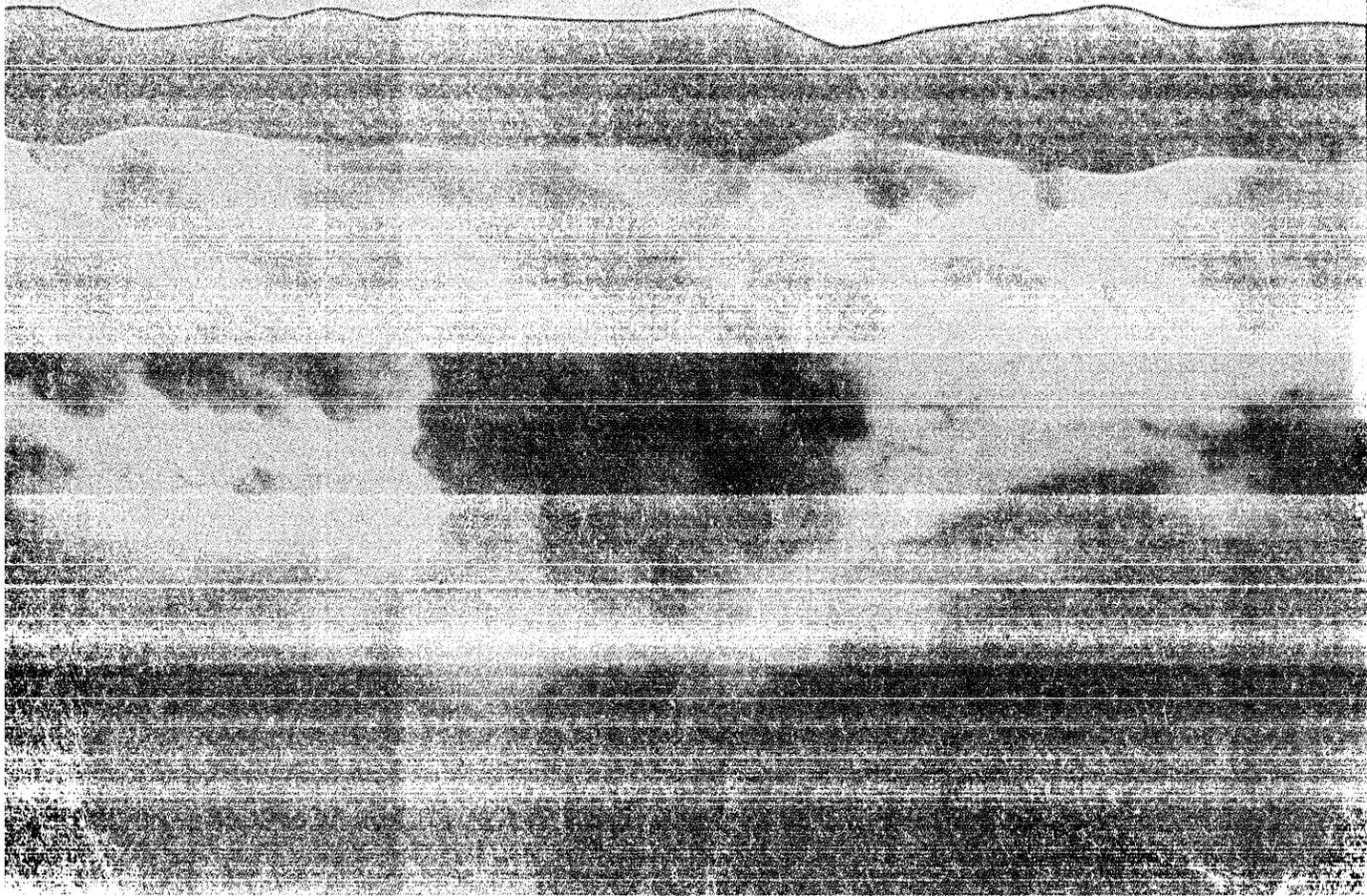
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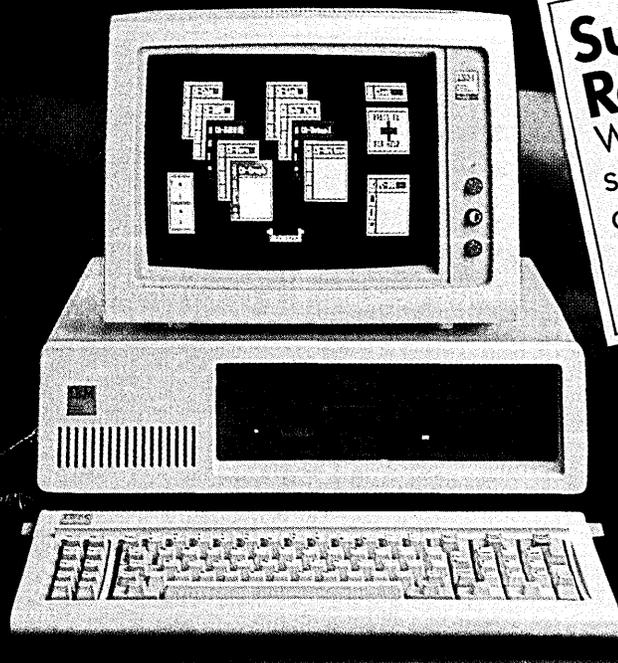
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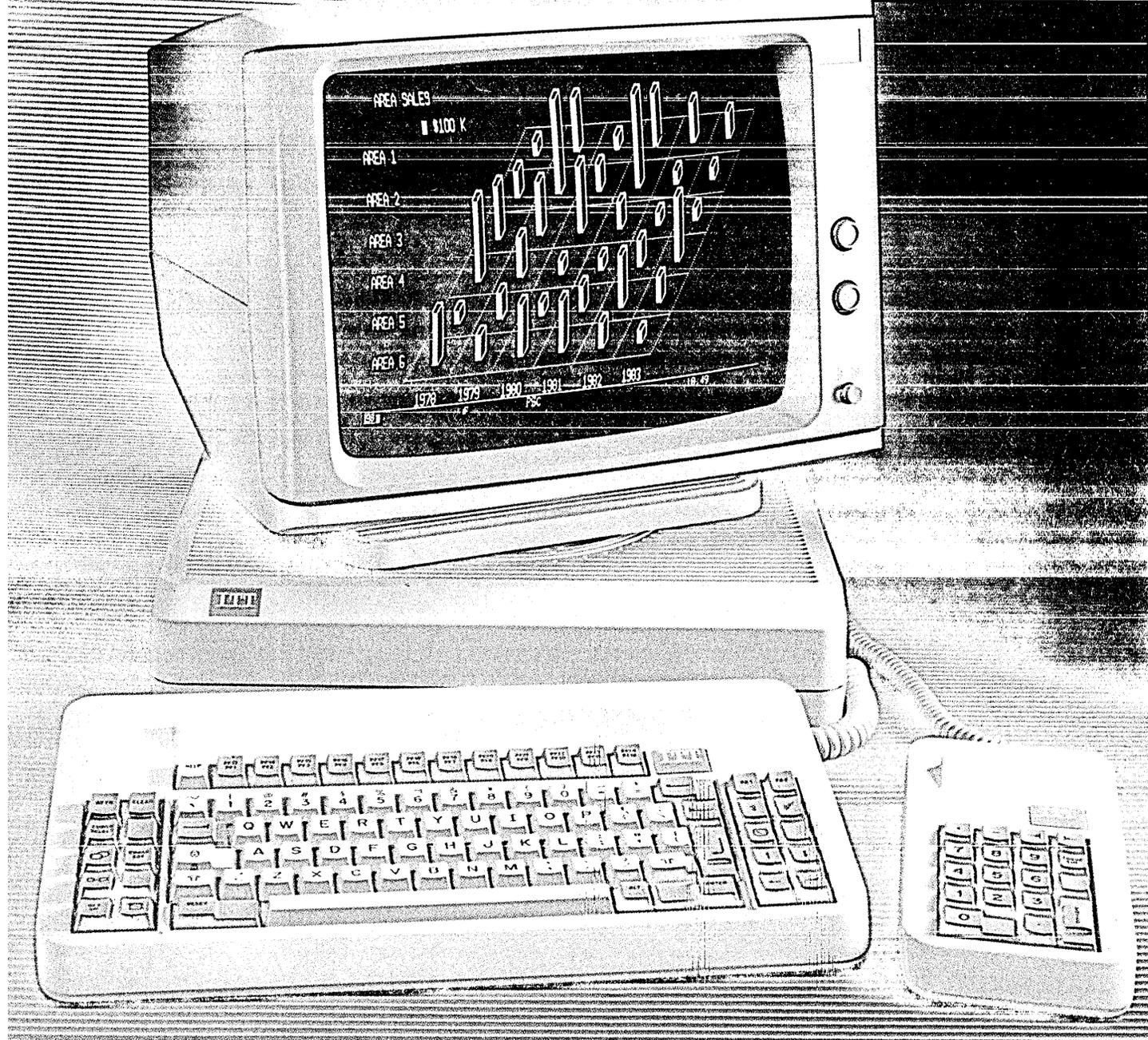
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CIRCLE 86 ON READER CARD



# THE ITT 9236. IT HAS THE FUNCTIONS YOU WANT TODAY, THE FLEXIBILITY YOU'LL NEED TOMORROW.

When it comes to extended functions, our new 9236 display has everything. For instance, it gives you dual logical units that let you change applications with a single keystroke. It has selectable screen formats so you can use one display to handle more than one application. It can use a light pen or operate a display-attached printer so you can make local copies at your workstation. It offers the ergonomic benefits of a non-glare matte finish. A compact, low-profile keyboard. And a flicker-

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working, the electronic office, or wherever else you want to grow. Of course it wasn't easy designing in all this and keeping the 9236's price competitive, too. But, then again, giving you more display for your money has always been what ITT Courier is all about. For more information, contact your nearest ITT Courier Representative. Or call the ITT Courier Sales Support Dept. at 1-800-528-1400, toll-free.



# HARDWARE

## OFF-LINE

When Honeywell Office Systems introduced its NX engineering Unix workstation recently, HOS director of workstation marketing J. Martin Strakhovsky was hyped as one of a new generation of corporate executives -- what John Naisbitt dubbed "intrapreneurs." The tag is cute, and it indeed applies to Strakhovsky, who brought the NX to fruition almost single-handedly, earning praise for bypassing Honeywell red tape.

But the NX itself is flawed, and one wonders whether its more obvious problems could have been avoided had the product gone through a more traditional development process. Its most apparent and serious drawback is its critical lack of software. HOS is relying entirely on independent software vendors to provide applications for the product. But those vendors, also working on products for hardware with broader potential markets, may be too busy to bother with the NX. While HOS is selling the NX as a kind of low-cost CAD machine, so far the only packages it can run are a word processing program and Multiplan. HOS can also show a set of three-dimensional graphs that can be drawn by a package called DDD-Graph, but that does not yet work with the NX. In other words, HOS is selling a CAD box with no CAD software.

Strakhovsky, in defending the lack of software, says that because the NX is based on Unix there should be several CAD applications available when it is shipped in January. That's of course assuming that Unix applications are portable from machine to machine. The NX's version is based on Bell Labs' System III, with Berkeley 4.1 extensions and a window manager and font editor that have nothing to do with any other Unix known to man. Those two additions are said to allow for multiple tasking without affecting Unix programs, but

the choice of System III raised some eyebrows, since the newer System V has more sophisticated applications available. Strakhovsky admits that System V had been announced when HOS started designing the NX, but says he did not want to wait until it was delivered. HOS, a division of Honeywell Information Systems of Waltham, Mass., thought patience need not be a virtue.

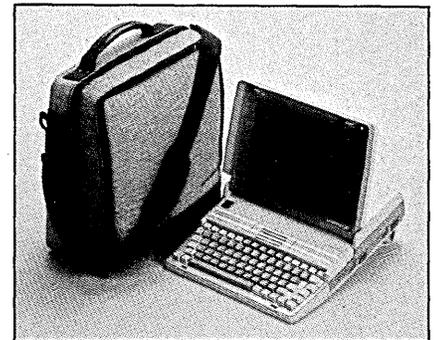
And then there's the network. Honeywell is selling Corvus's Omninet, which runs at 1Mbps, rather than an Ethernet-like 10Mbps net. Strakhovsky says the reason is cost: the company set a \$10,000 ceiling on the system, and he believed any Ethernet attachment would bring the system over that price. The other reason, which Strakhovsky doesn't mention as readily, is that Corvus, not Honeywell, built the NX. Both reasons are irrelevant if HOS really wants to sell the NX as a CAD machine, since CAD files are often too big to be passed among users without severely degrading network performance.

