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ALSO:  
ANNUAL MINI-MICRO SURVEY  
MAKING THE MOST OF UNIX

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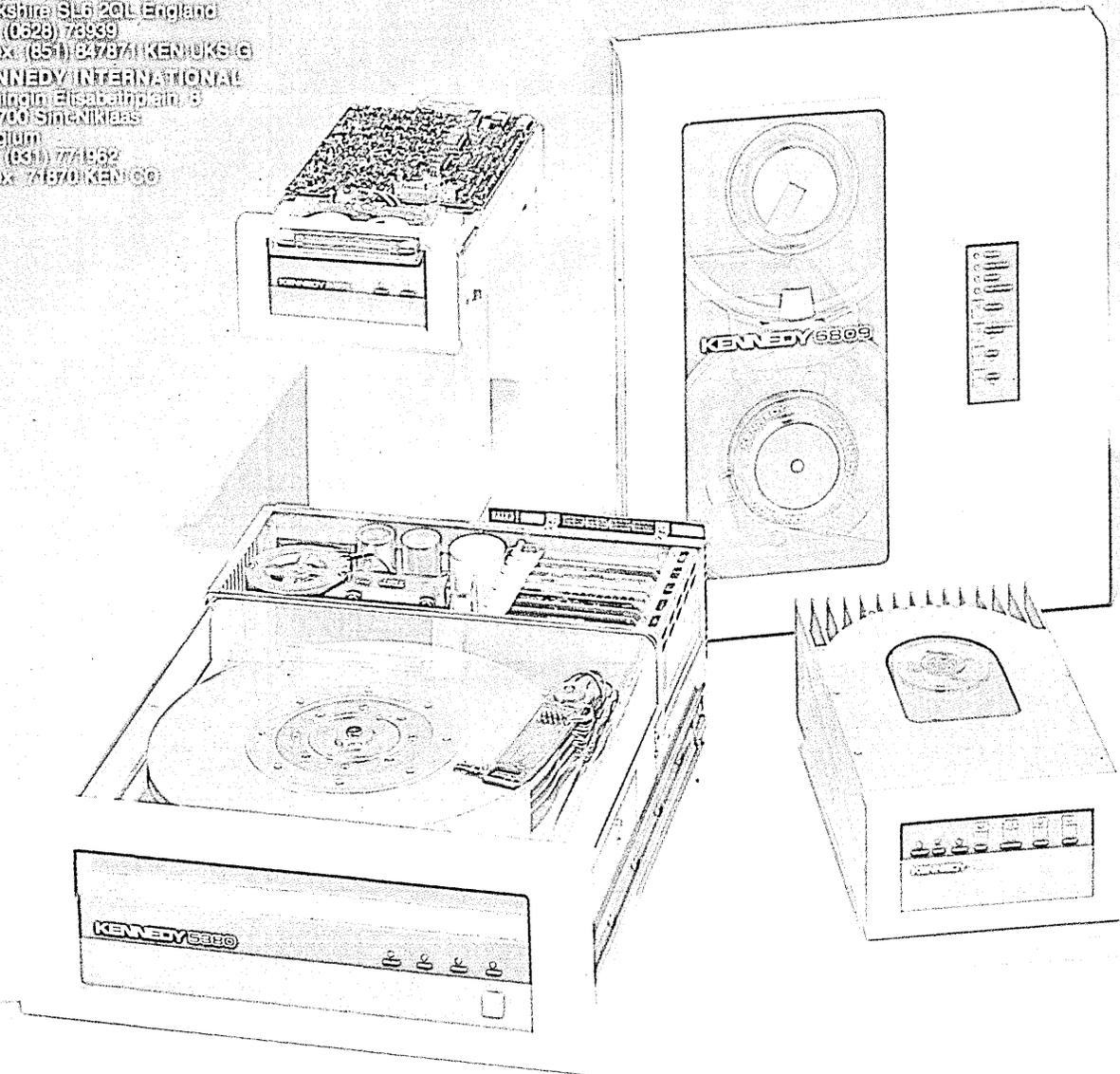
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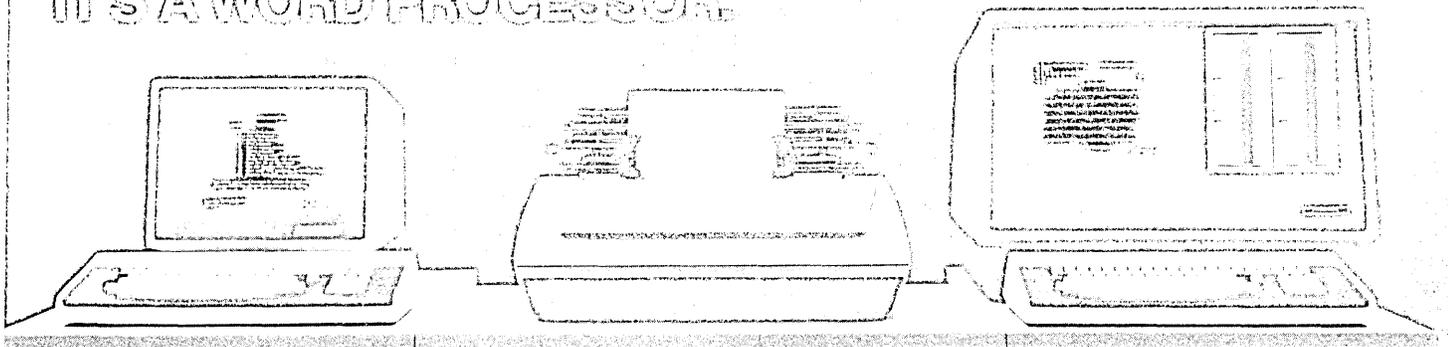
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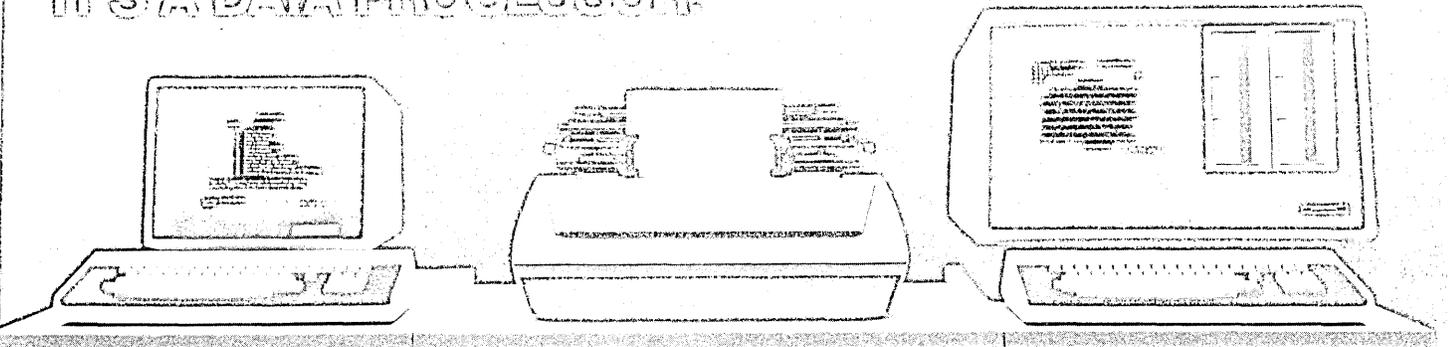
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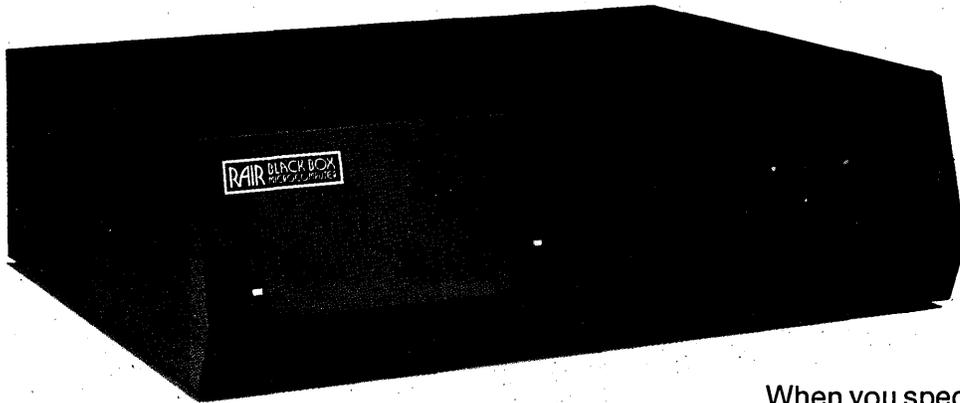


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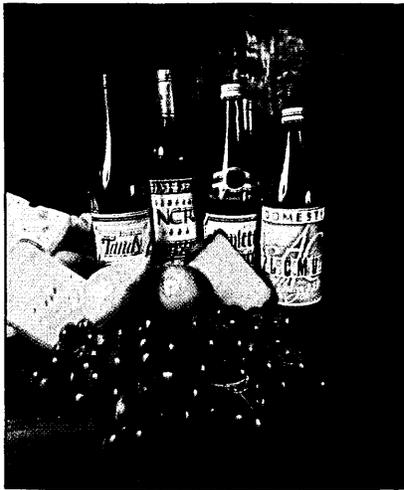
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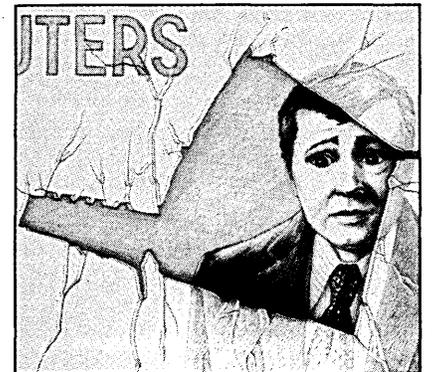
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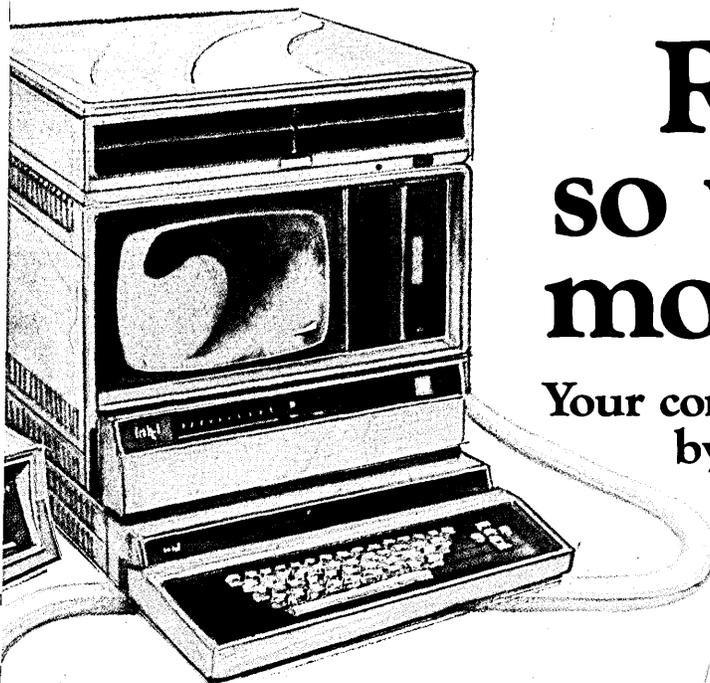
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**BPA** Circulation audited  
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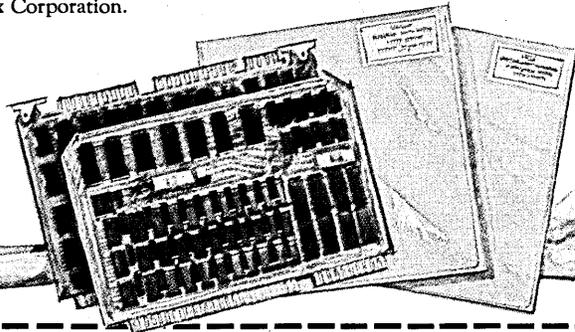
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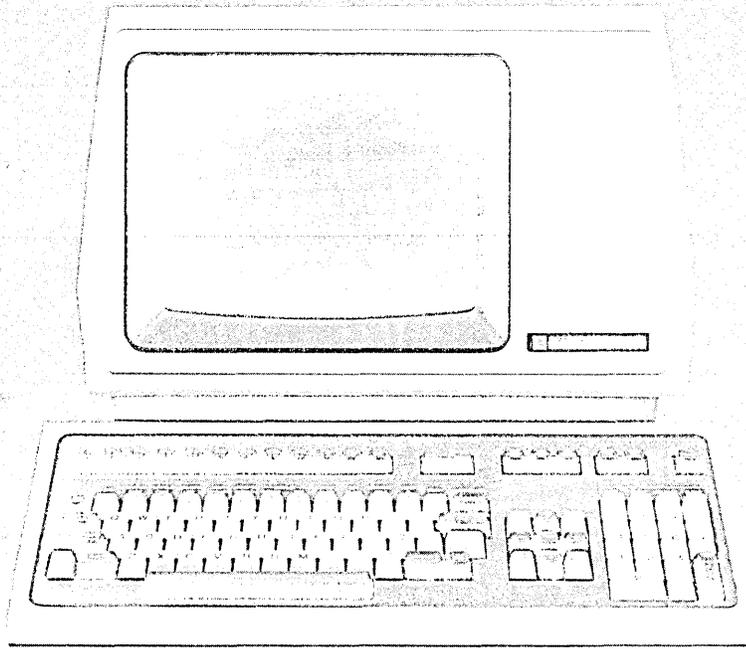
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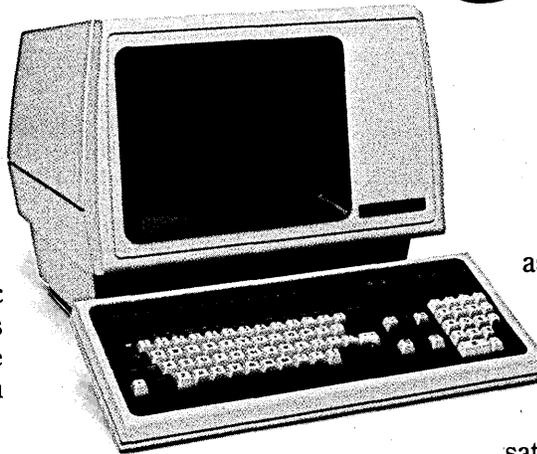
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The OPTI 900\* Model 940 is the first in a family of electronic video terminals from Texas Instruments. Combining the power of an editing terminal with the convenience of video display, the Model 940 brings new perspectives to applications including data entry, electronic mail, commercial timesharing and data base management.

The 940 offers state-of-the-art human-factor design features to help reduce operator fatigue, and a variety of versatile characteristics to enhance any business application requiring high performance editing.

Standard display features on the Model 940 include a 12-inch diagonal screen with an operator-selectable format of either 80 or 132 columns by 24 lines. A 25th status line displays information in three selectable modes for functions like tabs, margins, errors or host computer messages.

The 940's display can be split both vertically and horizontally into separate data regions allowing a user the flexibility to operate within one region without disturbing another. And for applications like process control, the Model 940 features scrolling regions for quick, effective data comparison.

There is also a transparent print feature that permits a host computer to bypass the screen and transmit data to an optional local printer, allowing the operator continued use of the screen during the printing cycle. And the Model 940's memory can store up to 1,920 characters of data.

Featuring 128 displayable ASCII characters, the versatile Model 940 includes a unique combination of double high, double wide and double high/wide characters for display emphasis and reduced visual strain. Additional video features include 7x9 dot matrix characters with true underlining and true descenders.

The Model 940's detached keyboard, designed to increase operator comfort and productivity, is connected to the display monitor with a 6-foot coiled cord and features operator-oriented functionally clustered keys. For added user convenience the Model 940 also offers detachable nonglare screen filters and a tiltable display monitor

as options. Other available application-oriented options include international or graphic character sets and additional memory of up to 5,760 characters to give the 940 added versatility for data entry applications.

TI is dedicated to producing quality, innovative products like the new OPTI 900 Model 940 Electronic Video Terminal. And TI's hundreds of thousands of data terminals shipped worldwide are backed by the technology and reliability that come from 50 years of experience.

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# LOOKING BACK

## PALEVSKY PRODUCTION

*November 1961:* After his sudden departure from Packard Bell Computer in July of '61, Max Palevsky proceeded to finance and organize a new computer company called Scientific Data Systems in Santa Monica, Calif. The new company entered an already crowded territory: the small-scale, scientific computer marketplace. SDS was "privately and substantially financed," had 20 employees in November of '61, and expected to undertake a "more ambitious program than was pursued at Packard Bell." Joining Palevsky at SDS were Robert Mark Beck, vp of engineering, formerly with Packard Bell; Albert Sperry, chairman of the board, the former head of Information Systems, Inc.; and, as chief of the SDS computer group, Henry Herrold from Hughes. SDS planned to release its first system sometime in 1962.

\*

One of the computer industry's founding fathers, Professor Howard H. Aiken, director of the computation laboratory at Harvard University, announced his retirement from the faculty in late 1961. In collaboration with IBM, Aiken had designed what has been called the world's first large-scale computer, the Mark I, in 1939. He and his staff and students later went on to design and build the Mark II, III, and IV. Aiken also pioneered research in automatic language translation, automatic shorthand transcription, and the use of magnetic cores and drums as computer components.

## FAST FORTUNE

*November 1971:* H. Ross Perot's company, Electronic Data Systems, stepped into the federal limelight when a House Government Operations' subcommittee spent two days examining the company's relationship with Texas Blue Shield. Perot founded EDS in 1962, but the company didn't take off until 1966, when Texas Blue Shield awarded it the first two of many subcontracts to process Medicare claims. EDS's revenues leaped from \$3.7 million in 1967 to \$47.6 million in 1970, and in 1971 the figure

jumped to \$75.2 million. From 1967 to 1971, EDS earned \$150.6 million, more than half of it from nine Blue Shield groups.

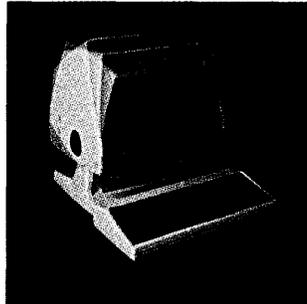
Testimony at the House hearings alleged that by giving the contracts to EDS without consulting the Social Security Administration (the government agency in charge of Medicare), Texas Blue Shield had violated the terms of its government contract. Compounding the violation was the fact that EDS's books were closed to the feds because its contract did not include a required "examination of records" clause. The testimony also indicated that Perot himself was guilty of a conflict of interest, in that the year before he became a subcontractor to Texas Blue Shield he was serving part-time as head of Blue Shield's dp department. Most of the testimony at the hearing came from Thomas Tierney, director of the Social Security Administration's Bureau of Health Insurance.

Texas Blue Shield answered that in 1966 it had three contracts with EDS and that one of them, for processing private claims, was larger than the two Medicare contracts combined. That being the case, Blue Shield reasoned, the regulations dealing with prior approval and examination of records regulations were not applicable. The SSA never accepted this reasoning, but reimbursed Blue Shield for its payments to EDS anyway. EDS's Medicare profits in 1966 and 1967 were not known, but DATAMATION used an SSA estimate of the company's annual costs during the period to calculate that its rate of return exceeded 100%.

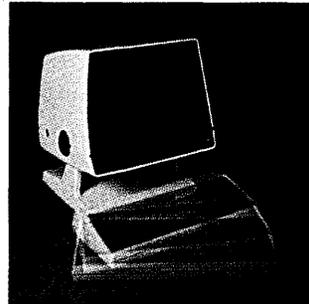
Tierney stressed in his testimony that EDS's unit charges for processing the claims were consistently lower than the national average, and Milledge A. Hart III, president of EDS, said he was pleased that the hearings had brought this out. He also noted that in 1969 EDS had set up a special subsidiary, EDS Federal, to handle its Medicare business. "Federal auditors are free to examine EDSF's records whenever they want to," he said.

—Deborah Sojka

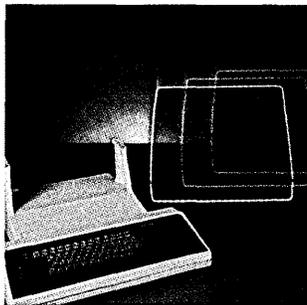
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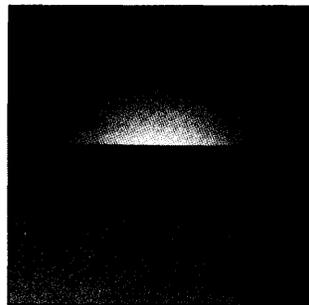
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When compared to conventional disks, Intel's FAST-3815 offers many cost-effective advantages for IBM 4300, 158, 168, 303x and PCM users. These include:

- Improving paging and swapping up to 300 percent,
- Enhancing systems performance by reducing page service time up to 67 percent (vs. a 3350),

- Reducing users' response time and/or increasing the number of users with no degradation in response time, and
- Providing environmental savings—cooling, power and space.

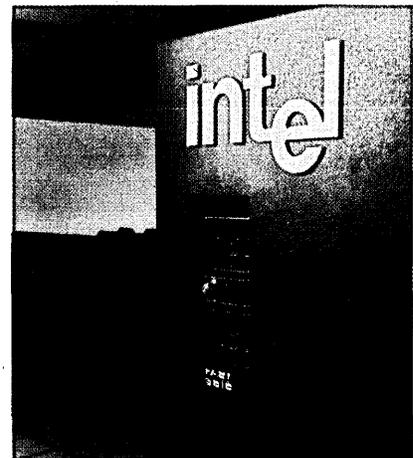
**Intelligent memory priced at \$6K a megabyte**

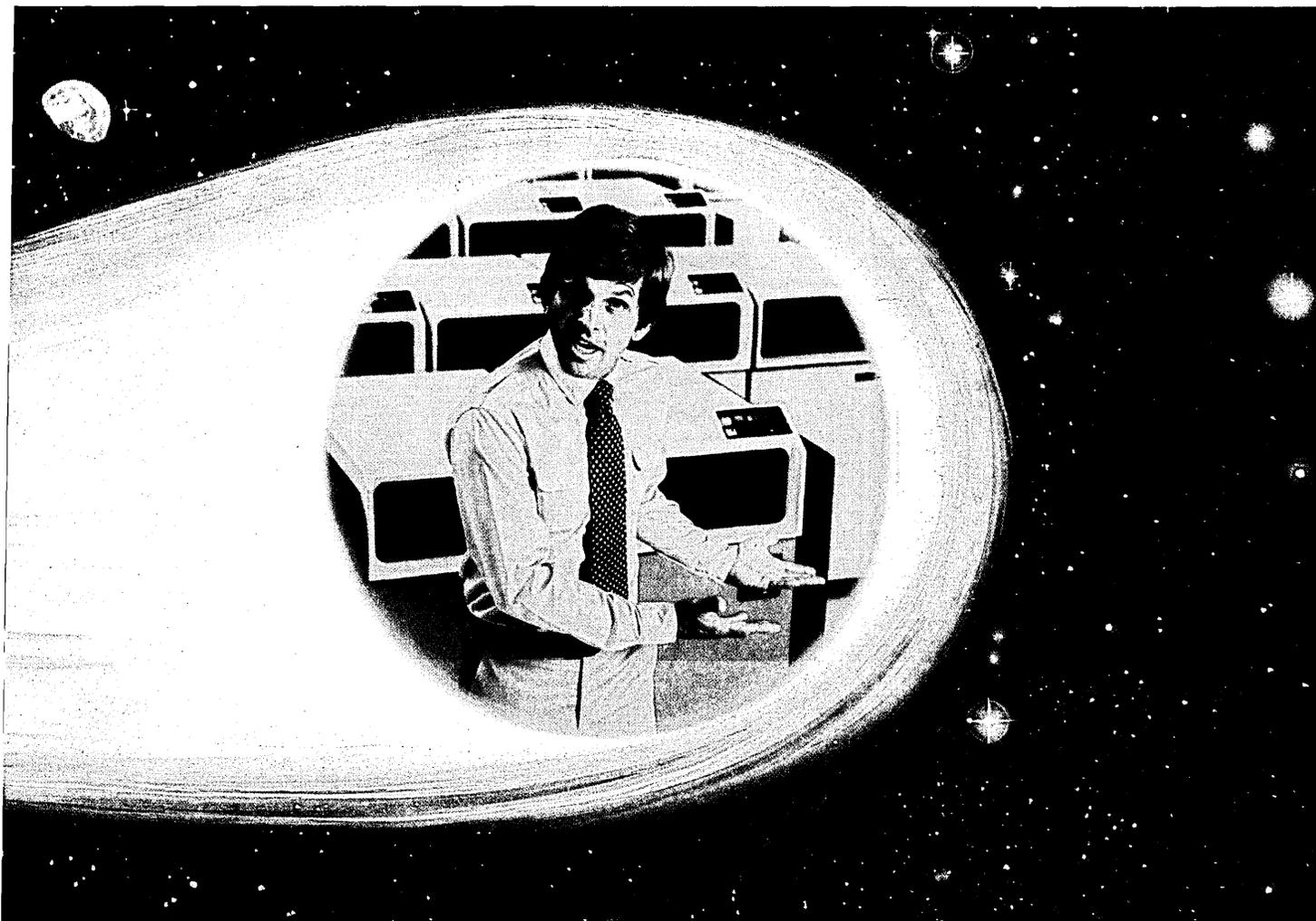
You won't find RAM memory anywhere priced as low as \$6K a megabyte... especially *intelligent* RAM memory. Intel's advanced iSBC 86/12™ single-board computer equips the FAST-3815 with unparalleled intelligence that, among other functions, handles channel protocol and performs

sophisticated self-healing diagnostics.

Self-healing procedures which make the FAST-3815 virtually fail-safe include:

- The first commercial application of 'hot' spares and double-bit error correction with multiple-bit detection,





# you free 3350s. Now.

- A unique software sweep that 'scrubs' soft errors and reallocates spare memory in place of hard errors, and
- An automatic recording—in its own battery backed-up memory—of the board and device location of any errors to provide maximum service efficiency.

The FAST-3815's microcomputer also ensures complete IBM compatibility and the ability to emulate numerous direct access storage devices.

#### Fast access

The FAST-3815's extremely fast paging and swapping performance can release 3350s (and 3380s) to perform the function they handle best—normal data storage. The FAST-3815's 0.8 milliseconds access time is considerably faster than any IBM alternative.

By moving the paging data sets of swap files onto a single FAST-3815, you can free *multiple* 3350s (and 3380s) to handle your growing data storage requirements. And, Intel's FAST-3815 is available for delivery *now*.

#### The FAST-3800 family

The new FAST-3815 is an entry-level version of the Intel FAST-3805 semiconductor disk. Both devices in the FAST-3800 family offer impressive environmental savings. Power costs, cooling costs and space requirements are at least half of those of conventional disks.

Intel's FAST-3815 releases your disks for more productive use, offers increased systems performance, and is available *now*. Interested? Contact Intel's Market Information Office at 512/258-5171. Or mail the attached coupon today.

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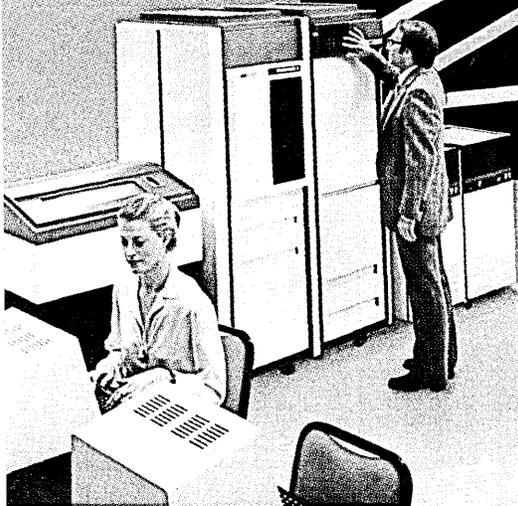
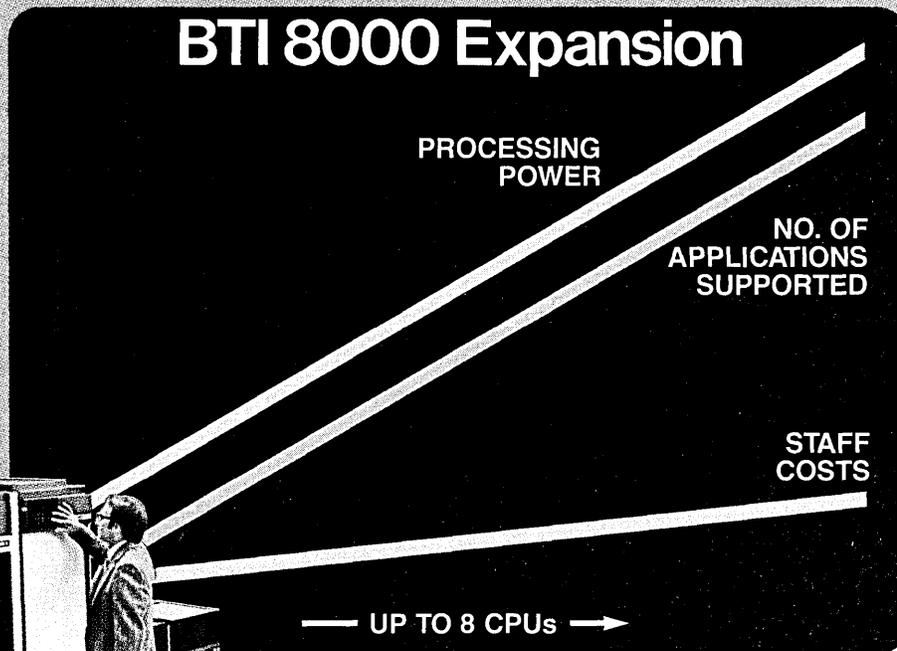
Return to Intel Market Information Office, P.O. Box 9968, Austin, Texas 78766.

Europe: Intel Corporation S.A., Systems Group, Rue du Moulin a Papier 51, Boite 1, B1160 Brussels, Belgium, 322-660-30-10, TLX 846-24814. Canada: Intel Semiconductor of Canada, Ltd., 201 Consumers Road, Suite 200, Willowdale, Ontario M2J 4G8, 416/494-6831.

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**CIRCLE 12 ON READER CARD**

# LOOK AHEAD

## SOFTWARE FOR THE DISPLAYWRITER

The IBM Displaywriter, ostensibly designed for word processing, may be a good opportunity for independent application software developers. They are enamored of the machine's price/performance ratio and self-diagnostics, both of which surpass IBM's Personal Computer -- not to mention the Displaywriter's popularity with customers who wouldn't consider a computer otherwise. Already, Digital Research has come out with a version of its CP/M operating system for the Displaywriter, and soon Advanced Software Products, Inc. of Delray Beach, Fla., will come out with a COBOL compiler for the machine. Similar to the virtual COBOL it offers for the IBM Series/1 mini, Advanced Software's package is expected to rent for about \$25 a month per machine. Meanwhile, industry observers are waiting for IBM to disclose its BASIC package for the system.

## TI SPEAKS UP

Look for Texas Instruments to announce a new line of products in its voice synthesis family that will expand its market from the chip level to the systems level. It's rumored that the semiconductor group will unveil a speech development system based on TI's Model 12 computer at this month's Midcon. Now a user can develop speech capability for his products "at home" instead of taking the product out to a TI regional technology center.

## MORE SMARTS FOR THE IDM

Sprucing up for a January users meeting, Britton Lee's intelligent data machine (IDM) will sport a host of new enhancements. Internal memory will be upped to 6 megabytes from its current 3 MB capacity. A tape drive interface solves the backup problem. Now, the IDM can dump directly from disk drives to tape, instead of detouring through the host computer. Speeding up processing time is a floating point binary coded decimal function enabling the IDM to do arithmetic directly on decimal numbers.

## MORE THAN IT'S DESIGNED TO DO

IBM's "best-kept secret"? The 5280, says Software Systems Inc., Jefferson City, Mo. Renting for under \$500 per month, the 5280, when outfitted with SSI's \$560 operating system, acts more like a single user System/34 than a Datamaster, says SSI president Joe Frank, a 12-year IBM veteran. By December, SSI says the 5280 will be acting like a 5251. Meanwhile, IBM warns that the 5280 wasn't "designed" to do all that. "So what?" asks Frank. "The 8080 wasn't designed to do data processing."

## THINK COMPUTHINK

A multitasking microcomputer supporting 16 users and priced at less than \$10,000, quantity one, will

# LOOK AHEAD

## OF MONEY AND MICRODATA

debut at this month's Comdex show. Made by Compu-think, Sunnyvale, Calif., the micro's basic configuration includes 128KB main memory, 5.9MB Winchester, 800KB on floppy, power supply, and chassis. The so-called Hawk 32, based on the 68000 processor, will have a Version 7-compatible Unix-like operating system, including a file manager (multi-keyed ISAM). In addition to providing ISO Pascal, FORTRAN 77, and C, the vendor says it will be the only system in the mini market to offer high-intermediate certified COBOL.

Since its acquisition of Microdata two years ago, McDonnell Douglas has invested more than it initially paid for the Irvine, Calif., mini-maker. According to Donald Fuller, Microdata chairman and ceo, the parent company is set to pump significantly more capital into his operation in the near future.

## MONROE SLIPS A DISK

Monroe Business Systems is expected to drop its single-diskette Occupational Computer 8810 after receiving initial feedback that single floppy systems aren't sufficient for most business needs. The \$600 or so difference between the single- and dual-drive versions apparently isn't compelling enough to make users go to the trouble of swapping diskettes during backup.

## A DIFFERENT POINT OF VIEW

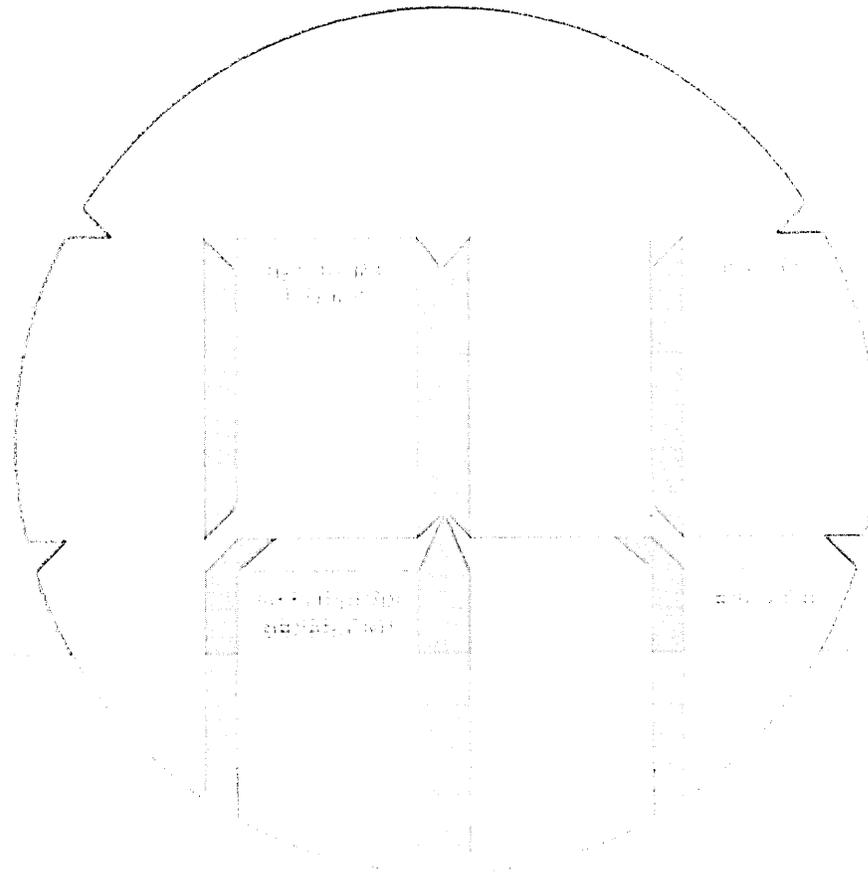
With its Viewpoint terminal having heated up price competition in the low-end ASCII market, Applied Digital Data Systems Inc. of Hauppauge, N.Y., has trained its sights against a major competitor -- the Lear Siegler ADM-3. A new Viewpoint model with ADM-3 compatibility will be shown this month at the Comdex show in Las Vegas. Price will remain the same at \$650 to end users in single quantities.

## BEEFING UP THE BUSINESS

Comserv Corp., Mendota Heights, Minn., is headed up a new marketing path that may broaden its product appeal beyond the country's 1,000 largest companies and expand its 40% share of the manufacturing systems software market. By year-end, staff is expected to number 375, up from 260 in April, as the company beefs up its development efforts in the on-line and minicomputer areas. Facilities are expanding too; R&D now has its own building and a new headquarters will be completed by year-end '82.

## RUMORS AND RAW RANDOM DATA

Microdata plans to offer SNA communications support early next year, with X.25 packet switching capability to follow...DEC is on the verge of announcing an entry into the CP/M market, with its offering most likely packaged as a desktop system resembling one of the VT series of display terminals.



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- o Scarcity of IMS and CICS expertise
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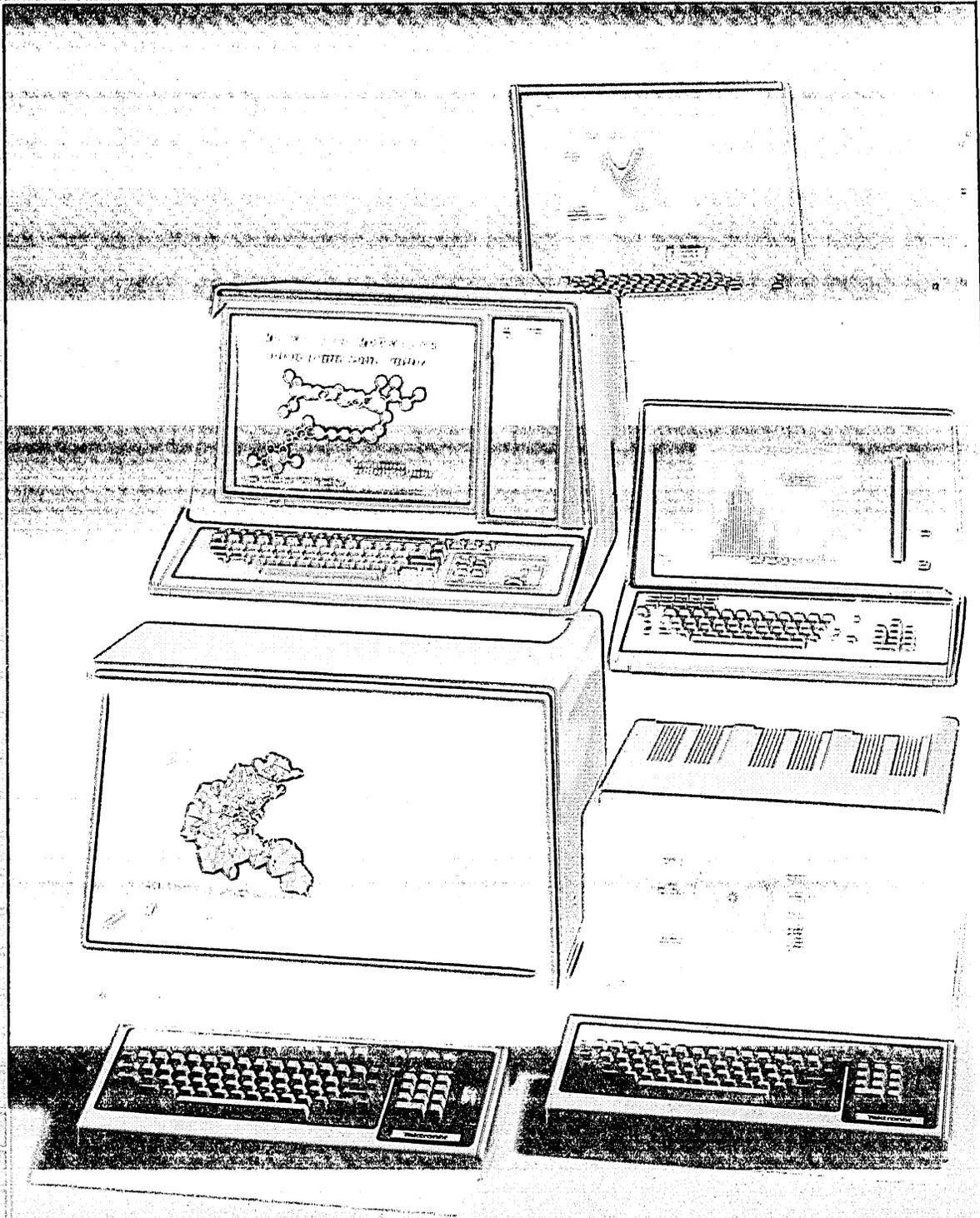
D11 81

Security or resource control

Implementation Systems are essentially transparent to IBM environments and data bases. Even less-experienced programmers can write error-free programs that contain all the functions required by conventional requirements.

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For example, with our PLOT 10 Easy Graphics Series, you can choose from a wide range of user-oriented operations, such as cursor, scroll, and window. Ease of use and system management capabilities help you get the most out of your graphics. And our PLOT 10 Easy Graphics Series is supported by a wide range of software, including the industry's most popular.

In the field of data analysis alone, Tektronix offers a complete range of mutually compatible tools. The Tektronix 4020A Series, for example, is a line of a kind combination of text handling and graphics capabilities in color or monochrome terminals. Intelligent, programmable and supported by Tektronix PLOT 10 Easy Graphics, the terminals are as equally

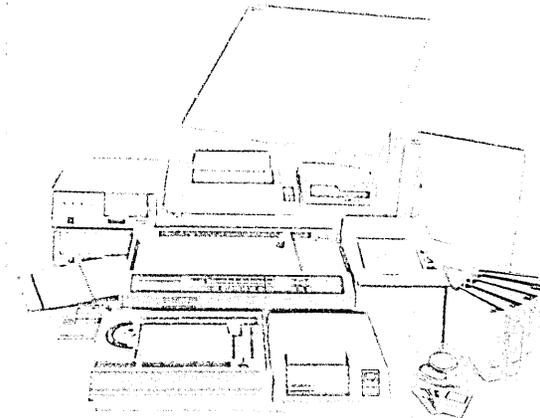
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# CALENDAR

## NOVEMBER

### **Western Educational Computer Conference, November 19-20, San Francisco.**

Sponsored by the California Educational Computing Consortium, this is the CECC's fifth year. Contact Ron Langley, Director, Data Processing Services, California State University—Long Beach, 1250 Bellflower Blvd., Long Beach, CA 90840, (213) 498-4111.

### **COMDEX '81, November 19-22, Las Vegas, Nevada.**

This is the third annual conference and exposition geared to the needs of independent sales organizations. Contact the Interface Group, 160 Speen St., Framingham, MA 01701, (617) 879-4502.

### **Future Systems Forum, November 23-24, Toronto.**

Advanced Computer Techniques Corp. sponsors this forum, entitled "The Massive Service Centers of the 1980s." Speakers include Dr. Marvin Minsky, MIT; Herman Kahn, Hudson Institute; Charles Lecht, Advanced Computer Techniques; and Paul Strassmann, Xerox. Contact Marie Jensen, ACT Corp., 437 Madison Ave., New York, NY 10022, (212) 421-4688.

### **1981 National Telecommunications Conference, November 29-December 3, New Orleans.**

"Innovative Telecommunications—Key to the Future" is the conference title. Topics include using communications technology to develop energy resources, and other innovative uses of telecommunications products and services. Contact Kenneth Black, New Orleans Public Service, 365 Canal St., Rm. 950, New Orleans, LA 70140, (504) 586-2173.

## DECEMBER

### **Twelfth International Conference on Computer Performance Evaluation, December 1-4, New Orleans.**

The conference is sponsored by the Computer Measurement Group, and will feature CPE sessions from three viewpoints—technical, managerial, and tutorial. Contact Donald Deese, FEDSIM, 6118 Franconia Rd., Alexandria, VA 22310, (202) 274-8461.

### **WSC '81, December 9-11, Atlanta, Georgia.**

The annual Winter Simulation Conference is cosponsored by seven organizations, including the ACM/SIGSIM, and the IEEE's Computer Society. Contact Claude Delfosse, CACI, Inc., 1815 North Fort Myer Dr., Arlington, VA 22209.

### **The Gulf Computer Exhibition, December 15-19, Dubai, United Arab Emirates.**

The Arabian Gulf will have its first computer conference and exhibition at the Dubai International Trade Center, sporting the

theme "Computer Applications in Business and Commerce." Contact Diana Clifton Sewell, Seymour House, 17 Waterloo Place, London, SW1Y 4AR.

## JANUARY

### **Data & Telecommunications/Japan, January 20-23, Tokyo, Japan.**

Suppliers of PABX equipment, modems, cables, etc., from all over the world will be exhibiting at the Tokyo exposition. A conference program is also scheduled. Contact Industrial & Scientific Conference Management, Inc., 222 West Adams St., Chicago, IL 60606, (312) 263-4866.

### **ASEE '82, January 26-28, San Jose, California.**

The Advanced Semiconductor Equipment Exposition is the fourth annual show and conference of semiconductor processing, production, and test equipment and materials suppliers. Contact Carlidge & Associates, Inc., 491 Macara Ave., Sunnyvale, CA 94086, (408) 245-6870.

## FEBRUARY

### **IWP Spring Symposium, February 2-4, Anaheim, California.**

There will be educational sessions backed by a manufacturers' exhibit at this year's spring meeting, held by the International Information/Word Processing Association (formerly the International Word Processing Association, still known as IWP). Contact IWP Conference Services, 1015 North York Rd., Willow Grove, PA 19090, (215) 657-6300.

### **ISSCC, February 10-12, San Francisco.**

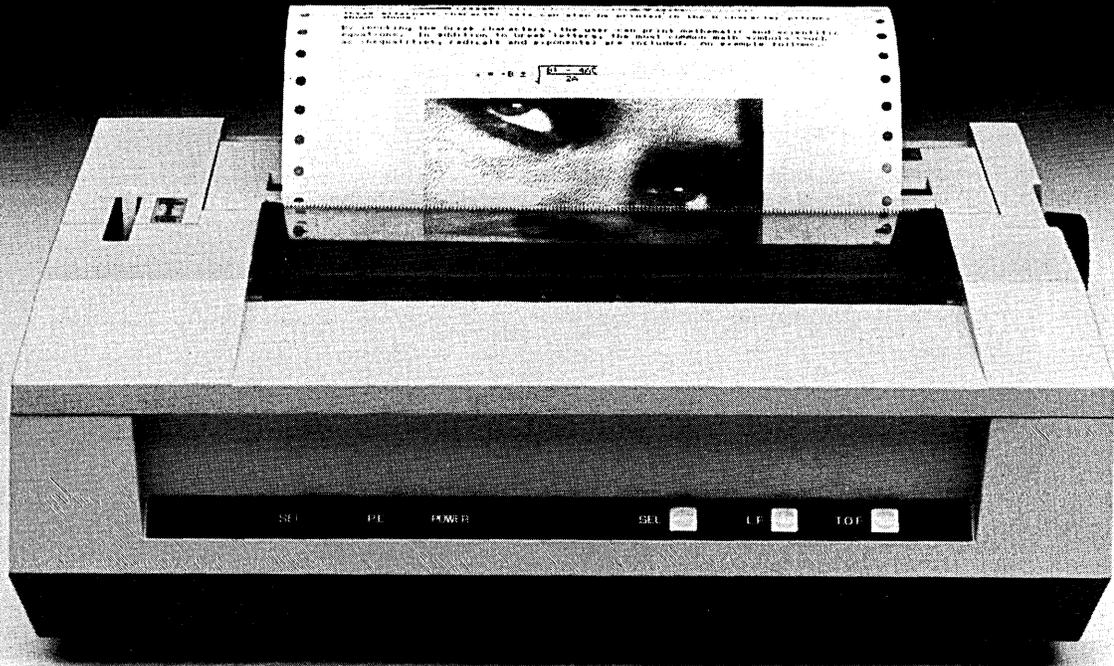
The International Solid-State Circuits Conference, in its 29th year, is sponsored by the IEEE Solid-State Circuits Council, the IEEE San Francisco Section and Bay Area Council, and the University of Pennsylvania. Contact Lewis Winner, 301 Almeria, Box 343788, Coral Gables, FL 33134, (305) 446-8193.

### **Industrial Productivity Conference and Exposition, February 16-18, Memphis, Tennessee.**

The Society of Manufacturing Engineers (SME) is sponsoring this show, which will emphasize plant maintenance and cost-efficient plant operations. Contact SME, PR Dept., One SME Drive, P.O. Box 930, Dearborn, MI 48128, (313) 271-1500.

### **Federal DP Expo, February 22-24, Washington, D.C.**

This is the eighth annual conference and exposition for computer systems users in the U.S. government. Hardware and software products, and systems and services will be included in the show. Contact The Interface Group, 160 Speen St., Framingham, MA 01701, (617) 879-4502.



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In addition to introducing the Prime 850, we've also enhanced the price/performance capabilities of other 50 Series members, including the Prime 250-II and 550-II. To meet the leader, contact the nearest Prime office or write Prime Park, MS 15-60, Natick, Massachusetts 01760. In Europe, write Prime Europe, 6 Lampton Road, Hounslow, Middlesex, TW31JL, England. Tel: 01-570-8555.

# PRIME Computer



# LETTERS

## PRIORITIZING HEADACHES

Re: "Accounting Packages: Selection and Management" (August, p. 76), I must take exception to a number of the points Mr. Walker has made, or ignored, in the area of applications software implementation. He apparently feels that the most important task of a dp manager is selecting the package, yet nowhere in the article does he mention the all-important task of defining the requirements of the application being addressed. It is in this requirements definition that the user should take a very active role, primarily in the areas of his/her use of the system inputs and outputs. A few areas where the user might assist the dp department would be to look at a prospective application in terms of the amount of necessary interface with the computer operations area, the required turnaround time of input, and the type and quantity of data which must be processed and stored, among other considerations.

Many applications software vendors make it a practice to "sell the sizzle" of their products to uninitiated users while minimizing any problems of their systems. Therefore, it is extremely important that the project manager and the user define and agree upon the prospective system's requirements before venturing out into the hazardous area of package selection.

Secondly, Mr. Walker states that, "To minimize or eliminate changes (to the applications software), it may be necessary to make procedural changes to existing operations." While it should be obvious that any new system will necessitate some changing of existing procedures, a primary consideration in the selection of a package should be to keep such changes to a minimum unless they will materially improve the application being systematized.

While the packages on the market may have been "... professionally designed and written," this certainly should not be a major consideration in changing a company's present operating procedures. It must be kept in mind that application software packages usually are designed with the intention of selling them to a diverse group of customers across industry lines. The "clerical methodology" which is designed to run these systems not only will be a similar compromise to accommodate the system, but, in my experience, it will have

been written almost as an afterthought to the computer design.

Mr. Walker states that "... standardization [of business applications] is becoming more and more prevalent." While certain business standards have always been adhered to, both in law and in form, standardization of business practices does not automatically increase efficiency. J.C. Penney undoubtedly has increased its own efficiency by using its "clout" over its many vendors, but I doubt that all of those vendors would agree that changing their systems to accommodate Penney was a cost/effective modification (aside from their potential loss of business!).

While Mr. Walker makes some very valid points in his article, I feel he has inadequately addressed the difficult task a project manager has in analyzing current systems and future needs, wading through the morass of applications software vendors to find the one which "does the job" for the user, and then implementing a package which will make the user, the operations staff, and the systems and programming staff realize that all of the analysis, planning, and headache was worth it.

JAMES S. PUSKAR

Project Manager, Financial Systems  
Kaiser Cement  
Oakland, California

*Mr. Walker responds: Although I did state that package selection is a long and involved process, perhaps I should have mentioned more specifically a requirements definition phase. In some instances, this phase could be a collation and summary of complaints and postponed enhancements to the currently used inadequate system. Moreover, the user's first exposure to a software applications package description often results in the discovery of a feature that is very valuable but was not thought of during the requirements definition phase. Users and the dp department may find it difficult to accept a package as the "not-invented-here" syndrome comes into play.*

*I disagree that "a primary consideration is to keep procedural changes to a minimum." If a procedural change can be made to avoid hazardous and costly programming changes, I suggest you seriously consider making the procedural change.*

*Regarding standardization, more*

*often than not it leads to efficiency. Consider the recently announced federal tax changes which will impact all capital asset accounting systems. Those users who chose to standardize via the use of an unmodified applications package can sit back and wait for their vendor to supply them with changes. The others will be putting in long hours to make the changes themselves for the next federal income tax filing.*

## OMISSIONS AND ADMISSIONS

Re: "Business Applications Software Outline" (August, p. 79), Microdata Corp. has been a major factor in the small business systems market since 1973, and numerous business applications supplied by our company and third parties are available for our REALITY computer systems. Unfortunately, your authors do not consider Microdata to be sufficiently important in this market to separate it from the "other make computers" category. I am surprised at this, since other machines are shown separately, even though substantially fewer business application packages are available for these machines than for the REALITY family. For example, while Modular Computers undoubtedly offers a very good computer system, your article shows only one package available for it.

Furthermore, many of the third party developed packages for REALITY systems are not shown in your article. Finally, your article completely excludes packages developed by Microdata itself and other hardware manufacturers. Not even IBM's DMAS and MAPICS are mentioned.

The article's omissions are compounded by the lack of explanation of the criteria for selecting packages and vendors. Without such an explanation, the article is confusing at best and misleading at worst.

HOWARD D. MIROWITZ

Manager, Market Planning  
Microdata Corp.  
Irvine, California

Why would your authors list Modular Computers separately as a hardware vendor and leave Wang out? Only one of the third party software vendors offered a package that runs on Modcomp systems. At least six of the software vendors listed had packages that run on Wang equipment. The authors also excluded Wang's Human Resource

## LETTERS

Management System, which has over 400 installations. Wang's VS100 computer is a powerful mainframe; the company's not only in the word processing business. We have a VS100 with packaged software (COBOL) from Software International, Comserv, and Mini Computer Business Applications. We currently have 45 remote and local terminals getting one-second response time. It seems odd that Modcomp would be included at the expense of Wang.

DAVID H. EISS  
Director of Administration  
Kroy Industries Inc.  
St. Paul, Minnesota

The software industry says a collective "thank you" for your focus on software. While we realize it is impossible to print a complete list of companies, especially since new software firms are born every day, we were one of the oversights (even though we weren't born yesterday).

Timberline Systems Inc., now in its 10th year, develops, packages, sells, and supports more than 60 standardized software products with Burroughs or Texas Instruments minicomputers to a variety of vertical markets. The company is the largest oem of TI, and is a leading supplier of software for Burroughs minis since 1971. Our headquarters are in Portland, Ore., and we have branch offices in Chicago and Boston. An employee-owned company, we have a full-time staff of 130. We hope you will include us in your next survey.

DOUG FORAN  
Manager, Advertising/Public Relations  
Timberline Systems Inc.  
Beaverton, Oregon

Re: "Survey of Financial Applications Vendors and Packages" (August, p. 88), the description of Lavan software which appeared in your survey is erroneous. We do market a system called FUTURESCOPE, but it bears little resemblance to the system described in your publication.

FUTURESCOPE is an executive office automation system featuring automated business contact filing and display, contact history, event planning, automated calendar, and letter generation. Designed for the Wang VS, FUTURESCOPE is tailored to the office automation needs of high-level corporate executives.

PHILLIP KLAHR  
Manager, Publications  
Lavan Systems Inc.  
New York, New York

Thank you for including National Information Systems in your survey, but unfortunately those particular products listed belong to another company.

Our products include QLM, a lease analysis package to assist corporations in structuring and analyzing complex leveraged or single source leases primarily from

the lessor's analysis. QLM runs on DECsystem-10s and 20s and can be purchased for \$85,000.

We also offer VUE, an interactive project management and planning system. VUE gives managers a powerful analytical tool to compare alternative strategies and their corresponding impact on current or planned projects. VUE runs on a DECsystem-10 or 20, a PDP-11, and VAX.

MARY VON RAESFELD  
Advertising & Public Relations  
National Information Systems Inc.  
Cupertino, California

A description of our IBAS and SUMMIT software packages was printed in your survey with an incorrect company name and address. The correct listing should read:

Diversified Data Systems, Inc.  
2601 North Fairview Avenue  
Tucson, AZ 85705  
(602) 792-3250

We presently have 12 SUMMIT users and 25 IBAS users.

PHILIP D. JOHNSON  
Management Services Analyst  
Diversified Data Systems Inc.  
Tucson, Arizona

Your vendor listing does not have the current address. The new information is as follows:

Sun Information Services Co.  
280 King of Prussia Road  
Radnor, PA 19087  
(215) 293-8000

ADELE L. GAILLARD  
Marketing Services  
Sun Information Services Co.  
Radnor, Pennsylvania

Due to a regrettable typographical error, our software packages were incorrectly listed as being available on the HP-2000 series of equipment. The correct equipment is the HP-3000 series.

NORMAN STATLAND  
National EDP Director  
Price Waterhouse & Co.  
New York, New York

Unfortunately our Praxa line of software was not included in your survey, even though we did have an ad on p. 157. We would like to receive coverage in any future articles of this type.

JUDY FAULKNER  
Manager, Marketing Communications  
Xerox Computer Services  
Praxa Division  
Cherry Hill, New Jersey

We found your vendor listing interesting and informative and only regret that we were not included in the survey. Our software offerings include the Software Shop Distribution and Financial System (introduced in 1978 and now with 600 users) and

the Software Shop Manufacturing and Financial System (introduced in 1979 and having 300 users). Both systems offer modules for general accounting, purchase accounting, sales accounting, order fulfillment and order control, and payroll and personnel. The software runs on the IBM System/23, System/34, 5120, and 5110 under BASIC. The Software Shop is located at 5825 Glenridge Drive, Building 1, Suite 106, Atlanta, GA 30328, (404) 255-8164.

STEVE TESTERMAN  
Manager of Marketing  
Software Shop  
Atlanta, Georgia

... Our apologies for the inadvertent omissions and inaccuracies in our August survey. And our thanks to the vendors and users who called us on it.—Ed.

### MANY-HEADED

Re: "Hydra Versus Kangaroo" (July, p. 38), as manager of a project now under way that consists mainly in the installation of more than forty 8100s in remote locations all over Spain linked to a 4341 as central host, I must comment that I hardly regard the 8100 simply as an "intelligent controller" as Mr. Ralph Emmett stated in this article, but rather as a true remote processor, although I can agree that until recent enhancements it lacked a certain amount of power and speed.

While the 8100 system had some technical shortcomings in an early stage of its launching, I feel that most of the reviews about it that have been published both in the U.S. and in Europe show a misunderstanding of its key features, among which the approach to the "black box" concept and hence to the "people-less computer" is one of the most remarkable. The reviews tend as a whole to underrate a system that can truly be regarded as one of the most serious steps ever taken in the distributed processing field.

LUIS R. LLEDÓ  
C.A.M.P.S.A.  
Madrid, Spain

Your news story describing the way in which 4300s can be made to run "untouched by human hands" confirms my faith in my own, as well as DATAMATION's ability to read the way the computer industry should go. The December 1977 issue of DATAMATION carried my article, "Computer-Controlled Computers," which suggested that computers might profitably be set to turn themselves on and off, thus coming into their own and leaving the human sitter environment. I am doubly delighted that it is IBM—whose leadership in the field can hardly be questioned—which has implemented the unattended computer concept.

DOROTHY A. WALSH  
Dp Consultant  
Rome, Italy



# Ocean Spray

## **OUR CUSTOMERS NEVER GET BOGGED DOWN WITH SLOW DELIVERIES.**

Companies like Ocean Spray appreciate a terminal supplier that can meet delivery schedules. That's why our large inventory makes such a big splash.

They also like one that can supply all their needs. One they can call to get everything from state-of-the-art terminals, to modems, to paper

and ribbons and get it all delivered fast.

We know there are a lot of distributors and manufacturers you can buy or lease your terminals from. So we don't intend to let anyone scoop us in any area.

If that sounds refreshing, why not call us today.

**COMPUTREND**

THE SOURCE FOR DATA TERMINALS

**CIRCLE 17 ON READER CARD**

# Ask American about its new Bu

**We did. We asked American Hospital Supply Corporation, a worldwide manufacturer and distributor of health-care supplies. American Pharmaseal, a division of American Hospital Supply, was the first to install the B 5900. And its response was so overwhelmingly favorable we thought anybody involved with computers would be interested in an actual user's experience with the B 5900. Satisfied users like American Pharmaseal are one of the strengths of Burroughs.**

**Here's what Mr. Harvey Cohen, Director of Management Services at American Pharmaseal, who's been in the data processing business for seventeen years, had to say . . .**

"It's an awesome achievement. The thing that makes it all the more impressive is that the darn thing performs as advertised."

#### **The last conversion.**

"The B 5900 is an entry level system in a class of systems that ranges up through the largest machines that Burroughs makes, all of which have the same software and the same operating environment. So once people get on to the B 5900, they may replace processors, they may upgrade systems, they may add components—but the operating environment will remain the same all the way up the

line. So once you have made it, it is the last conversion."

#### **Advanced technology.**

"I am not an electronics expert, but the internal hardware architecture of the system appears to be a major advance in technology. I was told that the B 5900 is the first computer with the Burroughs multi-level Function Processor architecture, an internal structure of computers within computers. That's one of the reasons why the productivity is higher while the physical size and power consumption are smaller."

#### **Terrific hardware.**

"The processor has been rock solid. The memory has been rock solid. We have not had a single problem. When I consider the processor and the memory, which are the parts of the system that are really new—I can't say anything bad about them. They have been tremendous."

#### **Best operating software.**

"My experience since 1970 has been with Burroughs equipment. They have, in my opinion—and I think it's generally recognized in the industry—the best operating software around."

#### **Higher productivity.**

"The downtime on the processor was so low that the Burroughs people were afraid nobody would believe it. So I think they wrote it



# Hospital Supply Burroughs B5900.



up on the acceptance test as 99.8%. Now with that kind of experience, is it any wonder I would recommend the machine?"

#### **In-house time-sharing.**

"On the B 5900 we are now able to offer in-house time-sharing services to our community of general management people who just didn't have access to that kind of facility before.

Now that they have this alternative, there are a number of other people at American Pharmaseal using outside services who are looking at potentially saving several thousands of dollars a year by doing that work internally."

#### **Total support.**

"We expected a high level of support and we received it. In general, though, support has a lot to do with reliability. If the system doesn't break down, your need for support is obviously lower."

#### **User-friendliness.**

"There is no question that the ease of use of the software tools that Burroughs provides and friendliness in terms of prompting and keeping you from going down the garden path, so to speak, make it much easier to learn and adapt to the new environment.

From the perspective of my own staff, everything—the workflow, CANDE, the operating system itself, the

language processors, all of the software tools that Burroughs provides—has an impact, a positive impact on their productivity. They are able to sidestep a lot of nit-picking details and just concentrate on getting the job done."

#### **Reliability.**

"One part of the B 5900's reliability stems both from the design engineering of the system and advances in the quality control of the manufacturing process. The other part is clearly the reliability of the software that goes with the system. I think the design of the hardware and software and the symbiosis between them is the strongest feature of the Burroughs large system environment. When you have that combination, it makes a lot of things happen."

#### **A system to build upon.**

"When we were thinking of acquiring a system, our primary consideration was the fact that American Pharmaseal has plans for major expansion in the next few years. So what we were looking for was a system which we could build upon. I am confident that we have that in the B 5900."

**We'd like to tell you more about the strengths of Burroughs and demonstrate Burroughs systems approach to data processing management. Burroughs Corporation, Dept. D-46, Burroughs Place, Detroit, MI 48232. For an update on what's happening at Burroughs, call 1-800-521-4866. (In Michigan, call 1-800-482-2402.)**

# Burroughs Building on strength.

## LETTERS

### BURNED OUT ON BURNOUT

Re: "Burnout: Victims and Avoidances" (July, p. 92), you quote Sidney Dunayer, the vp of dp-turned-consultant, whose position clearly seeks to establish a mandate to put the inmates in charge of the asylum. I cannot articulate the dper's lot in the private sector, but in the federal bureaucracy the inmates do run the asylum. Even within the Reagan Administration, "they" are still flying over the cuckoo's nest.

So you see, Sydney, you merely chose the wrong workplace. Come on over. We have a position for you at EPA.

MEL MINOT

Computing Resources Project Officer  
Environmental Protection Agency  
Research Triangle Park, North Carolina

### OF NOSTALGIC INTEREST

Re: "Professor RAMAC's Tenure" (April, p. 195), may I compliment—a bit belatedly—Mr. Morris on his article. Being an old-timer in IBM and one of the first in this country to be educated as a RAMAC programmer, I read the article with great nostalgic interest—and so did another old-time RAMAC specialist who works for the Scandinavian Airlines System. This airline used an IBM 305 RAMAC during the first half of the 1960s.

My friend did notice, however, an understandable error made by Mr. Morris:

there is in fact at least one 305 RAMAC in a museum—the Technical Museum of Denmark in Hamlet's own town, Elsinore!

If Mr. Morris eventually comes to Copenhagen, he will be most welcome and we will be happy to show him the Danish museum example of the computer sensation of the '50s—the IBM 305 RAMAC.

ERIK AAGESEN

Information Department  
IBM Denmark  
Copenhagen

### FRIGHTENING EXPOSE

Re: "Importing Software Talent" (Aug. 25 Special Report, p. 82) was a frightening exposé of the illegal means by which aliens are imported into this country to take job opportunities away from Americans. Mr. John Verity quotes one recruiting firm that admits to "bending the rules" to bring in foreign software talent. But bending the rules equals breaking the law, and to the detriment of America's software talent.

Part of the blame lies with these unscrupulous recruiters, part with the employers (who, rather than pay American technical talent what it is worth, will become part of a conspiracy to circumvent our laws), and part with the professional societies (which are dominated by academics and corporate executives, both of which benefit from a glut of technical talent).

When will Americans wake up to demand of their elected representatives and their professional societies that steps be taken to enforce the existing laws?

IRWIN FEERST

Committee of Concerned E.E.S.  
Massapequa Park, New York

### ONE MORE LEAP

Re: Letters (August, p. 21), how lucky can a guy get? Some 70 of your readers took the time and made the effort to untangle my glitch with regard to leap years. My thanks to them all, and I'll make sure that I clearly identify my elbow from my astronomical year in the future.

EUGENE D. GODDESS

General Management Consultant  
Seattle, Washington

### FAINT PRAISE

Re: "Feds Find Software the Problem" (Aug. 25 Special Report, p. 66), though we welcomed the article, we felt the indication that "the situation has improved slightly with the establishment of the Office of Software Development" has somewhat damned us with faint praise. The very existence of the office is significant in that it acknowledges the growing recognition that software is *the* federal adp problem.

The government situation is somewhat the same as the private sector's. More

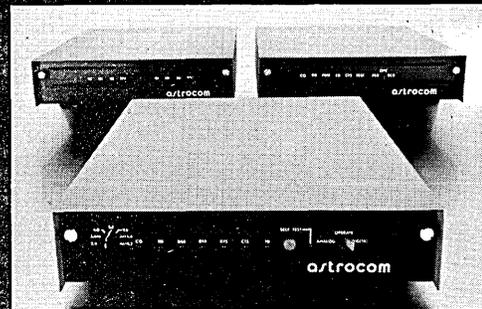
# OVERKILL?

**Beware wasteful modems:** Modem overkill can waste big money. Yours. It happens, for example, every time someone specifies a \$6000 modem for an application that could be served even better as efficiently by a \$700 Astrocom SH. Wherever shorter distances are involved, you can save thousands of dollars at each location by not overbuying (or overleasing) modem capacity. And still have all the modem power you need with optimal test features designed in. Just remember Astrocom's SH96 (asynchronous) and MOS 2 (synchronous) Limited Distance Modems. And the Astrocom Modem Emulator, which takes the place of two modems in applications 200 feet or shorter. Our band of knowing, happy repeat customers have saved their companies millions with these products since we pioneered their development. Designing out expensive overkill is inherent in our approach to designing solutions.

For more information, write: Astrocom Corporation, 120 West Plato Boulevard, St. Paul, MN 55107. Or call toll-free 1-800-528-6050, Ext. 1103. (In Minnesota, call 612-227-8651 collect.)

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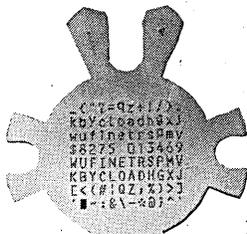


CIRCLE 19 ON READER CARD

# DATAGRAPHIX 132-COLUMN DISPLAYS GIVE YOU NOT ONLY BETTER QUALITY, BUT LETTER QUALITY.

It's the CHARACTRON  
that makes the difference!

Reproduced from an unretouched photograph of a CHARACTRON CRT.



Why suffer with display terminals that show only part of your output? Or if you do get a 132-column display, why suffer eyestrain trying to read it?

The innovation that makes all other 80- and 132-column display terminals and their dot matrix characters seem primitive is the Datagraphix CHARACTRON® CRT. A Datagraphix exclusive that literally stencils letter-perfect characters on the screen with an electron beam. Sharp, clear, fully-formed characters that are even easier to read than most hard-copy computer printout pages.

No more wasted time and money on programming to reformat the computer output to 80 columns. No more lost computer time and wasted paper running hard-copy printouts to see the complete 132-column picture.

The Datagraphix 132-X series has a model with just those features you want. From the simple character mode 132-1, to the DEC-compatible 132-1D, to the advanced editing, block mode 132-2.

You don't have to spend a fortune either. The Datagraphix 132-X series of display terminals feature a surprisingly low factory price, or liberal terms if you prefer to lease. Also there are more than 100 convenient locations for factory-direct service. It is a combination unmatched by any other manufacturer.

There's no waiting either.

Delivery is from stock for most orders. But don't just take our word for Datagraphix display superiority. Send us the coupon today and we'll arrange a live demonstration right in your facility. You have to see it to believe it.



**Yes, I want to see your letter quality display terminals.**

- Please call me to make arrangements for a demonstration of the low-cost 132-1  132-1D  132-2 .
- I am interested in receiving information on the 132-1  132-1D  132-2 .
- I am interested in receiving information about your advanced editing terminals 132A, B  132-70 IBM-compatible system .

Name \_\_\_\_\_  
(please print)

Title \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone (\_\_\_\_\_) \_\_\_\_\_

Mail to:  
Datagraphix  
Display Products Department  
P.O. Box 82449, San Diego, CA 92138  
(714) 291-9960

D/11-81

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CIRCLE 20 ON READER CARD

## LETTERS

than 60% of our adp costs seem to go to software development, maintenance, and conversion. Software activities still remain labor intensive and we see little short-term hope for any kind of major productivity breakthrough. Programmers are increasingly in short supply, are increasingly costly, and we are less and less in a position to attract the best and brightest to government.

In many agencies which significantly rely on adp to meet their mission, most of the programmers are tied up in simply keeping the existing kludges working. Few resources are available to respond to improving software, or to applying creative thought to new and better ways of doing things. Much federal software is out of date—being little more than a COBOL legacy of programs built for machines that were obsolete 15 years ago. Improving these programs is a serious problem, and our track record of contracting for new software holds little hope for quick solutions.

Far more serious though than the above problems is the impact software has on the effectiveness of the whole government. The government is an information intensive industry and many agencies rely completely on the support of their adp systems to meet their missions effectively—as do banks and insurance companies.

In recognition of this problem, it is a step forward that the office exists. It is also

significant that in this first year of our operation we have been able to convince some major adp users to redirect their priorities towards solving some of their software problems rather than continually focusing on bigger and better hardware. The office currently has three priorities:

1. Improvement of existing federal software to cut maintenance costs, increase data service levels, and gain control over systems that potentially could run amok.

2. Improvement of the acceptance testing process for contracted software as this drives the quality of the whole engineering process.

3. Gradually changing the procurement of software from the service concept (buying labor hours and managing the resources) to a product basis.

On this third point, and in response to comments by Mr. Miller, many large corporations in the private sector buy major software systems on a fixed price basis from companies that offer an existing framework or packaged system. The problem is not that software cannot be bought on a fixed price basis, it is rather that the government has institutionalized a procurement process based on labor hours, making it very difficult for such suppliers to effectively market to the government. Also I am not sure that we can be termed naive to expect agencies to be able to specify their needs suitably for

subsequent fixed pricing after spending half of the project software budget.

A final point may on the surface seem trivial but is nonetheless a significant indication of how the Office of Software Development works. The recent GSA bulletin on software contracting mentioned in the article was not a regulation; it was a guideline only. We would hope to accomplish major progress on all three priorities without adding further to the complex regulations concerning adp. We believe that if what we suggest to agencies is common sense and reflects effective practice in the industry, and if we can also supply suitable quality assistance and technological guidance, the agencies will follow our lead. This is certainly happening so far, as the demand for our help is greatly exceeding our ability to supply. Recognizing this at the outset, our strategy calls for us to become a channel for proven technology from the private sector to the needs and problems of agencies that ask for help.

BERNARD J. BENNINGTON  
Assistant Commissioner  
Office of Software Development  
General Services Administration  
Falls Church, Virginia

Being employed by a federal agency, I was accepting what I read in Mr. Willie Schatz's article as, if not gospel, at least a larger view

## Ease of use.

### FOCUS enhances productivity with English instructions.

FOCUS is a user-oriented software system. Its high-level, English-language commands let programmers develop complete applications in 1/10th the time of procedural languages. Non-programmers can learn to make queries within hours and users can write fully formatted reports after one day of training.

**Data capture and management . . .** FOCUS attends to all your data entry, validation, and maintenance. It interfaces with VSAM, IMS, IDMS, etc., and has relational file structures for complete information access.

**System flexibility . . .** operating interactively (VM/CMS, TSO/MVS, CICS/MVS) on IBM 3000s, 370s, 4300s, or equivalent mainframes, FOCUS also offers comprehensive sub-systems that produce graphs, financial models, and formal statistics.

**A proven record . . .** over 400 major companies, institutions, and government facilities are using FOCUS. Typical applications are in personnel, finance, marketing, sales, general administration, research and customer service.

Put FOCUS to work for you. For more information, call or write for our brochure.

(FOCUS is also available on a service bureau basis through Tymshare Inc.)

```
FOCUS:
"PROFITABILITY REPORT"
SUM SALES AND COST AND COMPUTE
MARGIN = 1 - (COST/SALES);
BY REGION BY CUSTOMER
```

```
PROFITABILITY REPORT
```

REGION	CUSTOMER	SALES	COST	MARGIN
SOUTHWEST	ABC COMP	1,000,000	600,000	.40
	DELTA INC	750,000	397,500	.47
	ZETA CORP	1,350,000	877,500	.35

 **FOCUS**

Information Builders, Inc.  
1250 Broadway  
New York, N.Y. 10001  
(212) 736-4433

CIRCLE 21 ON READER CARD



# Paradyne

## Paradyne.

## Simplified Networks..

**Should networking be difficult? Do host computers need to be burdened with telecommunications tasks?**

No...At Paradyne networking has been simplified. And computers are used for what they do best — remote processing — instead of telecommunications tasks.

How is this possible?

**"State of the Art"  
Distributed Data Processing**

Using our experience in high speed modem technology and networking products, we've extended our expertise into all aspects of data communications. This has allowed us to develop high speed "systems" to simplify remote data processing over a variety of communication media.

Our PIX system was developed to relieve the host computer

of telecommunications tasks. PIX allows remotely located peripherals to appear to the host as if they were in the computer room.

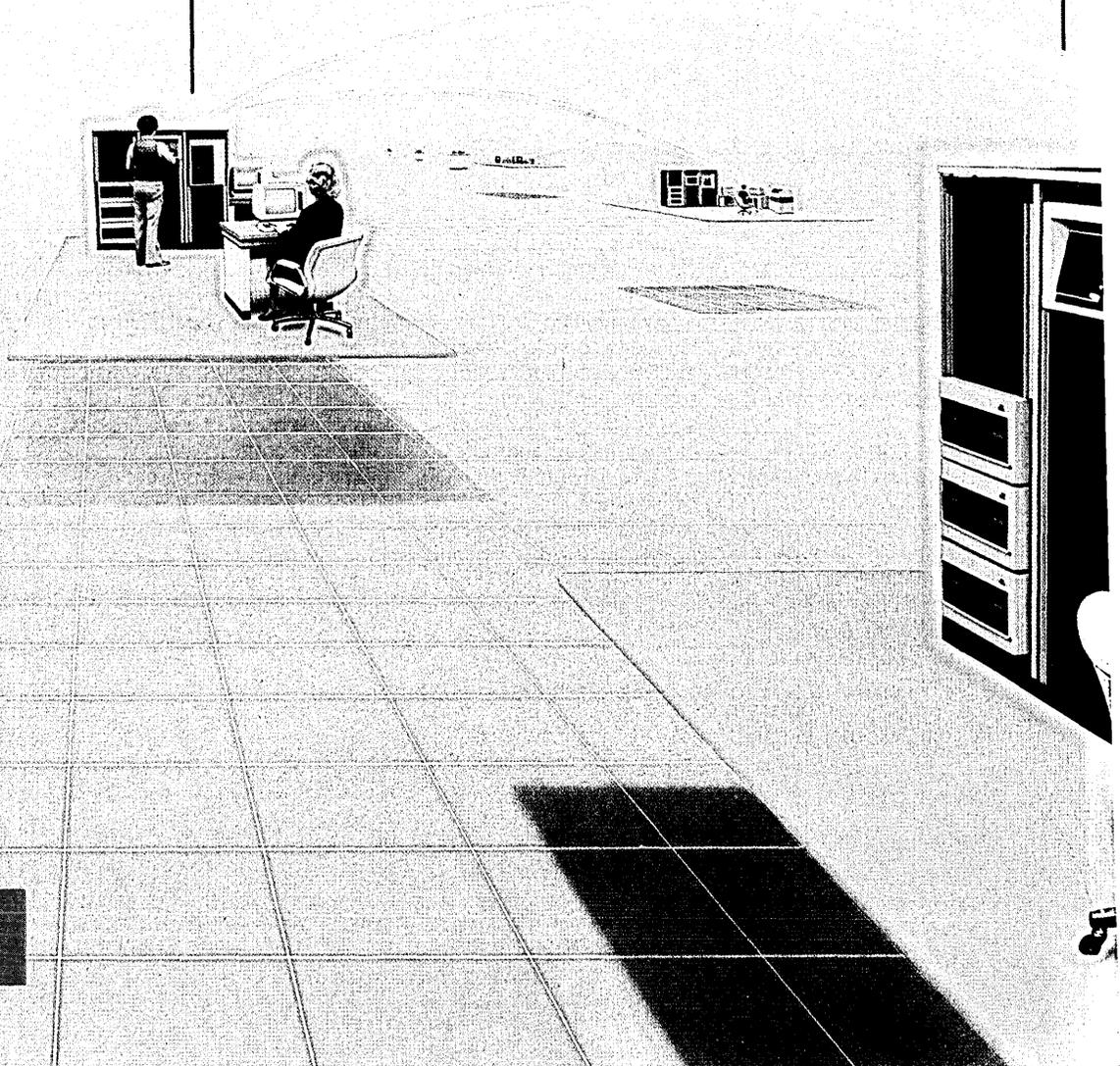
To provide networking capability in more complex processing environments, PIXNET allows the devices attached to multiple PIX systems to interconnect with more than one IBM host processor.

The result? Simplified and more cost efficient communication!

Paradyne's **RESPONSE** adds an additional level of advantage to the benefits of PIXNET by providing the capability for on-line, interactive processing applications.

RESPONSE gives IBM users a distributed data processing capability by putting transaction processing, word processing and data entry functions in remote locations and utilizing PIXNET for its distributed communications.

The result? Again, more efficient and cost effective communications!



# and Much More!



**ANALYSIS: Network Management System**

## Superior modems/network management

As the leader in using LSI and microprocessor technology to develop modems, Paradyne produces a complete family of modems for operation at data rates of 1,200 to 16,000 bps.

We were the first with high speed LSI modems. The first with high speed microprocessor modems. The first with the 14,400 bps modem. The first with a 16,000 bps modem designed for computer data. And, most recently, the first with an end user 9600 bps modem for under \$2600.

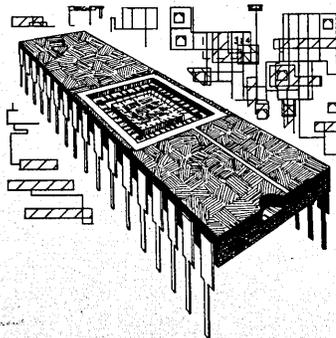
Because we were also the first to use modems to measure line impairments, our **ANALYSIS** Network Management System offers features unique in the industry. In complex RJE, teleprocessing and distributed networks, **ANALYSIS** constantly monitors the status of all modems, telephone lines and terminal connections.

With our new **DATALYZER** option, **ANALYSIS** can now provide system performance information such as response time for CRT's and computer transaction time. Our newest advance, the **NETWORK ADMINISTRATOR**, makes problem management, inventory control and report generation capabilities available to the teleprocessing network manager.

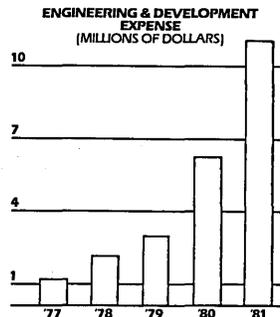
Once you've seen all the members of the **ANALYSIS** family of products, you'll know why it's become the standard against which all other systems are measured!

## Advanced technology

We've used advanced technology to develop and patent superior communications products. Products that



have better features, lower costs and longer lives. Products that satisfy today's communications requirements better than any available alternatives. And by continuing our policy of spending 8-9% of revenues on product development, we are ready for tomorrow's requirements as well.



## Rapid growth

With annual revenues increasing at a rate of over 50%, Paradyne has become a leader in an industry known for its rapid growth.

Our remarkable sales increases to both end users and to "Value-Added-OEM's" indicates our philosophy of using superior technology to develop unique data communications products has been accepted by the marketplace.

And by understanding that data communications means going where the data needs are, our marketing and service offices aren't just in the major metropolitan areas. We're in smaller cities as well with a rapidly growing network of offices across the United States and around the world.

We're **PARADYNE**... THE Data Communications Company of the 80's.

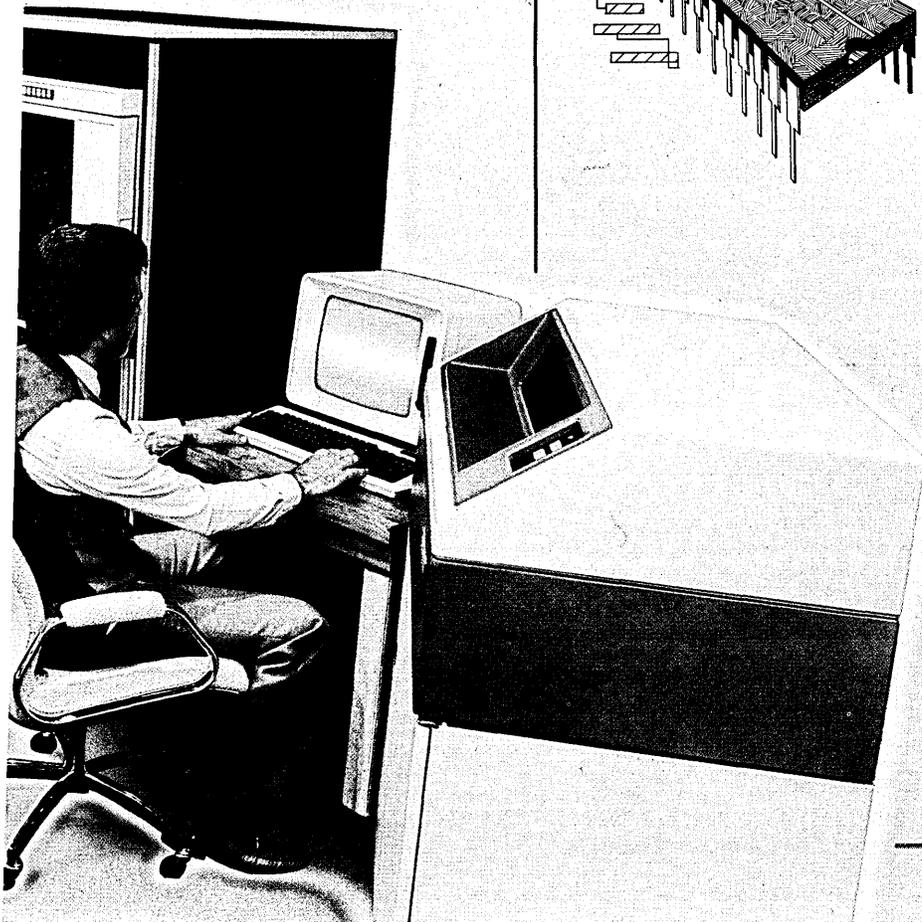
If you would like to know more about Paradyne's products and services, write on your letterhead or call:

**PARADYNE, 8550 Ulmerton Road, Box 1347, Largo, Florida 33540 (813) 530-2000.**

**Paradyne Canada LTD., (416) 494-0453, Telex 986911, PARADYNE TOR; Paradyne (U.K.) Ltd., (07535) 56712, Telex 849943, PARAUUK-G; Paradyne G.m.b.H. (0221) 491078, Telex 888-5516, PARA D; Paradyne Japan, (03) 245-0431, Telex 222-7024, SCPDYN**

**paradyne**

CIRCLE 23 ON READER CARD



## LETTERS

of the government's software situation than I could obtain through office gossip. Then I read about GAO's survey on maintenance, and I didn't read further. The article cited GAO's survey as saying that most COBOL programs live 5.4 years, FORTRAN programs live 4.8 years, and the oldest program found in production was 9.4 years old. Arrghh! I maintain 14 programs, in BASIC, FORTRAN and COBOL, and the *newest* of them is over five years old (the oldest approaching 25). Where was this GAO survey taken, for pete's sake? My situation is the rule rather than the exception here, as well as in the three other government labs I have visited.

