DATAMATION 85®
NOVEMBER 1 $3 © TECHNICAL PUBLISHING

JAPAN TRADE: THE HURDLES GET LOWER

ANNUAL MINI-MICRO SURVEY

DATA INTEGRATION TECHNOLOGY

ON THIN ICE: MICROS AND DATA INTEGRITY

Model 9400 GCR Tri-Density Tape System with

Autocal

It'll saturate your tape

Model 9400 from Kennedy now offers unmatched GCR data reliability. How? First, with Autocal—the first GCR write system that ensures that every 6250 tape will be written to its' optimum level. This results in the highest interchange reliability available.

Second, Model 9400 provides automatic gain control to ensure the highest read reliability regardless of tape used.

The results? Unmatched performance, unparalleled data recording and exceptional read characteristics.

Autocal is one more feature to add to many others: a tri-density tape system with Automatic Density Selection, true start/stop and the fastest access time of any low-cost drive available. And it's from Kennedy—still the first with a full-line of tape products.

KENNEDY
An Allegheny International Company
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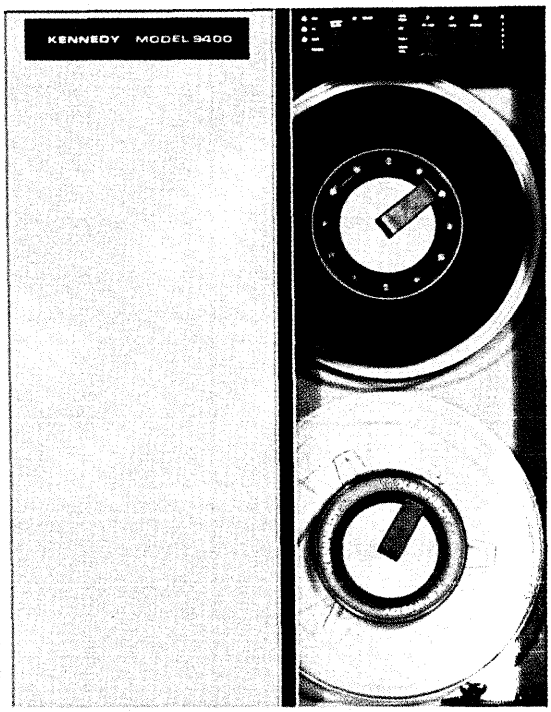
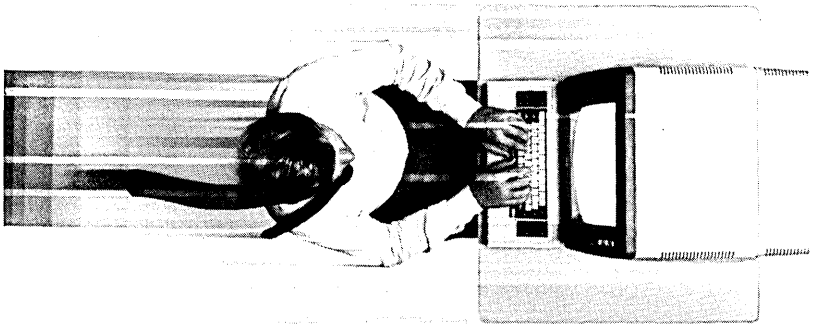
(818) 357-8831 RCA TELEX 247019 KNDY-UR



KENNEDY • QUALITY • COUNT ON IT

CIRCLE 1 ON READER CARD

When Your Data Goes Faster



Your Dollars Go Further.

StorageTek's 4305E Enhanced Solid State Subsystem lowers response times and raises productivity and profits.

StorageTek's 4305E "Optimizer" is the fastest storage subsystem ever designed. Its solid state technology eliminates the rotational delays that slow both disk drives and user response times. Instead, the 4305E transfers data at near-mainframe speeds... boosting performance by up to 70% throughout your system.

The 4305E stores and retrieves data in an IBM 3380 disk format... so it configures easily into virtually any user system. In addition, its modular design allows for simple modification as customers' requirements change.

The 4305E... for the speed and reliability of solid state technology... for easy configuration and modification... and for the fastest track ever to productivity and profits.

StorageTek

Storage Technology. It's More Than Our Name... It's Our Commitment.

Storage Technology Corporation Louisville, Colorado 80028-0001

CIRCLE 80 ON READER CARD

How To Protect Your Hard Disk Data

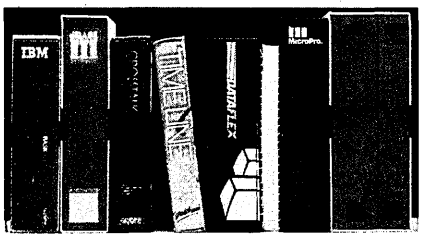
AST's Knight™ Data Security Manager Guards Against Hard Disk Data Losses From Accidents, Tampering And Program Theft. Now you can have the security and *convenience* of password protection for your personal computer–just like the mainframes.

```
Enter Password:
```

It's simple. Identify yourself to Knight at "logon" with your password. When the application screen is presented, only those applications previously authorized by your system manager may be executed. All requests to unauthorized applications or disk areas are blocked, and can be optionally recorded. That's it–you use your PC resources like always, and of course, you can change your password as often as you like.

Knight continuously monitors disk access too, so the contents of a protected hard disk are secure even if someone boots your PC with a floppy-based version of DOS.

And there's no performance penalties. Knight's security system builds protected "walls" around your hard disk files, rather than relying totally on encryption/decryption techniques, and preserves full-speed disk access for authorized users. In fact, its integrated disk cache causes disk based applications to run faster than standard DOS.

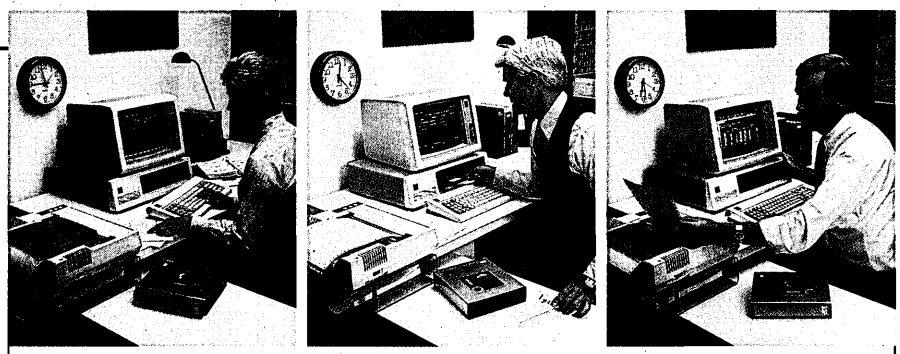


With Chaperone,™ Knight's built-in program export monitor, programs cannot be copied off your hard disk without your permission.

What About Encryption?

Encryption is a method of converting your data into coded "bits" based on a "key" you supply. Coded data can only be decoded with knowledge of the same key.

Included as an optional utility with the Knight security package, encryption can be invoked automatically or you can use it whenever an extra degree of confidentiality is necessary.* All or any part of the information stored on your hard disk or floppy disks can be encrypted. It's particularly useful when there is a possibility your data might appear outside your Knight-protected PC, such as when transferred to a floppy disk, or sent over a modem or LAN.



With Knight, when different people share the same PC throughout the day, all their data is automatically organized into individual, personal areas and protected from accidental modification or deletion by others.

Should I use Knight On My Personal PC?

Even if you don't share your PC with others, Knight adds several advantages to keep your data organized and protected. For example, it lets you use project titles in place of user names for identification and usage authorization. With all data files securely associated with their relevant project, you'll never make accidental file deletions relating to one project while you're working on another.

Reminder: Check spreadsheets for latest info.

What About Storing Electronic Messages?

With Knight's electronic message center, you can create bulletin boards, type reminders to yourself or place private messages to other users in protected "mailboxes."

Can Knight Help Me Automate My Recordkeeping Too?

Enhancing security by recording usage and access attempts, Knight's integrated auditing system can also be used to log your day's activities, automate client billing, or allocate system costs based on usage.

Stored in a defined format for optional input into database, spreadsheet or other information management programs, Knight's audit file may be viewed and/or printed in total, or sorted by user, application, date or disallowed access attempt.

Is Knight Easy To Use?

Advanced menu driven screens eliminate the need to master DOS commands. And Knight supports batch files, lets you select application names for any program and provides full automatic use of DOS sub-directories, drives and volumes.

You can also enjoy the protection of Knight without the menu system. Our "DOS commands" option returns the familiar "C>" to your screen, while retaining Knight's program and sub-directory protection.

What If I Already Have Files On My Hard Disk?

The automated Knight Installation Program installs the Knight Kernel and utilities onto your hard disk without reformatting or disrupting existing files. And our sophisticated bulk file transfer utility helps you install new files and applications.

How Do I Find Out More?

Ask your dealer about AST's Knight Data Security Manager, or call our Customer Information Center (714) 863-1333. AST Research, Inc., 2121 Alton Avenue, Irvine, CA 92714 TWX: 753699 ASTR UR.

Specifications

- Floppy Boot Protection, user option
- Password: Up to 17 characters each, user defined
- Numbers of Users or Tasks: 52
- Number of Protected Directories Per Individual: 64
- Encryption Method: DES or Proprietary AST Method
- IBM PC/XT/AT or compatible
- DOS 2.0 or later
- DOS Compatible Hard Disk
- LAN compatible version Q4 1985

Knight and Chaperone trademarks of AST Research, Inc.
*Encryption utilities available in U.S. and Canada only

AST RESEARCH INC.

