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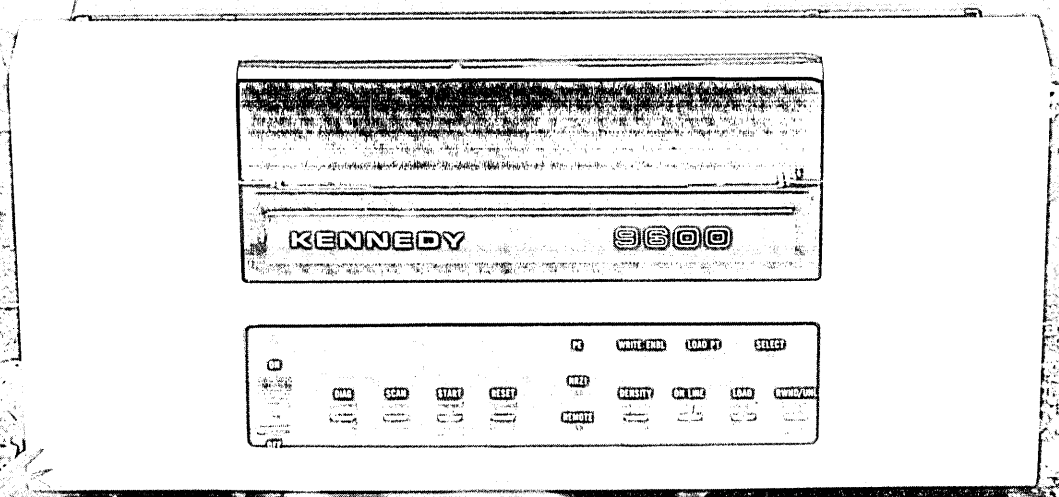

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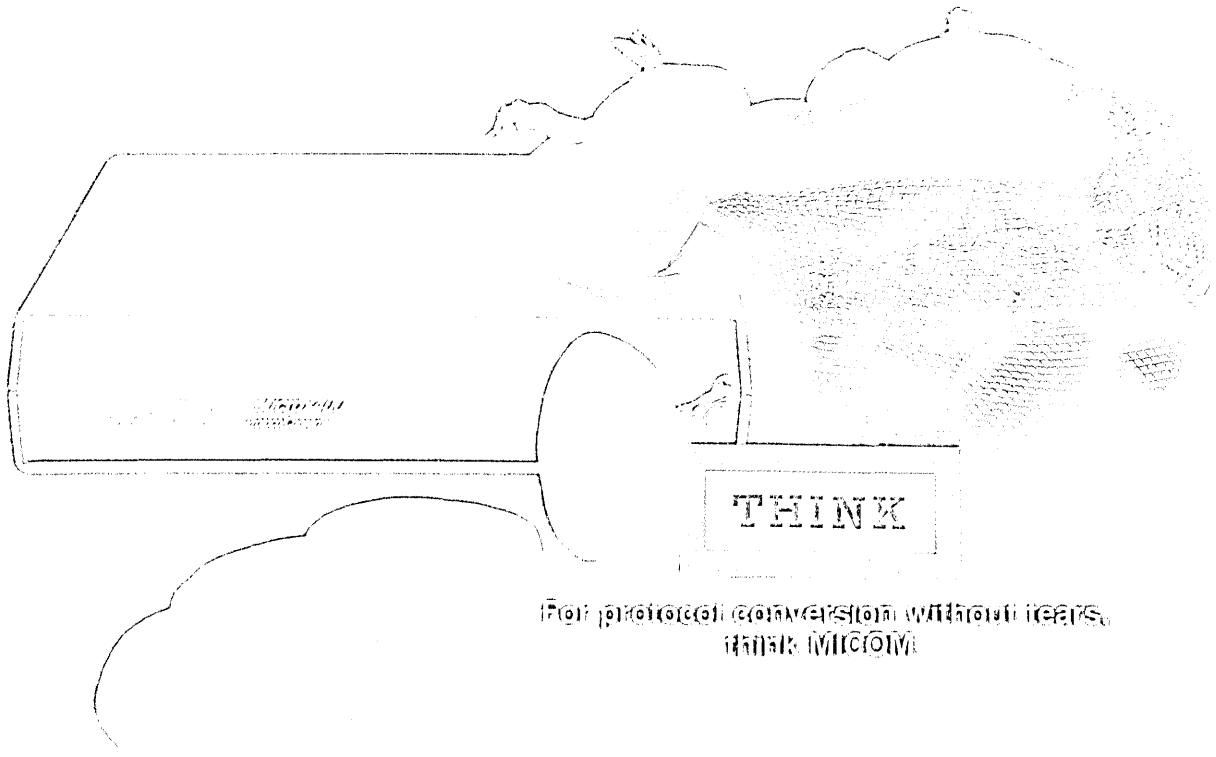

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Since 1975, thousands of knowledgable companies have come to rely on Candle software products to help manage the performance and availability of their computer systems running MVS, IMS, CICS, and [illegible]. Today, Candle is proud to announce the availability in December 1984 of OMEGAMON/VM, the first member of our VM product family. OMEGAMON/VM features high availability Design so that it continues working even during severe hardware or software problems. Exception Analysis to warn automatically of immediate or impending threats to performance or availability, over 100 Exploratory Commands to provide a realtime "microscope" into the inner workings of VM and a powerful set of [illegible] Commands which properly authorized personnel can use to control problems on the fly, thus avoiding [illegible] slowdowns.

An integrated member of the OMEGAMON family, OMEGAMON/VM can share a 3270 type display terminal with up to seven other Candle Corporation realtime performance monitoring products in this way you can simultaneously monitor VM, MVS, IMS, and CICS on the same or loosely coupled systems from a single terminal.

Candle VM products will have the same high quality product support of new IBM releases, and knowledgable responsive technical support that Candle customers have come to expect. And introductory prices are now in effect.

J Candle

Candle Corporation
[illegible]
Los Angeles, CA [illegible] (213) [illegible]

CIRCLE 6 ON READER CARD

DATAMATION

JANUARY 1, 1985/$3.00 U.S.A.
VOLUME 31 NUMBER 1
This issue 184,390 copies

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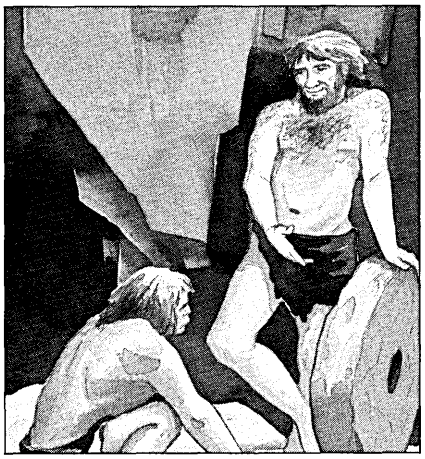

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PHOTOGRAPH BY ARTHUR KLONSKY
STYLIST: CAROL ROTHMAN

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For 8 Days in April, the World's Computer & Office Equipment Experts will Convene at Hannover.

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		PAPER PRODUCT	79.118
CENTRAL	DISTRICT OF COLUMBIA		453.098
CENTRAL	PENNSYLVANIA	FURNITURE	68.136
		BUS. MACHINES	116.684
		SUPPLIES	78.869
		PAPER PRODUCT	20.265
CENTRAL	PENNSYLVANIA		283.954
CENTRAL	VIRGINIA	FURNITURE	111.841
		BUS. MACHINES	148.542
		SUPPLIES	179.122
		PAPER PRODUCT	52.367
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	NORTH REGION	CENTRAL REGION	SOUTH REGION	ALL REGIONS
SALES:				
FURNITURE	452.8	288.2	312.5	1.053.5
BUS. MACHINES	733.0	407.7	490.0	1.630.7
SUPPLIES	811.7	381.1	422.5	1.615.3
PAPER PRODUCT	228.3	151.9	192.0	572.2
TOTAL SALES	2.225.8	1.228.9	1.417.0	4.871.7
EXPENSES:				
DIRECT COSTS	1.179.6	639.0	680.2	2.498.8
INDIRECT COSTS	445.2	245.8	283.4	974.4
SALES COSTS	400.6	208.9	311.7	921.2
TOTAL EXPENSES	2.025.4	1.093.7	1.275.3	4.394.4
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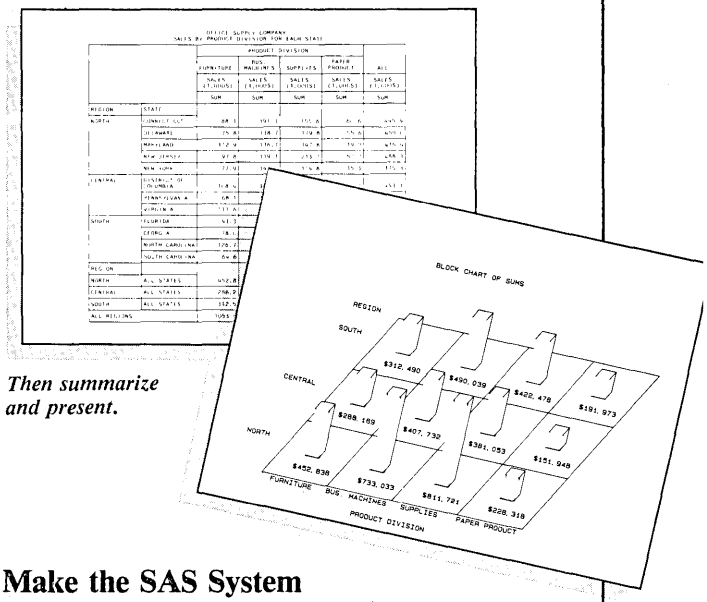

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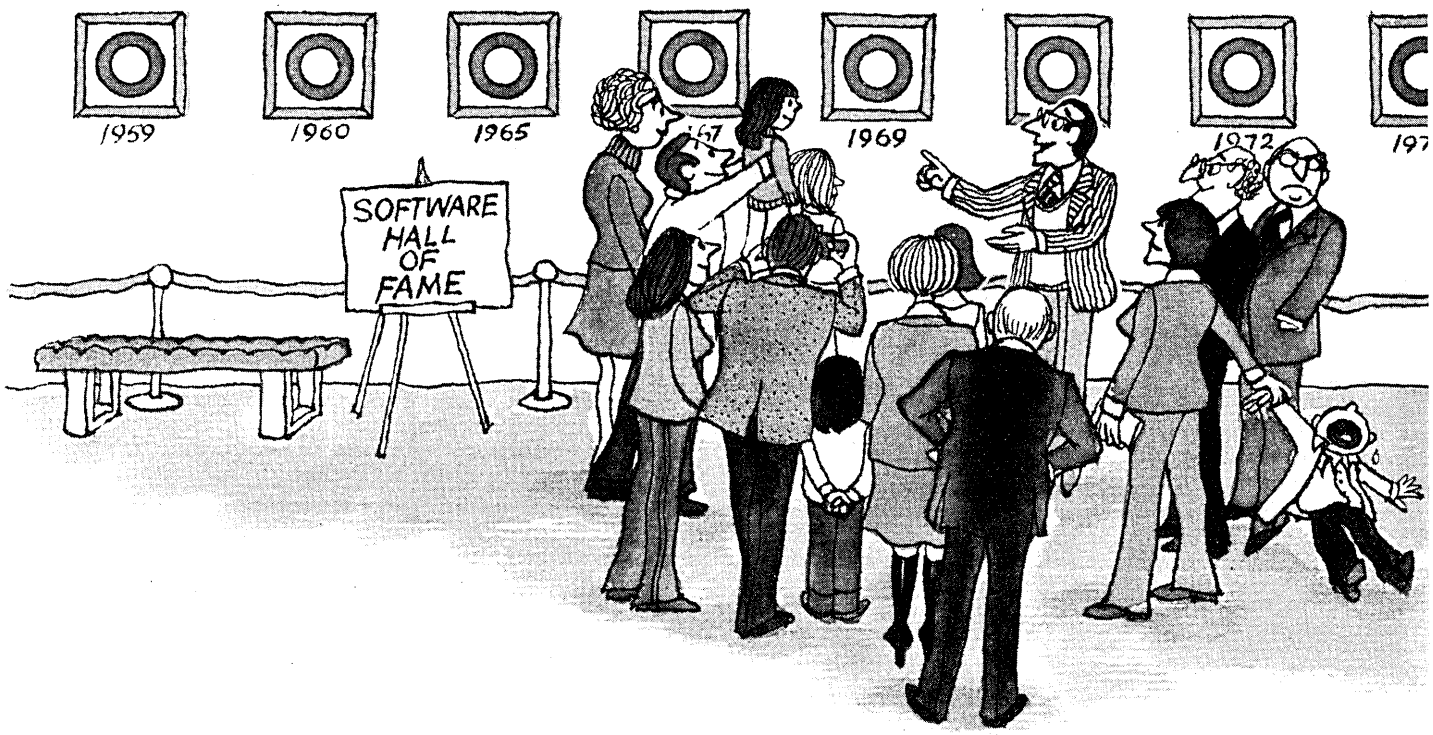
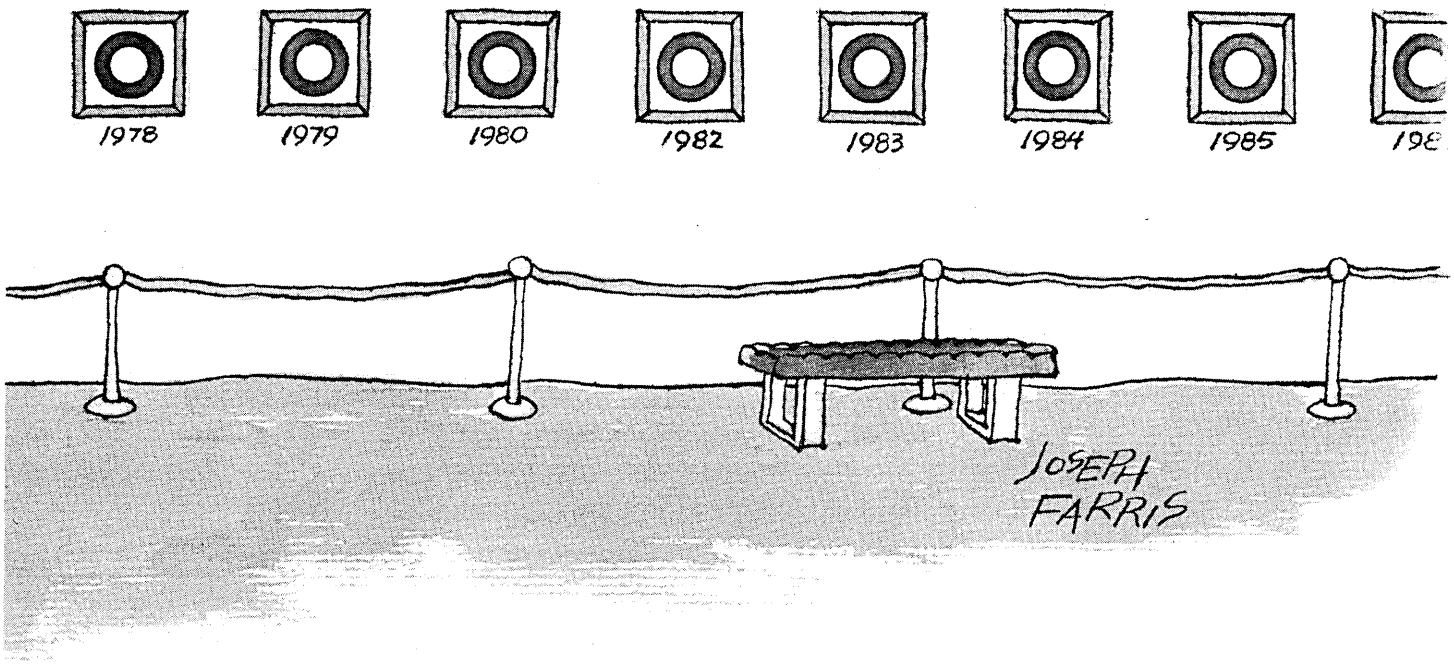
WE KEEP WRITING THE



"And about the time America put the first man on the moon, ADR put the first programmer on-line."

HISTORY OF SOFTWARE.



When an industry is as competitive as the software business, it's difficult to tell the imitators from the innovators. Fortunately, in our industry, history clearly shows which is which.

ADR, Applied Data Research, invented the software business. In fact, we received the first patent ever granted for a software product. And at a time when our only competitor, IBM, was actually giving their software away, people were willing to pay for ours. Ever since then ADR has been setting the standards for the systems software industry.

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CIRCLE 8 ON READER CARD

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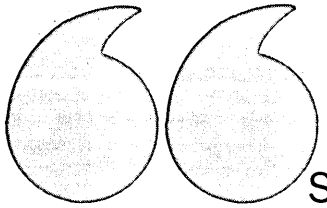
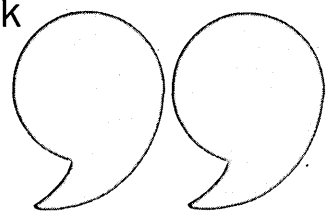


In short, System W is a mature, well-rounded product supported by years of experience in the decision support field and by a company whose reputation is above reproach. Therefore, without hesitation, we would recommend that anyone in the market for a state-of-the-art decision support system not overlook System W in their evaluation.



— Data Decisions, Cherry Hill, New Jersey, September, 1984.

More than 100 top corporations chose Comshare's System W decision support software in the last 18 months. Teamed with IBM mainframes, System W untangles the information management challenges that face business professionals. Especially the big payoff ones like performance reconciliations, problem analysis, forecasting and electronic management reporting.

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You should read the *Data Decisions* evaluation before your company makes a major investment in decision support software.

For your *free* copy of the full *Data Decisions* report, call Chris Kelly at Comshare toll free: 1-800-922-SYSW (in Michigan call: 313-994-4800). Or mail your business card to: Comshare, P.O. Box 1588, Ann Arbor, Michigan 48106.

SYSTEM W DECISION SUPPORT SOFTWARE

COMSHARE®

For decision makers who need to know their options now.

CIRCLE 9 ON READER CARD

LOOK AHEAD

WANG ON AT&T LIST?

We hear that American Telephone & Telegraph considered and recently rejected an acquisition of one of the BUNCH companies -- Burroughs, Univac, Control Data, Honeywell, NCR -- as a way of finally getting an installed base and worldwide computer marketing network. After a long internal struggle over whether to buy or make its own network, Ma Bell has decided to buy. The top name on the lips of senior officials is Wang Laboratories. Wall Street sources say that the bid for a major dp player will come within two months, and will buoy the rest of the industry because it will raise the value of other computer companies.

...AS WANG JOINS UNIX BANDWAGON

Given AT&T's interest, or maybe because of it, look for a soup to nuts commitment to Unix from Wang. The company is expected to announce a complete series of operating systems for its entire product line, based on AT&T's Unix System V. Expect a rollout in May, followed by the software bridges to interconnect Wang's office automation offerings with IBM's DIA/DCA formats a month later. A new version of its database management system will handle digitized voice and images as well as data by year-end, sources claim.

IBM MICRO SW EFFORT SOARS

Silicon Valley is abuzz with stories of efforts by IBM to recruit writers of micro applications software. The company supposedly has openings for more than 3,000 programmers, analysts, and other software mavens to rapidly expand its product offerings. High on the list is a micro-to-mainframe link, sources say.

MICROVAX2 TO APPEAR LATE IN 1985

DEC's new MicroVAX II, with the processing power of up to 1 million instructions per second, will begin shipping in volume by midyear, and the company expects its oems and system integrator customers to deliver end-user systems by December. Oems that have already received a preview of the new machine say its processing power will range from .6MIPS to more than 1MIPS, comparable to the company's VAX 750 through VAX 780 line, in a package similar in size to a rack-mounted PDP-11/34. More than a dozen beta test site units are scheduled for shipment in the next few weeks.

10,000 MACS TO GEISCO

There's more to the recently announced deal between Apple Computer and General Electric Information Services than was announced. Instead of the 1,000-Mac purchase that GEISCO admitted, up to 10,000 personal computers may be ultimately

LOOK AHEAD

	involved. The procurement is part of a worldwide network GEISCO is setting up for Apple's 100 offices. Apple will use the net for applications including inventory control, shipping, receiving, and electronic mail. To be called AppleLink, the net will use Apple's proprietary error-free protocol, a takeoff on AppleBus. Sources say that the net, scheduled to go into beta testing this month and to be rolled out in March, will cost Apple $250,000 per month -- cheaper, perhaps, than what it was paying Tymnet for packet switched service. Will AppleLink be setting a new industry standard that big carriers like the Rockville, Md.-based GEISCO will adopt? "Why do you think we bought 10,000 Macs that retail for about $2,000 apiece, dummy?" replies a GEISCO savant.
CT IN AGONY INSTEAD OF ECSTASY	The IBM PC AT and internal strife are leaving Convergent Technologies a shambles: the order books for the Santa Clara maker of intelligent workstations and multi-user Megaframe and Miniframe cpus are slender due to increased competition, customer concern over the future of the company, and massive staff defections. Indeed, in recent weeks the company had to reassure investors that it is not headed for bankruptcy.
DOCUTEL DUMP DUE	The embarrassing situation among Olivetti, AT&T, and Docutel is about to end. Look for Olivetti to divest its 50% interest in the Texas maker of automated teller machines any day now. For more than a year, Olivetti executives have been "embarrassed," in the words of one source, about the obvious conflicts between the Docutel/Olivetti marketers and AT&T. The folly of AT&T, Olivetti, and Docutel/Olivetti each trying to sell the same Olivetti PC clone has gone on long enough, and Olivetti is desperately trying to find a buyer. Meanwhile, the Milan-based company has just about taken over day-to-day operations of the Texas firm, replacing most of the American management.
RUMORS AND RAW RANDOM DATA	Look for Floating Point Systems to introduce a new low-end array processor next month. The pressure's mounting from Star Technologies and other new-comers, and FPS is expected to come out of its doldrums of the past few months....One Wall Street analyst now predicts IBM will have 55% of the unit shipments of microcomputers by 1987, double its 1984 level. Apple will have 20%, with AT&T, Compaq, Tandy, and all the rest fight for the remaining 25%....Data General is developing a fault-tolerant version of its 32-bit supermini using a clustering technique a la VAXcluster.

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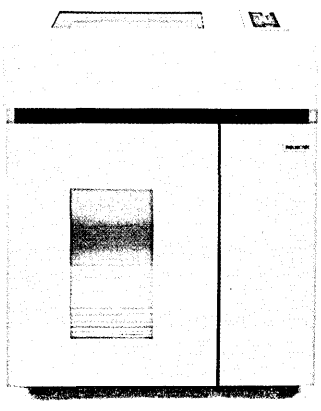


CIRCLE 10 ON READER CARD

THE MOST IMPORTANT FEATURE YOU'LL FIND IN DIGITAL'S TELEPRINTERS IS THE COMMITMENT BEHIND THEM.

When Digital pioneered the concept of interactive computing some 25 years ago, an interesting side benefit occurred. Out of necessity, we had to develop our first teleprinter.

But rather than simply approaching the task as a sideline, we genuinely committed ourselves to the job of developing a truly outstanding product. The end result was the LA36™ teleprinter. A system that provided far more features, capabilities and durability than most people needed just then. The fact that over 200,000 LA36 teleprinters remain in active duty across the country today is a true testament to the careful thought and foresight that went into the original design.

Each new model introduced since the LA36 teleprinter has been yet another demonstration of our commitment to the needs of the marketplace. And an equally strong demonstration of the market's commitment to us. For the popularity of our products, in several cases, has actually helped drive the industry to adopt new standards. With the introduction of the LA36 teleprinter, for instance, came the wide acceptance of the 300 baud communications rate. And the LA120™ teleprinter helped popularize the faster 1200 baud rate.

Digital's commitment to the teleprinter market remains rock-solid. Our terminals manufacturing plant in Arizona currently produces more teleprinters than ever before. So as long as there's a need for teleprinters, you can count on Digital to fulfill that need. With a product specifically designed for the job.

THE DECWRITER III. THE IDEAL TERMINAL FOR HIGH DUTY CYCLES AND RUGGED ENVIRONMENTS.

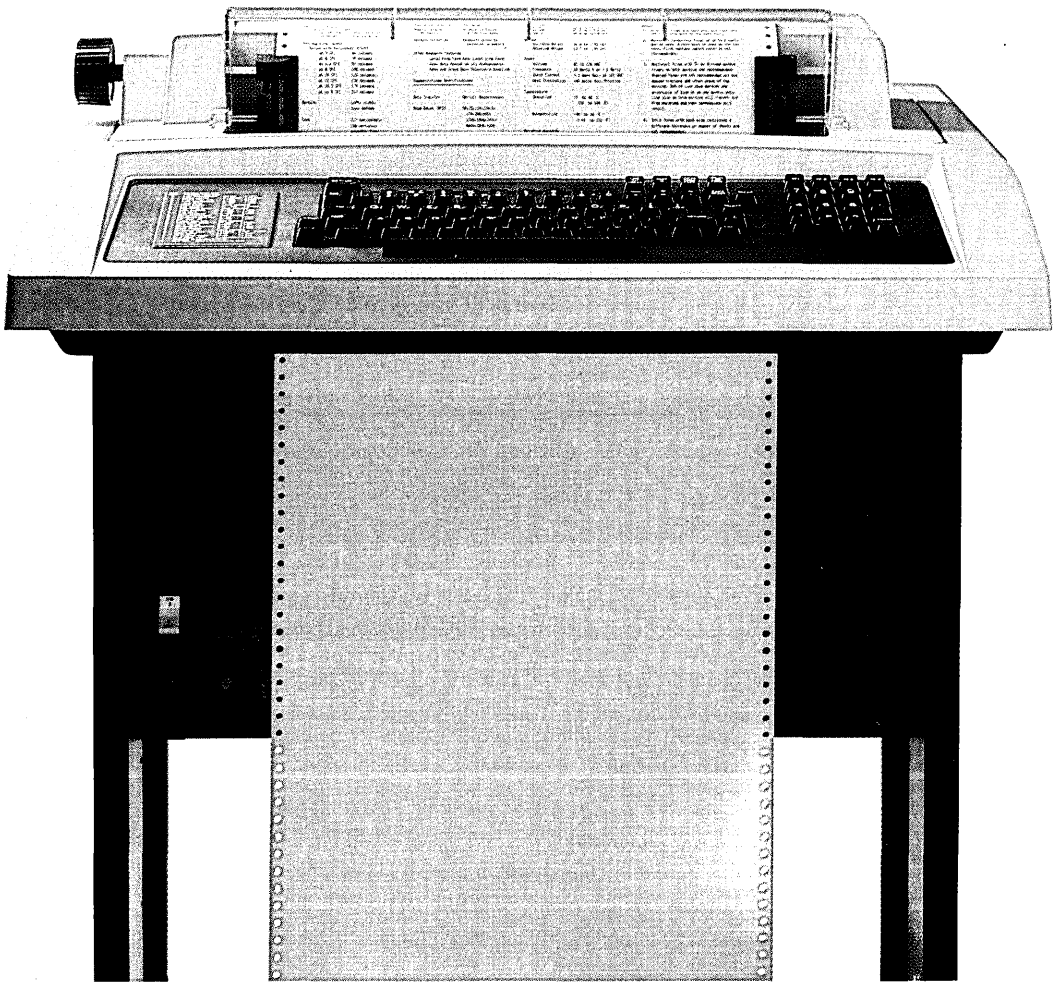
Even the briefest glance explains why the DECwriter III™ (the LA120) teleprinter has established Digital's long-standing reputation in the terminals market. This heavy duty teleprinter is every bit as tough as it looks.

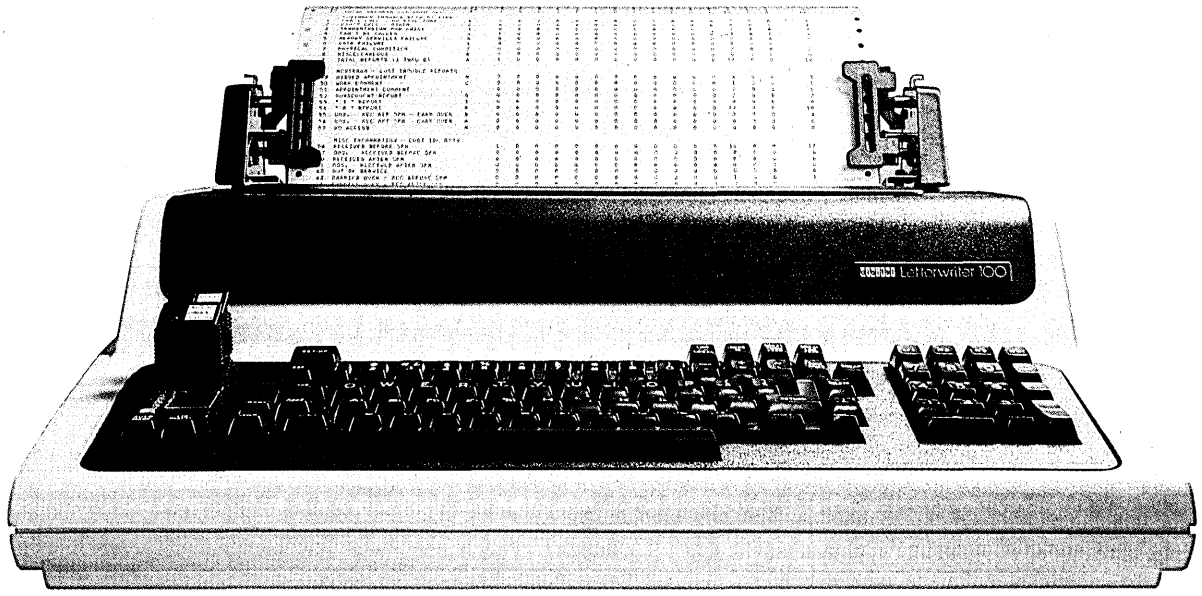
It gives you exactly what you want. Fast draft speed printing at 180 characters per second. Fanfold paper capabilities in widths up to 15". A choice of 8 character widths. And extensive communications support, including auto answerback and auto disconnect.

Most importantly, the DECwriter III teleprinter is a true master of forms. Some 45 features, like horizontal pitch, left/right and top/bottom margins, as well as horizontal and vertical tabs, are all summarized right on the keyboard, allowing you to set up formats in an unusually quick and simple manner. Then, once set, all can be stored in non-volatile memory. And the DECwriter III teleprinter can provide crisp, legible forms up to an impressive 6 parts.

DIGITAL'S LETTERWRITER 100. THE BEST ENGINEERED TELEPRINTER FOR THE OFFICE.

Flexibility is the word that best describes the Letterwriter 100™ teleprinter. For starters, you have a choice of multiple print speeds. You can print a draft copy of a one page proposal in just 10 seconds. Then,





by simply pressing a single button, you can shift from a high speed 240 characters per second to a high quality 30 characters per second, with printing that's difficult to distinguish from true letter quality. There's even an optional 80 character per second memo mode that's ideal for interoffice correspondence.

For further versatility, the Letterwriter 100 teleprinter lets you select from 8 different character widths, multiple character sets and a wide variety of typefaces. In fact, you can store 5 different typefaces resident within the teleprinter, and the selection can include Courier 10, 12, and Italics, Gothic 10 and 12, Orator 10, and APL, so you can select the style that suits the job as easily as pressing a key. And, in the event you'd like to illustrate a particular point, bit map graphics help you do just that.

The Letterwriter 100 can handle the paper that best suits your needs. Sheet, fanfold or roll, in any width up to 15".

Finally, the Letterwriter 100 product tackles all your forms. Setup is simple, and the high quality dot matrix printhead provides crisp, legible copies through 4 part forms.

In short, the Letterwriter 100 is the one teleprinter that finally lives up to the requirements of your whole office.

THE DECWRITER CORRESPONDENT. THE ONLY FULL-FEATURED COMPACT YOU'LL FIND.

In many situations, the applications themselves suggest a clear solution.

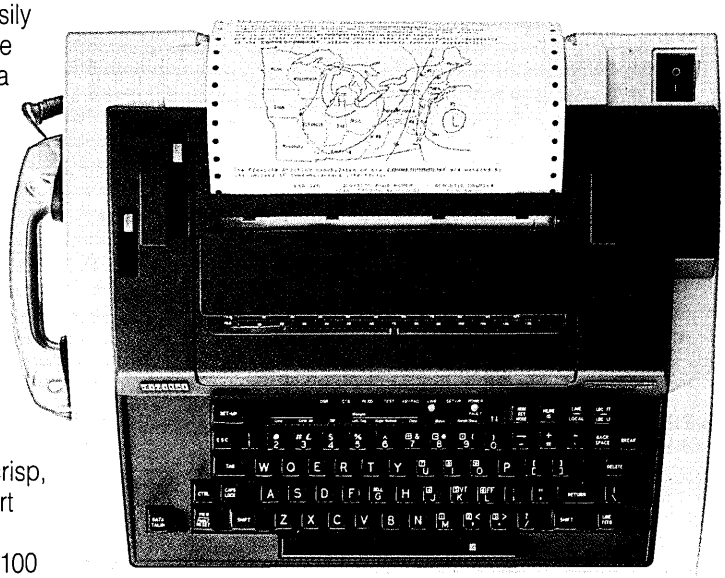
But just as often, the solution isn't quite so clear.

That's when you need Digital's Correspondent™ teleprinter. It's the closest thing to an ideal, all-around terminal.

Consider its wealth of features. The Correspondent teleprinter allows you to use ordinary single sheet, roll, or fanfold paper for high quality output that won't fade over time like thermal paper. It also gives you the flexibility to print multiple part forms and labels. And you may customize the text output to your own particular style by selecting from a wide variety of character sets, widths and sizes alone or in conjunction with bit map graphics.

But what makes the Correspondent teleprinter truly impressive is that you get all these features in a compact little 20-pound package. A package complete with three communications interfaces. Not just the usual RS232-C port, but a 300 baud acoustic coupler and a 300/1200 baud modem as well. That means the Correspondent teleprinter can function as a console or as a transportable terminal that can move from desk to desk or office to office, ready to communicate in whatever mode is available.

No matter how you look at it, the Correspondent teleprinter gives you a lot of capability in a small package.



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Digital's teleprinters, like all Digital hardware and software products, are engineered to conform to an overall computing strategy. This means that our products are engineered to work together easily and expand economically. Only Digital provides you with a single, integrated computing strategy direct from desktop to data center.

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THE BEST ENGINEERED COMPUTERS IN THE WORLD.

digital™

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Now IBM 3270 and Displaywriter compatible!

Baby/Laser for your Baby/36. The good news is that you can afford it.

If you have an IBM Baby/36 or if you are "expecting," then the GBT Baby/Laser is all the printer you will need.

$5995. A small price for a small printer with big performance for your IBM S/34, S/36, S/38, 3270 or PC.

The GBT 6630XP Baby/Laser prints reports and letters both horizontally and vertically. Print on standard letter or legal size bond, letterhead, envelopes, labels, cardstock and transparencies. All at speeds of up to eight pages per minute. That's more than 500 lines per minute! Not bad for a Baby.

Multiple print fonts and raster graphics allow infinite possibilities for document creation. Make impressive looking reports using graphs, charts and logos. With its resolution of 90,000 dots per square inch, the result is a page that looks professionally printed.

The GBT Baby/Laser is so quiet that you won't mind putting it on your desktop. All supplies are contained in easy to handle cartridges, making maintenance quick and clean.

The Baby/Laser is cared for nationwide by both Hewlett-Packard and General Business Technology, Inc.

To take immediate delivery of your own bundle of joy, the GBT 6630XP, or for further details, call **(714) 261-1891.** Or write **General Business Technology, Inc.,** 1891 McGaw Avenue, Irvine, CA 92714.

GBT®

Printers for your IBM S/34, S/36, S/38.

Baby/36 is the commonly accepted nickname for the new IBM 5362 or "small" System/36.
It is also a registered trademark of California Software Products, Inc.

CIRCLE 11 ON READER CARD

LETTERS

HYPERCORRECT?

I would feel forced to argue with your headline "Utterly Correct" for the letter from Herbert F. Spirer (Sept. 1, p. 15) except that pedantry of this nature is always based on theoretical appreciations of language that do not really model English as she is spoke. On a theoretical level, Spirer may be absolutely correct, partially correct, incorrect in the main, or, for emphasis, very hot-damn correct, depending on the theory being espoused.

On a real level, he is not very correct, and is at least partially incorrect in his assertions. For example, his assertion that a statement is either correct or incorrect is incomplete. Is it correct or incorrect or very incorrect? I think it should read, "A statement is correct or incorrect or neither or both." Or it is sometimes correct!

I think many great detective yarn-spinners feel their readers want to know the villain was very dead. And many heart transplant recipients prefer to know that the donors who saved them were *not very* dead!

To berate someone's writing style is pointless and unfair. That is either for sure or for unsure. Of that I'm very sure, but not so sure it isn't very correct!

DON C. WARREN
AO-D
NAMSA
APO, New York

REPLY FROM THE STACKS

In response to my piece, "Librarians: The Untapped Resource" (Readers' Forum, Sept. 1983, p. 243), you kindly printed two very positive replies and one very negative one, "From the Padded Cell," from Mr. Robert M. Gordon (Letters, February, p. 23). At the time, I considered writing a rejoinder to Mr. Gordon.

Recently, in preparing for a course I teach at the Columbia University Graduate School of Business on the subject of MIS/DSS, I had the occasion to read in detail an article on the history of IMS that I had only skimmed before: "IMS: Past, Present, Future," by William Grafton, an article that had quite serendipitously appeared in the same issue as my piece (p. 158). Mr. Grafton provides a far better rejoinder to Mr. Gordon than I ever could have. He comments deservedly on the great success and impact of IMS, but he is also candid enought to comment on opportunities missed. In that context he says:

"Why were hierarchical databases chosen for DL/I? I can remember the debate at Rockwell. There were advocates of the network approach being used by Bachman at GE, and of the inverted file concept used by some of the library automation projects.

"But disk files were small at the time, and the Apollo storage requirements were large. . . ."

The implication is clear: if business data processing had taken its cue then from library data processing, the development of DBMS/MIS technology would have been greatly expedited.

Thank you Mr. Grafton for your neutral and elegant support of the thesis that business and library data processing have much to learn from each other.

MICHAEL E.D. KOENIG
Columbia University
New York, New York

VENDOR BENDER

Michael Tyler makes some interesting points in "Hard Facts on Hardware Reliability?" (Oct. 1, p.82). All attempts to compare different vendors' performances based on data recorded in Logrec (R+, EREP, etc.), however, are ultimately dependent on the vendors' hardware having accurately and responsibly returned diagnostic information to the cpu.

With such highly sensitive information, this is a little like the fox guarding the chicken coop. I'm aware of one vendor that has programmed its disk controller to report temporary equipment checks (which worry dp managers) as temporary data checks (which are easier to dismiss). If pressed, they will patch the controller to report accurately.

Unfortunately, there is very little as objective as a head crash.

JOSH SALE
Trillium
Manhattan Beach, California

PROLOG IS PAST

Our product IF/Prolog has been available for VAX with Berkeley-Unix since September 1983, also beating DEC's Prolog implementation (Letters, Oct. 15, p. 23). During 1984 we have ported IF/Prolog to 14 different computers including IBM's PC, VAX/VMS, and Eclipse/AOS. We are currently working on a Prolog compiler to be released during the first quarter of 1985.

CLAUS M. MUELLER
President
Interface Computer GmbH
Munich, Germany

MEAN LETTER

Your article, "Hard Facts on Hardware Reliability?," does not point out a significant statistical fact of life: in a normally distributed population, half the members are "below average" by definition. To overlook this truth is naive.

A manager must use his awareness of his resources and mission to set his own standards of reliability. Anything short of those standards is unacceptable. A manager whose standards are derived from product comparisons is no manager at all. He cedes the responsibility for setting goals and measuring performance to statistics drawn from a population over which he has no control.

RAY PASEUR
Systems Support Representative
Vion Corp.
Washington, D.C.

THE RIGHT PRICE

Thank you for mentioning our latest report, "Making the Micro-Mainframe Connection," in your Oct. 1 issue (Source Data, p. 159).

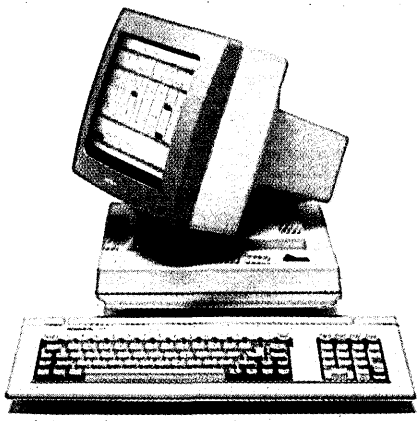
The $12.95 price you quoted for this report, however, was in error. The correct price is $39.95. This second edition has been expanded and includes candid product reviews, tips on installation, plus three ways to install the link with or without the cooperation of the data processing department.

STEPHANIE WILLIAMS
Information Research
Mattawan, Michigan

18 Reasons We're Uniquely

1 There's our position on the bottom line. Simply put: No one can match our emulations, editing and ergonomics for $549.

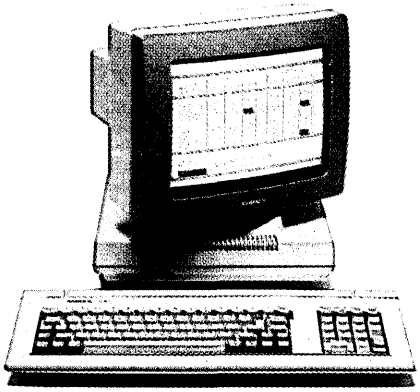
Can anyone better this price?



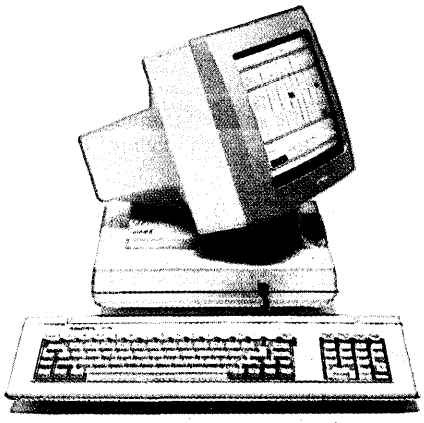
2 Only at the expense of features. Often it's obvious where they've cut corners:

With a pug-ugly box.

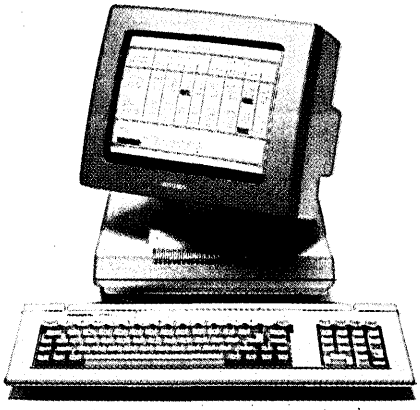
But as you can see, the Ampex 210 is sleekly ergonomic.



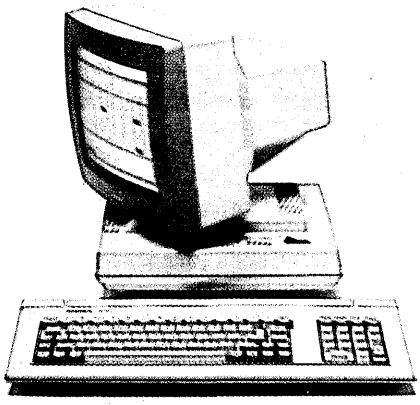
3 We human-engineered the Ampex 210 with a full 14" screen that tilts and swivels to just the angle you need. So it's comfortable to use, no matter how you're positioned.



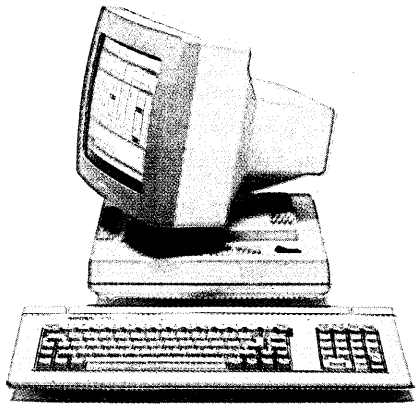
7 As well as the local editing and block mode transfer capacities you need to speed work flow.



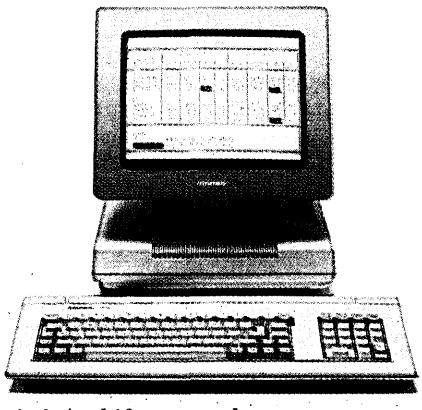
8 Plus 16 resident emulations you can switch at the touch of a key. Including the TeleVideo 910, 910+, 912, 920 or 925*...



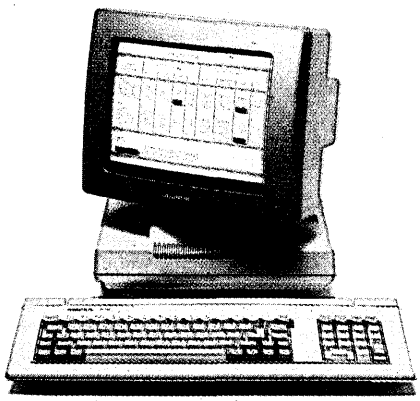
9 The Lear Siegler ADM 3, ADM 3A, 3A+ or ADM 5*...



13 What's more, we'll add more. In OEM quantities, we'll customize our 210's appearance, personality and programming so it's perfectly suited to your needs.



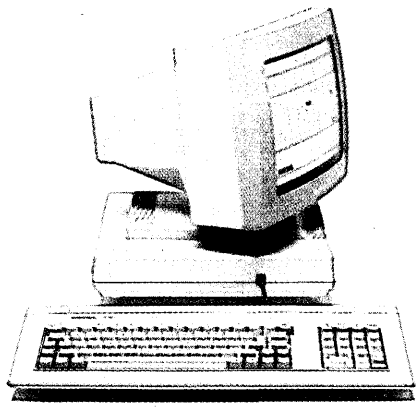
14 And if you need a more powerful terminal with even more features, consider the next step up in our family of terminals: the Ampex 230.



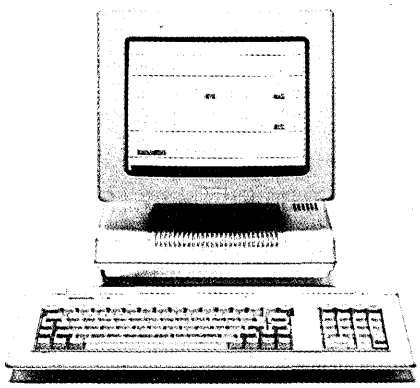
15 We back every Ampex terminal with a six month warranty and a worldwide service network.

*TeleVideo, Lear Siegler, Esprit and Qume are trademarks of TeleVideo Systems Inc; Lear Siegler Inc; Esprit Systems Inc; and Qume Corporation respectively.

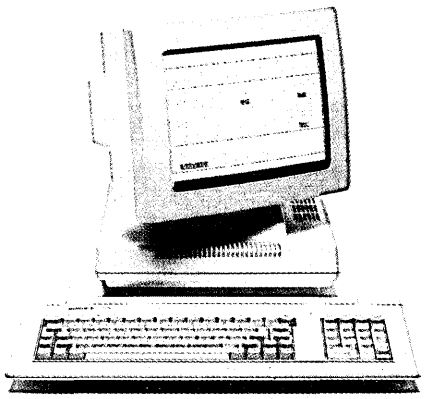
Positioned to Meet Your Needs.



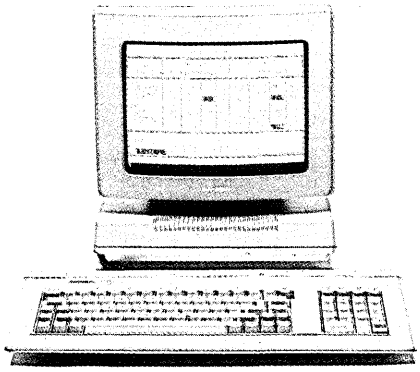
4 We also equipped it with a low-profile, Selectric-style, adjustable-slope keyboard for easy typing.



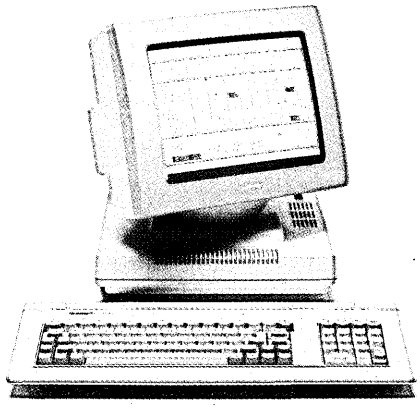
5 And with a soothing, flicker-free amber screen for easy reading. (If you prefer, you can have the option of green at no extra cost.)



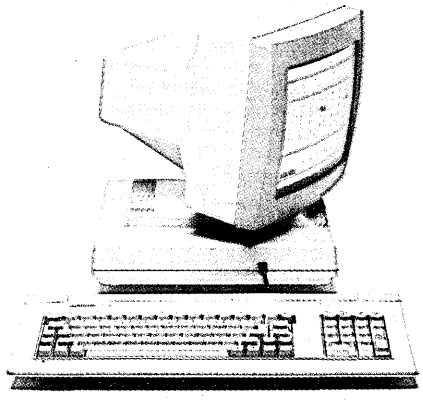
6 But ergonomics are just the beginning. The Ampex 210 is as beautifully engineered inside as outside. With line graphics and a bidirectional printer port as standard features.



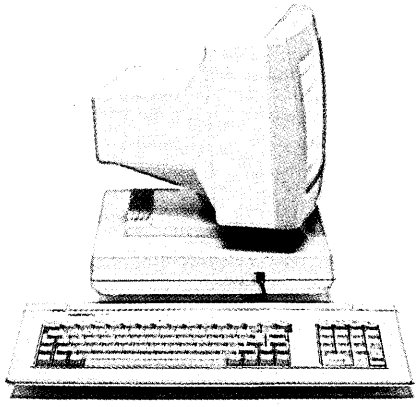
10 The Esprit (Hazeltine) 1400, 1410 or 1500*..



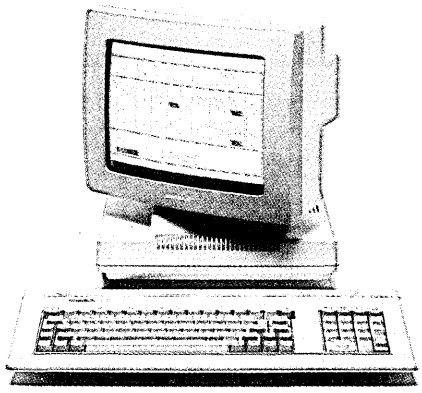
11 ADDS Regent 20, 25 and Viewpoint.†..



12 And Qume's QVT 102.*



16 How can we pack all that into the Ampex 210 for just $549? We're in a position to be competitive. We can take advantage of over 25 years of video, computer peripheral and offshore manufacturing experience.



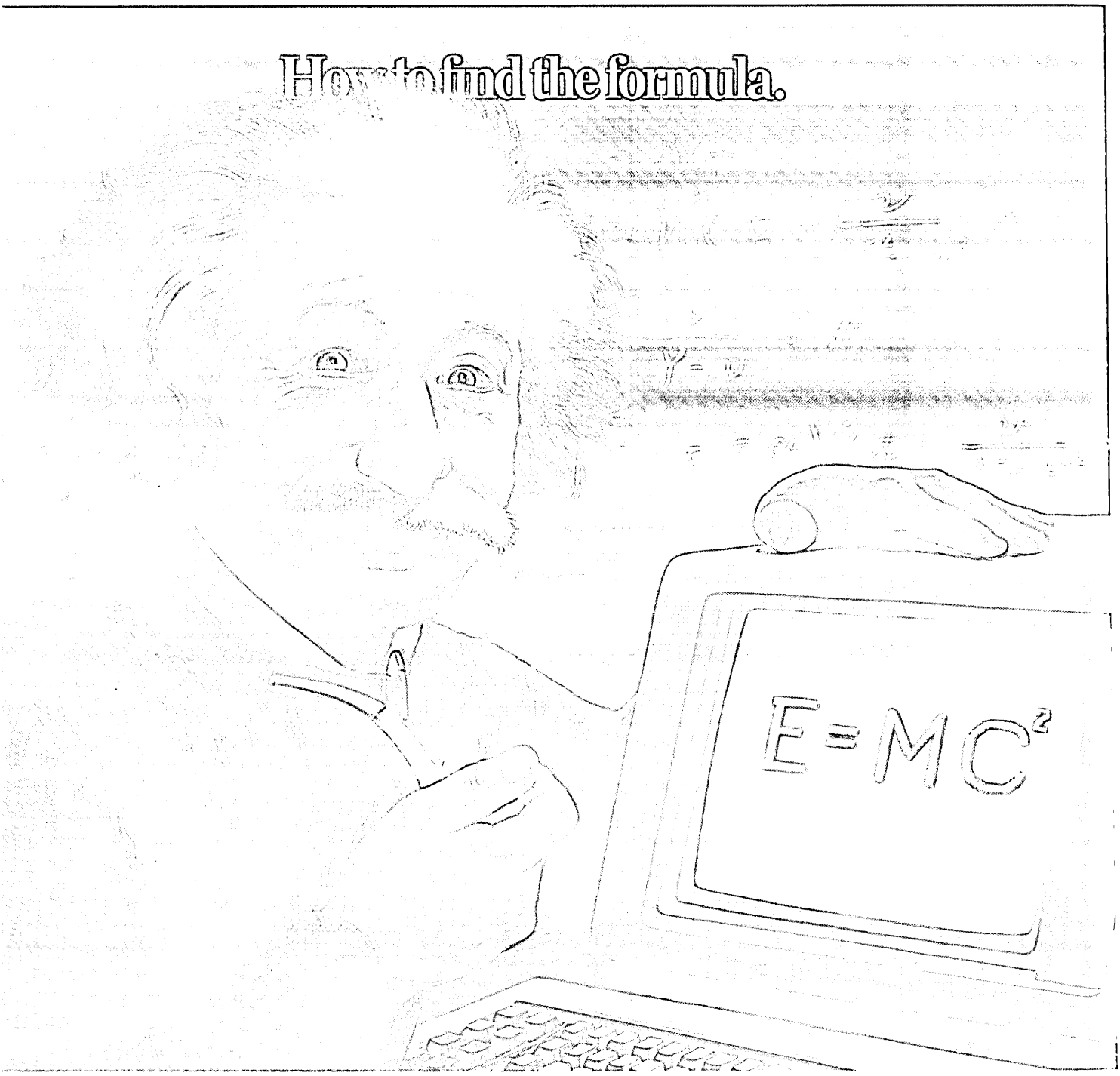
17 So if you need a well-designed, full-featured terminal, call us at 800 621-0292. Or 800 821-9473 in California. We'll show you how you can be very comfortably situated for just $549.

AMPEX

18 The Ampex 210 is from the Computer Products Division of Ampex Corporation. One of The Signal Companies

†ADDS, Regent and Viewpoint are trademarks of Applied Digital Data Systems Inc.

CIRCLE 12 ON READER CARD



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CIRCLE 13 ON READER CARD

Rebecca S. Barna, Editor

EDITORIAL

IBM UNFETTERED: EXTRAVAGANCE OR NECESSITY?

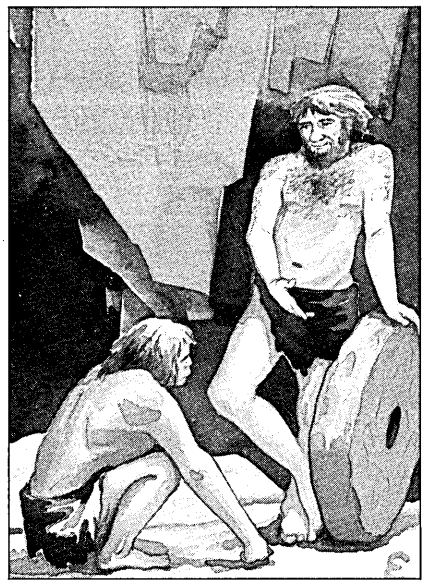


ILLUSTRATION BY DORIS ETTLINGER

Today's extravagance can be tomorrow's necessity. Likewise, today's extravagance can be tomorrow's ticket to the poorhouse. Nowhere is that more apparent than in information technology.

Take a look at keyboard devices. As we rang in the new year in 1983 there was an astonishing number of keyboards in use—one for every five white-collar workers in America. This year, the ratio should be one for three. By the end of the decade, we can expect at least one keyboard device for each white-collar employee. Already, many research scientists rely on multiple keyboards—one in the office, one in the lab, and one at home.

You can bet many of those keyboards were bought as an extravagance; most are now a necessity.

Just two short years ago, the installed processing power worldwide was half what it is today. The next two years will see the purchase of as much computing power as has ever previously been available. Processing power doesn't double every two years out of dire necessity; but that's what it quickly becomes.

Affordability is a big factor. Computing costs are coming down by better than 20% per year. In a competitive world, applications that might have required extravagant expenditures are now so reasonably priced that they can easily be rationalized as necessities.

Those changes come compliments of technological progress. There are major marketing changes as well. Already a $100 billion business, the worldwide market for information processing will break $200 billion by decade's end. The world's newest market will soon be its biggest.

Information processing plays a pivotal role in today's global economy (annual information processing revenues now exceed the sales of all but the automotive and oil sectors), and this places awesome responsibility on the industry and its players. That's why we pause at the onset of the new year to put the spotlight on IBM, this industry's leader, a company with such immense power that its simplest gesture would be the wildest extravagance on the part of any of its competitors.

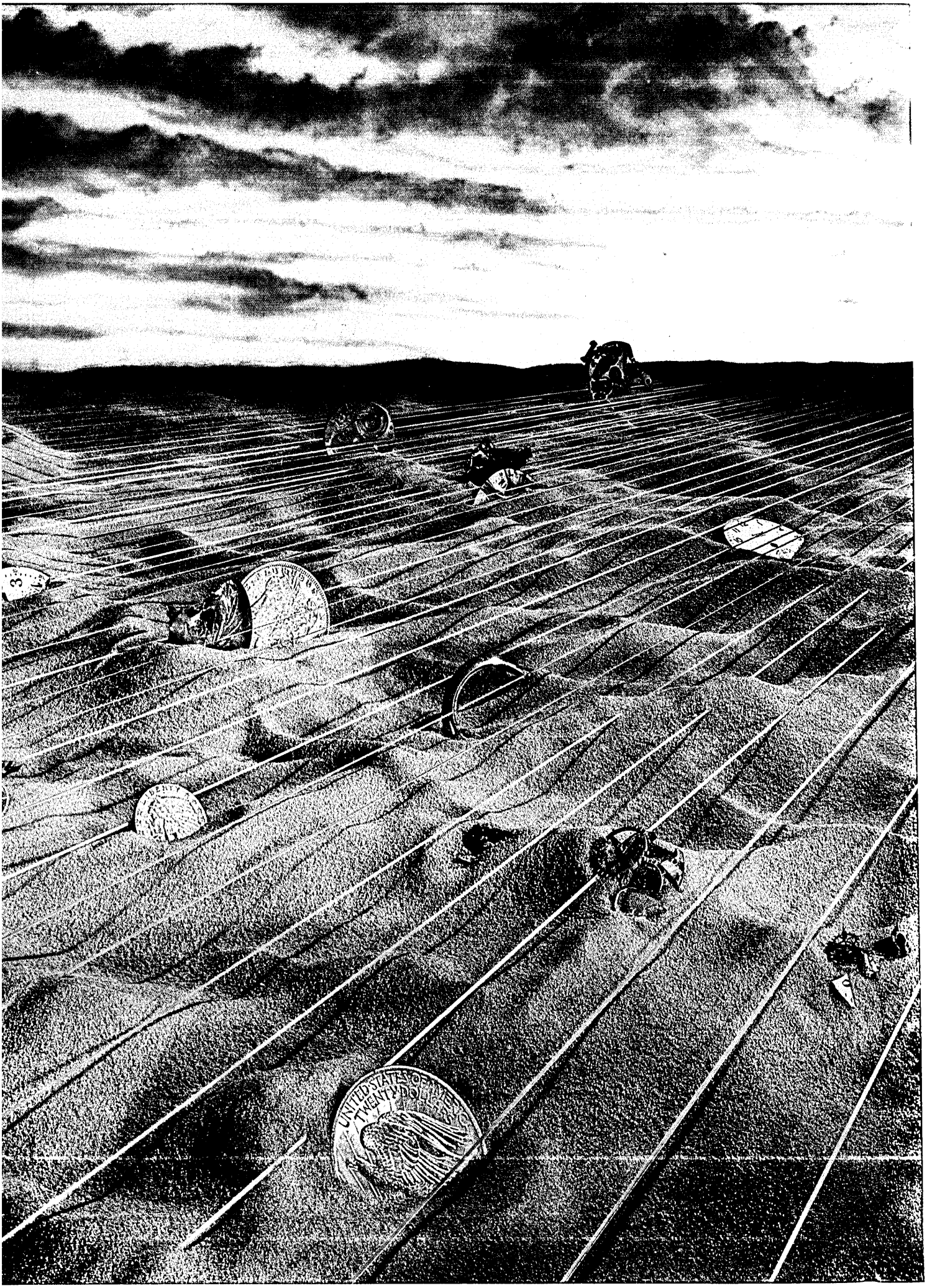
As the feature articles in this issue indicate, IBM is now either the incumbent or a shoo-in for the top spot in almost every segment of the information processing business. And as President Reagan embarks on his second term in office, it's almost a given that IBM will have four years free from the federal antitrust attentions that have troubled it for decades.