EUGENIA SCHNEIDER  
Naval Weapons Center  
China Lake, California

### ALSO LEFT OUT

Re: "The DBMS Market Is Booming" (September, p. 153), while the authors listed 54 database management systems, some of which had as few as 10 installations, they failed to mention FOCUS, which has over 200 installations and accounts for 2% to 3% of today's independent database markets.

Our product combines a shared structure DBMS with a nonprocedural language which is powerful enough to develop complete applications yet easy enough to learn in one day. Transactions against FOCUS-databases may be entered using mul-

iple, fill-in-the-blank, screen forms which are readily created using the FOCUS Interactive Data Entry Language. Other options available are color graphics, statistics, and a financial modeling extension to the language itself.

FOCUS runs on any hardware that uses IBM's VM or MVS operating system. A FOCUS system may be leased for \$1,680 per month or purchased at a starting price of \$43,000 from Information Builders Inc., 1250 Broadway, New York, NY 10001, (212) 736-4433.

DAVID R. KEMLER  
Vice President of Marketing  
Information Builders Inc.  
New York, New York

Your article claims to provide "a complete list of [DBMS] vendors . . ." So why did you leave us out? Our DNA-4 information management control system includes a DBMS capable of structuring a variety of data models in a single database and doing it simply. But the DBMS is only part of the system. We also have SCREENG, an automated programming system, and GO, a multiterminal, multitasking executive that provides an on-line environment so that the user need not worry about the concurrent update, response performance, or any of the other problems presented by such systems.

We refer to the DNA-4 system as an

integrated software product that provides applications generation facilities, database management, and an operating environment. No other software is required. DNA-4 runs on the entire Data General line of computers from micros to Eclipses within the manufacturer supplied operating systems. Fifteen DNA-4 installations are in daily operation, and we project 20 to 40 more in our current year. More information is available from Exact Systems and Programming Corp., P.O. Box 115, Thornwood, NY 10594, (914) 948-4913.

HENRY OSWALD  
President  
Exact Systems and Programming Corp.  
Thornwood, New York

### CORRECTIONS

Re: "Talk Is Getting Cheaper" (August, p.70), we incorrectly listed the address of ASI Teleprocessing as Watertown, Conn. Watertown is located in the state of Massachusetts. And since the time the article was published, ASI Teleprocessing has changed its name to AMNET, Inc. The address remains the same.

Re: "Pain and Pleasure In Going Public" (Aug. 25 Special Report, p.60), our apologies to Mr. Steve Elias, who is corporate director of acquisitions for Computer Sciences Corp., not for Intel. \*

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ANIMATION

SIMULATION

MAPPING

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## GRAPHICUS-80

offers a Simplified  
Approach to Refresh Graphics  
with a 21" Screen Display

Waveform analysis, animation, mapping, simulation, CAD/CAM . . . you name the application and Vector Automation's intelligent terminal has the hardware and software to give you outstanding performance. With a resolution of 4096 x 4096 and 2,000,000 short vectors per second, the Graphicus-80 leaves its competition struggling to catch up. And Graphicus-80 has a memory that's expandable to 1.0M Bytes to go with its firmware and emulator packages. Highly interactive with built-in diagnostics, the Graphicus-80 requires no analog adjustments. It's engineered by professionals with 9 years of CAD/CAM experience for systems flexibility and expandability to meet your needs.

- Host serial/parallel interfaces available
- 2D and 3D
- Programmable motion
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Better and timelier weather forecasts will be possible when a microwave sensor is launched aboard a military satellite in the mid-1980s. The instrument will tell how hard rain is falling in a specific area rather than simply how much has fallen over a wide area within 24 hours. It also will determine wind speed, atmospheric water content, soil moisture, and sea ice conditions. Because the satellite will follow a low polar orbit, the sensor will gather important data on the little-studied polar regions and oceans. Hughes will soon deliver the prototype Special Sensor Microwave/Imager to the U.S. Air Force.

The U.S. Forest Service is using satellite pictures to monitor and manage national forests. The agency has gotten detailed views of its lands from NASA's Landsat 2 spacecraft. Landsat data can be adapted by computers to create false-color maps for categorizing different vegetation and ecological zones. The pictures, covering an area about 115 miles square, help the Forest Service measure changes in the growth and health of forests. Tests begun in South Carolina last year are to be followed by a complete inventory of Idaho's forests in 1982. Landsat 2's electronic camera, a multispectral scanner, was built by Hughes.

The Manufacturing Division of Hughes Missile Systems Group in Tucson has many immediate openings for engineers. These career opportunities require expertise in designing test equipment for advanced major electronic and missile system programs. Openings range from digital logic, analog, and IF/RF circuit design to electro-optical and IR system design. Also needed are industrial engineers and manufacturing production engineers. For immediate consideration, send your resume to Engineering Recruitment, Hughes Aircraft Company, P.O. Box 11337, Dept. SE, Tucson AZ 85734. Or call (602) 746-8925. Equal opportunity employer.

A millimeter-wave radar has demonstrated its ability to track targets and guide missiles accurately through smoke and rain. The radar, under study because it has more resolution than conventional radar and can penetrate adverse weather better than infrared, was used to guide TOW (Tube-launched, Optically tracked, Wire-guided) missiles to stationary targets. In three of the successful launches, the target was obscured by heavy smoke and aerosols. In one of those, visibility was further deteriorated by rain. The demonstration was conducted by Hughes for the U.S. Army and the Defense Advanced Research Projects Agency.

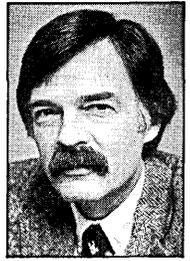
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# EDITOR'S READOUT



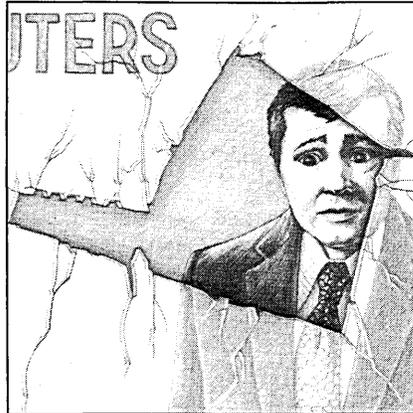
## IMPERSONAL COMPUTERS

**Without significant postsale involvement by the manufacturers, we may be creating legions of frustrated first-time computer users.**

*It was the attack on the Sears computer store salesman that gave us our first clue that something was wrong. Until then the spring of 1983 had been pretty quiet. We thought everything in the personal computer market was hunky-dory. But when a pet shop owner vaults a counter and clobbers a retail clerk . . . and then a week later a dentist in Toledo throws his TRS-90 through the front window of a Radio Shack store . . . well, we knew something was wrong. The incidents multiplied and grew to crisis proportions in June when 5,000 irate users of IBM's personal computer marched on the company's headquarters in Armonk. The rioting started when they learned that the corporation had divested itself of its personal computer line that morning, selling it to Exxon. We learned later from newspaper reports that most of the marchers were small businessmen from the New York area who were regarded as solid citizens in their communities.*

Although this fanciful scenario has no chance of ever becoming a reality, it does illustrate a point. In a few years there may be scores of very unhappy personal computer owners. Most of them will be neophyte computer users running small businesses. They will suspect our industry of perpetrating a plot to ruin them and their companies.

Now the small business market, estimated at \$590 million in 1980, is expected to skyrocket to \$2.7 billion by 1985. Those numbers translate into legions of people using computers, many



for the first time in their lives.

Most of them don't know a bit from a byte and could care less. To them a computer is not a thing of magic and mystery; it's an appliance like a washing machine or a toaster and it's supposed to perform reliably and accurately. That hardware wears out and breaks down now and then they can understand. But software? Whatever it is, it should not cause your entire payroll to come crashing down around your ears on a Thursday evening.

It all hinges on software support, or rather the lack of it. When IBM announced its personal computer last August, spokesmen for IBM (and for Peachtree, which will supply financial packages) said they would not directly support applications software. Instead, maintenance and software enhancements would be handled at the point of sale, which includes Computerland and Sears stores. Other manufacturers of personal computers are not doing much more in terms of software support.

Despite the fact that Sears will be setting up special stores with specially trained employees, we find it hard to believe that the user will get the handholding he needs when something in the software goes awry.

In addition to bugs in the system, there is another consideration that compounds the problem. Many users

will not understand the concepts behind the applications they are attempting to implement. They may try to run a general ledger program without really having a good grasp of accounting. Will their Sears computer store clerk be able to help them with that?

When we hear the assertion that user-friendly languages and prompting techniques will cure all these problems, we have our doubts. User friendliness is usually a response after the fact; how friendly is the user going to be when the screen informs him, "We are sorry but you have just destroyed your master file."? And prompting won't help when the promptee who is attempting to run that general ledger program doesn't know a debit from a credit.

Unless we are to have scores of disgruntled users at odds with the very industry they turn to for help, the manufacturers of the hardware and the software will have to lend a hand.

In the case of software maintenance, it could be as simple as a toll-free line to experts at the manufacturer, a service invoked only when the retail store's expertise has been exhausted. (Peachtree, recognizing the problem, is installing such a system.)

And to help users master the basic concepts behind the applications they have purchased, programs must teach as well as process. For example, that general ledger program could have a lesson on the pertinent accounting principles built right into the package. (Vocational schools and continuing education can also help by presenting courses on electronic accounting.)

These and other innovative handholding techniques must be developed by the manufacturers. It's too early in the game to just drop these complex machines on unsuspecting users with a cheerful cry of "caveat emptor." In other words, our industry should take responsibility for "getting 'em young and raising 'em right." \*

# INFOCUS

## TRACKING EUROPE'S TOP 25

**A DATAMATION survey charts the course of the computer companies doing the biggest business on the Continent.**

The last 12 months have been a difficult period for most companies, and the data processing industry has not been spared. The dp market in Western Europe has been plagued with even more problems than the American arena.

Some of the trouble stems from economic conditions. The recession in Europe is lasting longer than expected and the market seems decidedly static. Continuously fluctuating exchange rates have caused problems for many companies, although some have benefited from the currency shifts. IBM, with classic panache, seems to have succeeded in playing the money markets to its advantage, leading to accusations, albeit tongue-in-cheek, that it was looking more like a finance company that made computers on the side.

Interest rates have risen to uncomfortable heights, catching some companies with too much stock and outstanding loans. This has caused serious difficulties for many firms, notably ICL, which has been teetering on the brink of disaster. Meanwhile, other U.S.-based firms, such as Memorex, Texas Instruments, and Burroughs, have also been having a tough time. Even the seemingly unshakable IBM has been imposing strict controls over expenditure, and its performance has lacked the previous sparkle.

Given all the problems that face the dp industry in Europe, it is, on the surface, reassuring to find that the top four companies have broken the billion dollar mark in terms of European dp revenues. Predictably, as in the U.S., IBM tops the charts with a dp-office products revenue approaching \$10 billion. What proportion of this is derived from office products is not disclosed, but even taking this into account, its number one position remains unchallenged.

The next four places are all held by European firms—Siemens, Cii-Honeywell Bull, ICL, and Olivetti—before the rest of the American companies swamp the rankings again. Of the top 25 companies, 13 are from the U.S., four from France, three each from the U.K. and Germany, and one each from Sweden and Italy. The gap between the top and the bottom is indeed wide, the first four companies' European dp revenues probably exceeding the combined totals of

the bottom 21. IBM aside, there are equal numbers of U.S. and European companies in the rankings; the Europeans, however, win the numbers game, capturing almost 60% of the remaining revenue. It would appear from all this that the U.S. domination of Europe is not yet complete.

The nationalities of the leading European dp companies reflect the major markets in Europe, namely West Germany, U.K., France, and Italy. Together, these four countries account for about two-thirds of the total dp market in Western Europe. The final third is almost entirely accounted for by Scandinavia, Benelux, and Spain. The remaining countries represent only a very small proportion of the total market. This is due, in the case of Greece, Ireland, and Portugal, to their small working populations and the structure of their economies. The current low penetration of dp in these areas does, however, offer very high growth rates to any company actively marketing there.

West Germany, France, Italy, and the U.K. are the major markets in Western

### **Four countries account for about two-thirds of the total dp market in Western Europe.**

Europe, and the existence of one major dp company in each is no accident. The size of these individual national markets obviously stimulates the growth of an indigenous manufacturer. The preferential treatment afforded these manufacturers by their governments, however, is the real reason for their preeminent positions.

Until recently, for example, ICL was not subject to competitive bidding for orders in the U.K. government sector. Likewise in France, Cii-Honeywell Bull has been distinctly favored by the French government. The French market in fact has long been regarded by outsiders as one of the most nationalistic and difficult to enter. Similar preferential treatment has been seen in West Germany with Siemens

### **TOP 10 REVENUE GROWTH RATE**

	<b>DP% GROWTH RATE*</b>
1. Data General	56
2. Hewlett-Packard	54
3. Rank Xerox	50
4. Ferranti	47
5. DEC	39
6. Datasaab	36
7. CDC	34
8. HIS	29
9. NCR	27
10. ITT	24

\*EUROPEAN REVENUE, FISCAL YEARS 1979-1980



and in Italy with Olivetti.

This massive support in the home market helps explain why these companies are in the top five positions in Europe. For them, the attractions of concentrating on the domestic market are obvious. Siemens, in particular, derives 80% of its total European dp revenue from its home market.

There is no simple way to determine why some vendors—either European or American—are more active in pioneering new markets. America represents a more or less homogeneous market with a common language, constitution, and operating practices. In contrast, Europe comprises many countries differentiated not only by language but also by business customs, legislation, and constitutional struc-

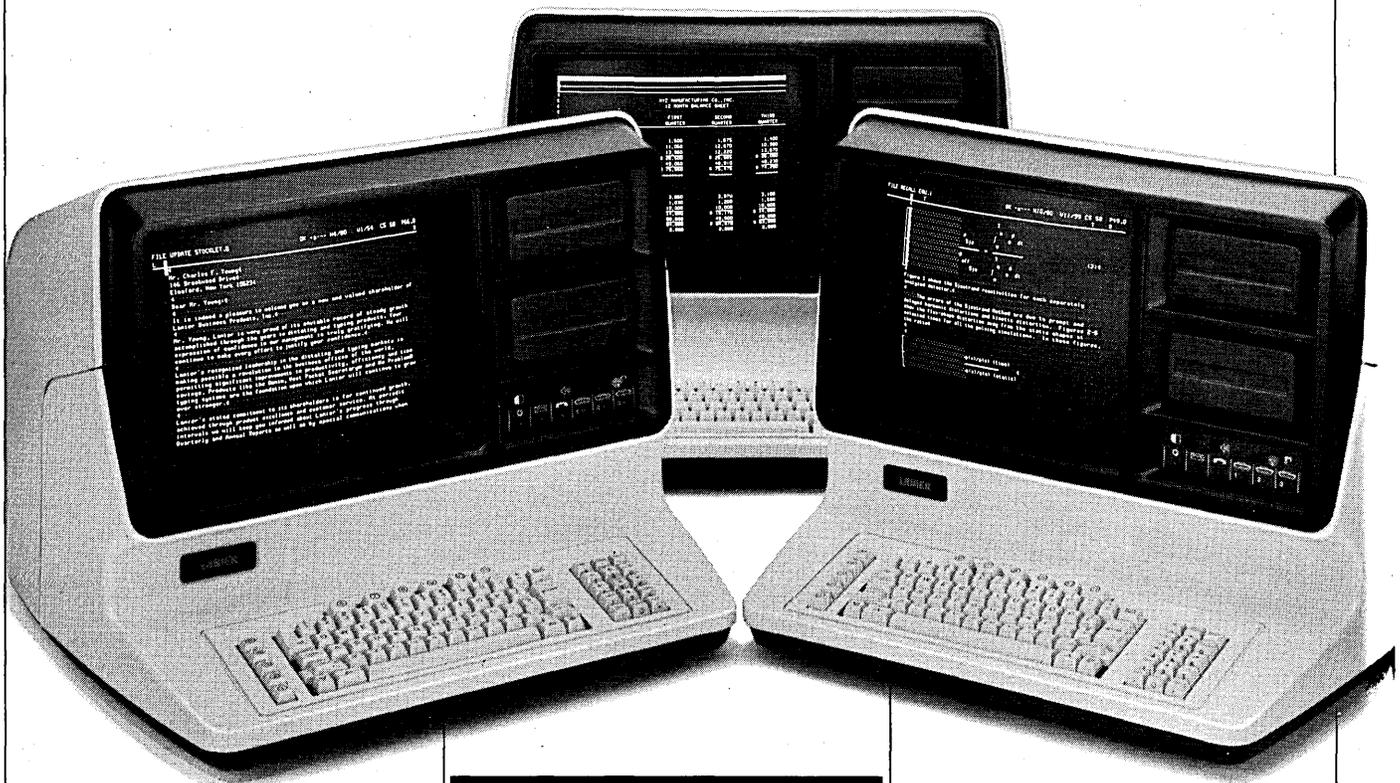
ture. To operate successfully in Europe, a multinational must cope with a wide range of economic situations.

Not only do the individual national markets differ in language and customs but they also display their own peculiar characteristics in terms of dp demand. The dp market in West Germany, for example, shows a marked preference for local minicomputers. This is partly due to Germany's political structure, which does not favor centralization. This trend can also be attributed to the attitudes and tariffs of the Deutsche Bundespost, which did not encourage data communications. France, on the other hand, has long been centralized around Paris. This approach has resulted in the development of a market oriented towards big mainframes, so much so that

the French government has had to actively encourage the minicomputer industry and support the growth of distributed processing systems through favorable tariffs.

Perhaps the most striking example of the national differences in organizational structure, and hence market demand, is a comparison of the U.K. and German banking industries. The banking arena has long been one of the major sectors of the dp market as a whole, and is thus highly important. In the U.K. the big four commercial banks account for the great majority of all banking dp sites, with very large networks feeding centralized dp systems. By contrast, in Germany the top four banks (in terms of assets) account for only a small portion of the total market. Each bank has a relatively small dp department,

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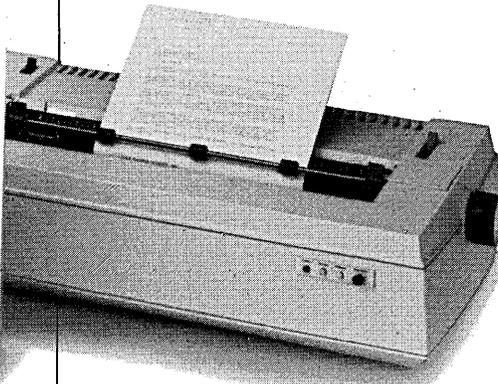
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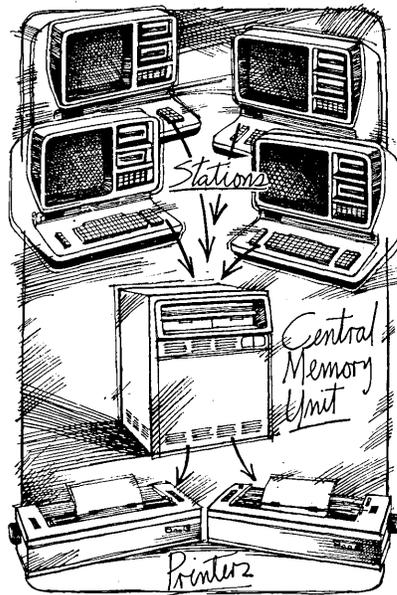


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Nov. 81 Datamation 4 6 1 H K 1

DATAMATION'S EUROPEAN TOP 25

1980 RANK	COMPANY	PARENT COMPANY HQ	EUROPEAN DP REV. CAL YR 1980 (IN \$ MIL.)	% CHANGE EUROPEAN DP REV. FY 1979/80	DP REV. DOMESTIC (PARENT CO.) FY 1980 (IN \$ MIL.)	DP REV. WORLDWIDE FY 1980 (IN \$ MIL.)	TOTAL REV. EUROPE FY 1980 (IN \$ MIL.)
1.	IBM	U.S.	9,902 <sup>1</sup>	+12	12,426	26,213	9,902
2.	Siemens	W. Germany	1,505	+10	1,204	2,040	12,921
3.	Cii-Honeywell Bull	France	1,444	+23	789	1,489	1,489
4.	ICL	U.K.	1,300	+13	665	1,494	1,271
5.	Olivetti	Italy	876	+23	479	1,221	1,847
6.	Sperry Univac	U.S.	825	+13	1,596	2,800	1,600
7.	NCR	U.S.	810	+27	1,428	2,525	1,064
8.	Digital Equipment	U.S.	786	+39	1,928	2,368	678
9.	Control Data	U.S.	764	+34	2,206	2,791	764
10.	Burroughs	U.S.	734	+14	1,635	2,902	734
11.	Nixdorf Computer	W. Germany	707 <sup>1</sup>	+23	410	855	707
12.	Hewlett-Packard	U.S.	593	+54	742	1,546	1,054
13.	Thomson-CSF	France	497	+17	*	*	*
14.	CIT Alcatel	France	493	+18	345	518	775
15.	Honeywell Info. Systems	U.S.	491	+29	1,226	1,634	985
16.	Plessey <sup>3</sup>	U.K.	289	+18	154	268	1,286
17.	Datsaab <sup>3</sup>	Sweden	276	+36	99	276	276
18.	Rank Xerox <sup>3</sup>	U.S.	254	+50	482	845	2,464
19.	Kienzle	W. Germany	232	+17	143	216	400
20.	Ferranti	U.K.	218	+47	122	201	380
21.	Memorex <sup>3</sup>	U.S.	175	- 7	415	501	268
22.	Data General	U.S.	171	+56	488	654	166
23.	CISI	France	156	+14	133	168	156
24.	ITT	U.S.	155	+24	260	*	*
25.	Amdahl	U.S.	152	+23	243	394	152

\* Not available    <sup>1</sup> Figures include word processing    <sup>2</sup> Profit before tax, not net income    <sup>3</sup> Estimates    <sup>4</sup> 1979 results

fragmenting the market to a great extent.

For the European vendor, the U.S. represents a massive but relatively structured market in which the competition is well established. It's also a market in which, until recently, everyone knew the rules and played by them. Unfortunately, someone forgot to tell the Japanese.

Recent activity in the U.S. market indicates that the Japanese giants Fujitsu, Hitachi, Toshiba, and others have every intention of doing in the dp market what they have already done in the automobile industry. With their huge and highly protected home market, they look set to wage a war on the U.S. industry, using pricing and reliability as the major selling points. Squaring off against them is IBM, which is not going to give in without a fight.

IBM's performance in both the U.S. and Europe has been relatively lackluster over the past few years. Nevertheless, it has a massive safety cushion of profits to tide it over in the event of an all-out war with the Japanese. Clearly, even the combined might of the Japanese will be hard pressed to do more than dent IBM's pride. Meanwhile, the rest of the industry will be caught in the crossfire and a number of companies, particularly Euro-

pean ones, are likely to suffer. ICL, already near death's door, seems an obvious casualty, and many other companies, such as Siemens and Memorex, could also have a tough time.

Since this is the first ranking of the European Top 25, it is difficult to establish trends. In next year's survey it should be easier to pinpoint some of the directions the European dp industry is taking.

**Collaboration deals have given the Japanese access to many of the lucrative sectors of the European market.**

There is, for example, no microcomputer manufacturer in this year's survey—a situation that may well change by next year. Word processing vendors may also be able to make the charts next year since it seems likely that within the next 12 months it will be impossible to differentiate between word processors and dp machines. This will open up the rankings to such companies as Wang and improve the standing of others such as Xerox.

Philips has not been included in this year's survey because it was impossible to estimate with any accuracy the com-

pany's 1980 revenue. Philips does not report results for its individual operations. Experienced industry watchers, however, estimate the firm's 1980 dp revenue was between \$150 and \$600 million, placing it in the bottom half of the rankings.

The Dutch company's dp activities are handled through its Products and Systems for Professional Applications group, which is also responsible for cable systems and telecommunications, audiovisual, and instrumentation equipment. In fiscal 1980, revenue in this area was about 30% of the corporate total. Despite the group's overall growth gains, which were above average for the company, Philips has been disappointed by sluggish sales in small business and office computer systems. To step up sales, Philips has come out with new system models, and a personal microcomputer and banking terminal.

The absence of any Japanese companies from the European Top 25 is interesting. This Japanese no-show, however, is not what it may seem. The Japanese approach to Europe appears to be more cautious—sneaking in through the side window rather than kicking down the front door. Collaboration deals between Hitachi and Olivetti, for instance, have given the

1980 RANK	COMPANY	TOTAL REV. WORLDWIDE FY 1980 (IN \$ MIL.)	% CHANGE IN TOTAL WORLDWIDE REV. 1979/80	TOTAL NET INCOME WORLDWIDE FY 1980 (IN \$ MIL.)	% CHANGE TOTAL NET INCOME WORLDWIDE FY 1979/80	TOTAL WORLDWIDE EMPLOYEES	YEAR ENDING
1.	IBM	26,213	+15	3,562	+ 18	341,279	Dec.
2.	Siemens	17,978	+14	356	- 7	344,000	Sept.
3.	Cii-Honeywell Bull	1,489	+23	43	- 17	20,267	Dec.
4.	ICL	1,494	+15	37	+ 50	32,582	Sept.
5.	Olivetti	2,545	+18	58	+ 52	53,339	Dec.
6.	Sperry Univac	5,000	+15	*	*	87,500	Mar.
7.	NCR	3,322	+11	255	+ 9	68,000	Dec.
8.	Digital Equipment	2,368	+31	409 <sup>2</sup>	+ 39	55,000	June
9.	Control Data	3,809	+18	148	+ 25	57,068	Dec.
10.	Burroughs,	2,902	+ 4	82	- 75	55,000	Dec.
11.	Nixdorf Computer	855	+25	42	0	13,650	Dec.
12.	Hewlett-Packard	3,099	+31	269	+ 33	57,000	Oct.
13.	Thomson-CSF	3,855	*	*	*	8,100	Dec.
14.	CIT Alcatel	1,802	*	68	*	40,000	Dec.
15.	Honeywell Info. Systems	4,925	+17	294	+ 13	29,000	Dec.
16.	Plessey <sup>3</sup>	1,626	+16	89	+ 28	44,499	Mar.
17.	Datasaab <sup>3</sup>	276	+36	*	*	3,354	Dec.
18.	Rank Xerox <sup>3</sup>	8,197	+17	619	+ 10	120,480	Dec.
19.	Kienzle	400	+18	11	+ 22	8,300	Mar.
20.	Ferranti	468	+12	22	+ 12	17,270	April
21.	Memorex <sup>3</sup>	769	+ 4	-29	-192	11,000	Dec.
22.	Data General	654	+29	55	+ 10	14,370	Sept.
23.	CISI	168	+15	4	- 20	2,150	Dec.
24.	ITT	21,996 <sup>4</sup>	+13 <sup>4</sup>	381 <sup>4</sup>	- 42 <sup>4</sup>	348,000	Dec.
25.	Amdahl	394	+23	15	- 1	4,021	Dec.

\* Not available    <sup>1</sup> Figures include word processing    <sup>2</sup> Profit before tax, not net income    <sup>3</sup> Estimates    <sup>4</sup> 1979 results

Japanese access to many of the lucrative sectors of the European market. They've also provided the Japanese with direct access to established and readily accepted sales and service organizations.

Returning to the ranking table, if we look at growth rather than absolute size, Europe appears to be a good market for many of the companies with growth rates well above average for the world. Hewlett-Packard (54% in Europe versus 31% worldwide), Ferranti (47% versus 12%), and Data General (56% versus 29%) are all prime examples.

It is also worth noting that the highest growth rates were achieved by companies such as these, which are all heavily involved in the minicomputer industry. By contrast, those companies that are more oriented towards mainframes—for example, IBM, ICL, Burroughs—displayed the lower growth rates.

## METHODOLOGY

Information for the European Top 25 survey was solicited through a questionnaire. For the purposes of the survey, Europe was taken to include Austria, Belgium, Denmark, Finland, France, West Germany, Greece, Ireland, Italy, Luxem-

bourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the U.K. Dp and related activities were defined as covering these product areas:

- Mainframes
- Minicomputers and microcomputers—computers with a minimum of system software—and small business systems and personal computers
- Terminals and peripherals—all those connected, either directly or via data communications links, to a dp system
- Software and services—bureau and database services, software packages, etc.
- Data communications equipment, including data connections (modems and equivalent) and communications processors (multiplexors, concentrators)

The following products were specifically excluded: word processors, general office equipment, electronic cash registers, electronic and magnetic card typewriters, instrumentation, dp supplies, and switching equipment supplied to PTTs for their data services.

The main ranking was based on 1980 calendar year revenues (in U.S. dollars) from dp operations in Europe for each company. Figures for companies whose fiscal year did not end December

1980 were adjusted, using published quarterly figures or estimates. All other figures appearing in this survey relate to the companies' reported results of their fiscal year ending 1980. In the main table, all results have been converted to U.S. dollars, using OECD exchange rate statistics for the appropriate time period.

Total revenue figures for Europe and worldwide refer to the parent company, where appropriate. When the parent company itself is not strongly involved in dp, the principal company has been considered as independent. Anomalies in the figures are inevitable since requirements for public reporting are neither as stringent in Europe as in the U.S., nor are they consistent between the countries involved. Inconsistencies in the table have been indicated.

DATAMATION's Top 25 survey was prepared by Logica, a London-based computer system and software house. It provides marketing consultancy services for the computer and communications industries such as the Eurodata Reports on data communication and Tarifica on communications facilities.

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FEATURE COMPARISON CHART

FEATURE	Visual 400	Lear Seigler ADM-42	Perkin Elmer 1251	ADDS Regent 60	Hazeltine Executive 80, Model 30	Beehive DM30
ANSI X3.64 Specified	STD	NO	NO	NO	STD	NO
Set-up Modes Eliminate External Switches	STD	NO	STD	NO	NO	NO
Typomatic Solid State Keyboard	STD	NO	NO	NO	STD	NO
Detached Keyboard	STD	STD	OPT	NO	STD	STD
CRT Saver	STD	NO	NO	NO	NO	NO
Block or Underline Cursor	STD	NO	STD	STD	STD	NO
80 and 132 Columns	STD	NO	NO	NO	OPT	NO
Double Size Characters	STD	NO	NO	NO	OPT	NO
Smooth Scrolling	STD	NO	NO	NO	OPT	NO
Horizontal Split Screen	STD	NO	NO	NO	STD	NO
Video Attributes Require No Display Space	STD	NO	NO	NO	STD	STD
8 Area Qualifications	STD	NO	NO	NO	NO	NO
8 Resident Nat'l Char. Sets Including Line Drawing	STD	NO	NO	NO	NO	NO
Programmable Non-volatile Function Keys	STD	OPT	STD	NO	NO	NO
Display of ALL Control Codes	STD	STD	STD	STD	NO	STD
Insert Delete Line with Push Up or Down	STD	NO	NO	NO	NO	NO
Insert Delete Character with Push Right or Left	STD	NO	NO	NO	NO	NO
Select Editing Extent to Field, Area, Line, Page	STD	NO	NO	NO	NO	NO
20 mA Current Loop	STD	STD	OPT	OPT	OPT	STD
Programmable Message Framing (non-volatile)	STD	NO	STD	NO	NO	NO
Programmable Answerback	STD	NO	STD	NO	NO	NO
Baud Rates to 19200 BPS	STD	NO	NO	NO	STD	STD
Independent Xmit/Receive Rates	STD	NO	NO	NO	NO	NO
Printer Port Independent of Communication Interface	OPT	OPT	STD	STD	OPT	STD
Paging	OPT	STD	NO	NO	STD	STD

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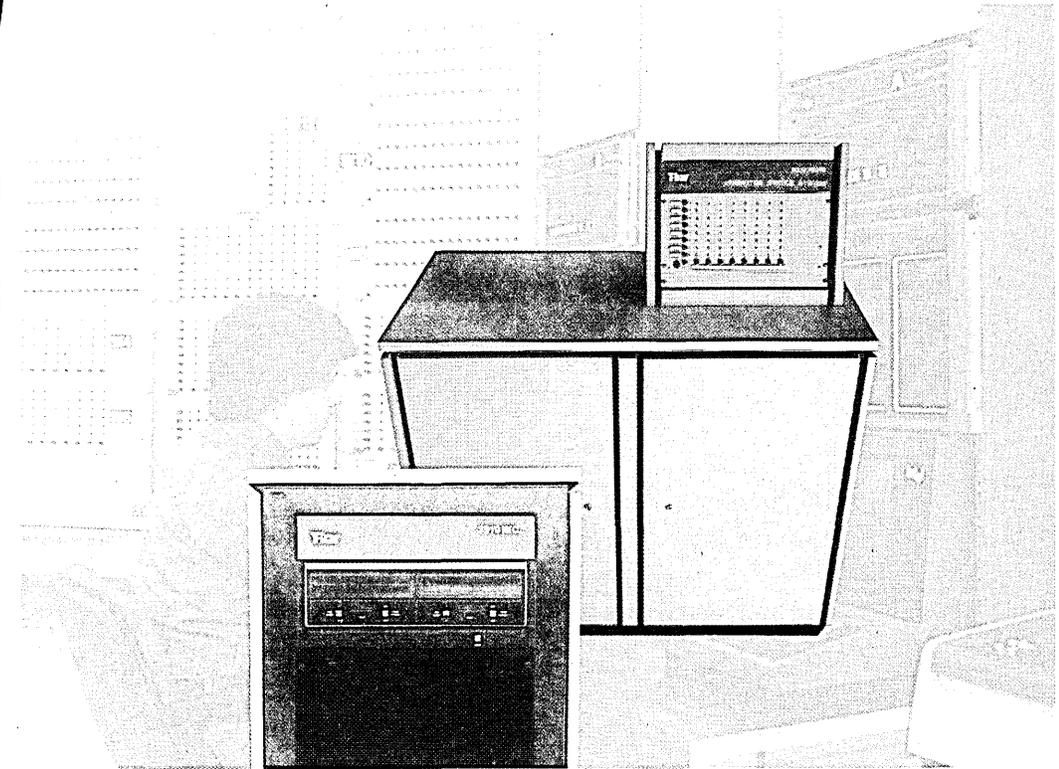
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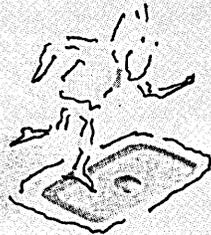
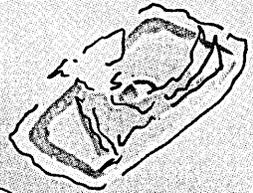
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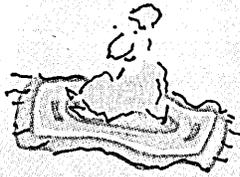
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# NEWS

## IN PERSPECTIVE

### STRATEGIES

## GOODBYE DPD, GSD AND OPD

**IBM's reorganization plan calls for two new marketing organizations, each of which will address customers with the full spectrum of IBM products.**

IBM has always been a marketing company, one that achieved its domination of the worldwide computer market primarily by controlling its customers' buying habits, not necessarily by offering the highest technology, lowest prices, or easiest-to-use machinery. Lately, falling memory prices, the microprocessor, and networking have radically changed the computer market's structure, prompting IBM and its multitude of competitors to find new methods of cost-effective selling.

Thus, it was only slightly surprising to hear last month that IBM is planning to reorganize its entire U.S. product development, manufacturing, and marketing structure to put it in a position, as president John R. Opel understated it, "to take advantage of tremendous growth opportunities in our business."

The reorganization, scheduled to take place over the next year or so, entails dissolving the three separate marketing forces represented by the Data Processing, General Systems, and Office Products divisions, and setting up two new marketing organizations, each of which will address customers with the full spectrum of IBM products. Moreover, many low-end machines, such as electronic typewriters, personal computers, and copiers, are expected to move primarily through non-IBM channels, like retail stores, office products dealers, and even mail-order houses.

The marketing changes had been under way for some time before the announced reorganization as IBM experimented with new methods of selling and new product offerings. Perhaps more importantly, IBM for several years had been gearing up for high-volume, low-cost manufacturing, having sunk hundreds of millions of dollars into automated facilities. It had also begun buying whole system components from outside vendors, apparently because these companies could supply products cheaper than IBM could build them.

In effect, IBM has taken on a new personality, one that will try to be as many things to as many customers as possible. It's

never seemed so hungry for business.

The Data Processing, General Systems, and Office Products divisions were set up in 1972 to market large systems, small systems, and office products, respectively. As the industry matured, product distinctions among those three categories blurred, and IBM reportedly suffered internal friction as the three separate marketing forces repeatedly clashed at customers' doors, each trying to sell competing products. No doubt the firm lost some sales as a result of such friction. A few years ago much was made of an observation that IBM intended to manage itself like General Motors, offering competing products that would keep each division on its toes. That plan has apparently been scrapped.

Although IBM declined to say what exactly its new marketing organization would look like, it did say two new marketing forces are to be formed early next year from the current GSD, DPD and OPD. Industry analysts said the two new forces would con-

**The combined marketing forces should enable IBM to attack the new markets it envisions with a united front.**

centrate, respectively, on national accounts and on smaller customers. Most important, they will be able to sell any IBM product to meet a specific customer's needs.

The two new marketing divisions, as yet unnamed, will be part of the newly formed Information Systems Group (ISG), headed by C.B. Rogers, corporate vice president and group executive. Rogers most recently headed the General Business Group, the umbrella organization over GSD and OPD, as well as several other divisions. ISG will also include the current Federal Systems, Information Records, Customer Service, and Field Engineering divisions.

IBM's prepared statement said only that the new marketing structure would simplify the distribution of products and better serve customers.

It is thought that the microprocessor, which provides cheap computing power, the continuing fall of memory prices, which enables larger software programs to be implemented, and networking, which allows dissimilar machines to communicate, are the primary factors in IBM's decision to let its salespeople offer any and all products. In the past, a DPD representative could have provided a 4300 mainframe, but not the distributed processing nodes of GSD's Series/1 minicomputer or the communicating word processing power of OPD's Displaywriter. Moreover, as local networking comes of age, customers will be more concerned than ever about compatibility among office systems, mainframes, and remote machines. There was some cross-marketing among IBM divisions, observers note, but it was mostly limited to referring sales and

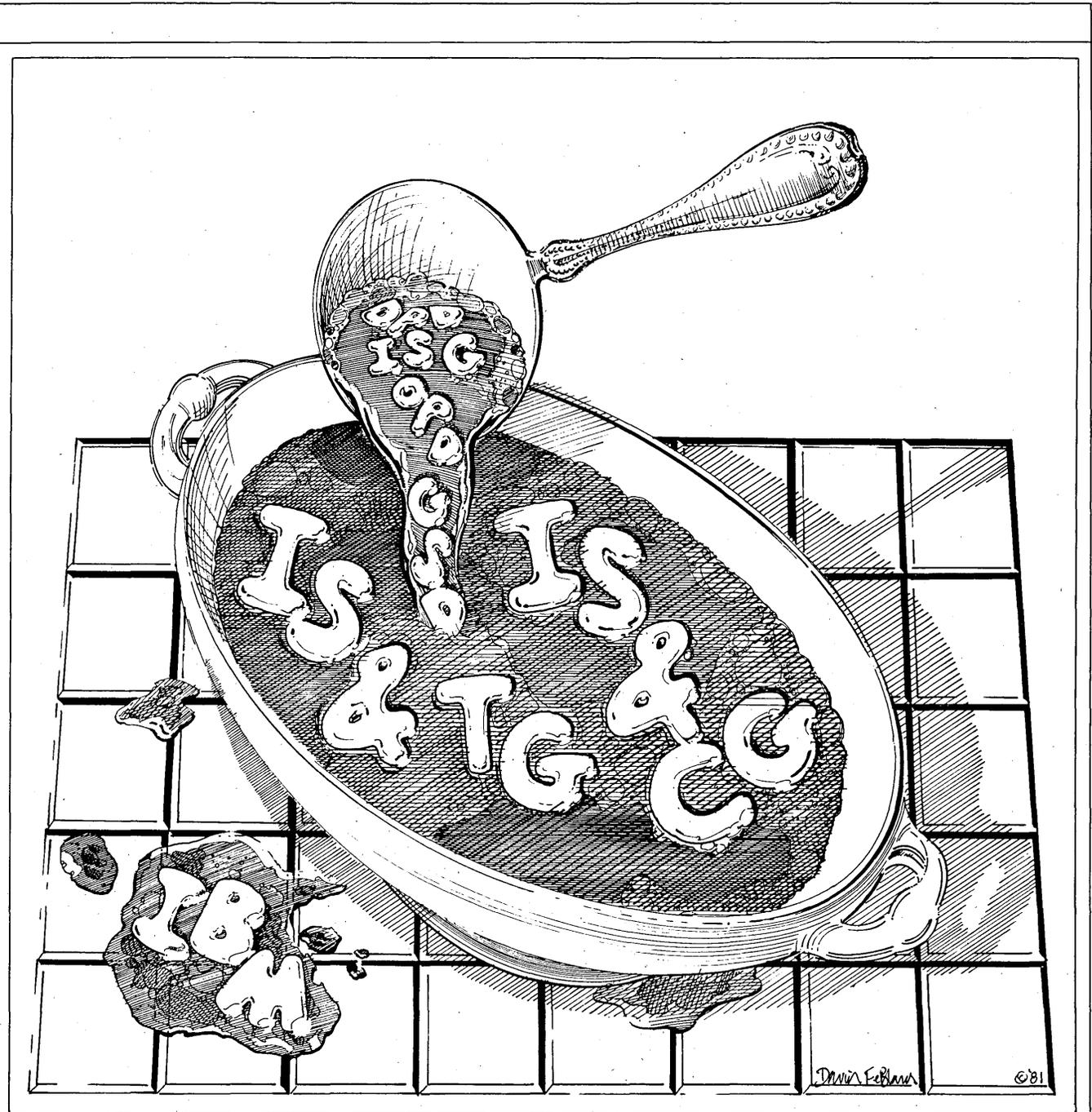


ILLUSTRATION BY DAVID FEBLMAN

splitting commissions. Now, it is thought, there will be less friction between salesmen for products that seem to offer similar capabilities, like GSD's 5520 word processor and OPD's Displaywriter.

To back up this integrated marketing approach, IBM is also reorganizing its development and manufacturing activities. Two new groups, clumsily identified as Information Systems & Technology Group (IS&TG) and Information Systems & Communications Group, (IS&CG) will take over from previous divisions under the old structure and will enable IBM "to take advantage of rapid changes in technology and to coordinate long-range plans to provide more effective growth paths for customers."

IS&TG, headed by Arthur G. Anderson, will develop and build large systems

and related storage peripherals, nonimpact printers, and related software, IBM said. It will also have responsibility for developing and making semiconductor devices. The group includes the Data Systems, General Products, and General Technology divi-

### IBM is also reorganizing its development and manufacturing activities.

sions, the firm noted.

IS&CG, headed by John F. Akers, will handle small computers, related peripherals, office products, and communications systems. It also will develop related software. IBM said the group is made up of three newly formed divisions—Communications Products, headed by Victor J. Gold-

berg, IBM vice president; Information Products, headed by Robert B. Dunlop, IBM vice president; and System Products, headed by H. Mitchell Watson Jr., IBM vice president. Communications Products is to handle such devices as the 5520 and Displaywriter; Information Products will handle typewriters, copiers, and banking equipment.

System Products will take care of small machines such as the 8100, Series/1, System/23, System/34, and System/38, as well as the 3270 terminal and the 4300 series mainframes.

Allen J. Krowe, formerly head of the dissolved System Communications Division, has been given responsibility for implementing the reorganization, IBM said, noting that he now reports directly to Opel.

If nothing else, the combined mar-

## NEWS IN PERSPECTIVE

keting forces should enable IBM to attack the new markets it envisions with a united front, one that will ostensibly provide few cracks for competitors to slip into. IBM's tactics have often appeared uncoordinated to outsiders. For example, when it introduced the Series/1, its first minicomputer, reports circulated that the machine was powerful enough to take business away from DPD salespeople who were trying to market low-end 370s. Then IBM came out with the 8100, a system designed specifically for distributed processing and apparently positioned smack in the middle of the Series/1 market. In the word processing arena, DPD, GSD, and OPD each came out with a different system, the 3730, 5520, and Displaywriter, respectively.

IBM claimed that its reorganization did not have any relation to the wearying Justice Department antitrust trial, but it looks as if the firm is assuming it will eventually win that suit and be free to be more aggressive than it has been over the past decade.

Starting with discounts on the Series/1 and the 4300 series of small mainframes, which were so low in price that they affected even IBM's bottom line, the firm has made moves in the past couple of years to branch out with new marketing methods. Among these are mail order and industrial distributor sales of the 3101 ASCII terminal, sales of the Personal Computer through Sears and Computerland stores, and an entrance into the oem peripherals marketplace. IBM is indeed diversifying its ways of addressing customers.

Frederic Withington, computer industry analyst at Arthur D. Little, says IBM is clearly looking to develop a multitier approach to its marketing, one that will enable it to fulfill Opel's stated goal of becoming the "lowest cost source of products" in the industry.

"IBM is experimenting with many nonstandard approaches. It may even sell

### **IBM is indeed diversifying its ways of addressing customers.**

through the corner drugstore before we're through," Withington jests.

The firm's entry into the oem market came to light in early September when IBM said it would offer its Piccolo 8-inch disk drive in a stripped-down version that would be sold with volume discounts. The Piccolo is the precursor to the wide range of 8-inch Winchester-type drives being sold now, but according to industry observers it won't be a significant threat to current suppliers because its price, physical size, and storage capacity don't meet essential market requirements. Nevertheless, IBM's entry has been noticed and is considered significant for the future.

More pressing in the minds of com-

petitors is IBM's recent signing up of seven authorized distributors that will handle its 3101 ASCII terminal, a newly introduced desktop printer, and perhaps its small computer systems products. IBM has sold the 3101 through distributors for more than a year, although it found the market sluggish reportedly because of its small discounts and inexperience with industrial distribution.

The new line of distributors, who will deal with a unit of IBM's Information Systems Group, are American Computer Group, Inc., Boston; Arrow Electronics, Greenwich, Conn.; the David Jamison Carlyle Corp., Los Angeles; Hall-Mark Electronics Corp., Dallas; Pacific Mountain States Corp., Los Angeles; Schweber Electronics Corp., Westbury, N.Y.; and Wyle Distribution Group, El Segundo, Calif. It is expected these companies will benefit from cooperative advertising, increased volume discounts, and more dealer support than IBM has offered in the past.

The reasoning behind selling the 3101 and the new 3232 model 51 keyboard printer through distributors—and by phone and mail order as well—is that these items are so low in price that profit margins are hard to maintain with direct selling.

IBM described the new printer as designed for interactive computing. It uses an electromatrix printing process with aluminum-coated paper to run as fast as 450 characters per second at burst speed. IBM said it will sell the printer for \$2,500 in single quantities. Distributors will set their own prices.

"What you're seeing is IBM trying out alternative marketing strategies," said Dennis Cagan, president of David Jamison Carlyle, a national distributor of computer peripherals. "They're using only the best, proven methods and procedures. Distribution is the best channel for low-end ASCII terminals."

Another new twist in IBM marketing methods also came to light in September when United American Service Corp. of Knoxville, Tenn., disclosed a volume purchase of IBM Displaywriters it plans to sell to banks for bank-at-home applications. Actually, the machines are to be used by professionals such as doctors and lawyers for in-house word processing and data processing as well as for on-line banking services supplied by their local banks. United American managed to negotiate a large volume discount with IBM under a Special Bids department at OPD. The discount is understood to be larger than that offered to regular customers of the Displaywriter because it was larger than the 150-machine order listed on IBM's published discount schedule. Again, however, it was a case of IBM meeting customer needs.

Last summer's introduction of the Personal Computer from IBM also represents several new tactics for Big Blue. The sys-

tem is largely composed of components built by independent suppliers and is to be marketed by independent dealers. Additionally, IBM is aggressively looking for software packages developed by outsiders (and its own personnel) that it will market on a royalty plan. The machine also uses the CP/M operating system, a de facto standard in the micro world. In sum, the Personal Computer would seem to be the least IBM-like of all IBM systems.

If nothing else, IBM has shown it can be flexible when the stakes are high enough. As ADL's Withington points out, the firm "got off to a rocky start with the 3101 but it kept adjusting it. There's no reason to think it will ever stop adjusting."

—John W. Verity

## VNET OR GRIPENET?

**IBM's VNET internal message network, largely a product of the VM community, seems to be evolving into a vehicle for employee complaints.**

IBM's top management is battling against sinking morale and a growing breed of dissidents across its Data Processing Division, say informed sources.

Employees, particularly in the areas of software development and technical research, are beginning to revolt on a scale unprecedented for IBMers. A few months ago, a catalog of their grievances was sent to IBM executives with a plea for reform. What's more, the complaint catalog was compiled from individual submissions sent over IBM's massive internal electronic mail network, VNET.

VNET has been used, among other things, for personal attacks on IBM managers, to send job resumes, and even to announce resignations, sources say. But, they add, a steady flow of less sensational and more constructive criticism of IBM has also surfaced on the network during the past year. Memos passed through the network claim that DPD employees are increasingly working without adequate tools or computing power, and with little or no merit incentives or career prospects.

Former employees point out that though VNET was the sole creation of IBM's VM community, it increasingly reflects the frustrations of the MVS contingency that is joining it.

VNET was born in late 1976. Its two main designers created it by melding several internal VM/370 timesharing networks. Former employees go to great lengths to stress that this file and message transfer network has been the spontaneous creation of the VM

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## NEWS IN PERSPECTIVE

community—not of IBM management.

This rumor is given credence by a research paper from the network's authors, Edson Hendricks and T. C. Hartmann. The 1979 paper points out, perhaps in a tongue-in-cheek mode: "The ubiquity of the network is most surprising in that it has materialized quite spontaneously without any explicit mandate or governing organization."

Both Hendricks and Hartmann are still with IBM and, quite understandably, are unavailable for comment. But former IBMers stress that both the network's designers and its early adherents seized on VNET in part to prove that IBM's user base needed VM, even if IBM management seemingly didn't.

Despite having no obvious answer to the question of what specific function the network was to serve, VNET quickly evolved into a vehicle to facilitate job information and data sharing between VM users at IBM technical sites and research centers throughout the world. Lately, however, "it has evolved into an enormous broadcast mechanism or mouthpiece for workers to let off steam and get out old hurts," said one inside source.

Conversations with many present and former IBM employees indicate that a major complaint within DPD is what those sources call a "systematic de-skilling" of the division's work force by IBM. The recent exodus of senior DPD operatives, they contend, is caused by a logjamming of career paths there, as well as by the growing importance to IBM top managers of DPD's sister division, GSD (General Systems Div.).

The "no career" complaint has long been characteristic of IBM's VM/370 work force, former employees claim, resulting in a steady drain of VM talent over the past five years. During the past year alone, IBM has had to say goodbye to several of its select team of VM "pioneers." One source calls them the second generation of entrepreneurs spawned by IBM.

"The first generation of operating systems developers—1960s and IBM 360s—left to form companies like Amdahl, Storage Technology, Telex, and Calcomp," he explained. "IBM's second generation—1970s and 370s—is coming out now."

Judging from the comments of the current mix of VM technicians, their dissatisfaction with IBM's seeming disdain for the VM world is growing by leaps and bounds. The outlet for their complaints has become VNET.

"In many ways VNET could already be the world's largest electronic newspaper," said one source. "But its editorial of late has not been the kind that IBM's top management likes to read."

This attitude is understandable, sources claim, when you consider that the massive 400 cpu network grew with little or no mandate, direction, or control by IBM management and is not based on the com-

pany's official network standard, SNA.

"The whole thing is an enormous testament to the power of VM," said one former IBM employee.

Sources suggest that the reason for IBM's disdain of VM is the fact that it was developed largely at user sites away from the mainstream at IBM. Because it wasn't developed as an internal IBM product, it has never met IBM's specific objectives, they surmise.

"At the beginning of the '70s," said one former employee, "before the two operating systems—VM/370 and MVS—were announced, development costs on MVS ran in excess of \$1 billion. VM/370, in stark contrast, had cost around \$20 million—one-fiftieth as much, or 2%."

Five years ago, when IBM began pushing heavily into MVS development, VM/

### **The "no-career" complaint has long been characteristic of IBM's VM/370 work force, former IBMers claim, resulting in a steady drain of VM talent over the past five years.**

370's bit player status was further undermined, say IBM sources. IBM decided to kill off its VM Product Development facility at Burlington, Mass., and move its people into the MVS fold at Poughkeepsie, N.Y.

"But there never were the VM jobs waiting at Poughkeepsie," said one source, "so, as a result, only the most junior people went there—maybe one-third of the 120 or so who had been at Burlington.

"Maybe another third were offered jobs at local branches or at the nearby Cambridge Scientific Center [also doing VM work]. The other third," he added, "all decided to leave IBM. Some of these went to Digital Equipment and helped build its state-of-the-art VAX superminis."

Some of the current crop of VM dissidents who have recently left the company say that the Burlington incident was probably a calculated attempt by IBM to reduce VM support—"something IBM has been trying to do all along," said one.

And it was into this seemingly threatening atmosphere, late in 1976, that VNET was born. During its first full year, VNET grew at one cpu a week. It grew at double that amount during 1978, with every kind of 370 cpu being added, its designers claimed in their 1979 paper.

"It was at this time [1978] that IBM management discovered they were the owners of this net," said a former IBMer. "By this time VNET had grown to around 200 nodes, and the arithmetic of running it [i.e., line costs] horrified IBM."

(IBM's current population of over 400 nodes is believed by insiders to be costing IBM some \$1 million a year in line costs alone.)

The former employee stressed that IBM then looked at ways to tear VNET apart, but quickly discovered that too many research projects depended on it. IBM's management also made another discovery at this time, he added. "The company found out that VNET was rapidly turning into a vast electronic newspaper and personal mail system."

He added, "IBM's security people were particularly concerned about one newsletter which pushes out editorial to some 10,000 subscribers of VNET. IBM's view was that the dissemination of information was too wide, and the information itself often too sensitive."

This scrutiny by IBM security was resented in some quarters of the VM community and considered valid in others, sources say. But IBM management's next move was universally loathed.

For some years there had been an unwritten law in the IBM organization that employees could use their computers for personal reasons as long as the practice didn't get out of hand, present and former employees say. An example of this practice was offered by one former IBMer who explained that former IBM chairman T. Vincent Learson often had courses for his oceangoing racers plotted on IBM computers during business hours. Other more typical examples included game-playing, chess problems, jokes, and even love letters.

For some reason, IBM's management decided to change this unwritten rule without telling anyone, and over a three- to six-month period during 1978 they brought in auditors to examine employees' disks for evidence of personal computer use.

"The searches were completely random, and employees were not told," says one source. "VNET was a special focus because of its nature.

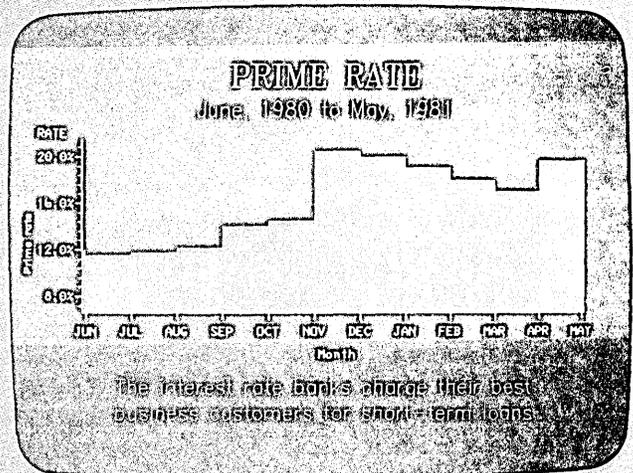
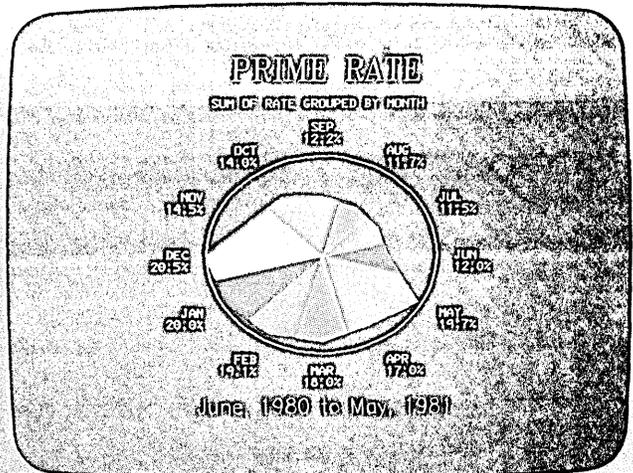
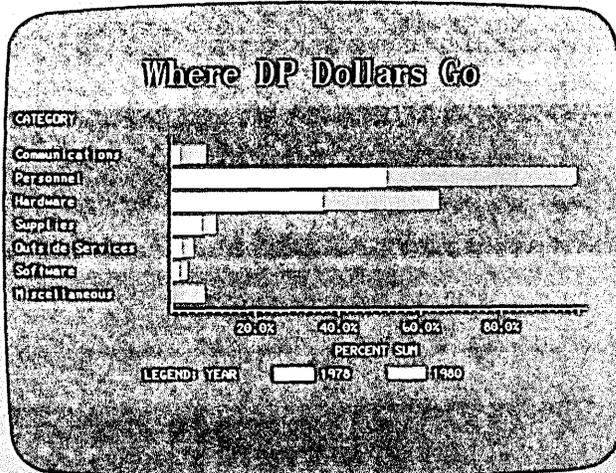
"The process was straightforward. All the auditor needed were the passwords for the systems and the employees' ID numbers, and he could look at the files. The auditor would come to the computer center after working hours, and having obtained the passwords and ID numbers from the chief systems engineer, he would make his search of the files."

IBM management in due course would get in touch with the employees that were "found out" and instruct them to remove all personal items from their disks, sources claim.

A DPD spokesman recently confirmed that the audit had indeed taken place. "It had come to our attention that there may have been abuses and some misuse of our internal systems," he said. "We conducted an internal audit to see whether this was the case. The search did reveal some personal misuse." He added that the whole exercise was "conducted with the highest sensitivity to personal privacy."

The IBM spokesman also comment-

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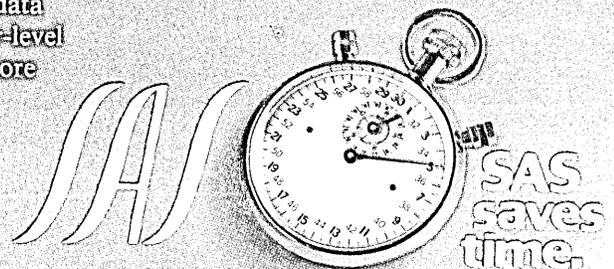
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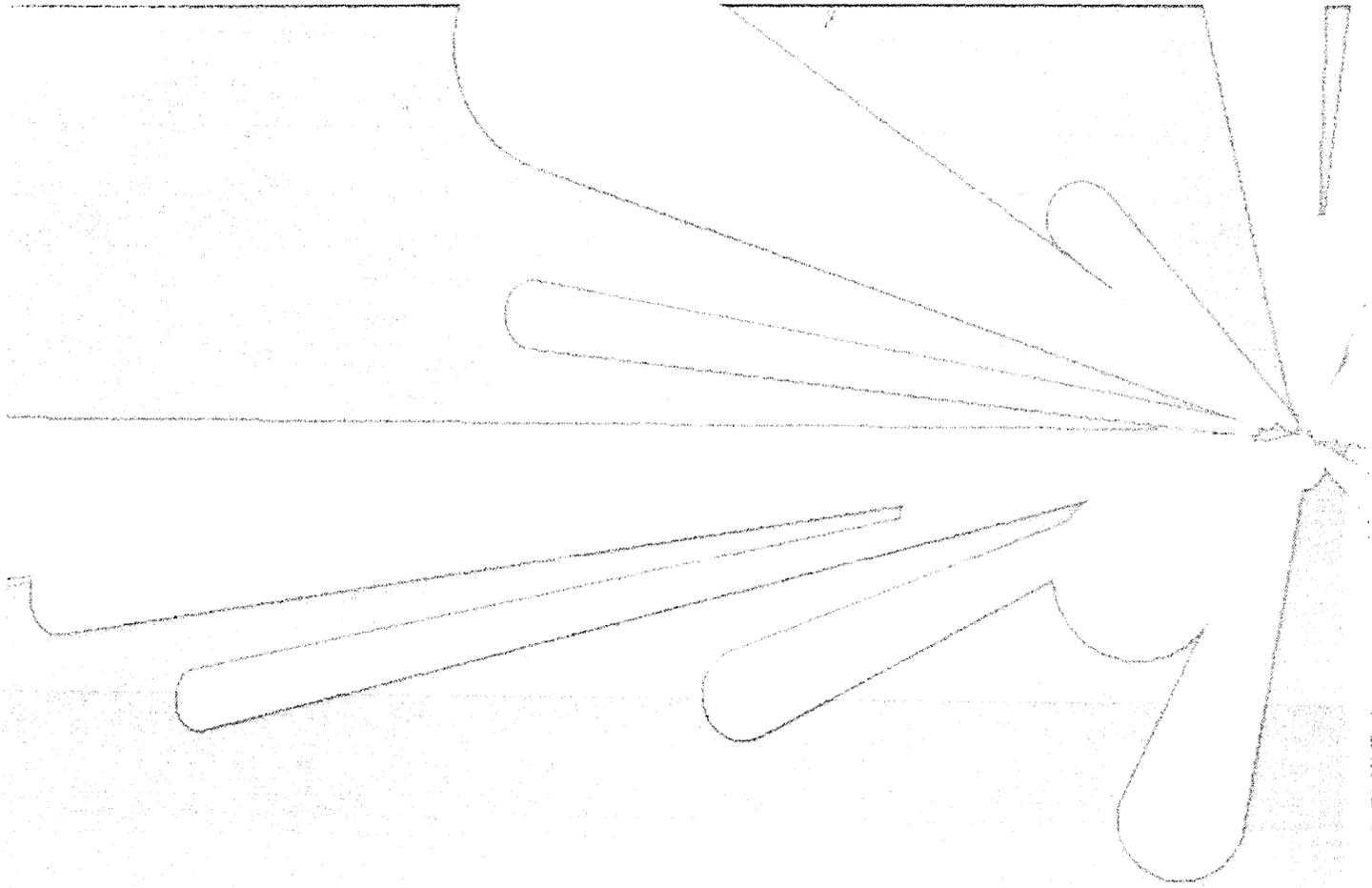
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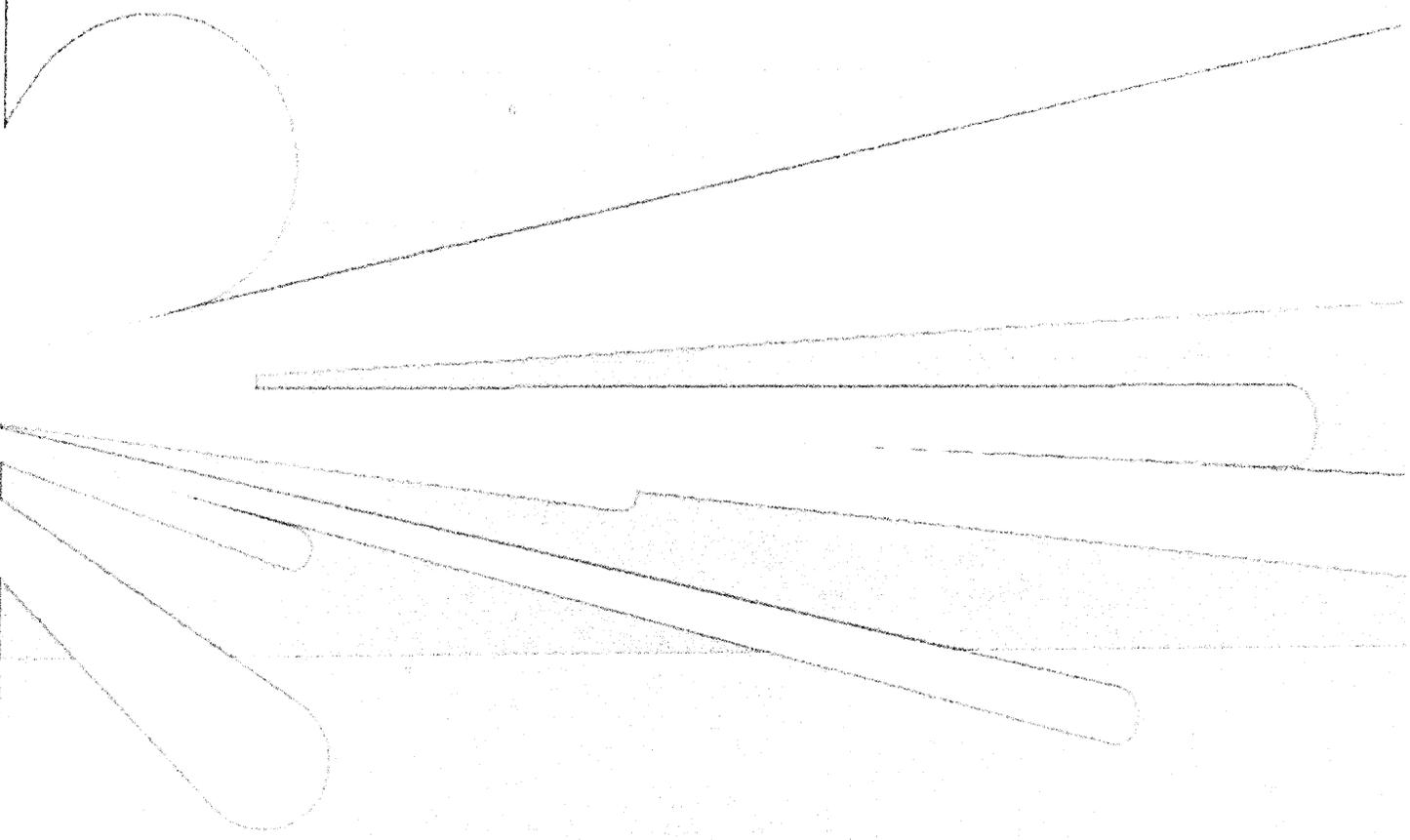




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## NEWS IN PERSPECTIVE

ed that the audit "was not companywide, nor was it directed solely at VNET."

But when the VNET community found out about the audits, they began using the network to broadcast their concerns about the practice, as well as to devise ways to make it more difficult for the auditors to do their job.

After these so-called "intrusions" by IBM management, VNET adherents had a whole new *raison d'être*—namely, using the network as a mechanism to let off steam. "The network began to take on a whole new purpose," says one former employee. "Its electronic conversations started to turn into electronic complaints. Some weren't too constructive and were just emotional digs at middle managers. Others reflected the frustrations of having a career that didn't seem to be going anywhere because it revolved around VM and not MVS. Yet others made quite constructive comments about IBM's policies towards research in general."

One example of those constructive complaints came from a young programmer at IBM's San Jose Research Center, Jim Gray, who now works for Tandem. He is known to have worked on IBM's big relational database system, System R. Former associates claim that a VNET memo Gray submitted some 18 months ago, titled "MIP ENVY," became quite a cause célèbre within the VM community. What did Gray mean?

"Basically, I was referring to the relative lack of power that IBM's programmers have at their fingertips compared to other companies." He explained that at Tandem he now has 10 times more power at his disposal than he ever had at IBM. "In addition, I get much more computer time." Gray said that on some IBM projects he worked on, he could only log onto the computer for half a day at most.

"For somebody who wants to do something meaningful, that can be frustrating," he said.

(When queried about Gray's comments, a DPD spokesman last month said: "IBM management is aware of these concerns and has recently taken steps to improve facilities available to employees." While he would not elaborate further, sources indicate that IBM intends to increase the MIP power available to its employees by 50%.)

Another employee who recently left IBM is Glen Myers, who worked out of San Jose. "I'd worked for five years on a radically new type of computer architecture—not just an extension of the 370—which I knew had zero probability of being used," Myers says. When Myers was headhunted by Intel, he accepted because he wanted to work for a firm that would reward his accomplishments with "something that got out of the door as a product."

Another recent defector from IBM, this time to the Massachusetts-based startup firm, Spartacus Computers, singled out

what he called a "disturbing" trend within IBM.

Say Mike Cassilly, formerly at IBM's Cambridge Research Center, "Programming isn't the art it once was. Today it doesn't really pay to be a professional and a conscientious programmer at IBM."

Cassilly, who says he left IBM because he wanted to help develop a business from the ground floor, claims that Big Blue has become more concerned with selling flashy boxes than with building systems.

"IBM's programmers are now being taught that every additional line of code they write can only be justified if it brings in new licenses," he added.

Programming was also the subject of a celebrated VNET memo—this time from one of IBM's most loved and respected VM "veterans," Lyn Wheeler, a systems programmer at IBM's San Jose center. Wheeler has probably done as much as anyone to make VM the current runaway success that it is, say former colleagues. His classic Wheeler Scheduler has become the natural mode for that operating system, they say.

A former colleague said that Wheeler accepted an invitation to visit Jim Gray after Gray had joined Tandem, about a year ago. The event was Tandem's celebrated weekly "beer bash," which has become a regular Friday afternoon revel—usually around the company's swimming pool.

A later VNET memo from Wheeler, a former colleague explained, pointed out that despite the beer party and the loss of

### Several of IBM's VM veterans have recently left the company to start up their own firms, many of them offering VM support.

most of every Friday, Tandem's programmers were still writing 10,000 lines of new code each year! They seemed to be thriving on the atmosphere.

Said one source, "The memo touched off a chord. Pretty soon a whole new spate of electronic graffiti and gripe began to emerge—some constructive, some not so constructive."

"In any event," said one former IBM'er, "previously veiled hostility to working conditions across the research and technical area began to emerge."

Several months ago Wheeler decided to package together some of the VNET "gripe" mail into a collection known within the VM community as the "Tandem Memos."

According to sources, Wheeler then removed the names from the memos and sent a copy of the package to each of IBM's top executives—sometime around April. When asked what he was hoping to achieve, Wheeler declined comment. Nor would he talk about the content of the memos.

By way of an answer, former col-

leagues point out that Wheeler is seen as something of a "father figure" or "spirit leader" within the VM community. Said one former colleague, "His motive is crystal clear. He wants a constructive response from IBM management to what he sees as valid criticism. He wants the gripe to stop."

"You shouldn't get too carried away by all you hear about these memos," warned former VM developer Chuck Tessler. "IBM doesn't have an official policy against VM," he said. "It's simply that a large number of influential people whose careers revolve around MVS naturally have prevailed."

Tessler, who left IBM last fall to form his own company, VM-CMS Consulting Services Inc. in Los Angeles, adds, "As a result, there is no high-level spokesman for VM within the company." Tessler is just one of a series of IBM's select VM development team to strike out on his own during the past year. Another consulting engineer, who like Tessler developed key chunks of the VM software repertoire, is Dick Jensen, who has since formed Jenware Systems Inc., Seattle.

The most recent and most senior member of IBM's VM team to leave is the company's VM product manager at DPD HQ, Jerry Depass. Unlike Tessler and Jensen, who are currently operating one-man companies, Depass with two partners (neither from IBM) has formed the potentially big league Adesse Corp., whose HQ will be in Chicago. Adesse has a very definite business plan which is initially based on wide-ranging support for VM/370 system control programs.

All of these men say that they have heard about the Tandem Memos. When asked whether they thought IBM would respond positively to Wheeler's initiative, they were of the same mind. "If they are articulating some things that are deeply felt within the VM community and if they are constructive in their comments, IBM will be sympathetic," said one.

When asked whether IBM's management had received the memos, a spokesman for DPD HQ in New York didn't answer directly.

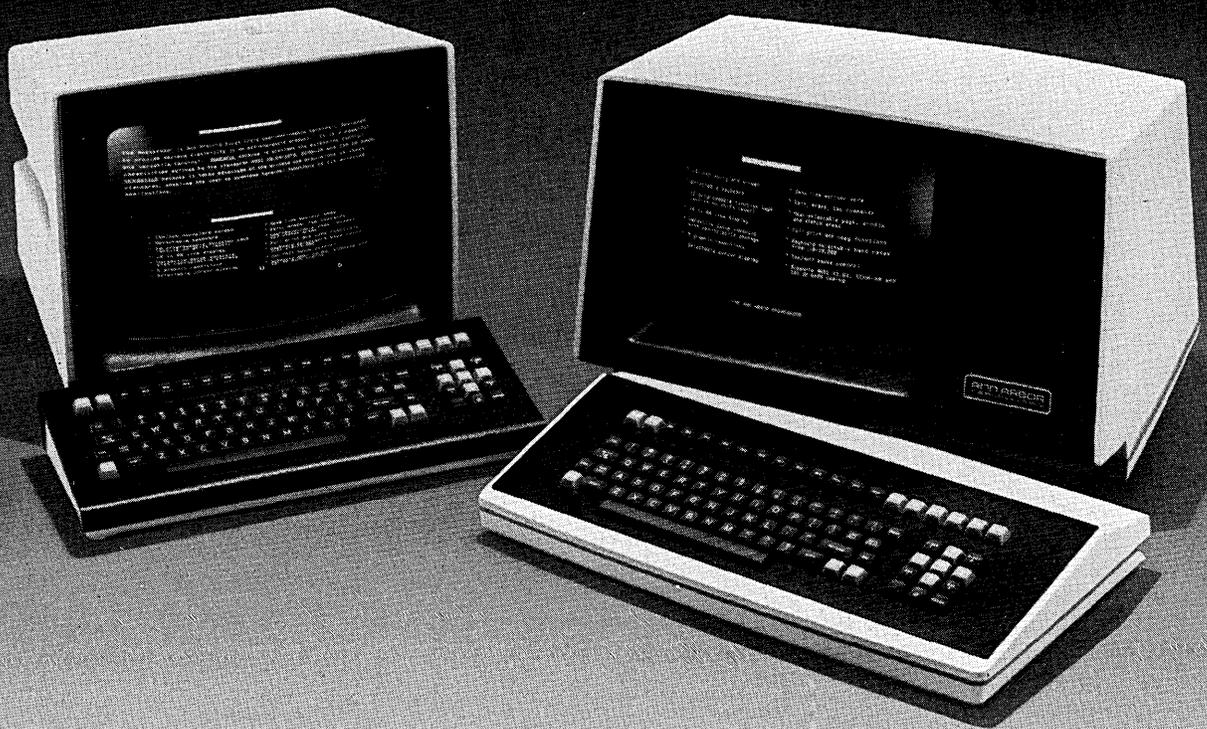
"Thousands of employees have access to VNET," he said. "Only a relative few have used it to make critical comments." The spokesman added, "IBM management certainly considers all constructive and valid criticisms, no matter what the source may be." He also said IBM would take the necessary measures to fix any real problems—"Be assured."

Says one observer, "VM is IBM's fastest growing product. It has enormous momentum. All the users know it. All the technical people know it. But so far, IBM's management doesn't know it."

The VM developers that have left IBM during the past year confirm that there seems to be an insatiable demand for their services. One guesstimate floating around

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the industry which they say could be true is that 1,000 active new VM installations were added between January and July of 1981.

These men, most of whom were with IBM for at least 15 years, helped pioneer the VM boom, but because of the giant's preoccupation with MVS, they say, they didn't always get the credit or the responsibilities they yearned for. One recurring complaint is the lack of a merit incentive plan for IBM's more "entrepreneurially minded" technicians.

Jensen said he conceived and worked for two years on his own to develop

SMART, VM/370's increasingly popular real-time performance monitor. IBM originally rejected his product because they said it was too close to an existing product, VMAP. "They told me I couldn't work on SMART during office hours, so I worked each night on my terminal at home to develop the specs."

Jensen said that when he took the specs back to IBM, they were pleased with what they saw. "But they were even more pleased that this had been developed at zero cost to them."

Jensen then went on to develop the

program at a customer site. He claims that today the product is already pulling in around \$500,000 a year with anywhere from 600 to 700 releases out at user sites. "IBM's policy is to put a ceiling on how much commission you can earn. For my creation of SMART, I received \$11,000," he said ruefully.

Jensen added that IBM may have to institute a more equitable incentive plan if it doesn't want to keep losing its more innovative people. "There's just no incentive." Jensen said that he was pleased that he and other VM developers were in high demand on the "outside." (Jensen now has his own Jenware Systems Monitor to compete with SMART.)

Tessler, like Jensen, was perhaps disillusioned by the lack of a work incentive plan at IBM, though he wouldn't put it that way. He was largely responsible for the VMAP data reduction program, which has become something of an industry standard for measuring VM performance on site.

Tessler said that he developed VMAP over a two-year period (1975-77), again, like Jensen, on a customer machine.

VMAP is probably pulling in some \$2 million a year for IBM; Tessler received \$18,000. "I went in with my eyes open. I knew there was a ceiling. Neither Jensen nor I had to write our own software. It was just part of the job."

Today Tessler is consulting for two banks and developing VM-related micro-computer software for TRS-80s. "I needed more freedom and, yes, more money." He said that with IBM he worked 14 hours a day. Now he works 18 hours, but for four to five times more money.

An example of his work was to advise one large bank to put in four 4341s (at \$1.2 million) rather than the \$4 million 3033 IBM had urged them to buy. "They get more power and a better system at one-quarter the price. But you can't make this kind of project happen if you still work for IBM."

It's generally accepted by former VMers that they probably have a three- to five-year window on the market while IBM works to bring MVS interactive capabilities up to VM levels.

Though individuals like Jensen and Tessler will take a fair bit of business away from IBM in their own way, a much more threatening prospect seems to be shaping up in the form of the Adesse Corp.

Adesse, says co-vice president Jerry Depass, is a corruption of a Greek word and means "We support." This seems to be the Adesse plan in a nutshell.

Depass says his company will concentrate on supporting the VM system control program for the next three years. During that time his conservative forecast is that Adesse will grow to about \$5 million in sales, and up to 30 people in size.

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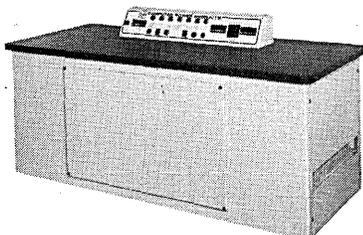
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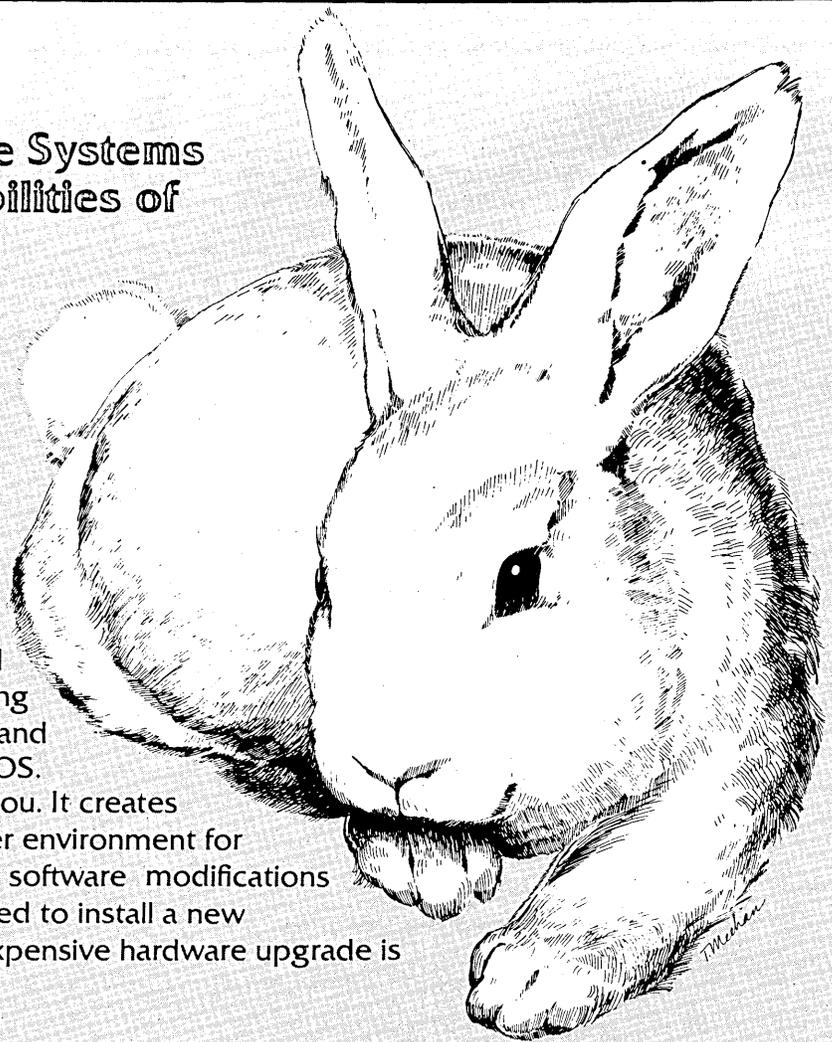
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## NEWS IN PERSPECTIVE

tion, and education. Interestingly enough, the best customer in the last category could be IBM itself! One rumor is that Adesse will sell VM education to IBM's 4300 development team at Endicott.

Sources say that this is likely for several reasons. First, after his 23 years with IBM, Depass enjoys very cordial relations within the company. And second, IBM is "deskilling" its technicians, say sources, at a time when VM requirement is surging and top VM talent is leaving—a combination that could land the giant in trouble.

Depass would not comment on this

statement. What he would say is that Adesse is developing 12 VM education packages and would be glad to sell to IBM.

Another more insidious threat from Adesse could come from what Depass claims will begin as a minor activity—namely body shopping, or contract programming. Currently there is a bidding war on for VM systems programmers; users simply can't get enough of them, say insiders. So far, apart from Spartacus Computers, Lexington, Mass., which could grow into a big hardware company, Adesse provides the only potentially large umbrella for dis-

gruntled VMers to join. Sources point out that Adesse could lure these programmers away from IBM and put them back onto the VM market. With its ranks inflated by such additions, Adesse could handle 20 or 30 big users at one time, rather than the three or four that Jensen and Tessler are working long hours to accommodate between them.

Unlike Spartacus, which has had a series of approaches from the venture community and looks set for quick growth through this path, Adesse will be strictly a "bootstrap" operation to begin with, says Depass. "We'll provide our own financing and start slowly so that we have time to practice being businessmen," he says. Associates of Depass point out that Adesse doesn't need to seek financing because the market is so energized that users are looking for him, rather than the other way around.

There is also an awareness among some in the IBM world that the new entrepreneurs face a "now-or-never decision." Said one observer: "These men are going through a midlife crisis, a kind of 360 menopause. They're searching for a kind of crowning glory for their work while market conditions permit."

He continued, "But the tide is turning. The focus is beginning to swing away from the operating system to running applications. What's needed now are high-level data management system PL compilers."