CIRCLE 81 ON READER CARD

DATAMATION

NOVEMBER 1, 1985/$3 U.S.A.
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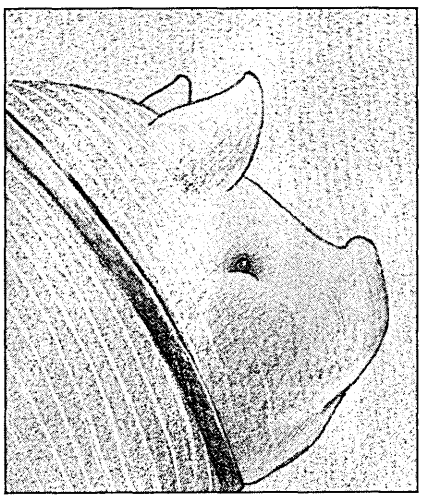

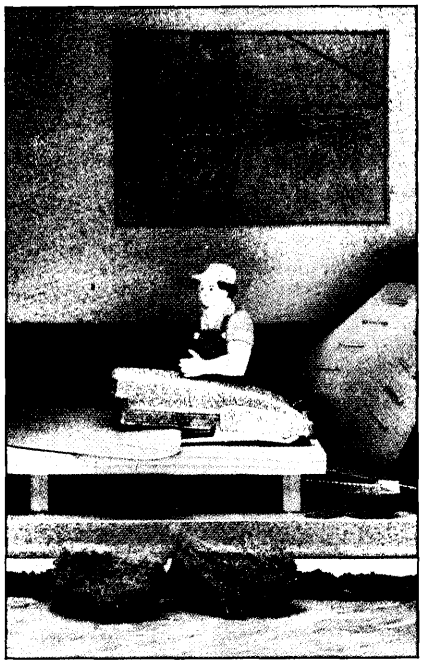

NEWS IN PERSPECTIVE

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INTERNATIONAL 76-1

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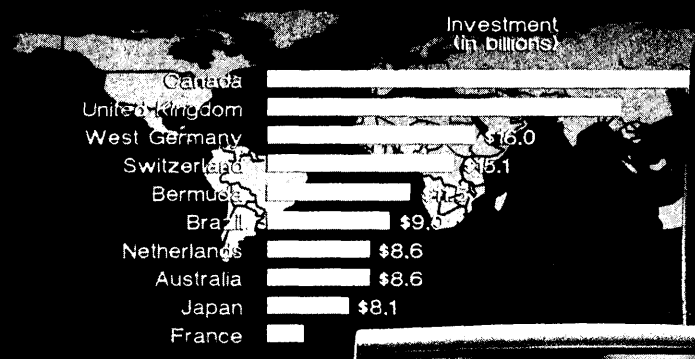
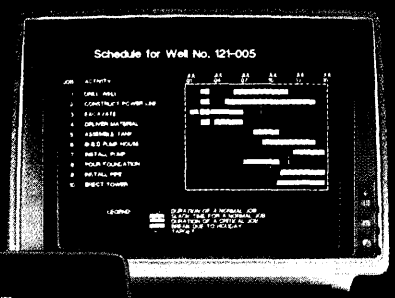
THE SAS® SYSTEM

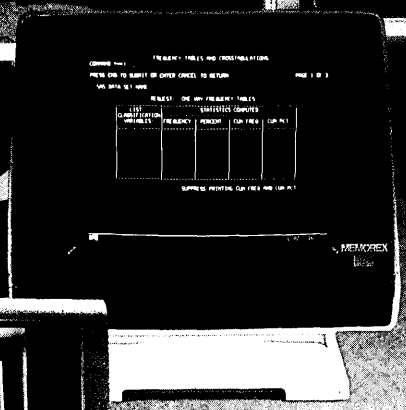
The Fourth Generation Solution That Works for You.

Investment Hot Spots

U.S. companies invested $226.1 billion in foreign operations in 1983. The largest investment dollars were attracted to these areas:







One Solution that's Powerful.

Now there's one software solution for all your Information Center applications. One solution for efficient data management, accurate statistics, easy report writing, and customized graphics. One solution—the SAS® System.

You can choose between the simple English-like command language or a front-end menuing system. On-line help facilities make it easy to handle every application, quickly and accurately. You can track sales leads, determine market share, present results. File employee records, analyze benefit programs, manage the payroll. Take orders, keep inventory, produce mass mailings. Schedule projects, determine product mix, make forecasts, produce spreadsheets. All this and more with the SAS System.

One Solution that's Friendly.

It's easy with the SAS System. You can write front-ends for all your applications. And with a few keystrokes, you can change them as your information needs change. A convenient screen manager lets you edit, display, and control your work without ever leaving your desk. And if you need to move between several operating systems, you'll find the language, syntax, and commands the same for the mainframe, minicomputer, and PC SAS System.

The SAS System runs on IBM 370/30xx/43xx and compatible machines under OS, TSO, CMS, DOS/VSE, SSX, and ICCF; on Digital Equipment Corp. VAX™ 8600 and 11/7xx series under VMS™; on Prime Computer, Inc. Prime 50 series under PRIMOS®; on Data General Corp. ECLIPSE® MV series under AOS/VS; on IBM XT/370 and AT/370 under VM/PC; and on the IBM PC XT and PC AT under PC DOS. Not all products are available on all operating systems.

Whatever your application, the SAS System is your Fourth Generation Software Solution. Call us today.

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Telex 802505

Q. IF A MODEM IS A MODEM IS A MODEM, DOES IT REALLY MAKE A DIFFERENCE WHICH ONE I BUY?

A. The fact is, all modems are not created equal. For example, some modems are better signal processors than others. And these superior modems can make an important difference in your total network performance. A difference that can lead to important savings in telecommunications costs.

Q. How can a modem make a difference in my telecommunications costs?

A. The primary purpose of a network is to move information to and from end users and thereby improve their productivity. And a superior modem can improve the performance of your network in at least four areas: It can make your network more reliable. Give your end users faster response times. Minimize the time you and your people spend on network management. And a superior modem can also save you money in line charges.

Q. What makes a superior modem?

A. As you know, a modem converts a data stream into a signal that can be sent (usually over a phone line) from Point A to Point B.

Now that may sound simple enough, but there are a number of variables in that seemingly simple scenario. Such as, what's the distance between Points A and B? What's the line between the points? What's the condition and stability of the line? And many, many more. The fact is, each variable carries technical implications that affect the design of the modem. And simply stated, a superior modem enjoys a superior design.

Q. Be specific. How can a superior modem save my company money?

A. Let's face it, modems are not the most expensive part of your telecommunications network. Chances are, line charges are. If you design a modem that can send data more reliably, then that modem can begin to affect your line charges. Every time a modem has a "hit," or an unsuccessful transmission of data, the data must be retransmitted, slowing down response time. The net effect is a reduction in the amount of information carried by the network.

If you use superior modems that give fewer hits, you'll have lower line costs per data unit transmitted and better throughput. Better throughput translates into time and cost savings.

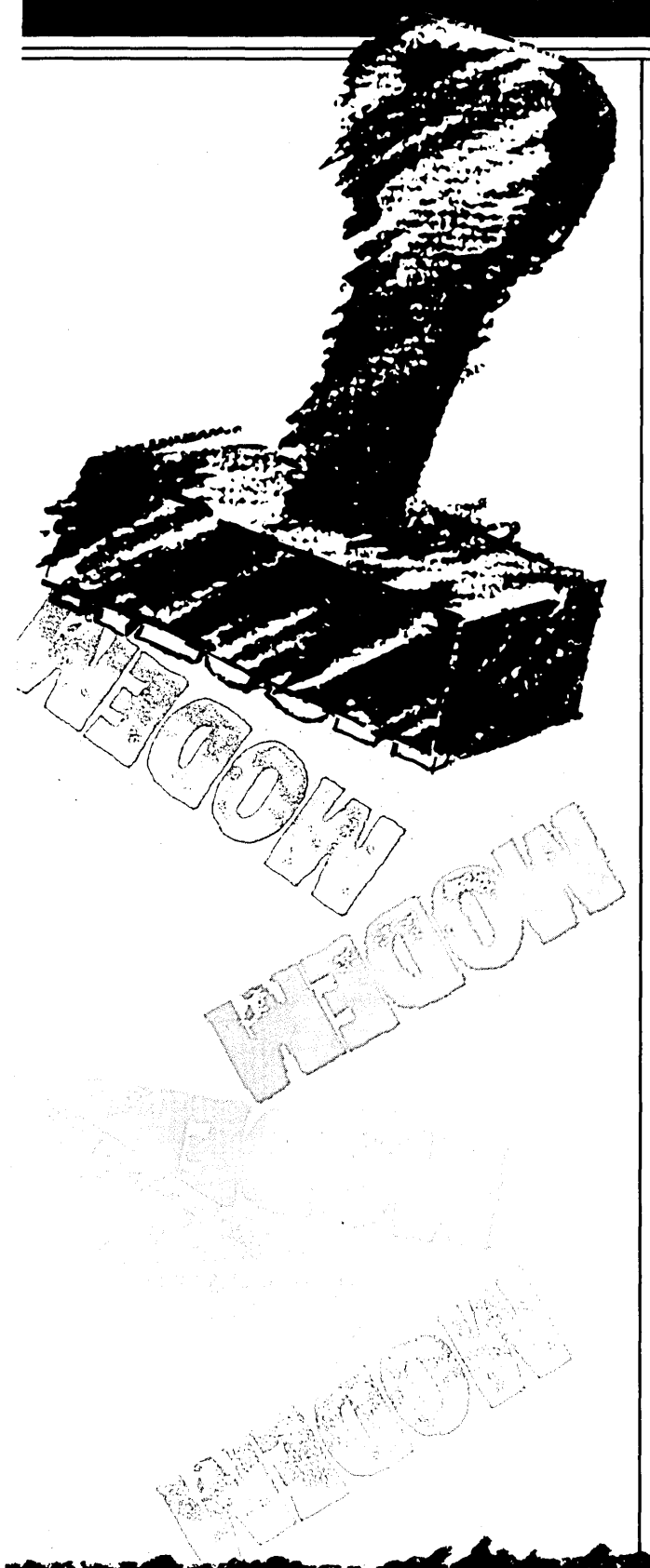
Q. Can a superior modem correct the problem of faulty lines?

A. A superior modem can go a long way toward compensating for poor line conditions—and thus make marked improvements in the hit rate.

Take the IBM 3865 Modem, for example. It contains a custom microprocessor with an advanced algorithm that in effect enlarges the target area of acceptable transmissions. The result is that this reliable 9,600 bps modem can operate very effectively over unconditioned lines. Now imagine all the line conditioning charges you won't have to pay your common carrier.

Q. What other modems does IBM offer?

A. With our new announcements *(see box),* IBM now offers a full range of modems from 2,400 bps to 14.4 kbps in stand-alone and rack-mounted models. There's also a limited distance modem that goes up to 19.2 kbps.



NEW IBM MODEMS

Q. What about higher speed modems?

A. We recently announced a new 14.4 kbps modem—the IBM 5866, and a new 9,600 bps modem—the IBM 5865. Both are available in stand-alone and rack-mounted models, and function in Communication Network Management (CNM) and non-CNM environments. They have multipoint capabilities, operate over unconditioned lines and now provide expanded line diagnostics.

Q. You mean I can even get phase jitter readings from an IBM modem?

A. Not just phase jitter, but readings for ten analog parameters that measure line quality. You can also do remote modem configurations and tests from the control modem.

Q. What about your limited distance modem (LDM)?

A. The new IBM 5811 is a compact, low-cost, non-CNM, baseband modem that operates over continuous wire or telephone cables. It offers synchronous transmissions at 2,400, 4,800, 9,600 bps and 19.2 kbps.

So if you're looking for reliable modems that are competitively priced, talk to your IBM marketing representative.

If you would like to receive free literature on IBM modems, call 1 800 IBM-2468, Ext. 82. Or use the coupon below. After all, it pays to be informed, because not all modems are created equal.

IBM®

11-1

IBM
DRM, Dept. LS/82
400 Parson's Pond Drive
Franklin Lakes, NJ 07417

☐ Please have an IBM marketing representative call me.
☐ Please send me literature on IBM modems.