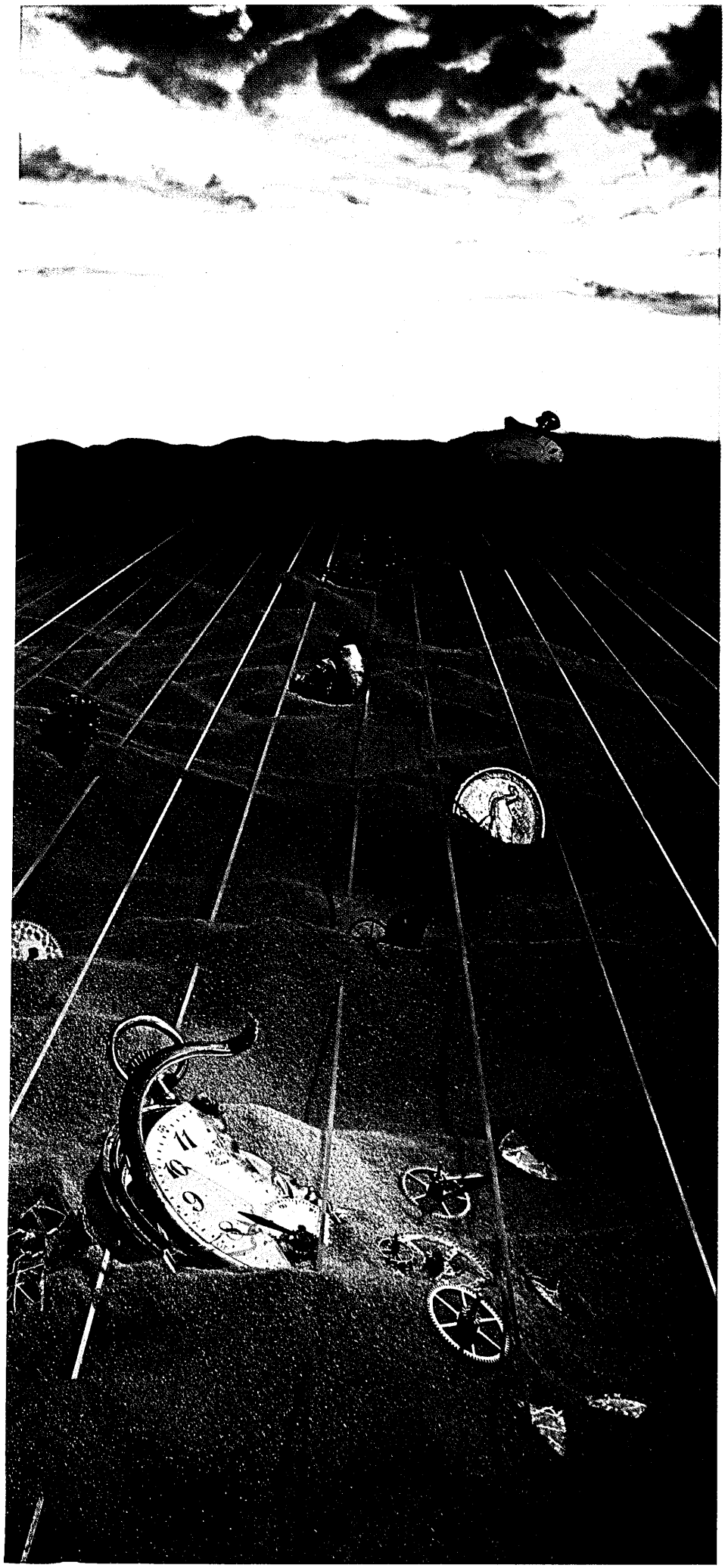
While we certainly make no allegation of specific antitrust violations on the part of IBM, we nevertheless suggest continued scrutiny of the company's position, power, and prognostications. When a company the size of IBM can enter an already established market such as personal computers and within two years be that market's leader, what might that same company accomplish in four years' time?

The argument always surfaces that to constrain IBM's activities is to constrict this country's lead in computing, that to put boundaries around IBM is to hobble the United States in its technological race with Japan.

But four years of unfettered growth for IBM at this high-growth stage of technology may be an extravagance that the country can't afford. Waiting another four years before reexamining IBM's market power may be too late. The bill that is rendered may well be tallied in terms of technologies not developed because prudent businesspeople found the prospect of competing with IBM too daunting. Too much may have been irretrievably lost.

Winston Churchill once said, "If we open a quarrel between the past and the present, we shall find that we have lost the future." We suggest that if we do not open a quarrel between the present and the future, we may have lost a rich and important past. ◉


UNITED STATES OF AMERICA
TWENTY DOLLARS



Peat Marwick technology has exploded the myths about computer systems development: It doesn't have to take forever or cost the earth.

Introducing Structured Retrofit.

Even the best-managed computer system can develop spaghetti code over the years. Changing demands and expanded requirements can make yesterday's state-of-the-art a state of confusion. And until now you haven't had a cost-effective way of replacing your system.

But now Peat Marwick has the answer: a technological breakthrough that gives you the best of both worlds: the technical currency of a new software system at an affordable price. It's called Structured Retrofit. Its advantages are simple: You save the valuable existing information from your present system by regenerating it in a structured format that is then used as a base to build your new target system. Even on a new computer.

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IN FOCUS

DP AND THE DISABLED

The computers currently on the market are essentially hostile to the handicapped.

by Nancy Burnett and Jill Neimark

Guest: Can I have a room for the night?
Host: Sure, if you don't mind making your own bed.
Guest: That's okay.
Host: Fine. The lumber's out back; here's a hammer and saw.

What we find funny about this old joke is the difference in expectations. The guest expects the same accommodation we would, i.e., that the room will be equipped with suitable furniture. Evidently, the host thinks otherwise.

Likewise, we expect to find suitable accommodations in our homes and workplaces. How many new employees plan to bring their own desks, chairs, or telephones to work the first day?

Many disabled workers do, because the items routinely supplied do not meet their limited physical abilities.

Fortunately, computer technology has the capacity to transform the lives of the disabled: enable the deaf to talk on the phone via computer bulletin boards; allow the blind to work as stockbrokers, lawyers, and writers using computer braillers; help paraplegics to draw and paint using sophisticated sensing pads. Technology that is even more friendly to the handicapped is on the way: opticon readers for the blind will prick out braille patterns on a person's thumb; devices will control computers via ultraviolet or infrared rays, so the handicapped can operate them from a distance; and a program being tested at North Texas State University in Denton will interpret the guttural sounds of the speech-disabled. The computer hears "wa," becomes activated, and makes the sounds, "May I have a glass of water?"

Much of this specialized hardware is currently being developed at great expense and at a very slow pace in isolated pockets around the country—often by people who have had their own or a family member's life scarred by disability. The manufacturing expense is, of course, passed on to the buyer. Even when the major computer manufacturers produce hardware for the disabled, it is often prohibitively expensive. Digital Equipment Corp. manufactures a much acclaimed $5,000 talking computer terminal for the blind. That price is staggering for an unemployed person—and most of the disabled are unemployed.

Until recently, programmers have been working within an industry largely indifferent to the needs of the disabled. The computers currently on the market are essentially handicapped-hostile. The hardware is not standardized, so a program adapted for the disabled on an Apple does not necessarily run on an IBM or Wang. And though machines like Apple and IBM are open-ended—which means you can take the lid off and adapt and add to the hardware—many are closed. What you buy is what you get—forever.

Codes designed to protect software from being pirated can keep it from being adapted to the needs of the handicapped as well. Sometimes, when special devices (such as speech synthesizers) are added, these programs can't send their information through the device. This means that many valuable programs—Wordstar and Lotus 1-2-3 among them—can be translated only on some computers.

Disability experts estimate the present disabled population in the United States to be as large as 36 million people. One of every 11 Americans has arthritis, or impaired vision, or diabetes, or heart disease, or some other limiting physical condition. The last 10 years have seen a growing awareness of the right of the disabled to equal access. Architectural and transportation barriers are succumbing to the thoughtful application of technology and design. Now that the disabled can get to work, however, a new barrier awaits on the desktop.

For someone who can't see, a screen is a useless method of computer output. For someone with limited or no manual ability, much hardware and software is also virtually useless. Ask yourself this simple question: could you operate your computer/terminal if you were wearing mittens? Your answer will suggest why many have feared that information processing jobs could be inaccessible to the disabled.

Describe a particular job and the disabled person who is to perform it, and JAN will search the database for examples of other employers who have solved the problem.

But not if the federal government has anything to say about it. The latest civil rights legislation resulted in some new tasks for the General Services Administration. The Office of Information Resource Management (OIRM) has been given responsibility for ensuring a coordinated effort in the U.S. government to use

PHOTOGRAPH BY STEVE COOPER

computer technology for the benefit of disabled employees. In addition, an interagency committee is being formed to formulate policy and guidelines for the use of such equipment in the government, and a technical assistance office has been created to advise government agencies on implementation of individual systems.

Judge Leonard Suchanek, chief judge of the Board of Contract Appeals at the GSA, has been assigned chairmanship of the interagency committee. Representation on the committee is at the assistant secretary level, with appointees from the Department of Defense, the Office of Personnel Management, the Department of Health and Human Services, and several other departments and agencies.

IBM hired its first disabled worker in its second year of business, 50 years before civil rights for the disabled became law.

"We plan to put the weight of the government and all its contracts behind the effort to develop accessible technology," says Judge Suchanek. "One policy that we might consider is requiring that all edp equipment sold to the government be adaptable for disabled users, or that it be compatible with adapted equipment."

He explains that the GSA is not going to require that all printers be braille printers, for instance, but that a braille printer be plug-compatible with other printers. "We want to encourage development of equipment that will serve more than one population. Voice recognition and speech synthesis are two technologies that would benefit both the disabled and the able-bodied."

To encourage the use of such equipment, OIRM has established a technical assistance office with a software specialist experienced in assembling systems for the disabled. "One of the problems in the government," notes Suchanek, "is that hardly anyone knows how to put two or three pieces of equipment together and get it all to work." OIRM has also placed a special identification for adaptive equipment on its "excessed equipment" inventory. This will enable those searching for technology to locate adaptive equipment on the excess lists, and then to recycle it.

The move by GSA is greeted with encouragement by Carolyn Emerson, handicap program coordinator for Honeywell. "After last year's White House Conference on Computers and the Handicapped," she says, "Honeywell organized a study group to consider ways of making our products accessible. It was apparent to us, though, that we couldn't be the only vendor to bid on a contract if our product has extra features the other bidders have not included. But requiring all vendors to meet the specification of accessibility will ensure not only fair bidding, but also some competition among vendors regarding an affordable, workable solution."

Among the possibilities being considered by the Honeywell study group are a port on each terminal that would accept any keyboard emulator, and software that would permit macroprocessing rather than individual keystrokes. A keyboard emulator is required by someone with limited manual ability. It may range from a modified keyboard with no autorepeat function to a single switch with which the user sends Morse code, converted to ASCII by the emulator.

Emerson points out an important fact in adaptive computer equipment: "We noticed a lot of small efforts were being made by company employees for other company employees, but there is no organization of those devices into marketable products, no standardization, and no awareness of the device beyond a small circle of employees." While several blind employees have been supplied with speaking terminals, braille printers, and the like, they may be unable to access more than one system with that equipment.

The big move by Honeywell to centralize awareness of disabled employees and their equipment represents a common trend in companies grappling with reasonable accommodation laws. There is a tendency to apply top-down, structured methodology to the situation now, rather than the earlier style of local area initiative, in which a manager would hire a disabled worker from time to time, with no overall corporate policy for affirmative action.

The same management commitment and style needed for affirmative action success could profitably be applied to the marketing of the numerous products developed in local applications. Emerson says, "Honeywell is not in the business of marketing all these adaptive devices, but we would be willing to help a separate entrepreneur develop a marketing plan, for instance, or otherwise lend some business and management expertise to such an effort."

IBM takes a similar position, establishing a value-added reseller relationship with companies such as Prentke Romich of Shreve, Ohio. These companies receive technical assistance in modifying keyboards, adding speech synthesizers, or other devices. The var then markets and services the device or system, and can keep a closer relationship with the community of users with special needs than could IBM. One program that is distributed in this manner was created by blind musicologist Dick Gage at the Cambridge IBM Scientific Center and distributed by Solutions By Example in Boston. It is called PC Speak and reads aloud programs like VisiCalc, which require viewing whole screens of information at once. With a single command the blind operator puts the computer in a suspended state so it will not process information, and moves the cursor across the screen, listening to the speech synthesizer translate the information out loud.

IBM also was one of a select group of corporations invited to the White House Conference attended by Honeywell. Carl Brown, affirmative action program manager for IBM, confirms that IBM is considering approaches to making its major products more accessible to the handicapped. While announcing no specific plans, he says, "IBM has always had a tradition of respect for the individual. We are strongly committed to affirmative action and equal opportunity, both for our employees and for our customers."

Brown is right. IBM is cited in the 1982 Department of Labor study of reasonable accommodation among federal contractors as having an "exemplary record" in hiring the disabled. IBM hired its first disabled worker in its second year of business, more than 50 years before civil rights for the disabled became law.

Declares Brown, "Every line manager at IBM is encouraged to hire disabled workers when appropriate, and to retrain employees who become disabled." Adaptive devices are paid for out of the local budget, or may be funded by rehabilitation agencies in the case of retraining.

A good example of IBM's company philosophy is the case of a Washington, D.C., area programmer who had worked in a technical capacity before being paralyzed in an accident. After rehabilitation, the individual has become not only a successful programmer for IBM, but also an entrepreneur with three companies run via computer assistance from home.

Ask yourself this simple question: could you operate your computer/terminal if you were wearing mittens?

IBM fulfills two conditions common in firms with outstanding affirmative action programs: it has over 200,000 employees and is a high-tech company. This combination gives the company the financial and technical resources necessary to provide reasonable accommodation to almost any worker.

The somewhat surprising results of a Department of Labor study were that 51% of all accommodations cost nothing, 30% cost less than $500, 11% cost between $500 and $2000, and only 8% of accommodation efforts cost more than $2,000. Many disabilities require changes

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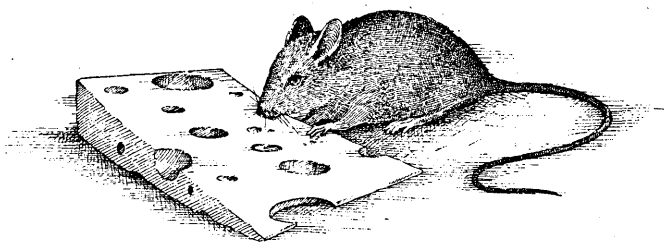

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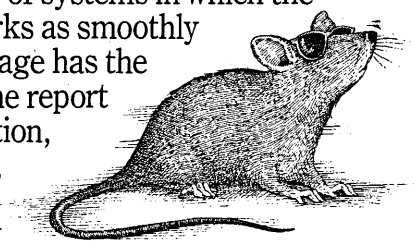

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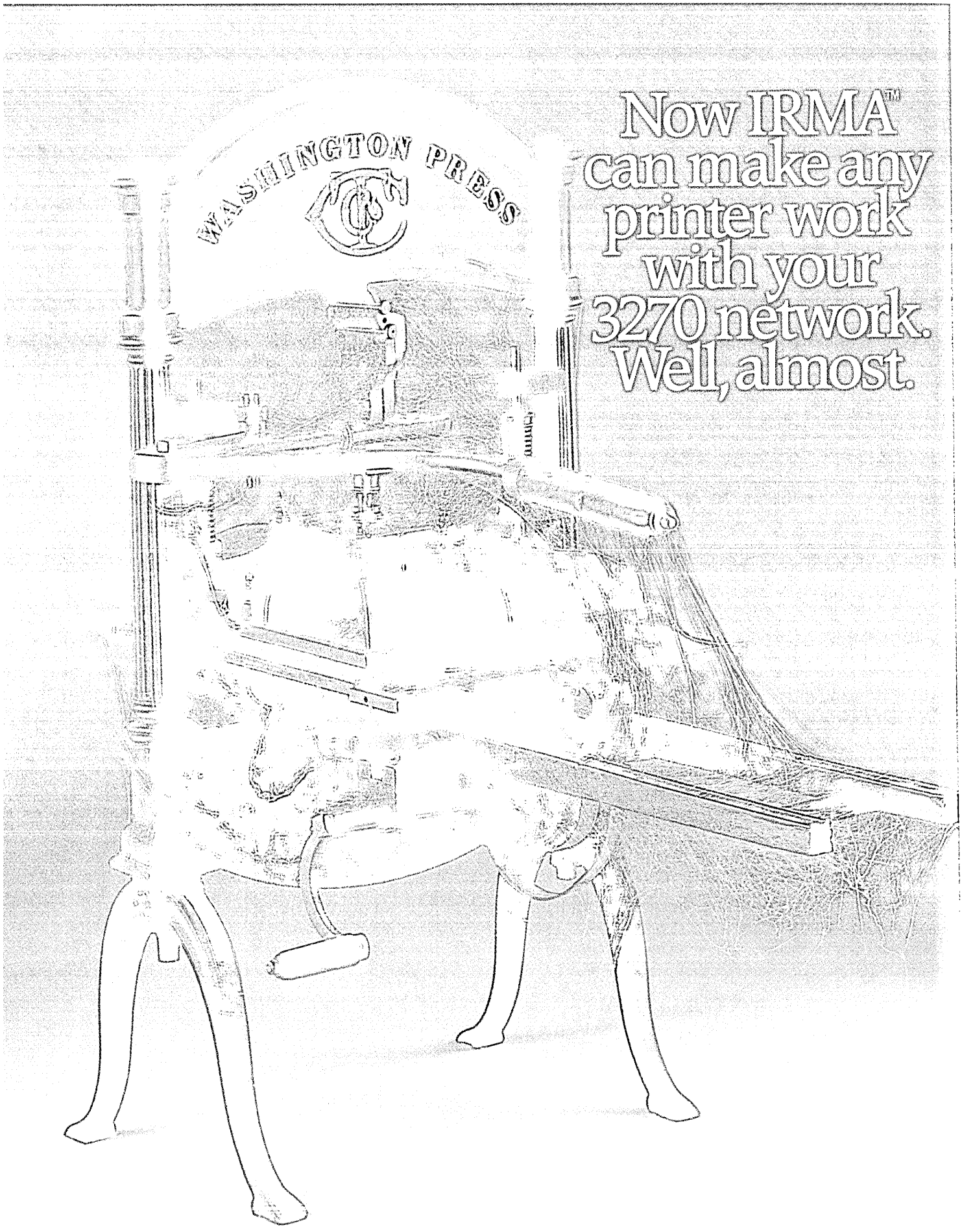

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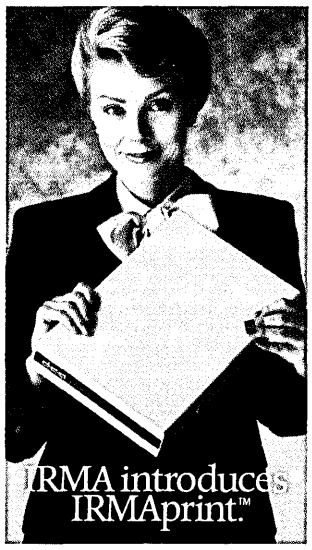

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CIRCLE 16 ON READER CARD

in work procedures (e.g., flexible hours) or the work environment (such as rearranging furniture).

Some products available now support the finding that vision impairment and paralysis require the most expensive accommodations, but they need not be prohibitively so. KeyTronics of Spokane, Wash., makes a keyboard compatible with the IBM PC that has "alternate action switches," which operate in serial rather than parallel fashion: the user presses control-alt-delete sequentially instead of simultaneously. The keyboard sells for $209, which is less than the cost of the KeyTronics keyboard for the PC.

Rosesoft of Seattle approaches the problem from the software side. ProKey 3.0 has a "one finger mode" designed to let manually impaired PC users assign such simultaneous functions to a single key. ProKey lists at $129.95.

DEC's DECTalk is a voice synthesizer of excellent quality that plugs into an RS232 port, and will read aloud anything in machine format to a visually impaired worker. At $4,000 it is more expensive than many earlier speech synthesizers, but it is more easily understood and is compatible with a much larger range of equipment.

At the high end of the price scale is the CASH III, a voice-operated system by Cascades Graphics, Santa Ana, Calif. The top of the line model includes fixed disk, modem, and environmental control system, allowing the user to answer the phone, turn on the lights, turn pages in a book, all by voice command and all independent of work in progress on the Apple-based workstation. Says Brian Taylor, technical engineer, "$15,000 is expensive, but it takes a lot of money to turn a voice into an arm and a leg."

In contrast to IBM's distributed approach to affirmative action, Control

Until recently, programmers have been working within an industry largely indifferent to the needs of the disabled.

Data decided on a more centralized architecture. In 1979, realizing that some 700 to 800 employees were on disability, the CDC management undertook a retraining program. Making extensive use of CDC's PLATO educational software, the program was, says Homework program manager Ralph McCrae, "enormously successful. We placed terminals in the employees' homes, along with whatever adaptive equipment was necessary so the individuals could use it, and then trained these people as programmers. Many of these people are working full-time now."

After the initial success at rehabilitating several dozen former employees, the program was expanded, offering training in various information-related fields besides programming and accepting applicants who were not CDC employees. The singular aspect of the project is that applicants work from home.

"The cost of maintaining such a situation is fairly low," says McCrae. "Employers are often helped in adaptive equipment purchase by the state vocational rehabilitation programs, and may not need to spend large sums on facility accessibility. The employee has the advantage of saving time and effort by not commuting, something that is even more difficult for the disabled than for the able."

McCrae emphasizes, however, that while "hiring the disabled is a good business decision," success depends on top management's commitment and good management practices. A manager can't just yell down the hall if the worker is at home.

Another somewhat surprising aspect of the Department of Labor study was the finding that for companies in the small- to medium-size range the ability to find technical assistance in developing accommodation was a slightly more important consideration than the tax breaks involved.

For nongovernment agencies, who have no GSA-sponsored office for technical assistance, and for companies without the various and extensive resources of old-line computer vendors, Honeywell's Emerson offers a suggestion. "Call JAN, the Job Accommodation Network, cosponsored by the President's Committee on Employment of the Handicapped and the West Virginia Rehabilitation, Research, and Training Center." Based in Morgantown, W.Va., the service is just for employers. They may call, describe a particular job and the disabled person who is to perform that job, and JAN will search the database for examples of other employers who have solved the problem. They may even contact those other employers for more detailed discussions.

What is the ultimate computer accessible facility? Perhaps the Andrew Woods Sensory Assistance Center of the Department of Justice in Washington. "We have about $50,000 to $60,000 invested in equipment for blind attorneys in the Justice Department," explains Ed Bordley, manager of the center. "What's terrific about our system is that everything is compatible."

The everything Bordley refers to includes state-of-the-art braille printers, optical scanners, paperless braille recorders, talking terminals, and anything else needed to ensure accessibility to the legal databases the Department of Justice uses. The Sensory Assistance Center is organizationally a part of the library. Funding for the equipment comes from working capital, and Bordley says funding has never been a problem. "We have funds to purchase new equipment, as it becomes available. We have already upgraded our hardware totally since startup in 1979."

The center meets the daily needs of about a dozen attorneys at the department, but is used primarily as a training tool. Blind employees from other government agencies are eligible to undergo training with this equipment. "You can't find this kind of equipment at Computerland or even the GSA computer stores."

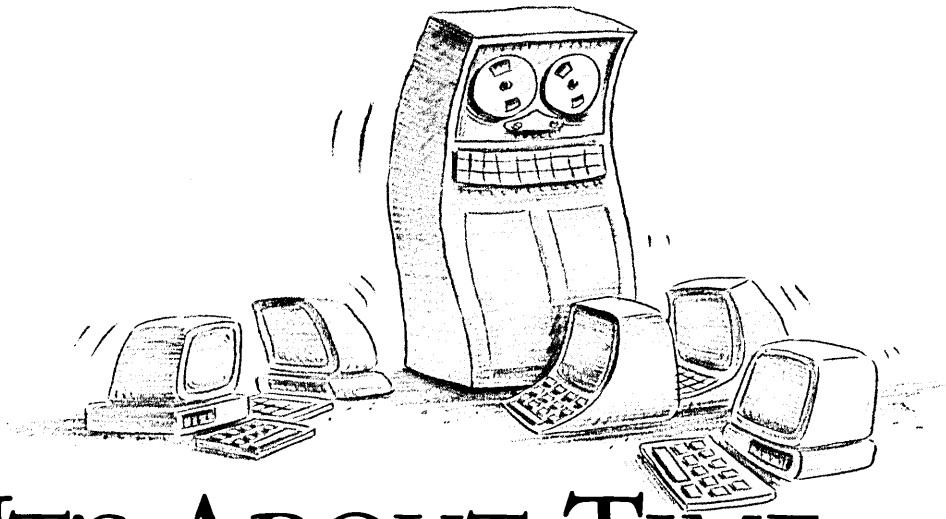
The next wave in computer technology threatens to sweep past the visually impaired.

When asked what the users thought of the setup, Bordley observed, "They think it's great we have it, but they want it on their desks."

The frustration level is not merely that of hearing about or seeing the gadgets now available for unrealistic sums. The next wave in computer technology threatens to sweep past the visually impaired. "A lot of blind folks are just crushed by the move toward graphics," says Tom Schworles, a quadriplegic and director of COPH-II, the Committee on Personal Computers and the Handicapped, a Chicago-based network with nearly 500 members. The American Foundation for the Blind has developed tactile displays that allow a blind person to touch and thereby read a screen, but these cost about $50,000 each and are not available to the general public.

For quadriplegics, the Trace Research and Development Center for the Severely Communicatively Handicapped, at the University of Wisconsin in Madison, has developed a remarkable portable computer "palette" about the size of a briefcase. The palette can be operated by a stick, a wand that beams light, or even by blinking in Morse code (a short blink for a dot, a long blink for a dash). This device, distributed by Prentke Romich in Shreve, Ohio, costs nearly $6,000 with add-on peripherals.

A related but much less expensive device is known as the Koala Pad, developed by David Thornberg and marketed by Koala Technologies Corp. in Santa Clara. The pad is actually two sheets of plastic coated with electricity conductive chemicals that convert the physical contact to an electric impulse. Not only can the $125 pad be used to program a computer, it allows the handicapped (particularly children) to paint on-screen. According to Jeb Eddy, head of Koala Technologies, one boy who has cerebral palsy learned to draw at Stanford Chil-



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dren's Hospital in a few hours by strapping a stylus to his head and moving it along the pad. Eventually an adapted Koala pad may be used by anyone who wants to draw graphs and curved lines on a screen—a task still difficult to perform with a mouse or joystick.

But what about attitudes in hiring? Despite the problems, IBM's Carl Brown says, "It's just good business to hire the disabled."

Statistics show that when the handicapped are employed, they have the best attendance records in industry. They are unanimously considered conscientious employees grateful for the chance to be productive. "I know a blind man who used to work 80 hours a week feeling keypunch cards by hand," says Dale Brown, program manager of the President's Committee on the Handicapped. "He was dedicated and he got the job done. Now with a computer he can finish his job in a normal amount of time."

To nudge the business world, the Senate recently passed a tax incentive that allows companies to deduct some of the cost of special equipment (such as talking computers) for the handicapped.

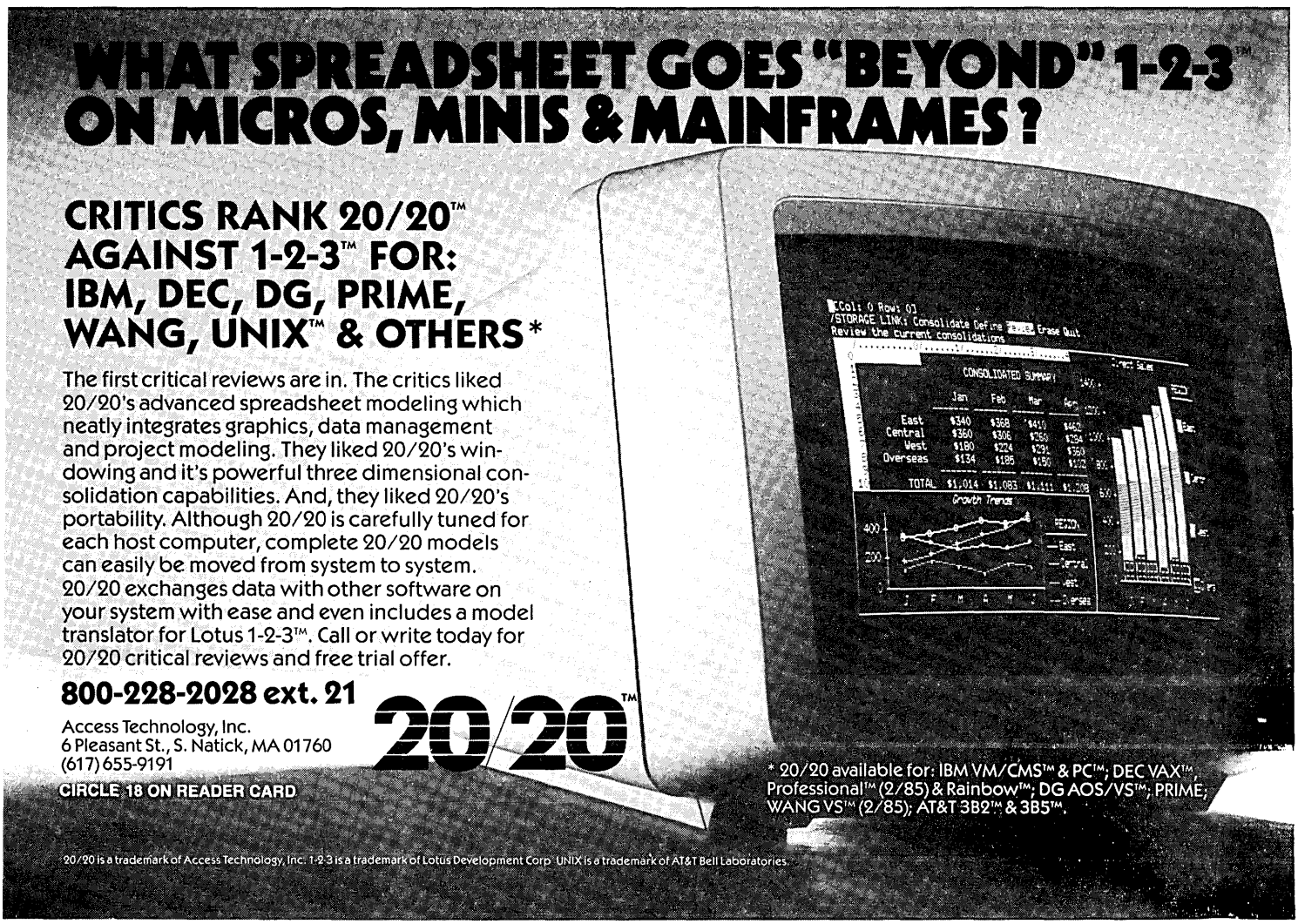
"The future of the disabled in business is unlimited," says Budd Hagen, publisher of a quarterly newsletter about computers and the handicapped called *Closing the Gap.* Budd's son is profoundly deaf as a result of a massive dose of penicillin given him when he was an infant. The drug burned out his eardrums. "You could shoot off a cannon behind him and he wouldn't hear a thing. We wanted to help him and everybody told us there was nothing available in computers. They were wrong. So much is going on my wife and I spend 90 hours a week on this newsletter, and have over 10,000 subscribers." Budd's son—who was failing junior high—is now "mainstreamed" and participating in regular classes with the help of a computer. "People who read the newsletter travel across the country and show up on our doorstep to ask for advice. A person without a voice can speak using a computer. A homebound person can make friends. A person who can't communicate can communicate. People keep saying, 'Someday computers will help the disabled. Someday it's going to happen.' That day is here."

"People keep saying, 'Someday computers will help the disabled.' That day is here."

Several organizations are actively training and placing the handicapped into the mainstream of data processing. Disabled Programmers Incorporated (DPI), in Campbell, Calif., was founded by former IBM engineer Thomas Purro in 1980 after his son was left quadriplegic by a diving accident. DPI has trained 87 disabled employees and 83 are now working—for Hewlett-Packard, CDC, and Levi Strauss, among other companies. Programmer Ed Isaac, for example, is paralyzed from the neck down, but by using a mouthstick he answers the IBM hot line and programs and maintains customer PCs. In the last three years, the Sensory Aids Foundation in Palo Alto has trained and placed 108 blind individuals in jobs in business.

Honeywell's Carolyn Emerson adds, "With the commitment of top management and the availability of technical assistance, there's no reason why more disabled people can't be productive employees. Besides, we should remember that the disabled are the only minority group anyone can join." ◉

Nancy Burnett is a programmer/analyst for the U.S. Navy in Indian Head, Md. She is experienced both with computers and disabilities, having one of each. Jill Neimark is a New York-based freelance writer.



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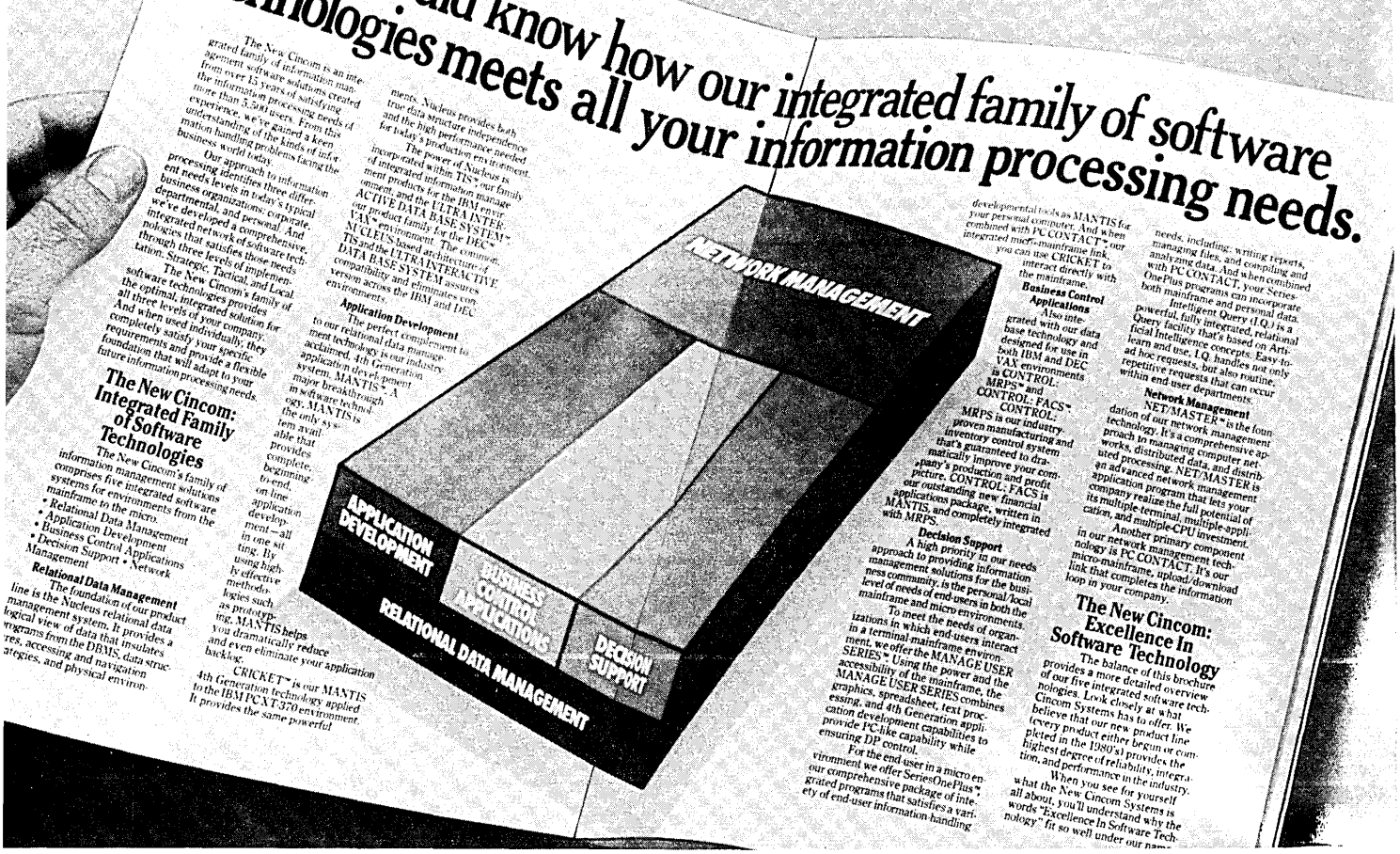

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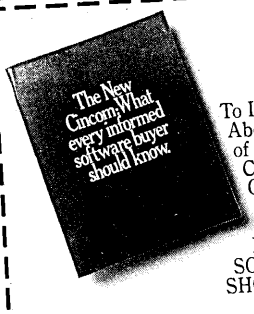

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NEWS IN PERSPECTIVE

EXPERT SYSTEMS

BRINGING AI HOME

Japanese companies are focusing on in-house expert systems that solve pragmatic problems.

by Thomas Murtha

Taking artificial intelligence out of the research lab and bringing it in-house, Japan's NEC Corp. has come up with an expert system that speeds up VLSI chip design. NEC's experimental Wirex system, which cuts layout time in half, is a good example of the type of pragmatic applications the Japanese are beginning to tackle with expert systems.

"Corporations in Japan seem to be focusing on internally generated expert systems that deal with well-understood problems," notes Daniel G. Bobrow, a research fellow at the Intelligent Systems Laboratory of the Xerox Palo Alto Research Center. "This may be a problem or it may be a solution for Japan. In the U.S., startup firms offering expert systems assume their tools apply to somebody else's problem. So they go looking for someone with a problem. It's much more a process of coming in from the outside. But in Japan, it seems as if they are building people into their systems. What it means is that they are installing expert systems in real environments where there are real problems."

NEC's approach to expert systems is indeed grounded in reality. Its interactive Wirex routing system uses a Prolog interpreter to interpret design rules and make inferences that automate the design process for gate arrays and custom LSIs. Three of these systems are being used at the company's VLSI production division in Kawasaki.

Satoshi Goto, research manager at NEC's Application System Research Laboratory, explains the rationale behind Wirex. "Since people generally stay at the same company in Japan, they usually develop technical expertise in a number of tasks. We want to increase the efficiency of VLSI design through a system that efficiently acquires, represents, and utilizes the expertise of our best engineers. The Wirex system is the first of many NEC projects for building databases of proprietary know-how for internal use."

NEC took the wraps off Wirex at the recent International Conference on Fifth Generation Computer Systems (see box). The conference was staged in Tokyo by Japan's Institute for New Generation Computer Technology (ICOT), which operates under the auspices of the government's Ministry of International Trade & Industry (MITI). The company, however, is no more willing to share the system with its Japanese rivals than it is with its American and European competitors. "Not only are we working independently of the U.S. and Europe, but we are also working independently of our Japanese competitors," declares NEC's Goto.

One of those local competitors is, of course, Fujitsu, which has been working with ICOT on a Prolog-based expert system for hardware logic design. As was true with the successful VLSI project in the 70s, any patents that result from the research will be held by MITI and made available to all Japanese companies.

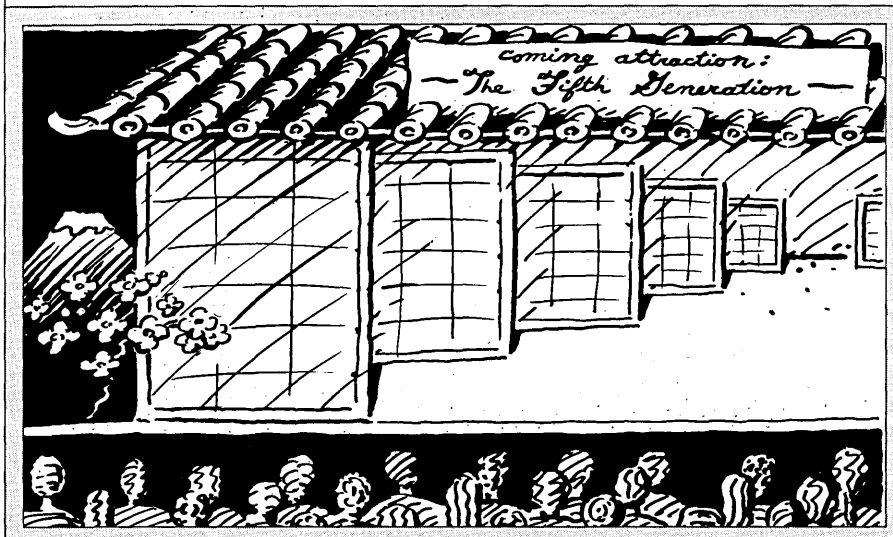
Work on the system, which is in actual use at Fujitsu now, began back in 1980. Researchers at Fujitsu developed preliminary versions of the system in the Lisp language. It currently runs on the company's M-series mainframes and Facom Alpha Lisp machine.

The system, which uses both Prolog and Lisp, is in fact the first practical application of expert systems at Fujitsu. So far, that application—designing hardware logic—has been a success. "We are very satisfied with the preliminary results," confirms Takao Uehara, deputy manager of Fujitsu's software laboratory in Kawasaki. We are evaluating the Pro-

"We want a system that efficiently acquires, represents, and utilizes the expertise of our best engineers."

log implementation for possible effectiveness as the basis for a new generation of CAD systems. There is a great deal of interest in expert systems at Fujitsu and among our outside customers. As a result, we decided to develop expert systems for in-house use and eventually we will develop expert system tools for our outside customers."

But for the time being, Fujitsu is concentrating on its ICOT effort on expert systems, which it detailed at the recent fifth generation conference in Tokyo. "Fujitsu is gaining a lot of experience by working with ICOT," according to Fujitsu's Fumihiro Maruyama, who is also working as a researcher at ICOT. "However, I still think we are a few years behind expert system researchers in the U.S. One reason Japan is behind is because expert system research has only recently started at Japanese universities. But we are rapidly gaining experience in expert system design. These systems more or less fit



FACTS ON THE FIFTH

The Japanese received mixed reviews at their recent international conference on the fifth generation staged in Tokyo. Over 1,200 people turned up to sort out fact from fantasy in the much ballyhooed research project.

Ballyhooing the loudest was the government's Ministry of International Trade & Industry (MITI), which extolled the virtues of Japanese technology and international cooperation. That international cooperation, however, had its limits, as some audacious Americans found out. Not content with the illusion of functionality, many U.S. participants requested blueprints and logic diagrams for the sketchy hardware and software presented by the Japanese.

The reply was no suprise. "We're sorry, but this project is funded by the Japanese government. MITI has control over any information considered proprietary," said one conference official.

Many conference goers resented MITI's claims that the project was indeed open. Put up or shut up was the general reaction. "The MCC [Microelectronics & Computer Technology Corp.] doesn't offer blueprints, but it doesn't claim to be open either," carped an American attendee. "If this project is really open, they [the Japanese] should be willing to sell their machines to foreign research labs."

This brouhaha belies the fact that the Japanese have indeed made progress on the fifth generation front. "Researchers here have carefully selected some initial goals that have given them a lot of leverage," remarked Daniel G. Bobrow of the Intelligent Systems Laboratory at Xerox's Palo Alto Research Center (PARC). "The extent to which Prolog has not been explored elsewhere gives Japan the opportunity to break new ground and make a distinction between itself and the U.S. It is very clear that one of the goals of this project is to build an infrastructure style of doing research that didn't previously exist in Japan."

During the conference the Japanese demonstrated two machines—a TTL Prolog Sequential Inference (PSI) machine built by Mitsubishi Electric Inc. and Oki Electric, and a relational database machine built by Toshiba Corp. Many foreign participants openly scoffed at the level of sophistication of the hardware. What the Japanese have produced "is very vanilla and looks like it was thrown together in a hurry," declared a Silicon Valley computer designer.

Other Americans at the conference showed a healthy but qualified respect for the Japanese effort. "The hardware of the PSI machine is very pedestrian," claims Samuel H. Fuller, vice president and group manager of Research and Architecture at Digital Equipment Corp. "There are many machines in the U.S. that are comparable or potentially superior. But I think this misses the point. I don't believe there's any group in the U.S. that in two years could have built such credible machines. With this learning experience, I think the Japanese have discovered a lot about building hardware and software systems, which will make them much more effective in building the next generation of computers."

After spending three years building a research infrastructure, Japan is now in a good position to contribute ideas to the international scientific community. "They have more or less met their initial goal and come up to speed on some fairly complex technology," says one American researcher. "But the goals for the intermediate stage seem incredibly aggressive. At the current level of funding—roughly $400 million over the next 10 years—they'll never do it. But if they reach even 10% of their goals, they will have achieved some major accomplishments."

—T.M.

Fujitsu's Industrial activities because they help people in the field do their jobs."

Fujitsu is also exploring the use of expert systems for automatic programming and digital switching. This, however, is not part of the ICOT pact, which remains the major focus at Fujitsu. "The next step at Fujitsu," explains software lab deputy manager Uehara, "is up to each of our divisions. Our laboratory will give them the tools we have developed through this project. Then we'll teach them how to build the expert systems that they need."

Expert system research involving MITI's ICOT isn't the only AI action in Japan. ICOT's FY '84 R&D budget of $21.3 million (Y5.1 billion) is in fact small potatoes compared to what private Japanese companies can shell out. Hitachi's FY '84 R&D budget, for example, was a whopping $941 million.

Some of those funds were earmarked for expert system research, a field Hitachi didn't begin to explore until 1981.

Fujitsu thinks it is still "a few years behind expert system researchers in the U.S."

"We only started discussing knowledge engineering three or four years ago, says Hirokazu Ihara, deputy general manager and associate director of R&D Planning at Hitachi's Systems Development Lab. "Compared to the U.S., where basic AI research has been going on for over 20 years, we are behind. But we are now working on some 15 knowledge engineering research projects. Research in the communication and cognitive sciences has had a tremendous impact on knowledge engineering in the U.S. But in Japan, cognitive science research has been very limited. We are trying to close the gap by developing practical knowledge engineering systems for internal use at Hitachi."

Knowledge engineering projects at Hitachi have resulted in a rule-based railroad operation system, automatic programming systems, computer assisted instruction (CAI) systems, and nuclear power plant diagnostic systems that were described at the fifth generation conference. About five Hitachi researchers are involved in ICOT projects and are also working on practical in-house applications of AI.

"Although we completely support the approach and goals of the ICOT research program, our own work at Hitachi is entirely independent," stresses Hitachi's Ihara. "We have different approaches and a different research agenda. ICOT has good ideas and has made them available to us, but we want to maintain our independence and not be managed by the government."

Japanese companies want this independence so they can be free to pursue commercial AI applications. "Nobody believes that ICOT will accomplish all of its goals," confides one corporate researcher. "But as a by-product, we have received a wealth of valuable techniques and have created an immense interest in practical applications of AI in Japan. At this stage of the game, most companies are learning by developing practical in-house applications of a variety of AI approaches. ICOT represents a dominant direction of Japanese corporate AI research, but not the only direction."

That's a familiar tune that's heard in many corporate corridors in Japan. Most Japanese research does indeed have a pragmatic bent. "Our approach to knowledge engineering is part of an incremental path," explains Koji Sasaki, senior researcher for R&D Planning at Hitachi's Systems Development Lab. "Artificial intelligence, knowledge engineering, the fifth generation approach—whatever you want to call it—is not meant to take over conventional approaches to computer applications. Most expert systems in the U.S. are developed without considering existing applications. We don't have that luxury. We must have good interfaces with conventional systems."

In pursuit of practicality, the Japanese often design their expert systems to link with existing FORTRAN subroutines. While most applications in the U.S. are on dedicated Lisp machines, Japanese researchers tend to favor general purpose,

"ICOT represents a dominant direction of Japanese corporate research in AI, but not the only direction."

high-performance computers that can be more easily connected to existing software.

Since most expert systems are generated in-house, the Japanese market is not as developed as it is in the U.S. or Europe. Some medical diagnostic systems developed at the University of Tokyo, for example, are merely Prolog implementations of what have already become expert system paradigms in the U.S.

A hush-hush atmosphere also surrounds much of the development work in the field. While most Japanese companies claim to have sophisticated process control and CAD/CAM systems, they are in fact reluctant to reveal their actual plans and progress.

Nevertheless, the Japanese have undoubtedly made progress in the expert systems realm. What seems to have helped them is their ability to absorb and implement two decades of AI research both at home and abroad. ◉

SOFTWARE

OUT OF THIN AIR

As multi-user and network pc hardware becomes more widely installed, pricing schemes for companion software are unclear.

by Tom McCusker

This may be the year that multi-user and networked microcomputer systems begin to proliferate in large organizations. But with few exceptions, the pricing schemes for these systems and their software remain a mystery.

A few hints have begun to emerge. Lotus Development Corp.'s chairman Mitchell Kapor told large users in meetings this fall that the company will add multi-user features to its popular Lotus 1-2-3 spreadsheet package and institute quantity prices instead of requiring every user to buy a separate package.

Ashton-Tate Corp. was telling dealers at the Comdex trade show in November 1984 that it will offer a multi-user version of dBase III, a more robust version of the Culver City, Calif., company's star dBase II product. But so far it has not disclosed its pricing plan.

The company's product manager, Ron Arons, says it might be patterned after the multi-user version of dBase II, which is priced at $995 for four users. Additional users can be added in units of four for $495. Price of a single user version of dBase II is $495. Other vendors scoff at the four-user unit limitation, noting that it is easy to circumvent the protection scheme.

The company has no plans to offer a multi-user version of Framework, its integrated spreadsheet package. Arons says studies showed a far greater interest in sharing database products than integrated software.

There are a handful of other pricing schemes, including one offered by Basic Four Business Products, Albuquerque, N.M., which sells accounting software for single and multi-user applications. It will make a single charge of $995 for what it calls a network upgrade kit, pricing all the modules in its software the same for both single and multi-user use.

Software Connections, a Santa Clara publisher of network-based applications software, follows what may be becoming a standard practice by doubling the price of single-user systems. A network version of its $495 single-user file management system, Datastore: Professional, is priced at $945 for five users and $1,945 for 16 users.

Mainframe software companies have fewer problems. Oracle Corp., Menlo Park, Calif., priced a micro version of its mainframe-based relational database program at $1,000. The mainframe version, which will accommodate 64 users, is priced at $64,000.

Still, a standard pricing pattern has yet to show up and isn't expected for some time. Unlike minicomputer and mainframe packages that were priced according to the price and capacity of the hardware, microcomputer software is perceived to offer much more value relative to the cost of the hardware, and thus generally is priced higher per user.

"In the case of microcomputer software, the proportion of value added has shifted from hardware to software,

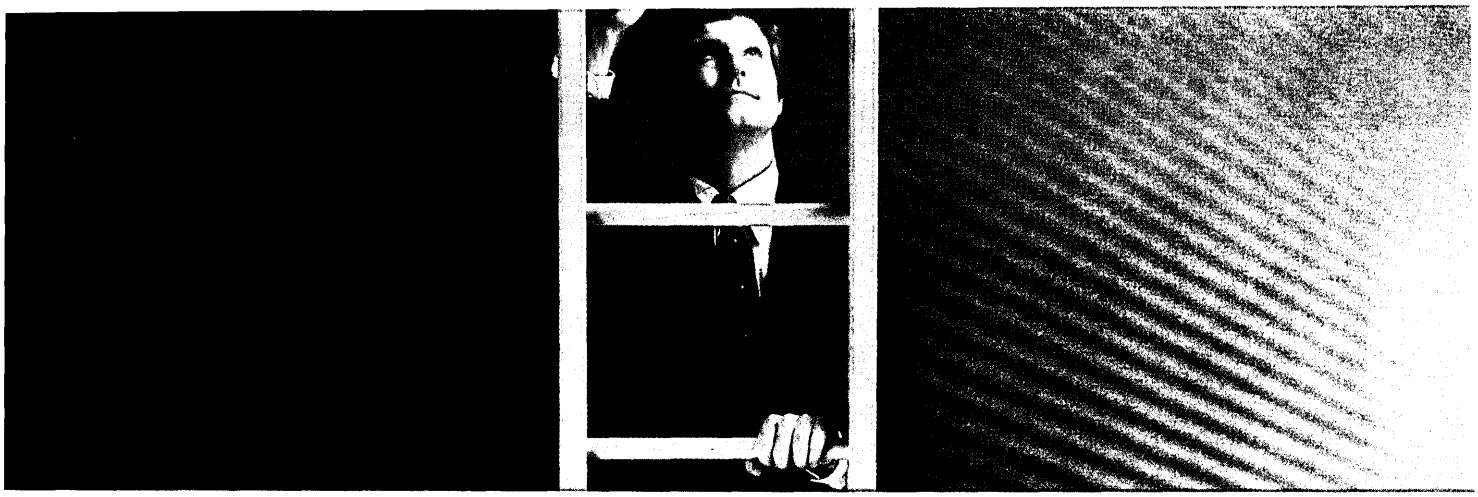
A standard multi-user or network software pricing pattern has yet to show up and isn't expected for some time.

thus freeing software from the tyranny of hardware," says Daniel S. Lankford, manager of software systems with AT&T Technology Systems.

"There won't be a standard until IBM sets one," observes Chris Christiansen, who follows microcomputer software trends for the Yankee Group, a Boston market research firm.

Besides, many vendors are in no hurry to set prices. "It's too early for us to be thinking about selling high volumes through networks," says Bill Crowell, vice president of product development with MicroPro International, San Rafael, Calif. "Unix and Xenix multi-user operating systems are still in their infancy," he adds.

Some vendors are waiting to see what the other guy does. "I went to Comdex to talk to other microsoftware vendors about multi-use distribution," says David Wilcox, vice president of Graphic Communications Inc., Waltham, Mass. That is but one reason for vendors' hesitancy. Others include the ever-present danger of illegal copying as large networks become prominent, making software more accessible. According to market observers, the current price of single-user packages already takes into account expected losses due to illegal copying, while vendors have not yet figured out the kind of cushion they will need with multi-user products. They also need better ways of tracking the number of legal users on a system. Finally, ven-



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dors need to develop pricing schemes that are simple enough not to throw their bookkeeping out of kilter.

They will also have to figure in the added cost of supporting more users. "A software vendor could have one copy of a package in a network of 50 users and that means 50 new users potentially needing support," says Brian Boyle of Gnostic Concepts, a Palo Alto market research firm.

Furthermore, not too many vendors will want to strike deals with large users for fear of alienating dealers who had targeted those users. Faced with the choice of good relations with customers or dealers, the vendors will opt for the dealers, says Boyle. Wilcox adds that the users are already getting discounts from the dealers and want to maintain that local service and support connection.

Faced with the choice of good relations with customers or dealers, the vendors will opt for the dealers.

Yet the dealers often have not been able to provide the kinds of international and bulk discounts for large users that these users want. Erna Anderson, an analyst with Future Computing, the Dallas research firm, explains that the vendors therefore must cope with pressure from customers. "The vendors are being told by these users 'deal with us or we'll deal with it ourselves.' In other words, the customers are saying that if they do not get discounts they will find a way around it," perhaps through illicit means if no legal methods are available.

Under this pressure from large users for some time, Lotus has agreed to provide discounts for large purchases, using its dealer channel exclusively. The Cambridge, Mass., firm is protecting itself from unauthorized duplication in multi-user systems or over networks with careful controls, the company says. Under its scheme, each site in a large purchase will obtain a single copy of 1-2-3 or Symphony, to be housed in a network server or the multi-user system's host. Then, each workstation authorized in the purchase agreement to use the software will be equipped with a "key," such as a port protection device, that will enable it to download the software and operate it.

Network providers also are offering copy protection schemes. EtherSeries software from 3-Com Corp., Mountain View, Calif., controls the number of users that can access a network server, thus providing software vendors with an accurate count and also with the technical details on how to gear their software to the 3-Com net.

Some vendors are getting around the support problem through what they call "user-sensitive pricing." Software Connections, for example, charges $200 for unlimited telephone support for its network version of Datastore and $500 for an application development tool called LAN: Datacore. It provides two levels of support. The basic level holds when only a single person in a user's company can call the support hot line; if anyone on the network is authorized to call, the price usually is double.

Greg Ennis, director of systems engineering for Sytek Corp., Mountain View, whose systems will be used in IBM network products next spring, thinks today's haphazard pricing method will clear up once vendors "coordinate with retailers, who will be selling application software into large network accounts."

Innis thinks retailers will find a lucrative niche in offering total systems to these accounts and providing total support. Timothy Bajarin, an analyst with Creative Strategies International, a San Jose market research firm, agrees: "Dealers seeing their software margins eroding will opt to bundle the software with multi-user hardware offerings."

But Bajarin adds that within two years it may all be academic if IBM, as is rumored, decides to develop a closed operating system for multi-user environments, one that uses only IBM-developed applications software. "It's somewhat speculative," he adds, "but that's what IBM did in the minicomputer and mainframe markets."

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LOCAL AREA NETWORKS

CAN MS/NET SUCCEED?

Microsoft's MS/Net faces an uphill battle to become a networking standard.

by Robert J. Crutchfield

Microsoft Corp. has high hopes that its networking software, MS/Net, will be to the local networking community what its MS/DOS operating system has become to the personal computer environment—a standard. And indeed, a substantial handful of major vendors have already decided to support MS/Net as a networking system

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CIRCLE 23 ON READER CARD

for their microcomputer systems.

Judging from initial reactions to the product from a beta test site and a software evaluation firm, however, the

"They have a technically clean product but they didn't take the user into account."

Bellevue, Wash.-based company faces an uphill battle to achieve its goal.

Microsoft Networks (MS/Net), a product that allows personal computers to share resources and run application programs independent of networking hardware, was evaluated by TeleVideo Systems Inc. at its facility in San Jose for more than three months last summer. At the conclusion of the testing, TeleVideo decided to continue using Novelle Inc.'s NetWare software because the beta version of the MS/Net "was not a product," says Bill Heil, director of product marketing for TeleVideo.

"Bill Gates [Microsoft's chairman] promised TeleVideo MS/Net in 1983, and we have yet to see the product up and running. It's a traditional Microsoft story," Heil says, referring to the company's apparent inability to deliver a working product on time.

According to Heil, one of the main problems with the product is speed. He says it is "extremely slow," adding, "MS/Net was brought up on an IBM PC XT-based environment. It had an effective throughput of 5KBps compared to the IBM PC/Net's 20KBps and the TeleVideo system's 66KBps."

Ironically, the very feature Microsoft reasons will make MS/Net an industry standard—its architecture being an extension of the MS/DOS operating system—is the very aspect that degrades performance.

"It's an operating system within an operating system, and that slows the whole thing down," says another hardware vendor who has used the product.

In response to that criticism, Leo Nikora, group manager for systems product marketing at Microsoft, admits that MS/Net is slower, explaining that "with peer-to-peer communication [it] gives up a little performance." He adds that MS/Net decouples low-level protocols.