Tessler agrees, but adds, "We have a few years to get established. Right now users do not have the knowledge and skills, but they do have the need. IBM offers them the hardware and operating system. We offer support." But, he added, "IBM will not allow independents to control their destiny for long."

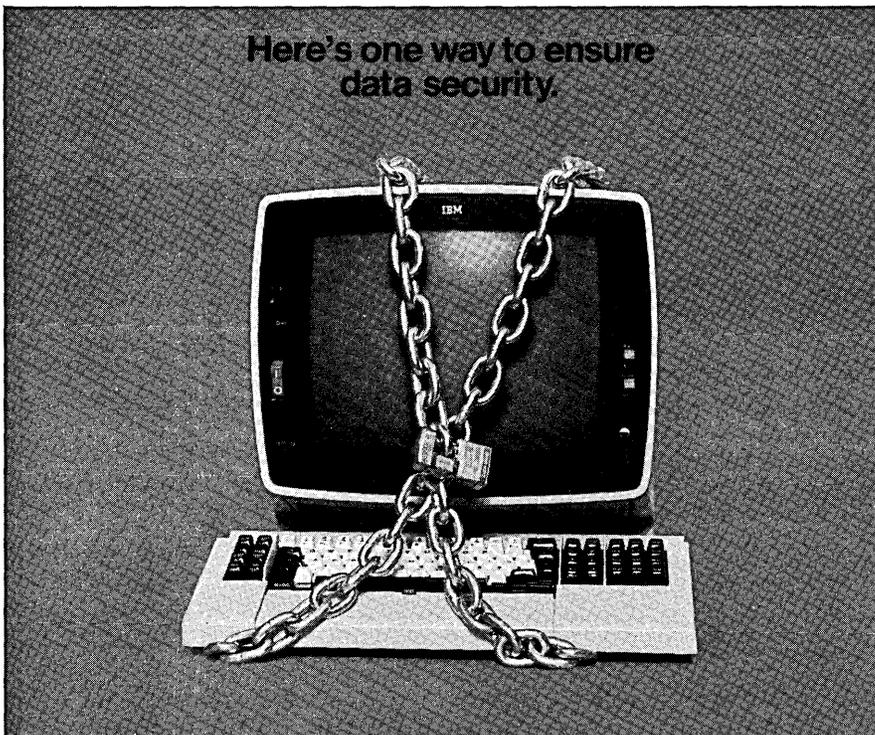
IBM has already started to enhance its VM products, observers point out. The company is preparing to announce its VM/4300 remote maintenance innovation, "Hydra," and next year may reveal cohost facilities for combined MVS/VM use, say sources.

Another well-placed source says that Wheeler and his colleagues in San Jose are also working on the support problem. "They're planning to offer local network support using Hyperchannel links from Network Systems Corp.," says the source.

There is a rumor that Wheeler may leave IBM and join his former colleagues on the outside as a consultant. "Right now he's pure gold whatever way you slice him up," says one source. "IBM needs him and the outside companies would probably pay anything to get him." However you look at this tug of war, it can only be good news for IBM's VM users.

"An enormous shop window is opening for them," said one observer. "And what they'll discover in that window is a very powerful tool to control their own destinies—and not have IBM do it."

—Ralph Emmett



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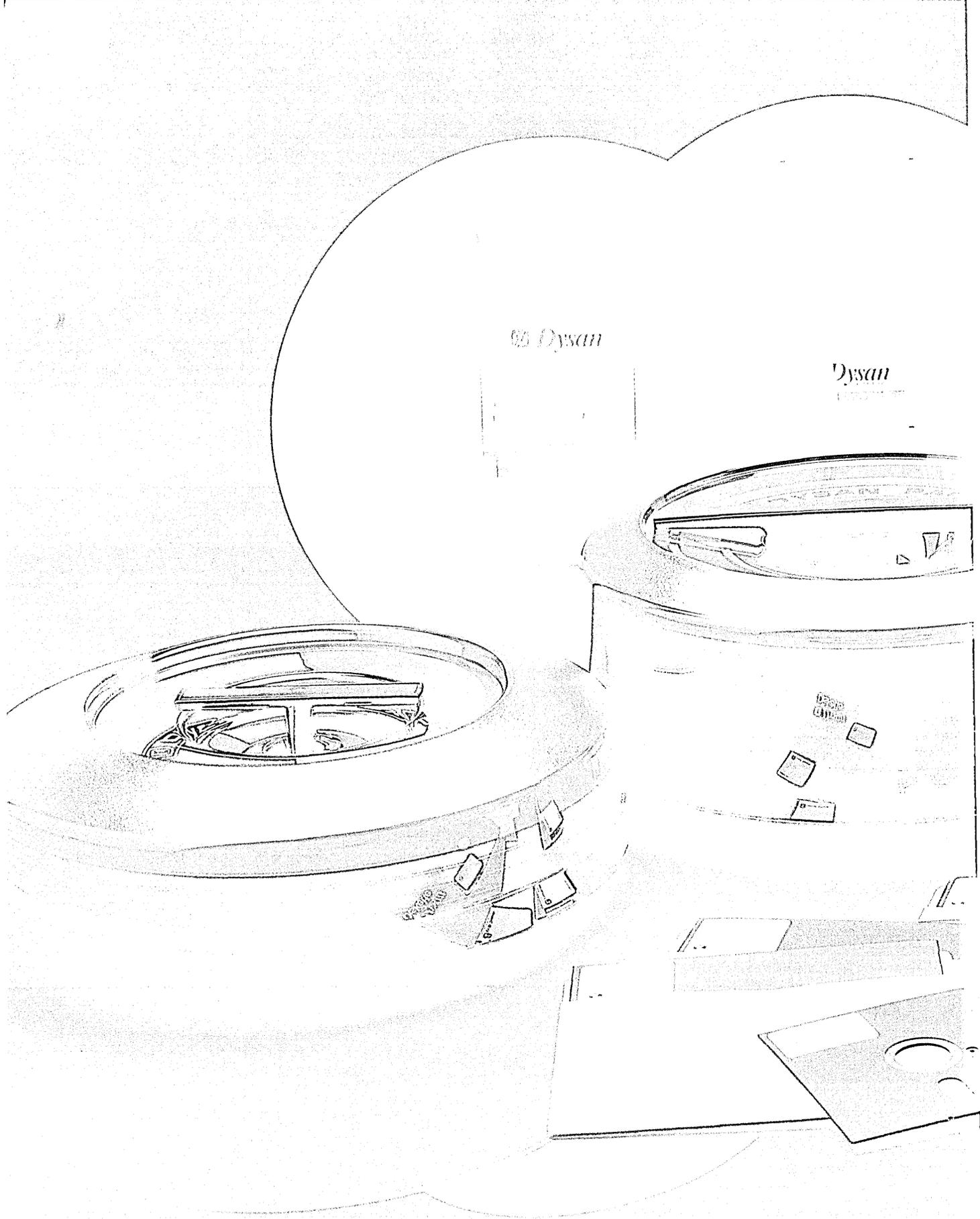
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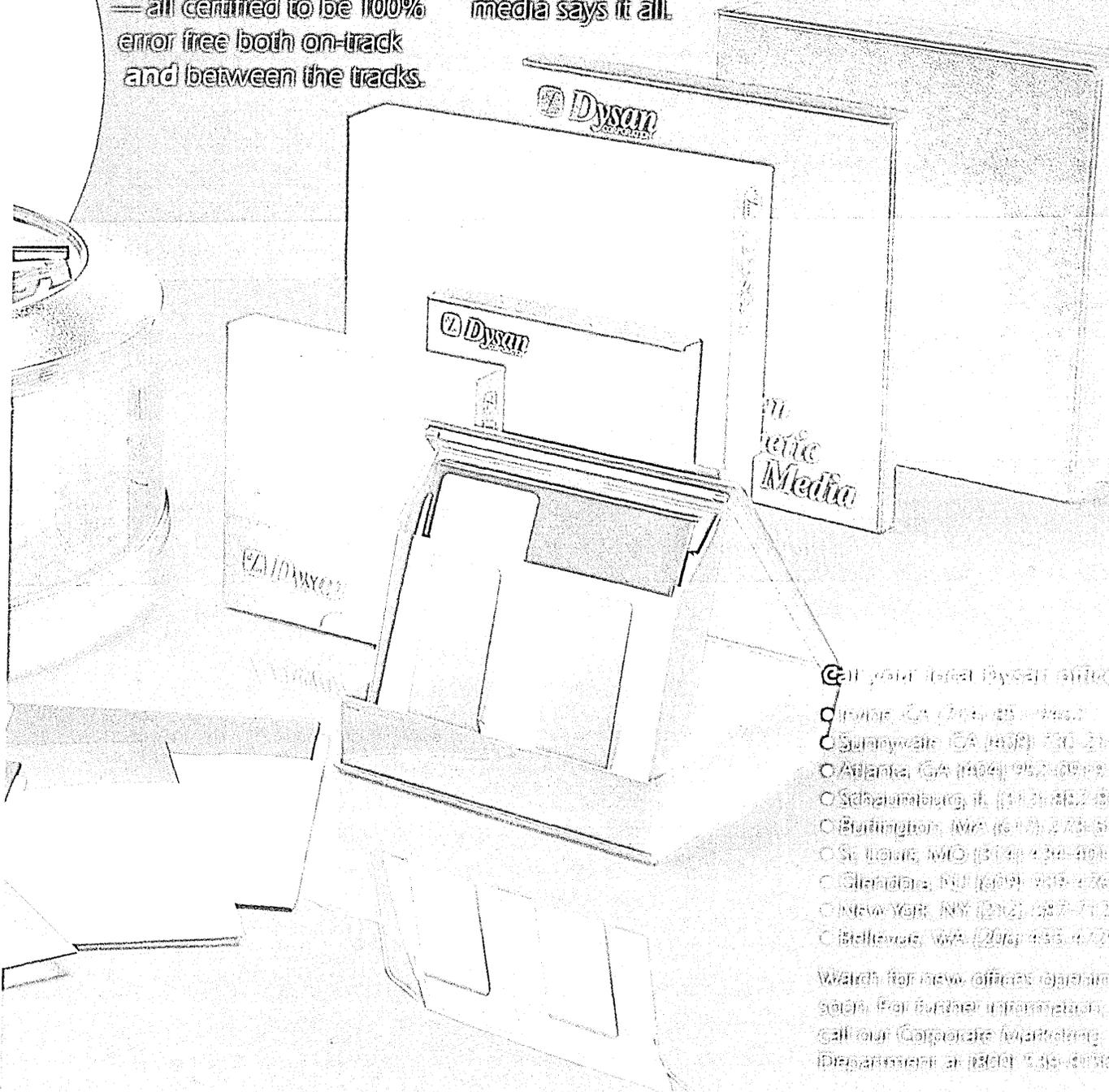
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### OFFICE AUTOMATION

# HP TAKES BOLD DDP STEPS

Last month's string of announcements from Hewlett-Packard may well be the largest product introduction in the company's history.

With the announcement last month of the largest computer yet in its 3000 family, Hewlett-Packard steps boldly into the market for distributed, remote processors of the IBM 4300 class. The new HP 3000 Series 64, rated at 1 MIPS, thus opens up an entirely new market with many potential new customers for the company. "We see a lot of people who own other people's computers converting to this new high-end HP 3000," says Edward R. McCracken, general manager of the business computer group.

In what may well be the largest product introduction in HP history, the company also announced a new low-end ma-



chine, the Series 40, priced 30% below the former lowest-cost model and yet outperforming the most powerful 3000 of a year ago, the Series III. A \$50,000 price tag is attached to a usable configuration that includes peripherals and software. "It brings the 3000 down to a departmental-sized system that's usable in an office environment

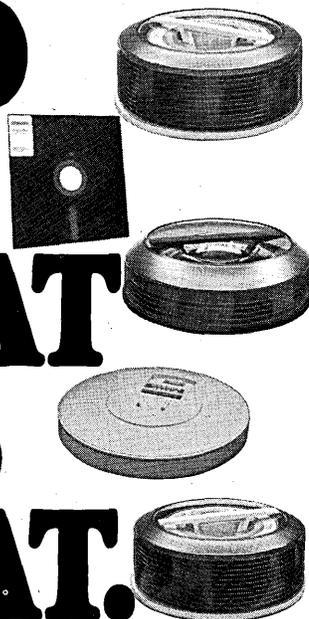
as a shared-logic system, in addition to being a distributed processing machine," McCracken adds.

Just as the largest processor provides a new upgrade path for current HP customers, the 40 serves as an entry path to the 3000 line for users of some small business computers. The two new computers join the Series 44 that was announced a year ago, the price of which has now been cut by 20%, and the three models form the 3000 product lineup for 1982.

It was in November of 1972 that HP first introduced the 3000, a machine subsequently recalled and then withdrawn. It was replaced in 1974 by the 3000 CX, which came with COBOL and marked HP's entry into the world of business dp. The 1,000th installation of a 3000 was achieved in October '77, followed in two years by the 3,000th machine. Last year, partially because of price cuts, the installed base doubled in size, and this month it should number 8,000. Further, according to Computer Intelligence Corp., the HP 3000 is the fifth most widely used computer in the U.S. marketplace, trailing only the IBM System/34, System/3, NCR 8200, and IBM 4331, in descending order.

Since so many of the distributed processing sites are offices, HP continues to develop software products for what it has begun calling the interactive office market-

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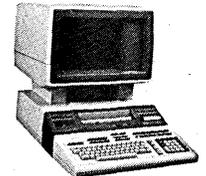
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## NEWS IN PERSPECTIVE

place. New software packages for word processing are combined with a secretary workstation that runs under the 3000. Earlier this year the company introduced its model 125 personal computer for the office; running under the popular CP/M operating system, it has software that makes it a standalone word processor. Other related products include a laser and a daisywheel printer previously announced.

But in a rare case of preannouncing its intentions, the company is also promising some electronic mail and electronic filing capabilities for 1982, its way of expressing a long-term commitment to the office environment. "We think, frankly, that electronic mail is the key to the office," says McCracken. "Word processing is nice, but electronic mail is the step that companies

### HP continues to develop software products for what it has begun calling the interactive office marketplace.

make when they really decide that the electronic approach is going to stay. So we're making it known that we're actively developing that capability." He adds that most of this research is taking place at the firm's research center in England.

Additionally, while HP 3000 systems have been able to talk to an IBM system

by looking like a 3270, HP now is supporting IBM's Systems Network Architecture. Thus users have a choice of using the bisync protocol or SDLC. The company has also announced its support for both the X.25 and X.21 standards, repeated its support for the IEEE 802 standards effort, and said it would evolve its network architecture toward open systems—those that allow devices from various sources to be intermixed.

The company, which credits its ever-increasing productivity for its ever-shrinking prices, not only of its hardware but also of its maintenance services, has also announced new software that it says increases programmer productivity. Some major HP customers who have already used the new Rapid/3000 family of programming tools have reportedly cut the amount of time it takes to do an application by a factor of from two to 10 over what it had previously taken on a 3000.

"We feel there's a chance with this package to do software prototyping," says McCracken, where prototype solutions can be done in a few days for trial and approval of the end user. If the solution is not approved, changes can be made quickly, a test performed, and approval sought again. But because transactions can be developed so quickly, it is said, two or three iterations can be done. "If that's the case," McCracken continues, "we think it will make a signifi-

cant change in the way people develop software and perhaps give the dp departments a better chance to satisfy their customers."

There's a lot of talk about people making inquiries to a database from a terminal and others being aided in their decision-making processes, but in fact most people are using terminals for data entry, and it is

### HP now is supporting IBM's Systems Network Architecture.

those application shots that need doing. Says McCracken, "We think 80% or more of our [HP 3000] terminals are being used by people essentially entering data."

The Rapid/3000 is priced separately, although HP several years ago bundled its Image database management system and its key sequential access file manager. "We did that at the time for several reasons," explains Robert T. Bond, marketing manager for the Computer Systems Div. "One, we felt that we really wanted to encourage the use of our productivity aids." And they wanted to include in the price of a system whatever a user needed to execute an application. The next level of productivity aids is Rapid/3000.

In some quarters at HP, the belief is that the most productive manufacturing facility in the company is its Boise, Idaho, plant. If nothing else, it's one of the newest

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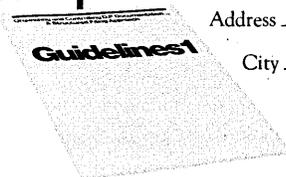
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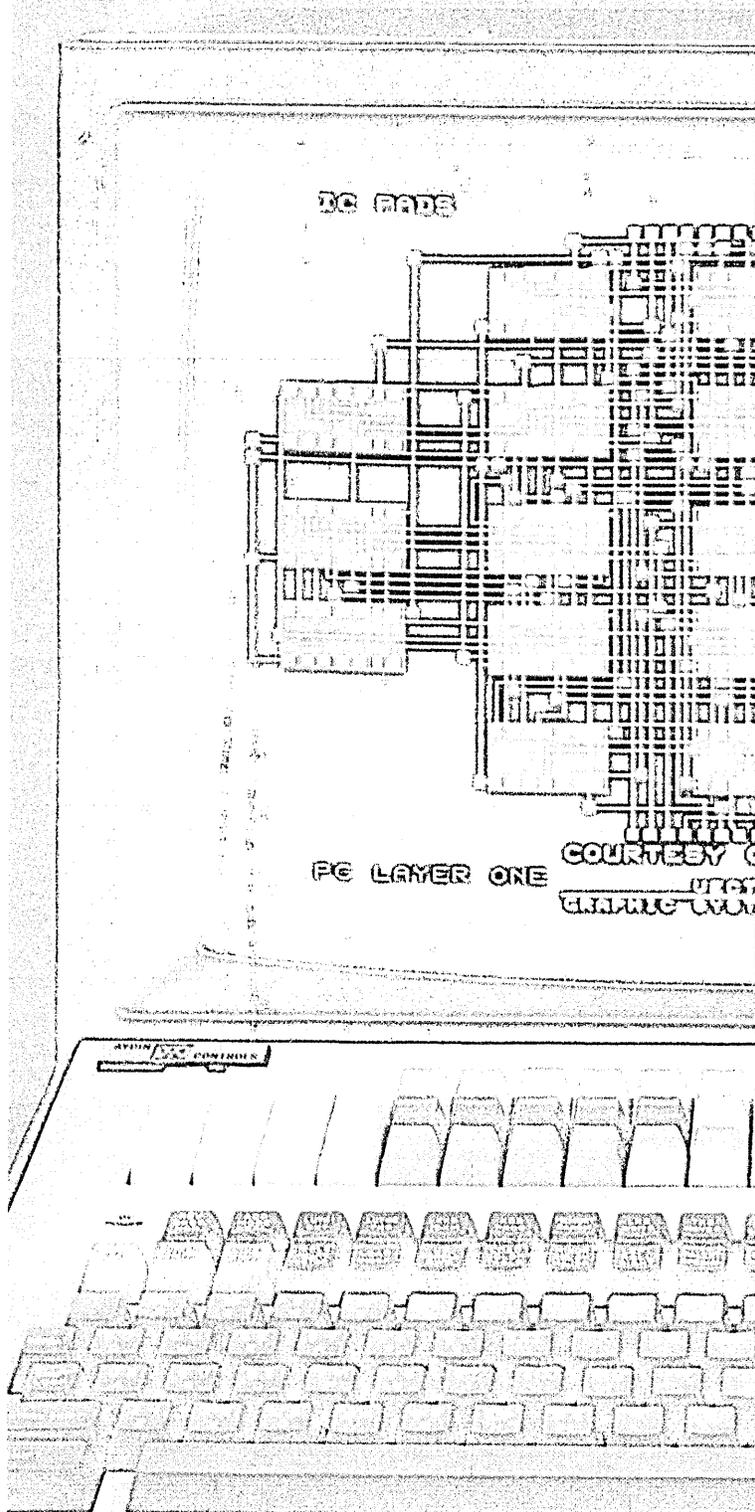
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factories and is thus equipped with the latest machinery. From that facility has come the laser printer announced earlier this year and now a 404MB disk drive priced at \$27,500. That comes to only \$68 per megabyte, possibly the lowest in the industry. Its areal density of 5.2 million bits per square inch, says consultant James N. Porter, is the highest of any removable-media drive he knows of. It is exceeded only by fixed Winchester drives, such as the double-density drives available from Storage Technology Corp. and Memorex Corp.

In typical HP style, the new model 7935 drive has about an 18% faster seek time (35 msec) and about a 35% faster transfer rate (one megabyte per second) than the 7925 it succeeds, and yet the price per megabyte is but 60% of its predecessor's.

The new drive does not require any preventative maintenance. There's even no need for head alignments; the drive automatically does this itself. Internal diagnostic features and fault-isolation capabilities reportedly lower the drive's mean time to repair to less than an hour and result in a basic monthly maintenance charge of a mere \$64. Says Jim Porter, author of the annual *Disk/Trend Reports*, "Against their competition, it's going to be a very powerful product."

The "competition" includes not only systems vendors in the ddp marketplace but also the increasing number of suppliers of HP-compatible peripherals.

—Edward K. Yasaki

## MINICOMPUTERS

# RTE. 128'S NEW WAVE STARTUPS

**Many newcomers to Boston's Route 128 have high hopes of emulating Data General's success.**

Who'll be the next Data General?

This is the question on the lips of the high stakes gamblers who for the past year have flocked to Boston's Route 128 area as if it were a minicomputer Las Vegas.

For many of these "deep pocket" venturists, the scene that now greets them along 128 offers a sense of déjà vu, of history repeating itself. Some of the veterans may still be kicking themselves for missing the last big plays in the area on Data General or Prime Computer a decade ago.

Today they are lured by the conflicting claims of a new wave of startups reminiscent of the late 1960s that have high hopes of emulating DG's achievement.

"All this activity has come about," says Apollo Computer founder Bill Poduska, "because computer technology just went through another major 'step function' which is making new entrepreneurial growth possible."

Apollo and Stratus Computer, SOLVation, and the revamped Charles River Data Systems are just some of the new Route 128 names that are vying to be the next Data General.

Poduska, speaking to investors at a recent Grumman/Cowen-DATAMATION

## **Apollo, Stratus Computer, SOLVation, and the revamped Charles River Data Systems are some of the new Route 128 names.**

mini/micro conference, said that the power and economies inherent in 32-bit micros, VLSI, Winchester disks, and portable high-level software—the chief ingredients of the step function—were the fuel behind the new wave of startups.

Another reason, and one that is probably the real thread linking the late 1960s and today, has been the booming issues market for high technology stocks, suggests Data General cofounder and noted venturist, Fred Adler.

Though a recent Grumman/Cowen-DATAMATION study of the mini/micro marketplace didn't profile the next Data General for investors, it did provide a few useful guidelines for those that wish to stake a play on fortune's wheel.

Inevitably, the weaknesses, if any, of the big names in the minicomputer business are what draw newcomers to the marketplace. "There's always a niche that could turn into market share for someone that's sharp enough," points out Ed Zander, a Data General marketing director.

By exploring the buying patterns of several thousand user sites, the survey seems to have unearthed a few niches that the minicomputer giants such as DEC, Hewlett-Packard, DG, and, of course, IBM are either ignoring or don't have time to defend.

The most obvious of these niches—historically the classic door to quick market share—has been the so-called product oems and system builders. It's the very same door that the fledgling Data General used to hustle its way into DEC's markets 13 years ago.

The survey shows that these system integrators, or middlemen, still provide the natural and easiest way to the big time for Route 128's new wave. But this window on the market is now shrinking noticeably.

According to the survey, the compound growth rate of the combined oem/systems house base has averaged 16% over the past five years. In stark contrast, real end users and end-user implementors have grown 27% over the same time frame, and this market is now soaring, explained

Grumman/Cowen's director of research Barry Rosenberg.

Both types of customers—end user and oem/system builder—have now outgrown their existing 16-bit machines, and many are turning to 32-bit systems for extra addressing power and performance, says Poduska. The question is, he says, which user camp do you aim for?

The major minicomputer companies seem to be in no doubt. The big money now is clearly in commercial end-user markets, as DEC's VAX family has shown, says Rosenberg. As a result, the market leaders have moved to offer new 32-bit superminis at the high end of their lines.

The minicomputer giants plan to upstage the mainframe companies by offering commercial end users the extra addressing power and performance they need for such booming applications as DBMS, local networks, and teleprocessing—but at "minicomputer prices," Data General vice president Barry Fidelman explains. That price, as shown by Data General's brand-new medium supermini, the MV 6000, is on its way down to \$100,000.

While all this sounds great for commercial end users, the picture is a little different for the thousands of small to medium-sized oems and systems houses that the top minicomputer companies have in the

## **Most new wave companies use a UNIX-like operating system at the heart of their offerings.**

field—the users of Nova and PDP-11 computers that have dominated this market, for example. These users are beginning to ask when they can get 32-bit machines, say the new wave companies.

The fact that these users also need great addressing power and performance hasn't gone unnoticed by former employees of such companies as DEC, Data General, Prime, and Honeywell—so far the most fruitful recruiting grounds for the startup companies.

"Oems and other system integrators are constantly bumping into the limitations imposed by the 16-bit architecture of most minicomputers," claims Charles River Data Systems (CRDS) vp of marketing and a former Data General employee, Dan DeLea. "With the 65K byte limit on addressing, programmers have had to work very hard to make their programs fit their machines."

CRDS, Perkin-Elmer, and Apollo are just some of the new movers who believe that there is a market opportunity to supply high-performance 32-bit oem computers.

The survey shows that oems and system builders expect to pay an average of \$35,000 for their 16-bit systems next year—\$20,000 for oems and \$50,000 for systems houses.

## NEWS IN PERSPECTIVE

The report also indicates a growing dissatisfaction among oem/systems houses with leading minimakers. DEC registered a -14.4% shift in satisfaction levels, and DG fared even worse with a -18.6% slide.

"Not only do these users want a 32-bit architecture and other key ingredients of the step function such as Winchester [hard disk drives providing low-cost mass storage]," says DeLea "but they like them at microcomputer prices."

"The top minicomputer companies are talking \$80,000 and beyond while we're coming in at a fraction of that," said DeLea. He adds, "Our company's Universe 68/10 offers these users a 32-bit system with 256K main memory (expandable to six megabytes) and eight megabytes of Winchester for \$16,000 in quantity-10 discounts."

Included in the price is a UNIX-like operating system. "And the whole thing is available now," says DeLea. He added that

### **At present Data General is believed to be looking at an architecture similar to that of IBM's System/38, which several gurus point to as the operating standard of the future for small machines.**

this is exactly the kind of machine that is now needed to add pep to oem markets.

Like many other new wave companies, CRDS management is convinced that top minicomputer companies cannot exploit the new step in microtechnology. Both Stratus (nonstop minis) and Apollo (network minis) have been saying that the only real competition they anticipate is from other startups.

"The big names like DEC and DG cannot bring new value-added architectures to the market as we are doing," says Stratus head Bill Foster, formerly with DG. "All their software development is tied into their own proprietary architectures."

New wavers point out that it wasn't so long ago that all DEC plug-compatible competition was restrained in the same manner.

"The real breakthrough," said one observer, "was when Bell Labs developed the UNIX operating system for PDP-11 computers. This has become the only truly portable standard across the minicomputer industry," he explained.

Most new wave companies use a UNIX-like operating system at the heart of their offerings. Many of them now use it with the powerful Motorola 68000 processor on a chip as the engine, DeLea explained.

"With these kinds of tools, we have more control over our own destiny," says DeLea. "We can sell to our own standard, not DEC's, IBM's, or someone else's. That's why there are so many new startups and so

much venture money."

Selling to your own new high-level standard also nullifies to some extent the awesome power of the minicomputer giants' installed base. "When they eventually respond with a 32-bit oem system, it will have to be compatible with that base," says DeLea.

"If you take the case of Data General, that means their new offerings have to be written around the 1969 Nova and its instruction set, which was written in assembly language," he argues. In sharp contrast, UNIX is written in the high-level language C—not machine language—and so it's easier to upgrade the operating system and adapt it to breakthroughs in technology, says the new wave philosophy.

Data General, for one, isn't unaware that continued compatibility with the Nova, and hence the late 1960s, could have some drawbacks, especially for oem users.

For this reason the company is believed to have instigated a search for a new architecture about five years ago, according to sources. This project, known internally as "Fountainhead," has had a stop-start history ever since, insiders claim.

At present, Data General is believed to be looking at an architecture similar to that of IBM's System/38, which several gurus point to as the operating standard of the future for small machines. Data General declined to elaborate.

Another reason for not coming back with a quick response to the upstart 32-bit oem systems is the current cash position the leading minicomputer companies have in their recent 16-bit offerings. Left to their own devices, they would generate a great deal of money over the next couple of years, the survey shows.

"DEC and DG and the others wouldn't want to obsolete these machines too quickly," says one consultant.

Though these new step functions are a boon to system integrators when offered by new wave startups, the mini/micro report points to end users as being much less interested.

A section headed "Why Choose a Vendor" is very instructive in this respect. It shows that newcomers can still compete on price and cpu performance in oem quarters. "But end users have a different set of priorities," says Grumman/Cowen's Rosenberg. "They're much more interested in things like vendor reputation, hardware reliability, applications software, and general support and service." He added that these are the kinds of qualities that you have to prove to the market over time.

"With a newcomer, the end user would have to take these things on trust," said Data General's Zander. "And not too many will." It is in this respect that a huge user base is a tremendous advantage, he explained.

"This startup excitement is all very

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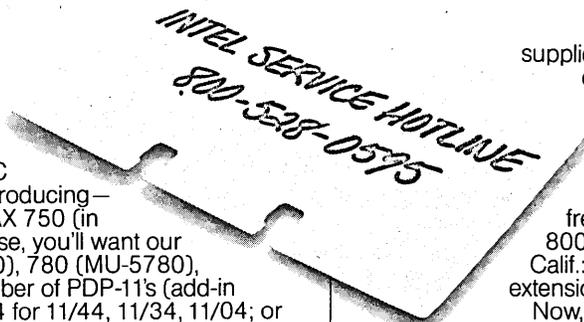
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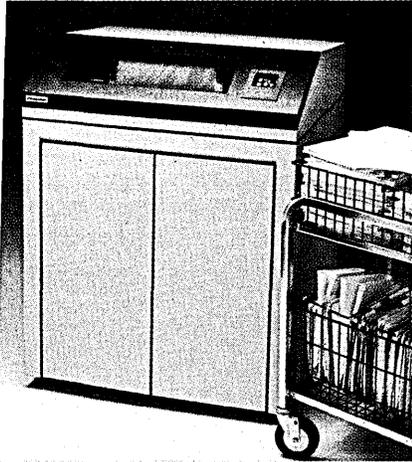
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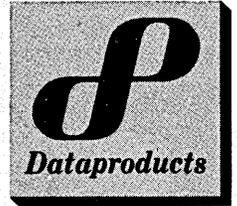
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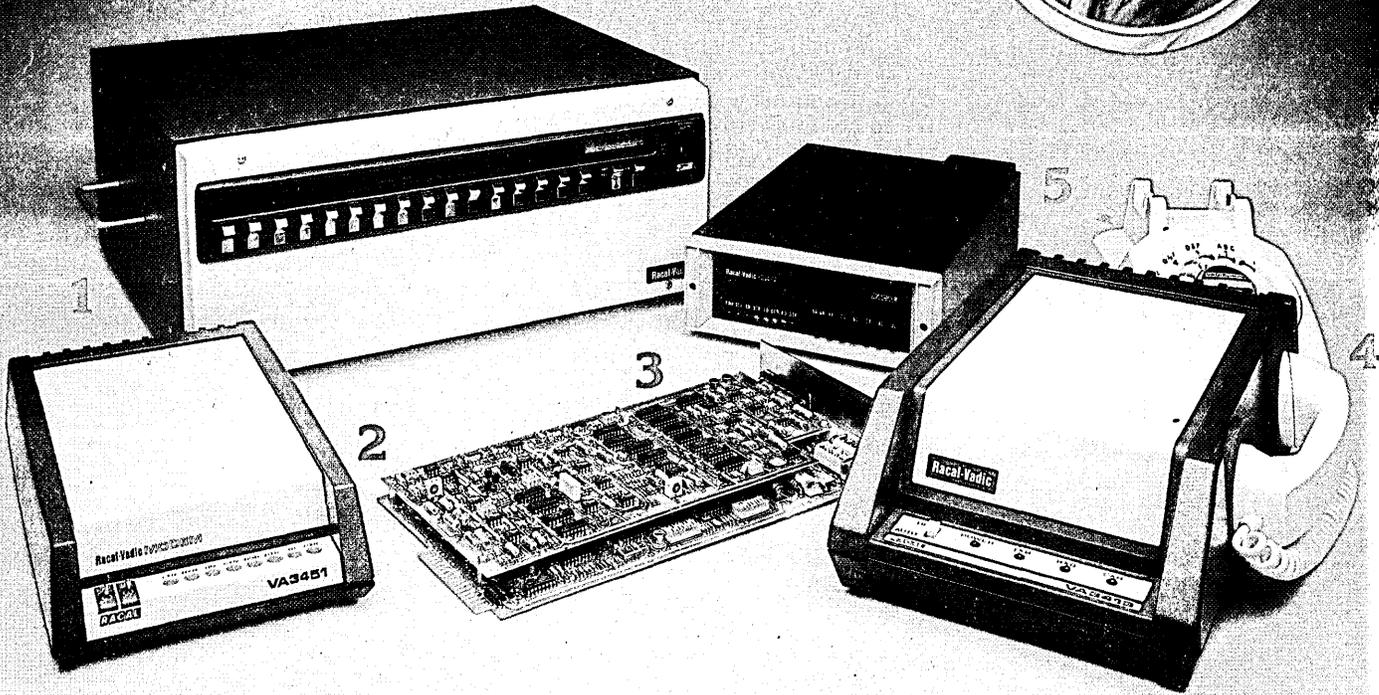


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CIRCLE 62 ON READER CARD

## NEWS IN PERSPECTIVE

good, and perhaps it's to be expected," said Zander. "But remember that DG was one of 80 or so minicomputer companies from the last wave. Only 10% survived. And not all of those are in good shape."

It's clear that Zander would ask the venturers on the Route 128 strip to place their bets with more than a little care.

—Ralph Emmett

## SOFTWARE

# INTELLECT ON DEMAND

**Artificial Intelligence Corp. expects to ride a healthy growth wave now that its English query language can access multiple files.**

It's been six and a half years in coming, but Artificial Intelligence Corp., Boston, has recently turned a critical corner. AI has begun its transition from a research and development company to a marketing company.

AI markets Intellect, the first and only commercially available conversational English query language. Costing between \$47,000 and \$62,000, the product has matured to where it can access multiple files rather than just one file. Now, Intellect can be directly interfaced to Cullinane's IDMS, Software AG's Adabas, IBM's VSAM, or AI's own file manager, DFAM (for Derived File Access Method). Prior to last month's release of Intellect, a user who wanted Intellect's capabilities on a CODASYL database like IDMS had to go through DFAM, which created and managed its own separate, single file. With release 103, life with CODASYL is much less complicated and DFAM isn't needed.

Come this January, the company hopes to further expand Intellect's market appeal with the introduction of a DOS version of the product. At present, Intellect is available on OS only. Future plans include interfaces to popular graphics and modeling packages, says Larry Harris, AI's president and sole creator of Intellect. The company's long-range goal is for Intellect to become the common query language for talking with several databases and application packages. A user could pull data out of a database, massage it using a financial modeling package, then arrange it in a graphical presentation, composing all the requests in conversational English. The company appears well on its way toward achieving that goal.

For the near term, Intellect is helping to solve some of the costly training prob-

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## NEWS IN PERSPECTIVE

lems that come with putting remote terminals in the hands of nontechnical users. Compounding that problem, many shops have a different query language for each database. When first-time users attempt to use these languages, claims of "user friendliness" and "English-like" melt away in the heat of frustration because a user can't remember the proper word or composition for the request.

Imagine trying to train hundreds of nontechnical users on a half-dozen query languages. Why not one language—one that allows them to make up their own questions? That's exactly what is happening at William Filene's, a Boston-based department store, and Reynolds Metals, Richmond, Va. Both companies have found Intellect requires almost no training—maybe a short course in how to use the keyboard. Both companies plan to bring Intellect up on several more databases.

The ultimate goal at Filene's, for instance, is to get terminals and Intellect in the hands of all management level employees. "That's about 981 people," says John O'Leary, Filene's vice president of management information systems, research,

### **AI has never wavered from its original direction, that of developing a query language system that understands natural language.**

and strategic planning. "We probably wouldn't be attempting this with any other query language." What O'Leary and his team have not come to grips with is how to deal with the demand on their computer systems. Restricting types of requests that can be asked and scheduled computer times are two suggestions that have been made.

Says Matthew Peterson, a software industry consultant with Peterson and Associates, Cincinnati, "I reviewed the product several years ago, and what they had even then was impressive nearly beyond words."

So why hasn't everyone rushed to install Intellect? The product's been on the market for more than a year. "Nobody knows about us," Harris says with a grin.

The company has no advertising program. It had a sales force of one until this year. And it conducted its first press conference this past September at Software Info in Chicago.

On Line English, which is Intellect packaged under Cullinane's name, probably has a more familiar ring and almost as many end users—"about a dozen," says Bill Rabkin, director of product marketing for Cullinane. AI counts 15 companies on its end-user list, three of which have served as product development sites for several years; 10 others have just signed up this year. End users include Honeywell Information Systems, Avco Computer Services, Filene's, Reynolds Metals, Chase Manhat-

tan, Du Pont, and the U.S. House of Representatives.

Cullinane has its own theories as to why sales have been sluggish. "A lot of people are very interested in the product, but they are not sure . . . not ready to get the product and turn the data over to end users," says Bob Goldman, Cullinane senior vice president. Part of the problem, he claims, is that many companies are still

### **Instead of making his grammar rules database dependent, Harris based them on standard rules of English syntax and semantics.**

bringing up their bread-and-butter applications. When a company gets its production applications on-line and its data under control, "then it begins to think about turning that data over to end users."

AI believes the market is ready for Intellect. "If you look around, you run into companies all the time that are forming committees to evaluate query systems, just like four years ago when they were forming committees to evaluate database systems," observes Harris. Over its six-year history, AI has never wavered from its original direction, that of developing a query language system that understands natural language, "the language people speak—English, French, German," Harris stresses. He quickly adds that "currently" Intellect only understands English. (There is rumor that a French company recently stopped by AI's office for a demonstration.)

At this stage of its development, Intellect seldom goofs on the most common type of requests, says Harris. An example of a simple request is: "Who are the top five salesmen in achievement quota?" It's only when the system gets hit with an unusually complex request—"Give me the average salary of our top two departments as determined by each department's average salaries"—requests that require second and third rounds of processing on the same piece of data, that bugs crop up, Harris admits.

The main difference between Intellect and other query languages is that Intellect never knows what it is going to get from the user. There is no set structure a user must follow. Harris's philosophy has been to put the burden of understanding on the computer. In all other query languages on the market, "the burden of understanding is on the user, not the system. Many users don't hold up their end; they don't read the manuals or go to all the schools. The problem then is the system assumes the user will do only correct things. Misinformation is the result. With natural language, the burden is on the system to understand and clarify," explains Harris.

The key to Intellect's flexibility is its lexicon, or dictionary. A separate lexicon is built for each database Intellect is applied

to, and users play a major role in developing that lexicon. After all, it's the way users talk about their data that determines what definitions or synonyms must be included, Harris says. Building a lexicon can take three to six weeks, depending on the complexity of the database and one's experience in building lexicons. Usually, AI builds a client's first lexicon, at a cost of \$7,500 per lexicon. That price is tacked on to the purchase price, which includes a week of training for a client's lexicon manager, the person responsible for maintaining and building future lexicons.

Suppose someone using Intellect enters a word not in the lexicon. No problem—a message appears on the screen telling the user that the word is not recognized and asking the user to rephrase the question or type in a synonym or definition of the word. The error is also logged on a master interaction file that the lexicon manager reviews regularly. It only takes seconds to add new words, definitions, or synonyms, says one company's lexicon manager.

The techniques employed in Intellect for dealing with grammar, semantics, and for navigating through the database files set the product two or three years ahead of potential competitors such as IBM, Hewlett-Packard, CalTech, Xerox, Texas Instruments, or SRI, suggests Jacqueline Morby, vice president with T.A. Associates. Her Boston-based investment firm put \$1.8 million in AI in October 1980, a decision that took the company only 48 hours to make. Robert Landau, president of Science Information Association, Kensington, Md., agrees with Morby. Landau's conviction dates back to 1974, when he conducted a search for the best research being done in

### **"It is certainly the only system in the world that automatically generates its own navigational advice."**

natural language query systems.

The search was started out of frustration, recalls Landau. For years he had crusaded in the government and, later, among the private sector for the adoption of a standard command language and "got nowhere," he said. He even helped a nonprofit research organization develop a simple, formal query language called BASIS. Its acceptance was limited. "I finally realized that even the best formal query languages or bridge languages probably would never be universally accepted, so the only way to go was with natural language."

Landau and his associate, Paul Krauss, looked through 20 or 30 of the best research leads they could find until they focused in on the project of a professor of computer sciences at Dartmouth. The professor was Larry Harris. It just so happened Harris was casting about for some business partners to help him form a company around



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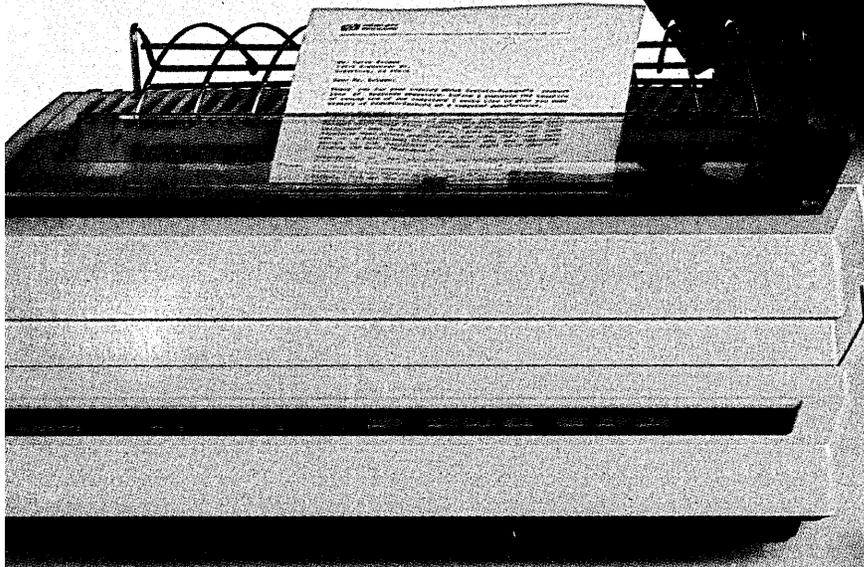
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A close-up of the HP 125 monitor showing a data table with multiple columns and rows of numbers. The text is small and difficult to read, but it appears to be a financial or statistical report.

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100	200	300	400
500	600	700	800
900	1000	1100	1200
1300	1400	1500	1600
1700	1800	1900	2000
2100	2200	2300	2400
2500	2600	2700	2800
2900	3000	3100	3200
3300	3400	3500	3600
3700	3800	3900	4000
4100	4200	4300	4400
4500	4600	4700	4800
4900	5000	5100	5200
5300	5400	5500	5600
5700	5800	5900	6000
6100	6200	6300	6400
6500	6600	6700	6800
6900	7000	7100	7200
7300	7400	7500	7600
7700	7800	7900	8000
8100	8200	8300	8400
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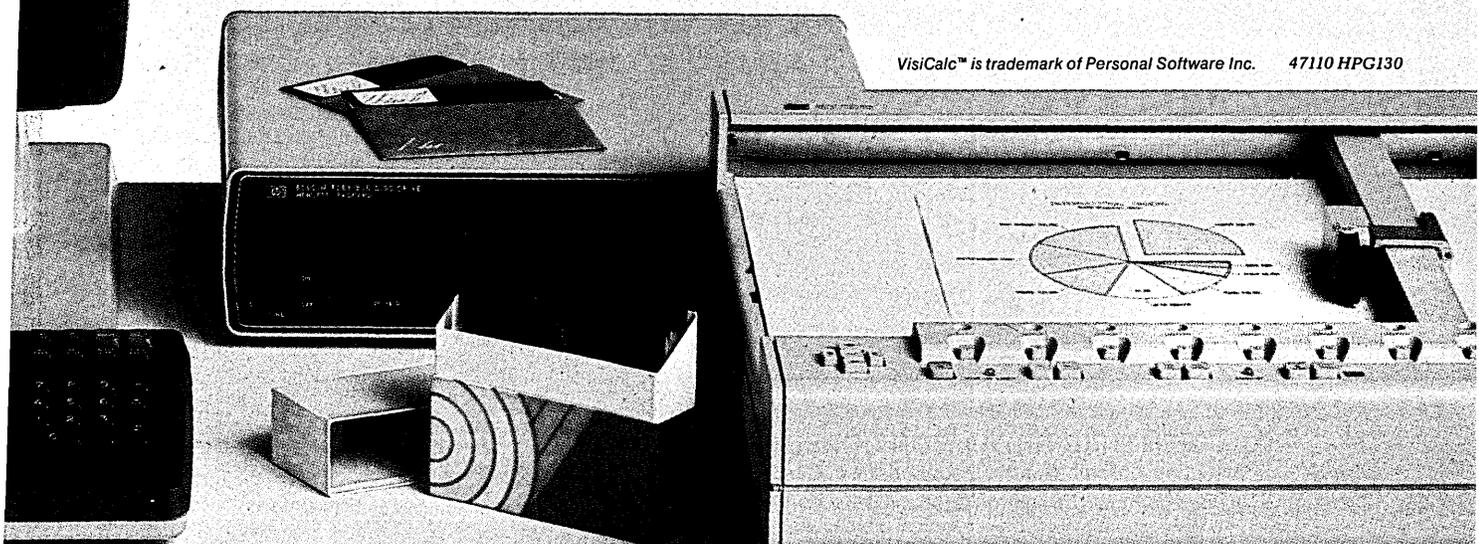
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## NEWS IN PERSPECTIVE

his research work. Artificial Intelligence was born in 1975. Krauss became the company's first president and Landau became and remains one of seven AI board members. Not long after the company was formed, its product was named Robot. Today, it's called Intellect and is still the only English language query system to be found on the market.

Why has Harris managed to produce a marketable product while others have lagged?

One significant difference between Harris' approach and that of some of his peers working on research systems is how he deals with the rules of grammar. In many natural language systems, the rules of grammar are dependent on the database being used. Should the author want to move the query language to another database, however, the system requires a major rewrite. Instead of making his grammar rules database dependent, Harris based them on standard

**"Intellect really gives you the ability to speak natural language. It's almost spooky."**

rules of English syntax and semantics. "You know you will always be dealing with such things as selection criteria and sort criteria."

Knowing that those criteria will al-

ways be included aids Intellect in interpreting the incoming sentence and building a semantic structure that represents the meaning of the question. "The only aspect of the entire system that is database dependent is the lexicon," notes Harris. "Everything else is based on general rules."

Another technique employed by Harris enables his query system to look at many sources of incoming information. Most programs look at only one source. "It is certainly the only system in the world that automatically generates its own navigational advice," he added. "Other systems force the user to type in the navigational advice."

"Intellect a breakthrough? Oh yes, I'd call it a breakthrough. I've not seen anything else that is truly natural language," was the energetic comment of Cherry Peters, technical consultant, data planning, research and development for Reynolds Metals. When Intellect was installed this past May, Peters said Cincom's TIS was tossed out. "Intellect really gives you the ability to speak natural language. It's almost spooky."

"Yes, it really is a breakthrough," agreed John O'Leary, MIS vice president for Filene's. Intellect was installed on Filene's personnel database in August and two more applications are soon to follow.

The real test of AI's mettle will unfold over the next year or two as the com-

pany embarks on its first marketing program. The strategy is to expand beyond the end-user market, devoting much attention and resources to oem sales. To accommodate this new direction, the company, which has grown to a staff of 30 (up from 10 in 1978), has made a lot of changes and additions in the areas of marketing and customer support.

The company already has gone

**The real test of AI's mettle will unfold over the next year or two as the company embarks on its first marketing program.**

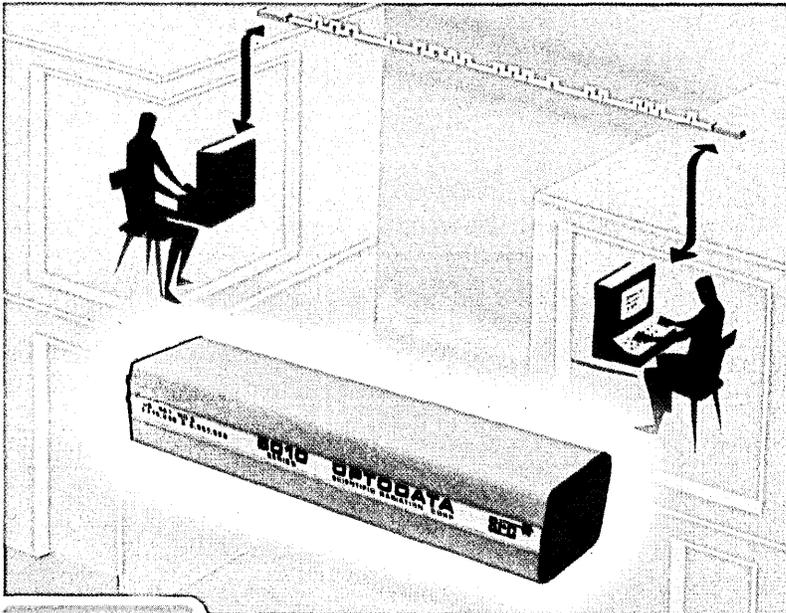
through some major changes in its top management. The most recent change took place in June when Harris took over the roles of president and chief operating officer from Dick Bloch, who prior to coming to AI had held management positions at such companies as Honeywell and General Electric. Bloch remains on the board of directors at AI.

If all goes as planned, by the end of next year Intellect's installed base should number in the 400s and the company should be riding a healthy growth wave, moving up an average of 30% to 40% annually, claim AI principals.

—Jan Johnson

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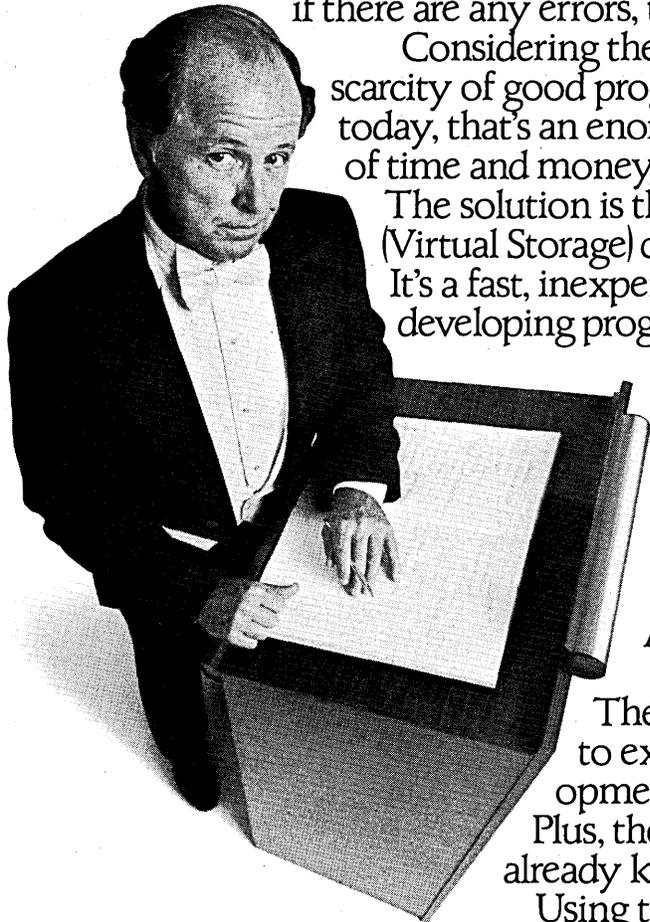
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CIRCLE 66 ON READER CARD

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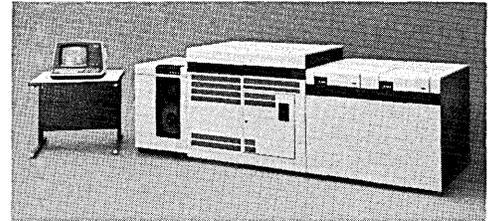
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## ARAMCO SERVICES COMPANY

## NEWS IN PERSPECTIVE

### PERIPHERALS

# A PUSH FROM JAPAN

**U.S. matrix printer  
manufacturers try to stay one  
step ahead of the Japanese  
in features.**

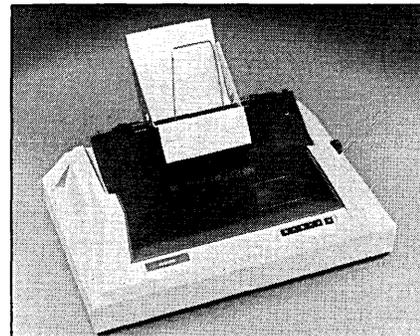
Reeling under Japanese competition in low-cost serial impact printers, U.S. manufacturers that created the market are looking to technology to protect market share in the high end. And it bodes well for users.

Kenneth A. Mathews, vice president of marketing at Anadex, Inc., Chatsworth, Calif., first in the marketplace with a printer priced under \$1,000 in December 1978, concedes the Japanese could do in the high performance end what it did in the low end. "So we try to keep one step ahead of them in features." Anadex has abandoned the low-end market.

Why was Anadex, first into the low-cost printer market, the first to get out? "Others came in soon after us, like Integral Systems with their Paper Tiger, and prices held for about two years," said Mathews, "then the Japanese came in and it's been all downhill ever since."

One survey indicates that the Japanese, with virtually no U.S. sales two years ago, are currently shipping half of all units selling for less than \$1,000, and their share will hit 75% by the end of the year. The under \$1,000 market is expected to be worth \$200 million this year and to grow to \$950 million by 1985.

"We create the market, then they [the Japanese] move in when the volume is high," said Mathews. "They can do it," he said, "because they invest heavily in robots and tooling and are less concerned with re-



THE ANADEX WP-6000 "correspondence quality" printer is capable of 150 cps in a word processing mode and up to 500 cps in a data processing mode.

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**DATABASE : CULLINANE**

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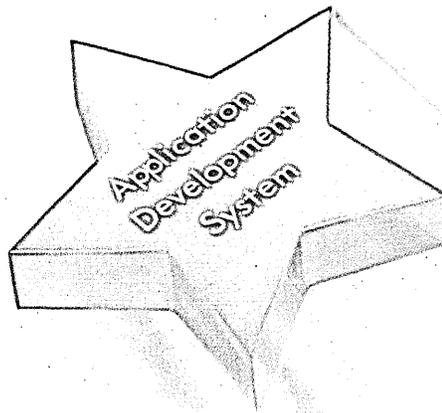
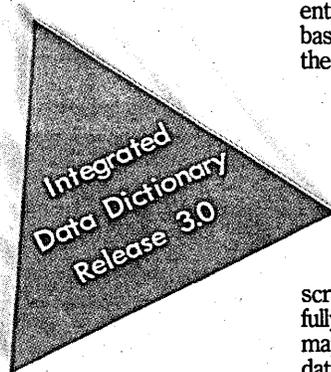
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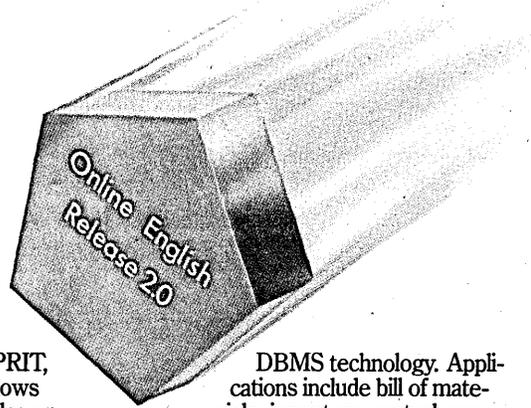
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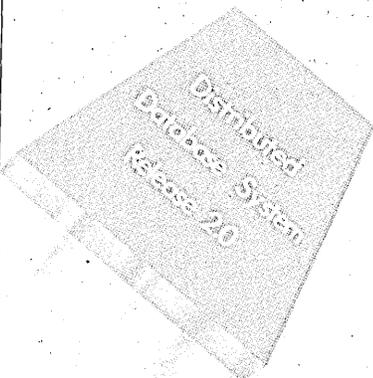
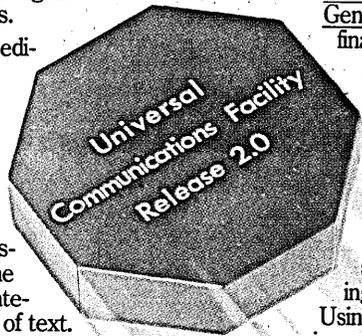


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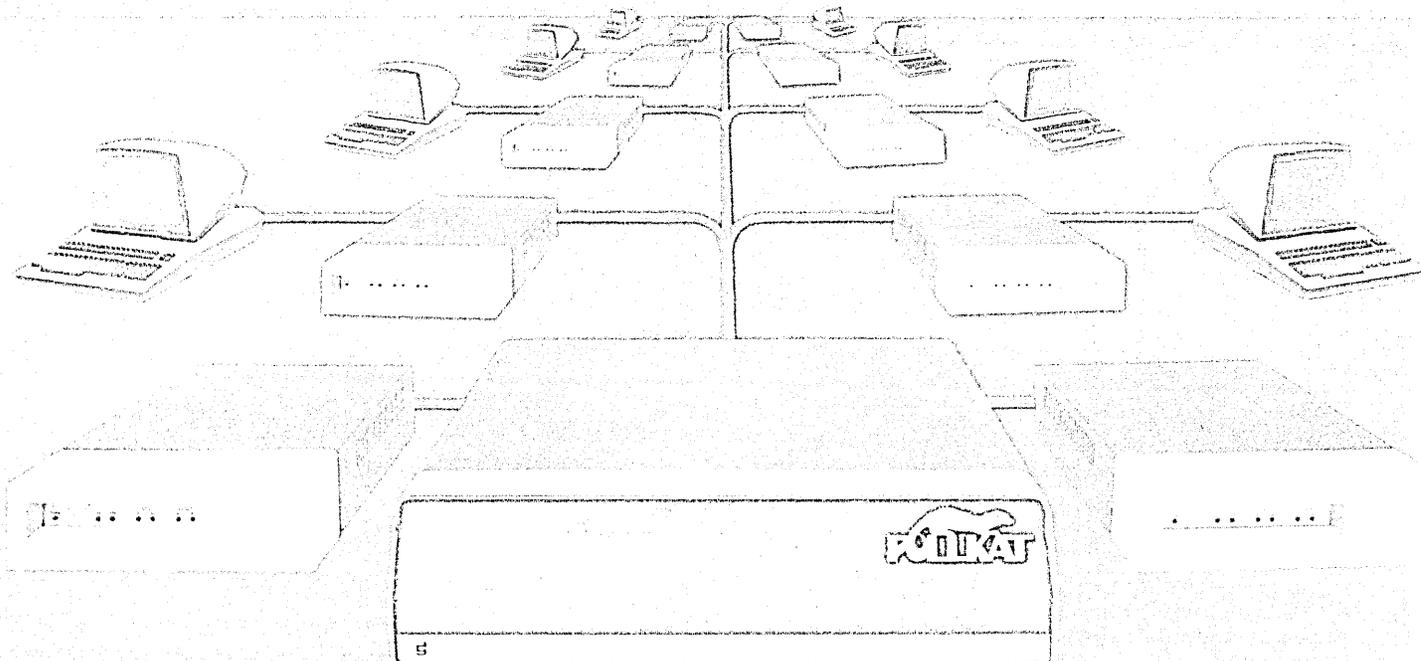


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CIRCLE 70 ON READER CARD

## NEWS IN PERSPECTIVE

turn on investment at the end of the year." He noted that Epson America, Shinshu Seiki Co.'s U.S. subsidiary which is pegged as the market leader with a \$445 model printer, spent three years on its development efforts.

"They can afford it and they don't have high labor costs," he says. He recalled visiting a production plant in Japan "where I only saw four people on four floors. Everything was automated."

Mathews said Anadex has a 16-strong development engineering group working on "printers capable of doing more things—in word processing and in speed."

Matrix printers have long been ruled out of word processing because of the lower quality of dot matrix printing compared to that produced by daisywheel printers. But now, said Mathews, at least four companies have working models of matrix printers that can produce what he calls "correspondence

### What daisywheel printers can do at 50 cps to 60 cps, matrix machines can do at a minimum of 150 cps—and for the same price.

quality" printing. It's not quite as high quality as daisywheel printing, he concedes, "but what daisywheel printers can do at 50 cps to 60 cps these machines can do at a minimum of 150 cps—and for the same price. Also, you can get all kinds of characters from dot matrix that you can't get with daisywheel."

Anadex's "correspondence quality" printer, the WP-6000, was formally announced at the NCC. Hardware design for a production model was completed last month. Production units should be available before year-end.

The unit is a dual mode printer capable of 150 cps in a word processing mode and up to 500 cps in a data processing mode (with a reduction in quality).

Key to its operation, Mathews said, is an 18 needle, dot matrix print head consisting of two vertical rows of nine needles that are slightly offset from each other in the vertical dimension. This allows up to 18 overlapping dots to be printed vertically in a single pass with the resulting dots having the appearance of a single straight line. Graphics capability is provided with a capability of 144 dots/in. resolution in both the vertical and horizontal axes.

In the "correspondence quality" mode, the WP-6000 can print a variety of U.S. and foreign fonts with and without proportional spacing. Other features include bidirectional, logic-seeking operation; standard interfaces of RS-232; current loop or parallel (Centronics compatible); and friction feed with an optional adjustable tractor feed. The oem price is under \$1,800.

Mannesman Tally, another company with a near-letter-quality matrix print-

er, achieves this with nine needles making two passes in which the second pass is with the print head raised a half-space.

Integral Data and one Japanese company also are said to be readying "correspondence quality" matrix printers for production.

Anadex is attempting to take advantage of the U. S. manufacturers' edge in the oem market, making long-term oem contracts a top priority. The company, which traditionally has sold through distributors, is setting up a direct sales force for this purpose.

"We won't take orders for less than 100 pieces here," said Mathews. "The smaller orders will still go to distributors."

The company sells exclusively through distributors in Europe and Australia, where it does 40% of its business. It recently signed up a five-office distributor in Canada in whom Mathews has great faith. "He used to be a Centronics distributor."

Service, another edge for the U.S. firms, is something Anadex intends to provide. "We bit the bullet," Mathews said. "We signed a contract with TRW's customer service division which has 32 operating service centers." He said the up-front costs in terms of training and spare parts were high, but "we expect to recoup over a five-year period."

Color is another area getting a hard look from U.S. printer companies. Integral Data is getting ready to introduce a printer with color capability for under \$2,400, which it says will be the lowest-cost machine of its kind.

Ian Turner, director of the Serial Printer Div. of Dataproducts Corp., Woodland Hills, Calif., told a session of Compat

### "We create the market, then they [the Japanese] move in when the volume is high."

'81 this fall that "the name of the game in matrix printing will be improved representation quality through increased resolution and multicolor capabilities."

He said future matrix printers will be able to achieve resolution of better than 100 dots per inch. "With this resolution, matrix output will essentially be letter quality. . . . Matrix printers with multicolored ribbons will be the only viable color output technology in the near future. Ribbon technology is currently the only limiting factor and is expected to improve rapidly with demand. In fact, we expect toned color capability to emerge in the marketplace shortly, further increasing the representational capability of matrix printers."

Will the Japanese be far behind?

—Edith Myers

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## NEWS IN PERSPECTIVE

# BANKING ON OLD MARKETS

**A startup company in California is refurbishing rotating memories, both drums and disks.**

Atypical among startup companies is SCR, Inc., Hawthorne, Calif. No state-of-the-art stuff for this firm. It's betting its future on old technology.

SCR stands for Southern California Refurbishment, and what it is refurbishing are rotating memories, both drums and disks. It started up with nine employees, all from the Rotating Memories Div. of Digital Development Corp., also in Hawthorne.

"It was becoming obvious that DDC was going to consolidate all of its operations in San Diego [where DDC is headquartered], and none of us wanted to move," said J. M. Till, a cofounder and vice president of SCR.

DDC Hawthorne was formerly the Rotating Memories Div. of General Instrument and earlier the Magnehead Div. of Bryant Computer Products, two well-known names in the rotating memory business. "We have with us probably the only three people in the world who know how to make Bryant and General Instrument heads," said Bob Lindberg, the other founder and vice president of marketing for the new firm.

The company started out with a customer base acquired in July from Datum, Inc., Anaheim, Calif. "They [Datum] wanted to get out of the drum business, so we bought their customer base and inventory," said Till. A big chunk of this base is in small drums used by NCR in point-of-sale units.

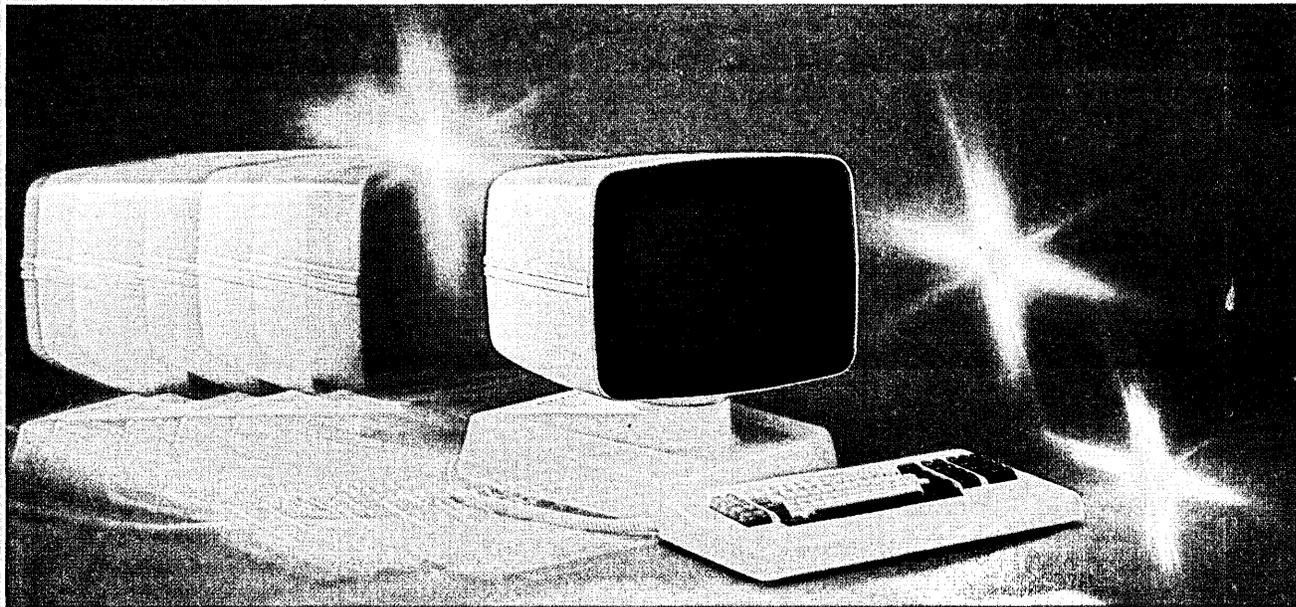
Lindberg said he believes the company can do \$10 million a year in drum refurbishing, excluding the Datum base. Part of his job is more detective work than selling—tracking down old and large orders for drums and finding out where those drums are today. Many of them are in military and other government operations.

"They're [the drums] in big, expensive installations, and the drums represent less than 2% of the total system cost," he said. "People are willing to pay up to 75% and sometimes even more of the original cost to have them refurbished."

As for disks, he believes "there are probably 40 million to 50 million out there that need refurbishing. We expect to do 5% to 10% of this initially and to work up to 40% to 50%."

As for head-per-track disks, which many said were on their way out even in the early '70s, Lindberg said, "There are large

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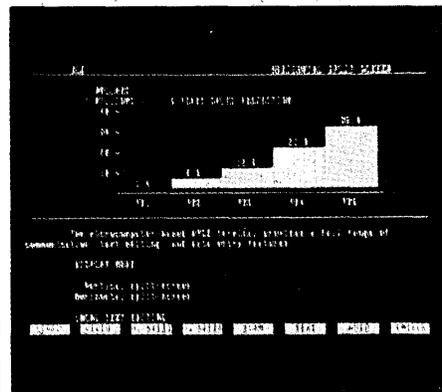
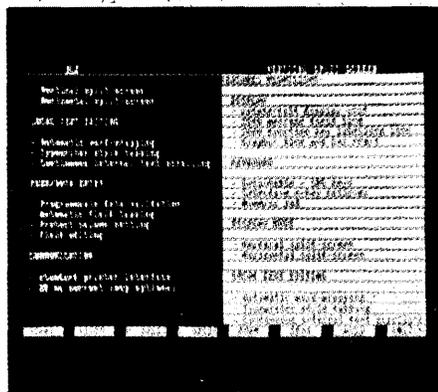
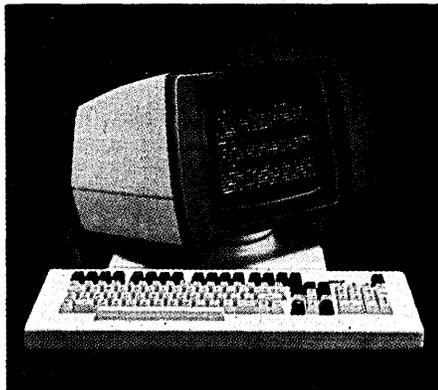
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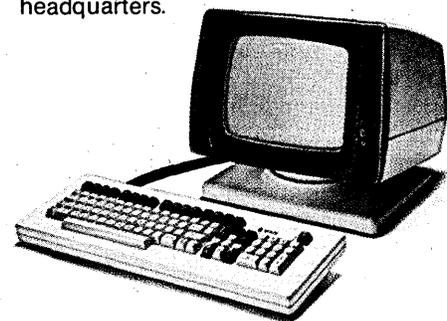
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## NEWS IN PERSPECTIVE

quantities in the marketplace, probably 300,000 to 400,000. They're reliable. They can be accessed in 8.3 milliseconds because they're always reading."

In addition to making new heads where necessary, SCR keeps close tabs on the salvage market, picking up heads from retired disks which Till said "are better than new because they've been burned in."

But it's not all in the past. "People are still buying drums," said Lindberg, and Vermont Research is still making them. He said both Reuters and Grumman had recently placed big orders.

Lindberg, however, likes tracking the old ones. Currently he's working on an order for 2,000 drums from Hughes. He's located 200 so far.

—Edith Myers

## COMMUNICATIONS

# ANOTHER LOCAL NET SURFACES

**Proteon Associates feels it has the answer to local networks for users of DEC PDP-11s and LSI-11s.**

This seems to be the year when local networking schemes are forthcoming on a regular basis. Various vendors have announced local network products to support their own equipment. But up to now the DEC mini user has had little to consider.

Now a small Waltham, Mass., company feels it has the answer to local networks for users of DEC PDP-11s and LSI-11s. Called Proteon Associates, Inc., the firm has begun supplying a limited number of

military and academic customers with its Pronet local area networking product.

Based on ring network architecture, instead of the collision detection methodology used in Ethernet, Pronet provides DEC users with Unibus and Q-Bus processors the ability to transmit data "up to several thousand feet." For short runs, Pronet reportedly can use twisted-pair cable, and longer distances can be handled with coaxial cable and even fiber optics.

A Pronet system consists of two circuit boards, a host specific board and a control card, and costs \$3,200, according to Howard C. Salwen, Proteon president. Originally developed for the MIT Laboratory for Computer Science, Salwen explains, the local network is now ready for commercial introduction.

Although the local network includes driver software, the user needs to integrate the ring network into his operating system before the product can be used. For most experienced users this should pose few problems, according to Alan C. Marshall, chief engineer.

Six Pronet systems have already been installed, Salwen says, and the key to the local net's design is that "minimal upheaval of the host is involved." Although users must add some software, most of the existing research and military installations have been "up and running in an hour or two," he claims.

Agreeing that some DEC users may not want to write the additional software, Salwen says that system houses could ideally offer users the 10Mbps local network on a turnkey basis. To expand on the current versions, Pronet implementations will be available by the end of this year for the DEC VAX processor and machines running under the RSX11 and RSTS11 operating systems, Marshall says.

The baseband ring configuration can support up to 255 users or nodes, and rings reportedly can be interconnected via gateways to further expand the network. A con-

trol character is circulated around the ring to eliminate transmission contention.

At present Proteon has about 30 employees, and Salwen says the company is set to produce up to 1,000 Pronet systems per year. Until now Proteon has done little to publicize its local network, but Salwen feels all that will change when users become familiar with the relative simplicity of his two-board system.

—Ronald A. Frank

# FRUITS OF MICOM'S LABOR

**By most counts, Micom holds an undisputed first place in the low-end statistical multiplexor market.**

The field of data communications seems to thrive on complexity. Users are regularly bombarded with network architectures, layered structures, protocol frame formats, and other terminology designed to give a telecommunications manager instant gray hair.

But a West Coast supplier of specialized data communications gear aimed at minicomputer users is trying to simplify things for its customers. Micom Systems Inc., Chatsworth, Calif., has made a name for itself by comparing its products with fruit—as in oranges and watermelons—and the idea seems to have worked.

Actually, Micom statistical multiplexors have little to do with fruit, but Roger Evans, executive vice president, didn't like that term when the first major product was introduced in 1978. "As far as I was concerned, [statistical multiplexor] sounded complicated. It describes how the product operates internally rather than what it does for the customer," Evans explained in a recent interview.

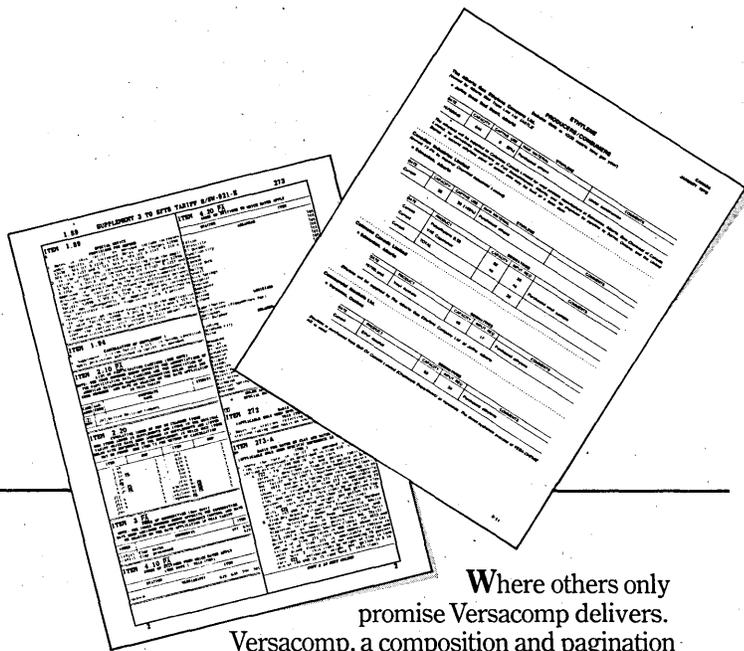
What Evans wanted was a name that more directly conveyed the real functions, so he called the Micro 800 a data concentrator. To explain what the 800 did, Evans used a can of orange juice concentrate and compared it with squeezing real oranges one at a time. The analogy was that the multiplexor or concentrator was much more efficient than individual data lines (or oranges). "It was remarkably effective for us in establishing an image. Long before people knew who Micom was, they would say 'Oh, you're the orange box company,'" he said.

The simple theme was doubly important to Evans and his boss, Micom president William A. Norred, because they were convinced that the biggest customer of the Micro 800 would be the minicomputer user



HOWARD SALWEN and ALAN MARSHALL explain the Pronet concept, originally developed for the MIT Laboratory for Computer Science.

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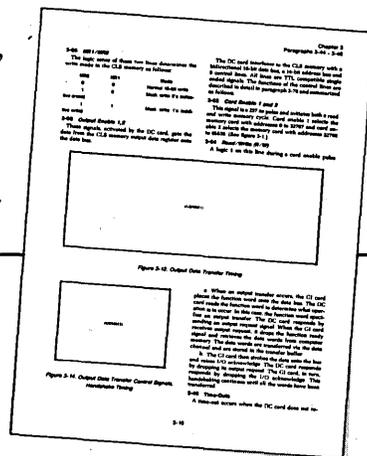
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## NEWS IN PERSPECTIVE

who was phasing into data communications but was not an expert in transmission principles and terminology.

The Micro 800 was designed to provide multiplexing features to small- and medium-sized business users who were transmitting data via dumb asynchronous terminals to minicomputers, which typically served as "mainframes" in their dp systems. The 800 allowed several dumb terminals in a remote office to share a single phone line; it also provided a retransmission capability when errors were detected.

Not only was the box simple to use, but it also did not require extensive installation. This meant that Micom could forgo a national network of trained field personnel and could instead rely on a system of distributors to sell the product. The Micro 800 set a pattern for microprocessor-controlled products designed for easy installation and use by minicomputers, and it was followed by the Micro 500 Error Controller and the Micro 600 Port Selector. One of Micom's recent introductions is the Micro 900, which is a concentrator designed for use on multi-point, multidrop lines.

While Evans acknowledges that other industry suppliers pioneered the statistical multiplexor, such as Codex with its 6000 box, he feels that Micom blazed a trail toward making this type of device compatible

### Micom plans to introduce an X.25 compatibility feature within six months.

with the needs of the small, less sophisticated minicomputer user. The formula has attracted other suppliers, and Micom now oems its multiplexors to such firms as General DataComm, Codex, and Paradyne.

To date, the company has shipped about 30,000 data concentrators, and by most counts it holds an undisputed first place in the low-end stat mux business. A recent study by International Data Corp., a market research firm, estimates that Micom shipped 13,000 of these boxes in 1980, giving it a 52% share of a market that totaled \$45 million. The IDC report lists Timeplex as the major competitor, with 38% of the market, followed by Infotron, with 4%.

For Micom, the fruits of its labor have resulted in a doubling of sales from \$15 million in 1980 to more than \$32 million in 1981. During the same period, net income jumped from \$1.75 million to \$3.95 million.

Although Micom plans to continue providing communications devices for minicomputer users, it has upgraded its products. It now offers integral modems in its concentrators, and is planning to introduce an X.25 compatibility feature within six months, according to Evans. The X.25 capability will employ a protocol conversion process using what Micom has dubbed Add-on Data Link Control.

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## NEWS IN PERSPECTIVE

For the immediate future, Norred sees little need to deviate from the general marketing goal of providing easy-to-use data communications products for the small- to medium-sized minicomputer user. Evans agrees, adding that even with the spectacular growth of Micom, only about 10% of the market for low-end data concentrators has been penetrated.

—Ronald A. Frank

## LEGISLATION

# GAO SAYS BABY BELL IS A SHAM

**A recent GAO report says that when a company operates in both monopoly and competitive markets, there is great incentive to cross-subsidize.**

After two years, thousands of staff hours, and 219 pages of sophisticated analysis and recommendations, will the General Accounting Office's report on "Legislative and Regulatory Actions Needed to Deal With a Changing Telecommunications Industry" be heeded?

"If logic means anything, Congress ought to listen to its own report," says Larry Katz of Satellite Business Systems. "It came too late to influence anything in the Senate, although it may have some effect on amendments to S. 898 [the Senate telecommunications bill which was expected to be approved last month]. But I think it's going to have significant impact in the House. The members of the telecommunications subcommittee have been actively interested in competitive and deregulatory issues and have held several hearings on them. That subcommittee is more receptive to procompetitive viewpoints."

"One would expect that Congress would give a report by one of its arms serious consideration," says Warren Burton, vice president of governmental relations for Tymshare. "But I'm sure it will be completely ignored by the Senate Commerce Committee. If they really respected it, the hearings would have been reopened. But they were determined to push the legislation through. All along their attitude has been 'don't confuse us with the facts; we've made up our minds.'"

"I think it will significantly help the cause of those opposed to AT&T in the House, though."

The GAO report analyzes the current state of the telecommunications market, the degree of competitiveness therein, and the Federal Communications Commission's ability to perform its statutory tasks as required by Congress in the Communications Act of 1934. GAO found minimal competi-

tiveness in the market and the FCC wanting and deficient in almost every area of its responsibility.

"This really isn't news. It confirms what AT&T would like to deny and reveals what's obvious to those who have been listening all along," says Herb Jasper, executive vice president of the Ad Hoc Committee for Competitive Telecommunications (ACCT). "It can and will be ignored in the Senate. But it's going to have substantial influence in the House, where senior members of the telecommunications subcommit-

## GAO would like to postpone Computer Inquiry II's March 1 date when AT&T is allowed to enter the dp market.

tee have been receptive to the information in the report. And it's going to be very helpful in the long run because it shows the lie of those who say the market is competitive.

"Now it's not just competitors and users saying the separate subsidiary is a sham. Now you have an arm of Congress saying it after two years of investigation. Even those who are pro-AT&T will have to be more reasonable."

"I'd characterize it as having an air of unreality," an AT&T spokesman says. "The people who put it together apparently don't understand the difference between regulation and management. GAO's proposals would turn the FCC into engineers, put them into the executive suite of AT&T, and have them co-manage the business."

## INDUSTRY COALITION COUNTERS AT&T

The pro-AT&T legislation that has been sailing through the U.S. Senate to amend the Communications Act of 1934 has led to extreme frustration among those who are in opposition.

The inability of users, vendors, and industry associations to provide input to the Senate Commerce Committee chaired by Sen. Robert Packwood (R-Ore.) has led to the formation of an all-industry coalition to counter the effects of AT&T's lobbying effort. Called Tele-Cause, the group is said to represent 5,000 companies "that use, provide, or manufacture telecommunications and information services or equipment."

Claiming that the members spend \$20 billion annually on telecommunications services and equipment, Tele-Cause was formed with the express purpose of proposing amendments to S. 898 that would make the bill more acceptable to the group's members. The broad-based coalition is believed to be the largest group ever formed to affect communications-related legislation.

Spokesmen for several Tele-Cause members said they had been completely unable to make their views known to the Senate committee before the 16 to 1 vote which brought the bill to the Senate floor. Al-

though they admitted that the coalition was formed at a late stage in the legislative process, the efforts of Tele-Cause reportedly were responsible for the introduction of several last-minute amendments when the bill was brought to the Senate floor.

Tele-Cause was spearheaded by GTE when it became clear to that carrier that its interests no longer coincided with those of AT&T, as had been the case for many years. Ironically, GTE decided to support the legislation when Packwood threatened to add a stipulation that General Telephone would have to form a separate subsidiary for its competitive operations, just like AT&T.

Even before the coalition was formed, three major user groups—International Communications Association (ICA), Telecommunications Association (TCA), and the National Retail Merchants Association (NRMA) had banded together to impact the course of S. 898 and other communications issues. This group decided to join Tele-Cause along with the Association of Data Processing Service Organizations (ADAPSO) and the Independent Data Communications Manufacturers Association (IDCMA). Individual companies represented, in addition to GTE, were Control Data, ITT, Sears, J.C.