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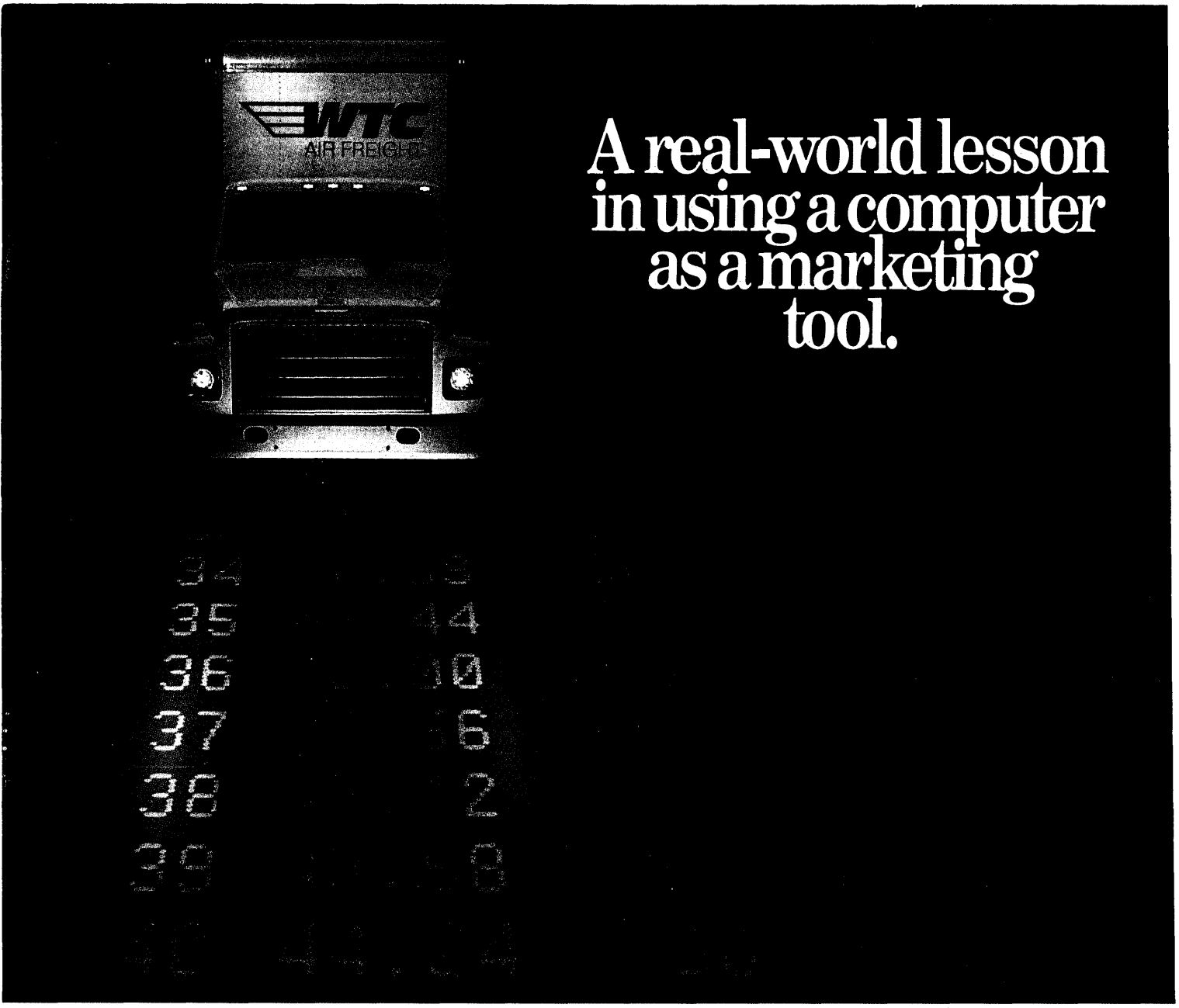


A real-world lesson in using a computer as a marketing tool.

Here's how it's done at WTC Air Freight. With the all-important help of a Sperry MAPPER® System.

WTC is a major worldwide freight forwarder. And in that tough competitive environment, large contracts can be won or lost on seemingly small vendor differences. For WTC's primary customer target, traffic management, control of goods in transit ranks high on the list.

So WTC developed a MAPPER-based computer system that gives the company a competitive edge by giving the traffic manager total information and control. Right at his own PC or terminal.

With just a few simple English-language commands, a traffic manager can get tracking information just about any way he wants it. A P.O. number is all he needs to get instant information on the status of any shipment, anywhere in the world. He can even pull one item out of a shipment and have it rushed to a new destination.

And a lot more. Right at his own PC or terminal.

What it all comes down to is a powerful marketing advantage for WTC.

Where competitors' systems require learning obscure computer codes, the MAPPER System uses plain English. In terms of user convenience, it's no contest.

MAPPER made development of the system a lot easier, too. With COBOL programming, it would have taken 60 man-months. With MAPPER, the job was done in just 12 man-months.

And because of the inherent simplicity of MAPPER language, non-DP management people were able to test and modify the system all through the development process. So they got precisely what they needed, instead of someone else's approximation.

The fact is, MAPPER's simplicity makes it a powerful tool for any task, any business. With the MAPPER System, ideas become computer solutions in astonishingly short order.

Seeing is believing. Come to a nearby Sperry Productivity Center and see MAPPER in action. Or, next best, look over our MAPPER literature. Call us toll-free: **800-547-8362, ext. 101.**

Or write: Sperry Corporation, Box 500, Blue Bell, PA 19424-0024.

SPERRY

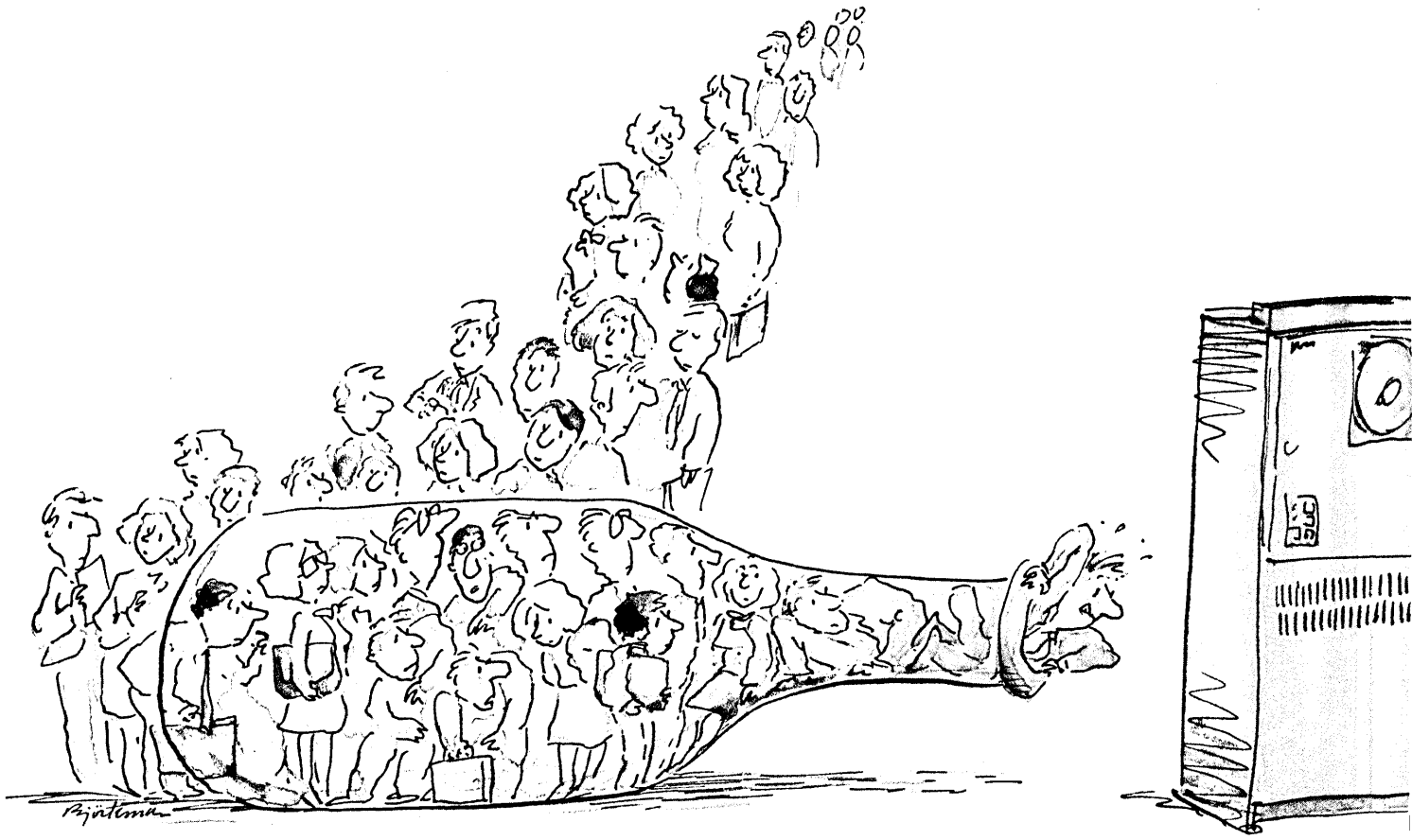
CIRCLE 5 ON READER CARD

LOOK AHEAD

AT&T USED APACHE TO WIN NSA PACT	A new fault tolerant system running Unix System V, code named Apache, may have been a crucial factor in AT&T's win over IBM and DEC for the recently awarded $946 million National Security Agency (NSA) contract. AT&T had bid 3B computers to win the contract. Apache's software is believed to have been developed on the 3B2 and 3B5 computers, while the hardware uses CMOS technology. Apache, which is not expected to have any IBM 370 compatibility, is expected to replace the 3B20 family, sources say. It is believed that over 70% of government bids demand Unix, and AT&T's System V is the "standard" form -- but, analysts say, so far no one has introduced an effective fault tolerant version. Meanwhile, both IBM and DEC are reportedly working toward "proprietary" fault tolerant systems. IBM, for example, is believed to have three such projects under development internally -- one each based on its 8100, Series/1, and 4300 computers. In addition, IBM is selling the Stratus engine (renamed the System/88) as a stopgap measure for those customers demanding an immediate low-end fault tolerant solution. IBM's and DEC's commitment to Unix V is still uncertain, however, though both companies have stated they will support it if their customers demand it. Meanwhile, AT&T is scouring the industry for a second fault tolerant Unix offering. Sources are betting that a three-year-old San Jose startup, Tolerant Systems, will inherit this mantle. The two are reportedly in talks, but neither company would comment on the reports. AT&T also refused to discuss Apache.
DEC DEVELOPS TRANSACTION SOFTWARE	Look for a major push from DEC in the on-line transaction processing area. Insiders were surprised (and presumably delighted) to find that the third biggest market for VAX clusters--behind the engineering and manufacturing markets--has turned out to be banking, an area in which DEC has had only a small presence. Sources say that two new programs from the minicomputer giant, a terminal display manager and applications control manager, have been created to boost VAX as a transaction processing architecture. No word yet on when these programs will be available. Meanwhile, watch for DEC in a few months to support both Berkeley 4.2 and AT&T's System V versions of Unix under its VAX Ultrix software.
MICROEAGLE, MV 12000 EXPECTED FROM DG	This month, Data General is expected to make formal announcements of two products considered strategically important for the company. Anticipated introductions are the MicroEagle, reportedly a supermini on five ICs, and the 7.5MIPS line-topper, the MV 12000. Both products have been expected from DG for