Although Nikora says this implementation of MS/Net can be slower, he cautions that any comparison to other

Even though the design of MS/Net is quite modest, it is not reliable, robust, or fast enough for full-time use in real world situations.

networking software should be made on an equal "apples-to-apples basis, not apples-to-oranges." He adds there are several factors, including "special [networking] hardware," that affect the speed of the system.

According to Heil, however, TeleVideo was asked by Microsoft to evaluate MS/Net as a possible replacement for its current networking software. After comparing the two systems at Microsoft's behest, it still opted to remain with its implementation of NetWare, he says.

"MS/Net is not multitasking. It has to deal through DOS," Heil says. "Once multitasking DOS is available, MS/Net will be greatly improved."

Other TeleVideo criticisms of MS/Net were that it was not "utility intensive," meaning that the networking system is not user friendly and lacks utilities such as a spooler and on-line help screens. The release tested by TeleVideo was a "very limited version," and not the same as the version 1.0 released by Microsoft in November 1984, according to Heil.

"They have a technically clean product but they didn't take the user into

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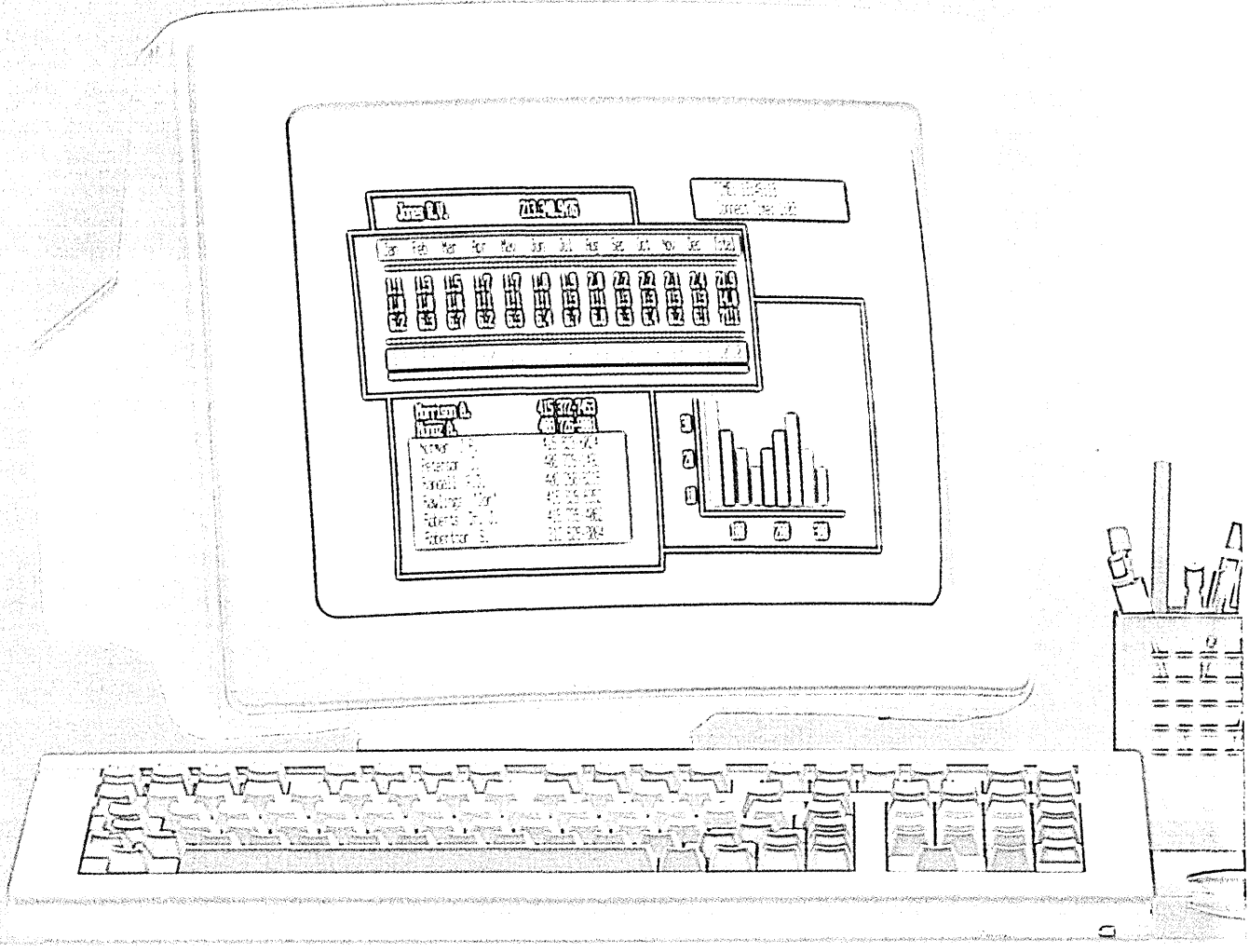
terminal bored
reasonable cost



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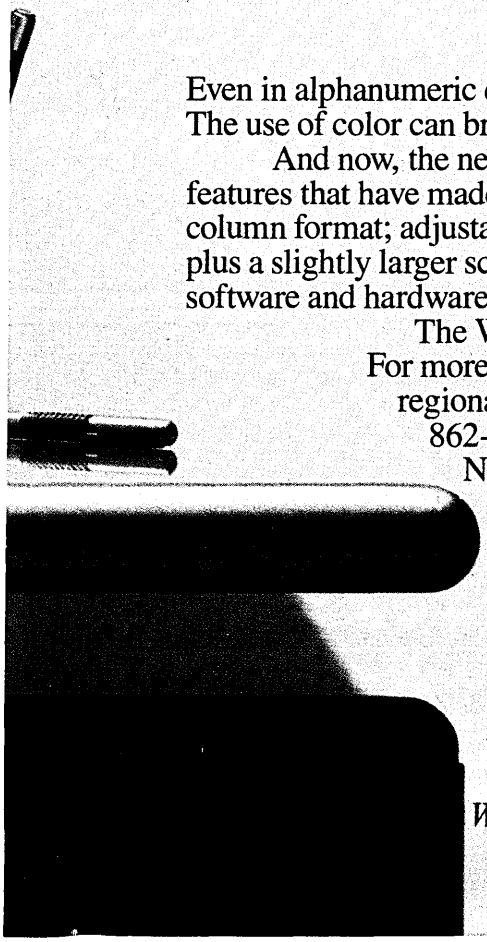

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WYSE

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Wyse Technology, 3040 N. First Street, San Jose, CA 95134.

account," Heil said.

Nikora says, not surprisingly, that future releases of MS/Net will be "more and more friendly." As for utilities, he adds that it is difficult to supply network utilities to everyone, and he expects that oems will develop many of the networking utilities.

According to Bill Ballmer, vice president of Microsoft's systems software group, the official company line is that Microsoft Networks "will become the industry standard for connecting different computers on the same network."

In a letter dated Sept. 17, 1984, Bruce Phillips, Microsoft products manager for networking products, told selected oem vendors that "with [MS/Net] you can finally satisfy those customers who have been waiting for a safe standard and for user applications. . . . You no longer have to play the IBM guessing game."

Even though the design of MS/Net is quite modest, it is not reliable, robust, or fast enough for full-time use in real world situations.

In a report obtained by DATAMATION, SuperSet, a software evaluation company in Orem, Utah, described MS/Net as a network system designed to be a simple extension of MS/DOS into a distributed network environment. Emphasis is placed on compatibility with existing DOS applications; both DOS 1.1 FCB file access calls and DOS 2.0 string file access will be supported.

MS/Net is built on a sequenced packet protocol following the International Standards Organization's Open Systems Interconnect networking model. "The protocol chosen is clearly a derivative of Xerox's XNS-sequenced packet protocols," the report says. "The file server software in MS/Net provides to its client stations only the file access primitives that DOS supplies; information concerning other network users and custom-tailored access security to networked information by user is not supplied."

The product allows multiple file servers. All file servers must be dedicated to servicing network requests and are not available for other use. Physical file locking and physical record locking are supported but automatic lock cleanup in the event of an uncontrolled station hardware or software failure is not supported. Nor may the locked records be "cleaned up" from the server's console, the report says.

"Improper or uncontrolled behavior (accidental or malicious) at any station may therefore bring down the entire network. Network performance is disappointing; observed data transfer rate on the 10Mb Ethernet network averaged only 2KBps to 3KBps. In short, even though the design of MS/Net is quite modest, in this beta implementation it is not reliable, robust, or fast enough for full-time use in real world situations."

The report calls MS/Net's design "quite modest" in comparison to the sophistication available in the local area network marketplace. "The network design proposed by Microsoft seems fine as far as it goes; the problem is that it does not go far enough."

The evaluation contends that no recognition is given to users on the network. "They are not named, they are not trackable, [and] they may not be addressed directly by programs running on the network."

The report goes on to say that a detailed examination of the beta release reveals "many rough edges and poor implementation decisions. These problems are compounded by shortcomings in the basic MS/Net design and result in a product that is unwieldy, unreliable, and unacceptable."

SuperSet advised TeleVideo not to implement the product in its InfoShare multi-user system, concluding that "Microsoft views networking as an essential and natural extension of its MS/DOS operating system, and has been developing a personal computer network that it hopes to market to the personal computer community as a networking standard. But MS/Net is not a state-of-the-art personal computer network, it lacks desirable features available on other commercially mature products, it has some design flaws and some implementation flaws that make it unacceptable in its beta form."

A detailed examination of the beta release reveals "many rough edges and poor implementation decisions, compounded by shortcomings in the basic MS/Net design."

According to Nikora, MS/Net was installed in 25 beta test sites. Since then, eight vendors have announced their intentions to implement MS/Net as a networking standard. The hardware vendors include ACT, Intel, Texas Instruments, Zenith, Corona, Hewlett-Packard, Digital Equipment Corp., and North Star. Network transport vendors using MS/Net include AST, Corvus, Nestar, Davong, 3Com, Orchid, Western Digital, and Proteon.

Nikora notes that IBM's PC/Net, a derivative of MS/Net, differs from the Microsoft original in that IBM wrote its own server and had Sytek Inc., Mountain View, Calif., build the network card. "We encourage lots of people to write servers for their own machines," he adds. ◉

COMMUNICATIONS

MODEM MARKET MADNESS

Vendors are scrambling over one another to bring out faster modems, but they may be pursuing a narrow market.

by Karen Gullo

Faster means better in the world of data communication. Witness the demand in the Fortune 1,000 market for faster file-to-file transfer. Meeting the demand head-on are the major manufacturers of direct-dial modems for personal computers, who are introducing faster and more sophisticated modems.

"Speed is very seducing," says John Fox, director of marketing at U.S. Robotics Inc., a Chicago-based modem supplier that produces its own modems and a line of modems sold by Apple. "It becomes addicting because the mind thinks very fast, and people working with large amounts of information want to get at data just as fast."

The current standard modem speed is 1,200 baud; many users, however, still have 300-baud units. In 1983, 55% of the 530,000 units shipped were 1,200-baud intelligent modems, according to Creative Strategies International, a San Jose, Calif., market research firm, while 35% were 300 baud. At 1,200 baud, 10 document pages can be transmitted in six minutes. But as pc memory capacity continues to increase, so does file size, triggering a demand for faster transmission speeds to expedite the transfer of large amounts of data.

Users say that even while they are satisfied with the current 1,200-baud standard, the time has come for an upgrade in speed. Jack Perry, dp supervisor at Inventory Auditors Inc., Seattle, an inventory evaluation company, notes, "I may not need the extra speed right now, but several of our grocery store chain clients have requested that in next year's reports we tell them the number of each item they stock, so the number of bits per store that we transmit in files to our other locations will increase. That means hour-long transmissions, instead of 10 or 15 minutes, which is where we are now."

Future Computing, the Dallas market research firm, predicts that this year, 2,400-baud modems will comprise 15% of the modem market. "By 1990,

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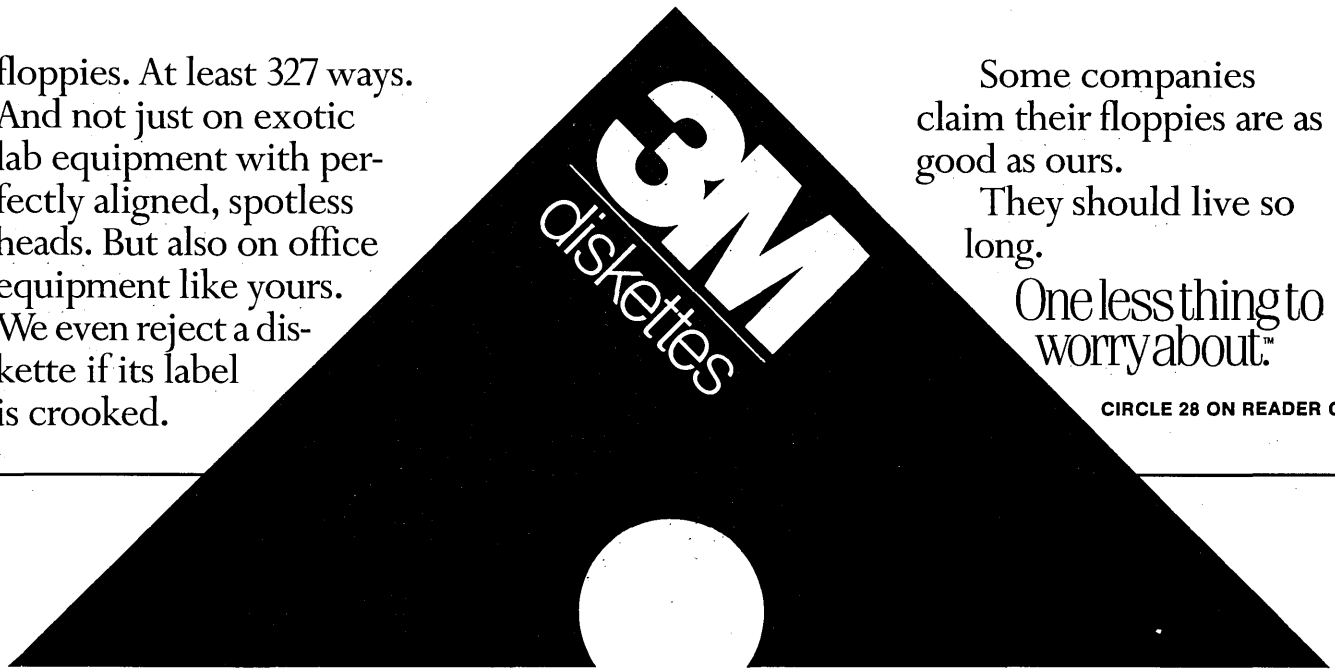

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you'll see [dial-up] modems communicating at 9,600 baud," says John Hoper, vice president for peripherals at Future Computing. "The driving force behind modem speed is increased computer memory. The size of files that need to be transferred is getting larger, and higher bit speeds will allow you to accomplish more and address new applications." Industry officials say that 9,600-baud modems will start to appear late this year or shortly thereafter. "You won't see a major vendor bring out a 9,600-baud modem for another 18 months to two years," says Robert Bauman, marketing and sales vp at Prentice Corp., Sunnyvale, Calif. The firm will offer its own 2400-baud item by the second half of 1985, he says, "along with a 2,400-baud rack-mount version for mainframes. It's more appropriate to offer a complete solution."

To top off higher speeds, today's new modems offer such features as call progress monitoring, voice and data switching, automatic redial, call logging, and automatic speed adjusting. Analysts estimate that 10% of all pc owners have purchased modems; 600,000 were sold in 1984.

Vendors predict a hefty increase in modem sales as prices begin to drop. An average intelligent 1,200-baud modem costs between $450 and $600, but some manufacturers are offering units for $300. "I would be surprised if we didn't see a 20% drop in prices for 1,200-baud units this year," contends Bauman. The new 2,400-baud modems range in price from $800 to $1,200, with the average price falling at $900.

Apparently, many users think the extra speed is worth the extra money. John Edson, dp manager at Nordan Laboratories, a pharmaceuticals manufacturer in Lincoln, Nebr., uses modems to transfer data from his IBM PC to the company mainframe. "And 20% of all data transfer here comes from accessing a scientific database service," he says. "We could cut our costs significantly with quicker transmissions."

"The size of files that need to be transferred is getting larger, and higher bit speeds will allow you to address new applications."

Cost isn't the only consideration, says Brenda Metcalfe, office automation coordinator at Chevrolet-Pontiac-GM of General Motors' Canada Group of Mansfield, Ohio. "Some days I'm using the modem all day," she says. "A faster modem doesn't just reduce connect time, it reduces my time."

At Harvey I Yates, a Roswell, N.Mex., petroleum producer, dp manager David McAlister expresses concern over the cost of replacing his existing modems with faster units. "Modems at both ends of a transfer must operate at equal speeds," he points out. "So if I want to transfer at 2,400 baud to our Midland, Texas, office, they have to receive at 2,400. Right now they have a 1,200-baud modem, and some of our executives have an HP 110 or a Radio Shack Modem 100 with a built-in modem that communicates at 300 baud. We'll have to equip everyone with new units or get more telephone lines installed—and that would add up."

Keeping its 1,200-baud standard in mind, Hayes Microcomputer Products Inc. of Atlanta introduced a 2,400-baud modem that automatically switches from 2,400 to 1,200, 600, and 300 baud on asynchronous communications and from 2,400 to 1,200 and 600 baud on synchronous communications, thus allowing users to continue using the modems they have. Hayes is the leader in a field of almost 100 modem manufacturers sharing a market that today is estimated at $300 million and is expected to reach $1.5 billion by 1988.

Hayes, a privately held firm whose revenues for 1984 are estimated by outside sources at $100 million, has a 75% share of the market for 1,200-baud modems. Other vendors are AT&T; Motorola's Codex Corp. subsidiary in Mansfield, Mass.; Racal-Vadic in Sunnyvale, Calif.; Paradyne Corp., Largo, Fla.; Anchor Automation, Van Nuys, Calif.; and Micom Systems Inc. and Novation Inc., both in Chatsworth, Calif.

The Hayes Smartmodem 2400, priced at $899 and available next month, meets CCITT V.22 bis requirements and Bell's 103 and 212A standards. The unit can monitor the progress of a call and distinguish among a busy signal, no dial tone, and no answer. When using long distance carriers like MCI and Sprint, the modem will wait for a second computer tone before dialing any digits or commands. The Smartmodem automatically redials a busy or no-answer number.

Users can switch between voice and data on the same call with the Smartmodem. A signal quality detector allows users to set levels of transmission errors that will be acceptable at various speeds, or accept the factory default of one error in 100,000 bits. A nonvolatile memory stores system configurations so that users need not set switches within the modem. Hayes also introduced a new software wrinkle for the 2,400-baud modem—Smartcom II emulates DEC VT 52 and VT 100 terminals.

Gary Betty, director of marketing and sales at Hayes, points out that the Smartmodem 2400 is not about to replace its forerunner, the Smartmodem 1200. "There will be very specific needs for the 2400," he says. "Our customers who have large files to transfer will be the ones who need the 2400. Its primary use will be port access. We don't expect to make 2,400 baud the next standard."

Bert Weiss, national sales manager at Anchor Automation, says 2,400-baud modems may not be accepted rapidly in the market. "People are just getting used to paying $300 for a 1,200-baud modem. They won't be willing to pay a premium for just twice the speed," he says. "The market for the 2,400-baud units will be narrow in 1985." Nonetheless, Anchor will soon introduce a 2,400-baud modem with a $600 price tag.

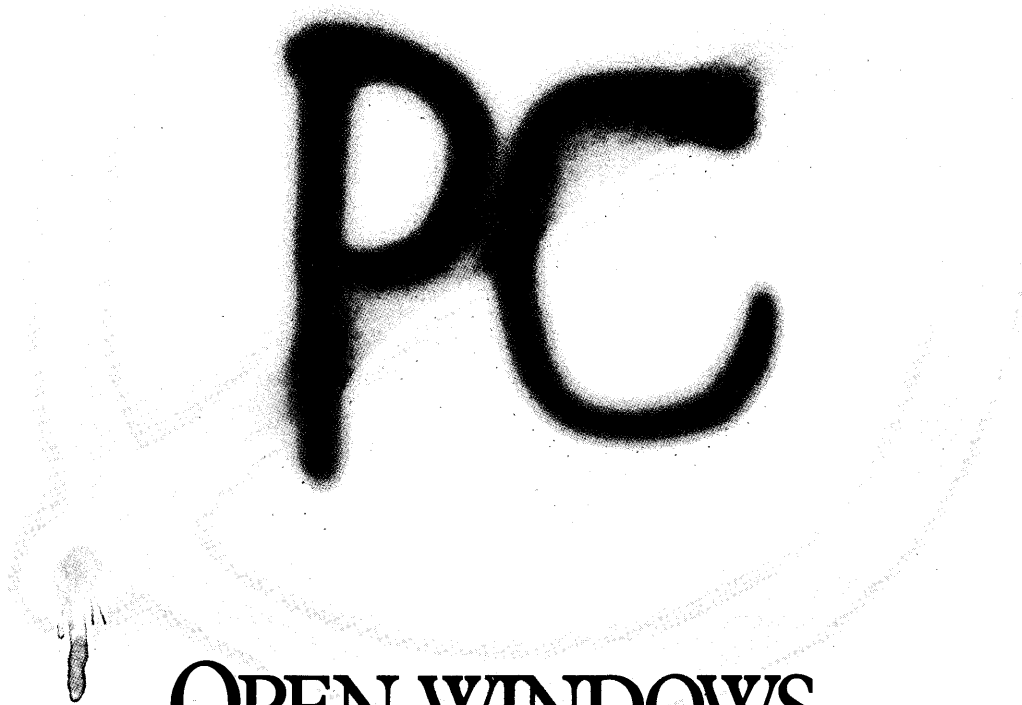
"We'll have to equip everyone with new units or get more telephone lines installed—and that would add up."

U.S Robotics, with 1984 revenues of $50 million, also has 2,400-baud autodial modems featuring call duration reporting, help screens, call progress monitoring, and automatic redial. The modem, which is slated to be available next month in both internal and external models, costs $895. Dale M. Walsh, director of advanced development, says 2,400 baud is as much speed as users will be able to handle for the near future. "Anything above that will be very expensive," says Walsh. "The complexity of the design of a 9,600-baud modem is about 10 times that of a 2,400. It's also not certain how well 9,600 baud will be accepted into the U.S. network." Prentice's Bauman estimates that a 9,600-baud modem for dial-up use would cost $2,000, far beyond the budgets of most pc users.

Jerry Skurla, product marketing engineer at Racal-Vadic, says that modem makers will have a problem in the coming years because public lines may not have the capacity to accept higher speeds. "The line capacities aren't going to change any time in the near future," Skurla says. "Getting 9,600 baud over public lines involves advancing the technique that condenses large amounts of circuitry into a single computer." While users would save money from the higher speeds, the higher number of errors and necessity of resending would cost the user more in the long run.

Racal-Vadic introduced its 2,400-baud modem in November. AT&T, Codex, and Paradyne have all introduced 2,400-baud products as well.

Some observers say the new modems are a bit premature. "We print out much of what we receive," says Metcalfe, of GM. "Printer speeds haven't caught up to modem speeds yet, so we can't receive any faster on transmissions where data are being printed out simultaneously."



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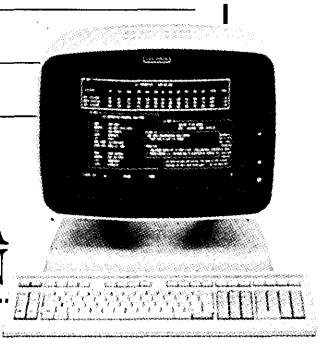

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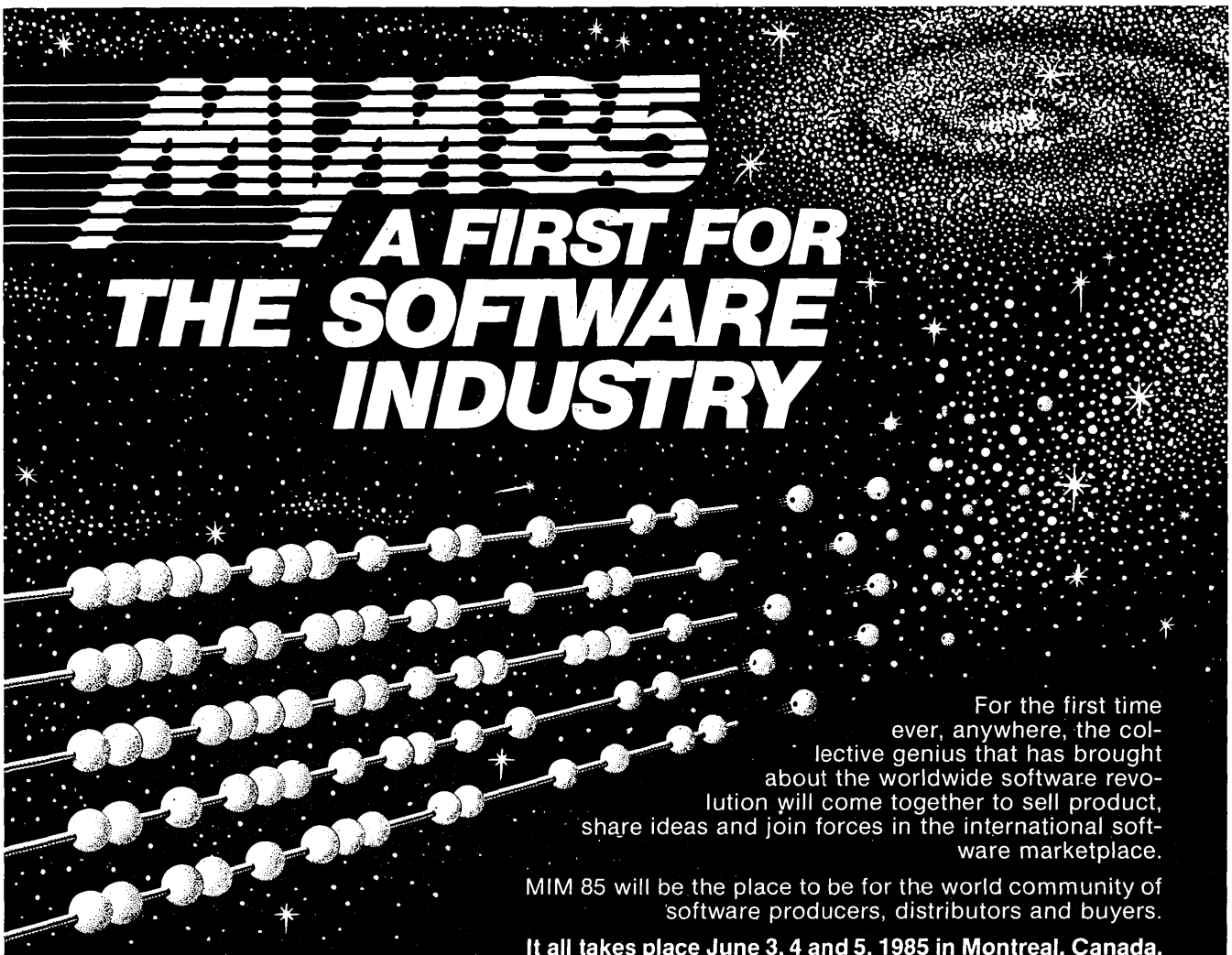

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Database services also lag behind the new modems, which is likely to impede the movement toward a 2,400-baud standard. Only one on-line service—Tymnet, the San Jose subsidiary of McDonnell Douglas—offers 2,400-baud access. Many database services will be offering 2,400-baud access in the coming year, but users can look for rate increases from some of them, which will offset connect-time savings.

While the initial reaction to 2,400-baud modems is positive, some say the outlook for the modem market in general is dim. Micro manufacturers will include modems in their systems as standard equipment soon, analysts say, edging out standalone units. Currently, analysts estimate that 60% of all modems bought are external units. Argues Bauman of Prentice, which makes both, "Internals won't make dinosaurs out of the external models because there is a limit to the number of slots in the back of a pc."

Look for advanced technologies in communication and data transfer, not from the modem manufacturers but from companies like IBM, Rolm, AT&T, and Compaq, says Timothy Bajarin, an analyst at Creative Strategies. But these products are sure to be expensive—Rolm's Cedar is priced at $4,245, more than double the cost of an IBM PC. This, coupled with users' wariness of such sophisticated machines, may ultimately keep demand for faster modems on the rise. ◉

MAINTENANCE

MICRO SERVICE SHAKEOUT

Turmoil in the maintenance business is leading users to the third parties and away from dealers.

by Paula S. Stone

The acquisition of Sorbus by Bell Atlantic, Philadelphia, announced late last year, is but one sign of the shifting landscape in the microcomputer maintenance and service business. While the move makes Sorbus stronger, according to dpers, microcomputer maintenance is rapidly moving to a new phase, with the third-party organizations taking a front row seat while the dealers and vendors fade from view.

"This is part of a natural realignment in the marketplace," observes John Highbarger, director of MIS at Diamond Shamrock, Dallas. "With the retailers there is obviously going to be a shakeout, with a few major players surviving. From a manufacturer's standpoint, I don't think they can or want to build the networks necessary to service the incredible number of microcomputers worldwide. So, the third-party vendors will probably provide service for or in place of the retailers. The jury is out and we are willing to wait and see what that means."

For the pcs soon to be or already out of the initial warranty, the corporations that spent millions on acquisitions are now faced with another costly problem: how to maintain and service all those boxes on a continuing basis.

The sources for extended service divide into four camps. These include service from dealers, third-party maintainers, manufacturers, and in-house support personnel. Right now dp managers are opting for a combination of providers, and some of them note that the value and cost-effectiveness of dealer-supported maintenance agreements have come under serious question.

"When it comes to dealers, there is a lot of concern about the quality of their people, and how effective they really are in supporting the products that are out there," notes Highbarger. "So we see some shakeout with a few surviving—those capable of ensuring quality with a good solid marketing effort will survive overall."

That kind of attitude spells trouble for the dealers, since 88% of corporate pc buyers go to retail stores for service, according to a recent survey of 6,264 data processing departments by DATAMATION and Cowen & Co., Boston (see "Upstarts Outshine the Stars," Nov. 15, p. 34). Their experiences to date have not been satisfactory. Dp managers say that dealers failed to offer adequate support on several fronts. For example, many dealers do not support computer systems that have components from different manufacturers. Barring courier service and the delays it causes, dealer service is restricted by geographic area. Then there is the question of the quality and cost of support. Dealers cannot be all things to all people, which opens the door for outside national service organizations to enter.

Indeed, notes Highburger, the turmoil at Sorbus and recent entries by General Electric are due to several factors. "There is going to have to be more of a capital infusion in order to become a market presence," he says. As for the fact that 88% of pc buyers go to retail stores, "probably hardly any of them have been called upon by these organizations. So, to be more successful, they are going to have to penetrate the marketplace more. In fact, they may provide the service for the retailers. That seems to be a very likely way for that to progress."

HOWARD OF FOX PHOTO: If Sorbus isn't around, the local manager must find a dealer.

Many of these newly formed service groups are the offspring of familiar old-timers. They include MAI Sorbus, Frazen, Pa.; RCA, Cherry Hill, N.J.; TRW, Cleveland; Western Union, Davenport, N.J.; and Xerox.

Fox Stanley Photo Products Inc., a San Antonio-based automated photo lab with $152 million in sales in 1983, opted to go with Sorbus, founded in 1971. Fox Stanley has 115 one-hour minilabs located throughout the continental U.S. and Hawaii. There is an IBM PC in each minilab location, some at the regional offices, and a mixture of PCs and XTs in the home office. Some of the machines use Quadchrome monitors, all have Hayes modems, Quadram boards, and C. Itoh Prowriter printers.

"Our minilabs are often used 14 hours a day, six days a week, for quality control, management reporting, pricing, invoicing, and communications. It is imperative that the computers are operational," states vp of MIS Vincent P. Howard. "When we started looking at service options over a year and a half ago, many third-party servicers were not in business. We talked with nationwide computer stores and they could not provide coverage in the states where we needed them nor service our mixed systems. For these reasons, we decided to go with Sorbus, which I had heard of years earlier."

Over the past year Fox Stanley acquired new minilabs, some in areas not currently serviced by Sorbus. "In these

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CIRCLE 33 ON READER CARD

cases, I had the local Fox store manager search for a computer store that would provide timely on-site service, an essential criterion for us," adds Howard.

Diamond Shamrock Corp. also uses a mixed service approach. The $6 billion Dallas-based oil company surveyed the options and selected a third-party maintainer service program supplemented with dealer support where necessary. Diamond Shamrock uses about 300 PCs and PC XTs, and 150 Apple II Plus, Macintosh, and Lisa computers in 14 major locations. In addition, a large number of facilities have only one or two computers.

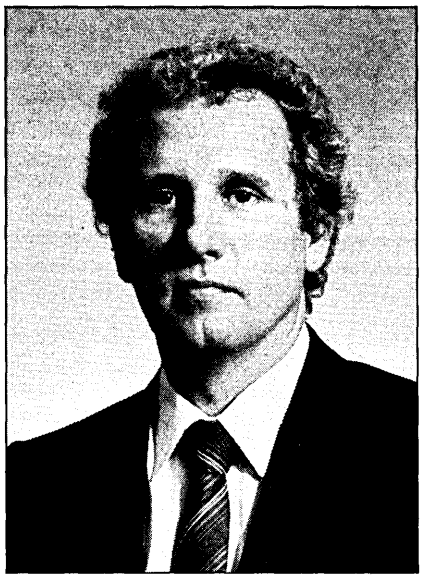
"We have had retailer service and found it unsatisfactory due to the level of quality, responsiveness, and cost," says Highbarger of Diamond Shamrock. "We looked at several alternatives and decided to go with service vendors—Sorbus for the IBM computers and RCA for the Apple products. We rely on local dealers to support the machines at remote locations."

Some companies, like the Big Eight accounting firm Touche Ross & Co., New York, let each location select its own service approach. The $400 million-plus company has over 1,300 IBM PCs and Compaqs for its 7,400 employees located in nearly 100 U.S. offices. Each local office purchases its pcs from a single New York dealer. The dealer provides extensive service: total system configuration, hardware and software evaluations, as well as a rigorous burn-in to eliminate bad components. "We now have an extremely low failure rate when the equipment arrives at the office site—much lower than before we took this approach," explains Ron Jenks, director of information services.

"One of the services that we provide our clients is getting a job done on time. Since the use of microcomputers has become extremely important to us, we cannot let equipment failures get in the way," emphasizes Jenks. "That is why each location determines which servicer best meets its needs."

Manufacturer support is another service option, but it is sometimes more expensive. IBM's charges for a corporatewide microcomputer warranty program, for example, are much higher than nearly all other sources, according to microcomputer managers. Those companies that have tried to go with Big Blue can find equal or better service elsewhere with more money left in their budgets, according to many dpers.

With other manufacturers, it is a case-by-case situation. Radio Shack authorizes no servicer outside its own and few, if any, third parties want to touch Radio Shack equipment. RCA is Apple Computer's only authorized servicer, although a third-party vendor can be found



JENKS OF TOUCHE ROSS: "We now have an extremely low failure rate since we began using dealer service."

to support any Apple product. The TI Professional Computer is relatively new, and although many third-party organizations are planning to support the Professional Computer, TI is primarily responsible for its own maintenance.

Another option increasingly considered by major corporations is do-it-yourself. Farmland Industries Inc., Gladstone, Mo., a $5.4 billion agricultural cooperative, services 2,300 local groups in 19 states. Its Data Marketing Services provides on-line accounting services to 600 local co-op subscribers, 200 of which use TI Professional Computers as stand-alone units and terminals to access the accounting system. Farmland is in essence the dealer and sells the TI pcs to the membership at a reduced price, provides hardware and software support services, and maintains an inventory of parts. A TI-trained Farmland repair force services the equipment for the cooperative at a competitive price.

The do-it-yourself option works with smaller firms, too. Computer Language Research, Dallas, an $85 million firm that develops and markets automated tax applications packages for corporations, relies on in-house field engineers who troubleshoot problems in the components. "We stock some of the parts. The rest are purchased at a parts house," explains field equipment support manager Bernie Francis. "It isn't a big deal."

For Farmland and others, establishing a service program was simple. For smaller organizations, opting for the vendor is the least painful way to go.

Jay Ammerman, dp director for the American Bar Association, Chicago, purchased nearly a dozen Wang pcs to use with the in-house Wang workstations. The pcs work as terminals with the mainframe that's used to maintain the ABA membership database and provide support to the members. The Wang pcs are still under initial warranty, but Ammerman has had good service from Wang over the years, so he plans to go with Wang extended warranty contracts.

Meanwhile, most companies are still looking for a solution to the problem. American Airlines, Fort Worth, recently purchased 200 pcs—mostly IBMs with a smattering of Compaqs—and is examining service alternatives. With pcs located in every AA Sky Chef airport kitchen throughout the country, and the remainder located in headquarters, American is particularly sensitive to expeditious service at multiple locations. "American Airlines has many different requirements in numerous locations. We are looking at all the options," explains Denny Welsh, technical coordinator for the pc program. Welsh admits that American has the luxury that many MIS departments do not have—lots of available airplanes. "Most of the personal computers are still under warranty," he states. "We are now looking at the problems that other companies have had to see how they solved them."

And then there is the group of dpers who feel strongly that the whole idea of maintenance is overdone. "It is potentially a straw man put up by the MIS groups to scare the users into shying away from pcs," contends John L. Deisem, managing consultant for Touche Ross & Co. and former vp of MIS for McGraw Hill Inc., New York. "The yearly expenditure for maintenance, particularly on a large number of computers, can be costly. But at McGraw Hill, each office did its own maintenance. We used the diagnostics diskette to find out what was wrong, replaced the modular part, and then got the piece repaired. It worked just fine."

Others feel that it is important to have a company-trained or certified technician to look after the machines, claiming that it is too expensive for the company to train and maintain field engineers and parts. "The initial money and time it takes to train people and keep them current is considerable. A company like Sorbus trains and updates their people all the time," states Cheryl Reynolds, office automation coordinator for Diamond Shamrock. "The response time from Sorbus has been good—they call within an hour and arrive on-site within four. So, it is not really cost-effective for Diamond Shamrock to train an in-house repair force at this time."

As the shakeout continues in the service area, only time will tell how happily ever after people will live with their little boxes. ◉

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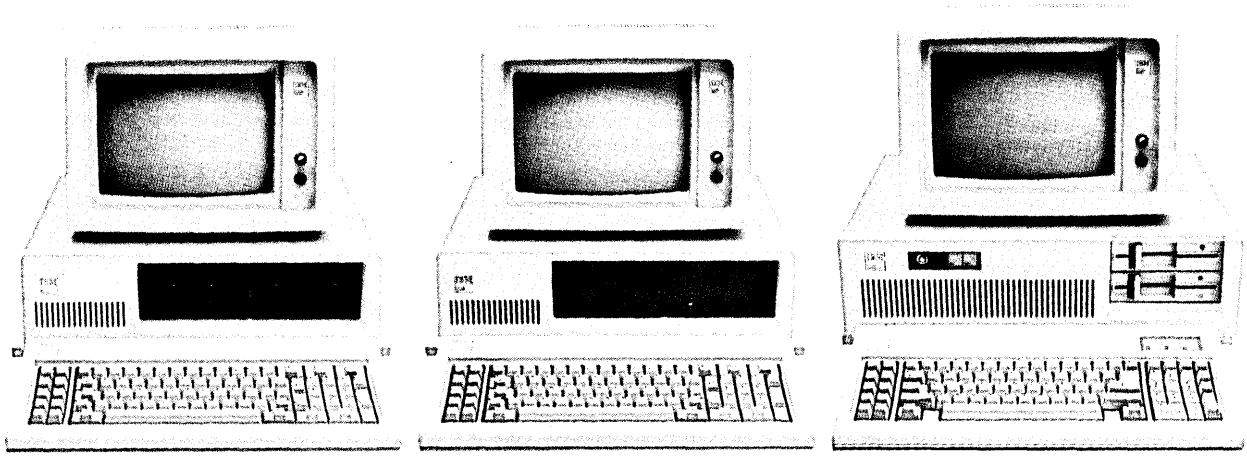

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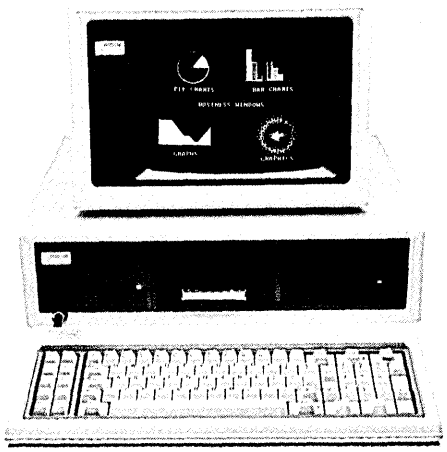

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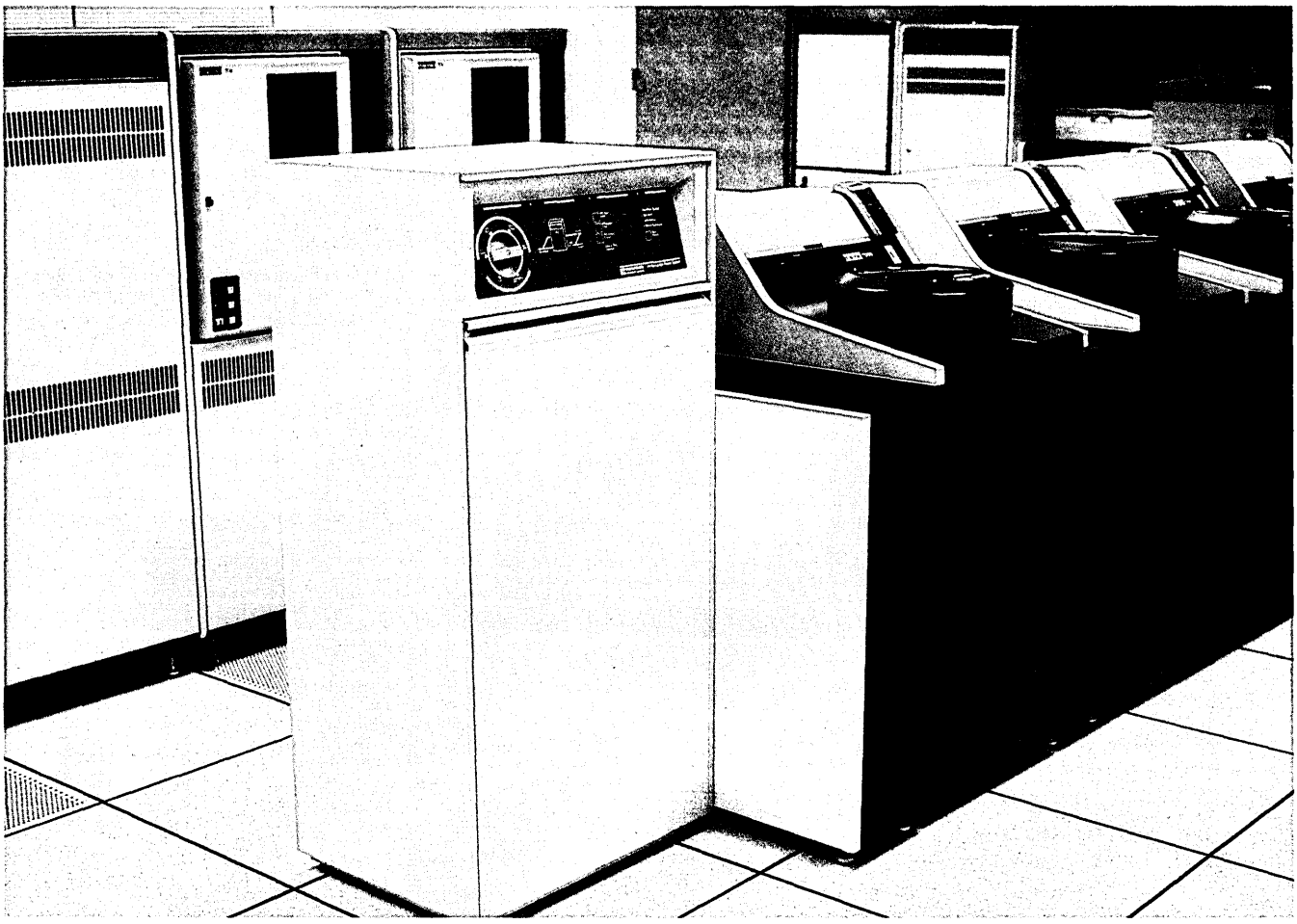

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MICROCOMPUTERS

BATTLE OF THE BOARDS

Business has never been better for the established enhancement board vendors, but don't try cashing in on their success.

by Willie Schatz

Any entrepreneurs still tinkering in their garages on enhancement boards for a personal computer may just as well find another line of work for all the rewards they can expect.

It's not that business isn't good. It's fabulous. But the bucks stop at those who are already there.

"You have to be almost psychotic to enter this industry now," says Martin Alpert, president of Tecmar Inc. in Cleveland. "The only way to do it is by taking a gamble on a new computer. If it wins, you win. If it loses, you lose.

"In the early days of this business, all you needed was hardware. Now the ante is hardware, software, and peripherals," the executive says. "Look at what's happening now. There are 65 multifunction and memory cards out there. The shakeout's already happening, and it's going to get worse. You can't make it in this industry without already existing."

Yet even among those firms already in the market, bigger is better. Barely three years after IBM introduced the PC and its heirs, to which the add-on industry is bound heart and soul, a hierarchy has been established. Like the auto industry, there are the big four that command the vast majority of the market. For the smaller fry, it's every company for itself.

Tecmar is generally regarded as the American Motors of the group, while AST Research, Quadram Corp., and Hercules Computer Technology interchange the roles of GM, Ford, and Chrysler, depending upon the observer's point of view. All the companies make boards that a user can stick into slots on the various IBM PCs to make those machines do wild and crazy things.

Moreover, end users generally know what they want to stick where. "We've seen a change in client awareness," says Jim Livingston, financial branch manager for Morris Decision Systems, a New York retailer that does 80% of its business with the Fortune 1,000. "Eighteen months ago we were being called upon to recount our experience with enhancement boards, but now most large corporations have a significant installed base of pcs. And 80% of them come in here and tell us what they want. In fact, the sophisticated professional user community always seems to know what it wants."

So the money flies in faster than a speeding bullet. Tecmar, a veritable relic at 10 years old, did more business in October than in all of 1982. Hercules, based in Berkeley, Calif., and all of three years old, originally put together a business plan forecasting $7 million in sales in its third year. It topped $30 million in sales in 1983 and projects $5 million monthly by the end of this year. Three-year-old AST, of Irvine, Calif., reached $63.8 million in sales in fiscal 1984, which ended June 30. It recently added two Apple boards to its repertoire. And Quadram, a unit of Intelligent Systems Corp. in Atlanta, is another precocious three-year-old. It expects to provide more than half its parent's estimated $130 million sales for fiscal 1985, which ends in March.

"It will be very difficult to start another AST," says Safi Qureshey, the company's president. "There's not much room now, and there's going to be even less a year from now. I think the industry is going to be reduced to two or three major players."

It's pretty close to that already. And the majors aren't exactly losing sleep over competition from any upstarts in the minors.

"I'm not the least bit concerned about a new company starting to be a competitor of ours now," says J. Leland Strange, president of Intelligent Systems. "It would be murder trying to get through the distribution channels. There's more selective buying by large companies and by retailers. That's good for us, but bad for entrepreneurs."

The key problem is clearly the flood of companies and products on the market. "There's tons of good ideas and products out there," Strange says. "But how are you going to get it through the noise? You can no longer do it if you're a little company. There wasn't that much noise when we started. The hurdle has been raised considerably."

That's not the only obstacle the add-on manufacturers need to have jumped already. There's a psychological one higher than the Empire State building: they've had to deal with being IBM parasites. They don't teach you that in Psych 101.

"Their business is based on IBM not presenting the right configuration to users," says Princeton, N.J., consultant Irene Nesbit. "They bounce in and hope that IBM keeps making mistakes. So they are really spotting holes and putting products out quickly. It's almost like the peripherals business on IBM mainframes."

The sales figures show that leeching off Big Blue seems to be a breeze. Just attach your company to its product cycle, wait for The Word to come out from Boca Raton, then scramble to beat IBM and your competitors to the dealers' shelves. If you build a better board, the world may indeed stick it in an open slot.

"Of course the marketplace is driven by what IBM does," admits Kevin Jenkins, the 29-year-old president of Hercules. "It doesn't bother me living this way. I've made a fortune in this business, and so has my partner. But we'd like to create an environment for our product to stand alone."

Is it possible to find niches that are less vulnerable to what IBM does? Is there room for another Apple? "No. The days of those systems are past," he says. "But IBM is the absolute enemy. It's only because of their mistakes that we're in business. We take advantage of their mistakes in production, packaging, and design. Even IBM can't satisfy everyone's needs immediately. There's no way a $40 billion company can respond with the speed and enthusiasm of smaller companies that are in business to make money."

Obviously, Jenkins's competitors believe the same dogma about their own companies. Otherwise, they wouldn't be open for business. Yet while there is universal, albeit grudging, recognition of their dependence on IBM, not every dependent hates the head of the family.

"I think the enhancement board industry is going to be reduced to two or three major players."

"IBM is a sword hanging over us. It's going to be there forever, no matter how big we get," Quadram's Strange concedes. "But in reality it's not that big a threat. They may think so on Wall Street, where if they don't know what IBM's doing they presume it's something bad. In fact, it could be something very good."

Strange sees IBM's new AT as one product IBM hit the mark with. "The AT's terrific. Of all the things they could have done, they did what was best for us. It's a machine with open architecture, and it needs a lot more third-party peripherals at a higher price than in the past. They didn't take anything away from us."

That's comforting, but it's not enough. As the enhancement numbers shrink, the territory to be defended gets wider. Depth and breadth are now the order of the day. The more products a company has on the market, the less likely that it will find the dreaded Sword of Ar-

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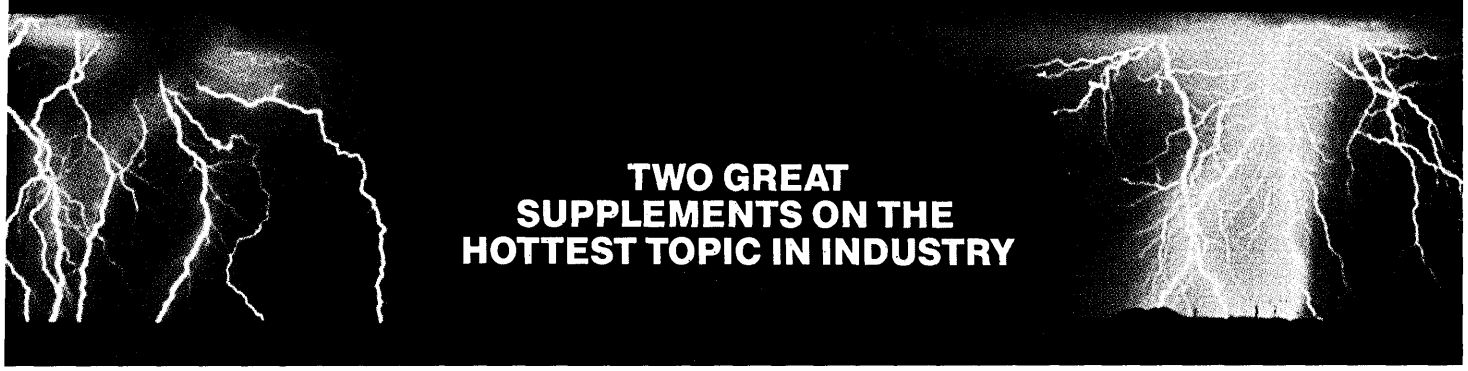

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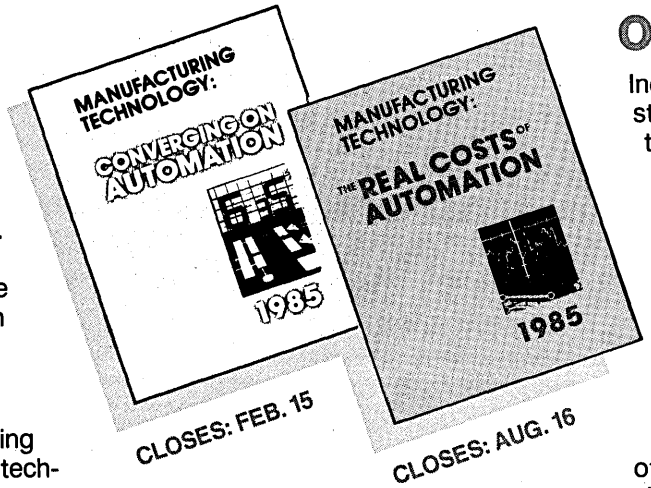

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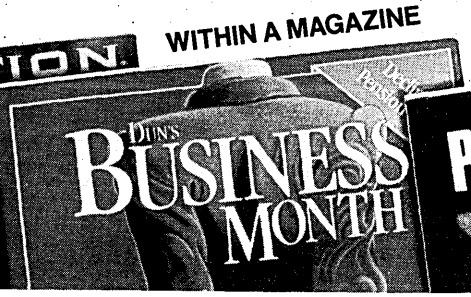

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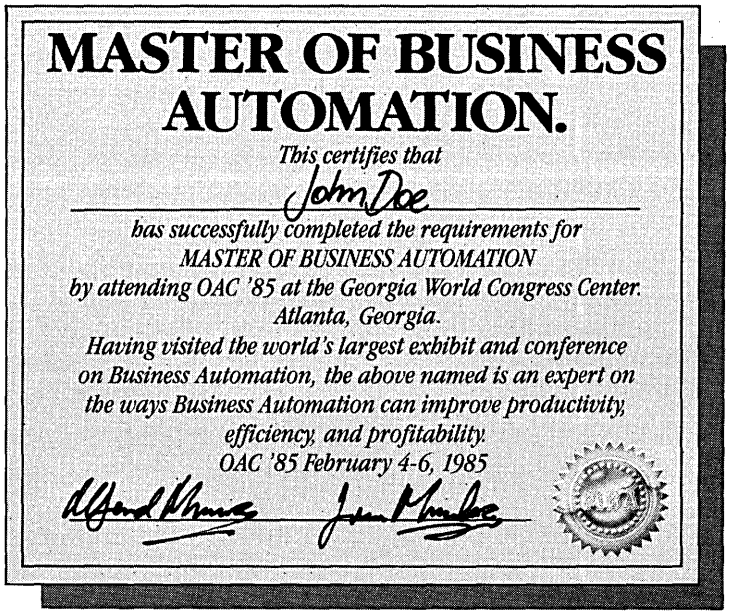

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monk dropping like a guillotine. Or so the theory goes.

"Every time IBM gets more aggressive, it creates more opportunities," Hercules' Jenkins says. "You have to get used to products lasting a short time, then move on."

Thus, Intelligent Systems has slipped into an acquisition mode, buying Quadram and Princeton Graphics, which claims to be second only to IBM in color monitors for PCs. AST released 18 products in the first 10 months of this year. Tecmar has over 200 products on the market. Only Hercules is bucking the trend, sticking with its Graphics Card and Color Card.

"A broad product line is necessary," Tecmar's Alpert says. "Computer companies recognize the need for peripherals. They're essentially saying, 'Please support us with products.' IBM, AT&T, and Apple aren't going to be profitable with a product that does $10 million worth of business. But if I've got 10 products doing $10 million, I'm a happy guy."

Sometimes, due to the IBM dependency, the life cycle of some products is just barely longer than that of the fruit fly. And quality is often less important than timing. If you're there first, you don't necessarily have to be there with the best.

"In micros, being first is it," Hercules' Reynolds says. "Timing is absolutely critical."

Which is exactly why these companies have gotten to their exalted economic plateaus, and why new companies will find the same route far more hazardous. The climate has undergone a drastic change since 1981. Even the venture capitalists, always looking for a buck, don't hang around garages much anymore.

"There are going to be fewer and fewer competitors because the barriers have gotten so high," Strange says. "The Fortune 500 isn't buying from the little guy doing $25 million. They're afraid of whether he'll still be here in three years." "Anybody can start a company in a garage if he has the right product at the right time," Jenkins insists. "But he's not going to do it in the board business. It's already gone through a shakeout. It's relatively mature for the computer industry, and it's going to consolidate even more. Large companies will dominate most areas. Smaller companies will compete against them, but only in certain niches.

"We're still too dependent on IBM. But our salvation is the retail marketplace. As long as IBM has product out there, they can't control it. We're always looking for that protected niche. We just haven't found it yet."

They didn't find the Holy Grail, either. That might have been easier. ◉

BENCHMARKS

ON THE BLOCK: IBM's acquisition of Rolm Corp. was approved by the Justice Department on the condition that Rolm's Mil-Spec division be sold. The division, which sells military computer systems designed to withstand harsh environments, accounted for less than 15% of Rolm's 1983 revenues of $659 million. While IBM does not currently compete in the market for computers modified to military specifications, the Justice Department said the Armonk, N.Y., giant had indicated its intention to do so, and that IBM's purchase of the Mil-Spec division would substantially lessen competition in the market. The Mil-Spec operation controls about 50% of the market, while Norden Systems Corp., a unit of United Technologies, has an additional 30% share. The agreement between Justice and IBM provides that IBM must sell the Mil-Spec unit by May.

OS SALE: Multi Solutions Inc., a Lawrenceville, N.J., startup that had been struggling to sell its highly touted S1 operating system, recently inked a five-year deal with Computer Engineering & Consulting of Tokyo. CEC guaranteed Multi Solutions a total of $40 million in royalties in exchange for an exclusive license to market the S1 system and related products to Japanese hardware vendors. The contract is renewable at CEC's option for an additional five years, during which Multi Solutions would be paid at least $20 million a year.

Multi Solutions was formed in 1982 to market S1, a collection of interrelated modules developed by a Princeton University computer science professor. The company has had virtually no revenues since its founding. CEC, a member of the Mitsuiwa group, reported $33 million in revenues in 1983.

TAKEOVERS: Lee Data Corp. acquired Visual Technology, the Tewksbury, Mass., marketer of the Commuter portable computer, in a stock swap valued at $16.8 million. The Minneapolis pc and terminal manufacturer will operate Visual as a wholly owned subsidiary, with Visual ceo Thomas Foley sitting on Lee Data's board. Lee Data's salespeople will also market Visual's Commuter, asynchronous terminals, and model 2000 multi-user system. Both companies have experienced financial woes, with Lee Data's first-half profits down to $3.8 million on $46.2 million in sales, compared with $7.7 million on $41.2 million in sales a year earlier. Visual's first-half earnings were $190,000, down from $3.7 million a year ago. Sales dropped to $25.3 million from $47.3 million, largely because sales of the Commuter have been slack. Separately, Control Data purchased the Communications Solutions Inc. subsidiary of VisiCorp for $5 million. The new subsidiary will concentrate on developing micro-to-mainframe connections and will operate as an autonomous unit. Earlier, the Minneapolis mainframer had bought the rights to the VisiOn software and the development team from the San Jose firm. After all the buying, CDC is also trying to sell its Commercial Credit subsidiary, but at press time no buyers had been found. CDC is recovering from the buffeting it took in 1984; profits nearly evaporated through the first nine months, falling to $600,000 from $113 million.

NEW MARKET: Eastman Kodak, continuing its push into new technological markets, has created a new division that will sell excess capacity on the Rochester, N.Y., firm's internal telecommunications network. The Eastman Communications unit, headed by Lester G. Miller, will provide enhanced data transmission, voice, and shared network services. Customers will be able to place long distance calls to any telephone in the U.S., Miller said. The network's major switching facilities in 17 U.S. cities currently handle 7 million long distance telephone calls and move a million data files a year among 225 locations worldwide. Miller said that the Kodak service will cost customers 30% less than AT&T long distance rates because of lower unit costs involved in selling the excess network capacity. Unlike most public networks, which operate at 1,200bps, the Kodak network will operate at 9,600bps, with new software to prevent transmission errors, the company said. The move follows by three weeks Kodak's entry into the floppy disk manufacturing business.