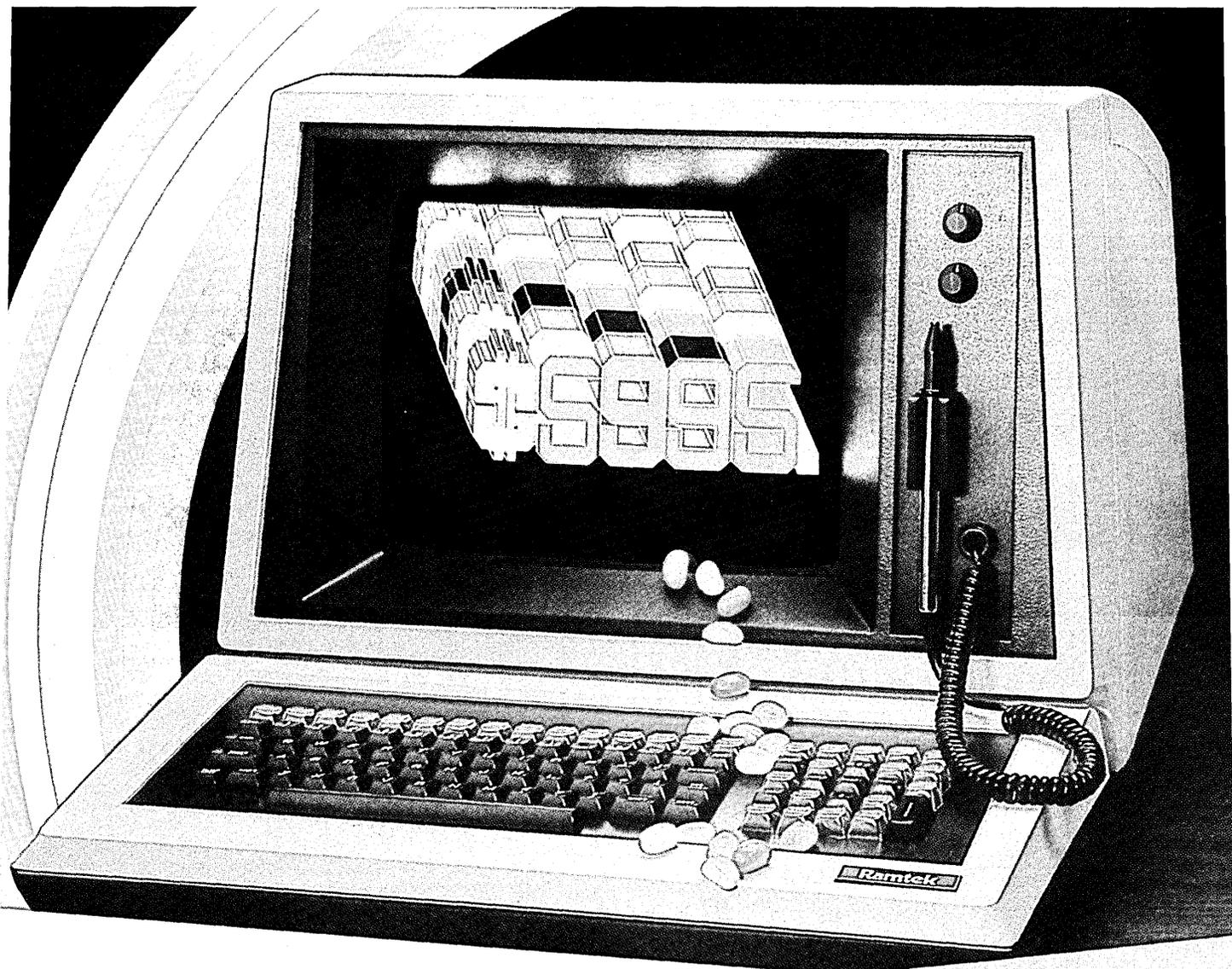
Penney, Rolm, and Electronic Data Systems (EDS).

While Tele-Cause was formed specifically to deal with S. 898, a spokeswoman for the coalition would not rule out later involvement in legislative issues if a consensus of the members could be reached.

At the recent TCA conference in San Diego, Rep. Tim Wirth (D-Col.) said that his House communications subcommittee would introduce a separate bill to update the 1934 act "in late fall." Most industry observers expect the House bill sometime this month, with provisions that are more favorable to anti-AT&T interests than Packwood's bill. Most user organizations and some vendors said they had provided input to Wirth's staff in advance of the House legislation.

How the differences in the House and Senate bills will be resolved remains an open question. But industry observers say the White House has given high priority to assuring that some legislation passes the Congress before it adjourns in 1982. In this regard, former President Gerald Ford told the TCA conference in a keynote address that a final bill would be on the President's desk before the 1982 summer recess.

—R.A.F.



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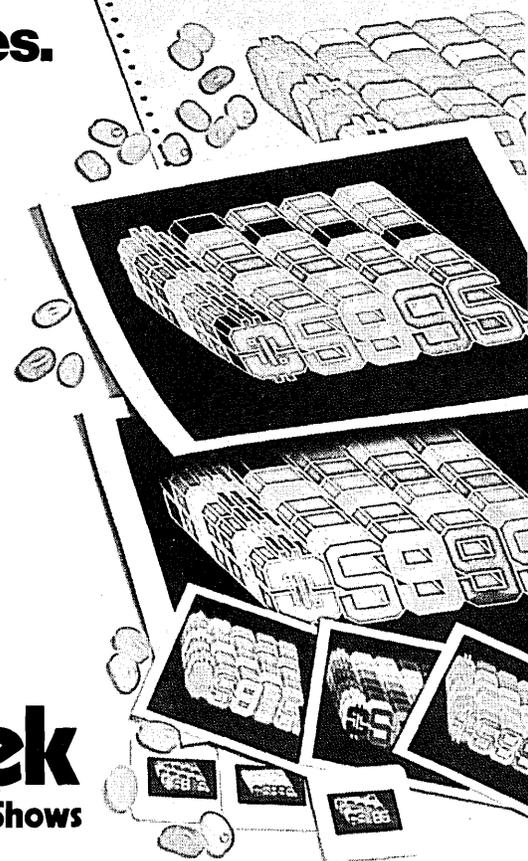
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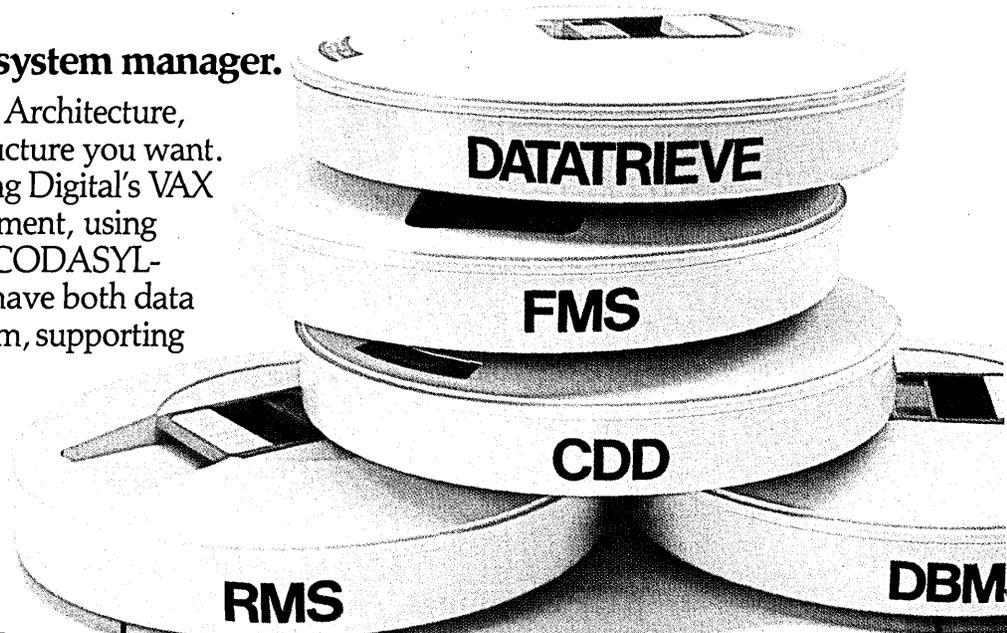
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## NEWS IN PERSPECTIVE

"I don't think it will have any influence in the industry. And I would hope it wouldn't be influential in Congress. I hope the senators and representatives are knowledgeable enough to see the holes in it."

If AT&T wants to lend bullets for more shots, the FCC will gladly borrow. That body took several hard knocks from GAO. But GAO also indicated that given the tools—money, staff and authority, three extremely unlikely commodities in today's deregulatory environment—the FCC could do the job.

GAO acknowledges that when "a

firm"—later identified, to no one's shock, as Ma Bell—operates simultaneously in monopoly and competitive markets, there is an incentive to cross-subsidize the competitive markets by undercharging for those services and overcharging for monopoly services. The watchdog agency contends that the FCC "needs to expand its regulatory approach beyond its traditional concern of potential abuse by carriers of their monopoly power to include ensuring fair competition between the established carriers offering monopoly and competitive services and new carriers offering only competitive ser-

vices." To achieve that goal, GAO recommends that Congress amend the Communications Act to direct the FCC to rely on competition and the private sector to the maximum extent possible and to allow exemption of carriers which, because of their limited market power, need not be fully regulated.

Other portions of the report examine applications of price/earnings regulation,

**"If its recommendations are implemented, GAO has taken a giant step forward for the benefit of foreign governments," AT&T says.**

costing principles and methodologies, depreciation rate setting, and ensuring fair, nondiscriminatory access to local exchanges. But the heart and soul of GAO's message is its analysis of separate subsidiaries as a competitive tool.

Pursuant to its Computer Inquiry II decision, which permits Bell to enter the dp market, the FCC ordered AT&T to begin a restructuring which would establish a separate subsidiary, known none too affectionately as "Baby Bell," to begin those dp activities. Computer Inquiry II is scheduled to become effective next March 1, but the GAO wants to slow down the calendar and delay implementation until "the commission is fully prepared and equipped to ensure the efficacy of the separate subsidy as a device for promoting competition and protecting against abuse of market power."

From GAO's viewpoint, the proposed Baby Bell is not separate and is very unequal.

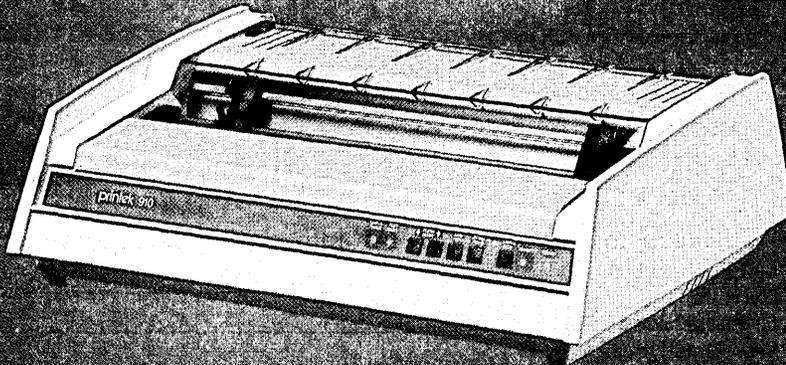
"We believe that the FCC will have to go well beyond the safeguards currently provided in Computer II if there is to be any assurance of success in encouraging and protecting competition in the domestic telecommunications industry," GAO writes. "Separate subsidiaries constitute an accounting safeguard rather than a definitive structural solution to the problem of monopoly power. They do not represent a quantum leap in the FCC's ability to detect cross-subsidization or to mitigate the risk of anti-competitive behavior.

"Maximal separation stands in marked contrast to the limited and, in our view, inadequate separation provided for in Computer II. Key FCC officials acknowledge that the structural separations and conditions and competitive safeguards provided for in Computer II are minimal by any standard and were formulated as much or more with an eye toward what would be acceptable to a commission divided on the question of the need for any structural separation at all, than to what is essential to ensure full, fair, and effective competition.

"The commission has given virtually no attention to the resource and organizational requirements implicit in implementa-

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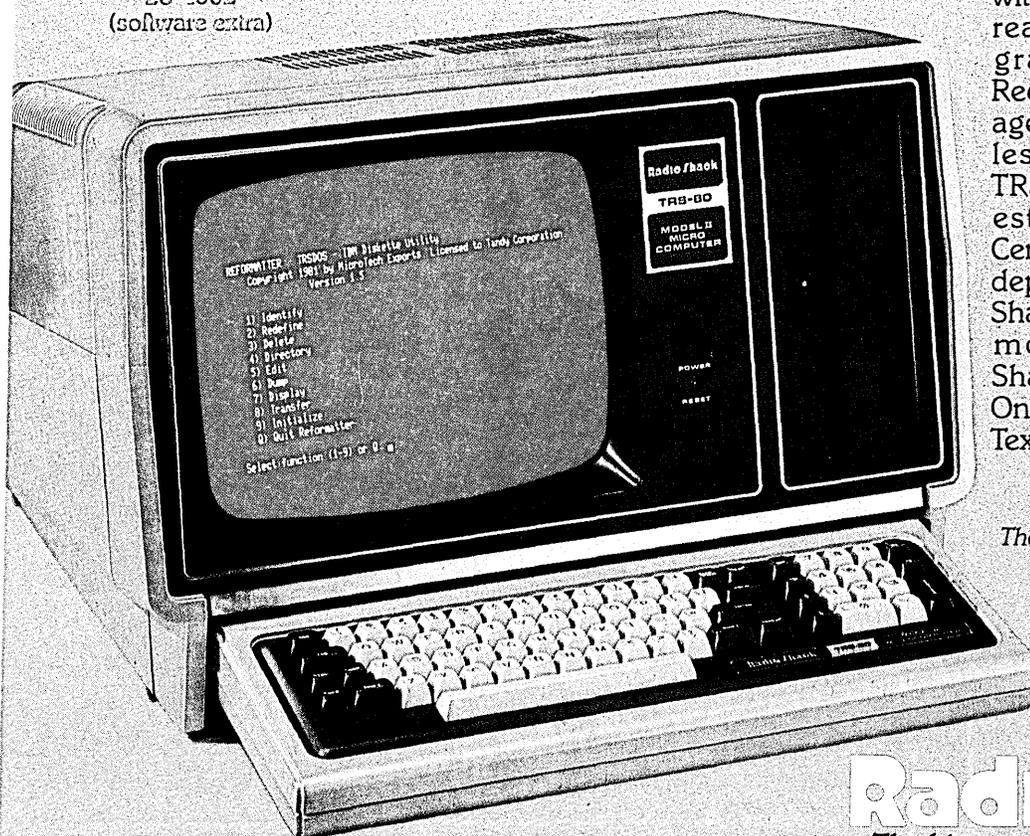
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## NEWS IN PERSPECTIVE

tion and enforcement of the separate subsidiary regulatory scheme. What is needed is a set of structural requirements, conditions, and prohibitions which will severely constrain the firm's ability to act on anticompetitive incentives and at the same time minimize the need for repeated ad hoc regulatory determinations and detailed, day-to-day regulatory oversight and intervention."

The outcome of the debate is as uncertain as passage of the bill in '82.

"AT&T's entire history has been predatory and anticompetitive," Tymshare's Burton insists. "For years FCC and the Congress have tried to control it and haven't been able to. It just does what it wants. I don't know if this report will help change that."

"Any control over deregulation will hamper the company's performance," the AT&T spokesman asserts. "If its recommendations are implemented, GAO has taken a giant step forward for the benefit of foreign governments."

"We have turned the corner, and this report will help us keep going in that direction," ACCT's Jasper says. "AT&T's influence has peaked, and the momentum is going ever so slightly in a pro-competitive direction. This report is another indication, and we plan to use it heavily in the House."

There is one caveat accompanying the tumult and the shouting. "When you're dealing with a political environment," one source cautions, "it's like walking through mush."

—Willie Schatz

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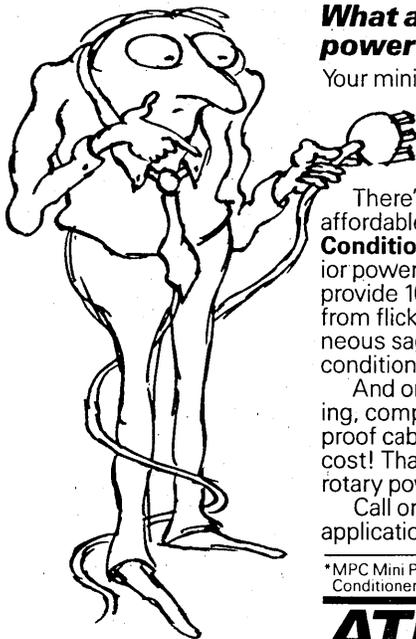
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CIRCLE 89 ON READER CARD

## NEWS IN PERSPECTIVE

is owned by Infocomsci, a New York City-based marketing consulting firm which specializes in management information systems (MIS) dealing primarily with large corporate clients, many of them financial companies.

"We helped develop Citibank's credit card database. We designed a lot of huge databases," says Andrew G. Rev, who left the parent company to become vice president of Budget. "We took a look at what some of our clients were paying timesharing companies. The charges bore little relationship to real costs."

Infocomsci, he says, decided it could couple its MIS expertise with timesharing and offer more reasonable costs. "We're getting in at the right time," he claims. "The others have done the groundwork. They've made big investments in hardware and software that we won't have to make."

The costs of operating a timesharing company have been steadily dropping as hardware costs drop and more and more

### **The company will offer each client a technical support specialist.**

packaged software becomes available. "And the drops haven't been passed on to the customers," Rev contends.

He agrees that many of his competitors have to pay "the cost of failure," those costs for developing software which never quite works, and to spread out costs of developing software which might be used by only 15 people.

Rev says most of today's large timesharing companies are offshoots of major aerospace companies "where a different philosophy of pricing [from the commercial world] prevailed. They were used to cost plus fixed fee, to passing on development costs not directly related to services offered. Customers accepted what they considered to be the going rates."

Now, he says, "we have a more sophisticated remote timesharing market. Users are not unsophisticated hicks anymore. Inflation has made users cost conscious and they know exactly what they want.

"What users are really looking to timeshare today is, number one, software. We intend to offer more software products than other companies." But they don't plan to develop it themselves. "We'll only offer tried and proven, widely used, brand name software."

But, he emphasizes, what Budget is offering is not a no frills proposition. "Anyone can benefit from our pricing and services," he says. "Companies presently spending between \$5,000 and \$10,000 per month on timesharing should be able to cut expenses in half and receive the ultimate in database, statistical, and MIS service."

Rev claims pricing plays an important role in his company's marketing philosophy but adds, "It is not the only advantage being aggressively marketed." He says the company will offer each client a technical support specialist in areas such as accounting, banking, finance, marketing, personnel, sales tracking and forecasting, statistics, strategic planning, manufacturing, and engineering.

Budget's IBM shop is located in Marina Del Rey, Calif., and is connected nationally to its market cities via leased telephone lines, Tymnet, and Telenet.

Decision to offer the services was made by Infocomsci more than a year ago, and the service has been offered on a test basis in Los Angeles and New York for a little more than a year. Average response time has been under two seconds and up time is 99%, says Rev.

In inaugurating its nationwide service, Budget is adopting at least one technique which is probably shared by more consumer-oriented firms with the same name—the free 30-day test. Rev says "qualified" customers can sign up for a free, no-obligation test trial of the system for up to 30 days.

Rev fully expects to double his company's market share this year. Since the company is starting from a test base, it now has a small share of a very large market.

The most recent survey of software and services companies done by Input, an independent research firm, for the Association of Data Processing Service Organizations (ADAPSO) put annual revenues at \$14.9 billion. (This figure included for the first time revenues of hardware manufacturers from software or services.)

Input said industry growth rate was at 21% in 1980, and predicted it would grow at a good pace for the next five years to total some \$35 billion by 1985.

Rev says he expects his company's customer base to grow by at least 30% over the next three years. And he said its dp facilities can accommodate this.

Rev stresses that his is not a pioneering company in a technical sense. "Marketing is the name of the game now [in timesharing]." But he looks to the spread of timesharing even to private homes.

Frank Lautenberg, chairman of the board of Automatic Data Processing Inc., once told an ADAPSO meeting: "Beyond businesses there are 77 million households in the U.S. alone. If only 10% of these households employed some form of computing service, we could open a market of nearly 8 million new clients, assuming only one user per household."

Rev likes this thought. It brings him back to the subject of software and ease of use. He compares current times and the shortage of programmers to the '40s, when it was said that keeping up with the increasing need for telephone operators would

mean every man, woman, and child would have to become a telephone operator. "That's happened." He believes the time will come when "every man, woman, and child will become a programmer."

For Budget Time-Share, this would undoubtedly mean new marketing strategies. And maybe even family rates.

—Edith Myers

## PERFORMANCE MONITORS

# ALL IT TOOK WAS A DRUM

**The addition of one solid state drum increased an Amdahl cpu's utilization by 35%.**

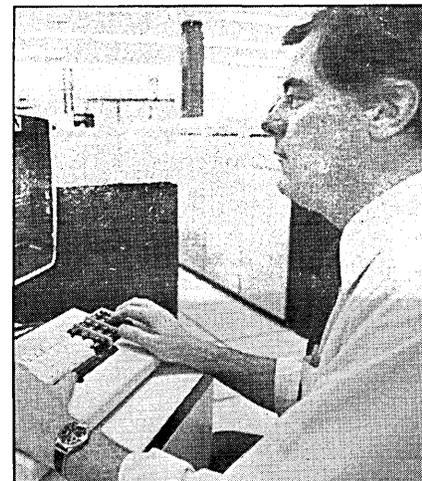
When Bob Nelson became manager of systems programming at System Development Corp., Santa Monica, Calif., he determined that the systems group's cpu was only getting 60% utilization. He didn't know why.

He knows now and has, with the simple addition of one solid state drum—a Storage Technology Corp. 4305—increased utilization by 35%.

The cpu in question is an Amdahl V7 operating under MVS with 80 billion bytes of peripheral storage.

Nelson diagnosed the problem with performance monitoring. After studying the system for about a month, he installed an Omegamon software performance monitor from Candle Corp., Los Angeles.

"I was able to see the intricacies of how tasks and resources were interacting in the machine while it was actually running," said Nelson. "I could see how various phe-



BOB NELSON installed an Omegamon software performance monitor from Candle Corp. to diagnose the problem.

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**CIRCLE 90 ON READER CARD**

## NEWS IN PERSPECTIVE

nomena would start to ripple through the machine, and what I needed to do to rectify bottlenecks."

By watching the interactions between various types of work, he said, he could see that TSO users (timesharing users, primarily program development people) were adversely impacting both batch and on-line production and that there were problems with paging.

The big problem was in usage of memory. "TSO users were just thrashing in and out. Too much time was spent moving stuff in and out of memory which left too little time for processing what was going in and out. And local paging was causing severe queue problems. The machine was waiting on the paging subsystem and it couldn't do any work."

Nelson elected to add the 4305 to the system and, with it, 22 megabytes of fast auxiliary storage "because solid state drums are head and shoulders above disk in performance. It [the drum] greatly reduced in and out time. We achieved a net gain in system throughput at a very low incremental cost. Now our prime shift utilization is running consistently in the high 90s."

Is he continuing to monitor? Yes, said Nelson. "There are continuing problems. No installation is going to remain static for very long."

—Edith Myers

## POLICYMAKING

# SOFTWARE ISSUES AIRED

**The Commission on Software Issues in the '80s has released the first set of reports on "problems of the software revolution."**

Report by report, the Commission on Software Issues in the '80s is laying a foundation for exploring what it describes as "issues for the new era in computers and information."

The group, established last December to "present critical and objective reports airing the social, economic, technical, and legal issues arising from the development, distribution, and use of computer software during the coming decade," presented three reports and received public input and criticism on them during its first symposium last month in Washington.

The reports by task forces on soft-

ware standards, taxation, and education and training of software professionals (the fourth task force, on software protection, failed to meet the deadline) are designed to provide reference points for industry, legislative, consumer, and other representatives concerned with what the commission calls "problems of the software revolution."

"The easy availability of computer hardware to virtually everyone who has a business problem or personal interest in computing is creating a growing demand for sophisticated, high-quality software which will be used by an increasingly unsophisticated user base," James Porter, vice president of business operations at Informatics, told the attendees. "This user base, for the most part, will no longer even consider the possibility of 'making' this software, thus putting to final rest the tendency for data processors of the past to worry with 'make or buy' economics.

"With today's contingent of over 500,000 programmers attacking a backlog of an estimated 10 million programs, it is discouraging to think that our universities are putting out only 8,000 to 9,000 computer science graduates per year. The effort of the software commission should be placed on encouraging our universities to train design engineers to accurately specify a detailed blueprint for a programmer to follow in constructing a software product. Sadly,

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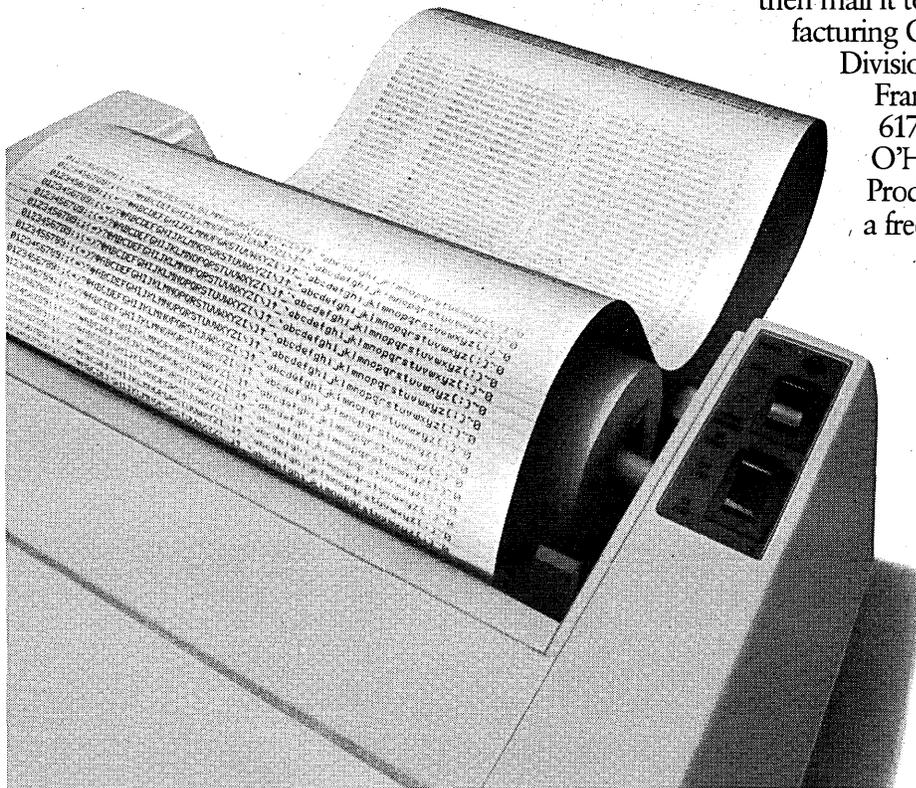
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## NEWS IN PERSPECTIVE

our universities are not only falling behind in production of graduates in a critical area but are still too oriented to teaching numerical analysis and compiler design instead of how to provide quality design engineering for solving a business application problem.

"This is a crucial shortcoming in a critical time of change and opportunity to control the future directions and success of the software industry," Porter concluded.

The taxation task force undertook a lengthy, legalistic examination of the confusing and often contradictory federal and state tax treatments of software and programs. The members analyzed investment tax credit, depreciation, sales and use taxes, major regulatory trends, and judicial trends.

"The taxpayer faces problems in the inconsistent federal and state tax treatment," the report stated. "The computer software purchaser will find himself or herself in the anomalous position of being required to pay a state sales tax because the software is tangible yet unable to take federal investment tax credit because it is intangible. Clearly, this conundrum bothers state and federal tax authorities hardly at all because it means money in the treasury.

"Obviously uniform sales tax treatment of computer software would be preferable to the patchwork of state laws and regulations which now exist. Such treatment should take into account both the business and technical realities of computer software as well as state needs for revenue. The time to begin the process is now."

Although the software protection task force blew its deadline, Ralph Wertheimer, general manager of the general distribution division of Data General, shared a few thoughts with the attendees.

"Software is a large and increasingly important asset and money generator for the corporation," he said. "The corporation wants to protect this software. The way to provide maximum protection is to keep the software absolutely secret."

Those devices are patents, copyrights, trade secrets, and trademarks. In addition, almost all vendors use program license agreements—specific terms and conditions regarding use of the software.

The task force on standards concluded that users were out, manufacturers and suppliers in. "The role and importance of software in our future depend on the quality and quantity of participation by users in the software standards-making process. For example, users want to avoid enormous conversion costs often required by a revised and improved standard. But it seems unreasonable to adhere forever to an outdated standard to avoid conversion costs." He encouraged users to get involved in the standards-making process at the initial stages of any proposal, rather than wait to contest what's already been decided in a time-consuming and costly process.

—Willie Schatz

## BENCHMARKS

**ILLIAC:** The plug has been pulled on the Illiac IV parallel processor at NASA's Ames Research Center, Moffett Field, Calif. The aged mainframe consisted of 64 processing elements and a single control unit to perform the instruction decoding and program control. It was said to have had an effective processing speed of more than 150 million operations per second, but more typically ran at about a third of that. Conceived in the early 1960s at the University of Illinois, the unique computer was nurtured by the Advanced Research Projects Agency of the DOD. It contracted Burroughs Corp. in '67 to design, develop, and manufacture the machine, and in 1970 reached an agreement with NASA to install the new computer at Ames. Delivery in '72 was followed by the completion of acceptance tests in early '73 at the California facility, after an expenditure of more than \$30 million. It is being replaced by a Cray-1.

**TRADE CENTER:** In case you thought four days at the NCC was too much to handle, check this out. A year-round computer show is to take place at a computer industry trade facility being built in Dallas. Designed to bring OEMs and systems houses together with manufacturers on a continuous basis, the 535,000 sq. ft. building will offer sellers permanent, leased showrooms. Five floors of product displays and a ground-level exhibition floor are to be ready by 1983, according to builders Leggat McCall & Werner, a Boston real estate firm. The project is costing \$60 million and has been designed after similar trade facilities in Europe, according to a spokesman.

**CONSOLIDATION:** Microdata Corp., Newport Beach, Calif., minimaker, has consolidated its domestic and international operations and has promoted Gary E. Liebl, formerly president of Microdata International, to president of the combined operation. Donald W. Fuller remains chairman and chief executive officer. Al Cosentino, former president of Microdata Domestic, is now senior vice president, U. S. Operations, responsible for manufacturing and engineering. Carl Jeramais, formerly group vice president, sales and marketing, is now vice president, U.S. Sales. Gerry Fleming is new vice president, marketing for the overall operation. Jeramais and Fleming will be reporting to a new senior vice president who had not yet been named in early October.

**THIRD LIFE:** "We want the world to know we're alive and well and still very much in the disk drive business," said Richard Brechtlein, director, product marketing for Century Data Systems. Brechtlein joined Century Data in its first life as an independent company and left it during its

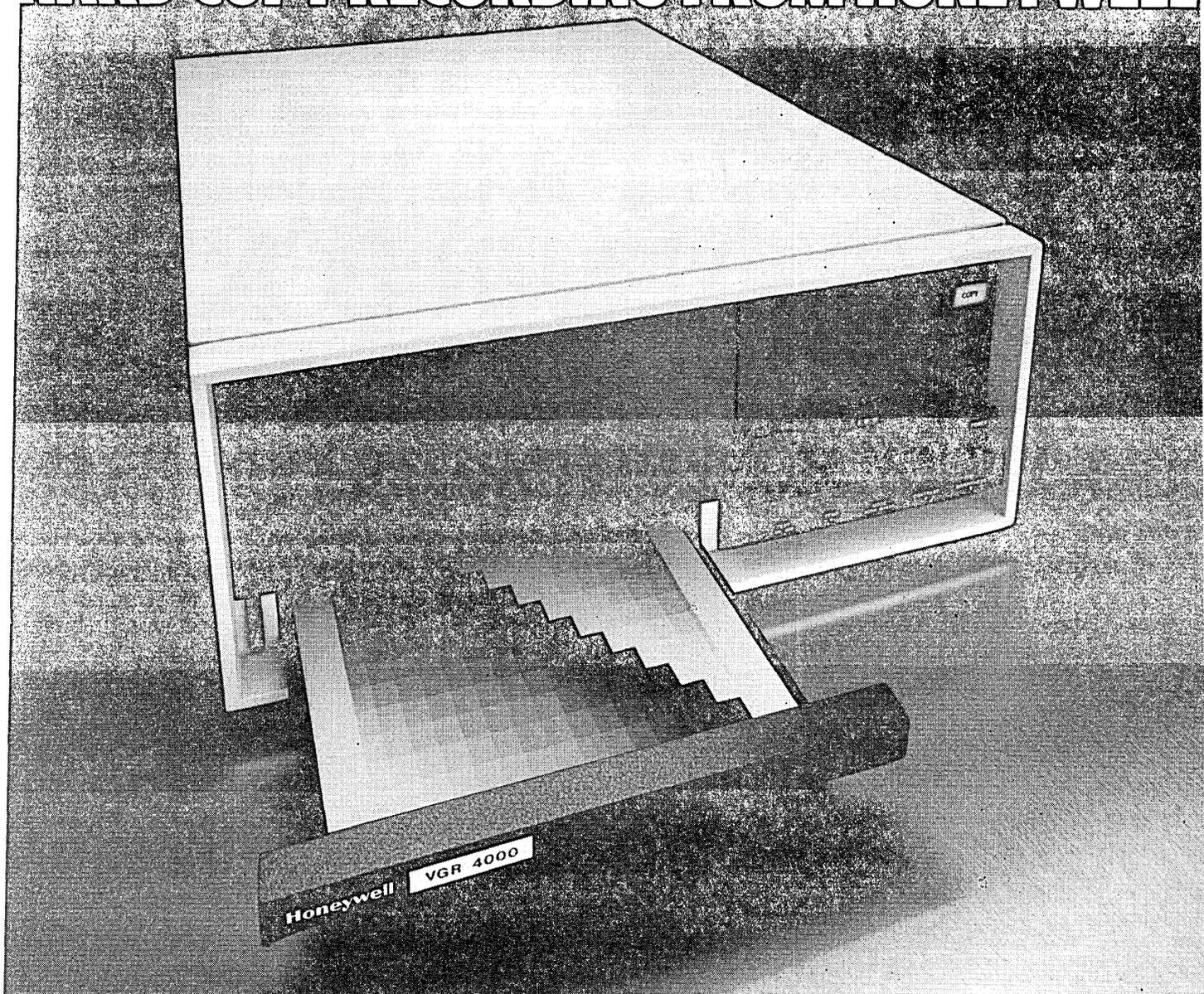
second as a part of California Computer Products. He has returned to Century in its third life as a Xerox company after a stint selling tape backup products for Archive where, in selling disk backup, "everyone I talked to about Century didn't think they were still in business. They thought we'd been absorbed into Xerox. Xerox accounts for less than 10% of our business. We still sell 90% OEM." Century will be trying to prove it's alive and well Nov. 18-20 at Comdex in Las Vegas, where it will introduce an advanced series of Marksman Winchester disk drives and a disk/tape formatter allowing direct, plug-compatible backup via an auxiliary peripheral port which supports the Archive Sidewinder, Cipher Quarterback, and DEI Streamer ¼ in. streaming tape models.

**NETWORKING:** The idea of local networking has been a hot topic since last year when Xerox formally introduced its Ethernet concept along with support from Intel and Digital Equipment. Many other firms, some startups, are in the same arena, and further joint efforts are expected to emerge as demand and technology develop. The latest tie-in is an investment by cable television equipment leader General Instrument in Sytek, Inc., a privately held Sunnyvale, Calif., datacom company. GI has the VLSI and broadband equipment manufacturing experience, and Sytek has data networking expertise that will combine to help each get a piece of the local networking market, which GI expects will grow about 35% to 40% a year for the next five years. Over time, GI will increase its ownership in Sytek to 51%, providing capital needed for expected growth. Unlike Ethernet, which uses baseband broadcasting techniques, Sytek's networks use a broadband scheme that provides 120 channels of 128K byte capacity for a total of 14 megabytes per second throughput.

**FRENCH CONNECTION:** Roy Bright, managing director of Intelmatique, the promotional arm for the French telecommunications administration, urged independent telephone companies to get into home information services. He suggested that the French Télétel videotex and electronic directory offer the best trade-offs in terms of cost.

His recommendations were made at Intel Expo '81 in Los Angeles, a conference and exhibition sponsored by the U.S. Independent Telephone Assn. Bright said his group is already working with Continental Telephone Corp. on a home transaction system it will test beginning next spring. Bright would also like to see advertising agencies brought into electronic directory offerings. He talks of a "quaternary" of such offerings—the information providers, the communications utilities, the users, and the advertising agencies. \*

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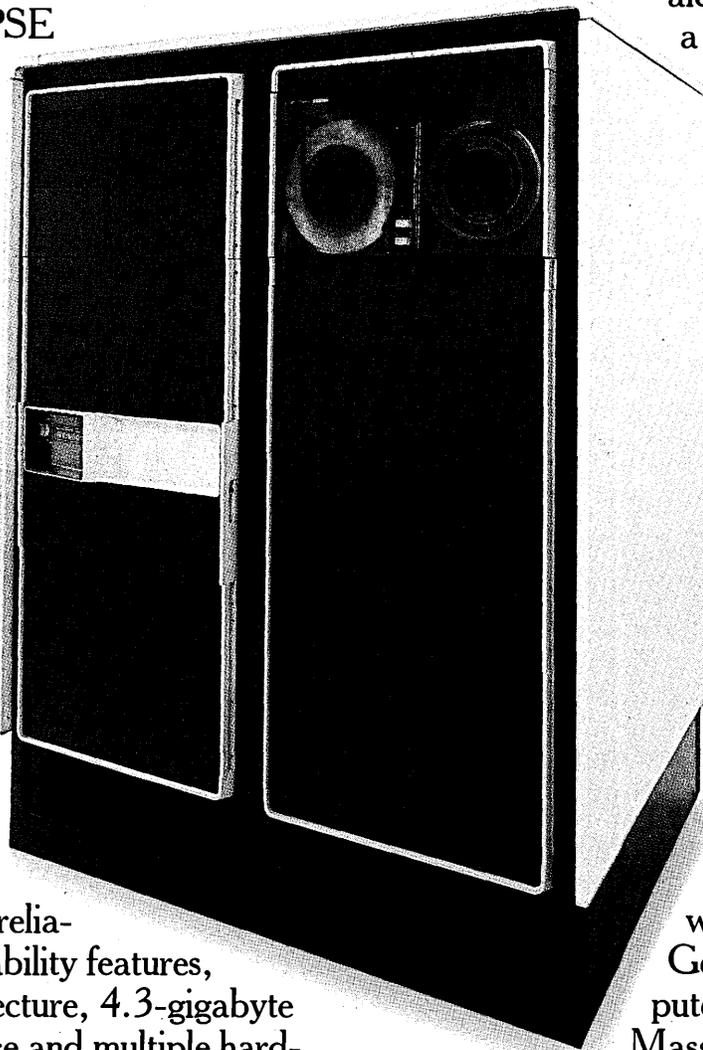
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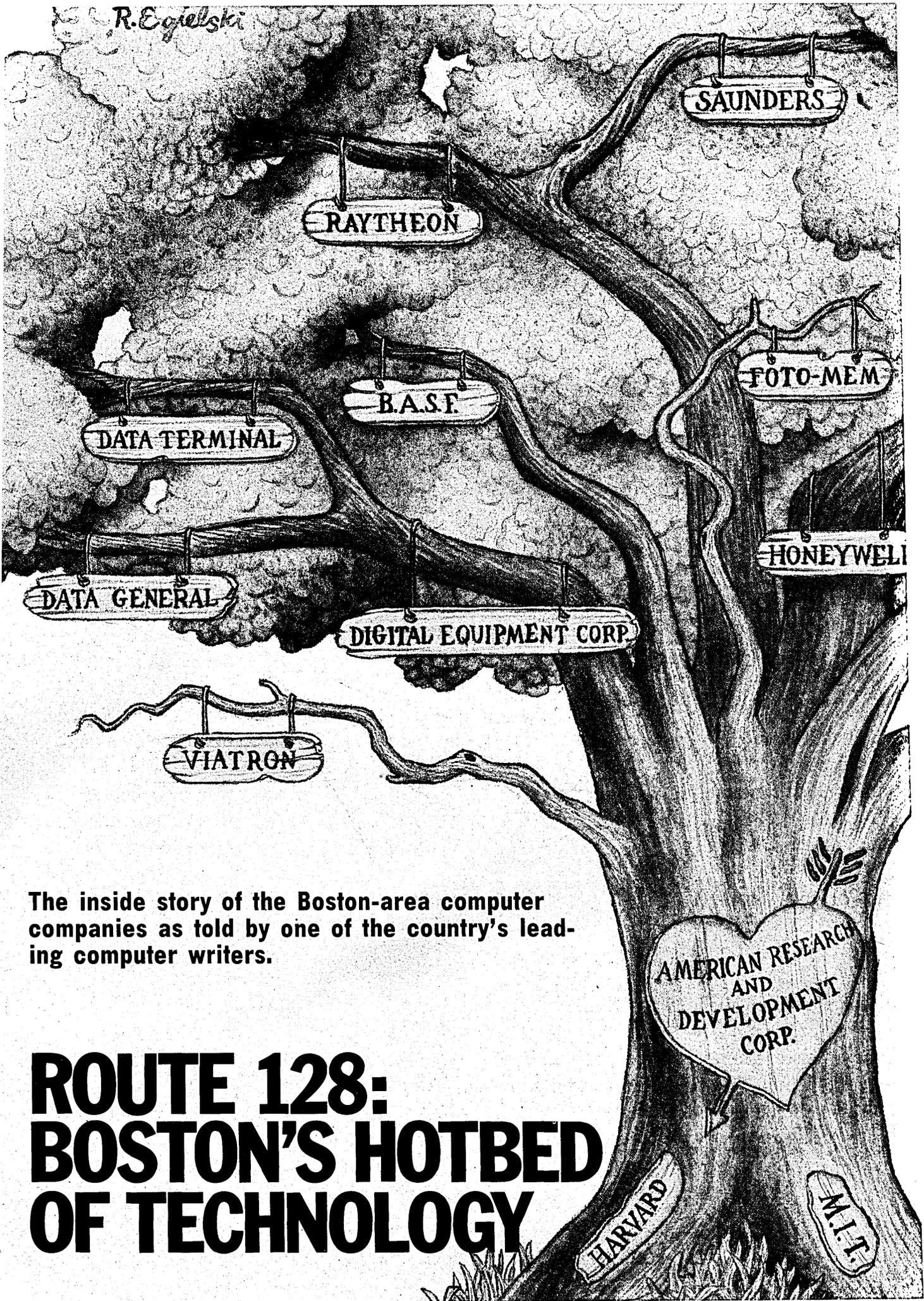
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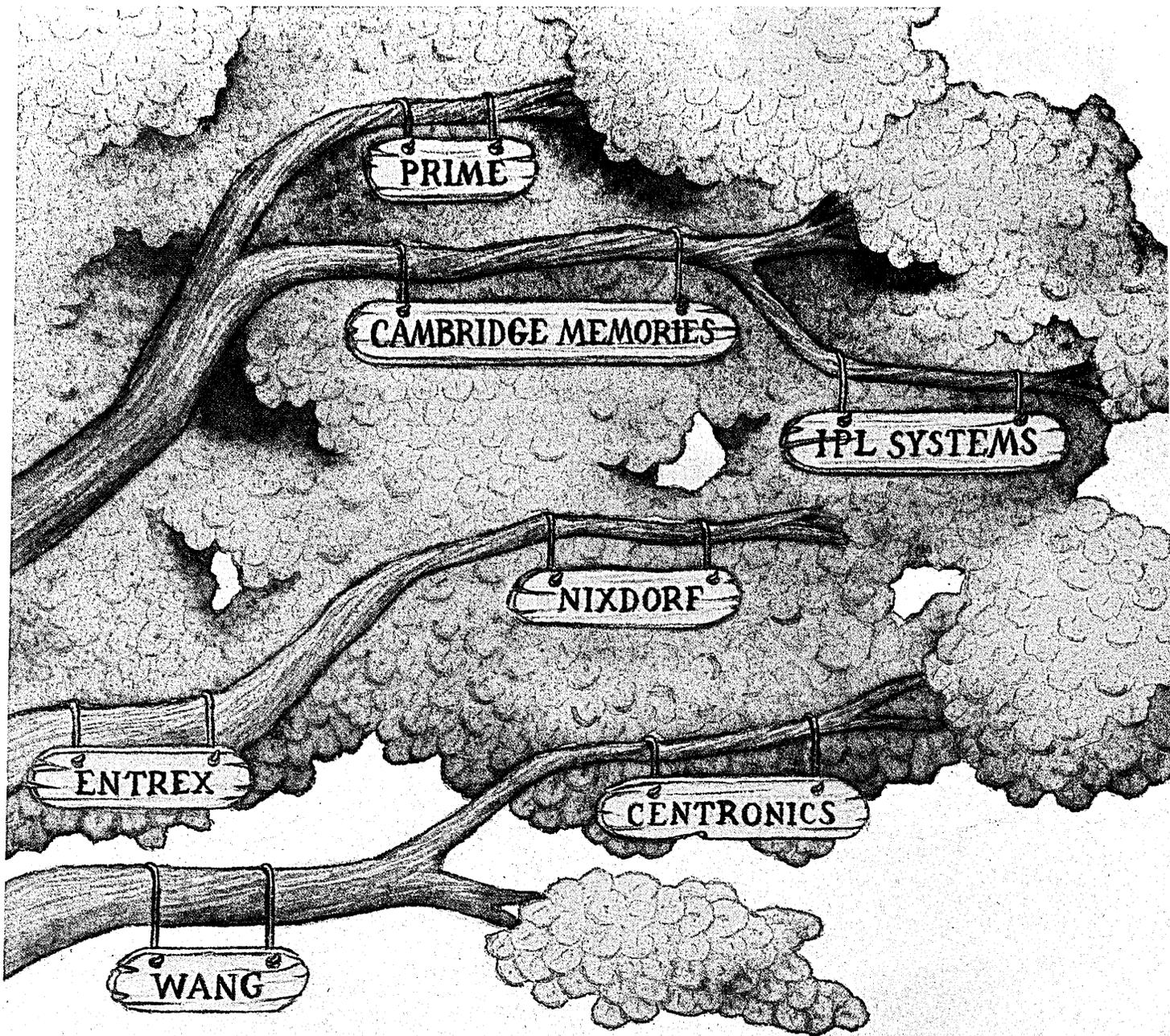
CIRCLE 93 ON READER CARD

R. Egielski



The inside story of the Boston-area computer companies as told by one of the country's leading computer writers.

# ROUTE 128: BOSTON'S HOTBED OF TECHNOLOGY



## by W. David Gardner

Route 128 served as a safety-valve release for metropolitan Boston when it was built in the early 1950s. The highway was at first widely opposed by many Boston Yankees, whose New England mentality has traditionally been suspicious of change. It was even nicknamed "The Autobahn," after Hitler's Autobahns (automobile expressways), many of which went nowhere except to Czechoslovakia.

For a while, 128 went nowhere too. But gradually electronics and computer companies took root along the highway, and employees who had been bottled up in the surrounding cities settled along the suburban road. These new companies—armed with significant venture capital, staffed by innovative technical people, and headed by aggressive entrepreneurs—planted the seeds of a dynamic new industry, one which has been spinning off new enterprises ever since.

The Boston computer industry had its beginnings where many things of importance get their start in Boston—at Harvard. In this particular instance, in 1952, seven bright young Harvard Business School students prepared a report on what they called "The Giant Brain."

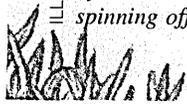
The students predicted that the new "Giant Brain"—then just beginning to be known by its other name, *computer*—would one day handle business and office routines. Moreover, they predicted that it would eventually carry a price tag of between \$50,000 and \$100,000—an amount thought at the time to be absurdly low.

The report, which was made public, was promptly forgotten by the companies that then counted in the fledgling computer industry—IBM, which was dedicated to building tabulating machines, and Remington Rand, which had just built the world's first commercial computer for more than \$1 million.

There was, however, one man who had learned a great deal from the Harvard students' report. He was their teacher, Professor Georges Doriot. "The General"—as he liked to be called—had been teaching at the business school for many years and on the side running a venture capital investment company called American Research and Development Corp.

A few years passed, and one day a pair of engineers from the Massachusetts Institute of Technology (MIT) approached Doriot with the idea for a company. The venture capitalist liked what he saw and for \$70,000 Doriot's AR&D picked up 78% ownership in the startup company, called Digital Equipment Corp. (DEC). The rest, as they say, is history.

"We did everything ourselves," recalls DEC's founder and president, Kenneth H. Olsen. "We cleaned the johns and swept the floors. We did the photography in my basement; we made our printed circuit boards



with real silk on wooden frames and etched them in aquarium tanks. Since I was the closest thing we had to a toolmaker, I made the tools. Every now and then, while hardening some tools, I'd leave them to answer the phone, only to come back and find the tools burned. We learned a lot about all aspects of business."

They learned their business very well indeed. Over the years, DEC boomed ahead in the dp industry, and will log well over \$3 billion in sales this year—enough to capture the number one spot in the minicomputer market and to place the firm solidly in the number two position behind IBM in the industry as a whole. For many years now, DEC has been based in an old mill in Maynard, Mass. Today the firm employs more than 60,000 persons worldwide.

Olsen is still president and still has his Yankee hair shirt ways, driving Pintos and Datsuns (although since he joined the board of directors of the Ford Motor Co. he seems to have settled permanently on a Ford). A shy and modest man with a slightly rumped engineer's look, he seems genuinely embarrassed about his net worth, which was recently reported to be more than \$100 million, representing his 6% ownership of DEC. His employees call him "Ken," but the Clark Kent exterior doesn't really fool anyone. Olsen is a fierce competitor, carries a staggering work load, and has flown his own plane for years.

Like many of the computer companies that grew up around Routes 128 and 495, Boston's circumferential highways, DEC had close ties to academia from its start and has kept them. Besides General Doriot, who is still on DEC's board, many members of DEC's present top management team once worked at MIT—usually with Olsen.

One early DEC director was MIT Professor Jay Forrester, Olsen's boss at MIT, who has gone on to gain new fame as a futurist. Forrester had been the leader of MIT's Project Whirlwind, a computer project initiated in 1944 to build an aircraft simulator. Somewhere along the way, however, the aircraft simulator got lost, and nine years later the high-speed digital computer Whirlwind emerged. But perhaps the most significant contribution of the project was the training of the first generation of computer scientists and technicians in the Boston area, Olsen being a premier example.

The work of Forrester and Olsen has another interesting twist. At MIT in the 1950s, the two men worked with IBM on a computer for the Air Force, and later IBM paid handsomely for their computer memory patents. Forrester, in fact, collected more than \$1 million for the work. Of course, at the time, IBM had no inkling that it was subsidizing the directors of a company that would one day become its biggest competitor.

## NOT ALL SUCCESS STORIES

Everyone remembers the colossal success stories—like DEC and Wang Labs—but the 128 area produced some colossal busts, too. Certainly the most interesting of these was Viatron Computer Systems Corp., whose brief corporate life a decade ago reads like a scenario for a Marx Brothers movie rather than a corporate case study to be examined by graduate business school students.

Viatron had all the proper ingredients for success, or so it seemed. There was initial private financial backing from members of a prestigious Wall Street firm. There was the obligatory Harvard Business School professor in the person of Professor Pearson Hunt, one of the nation's leading authorities on corporate finance. There was an exciting business plan. But, most important of all, there was Viatron's president, Dr. Edward Bennett, a charismatic psychologist whose restless genius captured the minds—and many dollars—of the computing world for a year or two.

"By 1972, we plan to have delivered more digital machines than have previously been installed by all computer makers," said Dr. Bennett in 1969, not long after he left the federal government's think tank, Mitre Corp., to found Viatron. The country's leading semiconductor manufacturers took Viatron seriously as did IBM, which watched the company closely.

Viatron quickly built its work force to 1,200 employees, went ahead with its plan to make an exciting computer system that it offered to customers for the unbelievably low price of \$39 a month, and raised \$40 million from the public. The company's stock soared to \$60 a share. But, Viatron had a rapacious appetite for capital, as might be expected of a firm that was planning to ship more computers than any other firm in the world.

"The question," said Dr. Bennett, "was always whether you could get financing. And, as soon as you did get financing, then the question was whether you could get it again."

Viatron couldn't get financing again. In the early 1970s the Wall Street well went dry, not only for Viatron, but for many other firms.

Viatron had other problems. The company changed its business plan at a dizzying pace. It had three marketing heads in three months. There were production problems and delivery of equipment was de-

layed. Some of the equipment didn't work. Equipment prices were increased. And, the unkindest cut of all, the company's stock plunged.

It all ended, more or less, with the famous "living room putsch." At a Viatron board of directors meeting in Dr. Bennett's house, he was fired in his own living room. His wife had prepared a hearty dinner for the directors, but under the circumstances it was never served. It didn't make much difference anyway—nothing could save Viatron, and the company went into bankruptcy and subsequently down the drain.

Today, Dr. Bennett looks like a prophet of almost biblical proportions. Viatron pushed the semiconductor companies to use more efficient modern computer memories. The Viatron approach of small computers scattered about has caught on in recent years and has become the computing rage now called distributed data processing. Dr. Bennett worried about Japan's move into computing ("I saw Viatron as the principal force that the Japanese would have to move against") at a time when the rest of the computer industry viewed the Japanese as capable of producing little more than plastic toys. Today, the Japanese move into computing in America is very real indeed. Ironically, Nippon Electric Company's NEC Information Systems' U.S. headquarters is located in suburban Lexington, where Dr. Bennett maintains a small office.

In the last analysis, it was Dr. Bennett who wrote Viatron's epitaph: "You can start small and you can stay small and you can die small; or you can start big and you can grow bigger and you can die a little bigger than you would have otherwise."

Viatron died big.

But Viatron was outdone by another Boston company called Foto-Mem, which liked to bill itself as "one of the nation's most progressive computer oriented firms" and which had generated so much investor excitement that there was nearly a riot at the Boston bank handling the company's first public stock offering. Foto-Mem was the flagship company of a Boston venture capitalist named David A. Freedman, who drummed up financing for some 80 companies.

As presented by its president, Albert Eng, Foto-Mem was an exciting company with a seemingly endless string of products. The company received a great amount of

## DR. WANG ENTERS SCENE

Another Boston scientist IBM paid lavishly for his computer memory patents was a Harvard PhD named An Wang. Dr. Wang had come from a humble background in Mainland China—he once told an interviewer that his family's wealth totaled around \$100. At the conclusion of World War II, he left China forever, armed with an undergraduate degree and a scholarship to Harvard. When he finished his graduate studies, he got a job at the school's famed

Harvard Computation Laboratory. There his work in computer memories garnered more than \$400,000 in preinflation dollars from IBM.

With this grubstake, Wang decided to establish his own company in Boston in 1951. "I didn't need outside help," Dr. Wang once said of his company's early days. "I started by hiring a part-time college student. I doubled my sales every year, but because I started so small, it took me several years to get big." The firm grew so slowly, in fact, that 12 years

publicity for a system called RISAR it was developing for the *New York Times*' automated information bank. Foto-Mem maintained that it had achieved a technological breakthrough which "opened an \$8 billion market potential" for its products. Exactly what those products were was never learned because few of them made it to the marketplace. One that did was the system for the *New York Times*. One day it blew up at the newspaper, and it was thrown out for good. However, Foto-Mem stock worked very well—it went up and up and up.

Then the stock started coming down, and when it hit earth it wasn't just widows and orphans who lost their shirts, but missionaries, too. It seemed that a Catholic priest-stockbroker named Rene Sauve had approached various Catholic institutions around the country and in Canada and convinced them to acquire equity in Foto-Mem and in various other Boston startup computer companies that also proved to be financially shaky.

In due time, Foto-Mem went into bankruptcy proceedings. By then, three Catholic religious orders and the Diocese of Reno, Nev., were on the brink of insolvency, too. They were saved from going over the financial edge only by the intervention of other Catholic institutions. The Vatican even made a contribution.

Like most other Boston computer companies that went aground on financial rocks, Foto-Mem's affairs were taken over by the bankruptcy bar—attorneys who specialize in bankruptcy work—and the company and its employees gradually faded away. To the bitter end it was difficult for outsiders to determine precisely what it was that Foto-Mem had set out to build.

Foto-Mem and Viatron are just two examples of the scores of startup companies that went broke in the Boston area. But the very big established electronics and computer companies haven't fared particularly well in Boston either. RCA's computer operation had just moved its headquarters from New Jersey to Marlboro, Mass., when it died a violent death, guillotined by RCA's New York corporate directors, who didn't understand the computer business. RCA's write-off was nearly \$500 million—a figure that qualifies RCA for a place in the *Guinness Book of World Records* for producing America's biggest business disaster.

But RCA's computer operation

wasn't exactly a Boston company, so new was its move to its headquarters building in suburban Marlboro. Digital Equipment took over RCA's headquarters building, its long-haired and casually dressed engineers and programmers looking strangely out of place in the futuristic and modern building that had been built for the button-down RCA employees.

The Boston area also could boast that it spawned the only Military Academy spin-off. Inforex Inc., a data entry firm that specialized in replacing IBM keypunches, was founded in 1969 by a group whose members were graduates of the Military Academy at West Point and the Naval Academy at Annapolis. Jokes were rife about directors' meetings resembling military formations, since the directors packed the board and executive staff with their military cronies. Inforex was one of the hottest companies in the computer industry for a few years, making its own minicomputer and tape and disk drives at a period in the early 1970s when those technologies were just emerging and it was still extremely difficult to make such gear.

The two top operating officers at Inforex, president Thomas Horgan and marketing vice president Bruce Elmblad, were West Point graduates, as was Gerald Lodge, a venture capitalist on the directors' board. The other venture capitalist on the board, David Dunn, was an ex-marine who was graduated from the Naval Academy. Later, when Inforex began having problems in the mid-1970s, it turned to Timothy Cronin to take over the reins. Cronin was, of course, a West Point graduate. Cronin named still more former West Pointers to the board.

In the end, having all that military brass did no good. The company struggled, and in February of 1979 things even looked good. Cronin announced: "We're moving into 1979 stronger than ever before. Inforex is in the best position in its 10-year history to achieve its goals."

As it turned out, it was the calm before the storm. Later that year Inforex filed for court protection under the Federal Bankruptcy Act. The pieces were picked up by Datapoint Corp., a Texas company that was interested in Inforex's fine European marketing organization. In a bad joke that made the rounds at the time, it was noted that the company's creditors had played taps for Inforex.

that happened in the mid-1970s, Dr. Wang, nimble as always, moved into the word processing market, his company by then large enough to sustain major product development. Today Wang Labs is the number two firm in word processing, second only to IBM, which once again finds that long ago it subsidized an individual who ended up becoming a major competitor. Wang Labs' sales are moving along at a rate approaching \$1 billion a year, and Dr. Wang's bootstrap approach has paid off in one regard: he and his family own about 50% of the company's equity, a share worth several hundred million dollars.

The corporate electronics giant of Boston, Raytheon, made several fits and starts in computers over the years, and its tentative commitment to the business ended up in the training of a great many topflight entrepreneurs, who then went out on their own and founded their own firms.

For instance, one of Raytheon's best postwar scientists, Royden Sanders, left Raytheon with many of the firm's most talented engineers to form his spectacularly successful Sanders Associates. Many years later when Sanders was summarily fired by his board of directors, Sanders started up his own computer printer company, R.C. Sanders Technology Inc. The latest Sanders company has been in and out of bankruptcy and Roy Sanders has been in and out as chairman of the firm. He now serves as its "chief technologist," and the company believes it is on track again.

But Raytheon's most important effort in computers was its founding in 1955 of a concern called Datamatic Corp. Founded with Honeywell, Datamatic was taken over in its entirety by Honeywell two years later, and for many years Honeywell remained the major computer force in the Boston area. At one point, Honeywell announced plans to build a huge corporate computer headquarters there, but nothing ever came of it, and in recent years Honeywell has quietly moved the most important management pieces of its computer operation to Minneapolis.

Some particularly intriguing occurrences centered around Honeywell's mini-computer operation in the Boston area, its Computer Control Division. The mini operation—a small fraction of Honeywell's entire computer business—was once larger than Digital Equipment Corp. But Honeywell management was preoccupied with the acquisition of General Electric's computer operation in the early 1970s and—like RCA and Raytheon managements before it—couldn't devote the necessary top management time to the mini operation. One result was that DEC blew right by Honeywell's mini operation in sales and kept right on going until DEC today is considerably larger than all of Honeywell's computer operations combined.

later, Wang Laboratories (by then located in Lowell, Mass., north of Boston) had just 30 employees.

Dr. Wang has a precise and careful mind—indicative of his Harvard degree in applied physics and engineering—but if he had a grand design for his company, it would look like a crazy quilt. For Wang Labs has had one of the strangest product backgrounds in the history of the computer industry. The company initially specialized in memory devices, then moved into digital instrumenta-

tion, and by 1959 had jumped into computerized numerical control. (Wang got a healthy financial infusion about this time from Warner & Swasey Co., which was using Wang products.) After that, Wang began manufacturing typesetting computers, and finally, in 1965, the firm's first big-winning product, sophisticated electronic desktop calculators. But this product line was virtually wiped out a few years later when semiconductor companies unveiled their own less expensive handheld electronic calculators. After

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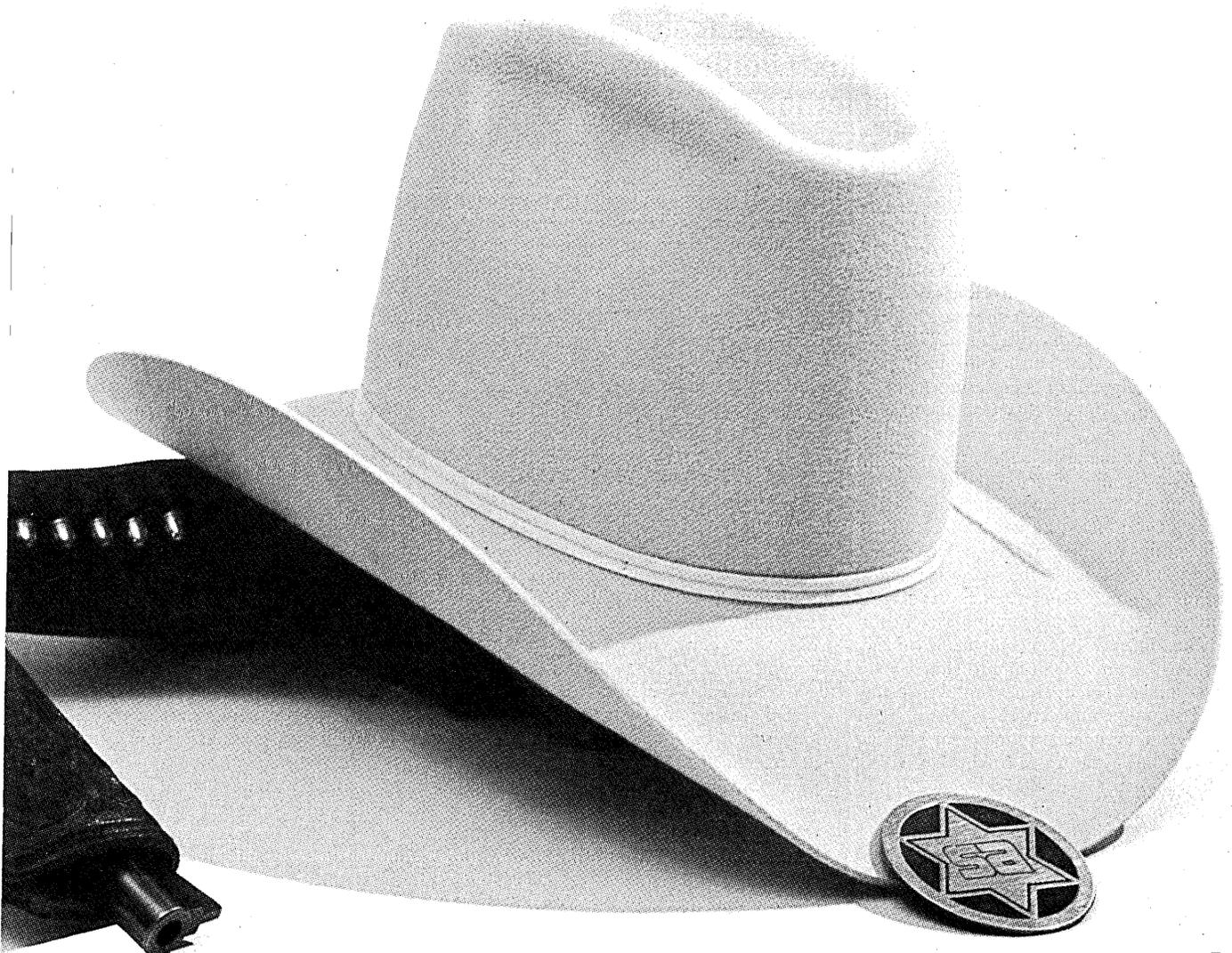
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# IBM had no inkling that it was subsidizing the directors of a company that would one day become its biggest competitor.

## PRIME OF PRIME COMPUTER

Another result of Honeywell's minicomputer policies is a company called Prime Computer Inc. Briefly in the early 1970s Honeywell lost interest in its minicomputer operation and the business began to fritter away. This development was particularly distressing to Robert Baron, then director of engineering and programming for Honeywell's Computer Control Division.

Even more distressed was Dr. J. William Poduska, then director of Honeywell's Information Science Center in Cambridge. When Poduska, an MIT graduate in electrical engineering, was chief of NASA's Man-Computer Systems Branch at the NASA Electronics Research Center in Cambridge, he developed an ingenious software operating system for use with Honeywell minicomputers. He had taken this expertise with him to Honeywell, but, as already noted, Honeywell was losing interest in minicomputers.

Gaining interest in minicomputers at the time, however, was a bright San Diego venture capitalist named David Dunn. Moreover, Dunn was fortified with wads of Texas oil money. Dunn melded all those ingredients—Poduska's know-how, Baron's management, and Texas oil money—into Prime Computer, which promptly began manufacturing minicomputers. Not surprisingly, Prime made minis that were software-compatible with Honeywell minicomputers. Many of Honeywell's minicomputer customers, who were becoming uncomfortable with Honeywell's lack of zeal in the mini area, were delighted to find a new supplier that could supply hardware that would run their existing Honeywell software programs.

Baron took the company through the difficult startup period, but the directors, with Dunn at the helm, soon bid him goodbye. It was a happy parting, one must assume, since Baron walked away with a few million dollars. Prime then surged ahead when Bruce Elmlblad, a former West Point football player, and Ben Robelen, a sharp internal financial man, took over the reins. When the company was pointed solidly on its way to success, Dunn bid Elmlblad goodbye and brought in Kenneth G. Fisher from Honeywell—where else? Fisher propelled the firm into one of the fastest growing companies in the industry. Prime's stock, for instance, was the best performer on the New York Stock Exchange in 1980.

Prime's spectacular growth rate, however, slowed earlier this year. The company made some conflicting comments on its business future. Then, suddenly last summer Fisher resigned and severed all relations with the company, declining even to remain as a consultant. When he walked away from the company, his stock was worth \$17 million.

Once again, David Dunn had bid goodbye to a Prime chief executive and there wasn't much doubt about who was running the company.

There was even a Hollywood ending for Honeywell in this story. In the mid-1970s, Honeywell took a hard look at its minicomputer operation and decided to reemphasize the business.

## COMPUTER SPIN-OFF STORY

To a large extent, the story of the Boston area computer companies is a story of computer spin-offs. DEC and Wang Labs had their genesis at Harvard and MIT. In turn, the Data General Corp. and the Data Terminal Corp.—both highly successful New York Stock Exchange companies—are spin-offs from Digital Equipment Corp., and those Sons of DEC, likewise, have seen bright young entrepreneurs leave their companies to start their own firms. BBN Computer can trace its parentage directly to the Harvard-MIT scientific community, and BBN, which is more computer think tank than computer manufacturer, has sold off a successful data communications unit called GTE Telenet.

Work in computer printers at Wang Labs led indirectly to the success of Centronics Data Computer Corp., and today two of Centronics' neighbors in New Hampshire, Dataroyal and Integral Data Systems, have some of the best printers on the market. The Boston area, incidentally, has had its healthy share of successful computer printer companies, including Computer Devices in Burlington and Selecterm in neighboring Wakefield.

By far the most interesting of the printer companies is Centronics. Located in the sleepy New Hampshire town of Hudson, Centronics has had a flamboyant and at times mysterious side. The company was originally founded to provide computerized systems for gambling casinos, but ended up concentrating on manufacturing printers. One of the company's early financial backers was Caesars World Inc., a large operator of gambling casinos.

One of Centronics' top executives, Max Hugel, went on to work in President Reagan's campaign last year and was subsequently named chief spy master of the CIA. Hugel, however, resigned the sensitive post in a glare of publicity a few months ago after he was publicly charged with being involved in improper stock transactions concerning shares of Centronics and another company. Hugel heatedly denied the charges.

But even more painful to Centronics than the bad publicity was the news that shortly followed the Hugel affair: the company, which for a decade had been in the vanguard of computer printer development and which had regularly logged healthy profits, had fallen on bad financial times. It lost nearly \$25 million in fiscal 1981 and said it expected

another loss in fiscal 1982. Centronics, however, said the company had a bright future in spite of the intense new competition from Japanese imports.

Several computer firms have spun off from Honeywell in the Boston area and one of these, Cambridge Memories, now called Cambex, would win first prize if an award were given for tenacity. Cambex has been at the brink of disaster several times—it actually went into bankruptcy once when Boston banks withdrew their financial support—but it has always managed to stay in business. Moreover, Cambex, primarily a manufacturer of computer memories, is currently looking downright robust. The Waltham company is profitable and its sales are up sharply. It has even managed to spawn a healthy company of its own, IPL Systems, which makes computers that operate IBM software.

Honeywell's minicomputer operation, however, stayed in the Boston area and Honeywell's Level 6 minis have carved out a solid niche as a pacesetter in the business.

Many of the Boston area computer companies have simply been swallowed up by larger firms. One that suffered that fate was a firm called Entrex, which specialized in replacing IBM keypunches. Entrex president Barry Harder was a bright and witty former student at MIT's Sloan School who paid his way through graduate school largely on the proceeds of computer dating businesses he started in California.

Harder clearly had a great future in the computer industry, but it was all cut short when he died tragically in a boating accident. Meanwhile, Entrex had attracted the attention of a flamboyant German industrialist named Heinz Nixdorf, who was renowned for his negotiating skills. Nixdorf always seemed to be a step ahead of anyone he was negotiating with, the consummate master of one-upmanship.

The Entrex executives vowed Nixdorf would not get the upper hand with them, and they planned their negotiating strategy carefully. But their carefully laid plans were eliminated in one swoop one day when they were waiting in their offices for Nixdorf. He was late, in line perhaps with the unwritten rules of the negotiating game which call for keeping the other side off balance. Suddenly, a helicopter appeared overhead. It was a Massachusetts plane, arranged for by the governor. Out stepped Herr Nixdorf, dazzling the Entrex executives and once again one up in the fine art of negotiating.

Entrex was subsequently acquired and its early work continues under the name of Nixdorf Computer. The U.S. operation has annual revenues of more than \$150 million.

Another German computer firm with a headquarters in the Boston area is BASF Systems Corp., which got a toehold in the

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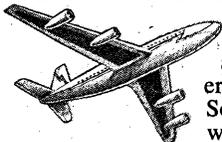
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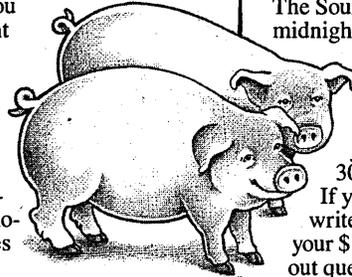
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## Many of the computer companies that grew up around Boston had close ties to academia.

market by acquiring a smaller company. A Swedish company, Electrolux, has acquired controlling interest in Dataroyal.

The European companies have tended to acquire U.S. computer companies outright or to purchase a substantial share in them in order to keep up with quick-moving American technology. Japanese companies, on the other hand, tend to go it alone with their own technology. The most prominent manifestation of this phenomenon in the Boston area is NEC Information Systems in Lexington.

### FOCUS ON DATA GENERAL

Of all the computer firms in the Boston area, the one that has consistently occupied the spotlight more than any other is the Data General Corp., a spin-off from DEC. Founded in the late 1960s in an old beauty parlor, the firm quickly jumped to the forefront of the technology with an advanced minicomputer called the Nova.

But DEC management did not look kindly upon the brash upstarts in Southboro, and from the start it became apparent that a

bitter vendetta existed between the two firms. At first, Data General went cherry-picking at DEC for talent, luring people away with lucrative stock options. The paranoia was so rampant at DEC that many employees—rightly or wrongly—believed that the company's central switchboard was rigged to trigger an alarm when a DG telephone was called.

The raiding continued and Data General boomed in the early 1970s, a spectacular success story. The upstart firm quickly began to overtake Honeywell's minicomputer operation, and there were those who predicted that the company would even catch Digital Equipment.

One day in the mid-1970s, Data General's second in command of marketing, originally a hire from DEC, left Data General to return to DEC. It was a signal that the raiding was over, and the two minicomputer firms settled into a coexistence of quiet belligerence toward each other.

Data General had a flare for capturing headlines. At first, its products tended to lead the marketplace, but eventually DEC regained

much of the initiative that Data General had taken from it. In an industry whose management tends to change erratically, Data General's ruling triumvirate—Edson de Casto, Herbert J. Richman, and Frederick R. Adler—has remained remarkably stable. De Castro is the shy engineer, Richman the extroverted salesman, and Adler the Wall Street venture capitalist with industry savvy.

The three have always savored their reputation for brains, and at the same time have traditionally enjoyed their reputation for toughness. The company's top executives used to publicly describe themselves as "tough bastards," and there was a whiff of boast to that description. But there are recent indications that they would like their company to be loved—or at least liked.

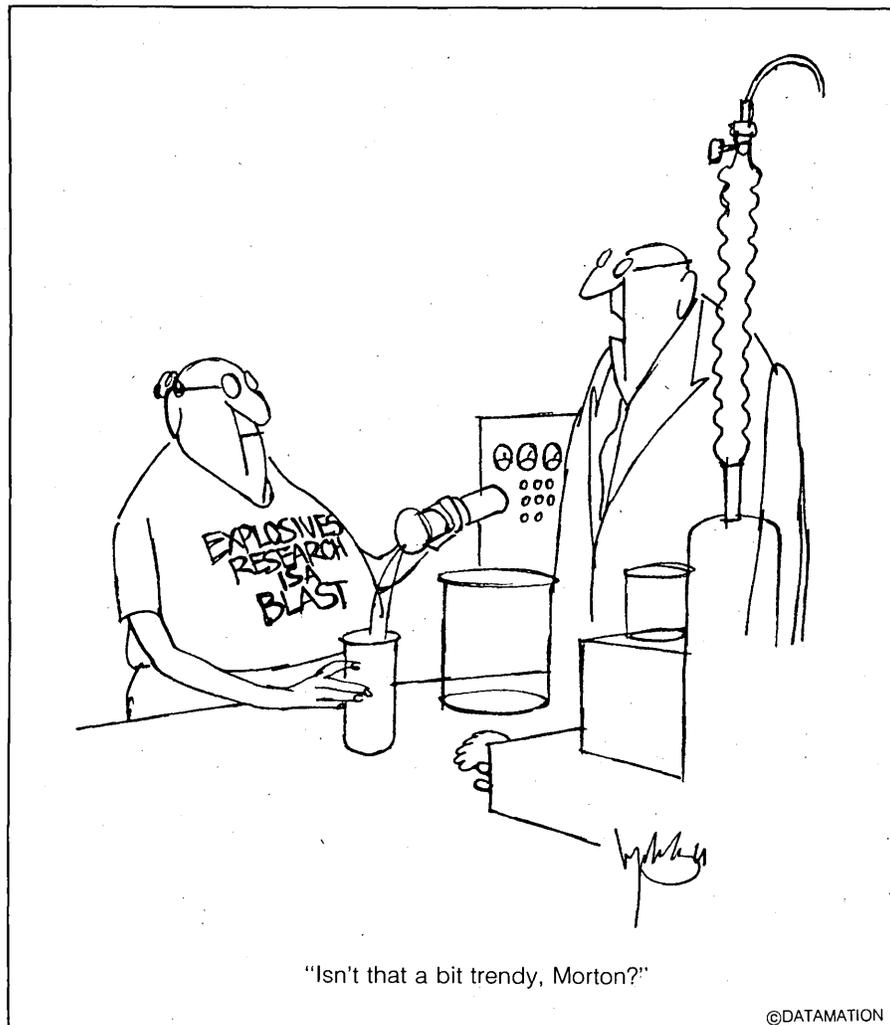
Many Data General competitors found themselves in litigation with the aggressive company, but recently the company has moved to better its customer relations. Customer service has improved, and salesmen are encouraged to cooperate more closely with customers.

Sometimes the tough image has backfired. A few years back, Data General took a vocal and hard line against Massachusetts' high tax rate and threatened to move key segments of the company out of the state. The state turned a deaf ear to the company—Massachusetts is often referred to as "Taxachusetts"—and Data General moved the firm's research and development center to North Carolina.

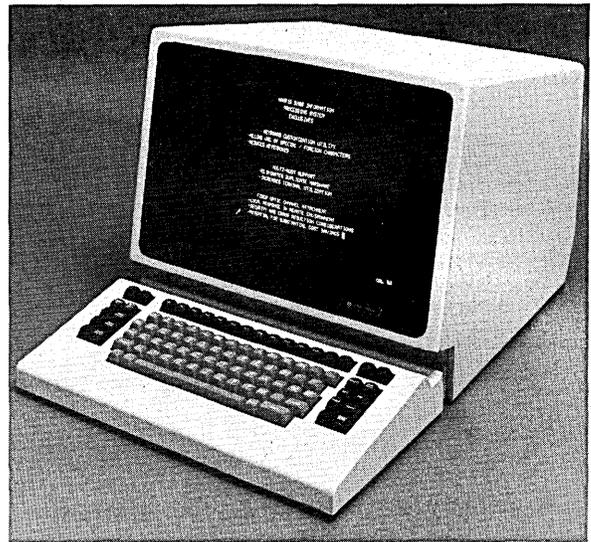
Not long after that, Data General found that its development effort for a 32-bit machine was lagging DEC's. Data General turned on its effort full blast. Alas, the design developed in its North Carolina facility was not up to the company's normally high standards, so it was set aside. The firm then turned to another team of engineers working on a 32-bit machine—in Massachusetts—and Data General today is marketing the machine designed by the Bay State team.

Data General is still famed for its ongoing rivalry with DEC. Before there was a Data General, DEC was a sleepy albeit fine company content to log a decent growth rate year in and year out. The sudden formation of Data General, particularly its composition of former DEC employees, fired up Digital Equipment's competitive sense.

In the end, everyone benefited: DEC and Data General grew like Topsy, their stockholders got rich, Massachusetts got jobs (and its taxes). The marketplace got better products because of the competition. And in this way it came to pass that Professor Doriot's students at the Harvard Business School got their "Giant Brain" for handling office and business routines, and they got it quicker because of the competition between the two minicomputer rivals.



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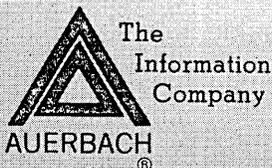
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# A total of 16,248 minis were delivered to 3,226 respondents during the year ended June 1981.

capacity on these machines, possibly a reflection of tight supply in the peripherals market. The leveling would seem to go against the trend toward bigger main memories, more software, and larger databases to run on small computers.

Nevertheless, the computer industry's low end is alive and well, giving users, suppliers, and investors much to be happy for.

Industry shipment growth for the next 12 months, according to Grumman/Cowen's survey of some 6,000 organizations, is projected at just under 25%. In total, for all applications, 3,226 respondents said they took delivery of 16,248 minicomputers with an approximate purchase value of \$835 million during the year ended June 1981. For the next year, 2,709 respondents said they would acquire 19,774 systems worth \$960 million.

Despite high interest rates and a rather uncertain economic outlook, oem and systems houses buyers said they were bullish on the minicomputer market. They said they plan over the next year to increase spending in the market by an average of 37%, a significant increase over the buying they did the year before. End-user respondents, however, showed a much smaller increase, only 19% on the average, after adjustment for new user expansion of the marketplace.

New users continue to be a strong source of minicomputer business growth, although compared to previous surveys, this year's figures show a slowing of the trend. Tandem Computer and Texas Instruments, two companies that are relatively new to the market, were the strongest gainers of business from new buyers.

Digital Equipment, on the other hand, showed a relatively low rate of increase, suggesting that its strong growth over the past few years was because of its already large established customer base. Also, Grumman/Cowen reasoned, long delivery lead times at DEC may have acted to restrain the company from adding new names to its account lists.

Expansion of minicomputer usage to new customers was strongest in the distributed business processing area, followed by standalone business, support equipment, and office systems applications. Lowest on the list of businesses were industrial lab and instrumentation and medical/biophysical applications, which drew only 2% and 4%, respectively, of the overall new users.

## MIX OF SYSTEMS THE SAME

The survey showed a mix of systems similar to that of last year's survey, with traditional minicomputers representing just over half of the purchases made. About 34% of the systems were in the small business system category, followed by 7% in the data entry category, 4% in intelligent terminals, and 3% in office systems.

FIG. 1  
**WHO HAS RESPONSIBILITY FOR MINICOMPUTER PROCUREMENT?**  
PERCENT OF RESPONDENT SITES

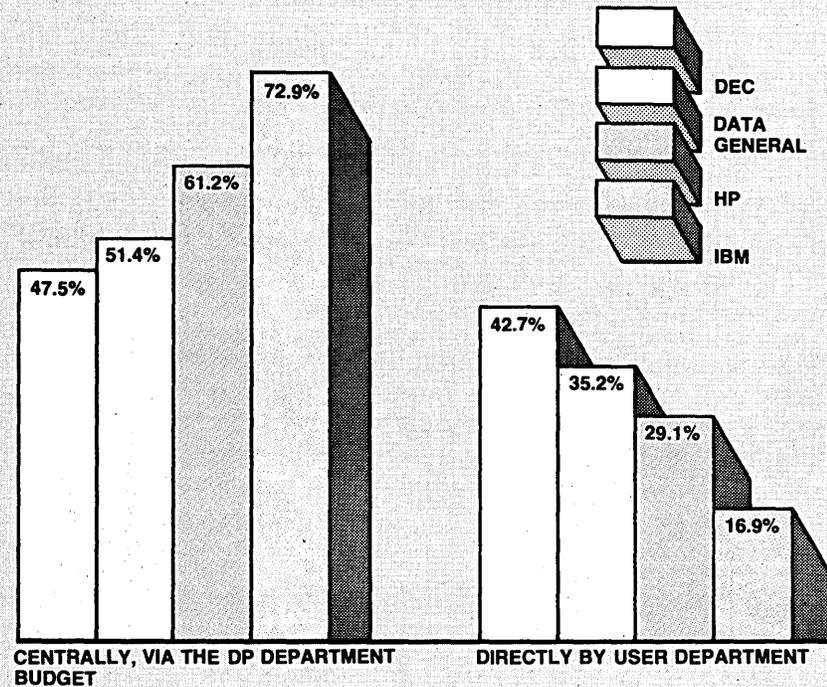
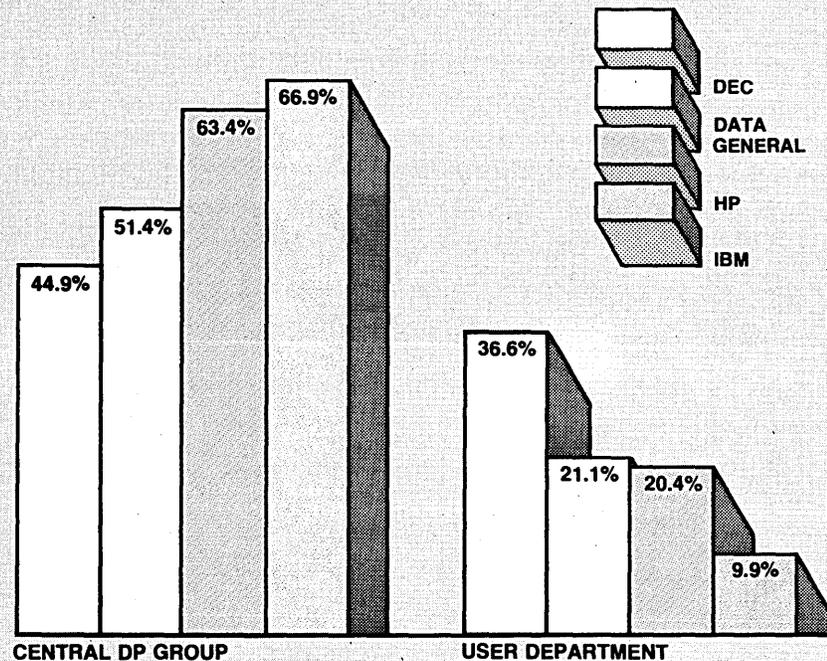


FIG. 2  
**WHO DEVELOPS MINICOMPUTER APPLICATIONS SOFTWARE?**  
PERCENT OF RESPONDENT SITES



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As for the purchasers themselves, fully 82% were end users acquiring machines for their own use. Most of these are users within larger organizations that purchase minis at a corporate or department level. About 8% of the buyers bought machines as "implementors," with the final end users somewhere else within an organization. The next 6%—the so-called systems houses—acquired machines for resale in a "customized product." Four percent of the respondents were in the oem category, buying machines for resale as part of a larger system sold in a standard configuration. The rest of the buyers act as dealers or distributors, according to Grumman/Cowen.