These drawbacks indicate a basic lack of direction in the NX, a direction that could have been provided with more input from other areas of the firm. Strakhovsky's decision to go outside for hardware and software despite Honeywell's substantial vertical market expertise, his impatience with Unix System V, and his miserly choice of Omninet all indicate that he feared missing the market window for a low-cost CAD system. As a result, the NX is competing primarily on price: by rushing to market and keeping price paramount, Honeywell severely compromised the NX's capabilities and market potential. All of this shows that as talented as Strakhovsky is -- and he certainly deserves praise for getting the NX to market without strangling in red tape -- the market is too sophisticated for individuals to go it alone: no man can afford to be an island.

## BIG SCREEN LAP SIZE

The Data General/One Personal System is a 10-pound portable personal computer that incorporates a full-sized liquid crystal display capable of displaying 25 lines by 80 columns in a unit smaller than a briefcase.

The system runs MS/DOS, CPM/86, and Venix. According to the vendor, it is fully compatible with the IBM Personal Computer. The 25-line by 80-column



screen has a bit-mapped display with 640 by 256-pixel resolution allowing use of graphics applications. It can accommodate up to 512KB of user memory and up to two 3½-inch floppy disk drives of 737KB each. The unit also has a full-sized, full-function keyboard with 79 keys.

In addition to the internal peripherals, an external 5½-inch IBM-compatible disk drive is available. The vendor will also offer an IBM PC-compatible expansion chassis for the unit. The chassis will accept up to five full-sized expansion cards. Other options include a 300-baud modem and a rechargeable nickel-cadmium battery pack that can run the computer for up to 10 hours of constant use.

The vendor said that by using its software link, called CEO Connection, the computer can translate documents and files from microcomputer software programs to larger computers in a Data General CEO Comprehensive Electronic Office automation network. Prices for the One Personal System start at \$2,900 for a system with 128KB of memory and a sin-

## HARDWARE

gle disk drive. DATA GENERAL CORP., Westboro, Mass.

**FOR DATA CIRCLE 301 ON READER CARD**

### MASS STORAGE FOR MICROS

The AQMS 513 is a mass storage subsystem designed to provide micros and micro LAN systems with a complete system that has the storage capabilities of a mini or mainframe, the vendor says.

The system consists of a 14-inch Winchester mass storage drive with a formatted capacity of 411MB and a 160MB streaming tape drive. The unit's software provides the interface between the mass storage drive and the MS/DOS operating system. According to the vendor, most IBM PC software runs on this mass storage system without modification. Because of its speed, network bogging can be reduced when a large number of users are logged onto the system. In addition, each network user can be provided with a much larger data storage area. The AQMS 513 costs \$24,000. AQUIX ADVANCED SYS-

TEMS CORP., Farmingdale, N.Y.

**FOR DATA CIRCLE 302 ON READER CARD**

### LISP MACHINE

The LMI Lambda 4X4 is a four-user, high-performance Lisp machine. It is a full-function, high-speed software development station designed specifically for use in AI software design environments.

The system allows four fully independent Lisp processors to share power supplies, card cages, communication, tapes, and disk storage. The unit employs the 37.5Mbps multiprocessor NuBus architecture. Its open-ended design allows users to have a machine that suits their specific needs.

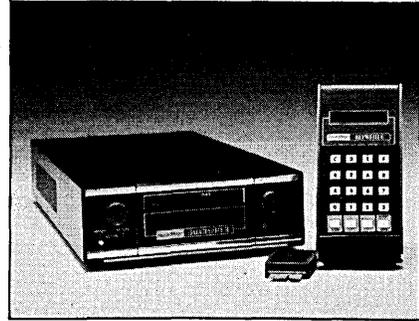
This system supports ZETALISP-PLUS software. As an option, LM-PROLOG is available. The machine's standard 4MB of physical memory, expandable in 2MB increments, is segmented between the processors, while other system resources are shared, including the 470MB Winchester disk drive, the integral Multibus, and

the optional Ethernet-II interface and tape drive. The system is priced at \$45,000 per user. LISP MACHINES INC., Los Angeles.

**FOR DATA CIRCLE 303 ON READER CARD**

### ENCRYPTOR

The Datacryptor II Model 1027 is a link encryption device designed to safeguard



sensitive, unclassified government data. It has been endorsed by the U.S. Government as meeting Federal Standard (FED-STD) 1027, which specifies operational and design criteria for security. The unit implements the National Bureau of Standards Data Encryption Standard algorithm.

This device operates with protocol transparency at data rates of up to 9,600bps, synchronously or asynchronously, in full- or half-duplex modes, and on leased or dial-up lines.

For each communication link it encrypts, the unit works in conjunction with an accessory key writer to enter cryptographic key values in compliance with FED-STD 1027. The device incorporates diagnostic functions, including self-test and operator tests for analysis and system fault isolation. The Datacryptor II Model 1027 costs \$2,800. RACAL-MILGO, Miami.

**FOR DATA CIRCLE 304 ON READER CARD**

### DRAFTING SYSTEM

The Producer II is a drafting system aimed at the computer aided design (CAD) marketplace.

It features two 19-inch monochromatic graphic displays, a controller with a 27MB Winchester disk drive, the DMP-52 sheet-fed plotter, menu pad, workstation desk, and a library of 5,000 predrawn figures. All hardware and software is compatible with the rest of the vendor's drafting systems.

The monitors have a resolution of 1,024 by 800 pixels. Each of the intelligent raster displays has its own MC68000 graphics processor to perform intensive graphic operations like instantaneous pan, zoom, and local redisplay.

In addition, the unit's servo-driven plotter offers pen speeds of up to 22 ips and a resolution of 1/1,000th of an inch.

## HARDWARE SPOTLIGHT

### OFFICE SYSTEMS

The Office Management System (OMS) is a line of communication-oriented office systems that packages hardware and software for departmental applications. The menu-driven system is available in three models. The units offer departments of office processing capabilities, data entry and program development tools, and electronic mail and communication facilities.

The OMS 40 system is based on the vendor's 16-bit minicomputer technology and the OMS 90 is based on the manufacturer's 32-bit superminicomputer. The systems support concurrently four to 34 users. Each system runs under the vendor's GCOS 6 operating system and is compatible with the company's DPS 6 small computer product line.

Both models use the Office Automation Systems (OAS) software. The integrated OAS software includes text processing, records processing for creating office-level databases, a calendar feature, calculator capabilities, and InfoCalc, an electronic spreadsheet. The system also includes a spelling verifier and corrector.

Communication capabilities include terminal-to-terminal and system-to-system, as well as access to timesharing and public information services. Included are electronic mail, BSC and SNA-based communication and document transfer capabilities with IBM hosts, and document transfer capabilities to remote Honeywell host systems via the vendor's RNP and DSA networking protocols. The Asynchronous Communications Facility (ACF) gives users interactive access to tty-com-

patible systems and also allows users to tie into public information services. The ACF also allows users to record the session and save the document for subsequent printing or processing.

A user-defined applications interface enables users to tie applications that they have developed or that have been developed on a DPS 6 system into the OMS system menu. A program development facility, which includes compilers, editors and run time libraries for BASIC, FORTRAN, COBOL, and Pascal, is available for OMS 90 users who want to create their own applications. Also available is a data entry facility, which allows data entry on forms established by users and includes validation and editing functions.

Both models incorporate current DPS 6 refinements, including a memory management unit built into the central processor.

Memory and storage varies with each model: the OMS 40-1 provides 1MB of main memory and 40MB (20 fixed and 20 removable) of disk storage, and the top-of-the-line OMS 90-3 includes 4MB of main memory, and either 134MB or 512MB of mass storage with the option to add up to 1.1GB of disk storage.

Pricing varies by model and the number of terminals and printers attached to the system. An OMS 40-2 configuration with eight terminals and four letter-quality printers sells complete with software for \$80,000. The high-end OMS 90-3 system with 34 terminals and 14 letter-quality printers is priced at \$222,000. HONEYWELL INC., Billerica, Mass.

**FOR DATA CIRCLE 300 ON READER CARD**

# NO OTHER LETTER-QUALITY PRINTER CAN TOUCH OUR NEW SPINWRITER FOR SPEED AND EASE-OF-USE.

## Introducing the Spinwriter 8850.

Our newest, and fastest, Spinwriter® printer operates at over 550 words-per-minute. And is extraordinarily easy to operate.

For one thing the Spinwriter 8850 takes care of basic settings such as pitch and forms length automatically. Of course you can also change either

printer available for the IBM® PC. It's still one of the few that works with all IBM PC software, as well as all other popular packages. You'll notice even its looks are compatible.



THE 8850 JOINS THE HIGHLY-RELIABLE SPINWRITER LINE.

one at the touch of a button. It also has a unique control panel.

With large, legible alphanumeric LED's to indicate the specific operating status. And make it simple for even an unfamiliar operator to use.



UNIQUE LED DISPLAY TELLS USER EVERYTHING FROM THE FACT THAT PAPER IS OUT



TO THE FACT THE COVER IS OPEN.

And, of course, the 8850 has all the features, quality and reliability that

make a Spinwriter a Spinwriter. **The first choice of IBM PC users.**

The Spinwriter printer was the first totally plug compatible letter-quality

CHANGE FORMS LENGTH AT THE PRESS OF A BUTTON.

years without a failure is not unusual. No wonder there are more Spinwriter printers hooked up to IBM PC's than any other letter-quality printer.

## How to get up to speed.

For more information on the Spinwriter 8850 or our two companion



THE 8850 PLUGS RIGHT INTO THE IBM PC.

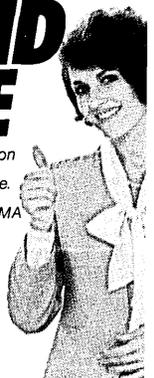
models, just call NEC Information Systems at: 1-800-343-4419; in Massachusetts call (617)264-8635.

Also available at: Entre, 1-800-HI ENTRE; Sears Business System Centers, 1-800-228-2200; and Computerland stores, (In California) 1-800-321-1101; (Outside California) 1-800-423-3008.

Find out why more and more IBM PC users are saying, "NEC and me."

# NEC AND ME

NEC Information Systems, Inc.  
1414 Mass. Ave.  
Dept. 1610  
Boxborough, MA 01719



Spinwriter is a registered trademark of NEC Corp. IBM is a registered trademark of International Business Machines Corp.

CIRCLE 88 ON READER CARD

# How to be in 16 places



# ...at once.

**With Northern Telecom's unique multi-tasking capability, you can perform a multitude of jobs — simultaneously.**

Now your staff can work on spreadsheets, move to word processing, shift to personal computing, then access data and communicate, without missing a beat. No more time-consuming interruptions. Thanks to the unique multi-tasking capability of Northern Telecom's 500 Series Office Information Systems.

With our unique access feature, your staff can leave any application at any point and move to another — and another — while the original task is processed through completion. In fact, the 500 Series will keep track of as many as 16 running programs at once!

Northern Telecom's 500 Series Information Systems also have outstanding communications capabilities. Besides being compatible with each other, they communicate with a multitude of mainframes, including IBM, Burroughs and CDC. They also talk to other minis and even micros such as IBM PC's and Apple.

Our multi-tasking capability allows for up to 16 users to access common files — send or retrieve — from across the hall or across the country. So your people spend less time researching, duplicating efforts and conducting meetings.

Let us show you how easy and cost-effective it is to be in 16 places at once.

Write Northern Telecom Inc., 9705 Data Park, P.O. Box 1222 — T-240, Minnetonka, MN 55440; or call 1-800-331-3113. (In Minnesota, call 612-932-1145.)

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"IF IT WAS ANY MORE USER-FRIENDLY, IT WOULD JUMP UP AND KISS YOU."

—George Heffley, Intel Corp., Phoenix, AZ

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Presents

# DATA PBX

A user-friendly  
Port Selector



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—Dr. Harold Koplow, Modular Computer Systems, Fort Lauderdale, FL (Equinox's first user)

**"Surprisingly compact for its dazzling array of features."**

—Charles Bairos, Polaroid Corp., Needham, MA

**"Powerful switching with elegant simplicity."**

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**"The greatest thing since sliced bread in datacomm."**

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**"Obsoletes Goliath Port Selectors."**

—Ralph Glasgal, Glasgal Communications, Inc., New York, NY

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CIRCLE 90 ON READER CARD

## HARDWARE

The plotter produces C or D size ink originals of paper, vellum, or polyester film. The Producer II drafting system costs \$42,000. BAUSCH & LOMB Interactive Graphics, Austin, Texas.