UNIXVAC: Deciding that the only way to expand its shrinking user base is through the Unix operating system, Sperry Corp. recently revamped its entire line of processors, enabling every product from the low end Sperry PC micro to the high end 1100/94 mainframe series to use Unix or a look-alike. The company introduced two new midrange processor families, the 5000 series and the 7000 series, which are based on hardware provided by Arete Systems, NCR, and Computer Consoles. The micros will offer Microsoft's Xenix, while the mainframes will run SX 1100, a Unix System V implementation designed to run as a subset of Sperry's proprietary OS 1100 operating system. The 5000 and 7000 series, which are based on Motorola 68000 microprocessors, will run Unix V directly. Sperry also introduced factory and office automation software for the midrange machines. ◉

To: [illegible]
From: Roger
Subject: IBM Technology

I've been reviewing some of our past [illegible] present technological achievements, and it occurred to me that the scientific, engineering, and [illegible] communities might like to know more about them. Will you [illegible] the following list? Thanks.

Vacuum tube digital multiplier

IBM [illegible] [illegible]

Selective Sequence [illegible] Calculator ([illegible])

Tape drive vacuum [illegible]

Naval Ordnance Research Calculator ([illegible])

Input/output channel

IBM [illegible] transistor [illegible]

FORTRAN

RAMAC and disks

First automated transistor production

Chain and train printers

Input/Output Control System (IOCS)

[illegible] computer

"Selectric" [illegible]

SABRE airline reservation system

Removable [illegible]

Virtual [illegible]

Hypertape

System/360 [illegible]

[illegible] System/360

[illegible] Technology

[illegible] 67/Time-[illegible] System

[illegible] memory cell

[illegible]

[illegible] data base

[illegible] monolithic main [illegible]

[illegible] recording head

[illegible]

[illegible] code recording

Systems Network Architecture

Federal cryptographic standard

[illegible] electrophotographic printer

First 64K-bit chip mass [illegible]

First E-beam direct-write chip production

[illegible] Conduction Module

[illegible]-bit memory chip

[illegible] control language

[illegible] the Engineering [illegible] System

Mastersli
the Engin
Design Sy

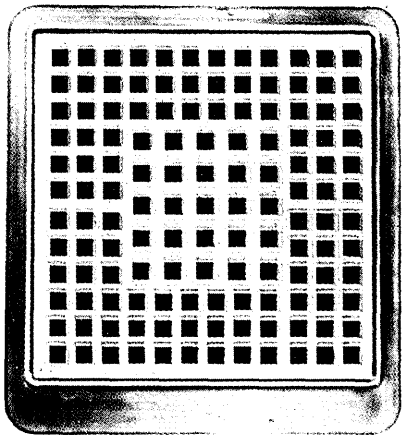
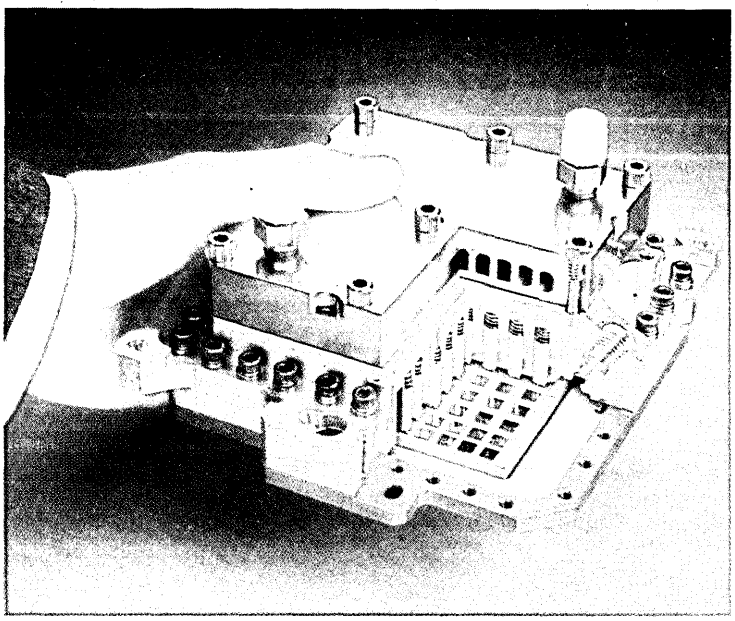


Figure 1: *The logic module used in large IBM computers (cutaway below) is part of the industry's densest circuit packaging. The electronic chips mounted in each module (right) were made through IBM's Engineering Design System and the masterslice concept: customize where necessary, standardize where possible.*



As computer applications continue to expand, designers of large computers are faced with many challenges. One of the biggest of these is designing semiconductor chips: not only do engineers have to design chips to contain the desired function, but they must also integrate the chips into the rest of the system and accomplish this quickly and inexpensively.

For nearly two decades, IBM designers have been leaders in this field, pioneering the technologies of chip customization, automated design, and automated manufacturing. In the mid-1960s, IBM researchers began developing a chip customization technology—known as gate array or masterslice—as well as a totally integrated set of design automation tools called the Engineering Design System.

The first masterslice chip came off IBM production lines in 1967 and was part of the System/3 announced in 1969. Growing increasingly important as an element in IBM computers, masterslice became the basis for the logic in the System/38 in 1978. This marked the first major impact of masterslice technology on computer architecture, making masterslice a driving force in semicustom, large-scale integration of chips in the computer industry.

In masterslice, a predefined pattern of circuit elements is fabricated in an area of a silicon chip called a cell. The pattern is then repeated so that almost the entire chip is covered with identical cells. In this manner, many chips

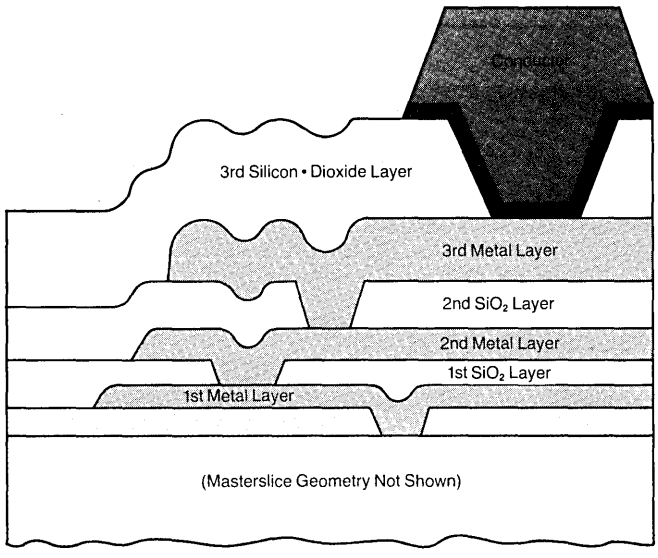


Figure 2: *This simplified side view of a logic chip shows three layers of metallization (along with three layers of insulating silicon dioxide) that are put on top of the masterslice to produce a semicustom chip. The metallization process enables designers to customize chips for a specific job. And a standard "base"—the masterslice—allows quicker turnaround times and lower manufacturing costs.*

may be produced with identical arrays of identical cells.

Customization takes place in "metallization"—the adding of alternate layers of insulators and metal wiring interconnections over the masterslice pattern of the circuit elements. This gives chip designers the freedom to make hundreds of variations in their design and still maintain the economic standardization of parts.

Masterslice technology has grown into an important process for implementing logic in IBM products. It is the basis of the 1,200 logic chips that make up the 500 different logic configurations of the central processing unit of IBM's largest computers, the 308X family.

IBM's Engineering Design System (now a full family of integrated design tools) has a data base that contains a complete description of each chip and its relation to the rest of the system, from the physical properties of individual devices to the requirements of the entire logic system of the computer. Thus, this design system enables the needs of a large system to be reflected in the design of its smallest components.

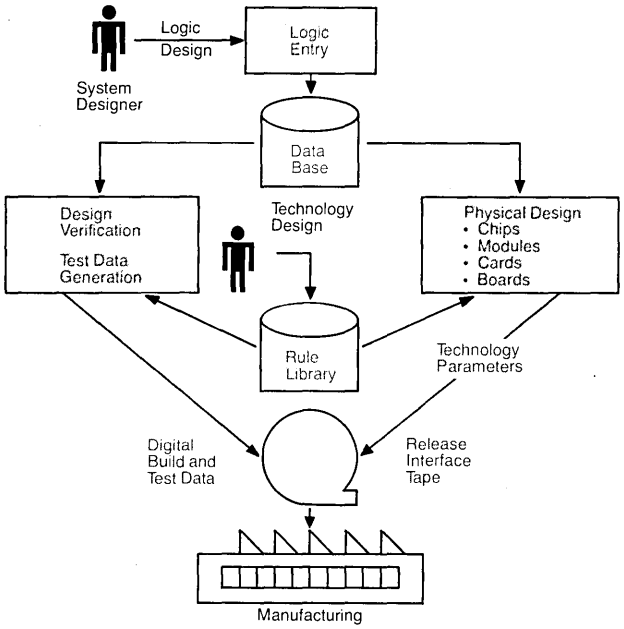


Figure 3: *With IBM's Engineering Design System, machine designers use terminals to input logic functions for a chip and establish a data base. Through simulation, the system provides logic verification and performs logic delay checking. Test patterns are then automatically generated for each part. In the meantime, physical design of the chip is done with computer programs that perform the following tasks: circuit placement, I/O assignment, wiring, and checking. All physical design information is then transformed into shapes, patterns, and precise locations of interconnections and circuit elements required for manufacturing.*

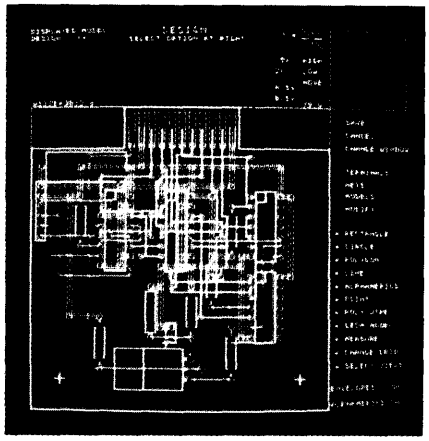


Figure 4: *Shown here is a display screen from the Interactive Graphic System (IGS), one of the many Engineering Design System tools developed by IBM to speed chip development and implementation. IGS is a powerful shape manipulation tool used to design new masterslices.*

The thousands of individual software modules of the Engineering Design System can be used to take a chip from initial design, through simulation and testing, to manufacture. Linking such a wide range of functions through common interfaces to form a total system is a feat unmatched in the industry. A designer using this system can take a chip from the start of the physical design stage to the manufacturing line in about six days.

Many engineers, scientists, and programmers throughout IBM contributed to the development of masterslice and the Engineering Design System. Their contributions are only part of IBM's continuing commitment to research, development, and engineering.

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FAST BREAK IN ARMONK

by John W. Verity and Willie Schatz

In the past several years International Business Machines Corp., arguably the world's most powerful corporation, has displayed some dazzling offensive moves. It has slashed prices, pushed technology, moved swiftly into new markets, and generally extended its global reach.

Since the U.S. government dropped its antitrust case in early 1982, IBM has drastically lowered its formerly comfortable price umbrella, leaving little room for hangers-on. Unfettered by the current administration, IBM has wasted little time taking advantage of the relaxed atmosphere.

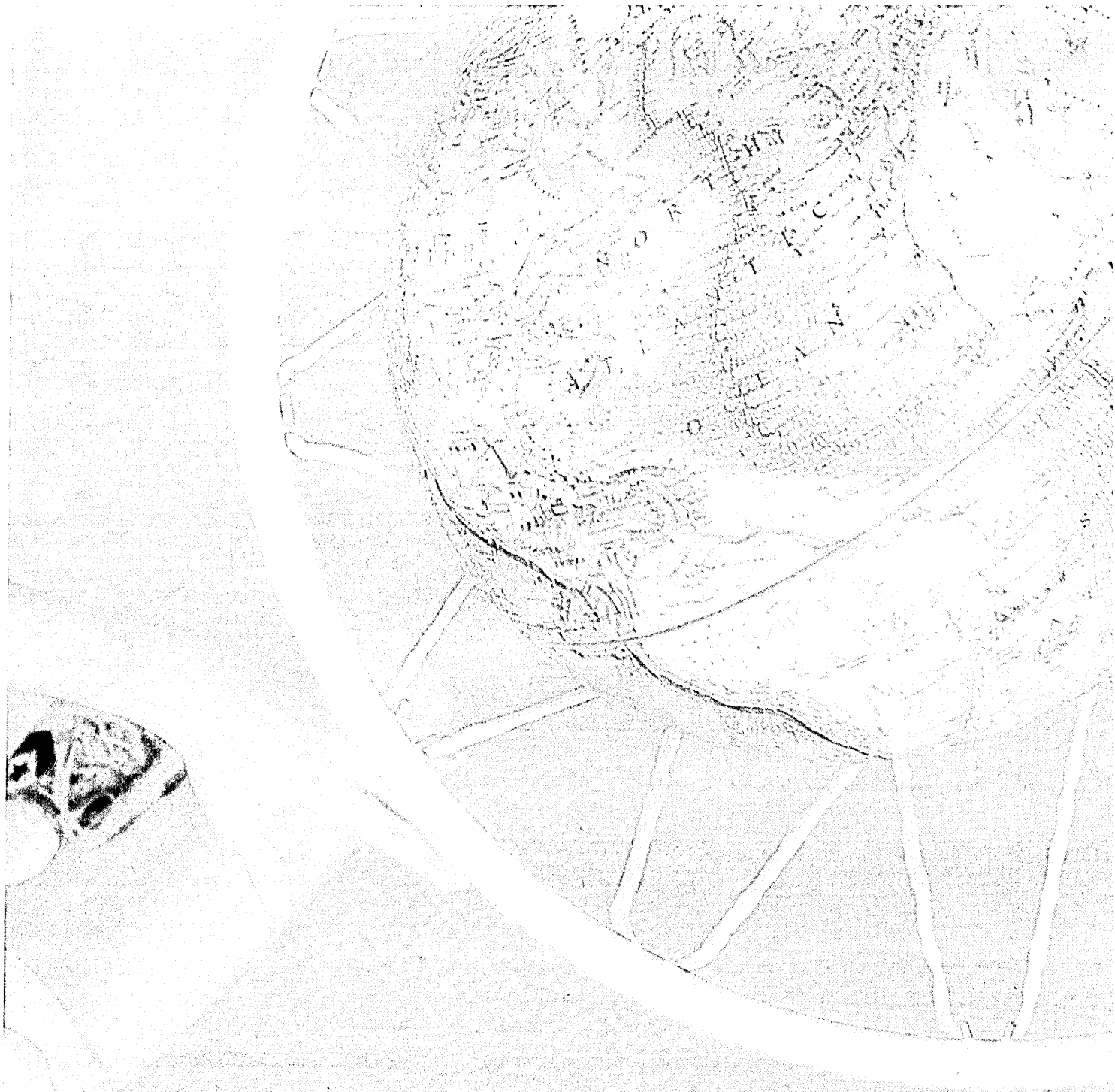
Now, given IBM's long history of pushing against the sometimes ambiguous boundaries of the trust laws, the obvious question arises: is IBM in any danger of feeling the pinch of another antitrust suit, private or public?

Most legal experts think not. The Reagan administration is certainly not about to try to dismantle the company, and few are the private firms that could fund the kind of protracted legal fight at which IBM excels. Moroever, Big Blue is currently appreciated—some might say overappreciated—in Washington and by much of the electronics industry as the United States' very own samurai warrior in the technological battle with the Japanese. Breaking up the company, it is argued, would be tantamount to opening the door to Japanese domination of the global information technology marketplace.

"IBM isn't immune, but suits aren't being brought," comments Ray Carlson, lead trial attorney from 1971 to 1977 on the Justice Department team that prosecuted IBM. "[Attorney General William French] Smith won't allow the Fortune 500 companies to be sued. Big business is big business, and the bigger the better.

"About the only thing that could get IBM in trouble is if something happened in the dismissal of the government's lawsuit that was legally impermissible. But I know

PHOTOGRAPH BY ARTHUR J. KLONSKY/JANEART



IBM has generally managed to get away with little more than a slap on the wrist.

of nothing like that. The likelihood of a hard-core case being brought against IBM is virtually nil," Carlson says.

Adds John Chapman, the Justice Department's senior trial counsel on the IBM case from 1977 to 1980, "Antitrust enforcement is so poor that you won't see anything but the most flagrant action challenged. The Department of Justice isn't rattling the sword anymore. The threat of the Antitrust Division has disappeared. Justice would only take action where it would be embarrassing not to. It would step in if IBM made a move to acquire or control Intel [Corp.]"

IBM would of course respond to the question of its vulnerability to antitrust litigation with an emphatic no. The company points to the government's dropping of the 13-year-old antitrust case and its success against a long string of private antitrust actions as evidence that it has not illegally monopolized the computer industry. The company is undoubtedly the largest manufacturer of computer equipment in the world, but IBM has argued in various publications and statements that its leadership was not attained through predatory pricing, illegal "fighting machines," or any other abusive tactics. By IBM's measures, its share of the computer systems market has continued to drop ever since the early '50s and is now in the 30% range. IBM says it now faces more challengers than ever.

A recent survey by International Data Corp., Framingham, Mass., however, shows IBM as dominant as ever in the all-important large system arena. IDC notes that in terms of dollar value of its installed base (a measure IBM calls "a myth of no relevance"), IBM's share of the large system market has been "at least 74%" since 1982, after a decade of "wide fluctuations." Noting that IBM's share combined with the plug-compatible manufacturers' share totals about 85%, IDC points out that the current stability in IBM market share began just after the government's antitrust suit was dropped.

CAREFULLY PLOTTED TACTICS

Critics explain IBM's dominance of the overall industry as the result of carefully plotted leveraging off this unassailable large system stronghold. Through a variety of tactics including functional pricing (by which users are charged according to the relative performance of the equipment they install rather than the manufacturer's cost), clever manipulation of intrasystem interfaces, and bundling, IBM has maintained its market power, they say.

Except for a few occasions—most notably when Control Data accused IBM of preannouncing a large scientific computer and when Telex won against IBM at the circuit level—IBM has won the court cases based on such claims.

"If there was strong evidence that IBM went into the market with prices below cost—or below average variable cost, which is regarded as the key test—then the Justice Department would be concerned," says Phil Verveer, who was a member of the government trial team from 1973 to 1977 and chief of the FCC's Common Carrier Bureau from 1979 to 1980. "But determining predatory pricing requires getting into the innards of the accounting system, and there would have to be very strong evidence before Justice would do that.

"IBM represents the essence of what the current administration wants to see in the economy. The fact that it's making life tougher for the StorageTeks of this world doesn't trouble Justice at all. They've got a very Darwinian view of things," continues Verveer, who now practices law privately. "It's very clear that IBM has the status of a monopolist. But even that combined with its very aggressive behavior isn't enough to trigger government action. It's real bad news for competitors."

If anything, IBM when in court now is more often plaintiff than defendant, a role it presumably relishes after more than a decade of being in the dock so often. Ostensibly concerned with protecting its trade secrets, the company has sued competitors ranging from a tiny disk startup to the Japanese computer giant Hitachi. It has also gone after market researchers who would allegedly trade in internal IBM information.

"There's no question that IBM has gotten substantially more aggressive since the [government's antitrust] case was dropped," notes John Soma, a lawyer who from 1975 to 1979 worked with the Justice Department team prosecuting IBM and who now is an assistant professor of law at Denver University. "I see them getting even more aggressive, especially in marketing. The line beyond which they can't go is becoming more and more generous to them. It's a little fuzzy, but they know where it is."

And yet, IBM hasn't been able to do everything it wants to. Antitrust actions haven't gone away entirely. Despite the relaxation of the investigation and a strenuously negotiated agreement late last summer, the European Community's antitrust investigation of IBM is still active. The company is being watched very carefully on the Continent by national governments who see their future as viable suppliers in the worldwide market for information technology and their very sovereignty threatened by the big American company. Of particular interest to them are IBM's software policies.

In the United Kingdom last October, IBM was blocked by the British government from starting a joint data networking venture with British Telecom, the local PTT. Apparently prompted by favorite son ICL, the Thatcher government was concerned that IBM and British Telecom would thwart competition and innovation in the all-important data communications arena.

Closer to home, even the Reagan Justice Department is not totally uninterested in IBM's current drive. The department last summer said it was looking into potential abuses by IBM relating to the settlement of its much-publicized "sting" case against Hitachi and other Japanese manufacturers (see "IBM Under Scrutiny," Aug. 1, p. 43). There has been no word since about the status of the investigation.

In early November the Justice Department investigated the potential for trust violations in IBM's proposed $1.25 billion acquisition of Rolm Corp. Its concern was the relatively minor military computer market, where IBM expects to increase its presence this year. Rolm's Mil-Spec division is a leading vendor there, but IBM agreed to sell the division.

PRIVATE ANTITRUST CASE

Less publicized is a private antitrust case filed in San Jose by software vendor BMC Corp., Sugar Land, Texas, which charges the industry leader with rebundling certain functions of the IMS database manager in violation of the Sherman and Clayton antitrust acts (see box). BMC may be joined by several other software suppliers disgruntled by recent IBM actions, according to industry sources.

IBM has run afoul of trust busters many times during its history but has generally managed to get away with little more than a slap on the wrist. During the Depression, when IBM was riding high on booming punch card machine sales and Thomas J. Watson Sr. was the highest paid executive in the country, the government stopped IBM from forcing customers to buy only its blank punch cards. In 1956, IBM signed a Justice Department consent decree calling for it to sell accounting equipment instead of just leasing it.

Finally, the government filed an antitrust suit in 1969. Thirteen years later the Justice Department declared the suit "without merit"; in retrospect it seems clear that this came about at least partly because of effective delaying tactics by IBM

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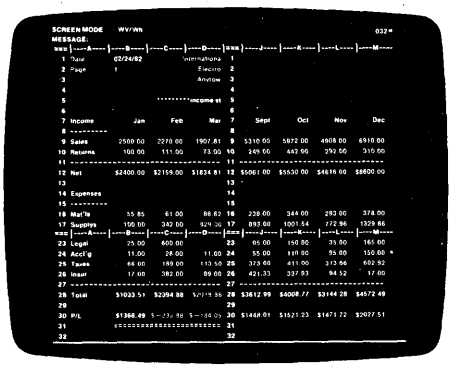

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CIRCLE 39 ON READER CARD

BMC GOES AFTER IBM

It may be a case of David battling Goliath, but tiny BMC Software Inc., of Sugar Land, Texas, has sued IBM under the Clayton and Sherman antitrust acts. In a case that may have important ramifications for the software industry, BMC charges that IBM has illegally hindered it from selling software that enhances the IMS database management system.

The suit is one of the first antitrust cases filed against IBM that concerns software products instead of hardware. It therefore raises interesting questions as to IBM's conduct in that increasingly important arena.

"Software is something of a mystery to most of the business world, but the antitrust problems there are very similar to the hardware problems of the '50s and '60s," says John Moores, president of BMC, who is trained as a lawyer. "I think IBM has been doing some bad stuff."

BMC alleges abuses that are strikingly similar to those raised in previous hardware-related antitrust suits against the industry leader. IBM is charged with bundling and making tie-in sales of certain add-on software for IMS that was sold previously as separately priced packages; altering interfaces between IMS and add-on software; preannouncing a new version of IMS but not delivering it on schedule, thereby forcing BMC to compete against a "phantom product"; offering IMS on a lease-only basis, which allegedly helps IBM force users to migrate at its will; and threatening to withhold IMS source code from BMC and other users.

The charges center around BMC's Logplus, a software package designed to record data used pertaining to an IMS database's operation, modification, and updating. Logplus data are used to recover from an IMS or system failure. BMC claims that Logplus's main advantage over IBM's Logger is that Logplus stores data on random access disks, while Logger uses slower, sequential tape.

BMC claims to have installed 238 copies of Logplus but says it now finds its market about to dry up as IBM coerces users to buy IBM's Logger package, which is bundled into IMS 1.3.

As of mid-November, BMC and IBM had begun their discovery, investigating each others' files, and were waiting to hear whether a judge in the district court of San Jose would grant BMC's request for a preliminary injunction that would stop IBM from continuing to market IMS in the lease-only, bundled manner. IBM was understood to be seeking a summary dismissal of the suit, which was filed in August last year. A spokesman in White Plains, N.Y., said IBM had no comment.

Court papers filed by BMC offer a detailed view of IBM's marketing of IMS, its premier database management system. IMS is understood to be highly important to IBM's overall large systems marketing strategy because it is so central to users' dp operations. Sale of the large software system, developed in the '60s to help manage the building of Apollo spacecraft, has come under severe attack from independently produced DBMS packages, most notably Cullinet's IDMS. IBM is said by industry observers to have made IMS a priority sale to large-scale accounts, for the product often helps sell large amounts of hardware and other software. BMC says there are over 4,000 IMS installations worldwide, 2,500 of which are IMS/DC, the on-line version.

The argument BMC advances in support of an injunction pays particular attention to the alleged bundling of IMS satellite products—add-on software modules designed to enhance IMS operation and maintenance—through physical and pricing means. In other words, BMC charges, IBM has made it extremely difficult for BMC to sell Logplus for use with IMS 1.3 because of the intimate relationship between IBM's Logger product and the main IMS package.

For instance, BMC says that to install Logplus on IMS 1.3 requires extensive modification to 12 IMS modules, compared with the relatively minor changes to only four modules necessary for previous IMS releases. Not only would these modifications be extremely difficult if IMS 1.3 were only supplied in object form, but users would be reluctant to let BMC make such modifications, the plaintiff says. Moreover, BMC charges that the IMS/DC "gen" process, by which the software is installed at a user site and customized to the user's purposes, is not possible under release 1.3 without including the IBM Logger package.

BMC says also that while IBM has stated that Logger can be removed after the installation of IMS 1.3, "no IBM manual describes any procedure to accomplish this." The Texas company says IBM should make it easier for users to install third-party IMS software products and that there are "no valid technical reasons" for the bundling.

The papers also charge IBM has "offered to lease its logger [sic] for $220 per month," while BMC gets $1,080 a month, or $27,000 for purchase, for its competing product. BMC calls this "predatory pricing" on IBM's part, because the IBM pricing is "below cost."

IBM has designated at least some of its opposing court papers as "restricted information" under a protective order. BMC said it filed its suit in San Jose because that is where IBM's IMS development activity takes place, the district court there is familiar with technology-related cases, and the location is more convenient to the law firm it has hired, Boone, Knudsen, Martin & Davisson of San Francisco, which specializes in such cases.

Says BMC's Moores, "We tried very hard to settle this without filing a lawsuit. We negotiated with IBM for three years, but they just looked at us like a puppy dog with big eyes, saying, 'We don't understand.' "

He concedes that suing IBM will be "ferociously expensive," but says he and BMC are prepared to fight it out.

—J.W.V.

and the government's mismanagement of the case. During that time a dozen or more private antitrust suits were filed, all but a few being overturned in IBM's favor or settled out of court. IBM points to this string of dismissals as vindication. They have failed, however, to provide much clarification as to what would truly constitute an antitrust violation in the computer marketplace.

Legal eagles generally agree that IBM is so secure in today's political and economic climate that it would have to make a major blunder to be charged with trust violations.

"About the only limit on IBM would be if it tried to knock out DEC [the second largest computer maker]," says Soma. If it did it unwisely, [IBM] would probably get in trouble. But if it did it wisely, it would probably get away with it. It could make small price cuts here and there and let DEC slowly bleed to death."

Says Verveer, "IBM isn't immune [to antitrust action], but the termination of the case and the present doctrine that guides antitrust enforcement at the Justice Department and the Federal Trade Commission mean that IBM has much greater competitive latitude than it had a few years ago.

"The antitrust authorities want companies like IBM to be very aggressive competitively. They don't want them circumscribed. Their doctrine and philosophical concepts are being played out in the markets IBM is competing in. It's being fiercely aggressive, which is exactly what [former antitrust chief] Bill Baxter would have wanted."

It was Baxter, brought in by the Reagan administration, who declared the end of the suit against IBM after reviewing the case and discussing settlement options with the company. After a somewhat controversial tenure, during which questions were raised about his previous relationship with IBM and the manner in which the suit was dropped, Baxter left the Justice Department and was replaced by J. Paul McGrath.

McGrath has spoken out in favor of joint ventures between companies as an alternative to mergers that would eliminate competition.

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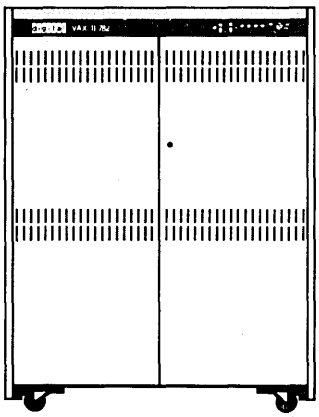

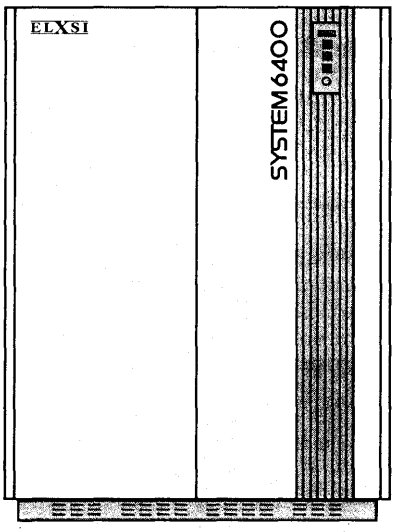

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CIRCLE 40 ON READER CARD

IBM may have come down so forcefully on Hitachi because it felt its control of the systems software business was threatened.

"A joint venture between two parties may pass antitrust muster, where their merger would not," he told a Harvard Law School audience in early November. He added that the Reagan administration would subject proposed joint ventures to less stringent tests than mergers. In particular he said he would rarely challenge R&D joint ventures if the market involved was large enough to support four other such ventures.

While the *U.S.* v. *IBM* suit was under way, some observers claimed it showed only the inadequacy of current antitrust laws, particularly the Sherman Act of 1890. That law was written at a time when technology didn't change as quickly as it does today, and there wasn't as much concern for global markets and the health of national industries. So what good came of the government's case against IBM?

CLOSE TO ZERO AS POSSIBLE

"There was no new antitrust law or doctrine as a result of the IBM case," says Carlson, now in private practice. "It was as close to zero as possible. The AT&T case was different. Their lawyers made a practical error when they moved the judge for dismissal. After that, he had to look into the merits and found that AT&T probably had violated the antitrust laws. But IBM's lawyers were much too smart to do that."

Perhaps because of their simple wording, the antitrust laws have always been viewed as ambiguous, leaving a great deal of room for interpretation and legal arguments as to their applicability in a particular instance. Much of IBM's defense against the government, for example, hinged on the effort to discredit the prosecution's notion that a market for "general purpose computer systems" even existed. IBM tried to show that there was no such market and therefore IBM could hold no monopoly.

It is likely, say observers, that any future antitrust action against IBM will not focus on general purpose computer systems or mainframes, but on some other submarket. With the growing importance of packaged software to the computer industry, it seems likely that the software arena could be one of those submarkets.

Of particular concern to the software industry these days is the tightening of IBM's source code policies. The company used to be freer in divulging source code of certain software packages, thereby enabling users and independent software vendors to make modifications and tune the packages very carefully. Now, however, IBM has made it difficult if not impossible to obtain source code, and vendors have been up in arms. There's been no formal talk of antitrust, however.

ADAPSO, the software industry's trade group, has been negotiating with IBM on the source code issue for many months now, but according to Jerry Dreyer, executive director, has not gotten very far. But, he says, "We keep plugging away."

More important to trust busters, say some observers, is IBM's rental policy for software. Virtually all the systems and applications software the company offers is available only on a rental or lease basis. This goes against the spirit if not the letter of the 1956 consent decree.

"Rental versus selling is a major issue in evaluating how IBM offers its products," notes Robert Djurdjevic, who publishes the Phoenix-based newsletter *Annex Computer Report*. Early last year, letters he wrote prompted the Justice Department to take a closer look at how IBM was using legal action against competitors. "When it rents, IBM retains ownership of the software, which means it can drive customers to migrate as it pleases. Then, it is also able to command high prices because there isn't any other software available. It's a form of bundling, or tie-in sale."

Djurdjevic says he thinks IBM came down so forcefully on Hitachi of Japan two years ago because it is one of the few companies with the resources necessary to challenge the American company's control of the systems software business. But, he adds, charges of illegal tie-in sales are "hard to win on—there's a split of opinion in antitrust law here."

One current antitrust case likely to set a precedent meaningful to the computer industry in this area is the suit filed several years ago by Fairchild Camera & Instrument against Data General, regarding the latter's alleged tie-in sales of an operating system with a computer processor. Fairchild designed a chip that mimicked the Data General Nova mini but Data General sued to prevent its Nova operating system from being used on the chip. After a series of suits and countersuits, the case is waiting to be heard by the U.S. Supreme Court.

Looking ahead, it seems very likely that the computer industry will continue to be dominated by IBM, as it has been since its inception in the early '50s. The company has craftily retained its nearly total dominance of business data processing, successfully making the transitions from punch cards to mainframes to the current distributed processing market. Some observers say IBM might run into trouble if it began trying to rub out non-IBM interface standards—for attaching into large data networks, for instance.

There's no reason to think that IBM's growth will not continue at traditional rates into the foreseeable future. What, besides a major economic collapse or a seemingly unlikely blunder by corporate management, could slow it down? Certainly no competitor, except for AT&T or the Japanese, has pockets deep enough to challenge IBM's number one position. The question then becomes one of how large the company can get before talk begins of regulation or divestiture.

Perhaps all that can safely be predicted is the galloping rush "onward and upward" that IBM's loyal workers used to sing about in the days of old Thomas J. Watson. ◉

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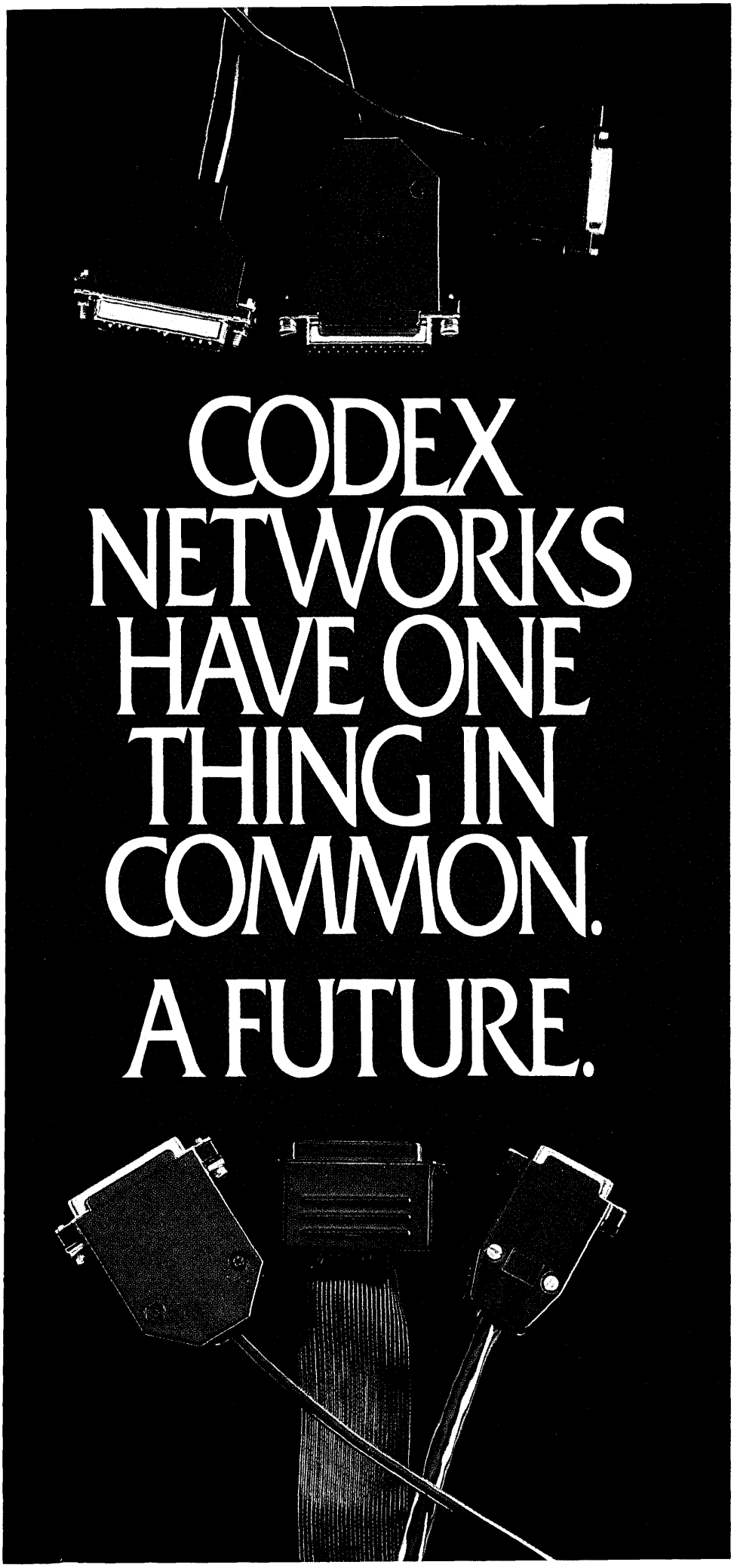

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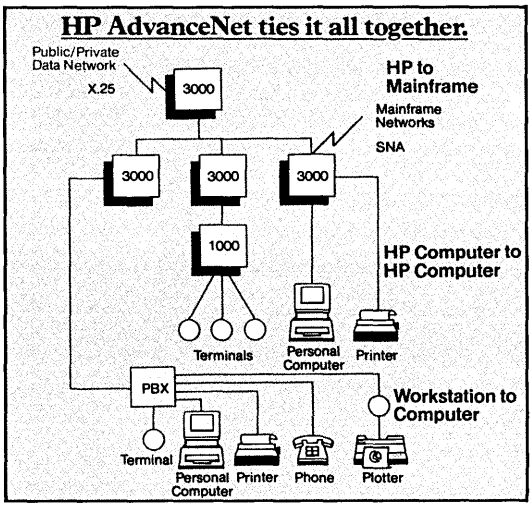

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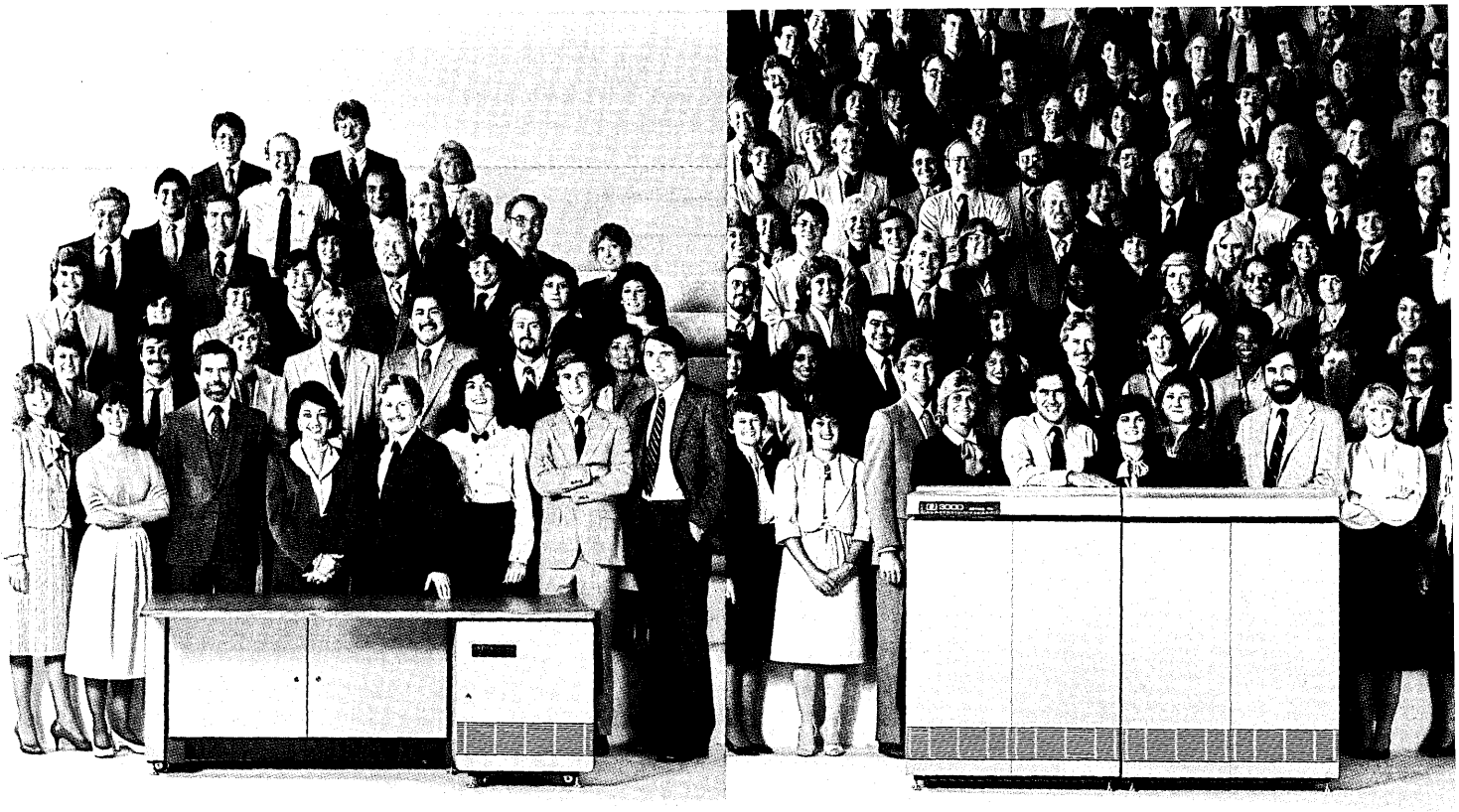

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CIRCLE 41 ON READER CARD

After several unsuccesful attempts to get going in telecom on its own, IBM has opted for a different approach. You might call it . . .

SHOPPING FOR MARKET SHARE

by Brian Jeffery

Circa 1981, it was common to hear speculation about IBM and telecommunications. People wondered: would IBM enter the U.S. PBX market? Would it reenter the U.S. service bureau market? Would it try to assert policy control over Satellite Business Systems? What most observers failed to anticipate, however, was that IBM would go the third-party route.

Four years later, IBM is on its second PBX vendor, is aggressively seeking a new partner or partners for SBS, has commissioned Motorola to build a $300 million cellular radio network, and has a joint venture with Sears, Roebuck and CBS for a broadly based national videotex service. There's also a joint venture with Merrill Lynch for an on-line financial service, and a string of other tie-ups covering distribution of the IBM PC line by telecommunications firms, support for the token ring LAN system, and supply of turnkey telecommunications equipment. IBM is negotiating with a variety of telecom firms about tie-ups for SNA-based value-added network (VAN) services, AT&T bypass telephone services, local area data transport (LADT), oem sales, token ring marketing, and other subjects.

Over the last three years, IBM has changed its telecommunications strategy. Where once the firm tried to find its own way in the market, it now follows a looser, conglomerate-style strategy of multiple third-party tie-ups. What the company has lost in clarity, it has made up for in volume. Grouped around IBM is a set of companies —probably still far from complete—that is starting to look like it might become one of the major players on the U.S. telecommunications scene.

Telecommunications has long been an area of IBM interest. The company has sold its Carnation PBX line and operated its Information Network service bureau in Europe since the early 1970s, and as early as 1973 was seeking to participate in what eventually emerged as Satellite Business Systems.

There were regulatory problems, however: protests from other telecom firms obliged IBM to adopt an arm's length policy toward SBS (it emerged as a one-third owner, along with Aetna Life and Casualty and COMSAT General), and the subject of telecommunications also cropped up in IBM's periodic antitrust suits. There were product problems, too. Former ceo Vincent Learson once said that the Carnation PBX line was "a dud, and always was a dud.'

The telecommunications scene changed considerably in 1982, with the AT&T divestiture and the government's abandonment of the antitrust suit against IBM. In general, these events, and the convergence of computer and communications technologies, presented IBM with vast new opportunities. In practice, it was difficult to see how IBM could address these markets on any significant scale. With a minimal market presence in the 1970s and the atrophy of such operations as La Gaude, France, IBM was not in the best of positions. The first moves were thus piecemeal and cautious:

- The Information Network was "repatriated" from Europe, beginning operations early in 1982 structured as an Independent Business Unit (IBU) and offering SNA-oriented VAN services.
- In July 1982, a joint development tie-up was formed with Canadian PBX vendor Mitel Corp. The object of the exercise appears to have been to develop an SNA capability based on a high-end digital PBX. It was primarily defensive, aimed at heading off what was seen as a potentially serious threat to IBM large account business from PBX and LAN technologies. (IBM perceived a number of threats at this time, including the Ethernet LAN system, digital PBXs, and personal computers). The token ring, an SNA variant developed at the Zurich, Switzerland, facility, was adopted as the base of this development track.
- Satellite Business Systems, still at arm's length, was given the go-ahead from the consortium partners in 1981 to shift its focus from large corporate networks to the AT&T bypass business.
- In 1981, Telecommunications Carrier Products, an IBU, was formed to sell to the Bell operating companies (BOCs) and other major U.S. telecommunications oems and end users.

MOOD OF CAUTIOUS OPTIMISM

IBM apparently wanted to establish footholds that could be developed and coordinated later. The mood at headquarters was one of cautious optimism—which proved to be unfounded. Over the next three years, IBM's moves into telecommunications began to look rather clumsy.

The Information Network, like most of the other IBUs, proved a poor performer, failing even to turn a profit over 1982-84; the Mitel tie-up bogged down in delays, technical problems, and differences between the participants, and was ultimately replaced in June 1983 by the tie-up with Rolm Corp., of Santa Clara. Losses at Satellite Business Systems mounted over 1982-83, and the Skyline venture, designed to compete for the AT&T bypass business, failed to make many inroads. And while Telecommunications Carrier Products signed up a few customers (AT&T for a Series/1-based voice mail system, Southwestern Bell for $10 million in modems), it otherwise proved a disappointment.

News from abroad was not much

ILLUSTRATION BY MICHAEL GARLAND

M. GARLAND

better. After signing a highly publicized contract with the German PTT in the fall of 1981 to set up a pilot public videotex system using the British Prestel technology, IBM ran into development problems and delays. During 1983 the German PTT was laying penalties on IBM, and the company had to make an embarrassing series of withdrawals from other videotex programs in Europe.

In retrospect, many of IBM's problems can be seen as resulting from late entry into established markets. In the case of PBXs, IBM also proved to have grossly overestimated its understanding of the market, and its own technologies. (What experience the company had was in the slower, less competitive European market, with the analog Carnation line. The U.S., and digital PBXs, proved to be a very different league.) Such overconfidence was widespread in IBM at the time—most of the company's IBUs had been similarly sent out as small, underfunded operations to compete against larger, established competitors in their respective markets. To make matters worse, corporate policy was that all IBM units should "pay their own way."

This succession of bad experiences appears to have led IBM to a major strategic reorientation. Briefly stated, the company is no longer trying to enter telecommunications markets by means of its own technical resources. IBM's current concern is to establish a substantial presence early on, by acquisitions or tie-ups with third parties—moves that provide technological inputs and instant market share.

In March 1983, the company announced the conclusion of a $300 million agreement with Motorola Corp. for the latter to develop and implement a nationwide cellular radio network linking 250 major U.S. and Puerto Rican urban centers. The network is intended for use by IBM's National Service Division field staff, enabling it to handle on-line system diagnostics via the network. Scheduled for completion in mid-1985, it will also give IBM one of the largest cellular radio networks in the U.S.

In June 1983, IBM made its second major acquisition since 1980: 15% of Rolm for $228 million. This share had risen to 23% by September 1984, when IBM announced its acquisition of the balance of Rolm, for $1.26 billion.

In May 1984, the FCC approved a filing for removal of restrictions on the IBM-SBS relationship; in July 1984, COMSAT General withdrew from the consortium and IBM acquired a 60% stake. Despite much speculation that the move was part of a broader IBM strategic effort targeted at telecommunications services, financial con-

WHAT'S WHAT IN IBM TELECOMMUNICATIONS

Bell operating companies (BOCs) that deal with IBM are American Information Technologies Inc., which supplies turnkey telecommunications systems and services to Satellite Business Systems; Sonecor Systems (Southern New England Telephone), an IBM value-added dealer (VAD) and pc retail dealer; Interline Communications Inc. (U.S. West), an IBM VAD and personal computer retail dealer; and six more BOCs are also token ring design and installation services and/or cable suppliers (see below).

Carnation is IBM's analog PBX line, dating from the early 1970s and comprised of the 3750 and low-end 1750. Developed by the IBM La Gaude, France, facility, it has sold poorly (no more than 120 units to date) in the U.K., France, West Germany, Belgium, and the Netherlands. It is not marketed outside Europe, and is scheduled for withdrawal in favor of Rolm Corp. products.

In the *cellular radio* field, Motorola Corp. is developing a proprietary system for IBM under a $300 million contract concluded early in 1982 and announced in March 1983. The system, scheduled for completion by mid-1985, is for use by National Service Division field personnel. It will cover 250 U.S. and Puerto Rican cities, and will operate on one or two 800MHz channels in each city, supporting up to 1,500 devices.

The *Communications Products Division (CPD)* has responsibility for IBM's major internal communications products. Based in Raleigh, N.C., its responsibilities include SNA, 37XX front ends, the 327X line, modems, some SBS earth-station equipment, and other communications products. It currently has responsibility for the token ring program. The division may suffer as result of the Rolm acquisition; its performance has not been outstanding, and Rolm is likely to play a larger role in these product areas.

Information Network is IBM's U.S. service bureau operation, based in Tampa, Fla., and offering a range of SNA-based on-line services via a data center in Tampa and a nationwide network of 37XX communications front ends. Formed in March 1982, it has consistently lost money. It continues to operate a regional marketing organization, but IBM appears to be looking for a third-party tie-up to cover this sector in the future.

International MarketNet is a joint venture between IBM and Merrill Lynch to offer an SNA-based financial service using 3270 PC-based workstations, information databases targeted initially at stockbrokers, and host software developed by New York-based systems house Monchik-Weber. Announced in March 1984 and originally scheduled to become operational by year-end, it faces major competition and problems in addressing its target market. IBM's commitment, however, is not a major one.

Rolm Corp., the PBX vendor with fiscal 1984 revenues of $650 million, is due to become 100% IBM-owned by year-end 1984. Rolm can be expected to become, in effect, the PBX division of IBM, selling its own product lines, handling the bulk of token ring development and marketing, and cooperating with National Accounts Division direct sales forces to cover the Fortune 500 market. Its European and Japanese operations are likely to be taken over by IBM in the near future, but it is likely to remain as a separate IBM unit for at least the next few years. IBM couldn't assimilate its operation in less time than that.

Satellite Business Systems, owned 60% by IBM and 40% by Aetna Life and Casualty Company, is a money-losing, smallish satellite communications firm in which IBM has been involved since 1974. SBS's 1984 revenues of $300 million are likely to be at least 60% derived from its AT&T bypass services.

Service bureaus that work with IBM include General Electric Information Services (GEISCO), Boeing Computer Services, Tymshare, and ADP Corp. These and many smaller companies are IBM VADs; GTE Telenet supports the Information Network.

Telecommunications Carrier Products is an IBM Independent Business Unit based in Princeton, N.J. Its mission is to sell IBM products and systems to BOCs and other large telecommunications oems and end users. Apart from an oem deal with AT&T for the Series/1-based Audio Distribution System voice store-and-forward system and a $10 million BOC modem sale, it has not sold much.

Trintex is a consortium of IBM, Sears, Roebuck, and CBS to develop and market a broadly based, consumer-oriented national videotex service. The service, scheduled to be operational on a pilot basis in 1985, appears to be derived from the Canadian Telidon-NAPLPS system. IBM will be covering Fortune 500 information services and markets. Trintex looks the most credible of the current contenders for the U.S. videotex market, but probably won't develop a significant volume of business until the late 1980s.

The *token ring companies*, announced in May 1984, supply design and installation services and/or cable for the token ring LAN system (scheduled for 1986-87 availability). The field includes six BOCs (American Information Technologies, Pactel, U.S. West, Southern New England Telephone, South Central Bell, and Southwestern Bell), several major telecommunications firms (GTE, two GE subsidiaries, Rolm) and various equipment distributors.

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CIRCLE 42 ON READER CARD

In retrospect, many of IBM's problems can be seen as resulting from late entry into established markets.

cerns were paramount. SBS had been losing large amounts of money ($100 million in both 1982 and 1983). COMSAT General couldn't handle the company's ongoing capital requirements. IBM could, but obviously didn't want to.

SBS ceo Robert Hall was removed early in the year, to be replaced by IBM marketing veteran Steven Schwartz. Layoffs and cutbacks followed, and the company emphasized expansion of its money-losing AT&T bypass business. In September 1984, under the gun from IBM headquarters, SBS went outside for financing. A sale-leaseback deal with Salomon Brothers for satellite capacity provided around $100 million in working capital.

LOOKING FOR A NEW PARTNER

No sooner had IBM assumed majority control over SBS than it was publicly advertising for a new partner. SBS statements indicated that IBM was looking for a company that would, to quote an SBS spokesman, "help or accelarate SBS growth." Such a candidate might be "a very large private corporation that needed a very big private network" or "a company that had a lot of customers and/or employees that could be customers and/or employees of SBS." In short, all offers gratefully considered. Since that time, IBM has approached a variety of companies, including large end users and other AT&T bypass suppliers. A third party could help provide the "critical mass" (SBS's phrase) that the company so sorely needs in order to be successful. Since its inception, SBS has been hampered by the fact that it is a small player in the markets it attacks.

Announced in February 1984 and formed in May was the Trintex videotex consortium, in which IBM is an equal partner with Sears, Roebuck and CBS. The Trintex consortium is scheduled to begin operations in 1985-87, offering a broadly based consumer videotex service. An outgrowth of earlier Sears and IBM experience with the Canadian Telidon program, Trintex is likely to benefit from Sears' substantial catalog shopping and financial services presence (at present, Sears turns over more than $9 billion monthly through its 25 million-plus active store credit cards). Sears and CBS also provide consumer market presence and experience. IBM covers the business market. For sheer clout, the consortium's partners are impressive, and Trintex is certainly the most credible-looking contender to emerge to date for the U.S. videotex market.

In May 1984, in a series of announcements concerning the token ring LAN system, IBM described a set of 16 companies that would act as token ring design and installation services and cabling suppliers. Notable in the list: six BOCs, a variety of equipment distributors, and subsidiaries of GE and GTE. The IBM goal appears to be to ensure early and major market penetration for the token ring system by providing it with some formidable backers. The IBM relationship with these firms is likely to expand as the token ring nears stability.

Less visibly, IBM has also concluded a string of agreements with other companies in the telecom field. There's a joint venture with Merrill Lynch to offer an online financial service. There are also value-added dealer (VAD) arrangements with four of the country's largest service bureau operations (GEISCO, Boeing Computer Services, ADP, Tymshare); two BOCs (U.S. West, Sonecor Systems); an independent telco (Alltel) and assorted vendors of LANs, voice/data communications systems, and the like. GTE Telenet carries the Information Network, and BOC American Information Technologies Inc. supplies the Real Estate Communications Corp. (an SBS subsidiary) with turnkey telecommunications equipment and services.

What IBM has done, then, is to establish direct or indirect presence in telecom markets via established players. The result is a budding telecommunications conglomerate that may want to add a major AT&T bypass supplier (MCI, GTE?), a VAN vendor (GEISCO, GTE?) and probably also a string of BOC and independent telco relationships before it is done.

PICTURE BECOMES CONFUSED

It is tempting to comment on how well IBM has learned from its mistakes, how clever it is being, and how the pieces of the jigsaw all fit together. On closer examination, however, the picture becomes more confused. There is the curious business of Rolm—curious in that IBM should need 100% of a $650 million PBX vendor to obtain an adequate level of cooperation. Then, consider IBM's willingness to pay out this kind of money for Rolm (which made only a minimal profit in fiscal 1984, and a net loss in the first quarter of fiscal 1985) at a time when it is obliging Satellite Business Systems to close down R&D activities, freeze certain business areas, lay off staff, and sell off spare satellite capacity to raise investment capital.

All part of the strategy, right? Maybe not. Rolm isn't the only company to have talked IBM into a tie-up: both the Trintex consortium and the IBM-Merrill Lynch joint venture resulted from IBM being solicited to participate rather than vice versa. None of these arrangements was planned much in advance.

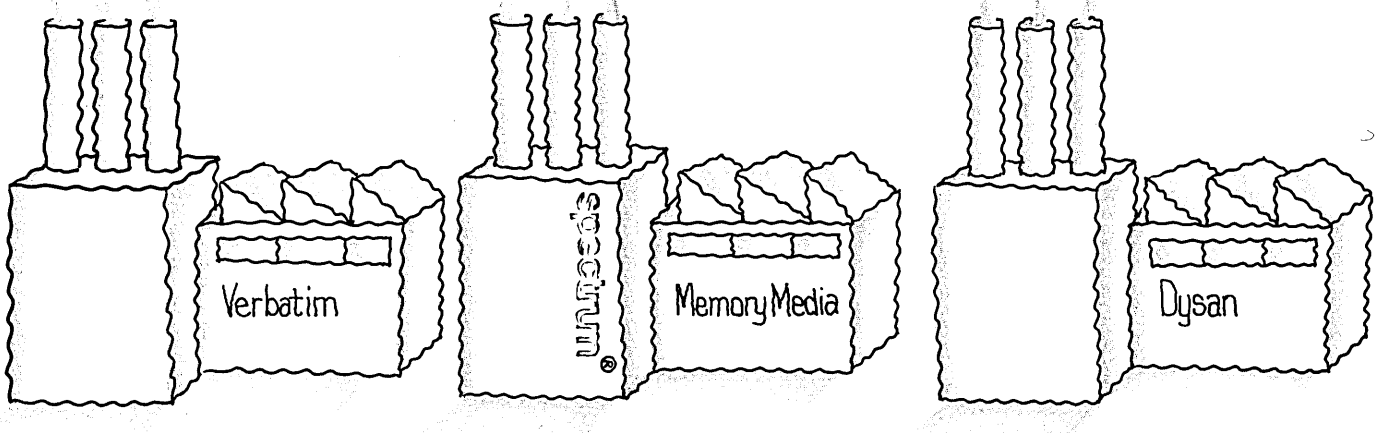
Moreover, a look at the IBM organization chart suggests that strategic coordination is not much in evidence. Rolm and SBS operate at arm's length, reporting to IBM vice chairman and finance chief Paul Rizzo; Trintex and the IBM-Merrill Lynch joint venture are also at arm's length, and report to the Information Systems Group; the cellular radio network is run by the National Service Division; and other tie-ups are handled by the Entry Systems Division, the Communications Products Division, marketing divisions, and IBUs. If IBM has a well-defined telecommunications strategy, it is not much in evidence, and there is in any case no organizational structure to implement it. We seem to be dealing less with a coordinated strategy for entering telecommunications markets than with a series of improvisations and responses to opportunities. Here, too, the approach is reminiscent of conglomerates in the 1970s.

The key to the situation appears to be the new IBM emphasis on joint ventures and acquisitions. An operation like the Information Network might be planned in detail, but the frequency with which a Kenneth Oshman (Rolm's ceo) might come visiting is difficult to predict.

At most, IBM appears to be working with a generalized shopping list of the types of operations it would like to be involved in. What interests the company most are operations with established market presence to provide the critical mass IBM cannot provide on its own. The preferred modes of participation are acquisition or capital contribution by a stock swap (as in the case of Rolm) rather than by cash—which is again reminiscent of the 1970s conglomerates.

All of this makes IBM's next moves hard to predict. The company would like tie-ups with a major AT&T bypass supplier and/or VAN vendor, and has become quite chatty with such firms as BOCs, independent telcos, GTE, and MCI. The people at headquarters under finance chief Rizzo will look at the financial aspects; the product divisions will work on synergies later. And between now and the end of the decade, the IBM telecommunications conglomerate is likely to grow and grow. ◉

Brian Jeffery is director of research for the International Technology Group, a research and consulting firm. A former strategic planner for U.S. and European companies, he is responsible for the ITG's *IBM Inc.*, a 1,000-page study published in December 1984 and currently available from ITG, 2465 East Bayshore Rd., Suite 301, Palo Alto, CA 94303.