The research firm noted that more than half of the oems in the survey and 70% of the systems houses had annual revenues of under \$10 million. It noted that oem/system house buyers have become a shrinking part of the annual survey population because the end-user sector is growing faster, but they nevertheless remain, with a 10% share, "a vital factor for industry shipments."

Asked what applications their systems were designed for, oems and systems houses using IBM and Datapoint said all their products went into commercial use, while those using machines from companies such as Wang, Computer Automation, and Hewlett-Packard said they sold between 64% and 82% to commercial end users. Perkin-Elmer and DEC systems houses were lowest in commercial applications, showing 50% and 54%, respectively.

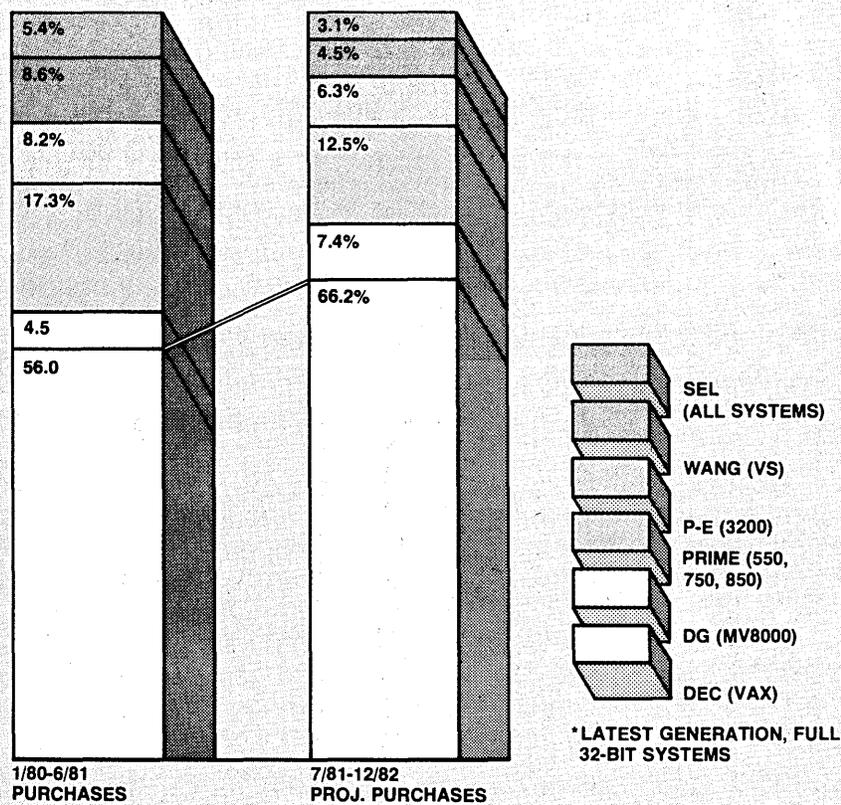
What had been a dramatic growth in minicomputer user sites, ranked at an eight-year compound growth rate of 37% in 1975, has fallen to a new low of 21%.

Spending by minicomputer users will probably be up despite high interest rates and economic uncertainties, according to the research house. Oems and systems houses, in particular, said they foresaw an increase in spending over last year of nearly 47% per site. End-user respondents said they planned an average increase in spending of only 6%, however.

A modest decline in average system prices for the upcoming year was said to reflect a shift in the mix of end-user and oem respondents in the survey. For the year ended June 1981, the average system price was \$51,700, while for the year ended June 1982, respondents said the figure would be about \$48,500.

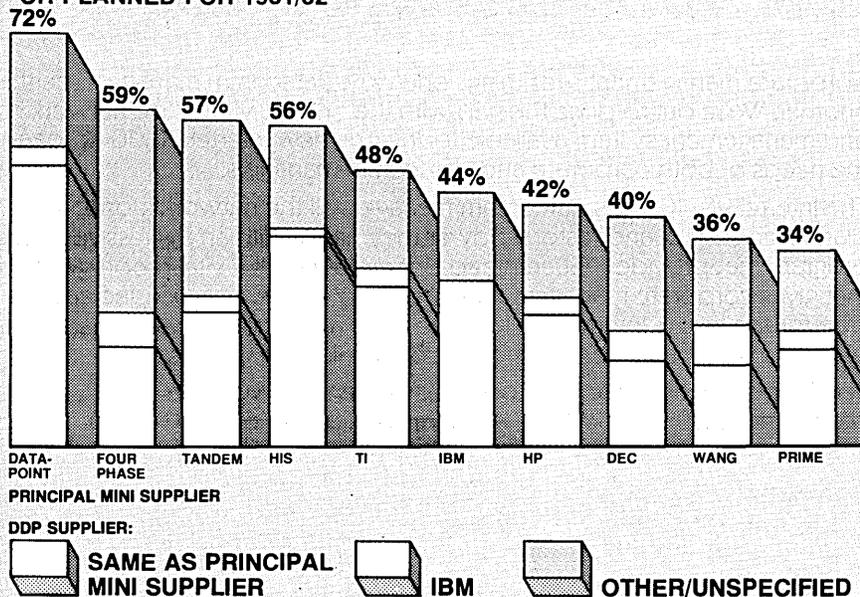
Grumman/Cowen pointed out, however, that the average system prices appear relatively level when looked at on the basis of the type of organization doing the buying. For instance, the average end-user system will rise to \$91,800 for next year, from \$87,300 for last year. Also, if measured by type of system—traditional mini vs. office system,

FIG. 3  
**DEC SHARE OF 32-BIT HIGH-END SEGMENT GROWING**  
**PERCENT OF RESPONDENTS' 32-BIT SYSTEMS\* PURCHASES**



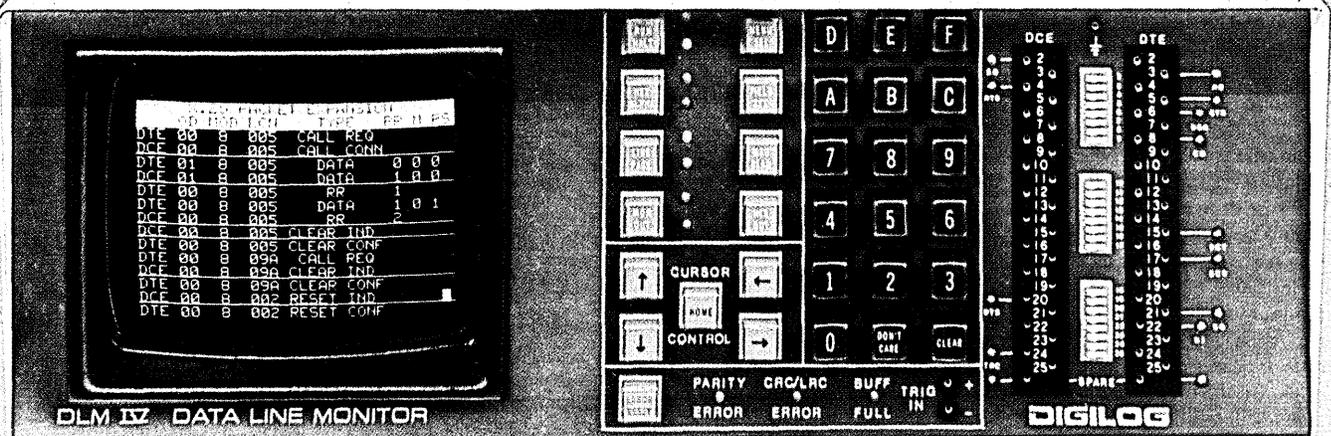
- All of growth in respondents' 32-bit purchases coming from DEC VAX (+30%) and DG MV8000 (+83%) in absolute dollar as well as percentage share terms; two-thirds of VAX growth increment from 11/750
- Relatively light respondent purchase expectations for new Prime 850 possibly a reflection of survey timing relative to 850 initial volume shipments (not slated until late in 1981)

FIG. 4  
**DDP IMPLEMENTATION ACTIVITY HIGHEST IN DATAPPOINT USER BASE**  
**PERCENT OF SITES WITH DDP ALREADY IN USE OR PLANNED FOR 1981/82**



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## Standalone, interactive systems were the primary types listed in the survey; they were mentioned by 66% of all respondents.

for instance—the average system price is relatively level between last year and this.

Based on the number of respondents that expect to acquire systems over the next year, the following systems ranked as most popular: DEC's VAX/11-780, to be acquired by 163 sites; IBM's Series/1, to be acquired by 121 sites; DEC's PDP-11/44, by 113 sites; IBM's System/38, by 107 sites; and IBM's System/34, going to 102 sites.

Some other random highlights from the respondents' buying plans include orders for a total of 151 smaller VAX systems, the model 750, valued at \$23.6 million; \$30.3 million worth of DEC PDP-11/70 machines; some 62 Data General MN/8000 systems totaling \$14.5 million, and a total of 135 System/38s valued at \$31.7 million.

In the small business system area as a whole, the research showed a drop in growth of dollars being spent by those surveyed. While the drop may prove to be only cyclical, it could in part reflect the growing influence of microprocessor-based products—from Apple, Tandy, and others—that are replacing traditional small business systems sold by firms such as Basic Four, Wang, and even IBM.

On the other hand, spending for intelligent terminals continued to grow, achieving a 64.7% increase over last year's survey figure.

Asked whether their spending in the upcoming year would be the same, behind or ahead of last year's, those surveyed provided the same figures as last year, according to Grumman/Cowen. About 32% said higher, 26% said about the same, 23% said lower, and 19% said they didn't know. In 1977, the research firm pointed out, 44% answered higher and only 14% foresaw lower spending.

### MARKET-PLACE IS SOBER

This year's response to the future spending question suggests that "the marketplace remains sober" in light of questions about the economy as a whole.

The spending outlook was most favorable among those involved with industrial automation, laboratory, military, aerospace, and distributed business processing, Grumman/Cowen said. It was least favorable in educational, medical, biophysical, and scientific/engineering computational applications.

In choosing their systems, respondents are most concerned with hardware reliability. This holds true in all systems categories except intelligent terminals. The next most cited factors in vendor selection for small business systems were vendor reputation, field maintenance, price, and applications software packages, in that order.

This year's survey showed a fairly high level of customer loyalty to current mini

TABLE I

### TOP 10 SYSTEMS ACQUIRED IN 1980/81

#### A. Based on number of respondents acquiring systems

MANUFACTURER	SYSTEM	HOW MANY SITES BOUGHT	PERCENT FIRST-TIME MINI USERS IN 1980/81
IBM	System/34	285	24.2%
DEC	PDP-11/34	187	15.5
DEC	VAX-11/780	172	10.5
DEC	PDP-11/70	156	13.5
IBM	Series/1	151	26.5
DEC	PDP-11/44	124	6.5
HP	3000 Unspec.	113	21.2
DEC	PDP-11/23	102	16.7
HP	1000	82	14.6
Data General	Nova 4	73	16.4

#### B. Based on number of units acquired

MANUFACTURER	SYSTEM	HOW MANY UNITS WERE ACQUIRED	PERCENT BY FIRST-TIME MINI USERS
IBM	Series/1	1002	12.8%
Data General	Nova 4	997	1.9
DEC	PDP-11/44	985	0.8
Texas Instruments	DS 990	662	0.2
Data General	Nova 3	624	1.3
Datapoint	1500	590	49.3
DEC	PDP-11/34	536	6.5
IBM	System/34	490	17.6
Data General	Eclipse 2XX	349	0.3
DEC	PDP-11/23	307	9.1

- As was foreseen in last year's survey, the VAX-11/780 topped the list of systems acquired during 1980/81, based on the number of respondents acquiring the systems
- Similarly, the IBM Series/1 ranked first, as was projected, in terms of units
- In total, during the 12 month period starting 7/80, 3,266 respondents (53%) reported the acquisition of 16,149 systems with an estimated purchase value of around \$835 million

vendors. Only 7.2% of those responding to the survey said they expected to switch to another vendor during the coming year, a slightly higher figure than the 5.6% recorded last year.

Software support was the most frequently cited source of dissatisfaction among OEMs and systems houses and end users alike. Last year OEMs and systems houses cited delivery schedules (primarily DEC's, which had slipped badly) as the major source of grief from their vendors.

Grumman/Cowen stated that its latest survey results show the same general trend toward single-source minicomputer procurements that has been evident in previous surveys. Only in the intelligent terminal category

does a reverse trend appear, perhaps indicating a growing intensity of competition in that market segment.

On average, it was noted, almost 75% of this year's respondents specified their minicomputer manufacturer, as opposed to an independent supplier, as their primary source of peripherals in 1981-82. Hewlett-Packard was seen as capturing much more of its customers' peripherals business than DEC and Data General.

It was noted that Wang and IBM garner more than 90% of their users' peripherals add-on business while Data General and Perkin-Elmer capture less than 60%.

Grumman/Cowen concluded that the past three-year compounded growth in aver-

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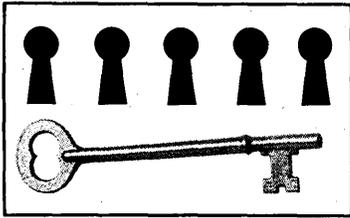
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# MAKING THE TOUGH DECISIONS



## A budget-management report from United Way

At United Way, volunteers carefully review the budgets, operating patterns and track record of agencies asking to become part of the United Way organization.

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TABLE II

## TOP 10 SYSTEMS TO BE ACQUIRED IN 1981/82

### A. Based on number of respondents acquiring systems

MANUFACTURER	SYSTEM	SITES ACQUIRING	AVG. UNITS/SITE
DEC	VAX/11-780	163	2.1
IBM	Series/1	121	8.8
DEC	PDP-11/44	113	11.5
IBM	System/38	107	1.3
IBM	System/34	102	2.0
HP	3000 Unspec.	94	2.7
DEC	PDP-11/70	84	1.8
DEC	PDP-11/34	73	3.6
DEC	VAX-11/750	71	2.1
DEC	PDP-11/23	71	8.1

### B. Based on number of units being acquired

MANUFACTURER	SYSTEM	HOW MANY UNITS BEING ACQUIRED	EST. VALUE (\$ MILLIONS)
Data General	Nova 4	1583	\$27.4
DEC	PDP-11/44	1296	21.5
Data General	Eclipse S/1XX	1077	59.3
IBM	Series/1	1059	42.5
DEC	PDP-11/13	576	7.3
DEC	VAX-11/780	337	90.5
HP	21MX	311	0.8
HP	3000-30	299	27.8
Data General	Eclipse S/2XX	295	41.6
IBM	8100	276	22.0

Respondents also planned to purchase

- 151 VAX-11/750s for \$23.6 million plus 72 unspecified VAX systems for \$13.7 million
- 153 PDP-11/70s for \$30.3 million
- 62 DG MV/8000s for \$14.5 million
- 66 Prime 550/550-2s for \$9.8 million, 47 Prime 750s for \$11.7 million, and a relatively slim six 850s for \$2.6 million
- 135 IBM System/38s for \$31.7 million (and 4 of the brand-new System/23s)
- 61 Wang VS systems for \$8.6 million

In total, 2,709 respondents (44%) reported plans to purchase 19,774 systems valued at roughly \$960 million between 7/81 and 7/82

age main memory size of minicomputers has been over 50%. That size is now up to 383,000 bytes, compared to 319,000 bytes in 1980. These figures, the research firm said, show a continuing price elasticity in main memory.

Surprisingly, however, disk capacity has leveled off at around 143 megabytes, compared with 149 megs last year. The company said that this may be a temporary plateau caused by a "persistently tight industry supply situation."

It has long been a given in the mini-computer industry that its machines are generally run in an interactive mode, a situation clearly shown by the Grumman/Cowen research. Standalone, interactive systems were the primary types of systems listed in the survey, mentioned by no less than 66% of all respondents.

Not surprisingly, network software

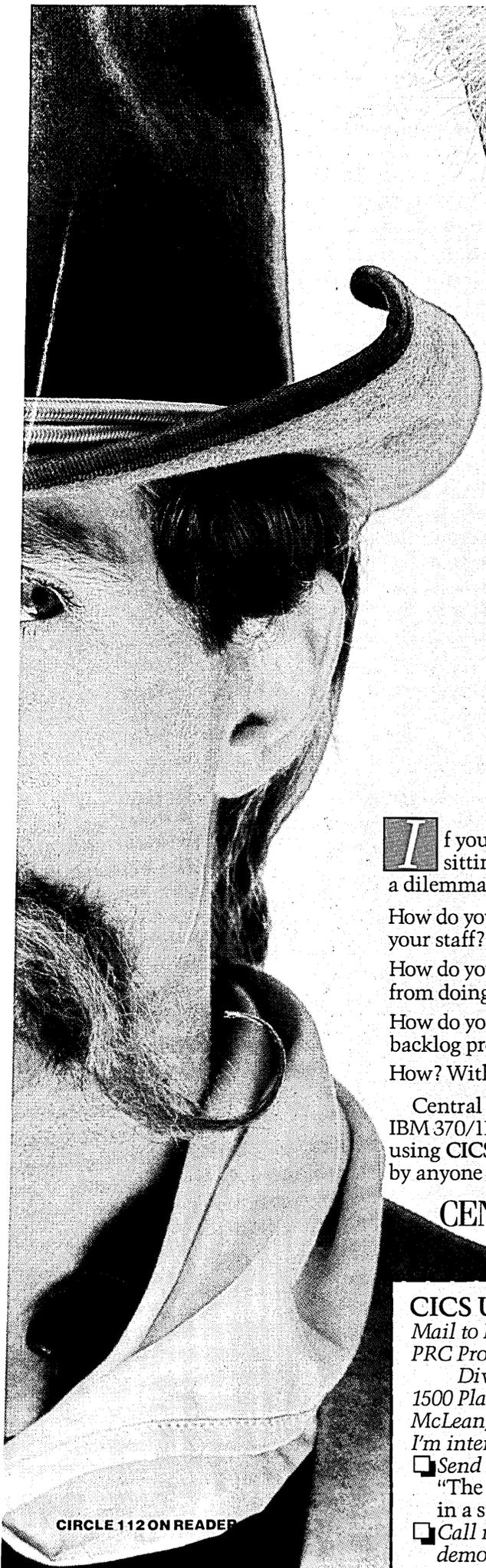
usage was particularly high among users of Tandem computers. Tandem has long marketed its machines for distributed processing applications. In the database system usage list were Microdata, Hewlett-Packard, and Tandem.

## FOCUS ON SPECIAL ISSUES

Among these were the 32-bit market, interest in so-called nonstop systems, and plug-compatible minis.

To the surprise of very few, Digital Equipment holds a strong lead in the 32-bit arena, with a 56% share of 1980-81 purchases and a 66.2% share of planned purchases in the coming year. The survey showed that Prime (with 12.5% of planned purchases), Data General (7.4%), Perkin-Elmer (6.3%), Wang

Several special issues of the minicomputer industry were focused on by the Grumman/Cowen survey.



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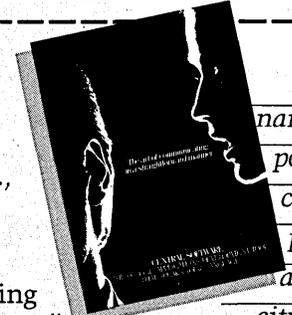
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CIRCLE 112 ON READER

If you've been postponing data base until you get back to solid ground—don't delay any longer. IMS could be your best bet to cope with the constantly rising backlog of new projects and critically needed maintenance.

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Eventually, you will discover—as many users have—that those extra functions of IMS/VS actually can be powerful solutions to new problems.

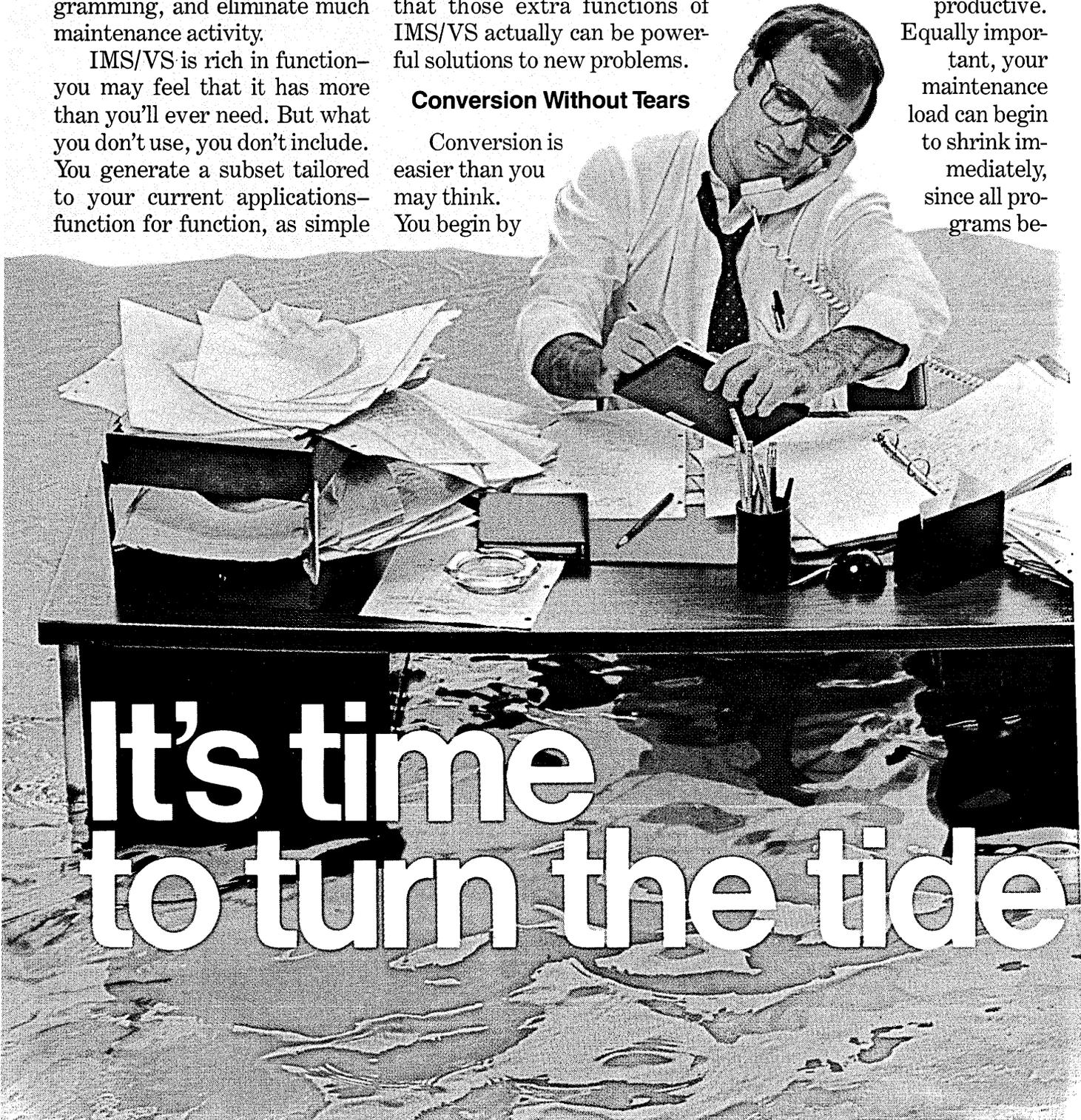
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writing your new applications for IMS/VS. Convert existing programs later, whenever it's convenient.

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with IMS.

(4.5%) and SEL (3.1%) followed.

Grumman/Cowen estimated that two-thirds of the growth in the DEC VAX market for the year ending June 1982 is coming from the firm's smaller machine, the model 750. It also noted that the survey was taken too early to reflect late-1981 deliveries of Prime's 32-bit model 850 machine.

But clearly, the firm added, the VAX system is of "considerable overall importance to DEC," showing up as 51.6% of planned dollars to be spent by respondents with DEC over the coming year.

The Grumman/Cowen survey found that 47.3% of the 32-bit machines purchased from Data General were for oem use, 33% of Perkin-Elmer's units were for oems, and 25.7% of DEC VAX systems went to oems. The Data General machine is going primarily into timesharing applications, as is the DEC system, while Perkin-Elmer's units are slated mainly for scientific and engineering computations. DEC and Prime are competing heavily in the 32-bit market for interactive design and decision support applications.

In the nonstop area, where Tandem has essentially created and dominated a market it still has to itself, interest was up from last year's survey. Almost a fifth of those responding said they were interested in nonstop systems and said they would pay more for that feature. Another 28% said they were interested in the systems but "would not pay up for it." Only 2% of the respondents had nonstop systems installed and all of them were Tandem machines.

Grumman/Cowen's figures also showed a direct correlation between size of the buying organization and its interest in nonstop computers.

Distributed processing plays a big role in the minicomputer market, where for several years users have been attaching small machines to large mainframes and to other minis via telecommunications links. While all the software problems have not yet been worked out, many organizations are strongly committed to distributed processing.

Ranking distributed processing suppliers according to penetration of accounts where they are principal mini suppliers, Grumman/Cowen found Datapoint with the highest level of activity. Following it were Honeywell and IBM, trailed by Texas Instruments and Hewlett-Packard.

IBM was found to be the largest distributed system supplier and its share of the market is growing. It was also shown that the greatest distributed processing activity was at organizations that also used IBM mainframes. Just over half the IBM mainframe users expected to have distributed systems in place by mid-1982.

In the non-IBM mainframe arena, just under half of the respondents expected to

TABLE III

**TOP 10 SYSTEMS TO BE ACQUIRED DURING 1981/82 COMPARED WITH TOP 10 ACQUIRED DURING PREVIOUS 18 MONTHS**

**A. Based on number of respondents acquiring systems:**

	1/80-6/81	7/81-12/82	CHANGE
1.	IBM System/34	DEC VAX-11/780	+
2.	DEC PDP-11/34	IBM Series/1	+
3.	DEC VAX-11/780	DEC PDP-11/44	+
4.	DEC PDP-11/70	IBM System/38	New
5.	IBM Series/1	IBM System/34	-
6.	DEC PDP-11/44	HP3000 (Unspec.)	+
7.	HP3000 (Unspec.)	DEC PDP-11/70	-
8.	DEC PDP-11/23	DEC PDP-11/34	-
9.	HP1000	DEC VAX-11/750	New
10.	DG Nova 4	DEC PDP-11/23	-

**B. Based on number of units being acquired**

1.	IBM Series/1	DG Nova 4	+
2.	DG Nova 4	DEC PDP-11/44	+
3.	DEC PDP-11/44	DG Eclipse S/1XX	New
4.	TI DS990	IBM Series/1	-
5.	DG Nova 3	DEC PDP-11/23	+
6.	Datapoint 1500	DEC VAX-11/780	New
7.	DEC PDP-11/34	HP21MX	New
8.	IBM System/34	HP3000-30	New
9.	DG Eclipse S/2XX	DG Eclipse S/2XX	NC
10.	DEC PDP-11/23	IBM 8100	New

TABLE IV

**PERCENT OF SITES PLANNING/CONSIDERING VENDOR SWITCH**

PRINCIPAL SUPPLIER	1980 SURVEY	1981 SURVEY
<b>Basic Four</b>	16.9	32.7
<b>Burroughs</b>	29.6	27.0
<b>Computer Automation</b>	23.1	31.8
<b>Data General</b>	18.2	22.0
<b>Datapoint</b>	9.4	15.2
<b>DEC</b>	12.8	13.2
<b>Four Phase</b>	20.0	19.6
<b>General Automation</b>	53.8	60.0
<b>Harris</b>	24.6	30.0
<b>Hewlett-Packard</b>	10.6	10.7
<b>Honeywell</b>	17.9	21.4
<b>IBM</b>	11.9	12.8
<b>Microdata</b>	20.3	16.2
<b>Modcomp</b>	17.9	23.3
<b>NCR</b>	19.8	15.5
<b>Northern Telecom (Sycor)</b>	41.7	30.0
<b>Perkin-Elmer</b>	19.8	26.2
<b>Prime</b>	8.3	8.2
<b>Raytheon</b>	55.6	67.2
<b>SEL</b>	11.1	16.7
<b>Tandem</b>	6.9	0.0
<b>Texas Instruments</b>	14.5	18.3
<b>Univac</b>	22.6	26.7
<b>Varian</b>	23.3	38.5
<b>Wang</b>	15.6	19.3
<b>Total Sites</b>	17.2	18.6

- Impressively high degree of customer loyalty for Tandem
- Consistently high also for Prime, HP, IBM and DEC
- Persistently low for Raytheon and General Automation
- Most sizable negative shifts for Basic Four and Varian

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CompuStar™ user stations can be configured in almost as many ways as you can imagine. The wide variety of terminals offered gives you the flexibility and versatility you've always wanted (but never had) in a multi-user system. The CompuStar Model 10 is a programmable, intelligent terminal with 64K of RAM. It's a real workhorse if your requirement is a data entry

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

Add as many terminals as you like - at prices starting at less than \$2500. Now that's truly incredible!

No matter what your application, the CompuStar can handle it! Three disk storage options are available. A tabletop 10 megabyte 8" winchester-type drive complete with power supply and our special controller and multiplexor costs just \$4995. Or, if your disk storage needs are more demanding, select either a 32 or 96 megabyte Control Data CMD drive with a 16 megabyte removable, top loading cartridge. Plus, there's no fuss in getting a CompuStar system up and running. Just plug in a Video Processing Unit and you're ready to go . . . with up to 254 more terminals in the network by simply connecting them together in a "daisy-chain" fashion. CompuStar's special parallel interface allows for system cable lengths of up to one mile . . . with data transfer rates of 1.6 million BPS!

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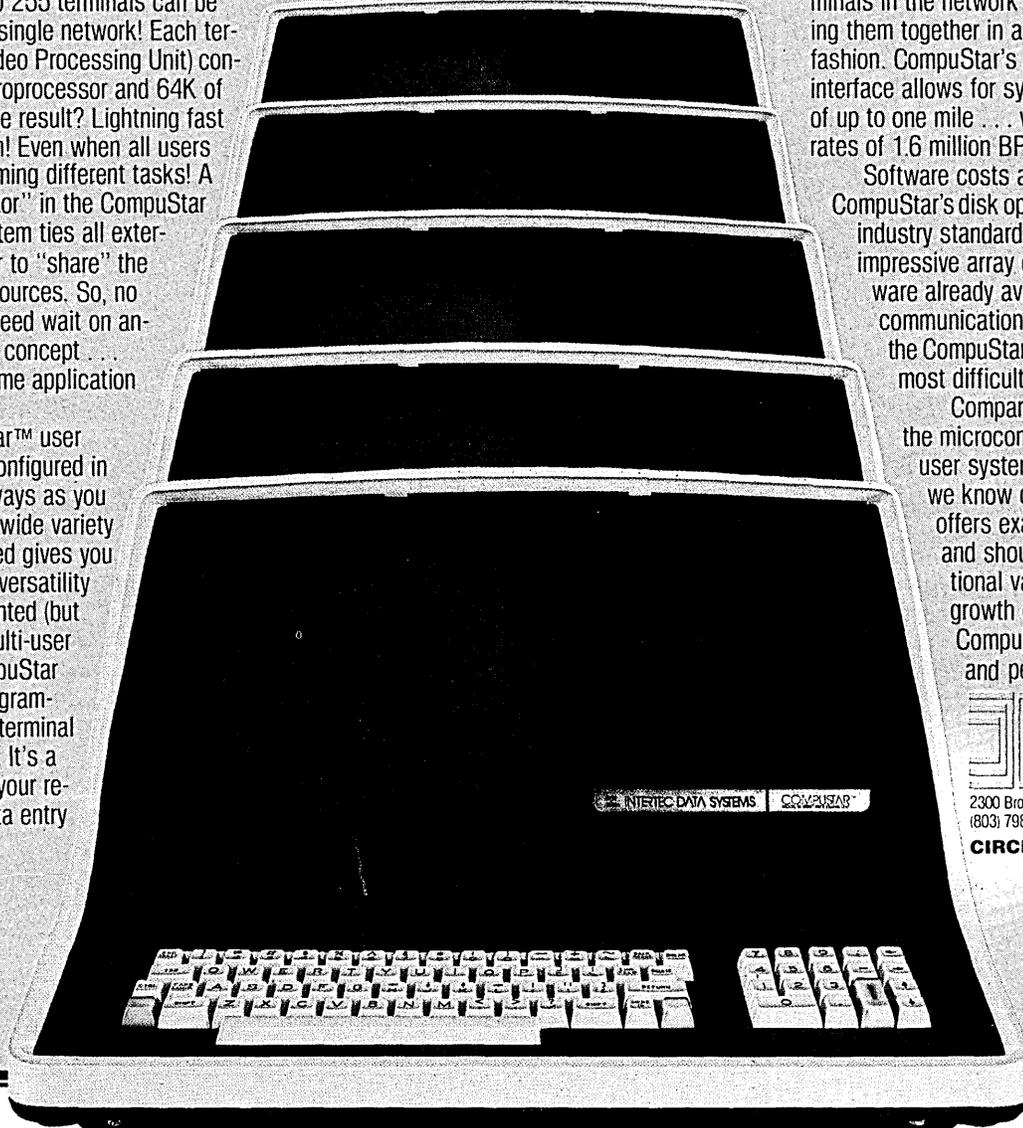
CompuStar's disk operating system is the industry standard CP/M\*. With an impressive array of application software already available and several communication packages offered, the CompuStar can tackle even your most difficult programming tasks.

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have their distributed processing systems installed by next year. As for growth of distributed processing among mainframe users, both IBM and non-IBM users showed a growth rate of about 65%. Significantly, among users with no mainframes, only 30% will have distributed processing in place by next year. However, the distributed systems of those same users are expected to grow at an 85% annual rate.

IBM was cited as the principal supplier of distributed systems by 29.9% of all respondents with that kind of system already in use. This correlates with data recorded in Grumman/Cowen's mainframe user survey taken last winter.

Growth in distributed system installations looks to be strong not only for IBM but also for Hewlett-Packard, Prime, and Data General.

Grumman/Cowen's figures showed little change in users' interest in having IBM 370-compatible minicomputers. Only 28.9% said they would like 370 compatibility, compared to a figure of 26.4% in last year's survey. On the other hand, communications capability with 370 machines was much more popular—36.7% said such a facility would be very desirable.

Interest in 370 software compatibility was concentrated but not limited to respondents who are also IBM mainframe users. A full 17% of those users expressed such a desire.

Asked how much of a price break they would want from a PCM before switching from an established supplier, end users, oems, and systems houses showed quite similar responses. About a third in each group said they would not buy from a PCM under any circumstance, another third said they would switch for a price break of more than 20%, and the remainder would switch for as little as 10%. As a class, systems houses seemed less interested in PCM gear than oems.

Price and cpu performance were said to be the most important selection criteria for those most disposed to PCM equipment, while vendor reputation, vendor support, and field maintenance were the least important factors. So far, the PCM question is an academic one for all suppliers but Data General.

So far, the PCM question remains an academic one for all mini suppliers except Data General. It is currently embroiled in an antitrust suit with Fairchild, which brought to market a microprocessor that emulates Data General's popular Nova mini.

To order the full minicomputer survey contact Shirley Stirling or Kathy Murray, DATAMATION sales, 666 Fifth Ave., New York, NY 10103. In New York State call (212) 489-3473; out of state, (800) 223-0743.

TABLE V

**REASONS FOR CONSIDERING VENDOR SWITCH**

Current Principal Vendor	PERCENT OF "SWITCHING SITES" DISSATISFIED WITH:					
	Delivery Schedules	Price	Hardware Reliability	Software Support	Sales/Serv Org.	Other
<b>Basic Four</b>	6.3	25.0	12.5	31.3	18.8	18.8
<b>Burroughs</b>	16.7	4.2	45.8	41.6	50.0	16.7
<b>Computer Automation</b>	—	14.3	57.1	57.1	—	14.3
<b>Data General</b>	8.0	9.2	31.0	36.8	29.9	26.4
<b>Datapoint</b>	3.7	7.4	37.0	48.1	25.9	37.0
<b>DEC</b>	19.3	20.5	25.1	35.7	18.7	22.8
<b>Four Phase</b>	5.3	5.3	21.1	57.9	21.1	31.6
<b>General Automation</b>	6.7	6.7	33.3	33.3	26.7	33.3
<b>Harris</b>	—	8.3	50.0	41.7	25.0	8.3
<b>Hewlett-Packard</b>	3.8	13.2	20.8	50.9	15.1	41.5
<b>Honeywell</b>	4.2	16.7	25.0	75.0	37.5	20.8
<b>IBM</b>	4.5	28.8	23.5	46.2	19.7	25.0
<b>Microdata</b>	—	27.3	18.2	18.2	45.5	36.4
<b>ModComp</b>	28.6	—	42.9	42.9	28.6	14.3
<b>NCR</b>	—	9.1	36.4	45.5	27.3	9.1
<b>Northern Telecom (Sycor)</b>	—	—	66.7	33.3	50.0	—
<b>Perkin-Elmer</b>	5.9	11.8	29.4	47.1	23.5	23.5
<b>Prime</b>	15.4	15.4	30.8	46.2	30.8	30.8
<b>SEL</b>	—	—	50.0	50.0	—	—
<b>Tandem</b>	—	—	—	—	—	—
<b>Texas Instruments</b>	—	5.3	26.3	42.1	31.6	26.3
<b>Univac</b>	—	37.5	75.0	37.5	—	—
<b>Varian</b>	20.0	20.0	—	40.0	20.0	60.0
<b>Wang</b>	2.9	—	35.3	20.6	44.1	32.4
<b>Total Sites</b>	7.3	15.0	28.5	40.4	24.1	27.1

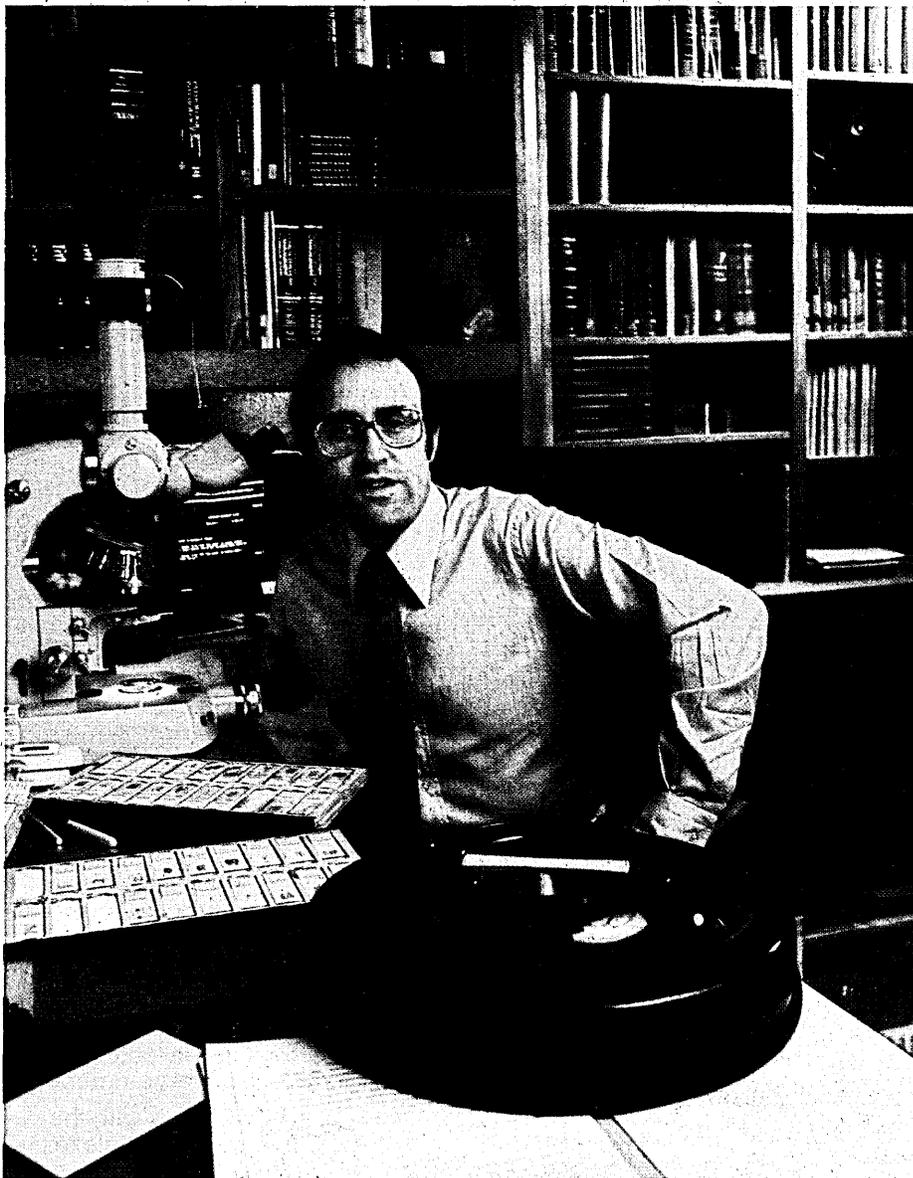
TABLE VI

**MINICOMPUTER-RELATED SPENDING 1980/81**

Percent Of Total Spending	END USER				TOTAL SITES		
	Own Use	Imple-menter	Oem Systems House	Dealer/Distrib.	1981 Survey	1980 Survey	
<b>A. Directly with systems supplier</b>							
1. Cpus, memory, peripherals	67.5	72.6	73.5	73.5	83.1	69.9	72.2
2. Software/programming	8.2	8.6	5.0	4.3	3.8	7.4	6.8
3. Maintenance/spares	10.4	9.2	7.3	5.4	4.3	9.2	7.7
<b>B. With independent suppliers</b>							
1. Memory, peripherals	6.0	5.1	12.2	14.4	2.6	7.7	6.9
2. Software/programming	7.8	4.5	1.9	2.4	6.1	5.9	6.4

Rising percentage of spending going for systems maintenance.

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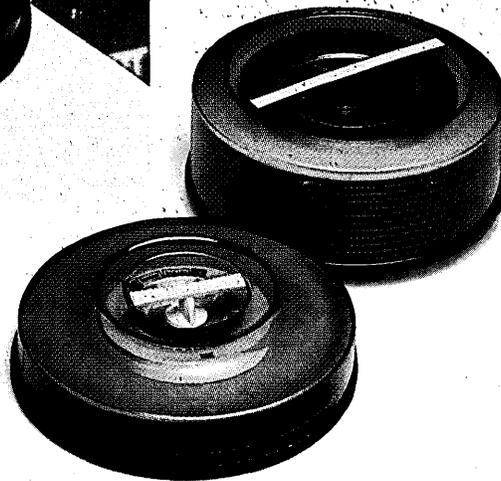
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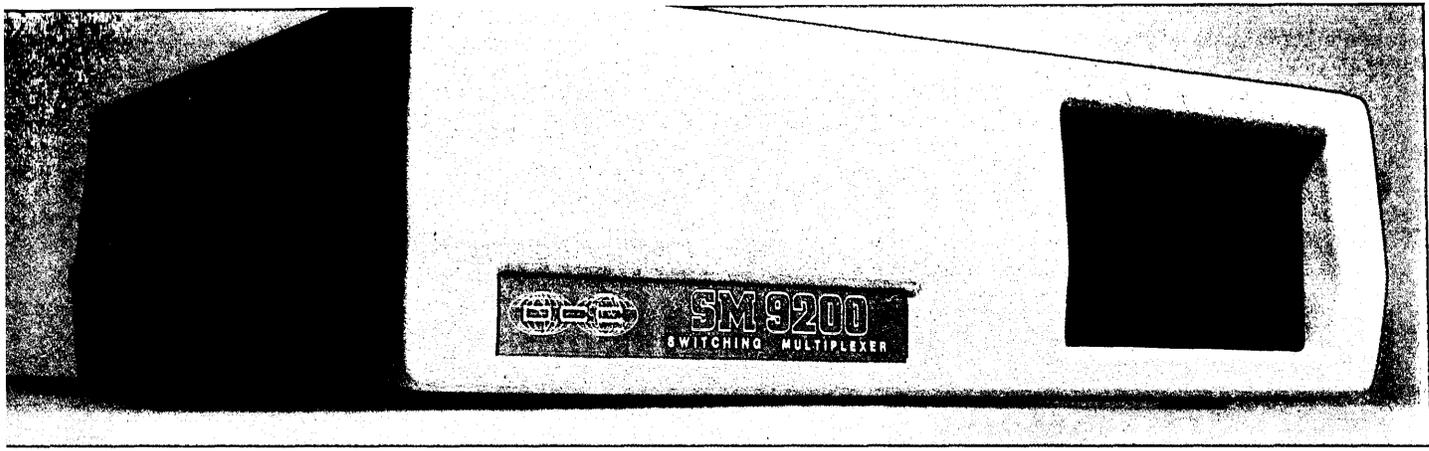
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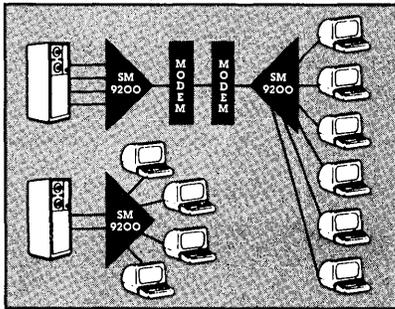


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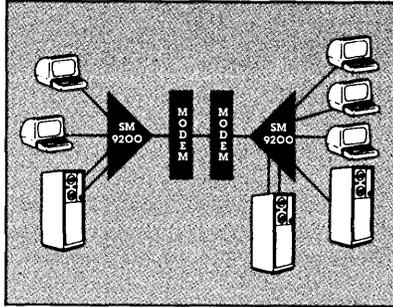
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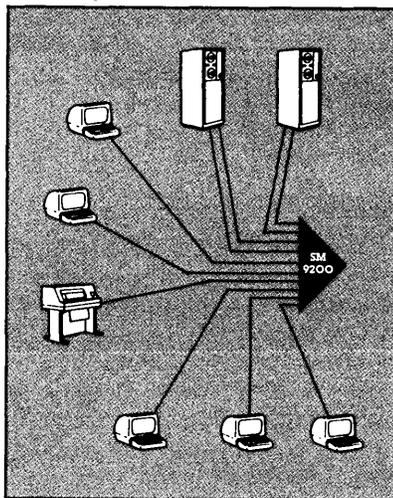
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CIRCLE 116 ON READER CARD

The system design is elegant but the user interface is not.

# THE TROUBLE WITH UNIX

by Donald A. Norman

UNIX is a highly touted operating system. Developed at the Bell Telephone Laboratories and distributed by Western Electric, it has become a standard operating system in universities, and it promises to become a standard for micro and mini systems in homes, small businesses, and schools. But for all of its virtues as a system—and it is indeed an elegant system—UNIX is a disaster for the casual user. It fails both on the scientific principles of human engineering and even in just plain common sense.

If UNIX is really to become a general system, then it has got to be fixed. I urge correction to make the elegance of the system design be reflected as friendliness towards the user, especially the casual user. Although I have learned to get along with the vagaries of UNIX's user interface, our secretarial staff persists only because we insist.

And even I, a heavy user of computer systems for 20 years, have had difficulties: copying the old file over the new, transferring a file into itself until the system collapsed, and removing all the files from a directory simply because an extra space was typed in the argument string. The problem is that UNIX fails several simple tests.

*Consistency:* Command names, language, functions, and syntax are inconsistent.

*Functionality:* The command names, formats, and syntax seem to have no relationship to their functions.

*Friendliness:* UNIX is a recluse, hidden from the user, silent in operation. The lack of interaction makes it hard to tell what state the system is in, and the absence of mnemonic structures puts a burden on the user's memory.

What is good about UNIX? The system design, the generality of programs, the file structure, the job structure, the powerful operating system command language (the "shell"). Too bad the concern for system design was not matched by an equal concern for the human interface.

One of the first things you learn when you start to decipher UNIX is how to list the contents of a file onto your terminal. Now this sounds straight-forward enough, but in UNIX

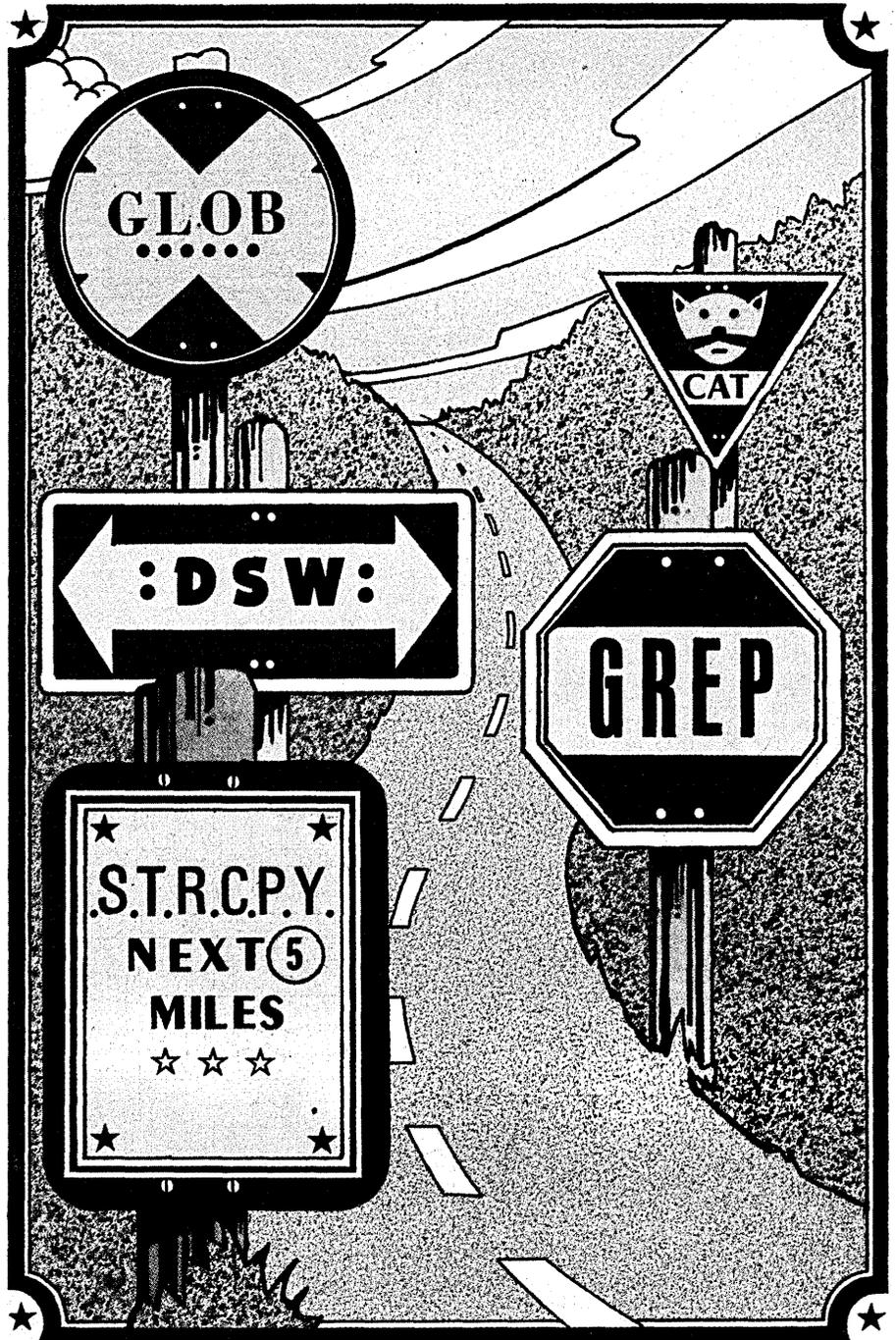
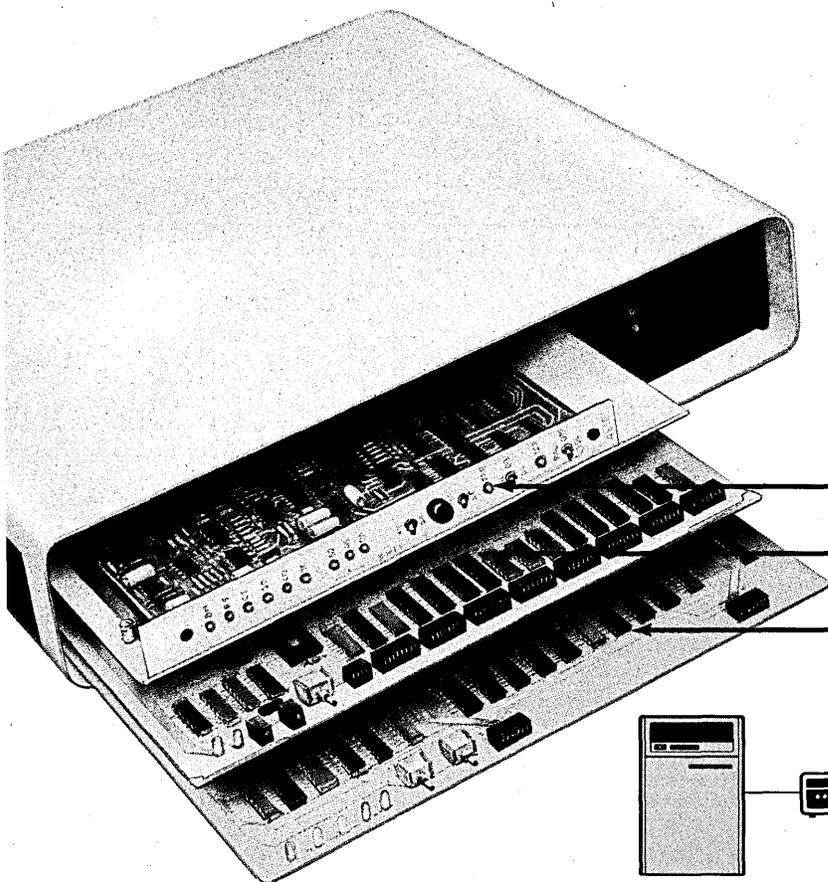


ILLUSTRATION BY CHRIS SPOLLEN

Minicomputer users:

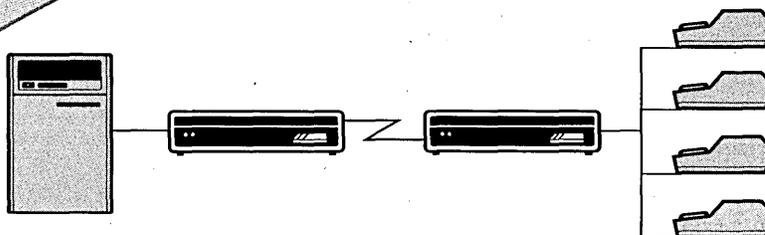
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## WHAT IS UNIX?

UNIX is an operating system developed by Dennis Ritchie and Ken Thompson of Bell Laboratories. UNIX is trademarked by Bell Labs and is available under license from Western Electric. Although UNIX is a relatively small operating system, it is quite powerful and general. It has found considerable favor among programming groups, especially in universities, where it is primarily used with DEC computers—various versions of the DEC PDP-11 and the VAX. The operating system and its software are written in a high level programming language called C, and most of the source code and documentation is available on-line. For programmers, UNIX is easy to understand and to modify.

For the nonexpert programmer, the important aspect of UNIX is that it is constructed out of a small, basic set of concepts and programming modules, with a flexible method for interconnecting existing modules to make new functions. All system objects—including all I/O channels—look like files. Thus, it is possible to cause input and output for almost any program to be taken from or to go to files, terminals, or other devices, at any time, without any particular planning on the part of the module writer. UNIX has a hierarchical file structure. Users can add and delete file directories at will and then “position” themselves at different locations in the resulting hierarchy to make it easy to manipulate the files in the neighborhood.

The command interpreter of the operating system interface (called the “shell”) can take its input from a file, which means that it is possible to put frequently used sequences of commands into a file and then invoke that file (just by typing its name), thereby executing the command strings. In this way, the user can extend the range of commands that are readily available. Many users end up with a large set of specialized shell command files. Because the shell includes facilities for passing arguments, for iterations, and for conditional operations, these “shell programs” can do quite a lot, essentially calling upon all system resources (including the editors) as subroutines. Many nonprogrammers have discovered that they can write powerful shell

programs, thus significantly enhancing the power of the overall system.

By means of a communication channel known as a pipe, the output from one program can easily be directed (piped) to the input of another, allowing a sequence of programming modules to be strung together to do some task that in other systems would have to be done by a special purpose program. UNIX does not provide special purpose programs. Instead, it attempts to provide a set of basic software tools that can be strung together in flexible ways using I/O redirection, pipes, and shell programs. Technically, UNIX is just the operating system. However, because of the way the system has been packaged, many people use the name to include all of the programs that come on the distribution tape. Many people have found it easy to modify the UNIX system and have done so, which has resulted in hordes of variations on various kinds of computers. The “standard UNIX” discussed in the article is BTL UNIX Version 6 (May 1975). The Fourth Berkeley Edition of UNIX is more or less derived from BTL UNIX Version 7 (September 1978), with considerable parallel development at the University of California, Berkeley and some input from other BTL UNIX versions. I am told that some of the complaints in the article have been fixed; however, Version 6 is still used by many people.

The accompanying article is written with heavy hand, and it may be difficult to discern that I am a friend of UNIX. The negative tone should not obscure the beauty and power of the operating system, file structure, and the shell. UNIX is indeed a superior operating system. I would not use any other. Some of the difficulties detailed result from the fact that many of the system modules were written by the early users of UNIX, not by the system designers; a lot of individual idiosyncrasies have gotten into the system. It is my hope that the positive aspects of the article will not be overlooked. They can be used by all system designers, not just by those working on UNIX. Some other systems need these comments a lot more than does UNIX.

—D.A.N.

even this simple operation has its drawbacks. Suppose I have a file called “testfile.” I want to see what is inside of it. How would you design a system to do it? I would have written a program that listed the contents onto the terminal, perhaps stopping every 24 lines if you had signified that you were on a display terminal with only a 24-line display. UNIX, however, has no basic listing command, and instead uses a program meant to do something else.

Thus if you want to list the contents of a file called “HappyDays,” you use the command named “cat”:

```
cat HappyDays
```

Why cat? Why not? After all, as Humpty Dumpty said to Alice, who is to be the boss,

words or us? “Cat,” short for “concatenate” as in, take file1 and concatenate it with file2 (yielding one file, with the first part file1, the second file2) and put the result on the “standard output” (which is usually the terminal):

```
cat file1 file2
```

Obvious, right? And if you have only one file, why cat will put it on the standard output—the terminal—and that accomplishes the goal (except for those of us with video terminals, who watch helplessly as the text goes streaming off the display).

The UNIX designers believe in the principle that special-purpose functions can be avoided by clever use of a small set of system primitives. Why make a special function when the side effects of other functions

will do what you want? Well, for several reasons:

- Meaningful terms are considerably easier to learn than nonmeaningful ones. In computer systems, this means that names should reflect function, else the names for the function will be difficult to recall.

- Making use of the side effects of system primitives can be risky. If cat is used unwisely, it will destroy files (more on this in a moment).

- Special functions can do nice things for users, such as stop at the end of screens, or put on page headings, or transform nonprinting characters into printing ones, or get rid of underlines for terminals that can't do that.

Cat, of course, won't stop at terminal or page boundaries, because doing so would disrupt the concatenation feature. But still, isn't it elegant to use cat for listing? Who needs a print or a list command? You mean “cat” isn't how you would abbreviate concatenate? It seems so obvious, just like:

FUNCTION	UNIX COMMAND NAME
c compiler	cc
change working directory	chdir
change password	passwd
concatenate	cat
copy	cp
date	date
echo	echo
editor	ed
link	ln
move	mv
remove	rm
search file for pattern	grep

Notice the lack of consistency in forming the command name from the function. Some names are formed by using the first two consonants of the function name. Editor, however, is “ed,” concatenate is “cat,” and “date” and “echo” are not abbreviated at all. Note how useful those two-letter abbreviations are. They save almost 400 milliseconds per command.

Similar problems exist with the names of the file directories. UNIX is a file-oriented system, with hierarchical directory structures, so the directory names are very important. Thus, this paper is being written on a file named “unix” and whose “path” is /cs1/norman/papers/CogEngineering/unix. The name of the top directory is “/”, and cs1, norman, papers, and CogEngineering are the names of directories hierarchically placed beneath “/”. Note that the symbol “/” has two meanings: the name of the top level directory and the symbol that separates levels of the directories. This is very difficult to justify to new users. And those names: the directory for “users” and “mount” are called, of course,

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## After all, as Humpty Dumpty said to Alice, who is to be the boss, words or us?

“usr” and “mnt.” And there are “bin,” “lib,” and “tmp” (binary, library, and temp). UNIX loves abbreviations, even when the original name is already very short. To write “user” as “usr” or “temp” as “tmp” saves an entire letter: a letter a day must keep the service person away. But UNIX is inconsistent; it keeps “grep” at its full four letters, when it could have been abbreviated as “gr” or “gp.” (What does grep mean? “Global Regular expression, Print”—at least that’s the best we can invent; the manual doesn’t even try. The name wouldn’t matter if grep were something obscure, hardly ever used, but in fact it is one of the more powerful, frequently used string processing commands.)

### LIKE CAT? THEN TRY DSW

Another important routine goes by the name of “dsw.” Suppose you accidentally create a file whose name has a nonprinting character in it. How can you remove it? The command that lists the files on your directory won’t show nonprinting characters. And if the character is a space (or worse, a “\*”), “rm” (the program that removes files) won’t accept it. The name “dsw” was evidently written by someone at Bell Labs who felt frustrated by this problem and hacked up a quick solution. Dsw goes to each file in your directory and asks you to respond “yes” or “no,” whether to delete the file or keep it.

How do you remember dsw? What on earth does the name stand for? The UNIX people won’t tell; the manual smiles the wry smile of the professional programmer and says, “The name dsw is a carryover from the ancient past. Its etymology is amusing.” Which operation takes place if you say “yes”? Why, the file is deleted of course. So if you go through your files and see important-file, you nod to yourself and say, yes, I had better keep that one. You type in “yes,” and destroy it forever. There’s no warning; dsw doesn’t even document itself when it starts, to remind you of which way is which. Berkeley UNIX has finally killed dsw, saying “This little known, but indispensable facility has been taken over . . .” That is a fitting commentary on standard UNIX: a system that allows an “indispensable facility” to be “little known.”

The symbol “\*” means “glob” (a typical UNIX name: the name tells you just what it does, right?). Let me illustrate with our friend, “cat.” Suppose I want to collect a set of files named paper.1 paper.2 paper.3 and paper.4 into one file. I can do this with cat:

```
cat paper.1 paper.2 paper.3 paper.4>
newfilename
```

UNIX provides “glob” to make the job even easier. Glob means to expand the filename by examining all files in the directory to find all

that fit. Thus, I can redo my command as

```
cat paper*>newfilename
```

where paper\* expands to {paper.1 paper.2 paper.3 paper.4}. This is one of the typical virtues of UNIX; there are a number of quite helpful functions. But suppose I had decided to name this new file “paper.all”—pretty logical name.

```
cat paper*>paper.all
```

Disaster. In this case, paper\* expands to paper.1 paper.2 paper.3 paper.4 paper.all, and so I am filling up a file from itself:

```
cat paper.1 paper.2 paper.3 paper.4
paper.all>paper.all
```

Eventually the file will burst. Does UNIX check against this, or at least give a warning? No such luck. The manual doesn’t alert users to this either, although it does warn of another, related infelicity: “Beware of ‘cat a b > a’ and ‘cat b a > a’, which destroy the input files before reading them.” Nice of them to tell us.

The command to remove all files that start with the word “paper”

```
rm paper*
```

becomes a disaster if a space gets inserted by accident:

```
rm paper *
```

for now the file “paper” is removed, as well as every file in the entire directory (the power of glob). Why is there not a check against such things? I finally had to alter my version of rm so that when I said to remove files, they were moved to a special directory named “deleted” and preserved there until I logged off, leaving me lots of time for second thoughts and catching errors. This illustrates the power of UNIX: what other operating system would make it so easy for someone to completely change the operation of a system command? It also illustrates the trouble with UNIX: what other operating system would make it so necessary to do so? (This is no longer necessary now that we use Berkeley UNIX—more on this in a moment.)

### THE SHY TEXT EDITOR

The standard text editor is called Ed. I spent a year using it as an experimental vehicle to see how people deal with such confusing things. Ed’s major property is his shyness; he doesn’t like to talk. You invoke Ed by saying, reasonably enough, “ed.” The result is silence: no response, no prompt, no message, just silence. Novices are never sure what that silence means. Ed would be a bit more likable if he answered, “thank you, here I am,” or at least produced a prompt character, but in UNIX silence is golden. No response means that everything is okay; if something had gone wrong, it would have told you.

Then there is the famous append mode error. To add text into the buffer, you have to enter “append mode.” To do this, you simply type “a,” followed by RETURN. Now

everything that is typed on the terminal goes into the buffer. (Ed, true to form, does not inform you that it is now in append mode: when you type “a” followed by “RETURN” the result is silence.) When you are finished adding text, you are supposed to type a line that “contains only a . on it.” This gets you out of append mode.

Want to bet on how many extra periods got inserted into text files, or how many commands got inserted into texts, because the users thought that they were in command mode and forgot that they had not left append mode? Does Ed tell you when you have left append mode? Hah! This problem is so obvious that even the designers recognized it, but their reaction, in the tutorial introduction to Ed, was merely to note wryly that even experienced programmers make this mistake. While they may be able to see humor in the problem, it is devastating to the beginning secretary, research assistant or student trying to use UNIX as a word processor, an experimental tool, or just to learn about computers.

How good is your sense of humor? Suppose you have been working on a file for an hour and then decide to quit work, exiting Ed by saying “q.” The problem is that Ed would promptly quit. Woof, there went your last hour’s work. Gone forever. Why, if you had wanted to save it you would have said so, right? Thank goodness for all those other people across the country who immediately rewrote the text editor so that we normal people (who make errors) have some other choices besides Ed, editors that tell you politely when they are working, that tell you if they are in append or command mode, and that don’t let you quit without saving your file unless you are first warned, and then only if you say you really mean it.

As I wrote this paper I sent out a message on our networked message system and asked my colleagues to tell me of their favorite peeves. I got a lot of responses, but there is no need to go into detail about them; they all have much the same flavor, mostly commenting about the lack of consistency and the lack of interactive feedback. Thus, there is no standardization of means to exit programs (and because the “shell” is just another program as far as the system is concerned, it is very easy to log yourself off the system by accident). There are very useful pattern matching features (such as the “glob” \* function), but the shell and the different programs use the symbols in inconsistent ways. The UNIX copy command (cp) and the related C programming language “string-copy” (strcpy) reverse the meaning of their arguments, and UNIX move (mv) and copy (cp) operations will destroy existing files without any warning. Many programs take special “argument flags” but the manner of specifying the flags is inconsistent, varying

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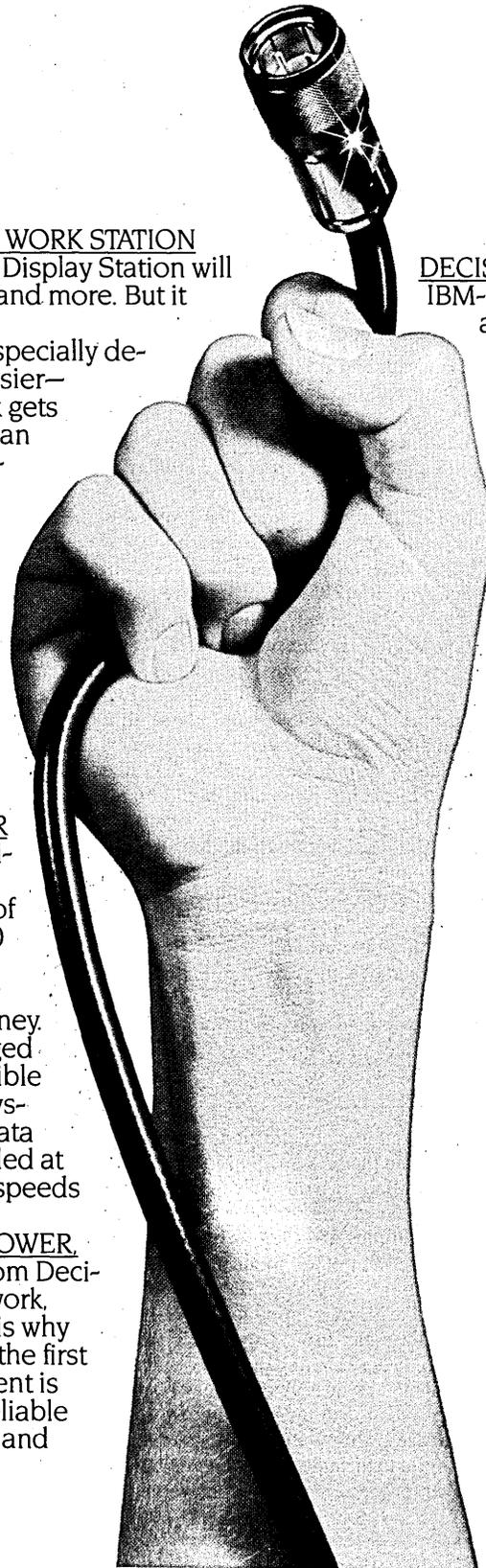
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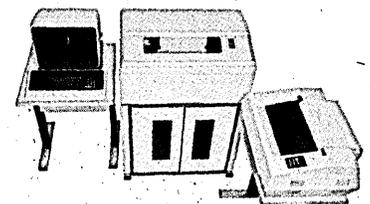
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CIRCLE 119 ON READER CARD

## Ed's major property is his shyness; he doesn't like to talk.

### ANOTHER VIEW

Prof. Norman praises the UNIX system design but makes a number of caustic remarks about command names and other aspects of the human interface. These might be ignored, since he has no experimental tests to justify them; or they might even be taken as flattery of UNIX, since he does not name any system he likes better; but some of his comments are worth discussing.

Most of the command names Norman points to are indeed strange; some, such as `dsw`, were removed several years ago (by the way, to repair the discourtesy of the manual, `dsw` meant "delete from switches"). However, it is not clear that it makes much difference what the command names are. T. K. Landauer, K. Galotti, and S. Hartwell recently tried teaching people a version of the editor in which "append," "delete," and "substitute" were called "allege," "cypher," and "deliberate." It didn't seem to have much effect on learning time, and afterwards the users would say things like "I alleged three lines and deliberated a comma on the last one" just like subjects who had learned the ordinary version of the editor ("A Computer Command By Any Other Name: A Study of Text Editing Terms," available from the authors at Bell Labs.)

In addition to the amusing but secondary discussion of command names, Prof. Norman does raise some significant issues: (1) whether systems should be verbose or terse; (2) whether they should have a few general commands or many special-purpose ones; and (3) whether they should try to anticipate typical mistakes. Experimental results on these issues would be welcome; meanwhile, the armchair evidence is not all on one side.

UNIX is undoubtedly near an extreme of terseness, partly because it was originally designed for slow hardcopy terminals. However, the terseness is very valuable when connecting processes. If the command that lists the logged-on users prints a

heading above the list, you can't tell how many users are on by feeding the command output to a line counter. If the editor types acknowledgments now and then, its output may not be directly usable as input somewhere else. Of course, you could feed it through something which strips off the extra remarks, but presumably that program would add its own chatty messages.

Prof. Norman complains about using "cat" for a command which prints files, rather than having a special-purpose command for the purpose (there is one, by the way: "pg"). Having a few general-purpose commands is a definite aid to system learning. In practice, it is not the novices who use the alternatives to "cat"; it is the experts, who want something better adapted to their special needs and are willing to learn another command. In general, people are quite good at recognizing special uses of commands in context, probably because it is a lot like things they have to do every day in English. To take an analogy from programming languages, one doubts that Prof. Norman would advocate a separate operator for "+" in integer arithmetic and "+" in floating point arithmetic. There are many advantages to a small, general-purpose set of commands. Having only one way to do any given task minimizes software maintenance while maximizing the ability of two users to help each other with advice. But this implies that whenever a general command and a specific command do the same thing, the specific command should be removed. It would be a definite service if the "cognitive engineers" could tell us how many commands are reasonable, to give some guidance on, for example, whether "merge" should be a separate command or an option on "sort" (on UNIX it is a sort option) and whether the terminal drivers should be separate commands or options on a graphics output command (on UNIX they are separate). The best rule of thumb we have today is that designing the system so

that the manual will be as short as possible minimizes learning effort.

Prof. Norman seems to think that the computer should try to anticipate user problems, and refuse commands that appear dangerous. The computer world is undoubtedly moving in this direction; strong typing in programming languages is a good example. The "ed" editor has warned for some years if the user tries to quit without writing a file. The "vi" editor has an "undo" feature, regardless of the complexity of the command which has been executed. Such a facility is undoubtedly the best solution. It lets the user recognize his mistakes and back out of them, rather than expecting the system to foresee them. It is really not possible to anticipate the infinite variety of possible user mistakes; as every programmer who has ever debugged anything knows, it is hard enough to deal with the correct inputs to a program. Human hindsight is undoubtedly better than machine foresight.

A large number of Prof. Norman's comments are pleas for consistency. UNIX has grown more than it has been built, with many people from many places tossing software into the system. The ability of the system to accept commands so easily is one of its main strengths. However, it results in command names like "finger" for what Bell Labs called "whois" (identify a user) and "more," "cat," or "pg" for what Prof. Norman would rather call "list." The thought of a UNIX Command Standardization Committee trying to impose rules on names is a frightening alternative. Much of the attractiveness of UNIX derives from its hospitality to new commands and features. This has also meant a diversity of names and styles. To some of us this diversity is attractive, while to others the diversity is frustrating, but to hope for the hospitality without the diversity is unrealistic.

—Michael Lesk  
Bell Labs  
Murray Hill, N.J.

from program to program.

The version of UNIX I now use is called the Fourth Berkeley Edition for the VAX, distributed by Joy, Babaoglu, Fabry, and Sklower at the University of California, Berkeley (henceforth, Berkeley UNIX). This is both good and bad.

Among the advantages: History lists, aliases, a richer and more intelligent set of system programs (including a list program, an intelligent screen editor, an intelligent set of routines for interacting with terminals according to their capabilities), and a job control that allows one to stop jobs right in the middle, start up new ones, move things from back-

ground to foreground (and vice versa), examine files, and then resume jobs. The shell has been amplified to be a more powerful programming language, complete with file handling capabilities, if—then—else statements, while, case, and other goodies of structured programming (see box, p. 00).

Aliases are worthy of special comment. Aliases let users tailor the system to their own needs, naming things in ways they can remember; names you devise yourself are easier to recall than names provided to you. And aliases allow abbreviations that are meaningful to the individual, without burdening everyone else with your cleverness or

difficulties.

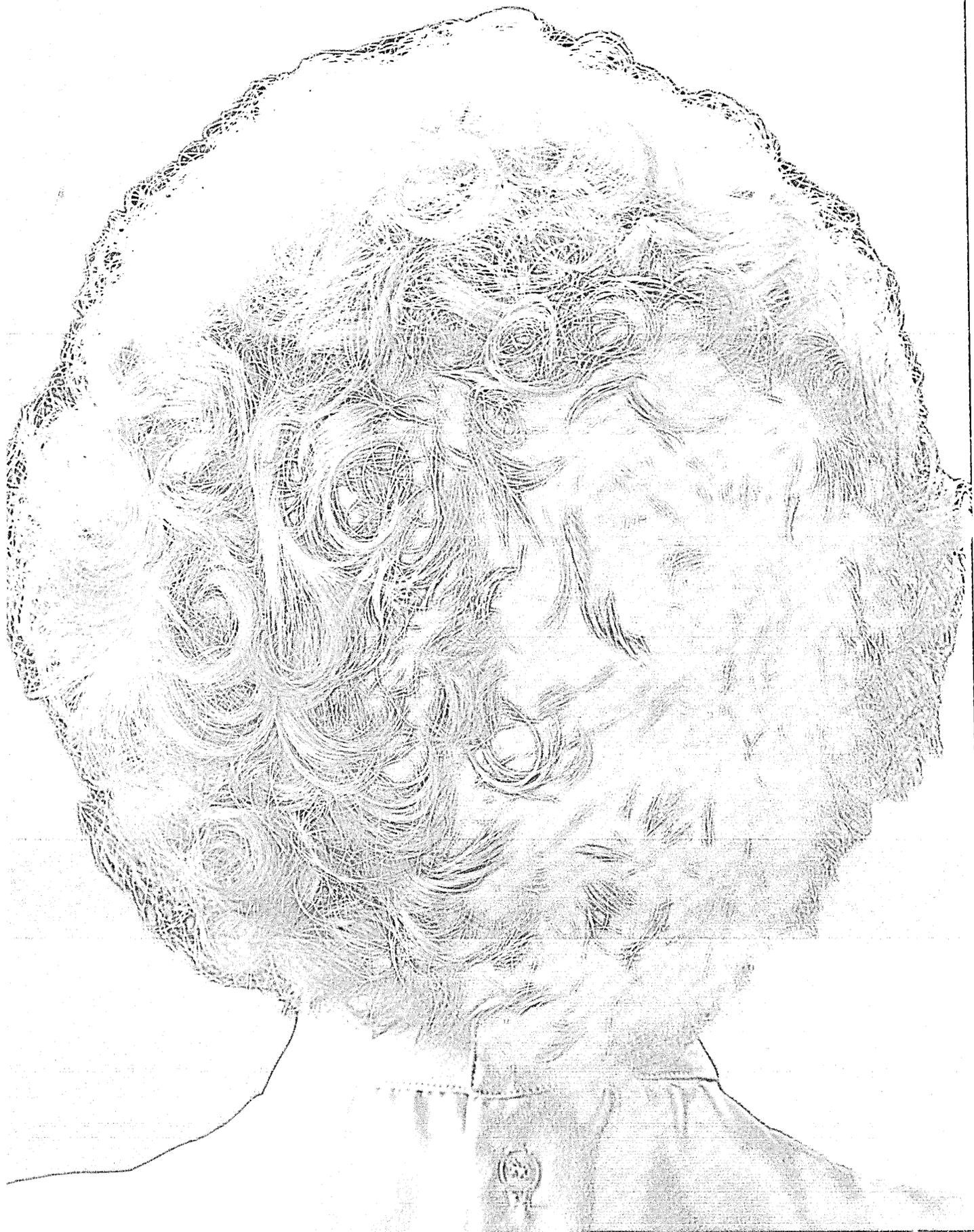
To work on this paper, I need only type the word "unix," for I have set up an alias called "unix" that is defined to be equal to the correct command to change directories, combined with a call to the editor (called "vi" for "visual" on this system) on the file:

```
alias unix "chdir /cs1/norman/papers/  
CogEngineering; vi unix"
```

These Berkeley UNIX features have proven to be indispensable: the people in my laboratory would probably refuse to go back to standard UNIX.

The bad news is that Berkeley UNIX is jury-rigged on top of regular UNIX, so it can





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# There are lots of aids to memory that can be provided, but the most powerful of all is understanding.

only patch up the faults: it can't remedy them. Grep is not only still grep, but there is an egrep and an fgrep.

And the generators of Berkeley UNIX have their problems: if Bell Labs people are smug and lean, Berkeley people are cute and overweight. Programs are wordy. Special features proliferate. The system is now so large that it no longer fits on the smaller machines: our laboratory machine, a DEC 11/45, cannot hold the latest release of Berkeley UNIX (even with a full complement of memory and a reasonable amount of disk). I wrote this paper on a VAX.

## LEARNING IS NOT EASY

Learning the system for setting up aliases is not easy for beginners, who may be the people who need them most. You have to set them up in a file called `.cshrc`, not a name that inspires confidence. The "period" in the filename means that it is invisible—the normal method of directory listing programs won't show it. The directory listing program, `ls`, comes with 19 possible argument flags, which can be used singly or in combinations. The number of special files that must be set up to use all the facilities is horrendous, and they get more complex with each new release from Berkeley.

It is very difficult for new users. The program names are cute rather than systematic. Cuteness is probably better than standard UNIX's lack of meaning, but there are limits. The listing program is called "more" (as in, "give me more"), the program that tells you who is on the system is called "finger," and a keyword help file—most helpful, by the way—is called "apropos." I used the alias feature to rename it "help."

One reader of a draft of this paper—a systems programmer—complained bitterly: "Such whining, hand-wringing, and general bitchiness will cause most people to dismiss it as over-emotional nonsense. . . . The UNIX system was originally designed by systems programmers for their own use and with no intention for others using it. Other hackers liked it so much that eventually a lot of them started using it. Word spread about this wonderful system, and the rest you probably know. I think that Ken Thompson and Dennis Ritchie could easily shrug their shoulders and say 'But we never intended it for other than our personal use.'"

This complaint was unique, and I sympathize with its spirit. It should be remembered, though, that UNIX is nationally distributed under strict licensing agreements. Western Electric's motives are not altogether altruistic. If UNIX had remained a simple experiment on the development of operating systems, then complaints could be made in a more friendly, constructive manner. But UNIX

is more than that. It is taken as the very model of a proper operating system. And that is exactly what it is not.

In the development of the system aspects of UNIX, the designers have done a magnificent job. They have been creative, and systematic. A common theme runs through the development of programs, and by means of their file structure, the development of "pipes" and "redirection" of both input and output, plus the power of the iterative "shell" system-level commands, one can easily combine system level programs into self-tailored systems of remarkable power. For system programmers, UNIX is a delight. It is well structured, with a consistent, powerful philosophy of control and structure.

Why was the same effort not put into the design at the level of the user? The answer is complex, but one reason is the fact that there really are no well known principles of design at the level of the user interface. So, to remedy the harm I may have caused with my heavy-handed sarcasm, let me attempt to provide some positive suggestions based upon research conducted by myself and others into the principles of the human information processing system.

Cognitive engineering is a new discipline, so new that it doesn't exist, but it ought to. Quite a bit is known about the human information processing system, enough that we can specify some basic principles for designers. People are complex entities and can adapt to almost anything. As a result, designers often design for themselves, without regard for other kinds of users.

The three most important concepts for system design are these:

1. Be consistent. A fundamental set of principles ought to be evolved and followed consistently throughout all phases of the design.

2. Provide the user with an explicit model. Users develop mental models of the devices with which they interact. If you do not provide them with one, they will make one up themselves, and the one they create is apt to be wrong.

Do not count on the user fully understanding the mechanics of the device. Both secretaries and scientists may be ignorant of the difference between the buffer, the working memory, the working files, and the permanent files of a text editor. They are apt to believe that once they have typed something into the system, it is permanently in their files. They are apt to expect more intelligence from the system than the designer knows is there. And they are apt to read into comments (or the lack of comments) more than you have intended.

Feedback is of critical importance in helping establish the appropriate mental model and in letting the user keep its current state

in synchrony with the actual system.

3. Provide mnemonic aids. For most purposes it is convenient to think of human memory as consisting of two parts: a short-term memory and a long-term memory (modern cognitive psychology is developing more sophisticated notions, but this is still a valid approximation). Five to seven items is about the limit for short-term memory. Thus, do not expect a user to remember the contents of a message for much longer than it is visible on the terminal. Long-term memory is robust, but it faces two difficulties: getting stuff in so that it is properly organized, and getting stuff out when it is needed. Learning is difficult, unless there is a good structure and it is visible to the learner.

There are lots of sensible memory aids that can be provided, but the most powerful and sensible of all is understanding. Make the command names describe the function that is desired. If abbreviations must be used, adopt a consistent policy of forming them. Do not deviate from the policy, even when it appears that a particular command warrants doing so.

System designers take note. Design the system for the person, not for the computer, not even for yourself. People are also information processing systems, with varying degrees of knowledge and experience. Friendly systems treat users as normal, intelligent adults who are sometimes forgetful and are rarely as knowledgeable about the world as they would like to be. There is no need to talk down to the user, nor to explain everything. But give the users a share in understanding by presenting a consistent view of the system. Their response will be your reward.