**FOR DATA CIRCLE 305 ON READER CARD**

### AUTO LOG-ON MODEM

The DialNet 3000 Model 3024 is an auto-dialing, full-duplex modem that operates at 2400bps. It has the ability to automatically log-on to a host computer.

The unit uses a new modem design that combines a digital signal processor chip with semicustom CMOS circuitry to provide CCITT V.22 bis-compatible communication at 2400bps. The modem also has a secondary 1200bps Bell 212 compatibility mode. During its answering sequence, the unit determines the speed and transmitting mode of the calling modem, automatically setting its own speed and mode to match.

The autodialer can place calls to numbers entered with the dial command, or the number can be selected (by name) from up to 20 numbers stored in the modem's internal directory. It operates under either terminal or computer control. Both pulse and tone dialing are supported by the autodialer, and the two modes can be mixed within a number, ensuring access to and compatibility with all long distance carriers, the vendor says.

Numbers stored in the modem's autodialer directory can be linked, so that if the first number is busy or doesn't answer, the modem will dial alternate numbers in a user-specified sequence.

Automatic log-on sequences also can be stored in the unit's directory. Then, whenever the modem calls a computer, it also can log-on to the user's account, all in the response of a single command. The modem has nonvolatile memory to store phone numbers and log-on sequence and the EEPROM used doesn't require battery backup.

The DialNet 3024 is offered in desktop packaging or as a card module for use in a compact rack-mount chassis. The standalone model sells for \$900, while its card module counterpart, the 3224, is \$850. MICOM SYSTEMS INC., Chatsworth, Calif.

**FOR DATA CIRCLE 307 ON READER CARD**

### VOICE PERIPHERAL

The CallText 5050 is a voice peripheral that gives any computer with an RS232C port the ability to speak with an unlimited English vocabulary. The unit features a text-to-speech conversion algorithm and a full-functioned FCC-registered telephone interface in a standalone package measuring 5½ by 9 by 16 inches.

The unit is designed for use in interactive systems with either local or re-

mote users. In locally operated systems for training, inspection, or alarm, it provides voice prompts, warnings, and responses to the user in a highly intelligible voice. Any user with a push-button telephone can also interact directly with any computer equipped with the CallText 5050 peripheral.

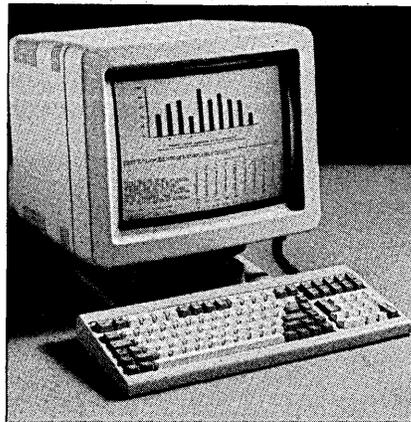
Some uses for this system include remote order entry; retrieval of electronic mail-in voice; access to information on securities, real estate, or transportation; as well as other types of voice transactions.

The telephone interface will both detect and generate DTMF (Touch-Tone) signals and provide all controls necessary to answer and initiate calls. It connects to the telephone through an RJ-11 modular connector. The unit can support up to three simultaneous conversations. Because the system converts ASCII text to speech, the computer sends it text similar to that which would be sent to a printer. Messages can be entered or automatically generated by the computer. According to the vendor, a benefit of this device is that there is no need to use a professional announcer to record voice messages or to allocate large amounts of memory to store speech data. The CallText 5050 in a single-conversation configuration costs \$3,000. Users can upgrade the unit to service additional simultaneous conversations by installing CT5010 expansion cards, which cost \$2,700 each. SPEECH PLUS INC., Mountain View, Calif.

**FOR DATA CIRCLE 306 ON READER CARD**

### ANSI TERMINALS

The XL Series consists of a line of four ANSI-standard terminals. Each features 15-inch nonglare amber, green, or white phosphor screens. Users may select a



landscape (horizontal) or portrait (vertical) screen orientation.

The landscape screen display is suited to applications involving vector graphics or large columns of data such as spreadsheets. The portrait display gives the appearance of an 8½ by 11-inch page for word processing applications. The

models also have a 110-key keyboard, which is programmable, and a swivel and tilt stand for the monitor.

Enhanced video features include slow scroll, keyboard pause control, and a dynamically selectable display capability that lets users locally zoom more data onto the screen for context or move data off the screen to increase character size. Visual attributes include normal, reverse, video, bold, blind, underline, and security. User-definable top and bottom host areas are standard. A full array of editing and erase commands are standard, including the ability to set editing extent to be within a line, field, or area. In addition, a private-use "push and pop" command allows for local rearrangement of data blocks.

Models include the Genie Plus XL, the Ambassador XL, the Tek-compatible GXL, and the Guru XL. The units feature the RS232C communication port operating at 110 to 19,000 baud with XON/XOFF and DTR protocols. Prices for the XL Series start at \$1,400. ANN ARBOR TERMINALS INC., Ann Arbor, Mich.

**FOR DATA CIRCLE 309 ON READER CARD**

### MAGNETIC PAGE PRINTER

The Model 800 is a magnetic page printer based on a patented, thin-film magnetic recording head. It is designed as an alternative to low-cost laser printers, the vendor says.

The desktop printer operates at 10 pages per minute and is designed for office printing applications ranging from 2,000 to 10,000 pages per month. The printer can store images on its magnetic drum. Once an image has been created, it can be used indefinitely as a magnetic master copy in a duplicator mode to print 14 pages per minute without data retransmission.

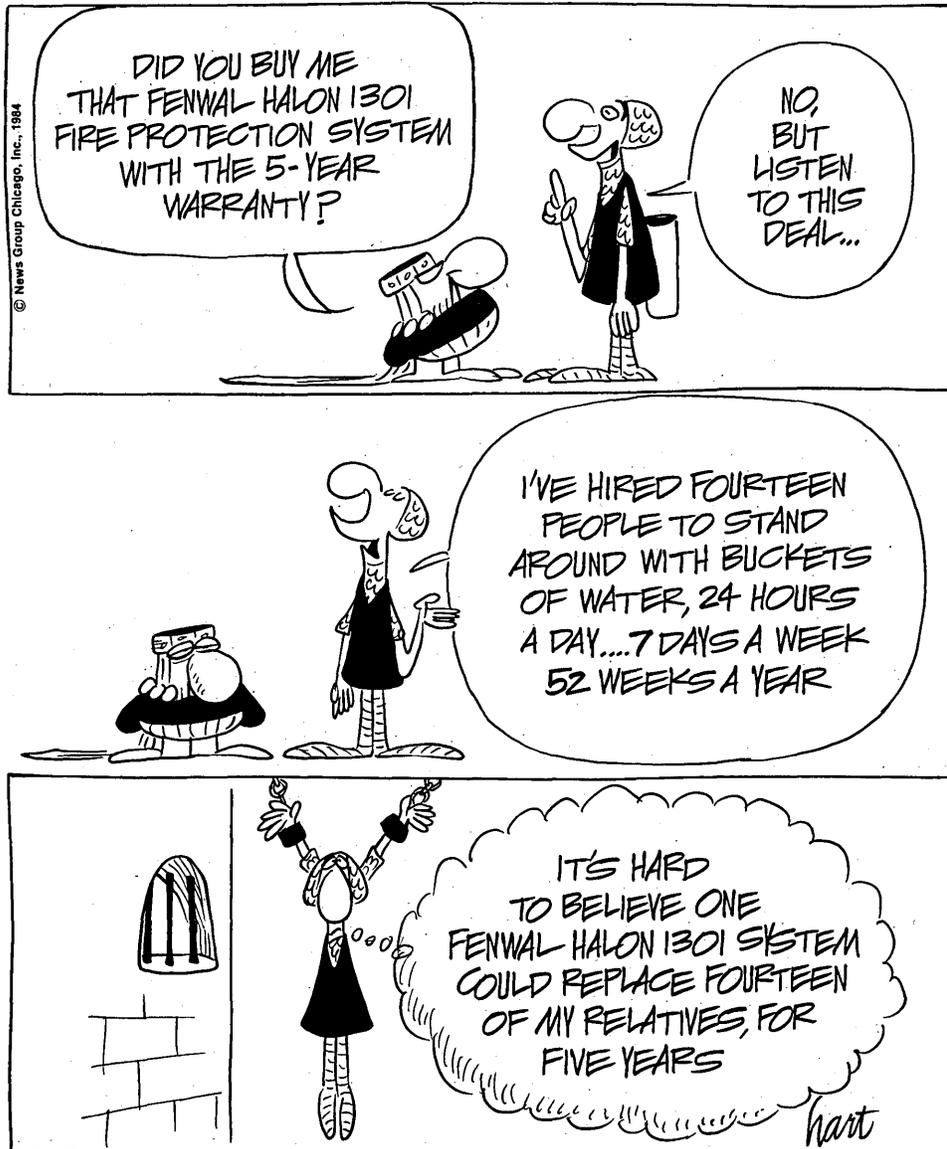
The patented thin-film magnetic head has what the vendor calls an "inside-out" architecture. Unlike a traditional ring core head where coils are wrapped around magnetic materials, this head has an internal coil structure surrounded by magnetic material.

The printer operates using an array of magnetic head elements mounted in a flexible substrate to generate concentrated dot images (57,600 dots per square inch) on a magnetically coated drum. As the drum rotates, it comes in contact with dry, monocomponent toner that adheres to the latent magnetic images. These developed images are then transferred to ordinary paper and heat fused to produce sharp, distinct characters. The Model 800 Magnetic Page Printer will cost between \$2,000 and \$3,000 in the oem market. FERIX CORP., Fremont, Calif.

**FOR DATA CIRCLE 310 ON READER CARD**

—Robert J. Crutchfield

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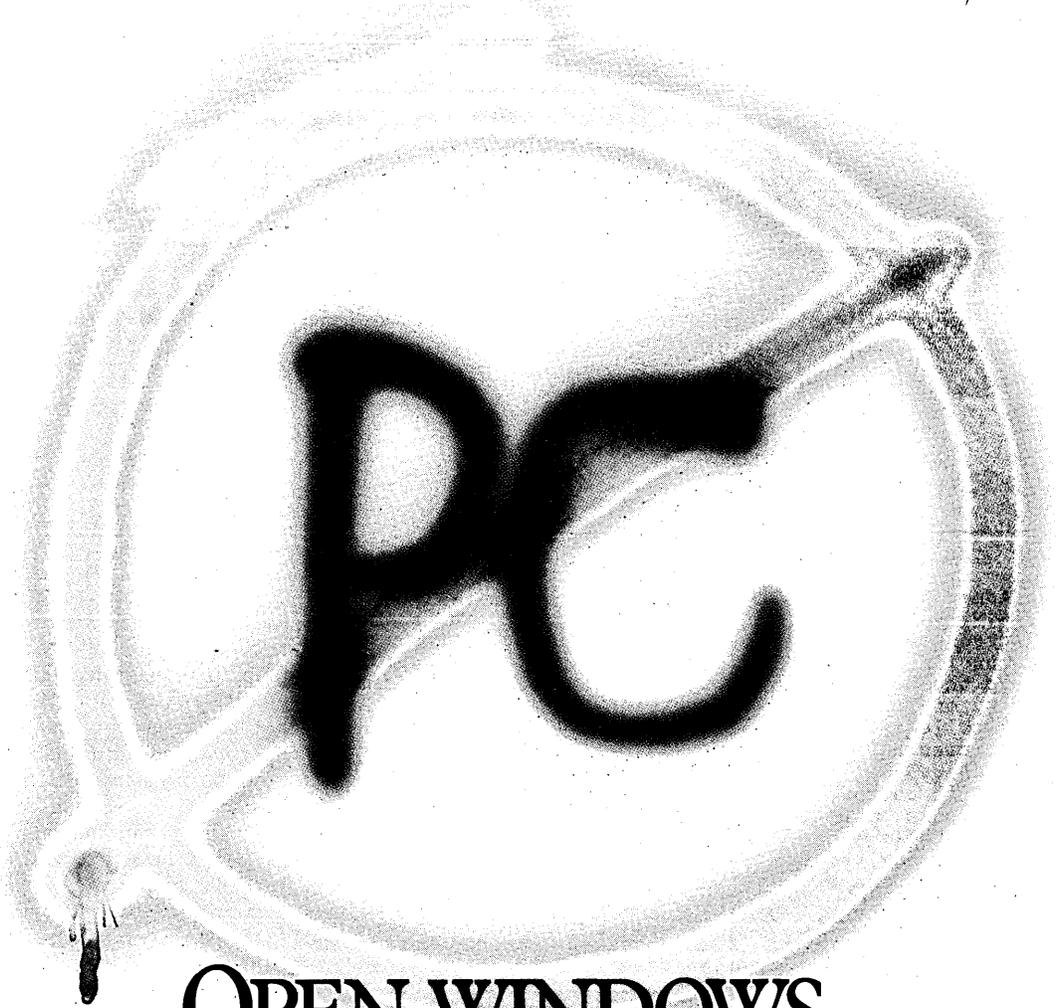
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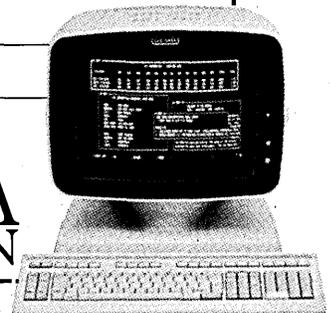
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# SOFTWARE AND SERVICES

## UPDATES

Ever since Admiral Bobby Inman's (U.S.N. Ret.) R&D group -- Microelectronics and Computer Technology Corp. (MCC) -- moved into the backyard of the University of Texas at Austin, that college's computer science activities have been much more visible.