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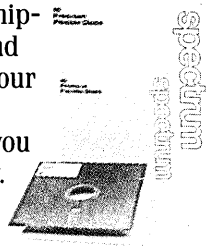

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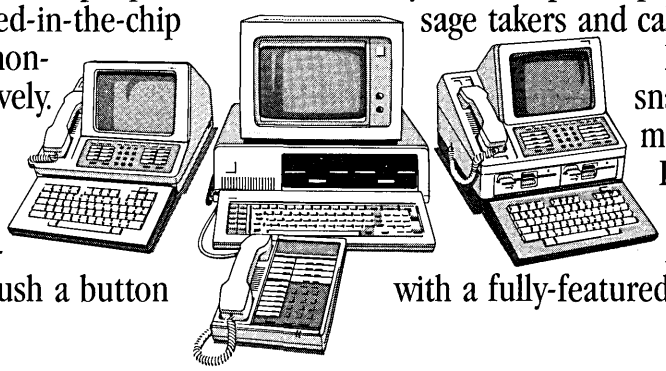

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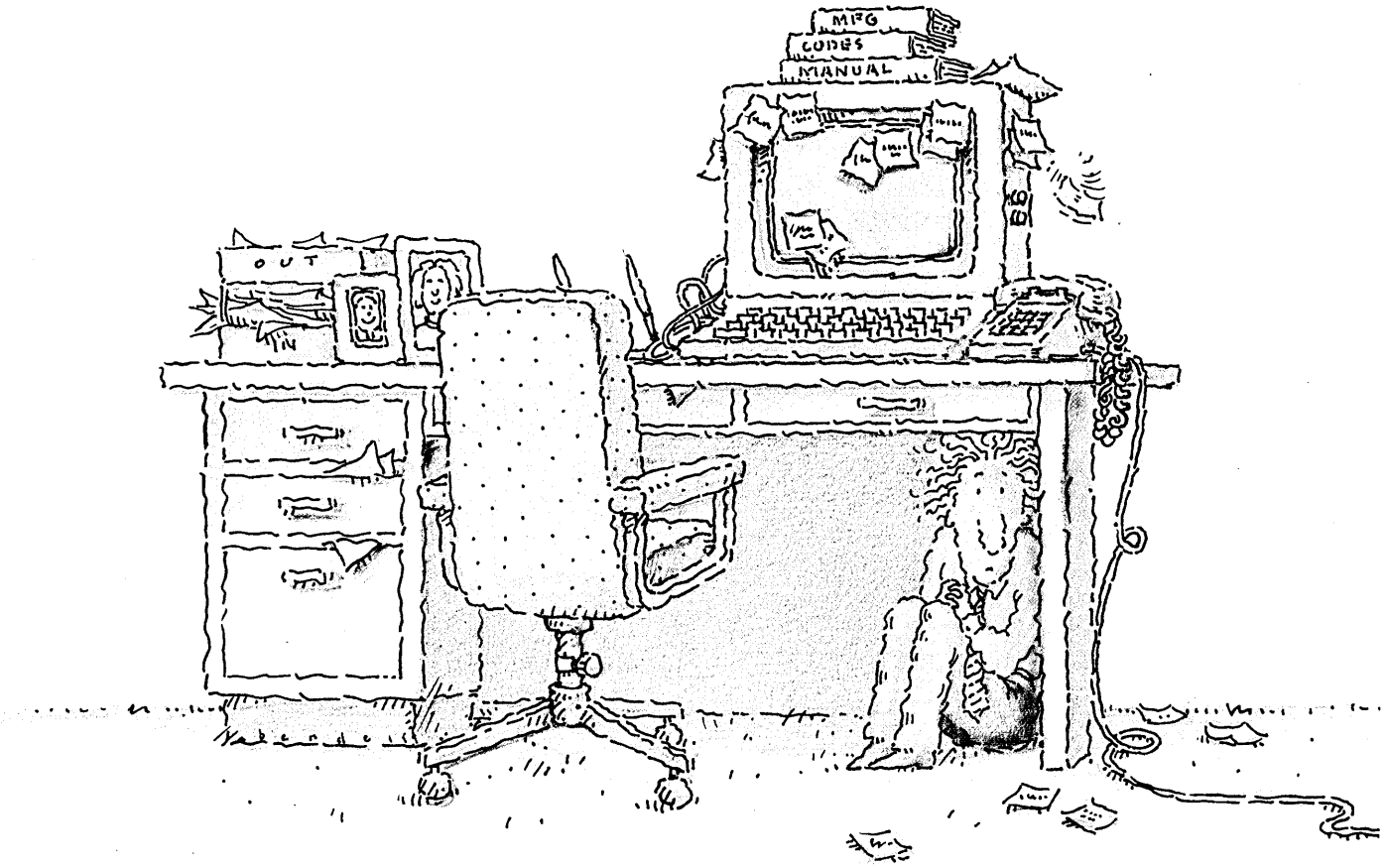

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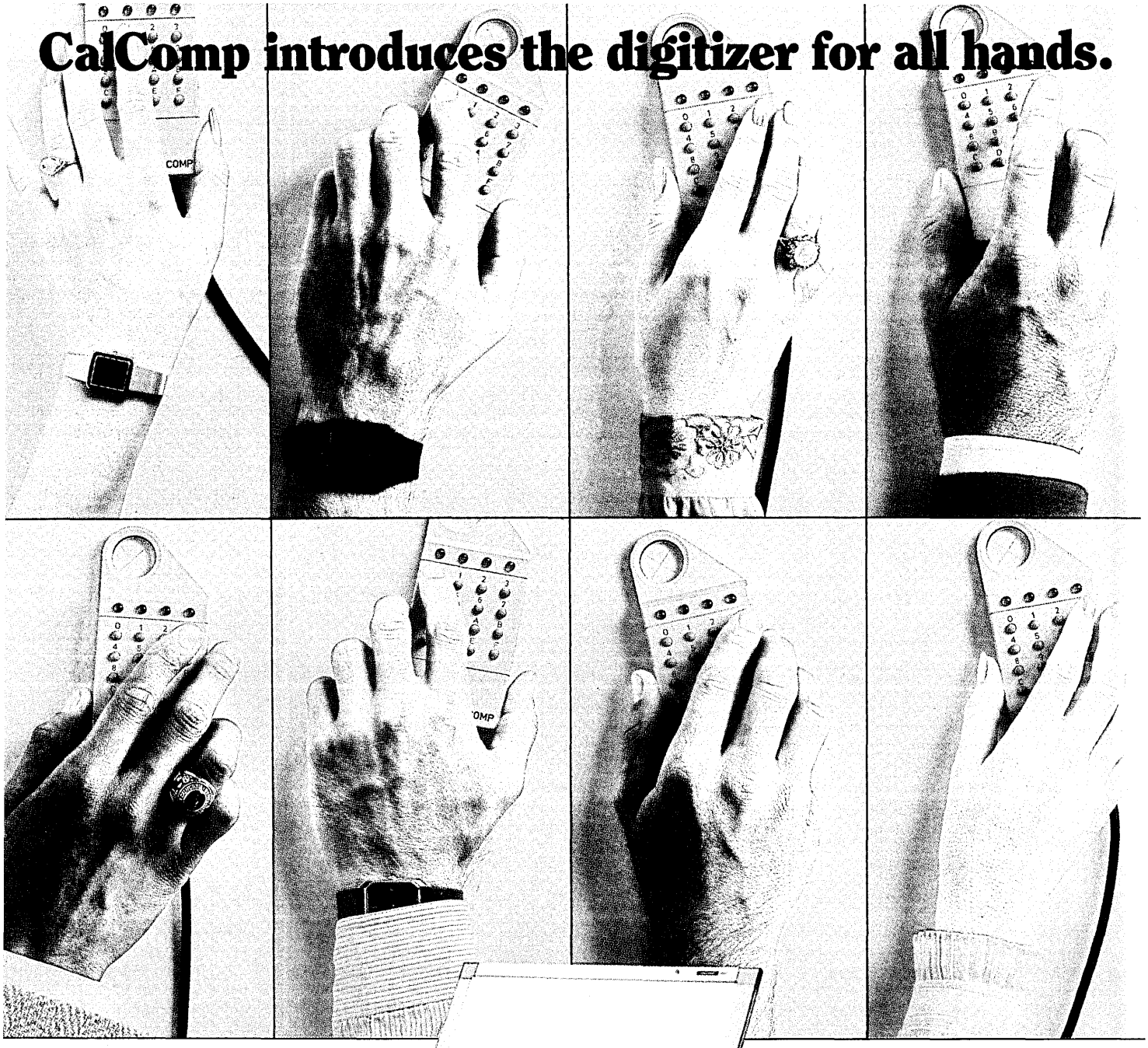

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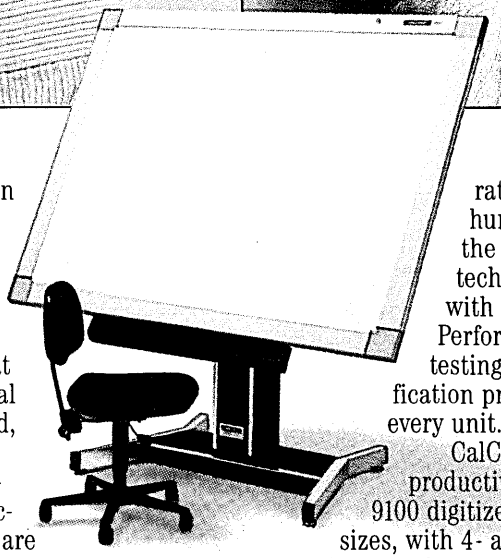

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CIRCLE 45 ON READER CARD

A group of managers of large shops contemplate the next five years with IBM.

THE USERS' STORY

by Edith D. Myers

Blue may not be everyone's favorite color, but it certainly ranks high with a group of major IBM users that were surveyed by DATAMATION.

"We're all blue and we'll probably stay all blue," says Nell Cox, senior vice president, City National Bank, Los Angeles.

"For the next two or three years, we'll still be seeing mostly blue around here," says Ron Mosier, assistant director of management information systems for the Los Angeles Department of Water & Power.

Bill Synnott, senior vice president, Information Systems & Services Division, First National Bank of Boston, didn't talk color but predicts, "In five years IBM will be as strong as it is now."

John L. Hancock, senior vice president, corporate systems, Wells Fargo Bank, San Francisco, is a little less positive. "We judge each application on its own merits and that accounts for our using a number of vendors—but IBM is our major supplier. Five years from now? It's hard to say but I think they'll still be our major supplier."

"Yes, five years from now I expect IBM will still be our major supplier" is the emphatic response of Wendall J. Meyer, general manager, Data Services Bureau, City of Los Angeles.

IBM provides the lion's share of equipment for Dick Gallagher, vice president of data processing at the Burbank Studios, Burbank, Calif. He sees "no reason why they shouldn't be" the major supplier five years from now as well.

John Jacobs, director of information systems, Salt River Project, Agriculture Improvement & Power District, Phoenix, says his organization has been with IBM since the late '60s and "I imagine we still will be five years out."

Tektronix Inc., Beaverton, Ore., relies heavily on Digital Equipment Corp. for its scientific and engineering computing, but on the business side, IBM is the primary supplier. Robert Schneider, manager of data processing planning and operations, expects this will still be true in five years.

Perkin-Elmer Corp., Norwalk, Conn., a computer maker in its own right, has no such definite long-range plans for an IBM 3033 it uses as a combination scientific time-sharing and MIS batch machine. "We expect to retain it for at least another year," says George J. Hefferon, director of corporate computing. "After that, it's unclear. We're working on our own next generation of superminis and we could go with them, but there is still the possibility that we could go with the next generation from IBM." Of his 3033, which runs in a VM/CMS environment, he says, "It's a comfortable software configuration because it allows guest operating systems."

With all of this expressed loyalty, the pure blue shops represented in our group were definitely the exception. The account control IBM has long exercised—where the IBM salesman is a personal friend of the dp manager and a kind of adviser to his or her operation—still exists in remote locations where a user's only contact with the outside world is IBM, but it is fast disappearing in and near the big cities.

"The governmental agencies have to go out and bid for all of their equipment, which means they get a mix, and private industry has followed suit," explains computer consultant Robert L. Patrick.

Hancock of Wells Fargo says there never is "a uniform hardware solution. We like to look at all of what technology has to offer." In addition to its IBM gear, Wells Fargo has equipment from Amdahl, DEC, and Tandem.

An MIS director who doesn't wish to be named because his is a regulated company, says he uses IBM "from the largest mainframes, all of the 3080 line, to PCs," but also has Amdahl cpus and disks, many Storage Technology disks and tape, a large Honeywell installation for internal time-sharing by engineers and knowledge workers, and a variety of DEC machines in support roles.

Meyer's Los Angeles Data Services Bureau uses an IBM 3084Q and two 4341s, but its dispatching system for fire and police is primarily DEC-based, the tape drives are mostly Storage Technology, and its office products are primarily Wang.

"A COUPLE THOUSAND PCS"

Shirley Prutch, vice president of Martin Marietta Data Systems, Baltimore, says she has "six or eight 3083s and 4300s coming out the gazoo," and "a couple thousand various pcs, and CDC, DEC, and HP equipment."

Outside of Dick Gallagher's "lion's share" at the Burbank Studios, there are "a couple of Wangs and we use HPs in Europe," he says.

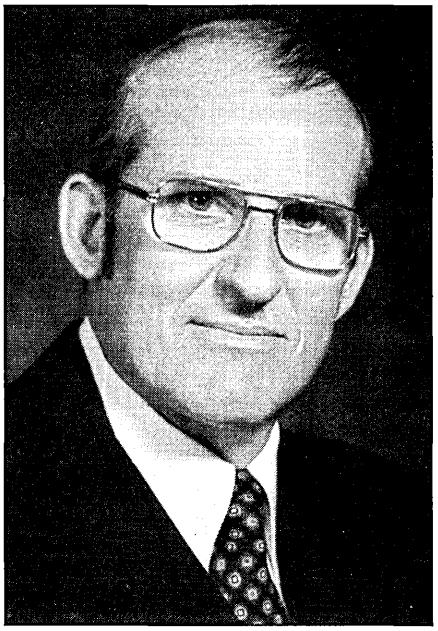
Schneider of Tektronix says that while IBM is the dominant supplier on the business side of his company's dp operations, corporate information systems also has "a large population of DECs, Cybers, and onesy-twosy odds and ends."

Jacobs of the Salt River Project says, "I looked at a lot of other vendors and tried them out, especially for peripherals, and I've always come back, primarily because of service and support."

Cox's City National Bank shop is pure blue. "We're going to remain all blue because of maintenance and support," she says. "Nobody else really compares."

IBM's service and support generally draws high praise from our group but there

"You have to have a large hammer to get their attention, but yes, it has been satisfactory."



W.R. SYNNOTT, First National Bank of Boston

are exceptions.

Not quite so laudatory is Mosier of the Los Angeles Department of Water & Power. "I wouldn't want to go overboard. When you have problems, you have to have a large hammer to get their attention, but yes, it has been satisfactory. They're reducing the amount of their spending on maintenance, trying to maintain with fewer bodies."

Hefferon of Perkin Elmer says the service and support he's received from IBM "has been sort of mixed. We have two different facilities and when we're satisfied at one, we have problems at the other. I don't see any trend toward worse or better and would generally call it fair to good. It's certainly not a disaster, but it leaves something to be desired in many cases."

Larry Myerley, manager of software integration and support services for Cities Service Co., Tulsa, Okla., differs."Our service and support has been very good and pretty consistent. I expect it will remain that way." Hancock of Wells Fargo agrees. "Their service and support is excellent, generally excellent. They have a lot of resources to get things done for you. We get a lot of support."

Our MIS director from the regulated company says his service and support from IBM is "excellent. Management [of IBM] clearly recognizes they've got to couple cost and service as a package and they've really turned that corner in the last three years. It's a strong part of their business emphasis. A lot of people say if they didn't do this, they'd still make a lot of money, but they do it. They make added value a major objective."

"All of our service and support from IBM has been generally and consistently good," says Los Angeles's Meyer. Gallagher of the Burbank Studios concurs: "It's been excellent and I see no reason to expect it to change."

Prutch of Martin Marietta also praises IBM's service and support. "I don't know if it's people or what, but we've had good service all over the country. If we've ever had a blip it's been a person blip. They're too smart a company to let that [service and support] get away from them."

Schneider of Tektronix is less enthusiastic. "Generally, I wouldn't say I was satisfied," he says, "but compared to the alternatives, they're good. There always are some problems but IBM is head and shoulders above the others." He says he got better software support before IBM established its remote software support centers, but "we do get hardware support. We see the same faces. They spend a good portion of time here and we have a place for them."

Tom Horan, vice president of corporate information systems for Aetna Life & Casualty Co., Hartford, Conn., considers IBM's service and support to be "very good," but unlike Schneider, he particularly likes the remote software support centers. "It's been a definite improvement over what existed before. We were somewhat skeptical at first but not now. When we have a problem we first pass it by our own technicians. The next step used to be to call a local representative. Now we communicate with a support center using TSO [IBM's timesharing operating system] for enquiring into IBM's problem database, and a voice connection to exchange information. The theory is that the group of experts helping you with diagnostics from the support center would be more knowledgeable than a local representative and, in our experience, that has turned out to be true."

GET MORE ON-SITE SUPPORT

Salt River Project's Jacobs, who says he came back to IBM on a number of occasions primarily because of service, notes that his organization's service improved over the years as it got bigger. "We're a large account now and we get more on-site support. We've grown a lot and gotten a lot more attention from IBM over the last five years. We had two 370/145s in 1978. Now we have a 3084 running MVS XA, a 3033, a 4381, and a 4341. Then we had one person on-site and now we have three."

Costs are always a big consideration in running any operation and a data processing operation is no exception.

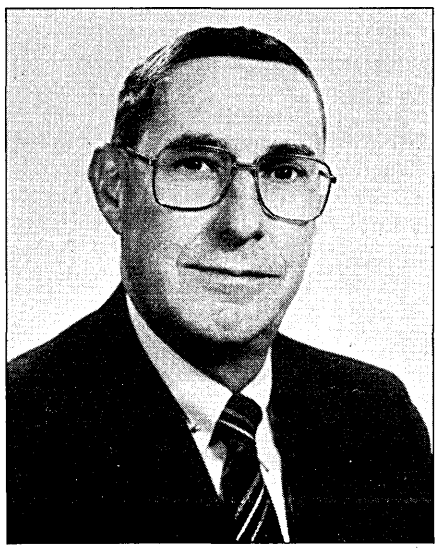
The regulated company's MIS manager sees his total data processing costs going up by a factor of five to seven by 1990. Others project similar increases. Keeping costs down is a matter of concern.

An MIS manager who wishes to remain anonymous says IBM was giving her the cold shoulder because she was buying used rather than new equipment. "A lot of people are looking at their major investments, at the rapid depreciation of their equipment." She remembers a piece of equipment bought seven years ago for $2.3 million that "we just gave away." She also cites paying $1.9 million for a 3032 last year rather than buying another, bigger one this year, "for 50 grand."

"I don't know a dp shop that hasn't had this problem," she adds. "They have to depreciate their cpus in three years, yet even the new investment tax credit laws say five years. We bought a 3033 last week for $75,000 that would have cost $2 million had we bought it new."

Mosier of the Los Angeles Department of Water & Power says he has a 3033 that has no resale value, but adds "that's of no concern to us. We don't have to look at it in the same way as a private company. We use the 3033 as a customer information system, a large CICS system. It'll be good for this for two to three more years. Its utility to us is still high."

Jacobs of the Salt River Project hedges the depreciation problem by alternately buying and leasing. "If we get something early enough in the product cycle, we buy; if it's late in the cycle, we lease. We have a 3033 we got early. It's bought and



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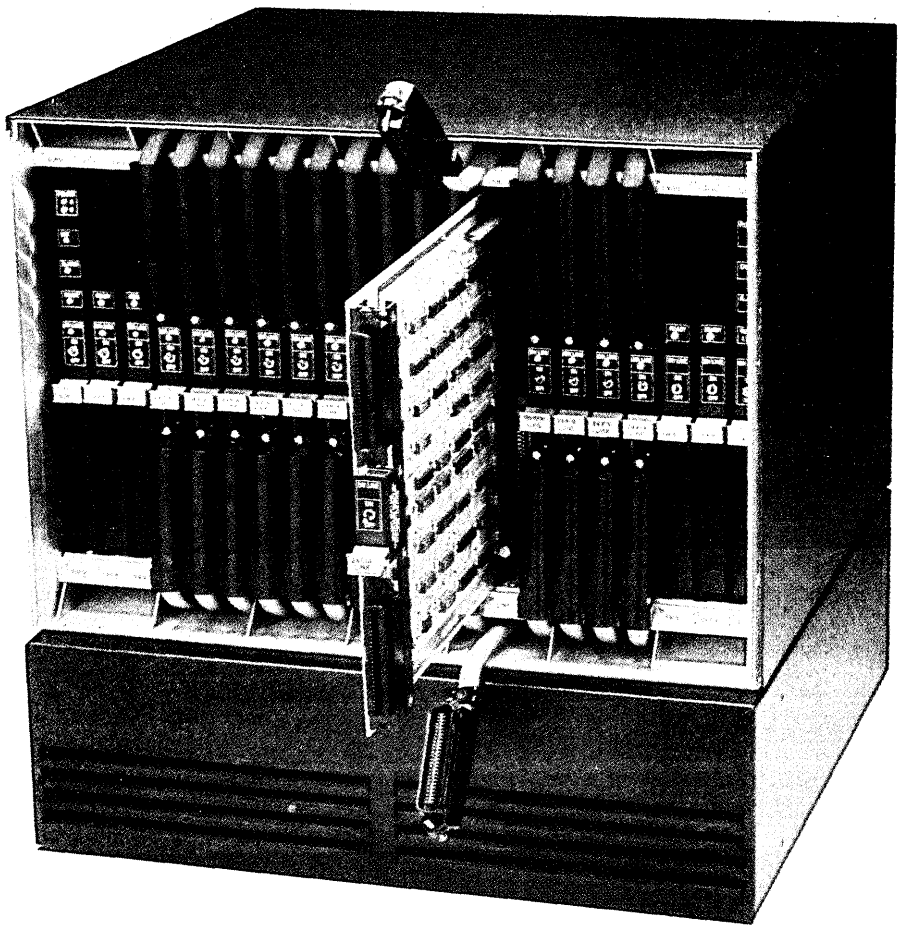

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"They're too smart a company to let service and support get away from them."

paid for and we've written it off already. It's used as a VM system for office automation and will be with us probably till 1986; then we'll get rid of it. There'll be someone who might want to buy it. We sold a 3032 last year for $25,000." It had been bought for $1.2 million.

COME IN AND MAKE IT BETTER

A lot of people feel IBM has gotten around the problem of depreciation by making the 3080 family field upgradable. "It's the first time they've taken that tack," says the unnamed manager who has been shunned by IBM. "Now you don't have to give something away. You just say come in and make it better."

Our manager from the regulated company lauds the introduction of the 3080 family. "Starting with this line, they have integrated their product line. They're recognizing that service and marketing go together."

Gallagher of the Burbank Studios says the fact that the 3080 family is field-upgradable "has made me feel more comfortable. I'm planning an upgrade next year."

Schneider of Tektronix says, "We always think field upgradability is a good feature, but the fact that the 3080 family is field-upgradable means little to us. We're at the end of the product line. We've taken all of our upgrades."

Our group of managers is generally more likely to stray from IBM in storage devices than in mainframes.

Synnott of First National Bank of Boston believes there will be more vendors of compatible storage devices five years from now. He has used Storage Technology devices in the past and feels in five years he will be using IBM "and others."

WENDELL J. MEYER, City of Los Angeles

JOHN JACOBS, Salt River Project.

Hancock of Wells Fargo foresees IBM continuing to be his major storage device supplier, but "as with cpus, the application's the thing and we'll check out whatever's available."

Says Mosier of the Los Angeles Department of Water & Power, "The longer they [IBM] have a storage model in service, the more third-party competitors show up. If they're responsive, we'll go with them. Right now, all of our storage is IBM."

Jacobs of Salt River is unlikely to stray. "We're totally IBM in storage. We tried other vendors and backed off because of support and reliability."

Myerley of Cities Service Co. also anticipates sticking with blue. "Yes, IBM probably will still be our major supplier of storage five years from now." Cox of City National Bank concurs. "All of our tapes and disks and other stuff are IBM and probably always will be."

Schneider of Tektronix says he has 30 spindles of STC storage, "STC 3350s, and the rest are IBM 3380s." He will continue to look at multiple vendors. He expresses some concern over STC's financial problems but adds, "We think they're basically sound and will work out their problems."

He says IBM is a major communications supplier to Tektronix and he expects this to continue. "We have 3705s and 3725s, and a full VTAM SNA, SDLC network. All of our IBM machines are hooked together in a network, and five years from now I expect it will be the same."

Most of our managers feel IBM will be a major contender in communications through 1990. Myerley of Cities Service is less certain than most. He isn't at all sure that IBM will be his communications supplier five years from now. "They'll probably be a top candidate, but with others around, they'll have a lot of competition."

Horan of Aetna is also uncertain as to IBM's future as a communications provider. "They certainly want to be. Whether they are successful or not will depend on how well they are able to integrate communications with what they have been doing in computers, things like their venture with Rolm. They've not always been successful in integrating things they are doing."

STRONG, GETTING STRONGER

Synnott of First National Bank of Boston says he has a distributed international network using IBM switches. "IBM is strong and I think five years from now they'll be as strong as they are now, but it'll be them and others. We'll be using a smattering of many. We already use AT&T and Northern Telecom, several local telephone companies, and optional common carriers. Five years from now, IBM will be in there and AT&T will be, too. IBM will get stronger in communications and AT&T in micros."

IBM is not now a communications provider to Wells Fargo Bank but Hancock feels it could be in the future. "There will be a number of players and IBM will be one of them and will be competitive. I think IBM will capture share of market but what our company does will depend on applications."

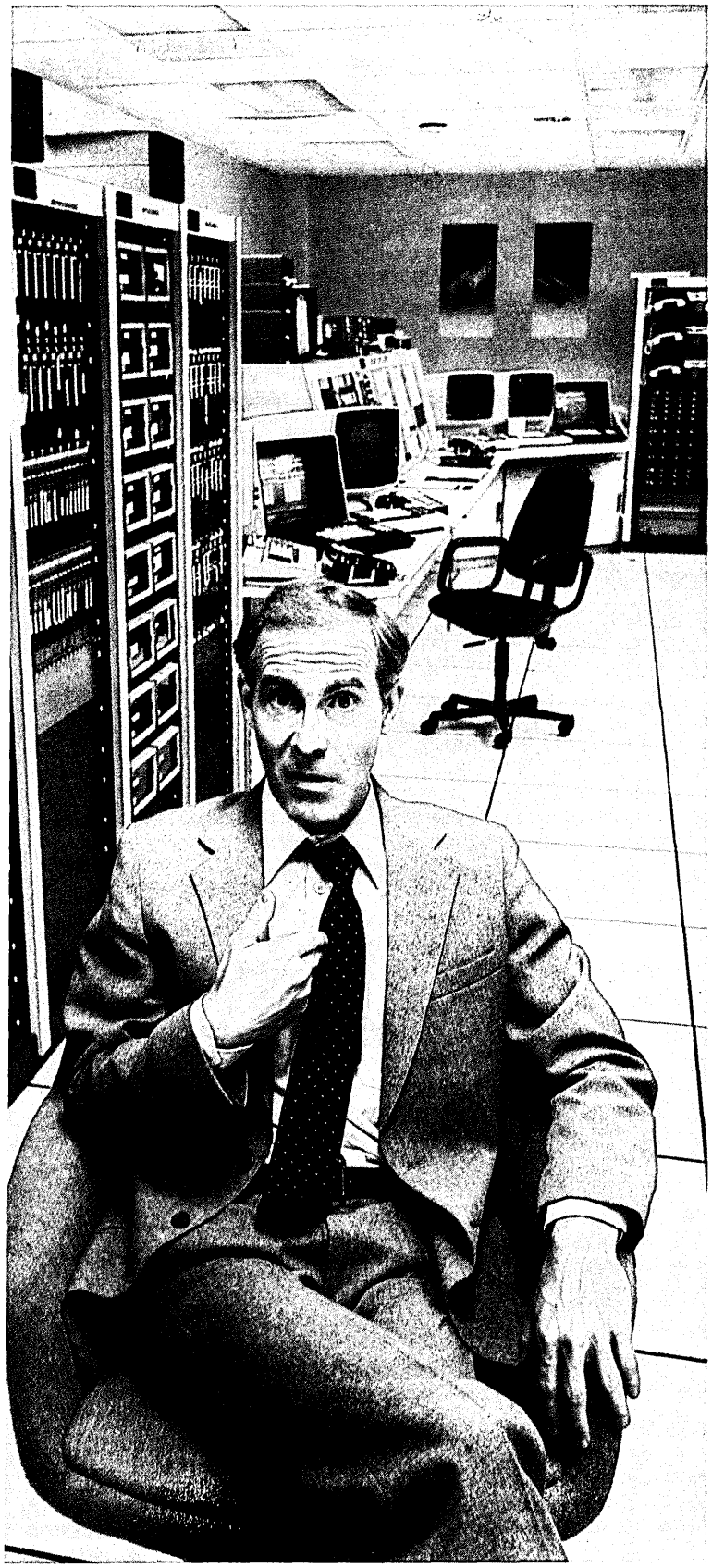
The regulated company manager feels IBM will grow in communications though he doesn't use the giant as a communications supplier now. "Given such external influences as the absence of strict antitrust laws, they'll increase their market."

Meyer of the City of Los Angeles says his bureau is "slowly building up local area networks and we'll be looking to IBM or somebody else to help us combine voice, data, and images. We own a lot of our own communications facilities. We have our own microwave system and our own cable tv."

The Burbank Studios' Gallagher doesn't use IBM as a communications vendor now but he says, "If I believe all of the articles I read, I can expect to be talking to them in less than five years."

Mosier of the Los Angeles Water &

When this D.P. Manager asked for a Computer Environmental Data Acquisition System, we told him to build it himself.



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Most of our managers feel IBM will be a major contender in communications through 1990.

Power isn't sure at all where he and IBM will stand in communications over the next few years. "We have enough communications problems of our own to mask what outside vendors are doing. I can't see that too clearly."

Salt River's Jacobs feels IBM "will be good competition for AT&T in good time. We use their modems, front-end processors, and their communications software now, and we're very satisfied."

Most of our managers see a changing role for their mainframe computers, but not necessarily a diminishing one. In the future, says Synnott, "the mainframe will be used primarily to run corporate systems, systems that span the corporation to support end-user computing, and as a database repository. Also, it still will be used to run major applications systems."

Hancock says Wells Fargo has "distributed a good bit of data processing to user areas. As you do that you normally tend to down-size the equipment. Over time, utilities will decrease in size but in five years they will not go away. Hardware costs are coming down and technology is permitting manufacturers to build more powerful equipment. Data requirements continue to grow, requiring more power. The footprint will be smaller but the power will go up."

As data requirements increase, says the regulated company's manager, "mainframes will become vehicles to house data—they will be bulk data storage facilities."

The City of Los Angeles's Meyer sees the mainframe of the future as "basically a reservoir for data. It will provide certain central services like security, conversions of databases, maintenance of databases and all that entails, and electronic mail distribution."

"I believe the role of the mainframe has changed right now," says Prutch of Martin Marietta, "and it will continue to change to do more and more file maintenance, number crunching, and database management rather than a mixture of everything. It'll be used in an inquiry mode."

Gallagher says he feels "the role of the mainframe has changed a lot in the last two years. What with communications and a lot more pcs, the mainframe becomes a large corporate database with a lot of work out in the user area."

Cox of City National Bank says, "The great thing that's happening is micro to mainframe. We're going in that direction. The next level is more communications and that's where it's going. We'll never do away with the mainframe. It has the capacity to store so much data and for immediate access because they're stored in disk format."

SHIRLEY PRUTCH, Martin Marietta

Synnott looks for "a real proliferation of micros and workstations, but as managerial aids. They will not take processing away from the mainframe."

"We're going to see a lot more pcs," says Gallagher, who says they have between 50 and 60 IBM PCs at the Burbank Studio. "They're going to take a lot of work out into the user area."

CAN'T FORETELL FUTURE

Horan of Aetna, reluctant to look too far ahead, says, "Five years is a long time in this business; one can never tell what will happen. There will be a range of smaller machines. I see pcs getting bigger and minis getting cheaper and a lot more use of both of those. The role of the mainframe will diminish in terms of share of the total amount of processing. I think right now there are more MIPS outside of the data centers than in."

"When IBM got into pcs," says Prutch, "a lot of people said, 'hey wait, they're too late,' but suddenly they began to take notice of what could be done with pcs, done by managing pcs."

IBM, she adds, "is a barometer. If they get into something, we sure as heck better take a look at it." She also feels that "with the new areas they're going into, we should get a better feel for the kind of architecture we need. As they get into new areas, they give us a better picture of what we need, a better perspective. People are tending to rely more and more on them."

Prutch considers IBM "on the whole, a very good vendor. You have to keep in mind that they're not in business for the good of the world but to make money, which we sometimes forget. If you have your plans in line, they're receptive to ideas."

Meyer of the City of Los Angeles feels MIS managers are having to depend less on vendors and more on themselves. "The whole information systems market is changing. There are a lot more low-cost items out there and we are having to become specialists. It will continue to change. We have to be able to determine exactly what we need, to configure pieces of equipment where we used to depend on the vendor to do this for us. There are a lot of little items that don't have the profit margins to warrant a lot of help. There are more and more areas where you can't get service except at the depot level where you have to take it in."

Since 1955, IBM users have banded together in user groups (see "United We Stand," April 1, p. 95). Myerley of Cities Service was active in one of these, GUIDE, until he resigned from its board of directors last year. "I think associations like GUIDE are vitally important in getting the voice of the data processing community back to IBM and other vendors," he says. "They're critical to making sure the vendors understand."

Schneider of Tektronix would like to have IBM understand the need "for software utility capability compatible with SNA for bulk storage."

Horan of Aetna hopes IBM will work on "interconnectivity so that all of their products can talk to each other and pass data back and forth." He runs both MVS and MVS XA and feels that the XA operating system has given him more virtual storage in applications where that had been a constraint with MVS. Horan's is not an all-blue shop. In addition to IBM, Amdahl, Storage Technology, and Xerox are suppliers to Aetna.

Of all the expectations for the next five years expressed by our group, the simplest came from Prutch: "I expect the same but better." ◉

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IBM® Software Notes
News for the DP professional

BancOhio is constantly improving its products and services, with help from IBM's DB2.

Managers at BancOhio Are Banking on DB2

"DATABASE 2 (DB2) is an efficient vehicle for providing our top management with financial and analytic details," says Jack Kiger, Vice President and Director of Data Processing at BancOhio in Columbus, Ohio.

The bank, which has more than 250 branches throughout the state, has been testing DB2, IBM's full-function relational data base system, for a year and a half. "In that time, we did a 22 man-year MIS project in only 24 man-months," reports Kiger.

The key to this outstanding productivity is DB2's powerful Structured Query Language (SQL), which makes corporate data available—simply, economically and with full data security and control.

Through its Query Management Facility (QMF), DB2 provides end users with a friendly interface to SQL, including a full set of helps and prompts. With QMF, users can query the data base directly, ask the system to generate reports or create their *(continued next page)*

A NOTE TO THE READER

To keep you informed of software developments at IBM, we will publish *Software Notes* on a regular basis.

Software Notes will bring you news of programs that help make systems and people more productive. It will feature articles on high-productivity packages such as DB2, IBM's full-function relational data base system, and application development tools such as the Cross System Product Set. And it will tell you about users' experiences with IBM software.

We'll also let you know about new software courses and other IBM offerings that can help you get the most from your DP resources.

The Cross System Product Set Aids Programmers at Corning

Through an innovation in application development, Corning Glass Works, Corning, New York, has eliminated most of the detail work involved in conventional programming.

The innovation is the Cross System Product Set from IBM.

With this program, a developer can complete every phase of a project interactively at a terminal. This includes defining and validating screens, files and logic; testing and debugging a program; running trial executions and putting the application into production.

The Cross System Product Set is especially effective as a development facility for applications designed to run under CICS, or in distributed 4300 and 8100 systems.

According to Steve Grace, Supervisor of Application Development Technology at Corning, "The program's interactive nature and extensive debugging aids lend themselves to developing applications quickly and accurately."

What's more, the Cross System Product Set requires fewer special CICS skills on the part of the programmer.

Such features as trial screens and quick prototype executions improve communication between DP personnel and end users.

The program runs on all 4300 and 30XX series operating systems and on the IBM 8100 with DPPX/System Program. It's portable, so that an application developed on one supported system can be run on another.

Mr. Grace sums up the experience with the Cross System Product Set at Corning Glass like this: "As a result of its many benefits, we've been able to satisfy user requirements faster and more economically." ■

DB2 (continued)

own unplanned reports.

But DB2 is much more than an end-user product.

It's a full-function relational system that lets professional programmers develop complex applications with greatly improved productivity. It provides them with the facilities they need for backup, recovery, restart and security. These functions can be incorporated in an application by simple statements and need little explicit programming.

With these security provisions, transactions are well protected. This means that DB2 can handle online applications while maintaining the integrity of the corporate data resource.

Thus DB2 can meet the full range of needs. It can handle production work as well as end-user query and reporting services.

"Our experience with DB2 has been beneficial," Kiger adds. "From the standpoint of stability and ease of use, it's the best product IBM has delivered to us." ■

'Usability' Labs Help Make IBM Software Easy to Use

It's one thing to create software that works. It can be quite another to make that software easy for users to learn and operate, and to support it with documentation that's easy to follow.

Dr. Lewis Branscomb, IBM's chief scientist, puts it this way: "It shouldn't be necessary to read a 300-page book of instructions before using a computer, any more than it is before driving a new automobile."

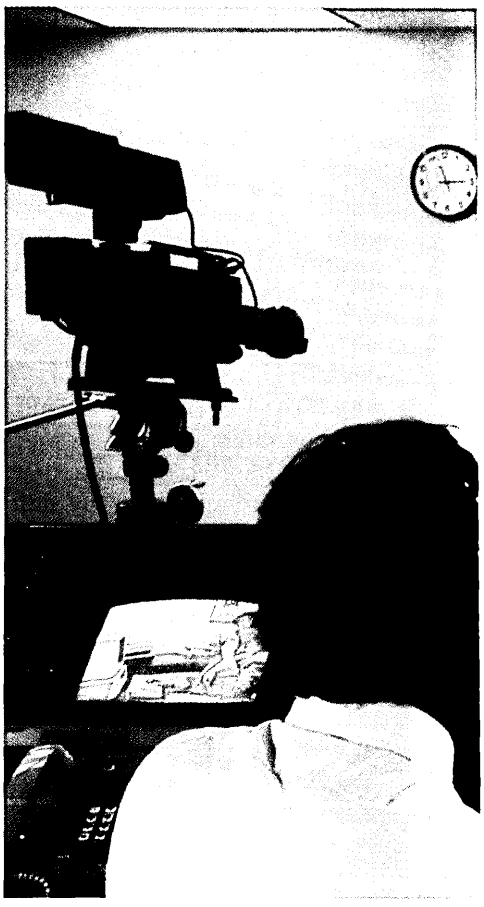
That's why, prior to release, IBM evaluates many pieces of software for "usability." We've taken a scientific approach to this process in Usability Laboratories located in cities across the United States.

The evaluators are people who have not had software experience.

In each lab, we've set up a complete office environment, attractively decorated and comfortably furnished. On each desk is an IBM workstation which supports the software to be evaluated.

Here, evaluators at the workstations are handed the instruction manuals and assigned the task of putting a piece of software through its paces. As each evaluator works, he or she is observed and recorded. Every interaction on the workstation screen is recorded too.

Through this feedback we've learned a lot about our software—and our documentation. We've also made software, such as the IBM Business Management Series, a lot simpler to use. ■



Evaluator (rear) works with a piece of IBM software. Observers (foreground) note her efforts and record them for study.

RACF Helps Protect Data At United Student Aid Funds

"We are pleased with the enhancements of the IBM Resource Access Control Facility (RACF)," says Dan Roddy, Manager of Data Center Support for United Student Aid Funds, Indianapolis, Indiana, a nonprofit corporation which guarantees and services student loans.

"In particular, a new system of resource definition in RACF, called 'generic profile checking,' makes administration much simpler. Most data sets can be protected using only the first-level qualifier," Roddy adds.

Profile checking is just one of the many features that make RACF easy to implement and maintain. Flexibility of design and structure is another. In addition, with RACF you need not modify your operating system or system-level software such as CICS, IMS, DB2 or HSM.

RACF uses list orientation, a simple technique for access control. With little effort, you can establish ownership and control over your resources. You can also designate who else may have access—and how much access.

RACF has built-in features which make it easy to demonstrate that the controls have worked.

Positive control, excellent security, simple maintenance and administration: These are the benefits that make RACF a widely accepted access control product. And RACF is designed to work closely with such IBM operating systems as MVS and MVS/XA. ■

VS COBOL II will be available in the first quarter of 1985. This major new COBOL product will let you compile programs to run above the 16-megabyte line in XA systems. And that includes CICS or IMS transactions.

IBM Offers Courses On IS Management

If you're interested in learning about management issues related to information systems, or in getting advice on training, or in just keeping current yourself, you'll be interested in the offerings of IBM's Information Systems Management Institute.

The institute offers over 38 courses in six information systems areas: Information Systems Planning, Applications Development, Service Management, Information Asset Protection, End User and Personal Computing, and Personal Development and Management.

The courses seek to help users increase their productivity in data processing. Lasting from two to five days, the courses are offered in over 25 cities and are taught by staff instructors who combine years of teaching with practical knowledge.

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1-1

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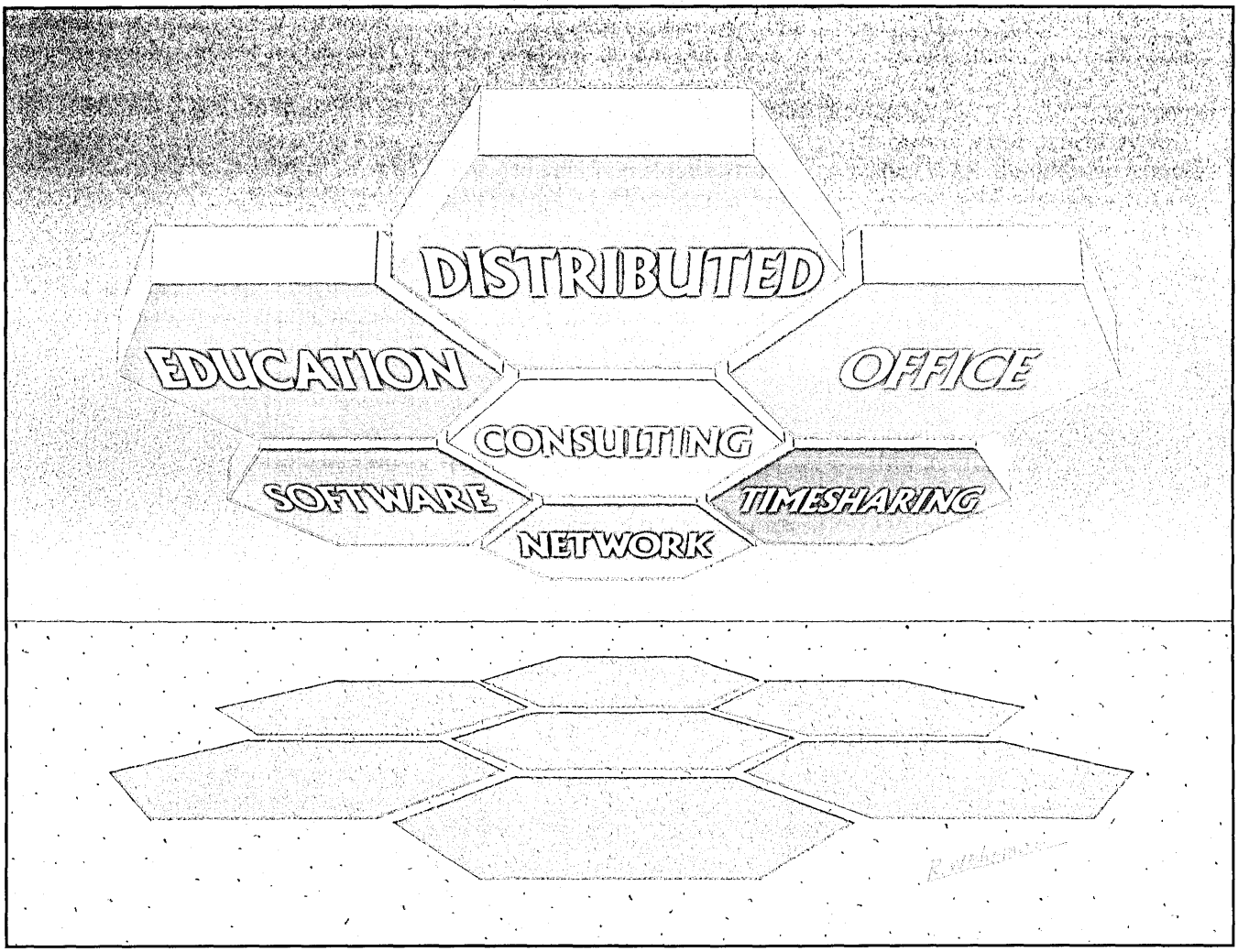

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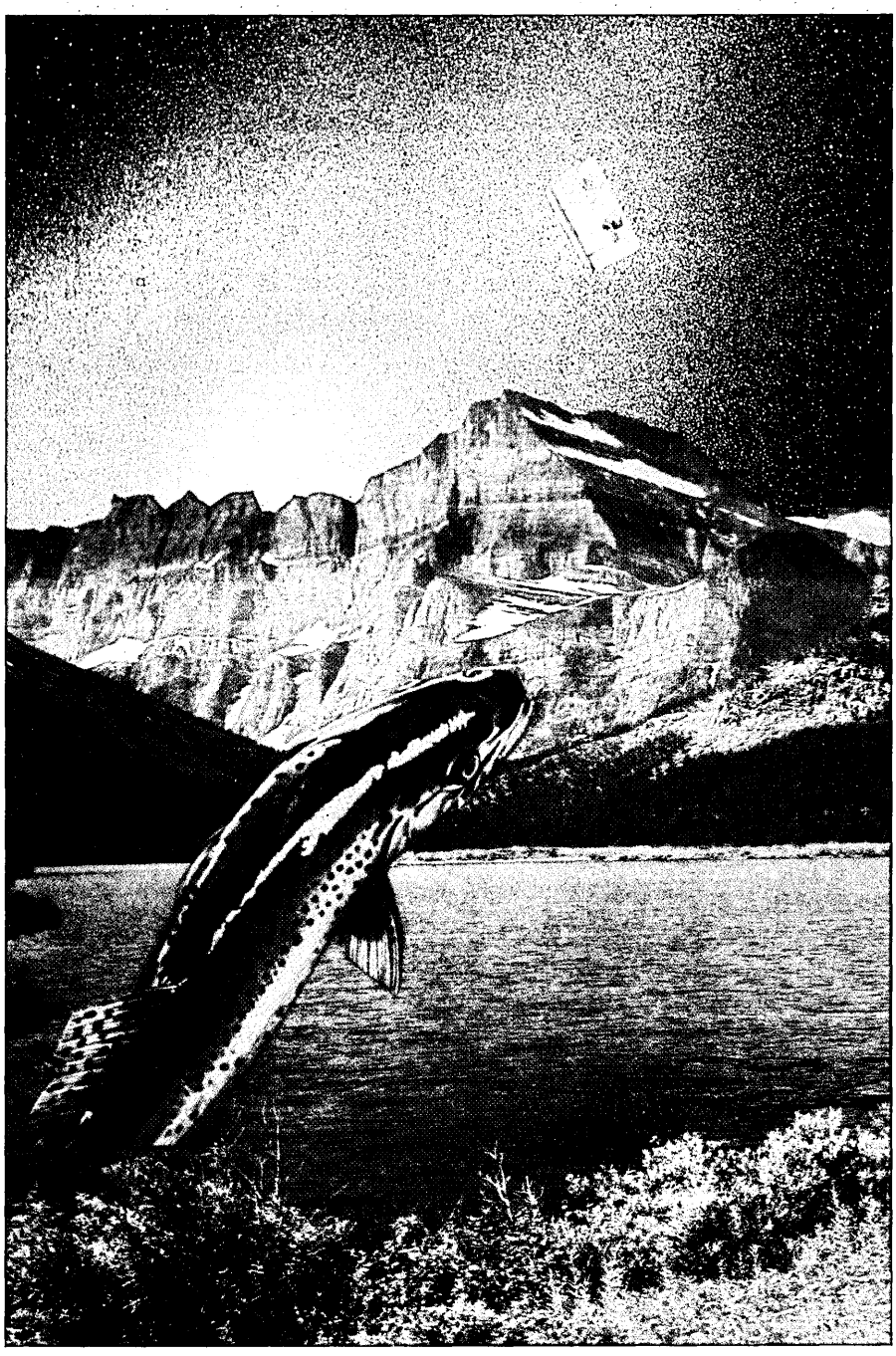
CIRCLE 49 ON READER CARD

A new, cohesive integrated architecture is expected to emerge within the next five years.

IBM: MAINFRAMES IN 1990

by Norman Weizer and Frederic Withington



COLLAGE BY MARK YANKUS

This forecast is based on an analysis of three factors: the needs of IBM's large customers; the potentials of technology, particularly the kinds most familiar to IBM; and IBM's self-interest. Although the forecast is unlikely to be correct in every detail, we believe its overall direction is accurate.

By 1990, IBM will have evolved an integrated architecture encompassing all its multiple product lines. This architecture will be based on the following components:

- the SNA overall communications architecture,
- the DCA document content architecture,
- the DIA document interchange architecture, and
- office and factory-floor local area communications architectures.

These integrated architectures will operate under an evolving MVS/XA umbrella with VM/CMS playing an important role for interfacing end users. According to its Feb. 23, 1984 guideline statement, IBM does not intend to implement these facilities in DOS/VSE. Therefore, by 1990 we expect DOS/VSE will have been stabilized and its use will be declining.

As the primary host operating system, MVS/XA is expected to be able to operate on mainframe systems composed of a variety of functional subsystems (see Fig. 1). The stabilized versions of DOS/VSE and the then-current version of VM/XA will thus remain operable as job entry subsystem (JES) or application processors under MVS/XA. The IBM modular mainframes will also permit IBM processors with older architectures to operate as subsystems. This will be especially useful for customers who resist conversion to the new architecture systems.

Within this overall architectural framework, DISOSS will be the primary subsystem for all document filing, search, retrieval, and output functions. While initially text-oriented, DISOSS is expected to evolve to have a full spectrum of integrated

Users will be able to choose degrees of increased cost to obtain increased levels of fault tolerance.

storage and retrieval capabilities, including ones for image, graphics, and voice (both limited voice recognition and speech synthesis). DISOSS is expected to provide compatible, revisable form document storage and interchange facilities for all of IBM's office automation systems.

PROFS will continue to evolve (under DISOSS) as an easy-to-use end-user subsystem in the evolved VM/XA environment. Its functions will be enhanced to encompass full revisable text interchange among the IBM multifunction workstations, as well as enhanced forms of the professional office automation functions it currently supports.

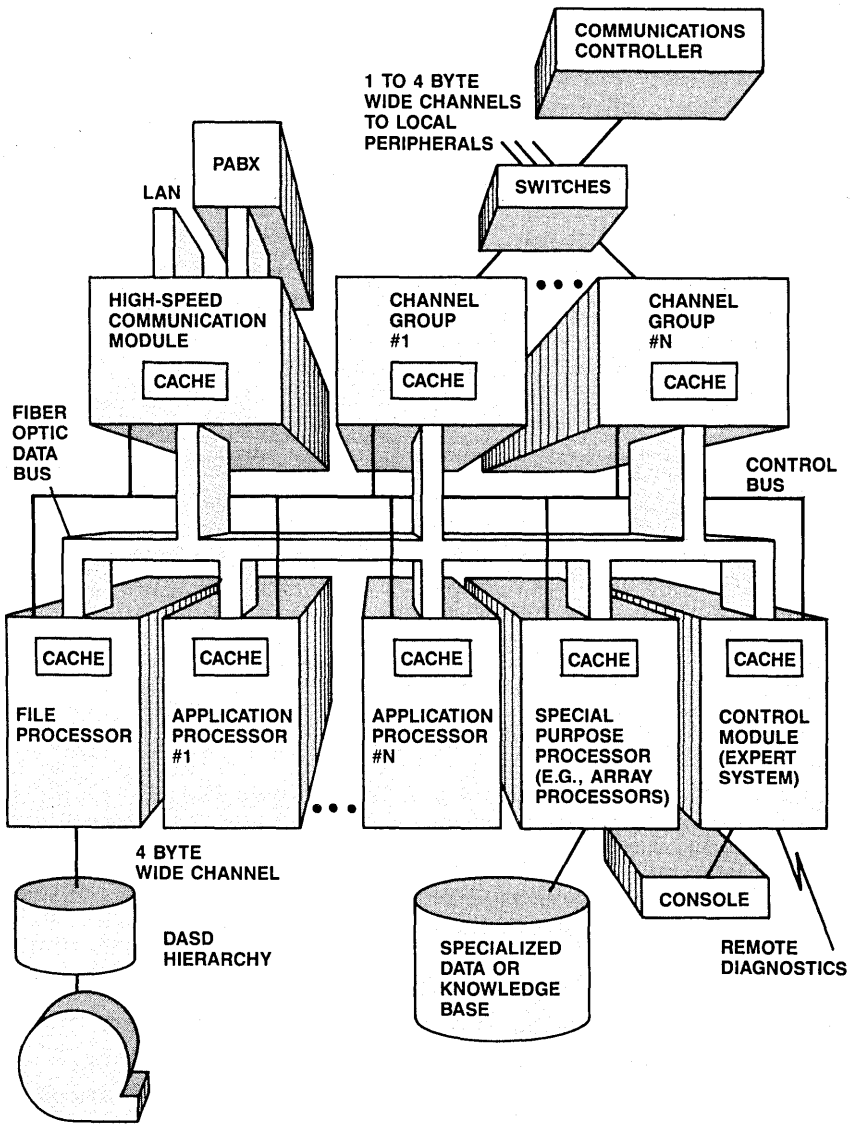
IBM's 1990 mainframe, then, will still play a central role in its overall architecture. It will be the central file manager and switch not only for data, but for objects in other media, and will of course retain its original role as a large scale batch and interactive processor when job sizes exceed the capabilities of network nodes.

By 1990, the electronic components available to IBM for use in its mainframes will cost no more than one tenth of current prices. Semiconductor memory chips, the largest of which now store 262,000 bits of information, will by then be storing 1 million to 4 million bits in the same area at about the same cost.

The cost of logic will also be lower. The 16-bit microprocessors now used in most personal computers have just passed the $10 price level; by 1993, they should be approaching $1 each. Similarly, 32-bit microprocessors with approximately four times the computing power will have dropped below the $10 level and will continue downward. These will be widely used throughout IBM's mainframes, and the still-needed higher-speed logic chips will also cost less.

FIG. 1

IBM 1990 MAINFRAME HARDWARE ARCHITECTURE



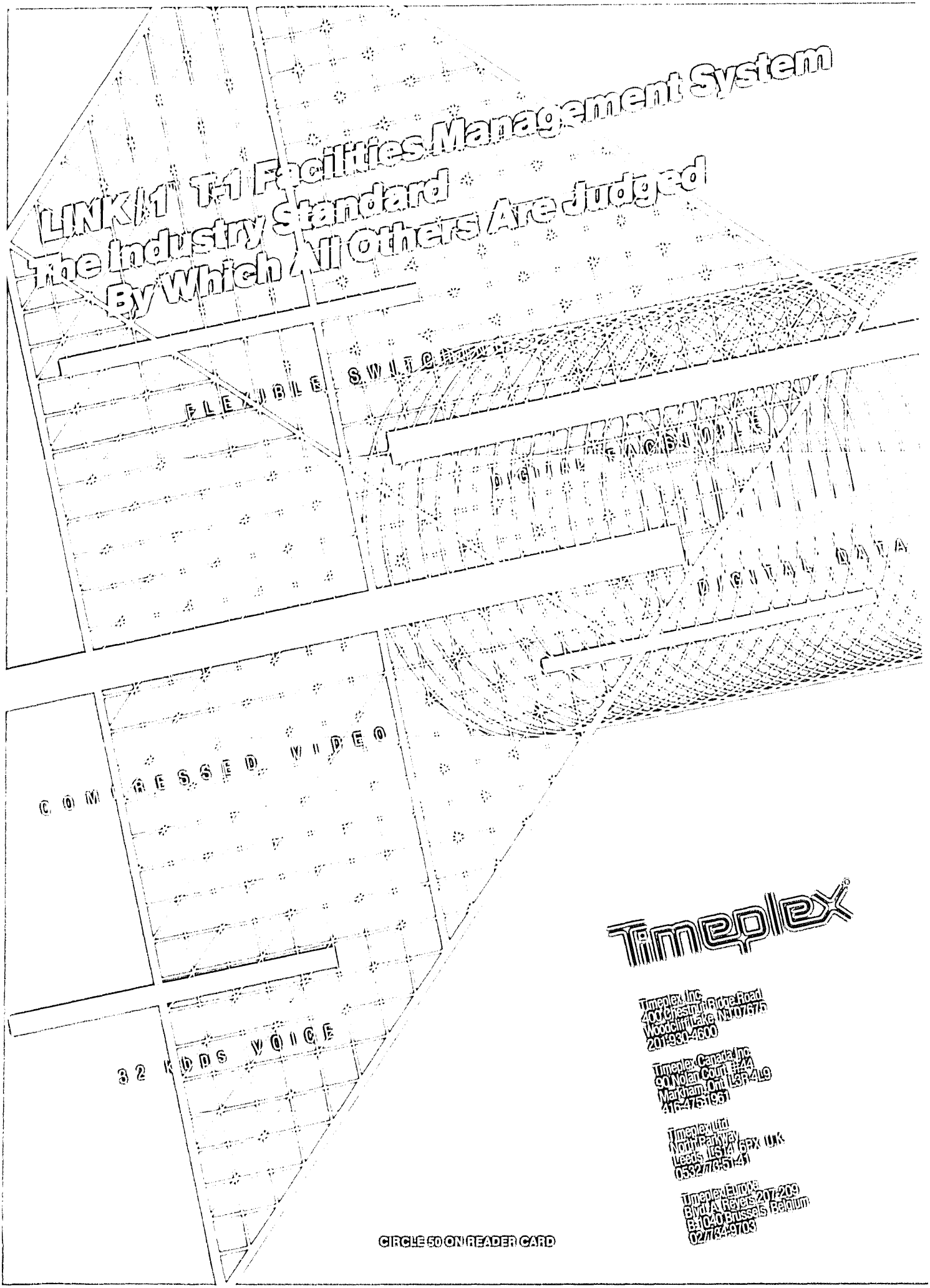
SOURCE: ARTHUR D. LITTLE, INC.

SPEED MAY IMPROVE FIVEFOLD

Speed may prove to be somewhat more of a constraint. Faster circuits require denser packing of circuit functions on the microchips, an arrangement that creates problems of signal strength, heat dissipation, and quality control. Gallium arsenide should be available as a substrate, however, together with smaller feature size and better cooling for silicon chips. We expect about a fivefold improvement in the speeds of the fastest routinely available electronics, and even higher performance with new technologies.

To take advantage of the low-cost but relatively low-speed components that will be available, IBM's mainframe system of 1990 will contain multiple processors dedicated to specific functions. Each processor will contain a very large cache (in excess of 1MB) that will in effect be a loosely coupled main storage facility. The specific function of each processor, e.g., the instruction set to be processed, will usually be determined by alterable microcode. The processors will communicate with one another via messages and data blocks in standard form, regardless of whether the content is a program, data, digitized text, image, or voice. The processors will also be able to back one another up, should any one of them fail (fail-safe). Fault tolerance will be available both at the system level and at the device and component level to accommodate the increasing demands of users for high system availability. Users will be able to choose degrees of increased cost to obtain increased levels of fault tolerance.