LOOK AHEAD

	some time; the only thing unclear has been the timing of the formal introductions. In addition, a host of new CEO office automation, networking, and applications software to tie it all together is expected.
NCR TO ADD 370 FRONT END	NCR-Comten early next year will unveil a new 370-compatible front-end processor dubbed Fusion. It will hook directly into T1 trunk lines and have enough horsepower--up to four times the IBM 3725's oomph, say informed sources--to keep those lines filled with data. The machine will match IBM's Network Control Program Version 4 software.
AI PRODUCTS LEAVING LABS	The artificial intelligence workstation race is heating up as expert systems and other kinds of AI systems leave the development lab for the commercial marketplace. Neck and neck are Symbolics Inc. of Cambridge, Mass., and Xerox. The latter recently scored big with a 1,000-unit order from Applied Expert Systems, also of Cambridge. The machines will be used as the "delivery vehicles" for an expert financial planning system. Meanwhile, Symbolics' unit sales of its small 3640 machine have reached about double those of its larger 3670. The company is looking forward to coming out next year with a low-priced gate array version of its hardware. For even later delivery, Symbolics is working on a 40-bit VLSI machine.
ZEN AND THE ART OF SALES, IBM STYLE	IBM's ex-supersalesman Buck Rogers will hit the talk show circuit soon with a book titled The IBM Way, which purports to share with those still searching for "excellence" the industry giant's world-winning marketing and sales methods. The Harper & Row book may not convince experienced computer makers, however, for they know firsthand that it's IBM's deep pockets and commanding market share, not the starched shirts and koan-like THINK slogan, that make it so formidable.
RUMORS AND RAW RANDOM DATA	Softool Corp., Santa Barbara, Calif., which since 1981 has been marketing methodologies and tools for creation and maintenance of software for a variety of computers including DEC VAXs, will move into the IBM Mainframe market in January. Toward that end the company has several new hires from Pansophic Systems, Oak Brook, Ill. Currently big in government and government contractor markets, Softool hopes the IBM line will push its commercial sales. . . . Serviceland Inc., Westlake Village, Calif., which had plans for a nationwide franchise operation for personal computer servicing, has shifted gears to follow a plan for company-owned service stores. . . . Computer Sciences Corp. has received a five-year, $175.6 million contract from the Environmental Protection Agency for software and systems support.



Announcing the end of the on-line bottleneck.

If your interactive users are *in line* waiting when they should be *on line* working, you'll be glad to know there's a better way: the BTI8000 32-bit multiprocessor system. And the BTI8000 now offers new software capabilities that enhance its mainframe-like processing power.

Hard-to-beat hardware performance

The BTI8000 supports hundreds of on-line terminals. Its performance has been proven in independently audited benchmark tests simulating busy interactive COBOL users. For example, with 200 on-line users, *the average response time was only one second.* Can any other supermini *demonstrate* numbers like these?

Over ten to one growth potential

The BTI8000's modular design lets you start with a one-CPU entry-level system. Then as your needs grow, you can increase processing power by more than a factor of ten—up to 8 CPUs, 24 megabytes of main memory, and 8 gigabytes of mass storage. All by just plugging in extra resource modules—rather than having to buy a new computer.

Relational DBMS with fourth-generation language

For fast application development, there's nothing like the BTI8000's new relational DBMS and fourth-generation language. This economical package can cut your application development costs by as much as 75%. And cut your development schedules by an equal amount. Designed specifically for high-volume transaction processing, it also features exceptionally fast response times. Even with large numbers of on-line users.

Popular MCBA business software

To enhance its hardware capabilities, the BTI8000 now includes powerful business software from MCBA. Written in RM/COBOL, these integrated packages are in use at over 17,000 installations worldwide, making them some of the most popular business solutions available today.

Very competitively priced

At a low base price of $79,950, the BTI8000 gives you a cost-effective starting point for building just the right configuration. And with BTI, the more interactive terminals you add, the better we look on your bottom line. Whichever configuration you choose, you can count on our 15 years' experience in supporting over 3,000 BTI computers in the U.S., Canada and Europe.

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But there's one test of a video terminal that simply can't be judged in a 15 minute demonstration.

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While other display terminals were designed to impress you in the showroom, Digital's VT200 series was designed to make a more lasting impression. To keep you comfortably productive years down the road.

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THE DIGITAL LOGO MEANS LONG TERM PRODUCTIVITY.

It's no coincidence that the VT200 family was designed by engineers who, like end users, sit in front of display terminals day in and day out. They've discovered the shortcomings, the idiosyncrasies and all the subtle little problems that can end up robbing you of productivity.

As a result, some of the VT200's best features are ergonomic. The angle of the screen. The sculpture of each key. The design of the keypad.

These are the things that become most apparent after hours of prolonged use. And often spell the difference between a terminal that's a genuine productivity tool and one that's – quite literally – a pain in the neck.

The fact is, the VT200's ergonomic design and the resulting ease of use were two of the reasons it won the International Design Award, in both 1983 and 1984.

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In addition, our breadth of product line means Digital can provide you with a total solution. Hardware, software and peripherals. And while single sourcing is not an end in itself, it certainly provides an extraordinary measure of convenience, compatibility and reliability. Particularly when the single source is Digital.

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Over the years, we've heard some pretty gruesome stories about the ordeal our terminals have endured. Like coffee that was spilled on keyboards. Or cables that were inadvertently ripped from their ports. They've even survived trial by fire. While it's unreasonable to expect even the toughest video display to come through every major trauma unscathed, it's comforting to know your terminal has a reputation for survival.

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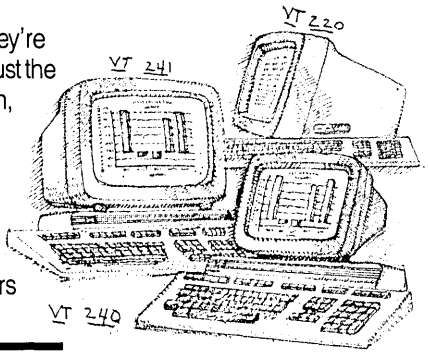

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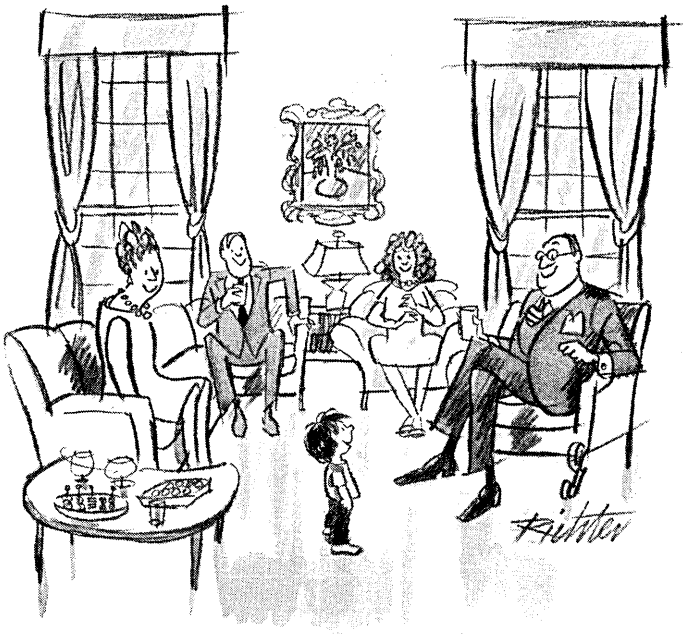

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LETTERS

DP DUDS?

"Of Commerce and Academe" (Sept. 1, p. 68) was extremely interesting because it emphasized the continued short-sightedness of the dp industry's concentration on immediate, low-quality results.

I have been in the dp industry for over 18 years, earned my BS degree in CMS 10 years ago, a master's in management and human relations four years ago, and am a founder of the Denver Chapter of the Quality Assurance Institute. During those 18 years, it has been my perception that what industry really wants are "professionals" who will massage an inoperative dp product to produce what appears to be a quality product. The dp industry, in general, has created a perpetual system that thrives on the "quick and dirty" philosophy that promotes low-quality product development.

The educational system is attempting to teach conceptual models that are application transparent. Given that certain constructs are always in force, learning a language is a matter of learning a new set of semantics. Likewise, applications can be translated into conceptual models. If industry removed its focus on specific semantics of each program, training would be easier and productivity and quality would probably improve significantly.

I hope academia will continue the battle until the industry ceases to demand graduates who have been trained to perpetuate a reality mired in defects. It is the industry that must change and learn to accept that quality in product and service is the bottom line.

HOWARD FELDMAN, CSP, CQA
Senior QA Analyst
Mid-Continent Computer Services
Denver, Colorado

LIKE A VIRGIN?

I recently read Steve Ditlea's article ("Befriending the Befuddled," p. 84) in the June 15 issue. I take exception to his use of the term virgin for the business professional who is new to computing. I don't like his definition of the "power user" either. Clearly, neither term is intended to be interpreted in a positive light.

Virgin is an especially irksome term to me. There is nothing virginal about a business professional learning how to use automation tools for better information processing. Information processing did not begin with the computer, nor will it ever be confined to computers. At issue here is the business professional who understands and applies the principles and tools of automation successfully to information processing.

Ditlea could have sacrificed his display of cleverness for the more commonly accepted though still lacking term novice user. At least this phrase focuses on the *use* of computers. Also, the novice is one who has begun the journey to mastery.

If Ditlea is in search of a better descriptive name than user, he is not alone. The term user is as commonly associated with drugs as computers for many novices. Recently, I heard an MIS manager comment that the user/drug association had validity in the computer world, because users often display signs of addiction.

If I am deemed overly sensitive to semantics here, please consider the fact that Ditlea's opening sentence speaks to the discord between MIS and the end user. Sensitivity toward our noncomputer professional peers is really the only way of "befriending the befuddled."

CHARLOTTE COOK HOFMANN
Director, Product Development
The Knowledge Transfer Inc.
Oakland, California

P-SYSTEM DEFENDER

If Edith Holmes were more knowledgeable about the p-System community, she might have titled her comments in your Aug. 15 issue (News In Perspective, p. 50) "P-System Gets a Chance for New Life," instead of the chosen "P-System Poops Out."

The problem has been Softech's marketing, not lack of a market for the p-System. The May '84 issue of *Business Computer Systems* reported a survey showing the p-System fourth among microcomputer operating systems with a 10% market share in 1983, behind CP/M (39%), MS/DOS (30%), and Apple DOS (13%). The same survey showed Unix holding a 2% market share. At the time the article was published, AT&T was spending millions of dollars publicizing Unix as the next industry standard, and Softech's Ben Goodwin was quoted in the trade press as saying, "We have lost the war with PC/DOS."

Softech Microsystems has done more to hurt the p-System than help it. The p-System they introduced for the IBM PC was abominably slow (the version done by Network Consulting runs five times faster), and priced hundreds of dollars more than PC/DOS. Furthermore, after a major advertising campaign, Softech failed to deliver its Liaison networking package.