Recently, UTA's computer department hosted a conference on artificial intelligence -- a subject that has received much attention in the software community.

In fact, the research firm of DM Data Inc. of Scottsdale, Ariz., estimates that the total artificial intelligence market will grow from \$148 million this year to \$2.8 billion by 1990. The study indicated this AI growth will occur in expert systems, natural language software, computer aided instruction, visual recognition, and voice.

The arguments for implementing expert systems are many, and the lure seems to be the ability of artificial intelligence to assist end users in gaining information by making queries in English to a system that has a specific body of knowledge stored in its database. One conclusion reached at the conference was that if computer scientists are ever to develop "expert machines" with the same level of intelligence as human experts, they first must define methods that best transfer the vast amount of human knowledge from man to computer. Researchers say the process of knowledge transfer is "crucial in the design of successful expert systems." But they add that some knowledge is often inexact and incomplete for computer systems in artificial intelligence. The basic themes that AI researchers therefore rely on is the philosophy of telling computer programs what to know and what not to do, as is done in ordinary computer programs. As a general rule,

researchers apply bits of knowledge incrementally or in a step-by-step process based on prescribed rules, the researchers say. To build expert systems, programmers must know the properties that characterize knowledge of certain fields, or a knowledge base, and there must exist an identified problem in order for the expert system to be utilized effectively.

"Expert systems gain expertise in incremental nature," said Dr. Douglas Lenat, a professor of computer sciences at Stanford University and a conference participant. The group also found that a problem or task can exist in many fields. Dr. Lenat also said, "If we can build expert systems that have utilized the success of previous systems, we can design them successfully," but warned that "one of the real dangers of the lure of expert systems is how to get knowledge from the heads of experts to expert systems and how to evaluate the system once built."

Researchers measure the success of a system by validating the structure of the program. This task remains elusive to many in the field, although validation of an expert program can be achieved by those who constructed the program. "We want to keep the program expert informed of the program because of the change in knowledge," said Dr. Lenat, adding, "Knowledge is not static." And judging from the attention artificial intelligence generates in the dp community (and not just in the cloistered halls of computer science departments of universities), conferences and product introductions dealing with AI are not static either. Many new AI products are making their way into the dp mainstream in greater numbers from more vendors. And with the products, expect more conferences and claims.

## INFO CENTER COURSEWARE

The Introduction to VM/CMS for Information Center End Users is microcomputer-based training courseware for information centers that use the VM operating system with CMS. It teaches those basic segments of the VM/CMS operating system and editor that a business analyst would need in order to use application software on the mainframe for decision-making or information processing.

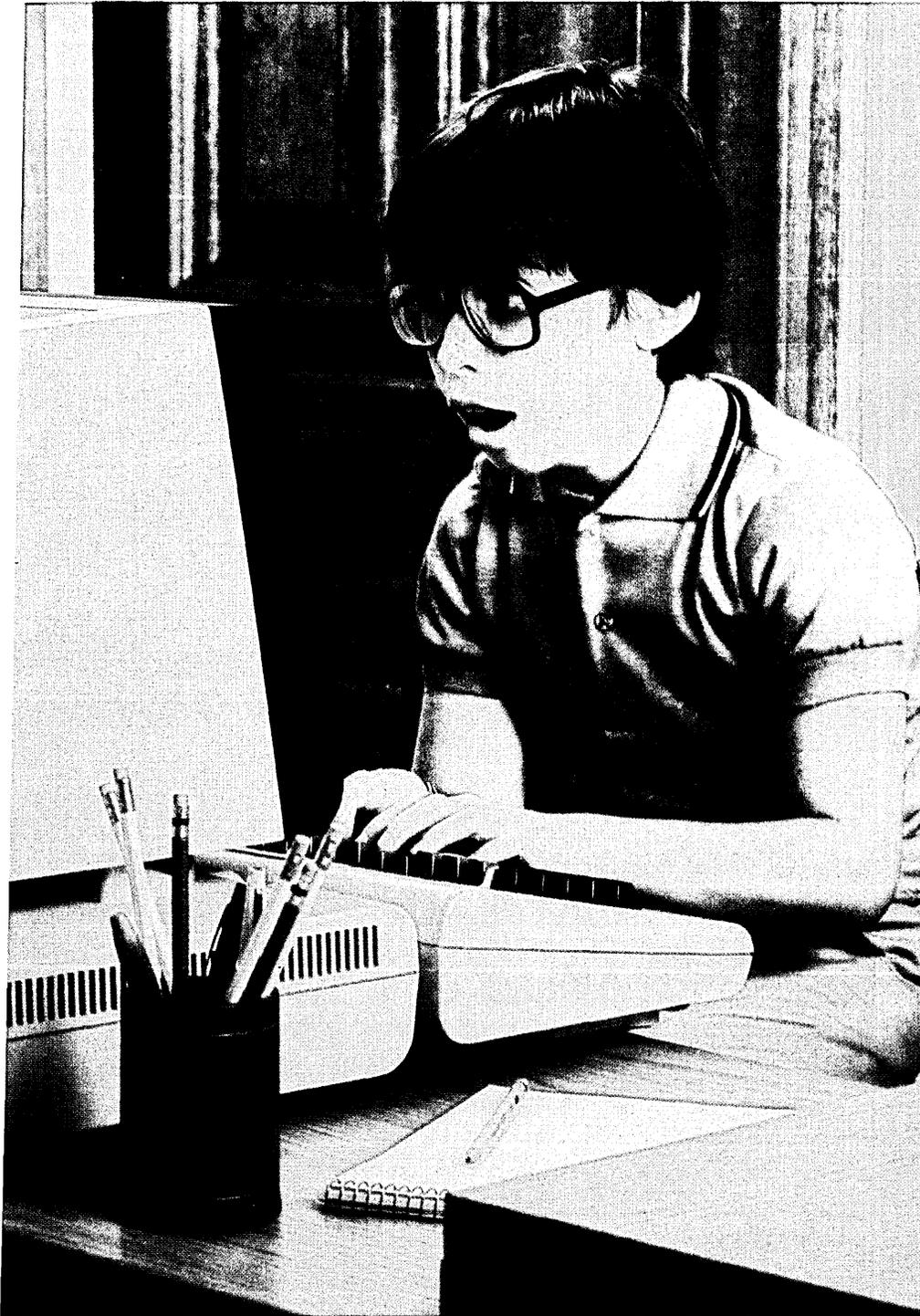
The course runs on the IBM Personal Computer, PC XT, or 3270 PC. According to the vendor, the 3270 PC offers the best environment for users to do the course because it not only operates as a micro, but it has immediate access to the VM/CMS environment on the mainframe. When it is time to do one of the course's practical exercises, the student uses the 3270's "jump" key to go directly to VM/CMS.

The six-to-10-hour interactive course gives users total control over what is learned and how it is learned. What is learned is selected using the courseware's menus to choose from eight modules offered. There are over 2,000 screens that present simulations, ask questions, and provide information about the different aspects of using VM/CMS.

After users have decided what to learn, they can elect how to learn it. The information in the course is presented in detail form as well as in summary form on the micro and also on videotape. A course guide to use both during and after training is also included. The combination of menus and detail and summary and video course tracks provides the versatility an information center needs to accommodate diverse backgrounds and learning paces of users, support initial and refresher levels of instruction, and to vary the length of instruction to match the amount of time users can devote to training. An optional performance tracker module can be used by the information center's staff to monitor the progress and performance of each student.

According to the vendor, upon

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For more information on VMCENTER, call or write VM Software, Inc., 2070 Chain Bridge Road, Suite 355, Vienna, Virginia 22180, telephone (703) 821-6886.

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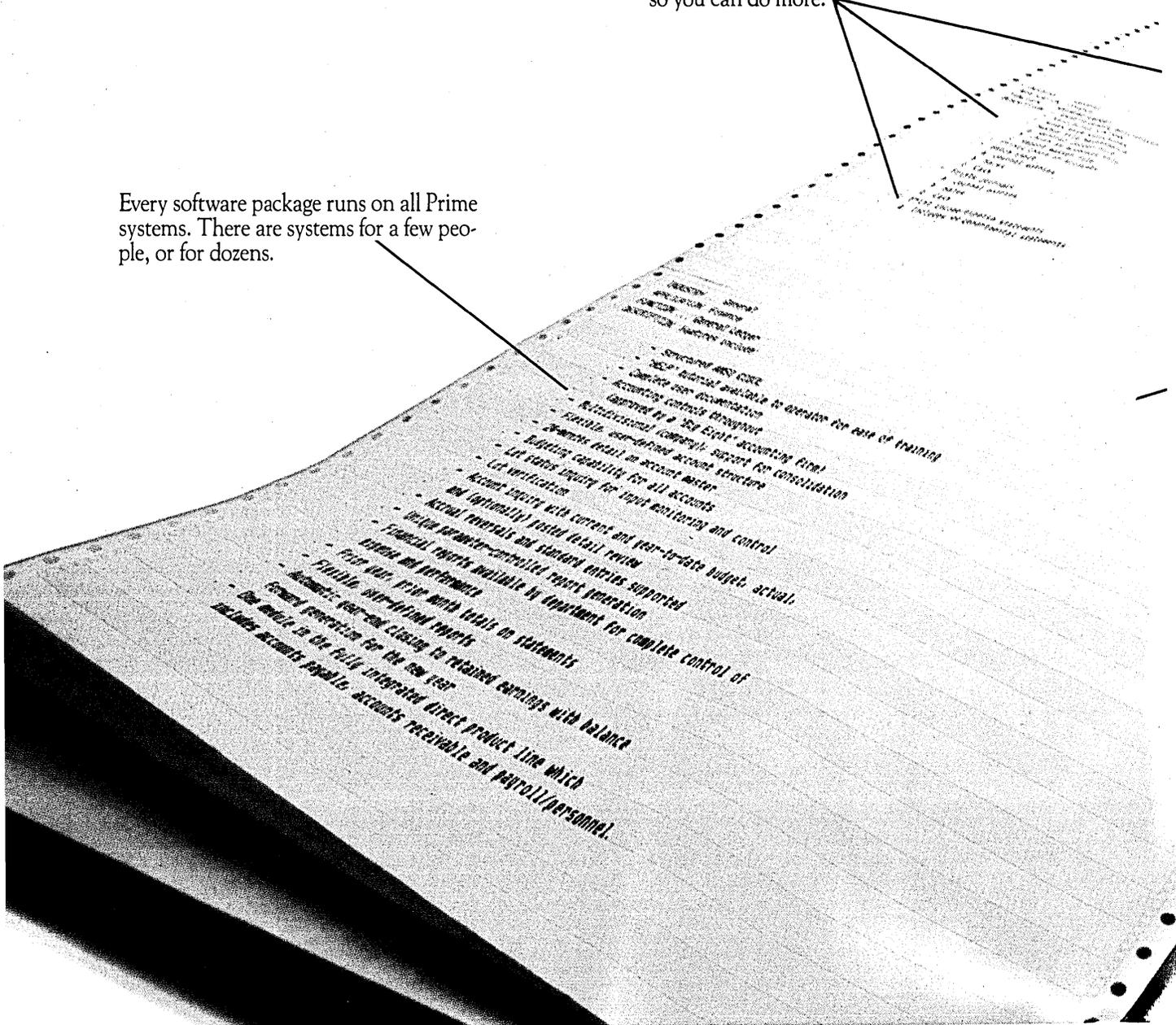
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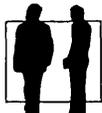
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CIRCLE 95 ON READER CARD

## SOFTWARE AND SERVICES

completing the course users will be able to describe the relationships between minidisks and the virtual machine; log-on and log-off VM/CMS and describe the function of the keys on the terminals; interact with VM/CMS and describe the command environments; create a file using XEDIT; perform file, mini-disk, and account housekeeping tasks; create and edit PROFILE XEDIT and PROFILE EXEC files; and custom program the terminal's function keys.