The largest mainframe models will be capable of supporting up to 16 general purpose processors as well as several special purpose processors. Smaller members of the mainframe product line will be able to support fewer and less capable processing subsystems.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CIRCLE 50 ON READER CARD

Exhaustive searches of large databases will be practical for the first time.

This mainframe-federated functional subsystem architecture will employ a fiber optic main data bus to interconnect the various functional elements, and probably a separate control bus.

Among the various optional functional subsystems offered in the product line will be

- several sizes of input-output processors,
- relational database processors and buffered file processors,
- application processors (for various programming language environments),
- array processor modules,
- image processors, and
- expert system modules.

Many of these modules will have hardware architectures specific to their intended tasks. Others will be software/microcode variants of the standard processing modules.

The input-output processors' sizes and characteristics will vary, including the capabilities of conventional channel groups and also new high-speed communication controllers. Among them they will be capable of communicating with several kinds of attached communications facilities and of switching messages between terminals (whether they contain data, text, digitized images, or voice). They will also control local batch input-output devices such as line printers, and existing DASD controllers if file processors are not used.

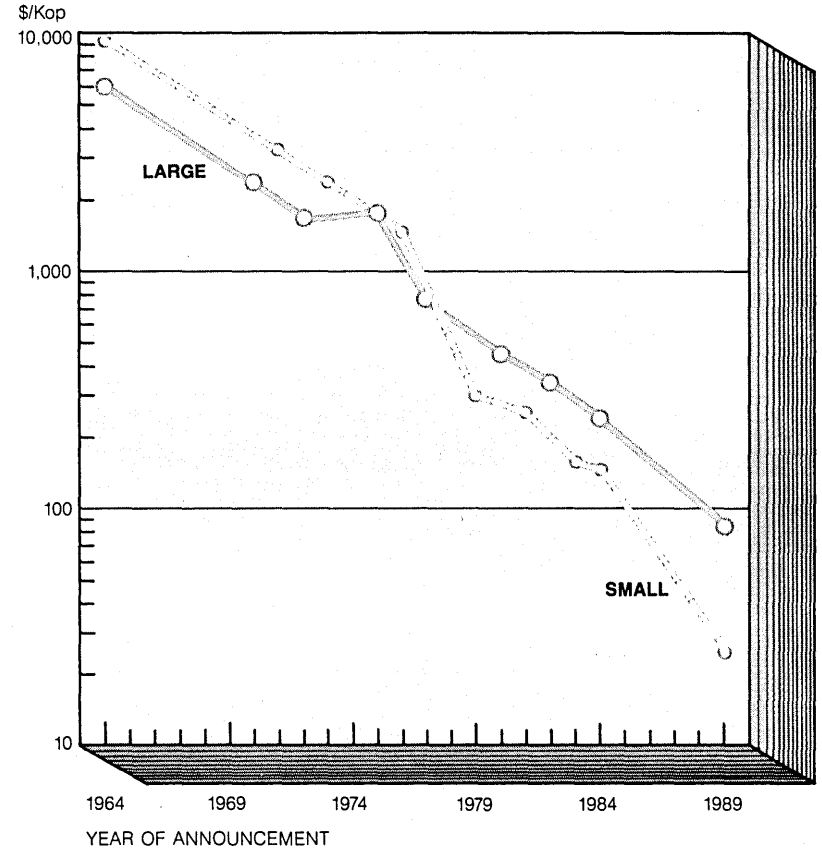
The application processors will be dedicated to particular computational environments. Some will be oriented to direct execution of programs written in specific programming languages (for example, COBOL or FORTRAN), while others will support problem-oriented languages (for simulation). Still others will run the software of obsolete machines. The orientation of each application processor will be specified by alterable microcode; within limits, the processor orientations can be changed via the supervisory processor to meet different workload requirements.

The database and file processors will evolve especially rapidly, based on evolution of the cache disk controllers (3880-21 and 23) and on hardware to support processing of relational databases.

FIG. 2

IBM: HISTORICAL PRICE PERFORMANCE

LARGE VS. SMALL MAINFRAMES



SOURCE: ARTHUR D. LITTLE, INC.

SPECIAL PROCESSOR VERSIONS

Also available for different kinds of applications will be specialized versions of file processors. Text, voice, and graphic data will be stored in the same databases as computational data, with unique query, search, and report generation routines to account for the special characteristics of the data processed.

One type of specialized file processor will emphasize high throughput to handle 1,000 to 5,000 file updates per second. (Today's largest general purpose computers have difficulty handling more than 1,000 updates per second.) This processor will involve sophisticated computer control to stage data up and down a hierarchy of storage devices with different access speeds (in accordance with patterns of use), and to handle a variety of storage devices arranged in parallel for simultaneous access. Such high-throughput storage systems will be useful in centers with the largest processing networks.

Other types of file processors will employ less structured methodologies so that associative or content-related inquiries can be made. These less structured file processors will be useful in office applications or research and information-retrieval applications. They will be useful in collecting and retrieving a variety of text and graphic materials, as well as data from a number of sources not subject to a common structure or indexing system. Such unstructured file processors are likely to evolve from the relational database software now available as programs for use in conventional computers. They will eventually employ arrays of microprocessors that will make exhaustive searches of large databases practical for the first time.

Other versions of file processing systems are possible for such things as voice or graphic information (which may be stored in noncoded forms). In the late 1980s and early 1990s, some processors will have special architectures adapted for artificial intelligence and/or data-driven applications.

In 1990, IBM will offer a broad family of these modular systems. This family will be headed by a tightly coupled confederation of very high speed general and special purpose processors with an aggregate processing power of over 100MIPS; the low end will extend down to workstations with

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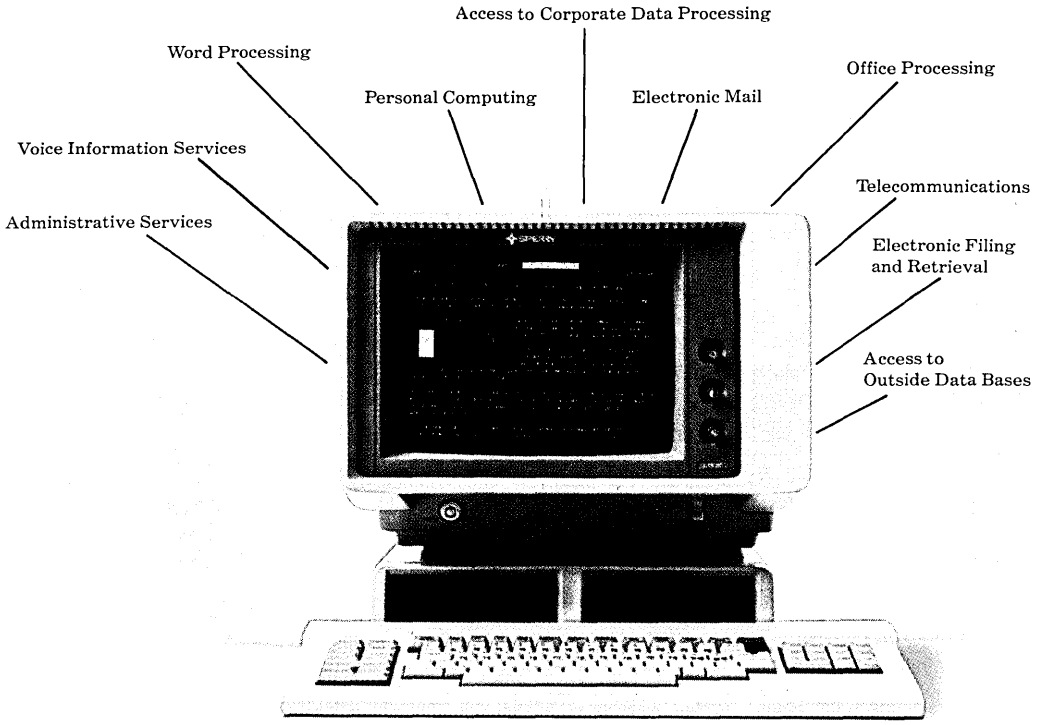

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SPERRY

CIRCLE 51 ON READER CARD

Integration of the DBMS and other software will form a unified applications development and operations environment.

processing power of approximately 1MIPS.

As shown in Fig. 2, IBM's current mainframe product line is characterized by two distinct price/performance levels. At the low end (4300), the systems average approximately $150/KIPS (one thousandth MIPS). At the high end (308X), the systems average approximately $250/KIPS. According to these price/performance trends, we project that in 1990, the low-end systems will be priced at approximately $20/KIPS and the high end at approximately $80/KIPS. The small systems pricing advantage will primarily be due to the lower performance components needed at the low end of the mainframe line, and the higher level of manufacturing automation that can be applied to production of smaller systems.

These prices are exclusive of separately priced system programs. By 1990, most IBM mainframe users will likely pay more on a life cycle basis for system programs than they do for hardware.

MVS/XA will form the primary system software environment for IBM mainframes in 1990. The current MVS/XA product will, however, be significantly modified between now and then. Most of the changes will take the form of additional and enhanced capabilities. IBM will be careful to change the existing program and JCL interfaces as little as possible to minimize customer compatibility and migration problems.

We expect the major MVS enhancements to include

- the addition of more functional subsystem capabilities,
- the addition of autonomous monitors to operate the various functional subsystems,
- the migration of increased amounts of code into the microcode of the various functional subsystems.

These enhancements will be needed because the operating systems accompanying modular computers must also become modular. Already, MVS/XA is undergoing a long-term, gradual transition from an easily identified, integrated collection of software to modular software and microcode-implemented sets of elementary functions whose major purpose is to allocate and control subsystem resources on a millisecond-by-millisecond basis. Since the user and his application software are far more sensitive to changes in the operating system than they are to changes in the hardware, this transition has to be a long and gradual one, avoiding major discontinuities or conversions, whenever possible.

MICROCODE ASSISTS A TREND

Microcode assists have appeared primarily to speed up processing. Although many of these assists are not necessary for operating the system, a trend toward making the assists a prerequisite for higher-level software is becoming more marked.

System interfaces are beginning to disappear from the user's view, being replaced by easier-to-use, more logical interfaces in the higher-level support software systems.

During normal operations, the operator's interaction with the system will be primarily to mount and dismount removable printing and storage media. Other interactions will take place only in the event of unusual situations like the failure of one or more of the major components of the system.

Most operators, except those involved with physical media, will probably be located in an operations control center away from the computers. Expert system components such as IBM's YES/MVS will be used to implement overall system scheduling and configuration policies.

These operating systems will be completely self-sufficient. Other than management-level priority setting, they will require no human intervention. Within the computers, operations will be almost completely implemented in microcode of one type or another; the remaining software will function primarily at the supervisory level. Any modifications made on the operating system will probably void any system warranties.

We anticipate that existing database management software will continue to evolve along with the file processors discussed above. Emphasis will be on integrating the DBMS with other software to form a unified applications development and operations environment. In addition to the DBMS, four important parts of this environment are the data dictionary, the application generator (for producing transaction processing programs), the end-user language for ad hoc inquiry and small database applications, and the extract relational database system. Downloading of data from the mainframe hierarchical and/or extract relational DBMS to personal computers and back again is already a reality; this facility will be enhanced in the coming years.

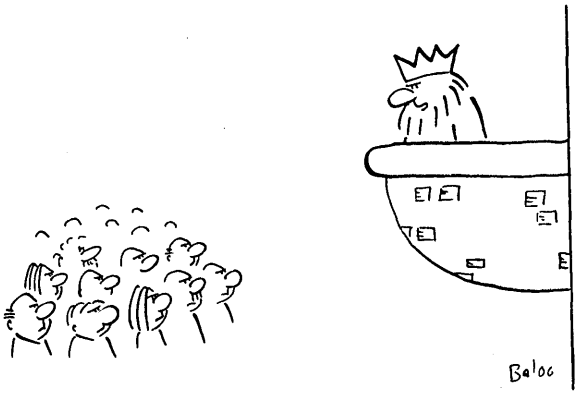
Relational database systems will evolve quickly over the next several years, now that DB2 and SQL are mature products. They will be used as accessory DBMS for mainline hierarchical DBMS systems (and sometimes as the main system) in mainframes, as well as in file processors for offices.

By 1990 IBM's hierarchical database IMS (DC/DB) will be mature. By that time CICS DL/1 is expected to be the primary system with IMS DC/DB relegated to a secondary role. In many cases, however, DB2 or a successor product will be the primary database system for at least most new applications. By that time, most of the current relational database inefficiencies will undoubtedly have been corrected or will be unimportant.

Where DB2 does not have the primary role, it will be heavily used as a major professional computing and office automation database. In this role it will contain data extracted and/or summarized from the main DL/1 corporate databases. Such data, which are much more useful to most end users, will form the basis of most non-operational applications.

The use of such an extract database will have the effect of protecting the security, usability, availability, and integrity of the main operational databases.

Integrated development environments oriented toward data dictionaries will be heavily used. These environments



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CARTOON BY REX F. MAY

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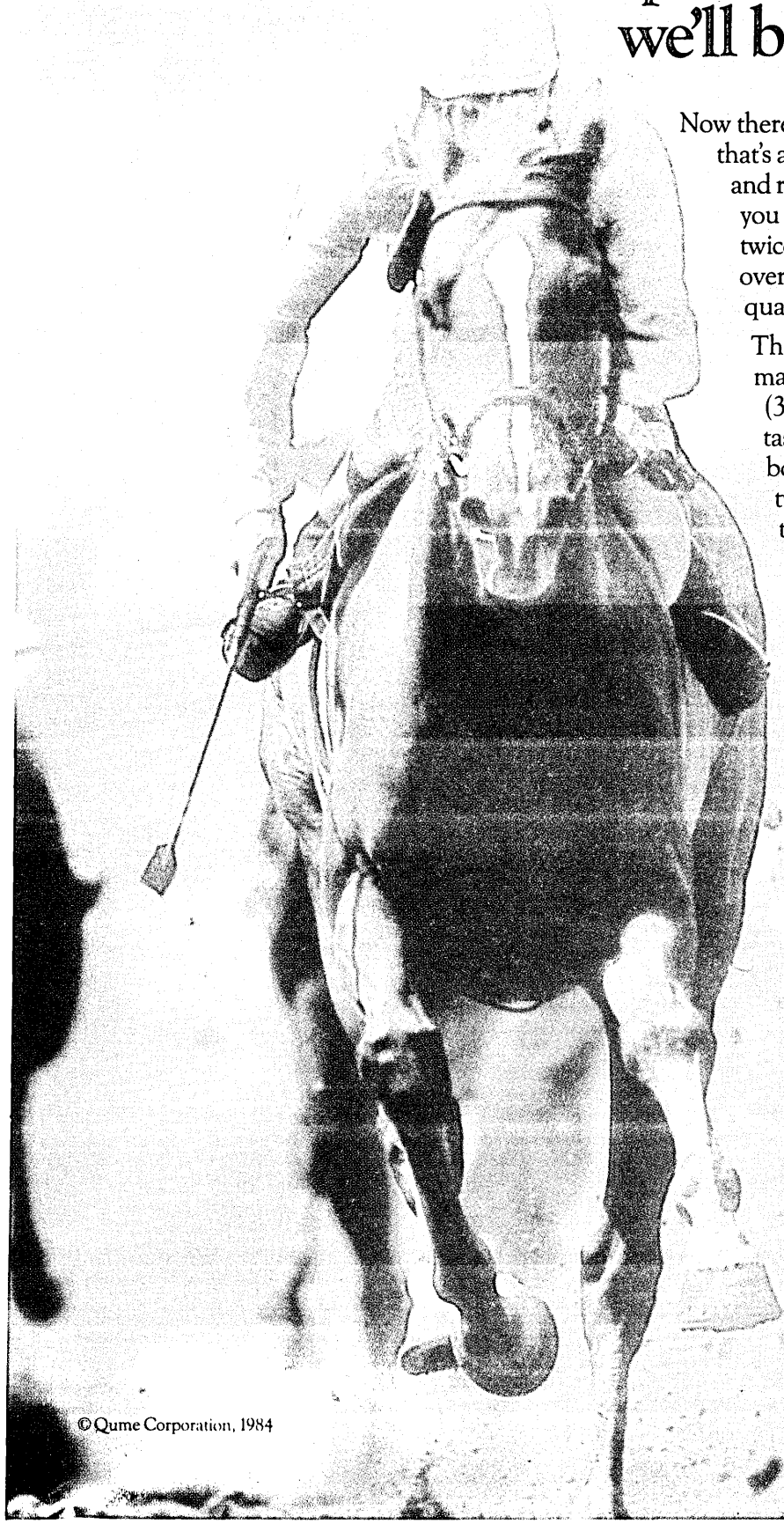

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CIRCLE 52 ON READER CARD

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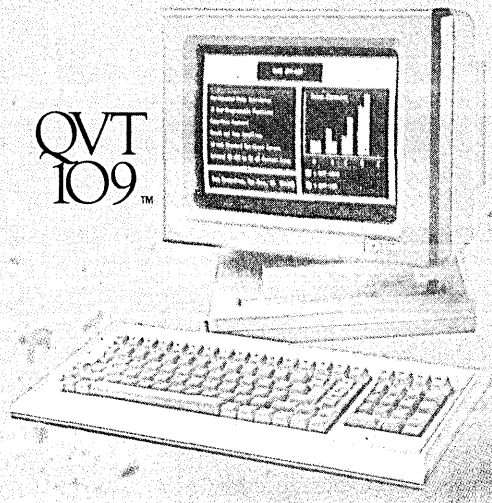

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The new architecture will allow mainframes to be incrementally updated and enhanced with the specific modules required.

will contain a mature set of integrated development, project management, and documentation tools.

4 GL WILL IMPROVE BY 1990

Fourth generation languages will have been improved significantly by 1990. They will be employed primarily for user-driven systems where their efficiency and self-structuring limitations are more than offset by their advantages of ease and speed of development. The primary reason for using these packages will be to obtain greater user satisfaction with the finished system than can be obtained with other development methodologies.

By 1990, professional computing tools will have proliferated. The emphasis in these tools will be on information retrieval and management, rather than on number crunching. Compatibility and interaction between the workstation environment and the mainframe environment will be stressed. Many applications will be written in two or more parts, with each part intended to run in a different environment.

IBM will continue to stress professional solutions that involve the use of mainframes. Development tools will be provided for professional mainframe programmers so they can set up menus and batch workstreams for workstation users. In turn, these users will lead other users through the more complex workstation applications without long periods of user training.

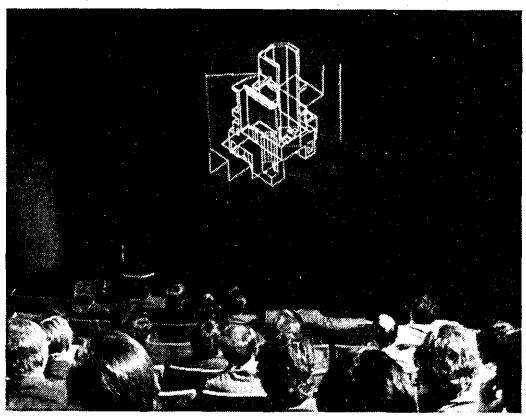
We also expect expert systems from IBM to be of increasing importance for specialized applications. These systems will not be in widespread general purpose use by 1990, but will be important where they can be successfully applied.

These changes in mainframe architecture and price performance will have significant implications for users' information processing systems. Special-function-oriented mainframes will be common with significant capabilities in one area, such as file processing, and little capability in another area, such as scientific computing. Thus large users will be able to economically configure special purpose processors that can be distributed to departmental locations without special environments.

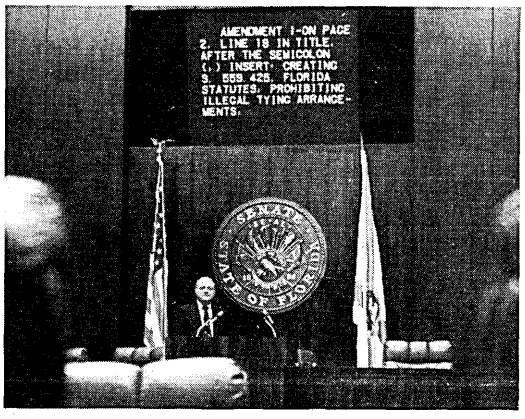
The new architecture will also allow mainframes to be incrementally updated and enhanced with the specific modules required. Complete computer systems will rarely be replaced. Modules will often be replaced, however, and plug-compatible, specialized modules will be offered by small vendors. The significance of these 1990 mainframes to the industry's competitive structure has yet to be determined, but it appears that as many doors will be opened as are closed. ◉

Norman Weizer is a senior member of the consulting staff at Arthur D. Little Inc., Cambridge, Mass., where he specializes in technology forecasting, information processing system design, and strategies for participants in the information processing industry. During his 25 years in the dp industry, he has helped design three generations of systems.

Ted Withington is a vice president of Arthur D. Little Inc. A longtime DATAMATION adviser, he has written four books and over 30 articles and papers.



COMPUTER-AIDED DESIGN displayed by General Electric projector is viewed by Engineering Society of Detroit.



WORDS "PUNCHED UP" by clerk of Florida State Senate are inspected carefully before a vote.

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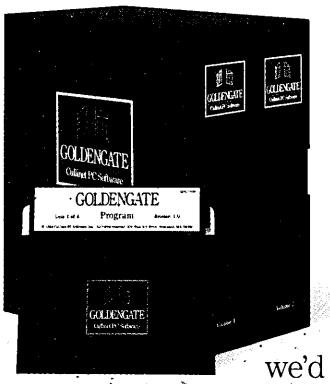
GENERAL ELECTRIC

CIRCLE 53 ON READER CARD

The pc software to use if you have IDMS/R.



At last count, there were more than 50 integrated personal computer software packages. But for companies with IDMS/R, we'd like to suggest that only one really makes sense.

GOLDENGATE,™ Cullinet's pc software package, integrates seven components: database, spreadsheet, graphics, document processing, 3270 terminal emulation, asynchronous communication, and information manager. While the software is exceptional on a standalone basis, it offers an added benefit to pc users in an IDMS/R environment—true micro-to-mainframe integration.

Through the Information Database (IDB), the Cullinet software product that serves as a foundation for corporate information management, a GOLDENGATE user can have direct "transparent" access to all data stored in the IDMS/R database. Indeed, with GOLDENGATE, accessing corporate data is indistinguishable from accessing data on a diskette.

The Complete Software Solution
Decision Support Applications Database

To find out more about GOLDENGATE, IDB and other components of our complete approach to information management, attend a Cullinet Seminar. To make arrangements, phone, toll-free, 1-800-225-9930. In MA, the number is 617-329-7700.

The pc software to use if you don't have IDMS/R.

How does GOLDENGATE™ stack up against the more than 50 competitive integrated pc software packages on the market today? With all due respect to those other packages, we'd like to suggest that it stacks up best.

GOLDENGATE's superior functionality results from its unique architecture. Each function in the program is designed to provide an optimum working environment. And each is linked to the others through core software.

The result is a functionally rich integrated pc package for business professionals. GOLDENGATE integrates spreadsheet, database, word processing, graphics and telecommunications capabilities. For use with databases other than IDMS/R, GOLDENGATE has a unique capability in combination with a standalone version of the Information Database (IDB) from Cullinet, a remarkable ability to effect effortless micro-to-mainframe integration. Integration so direct and transparent it allows the user immediate access to corporate data as needed.

GOLDENGATE, the integrated software that works better, because each of its components work better.

To find out more, we encourage you to attend a Cullinet Seminar. To make arrangements, phone, toll-free, 1-800-225-9930. In MA, the number is 617-329-7700.

Cullinet

We understand business better than any software company in business.

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CIRCLE 54 ON READER CARD

How to be in 16 places

...at once.

With Northern Telecom's unique multi-tasking capability, you can perform a multitude of jobs—simultaneously.

Now your staff can work on spreadsheets, move to word processing, shift to personal computing, then access data and communicate, without missing a beat. No more time-consuming interruptions. Thanks to the unique multi-tasking capability of Northern Telecom's 500 Series Office Information Systems.

With our unique access feature, your staff can leave any application at any point and move to another—and another—while the original task is processed through completion. In fact, the 500 Series will keep track of as many as 16 running programs at once!

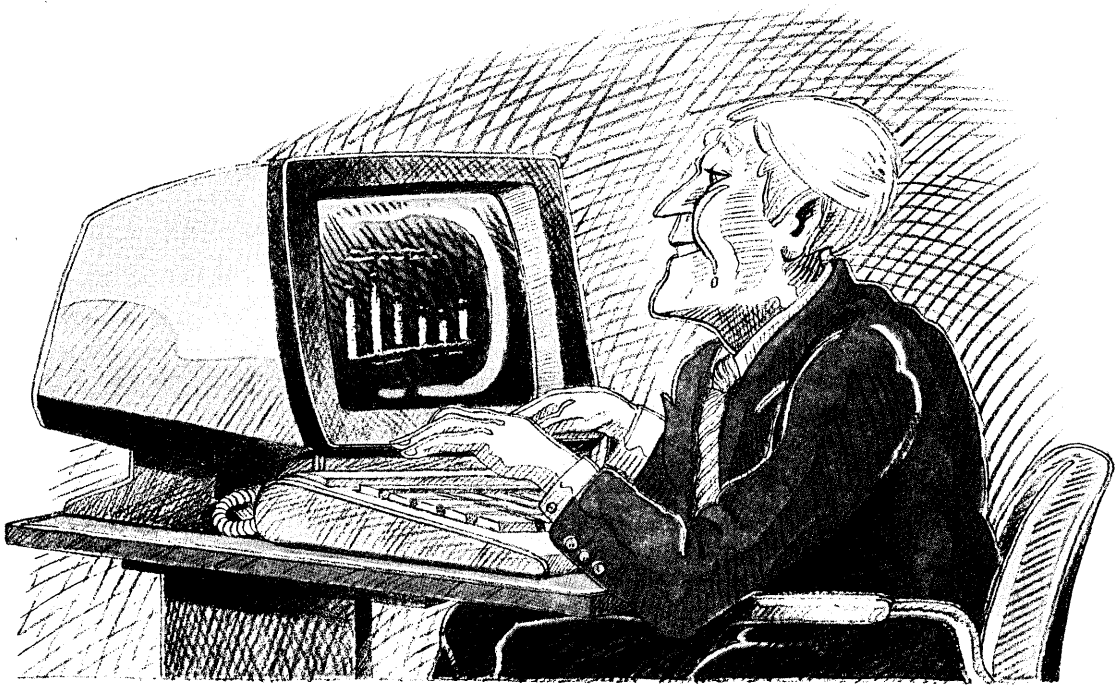
Northern Telecom's 500 Series Information Systems also have outstanding communications capabilities. Besides being compatible with each other, they communicate with a multitude of mainframes, including IBM, Burroughs and CDC. They also talk to other minis and even micros such as IBM PC's and Apple.

Our multi-tasking capability allows for up to 16 users to access common files—send or retrieve—from across the hall or across the country. So your people spend less time researching, duplicating efforts and conducting meetings.

Let us show you how easy and cost-effective it is to be in 16 places at once.

Write Northern Telecom Inc., 9705 Data Park, P.O. Box 1222—T-240, Minnetonka, MN 55440; or call **1-800-331-3113.** (In Minnesota, call 612-932-8223.)

nt northern telecom



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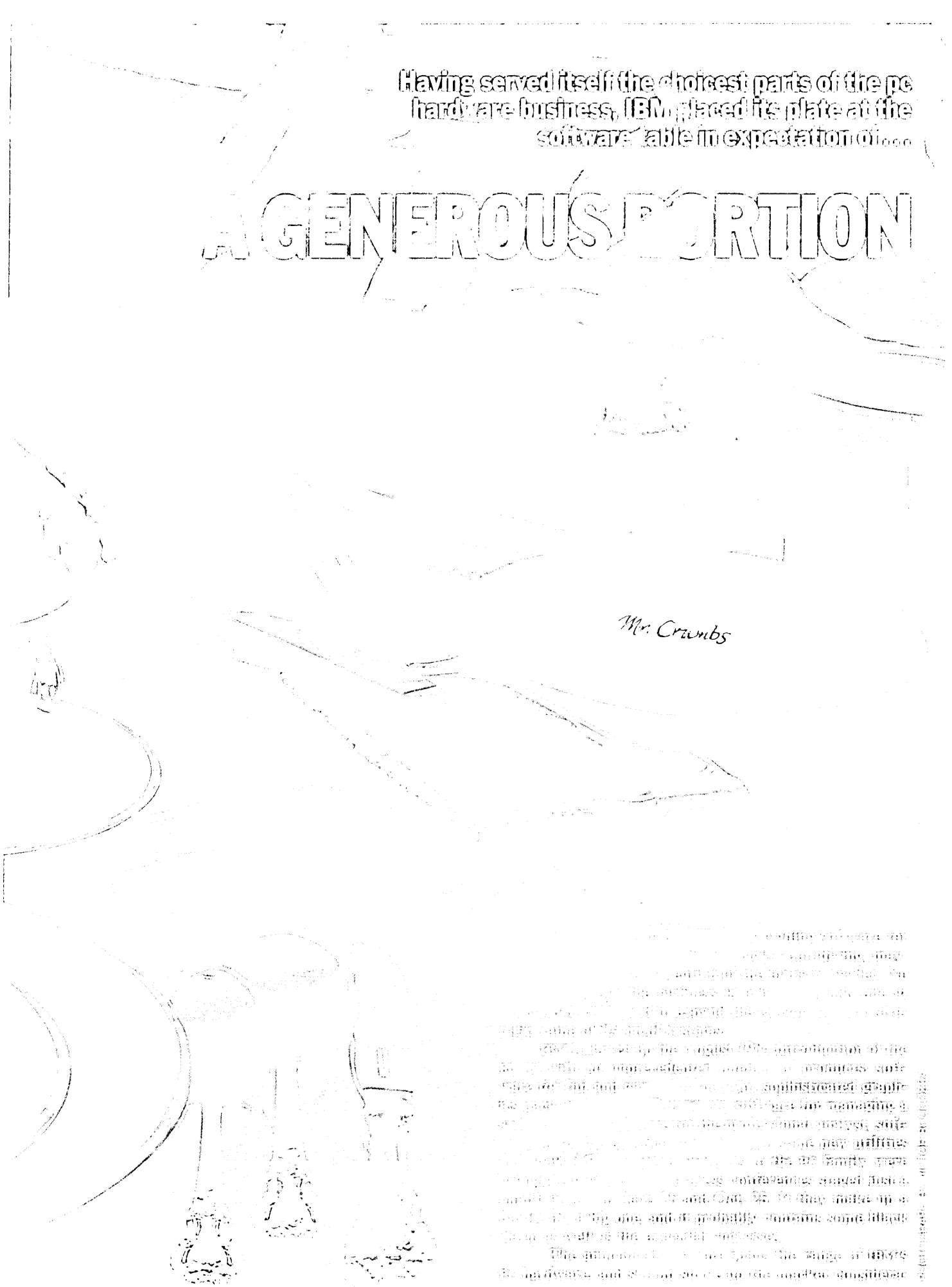
CIRCLE 68 ON READER CARD

Mr. Akers

Having served itself the choicest parts of the pe
hardware business, IBM placed its plate at the
software table in expectation of...

A GENEROUS PORTION



IBM still wants to be the company that lets you sleep well at night—even if you have a small computer.

bly—especially for Ashton-Tate and Lotus, the current biggies in the field. The software strategy looks a lot like the one the company used for PC hardware. Other developers have tested the market; now that it's proven and profitable, IBM has jumped in (see "A Game Without Rules," Nov. 15, p. 58).

For some time now, IBM has been selling "vendor logo" software. These are products developed by third parties to IBM specifications. Examples include the BPI Accounting Series, Graphwriter, InfoStar, Tax Decisions, and many others. IBM's willingness to experiment with developers reflects the PC's original open architecture. But IBM is less open now. The new software announcements are all products that have been developed internally by experienced software groups.

One measure of IBM's commitment is the fact that it has switched mainframe or mini software teams to new PC software groups. For the most part, they are producing software intended for a "host" environment (the word mainframe seems to have vanished from the IBM lexicon). Although the development may take place at almost any IBM location, the software is announced and released by the Entry System Division in Boca Raton, Fla., (the "product owner" of the PC) and the Information Systems Group in Rye Brook, N.Y., which handles the XT 370 and 3270.

In the splashy Sept. 25 announcement, IBM listed 31 integrated packages. For corporate analysts, there's the Personal Decision Series—five programs centered on a data management program called "Data Edition." The other editions are Reports+, Graphs Edition, Words Edition, Plans Edition (the spreadsheet), and Plans+ Edition. The Personal Decision Series competes with much of the software currently popular with business professionals (e.g., Lotus 1-2-3, Ashton-Tate's dBase II). The prices run from $150 to $250 per module.

IBM is offering the packages in this series (and each edition) for use alone or together. You can start out with just the Data Edition or just the General Ledger, and end up with everything—and the ability to merge accounting information into spreadsheet analysis data.

The Personal Decision Series is being promoted as a set of productivity tools that can help you make business decisions. There is a rich list of functions for each edition. The Plans module provides "what if" modeling and spreadsheet analysis with graphics and formatted reports. There are audit trails and powerful built-in calculation functions that will dazzle number people. Throughout the Decision Series, the software *looks* great. There is nice use of color on the screens, good graphics, easy-to-use menus, and generally good user interfaces.

Is it better than 1-2-3 and Symphony? It may be, and it may not even need to be. One IBMer I talked to said he thought Symphony had a marketing problem because it cannot be explained succinctly. IBM has been extraordinarily clever in coming up with one-liners to explain this series, and the company's name and marketing skills may be the edge needed to outsell the competition.

Even more impressive is the Business Management Series, intended for the small-businessperson. It consists of six programs: General Ledger, Accounts Payable, Accounts Receivable, Payroll, Order Entry and Invoicing, and Inventory Accounting. The Series was developed by IBMers in Atlanta who have also developed software for the System 23 Datamaster. Each module will be sold at $695.

SOLVING BUSINESS PROBLEMS

IBM never forgets its audience, and the demonstration diskette for this series emphasizes how the software will solve business problems. The feature list is comprehensive. Accountants will love it and recommend it to their clients. The theory that excellent programmers find accounting programs dull, and generally refuse to work on them, seems not to apply here. IBM apparently assigned the very best programmers and accounting experts to develop this series. The result is first-rate—in terms of features, auditability, expansion, understanding, and operational ease.

IBM didn't stop with software. There is also a book called *The IBM Guide to Choosing Business Software,* which explains accounting procedures and then leads the reader into choosing packages (guess whose?). There's a Training Edition, diskette tutorials that teach you how to use the software. Last but not least there is IBM Extended Support, a program that costs from $125 to $275 annually and includes an 800 number for answers to queries, program maintenance service, and journals that provide tips and techniques on using the programs. For an additional charge, users can receive updates to each program product.

The Extended Support Program is an example of IBM's new marketing and support direction for PC users. For mainframe sales IBM can afford to send system engineers, customer service reps, and others out to the installation. PCs, however, demand a different support and service profile, and IBM is working hard to find it. IBM still wants to be the company that lets you sleep well at night—even if you have a *small* computer.

Along with the Business Management and Personal Decision Series, IBM has been promoting "Personally Developed Software" as an important part of the PC family. This is "affordable software developed by creative, talented individuals" who are all employees of IBM or members of their families. IBMers submit their software to an IBM "software submissions" department for review, in much the same way third-party developers do. There is a free catalog called "Personally Developed Software for IBM Personal Computers," featuring packages priced between $20 and $45. The software comes without printed manuals, (documentation is on the program disk) and in plain packaging.

There are four categories of software in this series: entertainment, education, productivity, and business. In the productivity category is a utilities package providing useful DOS functions: compress and expand files, locate files, backup, and unmark. You can buy all the utilities for $56.95, about $40 less than if each package were purchased individually. The business family includes software for a phone directory and project planning. The education family includes titles like "Adventures with Decimals" and "Adventures with Negative Numbers." Much of the software runs on all PCs: PC, PC XT, PC AT, and PCjr.

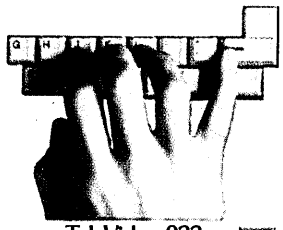
MARKETING BY THE NUMBERS

Marketing PC software requires a new approach. Ten men in blue suits can no longer visit every potential installation, so IBM uses AT&T. Almost every ad includes an 800 number to call for more information. There's a number for inquiries about personally developed software: (800) IBM-PCSW. Then, there are temporary 800 numbers set up for special product announcements (e.g., (800) IBM-LANS for information on local networking). To locate a dealer, call (800) 447-4700, and for PCjr info call (800) 428-2569. The IBM direct number is (800) IBM-2468. This is a good, all-purpose number for information on a variety of products and services—supplies, pcs, cabling systems, and even typewriters.

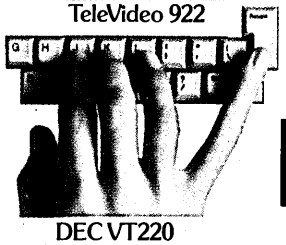
Warranty service inquiries are handled at (800) 428-2569. For customer complaints, though, you have to spend your own quarter: (305) 998-6048.

TeleVideo corrects the VT220 key mistakes.

The new TeleVideo® 922 shares but one feature with the VT220®: DEC®-compatibility. The similarity ends there.

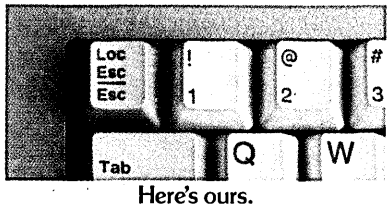


TeleVideo 922

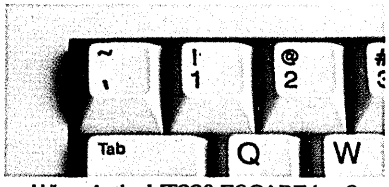


DEC VT220

1. Take our keyboard, for example. The RETURN key is within direct, easy reach. But VT220 users must stretch over an additional key to hit RETURN. Or have the hands of a concert pianist.



Here's ours.



Where's the VT220 ESCAPE key?

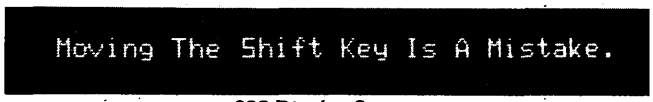
2. Our ESCAPE key is located above the TAB key, right where you'd expect to find it.

Theirs isn't.

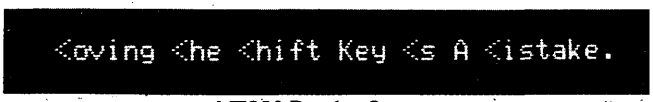
In fact, you have to go hunt for the VT220 ESCAPE key halfway across the row of function keys.

3. Take a look below at the 922 keyboard. That's a true accounting keypad, complete with a Clear Entry, Double Zero and a TAB key. Not merely the numeric keys you get with the VT220.

4. Our SHIFT key is exactly where it should be, so it does exactly what it should do—shift. Their SHIFT key is shoved over by the < and > key to create lots of < and > on the CRT. Of course with a little practice, you could relearn their keyboard. But why, now that you've seen our 922?



922 Display Screen.


<oving <he <hift Key <s A <istake.

VT220 Display Screen.

5. And after we built a better keyboard, we built a better terminal. With exceptional reliability. Quality. Advanced ergonomics. Everything you'd expect from the industry ANSI leader.

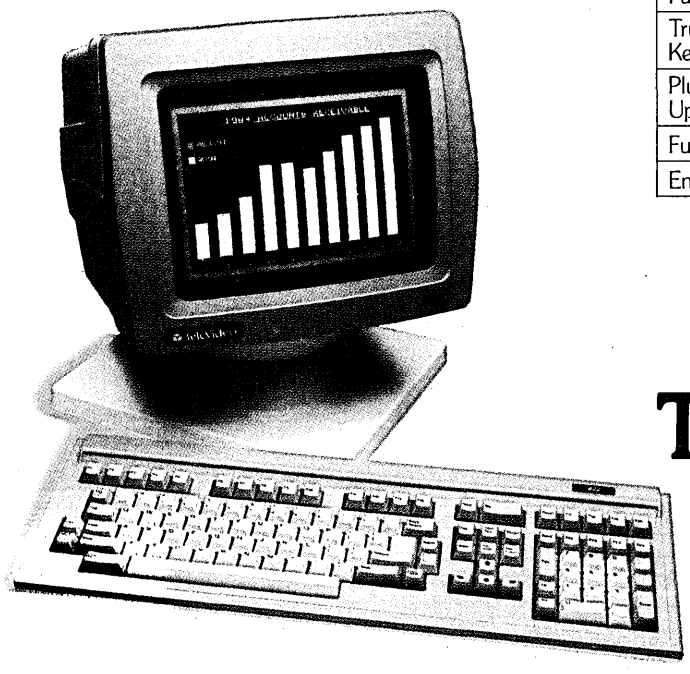
The new 922 is available now and priced to move now. And it's backed by a worldwide sales and support network.

6. Here are 5 more advantages to the 922.

	TeleVideo 922	DEC VT220
Programmable Function Keys	15 (30 with shift)	15 (shifted only)
True Accountant Keypad	YES	NO
Plug-in Graphics Upgrade Option	YES	NO
Full Tilt & Swivel	YES	NO
Enhanced ANSI Mode	YES	NO

DEC VT220 are registered trademarks of Digital Equipment Corporation.

800-538-8725.
In California, call 408-745-7760.



The TeleVideo® 922

TeleVideo Systems, Inc.

CIRCLE 56 ON READER CARD

The PC Network does appear to be a product of thoughtful design and full features.

An intriguing feature of this catalog is that the software developers have their pictures next to their titles in the table of contents. I can't ever remember seeing pictures of IBMers in a public document. Does IBM think software developers will become stars?

Of all the Sept. 25 announcements, probably the most interesting for those of us who work in data processing is another class of software—one that can be used to move information around, to connect machines together, and to use the PC in a host environment. With its new products in this area, IBM can be the major supplier of networking, host connectivity, distributed or cooperative processing, and office support systems.

GREATER RELIANCE ON IBM

These products may provide the solutions we have been seeking. They may help us to tie all these machines together, and provide portability and flexibility to the users. The flip side, however, is that all these new products may result in a greater dependence on IBM. Big Blue may be able to achieve its goal: continual account control. And we may once again have nightmares about incompatibilities, foreign hardware, and what release works with what version. Is it back to bundling or is it simply the software we need?

PC Network, IBM's solution for networking PCs, consists of boards and a program allowing up to 72 PCs to be connected in a 1,000-foot radius, via broadband coaxial cable. By adding broadband amplifiers and cable equipment, up to 1,000 PCs can be connected over several miles. The network program runs under DOS 3.1, uses extensions of DOS commands, and can be driven through commands or menus. Information along the network is transferred at 250,000cps. With PC Network, users can share data, messages, printers, and other peripheral devices. More important, the network will support distributed, multi-user applications.

PC Network, was "codeveloped" (IBM's word) with Sytek Inc., Mountain View, Calif. The PC Network Adaptor card costs $695, the Network Translator unit $595, and the PC Network program $75. There is a PC Network SNA Emulation Program available for $375. All of this will be available during the first quarter of this year.

At the same time that IBM announced the PC Network, the company issued a statement of direction for its other LAN, the long-awaited token ring network, which is currently expected sometime around May of 1986. This LAN will interconnect to the PC Network "in the future."

It is difficult to assess the PC Network. It isn't ready to test-drive. It sounds good; if applications can easily take advantage of the network and the net can operate efficiently, the product may be a big success. These, however, are sizable ifs. Not only are the applications missing, but DOS is not a multi-user operating system. Mainframe fans will likely find fault; small time-sharing systems are hard to like if you are accustomed to large ones. Many users, however, want to connect and share PCs, and the PC Network does appear to be a product of thoughtful design and full features.

Another part of the Sept. 25 announcement that got the attention of dp professionals is TopView, a high-powered windowing system also expected to be available early this year. This is a character-based (not graphics-based) system. Rumor has it that almost every single application program runs under TopView without difficulty. Like all good windowing systems, TopView can run several different programs concurrently, switching from one task to another.

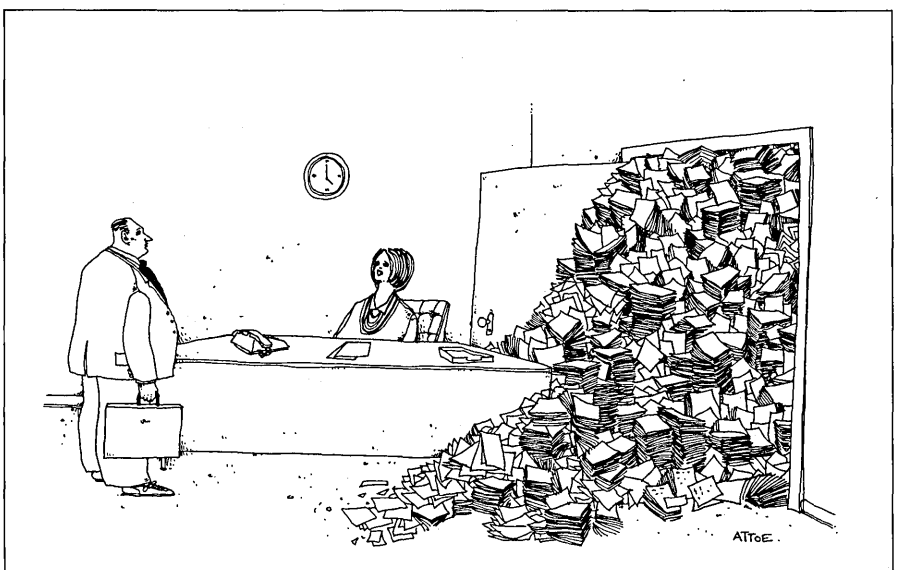
There are special facilities for programs written to TopView specifications. These include panel areas on the screen, cursor control, keyboard control, mouse control, list scrolling, data input features, and prompting. TopView does require applications to conform to DOS 3.0. Many current applications, like Lotus 1-2-3, bypass DOS for certain functions to gain speed and performance. TopView may thus force developers to choose between windows and performance.

CHOOSING DOS ABOVE OTHER OS

It may also force them to choose DOS above the other operating systems. There are three operating systems available for the PC: DOS 3.0 (soon to become 3.1), Xenix, and PC IX. The Unix-based Xenix is currently the only multi-user system. If PC Network is to take off, it is likely that DOS will become multi-user. PC IX is also Unix, and likely to support multiple users.

Which one will become the standard? None—at least for awhile. IBM will keep all of them in the race, and when there is a clear winner, it will become the standard. IBM will probably keep enhancing DOS, making it a better bet, but certainly not a sure thing.

Just a month after the announcements of TopView, PC Network, and the rest, IBM informed us it was connecting the office. On Oct. 25, the company announced DisplayWrite 3, Personal Services/PC, and VM/PC 1.1, plus additions to the PC Family of hardware—the PC AT/370 and the PC XT/370 and 3270 PC additions. DisplayWrite 3 is to the Displaywriter what MultiMate is to the Wang wp line: a similar user interface on different equipment. It will provide uniform word processing capability across several IBM machines. IBM seems to have at least seven word processing programs out. DisplayWrite 3, if successful, may become the IBM word processor of



"Mr. Dethers can't see anyone until he's finished his paperwork."

CARTOON BY STEVE ATTOE

If you're stuck in the confusion surrounding business communications, we can help you out.

Try to follow the changes in business communications today and you could wind up feeling engulfed by the complexity of it all. But at NYNEX, we have the people to change all that.

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Best of all, they'll stick with you. So you'll never be stuck again. To find out more, contact a NYNEX Account Executive—leader of a team of NYNEX advisors. **1 800 535-1535, ext. 422.** Or send us the coupon below.

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CIRCLE 57 ON READER CARD

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IBM has once again shown itself as a company capable of dominating nearly every segment of the industry.

choice for the large office.

Personal Services/PC is a new PC applications program that will allow users to exchange text documents with a host—provided the host is running DISOSS version 3.2 or 3.3. The PC user can also communicate with other DISOSS/370 users on terminals or PCs, or talk directly to other PC users using Personal Services/PC through async communication. In the statement of direction for this product IBM says it intends to provide the following functions: the ability to directly attach to System/36 or System/38 networks for exchange of information, and the ability to exchange information with DISOSS/370 when attached to the IBM PC network or other IBM networks supporting the NETBIOS interface.

Personal Services/PC offers us some of the connectivity the office needs, but it is on IBM's terms: DISOSS is required and not everything works as you wish it would. For example, there is a TopView limitation: edited files cannot be moved. Moreover, Personal Services/PC is the kind of thing that hints that the pcs you connect to the System/36 should be all blue. It is not clear how all this will work if you are running a lot of non-IBM software, using non-IBM add-on boards or—worst of all—using an IBM PC clone. This announcement, more than any of the others, signals IBM's intention to dominate the PC marketplace by defining the connections in the office.

The October hardware announcements underscore IBM's intention to control the office. The new PCs are designed to function as three workstations in one: as a System/370 CMS workstation, as a 3278/79 display attached to a host (a new function for the XT/370), and as a standard PC AT or PC XT. There's also a new application program for the 3270 PC that allows users to send host data down into spreadsheet applications running in a PC session—without making programming changes at the host.

The 3270 PC is a very different machine from its cousins. The BIOS is different from the PC, and it is attached to a control unit. It is not simple, as the stores would no doubt prefer. For example, VM/PC is compatible with VM/CMS, and allows a user the choice of running local or remote 3270 sessions. The VM/PC applications interface permits most CMS applications to run unaltered. It is likely to be the 3270 PC or the 370 that IBM will encourage MIS professionals to connect to the host.

With its rapid moves in PC software, IBM has once again shown itself as a company capable of dominating nearly every segment of the industry—creating, in the process, some products that are very good. Much of the PC software discussed here is very good. The applications products are impressive, and the networking and host attachment software hold great promise for truly connecting machines and delivering greater computer services to users.

My hope is that IBM maintains an open view and allows third-party software to enhance and enrich the PC/host environment. IBM's family may be large, but no family is big enough to be self-sufficient. ◉

Irene S. Nesbit is president of Nesbit Systems Inc., Princeton, N.J., and a member of the DATAMATION advisory board. She has been installing small systems at large companies for the past three years.

Heart disease or stroke can cheat you out of the best years of your life.

Those are the years shared with people you love. And when a loved one is gone, everything changes. You can't imagine the loss, unless it happens to you. Last year, nearly one million Americans died of heart disease and stroke — 200,000 of them before retirement age.

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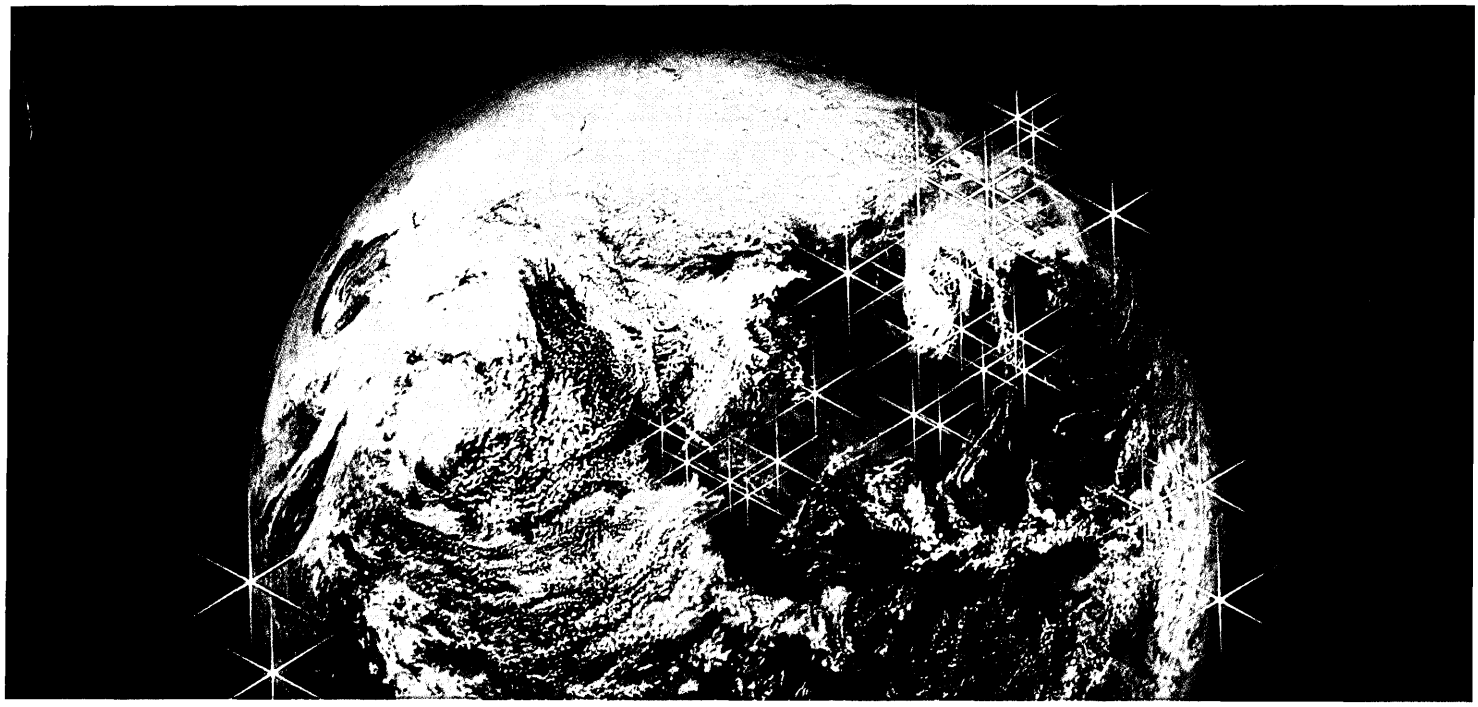

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CIRCLE 58 ON READER CARD

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TBWA

A look at the IBM Credit Corp. and its role in the computer leasing business.

BANKING ON IBM

by Hesh Wiener

This year, IBM Credit Corp. will be the largest participant in the computer leasing business. While IBM Credit's rapid growth has enabled many users to reduce the cost of computing, some aspects of IBM Credit's expansion may represent a threat to users, independent lessors, and even IBM.

If you want to lease a 4381 mainframe, IBM Credit is the place to go for the cheapest deal. By the reckoning of several third-party lessors who have pretty much given up fighting in the 4381 lease market, during the past six months IBM Credit has taken down something like 80% of the financings of these midrange processors, beating the independents' prices by 3% to 6% or more. In the 3380 disk business, quite a few financings have also gone to IBM Credit lately, with third-party estimates of IBM Credit's share in the 50% range. A similar situation is shaping up in the 3725 communications controller market, particularly on deals that leave investment tax credit for the lessor, where IBM Credit may be winning 40% of the competitive lease bids.

This is not the case for other IBM products. Chances are good that independent third parties will offer you the best lease rates on a 308X mainframe, on most older IBM products, and on deals that require subleasing machines you have on site to someone else to make room for your new hardware. But as IBM announces new products, Credit's share of the financing market is going to be big, according to IBM Credit's competitors.

Because many of the cheap deals from IBM Credit have been done on equipment that third parties would like to add to their lease portfolios, there has been much grousing by those IBM has edged out. Some of the talk is sour grapes. Some, stripped of effect, points to problems IBM Credit may cause. These problems are not just those of lessors; users, too, will have to reckon with the impact of IBM Credit's growing presence, and so, perhaps will IBM Corp.

Since one dollar is exactly like the next, a user in search of financing—at least one behaving with economic rationality—is indifferent about the source of funding, all other aspects of a transaction being equal. A well-written lease provides the financing in a form the user wants and protects the user from financial problems the leasing company may encounter. With a properly constituted lease contract, the user need not care whether IBM's logo is at the top of the agreement. This puts IBM Credit's offerings in a different market position than, for instance, IBM's typewriter products.

The IBM name may open the door, but it won't close a deal. A user will talk to IBM Credit (via his or her IBM sales rep) more readily than to an unknown lessor. But once bidding on a lease deal begins, any respectable lessor can win the business by offering the most appropriate arrangement for the least money, and with the fewest strings attached.

This makes the smallest lessor the potential equal of IBM Credit. And, as Credit has found out, IBM can be beaten in the market by a very small company indeed, if the small company is giving the user a better deal. Consequently, IBM Credit can only grow by offering cheaper leases, more acceptable terms, or other concrete provisions in its contracts.

IBM Credit has been growing at a furious pace, something over 100% a year in the business of three-, four-, and five-year financings that make up the bulk of computer leases. This growth has come as a direct result of IBM Credit's lower rates. Independents are unable or unwilling to match many of IBM's deals; they say they cannot afford to do so. They also say that IBM Credit is acting in a way that may be imprudent or downright silly.

"IBM Credit is buying business," say several independent lessors. "They don't realize that this will not get them loyalty. The game starts fresh with the next deal." The lessors tell this to each other, and they really believe it. But, when they criticize IBM Credit in response to a reporter's questions, each of them invariably adds, "Please don't quote me on this. I've got to get along with IBM." This seems to be more a result of lessors' anxieties than of any insincerity.

Some lessors say that IBM Credit could lose money on a lot of its 4381 mainframe leases, while others figure the finance company has got to know what it's doing. The least hostile comments on IBM Credit seem to come from smaller leasing companies, who figure they've survived (and prospered) with giants in the market up to now, and that one more won't hurt them. These smaller outfits generally point to Comdisco and CMI—the two largest lessors after IBM Credit—as big companies that have grown without stifling smaller organizations.

FROM SHELL TO LEADER

But circumstances are changing. IBM Credit has grown in four years from an empty shell to an industry leader. It plunks nine-digit debt offerings into the Eurodollar market with unprecedented skill: IBM is paying lower interest on its debt than the U.S Treasury! No independent leasing company can hope to match this feat, although the leasing subsidiaries of multinationals can borrow at similar, if not equal, rates. Thus, the smaller lessors and, to an extent, the larger participants in the market, suffer some disadvantage in credit markets that can raise the costs of their leases. This situation may get more complicated as IBM readies itself for new financing opportunities.

IBM Corp., along with Sears and Dow Chemical, is organized to enter a new financial market, a yen-denominated bond business within the European debt instrument market. Euroyen offerings, unavailable to most independent computer lessors, may provide even cheaper lease funds to IBM Credit than the Eurodollar market that worked out so well for IBM's captive finance organization. The Euroyen market is an outgrowth of the so-called Samurai bond market (not yet entered by IBM) that has provided economical yen-denominated bonds for non-Japanese borrowers in the

ILLUSTRATION BY ANDREA BARUFFI

IBM is paying lower interest on its debt than the U.S. Treasury. No independent leasing company can hope to match this feat.

Japanese financial market. While the concept of yen bonds is esoteric, changes in the world monetary system and new directions in the international economy could make such instruments an important part of computer leasing, visible to the user mainly in the form of reduced rates.

IBM Credit raised $100 million in five-year money at a cost of 11.4% annually in early November. At the time, comparable U.S. Treasury paper was being sold at higher rates. Two months earlier, IBM Credit sold two three-year offerings of $100 million each (at an annual cost of 11.85%); that deal bought funds at 60 basis points (0.6%) below T-notes.

Lessees see a debt rate on their leases based on their own credit in U.S. markets; this is typically half a point to a point and a half higher than IBM's borrowing rate. So IBM Credit, like a bank, is making money on the lease itself and on the spread between the costs of its own funds and those the lessee sees. In a competitive situation, IBM could pass some of its savings through in the form of lower lease rates. The impact on IBM Credit would be a reduction of profit, not a loss on borrowings. In the case of leases on small systems and installment payments (which are plain vanilla chattel mortages), IBM Credit may charge interest that is substantially greater than its cost of money, particularly if the user is an organization with limited borrowing capacity.

IBM Credit's rates seem to reflect success in equity markets, too. Lessees of mainframes generally sign tax-leveraged leases. That is, an owner takes some of its payment in the form of tax benefits rather than in the form of interest. This dilutes the interest on the debt portion of a deal. A mixture of five to eight parts equity to one part debt is common (whether the deal is with IBM Credit or an independent lessor); a larger equity investment by the lessor makes for lower monthly payments by the lessee.