The p-System will survive without Softech. Several vendors in North America and Europe market p-Systems for various computers. If Softech's rights to the p-System are acquired by a company that understands the strengths of the operating system, particularly its potential for multi-user configurations on Motorola 68000- and Intel 80286-based equipment, Softech's departure from the p-System community will not be mourned.

ROB COZENS
Information Services Manager
Omega
San Francisco, California

CORRECTION

In "Surveying the Software Generator Market," (Sept. 1, p. 105) the following note should have appeared: This paper and the research on which it is based were prepared under the direction of A. Milton Jenkins, Peat Marwick Visiting Professor. Others contributing to this work include personnel from Peat Marwick's Strategic Research Services and Catalyst Group, and graduate MIS students at Indiana University. Copies of the complete survey are available from Richard A. Willner, Strategic Research Services Group, Peat Marwick, Mitchell & Co., 345 Park Ave., New York, NY 10154, (212) 872-6548.

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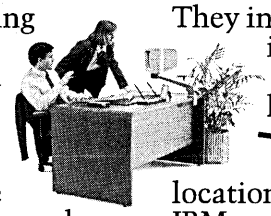
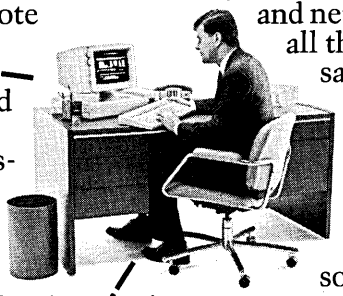


Then there's Wang Systems Networking, a flexible framework that offers a wide range of networking solutions. Like WangNet, Wang's universal, open transport system.

Finally, with Wang OFFICE, you can give anyone with a desktop terminal access to data processing, office automation and networking—all through the same, easy-to-use, menu-driven interface.



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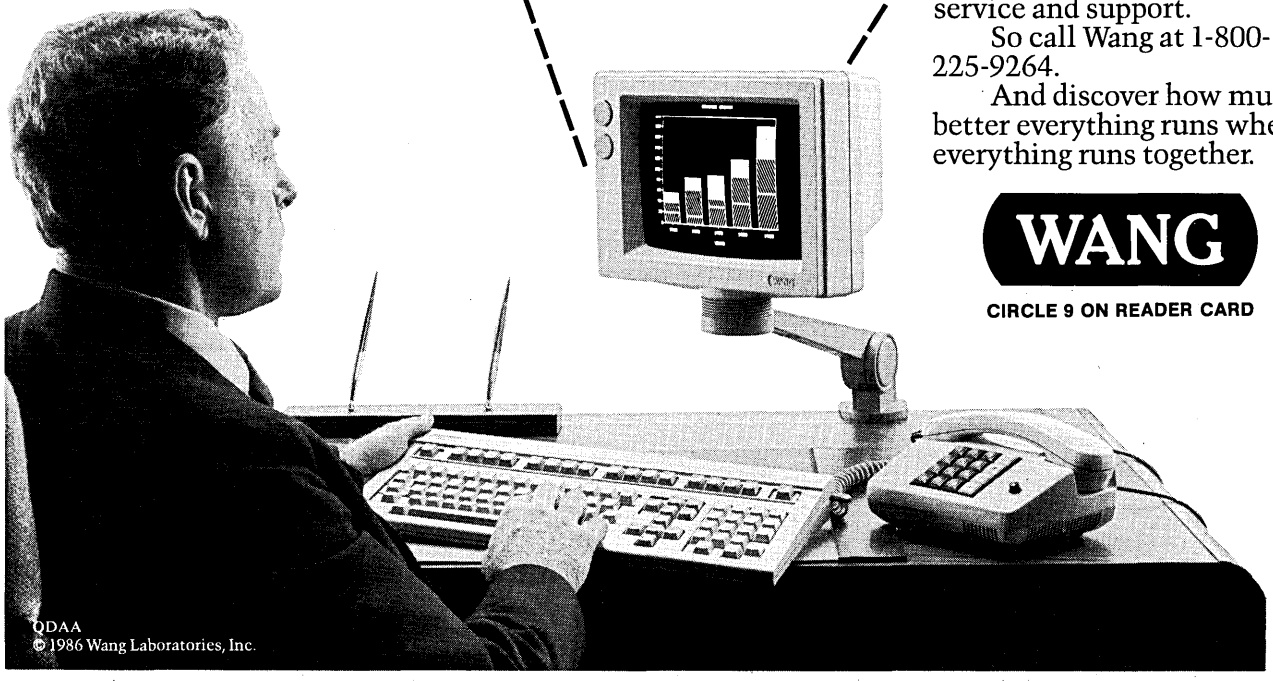


QDAA

George R. Davis, Editor-in-Chief

EDITORIAL

IT'S TIME TO SHOW YOUR STUFF IN JAPAN

ILLUSTRATION BY DORIS ETTLINGER

A peace of sorts has descended in the long-fought battle to lower Japanese trade barriers against U.S. computer and telecommunications manufacturers. Following years of intercontinental haggling and months of meetings, proposals, counterproposals, and behind-the-scenes arm-twisting, the Japanese government has agreed to remove all import tariffs on cpus and peripherals by early next year and to establish a private sector group for discussion of international standards. In addition, the Japanese government has decreed through MITI that 132 Japanese firms will purchase more foreign computer and communications products in the future.

While all of this is encouraging for proponents of fair trade, it is really nothing more than a small concession made by the Japanese to stem mounting U.S. protectionist legislation (see Tokyo bureau manager Thomas Murtha's "The Kimono Is Open," p. 36). These Japanese concessions will provide access to some business not previously available to U.S. manufacturers. The real trade imbalance problem between the U.S. and Japan, however, lies in the minds and hearts of the Japanese buyers. Like it or not, Japanese buyers—whether of computers or cars—see the international product game differently from the rest of the world. "Made in Japan" has a much deeper emotional meaning to a Japanese buyer than a "made in the U.S.A." tag does to the average American buyer. This is due partly to the siege mentality of a small island nation, and partly to the Japanese's real pride in the economic miracle they've brought off in the postwar decades. It will be all but impossible to force a Japanese user to buy American equipment simply because it is American. Even if it were possible, it might play to the strength of those Japanese who want to further protect their home market. Japanese buyers could view legislated purchases as a clever trick, meant to keep the U.S. Congress from bringing stronger anti-Japanese trade legislation to bear. As a result, Japanese users will have little respect for the American product they will be forced to buy.

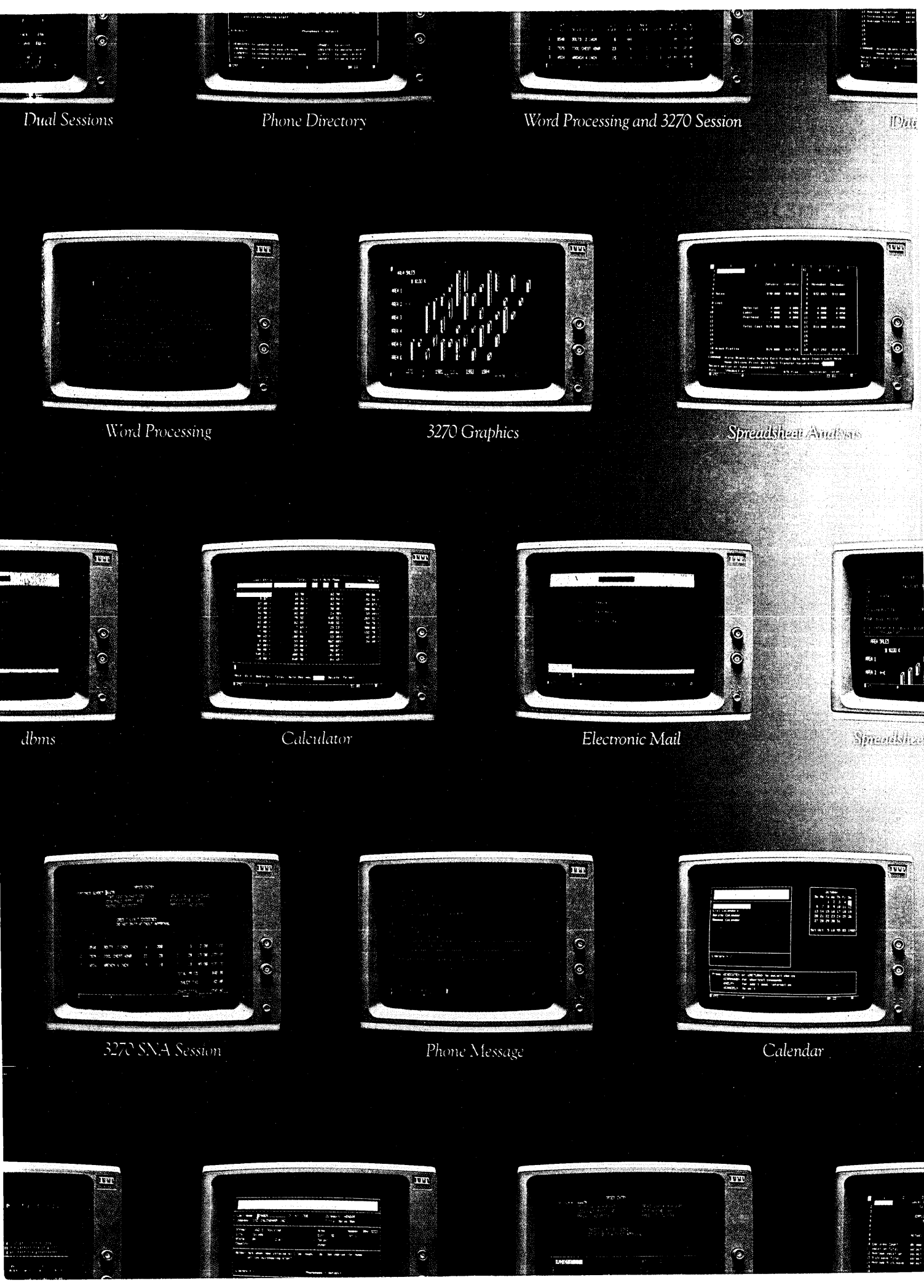
It is in the best interests of American manufacturers to look at this relaxation of trade barriers as nothing more than an opportunity that will allow them to gain a new understanding of the Japanese marketplace. It is crucial that U.S. suppliers gain an understanding of the Japanese regulatory system and of the Japanese standards maze. Even with the relaxation of barriers, Japanese cultural differences will not be easy to overcome.

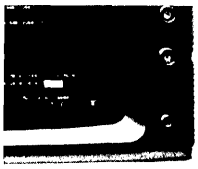
It is therefore imperative that American manufacturers convince Japanese users that they should buy American because of quality and innovation, not because of legislation.

Above all, American manufacturers must try to truly understand the Japanese buyer. That will be the most difficult task because it represents a new challenge for American marketing. Decades ago, when American computer companies entered European markets, the suppliers succeeded for the most part by applying good old U.S. computer marketing techniques. In other areas of the world they found different cultures and sometimes far different purchasing criteria, but at the time, American computers were the only game in town, so they won the markets. Nation after nation adjusted their criteria because they needed computers.