The tutorial requires PC/DOS, 64KB of RAM, and single disk drive. Introduction to VM/CMS for Information Center End Users costs \$3,000. COMSHARE, INC., Ann Arbor, Mich.

**FOR DATA CIRCLE 326 ON READER CARD**

### INTEGRATED SOFTWARE

ABILITY is an integrated software package that becomes a true operating environment by sheltering users from learning computer languages or protocols. It integrates common English language commands for all six of its applications.

The package combines word processing, spreadsheet, database, graphics, and telecommunications applications plus a module called Presentation, which creates a slide-like presentation using any combination of words, graphs, and numbers.

The product features a library with a table of contents and operating shell permitting changes between files using common English words. It is not necessary to know the disk operating system (DOS) language. The library graphics include icons to highlight the various modules.

The presentation application also permits users to enhance presentations with a selection of 25 precomposed tunes and a variety of transition techniques and icons. Screen snapshots can be taken by a keystroke. Users can transfer these to a diskette for presentation on a personal computer or transmit the entire package via a modem.

Custom command requirements may be programmed on up to 30 macro function keys. Selective one-way and two-way dynamic linking capability between individual cells in all five applications creates an environment that automatically alters all interdependent cells accordingly.

Other features include free intermixing of text, spreadsheet, and graphics from the text mode, capability to cut and paste any combination of words, numbers, and graphs, and a flip key for comparison of data from two different applications. The entire integrated software package resides on one diskette. A tutorial diskette is also included. The software is designed for use on an IBM Per-

sonal Computer with a minimum hardware configuration of 256KB RAM, two disk drives, color monitor, and color card. ABILITY costs \$500. XANARO TECHNOLOGIES INC., Toronto.

**FOR DATA CIRCLE 327 ON READER CARD**

### TALKING MICRO

SmoothTalker is a text-to-speech synthesis software product for microcomputers. It accepts plain English text from either the keyboard or from a text file and automatically synthesizes the text into a clear sounding adult male or female voice heard through the computer's built-in speaker or external amplifier.

This speech synthesis product is entirely software driven. Its speech patterns are based on the 41 English language phonemes. So, according to the vendor, memory is not taken up to store words in a dictionary form, since the software speaks the words based on preprogrammed rules about the speech patterns. The speech synthesis is done with an enhanced set of algorithms as opposed to linear predictive coding and other parameter passing techniques. Versions of this product are already under development in other languages.

The first application of the product is for the Apple Macintosh computer. Versions are also planned for other micros, including IBM's. The software is available in two forms. The first is as a software module that can be incorporated into other business and personal software programs. It is also available as a complete software package available through retail dealers.

Documentation is on-line. The software reads plain English. The voice is understandable and the speech quality doesn't distract users from understanding

what is being said. According to the vendor, it can be incorporated into computer programs without the need for a speech synthesis chip. It has save and recall capabilities. The speed, pitch, volume, bass and treble, and levels of speech are under software control. It understands salutations, mathematical symbols, and common English conventions. For example, the software says "doctor" for "Dr." The product also allows users to create their own defined dictionary and it can read text files and MacWrite files.

The male and female voice options are included with the package. Applications include education, entertainment, electronic mail distribution, product tutorials and demonstrations, and proofreading for writers. It can also convert book text into speech for the blind. SmoothTalker costs \$150. FIRST BYTE INC., Long Beach, Calif.

**FOR DATA CIRCLE 328 ON READER CARD**

### FAULT TOLERANT SOFTWARE

The Internet System is designed for 24-hour fault tolerant international banking systems. It features comprehensive and fully integrated application modules for the management of all major types of international banking transactions.

The software runs on Tandem NonStop II and TXP computers. The system keeps track of international banking from the management of foreign exchange and funds transfer to risk management and accounting. It also tracks loans and deposits, current accounts processing, and financial and managerial reporting.

Additionally, the system operates in perpetual real time. According to the vendor, this feature ensures that data from branch offices around the world are

## SOFTWARE SPOTLIGHT

### HARDWARE ACCOUNTING SYSTEM

The Hardware Accounting System (UCC-4) is an inventory accounting software package for managing data centers. On the physical side, the product offers a centralized base for inventory control data, making centralization of staff functions unnecessary. On the financial side, it provides immediate on-line access to information used for tracking and controlling hardware costs.

The automated accounting functions of the software allow management of all purchased, rented, or leased equipment. Its inventory control functions include configuration impact analysis, tracking of on-order equipment, rental/lease accrual tracking, and current book value tracking. Billing verification reports compare anticipated vendor

changes with those received on vendor invoices. Financial information may also be used for internal cost distribution and for budget projections.

A direct interface to the vendor's UCC-8, a data center management software package, will allow on-line management of all equipment problems. Through a single process, a complete record of device failures, vendor responses, and impact on configuration can be maintained.

The software runs under CICS on IBM and IBM-compatible MVS systems. Disk space is required for the product's database. According to the vendor, the amount of space depends on the number of inventory line items, but is not likely to exceed half of an IBM 3350. The Hardware Accounting System (UCC-4) is priced at \$15,000. UCCEL CORP., Dallas.

**FOR DATA CIRCLE 325 ON READER CARD**

## SOFTWARE AND SERVICES

always available, giving user banks an advantage with account balances, risk exposure, and electronic banking procedures.

The system features vertical and horizontal integration, perpetual real-time processing, flexible and comprehensive software and hardware, as well as a security system. Fourteen modular applications are available. These support functional capabilities ranging from transaction management and decision support to integrated communication and global electronic banking products of all types. The system also allows individual banks to interface their computer to major international clearinghouses and networks.

Security is built into the system. It uses an algorithm that restricts unauthorized personnel from accessing the system by limiting operators, terminals, times of day, functions, amounts, or accounts.

The software is written in Tandem languages TAL and ENFORM. Provisions have been made to support COBOL, FORTRAN, BASIC, and MUMPS. The complete Internet System is priced from \$700,000. INTERNET SYSTEMS CORP., Chicago.

**FOR DATA CIRCLE 329 ON READER CARD**

### PC COBOL

Professional COBOL allows the IBM Personal Computer to be used as a professional workstation in dp shops. According to the vendor, this product is a complete COBOL application development system that doesn't take up time on the mainframe.

It is designed for dp professionals and for computer users with COBOL experience. The product includes program development aids and programmer productivity and performance tools in a single package.

The software is based on the latest compiler and run-time system technology and employs internal architecture that increases program and data handling capacity. It runs on the IBM PC, PC XT, PC AT, 3270 PC, and the Portable PC. Minimum machine memory required is 256KB of RAM. MICRO FOCUS, Sunnyvale, Calif.

**FOR DATA CIRCLE 330 ON READER CARD**

### AI LANGUAGE

MPROLOG is a development language for logic-based systems. The software is derived and developed from an extension of the original PROLOG language used in Europe. It will be available in micro, mini, and mainframe versions. This programming language can be used to describe a problem without having to program explicit steps toward a solution. Its execution corresponds to a controlled deduction through facts, relationships, and rules.

The package is being marketed in the areas of general applications as well as specific programs. Areas where the language can be used include expert systems, deductive databases, natural language software, computer aided learning, fault diagnosis and repair, visual perception and guidance, and voice recognition. The product includes training, documentation, and support.

According to the vendor, programmers with as little as junior college training in programming can use this language productively to create expert systems. The software is declarative, it specifies the problem. It offers simple syntax and semantics that can be changed and expanded. MPROLOG's modular capability allows subsets of the problem to be specified and tested. An interactive program editor aids in program development. Other features include on-line help, concurrent editing and error correction.

The product runs on VM/CMS, VAX/VMS, Unix, PC/DOS, and SORD (Charles River) M68000 UNOS. LOGICWARE INC. Toronto.

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### INVESTMENT TUTORIAL

Analyzing Business Investment Opportunities Using Electronic Spreadsheets (ABIO) provides a means for evaluating potential business ventures. Spreadsheet templates enable users to implement techniques taught in the tutorials.

The product is available for the IBM PC, PC XT, and compatibles. It supports Lotus 1-2-3, Multiplan, VisiCalc, and SuperCalc 2. It is also available for the Apple IIe and II Plus.

Each package consists of instructional and template diskettes. Each also has a reference guide that includes formulas and exercises. The program focuses on financial statements and the time value of money. Concepts like present value, future value, discount rate, net present value, and internal rate of return are defined, explained, and explored. An actual case study of a new business opportunity is also examined using the technique of discounted cash flow analysis.

Template models that run on the user's spreadsheet software allow immediate evaluation of business opportunities with topics appropriate to the analysis at that time. ABIO costs \$70. CDEX Corp., Los Altos, Calif.

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### MANAGEMENT SOFTWARE

Organization Map Jr is designed to help managers improve their organization's productivity and at the same time manage their human resources more effectively. The software runs on the IBM Personal Computer and it consists of two sys-

tems, the human resources decision support system and the organization analysis and productivity support system, which work together to give managers a comprehensive picture of the organization.

The human resources decision support system provides a description of an organization's structure, including layers of management, spans of control, and staffing levels. In addition, this system can also serve as a manager's own human resource information system, enabling him to keep track of a variety of key facts on each of his employees, as well as tracking the characteristics of the overall work force.

The organization analysis and productivity improvement support system presents a manager with a detailed view of the work activities taking place within an organization, points out where these activities are taking place, and then calculates their various costs. As a result of this process, the vendor says management is better able to focus the efforts of its people on activities that will meet objectives, reduce redundant or low payoff work, and increase efforts on activities that receive too little attention or too few resources.

According to the vendor, other benefits of the software include its ability to strengthen manpower/succession planning efforts, computerize organization charts, monitor and control compensation costs, and simulate and analyze the effects of various organizational changes. It is menu driven and comes with a user's manual. Organization Map Jr costs \$900. A demonstration system is available for \$100. PACESETTER SOFTWARE, division of Synergistic Software & Systems Inc., Princeton, N.J.

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### PERFORMANCE ANALYSIS

The ADABAS Performance Analysis System (APAS) allows the database administrator to monitor database activity at any detail or summary level.

Insight, an optional component, makes all APAS facilities available on an interactive, real-time basis. With this module, the dp shop can control the generation and display of performance information to meet current needs such as determining causes of poor response times, tracking programs being tested, or determining who has the greatest impact on the system resources.

Areas of application include performance analysis, capacity planning, chargeback and accounting, security, and debugging. Prices start at \$8,750. DATABASE UTILITY GROUP, Federal Way, Wash.