Independent lessors and IBM Credit have several options for raising equity. IBM Credit has done this in two ways. On deals in which the user takes investment tax credit (ITC) on equipment, or where there is no investment tax credit available, IBM Credit puts in the equity and owns the system at the end of the lease. On deals in which ITC is retained by the lessor, IBM Credit sells the deal and the ownership to a partnership. So far, IBM Credit has formed partnerships with General Mills, Merrill Lynch, and Metropolitan Life Insurance to get the most out of tax benefits. (The tax laws prohibit IBM, as a manufacturer, from claiming tax benefits on the full selling price of equipment, but permit IBM or IBM Credit to get full benefits as a partner in a company holding title.)

FINANCING OUTSIDE PROJECTS

As IBM Credit has gotten others to invest equity in its deals, it has put money into the financing of outside projects. For instance, IBM Credit owns a piece of a Colorado electric generating plant and one of New York Air's planes. Some independent lessors have diversified, too, but they do so in other ways because they have tax and funding problems different from IBM Credit's.

IBM Credit's size has grown considerably as the organization has enriched its capital base. During all of 1983, IBM Credit bought $334 million in equipment from IBM for finance leases, and IBM Credit's partnerships picked up another $188 million, for a total of $522 million. During the first nine months of 1984, IBM Credit bought $550 million of IBM products for finance leases, and partnerships acquired $297 million, for a total of $847 million. While IBM Credit has not developed its fourth-quarter figures yet, the organization bought more than half its gear in the fourth quarter alone, as did its partnerships. The rate of growth in 1984 is unlikely to take the same fourth-quarter leap it did the year before, but full-year totals showing an increase in IBM Credit's portfolio equal to half that of the year's first nine months would not surprise the company's observers. This means IBM Credit's finance lease growth rate could be in the range of 125%. Projected into 1985, this kind of growth would make IBM Credit the buyer of $2.5 billion to $3 billion in new IBM hardware, and push its market share of the new equipment financing market toward a 50% chunk of what looks to be a $6 to $8 billion market.

While it is not yet clear whether IBM Credit can grow quite so fast during the coming year—or even if it wants to—there is no question that IBM's captive finance company is going to be the biggest company in the leasing business.

Where formerly there was a vacuum for IBM Credit to fill, there is now a crowded marketplace. If IBM Credit continues to grow the way it has during the past couple of years, something will have to give. Even though IBM's product shipments have been climbing, and with this the demand for leasing, IBM Credit has been growing substantially faster. The lessors are cutting up a larger pie, but the independents are dividing a smaller piece of it. As a result, those independents unable to accommodate slower growth may face tough sledding. And, perhaps surprisingly, so may IBM Credit and its parent, IBM. You can bet your bottom data processing dollar—which you may already have done—that hard times for IBM will be hard times for users, too.

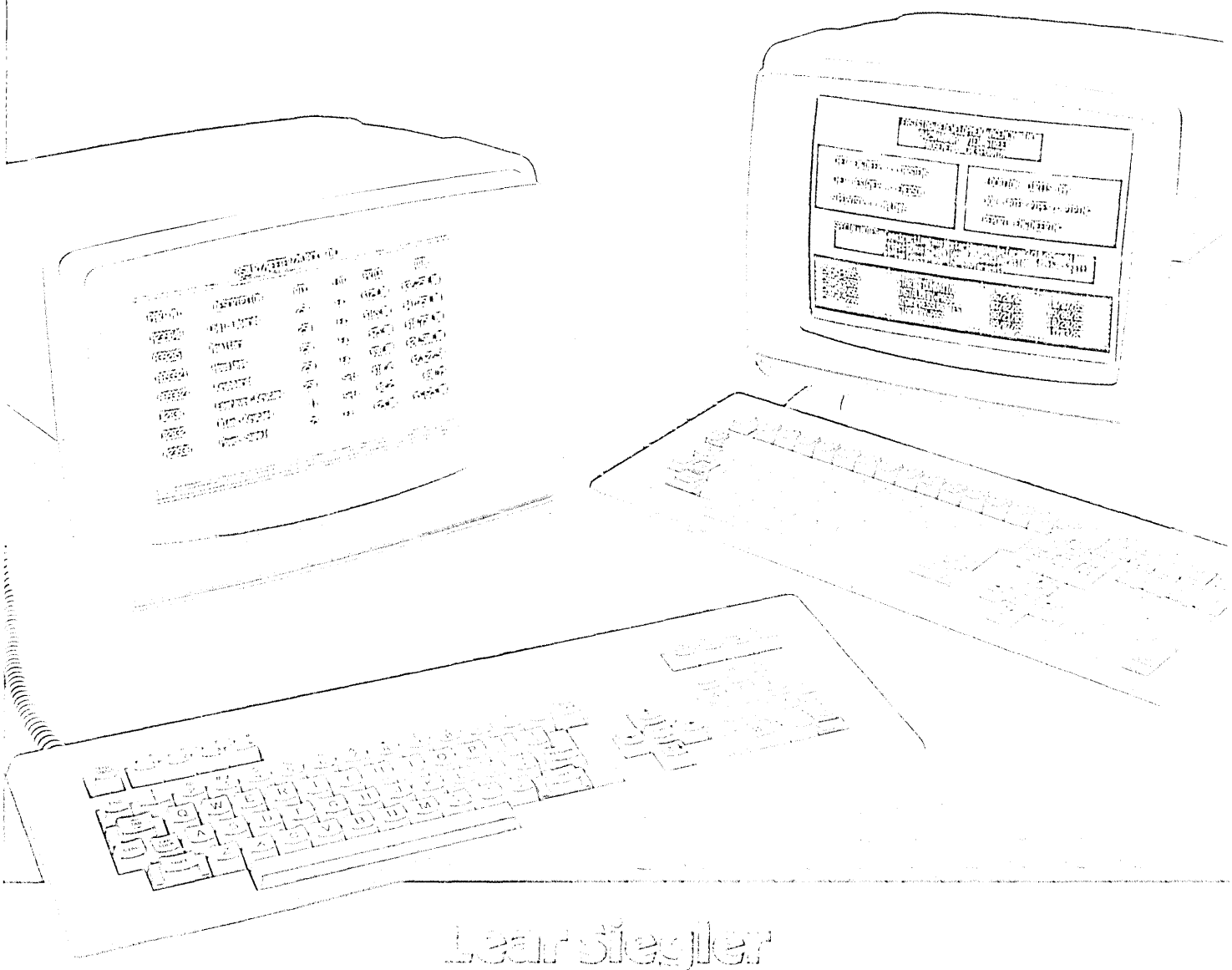
Most users don't understand leasing. That is, they know what their leases mean to them, but they don't know what they means to the leasing companies. Most of the time, that's fine. But now that the leasing situation is in flux, smart users will watch the business from every angle. Vigilance could prevent an unpleasant surprise.

From the lessor's point of view, a lease is a piece of business involving a calculated risk. If every user returned every piece of equipment at the end of every lease and replaced it with new gear, the leasing companies would go flat broke. This is because leasing profits are, in general, deferred until leases are extended, renewed, or created using the old gear at a new site. By the same token, if every user signed for another term at the end of every lease, the leasing companies would grow incredibly rich. Normal patterns of computer usage fall somewhere in between, and most leasing companies have gotten pretty rich, which enables them to take more risks in the future, perpetuating the trade. Users benefit from the aggregation of risk involved in leasing because they pay less for computers to the extent that lessors believe the machines—as a pool, if not unit by unit—will have residual value at the end of a lease.

SOME LESSORS FAIL

Despite the apparent success of most leasing companies, there are occasional failures. And leases that cost the leasing companies money are a lot more common than most lessees suppose. An aggressively competitive lessor expects to make money on four out of five deals and break even or take a hit on the other one. "If we don't lose money on some of our leases," says Comdisco's chairman, Kenneth Pontikes, "we probably aren't being aggressive enough." This is also true of IBM Credit. The company is bound to lose money sometimes.

While expanding rapidly into the 4381 market, IBM Credit has underbid nearly every competitor on nearly every deal. This puts the finance company in a position of high risk. Either that, or IBM Credit knows something that no one else knows, which is that the 4381 will stay around on lease longer than the independents figure it will. It seems inconceivable that IBM Credit could know this. Not because of its arm's length distance from its parent, but because the future of the 4381



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depends on things beyond the control of even IBM. In particular, any sign that IBM is betting on a long life for the 4381 may be taken as an invitation by competitors. Faced with serious competition—which does not now exist in the 4381 marketplace—IBM will have to up the ante in its midrange as it has in the past. The result: IBM 4381s will become obsolete faster than IBM Credit might wish.

A similar situation could shape up in the 3380 market. Even though IBM's chief rival in the disk business, Storage Technology Corp., has gone bankrupt, other competitors, notably some Japanese companies, are still in the game. IBM Credit, by setting a quicker pace in financing, has added to its portfolio in part by adding to the risk it takes on the future worth of disks and controllers. While the recent experience of independents has been that disk leasing is safer (and therefore more profitable) than mainframe leasing, the past is no guarantee of the future.

In essence, IBM Credit's position may turn out to be the opposite of that which IBM (the manufacturer) must take. The longer old products remain on lease, the longer users defer acquiring replacements. If a market is growing by leaps and bounds, this is not an issue. By every account, the midrange mainframe markets, the DASD markets, and the terminal markets have been growing at a blistering pace. To serve these markets, IBM has increased production, cut prices and introduced new machines. Residual values of displaced products have, in some cases, dropped dramatically. For a lessor, and, as a result, for a lessee, the fall in residual values doesn't have to be absolute (meaning relative to list price) to cause a problem. Rather, to create a problem in the financing business, a residual value has to fall faster than lessors and equity investors have bet it will come down. When this happens, lessors grow cautious and cover their risks on the next generation of products with higher lease rates.

Compounding the problem of accurate residual forecasting is IBM's volume purchase agreement sales plan. For example, a big user of 3380 disks and associated 3880 controllers may get a discount in the range of 17% to 20%. Figure in tax benefits and the cost of that disk comes down to perhaps 67% of list. So a big user won't take a used 3380 or its controller unless the market is at something like 65% of list. Why should it? A new machine is just as cheap, and it comes with some free maintenance, too.

The problem of falling values isn't a big one early in a product's life cycle. Rentals will come in faster than value is lost,

IBM CREDIT CORP.'S LEASE PLANS

IBM Credit Corp. offers three basic types of leases. With each, users may have opportunities to get ancillary financial products and services. Independent lessors also offer these three lease types, as well as some services not offered by IBM Credit. But, as in all financial transactions, if you don't see what you want, ask.

- Option A. This is an ITC (investment tax credit)-to-lessor finance lease. Terms run three, four, or five years, and other terms may be negotiable on large deals. The deal stands, come hell or high water—a user cannot get out no matter what. At the end of the term, the user can buy the equipment at fair market value. Monthly rates per $1,000 of asset value will be the lowest of all lease types, because IBM Credit and its partners pick up all the tax benefits. If you must get out, you may be able to get some help from IBM Credit in the form of a sublease, but this is not an option promoted by IBM Credit. So far, it looks as if the only way out will force you to take another (bigger) lease from IBM Credit. If your budget is big (a lease worth over $1 million or involving a 308X), you may also be able to arrange a monthly payment schedule that starts late, ends early, or has payments that change over time. Upgrading installed machines is out; this may be done with a related Option B lease.

Third parties generally offer more flexibility in terms, and their lower limit for negotiated terms is an order of magnitude below IBM Credit's. Also, while third parties would rather get follow-on leases, they generally allow the user to sublease at will within certain limits. (These limits protect tax benefits and insulate the lessor from certain risks.) Outright purchase or financed removal of installed gear is generally easier with third parties. When IBM Credit does a removal, it usually brings in a third party to handle it, but the user may not be made aware of this if IBM Credit buys gear from a user and then hands the sale to a third party.

IBM Credit rates on Option A deals are generally very good. They vary with the equipment type and are lowest on 4381s and 3380s. Despite IBM Credit's representation that these deals are done straight off a rate card, there seems to be evidence in some cases that quoted rates depend on competitive conditions as well as the current cost of funds. Users should negotiate before signing.

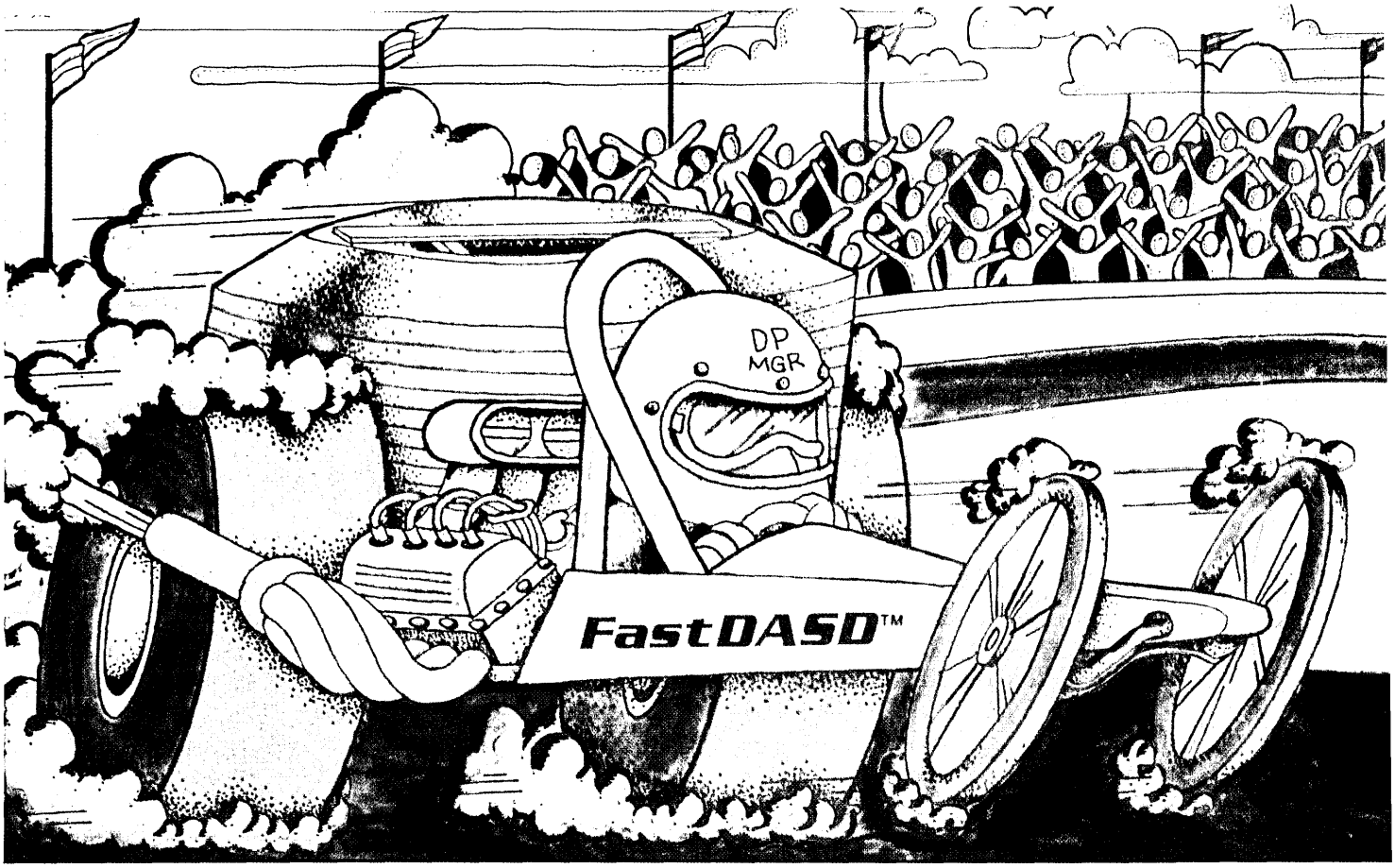
- Option B. The second type of lease from IBM Credit, Option B, passes investment tax credits to the user. Monthly rental is about 10% higher than with an Option A lease, but the user gets to claim all the tax benefits. Terms are also three, four, or five years, and under Option B, IBM Credit will be more flexible because it has no tax benefits at risk if the user buys the equipment before the lease is up. There are stipulated purchase option percentages during the term of the lease and at its conclusion. The lease rates and purchase option percentages vary with the type of equipment, but the buy-out prices are likely to be higher than used equipment market prices, particularly on machinery that is far into its product life cycle. Upgrades to leased machines are financed according to a special schedule. Special deals can be haggled for.

Third parties offer the same kind of deal, and are generally better able to compete with IBM Credit when ITC stays with the user. Early terminations are generally done differently by third parties, because they have often put title to the equipment into tax shelters. A user that wants to buy a leased machine, however, can talk to a third party about acquiring a like product. If the leased equipment is available in the used market, the lessee may do better working out a lease termination and subsequent purchase of second-hand gear through a third party.

- Option B Prime. The third type of IBM Credit lease is standard full-payout financing with a cheap end-of-term purchase option. This kind of financing is hardly unique to IBM Credit, although it pays to bring IBM Credit in on a competitive bid. Independent lessors and most banks can and will handle this kind of transaction. As the deal is simply a matter of debt rate, the user's cost is a function of credit rating, money costs, and bargaining skill. It is a deal the user can buy out of, but the high monthly rentals make it a tough one to end via a sublease without the user's facing some losses.

Users contemplating a lease with IBM Credit can ask for, and sometimes get, lease terms similar to those commonly offered by third parties. The key here is the size of the deal and the importance of the user's account at IBM Credit. If you've got some leverage, you ought to ask for everything IBM Credit will give—though it won't change your costs, which you should negotiate separately anyway. A deal made late in a fiscal year could be written so that payments begin with the next budget. If you need to buy out of an old lease, consider financing the termination costs both with IBM Credit and with third parties. Ask for bids in a bundled (new lease plus termination) and unbundled (each deal separate) way; the results will vary depending on the used equipment market as well as other financing factors. Also, consider including software in your deal. IBM Credit and independents will both finance program products that can be paid for on a single charge basis. You should also learn about a master schedule plan, which stabilizes financing costs, for a specified period. IBM Credit and some third parties will do this.

—H.W.



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Where formerly there was a vacuum for IBM Credit to fill, there is now a crowded marketplace.

and the lessor, IBM Credit or otherwise, will have a great chance to make a profit on that 3380 disk or whatever is leased. But late in a cycle, as the monthly rental drops, it gets harder for a lessor to recover the cost of a new disk. This is true even when IBM cuts list price, because IBM's price cuts late in a product's life generally come at a slower pace than the fall in used market values. IBM simply cannot reduce its manufacturing cost as quickly as market conditions change.

WILLING TO LIVE WITH RISK

IBM Credit, aggressive on 3380s nearly five years after announcement, is winning lease bids because third parties don't want to take the same risks IBM Credit is willing to live with. If IBM announces a better large disk in 1985 and manufacturing gets off to a good start, 3380 values will come down to very low levels by the time IBM Credit's three- and four-year leases have run out. Add in the possible impact of PCM disks in the late-in-the-cycle market, and it's easy to see where IBM Credit's interests as a lessor conflict with those of IBM as a manufacturer.

So how can IBM Credit go on the way it has? It's not in business to lose money, and, in the long run, it will have to do as well as other IBM operations to satisfy IBM's shareholders. The answer may lie in the company's organization. IBM Credit Corp.'s is different from independent lessors. It has some cost advantages over its third-party rivals, and these help the company, particularly in the short run. But the third parties have strengths that IBM Credit lacks, and, in the long haul, IBM Credit may find itself outgunned in the used equipment market.

While third parties have highly paid reps, IBM Credit cuts its deals with the help of IBM's sales force, which is paid modestly for bringing business to IBM Credit. Unless IBM changes its compensation plan quite a bit, as leased machines come off rent, IBM sales reps will try to get users to take new equipment; that's what they're paid for. So IBM Credit will have to unload the gear it gets back and, unless IBM Credit builds up a big remarketing force, this will have to be done by outside agents. The most likely agents are the companies that now deal in used IBM equipment. So far, IBM Credit has made overtures to the Computer Dealers and Lessors Association, but IBM Credit cannot pass its responsibilites to the leadership of CDLA.

Non-CDLA lessors would object, and rightfully so. Nor can IBM Credit appear to be blessing CDLA, for notwithstanding that association's excellent record of policing the activities of its members, IBM will want to make its own determination of the qualifications of remarketers. Some sort of authorization program may be developed, so that IBM Credit and its partnerships can sort out prospective buyers or sublessees of their equipment.

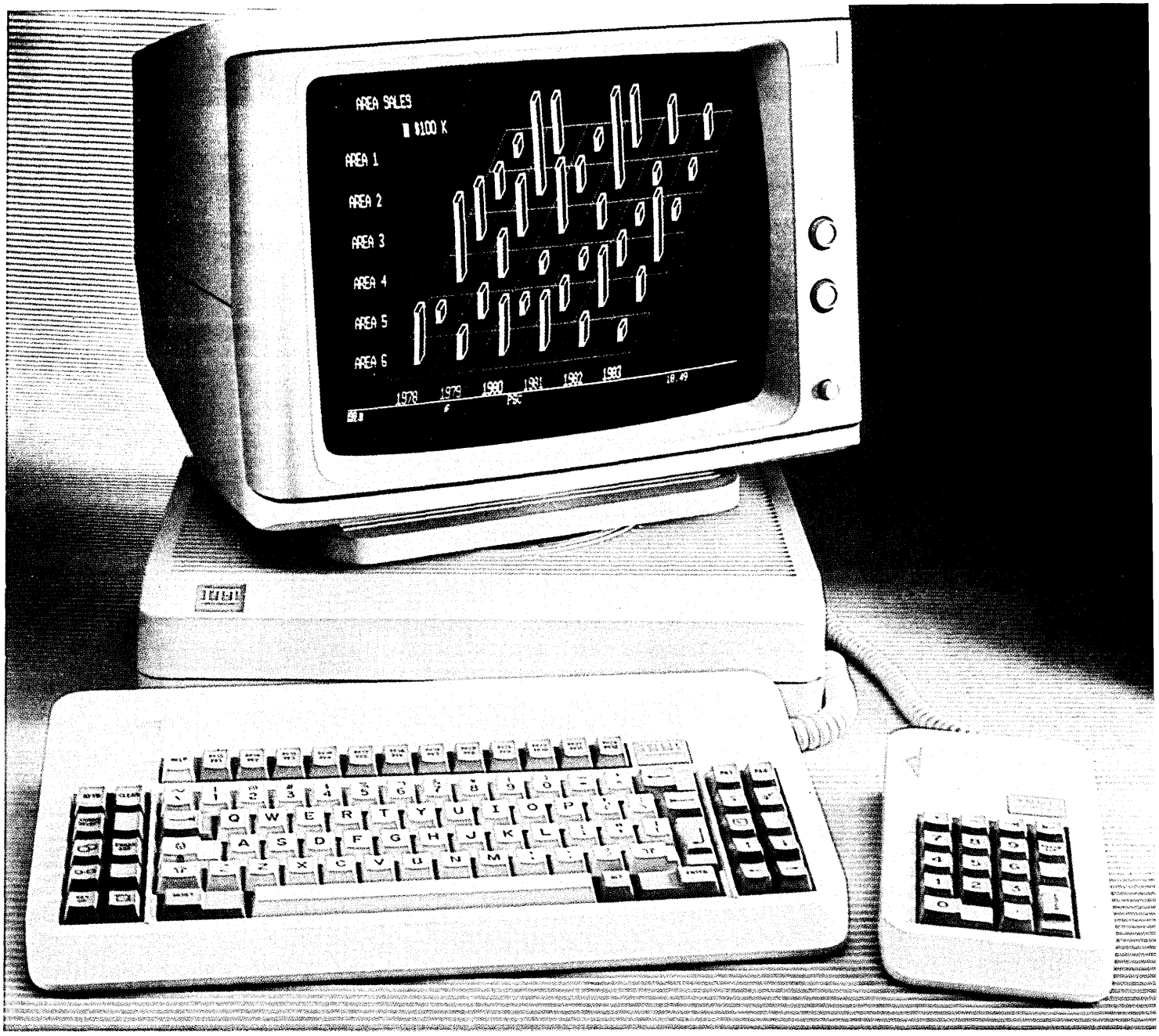
Further, IBM Credit is likely to find that its remarketing via independents is not the same as IBM's old ways of selling off rented equipment to users by cutting prices, raising rentals, or both. The user-buyers had only one thought in mind: minimizing their costs based on IBM's pricing. Lessors not only have to get the most gear for the least money, but they have to think about the impact of used equipment from IBM Credit on the market for machines they already have in their portfolios. No lessor with equipment in tax shelters can participate in remarketing IBM Credit gear in a way that undermines the residual values of investors' products. While smaller lessors can maintain that they have no control over the markets and must take deals from IBM Credit or users that look good at the time, the larger independents do have some sway over market conditions; they'll have to act cautiously and diligently as they bid for IBM Credit's used products. Conditioned by a bygone era during which much used IBM gear entered the market at half of current list—the user's buy-out price for rented or term-leased gear—there may be a few mistakes made by the independents who overestimate the worth of used computers. These mistakes could cost the lessors money and weaken them. Or, fearing mistakes, the independent lessors might draw back from taking risks on used equipment being unloaded by IBM Credit, increasing rentals to users.

For users, IBM Credit's remarketing effort, which will begin this year, may lead to perturbations in the used equipment market that will play havoc with budgets. While no data processing manager would object to paying too little for dp equipment, the chances are far greater that in a gyrating market the buyer will overpay and only learn about the error weeks later when the market has fallen. While it seems that IBM Credit would want to maintain orderly markets in used equipment, all one can count on is that this growing organization will give it a good try. ◉

"I like Eddie but he has almost *no* arcade experience."

CARTOON BY HENRY MARTIN

Hesh Wiener is the publisher of *Computer and Communications Buyer*, a newsletter aimed at users who buy or lease IBM mainframes and related equipment. His company, Technology News of America, New York, also provides users and vendors with a variety of news services and reports that focus on the financial aspects of information processing.



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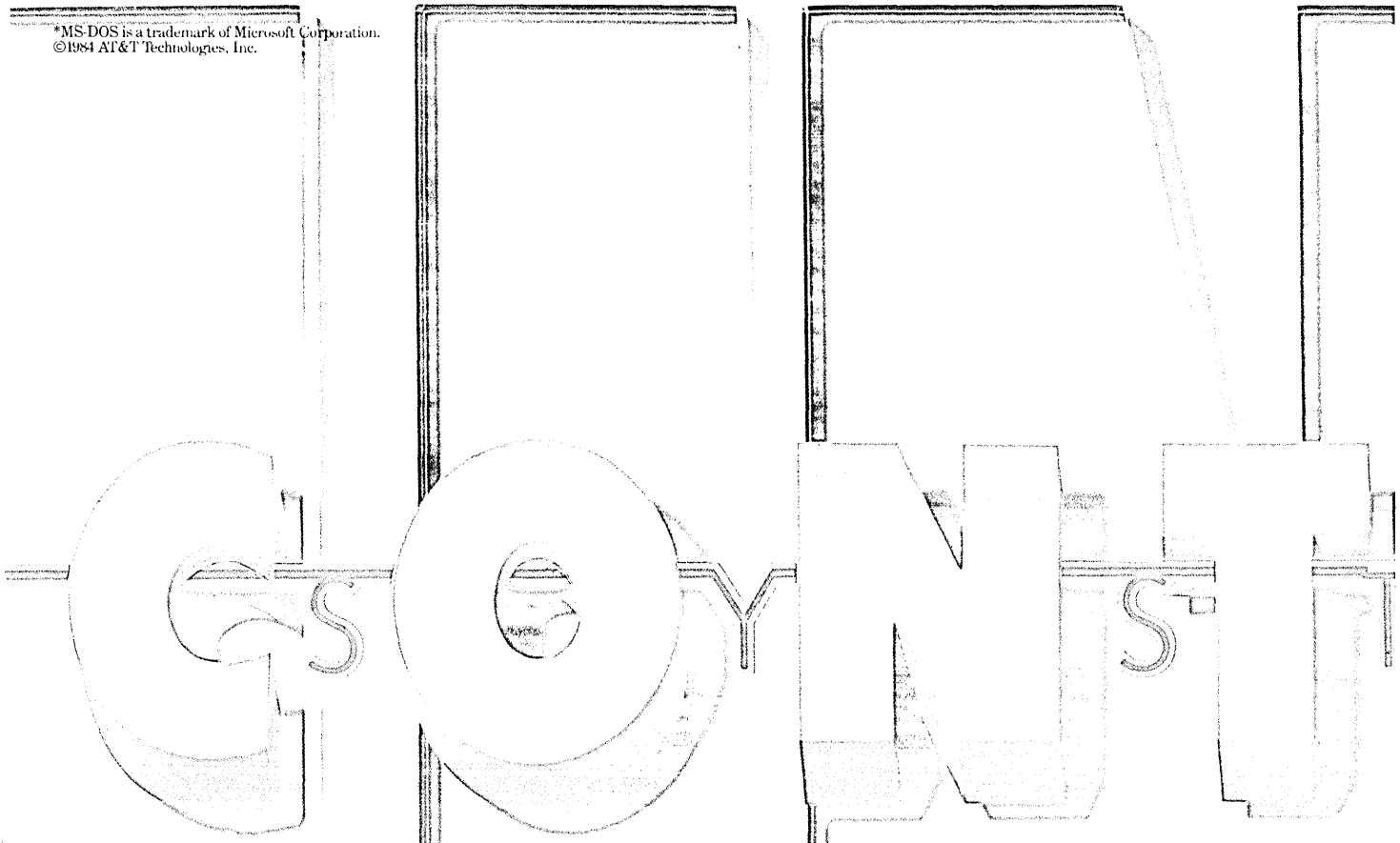

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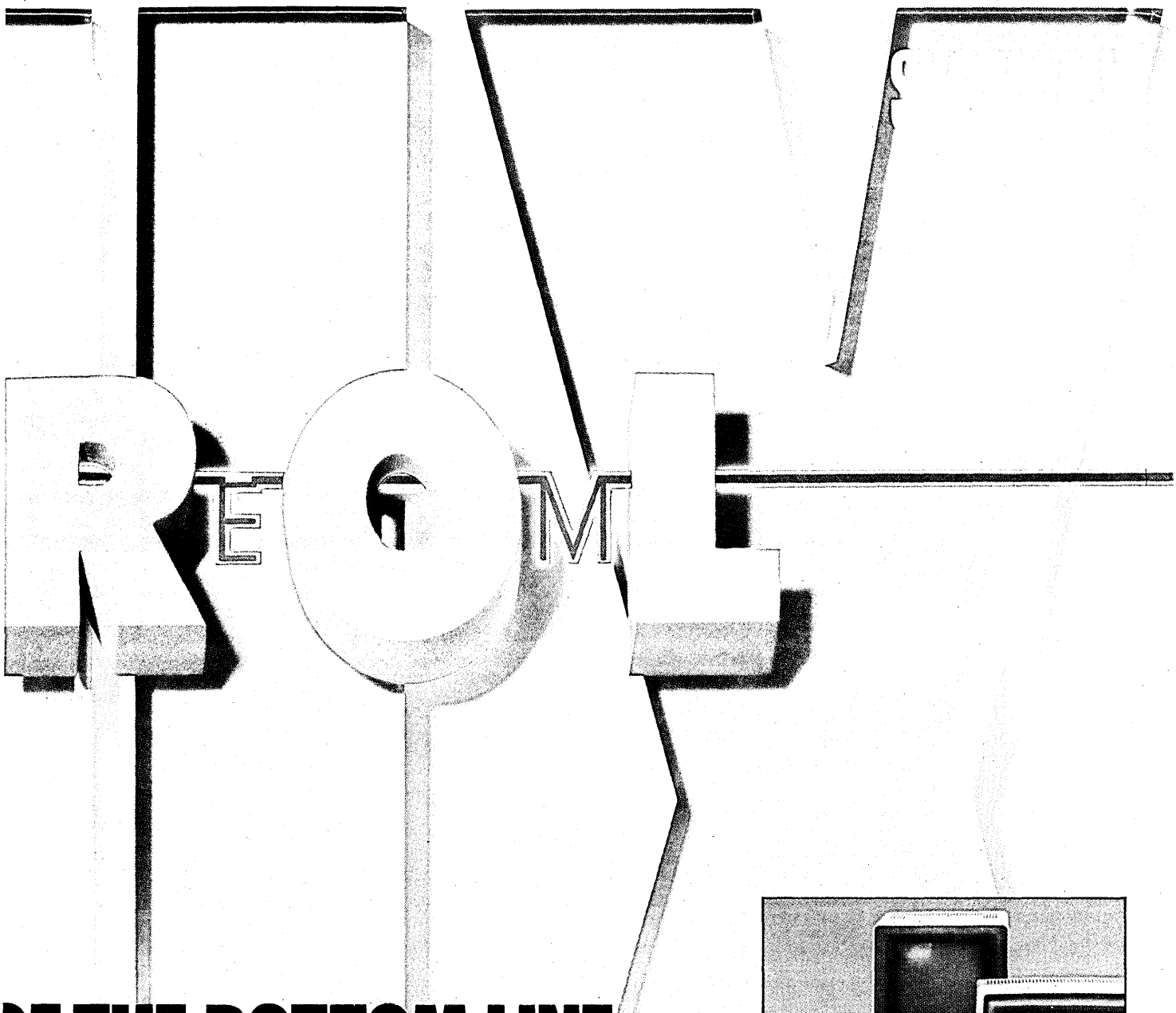

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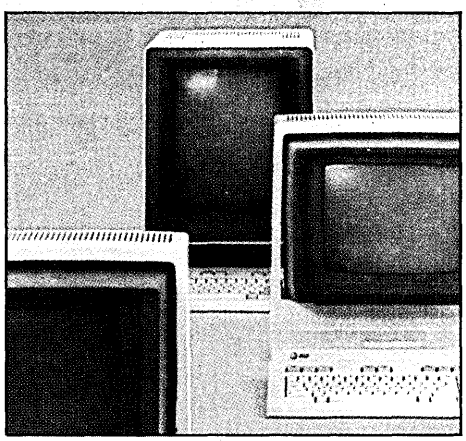

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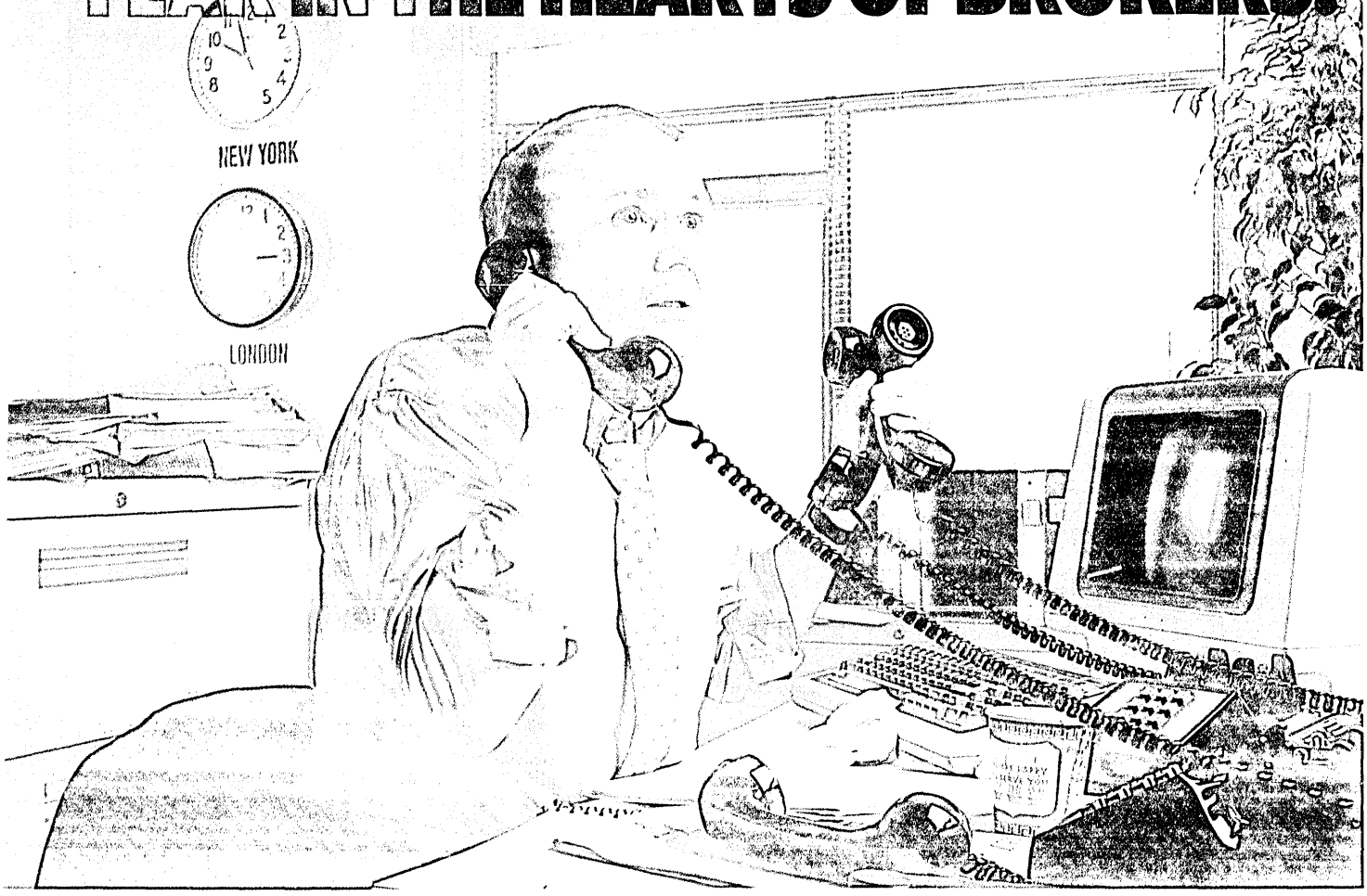

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**Computerworld, August 20, 1984*

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

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PEOPLE

YANKEE DOWN SOUTH

Southerners used to call them carpetbaggers. The phrase was usually associated with a slick-talking Yankee who went down south after the Civil War looking for profits. Almost one hundred years have passed since then, but even in the best of circumstances someone from north of the Mason-Dixon line can still come under a lot of scrutiny in southern climes. Take the case of George L. McTavish, who recently was named president of Hogan Systems Inc., a Dallas-based company that provides application software to large commercial banks and thrift institutions.

McTavish, 43, can hardly be discribed as a smooth-talking Yankee, even though his roots are a few miles north of the dividing line, in Pennsylvania. He didn't join Hogan under the most ideal of conditions. Besides the stigma of hailing from the North, he also has the distinction of becoming the company's first president brought in from the outside. He joined Hogan Systems in September as president and chief operating officer when Richard Streller moved up to chairman of the board. Streller helped found the company in 1977 and had been its president since 1981.

"I had expected resistance and a trial. It's natural for people to resist change," McTavish says. Yet when he arrived at the firm's Dallas headquarters, the employees proved very helpful, with an attitude of "high acceptance."

"The corporate culture at Hogan is superb. The people here are generally very talented, professional, easygoing, and aggressive in pursuit of the company's goals," McTavish notes.

GEORGE L. MCTAVISH: Hogan Systems' new president, brings a Northeast management style to this southern company.

The top spot at Hogan marks the first time McTavish has been president of a company. Previously, he had been chief operating officer and executive vice president of SEI Corp., a suburban Philadelphia firm that supplies automated systems and financial services to the trust departments of banks.

Hogan Systems, with its 450 employees, 125 customers worldwide, and 1984 revenues of $36.4 million, is only about half the size of SEI. The transition to a smaller firm "is an adventure, very rewarding and very exciting" because Hogan is currently in a stage of fast growth, McTavish says. Revenues are expected to exceed $50 million in 1985.

At SEI, McTavish was responsible for the overall operations of the major business components of that company, including all functional operating activities except financial administration and personnel. Hogan's advantage, from McTavish's perspective, is that because it is so much smaller it has a much faster growth track.

Although he sees his position more as a steward or custodian than as a captain, McTavish notes he has some very specific ideas about the company's direction. Still, he says, "Hogan doesn't need a lot of change."

Maybe so, but McTavish is making his mark quickly. Since joining the firm, he has moved to make the company more service oriented. In the past, he says, Hogan's involvement with a customer diminished shortly after a sale. Either the bank's MIS department or a third-party vendor has intalled most Hogan software purchased by banks.

That installation procedure has been "a trying time and not pleasant" for the customer, McTavish admits. He wants to involve Hogan in the installation process and make the company accountable for the success of installing the customer's software. Not only is it good business to work more closely with customers, he says, but Hogan has an opportunity to generate additional revenue. Hogan's clients pay in excess of $30 million a year to outside contractors to install the software, McTavish says.

Change does not come without drawbacks, however. Although Hogan Systems is profitable, it has experienced some disappointing quarters recently. McTavish, who has been billed as an executive who can achieve growth for the company, attributes the first quarter $1.5 million loss to the expansion activities of the company. "Like all growth companies, a point is reached when basic changes have to be made. That is where Hogan is today."

While Hogan is poised for future growth, McTavish says the company must be sensitive to the changes in the industry it serves—the banking community. Once viewed as one of the more stable institutions in the United States, the nation's banks have suffered through a period of flux following deregulation. But the executive insists the banking industry is in better shape than the way it has been portrayed, especially in the wake of the rescue of Continental Illinois Bank in Chicago.

For the most part, Hogan does not see its customer banks as competition. McTavish says most banks don't want to market the fruits of their internal software development on the open market. "Without exception, senior management calls MIS and explains to them that 'we are in the banking business.' There seems to be a 'not invented here' attitude at the very largest banks, which will always have large internal software development programs."

But in the market Hogan serves—the banks and thrifts with deposits exceeding $750 million—there is ample opportunity for growth, even taking into consideration the number of mergers that have occurred. "Our banks seem to be the acquirers most of the time." For a while, that situation posed a problem for Hogan. According to McTavish, aggressive banks with Hogan's software were buying institutions that were not using that system. Hogan's customer would then supply its new subsidiary with the software without paying Hogan. Now, McTavish says, the license fees have been restructured so the second bank also pays a fee.

"Six years ago, acquisitions were not viewed as an active thing in the marketplace. Today we have to protect ourselves against a bank providing software to another bank's data center [after a merger]."

Mergers and acquisitions are not the only activities that shape the future of a banking software company. McTavish notes that today's banks have to compete in different ways. They are beginning to recognize that interest margin spreads on depositor funds are shrinking, meaning that these institutions have to look to other sources for increasing revenues. Banks are looking to fee-based services as substantial revenue earners, McTavish says.

To gain entry into this area, Hogan has introduced the Preferred Client Services system, which generates combined financial statements to allow integrated reporting and management of a depositor's assets. This product is part of the trend toward upscale banking—special fee-based services for larger depositors. This type of product allows Hogan to branch out from banking to the financial and investment community.

Another way Hogan is diversifying is by offering its operating environment, Umbrella, as a general application development package, McTavish says. Yet Hogan will not stray far from the financial software business, he adds. It is currently studying the home banking market, an area he feels has much potential.

As president, he is responsible for the day-to-day operations of the company, including worldwide sales, marketing, customer support, and product development groups. He wants to push the planning horizon from months to years.

McTavish operates by a short set of rules. "I think it is important that we should work hard but we should enjoy ourselves. I believe in good communication. I don't want people coming to me just with problems, but with recommended solutions also. People should be left alone to do their jobs, and accountability cannot be passed on," the soft-spoken executive says.

McTavish graduated from the University of Maryland with a degree in political science. After a short stint working for the government, he was in a quandary as to what he wanted to do with his life, and while on a hunting trip in Scotland he made his decision to enter the computer business, a field he became interested in shortly after college. His first job was with MAI Corp., which at the time sold and serviced third-party IBM- and plug-compatible dp hardware.

From there he invested in a 20% ownership of Executone-Akron Inc. before moving on to Advanced Systems Inc. as a salesman. He went on to manage a special task force to analyze business performance and recommend strategic marketing, product, and sales plans.

The executive then joined Martin Marietta Data Systems where he held the post of vice president of the commercial division. He managed an organization consisting of a software center, marketing and communications, finance and administration, and four profit centers encompassing 14 field offices. He was also responsible for product development and control, sales and marketing of application software, remote computing services, and custom programming support services.

He says the computer industry is the "perfect business because it provides a niche for every type of personality and talent." One of the things he likes best is that "ideas are treated as tangibles. The whole business rests on people with ideas and concepts. I enjoy watching ideas become tangible products."

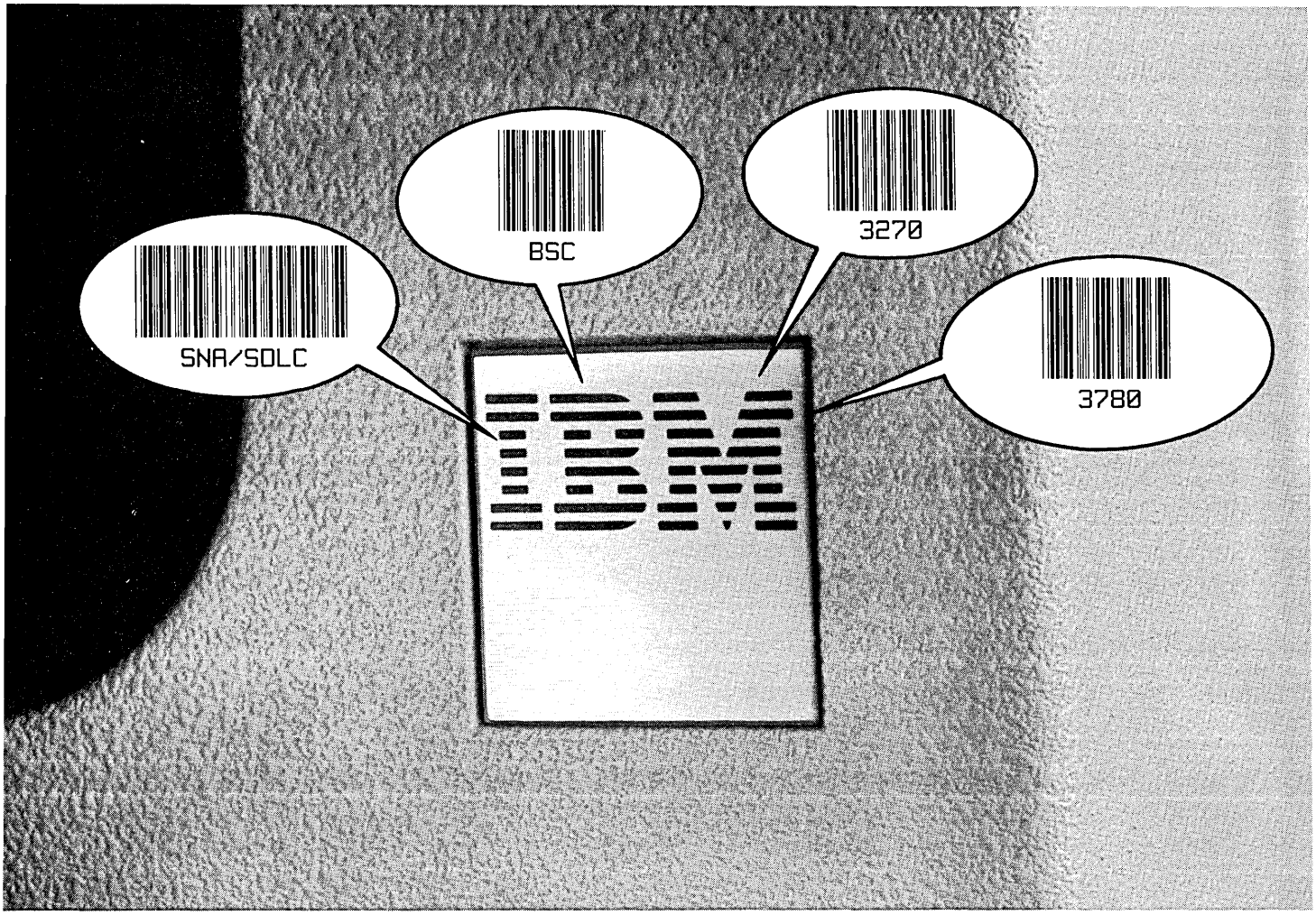
He now lives in Dallas with his wife, Linda, and 13-year-old son, Matthew. Moving from the Keystone State to Texas was a big change for him and his family, McTavish concedes. Perhaps the biggest change, he says, is that Texas on the whole is more conservative than the Northeast "in conduct, dress, and belief in country."

The move does have its advantages, however. "North Dallas has a very agressive business environment. In Philadelphia there is tradition. Businesses are more established. Business conduct in Texas is freer and much more creative—the sky's the limit."

—Robert J. Crutchfield

"I'll be down at the Melody Lounge holding court."

CARTOON BY HENRY MARTIN



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CIRCLE 65 ON READER CARD FOR LITERATURE
CIRCLE 66 ON READER CARD FOR DEMONSTRATION

HARDWARE

OFF-LINE

It's not enough that vendors of microcomputers market their products on the basis of features or that battle cry of marketing, "price/performance." Now these companies have even resorted to intimidation. In one tv commercial for Coleco's Adam home micro, for example, a teacher advises a mother that a computer might help correct the child's learning problems. In a second, a child is nervously awaiting his father's return from a parent-teacher meeting. Upon entering the house, the father says that the teacher thinks a computer might help the child's progress: "Son, we're getting you an Adam." One can only wonder whether both parents talked to the same teacher, and whether that teacher owns much stock in the Hartford, Conn., firm.

Another unsubtle example comes from the folks at Apple. In this spot, a job applicant's impressive qualifications, such as a Harvard MBA, are rattled off in laundry list fashion. At At the end of the list, the interviewer asks the applicant if he knows BASIC, and the poor interviewee sheepishly replies, "No, but I know a little French." We have our doubts that a Harvard MBA would be turned away from a job simply because he did not know BASIC. Besides, we thought Apple's whole campaign was based on the premise that people don't need to know BASIC as much as they need Jazz -- Lotus's Jazz.

Apple charted a more intelligent marketing approach in the Christmas season. The same company that tried intimidation also offered to let qualified customers take a Macintosh home for 24 hours for a test drive, as they called it. The premise was that customers would become adept at using the Mac in a day. And in case intimidation and test drives weren't enough, Apple sent a direct mailing offering customers $2,000 credit toward the purchase of Apple equipment. It has also decided that trade shows are not effective marketing tools, and plans to exhibit at only one dp show in 1985.

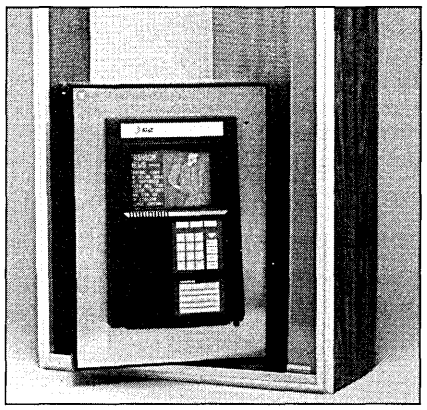
Regardless of their tone, all these efforts clearly show Apple's priorities. The firm is most interested in what Macintosh product manager John Rizzo calls the "Fortune 5 million." Apple is targeting colleges, small businesses, elementary and high schools, and home use. In deed if not in word, Apple is ignoring the nation's biggest corporations. Currently, only 15% to 20% of Macintoshes are sold into the Fortune 1,000; Apple's internal goal is 25%, but some outsiders see that as unrealistically optimistic. Yet as IBM has shown, one way to make big bucks from small computers is in the corporations.

Not that Apple is suffering. The company has already shipped 380,000 Macs, and through last month, the firm was still pumping one out every 27 seconds, over two shifts a day. That works out to over 40,000 Macs a month, a pace that would bring Apple $750 million per year. As the 800 employees in the Macintosh product group came to work for the first time this year, the firm was opening a second plant, effectively doubling Apple's capacity. (The plants won't hit a Macintosh every 13½ seconds for several months, however, as demand and manufacturing ramp up.)

Moreover, consider Apple's figures. Even at 15% of 40,000 Macs a month, Apple will capture a large chunk of the big Fortune 1000 market with Macintosh. Apple's goal of sending one out of every four Macs into that market by 1987 would give it a 30% to 40% share, according to the firm's internal figures; if that turns out to be the case, Mac will have become a second pc standard alongside the IBM family. Of course, by then they will all be obsolete. . . .

PUBLIC TERMINALS

This line of three public access terminals is designed for use with the AT&T Videotex Communications System, which is geared to display advertising and other information with text and color graphics.



Public access terminals can be used in shopping malls, banks, airports, hotels, entertainment sites, and office buildings. The vendor says that by 1987 more than 100,000 of these devices will be in use.

The terminals (models SK, TK, and XE) share common electronics, modems, and keypads. The SK has a 13-inch color monitor housed in a six-foot-high standalone kiosk with an optional video printer. The TK has a modular design with a nine-inch color monitor and fits in a variety of public telephone enclosures. The XE is designed to fit into special enclosures for custom applications. Prices for the AT&T Public Access Terminal Series range from $4,500 to $7,000. AT&T CONSUMER PRODUCTS, Parsippany, N.J.

FOR DATA CIRCLE 302 ON READER CARD

LINE PRINTERS

The HP 2566A and HP 2565A are matrix line printers that offer speeds up to 900 lpm. The printers are designed for medium- to high-volume print loads in such applications as EDP, manufacturing, and engineering.

The 2566A prints at a maximum speed of 900 lpm and the 2565A prints at

600 lpm. As many as 14 fonts may be installed at one time and mixed in a line of print. Both units can print bar codes. The standard character set for both printers is the 8-bit Roman 8, which supports ASCII in adition to 11 European languages at 10cpi, compressed 16.7cpi, and double-high/double-wide characters. Users select these characters from the printer's front panel or under program control. Character sets can be mixed in the same line of print. Optional OCR-A and OCR-B are available. The HP 2566A sells for $22,000 and the HP 2565A costs $19,000. HEWLETT-PACKARD, Palo Alto, Calif.

FOR DATA CIRCLE 303 ON READER CARD

SPEECH RECOGNITION

The Series 4000 Voice Recognizer is a voice data entry device designed to replace or augment existing manual or automated data entry procedures like terminals and bar code. It is speaker dependent, meaning it recognizes the voice patterns of individual users, and operates, according to the vendor, with high accuracy independent of accent, dialect, language, or daily variations in a user's voice in environments with up to 85db of background noise.

The hardware consists of a microphone headset and a portable console that accepts reusable, front-loading CMOS memory voice cartridges. Its console can be mounted on a desktop or wall. It contains no mechanical moving parts.

The vendor also offers Voice Planner software, a programming package that runs on PC/DOS-compatible micros, as well as on Digital Equipment Corp.'s VAX computers. The software allows users to develop voice data entry routines, word lists, training scripts, and translation tables for use with the Series 4000 Voice Recognizer.

To operate the system, a voice cartridge containing the user's speech patterns and application vocabulary is inserted into the unit. The device performs self-diagnostics and alerts the user that it is ready to accept verbal input. The user can then begin speaking into the microphone headset.

According to the vendor, the product's speech recognition capability allows a user to input a steady stream of data and commands without unnatural pauses. It converts this verbal data into a digital format and compares it with a model of the user's own voice patterns stored on the cartridge. The Series 4000 Voice Recognizer costs $5,000. The Voice Planner software costs $500. VERBEX, a division of Exxon Enterprises, Bedford, Mass.

FOR DATA CIRCLE 304 ON READER CARD

2,400BPS MODEM

The Smartmodem 2400 communicates at speeds up to 2,400bps and meets international requirements for data communication. The unit shares the same features as the vendor's 300bps and 1,200bps modems and can serve as the link between personal computers and mainframes. It meets CCITT V.22 bis requirements and Bell 103 and Bell 212A standards. Users can switch between CCITT and Bell transmission by issuing a command to the modem.

The unit supports asynchronous communications at 2,400bps, 1,200bps, 600bps, 300bps, and slower speeds. This device uses an enhanced version of the vendor's AT command set to establish communication parameters.

The product has the capability to monitor the progress of a call, distinguishing between a busy signal, no dial tone, and no answer. Long distance carriers can be accessed by users because the modem waits for a second computer tone before dialing any digits of commands. This feature permits automatic redial of a number.

The device also responds to quiet answer—a period of silence that follows several rings—used by many PBXs. The modem can then dial the access code needed to get a dial tone and extension.

The unit can switch between voice and data communications using telecommunications software. A signal quality detector allows this modem to reduce transmission error. A nonvolatile memory stores system configuration instead of setting switches within the modem. It can be tested without going on-line by using the self-test mode.

The vendor has also released Smartcom II version 2.0, an upgrade to its telecommunication software, which includes the XMODEM protocol. The Smartmodem 2400 costs $900. Smartcom II costs $150. HAYS MICROCOMPUTER PRODUCTS INC., Norcross, Ga.

FOR DATA CIRCLE 305 ON READER CARD

—Robert J. Crutchfield

HARDWARE SPOTLIGHT

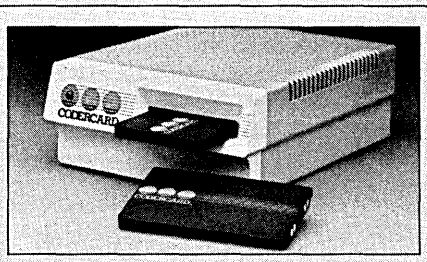
SECURITY SYSTEM

Codercard is a computer security system that can be integrated into any type of computer network or data communications environment to authenticate users and monitor all access attempts into the computer system.

The product combines hardware and software, interchanging data between user-oriented subsystems and a central verification subsystem. Its subsystems may be used in data communications environments consisting of terminals, workstations, or microcomputers, accessing either a host computer, front-end processor, or network control node.

A user inserts the Codercard into the card reader attached to a terminal via an RS232C port. Readers can be embedded in the terminal, or both card and reader can be fully integrated into the terminal device, which is activated when the user turns the terminal on. The card sends its identification number and 32-bit password to the host, which passes this information to the vendor's verification subsystem. This subsystem verifies the ID number, synchronizes its own random password generator to the user subsystem's value, and performs a random number of new password calculations.

The host receives this information



and passes only a portion of it back to the user subsystem, which must correctly duplicate the process and arrive at the same result before access is granted. Optional programmable Codercards can be loaded with biometric data, personal identification numbers, and other security checks. Also, user-written software can initiate additional security measures and control which system resources, programs, or databases can be accessed. Each card has a unique identification number in the firmware. All subsystems contain a sealed-in microprocessor programmed with an algorithm capable of generating billions of psuedorandom, invisible numeric passwords used in the authentication dialog process.

Codercards are priced from $80 to $100 each. Embedded card readers sell for $300. CODERCARD INC., Costa Mesa, Calif.