\*  
*Partial research support was provided by Contract N00014-79-C-0323, NR 157-437 with the Personnel and Training Research Programs of the Office of Naval Research, and was sponsored by the Office of Naval Research and the Air Force Office of Scientific Research. I thank the members of the LNR research group for their helpful suggestions and descriptions of misery. In particular, I wish to thank Phil Cohen, Tom Erickson, Jonathan Grudin, Henry Half, Gary Perlman, and Mark Wallen for their analysis of UNIX. Gary Perlman and Mark Wallen provided a number of useful suggestions.*

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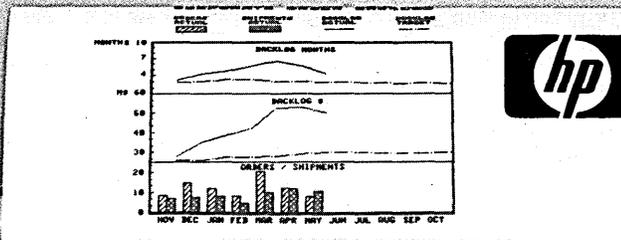
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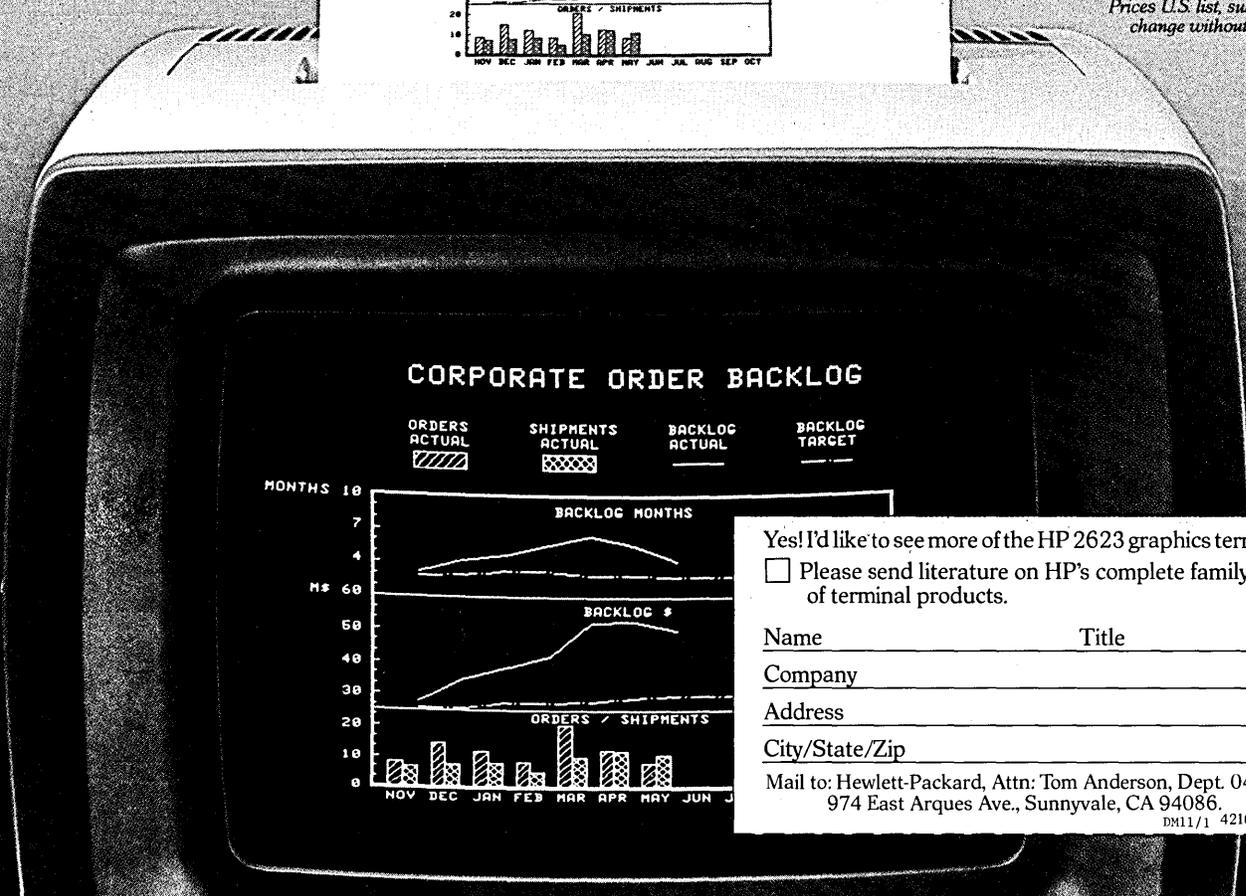
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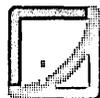
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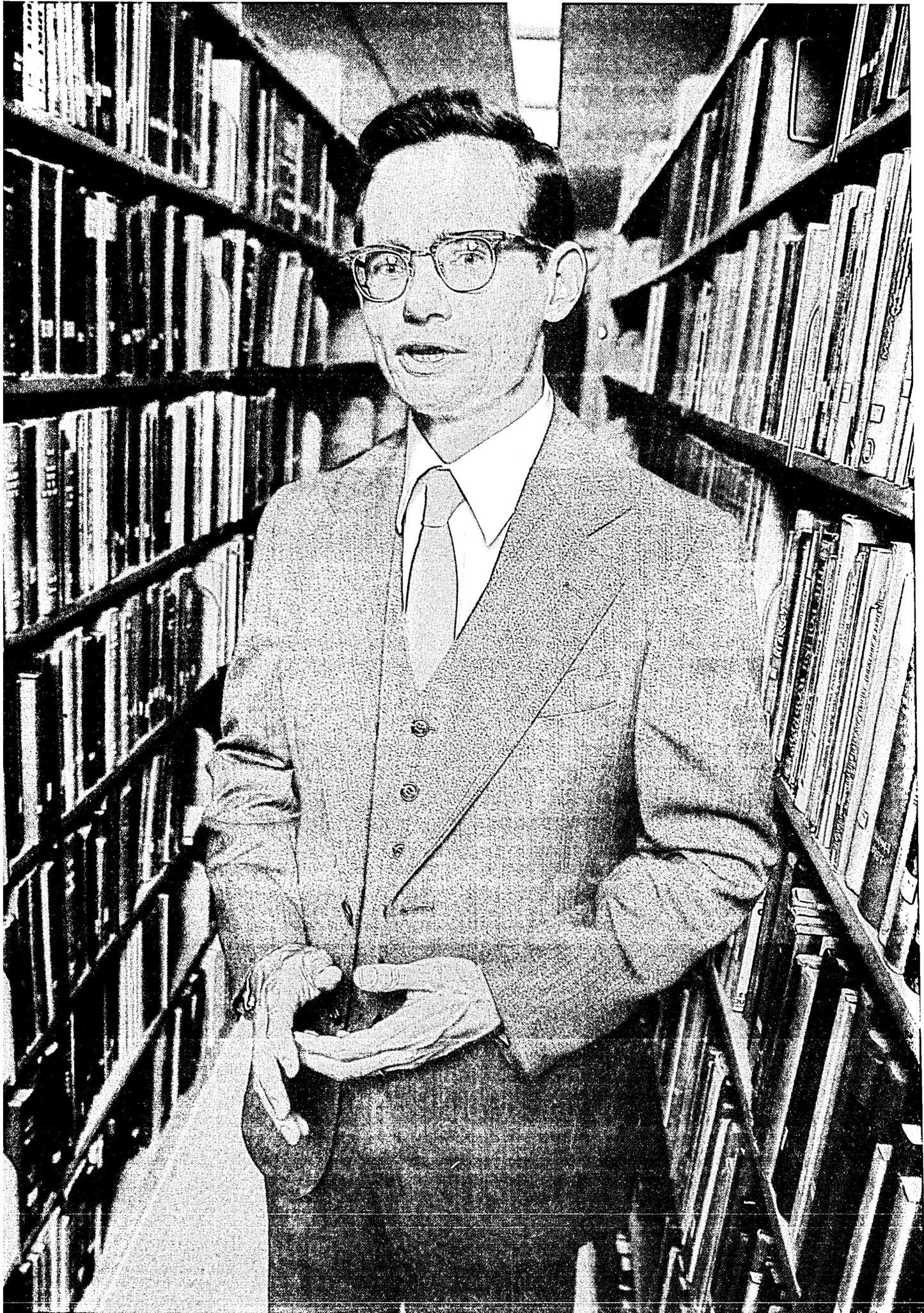
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A conversation with economic historian Gerald Brock,  
author of "The U.S. Computer Industry"  
and "The Telecommunications Industry."

# INSIGHT FROM A DISTANCE

by Esther Dyson

On meeting Gerald Brock, a visitor is struck by how little he resembles the captains of industry he writes about. A slight, mild-mannered man, he hesitates to venture opinions and endeavors to avoid being "promotional." Still, this is the man who chronicles the history of the great computer and communications corporations, the battles for market share, the shady competitive practices, the legal maneuvers that hold competitors and regulators at bay.

A casual reader of his most recent book, *The Telecommunications Industry*, may be similarly surprised. Where are the scandals, the commotion, the skulduggery? What, for example, was on the mind of Philadelphia newspaperman Henry O'Reilly in 1847 as his company began a race to string telegraph wires from Louisville to New Orleans? Brock doesn't care to speculate. The struggles are there, but they have been stripped of passion and pasted on an analytic matrix. O'Reilly's battle with the Morse patent holders, like Western Union's with AT&T, is seen as a shifting of suppliers and markets, determined by the confluence of technology, policy, and demand.

Dry, perhaps. But the approach offers a better chance of predicting the future than does an effort to divine the meaning behind AT&T chairman Charlie Brown's recent declaration, "We're not interested in providing want ads."

"People say all kinds of things they don't really mean," says Brock. "For example, 'Yeah, we think this bill is just right, except for this change, and that change . . . and suddenly you've altered the entire meaning.'"

So what does AT&T really want, according to Brock?

"Pretty much anything they can get, judging from the historical record," he replies flatly.

And what will AT&T get? For Brock, that's a more interesting question. "If you can make a fair judgment of an industry's

strengths and weaknesses, you can make a fair prediction," he allows.

This, then, is how he sees it. During the period he calls the era of regulated monopoly (1934-1956), "AT&T voluntarily relinquished its patent protection in exchange for greater regulatory protection. Its activities during that period transformed AT&T into a quasi-public company whose fortunes were more dependent on political and regulatory decisions than on market forces."

But AT&T is now suffering at its own sword: with the changes in technology and a trend to deregulation, those market forces—against which AT&T has grown vulnerable through years of protection—are coming back to plague the company. As Brock sees it, "structural forces and technological forces are controlling. It is a convenient fiction, one deeply embedded in the American work ethic, that anyone can succeed if he only tries." He reaches over to pull a small paperback from his shelves: *Acres of Diamonds*, first published around 1900 and reprinted by the Christian Board of Publications. "This espouses the concept that individuals move industry. That, of course, provides a great incentive for getting people to work hard.

"But look at Peter Redfield [the former chairman of Intel]. A few weeks ago I was reading some articles about Intel. On his way up, he's a great manager, a skillful strategist. Then, later on, suddenly we read, 'He fancied himself a great conceptualizer, but . . . ' In fact, he hasn't changed at all. The main things are interest rates and the IBM 4300"—which was itself a product of technology and market forces.

Satellites, microwaves, computers, and other new technologies are now creating a similar disruption in AT&T's nice, safe world. And the government is no longer inclined to preserve it.

For Brock, that's no tragedy: "I'm not convinced that government attorneys or congressmen are omniscient. The companies actually in the business generally have the best knowledge of how to apply technology.

But they're not about to reveal it to the regulators. They'll be kicking and screaming at competition, but economically an imposed industry structure is inherently less efficient than one that grows naturally in response to market and technological forces.

"I think as a matter of social policy, it was terrible that MCI had to go through all those long years of battling both AT&T and the government to start its business . . ." He checks himself: "Of course, from AT&T's point of view, it was the most efficient way to hold them at bay; it was a perfectly rational response.

"I am not a scandal writer or an investigative reporter," he points out. "I make an effort to see things from several different sides."

Yet, when pressed, Brock does admit to a few opinions. For example, he favors divestiture, even though he doubts it will come about: "After all, the reason for keeping the companies together (with a fully separated subsidiary rather than an outright spin-off) is to share advertising, marketing, R&D, and so forth. But if it's truly separate and no one's cheating, then you lose those advantages anyway." He just doesn't trust AT&T not to cheat.

Nonetheless, he's optimistic that technology and some change in government attitudes will lead to a far more competitive environment.

"Even if one company has a large share, as long as there are no restrictions on entry, competition can flourish. Because of technological progress, we now have a situation where there is no inherent monopoly. Everyone can go out and do his best. The dominant firms provide stability; the smaller firms provide innovation.

"Long distance is already definitely free and open, with satellites and microwave providing real competition to AT&T's wires. Local distribution is moving that way, but I'd hesitate to say that there's real competition now. It's starting to look competitive because of a lot of proposals, but it's not there yet.

# In the long run the technology will out, but in the short run the implementation depends on the players.

Still, I'd rather see the government declare it free and open, than call it a natural monopoly and stop any progress at all.

"After all, long-distance competition started in a small way too. The approval for MCI was accidental as far as policy goes. Technically the decision was reversible. But practically, once the competition exists, the burden of proving it harmful becomes almost insurmountable."

AT&T is painfully aware of this, Brock continues. He suspects that some of its interest in new markets—Yellow Pages and advertising on terminals, for example—is largely

defensive. The company may be stockpiling some bargaining chips.

"I don't really think AT&T has any great designs on monopolizing the newspaper market," he says, "but it doesn't mind scaring them so it can strike a deal. If they don't start first, their network could be eroded, and that's what they really fear. So they're doing what they can now to head off incipient competition, because things that start off little tend to grow."

Incipient now are the two allied areas of cable tv and local data distribution. "They've pretty much conceded the intraof-

fice market, things like PBXs and office machines, but they're still trying to protect their options with control over the basic external communications medium. If the basic communications medium becomes something else," like cable tv or microwave, AT&T will have some adjusting to do.

## ACTUAL CHANGE IS SLOW

It's bound to happen, says Brock, but not as quickly as many people expect. "In spite of all these technological changes, actual practices change very slowly," he notes. "Satellite Business

## A DISPASSIONATE LOOK AT AT&T

What's the best way to understand the fast-changing telecommunications industry? Gerald Brock's tack is to put aside the unsifted results of last week's hearings and press conferences and take the long view. His latest book, *The Telecommunications Industry* (Harvard University Press, 1981), provides an engrossing, thorough historical analysis that has more relevance to the next decade than to next week.

The moral of the story comes clear at the end: "Regulation has two major functions. The first is the protection of existing companies. . . . The second is to protect consumers from the monopoly power of the existing firms. To some extent, the second is created by the first." AT&T is not to blame for taking advantage of a government willing to protect it. Brock's intent is simply to explain how AT&T became the creature it is and thus enable us to see current events more clearly.

He builds perspective with a clear, orderly history of telecommunications in the U.S. and a slight digression on the European experience. (A turgid, formula-laden chapter two, unintelligible except to the economist/mathematician, may be skipped without much harm. Most of the points made are intuitively obvious: "High prices encourage entry of competition," for example. The mathematics is far more precise than reality could ever be.) Brock carefully details how the government helped create the monopoly it is now trying to dismantle.

The action is the interplay of technology, markets, and regulation, rather than that of businessmen and innovators. Brock's thesis is that "structural changes occur in predictable ways as a result of economic and technological forces. The question of the predictability of structural change is not an esoteric, academic topic but has important public policy implications. If structural changes are purely random, policy formulations (antitrust, regulation, legislative changes) should be based on the currently observed industry condi-

tions. If structural changes can be predicted, policy should be based on the expected conditions in the future. Thus it would be more appropriate to place constraints on an industry that currently has competition but is moving toward monopoly than on an industry that currently has little competition but is moving toward a more competitive structure."

AT&T began life as an upstart threatening the monopoly power of Western Union. As long as technology limited the telephone to local service, the two companies coexisted easily. Indeed, local telephone service provided a convenient means of access to Western Union's long-distance lines. But eventually it became possible to use the telephone over longer and longer distances.

"Telephones were not a direct substitute for telegraph but a complementary product," Brock writes. "They replaced messengers or personal travel, not telegraph lines. The telephone would displace potential telegraph demand from local service if the operation of the telegraph could be simplified sufficiently to make local service feasible. The telephone would displace telegraph lines if its range could be extended. Thus the complementary nature of the products could be transformed into competition between them by progress in either technology." It was, of course, the telephone that progressed, and eventually Western Union shrank into the afterthought it is today.

AT&T, meanwhile, was suffering competition from other telephone companies. It set out "to eliminate the direct competition of other telephone companies and increase barriers to entry." There was no inherent need for a total nationwide monopoly; different local companies, small natural monopolies, could interconnect with a nationwide long-distance monopoly. But in exchange for its acceptance of regulation, AT&T was allowed to embark on a massive program of acquisition until it ended up with 80% of the country's telephones and its only

significant long-distance network. "AT&T's cost of attaining market power through regulation was a limitation on the rate of price and service changes. . . . Uncertain authority, inadequate information, and the complex AT&T structure prevented the regulatory authorities from prescribing telephone rates even if they wanted to."

In effect, AT&T got the benefits of regulation with few of its disadvantages. Up to the present, Brock shows, it continues to charge what it will, waiting for regulatory challenges. When challenged, it files a new tariff—and waits for another challenge. The most recent example of this is the comedy over long-distance rates played out last summer. Finally the Feds got tired of challenging AT&T's numbers and the new rates went into effect—"temporarily."

But, of course, why should AT&T act differently? One reason is that there may at last be some competition. I personally am prepared to believe that most of AT&T's rates are fair—but its business practices, as outlined by Brock, are something else again.

Reading Gerry Brock puts me in mind of a delightful *Wall Street Journal* editorial on Mount St. Helens which said, in effect, what a pleasure it is to bemoan a disaster for which no one can be blamed. His book builds up a devastating case against AT&T's actions—but there is no guilty party, only a set of government strictures and market forces as powerful and irresistible as the shiftings of underground magma and the rules of plate tectonics.

Technology is now beginning to change those market forces, and new attitudes toward government and regulation are beginning to erode the government strictures. As Brock relates in his book, the first breach of AT&T's bulwark came with the rise of the long-distance services. "The regulatory barriers" protecting AT&T, he writes, "were reduced in a gradual and experimental manner rather than as a structured plan. . . . Yet in retrospect, the 1959

Systems, for example, kept on talking about all these wonderful new offerings: teleconferencing, facsimile, and so on. But what they're actually selling now is mostly just a cheap means of transmitting voice. It so happens that voice is just enormously efficient as a means of communication. We've had teleconferencing for years, but AT&T's Picturephone (in the '60s) never made it. The whole idea is just reviving now.

"Sure, within 10 years there will be a lot of it. But most of this high-capacity wideband will be in downtown commercial offices. Use will be substantial in dollars, not in

the percentage of businesses linked up." He glances around at his windowless, newly built office in a Minneapolis suburb. "There won't be any Ethernet around this office for quite a while. Electric typewriters is more the speed we're at. As for homes, that's not a technological or even a regulatory issue. Not very many people—aside from DATAMATION readers—have enough interest that they would want to do that at home as well."

Yet certainly a free market, where if one company doesn't do something its competitors will, should foster these developments. After all, new companies don't have

much to protect. In the long run, the technology will out, but in the short run the implementation depends on the players. Brock cites the early AT&T: "Without Alexander Graham Bell, you would still have had the telephone. Somebody succeeds first and gets the credit, but sooner or later someone else comes along who's been working on the same idea. [Elisha Gray filed a preliminary patent application on Feb. 17, 1876, the same day Bell filed an actual application.]

"But," he continues, "if AT&T hadn't had Theodore Vail [its creator in its current form], Western Union probably would have

decision to grant private microwave licenses was the key event in the gradual opening of the long-distance industry to competition.

"The original MCI application was predicated on the policy of open entry for private users. It was a small step to allow an intermediary to build a system for several users to share." AT&T's response was Tel-pak, a blatantly discriminatory pricing scheme for private-line service available only to individual users. It offered competitive pricing to would-be MCI customers, but was not available for resale by MCI or other long-distance service providers.

As Brock relates in his straightforward, sometimes unconsciously humorous fashion, "AT&T's actions were consistent with what would be expected of a profit-maximizing dominant firm. The general strategy used was to delay entry as long as possible through regulatory hearings, to restrict the scope of actual entry as much as possible through interconnection restrictions, and as a last resort to reduce the incentive for entry through price cuts on the service subject to entry. Regulatory delay and interconnection restriction were the least expensive methods of deterring entry. Price cuts were feasible so long as they could be confined to narrow classes of customers such as users of over 60 private lines or private-line users on high-density routes. So long as the new competitors retain [only] a small share of the market, broad-based price cuts to reduce the penetration rate are unlikely to be profitable."

This same problem has timely echoes in Advanced Communications Service, or ACS, AT&T's long-awaited answer to packet-switched networks such as Tymnet, Telenet, and United Telecom's just-born Uninet. Although technical delays have reportedly held up the system for several years, AT&T is currently indicating that it could offer the service any time now; it's just waiting for the regulatory scene to clear up. But, of course, if it offered the service,

at prices competitive with those of the other networks, what would happen to WATS—which costs the user three times as much? History does repeat itself. Like long-distance since the development of microwave in the '30s and '40s, the terminal equipment market is not a natural monopoly. Yet, says Brock, "The regulatory process maintained a tie between the intrinsically competitive terminal market and the monopoly telephone service market for 42 years"—until 1978. In 1978, after AT&T had "delay[ed] full implementation of the rules for 22 years by filing nonconforming tariffs, and waiting for the commission to hold hearings, declare the tariff illegal, and to order the companies to file another tariff," registration rules finally went into effect, permitting users to purchase their own terminal equipment as long as it was properly registered.

"From AT&T's point of view, the regulatory strategy was the least expensive method of maintaining a monopoly of the terminal equipment market," Brock writes. "So long as a tie could be maintained between telephone service and terminal equipment, entry was blocked into terminal equipment. The tie gave the company freedom to choose the prices of telephone service and terminals in order to take advantage of the interrelated demand without concern for entry in either market. The cost of maintaining the regulatory tie (primarily legal and related expenses for court and commission hearings) was small in relation to the cost of maintaining control of the terminal market through economic means. After the regulatory tie was broken, AT&T found it worthwhile to allow some competition into the market rather than to drop prices far enough to exclude competitors. Further price cuts can be expected in the future if regulatory barriers are not reestablished."

And that brings us almost up to the present. So far, competition has come from firms which "developed a product similar to one offered by the established monopoly firm." But now "new competition and sig-

nificant technological progress [have] modified traditional industry boundaries and brought previously unrelated products into competitive interaction." These new players are satellites, computers, and electronic mail.

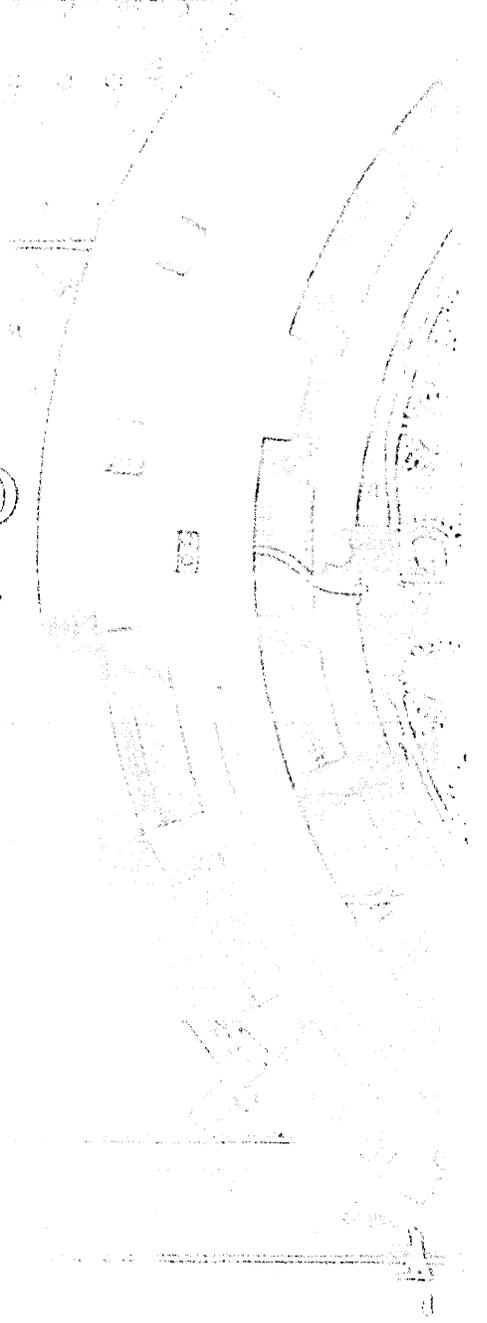
All these are becoming competitive with AT&T—and, conversely, represent attractive markets for AT&T to enter. Simultaneously, we have Congress' effort to produce a new industry structure—the outgrowth of the "Consumer Communications Reform Act of 1976," a telephone company-sponsored piece of legislation aimed at entrenching the phone companies' position. It has grown into something quite different from what they anticipated. And finally there is the government's on-again/off-again antitrust suit, seeking possible divestiture of significant parts of AT&T or at least the creation of a fully separated subsidiary.

In the context carefully laid out by Brock in the preceding chapters, these diverse factors all make sense. The exact outcome is unclear, but Brock is convinced that technology will overpower regulatory constraints in the long run.

The only question is, How long will it take? As it has done in the past, the government could impede the strong, if unwitting, tendency of the free market to advance the industry as a whole. Thus, Brock concludes, "Public policies for the industry should be designed to fit a rapidly changing, growing, progressive industry with large numbers of potential entrants from diverse technological specialties. No single company is likely to effectively use all the opportunities in telecommunications services in the decades ahead. Nor is any regulatory body likely to be aware of all the possibilities. The only way to ensure full benefits from this industry is to allow wide participation, with the opportunity for many companies to try out their innovations and succeed or fail according to the merit of the plan."

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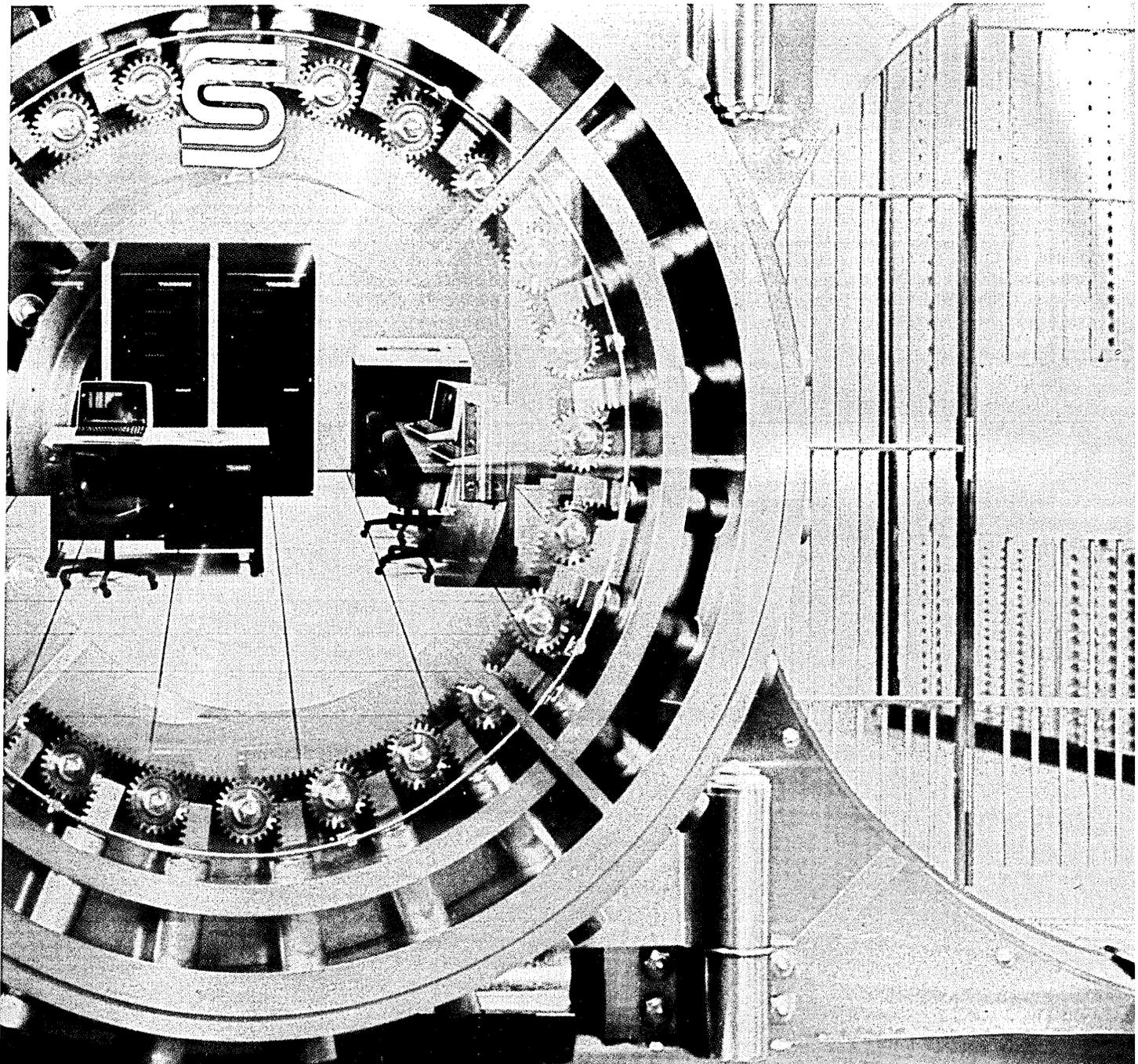
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**“Because of technological progress, we now have a situation where there is no inherent monopoly. Everyone can go out and do his best.”**

been the dominant developer of the telephone system. And most likely it would have come about very slowly, because Western Union would have tried to protect the telegraph.”

One thing that strikes him about AT&T, Brock says, is the company’s willingness to use its market power. “The actions they’ve taken would probably be illegal absent the regulation,” he muses. “They don’t send out goons, but they play hard, given the

capabilities they have.” As a student of the computer industry, he’s intrigued by the contrast with IBM: “AT&T was quicker to use its power than IBM was. Under the cloak of regulation, AT&T could do more. But from an economic point of view, that’s what we’d expect them to do.”

It’s these historical inevitabilities that interest Gerald Brock. “It’s one of the fundamental differences between business litera-

ture and economic analysis. People are just vehicles of a larger trend.”

Brock got into the study of computers and communications in college. As an undergraduate at Harvard majoring in applied math, he began as a keypuncher and graduated to free-lance programmer. By the time he was studying economics in graduate school, he made a decision to study the computer industry, but found there was a void in the literature. “It was a young industry, there’s a long publishing cycle, and the technology aspect evidently warded off all the standard economists. We had been assigned to read an industry study, but there wasn’t any, so I decided to do it myself.” That eventually turned into his first book, *The U.S. Computer Industry* (Ballinger, 1975).

“The industry study,” he explains, “used to be a standard format. But the traditional industry study was static and only of interest to people in that industry. Now it’s considered an out-of-date method and people tend to do cross-industry statistical studies. The trouble is, they often miss a lot of interesting stuff. With my two studies, instead, you could say I’m doing statistical studies across time. I was trying to develop theoretically how an industry changes over time.”

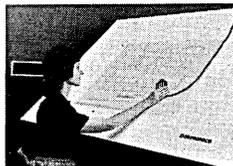
Brock taught at the University of Arizona and at Bethel College in St. Paul, Minnesota, before becoming an independent consultant. Eventually he plans to write a joint sequel to his two industry studies, perhaps entitled *The Computer and Communications Industry*, but he intends to wait until things settle down somewhat. Meanwhile, he’s working on a more personal opus: an attempt “to bring Christian value judgments to bear on some current issues” such as world hunger. Hence the multicolored world maps lining his walls; they show distributions of food, income growth, and other characteristics.

Gerald Brock, a devout Christian, isn’t as amoral as he seems in his dispassionate discussion of the communications industry. He just knows that you can’t legislate moral behavior by corporations. Free market competition, he believes, is likely to produce the greatest quantity of goods, but will not necessarily distribute them in a desirable manner. So his next book will be an attempt to influence people to assess the implications of their acts more carefully. That might not seem so important when the question is whether everyone will be able to buy Mickey Mouse telephones. Feeding the world, however, is a different matter. \*



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Some suggestions for would-be independents to consider before taking the plunge.

# SO YOU WANT TO BE A CONSULTANT

by Merrill Cherlin

If you wear polyester suits and are made nervous by a lack of structure, this article is not for you. If, on the other hand, you are a walking advertisement for Bill Blass and your associates think of you as the Dick Cavett of the two-martini lunch, read on. You've got at least part of what it takes to succeed as a consultant.

What other attributes are required? Established consultants we spoke with, all either independents or in small partnerships, expressed similar opinions: "People who look for tranquility, I don't recommend consulting for," says one. Another says, "A person must be comfortable with lack of structure. For instance, the person who doesn't feel comfortable when his 8 to 5 routine changes won't be happy in a consulting environment. You have to make your own structure and be able to handle a wide variety of work at any one time." Says a third: "It's quite risky; you have to be very single-minded and you have to sit down and take a profile of yourself. Are you aggressive enough to go out and hustle business? Because you're going to have to do that. Are you financially set up so you can weather the storm for a while? Also, people skills are critical. I've got a couple of guys in a seminar I'm giving who have 50 reasons why everything won't work. Manipulating them and getting them turned around can really deteriorate a session. One time I jump on them, the next time I humor them. If you get all defensive and take your marbles and go home you have problems."

Okay, say you have the expertise, you're good with people, and you want the freedom the consultant's life can bring. You're strongly considering making the big move and going into business for yourself. There's a raft of questions you still have to answer, including a pretty basic one posed by a friend of ours, who has been a consultant for 20 years.

"When people ask me for advice," he says, "the first thing I ask is *not* about their technical prowess, which is what they're usually so proud of. I ask them about their financial situation. Can they stand to go without a paycheck for 60 to 90 to 120 days? I explain patiently that if they hang out their shingle

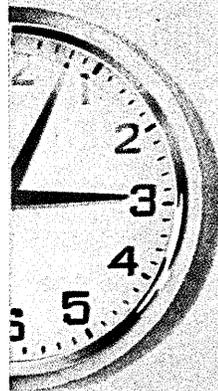
and announce they're in business and if in the first month they get enough business to keep them busy and they start working on that business in the second month, and bill at the end of the second month, which is the traditional billing cycle, and if the client pays promptly—within 30 days—that'll mean 90 days they've got to keep up appearances, provide for a family, drive a lot of miles, make a lot of calls, and so on. Can they handle that? Right off the bat about 80% of them are eliminated by that one question. They just can't do it financially. Most of the people I talk to are young males with a wife or kids to support from a previous marriage, a washer that's not paid for, car payments, and so on. If you have aspirations to become a consultant, you ought to start managing your family finances two or three years in advance so you've got that kind of money socked away. Or have a wife who makes a top salary or a sugar daddy somewhere. But generally the young males I talk to are on the macho side. They want to be masters of their own fate. You don't hang onto your wife's briefcase straps if what you're striving for is independence.

"And you sure as hell don't go to your bank. Even if they'd be willing to lend you the money for some normal enterprise, at 18% to 22%, you fail all their conservative questions because you're ready to leave a good steady job and go out on your own with no background."

## DON'T ASK IN-LAWS

"Don't borrow the money from your father-in-law—you'll find the financial pressures build up on you exactly when you don't need them. You want to get up and shave and put on your best shiny face and go out there and convince those guys you're ready and eager to work. You've been getting up for 35 mornings like this and you're trying to maintain a stiff upper lip, you're getting pretty bored with the whole damn thing, and then you find you have this financial pressure. These are not the conditions under which you can put your best foot forward."

Another consultant, who's in business with a partner, adds, "My partner took what he nested in his pension plan with his old company, plus some savings, and he'd identi-





## "If you have a reasonable number of prospects lined up, you have to take a chance and go."

fied some clients and lined up one or two before he left. And when I left IBM I took a self-imposed 50% cut in pay. I was running at that level for the first half-year. Within two years I was making substantially more than I would have been making with IBM, but I had to assume that risk."

Another warns, "No matter how well a guy has done in his previous job, he's now in a different ball game. People are going to look at him a little differently. They're going to analyze him, really check him out. That takes time. I think the prudent business approach is to be optimistic, aggressive, and all that. But don't expect to do much better than break even in the first year or two. Of course, if you worry too much about being ready, you'll never do it. You just have to bite the bullet and jump. I'd say, if you have a reasonable number of prospects already lined up, you have to take a chance and go."

But before we get into just how you line up that first contract, we should explore the prerequisites, other than financial, for making the grade in consulting.

One male chauvinist claims, "You need help and support from a wife. You can't be married to some sobbing broad. If your mate can keep the lid on the domestic scene and is sensitive to what you're doing and doesn't bug you with a lot of problems, that's what's important. And I can't imagine anyone doing it as a single. Swinging singles have enough trouble with dating, food service, and laundry. How do you add answering the telephone, putting out the proposals, doing the technical work, writing reports, reproducing them in quantity, and getting them delivered on time? I don't see how that works. It's a team effort. Behind every successful consultant is a good helpmeet."

Opinions may differ on that—ask any good female consultant—but other things are musts. For instance, projecting a professional image is essential. A Los Angeles independent puts it this way: "Although, theoretically, I could have worked out of my home, I thought an office was important for the sake of image. If I wanted to talk with people I could do it in a businesslike atmosphere. I also liked the idea of getting up and going to the office. It's certainly more businesslike than trying to work in your home. Another facet of image is manners and dress. You have to be willing to put some effort into your dress—perhaps plan on paying a little extra for your clothes. I guess I'm saying, 'Play the game.' If people are paying a consultant well above what they're paying the average manager they expect a more professional approach and appearance. They don't want some guy who's wearing a sport shirt and sandals, even though he may be brilliant."

Everyone also agrees that you have to "acquire a little stature." In other words, don't

### NOTES FROM A CONSULTANT

1. Why does everyone think a free lunch and a few drinks are all it takes to get a consultant to solve a major political and technical problem? I don't mind giving away a bit of free advice on occasion, but I hate to be pumped.

2. Always bill promptly—the bigger the client the slower they pay. Nasty letters don't help. Once in a great while a large company will try to settle for 70% of the fee. Play dirty, hire a good lawyer, threaten exposure in *Business Week* and *DATAMATION*, yell and howl.

3. The only good business comes from references and contacts. A phone call is better than nothing, I suppose, but I've never had any real luck with them.

4. Don't let a U.S. government agency pull its maximum per day limit on you. All the successful consultants have found ways around it.

5. Learn to type; it'll save you hours.

6. Before you go off into consulting, find a good source for all the slides and charts you're ever going to need—it's brutally expensive, and you take it for granted in a large corporation.

7. Most difficult things to find are a cheap copier and a clean public rest room in midtown New York. Never pass up an opportunity to use a rest room.

8. Philosophies of data processing are luxuries that independents cannot afford. You're in business to make money.

9. Don't hesitate to be a reference bureau for unemployed friends. One of them may be your next client.

10. Now that you're on your own, you're no longer a professional, but a businessman. You don't have the time and money to be active in ACM, DPMA, and the others. You should be active in them *before* you go out on your own, to get exposure. You certainly don't have time to play into society politics.

11. Write a lot of letters—somebody

out there is looking for you.

12. Fly first class. You're spending so much time on planes you need the peace and quiet up front. Avoid the Eastern shuttle—after a long day dealing with the government, the cattle car can get to you.

13. Going overseas to work for a week or two is a great way to recharge the batteries. The visiting American expert is treated with great respect and is very well paid—sometimes in cash! On the other hand, they never take your advice.

14. I promise you won't be in business six months before a client tells you payment is late because the computer fouled up.

15. Take two full-time jobs at once and work nights. You can always hire a neighborhood kid to cut the lawn. Better yet, move to an apartment.

16. Wear your dark suit on Wall Street, a sport jacket to show your independence most of the time, and a turtleneck in California. It seems to impress clients that you have a disrespect for their pet conventions, but you don't want to disregard them too far.

17. A beard helps if you're selling operations research or mathematical models, but it's better to be clean-shaven if you're dealing with banks and insurance companies.

18. Get a receipt for everything. It makes your accountant and the IRS happy.

19. Any time you're on-site, take all the manuals you think you're going to need for the next year. They're harder than hell to get when you're an outsider.

20. The IBM consultants' office can be very useful if you know how to deal with them.

21. Try to get a part-time press assignment—it gets you into a lot of interesting cocktail parties and technical meetings.

22. Get the business first, worry about doing it later. You can always subcontract.

try to become a consultant until you've been in the industry a few years. Merely toiling away in said industry, though, is not enough—you have to make yourself known. The same consultant continues, "You have to get a lot of publicity first—through speaking, writing, and appearances before professional organizations. In the early years I kept telling people of my availability to speak, and after a while the invitations started coming in. Now I get enough requests. It's a function of staying alive for a while so people recognize you're around and serious. It's crucial. People have to know you're there before you can be asked

to give a proposal or come in and discuss the situation.

"I was very lucky to get started in the writing business. I started writing for *Small Systems World* when it was still called *System/3 World*. In those days I'd do two or three articles a year for them. Then I helped start the annual manufacturing software survey for that magazine in 1978. I've written for other publications, such as *APICS News* and *DATAMATION*. My speaking was mainly for APICS [the American Production and Inventory Control Society], the main professional society in the part of the business I'm in."



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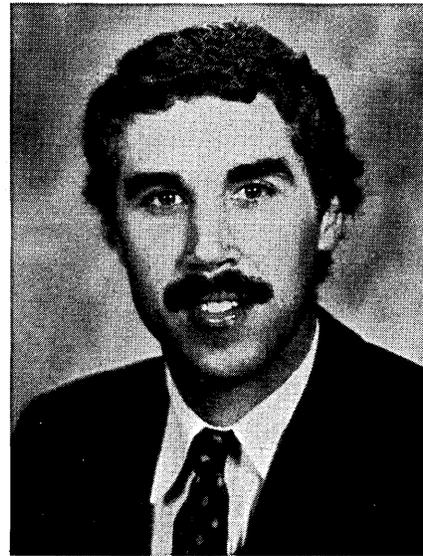
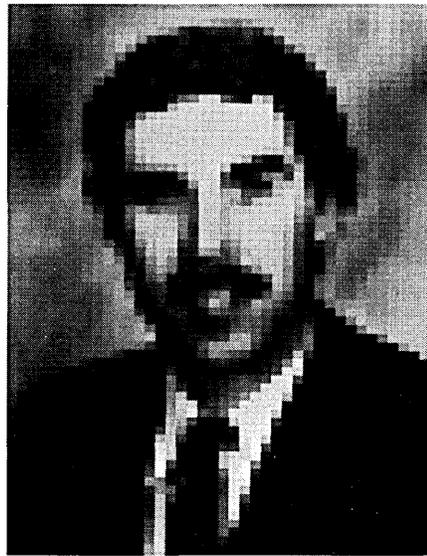
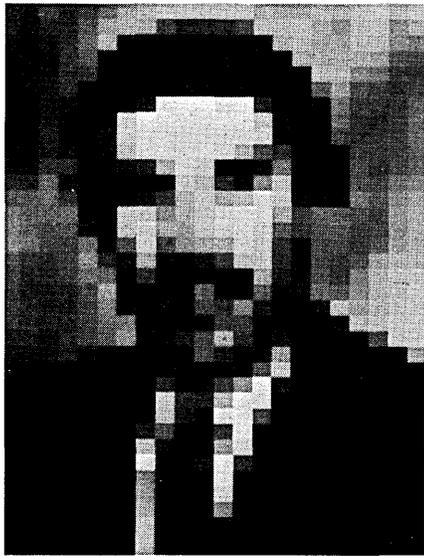
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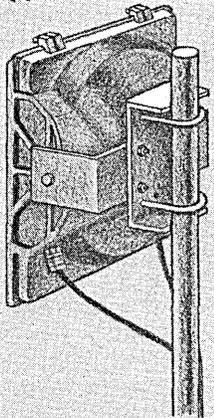
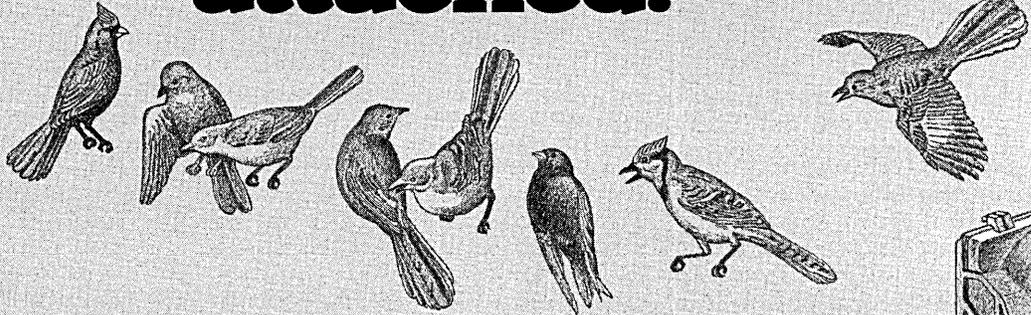
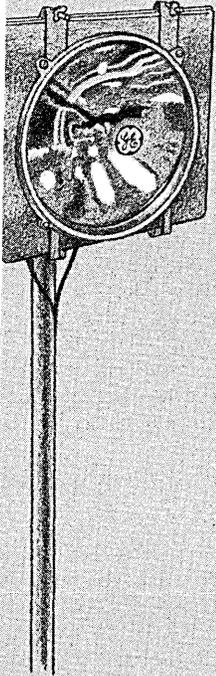
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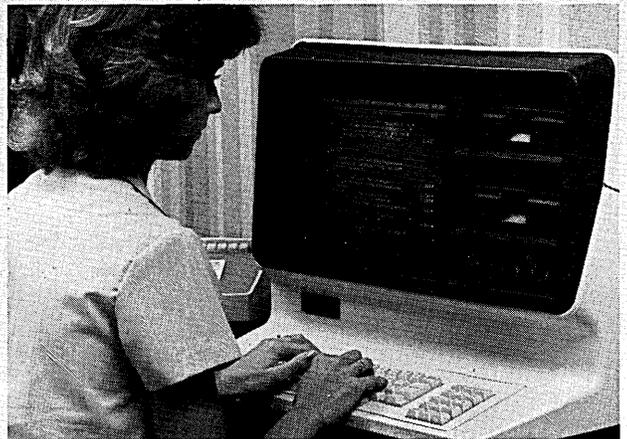
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## "You need something you can point to, something that has built you a reputation."

Another consultant specializing in materials management says, "I write for *Small Systems World* and have had the feature article in their big manufacturing issue two years in a row. That certainly gives you additional credibility. I joined APICS, first becoming active as a program chairman. Then I ran seminars for them, and eventually I took over as president of the St. Louis chapter for a couple of years. So I have good visibility and credibility with professionals. Those professionals don't buy business from us; only the top executives of the company do. But when the executives ask, 'Do you know these people?' they know who we are."

While these two have been getting continued exposure as they've built up their businesses, such publicity must really begin before one leaves his job. But rarely does the would-be consultant make such a decision with premeditation. A veteran explains, "I clearly believe in career planning, a career is much too important to be left catch-as-catch-can. If you have an idea that you want to consult in the future, you ought to get some exposure. But usually the people who become consultants are naturally outgoing and have something to say that they think is worthy of a broad audience. These are the people that get on SHARE committees, that attend GUIDE meetings, that are active in IEEE DPMA, or ACM. After they've done this for five or ten years in addition to their regular work, these are the people that say, 'Look, I've got enough people that know me and I'm good enough in my specialty that I might just make it.' It seldom works out that a guy says, 'Well, for my ultimate career, I'd like to be a consultant' and then works up to it.

"Frequently, people who come to me seeking advice are hotshot technicians. They may be spectacular technicians, but all they've ever written is computer code. They've never written a paper, never gotten anything published, never spoken at a conference or meeting. Nobody knows 'em. Even if they sent out a mailing or started making calls, there's nothing that would spark a remembrance in the mind of a client. They're absolutely cold.

"A guy came by last Thursday who's been working for IBM 25 or 30 years and has now left. At one time he was an outstanding leader in the field. He's been doing great work off in the catacombs but no one's ever heard of him. He's over 50 and is an outstanding brain, but if you looked at him in a police lineup you wouldn't know him from anybody else. You need the ammunition to convince not only the client but also the procurement department he's dealing with that you're better than the excellent technicians they already employ. You need something you can point to, something that has built you a reputation."

### HUSTLING FOR JOBS IS TOUGH

Once you have the ammunition—the published articles and so forth—don't expect clients to flock to you. A consultant's life involves a constant marketing effort. Hustling for the jobs, they contend, is a lot harder than doing the technical work itself. Are you going to send out mailings or printed brochures; hand out resumes, call on people in person or over the phone? You've got to decide what will be most effective. A midwesterner in business with a partner explains his strategy:

"We enlist the assistance of former clients in helping us identify other potential clients. It's like a chain letter. These are only prospects, not clients, but at least we can get in with a recommendation. And we write personal letters to key executives on topics having to do with MRP and how it's the solution to some of their problems. Our rate on follow-up calls is about 20%—pretty high. But we're selective in where we send the letters and we have a powerful message when we get there.

"If you can't sell yourself and your business, you're gonna dry up. I know a guy here in town who's been trying to get something going for two years. I don't think he's got his first client yet. He's a retired government employee who knows more about some of the systems that I work with than I ever dreamed of or wanted to know. But he doesn't know how to sell his business."

Next, you'd better have a clear idea of what your particular specialty is, and enter an area where there is a clear demand for your kind of service. "You may say," notes a successful consultant, "I'm the best assembly language programmer in the whole damn world." But how much of that is going and how much is getting contracted out? Almost no commercial user does it unless it's maintenance, which most people consider dog work. But if you're a PL/I designer or have great database skills you have an in-depth specialty that most companies need, but only for a short period of time. So now we're talking about hiring a specialist. That makes it a lot easier. You can make your reputation that way."

Another says, "Any area where there are a lot of products available and you want objective advice on what to do, there's an opportunity. Like, everybody's got a word processor—which one's good? How do you determine what you want to do, that kind of thing. Also, any area where people are having trouble getting results, but which is ballyhooed as profitable, is a great area for consulting opportunities."

Still another identifies four kinds of people currently valued: "A computer center director who's come up through the operations side and then gone into management, up above operations; a top-notch systems analyst who can go into a user situation and find

out why the user has a problem and what he needs (he must be able to work with two or three antagonistic or at least conflicting organizations and put together a package that is satisfactory); a person who has a flair for technical writing—not a contract writer or someone who can take someone else's prose and clean it up, but the person who can understand the job and can write adequate documentation and training materials for it; and a communications technical specialist—there's a terrible shortage of these guys."

Great—now you've identified yourself as a person in demand. Should you make the leap alone or with a partner? An independent says, "It's probably easier to go into a firm with someone else—you have someone to talk to, you can compare ideas, swap some of the workload around, critique each other. The independent has the worst situation in terms of emotions. It's a very up and down game, and a bit lonely. If you have a problem with a client, you have no one to talk it over with."

But a partner in a consulting firm warns that two can starve twice as fast as one. Let one person start the business, he recommends. After it's been going awhile, the second one can join him—if there's enough work.

And getting just the right amount of business can be tricky. Says a self-styled "computer specialist": "Most people are bright enough not to quit their current job until they get that first contract. My caution to them is: it ain't the first contract you ought to worry about, it's the second. You work very diligently at the first contract, but you're not doing much business development. At some point your first contract ends. You want to bring in your second contract exactly when the first one ends. That's very difficult to do. If the second one comes in too soon, you're working overtime, nights and Saturdays. You're trying to impress people with the quality of the work you're doing, but if you work too many hours the quality won't be as high.

"Of course, if you don't have a second contract ready to go and you have to wait 30 days before starting new work, that eats up all the profits from the first job."

A consultant who's been in the business for nine years adds, "I think the amount of work you can reasonably expect to carry shouldn't be more than 80% of your normal available billing hours. You have to have time for administrative and other work, for assignments you hadn't planned on—putting a little extra into an assignment and not billing for it. On the same score, don't plan on working 40 hours a week. You have to be prepared for some very unusual hours. It's not as if you'll be working 70 hours a week—you couldn't and still be an effective consultant. But it's definitely not going to be the 8 to 5 routine. You have to be prepared for fluctuations."

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## Is a particular consultant a success or failure? Only his banker knows for sure.

### BILLING CAN BE A DILEMMA

If you're fortunate enough to get adequate business, you may find yourself in a dilemma over billing procedures. He continues, "Basically, your fee is a per-diem rate which is based (not very scientifically) on what the competition's charging and what you feel comfortable charging. As an independent I can charge less

than the Big Eight CPA firms, but if I charged too much less people might think I'm just a schlock operation. There's a psychology to the billing structure; it can't be more than 15% less than the Big Eight CPA firms.

"Most consultants will give a range estimate of what the job will cost based on a definition of the assignment. A reputable consultant will submit a detailed proposal so his

client has a way of judging progress."

On the other hand, a New York consultant says, "Don't let some client push you around and touch your fee. If he wants you, he wants you. Set your fees and stay with them. Obviously, you charge less per day if a guy gives you a contract for two days a week for three months. Also, many computer people tend to underbill themselves. I'd rather get \$1,000 a day for two days a week than \$400 a day five days a week."

Written contracts can hang people up, too. An expert says, "Most of these would-be consultants have never bought anything bigger than a car or maybe a house. Now they've got to deal with large corporations on contracts or purchase orders or verbal agreements. They wish they had some legal advice. They don't understand the difference between the ant and the elephant. The elephant does whatever it damn well pleases and the ant stays out of the way. If you go into business for yourself, you've got to be a tiger technically but be very humble administratively—'cause you're just an ant. It's a little schizophrenic. You've got to know when to be humble and when to be the clawing tiger."

Another word of caution on becoming self-employed: Don't do it until you figure out how you're going to handle all the necessities like medical, pension, and disability plans. Should you buy income protection insurance? Most people never sit down and figure out how much their fringe benefits cost their employers over and above their salaries. Health insurance, vacations, the numerous paid holidays every year, travel expenses to attend meetings, office space, copying machines, office supplies, secretaries, telephones—the list is long. Since you must provide these things for yourself, the cost should go into your rate calculations. Don't overlook the fact that societies such as IEEE and ACM have fairly cheap group plans.

It's hard for outsiders to assess whether a particular consultant is a success or failure. A skeptic says, "Only his banker knows for sure. Maybe he had a lot of money in the bank but is getting no work. Your income has to exceed your old one by 50% because you're paying your own fringes. When you start to get repeat business you know you've made it."

And if you don't make it? Well, in most parts of the country there's such a shortage of computer people that you could just give up your business and find yourself another salaried job. While most of the consultants we spoke with said it was difficult to establish and maintain a successful business, they felt that failure would not lead to the poorhouse, merely to a loss of self-esteem, perhaps, or the painful relinquishing of a dream. As one says, "My basic goal was not to be a consultant, but to do my own thing." \*

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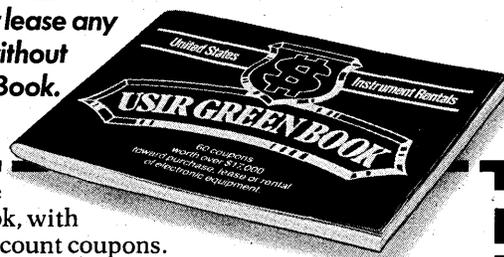
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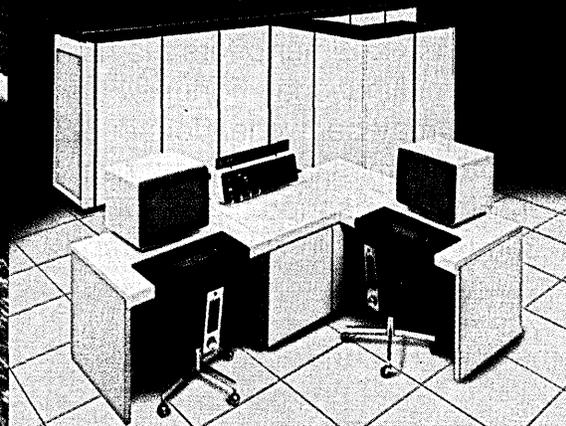
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CIRCLE 140 ON READER CARD

The classic methodology has certain defects; herewith, an approach for remedying them.

# MODIFIED TOP-DOWN DESIGN

by Gideon Samid

Experienced software systems developers have noted that the highly acclaimed top-down design method for large projects is rarely followed to its strictest degree. In fact, as deadlines draw near, the method's highly ordered structure often falls apart, leaving a catch-as-patch-can scramble to finish on time and to spec.

Investigation of the top-down method's application in several real-life cases shows that the final crumbling of the formal structure stems from the imperfection of human nature in dealing with abstractness in the initial phases of top-down management. Concept and requirement definition, feasibility and economic analyses, and overall design phases, for instance, produce vague and overloaded documents with "floating" phrases that every reader interprets differently. An interteam communications problem develops and time—for meetings, memos, and other work—is wasted in "what-do-you-mean-by-that" reviews. People become exhausted and discouraged.

Moreover, the classic top-down method tends to obstruct team harmony; the very notion of top and down implies a hierarchy that creates psychological division. The formal phase-after-phase approach loads the development team unevenly, particularly at the early stages when the top-phase groups sweat and the implementors are virtually unemployed. Later the workload evens out, but it is obviously hard to maintain a cooperative team when the load is unevenly distributed at any given time.

What follows is an attempt to come up with a formal modification to strict top-down methodology that can alleviate some of the psychological, financial, and economic defects inherent in the classic approach.

Almost every phase in the standard phase ladder may be conceived of as two or more successive stages. For the sake of simplicity, let's restrict ourselves to only two: coarse and fine. It is important to note that this coarse/fine or draft/final distinction is not the common abstract/detailed concept as understood between, for example, functional and detailed design. The breakdown attempts to view each phase as composed of two succes-

FIG. 1

## THE CLASSIC TOP-DOWN APPROACH

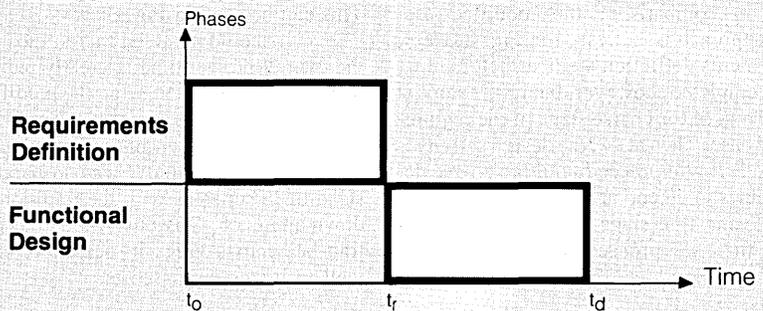


FIG. 2

## THE MODIFIED TOP-DOWN APPROACH

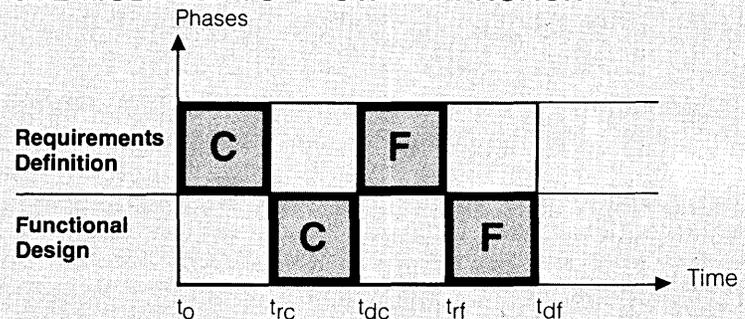
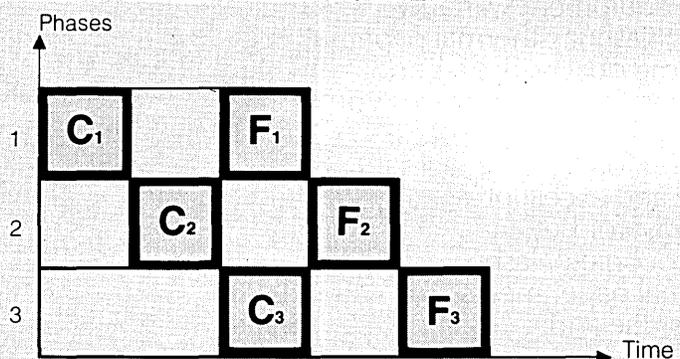


FIG. 3

## THE MODIFIED TOP-DOWN APPROACH WHERE n PHASES ARE INVOLVED



# In a sense, the modification is no more than a systematic approach to an otherwise abundant natural phenomenon.

sive efforts that are equally abstract and detailed. The second stage is no more than a review (or a refinement) of the first effort.

The actual distinction between the coarse and the fine parts of a phase is probably best done according to a time criterion. Tell the designer to deliver what he can do in half the regular design time. The submitted document will be called the coarse design.

Let's observe a small portion of the phase ladder, say the requirements phase, and the succeeding phase, functional design. The classic top-down approach is depicted in Fig. 1. The requirements effort (the top shaded area) starts at  $t_0$ , is completed at  $t_r$ , and triggers the design effort which terminates at  $t_d$ .

In comparison, the modified top-down approach is expressed in Fig. 2. Here, requirements definition starts as before at  $t_0$ , is not completed, however, but rather stops at  $t_{rc}$ , the end of the coarse stage of the requirements phase. Then at  $t_{rc}$ , the design activity is triggered. It will proceed until the coarse design comes to an end at  $t_{dc}$ . At this point we move to the fine stage of the requirements phase; then we proceed to the fine-design stage.

## FINE FOLLOWS COARSE

The very fact that the fine stage of the requirements activity is done after the coarse-design stage has been carried out gives the requirements analyzer extra insight into the system, a better "feel" for its nature. It may happen that the major requirements layout will be basically changed, or at least that a more intelligent requirements definition will be prepared. Based on a better and more considered requirements definition, the design phase as a whole has a better chance for improvement.

Of course, the modification can be applied to the more realistic case when many more than two phases,  $n$  phases, are involved. This can be seen in Fig. 3.

It should be noted that in most cases, the overall project time is greatly reduced in  $n$ -phase projects when using the modified approach. The savings come from a reduction in waiting time between phases—various parts of each phase are under way in parallel instead of in series as with the traditional top-down approach. Obviously, the time savings translate into savings in personnel costs as well as in computing costs.

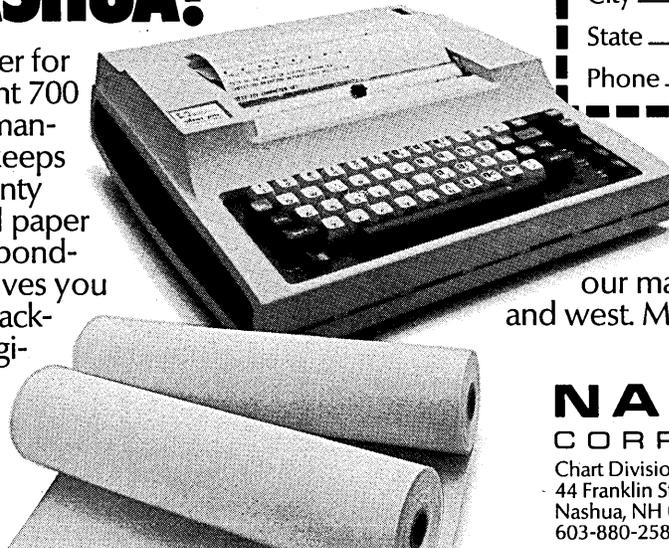
The modified method stems from the belief that system developers are not "square" enough for an elegant, aesthetic top-down design. Human imperfection is a fact. In a sense, the modification is no more than a systematic approach to an otherwise abundant natural phenomenon. In very simple systems, involving one or two persons, the process of running back and forth between different phase levels is always present: just think back to student days when vague concepts were coded in a rush, brought back for a late night redesign, coded again, and redesigned again. In large systems efforts, this feedback loop takes a more serious turn: many diehard managers enforce a strict top-down path only to find that design flaws surface in the final implementation stage. The system fails and a laborious design modification is required at great cost. \*

Gideon Samid, Chem. Eng., PE, MSc, is vice president, engineering, at Frontier International. He is the author of a book, *Nothing \* New*, which investigates new horizons in data representation.

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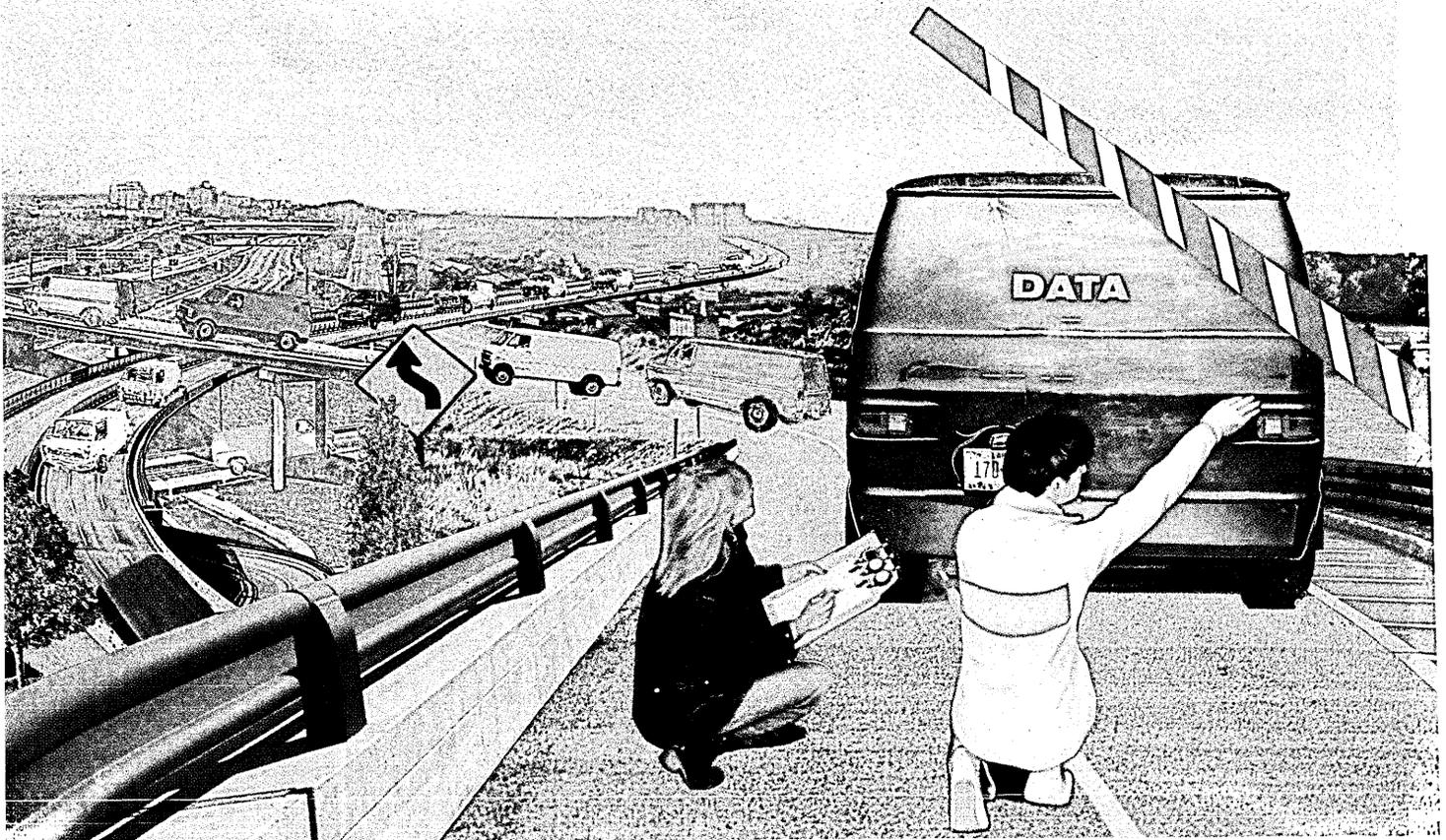


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Given a choice, most people will put the horse before the cart.  
Sometimes, though, it's hard to tell which is which.

# DISTRIBUTED SYSTEMS AND DATA MANAGEMENT



## by Paul R. Hessinger

Distributed data processing (ddp) means many things to many people. Unlike other new state of the art technologies—database, data communications, and computer graphics to name a few—ddp defies precise definition and categorization. One often hears claims that an enterprise's data processing is "going distributed" or that a recent vendor announcement means that the implementation of ddp is now a realistic objective. Upon investigating these claims, however, one often finds that those "implementing" ddp are not quite sure what it means.

Distributed data processing can be a very intimidating force, or it can be viewed as a rather straightforward approach to extending (i.e., distributing) the data processing resource. In other words, if one focuses on the word distributed, then the result is likely to be a lack of understanding or direction. If instead management and technicians place their emphasis on data processing—with all its attendant complexities—the concept of distributing this capability becomes one step in an overall master plan for supporting a business through information systems.

It is interesting to note that according to some of today's criteria, many dp installations achieved distributed status well in advance of the ddp era. (For clarity, let's assume this era began in 1978.) But other installations, instead of carefully analyzing the successes and failures of these pioneers, were caught up in a wave of dramatic advances in technology. There was an increasing emphasis on information systems. In many cases, organizations looked to ddp as an end in itself without careful analysis of the existing data processing operation.

Some executives came to regard ddp as a panacea. In one case, a major U.S. financial institution gave carte blanche endorsement to a complete distribution of the dp function. Briefly stated, the result was a significant decrease in data processing effectiveness. This can be attributed to at least three factors: endorsement of ddp without careful technical analysis and design; placement of data processing and responsibility for it in areas that were not prepared for either; and the lack of an overall master plan for data processing that magnified the first two issues.

As a result of this "adventure" and others like it, ddp as a formal concept and methodology got off to a rough start. Data processing management blamed vendors for not supplying the "complete ddp system." General management blamed dp management for problems associated with ddp, not the least of which were budget overruns. End users became more dissatisfied with the ability of data processing to assist them in their assigned business function.

There were plenty of symptoms: growing lines of customers at a bank teller's window because the computer was off-line; anxious waiting for a seat assignment as departure time for a plane trip grew near; and difficulties at a checkout counter where a computer terminal had replaced a simple cash register. Many people experienced these problems without realizing they were part of a massive infusion of computer technology such as had not been attempted before.

Though a lot of blame was being assigned at a time when the ddp philosophy was just developing, it's important to realize that ddp itself deserves a relatively small share. Data processing was at the root of many problems—some of which were self-inflicted (e.g., due to a lack of planning and control) and others where it was less in command of its fate (e.g., lack of top management support and understanding; rapidly advancing technology). As will be discussed, there may not have been enough emphasis on controlling the primary resource—data.

The 1970s saw dramatic and significant advances in data processing technology: database management systems; data communication hardware and software; larger, faster, and less expensive mainframes; sophisticated minicomputers and microprocessors. The arrival of home computers and handheld calculators literally put the computer resource in the palm of one's hand.

The early 1970s was also a period when, for the first time, management of the data processing function was discussed more as an integral part of a business rather than as a back-office clerical operation. Concepts developed in the 1960s could now be refined, with years of practical experience as a guide. Richard Nolan, in a 1974 *Harvard Business Review* article entitled "Managing the Four Stages of EDP Growth," provided one of the earliest blueprints for a combination of advanced technology and upper management exposure and responsibility to achieve a high return from the data processing resource. An interesting insight into dp development: In 1979 Nolan updated his original article, retitling it "Managing the Crisis in DP." Now there were six stages for dp growth. Was ddp one of them?

It's useful to contrast dp growth with the construction of a building. An architect, intimately familiar with the occupants' requirements, develops the construction plans while taking into account current techniques and products germane to the project. The building plans allow the occupants to view a conception of the finished product. Once approval is given, the foundation is laid, the first phase of construction. Then the framework, the walls, the floors, etc. are added. The building is very seldom occupied until 100% complete.



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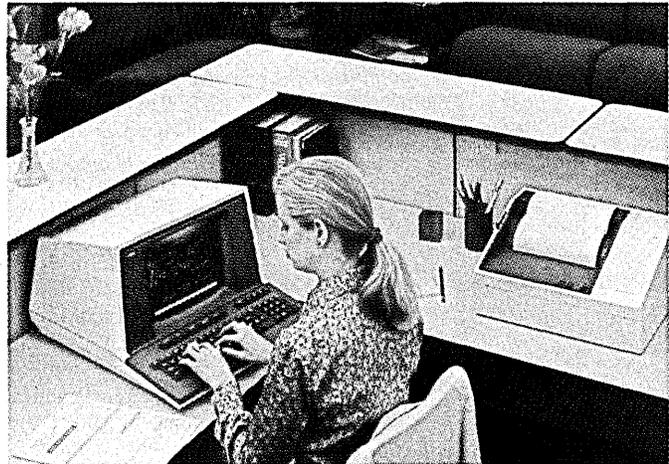
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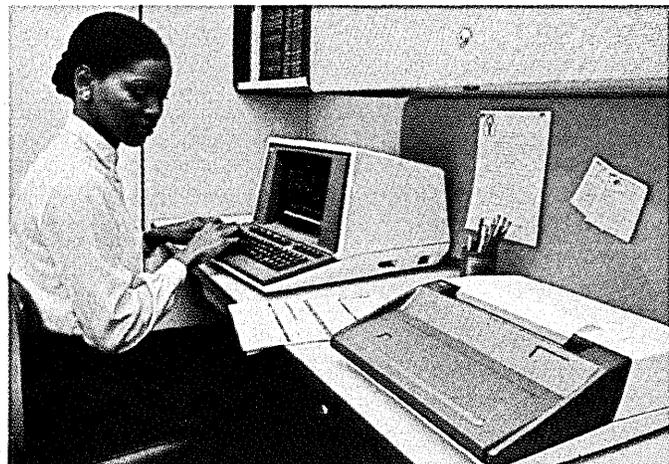
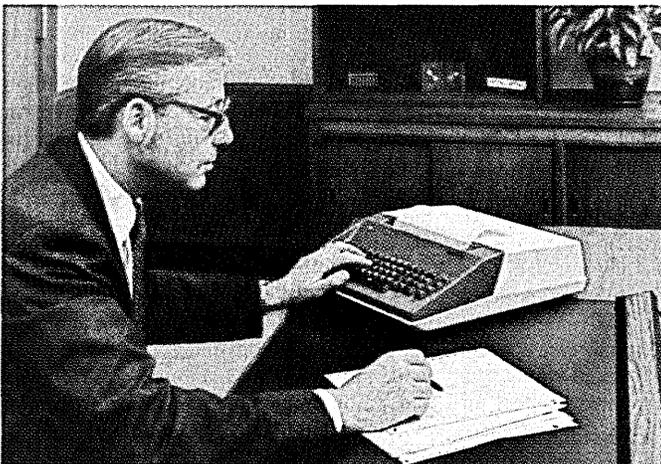
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# The primary objective of data processing is to provide accurate and timely information to assist the operation of a business.

Data processing is like a building perpetually under construction. The visibility that data processing began to have in many businesses focused attention on the project. Quite naturally, top management's eyes were on the "finished product," on putting the resources to use. But was there enough focus on the blueprint itself?

## BUILDING THE BASE

Nolan and other authorities had provided blueprints. They all stressed that the foundation of the dp organization must be strong. While this exposure would ultimately allow dp to play a more effective role in a business, its initial impact was pressure from top management to "put the roof" on the dp construction project. But database and data communications initially weren't part of the roof, they were part of the blueprint. Too rapid an introduction did not allow the foundation to settle.

The need for long-range planning was becoming clear. It was difficult, however, as users in dire need of immediate support provided a ready market for any resource that could be of assistance. For those with the time to grasp the technological requirements of the expanding user community, ddp was looking like the final blueprint for dp. For those unable to keep up with the technology and user requirements, however, ddp was a chaotic view of dp.

The mid- to late 1970s witnessed growing dissatisfaction with some of the "sophisticated" technology. Perhaps difficulties with IBM's IMS, a database software system, best exemplified the problem. Complex technologies were being implemented with little planning, very little expertise (as the technology was new), and unrealistic expectations of the benefits to be received. Data management (the foundation of information resource management) was a technical concept. It was supported by various hardware (e.g., faster and higher volume storage devices) and software (like IMS) resources. The benefits that the concept promised, however, overshadowed the operational planning and control required for the implementation of a successful data management program.

The overall dp effort generally suffered somewhat from the introduction of such technology. Development continued, however, as the pressure to support the business increased.

Bottlenecks began to develop in spite of larger and faster mainframe computers with greatly increased processing power. New computer applications sat waiting; changes to existing systems took forever (or so it seemed); and the reliability of the data processing resource seemed to be decreasing. For the first time, software development costs stood out as a major portion of a dp budget.

This was partially due to the decline in hardware costs. Also to blame were the absence of development methodologies, the lack of automated assistance for software, and inflation.

Data communications (even in basic form) provided a temporary relief in some respects. Users who blamed data processing for reports that were a day late (when, in fact, the intraoffice mail system was at least partly to blame) now had a printer installed in their work areas. Other users who had previously utilized a central data entry function were now allowed to interact with the computer system through a crt.

An evolution was taking place. Users adapted quickly to new capabilities and just as quickly demanded more. Dp management attempted to convince top management of the need for larger appropriations to sustain continued technological introduction in the data processing area. The short-lived respite offered by on-line access to data processing began to be questioned and reevaluated as budgets expanded dramatically.

It is important here to focus on a basic question: what is the primary objective of data processing? The answer is a major assumption of what has been said thus far and all that follows: Data Processing exists to provide accurate and timely information to assist the operation of a business. Dp as a function can and does exist in a manual fashion with the same objective. Many dp shops applied sophisticated technology without regard to this basic question and ended up reducing their effectiveness. Consider this situation:

"I'm telling you," said a member of the corporate steering committee, "that I want the flow-of-goods computer-based system, and I am willing to pay for it. And you are telling me I can't have it after we have approved your fourth running annual budget increase of over 30%. If you can't provide the service, I'll get it outside. There are reliable software companies around, and my people tell me that we should seriously consider a proposal that we received from a large minicomputer vendor."

"I'm at the edge of control," replied the vice president of information service. "It isn't any longer a question of financial resources. My budget has grown from \$30 million to over \$70 million in less than three years. The technology is getting ultracomplex. I can't get the right people fast enough, let alone provide suitable space and connections to our sprawling computer network."

On returning to his office, the vice president knew that the steering committee member would be going ahead with the minicomputer. There was no way that the corporate technical staff could provide the flow-of-goods functions at the price or within the time frame that the minicomputer vendor had promised.

## REVISING THE PLANS

To return to the architectural analogy, the challenge for executive and dp management was to re-evaluate a blueprint which, because of the introduction of independent or "satellite" processors, was changing as the building was going up.

So in considering distributed data processing, there are many perspectives from which one can view the subject. In summarizing, there are various groups that ddp will have an impact on and present a challenge to, namely: executive management, dp management, dp technical staff, and the end user community. Any survey of the current state of ddp should assess this impact.

In addition, we must consider what technology is available today to assist in distributing the data processing resource. A survey such as we are attempting must be updated constantly—letting it sit six months is dangerous. The technology that must be examined is not new to us:

- mainframes, e.g., IBM 4341
- operating software, e.g., MVS or DOS/VSE
- distributed processors, e.g., IBM 8100, Series-1; DEC PDP 11/70
- minicomputers
- database management
- data communications/networks

A review of developments in these areas must be included in a consideration of how to develop a strategy to apply them in a coordinated effort (ddp?) to achieve dp's objective of accurate and timely information.

As the notion of distributed systems has developed over the past decade, the underlying technologies have been evolving. Let's take a look at just one—database—and see how its evolution is related to the distributed systems issue.

Database technology has been with us for a decade, during which time DBMS products were developed, refined, and enhanced, and the understanding of database in the dp community deepened. This understanding took two directions. In one, those organizations who became involved with database were greatly disappointed at not achieving immediate positive results. This understanding reflected negatively on database as a technology.

Management had to decide whether the various resources should be tied together. This had serious implications for the overall role of dp within the business. There is also a technical challenge in adapting technologies to new environments (e.g., a minicomputer on a shop floor) and in new ways (e.g., applying database principles or a microprocessor). If nothing else, ddp has helped to clarify our picture of dp.

In another direction, installations that approached database with caution and careful

# Data management is the key for organizations getting involved with database in the 1980s.

planning had better results. They also experienced tremendous changes—new personnel (for example, DBAs), new software (DBMS and data dictionary), and new capabilities (query languages and application development aids). In developing a strategy to accommodate these changes, an understanding of database as a methodology for systems development appeared.

As the 1970s drew to a close, these two types of organizations came together and shared their experiences with database. Many of them resolved to try again; others determined, quite rightly, that it just wasn't for them. In the latter case, it was not a reflection on database as a technology. More likely, an organization determined that it could not commit to database as a methodology. Financial, organizational, and personnel issues formed a basis for that decision. For those installations, it was better to stay away from using DBMS as a "glorified access method" (a term borrowed from a systems programmer who believed it!).

In the former case, groups that understood database as a technology (i.e., the actual DBMS software and associated tools) and a methodology began to demonstrate that a comprehensive program of data management was required for database to be successful.

## LEARNING FROM THE '70s

As we entered the 1970s, the database theorists proposed a variety of tools that seemed to have tremendous potential, some of which have been put into operation. Likewise, the 1980s hold the promise of relational database, database machines, etc. But for organizations just becoming involved with databases, the 1970s provided a further practical definition of the database concept for the 1980s. The term data management represents that concept.

Briefly, Data Management can be outlined to show how it represents database as both technology and methodology. Four major areas can be identified:

1. A management structure responsible for the data resource. Two functions are required: a data administrator to represent the

user interest in the database, and a database administrator to be responsible for technical development.

2. Controls and standards that must be developed. A data dictionary and directory are the foundation of a data management program in this area.

3. The primary tool for database development and access, the Data Base Management System. The DBMS will play a pivotal role in database development, but organizations have been successful with more than one DBMS or with installation of the DBMS after a data management program is well along.

4. The selection of related tools such as nonprocedural, user-oriented information retrieval languages, and application development aids which, combined with the above, provide the user interface to the database.

Data management is the key for organizations getting involved with database in the 1980s. The basic concept remains the same—integrating the information systems of a business by consolidating and controlling the storage and processing of data. To do this requires more than just a software package.

The selection of the DBMS becomes a natural step in the data management program. It should be done only after careful analysis of the data environment and application requirements has been carried out. This is where the data management effort must relate to the overall data processing strategy.

The perspective from which an organization views the database decision is of utmost importance. The actual decision on which DBMS to install is important, too, but if considered in its proper perspective, it does not have to be a critical decision upon which is based the success or failure of a data management program and application systems development.

Three different perspectives should be considered. First is an approach based upon the overall strategy of the dp department. For example, if a dp organization is concerned with maintaining a position of compatibility with IBM, the DL/I is a natural choice as the DBMS. It will also have implications for the

type of data management program implemented. It is a decision usually made at top management levels and requires a commitment to and understanding of database.

Second, the decision as to which DBMS to install, when considered as part of a data management program, is based on a view of database as a methodology. The data administrator, together with other people knowledgeable about the overall management of data, can properly evaluate the merits of a DBMS for a given installation. Few organizations have chosen this perspective to date—but more are considering it.

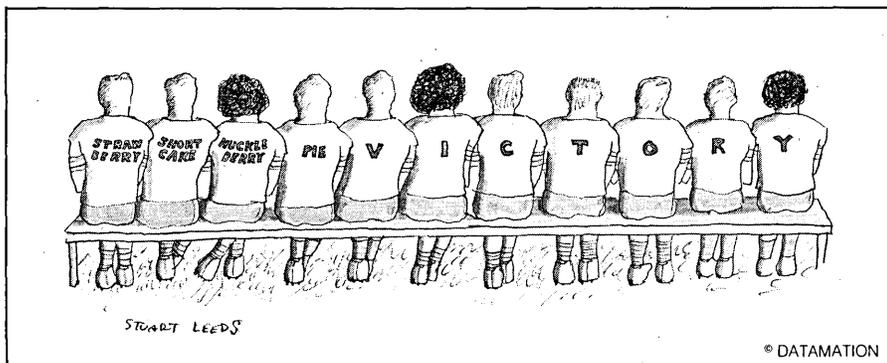
Third, and a factor which is a valid part of any software decision, is the technical quality of the DBMS. If an organization is not ready to change the orientation of its data processing (which database should do), but still needs improved reliability and performance, then database management can be considered on a smaller scale. The technical characteristics of the product become the primary consideration in selecting the DBMS. The concern here is that the solution database offers, if implemented on a limited basis, may not be a cost-effective one. The high costs associated with database are real.