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—Robert J. Crutchfield

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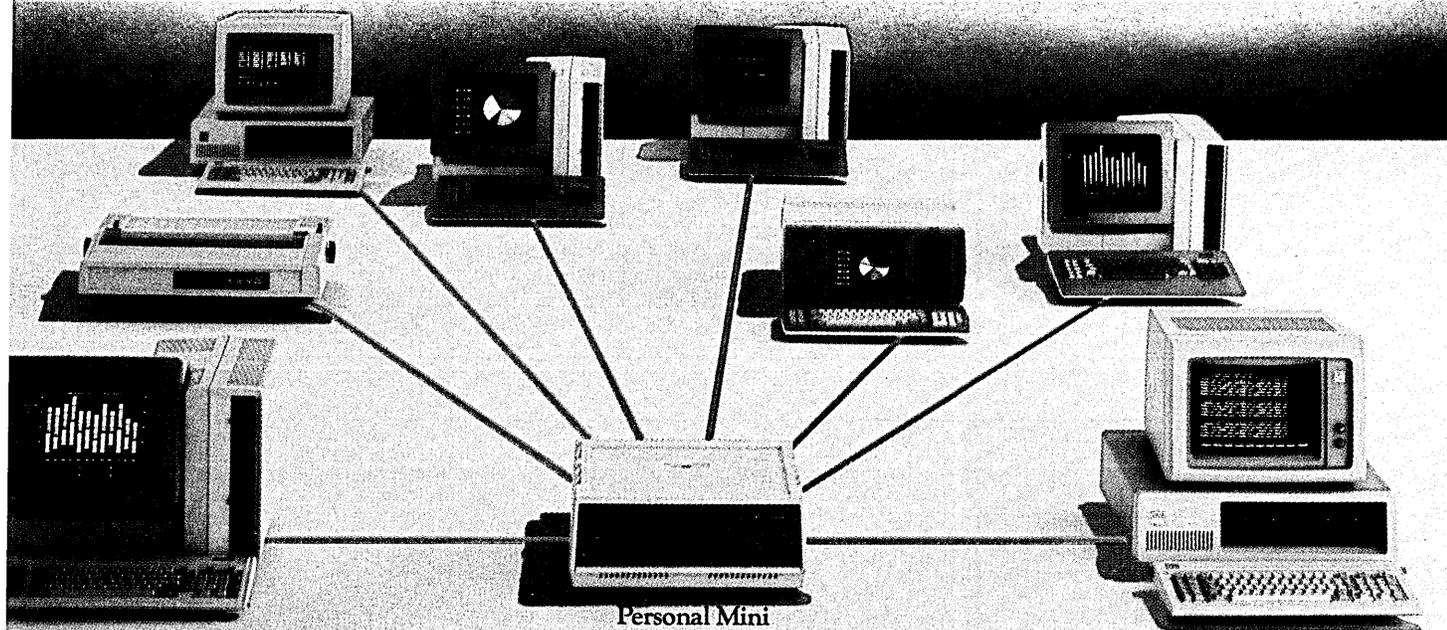
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# ON THE JOB

## FIRMING UP

Christian & Timbers Inc., a Cleveland high-tech search firm, recently did a study on the presence of women in high-tech jobs. It was found that while women had made some progress, they were rarely found to be managers in the field.

The company figures that no more than 5% to 10% of total executive em-

ployment consists of women.

The study did show that over the past three years, there has been a 200% increase in the number of high-tech searches resulting in the hiring of women. Most of these, however, have been middle management positions, with the aerospace industry the leader in having the most women in high-tech roles.

Another interesting finding was that there are more women ready to crack the high-tech exec market than ever before. Jeffery Christian, president of Christian & Timbers, says he's seeing a lot more women electrical engineer, mechanical engineer, and computer science grads climbing the corporate ladder. The biggest increase right now, he says, is at com-

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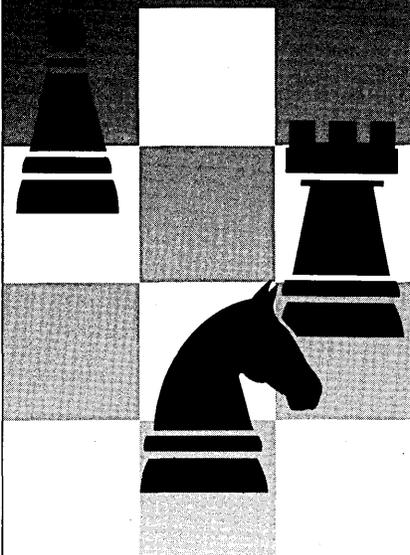
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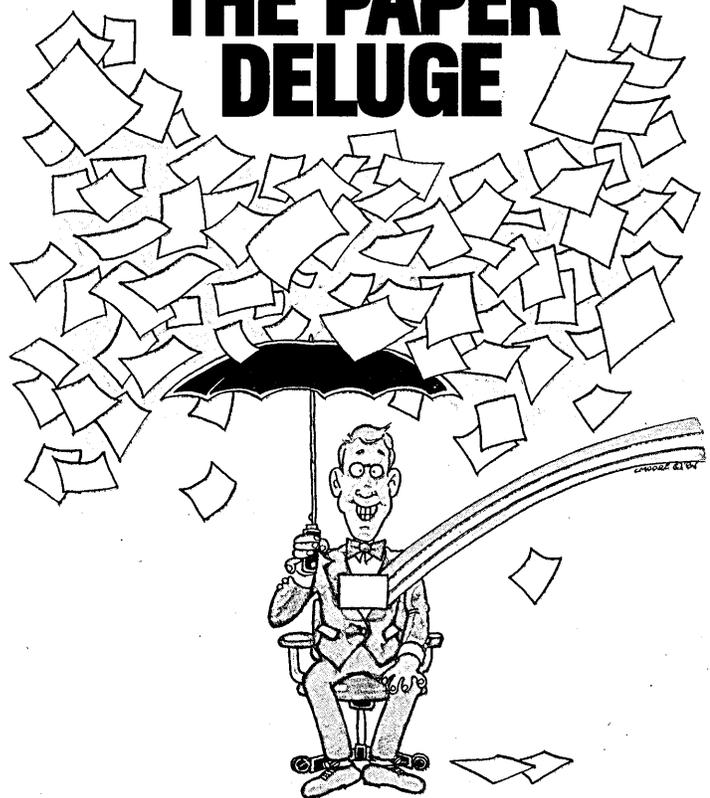
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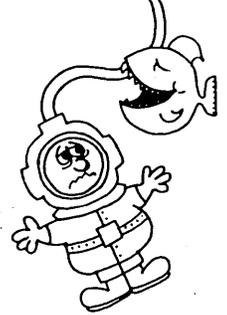
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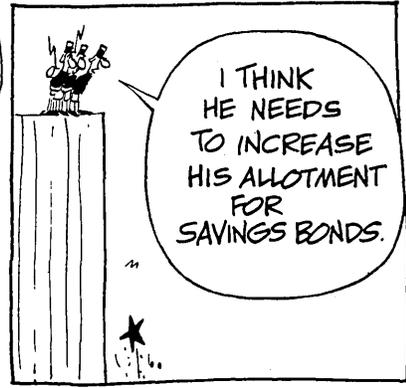
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## ON THE JOB

puter companies "with particularly large numbers of women in computer marketing roles."

### MANPOWER SURVEY

The Thomas-Mangum Co., a Los Angeles-based organizational development and executive search firm, has meanwhile completed its fifth annual survey on the executive and professional manpower market. It found the effects of the recession were fading a bit, since 32% of the 102 firms surveyed said they were still "impacted" by it, down quite a bit from the 94% reported in 1982.

More than half the companies (54%) reported expanded business in 1984, but did little or no hiring, and coped by maximizing their existing work force. Thirty-four percent of the firms hired additional help, and 21% expanded their facilities. Of the companies that did hire, 44% found they had "great difficulty" finding technical personnel. "Some difficulty" in hiring was experienced by between 36% and 55%.

Sixty-six percent of the technical people rose through the ranks, either through intensified recruiting or training for promotion. Forty-one percent had to go outside, boosting executive search firms into the number one slot as the best source for hiring such personnel.

Another curious item in the survey: 58% of all companies reported refusals of key job offers, a big leap over the 10% reporting such phenomena the year before. The number one reason jobs were refused was high mortgage rates (for people who would have to be relocated). The percentage of companies that needed to use counteroffers as a means of retaining employees or hiring new ones jumped from a low of 13% in 1982 to a high of 44% in '83. In 1979, the percentage was 42%. Counteroffers, inadequate compensation, and reluctance on the part of the family to move were ranked as the next three reasons. William T. Mangum, president of the company, feels that the restraint caused by the recession "has lifted, and employers and employees alike are jockeying again for position."

To entice prospective hires, companies offered special inducements with an eye to the high cost of housing. The main offerings were expense-paid trips to shop for a new house. Payment of real estate fees and mortgage assistance garnered the number two and three spots. Some of these deals doubled or tripled the cost of hiring. Relocation costs for executives, over and above the normal cost of moving, were between \$30,000 and \$50,000; for professional/administrative and technical personnel that figure was less than \$10,000.

Job placement for an employee's

spouse is another area of assistance for relocating employees. The percentage of firms giving this kind of help to new hires rose from 27% in 1982 to 38% in 1983, and a growing number of these firms report providing this aid to husbands of relocating women. For employees simply being transferred, such assistance was down to 31% in 1983 from 52% in 1982. Most companies, however, still don't offer this service at all.

Firms ranked company climate as the prime factor in attracting personnel,

with opportunity for advancement and salary as second and third reasons.

Salary increases for 1983 took a turn for the worse as companies reported that raises hovered between 5% and 6% overall and between 6.5% and 8% at the executive/professional/technical levels—less than in previous years.

If you would like a copy of the complete survey, contact the Thomas Mangum Co., 930 Colorado Blvd., Los Angeles, CA 90041, (213) 259-0600.

—Lauren D'Attilo



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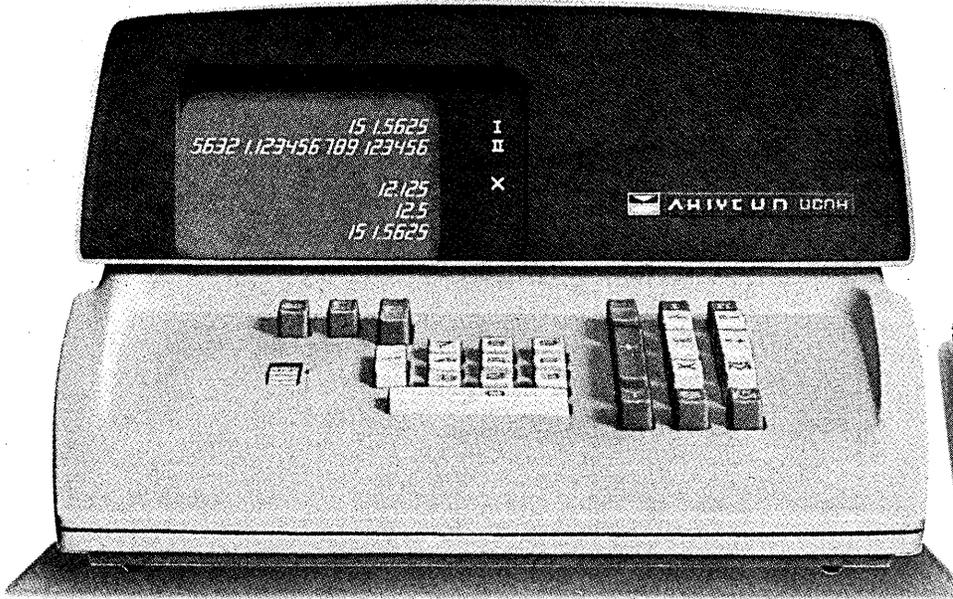
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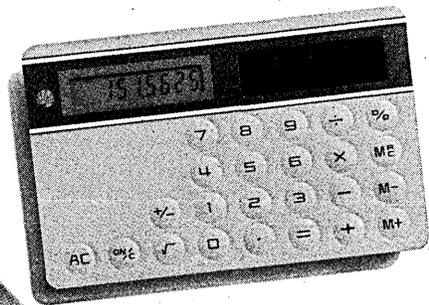
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# READERS' FORUM

## TELECOM VISIONS

Effective MIS managers are putting ever more energy into providing support for business functions and end users. They recognize information as a business resource and office technology as a major productivity opportunity. The on-line transaction processing systems they're building often set entirely new industry standards for order-entry systems and electronic cash management.

MIS managers are generally not very knowledgeable about telecommunication. Their experience is in hardware, data, and systems development. Even as they gear up for an entirely new era of data processing, they face a new and very difficult challenge. Equipment, information, terminals, and people do not get connected by luck or natural evolution. Someone has to take charge, but nobody knows who that someone should be.

It is no exaggeration to say that effective definition, delivery, and operation of the telecommunication infrastructure will increasingly determine a company's competitive position. Today, a bank or insurance company without first-rate communications is locked out of whole markets. Similarly, a multinational company in the same position is giving its competition a freebie, in terms of coordination of resources, reporting and management control, and productivity via office technology. In a sense, the MIS manager is mainly responsible for the traffic on the company's information highways.

Historically, communications has been managed in a fragmented way. The telephone manager bears much of the responsibility, as does the telex department. The computer operations function handles some data communication equipment, as does the unit responsible for word processing or electronic mail. Individual divisions in a distributed processing environment may make distributed communication decisions.