FOR DATA CIRCLE 300 ON READER CARD

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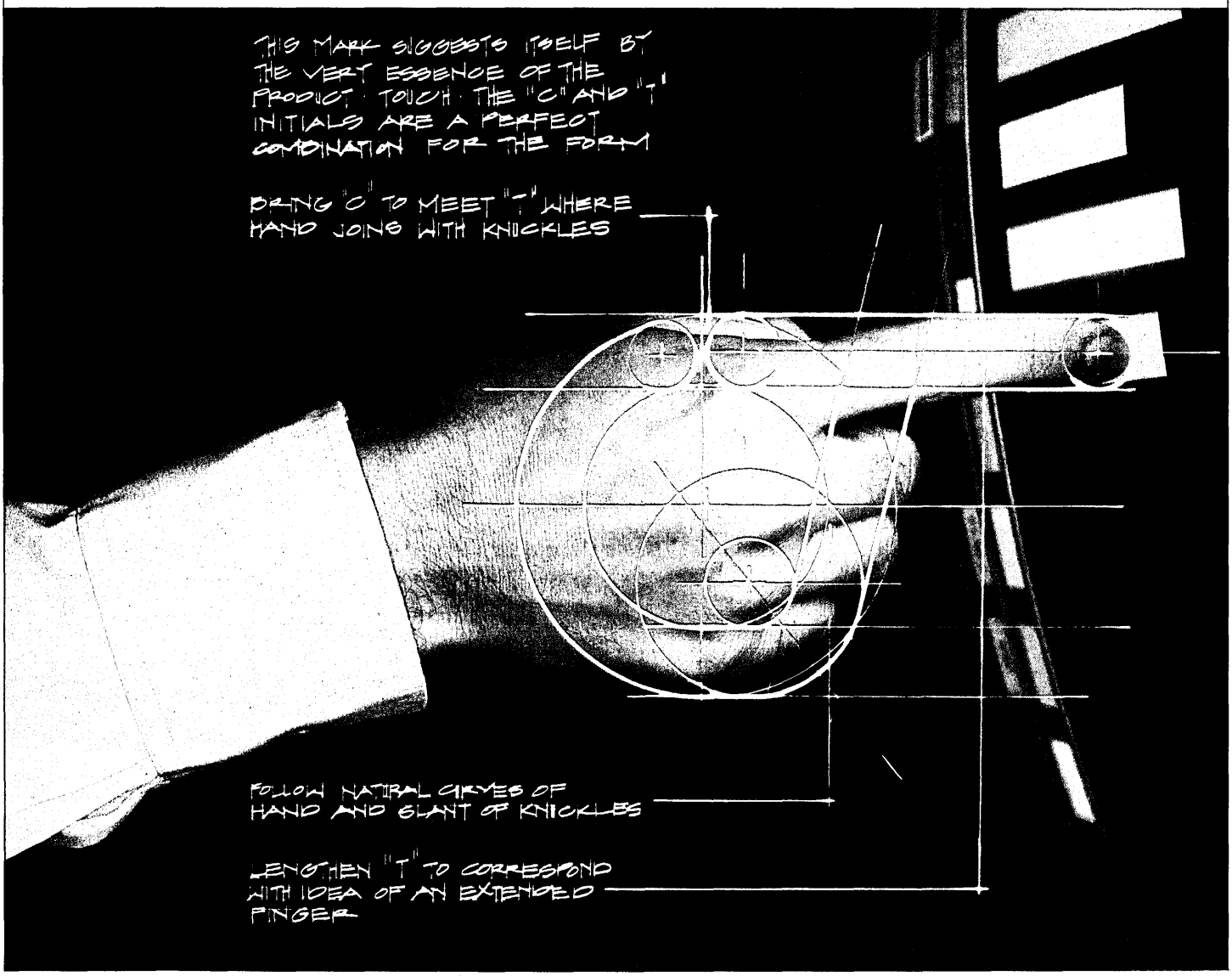

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SOFTWARE AND SERVICES

UPDATES

Have software developers lost contact with end users? Michael LaVigna, president and ceo of BBN Inc., says yes, adding that "too many people have spent money on software that has failed to perform as promised. The problem with most commercially available software is that there is seldom any contact between the developer and the ultimate user of the package prior to its introduction." He says the problem is mainly one of failing to understand that what may appear ideal to the developer may be cumbersome and lack utility for the user. He predicts commercial customers will buy only well-supported and field-tested packages.

MicroPro has finally brought out its enhanced WordStar packages -- WordStar 2000 and WordStar 2000 Plus. Critics of MicroPro have suggested for some time that the company should concentrate on developing an enhanced version of WordStar and stop experimenting with database packages and other software products. And what the San Rafael, Calif., vendor lacked in timeliness it has substituted with thoughtfulness. The new packages incorporate, among other features, word wrapping, a spelling checker, and a mailing list database. It can now accomplish footnoting and proportional spacing.

Now MicroPro must put the product to test in the marketplace. At stake is the company's market share, which has been eroding in the last couple of years. MicroPro will continue to support its existing WordStar products, the price of which it has reduced from $500 to $350. MailMerge and SpellStar were slashed from $250 to $100.

Artificial intelligence has been receiving a lot of attention in the software community recently. The University of Texas's computer department hosted a conference on the subject. The research firm of DM Data Inc. of Scottsdale, Ariz., estimates that the total artificial intelligence market will grow from $148 million this year to $28 billion by the 1990s. The study indicated this artificial intelligence growth will occur in expert systems, natural language software, computer aided instruction, visual recognition, and voice.

The arguments for implementing expert systems are many, and the lure seems to be artificial intelligence's ability to assist end users in gaining information by making queries in English to a system that has a specific body of knowledge stored in its database. One conclusion reached at the conference was that if computer scientists were ever to develop "expert machines" with the same level of intelligence as human experts, they must first define methods that best transfer the vast amount of human knowledge from man to computer. Researchers say the process of knowledge transfer is "crucial in the design of successful expert systems." But they add that some knowledge is often inexact and incomplete for computer systems in artificial intelligence. Therefore, the basic theme on which direct artificial intelligence researchers rely is the philosophy of telling computer programs what to know and what not to do, as is done in ordinary computer programs. As a general rule, researchers apply bits of knowledge in a step-by-step process based on prescribed rules, these researchers say. To build expert systems, programmers must know the properties that characterize knowledge of certain fields, and a problem must exist for an expert system to be useful.

CYBERNET CENTER

This vendor has formed the Cybernet Supercenter to serve the needs of all U.S.-based Cybernet customers. The center, to be located in Rockville, Md., will offer customers access to a 4 million-word Cyber 205 supercomputer and to nine of the vendor's largest mainframes, including 800 series equipment. The center gives customers flexibility to move processing and data without costly linkage between geographically separated mainframes, according to the vendor. All mainframes at the center will be connected via Loosely Coupled Network, which allows communication between mainframes at 5Mbps.

Services available include fast computing power coupled with large real memory, a variety of computing capabilities tuned for specific interactive batch or processing tasks, vector processing and interactive graphics and design, and processing capacity for volume production. Users will be routed to the center via existing local interactive and batch access from throughout the United States. The vendor will provide local access in 200 cities and maintain current levels of local I/O processing services and customer support in major cities. CONTROL DATA CORP., Minneapolis.

FOR DATA CIRCLE 327 ON READER CARD

EDITING SYSTEM

ACES is a comprehensive editing system for the Honeywell Level 66, DPS 8, and DPS 88 mainframes. It has also been developed for use with the Honeywell 7700 and 7800 series terminals to provide a program and documentation tool.

The product's approach to editing is similar to that of IBM's Structured Programming Facility (SPF), in which a menu-oriented operating environment is used to optimize the use of terminal capabilities. This software supplies a superset of SPF editor functions to the Honeywell environment. It doesn't rely on operation in a timesharing environment. The software has full control over cursor position-

ing within the edit screen and recognizes and directly supports most Honeywell file formats, including ASCII, BCD, compressed deck, and print formats. ACES is licensed for $8,000 per cpu. EXECUTIVE SUPPORT PRODUCTS INC., Newport Beach, Calif.

FOR DATA CIRCLE 329 ON READER CARD

MICRO-TO-MAINFRAME LINK

EComNet is a host-based software environment for micro-to-mainframe communication. IBM PC, PC XT, and PC AT users can access host facilities and files through the same PC/DOS commands used to call up locally stored data.

The software functions as a PC/DOS bubble around the mainframe, implemented and controlled by a company's MIS department. Personal computer users on the network can utilize host storage, gain access to host printers, and transfer data to and from MIS-defined host files. The host procedures associated with these tasks remain transparent to the user, even when logging on.

The product can be installed on most IBM mainframes or compatibles running under MVS 3.8, MVS/SP, or VM/SP. The PC needs a communications board and must have at least 128KB of RAM. According to the vendor, implementing this system results in a star network that uses the mainframe as a file server. It is an environment approach to connectivity as opposed to a terminal emulation or program-to-program approach.

EComNet consists of two initial modules. The first is called Virtual Peripherals. Each user is assigned a predefined amount of on-line storage on the mainframe, up to 32MB. This virtual hard disk is available to the user by referencing an imaginary drive specification, and can remain personal and protected. To share data among users, additional virtual drives can be assigned to act as "giant" floppy disks, again with 32MB of storage. The product also delivers host printing capabilities to the PC for shared printing.

The second module is called Cross System Link. It allows any data file on the mainframe to be brought down to the PC using the DOS copy command, followed by the name of the file. MIS can define which files are accessible to various users on the network. EComNet will have an initial license fee of $8,000. There is a monthly fee of $500 for Virtual Peripherals and $300 for Cross System Link. FORTE DATA SYSTEMS, San Jose, Calif.

FOR DATA CIRCLE 330 ON READER CARD

C COMPILER

The Safe C Compiler provides extensive run time checking of C programs and produces a dynamic trace of function calls with their arguments and returned values. It enables programmers to identify software bugs.

According to the vendor, one criticism of C compilers is their lack of safety as a result of limited built-in error checking. This compiler provides the safety of Pascal without sacrificing the flexibility of C. It doesn't impose any restrictions on the use of C and accepts the same code as an ordinary C compiler.

The compiler is designed to be a diagnostic tool that goes beyond the capabilities of the Unix utility lint, because it monitors a program while it is compiling and executing. A C program compiled with this product behaves as if it were compiled by the system's C compiler, with the exception of messages that are written to the standard diagnostic stream warning of potential problems.

It is designed to check a wide variety of difficulties including finding stray pointers, verifying that the types and numbers of arguments used agree with the function call and the function definition, detecting array indexes out of bounds, checking all calls to the standard I/O library, flagging arithmetic overflow and division by zero, and flagging overflow in the standard routines for manipulating strings. Each of the run time checks can be controlled at run time from within the program. Code generated by the Safe C Compiler can be freely linked with object modules generated by other compilers and assemblers.

Currently, the compiler is available for the IBM PC, other microcomputers, and minis including Zilog and VAX. A program that converts C code to English and English to C is also available. The Safe C Compiler prices range from $400 for an MS/DOS version to $4,000 for the VAX 11/780. CATALYTIX CORP., Cambridge, Mass.

FOR DATA CIRCLE 331 ON READER CARD

PROGRAM DESIGN

Action Diagrammer is a programming design tool based on the action diagram technique developed by James Martin, which involves a structured, graphic representation of the actions comprising a software program as a hierarchy of bracketed blocks.

This software tool has been designed to automate Martin's technique. It automatically supplies control structure syntax in English, COBOL, PL/1, FORTRAN, Pascal, and fourth generation languages including FOCUS, RAMIS, NOMAD, MANTIS, IDEAL, Natural, and ADS/O. Because it provides the syntax, it enforces integrity of logical structures.

Developed for the IBM PC or PC compatible, it shifts the program development task from mainframe resources to the PC's. It enables the system designer to integrate modularity, hierarchical organization, control, and structured logic constructs. Action Diagrammer sells for $500. A demonstration disk can be purchased for $25. DATABASE DESIGN INC., Ann Arbor, Mich.

FOR DATA CIRCLE 335 ON READER CARD

—Robert J. Crutchfield

SOFTWARE SPOTLIGHT

DECISION MODEL

Lightyear is a software package that helps business people define, analyze, evaluate, and communicate complex business decisions. It lets users apply the personal computer to managing complex tasks in an interactive manner. The program illuminates the steps of the decision-making process and articulates the results. The product was designed to amplify the way the human mind makes decisions. It guides a user through the decision-making process in a way that makes it easier to organize and evaluate all the factors important to a decision. The software defines decisions in terms of criteria, alternatives, and rules.

According to the vendor, not all criteria can be expressed with numbers. The software allows users three modes to enter information: numerical, verbal, and graphic. For example, an executive may express marketing costs in dollars (numerical), strength of competition from weak to strong (verbal), and each product's risk of failure relative to the other products (graphic).

Users can also create their own vocabulary for evaluating any of the model's criteria. The weight given to each criteria can be reestablished at any time during the process. Users can also express logical relationships—rules of thumb—that act as parameters within a model. Once the model is completed, the results are presented in the form of a bar graph.

Users can review the detailed results of a given option to see how it scored on each criterion or rule. Two alternatives can be compared point by point to see relative strengths and weaknesses of each. The software can compare two versions of the same model—incorporating different alternatives, criteria, or rules—and show how they compare with respect to weights assigned to criteria or in values assigned to individual alternatives in each category. Lightyear costs $500 and operates on IBM PCs and PC compatibles that have at least 192KB of RAM and at least one double-sided disk drive and a monochrome or graphics monitor. LIGHTYEAR INC., Santa Clara, Calif.

FOR DATA CIRCLE 325 ON READER CARD

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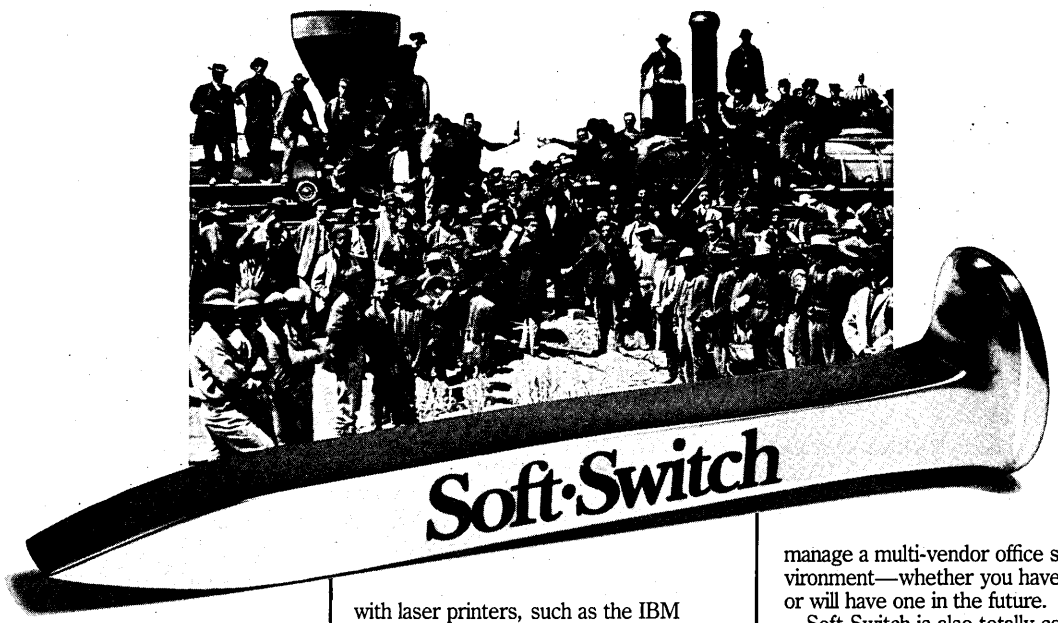

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For several reasons, you probably have office systems equipment from different vendors. You want to interconnect this equipment and integrate it into your IBM mainframe environment. That's no problem with Soft-Switch because it ties together a variety of brands of equipment. Soft-Switch communicates with IBM, Wang, Xerox, and NBI word processors. And with a variety of IBM PC-compatible word processing programs, such as MultiMate and DISPLAYWRITE 2; with host-based systems, such as DCF and PROFS; with laser printers, such as the IBM 6670; and with standard hard-copy printers.

Running as an application program in an MVS or VM environment, Soft-Switch allows users to send documents to other users—document translation is performed automatically. In addition to translation services, Soft-Switch provides comprehensive electronic document distribution services and text library services.

Soft-Switch solves real-world problems.

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Soft-Switch transports the document from the PC to the IBM host, translates it from MultiMate to Wang's WPS format and the IBM 6670 laser printer OCL format, automatically routes the document to its final destinations, and stores a copy in the library at the mainframe.

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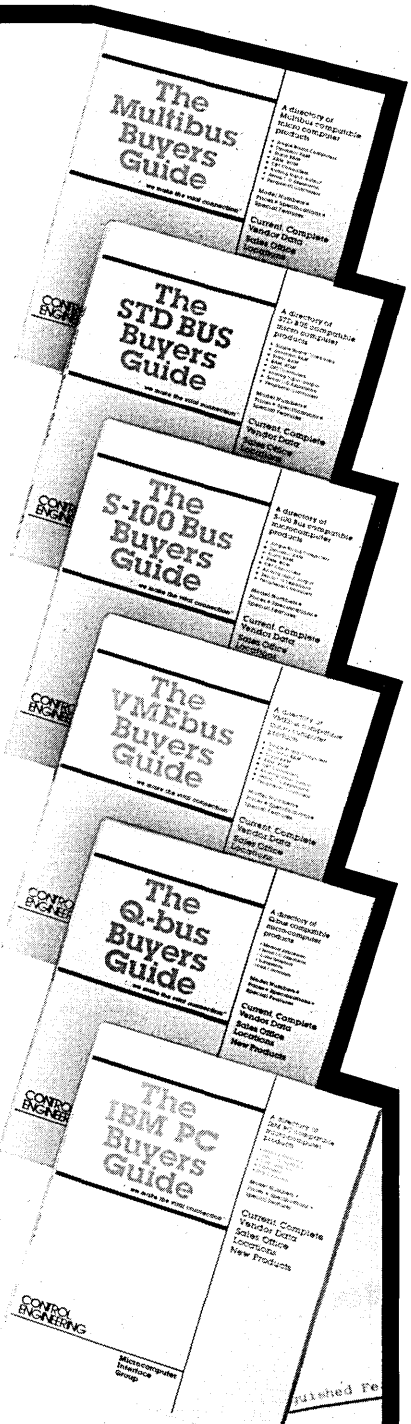

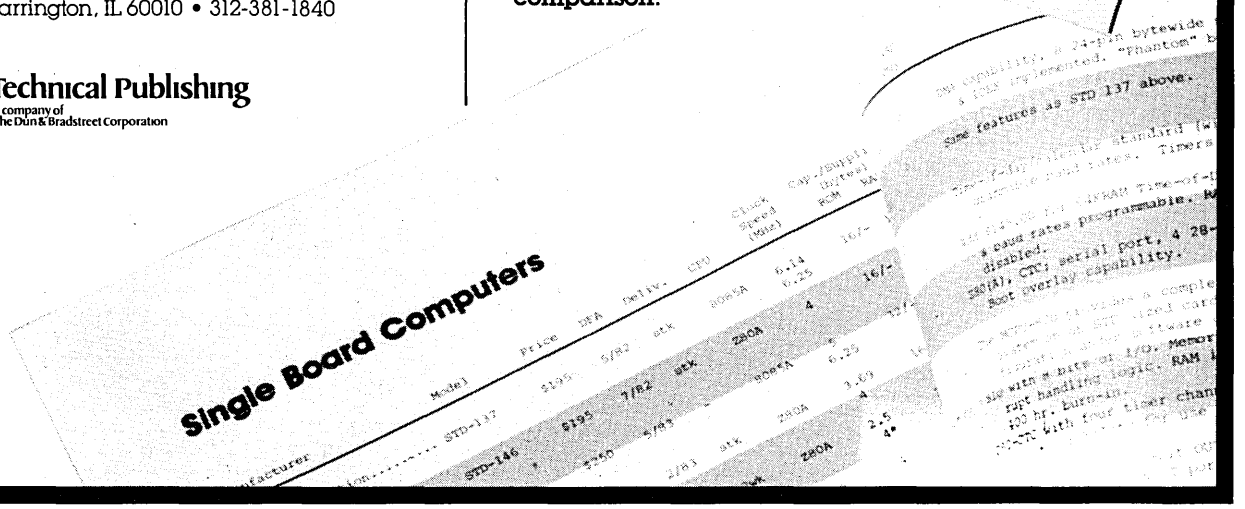

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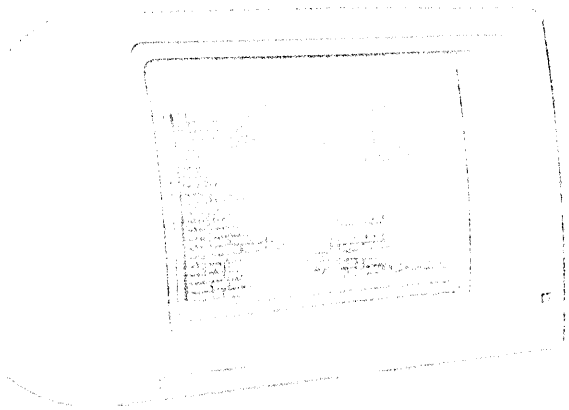

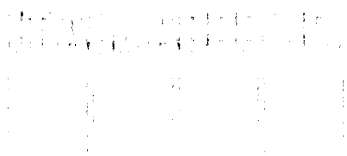

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SOURCE DATA

BOOKS

SYSTEMS DEVELOPMENT WITHOUT PAIN: A USER'S GUIDE TO MODELING ORGANIZATIONAL PATTERNS
by Paul T. Ward

One of the problems of an inbred organization is that it is effective only in isolation. Words forged in isolation mean just what they are intended to mean and all the acolytes know (or learn) what the monks intended. A problem occurs, however, when the monks venture forth among the great unwashed.

Some years ago Tom DeMarco ventured forth (in print) and gave us structured analysis. The faithful gathered around. He described ills we had and a cure we wanted. Following the book came courses. One of my big clients subscribed to the full gospel. He bought books in quantity, cycled his development analysts through the courses, and added structure charts to the mandatory part of his standard development methodology.

After structured diagrams had become a way of life, I reviewed a specification on a prestigious project. The spec consisted of 220 pages of bubble charts. No words, no definitions, no screen layouts, no detailed enumeration of record contents, no target response times, and no transaction volumes. Further, it did not address (among other things) security, cost, or data quality. Needless to say the charts solved only the easy part of the problem.

Now the door to the temple has once again opened and Paul Ward emerges. I was confused by his book's title. System development and pain I know well, but what's an "organizational pattern"? As I read through the introductory material (52 pages and five chapters), I found that Ward speaks in tongues. The preface states that he is avoiding "inconsistent and confusing computer jargon." That's commendable, but not if he substitutes Yourdonese for it. "Patterns" were never satisfactorily defined and their use is a far cry from the prevailing definition, "an ideal, model, or guide." He even casually uses the word "model" in several flavors, styles, and details without ever stating that a model is an abstraction for some specific purpose, and to be useful in computing, that purpose must be clearly stated.

A typical author's artifice is employed throughout this work. Ward chooses a simple example, which could be grasped in one glance by a system development neophyte after a three-martini lunch. This example is used throughout the book to dramatize his points and to illustrate the usefulness of ASML (A Systems Modeling Language), the latest evolution of the bubble charts of yore. But he never tells the neophyte that much (all?) of the resulting clarity stems from the triviality of the chosen problem and not the notation being promoted.

To Ward's credit he does state that big jobs should be left to dp professionals and that the optimum-sized team (using ASML) has from three to six members, but this falls far short of defining the domain of applicability for the techniques he is pushing.

Ward and I generally agreed on the problems. I tried to read with an open mind about schemas and models (several types) and patterns. I felt fairly comfortable when he separated the world into processes, data, and flows. But his sweeping generalizations using strong English words without qualification upset me greatly. For example:

- "A complex system . . . must be modeled."
- "I can guarantee it will be one of the most enjoyable books you ever read about computers."
- "Systems development isn't efficient . . . . The cause of this phenomenon is human communication problems."
- "The shortcomings of automated systems have a human cause, not a technological one."

Despite the claims of the author, this book will not become a valued addition to my library of selected computer books. It is not worth rereading several times—although that might be necessary to comprehend passages such as, "It's not sufficient to state that they [implementation models] must be complete [sic], since that's not specific enough. The models must be predictive [sic]; they must contain enough information to serve as a standard against which the behavior of the completed system can be judged." Nor do I intend to recommend it to the next eager user who wishes to do some systems development on his own. Yourdon Inc., New York (1984, 286 pp., $27.50).

—by R. L. Patrick

STRATEGIC PLANNING, SYSTEMS ANALYSIS, & DATABASE DESIGN: The Continuous Flow Approach
by Mark L. Gillenson & Robert Goldberg

Strategic planning, systems analysis, and database design are crucial to data processing. Yet few understand the interfaces and transfers of information among them. Is there a uniform way of merging them? Does the technique of choice depend on the chooser's organization?

This book is a fruitful collaboration between an educator, Dr. Gillenson, and a software engineer, Dr. Goldberg, both with IBM. It combines the tutorial approach of a textbook (including end-of-chapter exercises and an index) with solid pragmatic advice for developing business applications.

The authors guide us on a two-stage journey. First, they show us the outlines of today's major planning and design methodologies. They then offer us a continuous flow approach for merging the four activities—business planning, systems planning, analysis, and database design—into a unified, coherent whole.

In pursuit of the first goal, the authors survey current methodologies. They highlight the strengths and flaws of each technique by plotting it on a two-dimensional graph, using the latitude and longitudes of "formality" and "data/process focus." The notion of formality and data/process focus as yardsticks for comparing methodologies is a powerful one. It yields insights into the techniques that might otherwise escape notice.

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Formality measures the extent to which a methodology or technique confines the practitioner to narrow limits. At one extreme are weakly structured methods characterized by familiar yet ambiguous languages (such as English) that allow maximum creativity. They risk much, but also stand to gain much in return. At the other end are rigidly structured methods with precise, hard-to-learn languages that leave little room for individuality, hence risking little—again, for better or worse.

Data/process focus, the other dimension, tells whether a methodology emphasizes data analysis or process analysis. Methods driven by data structure lie at one end of this spectrum. Here, if you get the files right, everything else will fall into place. At the other end we find techniques that home in on procedure analysis, making data design almost an automatic by-product.

By plotting contemporary methodologies on this surface we learn about the following planning techniques:

- SofTech Inc., Waltham, Mass., has a product called SADT (Structured Analysis and Design Technique), which is aimed at finding the "... real requirements that cause a program to be written." Consequently, it helps us avoid the good-solution-but-wrong-problem pitfall. It is highly procedures oriented and moderately formal.
- IBM's BSP (Business Systems Planning) tells us first to analyze and understand our organization. If we identify the source and destinations of all company information, we can cluster these data streams into files, then into applications. This is a data-flow-oriented, informal technique.
- BIAIT, the Business Information Analysis and Integration Technique (by Donald C. Bernstein and D.W. Soknacki, published in GUIDE International and SHARE Inc.'s Proceedings of the Application Development Symposium, October 1979), takes advantage of the fact that, when you get down to it, there really aren't many different kinds of organizations. By asking seven questions, each defining a business characteristic, we can pigeonhole any firm into one of 128 organizational types, letting us select the appropriate standard application portfolio for that type. The method strongly focuses on data structure and is moderately formal.

Among the systems analysis methods, we're shown several things:

- Stepwise Refinement (developed by N. Wirth) simply tells us to break big problems into little ones. It is evidently strongly procedure oriented and quite informal.
- Structured Analysis and Design (a la Tom DeMarco, G. Gane and T. Sarson, and V. Weinberg) uses data flow diagrams to develop a top-down application specification. It lies in the moderately formal, data-flow-oriented area of the chart.
- The Warnier-Orr approach microscopically studies data items and their hierarchy to derive a design. Similarly, M. Jackson's *Design Methodology* affirms that, once data structure is known, program structure must parallel it. Both are, of course, quite formal and strongly focused on data structure.

In the database section, we are informed that there are "... four basic approaches to data definition languages and their underlying data structures" and that there are two design methods. The four basic approaches are relational, pseudorelational, hierarchical, and network. The database design methods are normalization and entity relationship.

The two design methods differ in that normalization synthesizes records out of individual data elements, while entity-relationship design starts with the entities (records) themselves and breaks them down into individual elements as a stepwise refinement.

Our journey concludes with two pieces of advice. First, the authors warn us that we are wiser to choose any methodology, any discipline, and stick with it than to flounder about with each systems analyst doing his or her own thing. Second, they point out that our database designs as well as system designs must flow from our systems plan. And our systems plan, in turn, must spring from our strategic business plan.

In the reviewer's opinion, the breathtaking journey among competing methodologies is worth the book's $30 price. Although neither as terse nor as technically fine-grained as Tom DeMarco's *Concise Notes on Software Engineering* (a similarly broad methodology review from Yourdon Inc.), the two-dimension charts tell more in an easy-to-remember, pedagogical fashion. The overview of the three planning methodologies, in particular, is outstanding. To my knowledge, there's nothing else quite like it. Also, the work is indexed with the names of the methodologies and their creators for easy reference. Gratitude goes out for this often neglected kindness to the reader. Finally, the physical workmanship is attractive: the hardcover binding is stitched, the type font easy to read, and the paper has enough gloss to shed fingerprints yet reflect no glare.

On the negative side, the work is a bit wordy. It takes 223 pages to tell what this reviewer believes could have been told in 150. We start our journey, for example, in 8500 B.C. in the Zagros mountains of mesolithic Iran, and don't reach the twentieth century until p. 9. Minor inaccuracies exist, but they're not serious enough to trap the wary reader. The worst of these is misuse of the term cohesion (p. 134). The authors use the words strength and cohesion when they mean, respectively, cohesion (or strength) and coupling. Of less import, they use the military science terms strategy, operations, and tactics, but they swap the meanings of the last two. Finally, their "continuous flow technique" amounts to little more than the exhortation, "Base your designs on your systems plan, and base your systems plan on your business plan.

In summary, buy this book for its insightful reviews of current methodologies, especially the planning methodologies. John Wiley & Sons Inc., New York (1984, 228 pp., $29.95).

—by Frank Sweet

BOOK BRIEF

1985 PROGRAMMER'S MARKET

So, you've written a hot little program for your Macintosh or PC, and you want to get it published, hit the big time, and retire to Rio. Before visions of mailboxes stuffed with humongous royalty checks get the better of you, look at this book. Like its predecessor, *Writer's Market,* this annual volume gives the lowdown on who buys what, from whom, and for how much. Some 700 microcomputer software publishers who publish free-lance work are listed. Included is information on what types of software each publisher is looking for, the number of programs each has published, the target machines each is interested in, and typical payment and rights arrangements. Some advice on how to negotiate contracts and several profiles of successful free-lance programmers are also provided. If there's one thing wrong with this book, it's an unquestioning, almost blind, optimism about software markets. *1985 Programmer's Market,* Writer's Digest Books, Cincinnati (1984, 343 pp., $16.95).

MVS/XA

IBM's 31-bit addressing version of the MVS operating system is a product virtually all large 370 shops will have to consider sooner or later. The new operating system is supposed to help provide large users with new system capacity and relieve many of the problems encountered when the current MVS is pushed to the limits of its 24-bit address space. Here is a relatively lucid report that discusses IBM's system software strategies, how MVS/XA differs from its predecessors, and what to expect when converting to it. Among the areas covered are virtual storage in general, MVS/XA's subcomponents, the installation process, and the costs of MVS/XA. *IBM and MVS/XA* sells for $120 a copy. Applied Management Services, 180 E. Main St., Patchogue, NY 11772. ◉

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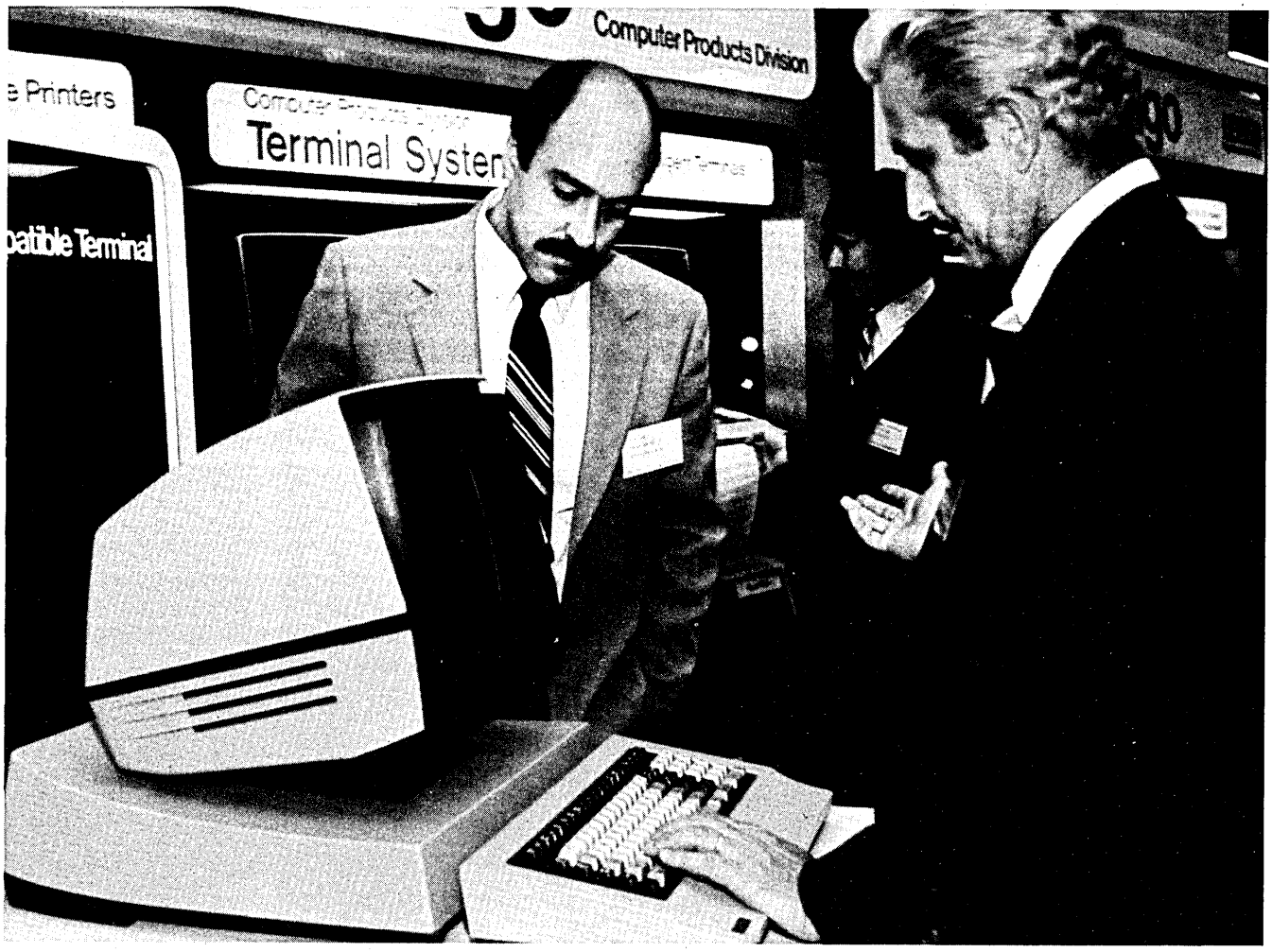

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ON THE JOB

DESIGNS FOR PRODUCTIVTY

The results of a six-year research program, instituted by the Buffalo Organization for Social and Technological Innovation Inc. (BOSTI), bring to light many interesting facts about the effects of office design on productivity and the quality of work life.

BOSTI conducted the nationwide study of more than 6,000 workers in 70 private and public organizations. This year, Westinghouse Furniture Systems published the findings in *Using Office Design to Increase Productivty*, authored by Michael Brill, president of BOSTI, along with Steve Margulis and Ellen Konar. The group utilized a two-phase plan that allowed them to study workers before and after changes were made to their existing office designs. It also included a comparison-across-group study.

Workers were surveyed two to four months prior to any changes and eight to 12 months after. Attitude, satisfaction, and performance were measured and related to measures of workers' physical environments, and how well those environments functioned.

The main source of information was a 500-item questionnaire emphasizing objective information and answers arrived at independently. Workers detailed their office environments and their behavior there, as well as evaluating their overall space according to each specific facet in the office (such as lighting, layout, furniture, appearance, and floor area). BOSTI pilot-tested the questionnaire to ensure that workers could successfully administer the tests to themselves.

BOSTI researchers defined four different categories in order to examine the differences between the many groups surveyed. The "Change Data Base," included about 400 office workers at 25 sites who completed surveys before physical changes were made as well as after, allowing researchers to examine the nature of those changes as well as their effects.

A cross-sectional example of nearly 1,500 office workers at 56 sites provided the information for the "Time 1/Time 2 Data Base." The Time 1 segment of the survey gleaned responses from people in relatively old work settings, before any changes were made, while the Time 2 segment involved people in new work settings, but only *after* changes were made.

Next up was the "Cross-sectional Data Base," which included 2,600 workers from 60 sites. In this sample, workers completed either one or more surveys, but only one of the surveys was randomly selected for the database. This part of the study contained the broadest spectrum of responses and included people at many points in the life of a facility: before or after a move, a long time after one, or at unrelated points. This was done to establish the most representative sample of office conditions possible.

Last but not least were the "Special Data Bases" constructed to probe issues where data were gathered under special conditions. These were one-time-only surveys of about 2,000 workers at 15 sites. This segment was used to focus on special conditions, or on specific problems in greater detail.

The survey's finding's proved that a well-designed office can have an impact on a worker's job performance, satisfaction, and productivity by as much as 15% of that worker's annual salary—approximately $4,000 per person.

There were other myth-shattering revelations:

Windows in offices exert no impact on job performance and only "a little" influence on job and environmental satisfaction.

The average amount of space allocated to managers, professionals, and clerical workers is more than adequate.

Reducing work space floor area by more than 25% reduces job satisfaction (common with clerical workers).

Brill feels that "too often, management consultants suggest only redesigning jobs, rather than redesigning both the environment and the job to improve job satisfaction and performance." The book therefore addresses three basic questions frequently asked by organizations:

Does office design affect productivity and job satisfaction?

If it does, what specific aspects of the office are involved?

What is office design worth in dollars and cents?

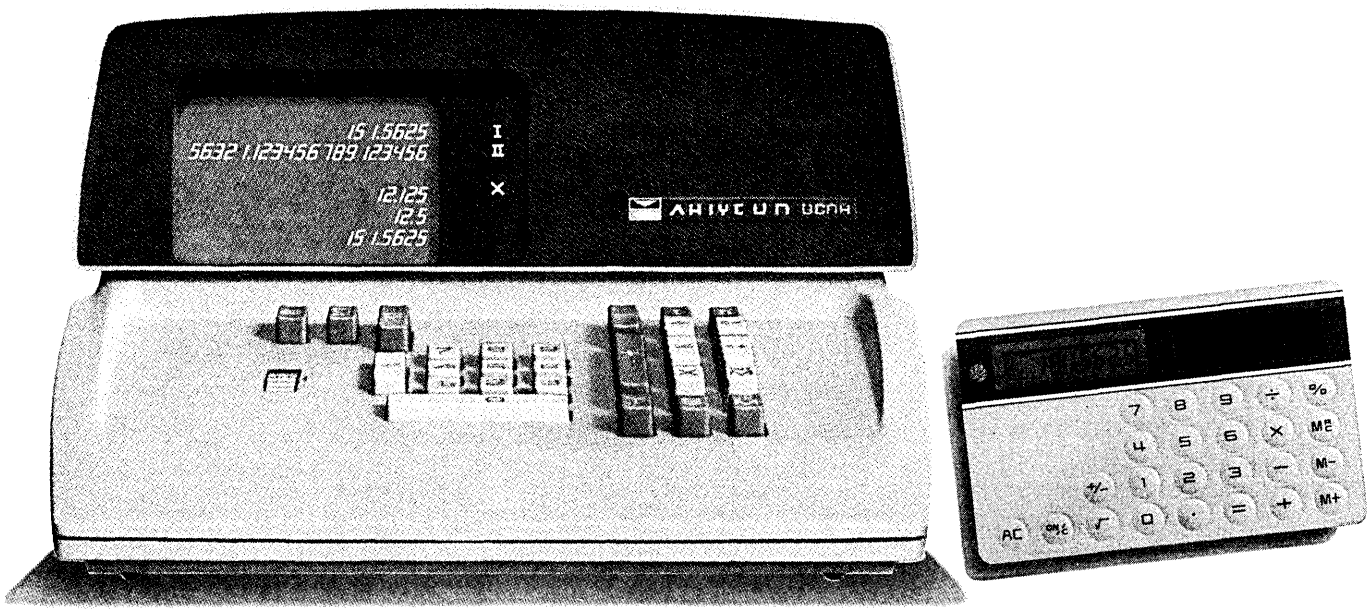
"The electronic office," the book states, "has helped improve office efficiency, but is no longer regarded as the panacea for raising productivity. . . . Today, more companies are realizing that they can increase productivity—along with cost savings and job satisfaction—by making the office environment more agreeable to workers, both functionally and aesthetically."

The book sets out to assist facilities managers, managers of organizations, and designers in reaching that goal by providing research data for making sound decisions about the office's physical environment.

Using Office Design to Increase Producivity, a two-volume set, can be ordered for $100 from Westinghouse Furniture Systems, 4300 36th St., S.E., P.O. Box 8829, Grand Rapids, MI 49508.

—Lauren D'Attilo

A SIMPLE LESSON IN ECONOMICS FOR ANYONE WHO BELIEVES ADVERTISING RAISES PRICES.



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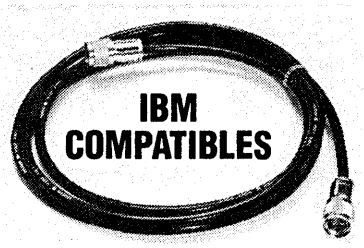

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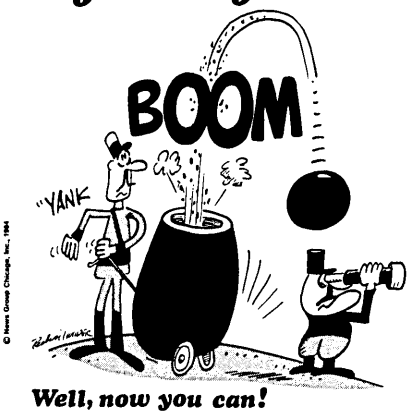

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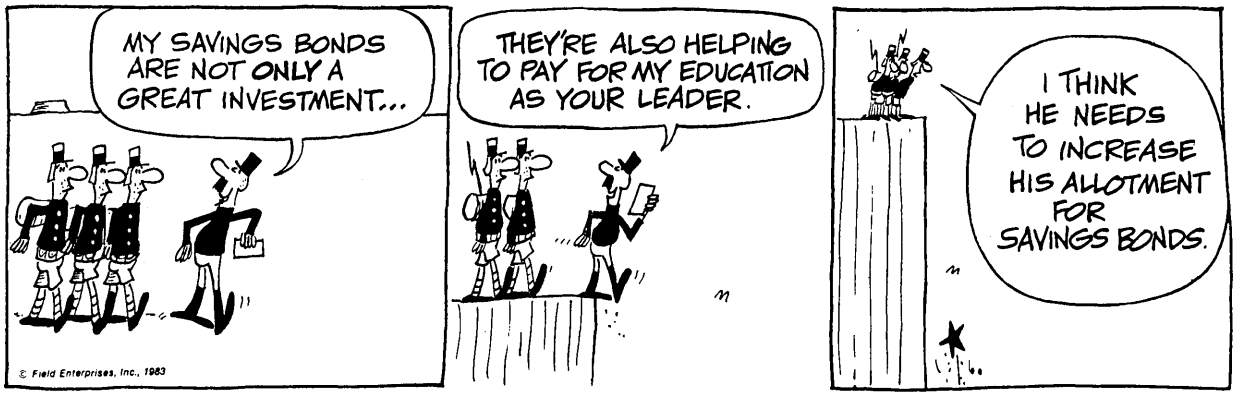

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An exchange of readers' ideas and experiences. Your contributions are invited.

READERS' FORUM

QUEST FOR KNOWLEDGE

TO: Director, Research
FROM: Anderson
SUBJ: Monthly report

Am working on metal device to open food cans.

TO: Anderson
FROM: Safety Coordinator
SUBJ: Corporate Instruction 45-A6-39

If device has sharp edges, you must file safety report.

TO : Director, Technical Publications
FROM: Director, Research

You should assign someone to work with Anderson on writing of manual for device to open food cans. Suggest using Behlen, who has worked with locks, doors, and other opening agents.

TO: Director, Technical Publications
FROM: Behlen
SUBJ: Copy on food can opener

To use food can opening device, push point through can top adjacent to raised lip, work up and down with hand until top is completely severed.

TO: Director, Research
FROM: Director, Marketing
SUBJ: Food can opening device

We can't advertise device with no gears, no lights, no sex appeal. Can Anderson make device interesting?

TO: Central Supply
FROM: Anderson

1. C battery, one
2. relay, one
3. lights—red, blue, green

TO: Board of Directors
FROM: Director, Research
SUBJ: Anderson device

Note that when operated, lights blink in sequence: red, blue, green.

TO: Director, Research
FROM: Board of Directors, subcommittee on product development
SUBJ: Anderson device, deficiency in

Anderson's device is hand-operated, does not reflect latest technology. Suggest motor.

TO: Central Supply
FROM: Anderson

1. motor, electric, small, one
2. bracket, motor, one
3. D batteries, two

TO: Director, Technical Publications
FROM: Behlen
SUBJ: Food can opener, additions to manual on

On p. 12 change "two D batteries" to "three D batteries when lights are in asynchronous mode."

TO: Director, Research
FROM: Subcommittee on product development
SUBJ: Anderson device

It doesn't open bottles.

TO: Central Supply
FROM: Anderson

1. pump, electric, small, one
2. 3/8" drill bit, one
3. chuck, drill, one
4. tube, flexible, 12"

TO: Board of Directors
FROM: Director, Research
SUBJ: Anderson device

Anderson device now extracts fluids from bottles. Small drill penetrates cap first, then flexible tube is inserted into bottle, and fluid is pumped into individual glasses. Red light indicates device in can-opening mode, green light in bottle-penetrating mode. Rate of fluid retrieval shown by speed of other blinking lights.

TO: Director, Research
FROM: Chairman, Board of Directors

Can Anderson device open screw-top jars?

TO: Central Supply
FROM: Anderson

1. motor, electric, large, one
2. transmission, electrical, one
3. belt, fiberglass, 24", one
4. switch, three-way, one
5. switch, two-way, one
6. transformer, AC/DC, one
7. lights, purple, yellow, one each

TO: Director, Technical Publications
FROM: Behlen
SUBJ: Additions to food can opener manual

1. Change four ½" by 3" bolts on page 36 to six ½" by 4" bolts. Engine develops much torque.

2. Insert "Put switch Number 2 on before engaging transmission" on page 74 after "jars over 4" high."

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ASM2 increases efficiency with a new data restoration facility called *Intelligent Transparent Restore* (ITR). It's intelligent because you'll never have to pre-check data set availability or issue manual restore requests again. What's more, ITR's unique "look-ahead approach" allows far more data to be archived and retrieved. ITR: Intelligent. Transparent. Automatic.

Best of all, ASM2 optimizes critical DASD space in the operating system so efficiently, it can easily pay for itself within a year.

ASM2 ... a more natural space manager would be very hard to find.

... Cambridge Systems ... on line ... data.

READERS' FORUM

TO: Board of Directors
FROM: Director, Marketing
SUBJ: Anderson device, marketing of

Suggest that "can opener," which Anderson calls device, is awkward. No panache. No zip. Suggest call it "Processed Food Retrieval System."

TO: Management
FROM: Corporate Policy and Patents
SUBJ: Trademarks and Proper Identification

1. The Anderson-developed machine will henceforth be called The Easy Access Processed Nutrient Retrieval and Dispersal Operating System.

2. For internal use only, it may be referred to as EAPNuRDOS—pronounced Eap Nur Dos—and used in headlines as such.

3. For external use, it must appear with trademark and spelled in full.

TO: Director, Production
FROM: Director, Marketing
SUBJ: EAPNuRDOS

First models should be in red, blue, ivory, and soft yellow. Further colors to be determined by survey.

TO: Accounts Payable
FROM: Dazzle Photo Service
SUBJ: Itemized bill, Feb. 9-13 photo session

200 views of EAPNuRDOS @ $25 each–$5,000

TO: Accounts Payable
FROM: Bide-a-Wee Printing Co.

Layout, strip, and print 132-page manual for Easy Access Processed Nutriment Retrieval and Dispersal Operating System: $23,000.

Changes to final design: $5,800.

TO: Anderson
FROM: Director, Marketing
SUBJ: EAPNuRDOS Improvements

New versions of your device will need changes and modifications to meet competition of marketplace. Anything planned?

TO: Central Supply
FROM: Anderson

1. bell, two-tone, electrical
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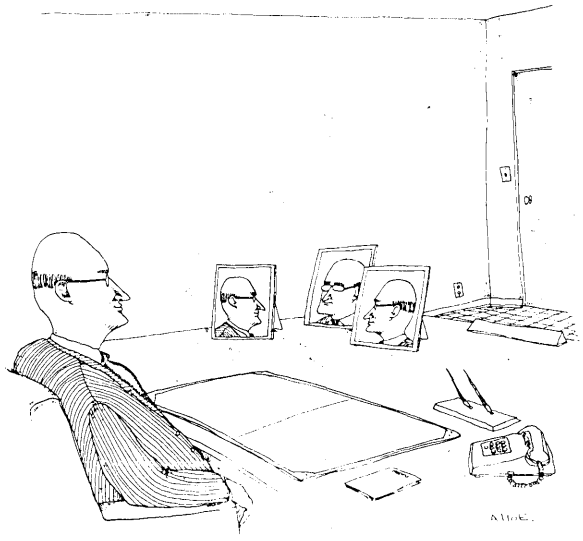


CARTOON BY STEVE ALTOE

READERS' FORUM

TO: Director, Research
FROM: Board of Directors
SUBJ: Budget, Anderson's

Approved in full. The quest for knowledge must never be stopped.

—William Earls
Cranford, New Jersey

SUPERTOOL

A powerful and flexible workstation product has been installed at select locations within our facility. We are evaluating its suitability for widespread use by those employees who generate the printed word, especially those who are uncomfortable with the netherworld inhabited by computer programmers—an unstructured lot flaunting sloth as an art form, traffickers in slipped schedules and powdered bat wings, a generally sly breed proving that God's wondrous plan is not complete.

Our preliminary determination is that this often-overlooked device is extremely user-friendly, serves to extend the productivity of the owner, and can fling an otherwise lackluster career through the gateway of tomorrow. Because this workstation is tightly coupled to the originator's own thought processes, the printed result accurately reflects the intent and personality of the author, including ragged right-hand margins and bizarre composition—as instantly recognizable as freckles and crooked teeth.

This workstation is most often referred to as an electric typewriter.

Those who are familiar with it marvel at its compact and cost-effective design. It requires only one connection, to a power outlet. It allows direct input from the user in incremental English via an ergonomic keyboard, and provides immediate character-by-character output on ordinary paper, not special pin-fed forms. Mistakes are instantly visible for correction and the resulting hardcopy is immediately available without waiting for a page to be disinterred from a sometimes recalcitrant memory or relegated to some distant station. Secretarial intervention is unnecessary, thus saving the time required to shuttle drafts back and forth in sneaking up on the final aesthetically titillating copy.

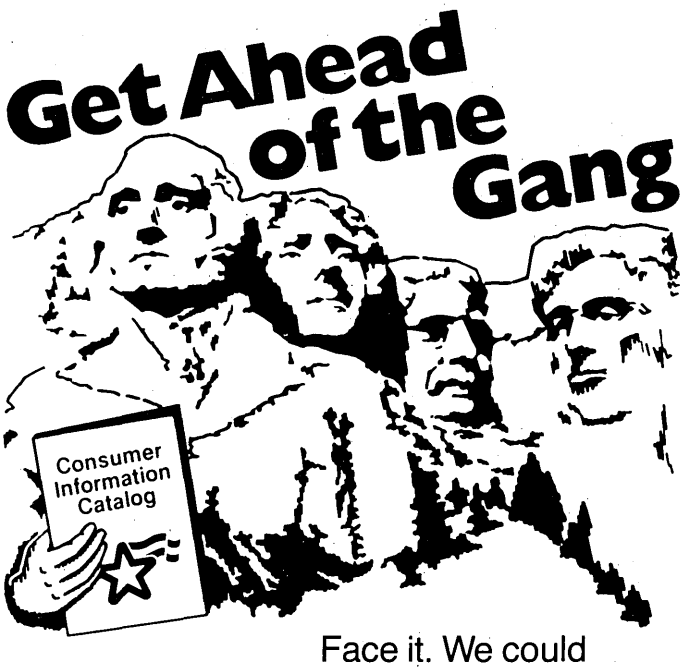
The ultimate acceptance of this device is expected in the most hallowed of offices since executives as high as vice presidents have already been broken in to the keyboard by virtue of having been given their own personal computers. While this has saved many from drowning in the wave of the future, more than a few have dropped from sight for extended periods with nary a hint of the purposeful behavior that formerly had propelled them to the top. The dictates of ego may, in some instances, require that privacy alcoves be installed; this will also serve to screen their newly evident skills from contemporaries who might be immobilized by envy as they struggle to stay astride the razor blade of corporate attainment.

Some predict that these devices may soon be found in every professional person's habitat. In some instances, they will replace word processors, personal computers, and other elegant excursions into the labyrinths of experimental technology, many of which require a stoic tolerance for the fickleness and gut-wrenching uncertainties of host computers.

It is recommended that every organization bent on improving professional productivity consider the acquisition of typewriters for those wordsmiths from whom tangible output is expected. This will free up the secretarial staff for running the organization and projecting an aura of efficiency to outsiders.

Bottom line: not everyone needs a pc or color terminal.

—Roger A. Wells
Long Beach, California



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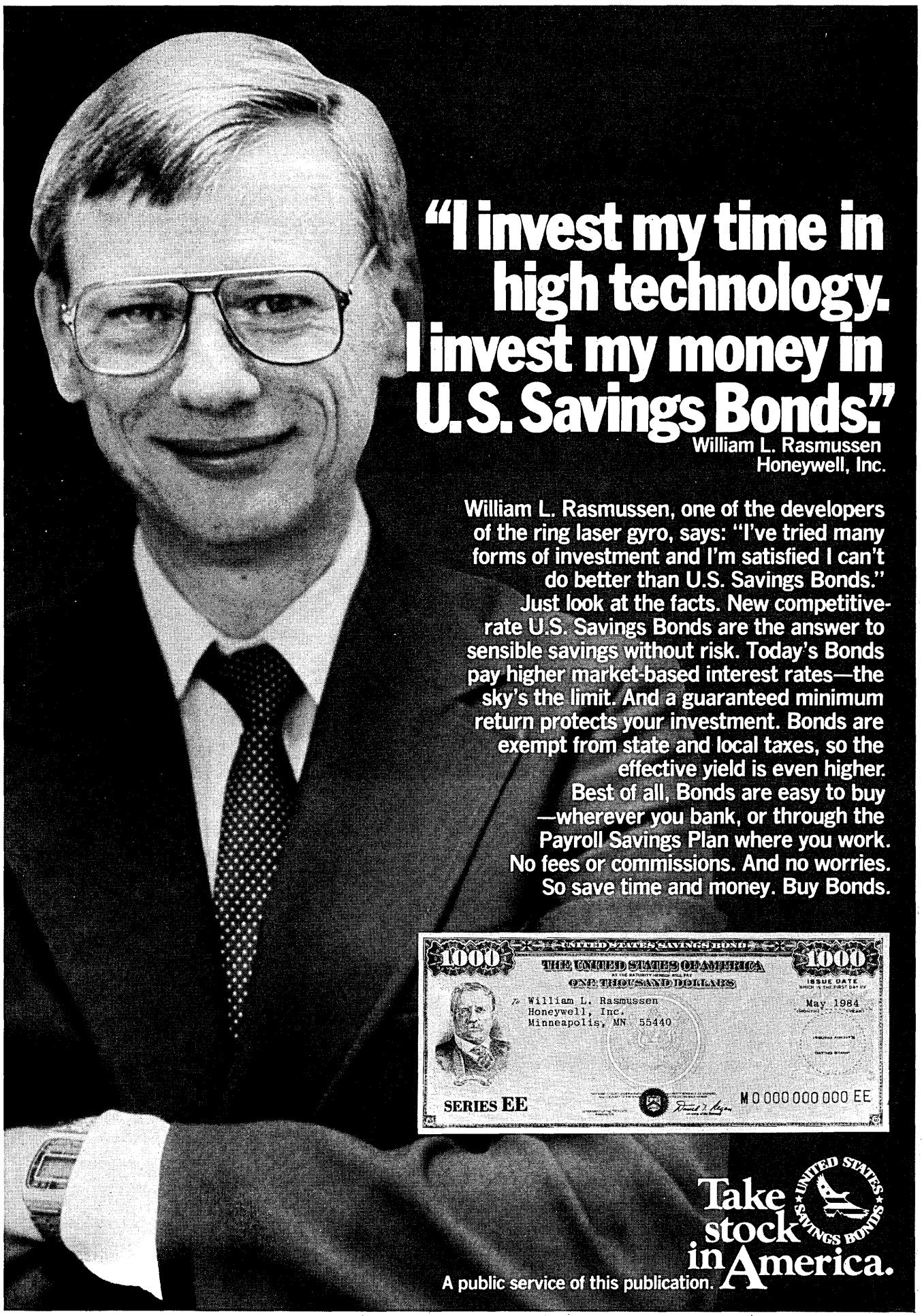

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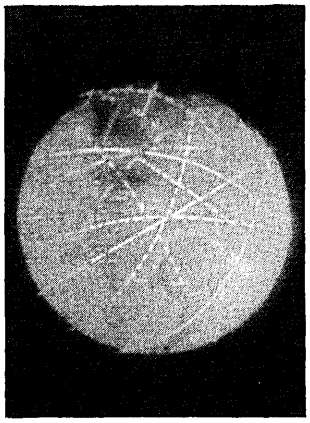

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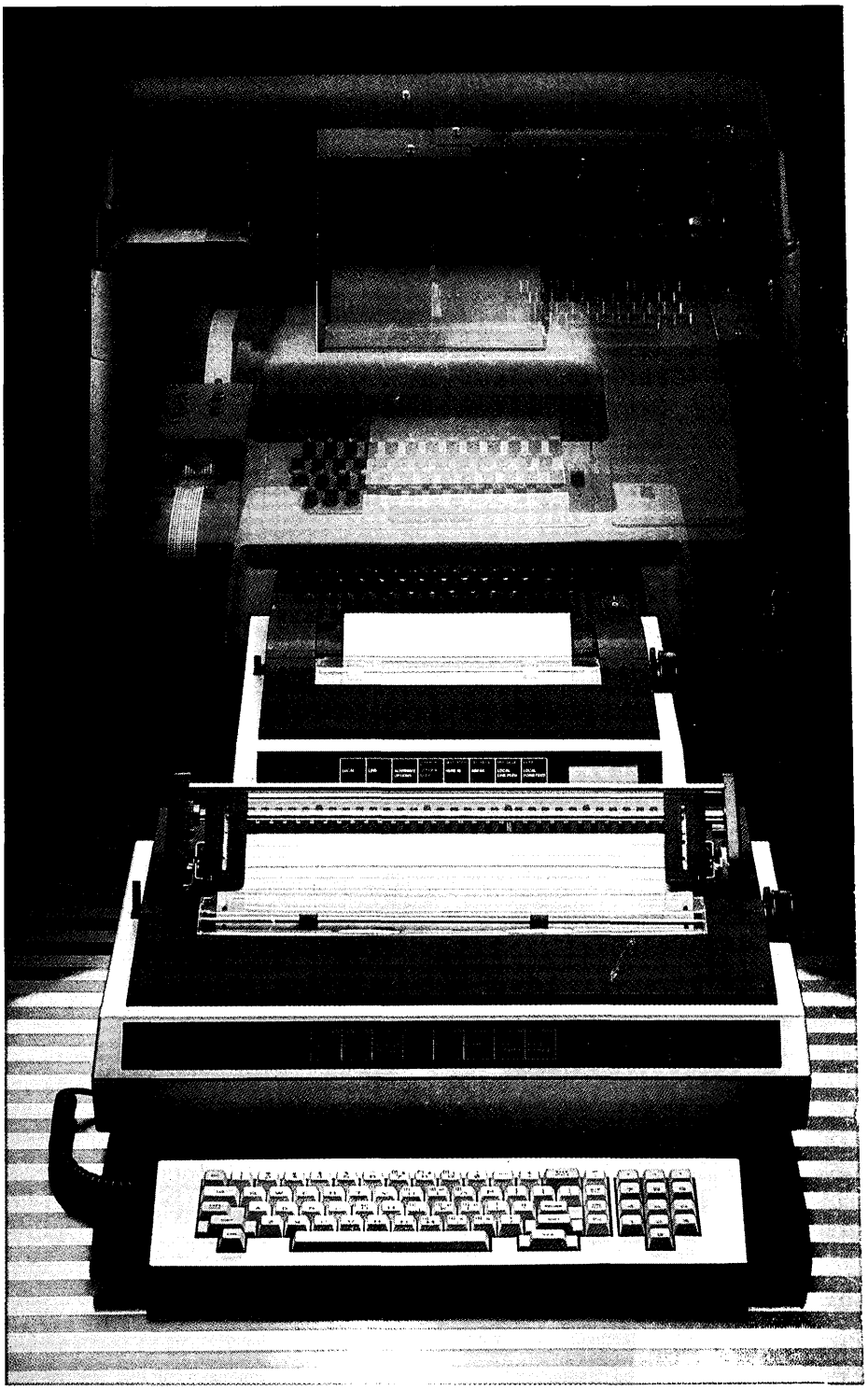

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