But things are very different in Japan. American manufacturers are faced with a society that has shown over and over again that it won't respond to Western marketing tactics. They are also faced with a society that has well-entrenched, highly successful computer and telecommunications industries. American vendors also cannot expect Japanese buyers to believe that "made in the U.S.A." automatically means the highest possible quality.

With the trade barriers now relaxed a bit, American computer and communications vendors have an opportunity to show their stuff, but the stuff they show will determine just how successful they will be. ◉


Dual Sessions
Phone Directory
Word Processing and 3270 Session
Word Processing
3270 Graphics
dbms
Calculator
Electronic Mail
3270 SNA Session
Phone Message
Calendar



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You've never seen anything like this before.

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Until now.

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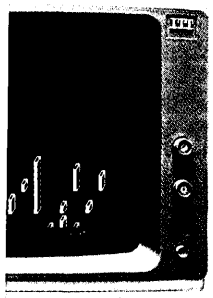

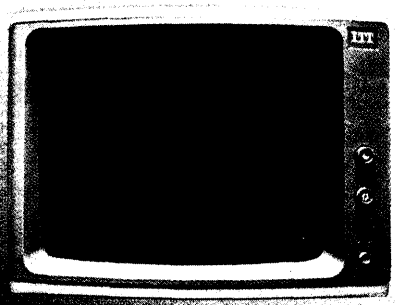

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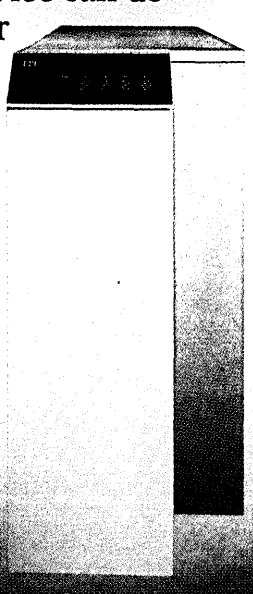
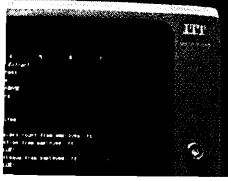


CIRCLE 10 ON READER CARD

The 9930 application processor.



IN FOCUS

IBM'S PC PACES THE PACK

Our annual mini/micro survey forecasts familiar faces in the winner's circle.

by John W. Verity

Minicomputer shipments during the year ending June 1986 will be up just 13.3% over the previous year in terms of dollar volume, according to the 1985-86 DATAMATION/Cowen & Co. mini/micro computer survey. This represents a substantial decline from the 25% growth forecast in last year's survey and is attributable largely to the ongoing strength of IBM's PC family.

Meanwhile, there will be a continuing deceleration of growth in personal computer shipments—only 24% growth in dollar volume compared with the 63% forecast last year—even as micros continue to encroach on business that once went to minis alone. The survey, made in July and August, found about a quarter of all mini sites (24%) and two fifths of pc sites (39%) expecting to spend more for those types of equipment in the year ending June 1987 than they will have spent in the previous 12 months.

Special attention was paid this year to, among other topics, AT&T and its Unix operating system, the needs and plans of those using Digital Equipment VAX computers, the IBM PC and related software markets, and the effect of pcs on minicomputer markets.

This year's survey tallied responses from 6,412 mini/micro sites where 27,557 minicomputers were operated and some 90,000 personal computers were purchased in the past year and a half. Most of these sites (93%) are end users, as opposed to systems houses and oems, which ultimately resell the gear they described for the survey.

As in previous surveys, results show that the rate at which minicomputer makers are signing up new users is falling as the market matures. The compound annual growth rate of the user base is 9% for the past five years, but 15% for the past eight years. The minicomputer system types showing the strongest growth in new users are workstations and intelligent terminals, which outperformed small business systems, traditional minis, and data entry and office systems.

One traditional application area for minis, scientific/engineering calculation, will slip almost a full percentage point in its share of the total shipments indicated by respondents for 1985-86. The strongest application areas appear to be standalone business data processing, on the strength of IBM's S/36.

Market activity seems dampened. Although responses varied according to the mode of buying and the primary equipment vendor involved, users indicated less anticipation than last year that their pc and mini suppliers would unveil major systems in coming months. Last year's survey found 26% of the minicomputer sites and 38% of the pc sites expecting major announcements, but this year the comparable numbers were 23% and 32%, respectively. The fall in expectations held among end-user and oem/systems house sites alike, although 37% of the latter (down from 45% last year) still said they expected to see major product introductions soon. Among the vendors seen as most likely to spring new products are Data General, Hewlett-Packard, and Apollo Computer of Chelmsford, Mass. The products mentioned as likely to surface include DEC's MicroVAX III and machines code-named Scorpio, Nautilus, Neptune, and Nebulus; HP's Spectrum; Data General's MicroEagle and MV/12000; and IBM's long-expected PC2.

Where important new products have been introduced or first shipped since the last survey, shifts have occurred in buying patterns. For instance, in terms of dollars, DEC VAX sites indicated a growing appetite for the model 8600 system (37.4% of the total spending for VAX equipment during the next 18 months, compared with 15.3% for the last 18 months), while the original VAX-11/780 and its companion model 785's dollar share tapered from a total of 56.3% in the previous 18 months to 31.6%. The MicroVAX II has gone from a mere 0.5% of

Among the vendors seen as most likely to spring new products are Apollo, Data General, and HP.

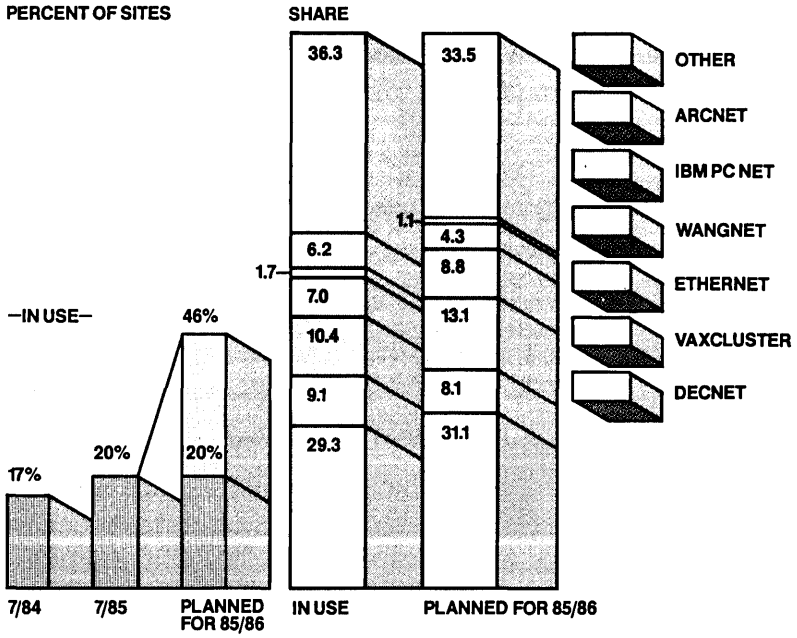
VAX spending to 15%. Indeed, in both technical and commercial arenas, the MicroVAX II was mentioned by 45% of VAX sites as the primary VAX machine for new applications: the prospects for that VLSI-based machine to grab a large share of the total VAX pie seem substantial. Nevertheless, the venerable PDP-11 is still holding its own at 16% of the value of all DEC shipments to responding sites.

In most cases, average minicomputer system prices have risen substantially in the past five years, more than doubling for some vendors. For instance, Data General machines purchased in 1980-81 averaged $35,000, but those purchased in 1984-85 went for an average of $101,000. Machines from Tandem Com-

FIG. 1

LOCAL AREA NETWORKS

Query: Do you have in use now, or do you plan to use initially in 1985/86, a local area network (LAN)?



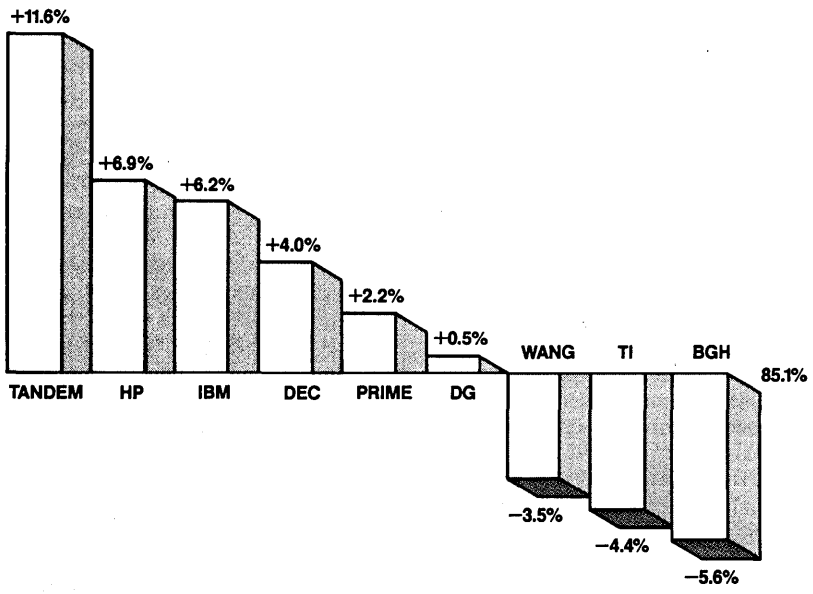
*Implicit 74%, 1.5-year compound growth rate
**Includes 3-COM 3.0%, Novell 2.6%, Sytek 0.9%, AT&T Starlan 1.3%, AT&T Other 2.5%, Primenet 1.3%, etc.

FIG. 2

CUSTOMER LOYALTY

Query: Do you expect to change to another manufacturer as your primary source of minicomputers in 1985/86?

PERCENT RELATIVE TO TOTAL SURVEY AVERAGE OF 85.1% ANSWERING NO*



*As opposed to answering Yes or Seriously Considering

puters of Cupertino, Calif., and Prime Computer of Nadick, Mass., however, now sell for a lower price than five years ago: for example, Tandem's average system price was $268,000 then but is only $202,000 now. The increasing popularity of DEC's MicroVAX II will probably trigger a fall from $143,000 to $98,000 in the average price of DEC systems purchased during 1984-85 and 1985-86, respectively.

For Data General, the most important 32-bit machines will be the highest-performance MV models, the 10000 and upcoming 12000, accounting for a total of 55.7% of the total planned purchases by respondents. The original model 8000's share (including the 8000-2) of 32-bit dollars spent with that vendor will fall from 36% in 1984-85 to only 10.6% in the next 18 months. Similarly, Prime stands to see 53.9% of its revenues from survey respondents come from its model 9955.

Average minicomputer system prices have risen substantially in the past five years, more than doubling for some vendors.