Obviously, this cannot continue. For business purposes, telecommunication rests on integration. It may be a few years before voice, data, text, and image are fully merged on the ISDN, but already the new generation of PBXs makes it essential to decide if, when, and how to integrate voice and data. The whole issue of deciding on a local area network—or rather a strategy for local premises—depends on that decision. One of the next major developments in office automation and dp will be document interchange. Part of this falls within MIS's sphere of expertise, like operating systems, but part of it also deals with the

increasingly complex, political, and uncertain area of communications standards.

Perhaps MIS managers are not the people to take charge of telecommunication at a strategic level. We are already overworked and tend to get tunnel vision. We are constantly accused of being dinosaurs by all those users lining up to install personal computers (the same ones who ask for rescue from their latest effort to build a worldwide financial planning system in VisiCalc and dBase II). Remember that the dinosaurs took millions of years to die out—but it may be that the traditional dp manager is on a downward evolutionary path.

It is certainly clear that in a lot of companies what I term the manager of information resources, to whom MIS may end up reporting, is a new breed, someone with good business awareness, credible as a manager, and more likely to know about Northern Telecom, BT, Ericsson, Case, and SNA than COBOL, CICS, and IDMS. People like that tend to be fast learners and very sharp—telecommunication and its intersection with business strategy requires strong intellectual skills. Such people build whole new cadres of thinkers and doers. They talk to the chairman of the board, and they think in both business and technical terms. As we know, few MIS managers are famous for their interest in and understanding of business. It's also possible that businesses don't always recognize the value of our technical and project management skills and just how far we've come in taming a technology that seemed uncontrollable in the '70s.

MIS is basically about managing development projects equivalent to building the pyramids. Systems development is intrinsically difficult. Often involving an unproven technology and a new application opportunity where no one has much experience, systems development is a discipline by which a multitude of tasks can be coordinated and people of very different backgrounds brought together. It requires troubleshooting, hand-holding, and getting the job done. It is both reflective and active.

Building a new intellectual base is essential for managing telecommunications. The topics of ISDN, OSI, LANS, PBX, network architectures, and the like are extraordinarily complex. The people who can contribute the most in these areas are likely to be young; it is vital to keep up to date. ISDN, for example, was discussed very little just two years ago, but it is now an extremely important practical issue. Obviously, though, the more recent the knowledge base, the less the practical experience. We need superior thinkers, but the doers tend to be the old guard in MIS.

The separation of functions relevant to telecommunication has created an even wider separation of expertise. People who have solid experience in all aspects of voice communication often lack insight into the details of transaction processing. Office technology specialists who are very comfortable with asyn-

## READERS' FORUM

chronous electronic mail tend to be unfamiliar with file transfers and large-scale bisynchronous applications. Few data processing staff understand PBXs.

In this situation, MIS should be the central reference point. Every scenario for the use of large-scale network capabilities in the 1980s assumes data, communications, and processing. For instance, when a manufacturing company links its customers to its files and programs via an order-entry system, the bedrock for the service is likely to be COBOL or PL/1 systems and the data center. The workstation that sends electronic mail accesses central files. In the end, OSI, SNA, DIA, and DCA often rest on CICS or on the operating system software.

The issue here is whether MIS is the brake or accelerator for the other aspects of telecommunication. It is easier to be the brake—but much less fun.

To become the accelerator, MIS managers have to develop a multifaceted approach that involves talking with the business people and building a vision; learning about digital communication; creating a business-based architecture for communications; and reorganizing, restaffing, and reeducating parts of their own organizations. Clearly, these are not easy tasks.

The starting point is to talk to the business people. In the past, MIS managers were only as good as their understanding of technology. Now we are now only as good as our understanding of the application of the technology to the business. Telecommunication can affect such key aspects of business as the delivery of services to customers, the flow of information across the company without time or geographical barriers, and a much broader access to data.

The MIS manager must totally understand the industry he or she is in—that includes markets, competition, problem areas, products, and company strategies. This is not an academic exercise, but more like feeling the pulse of the business. What are the marketing people hearing from customers? Which firms have an edge and why? Where do inefficiencies in operations, time gaps, or lack of information get in the way of getting things done? Who in the organization is looking at new business opportunities?

Telecommunication is not just a technology, any more than the telephone system is. Telephones let us talk to one another. Digital telecommunication opens up new conversations and makes it possible to talk to more people, inside and outside the firm. The MIS manager needs to become an expert on conversations—actual and potential.

The MIS manager must do more than listen. There are things he or she knows that the business people do not, such as trends in technology that offer new business opportunities or that now make it possible to do something previously not feasible or cost-effective.

Telecommunication needs a vision, a concrete picture, almost a photograph of the future. Before one can meaningfully talk about how to integrate text, data, and so on, one has to present a very clear view on why to integrate and how it will benefit the business. Can the MIS manager put together a vivid and convincing picture of business in the telecommunication era? If so, his or her technical knowledge now has a context instead of being separated from the business viewpoint. An aspect of such a vision is exemplified in the following resolution that could have been made by a banking or insurance firm: "There will be no paper-handling in any of our key transactions. Our customers will initiate transactions directly and neither time nor location will be a barrier to getting service."

Vision involves imaginative but sensible thinking about the future of the business, and the direction, strengths, and competitive opportunity of the firm. It has to be complemented by a sound understanding of digital communication. The MIS manager must become a student again. Our knowledge base is becoming obsolete, and there are already wide gaps in it about

telecommunication. There also seems to be a growing culture gap between the MIS and digital communication perspectives in some firms in that each focuses on different vendors and different key technologies.

The MIS manager naturally looks at the subject in terms of IBM, DEC, ICL, and so forth, and is very concerned with how to adapt communication into that environment. It really needs to be the other way around. What is the communication environment into which the current data processing resource must be adapted?

If MIS looks at telecommunication through dp-colored glasses, a number of communication specialists overlook dp issues or are a little disdainful of the mainframe vendors. It's very rare that anyone in the company has a deep understanding of telephones, telex, data communication, operating systems, and data processing. It is therefore up to MIS managers to have the broadest possible understanding of all the issues, so they can direct the specialists.

This means learning about PBXs, OSI, different types of switches, the SNA principles of transmission, multiplexing, and so on. While this is not easy when one is already working hard just to keep up with today's needs, it has to be done.

The term architecture is an important one in telecommunication. An architecture is a sort of blueprint that allows for suitable standardization, change in technical components, expansion of services, and growth in traffic. The growing debate about OSI vs. SNA, or the choice of a digital switch or PBX as the gateway into a network relate to architecture.

What is often missing from any specialist's view of the organization is a view of the business. That's why it is so important to start from a clear business vision. The whole goal for telecommunication is to define an information transportation system the firm can draw on as part of its business strategy or to support its strategy. The technical architecture has to be based on the business vision, not the other way around.

Thus, a main part of the MIS manager's job is to be the translator between the business and technical people. That is not something to be delegated. Taking charge of telecommunication is mostly directing the creation of the business-based architecture.

There is currently a shortage of top-notch communication staff and this will only increase as telecommunication becomes more and more central to the activities of business. A key reason why the MIS manager should be the overall director of the information resource is that the communication functions need a clear organizational base. In particular, voice and data communication have to be brought together, as do telex and data, office technology, and distributed processing.

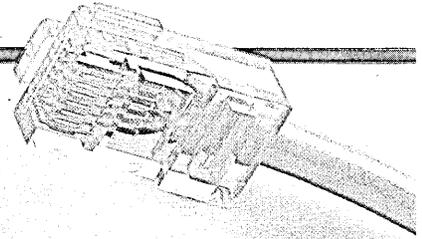
New jobs and skills are needed to build the base. There are two types of people that have to be found, developed, and, of course, retained—there will be a large demand for them. These are the thinkers and the doers.

The thinkers are analysts and staff who are up-to-date on what is happening with the technology and in the marketplace. They need to be good communicators and are the people who provide the new intellectual base for tackling a complex and fast-changing set of issues.

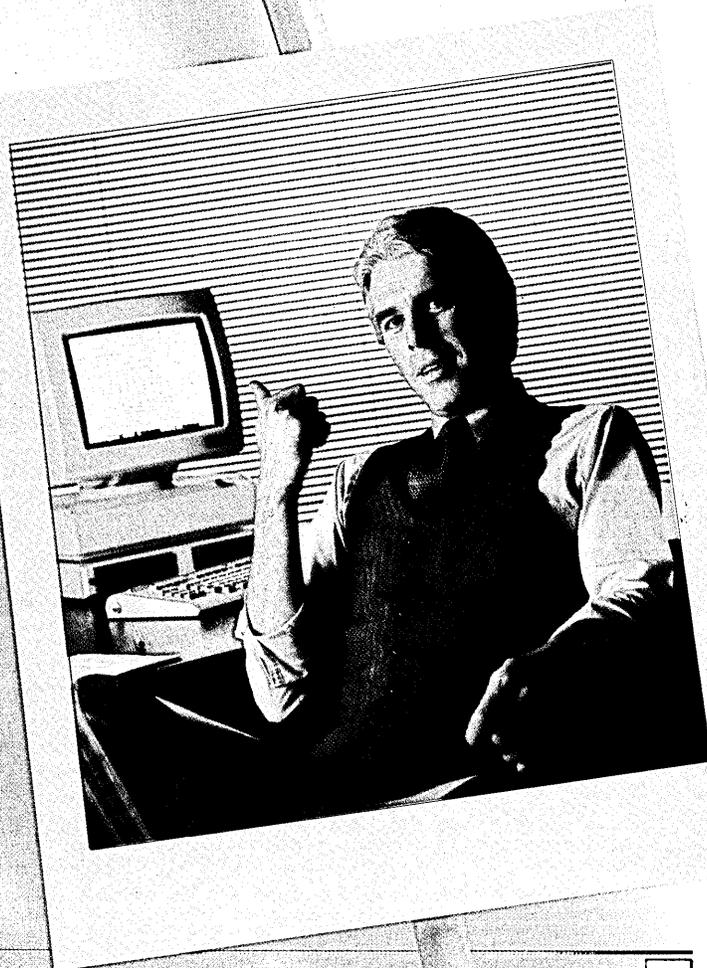
The doers are those with practical experience. When few firms have much experience in, say, changing the telex system to a message switch and using workstations to send and distribute telexes, the learning curve can be speeded up and the degree of risk can be greatly reduced by finding someone who has already gone through the process. The key is to anticipate the skills and experience the firm will need beforehand so that people are brought in early enough to help plan and teach, instead of just to pick up the pieces.

This means that MIS should be reviewing its needs for 1986-88 now and beginning the process of reorganizing—bring-