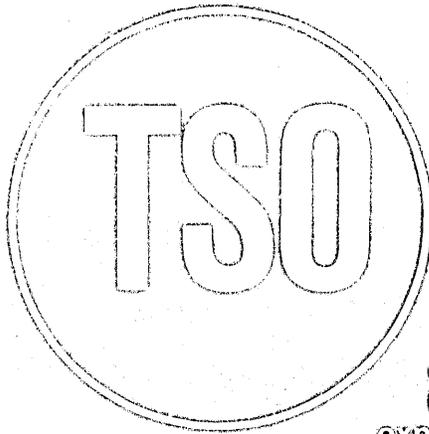
In approaching the decision of whether or not to proceed with database development, a balance between the three perspectives is recommended. This will allow for an exposure of the database concept at all levels in the organization, and it fosters an environment where a true commitment to the program can be made.

In summary, when we consider how data processing can be made more effective, the concepts of distributing this resource and managing the data being processed are natural directions to take.

To date, the former has overshadowed the latter. If data management had been endorsed as an integral aspect of the dp function, however, ddp might never have become such an enormous issue. Managing data in an integrated program can only lead to more effective processing of data and hence a greater satisfaction of dp function—the accurate and timely distribution of information. The access to this processing resource becomes a natural (but still challenging) step. It seems like the cart may have come before the horse.

Paul R. Hessinger is director of advanced technology research with the Computer Task Group, Inc., Buffalo, N.Y. His current duties include research and development in such information systems technologies as database and data communications. Mr. Hessinger graduated from Canisius College in 1975, where he also was employed as a computer operator/programmer.





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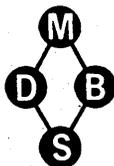
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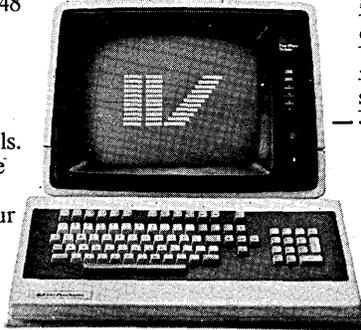
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How correct is the perception of the world that you entered into storage last month?

# SYNCHRONIZING DATA WITH REALITY

by Jim Highsmith

There has long been a gap between what users expect from information technology and what they get. With the proliferation of technically sophisticated hardware and system software, the gap has widened. Information processing organizations are becoming increasingly disconnected from the objectives of the business organizations they serve.

Gerald Matlin, in a recent article on top management's reaction to "Information Resources Management,"<sup>1</sup> observed that managers are disillusioned by the failure of databases and management information systems to make good on their promises. They are growing suspicious of the claims made by proponents of new technologies. Newer structured analysis and requirements definition techniques have provided better tools to narrow the communications gap. But there is another practice that should serve, but often does not, to improve systems development: synchronizing data with reality.

Most data processing operations have at least one large system containing so much bad data that its output is unusable. Because of organizational inertia, such a system nevertheless continues. Periodically, an attempt is made to rectify the situation, but the fixes are only temporary. The dp people avow no responsibility for the data quality, and usually blame some input clerk. Management's solution is to develop an on-line program for data entry and transaction validation. Then everyone wonders why the results are equally bad within a shorter period of time. Perhaps the data processing profession bears most of the fault because we do not fully understand the nature of the most basic components of our profession—data.

Jean-Dominique Warnier says data stored in a computer represent a perception of reality: "One must understand that the human mind deals with knowledge while the computer processes data that [are] only the image of knowledge. There is as much difference between the contents of the human mind and data as between a real object and the photograph or painting it represents."<sup>2</sup>

Warnier's statement forces us to dif-

ferentiate between data as reality and data as a perception of reality. What is stored in a computer is not real. It is only our perception of reality at a given time. From this concept, questions arise such as, "How correct is the perception of reality we entered into storage?" or more importantly, "Do the data previously entered match today's reality?"

Most systems analysts are preoccupied with entering data correctly. Once they're in the computer, there is a tendency to assume the "rightness" of the data. They may be right, but are they real? As reality changes over time, does the data systems perception of reality continue to reflect that change? Managing this synchronization of data and reality over time is a complex and difficult task.

Ken Orr has developed a rationale for output-oriented design. He says, "Output-oriented design leads to a rigorous design methodology," and furthermore, "if accurate and consistent data are to be obtained, then it is mandatory that the data be systematically and frequently put out and used."<sup>3</sup>

This concept of systematic usage—keeping stored data and reality synchronized over time—has two dimensions of feedback and control theory. The first is a time or sample rate dimension and the second is a knowledge dimension.

The timing component must assure that the sample rate is close to the natural frequency of change of the real world event. Too much sample may cause overcontrol while too little sample will cause the stored data and reality to fall out of sync.

The other component of systematic usage is more insidious. It requires a knowledgeable observer to take the sample, that is, to understand reality. As system complexity increases, this observer must be increasingly knowledgeable. Even those systems analysts who intuitively get the sample rate correct often fail to identify correctly the knowledgeable user.

Organizational information is complex. From relatively simple transaction systems, complex data relationships are developed. One manager may look at customer profitability, another at cash flow, another at

cost categorization, another at financial ratios. Each is a systematic user, but as summarizing, accumulating, selecting, and sorting data become more complex, the knowledge required to determine if the data match reality increase geometrically.

This systematic usage of data by knowledgeable people—usage that is absolutely required to maintain correctness over time—becomes extremely expensive. The management time to use and feed back corrections systematically is a major, but often hidden, component of a data system's cost.

Most systems analysts compound the problem. They have been burned in the past by inflexible systems. Responding to the availability of powerful database management software, analysts tend to add more data than are needed or than are maintainable because they make the fallacious assumption that data's costs are confined to input and storage.

## COST OFTEN IGNORED

Assessing the cost of any organizational activity has always been difficult. Information processing management appears to carry a significant cost component that is missing in most cost/benefit analyses. Data processing organizations have developed sophisticated charge-back mechanisms for computer operations, maintenance, and development. Even so, in most new development projects, only the development costs are included in the feasibility study. Some make a stab at ongoing operations costs and a few attempt to estimate future maintenance costs. But even those analyses that attempt to quantify these future costs often miss a significant cost component to the ongoing operation of the system.

This component, virtually ignored or overlooked, is the cost of data maintenance.

Data quality is related directly to data use, not to data collection, processing, or storage. The cost of maintaining data quality is related to the staff cost of knowledgeable users.

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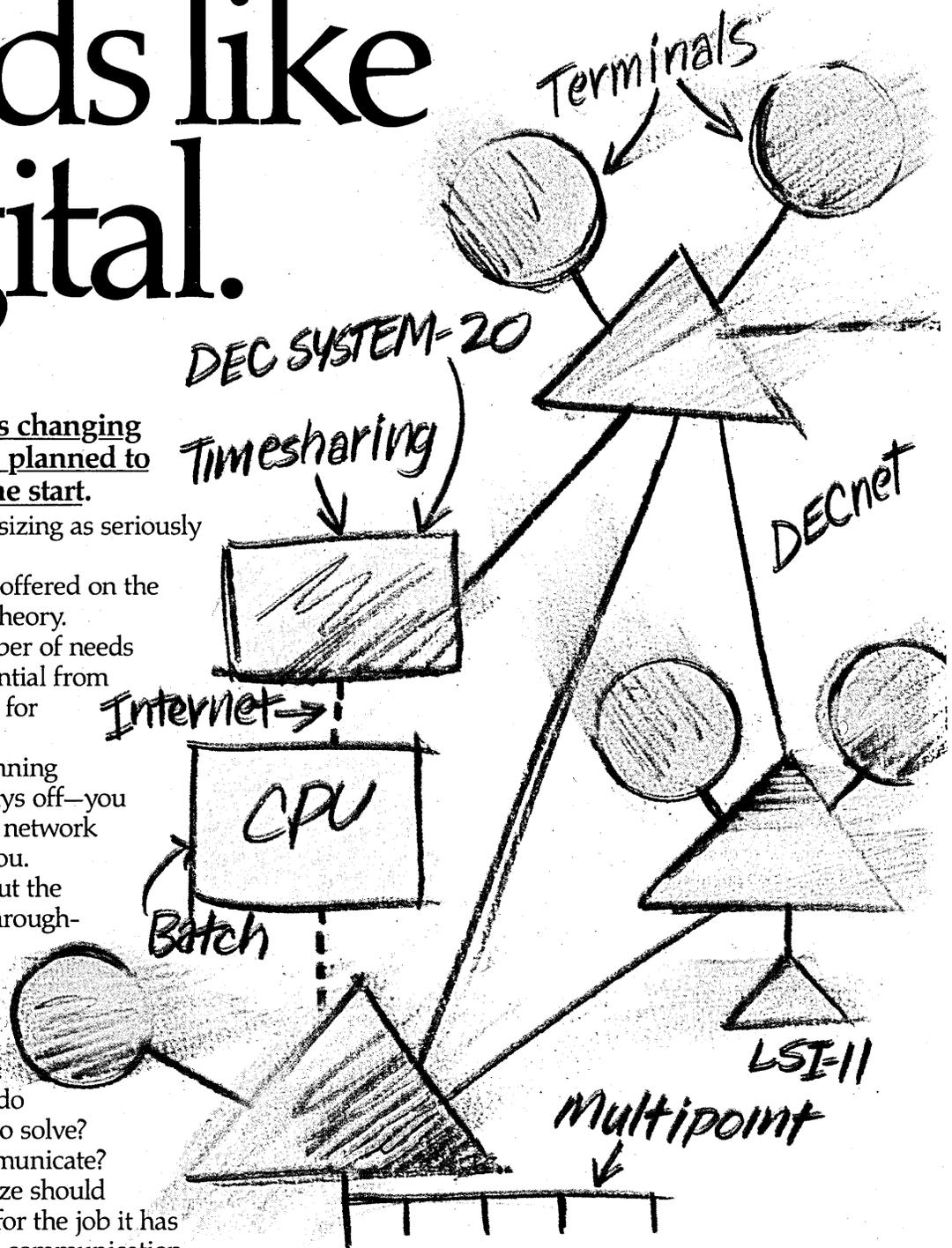
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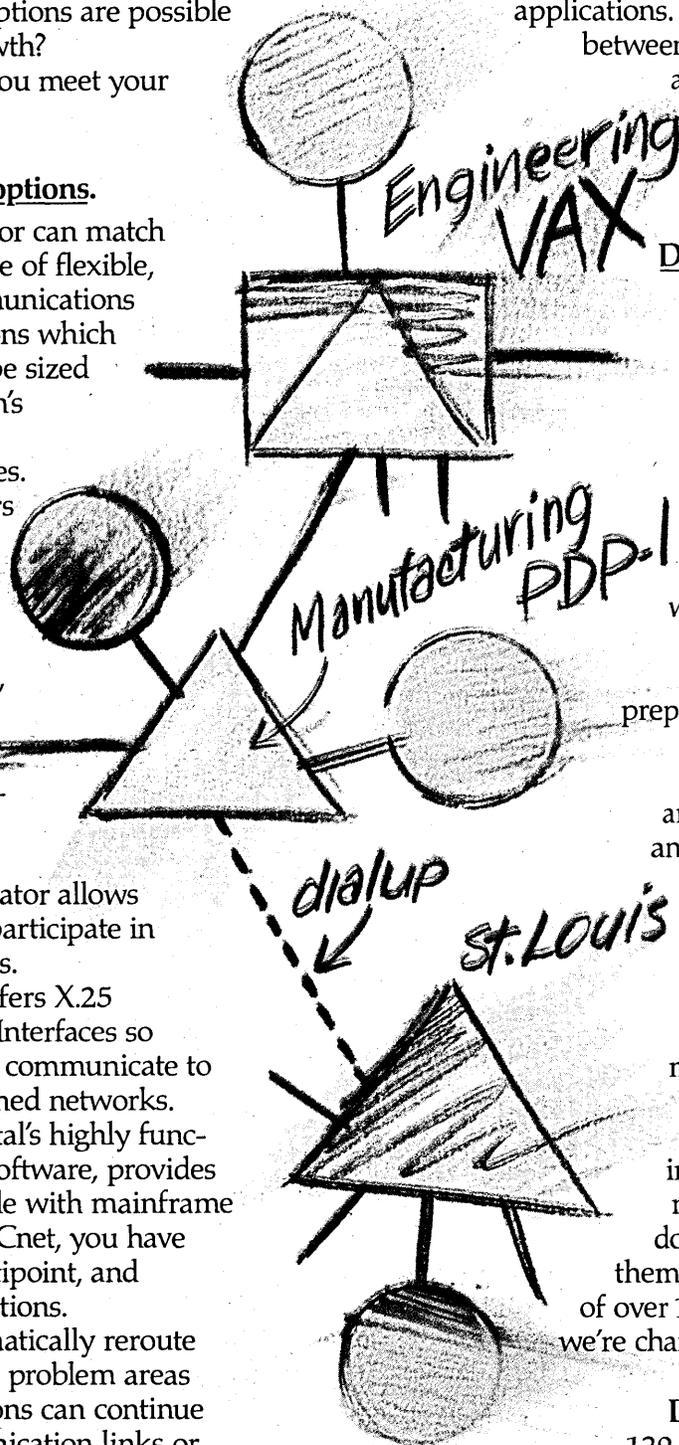
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## Although systems planning has been highly touted, it has proved difficult to achieve.

- external vs. internal data verification
- data relationship to continuous or discrete events
- system impact by one or more organizational groups
- relative sophistication/experience of system's user(s)
- system functional level

The farther data are from direct use outside the organization, the greater the tendency toward error. If an order entry or airline reservation system begins to lose transactions, feedback will be nearly immediate. Similarly, if an accounts payable system doesn't pay vendors properly, the company will hear from them.

But what about other data captured by the accounts payable system (cost distribution to products, projects, organizational units, etc.)? Management emphasis on cost control determines the accuracy of cost information by these internal categories. If product cost data aren't used by knowledgeable managers, they will begin to atrophy. They will rapidly become not only useless but also, possibly, dangerous.

The second factor affecting data quality is whether the reality being measured is a

discrete function or a continuous process. Maintaining cost data is more difficult on discrete projects than on continuous endeavors. A manufacturing process can be monitored more easily than a series of discrete equipment maintenance activities, primarily because a regular sampling cycle can be determined.

The third factor, familiar but often misunderstood, involves systems that operate across organizational boundaries, particularly when one group is responsible for input and another for usage. These systems are hardest to implement and maintain. Experienced analysts often add system components to give each organization feedback from the system, but often with limited success. Typically, the using organization takes no responsibility for the data, merely berating the inputting group.

The fourth factor, often mentioned in analyzing the risk of implementing a particular system project, is the experience of the prospective user with automated data systems. This experience factor is as relevant to maintaining data quality as it is to implementation risk. Inexperienced users should not be initiated with complex data systems.

The fifth dimension is the functional

level a system supports—whether it is a basic transaction processing system, an operational system, or a high-level planning and analysis system. Although maintaining a synchronized inventory control system may not be easy, at least there are definable methods of demonstrating consistency with reality (e.g., periodic physical counting). A sales forecast based on an econometric model, by contrast, is much more difficult to prove correct because its reality is in the future.

Decision support systems are becoming increasingly popular. In designing and using these systems, one must constantly remember the results are not only a perception of reality but also an unprovable perception of reality.

### HOW TO IMPROVE ODDS

There are various ways to improve the maintenance of correct data. For example, an audit and evaluation procedure similar to an inventory count might be developed for a system plagued by potentially erroneous data. This task might be assigned to a data administration function. A useful result may be a feedback and control mechanism cost substantial enough to alter

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the system's economics. If the cost of data maintenance cannot be borne by the system, installing it anyway, without necessary systematic usage procedures, will create an accident looking for a place to happen.

In summary, if one embarks on systems development with discrete processes, organizational boundary crosses, primary users unsophisticated in data processing, and minimal outside world interface—keep the database simple.

In many organizations, systems planning is in its infancy. Although it has been highly touted, it has proved difficult to achieve. Systems planning literature has emphasized strategic planning—developing a high-level view of the corporation through information network models that reflect the basic objectives of the business.

The best approaches to systems planning combine the most pressing current systems needs (derived from corporate objectives) and planning models (both data and functional) of the organization. Unfortunately, many organizations skip the planning phase because of the burdens of ongoing maintenance and tremendous project backlogs. The increasing use of structured devel-

opment techniques will affect the productivity of installing new systems and reduce the resources required for program maintenance, but the sheer magnitude of the backlog in most organizations indicates that even increasing development productivity by orders of magnitude is not enough.

In systems planning, organizations perform cost/benefit analyses that, ideally, span the entire cycle of development, maintenance, and operation. These plans also may contain risk analyses that examine the probability of successful implementation. Just as the cost/benefit analysis spans the system's life cycle, the risk analysis should also. A major component of the risk analysis should be an assessment of the probability that accurate data can be maintained, and an estimate of the harm that could result from incorrect information.

By accurately assessing the cost and risk of data maintenance during the planning process, planners can reduce the system's backlog to a more manageable size. They may decide to reduce the system's scope, or to eliminate some projects altogether. The ongoing cost of systems operation, including the cost of maintaining data integrity, should

realistically be evaluated before a new development is launched. Only by recognizing the natural tendency of stored data to be dissociated from reality can the system designer increase the probability of maintaining quality data systems over time.

### CURRENT TRENDS IN DP

Some current trends in data processing appear ominous. It is useful to examine these trends according to the principles elucidated thus far.

User-friendly systems are receiving much attention in systems literature. Proponents of this concept argue that data processing operations cannot overcome the backlog problem rapidly enough. They propose installing sophisticated hardware and software to let users solve their own systems needs, leaving to data processing organizations the consulting, training, and operating role.

But this user-oriented approach ignores the massive problems caused by inadequate attention to data integrity and system design. Users (or systems analysts) who encounter the backlog of data processing projects without adequate conceptual tools will generate a great deal of misinformation.

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CIRCLE 213 ON READER CARD

## The goal should be the effective use of this new systems technology knowledge in supporting the business objectives of our organizations.

Systems unhampered by linkages to corporate data processing plans, data structures, security provisions, controls, etc. are brought into action rapidly. But there is a catch. Discussing user-friendly systems and data quality, Ken Orr says, "User-friendly software is creating a potential monster and is making the goal of integrated management information systems difficult. More importantly, it has the potential for seriously disrupting the overall management of the organization."<sup>4</sup>

Once these systems grow beyond a very minimal level, data structures and data integrity become serious problems. There is a place for user systems, but each organization needs to define that place carefully.

A similar trend is heuristic development, touted by Daniel McCracken. It may be a useful tool, but probably not as envisioned by Mr. McCracken.<sup>5</sup>

First, it assumes that the objective of systems analysis is to specify a system which responds to user's needs, seemingly without regard to the information systems structure of the corporation and without regard to data integrity. Sitting at a terminal and creating inputs and outputs merely automates a design

technique that has occurred too often in the past—creating a bad new system from a bad old system. Another problem with this approach is addressed by Weinburg's Banana Principle: "Heuristic devices don't tell you when to stop."<sup>6</sup>

The underlying assumption of both user-friendly and heuristically developed systems is design bypass. Proponents of these techniques are still confusing the analysis, design, and programming steps in a system's life cycle. Automated tools can be developed to assist in each of these steps, but the steps cannot be skipped. The maintenance burden in today's dp organizations is largely due to incomplete analysis followed by coding, omitting the design process completely.

This design fallacy is exacerbated by the perception that once a user's requirements are identified, high-level programming languages will permit rapid implementation. An analogy to this approach would be handing an architect's rendering of a 15-story building to a mason and giving the mason an automated bricklaying machine. Systems design cannot be bypassed because it addresses key issues such as data structure, system architectural structure, relationships with existing sys-

tems, compatibility with strategic and operational systems' plans, ongoing program maintenance, hardware operations, and, one hopes, data maintenance.

### NO DESIGN SHORTCUT

Stephen Robinson has discussed this potential disaster: "In the early part of this period (1981-85), we will see an embracing of the heuristic systems design methodologies now beginning to appear in our industry. It will not take the industry long to realize that there are indeed no shortcuts to good systems design. Rapid development and implementation of faulty systems working off erroneous data will once more result in an angry user community."<sup>7</sup>

A third trend in the industry is toward relational database management systems. For all the hoopla in its 10-year history, database has been a dismal failure, as witness a recent presentation at GUIDE.<sup>8</sup> The technical problems have been solved, but not the organizational and management ones. Relational database design is another technical "physical design" technique. What we desperately need are better "logical design" methods.

The fact we are able to build gigantic databases doesn't mean we *should*. From the

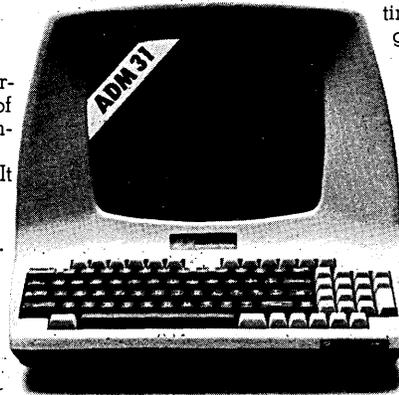
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perspective of the difficulty of maintaining data integrity, a large, relational, random, query-only database will become unusable in a very short time because the systematic usage principle has been violated.

The goal of this new systems technology knowledge should be the effective use of that technology in supporting the business objectives of our organizations. The information system designer must recognize the manager's perspective on data, as illustrated by John F. Rockart's acclaimed *Harvard Business Review* article on the identification of critical success factors. Quoting a chief executive, Mr. Rockart writes:

"The first thing about information systems that strikes me is that one gets too much information. The information explosion crosses and crisscrosses executive desks with a great deal of data. Much of this is only partly digested and much of it is irrelevant."

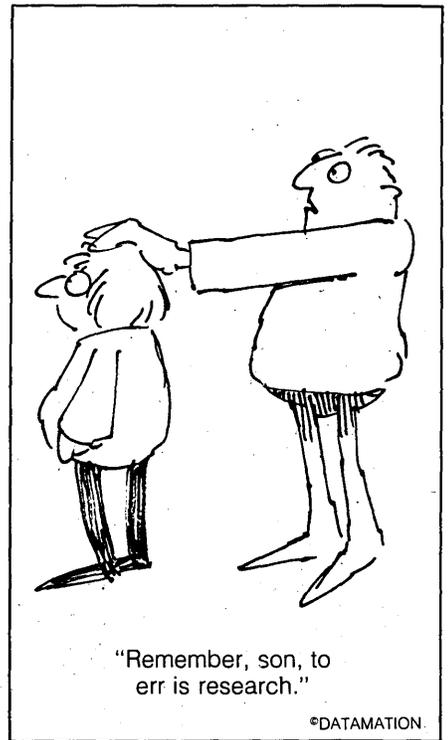
Maybe it's not just the executive's desk that is criss-crossed with irrelevant (and erroneous) data. Determining what information is needed, turning raw data into that information, and synchronizing the information with reality over time will keep systems development an interesting profession. \*

CARTOON BY TOM MASON

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Jim Highsmith is director of planning and market development for Ken Orr and Associates. He was previously manager of systems and programming for Oglethorpe Power Corp. in Atlanta. He has a BS from North Carolina State University and an MS in management from the University of South Florida in Tampa.



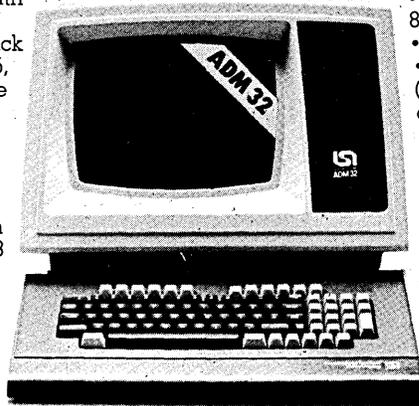
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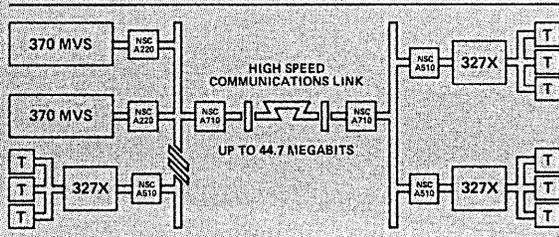


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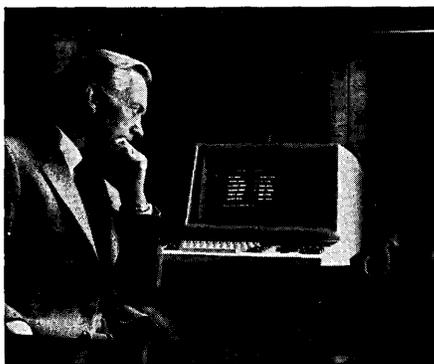
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## SINK OR FLOAT

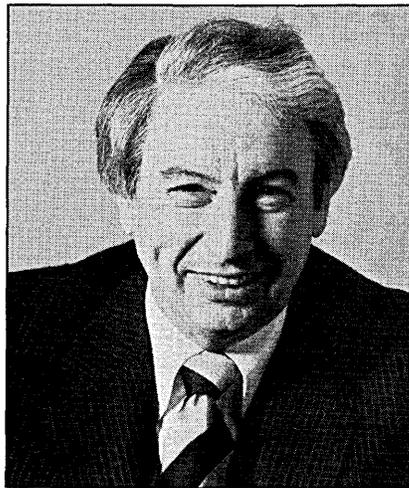
His partners had deserted the sinking Floating Point Systems, leaving Norm Winningstad holding the debts and pondering a painful choice: his home or his business.

"Since the house was free and clear, I promised my wife I'd never do this," says Winningstad, the Small Business Administration's selection as Oregon's Small Business Person of the Year. "But I went to her and said we've either got to lose everything we put in this company or take out a mortgage on the house. She said, 'Are you sure?' I told her, 'As sure as I can be.' She signed the paper, the bank did its number, and we stayed alive."

Stayed alive? There are few more robust, healthy entities in the entire computer industry. Since that moment of truth in the fall of 1974, Floating Point Systems has increased its sales 50 times in five years, from \$840,000 in 1975 to \$42.4 million last year. Net earnings increased 88% over 1979. Not a bad balance sheet for a company that started through circumstances beyond its founder's control.

"We knew we could sell enough to pay our salesmen and engineers and hang on," Winningstad says. "But we had no idea it would be such a ripping success."

But then Winningstad had no notion he'd ever be involved in such heavy finance. After graduating from the University of California at Berkeley with a BS in electrical engineering, he joined Television of California, where he experimented with propagation at ultrahigh frequency (UHF). Two years later he went to work at Lawrence Radiation Laboratory. Eight years, two patents, and several professional papers later, Tektronix called. He answered by going north to the company's headquarters at Beaverton, Ore. He spent 11 years there, obtaining six patents, introducing two product lines, and supervising the Information



NORM WINNINGSTAD: "When a guy says, 'Lots of luck,' my answer is 'Hell, man, it's not luck. It's skill.'"

### Display Group.

In February 1970 he had a revelation. The computer world was advancing far faster than he. He was technically obsolete at 44.

Deciding it was time to get down to serious business, Winningstad took a leave of absence and began attending MBA courses at Portland State University. At that point he was certain his past was not his future.

The conviction lasted eight months. While dabbling in business law and accounting, a friend selling Data General minis suggested to him and a few other acquaintances that developing floating point hardware—in which the decimal point moves as needed, rather than staying fixed—would be an excellent idea.

"This guy said, 'What you engineers need to do is design floating point hardware and we'll sell it to all the mini companies,'" Winningstad recalls. "We'll fix it so the small and big DEC computers [one of the few to have floating point equipment at the time] can use it."

"We thought it was a dead-end business. Then someone suggested all we had to do was build a super mini. We'd go into

business, design our own floating point hardware, turn a profit, go to venture capitalists, get a million bucks, and be first in the market with a 32-bit mini."

At that time, minis were trying to adapt 32-bit languages like FORTRAN into 16-bit computers. The process was particularly clumsy, time consuming, and expensive. Winningstad and his colleagues thought they could ease the transition and make some money while doing so.

Floating Point was founded in October 1970, opened for business the following January, made its first delivery six months later, and was in the black by June 1972.

"We had a gangbuster business plan when we went to see the venture capitalists," Winningstad says. "They turned us down flat."

"What we'd overlooked was the change in the capital gains tax made by the Tax Reform Act of 1969. There wasn't a venture capitalist in the world who was going to go with a new outfit that didn't have Gene Amdahl on its staff and wasn't located in Silicon Valley or on Route 128. We had no reputation, no location, no nothing. We didn't get a dime of venture money."

They didn't get a dime of much else, either. Floating Point limped through the remainder of 1972 and most of 1973. Then came the first oil crisis, an anathema for most of the country but a windfall for Floating Point.

Three seismic exploration companies contacted Winningstad, asking if he could improve their drilling calculations. "They essentially were asking for a poor man's array processor," Winningstad explains.

An array processor is used for complex mathematical and scientific computations. The machine receives staged information from a host mini or mainframe, rapidly performs the desired computations, and returns the processed data or results to the host computer or peripherals. A typical array processor consists of arithmetic units, memory, peripheral interfaces, power supply, and software. The amount and type of memory are optional, and the amount of

## PEOPLE

memory is often a significant portion of the purchase price.

"So we decided to give them exactly that," Winningstad says. "And as long as they wanted us to do it, we figured we might as well build a good one."

So he and his partners decided to risk their future on array processors. Engineering, advertising, and sales for Floating Point hardware would cease immediately. If an order arrived, it wouldn't be rejected, but all efforts would be concentrated on the new product line.

The field was almost totally untapped. Raytheon was building an integer array processor, but that was two years behind Floating Point's concept. With the booming seismic industry switching to floating point calculations, at least one customer was ready, willing, and able to do business.

Floating Point delivered its first machine to Digital Resources in Houston. The company had a PDP-11/45, which was less expensive but had much slower turnaround than the CDC machine used by a nearby competitor. Digital decided to combine the processor with its PDP-11/45.

While Digital was reaping the benefits of Floating Point's technology, the seller was taking advantage of the buyer's marketplace and status.

"We had a couple of companies interested in being the first purchaser," Winningstad says. "Naturally, we wanted to deliver it where we could maximize lever-

age for more machines. When Digital agreed to let us use their machine as a demo, the decision was easy.

"That was a win-win contract," he says with a grin. "Anybody we brought in was a potential customer for us and for their service bureau."

Three days later Floating Point had an actual customer. Engineers at Petty-Ray, an exploratory seismic company, visited Digital and swooned over Floating Point's processor. The company accountants, however, weren't too thrilled about Floating Point's books. But a lengthy credit investigation convinced them, and a few months later Floating Point had a \$1 million order, deliverable in the first quarter of 1976.

"That was a big order for us," Winningstad admits. "It allowed us to make it a front-loaded year. We could hire salesmen and change from selling through representatives to selling directly. We lined up our engineers and told them to go like hell on array processor software."

The rest is history. From near bankruptcy, Floating Point has exploded. It has sales offices throughout the United States, Canada, Great Britain, and Europe, and distributors in the Middle East, Japan, and India. It has outgrown its 150,000 sq. ft. headquarters and is building a second office of 120,000 sq. ft. in Beaverton. Its products are used in a variety of areas, from flight simulation to Computerized Axial Tomography (CAT scanning). Seismic data processing, the company's salvation, now ac-

counts for only 30% of sales.

"We couldn't fulfill our super mini ambitions, and for survival we switched to array processors," says Winningstad, who retains his original positions of chairman, president, and chief executive officer. There's no doubt about where the buck stops at Floating Point.

"It turned out to be the best thing that ever happened to us," he concedes. "Now there are five super minis and it's a dog-eat-dog world. If we'd brought out the 32-bit mini, it would have wallowed around because it was from a small company without a lot of software capability. We were fortunate that there was no venture capital available and that the Arabs caused problems in '73. If it hadn't been for those two events, we'd have been down an entirely different trajectory."

Winningstad plans to remain on the same path. He expects Floating Point to keep growing, although not at the same phenomenal pace of the past five years. The company did 1% of the available number-crunching business (\$2.5 billion) in 1978.

"All that business applications garbage is nothing more than moving bytes," Winningstad contends. "Number crunching is what I call scientific work. Most computers aren't made to do a good job of number crunching. They spend 99% of their time shuffling bytes. If your computer can't do 1 million floating point calculations per second, it's not a number cruncher."

"Minicomputers of the regular variety are to byte shufflers as we are to large number crunchers. We're the minicomputer of the number-crunching side. We're where minis were in the mid-'60s. We're the foremost proponent of this idea. But you couldn't use this in a regular office. We can't help the average business."

But Floating Point can get the business of those it helps. Winningstad expects the number-crunching hardware market to expand to \$45 billion by 1983. Floating Point reached 1% of that total last year. But it is unlikely the company will grow exponentially enough to capture 10% of that business in two years. The company, however, will not lack customers.

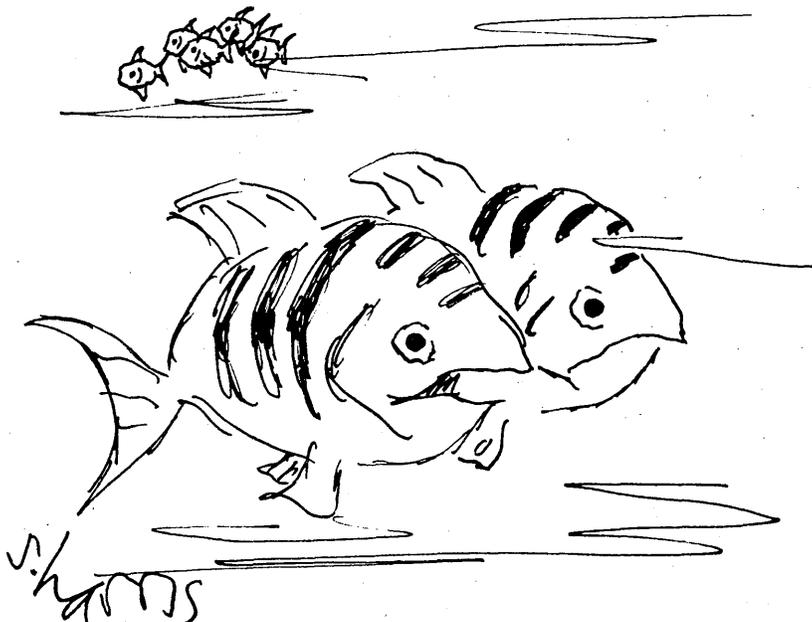
"In '74 we damn near folded it," Winningstad confesses. "The other founders dropped out because their personal obligations wouldn't let them live with slow business. I stayed because it was my money that started the company. I had the bull by the horns and couldn't let go."

"I'll take credit for keeping it together, but I wasn't the key technician or marketing person. And I'll take credit for having anticipated and correctly modeled what was coming."

"So when a guy says, 'Lots of luck,' my answer is 'Hell, man, it's not luck. It's skill.'"

And an understanding wife.

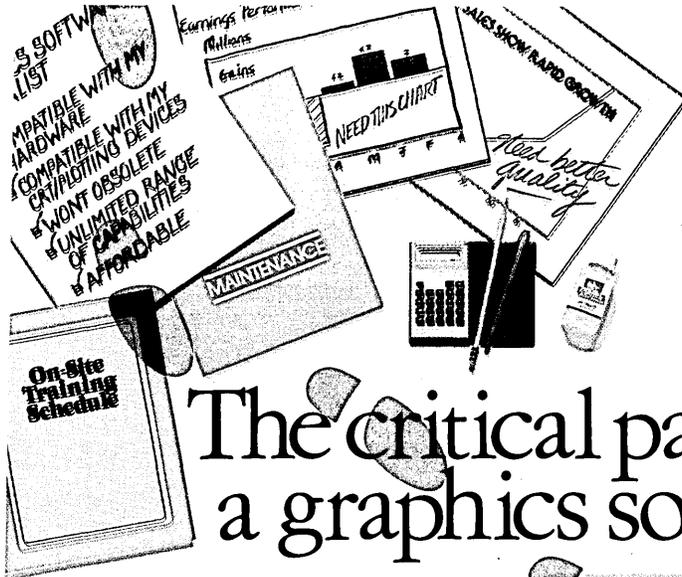
—Willie Schatz



"That's where we differ. I swim for pleasure."

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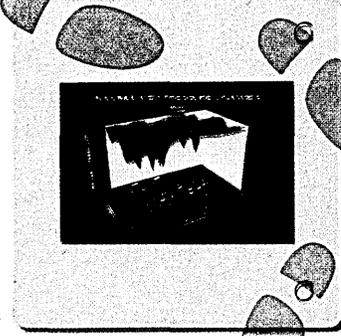


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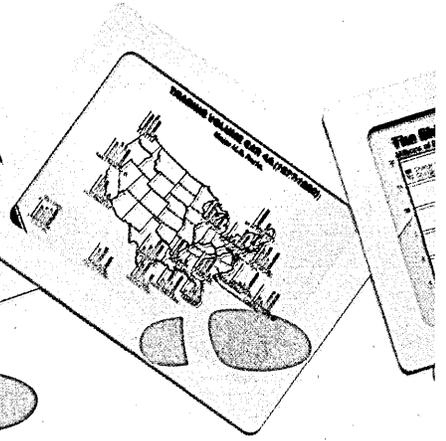
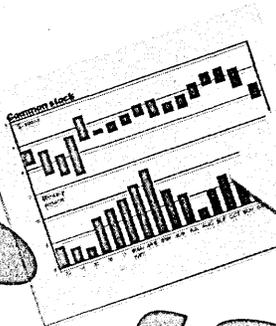
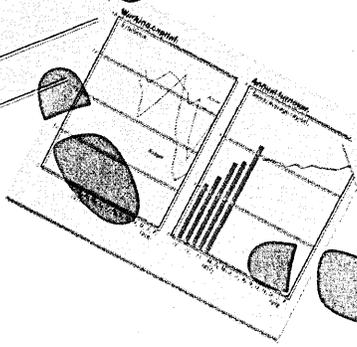
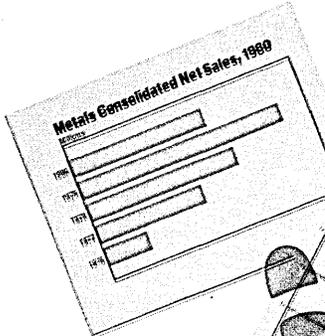
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555

## COMDEX has broken NCC's record! NCC '81 had 555 exhibitors.

You remember NCC '81 at McCormick Place in Chicago. Those huge, multiple exhibit floors presented hands-on displays from 555 computer-related companies. That was an all-time record for computer industry trade shows.

Now COMDEX, in only its third year, has eclipsed that NCC record. More than 560 computer-related companies have already signed to exhibit in over 1,600 booths at the Las Vegas Convention Center, November 19-22. And there's still a few weeks left for additional companies to get on board!

### Size Without Sightseers

But if COMDEX and NCC are now roughly comparable in the number of exhibitors

each can boast, there remains one very significant difference: COMDEX will not have tens of thousands of attendees who are students, or businessmen on their lunch hours, or computer hobbyists. The COMDEX audience is limited to ISOs (Independent Sales Organizations)!

COMDEX '81 -- A very big show indeed, a record breaker for the computer industry. But the atmosphere WON'T be "zoocy." Rather, it will be conducive to the serious negotiations so necessary to move an avalanche of computer related products.

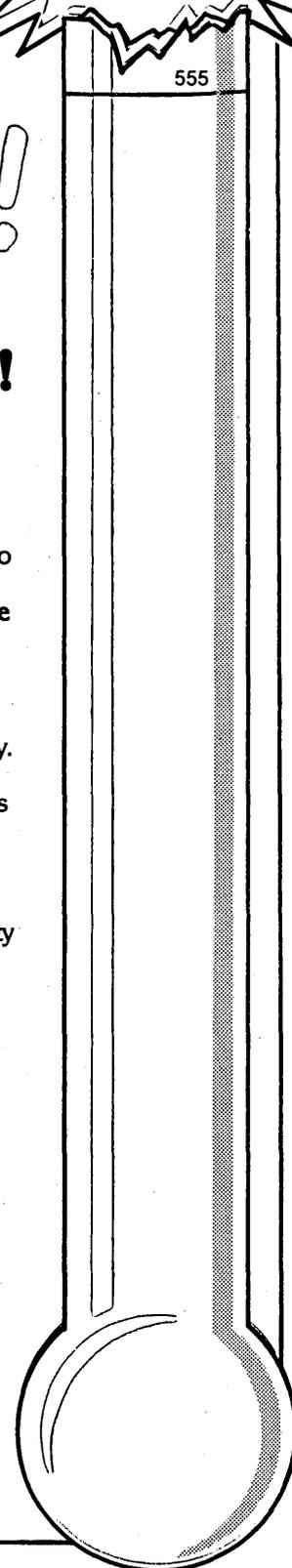
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All you need are Intermec readers at key points in your production and an Intermec Bar Code printer. Sub-assemblies and units are identified with bar code labels. Production line personnel feed dispositions and routing data to the computer simply by scanning bar code menus. Bar code puts the status of every job at the tip of your finger.

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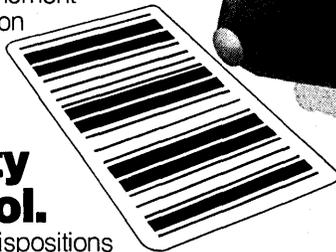
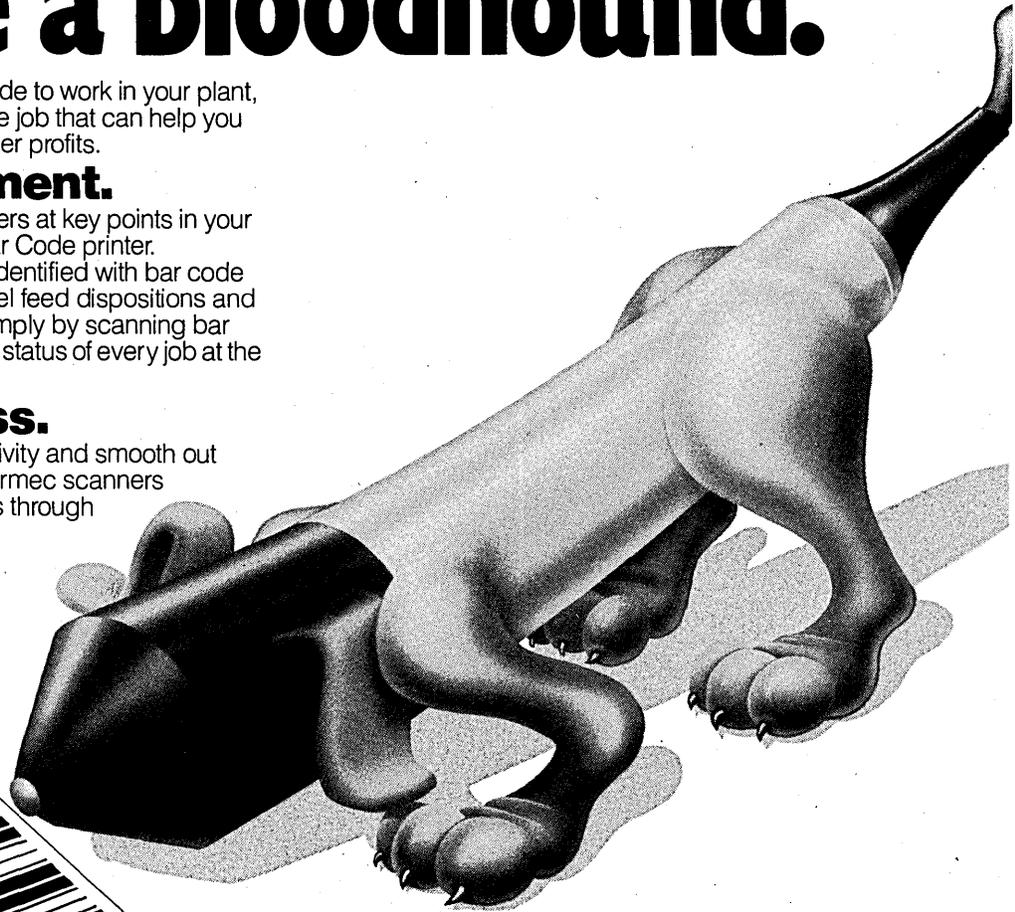
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## Engineering Changes.

With Intermec Bar Code, rework always gets done because you can pinpoint every product in production that needs to be changed. Your computer alerts you if changes aren't made.

## Shipping and Receiving.

You'll know exactly what's being shipped and you'll know the exact status of every customer order from the time it's received until the time it goes out the door. Answer delivery questions immediately.



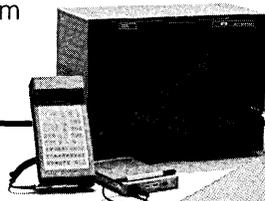
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You can use Intermec Bar Code in dozens of applications where tracking and control are important: books, tools, file folders, specimens and samples—you name it.

Intermec is the only company that manufactures a complete line of bar code printers, portable and on-line readers, and top-quality wands designed to meet the tough demands of industry.

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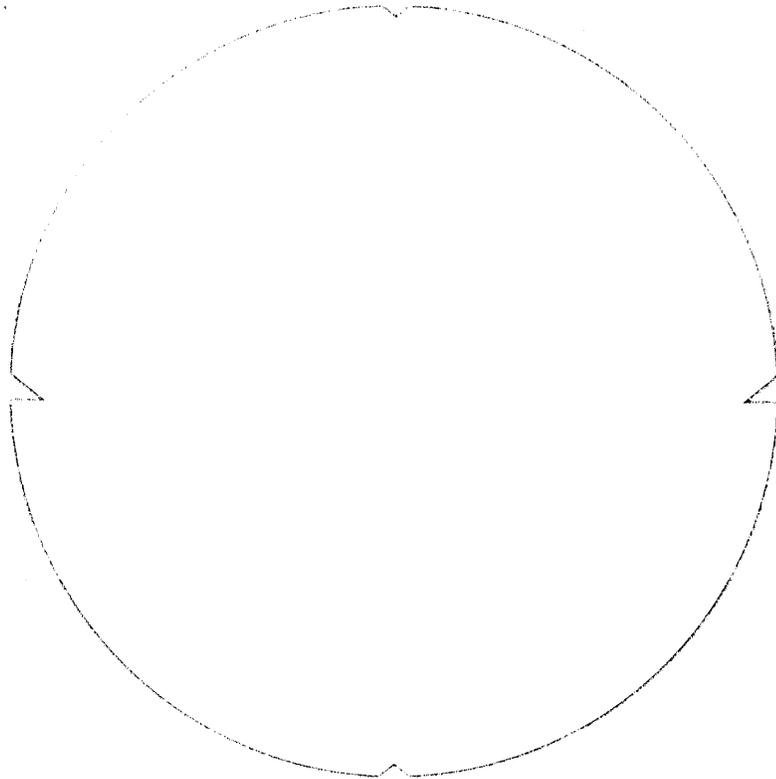


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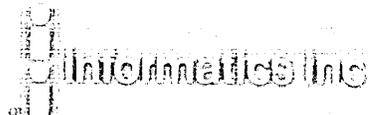
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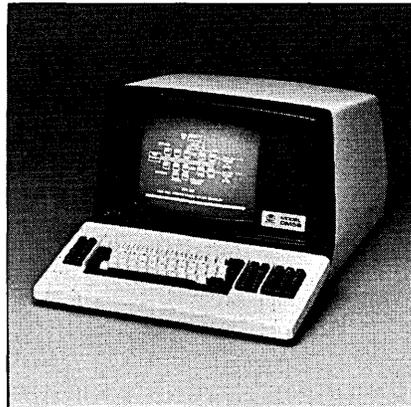
## OFF-LINE

What convolutions did IBM's marketing department experience in positioning the Datamaster System/23 among IBM's current products? Was it at one time the rumored 5130? Or, perhaps, an entry-level system for the System/32, 34, and 38 line? If manual writers are entitled to Freudian slips that get all the way through IBM's internal review process, we're inclined to the latter suggestion. In the System/23 Basic Language Reference manual, Section 1, you'll find a table of graphic characters and the statement, "There are 11 graphics characters in System/30 BASIC."

With an eye to the second half of this decade, Magnuson Computer Systems has embarked on a Very Large Scale Integrated (VLSI) semiconductor R&D program. For funding, Magnuson expects to form a limited partnership, which will contract for the development work of a newly formed subsidiary, Magnuson Development Corp. MDC has been staffed with key Magnuson personnel and experienced outsiders. Four executives have already been installed at MDC. Leon Wun fills the slot of president. Wun is joined by Dr. John A. Perri, Andrew T. Ling, and Daniel W. Murphy. Magnuson expects the VLSI technology coming from MDC will allow the parent company to remain competitive in the midrange plug-compatible mainframe market during the second half of the 1980s.

## CRT TERMINAL

Beehive International just introduced its DM5B ASCII terminal with switch-selectable RC232 and RS422 interfaces. The word "first" is anathema to me, but in this case



I'll make an exception: Beehive just became the first crt maker in my limited memory to inform the user public that it complies with the federal mandate that new terminal equipment be equipped with the new RS232 supersert interface specified by EIA RS422. Others may have done it, and at least one company makes an RS232-to-RS422 interface converter, but Beehive is the first that I can remember to tout compliance of its terminals.

The DM5B is a buffered terminal for both the interactive and batch mode environments. Editing features are standard. The user can select conversational, line, message, or page transmission modes. Programmable function keys are standard, as is a forms mode allowing forms definition with visual and logical attributes. Base price on the DM5B is \$1,295. BEEHIVE INTERNATIONAL, Salt Lake City, Utah.

**FOR DATA CIRCLE 301 ON READER CARD**

## TRS-80 NETWORKING

Datapoint and Tandy have been putting their corporate heads together, creating a joint venture called Texas Peripherals. Initially, the company was set up to mass-produce floppy disk drives, but now it's gone a step beyond, creating an interface that will allow TRS-80 Model II small business computers to be configured in Attached Resource Computer networks, pioneered by Datapoint in 1977 (DATAMATION, December 1977, p. 204). ARC networks consist of up to 255 processors, interconnected by coaxial cable. Within the network, processors act either as file processors or applications processors. While each application processor is essentially autonomous, file processors provide mass storage and shared databases. With the introduction of low-cost junction boxes that interface to the co-ax, TRS-80 Model IIs can now be configured in ARC networks, either entirely consisting of Radio Shack machines, or combined with Datapoint equipment. A newly developed Datapoint LSI circuit has cut the cost of building network interfaces. To bring Radio Shack computers onto the network requires an interface card in each TRS-80 Model II; the card will be built by Texas Peripherals and will sell for roughly \$400. Junction boxes, required for interconnecting processors, will cost under \$200 for a four-processor connection, under \$2,000 for larger configurations. Deliveries are planned for the second quarter of 1982. TANDY CORP./RADIO SHACK, Fort Worth, Texas.

**FOR DATA CIRCLE 302 ON READER CARD**

## ETHERNET EVALUATION KIT

To help product designers evaluate Ethernet, 3Com has put together a set of hardware and documentation to let engineers experiment with the 10Mbps local net. The pack-

## HARDWARE

age consists of three Ethernet transceivers, coaxial cables, terminators, and transceiver cables that connect to the device-specific controller required in each piece of equipment directly attached to the transceivers. The documentation consists of a two-page summary of the Ethernet standard agreed upon by Xerox, DEC, and Intel, along with information needed to interface transceivers and device controllers. Additional data includes descriptions of how signals move over the co-ax, and where the most important transmission factors can be found. For \$2,600 (U.S. only), 3Com provides three 3C100 Ethernet transceivers, three 3C110 transceiver cables, two 15-meter, 50-ohm co-ax cables, two 50-ohm terminators, and documentation. 3COM CORP., Mountain View, Calif.

**FOR DATA CIRCLE 303 ON READER CARD**

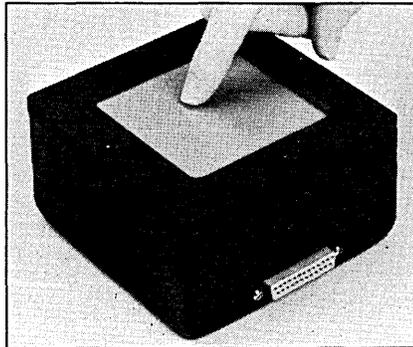
### V.22 MODEM

A modem for international communications and private network users conforms to the new international CCITT V.22 recommendation, including alternatives A, B, and C. The P-V.22 is microprocessor based and has 2-wire, full-duplex capabilities. In synchronous mode, data rates of 600bps and 1200bps are available, while 0 to 300bps, 600bps, and 1200bps rates are available in asynchronous operation. The 600bps rate is included primarily for fallback capability when transmission lines deteriorate. The unit includes analog and digital self-test signal generation. Developed by Prentice Corp., the P-V.22 will be sold to telephone companies outside the U.S. under the nameplate of L. M. Ericsson of Stockholm. Prentice will handle domestic marketing, and end user sales. Prentice's price for a single rackmounted version is \$949, and \$1,034 for packaged versions. PRENTICE CORP., Sunnyvale, Calif.

**FOR DATA CIRCLE 304 ON READER CARD**

### POSITION SENSOR

As an alternative to joysticks, mouses (or is the plural mice?), and other pointing devices, Spiral System Instruments has come up with the Trazor Touch Panel. Containing no moving parts, the touch panel has an



active surface measuring three inches square. The user indicates a position by moving a finger over the active surface to reach a rough position, then rolls the ball of the finger to allow precise positioning. The Trazor can select a single pixel on a 1024 x 1024 display. The unit interfaces to digital equipment through an RS232 port which outputs ASCII coded X and Y coordinates in the range of 0000 to 1023. Output rates are selected by an internal switch setting; available data rates are 300bps, 1200bps, 2400bps, 4800bps, 9.6Kbps, and 28.8Kbps. The Trazor, also known as a Model 506, sells for \$950 in singles, with volume discounts available. SPIRAL SYSTEM INSTRUMENTS, INC., Bethesda, Md.

**FOR DATA CIRCLE 305 ON READER CARD**

### MICROCOMPUTER

Control Data is the latest company to introduce a microcomputer. The Control Data 110 Microcomputer is a 64KB machine based on the Z80 microprocessor. CDC has a two-pronged marketing plan, aimed at both

the business community and the educational market. For business, the CP/M machine will be offered with applications packages ranging in price from \$625 to \$4,000. A Real Estate Sales Production System should be available by the time you read this, while an accounting package is scheduled for early next year. For education, the machine can tie into CDC's PLATO system. High resolution graphics are standard, allowing the 110 to exploit the graphics orientation of PLATO. Both CBASIC and Pascal programming languages are offered—but on different price schedules for educators and businessmen. Two types of communications are offered: an integral PLATO modem (1200bps transmit, 1200bps receive), and RS232 asynchronous communications to 1200bps. A basic Control Data 110 sans applications sells for \$4,995, and includes the microcomputer, an 8-inch, 1.2MB floppy, and CP/M. CONTROL DATA CORP., Minneapolis, Minn.

**FOR DATA CIRCLE 306 ON READER CARD**

### RASTER GRAPHICS TERMINALS

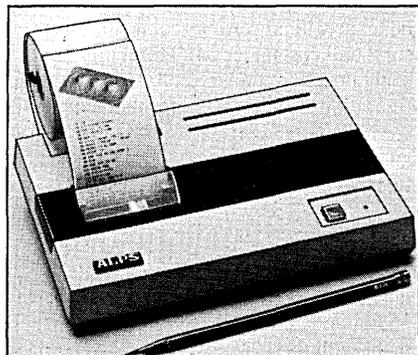
Tektronix has introduced a second line of upward compatible terminals in its 4020 series of raster scan graphic display terminals. Dubbed the 4020A series, the two new terminals increase the capabilities of the 4025 monochrome display and the color 4027 terminal. Key features include a switch from Intel 8080 to 8085 microprocessors and additional local processing speed provided by new EPROM-based firmware. Earlier 4020s can be upgraded for roughly \$600 by a board swap; this retrofit also frees up a board slot on the terminal's internal bus.

The 4025A and 4027A can communicate at faster line speeds: up to 9600bps. The terminals also have increased display memory, up to 16KB compared to the 4KB in the original 4025 and 8KB in the 4027. The 4027A maintains a 48KB base of graphics memory. Standard features of the 4027—up to 16 macro commands, locally defined circles and arcs, and clipping firmware—have been added to the 4025A. Both new terminals have improved firmware for driving their GPIB interfaces, allowing plotter output with 4096 x 4096 resolution (as opposed to 640 x 480). Video output capabilities have been provided, including RGB capabilities for the 4027A color tube. Pricing is approxi-

## HARDWARE SPOTLIGHT

### MINIATURE PRINTER/PLOTTER

An inexpensive miniature printer/plotter developed by Alps uses small ball point pen cartridges to write (or draw) images on 58mm (2.28-inch) roll paper. Two models are offered: the Model 1200 uses four pens, allowing output in multiple colors, while

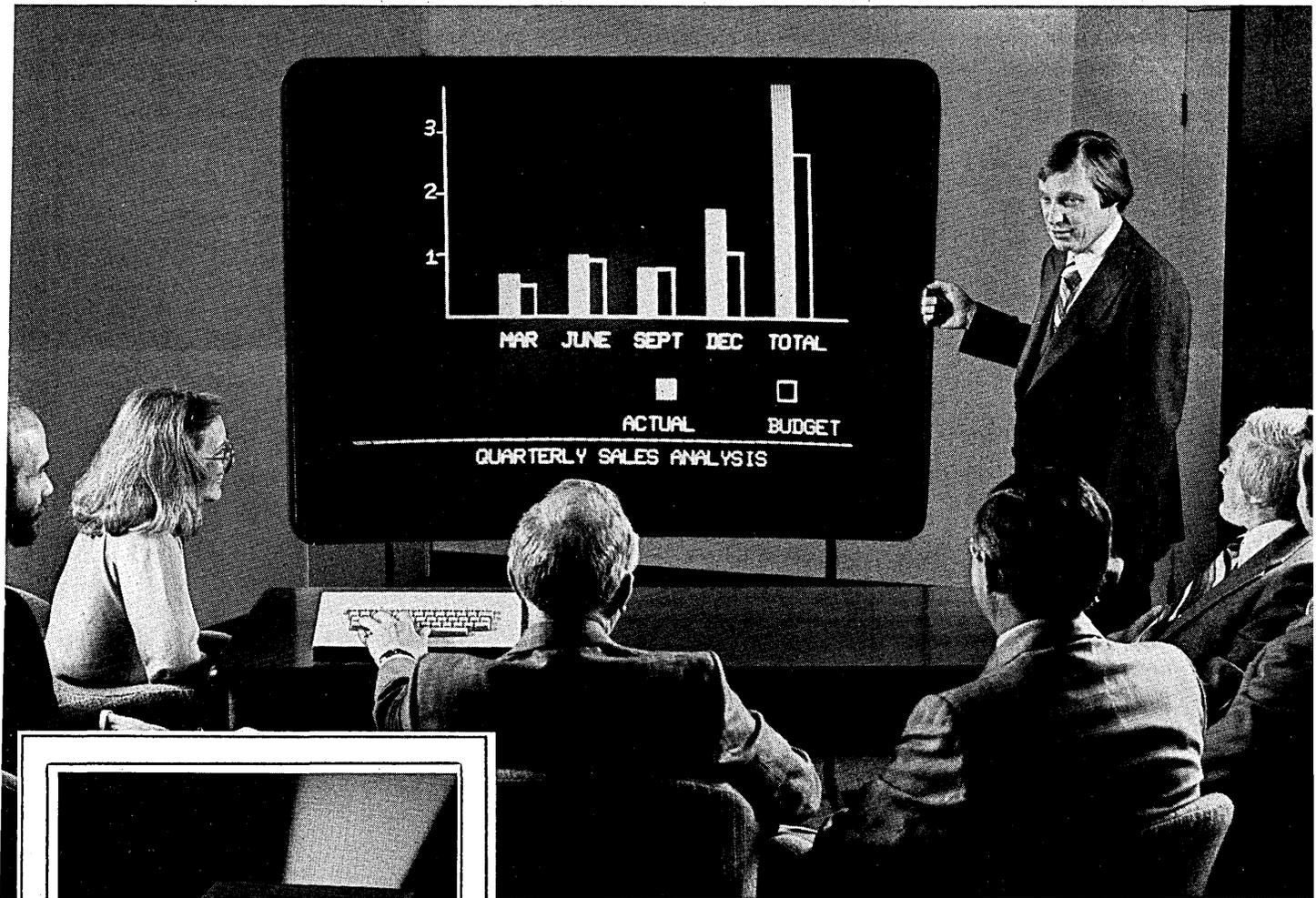


the Model 1100 uses a single pen. Both units use a Centronics-type interface. The four-color model can create graphics, with the host computer selecting pens under software control. It also does alphanumerics in 15-, 18-, 24-, or 36-column formats, writing at 6cps in the smallest character size. The single-pen version generates alphanumerics in either 10- or 40-column format (software selectable) at 12cps using the smaller character format. The units are offered as packaged units, or as bare mechanisms. A four-color mechanism is dubbed the DPG-12, and the single color version is called a DPG-11. Sample prices for single standalone units are \$325 for the single-pen version, and \$425 for the four-pen model. Mechanisms are \$140 for one color, and \$180 for four colors. ALPS ELECTRONICS (USA), INC., Rockville Centre, N.Y.

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## HARDWARE

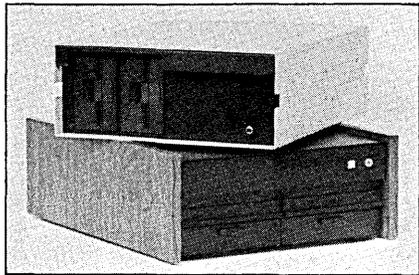
mately \$5,200 for the 4025A and \$10,000 for the 4027A. TEKTRONIX, INC., Beaverton Ore.

**FOR DATA CIRCLE 307 ON READER CARD**

### MICROCOMPUTERS

Virtually everyone knows that the television sets on sale at many major retailers are manufactured by someone else; only the label has been changed to suit the retailer. Frontrunner Computer Industries is taking a similar approach, producing S-100 bus microcomputers and adding the nameplate requested by the vendor placing the order. Frontrunner calls its systems "Private Label Computers."

Each packaged microcomputer consists of a 4MHz Z80A microprocessor with 64KB of memory, from two to four 5¼-inch or 8-inch floppy drives, diskette controller (double or single sided, double or single density), power supply, cooling fan, cabi-



netry, two RS232C ports (and one cable), and a Centronics-compatible parallel printer interface. Also included are a real-time clock, CPM 2.2 (MP/M is optional), and an S-100 bus with five open slots. The systems can be expanded from one to four users, and hard disks in 10MB, 34MB, and 64MB capacities are available. Maintenance support is available through an agreement with CISCO (a Co-operative of Independent Sellers of Computer systems and Office automation equipment). Dealer prices range from \$2,200 for a System 5D with dual single-sided 5¼-inch floppies to \$5,500 for a System 8W with one double-sided 8-inch floppy and 10MB of rigid disk. FRONTRUNNER COMPUTER INDUSTRIES, Reno, Nev.

**FOR DATA CIRCLE 308 ON READER CARD**

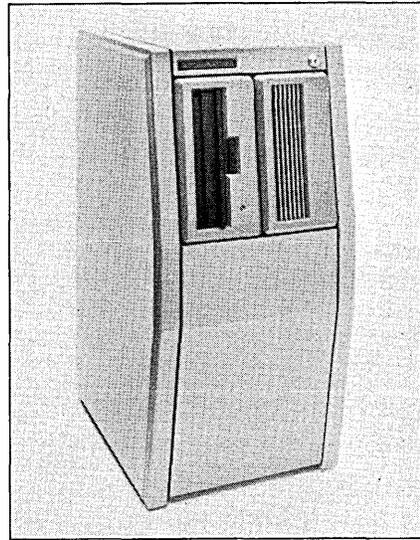
### CRT TERMINAL

Hazeltine's Esprit is an upper/lower case ASCII crt terminal with a 12-inch (diagonal) screen. Dual intensity video highlighting, reverse video, and underlining are programmable-available to enhance information displayed on the screen. Esprit offers editing capabilities in block mode; these include insert and delete, erase field, erase to end of line, and erase foreground functions. The single end-user list price for Esprit is \$695, with volume discounts available. HAZELTINE CORP., Greenlawn, N.Y.

**FOR DATA CIRCLE 309 ON READER CARD**

### MULTI-USER MICRO

Micromation's M/Net multimicroprocessor system has led to the evolution of the Mariner series, designed to support up to eight users in a business or office environment. As with the earlier system, Mariner provides each user with Z80 processor and 64KB of memory; up to eight of these boards can be plugged into the Mariner's S-100 bus. The bus also provides communications to systemwide shared peripherals, such as disks and tapes. A master processor pro-



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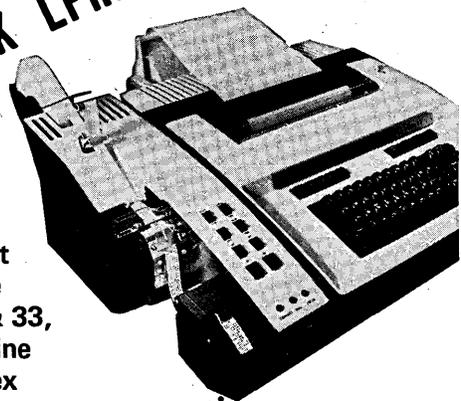
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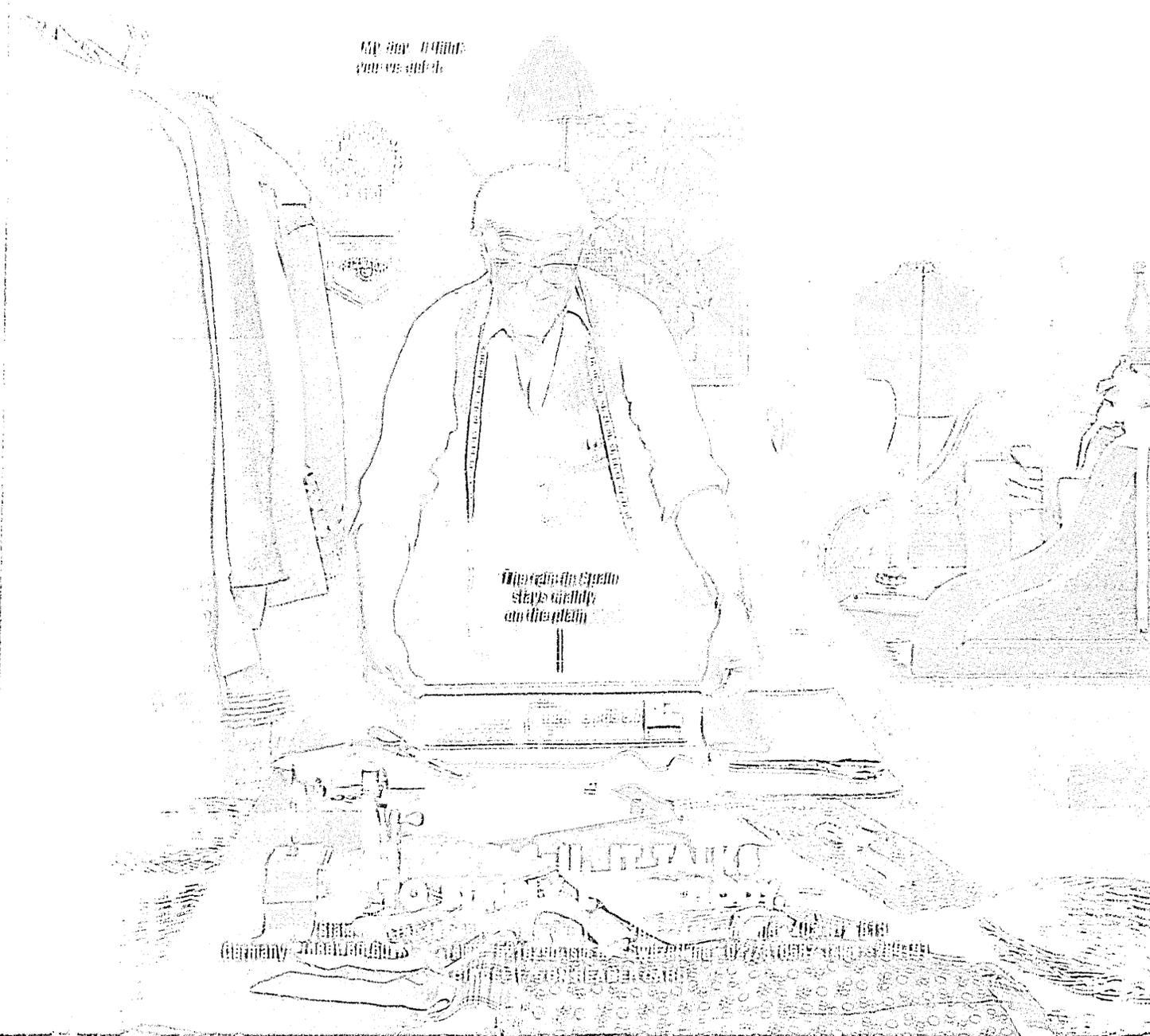
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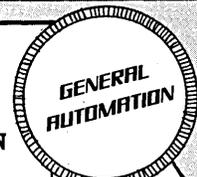
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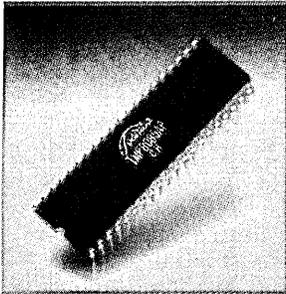
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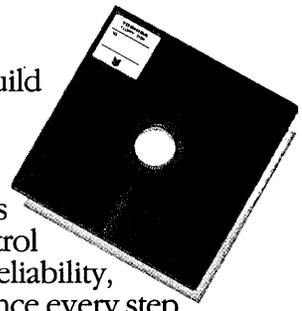
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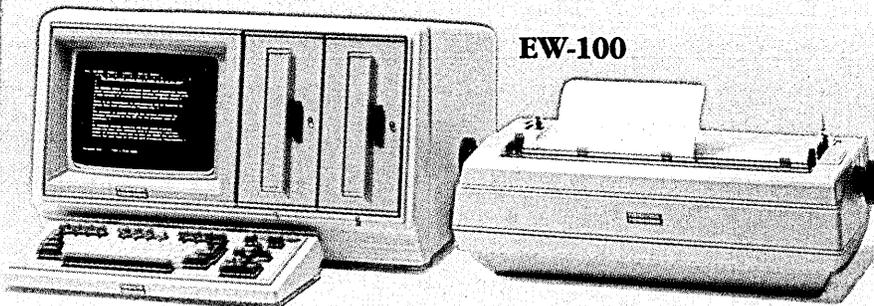


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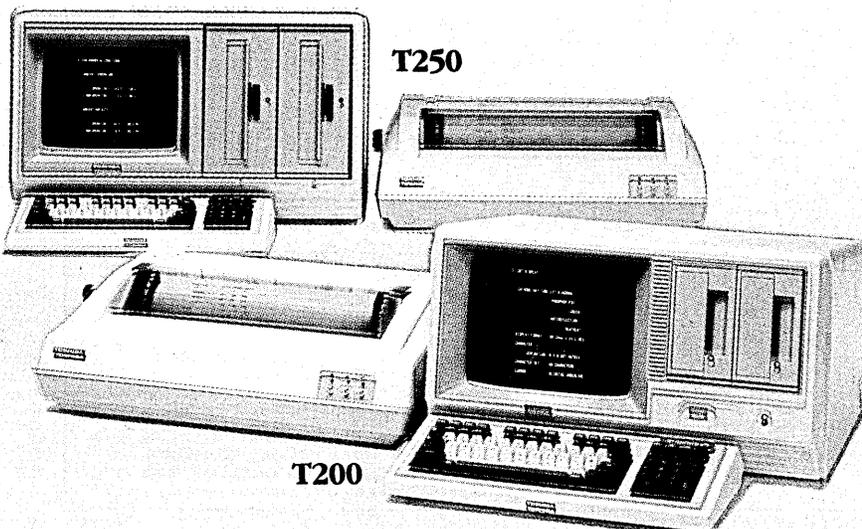
## Word Processor



### EW-100

display capacity: 80 characters × 24 lines  
floppy disk: 8"  
storage capacity: 300KB × 2,  
1MB × 2  
type of printer: daisy-wheel printer  
printing speed: 45 characters/sec.  
print pitch: 10/12/proportional spacing

## VSBC (Very Small Business Computer)



### T200/T250

#### Hardware

memory: 64KB  
display capacity: 80 characters × 24 lines  
floppy disk: T200: 5 1/4"  
T250: 8"  
storage capacity: T200: 280KB × 2  
T250: 1MB × 2  
printing speed: 125 characters/sec.  
characters per line: 136 characters

#### Software

CP/M®, Microsoft BASIC-80, CBASIC™

\* CP/M® is a registered trademark of Digital Research, Inc.  
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Please send me more information about Toshiba's Word Processor and VSBC:  Products  Dealer Program DM-81

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CIRCLE 177 ON READER CARD

## HARDWARE

vides coordination between the independent user processors, supervising overall system operation and handling bus arbitration. While the earlier M/Net system won't be discontinued, Mariner is where the company plans to concentrate its future development efforts. The system has been packaged in new cabinetry more appropriate for an office (M/Net was literally a black-box package); within the Mariner cabinet there's room for a pair of floppy drives (total capacity: 2MB) and an 8-inch Fujitsu Winchester disk with a 21MB capacity. Hard disk backup is provided by a streaming tape drive. The system supports RS232 terminals, and printers using the Centronics parallel interface. The operating environment is provided by either of two CP/M-compatible operating systems: MP/M or DBOS. A single-user system starts at \$4,500, while an eight-user system with hard disk, one floppy, and tape drive sells for \$26,850, including operating system. Language processors are separately priced. MICROMATION INC., San Francisco, Calif.

**FOR DATA CIRCLE 310 ON READER CARD**

### COMMUNICATIONS LINK

Primarily for industrial applications, Analite's Serial Transmitter And Receiver (STAR) accepts 24 bits of parallel input at logic levels, serializes the input, and sends it through a twisted pair (said to have "superior"

rior" noise immunity) at 7000bps. The opto-isolated system then reconverts the serial data to parallel signals at either logic levels or high-power open collector levels suitable for tripping relays and the like. Up to four 24-line transmitters and receivers can operate over the same twisted pair, allowing transmission of up to 96 bits at a clip. In quantities of less than 10, a STAR 101 transmitter sells for \$360, and Model 102 transmitter expanders are \$180. A Star 103 receiver sells for \$420, while Model 104 receiver expanders are \$210. High-power receivers and expanders are \$480 and \$240, respectively. A BCD six-digit display for use at the receiving end can be had for \$510. ANALITE INC., Plainview, N.Y.

**FOR DATA CIRCLE 311 ON READER CARD**

### 32-BIT MINI

Data General chose the occasion of SICOB in Paris to introduce its second 32-bit mini-computer, the MV/6000. A smaller version of the MV/8000, the machine reportedly has a price/performance ratio superior to those of the IBM 4331-2 and other likely 32-bit competitors, according to Ed Zander, director of DG's Information Systems Div.'s marketing. Compatible with the larger Eclipse MV/8000, and hence other DG machines, the MV/6000 features a logical address space of 4.3 billion bytes and a maximum user program space of 2.1 billion

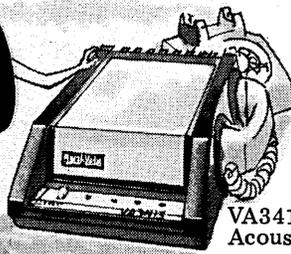


bytes. The new machine can support half the real memory of an MV/8000—2MB—and an on-line maximum storage capacity of 2.5 billion bytes. The MV/6000 can handle 64 simultaneous users, and it uses an intelligent asynchronous communications controller in place of the MV/8000's integral I/O processor. Like the previously announced MV/8000, the MV/6000 runs under the AOS/VS operating system, and supports the full range of DG's communications software, programming languages, data management packages, and utilities. A three-level I/O system comprises a 16.16Mbps burst multiplexor channel, 2.27Mbps data channel, and intelligent asynchronous controllers. A typical system with peripherals will sell for \$215,000, DG says. DATA GENERAL, Westboro, Mass.

**FOR DATA CIRCLE 312 ON READER CARD**



VA3450 Series  
Triple Modem



VA3413 Dual  
Acoustic Coupler



VA103  
Modemphone

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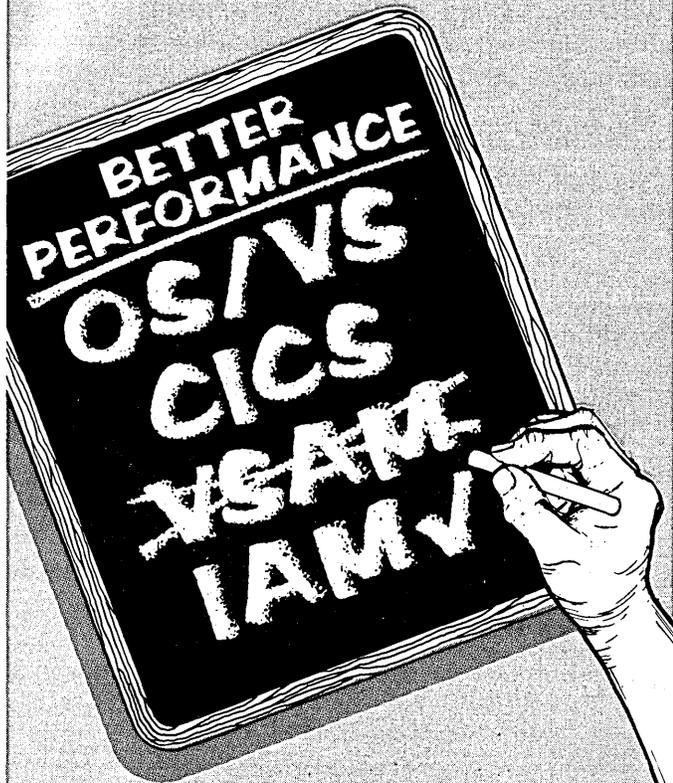
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# SOFTWARE AND SERVICES

## UPDATES

A proposed new standard for the COBOL programming language is available for public review and comment; the comment period ends Feb. 13, 1982. The draft ANSI standard revises the 1974 standard, cleaning up the existing specs and adding improved capabilities. The draft describes 11 modules: eight required and three optional. Required modules are: Nucleus, Sequential I/O, Relative I/O, Indexed I/O, Inter-Program Communication, Segmentation, Sort-Merge, and Source Text Manipulation. Debug, Report Writer, and Communications are the three optional modules. Structured programming constructs, nested programs, and reference modification are among the new capabilities specified. Some specs have been modified to improve the definition of the language and its use. An appendix lists the differences between the proposed and the existing 1974 standard. Identified as dpANS X3.23-198X, the proposal can be ordered from the X3 (Information Processing) Secretariat. Requests for copies, which cost \$25, should be addressed to the X3 Secretariat, CBEMA, 1828 L Street N.W., Washington, DC 20036, Attn: dpANS X3.23-198X.

Structured Systems Group of Oakland, Calif., and Xerox Corp. have inked a contract covering the distribution of SSG's software for use on the new Xerox 820 Information Processor. The agreement includes separate licensing for Xerox to distribute SSG's QSORT, Analyst, Letterright Mass Mailing, and NAD Name and Address systems.

## 3270 EMULATION

IBM is releasing an internally developed program that allows its 3101 ASCII terminals to access most applications developed for 3270 terminals. The Installed User Program (IUP) is called 3101 Pass Through Virtual Machine/370 Support, and it works with 3101s operating in block mode connected to mainframes already running the VM/Pass Through Facility Program Product (5748-RC1, already announced at \$121 per month). With its usual corporate caution, IBM refuses to say if block-mode ASCII terminals from other vendors will function with this program product; the company says that's up to the user to decide.

The program product allows dial-up connection to VM/Pass Through network. It provides simulation of both 3278 and 3277 display stations, and supports 12 program function keys and two program attention keys. Users can reassign program function keys outside the application program at the time of initial connection to the 3101 Pass Through IUP. The program runs on any processor with VM/370 Release 6 and any of VM/370 System Extensions Release 2, VM/370 Basic System Extensions Release 2, or IBM Virtual Machine/System Product. To access the Pass Through Facility, a 3101 (model 20, 22, or 23) may use either switched or dedicated lines, or they may be directly connected to the host. The host running the pass through software emulates either a 3271 (model 2) or 3274 (model 1C) control unit. The 3101 Pass Through VM/370 Support package licenses for \$170 per month. INTERNATIONAL BUSINESS MACHINES CORP., Data Processing Div., White Plains, N.Y.

**FOR DATA CIRCLE 325 ON READER CARD**

## DISK SUPPORT

Instant-FBA is SDI's answer to the variety of disk types and organizations proliferating

today: the software allows any real disk to simulate any other type of disk. It allows simulation of Fixed Block Architecture disks on Count Key Data devices, and vice versa, without requiring the user to make changes to either his program or JCL. By simulating disk types, SDI says it has gotten past problems of incompatibility between IBM access methods and differing disk types. The instant-FBA package runs under DOS/VSE or DOS/VS, and supports any combination of 2311, 2314, 3330, 3340, 3350, 3310, 3370, and 3380 disks as real or virtual devices. According to SDI, virtual disks are transparent to all access methods, including IOCS. Lease prices start at \$90 per month. SDI, San Mateo, Calif.

**FOR DATA CIRCLE 326 ON READER CARD**

## COMMUNICATIONS

For DEC users operating in RSTS or VAX/VMS environments, Clyde Digital Systems offers an intercomputer communications package called CALOUT; the company sells the package along with the requisite programmable auto dial, auto answer 300bps to 1200bps modem for a packaged price of \$1,845. CALOUT lets a user on a PDP-11 or VAX-11 specify the phone number of another computer—which need not be another 11—and the program will automatically make the connection. At the receiving end there must, of course, be a compatible auto answer modem, and a small handshaking program. Upon the first use with a given remote system, CALOUT will send the appropriate handshaking program.

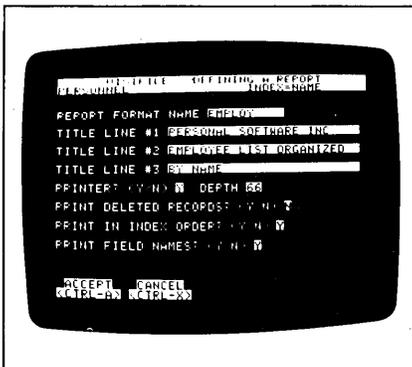
CALOUT, and its handshaking program, provide error checking to ensure the integrity of communications. The user can communicate with the remote system as a terminal user, or transfer disk files—regardless of type—in either direction. The program also allows a user to set up a text file of commonly called numbers, and select the

## SOFTWARE AND SERVICES

desired number from a menu for automatic dialing. CLYDE DIGITAL SYSTEMS, Div. of Clyde Enterprises Inc., Bedford, Mass.  
**FOR DATA CIRCLE 327 ON READER CARD**

### FILE MANAGEMENT

Personal Software has made yet another addition to its line of Visi Series user-friendly software packages for the Apple II personal



computer. The new package, VisiFile is a simplified file maintenance program for record filing, searching, sorting, and report and mailing label printing. Additionally, VisiFile stores data in a format compatible with other Personal Software packages, including VisiCalc, VisiTerm, and Visi-Trend/VisiPlot (see Software and Services, July).

In keeping with Personal Software's philosophy of making its packages easy to use, VisiFile's user interface is a "moving cursor menu" with prompting. Users can design custom formlike input screen formats. Sorting routines written in machine language and multiple keyed field indexes allow record retrieval within three seconds, according to Personal Software.

Report definitions and formats, including arithmetic calculations, can be cataloged for repeated use. Mailing labels may be printed up to five-up. Reports may be defined in a row-and-column format, or a custom format of up to six rows, as wide as the printer will allow. Report specification may include selection criteria—in addition to being sorted or indexed; thus a user can

request a report of all customers in California with back orders outstanding. VisiFile requires an Apple II (with language card or Applesoft BASIC card), or an Apple II Plus with at least 48KB of main memory and one diskette drive. Package lists for \$250. PERSONAL SOFTWARE INC., Sunnyvale, Calif.