AT&T, once a major source of business for minicomputer vendors, has shifted to its own systems in a big way. In the upcoming 18 months, the survey shows, AT&T sites will use AT&T minis 93.1% of the time, while DEC's share continues to fall, hitting near bottom at a mere 3.4%. Nevertheless, AT&T has had only limited success in penetrating minicomputer markets beyond its own boundaries. About 76.3% of the purchases of AT&T 3B minis planned by respondents will go to internal AT&T sites. Of the 3Bs used by respondents, 67.5% are scheduled for communications work (including systems run by the Bell operating companies), 9.2% for education, and 11.3% for financial services systems.

The Unix operating system, on which AT&T has been relying as a wedge into the IBM-dominated market, still ranks low on users' lists of criteria for selecting computer systems. Both technical and commercial sites ranked "strong Unix offering" as only the 12th most important criterion, while compatibility with installed systems and hardware reliability were most important to those two types of users, respectively.

As a primary operating system, Unix has made only modest inroads: 7.8% of the respondents indicated that Unix is now their main operating system and another 4.4% said it would become their main system in the next 18 months. But that future total of 12.2% is down from the comparable figure of 13.8% measured last year. A similar drop, from 18.2% last year to 15.8%, was seen in the

use of Unix as a secondary system.

Evidently, newer suppliers such as AT&T, Sun Microsystems of Mountain View, Calif., and Altos Computer Systems of San Jose have come to depend on Unix and its derivatives most heavily. Only 14.3% of DEC sites, for instance, said Unix would be their primary operating system, but users of Sun, Altos, and AT&T each showed greater than 92% planned usage. Of current users of Unix, DEC sites are most heavily represented, with 35%. Next are IBM at 10% and HP at 9%. And, not surprisingly, Unix is more widely used in technical than in commercial applications, particularly in software development. AT&T's System V is the most popular Unix variant, followed by the Berkeley 4.2 version and Microsoft's Xenix.

Slight increases were found in the use of such advanced programming languages as Ada, Lisp, and Prolog. Respectively, 7.4%, 8.9% and 4.3% of survey respondents said they would use those languages by the end of next year. Lisp was found most heavily used in educational sites followed by software development sites.

AT&T, once a major source of business for minicomputer vendors, has shifted to its own systems in a big way.

Interest in fault tolerant systems held at traditional survey levels, but doubts about the real size of this market raised by past years' surveys were confirmed. Asked if they would like their current vendor to supply a fault tolerant version of its minicomputer system, 3.1% of respondents said they already had such a machine installed, 15% said they would like such a system and would pay extra for it, and 36% said yes, but they would not pay extra for it. When asked if they would still be interested in this capability if it were not compatible with their current systems (say, an IBM 370 or VAX), 40.5% said no and only 10.5% said yes. As noted last year, this response suggests a much narrower market potential for new, proprietary fault tolerant systems than might have been expected.

In the "integrated" office systems arena, it was found that a handful of suppliers has captured the majority of installations, both planned and existing. IBM was found to have a 23.7% share, about even with DEC's 22.9% share; they were followed by Wang's 11.8%, Data General's 10.6%, and HP's 5.1%. Altogether, only 18% of survey sites had such systems installed or planned for future installation; usage is heaviest with large organizations (e.g., 31% of users showing annual revenues over $500 million). Except where IBM is the principal supplier—where mainframes still dominate and networked PCs are on the rise—integrated office systems tend to be based on shared minis. Forty-nine percent of the office system users said IBM communications compatibility (i.e., under System Network Architecture) was "very desirable."

Previous surveys in this series have shown the microcomputer in general, and IBM's PC in particular, making strong inroads in markets that were once the province of minicomputers. The microcomputer continues to extend its reach, although not as strongly as in the past few years. Last year, for instance, the year-to-year growth in new pc users within the survey population was measured at 65%, but this year's growth is only 22%. This suggests a maturation of the market in which most sites already have at least one pc installed. There may be only single-digit growth by next year. The slowdown in growth seems to be taking place among sites using all types of pcs—IBM, Apple, and all the rest.

The few new pc users are, not surprisingly, choosing IBM as their main supplier. That company has gained 63.3% of new pc users in the past year, compared with Apple's mere 4.6%.

The application of pcs is strongest among banking and educational sites. Asked how many hours on average they used their pcs, respondents matched last year's number of 4.9 hours. The most rap-

FIG. 3

TOP DOZEN MINICOMPUTER SYSTEMS 1985/86

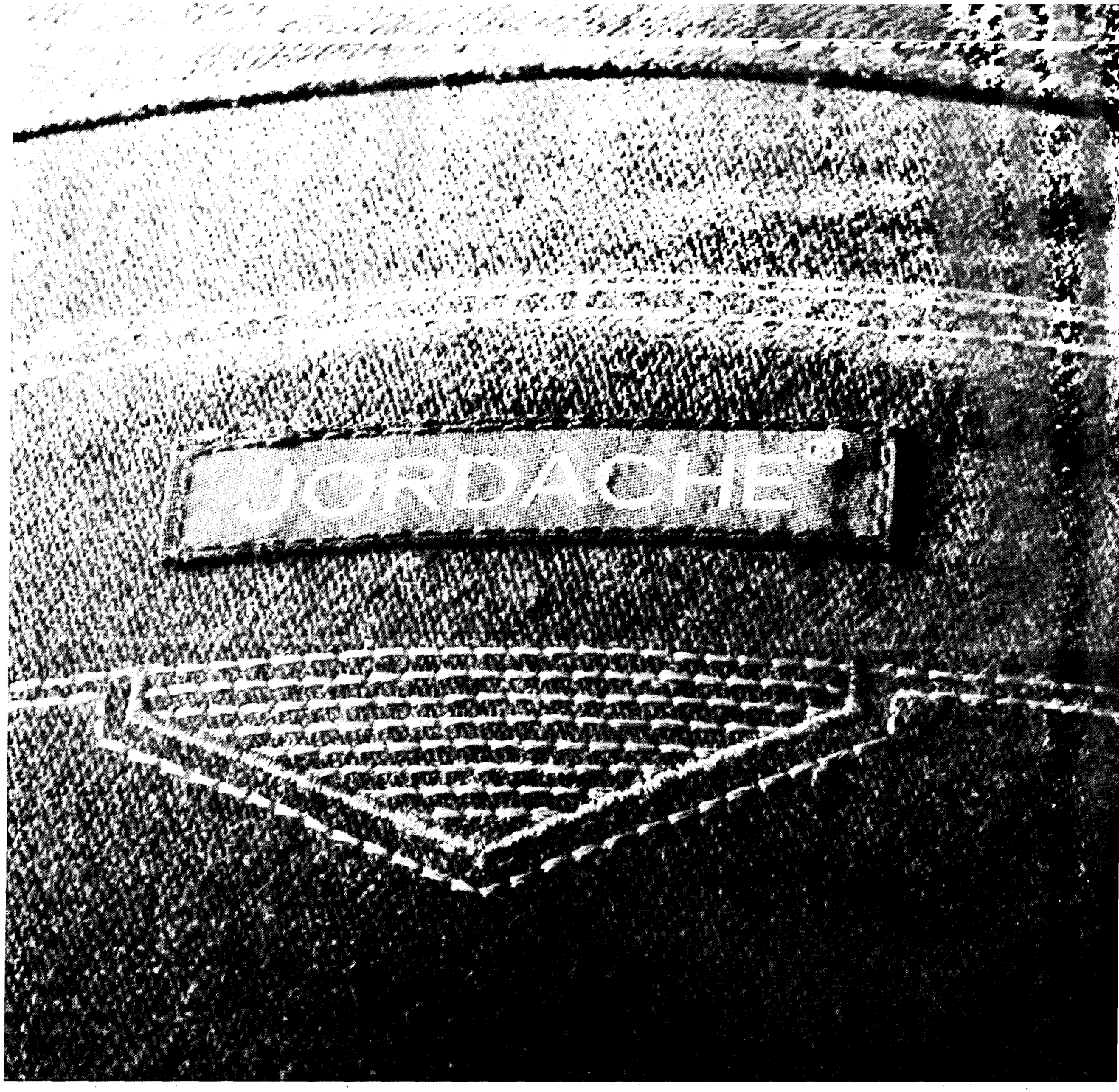
A. BASED ON NUMBER OF RESPONDENTS ACQUIRING SYSTEMS (7/85–12/86)

MANUFACTURER	SYSTEM	HOW MANY SITES ACQUIRING	AVERAGE UNITS PER SITE
IBM	System/36	224	7.9
DEC	MicroVAX-II	196	2.9
DEC	VAX, Unspecified	83	2.0
DEC	VAX-11/750	83	1.3
DEC	VAX 8600	75	1.4
DEC	VAX-11/785	67	1.4
DEC	VAX-11/780	64	1.3
HP	3000, Unspecified	52	2.8
IBM	System/38	47	1.2
DEC	PDP-11/84	42	1.8
DG	MV/4000	36	3.2
IBM	Series/1	34	9.8

B. BASED ON NUMBER OF UNITS BEING ACQUIRED (7/85–12/86)

MANUFACTURER	SYSTEM	HOW MANY UNITS BEING ACQUIRED	EST. VALUE ($ MILLIONS)
IBM	System/36	1,774	$103.4
DEC	PDP-11/73	621	9.3
DEC	MicroVAX-II	567	21.2
Burroughs	B20/B25	345	2.1
IBM	Series/1	332	12.7
Altos	986	251	2.5
DEC	VAX, Unspecified	164	35.6
HP	3000, Unspecified	144	31.2
Data General	Eclipse, MV/4000	144	12.2
DEC	VAX 8600	104	53.1
DEC	VAX-11/750	104	13.8
Data General	Eclipse, MV Unspecified	104	5.7

- The respondents also plan to acquire:
  - 95 DEC VAX-11/785s for $26.2 million and 81 VAX-11/780s for $22.9 million
  - 21 AT&T 3B20s for $6.3 million, 224 3B2s for $7.5 million
  - 95 DG MV/10000s for $19.6 million
  - 56 IBM System/38s for $14.8 million
  - 25 Prime 9955s for $8.6 million
- In total, 2,094 respondents reported plans to acquire 9,867 systems valued at over $693 million between 7/85 and 7/86.



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CIRCLE 48 ON READER CARD

id rise in pc applications has been in remote terminal emulation and graphics processing, but spreadsheet and word processing work continue to dominate.

In terms of sites, the "independent store" remains the predominant channel through which to acquire a pc (53.8%), particularly for machines from Houston-based Compaq Computer Corp. (88% of sites). About 63% of IBM sites buy from a store and another 25% buy direct from IBM. (For DEC, HP, and Wang, over 60% buy direct from the manufacturer.) When measured in terms of unit volume, however, "direct from manufacturer" is the leading channel of acquisition (51.8%). A shift was noted in the source of IBM PCs, from direct to the independent store, suggesting that Apple is losing retail shelf space. On the other hand, educational sites, where Apple is particularly strong, are heavily skewed toward acquisition direct from the vendor.

Even more than hardware, pc software is bought at independent stores. While only 22.9% of such software comes directly from the manufacturer, 58.2% comes from independent stores.