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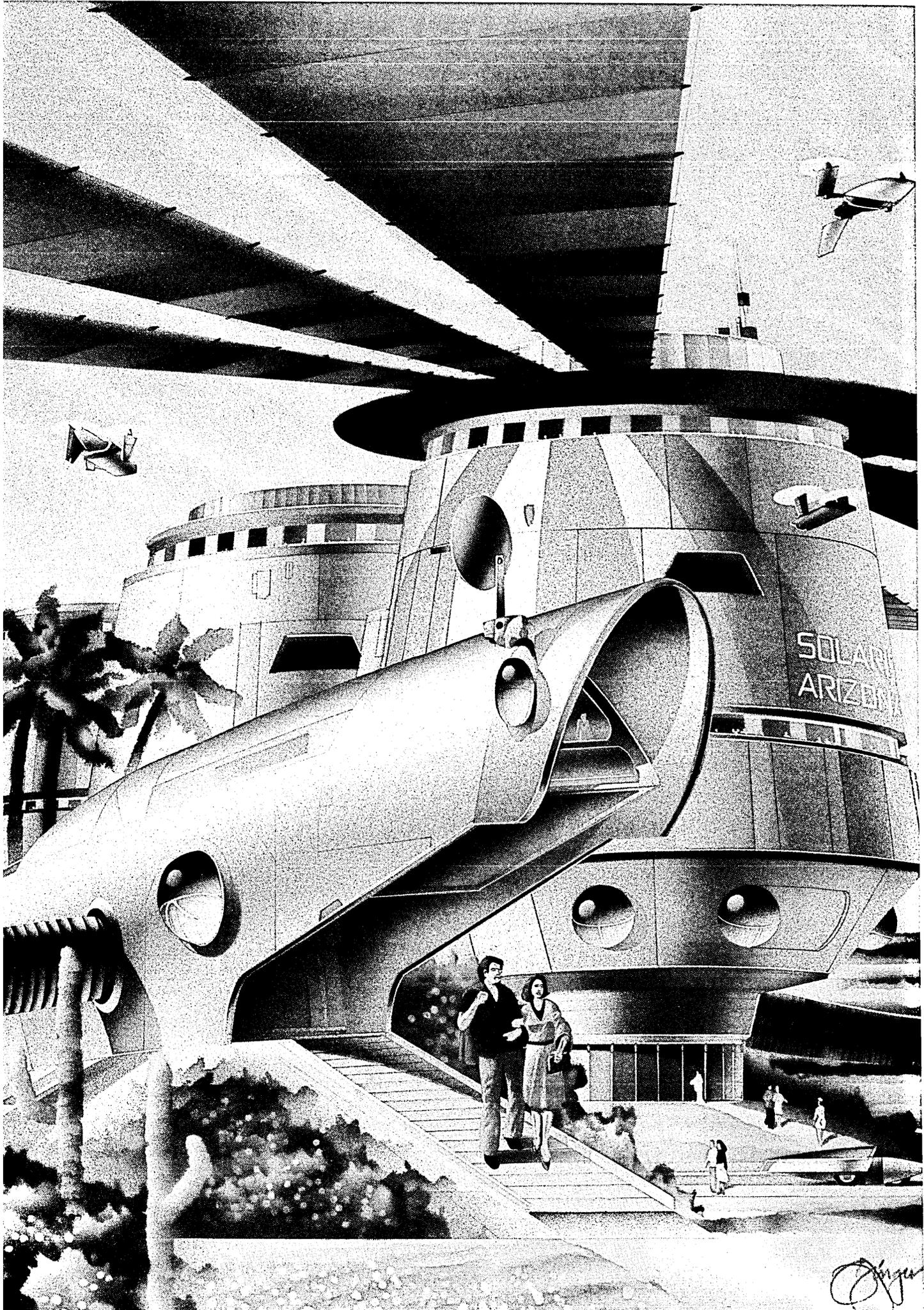
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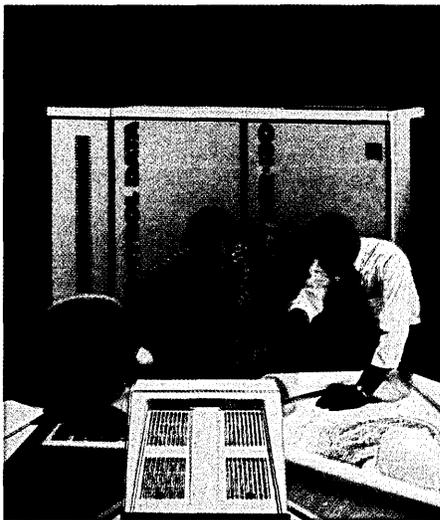
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## ADVERTISERS' INDEX

ACC-Advanced Computer Comm.	27
AGS Management Systems	8, 92
AT&T Communications	94-95
AT&T Information Systems	68-69
AT&T Information Systems	166-167
Able Computer	45
*Alcatel Thomson Sigadisc	168-15
*Alpha Microsystems	169-16/169-17
Ansul	66
Artificial Intelligence Corp.	72-73
Astrocom Corp.	89
BBN Software Products	32-33
Bell & Howell	165
*C. Itoh Electronics	169-32
Calcomp	135
Cambridge Digital	30
Cap Gemini DASD	168-26
*Celerity Computing	168-26
Cincom Systems Inc.	98-99
Codex Corp.	169
Comdex Japan	169-28
Computer Corp. of America	156-157
Control Data Corp.	90-91
Control Data Corp.	200-201
Convergent Technologies, Inc.	6-7
Corvus	49
Cullinet Software	4, 12
D & B Computing Services	61, 63
DJC Corp.	64
Data Design Assoc.	59
Dataproducts Corp.	19
Digital Communications Assoc.	50-51
Digital Equipment Corp.	15-17
Dow Jones News/Retrieval	70
DuPont Co./Tyvek	80
Emulex	138-139
Equinox Systems	178
Esprit Systems Inc.	64-65
Fenwal Protection Systems	149
Fujitsu Professional Microsystems Div.	149
*Fujitsu America, Inc.	168-18
GEISCO	75
Genicom	123
Graham Magnetics Inc.	155
Henco Software	143
*Hermes Precisa Int'l	169-21
Hewlett-Packard	24-25
Honeywell Info Systems	54-55
Honeywell Info Systems (CSD)	116-117
*IBC-Integrated Bus. Comp.	169-31
*IBM	169-23
IBM	38-39
*ICC-Europe	169-19
*ICC-U.S.	169-29
ITI-Integrated Technologies	53
ITT Courier	172
Information Builders, Inc.	147
Infotron Systems	2
Inmac-A	71
Innovation Data Processing	204
Innovative Software	150-151
Instant Cable (div. Micom)	186
Interface '85	186
Janus Associates	60
Lee Data Corp.	181
Arthur D. Little Inc.	74
*Logitech, Inc.	169-4
M/A-Corn Linkabit	115
MSA	132-133
MSP	195
*MTTR	169-11
Maxell Computer	168
McCormack & Dodge	41
MicroPlot Systems	74
Micromim Inc.	158
Motorola/Four Phase	28-29
Motorola, Inc. ISG	144-145
NBI, Inc.	110-111
NCR Comten, Inc.	78, 79
NCR Corp.—ADDS Div.	137
NCR Corp.—Micrographics	193
NEC	175
Nantucket Corp.	108
Nixdorf Computer	5
Northern Telecom, Inc.	10-11
Northern Telecom, Inc.	176-177
Numerics	101-103
OAC '85	203
On-Line Software	66
Paradyne	199
Peat, Marwick, Mitchel	124-125
Perkin-Elmer Corp.	22
*Plexus Computers	169-10
Prime	42-43
Prime	184-185
*Printronic	169-7
Quesonix	67
Qume-CRT Div.	81-88
Rolm Corp.	76-77
Rutishauser Data AG	112
*SGS-ATES	169-2/169-3
SPSS, Inc.	20-21
Charles H. Shaw Co.	154
Software AG	9
Sperry Corp.	163
Stratus Computer	131
Tact Technology	82
Techland Systems	83
Tektronix, Inc.	153
Televideo Systems, Inc.	180-191
Televideo Systems, Inc.	CV2
Telex Computer Products	1
Tesseract Corp.	97
Texas Instruments	CV3
3M Corporate	161
Transnet Corp.	154
*Triumph-Adler AG	168-13
Ungermann-Bass	46-47
*Unity Corp.	169-8/169-9
VM Software	183
Ven-Tel	129
*Xebec Corp.	169-24/169-25
Zilog Systems Div.	118
*OEM Edition	

## READERS' FORUM

ing voice and data responsibilities together; reeducating existing staff, which includes both technical and business people; and recruiting a new generation of talent.

All this adds up to a whole new style of corporate planning that is business-driven, cognizant of technology, and innovative in its application to the marketplace. It involves some extremely difficult technical decisions and large-scale, often risky projects. This essay only sketches out the issues. Obviously, putting it all into practice takes time, energy, and ability.

This is a tremendous and exciting challenge for MIS managers. The existing skills and disciplines of MIS are a necessary base but they are insufficient. The equipment does not connect itself, nor will simply putting in a local area network improve business effectiveness.

There must be a vision translated into an architecture, and backed up by a strong business-oriented technical staff. Surely, MIS ought to do this. Someone must.

—Lynda Woodman  
London, England

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Many of the things that make programs easy to maintain—like structured programming and documentation—are too often done poorly or not done at all. During program development, getting the program to run as soon as possible generally seems more important than doing a good job.

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—William Lewis and James Blodgett  
Albany, New York

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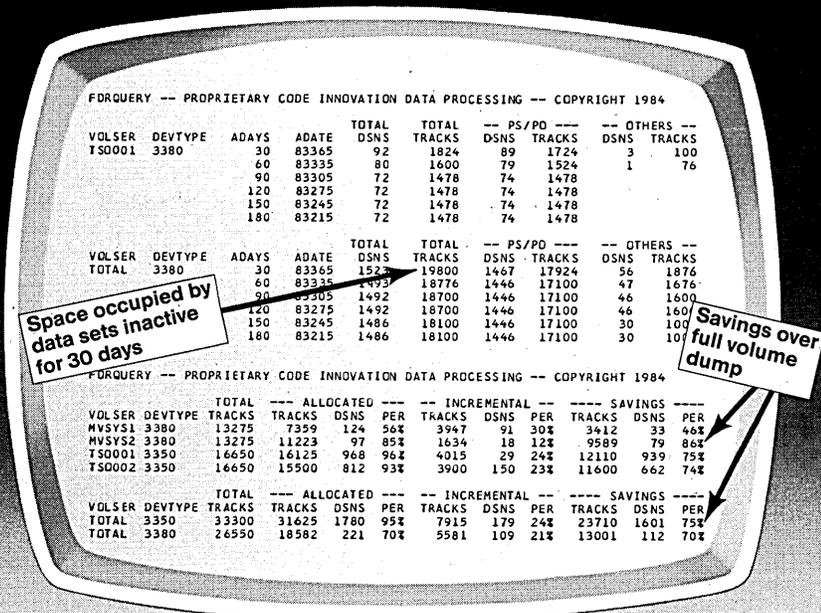


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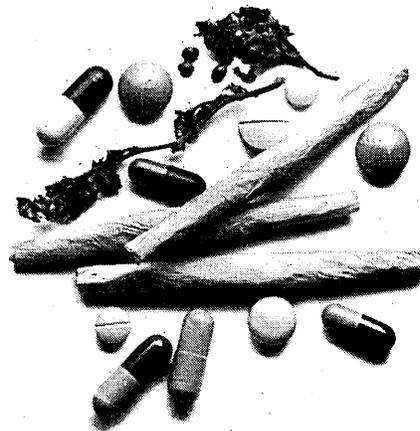
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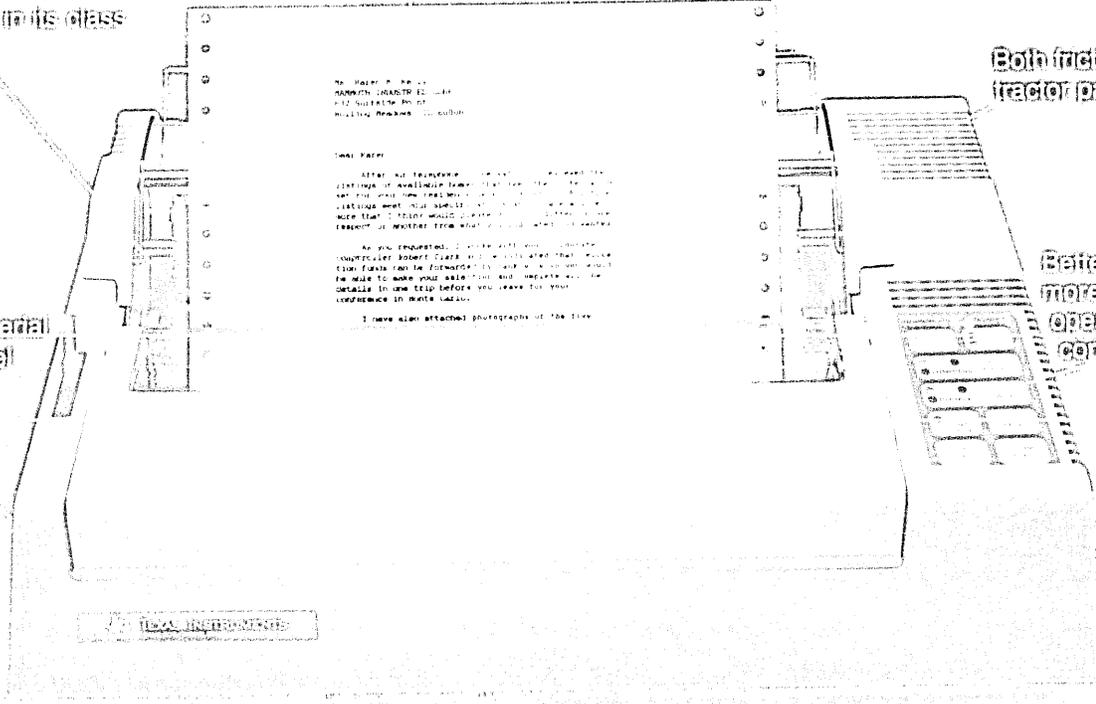
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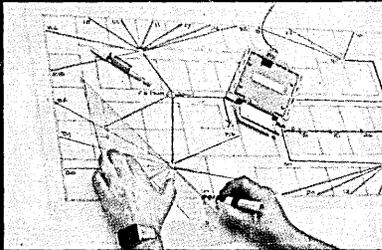
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