**FOR DATA CIRCLE 328 ON READER CARD**

### SOFTWARE ASSIST

To boost performance in VM/370 environments, Amdahl has developed a Virtual Machine/Software Assist (VM/SA), expanding and improving its AIDS (Amdahl Internally Developed Software) program product. VM/SA improves VM/370 instruction simulation, providing a functional equivalent of IBM's Virtual Machine Assist (VMA) and Shadow Table Bypass Assist (STBA). VM/SA reduces the number of instructions needed to simulate frequently used privileged instructions, enhances the simulation routines to best exploit the 470's architecture, and uses standard VN commands to control and interrogate its operations. The software assist can run on any Amdahl 470, 580, or compatible processor, including attached processor and multiprocessor configurations. With system control programs running under VM/370, VM/SA significantly reduces VM overhead: Amdahl says that with an MVS workload, the VM overhead reduction can exceed 75%. VM/SA licenses for \$500 per month per processor. Customers get a tape of the source code. AMDAHL CORP., Sunnyvale, Calif.

**FOR DATA CIRCLE 329 ON READER CARD**

### GRAPHICS EDITOR

Intelligent Systems Corp. now offers a Display Management System (DMS) that simplifies the creation of color graphic screen displays on its line of CP/M-based color desktop computers. According to the company, a user without programming expertise can create a color graphic display in roughly one-tenth the time it would take a programmer to get the same results using BASIC or FORTRAN. Instead of writing a program, the user simply paints a picture using the computer's cursor control keys, color pad, and special function keys. DMS recognizes the

user's keystrokes, and makes a record of the user's input augmented with control codes as needed. Completed screens are saved on diskette for subsequent recall; up to 18 displays can be saved in a single disk file. In addition to simplifying the creation of graphics displays, the package also reduces memory space requirements—typically reducing the 8KB needed to save a screen refresh memory to anything from 20 bytes to 1,700 bytes. The package, including the Display Management program that creates screens, a CALL routine that allows applications programs to present stored screens, and DEMO program, sells for \$300. INTELLIGENT SYSTEMS CORP., Norcross, Ga.

**FOR DATA CIRCLE 330 ON READER CARD**

### UNIX OPERATING SYSTEM

Perkin-Elmer has announced its marketing and support of the Bell Labs-developed UNIX operating systems for PE's 32-bit Megamini family of systems. Produced by The Wollongong Group, Inc., two versions, dubbed Edition VII and Edition VII Workbench, will be sold and maintained by the minimaker. With the commercial availability of UNIX, Megamini users now have the choice of operating in either an OS/32 or UNIX environment; the two operating systems cannot be active at the same time.

Edition VII includes the operating system, utility programs, and five languages: C (in which most of UNIX is written), FORTRAN 77, RATFOR, Pascal, and a macro assembler known as CAL. Electronic mail, graphics, text editing, and text processing (including phototypesetter drivers) are also included. The Workbench adds a Source Code Control System, making it attractive for program development. SCCS, as the Source Code Control System is known, controls and tracks program changes, aids in documentation, provides automatic version numbering and the ability to re-create previous versions of a program. Edition VII is priced at \$20,000, while the Workbench version is \$30,000. Both are configured to support but a single port. Additional support for more users goes for \$5,000 per eight ports. An "unlimited port expansion" option is \$45,000, thus pricing a full-blown 128 user system at \$75,000. PERKIN-ELMER, Data Systems Group, Oceanport, N.J.

**FOR DATA CIRCLE 331 ON READER CARD**

### DISKETTE CONVERSION

Hewlett-Packard now offers a relatively inexpensive—\$95—package that allows the transfer of data between its Series 80 personal computers and any other machine accepting IBM 3740 formatted diskettes. The Data Exchange Utility lets HP-85s and 83s convert 8-inch floppies to IBM format, and vice versa. The menu-driven package uses the personal computer's function keys to let the user select from among five functions. A file, a set of files, or all files can be transferred from Series 80 format to 3740 for-

## SOFTWARE SPOTLIGHT

### DISPLAYWRITER OPERATING SYSTEM

Well, IBM's Office Products Div. may not have announced the inherent data processing capabilities of its Displaywriter, but Digital Research has announced that it will offer CP/M-86 for that latent computer. For those who haven't followed the evolution of microcomputer operating systems, CP/M-86 is the 16-bit version of the de facto industry standard microcomputer operating system, CP/M. Once a user slips the 8-inch floppy containing CP/M-86 into a Displaywriter, an entirely new world of data processing will open up on the typist's desk. With IBM's

recent announcement of the Datamaster and its Personal Computer, we can understand the Grey Giant's reluctance to offer yet another small, affordable computer. With the wide variety of CP/M-compatible applications already on the market, not to mention programming languages including BASIC, COBOL, FORTRAN, and Pascal, IBM customers will have an even harder time deciding where to spend their dp dollars. Pricing still isn't solid, but Digital Research indicates that the system with documentation will be in the range of \$300 to \$375. DIGITAL RESEARCH INC., Pacific Grove, Calif.

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CIRCLE 181 ON READER CARD

## SOFTWARE AND SERVICES

mat, or from 3740 format to Series 80 format. Series 80 or 3740 diskettes can be cataloged: for a Series 80 diskette, the catalog shows file name, type, bytes per record, and number of records in the file; 3740 catalogs indicate file name, type, first record address, first unused record address, and last record address. Any file in either format may be purged or renamed. The utility also lets the user initialize a diskette to 3740 format, instead of the standard Series 80 format. The Data Exchange Utility makes it possible for the user to exchange

diskette files between the Series 80 personal computer and those computers supporting IBM formatted diskettes. Aside from the obvious application of moving data to IBM equipment, the utility lets Series 80 users move data to other HP systems in a two-step process: first converting the file or files to IBM format, then using other HP utilities to convert the IBM formatted diskette to the appropriate format for HP's 250, 3000, 9835, or 9845. HEWLETT-PACKARD CO., Palo Alto, Calif.

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**CIRCLE 182 ON READER CARD**

## WORD PROCESSING

Word/3 and MLS/3 provide word processing and mailing list maintenance capabilities, respectively, to users of IBM's 5110 and 5120 desktop computers. Together, the two programs can be used for selectively generating form letters.

Word/3 includes both text and math handling. Text functions include insert and delete, global search and replace, block move and copy, and statistical column moves. Column subtotaling and totaling, addition, subtraction, multiplication, and built-in formulas for interest and amortization calculations are included in Word/3's math capabilities.

For output, Word/3 supports a number of printers, including Diablo daisy-wheels; depending on the printer's capabilities, output can be proportionally spaced, justified, and overprinted. Reports can be printed up to 177 characters wide. Word/3 is priced at \$2,000.

MLS/3 can produce labels one- to four-up, with one to eight lines of data for each. A 40-position select code, and up to 23 additional fields for sorting and selection can be specified when the user defines his file layout. A "publisher's audit" function provides a count of the records meeting a specified selections criteria, such as "expired." This feature can also tally the number of subscribers in a given geographic region. The package sells for \$1,500. OPTION/1 SYSTEMS, Woodland Hills, Calif.

**FOR DATA CIRCLE 336 ON READER CARD**

## SPREADSHEET PACKAGE

Supercalc, originally demonstrated on the Osborne 1 microcomputer, now can be had for other CPM systems. Both 8-inch and 5-inch floppy formats are offered, with 5-inch versions formatted for Xerox 820, North Star, Superbrain, Micropolis, Zenith, Vector Graphics, and Apple (with the Z80 Soft-card). Written in Z80 machine language, Supercalc lets a user define a spreadsheet of as many as 63 columns or 254 rows. In addition to allowing the user to define spreadsheet calculation models, Supercalc allows merging data from several worksheets. It also provides a help function: entering a question mark tells Supercalc to explain the various operations available to the user at the current stage of his or her work. Thus, if a user forgets what arguments are available at a given point in a command, hitting "?" calls up appropriate explanatory information. Other features of the package include variable-width columns, automatic report formatting, text spread across several columns, and compatibility with more than two dozen terminals, including DEC's VT100 (an installation program lets the user define terminal and printer characteristics). Supercalc sells for \$295; an 8086 version is in the works. SORCIM CORP., Santa Clara, Calif.

**FOR DATA CIRCLE 334 ON READER CARD**

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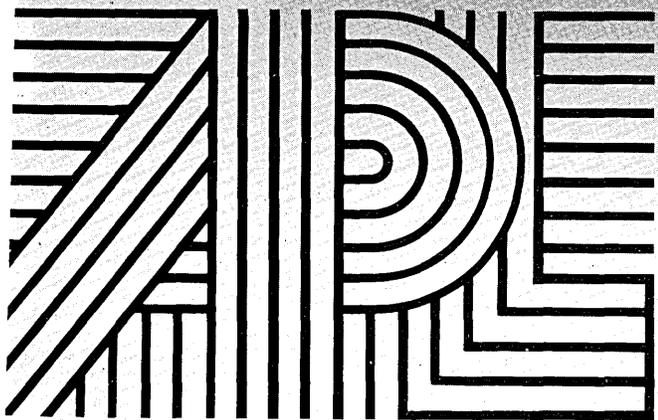
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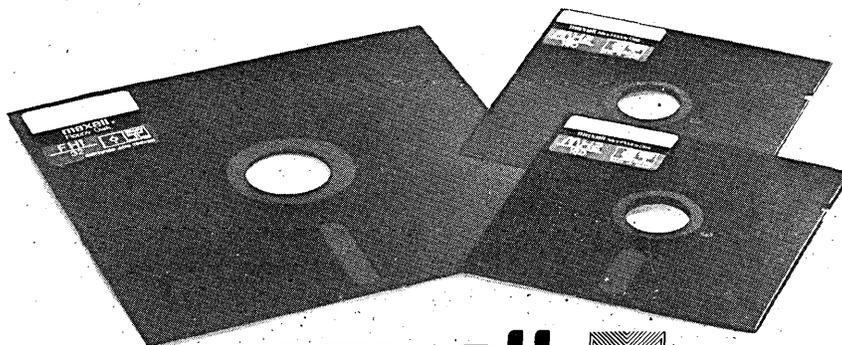
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## BOOKS

### FROM ENIAC TO UNIVAC: AN APPRAISAL OF THE ECKERT-MAUCHLY COMPUTERS

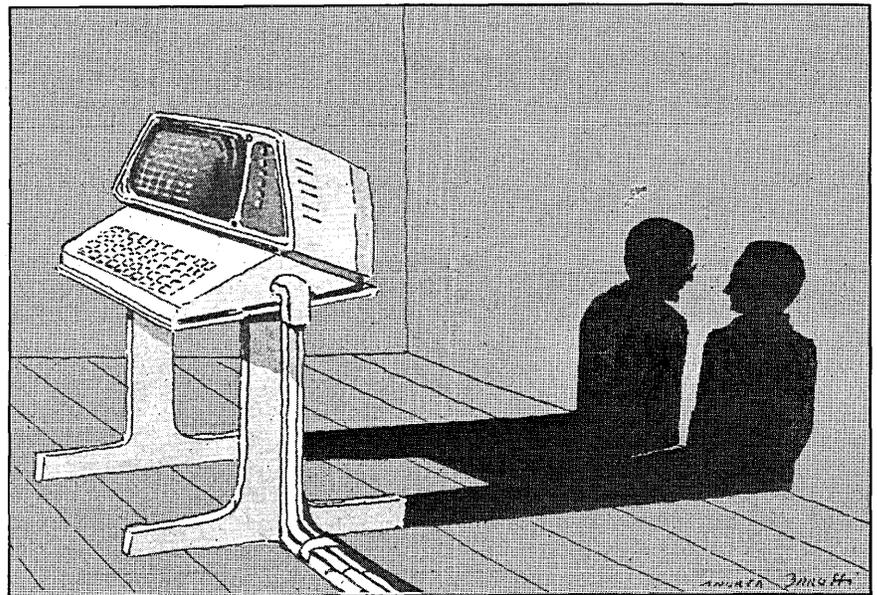
by Nancy Stern

Nancy Stern is a professional historian. She has been academically trained to strive for objectivity and to build her case from records and other tangible evidence. Take away the records and the proofs, and she, like all historians, is lost in a trackless wasteland.

Unfortunately for Dr. Stern, the evolution of digital computer technology at the hands of J. Presper Eckert and John Mauchly did not leave an orderly documentation trail. Both men were too busy building computer systems to write even the minimal reports required by their funding agencies. Before his death in January 1980, John Mauchly tried to fill some of the gaps by giving many interviews and writing an occasional article. Most of the time, though, he was more involved with weather forecasting problems, which were his springboard into computing 40 years earlier.

So, the historical record is incomplete. Nancy Stern has dipped into what is available and selected some issues that interest her. She has tried to do an acceptable job within her self-imposed constraints. The matters that seem important to her include the relationship between Eckert and Mauchly, the larger relationships between the engineering and mathematical communities, the role of John von Neumann, the performance of the little-known BINAC computer system, and the troubled history of the Eckert-Mauchly Computer Corp. Regrettably, these are only a small subset of the interesting subjects from the period in question.

Determining the scope of a work is a matter for the author and publisher. Truth could be better served, however, by deleting the subtitle "An Appraisal of the Eckert-Mauchly Computers." There is almost no material in this volume that could be classified as either a technical appraisal of the hardware, or as an attempt to define the



position these machines played in the sweep of digital computer history. There is no indication given of how any Eckert-Mauchly decision leads, or does not lead, to a change in a later machine's architecture. Reading this volume leaves the reader unaware of the Manchester machines, Zuse's Z-4, and all the other pre-1950 efforts.

Nor has there been any attempt to backtrack to the ideas of the late '30s and look at what John Mauchly was doing before he came to the Moore School. This would seem essential to any serious discussion of the Atanasoff controversy. In 1973, a federal judge ruling from the vantage of time, distance, and no technical understanding of the subjects involved, decided that Eckert and Mauchly did not invent the digital computer. Through some devious and tortured logic, Judge Larson came up with the hair-splitting idea that although Eckert and Mauchly did not invent the digital computer, since their ideas were derived from those of John Atanasoff, they did invent ENIAC.

The Atanasoff work was small in scope and never completed. One might also say that perhaps the work of Babbage and Pascal, among others, preceded Mauchly's

first thoughts. Perhaps the judge never understood that in pioneering science, one generation builds on the work of its predecessors. In practical terms, however, no matter how a judge may rule, Eckert and Mauchly built a real computer. It worked. It solved real user problems. The oft-quoted "The Law is an ass" seems highly appropriate here. Students of computing history are perfectly clear in their own minds about who invented the digital computers, judicial mulishness notwithstanding.

On some of the other issues that concern her, Stern does a good deal better. While perhaps slightly misinterpreting John Mauchly's motives, she really is not far off the track. It is implied, particularly in remarks attributed to John von Neumann, that Mauchly was motivated by the commercial exploitation of digital computers, and that this, somehow, is wrong. It does seem clear that Mauchly was not in the mold of pre-World War II academicians who believed that profit and commercial viability were evil. It also seems clear that Mauchly was not terribly interested in getting rich. What he wanted most was to deliver machines that worked to customers who needed them. Is

## SOURCE DATA

this a sin? In those days, many academics regarded off-campus work as distasteful. Times have changed.

Stern does well with the clash between pure mathematics and the engineering world. Careful proofs are not the way of engineers. Nor do they save their results for publication. True engineers want to build something that works. Presentation can wait for some future date. Throughout the early history of digital computers, regardless of which effort is being examined, there are obvious and open conflicts between the two groups. Perhaps the heart of the problem is that the pure theorists, the mathematicians, did not ever really see the broad scope of the digital computer's eventual usefulness. All they appeared to want was a tool to solve partial differential equations. Thus it is no surprise that many of the earliest machines, particularly those where the mathematical types ran the project, had such limited input/output capacity. Conversely, Eckert and Mauchly worked very hard at I/O subsystem development.

There is a generally accepted notion in the industry that John von Neumann invented the stored program concept. It is not true, and Stern does a good job of showing how clear the record is on this point. Von Neumann publicized the idea in a widely distributed (for that time) document titled "First Draft of a Report on the EDVAC," which is printed as an appendix in this volume. But the ideas he cited were already in place. As is noted in the book, the "Draft Report" changes the terminology but not the logic that Eckert and Mauchly already had developed. It certainly is not easy to deal critically with a man who was unquestionably one of the half-dozen greatest scientific minds of all time. But there is still considerable doubt as to why von Neumann signed his name alone to the report without adding due credit to Eckert and Mauchly.

Stern also covers the brief history of the Eckert-Mauchly Computer Corp., although not in detail. EMCC was one of those classic companies where the key management decisions were made by engineers, usually led by Eckert. Questions of marketing, pricing, and product cost were casually disregarded, and every time Mauchly sold a machine, the company fell deeper into the red. EMCC was a model for many computer companies to follow. Unfortunately, the same results always ensued. Get the orders, buy components, borrow money, suffer cost overruns, try to borrow more money, go into bankruptcy. The results are always the same: disappearance or acquisition (which were often the same thing.)

What is totally missing in this book is any understanding of how the machines worked. While occasional circuit diagrams are included, there is no reference to them in the text, nor is there any real discussion of machine architecture. Design trade-offs, then as now crucial in the development pro-

cess, are missing.

Also absent is any feeling for the excitement generated during the brief life of EMCC. For a better insight into what it was really like to be there at the creation, a look at the book by the late Herman Lukoff, *From Dits to Bits*, reviewed in these pages in January 1980, is recommended. Stern may be an important historian but she doesn't seem to appreciate what it is like to sit up all night with a balky circuit, to feel the frustration of chasing a transient error, or to get excited when something finally works. Success in a pioneering effort is neither objective nor bloodless, it is emotionally and psychologically rewarding.

Many interesting technical questions go unanswered. It would be revealing to find out the origin of the UNITYPER/UNIPRINTER concept and why it did not catch on in 1950. When Mohawk's key-to-tape systems appeared 15 years later, they were instant successes. Many of today's engineers would find a study of Pres Eckert's efforts to achieve tube reliability enlightening. He dealt successfully with building a viable machine from components whose reliability characteristics were, at best, marginal. Where did programming begin to rear its ugly head? It is hardly mentioned in this book and Grace Hopper's name never appears, even in the index.

There are other questions that fall into the category of "might have beens." Would EMCC have avoided the Remington Rand takeover if additional funding had been obtained from A.C. Nielsen Co.? Where might Univac have been today if they had ever understood John Mauchly? Might the whole industry have been different if NCR had followed up on their ideas in the '30s? What would have happened if EMCC had been sold to IBM?

In retrospect, federal judges and historians aside, there really is very little doubt as to how Eckert and Mauchly interacted to play their roles in computer history. John Mauchly was the idea man, the inspiration, the problem solver, the catalyst who triggered others to exceed themselves. Pres Eckert was the engineer, the builder, the fanatic about reliability and clean logical structure. Each without the other was incomplete. This is clearly evidenced by a look at the record after the 1950 takeover by Remington Rand. The synergism was gone. The output was ended.

In a larger sense, the industry knows about them. The achievements cannot be forgotten. Nor can it be disregarded that the work in Philadelphia was the inspiration for all the other systems that appeared in other parts of the world except for Zuse's lonely mountaintop research.

In spite of all the doubts, omissions, and reservations, Stern has added to our knowledge of the early years. While the book falls well short of perfection, it fills a useful role and is recommended. If you ex-

pect to find out how Eckert and Mauchly designed and built computers, though, this isn't the book. Nor will you discover how ENIAC, EDVAC, BINAC, and UNIVAC fit into the broad scope of computer development. That book is still to be written. Digital Press, Bedford, Mass. (1981, 286 pp., \$21).

—Philip H. Dorn

## LAW AND THE COMPUTER by Michael C. Gemignani

Evidence that we are rushing headlong into the Computer Age or Information Age surrounds us. Businesses, both large and small, rely upon computers to process vast amounts of vital information: accounts receivable, inventory, payroll, etc. Development of the microcomputer has spawned a population of home computer hobbyists. Shopping malls echo with the bleep and whirr of "Space Invaders" and a host of extraterrestrial computer-based games.

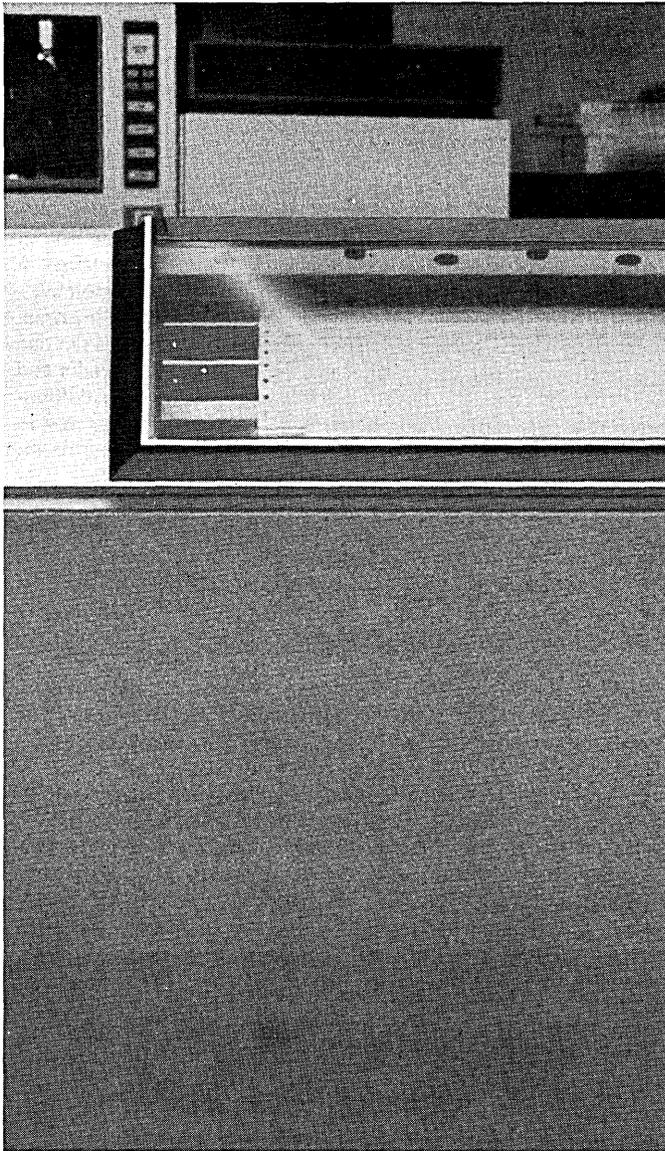
Given this increasing reliance upon computers, as well as the modern penchant for resolving every dispute in the courtroom, it is only a matter of time before computers and the law confront each other. For the computer professional this confrontation could well be mystifying, what with arcane proceedings, obscure terms like *voir dire* or *subpoena duces tecum*, and so forth.

Accordingly, mathematician-lawyer Michael C. Gemignani has set out, in *Law and the Computer*, to demystify the law, introducing those with no legal training to some basic legal concepts and terminology related to computing. His purpose is to educate the computer professional so that she or he may not only recognize legal problems before they occur but also communicate more effectively with attorneys.

The book begins with a brief overview of the sources of American law, statutes and judicial decisions, and proceeds to an almost textbook discussion of selected legal topics, including contract, tort, and criminal law, as well as evidence and the law of intellectual property. Where possible, these general legal principles are related specifically to computing.

For instance, the chapter on computer torts (civil wrongs) reviews negligence, professional malpractice, and strict liability principles as they relate to computer error. The author outlines the data processor's duty of care toward end users, the criteria by which that duty may be established, and the necessity of a damage-causing breach of duty—all elements of a civil wrong and standard legal fare.

Elsewhere, the discussion of evidence law focuses upon the rules that exclude from judicial proceedings hearsay and evidence obtained by improper means. Special attention is paid to the Business Record exception to the Hearsay Rule, an important exception given the increased reliance upon computers to maintain business data.



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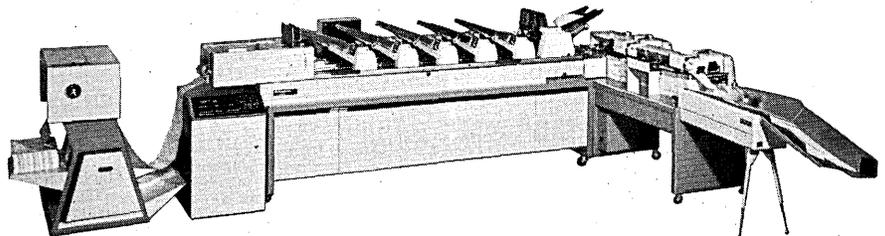
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A problem inherent to this area of law is that the questions raised by modern computer technology do not always fit neatly within traditional categories of legal thought and analysis. It is unclear, for example, whether computer software is "goods" for purposes of Uniform Commercial Code (UCC) Article 2, or whether a program is tangible property capable of being taken and carried away for criminal law purposes. (Larceny is typically defined as the felonious taking and carrying away of the property of another.) Nonetheless, the author notes, judges are comfortable with these traditional concepts and will likely rely upon them in fashioning remedies in computer technology cases, no matter how tight the fit. Then again, the law has always grown by expanding old ideas to cope with new problems.

Straightforward throughout, Dr. Gemignani admits that computer-related law is extensive and cannot, and perhaps should not, be explored in a single volume. Consequently, the book does not cover several significant legal topics. There is no discussion, for example, of the IBM and AT&T antitrust trials. Similarly, the book ignores privacy and security, electronic funds transfer (EFT), competition, and the like—complex legal issues which may someday be critical to society and which will certainly be difficult to resolve.

Because the law is developing so rapidly in this area, portions of the text are already out of date, especially in matters of intellectual property law. Before leaving office, President Carter signed the Computer Software Copyright Act which generally implements the recommendations of the Commission on New Technological Uses of Copyrighted Works (CONTU). Although the act clarified the issue of whether programs may be copyrighted, it may have raised more questions than it answered. What constitutes a derivative work for copyright purposes or whether use of the copyright notice precludes trade secret protection are significant but unanswered questions facing computer professionals and lawyers alike. In a related matter, the U.S. Supreme Court recently decided two patent law cases significant to computing, *Diamond v. Diehr* and *Diamond v. Bradley*. Though no fault of the author, there is but brief mention of these then-pending developments. This omission is most unfortunate because these cases have changed the complexion of the law insofar as computers are concerned, and a discussion of them would have greatly strengthened the book.

Perhaps the only major disappointment in the book is its treatment of data processing contract issues. From a review of the adversarial judicial system, the author launches into a discourse on contract law

laced with an adversarialism that is out of place. Computer system vendors are portrayed as powerful corporate villains, anxious to score "points" against naive customers by excluding warranties and disclaiming liability on computer services that are not only defective, but may also be dangerous. Caveat emptor may be the rule in the marketplace, but such adversarialism in this context is unnecessary and destructive.

The author fails to note the emerging consensus that the best contract is a fair one that allocates the risks between vendor and buyer equitably and reasonably. Additionally, he disregards the increased interest in resolving disputes outside the courtroom. Many data processing contracts now contain arbitration clauses as a way of avoiding the undue time and expense associated with litigation. Another device, the mini trial, has received national attention as an effective, if not novel, alternative dispute resolution mechanism.

Besides reviewing these areas of law, the author provides a glossary of common legal terms, and the book closes with an appendix that includes a short guide to legal research materials. An attractive feature of the appendix is the inclusion of selected case and statutory materials.

Whatever its shortcomings, *Law and the Computer* is a readable introduction to an area of law that is becoming increas-

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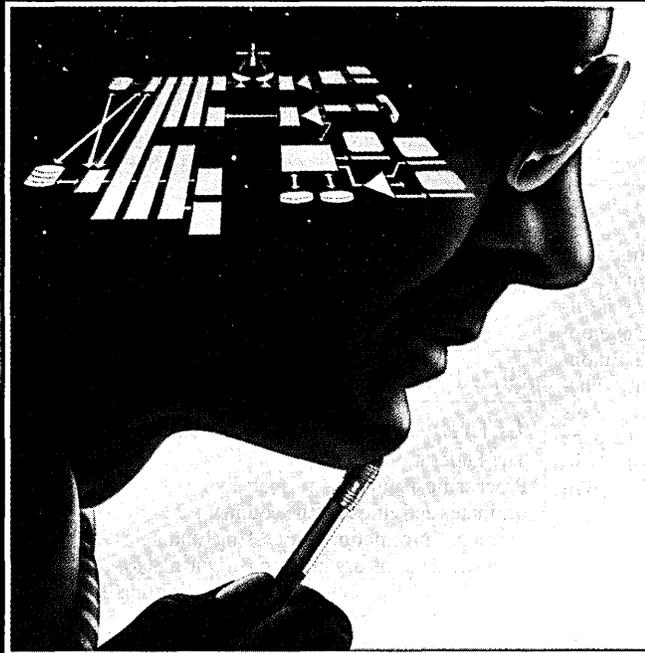
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ingly important to us all, computer professional and nonprofessional alike. CBI Publishing Company, Inc., Boston, Mass. (1981, 244 pp., \$19.95).

—Ronald J. Palenski

## REPORTS & REFERENCES

### TOOL TAXONOMY

As an aid in evaluating software tools, the National Bureau of Standards' Institute for Computer Sciences and Technology is offering a booklet called "Software Development Tools: A Reference Guide to a Taxonomy of Tool Features." The input, function, and output features of software tools are defined and discussed in this 12-page booklet. Contact the Software Tools Project, Technology A-265, National Bureau of Standards, Washington, DC 20234.

### LEGAL SIMULATION

The Institute for Civil Justice was established within the Rand Corp. in 1979 to perform "independent, objective policy analysis and research on the American civil justice system." Its purpose is to help make the system more efficient and equitable by providing policymakers with its research results. "Models of Legal Decisionmaking" is the first report in a series by the institute, and the research in it concerns the use of computers to simulate the way parties to a

dispute negotiate and settle out of court—a more common occurrence than in-court settlements. The authors (Donald Waterman, computer scientist, and Mark Peterson, lawyer, both with Rand) stress that the approach is still being developed; what they have tried to do is translate legal rules into computer language, leading to a prototype full-scale model of the actual settlement process. The report, number R-2717-ICJ, is priced at \$5 and is available from the Rand Corp., 1700 Main St., Santa Monica, CA 90406, (213) 393-0411.

## SEMINARS

### GETTING OUT FROM UNDER

The Federation of Government Information Processing Councils, formed in 1979, coordinates activities for the country's 22 government information processing and telecommunications organizations. During November and December, the federation has scheduled nine one-day meetings, in various U.S. cities, on the implementation of Public Law 96-511, the Paperwork Reduction Act of 1980. The meetings will be conducted by Robert V. Head and Donald W. Fitzpatrick and will consider the impact of P.L. 96-511 on information resources management and long-range planning for information systems. For people outside of Washington, D.C., the meetings will "pro-

vide an opportunity to find out how the new law will affect field organization and computer operations." Contact the Seminar Coordinator, U.S. Professional Development Institute, 12611 Davan Dr., Silver Spring, MD 20904, (301) 622-0066.

### GRAPHICS DETAIL

The National Computer Graphics Association announced its fall schedule of seminars, which will run from October to December in Washington, D.C., Denver, Los Angeles, Houston, Philadelphia, New York, and San Francisco. Each seminar covers a different aspect of computer graphics, such as computer mapping, business graphics, CAD/CAM systems implementation, and information-oriented graphic design. For further information, contact NCGA Seminars, 2033 M Street, N.W., Suite 300, Washington, DC 20036, (202) 446-4102.

### IEEE ON DATACOM

"Data Communications Network Interfacing and Protocols" is a one-day seminar to be presented by the IEEE on Nov. 17 in New York City. The seminar will examine all layers of private data communications networks, including the decisions necessary to build and manage such networks. Contact F. X. Kadien, New York Telephone, 395 Flatbush Ave. Extension, 4th Floor, Brooklyn, NY 11201, (212) 596-9554.

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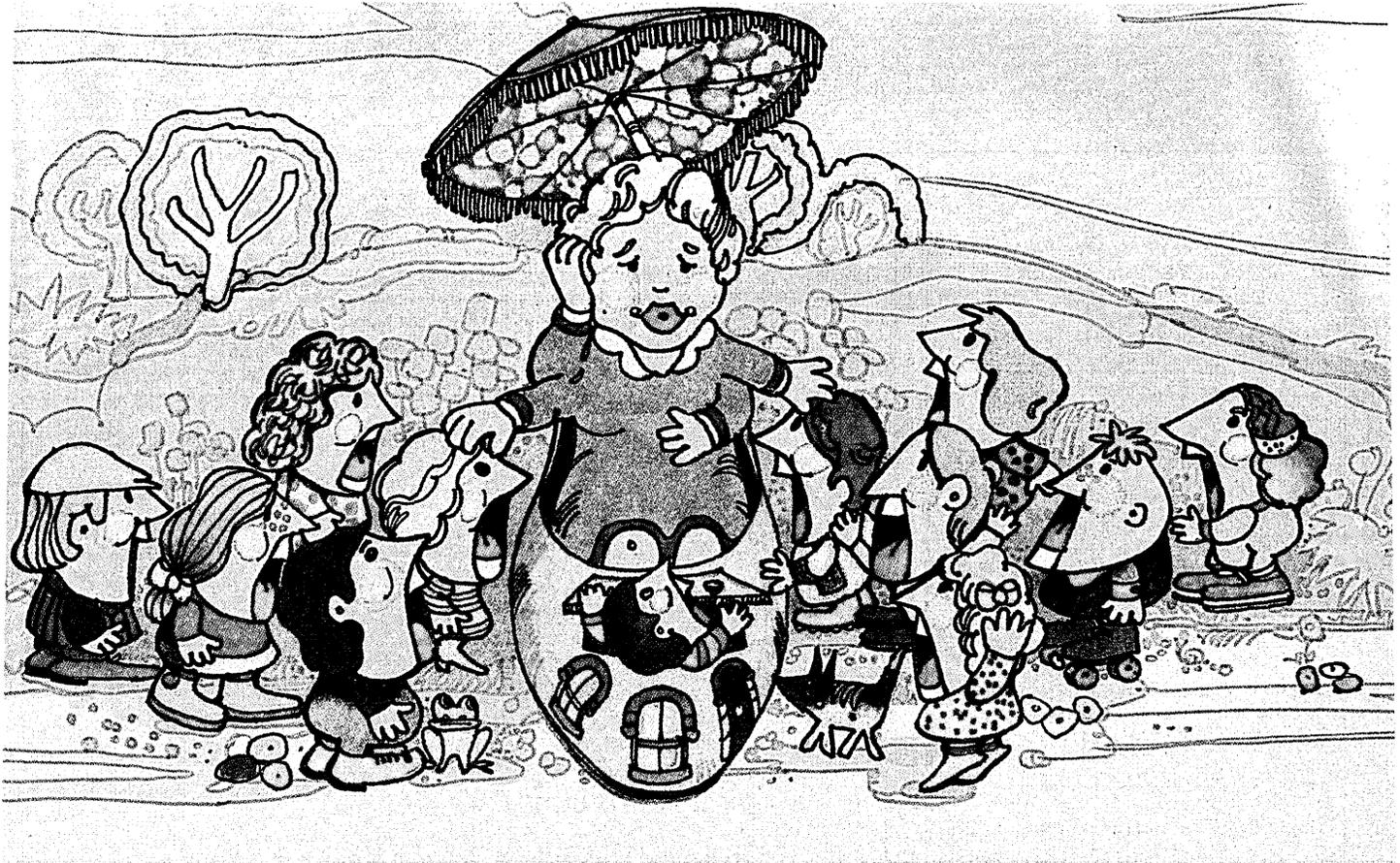
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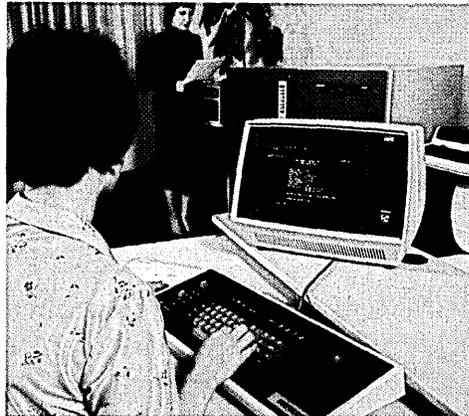
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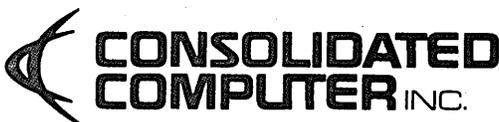
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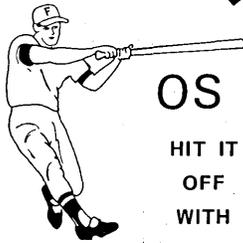


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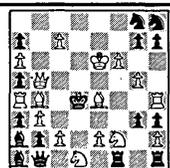
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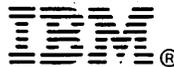
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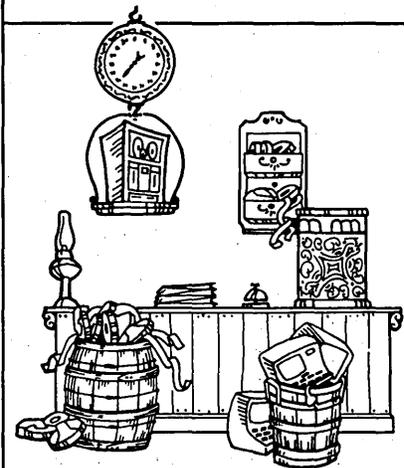
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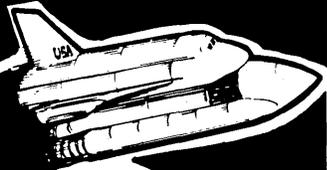
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CIRCLE 194 ON READER CARD

NOVEMBER 1981 237

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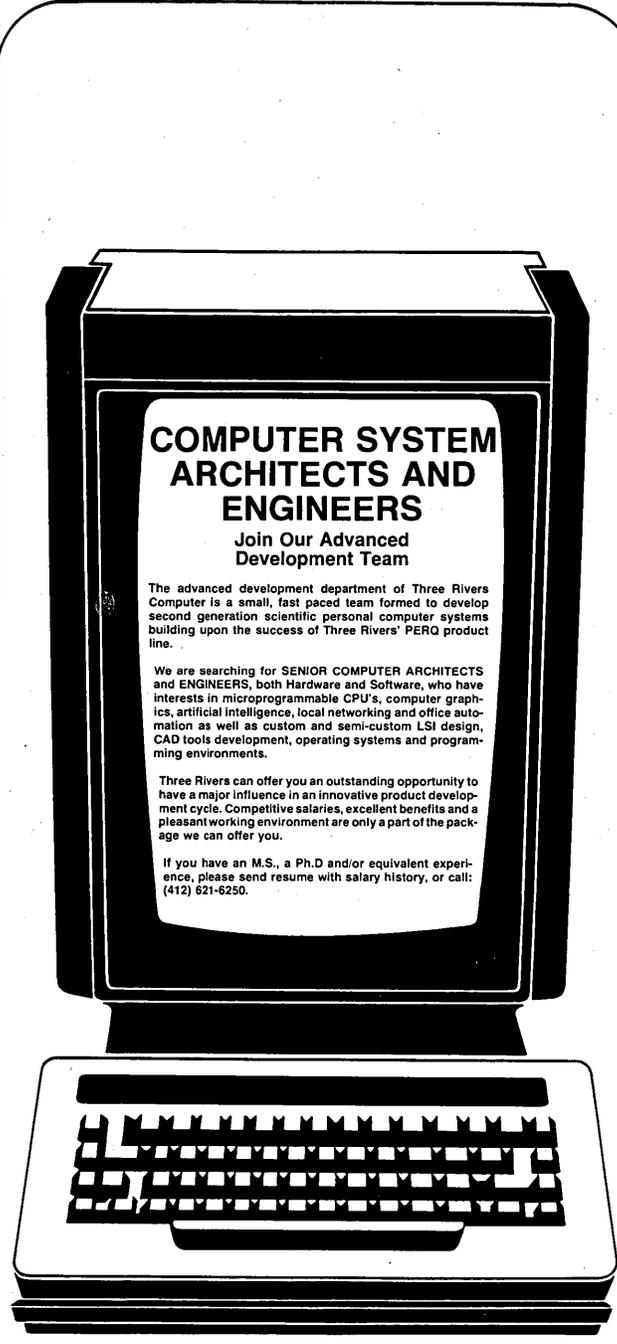
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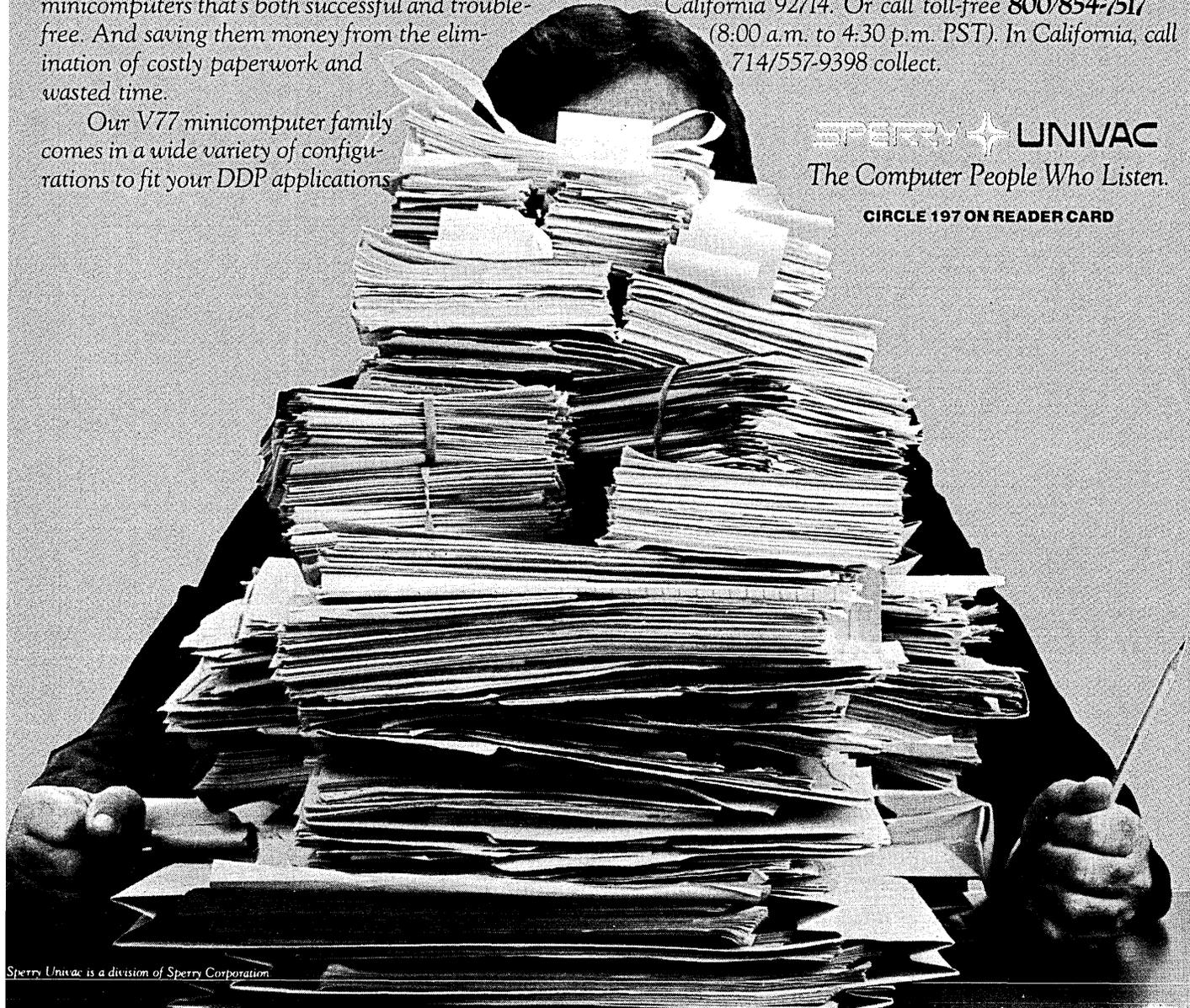
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CIRCLE 197 ON READER CARD



An exchange of readers' ideas and experiences. Your contributions are invited.

# READERS' FORUM

## THE SERVANT'S DILEMMA

Mr. J. (Jack) Murphy, president of the First National Bank of Oceanview (FNBO), is a most compulsive person. Every morning his longtime loyal servant, Mr. Finn, serves him breakfast at exactly 7:25 a.m. On the right side of the table he puts the morning paper, the *Oceanview Gazette*. Marked on it are the weather forecast for the day and the daily installment of "How Kansas Was Won."

When this history series first appeared in the *Gazette*, Mr. Murphy conducted some experiments and found out that he needed 11½ minutes to read both the daily story and the weather. Therefore, he decided to allocate that amount of time for reading the *Gazette* every morning.

His scheme turned out to be almost perfect.

Unfortunately, business kept Mr. Murphy out of town one morning, and Mr. Finn, knowing how compulsive his master was, never bothered discussing with him the consequence of this interruption to the otherwise perfect schedule. He kept the paper of that day on his desk, and every day thereafter, he continued to serve the previous day's paper. Mr. Murphy thus kept up with the intricate thread of the story but fell a bit behind on the weather forecasts.

After Mr. Murphy had sweated wearing his fur coat on hot days and been drenched wearing his summer outfit on rainy days, Mr. Finn began to suspect that his newspaper handling strategy was not all it could be.

As FNBO got more successful, Mr. Murphy accumulated more and more out-of-town mornings. One can verify the total by counting the papers on Mr. Finn's desk. Nevertheless, Mr. Murphy never missed even the smallest detail about the life of the early Kansans, since all the papers were always presented to him in the right order.

Mr. Finn now has an additional task: emergency runs to the bank to deliver an umbrella on the rainy days that catch Mr. Murphy by surprise. By now, with the growing number of overnight trips, there are more and more umbrella runs. Mr. Finn, not unintelligent, has the following dilemma: should he continue this buffering policy, or should he discard all the old papers and catch up? Both strategies are far from perfect. The former would keep his umbrella runs frequent, but the latter would cause a discontinuity in Mr. Murphy's readings about his heritage, for which Mr. Finn may lose his job.

This dilemma is not simple, and Mr. Finn spends many sleepless nights considering it. Lately, he even considered the decoupling of the problem by clipping the weather forecasts and the story from the paper, and discarding all the old clippings of the weather forecast while holding to the present buffering policy for

the daily installments of the story. This would permit Mr. Murphy to maintain the thread of the story while also allowing him to catch up with the weather reports.

This solution, having two separate disciplines of flow control in the same household, seems too radical a change.

What is a faithful servant to do?

—Danny Cohen

Marina del Rey, California

*This article appeared in 1980 in the ACM's Computer Communication Review and was presented by Mr. Cohen at the third annual Colloquium of Unchartered Banks.*

## THE KINGDOM OF INFORMANIA

Many centuries ago, on the southern coast of the Mediterranean lay a marvelous kingdom called Informania. On one side, the kingdom was bordered by the Oligarchy of Costa Data, and on the other, by the Matriarchy of Misfiguria. Informania was culturally superior to its neighbors. The kingdom was on the leading edge of its own acronym technology; it had invented the automation of information, and had even begun to pioneer in euphemismology, unheard of in those days.

The King of Informania had appointed a select group of automation experts to assist him in the collection of knowledge and wisdom. These experts were ordained Lords of the Ivory Tower, or LITS, to use the acronym of the day. So that the LITS could discharge their duties and accomplish the King's intentions without interference or interruption, this collection of knowledge and wisdom was concealed by the cleverest euphemism that euphemismology contained: GOODSTUFF.

One year, the LITS decided in a closed meeting that a modern system of devices was needed to produce more and better GOODSTUFF. To conceal the purpose and utilization of these devices, the project was called Bountiful Accumulator of GOODSTUFF, or BAG for short. The LITS regarded this concealing of a euphemism behind an acronym as a master stroke. Next, the LITS ordered that a large BAG be acquired. This BAG had to be of a certain size, color, shape, cost, and capacity. Only general specifications were given so that all BAGmakers could contend equally.

The procedure for BAG acquisition was extremely well developed and complex; few understood it. Even the panels and groups appointed by the LITS were astonished sometimes to see what came out at the end of the process. As one wag put it, "It's like dropping meat in a sausage grinder and having an oboe come out!" Even the King was seen scratching his head one day as he visited the BAG facility.

## READERS' FORUM

The LITS appointed a number of User Requirements Knights, or URKs, whose function it was to develop the basic principles and philosophy for the BAG. The URKs were backstopped by a BAG Upfront Group, or BUG, whose job it was to translate principles and philosophy into a formal Rococo Formulation of Postulates, or RFP. (Notice another Informanic subtlety: the acronym BUG conceals the acronym BAG. Anyone not in the know would expect the opposite.)

The RFP was issued to all major BAGmakers, and in due time their postulate answers were received. To digest and evaluate these answers, a series of panels was convened by the LITS:

- The Programming Instruction Panel, or PIP;
- The BAG Operations Panel, or BOP;
- The Software Operations Panel, or SOP; and
- The Mainframe Operations Panel or MOP.

The evaluation process was long, laborious, and argumentative. Frequently, loud angry voices were raised in debate, shouting, "That's the way the MOP SOPs!" or "I can't help it if the PIP doesn't satisfy the BOP!"

While the MOP, SOP, PIP, and BOP were conducting the technical reviews, the costs were under separate and independent scrutiny by the Panel for Underwriting BAG Expense, or PUBE.

Finally, all the panels completed their studies, effected coordination, and presented results to the Executive Management Unit, or EMU. It turned out that only one particular BAG was to be had at modest cost and operational sufficiency. However, all work had been done so expertly by the MOP, SOP, PIP, BOP, and PUBE that the EMU approved, the BS Board (BAG Selection Board) approved, and the King approved. An order was placed.

When the new BAG was delivered to the Kingdom of Informania, it was accepted by the LITS but not without misgivings by most of the people; they did not know about the secret meetings or the boards, panels, and groups. Furthermore, they had been led to

believe that they would probably get an oblong blue BAG, not a square gray one. The BAG the people wanted was 3033 x 370, whereas the BAG they got was size 1100 x 1108. A few people even insisted that to be usable the BAG size had to be as large as 1401 x 7070.

The people were finally told by the King (through the LITS) to cease their grumbling, that they did not know what was good for them, and that further dissension would be punished. Public grumbling ended, but the people continued to complain in private. The new BAG was installed and acceptance testing began.

In the beginning, as ordered, all the people brought their ideas, valuables, and other items, and reluctantly threw them into the new BAG according to custom, while they grumbled, albeit more softly. To their surprise, the new BAG held every item they threw in, large and small. Word slowly spread among the people that the new BAG was bottomless. They rejoiced and stopped grumbling because GOODSTUFF came out of the BAG in a torrent.

When the LITS heard this, they also rejoiced, but privately and with some relief, for they had told the people to throw in their items, and to expect GOODSTUFF to come out in great quantities. "Bring more items!" they shouted from the very top of the Ivory Tower. And the people heard, and brought more and more items to pour into the new bottomless BAG. And GOODSTUFF literally poured out. The King, the Lords, and all of the people were happy.

Years passed.

One day a man peered into the BAG (after throwing in several ideas and valuables) and exclaimed, "The BAG is filling up!" The other people standing in line laughed at him and ridiculed him until he was forced to move to another land. It was rumored he wound up as a sage in his new country of Nodatania, somewhat to the west of Informania. But the rest of the people gleefully threw more ideas and valuables into the now famous bottomless BAG. But there was a slightly sour note—the GOODSTUFF was not as abundant as before. The BAGmaker and the LITS pooh-poohed this and cried, "Bring more items!" But some of the people were complaining again.

Several more years passed. Finally, the BAG was indeed full, if not overfull. But the people believed the LITS and threw even more ideas, valuables, and other items into the fabulous bottomless BAG. Now the GOODSTUFF had slowed to a trickle, and the people grumbled all the time.

Then one gloomy day, the sides of the BAG burst open, and stored ideas, valuables, and everything else spilled out over the entire countryside. The flood knocked over people, inundated storage places, overturned monumental databases and systems (thus upsetting the architectural development of Informania for years), and deposited flotsam and other debris up to the very base of the Ivory Tower itself. In fact, it is said that the event left some mark at a high level of the tower. Of course, the GOODSTUFF stopped coming. Pandemonium broke out. Dogs barked, donkeys brayed, strong men fainted, and a camel gave birth to a dromedary.

Then the LITS called a great and prestigious emergency meeting. A committee was formed, and it finally recommended that the BAG should be punished for breaking open and shutting off the GOODSTUFF, thereby making all the people, the LITS, and the King unhappy. Former members of the MOP, SOP, PIP, BOP, PUBE, and EMU were tracked down and executed.

A great convocation was held, and it was decided that in order to salve their feelings all the people should take sticks or other weapons and soundly beat the broken BAG. They kept this up until there was nothing left of the former fabulous, bottomless square gray BAG.

The people were exhausted. Dust finally settled over everything. The sky was gray. A storm was brewing. Night fell. Winter was near. The King died, and was buried.

While all this was going on, the LITS in the Kingdom of Informania were holding a secret meeting. They had learned of a volcanic discovery by a foremost BAGmaker. He had developed a Super Accumulator of Complete Knowledge, or SACK, to replace all known BAGS.

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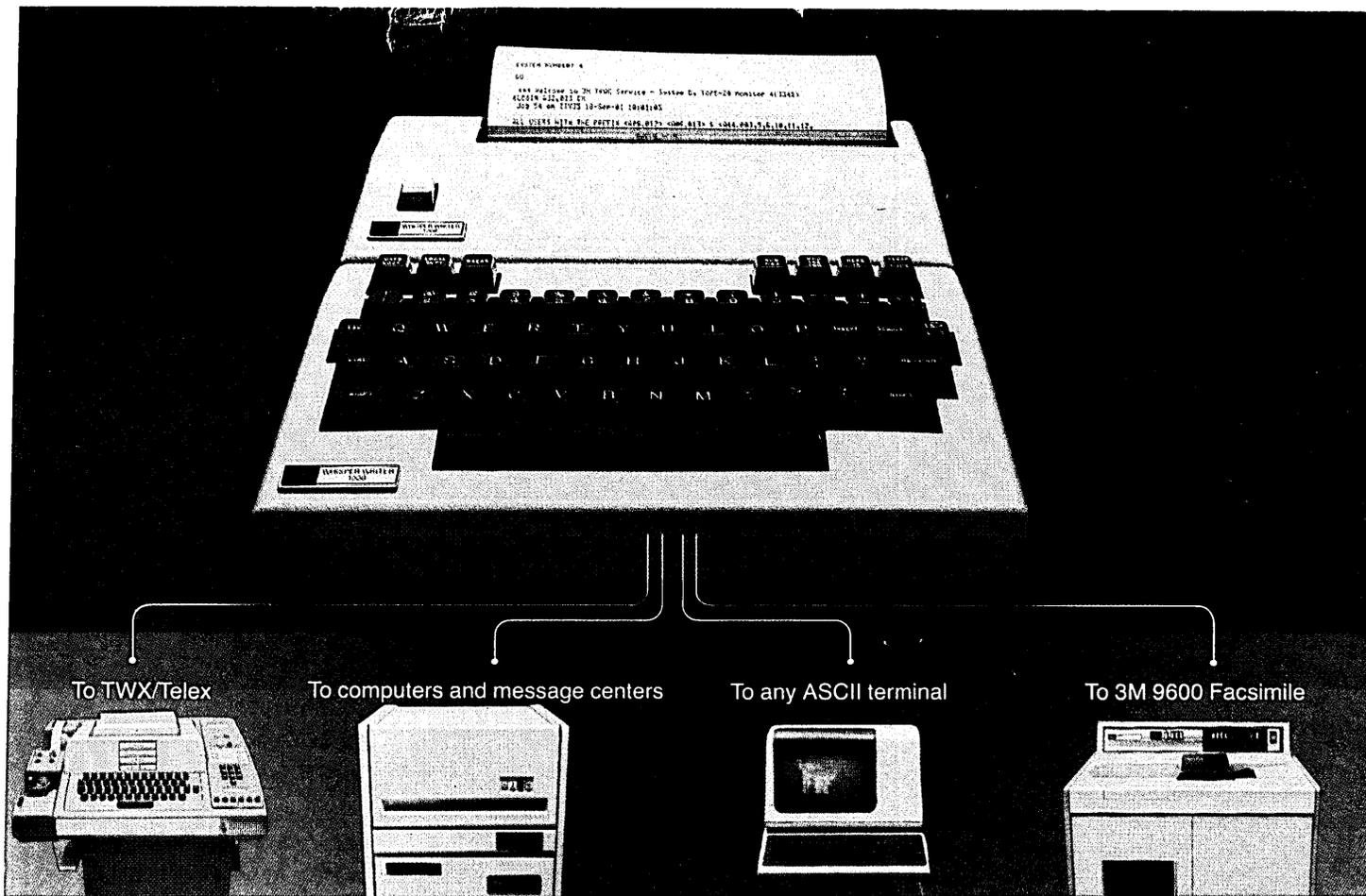
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CIRCLE 188 ON READER CARD



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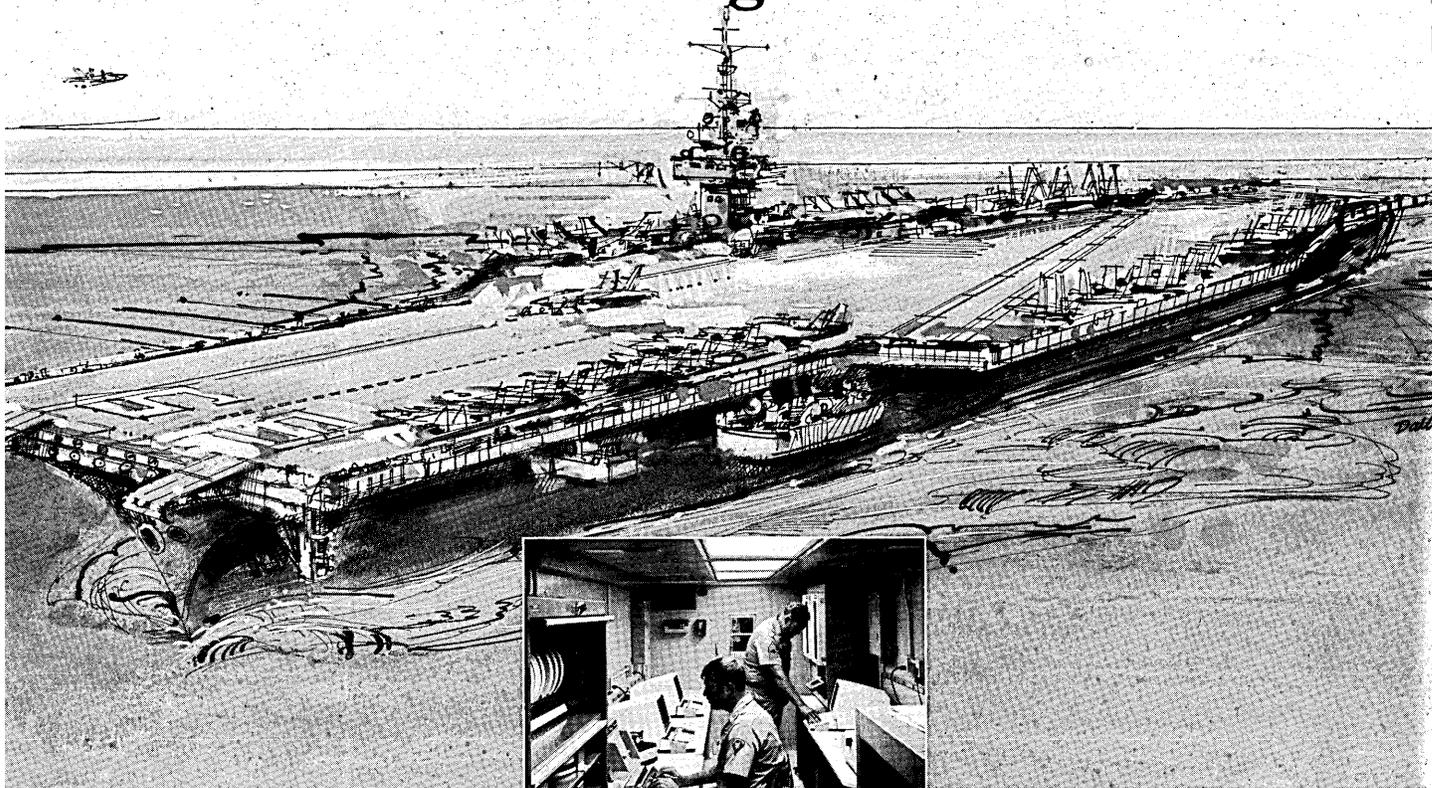
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transportable modular computer systems, GE is an industry leader.

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GENERAL  ELECTRIC

## READERS' FORUM

At this meeting, the LITs were so impressed that they decided a large SACK was needed to produce more and better GOODSTUFF and thus enhance and further their various activities and those of the new King. They appointed a committee to draw up some general requirements.

—George L. Whalley  
Alexandria, Virginia

# SOFTWARE PARTS NOSTALGIA

The idea that software should be built up from off-the-shelf parts is receiving a great deal of attention in software's contemporary literature.

It is an extremely attractive idea for two reasons. First, the software builder can reduce both cost and schedule considerations because prewritten software is immediately available. Second, he can increase software quality, since pretested software is generally of higher reliability than freshly written software. Since cost/schedule and quality are often competitors in a difficult trade-off game, it is especially nice to find a methodology that enhances both. The notion of software parts, then, has a near-magic allure, especially in an era where "productivity" is the number one buzzword.

There are two ironies here. One is that the software parts approach is a bottom-up one and thus conflicts with the top-down approaches of the '70s. An even greater irony is that our field has not improved, but instead has suffered a major regression in the software parts area during the past 25 years.

Probably 95% of today's software developers were not in the field in the 1950s, and precisely for that reason, it is worth spending some time discussing that era.

When we open the door of the 1950s' "Computing Laboratory," several things leap to our attention: crew cuts on the programming men, bouffants on the programming women; the clatter of keypunch machines; the immensity of the computer room—all that square footage for a computer that, by today's standards, is truly tiny. Let's look a little closer. There, on the desk of every programmer . . . what's that manual? Noting that it says SHARE on the binding, we open it, study it, and a light slowly dawns. This is a software parts catalog, and every single programmer either has a copy or has access to one.

"Where did this come from?" we ask a nearby young programmer. (Interesting—every one of them is young, as you might have noticed.)

"Oh, that's the SHARE manual," he answers, offhandedly. "SHARE is our user group. We all contribute software routines to SHARE, and we all use what has been contributed."

"What about this page? It describes a uniform distribution random number generator. Where'd that come from?"

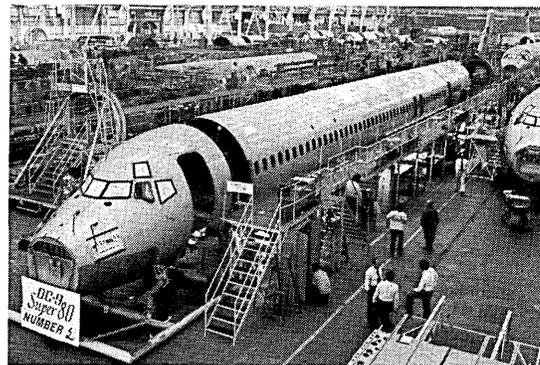
"Oh, that's from United Technologies. Fred Masner wrote it. In fact, he's written a lot of SHARE stuff."

"And what about this character string read routine?"

"Northwest Industries. Bill Clinger did it. His stuff is excellent, and it always works right."

Let's pause for a minute. It's important to realize a couple of things. First, in the '50s there was no academic computer science world worth speaking about. That development was still nearly a decade away. Programmers emerged from training in mathematics, business administration, or even English. And that, in turn, meant there was almost no computer science literature: a little bit of *Communications of the ACM*, but not much; a more universally available DATAMATION; a doomed fledgling called *Software Age*.

## AT McDONNELL DOUGLAS...



## DATA SWITCH pilots the computer complex!

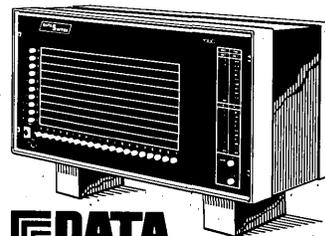
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## READERS' FORUM

As a route to software prestige, publishing was a limited outlet.

Second, Vendor software hadn't been unbundled yet. In fact, it hadn't even been bundled. Computer hardware often came with no software at all. And that's where the user groups, like SHARE, came in. It was a group for the sharing of software which was not available anywhere else.

Back to the '50s. The SHARE manual, a collection of software parts descriptions, begins to make a little more sense. Up front, here is a table of contents. Scanning down quickly, we can see a functional breakdown of software parts. Here's a section on "Input/Output," another on "Character String Manipulation," another on "Mathematical Services," and many more. Let's flip back to the math section to see how an individual section is organized.

Again, we see a functional breakdown. There's a section on trigonometric routines, another on matrix manipulation, another on integration routines, still another on random number generation.

Well, let's look even more closely. What's at the bottom of this whole parts taxonomy?

This page looks typical. Here's a first paragraph describing the functions performed by the part. Then we have the author's name and corporate affiliation. Now there's a description of the input requirements and the output produced, and finally, a discussion of restrictions and some miscellaneous notes. Usually there's one page per part. Sometimes, for the complex ones like I/O, there are two or three. Occasionally, when it matters, the underlying algorithm is discussed.

But always, near the top of the page, is the author's name and affiliation. And always, near the bottom of the page, is a disclaimer—"This software has been tested, but it is not guaranteed to be free from error"—or words to that effect.

"Is this stuff any good?" we ask the nearby programmer, wondering about that disclaimer.

"Yes, nearly always," he says. "In fact, if you read the code, you'll find it's usually—and I really hate to admit this—better than the best I can do. Most people don't contribute crumbly stuff to SHARE—there's too much at stake. And we quickly spot the ones who do."

"Too much at stake." "Spot the ones who do." Another light is dawning. The building of software parts, in an era where there is little drive to "publish or perish," is the route to software renown and prestige in the '50s. It's a highly individualized effort, the success route of the single contributor. And there's an automatic screening out of the inept.

Let's browse through the SHARE manual a little more. Sure enough, some names and affiliations recur about every fifth or tenth page. That's why our programmer friend immediately remembered the names of Fred Masner and Bill Clinger, and United Technologies and Northwest Industries.

Here's what we were doing right in the '50s:

First, there was a thriving software parts technology. Everybody expected to have prebuilt parts available to them.

Second, there was an effective parts taxonomy and an effective delivery document. If you wanted to find out what parts were available, you could easily do so.

Third, there was pride in software authorship. Parts appeared in the shared domain because there was strong motivation to do it.

Fourth, there was no stifling counterinfluence. Software was not available "free" or at low cost from the vendor; it was either shared or developed by individual users.

Looked at in this light, the '50s are a wonderful model for the present. What an irony that where we are going is where we've already been.

What went wrong? I saw it happen, and it's a sad and frustrating story. As the '50s blurred into the '60s, it was apparent that software was increasingly more difficult to produce. I/O packages might be SHARED, but could an operating system? More and more, SHARE members (and other user groups) pressed the vendors

## READERS' FORUM

to deliver the software, and eventually they did. The SHARING of software atrophied. After all, couldn't Big Brother do it better and more reliably? SHARE meetings changed from a community of software users presenting and sharing solutions to a clamoring hoard of users shouting "Gimme" at the vendors.

The SHARE manual fell into disuse, and finally vanished. In its place came a mile-long shelf of vendor literature. It emphasized the system, and often the use of tools within the system, but the notion of software parts—except for a few things like math libraries—simply disappeared. After all, a plethora of parts leaves a vendor open to a lot more user interaction and complaint. And can a vendor stamp that all-important disclaimer at the bottom of the writeup and legally get away with it?

A couple of other things happened, too, although their combined effect on the software parts community was less significant. Computer science departments sprang up in universities across the land, and a theory of computer science gradually emerged. The energies that had gone into producing better software parts now went into producing better software theories. Belady and Leavenworth said it best: "... software engineering is polarized around two subcultures—the speculators and the doers. The former invent but do not go beyond publishing novelty, hence never learning about the idea's usefulness—or the lack of it. The latter, not funded for experimentation but for efficient product development, must use proven, however antiquated, methods. Communication between them is sparse."

We all appreciate the rise of software theory, but what we have forgotten is acknowledgment of the software doer. All too often the doer is the butt of negative published comments written by a speculator.

The final strike against software parts was the emergence of the "egoless programmer" concept. Because ever-more-complex software required ever-more bodies to produce it, the notion of a team approach to software construction surfaced. And in those teams, human ego seemed to get in the way of team progress. That was true, of course. What was missed in this concept, however, is that human ego is an essential drive which cannot be suppressed without bad side effects. Can you imagine, for example, an egoless manager? Or can you imagine an egoless theoretician, publishing articles in professional journals with no name and affiliation attached and with no feedback to academic heads of department? We are all powerfully motivated by our egos, and when they are denied the result is lethargic irresponsibility.

This is precisely what went wrong with the old, true-sharing SHARE. A strong authority (the vendor) emerged and said, "We'll take over all this software tools and parts stuff; don't you worry your pretty little user programmer heads about it." With no ego pull to contribute parts to a SHARED library, the parts stopped coming.

So what can be done to hasten the software parts era of the '80s? Learn from the '50s, of course. At your computing shop:

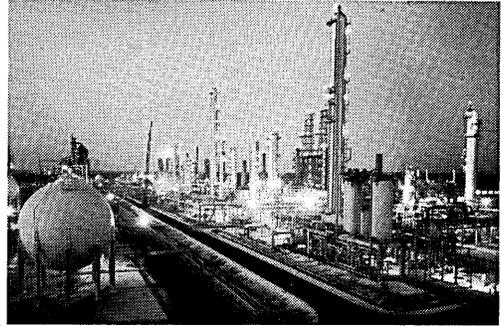
- Create a parts taxonomy and the shell of a parts document.
- Invite programmers to contribute generalized parts to the shell.
- Establish some sort of reward system for parts contributors.
- Distribute parts catalogs to all programmers.
- Decide either to allow disclaimers on parts, with a low-cost "user beware" mode of operation, or to establish a centralized parts certifying organization, with a high cost but high reliability mode of operation.

Gradually, within your computing shop—if not between computing shops—a thriving parts subculture will develop. Out of that subculture will come a collection of parts provided by the people most likely to understand what parts are needed—the applications programmers. And out of the reward system will come a collection of top programmers, their egos intact, who will have a new reason to feel proud of what they are doing, and visible rewards to show for it.

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—Robert L. Glass  
Seattle, Washington

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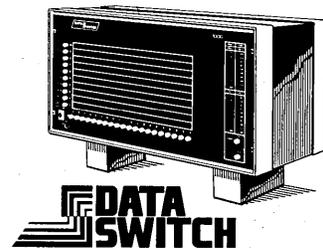
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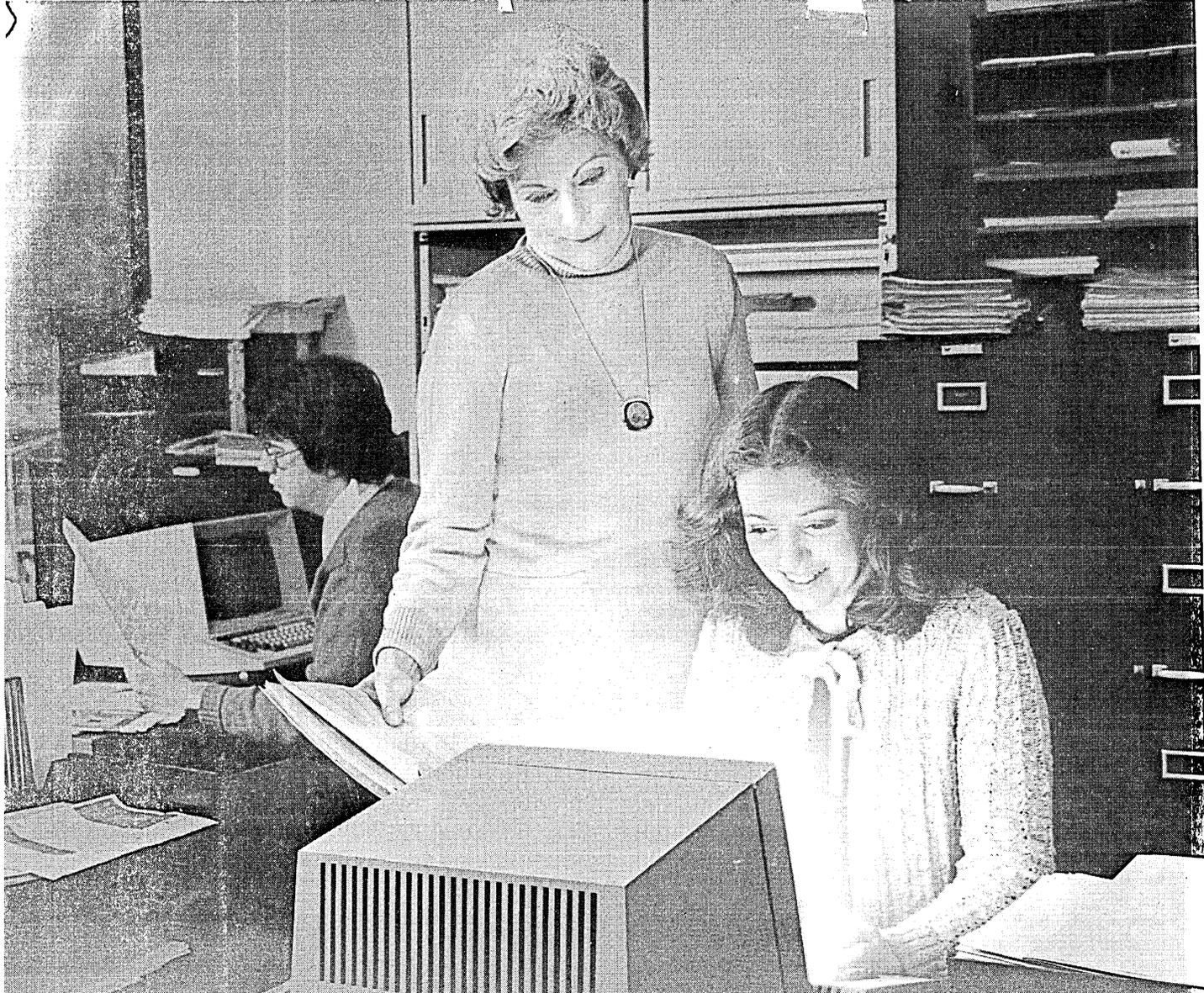
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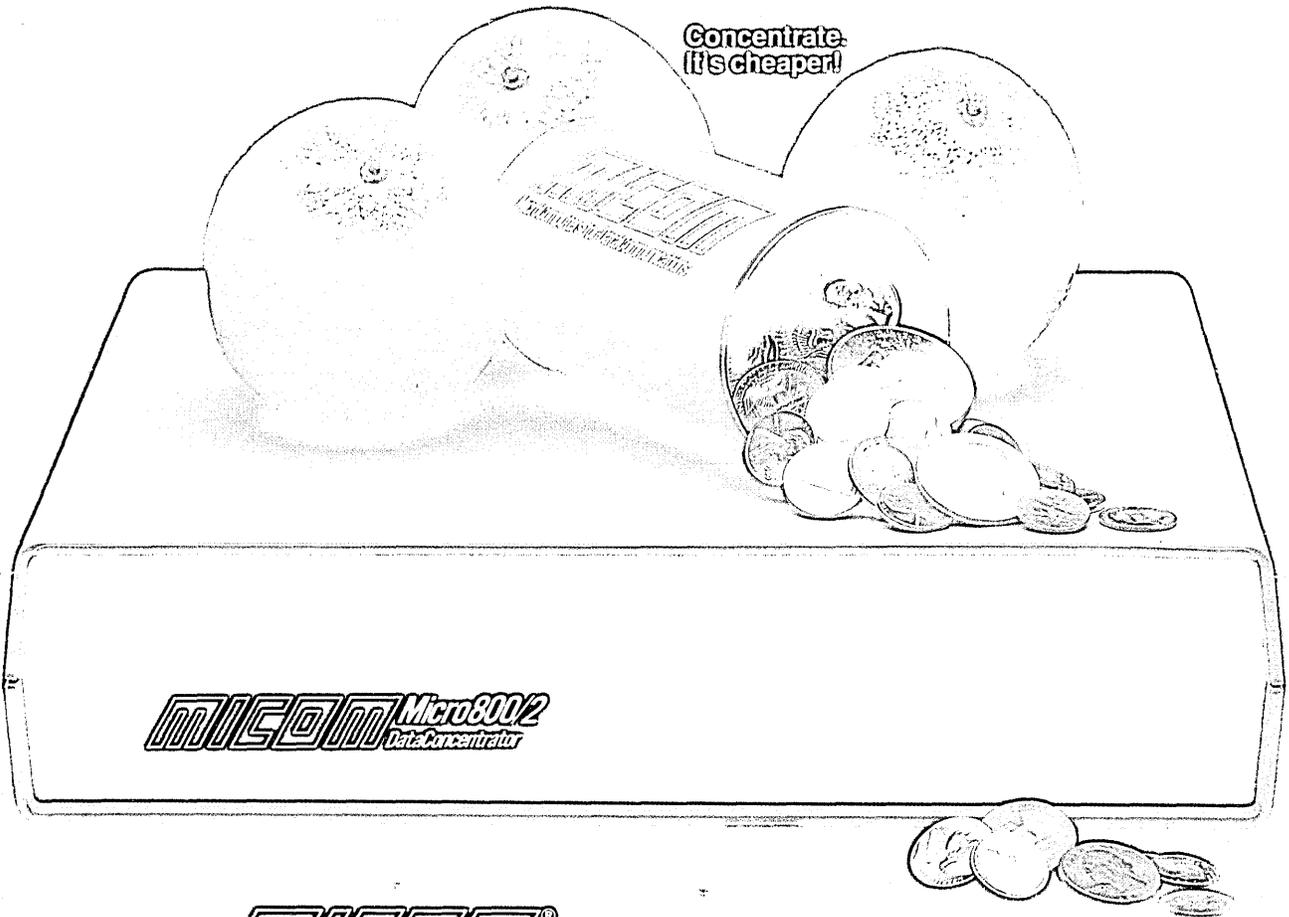
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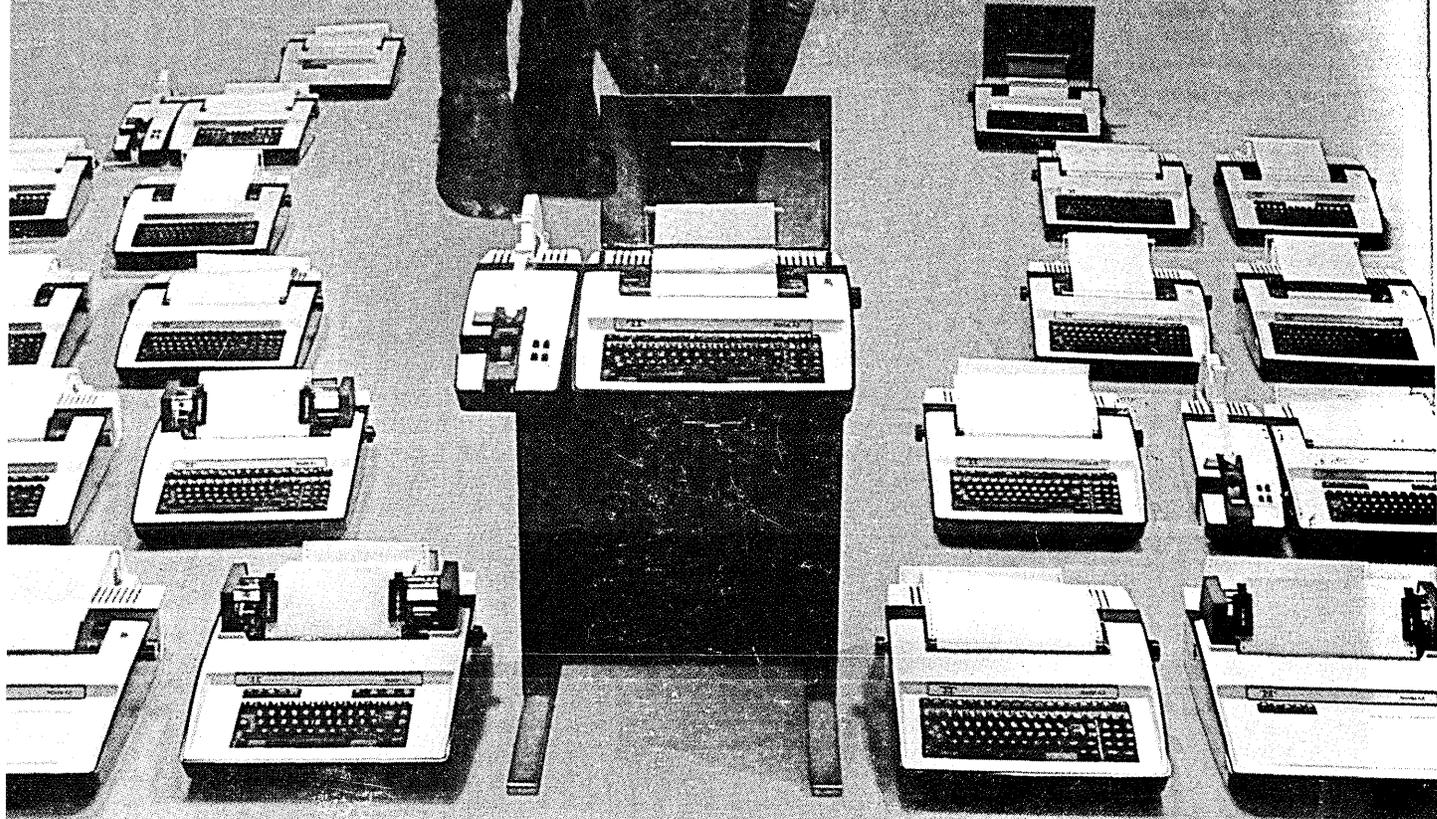
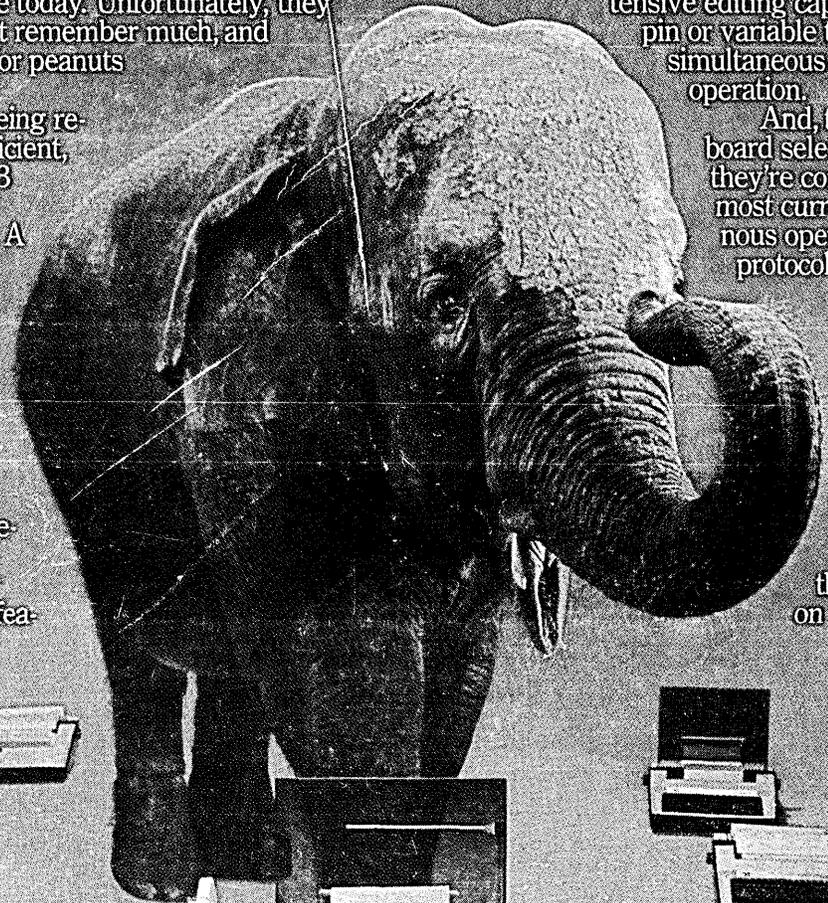
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