Selection of pcs is based heavily on compatibility with prior systems and the availability of software. While a quarter of the responding sites mentioned the viability of their pc vendor as a major selection criterion, the other two factors were each mentioned by 60% of the sites. For the first time, the IBM PC ranked ahead of Apple for software availability, but the industry leader's machine continued to lag the Silicon Valley vendor when it comes to ease of use and quality of displays.

Software continues to capture a rising share of the average user's pc spending. Software purchases accounted

As a primary operating system, Unix has made only modest inroads.

for 19.2% of the spending in the 12 months preceding the survey and stand to make up 20.4% of the coming year's spending. Helping to fuel that trend is the continuing perception by users that the quality of pc software exceeds that of minicomputer packages.

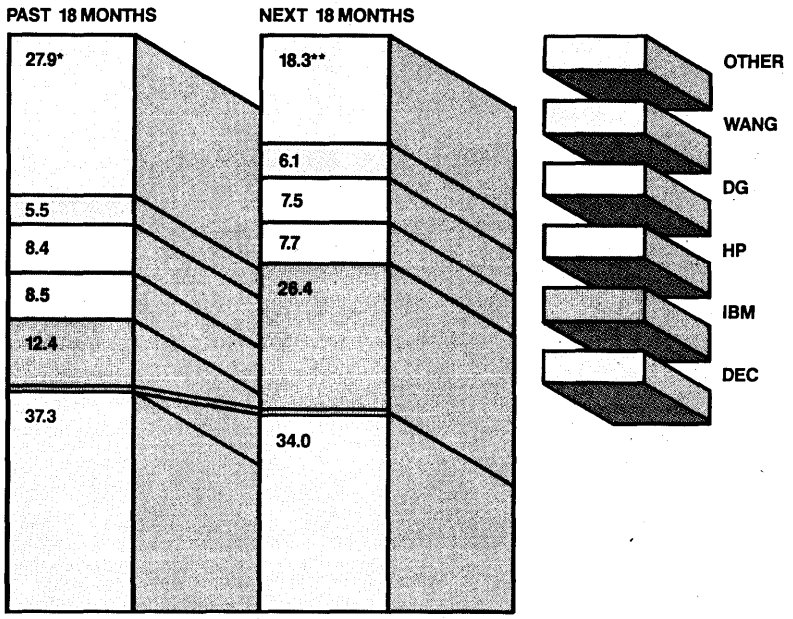
Lotus 1-2-3 and Wordstar continue to rank as the leading software packages for pcs among survey respondents. The former was mentioned by 68% of respondents while the latter was mentioned by 41%. Runners-up included various database packages and Multiplan. Lotus's Symphony showed up at only 20.8% of the sites, while IBM's DisplayWrite came in just under MultiMate's score of 7.3%. Nevertheless, IBM stands to push its way into the top five software packages to be used in the upcoming 18 months

FIG. 4

MINICOMPUTER PURCHASES

TOTAL SYSTEMS

PERCENT OF INDICATED SPENDING (IN DOLLARS)

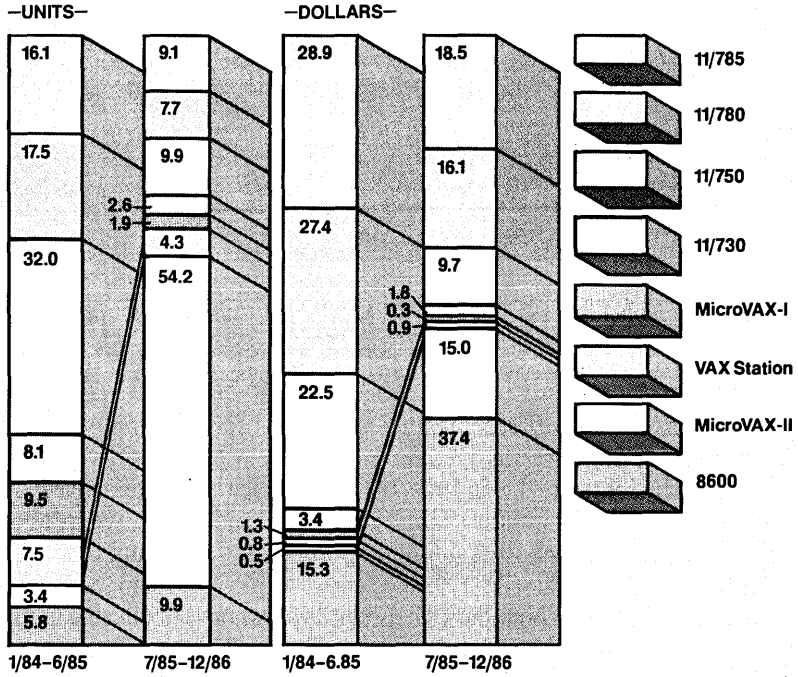


*Past 18 months includes: Prime 5.9%, AT&T 2.4%, SEL 1.5%, Tandem 1.5%
**Next 18 months includes: Prime 2.6%, AT&T 2.3%, SEL 1.6%, Tandem 1.6%

FIG. 5

VAX PRODUCT MIX

PERCENT OF RESPONDENT VAX* PURCHASES



*Excludes unspecified VAX models; VAX-II/725 and VAX-II/782 quantities nominal in these data

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CIRCLE 49 ON READER CARD

with DisplayWrite and TopView. By the same token, Wordstar's star seems to be falling. While TopView, IBM's windowing package, is currently in use at only 2.6% of the survey sites, users indicated that figure would reach 6.6% by the end of next year. Lotus's Jazz is now at 2.1% of the sites but the survey predicts it may get to 5.4% in the same time period.

Compatibility has been an issue in the pc market ever since IBM unveiled its market-winning PC in 1981, and this

For the first time, the IBM PC ranked ahead of Apple for software availability.

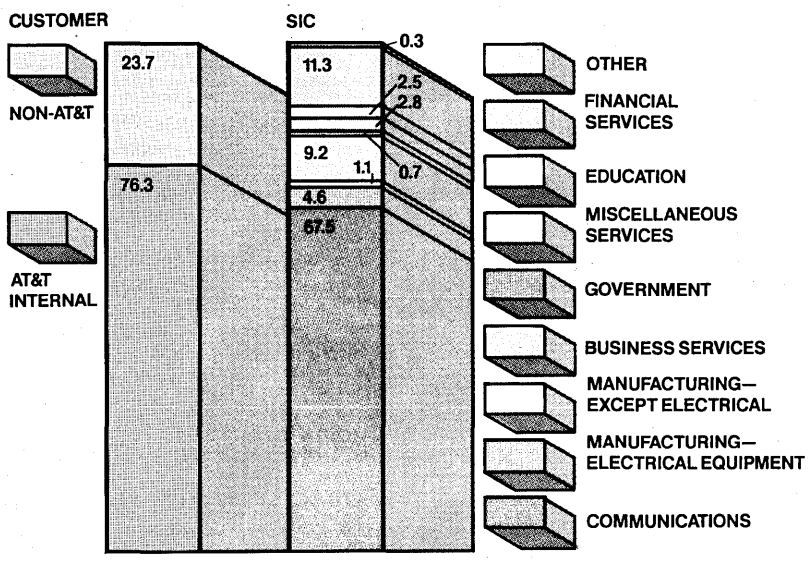
year's survey shows that systems-level compatibility is more important (64% of sites) than applications-level compatibility. This augurs well for the equipment manufacturer but less so for the independent software supplier. Of those sites that had standardized on one or two pc suppliers, 69% chose to do so along systems lines (MS/DOS, for instance), but only 26% at the software package level (e.g., Lotus 1-2-3).

Lotus is the major beneficiary of the ongoing standardization of pc software packages. Two fifths of the respondents have chosen 1-2-3 as a standard

FIG. 6

AT&T 3Bs SLOW TO TAKE OFF

RESPONDENT PLANNED 3B UNIT PURCHASES



- Manufacturing-Electrical Equipment SIC includes old Western Electric
- Communications SIC includes the old Bell Operating Companies
- Business Services includes computer and data processing service (i.e., much of systems house population)
- Manufacturing-Except Electrical includes office machine suppliers (e.g., hardware oems)
- These data do not reflect the recent very large 3B contract awards from the government sector (e.g., NSA)

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package, followed by Ashton-Tate's dBase product at 9.2%.

When it comes to pc hardware with an operating system, IBM is the hands-down winner. Of those sites that have chosen one or two standard suppliers, IBM was mentioned by three fifths of the sites, followed by Apple's 7% and Compaq's 6%, IBM winning even where another vendor is the major supplier of minicomputers: only 17.8% of DEC sites have standardized on DEC micros—52.6% have chosen IBM. In sum, IBM has captured more than half, 56.3% to be exact, of the sites with microcomputer installations. Apple is left with only 9.9% (down from 42% in the 1981 survey) and DEC with only 4.9%. IBM's share promises

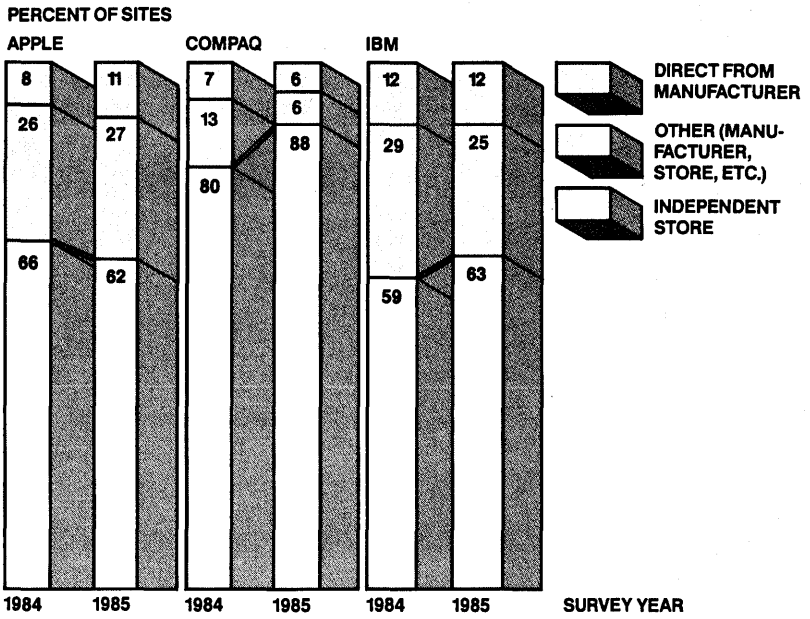
The few new pc users are, not surprisingly, choosing IBM as their main supplier.

to grow to 62% next year, according to respondents' planned purchases; Apple's share will drop by a half, to only 5%. Compaq and AT&T will each gain, however, the former up 1% to 5% and the latter tripling its current 1% share. Of the more than 90,000 pcs purchased by survey respondents in the 18 months preceding the survey date, 53.1% were from

FIG. 7

PRIMARY CHANNEL FOR PC HARDWARE ACQUISITION

Query: What is the primary channel through which your organization acquires its pcs?



• For DEC, HP and Wang, however, 60%± cite "direct from manufacturer" as primary channel

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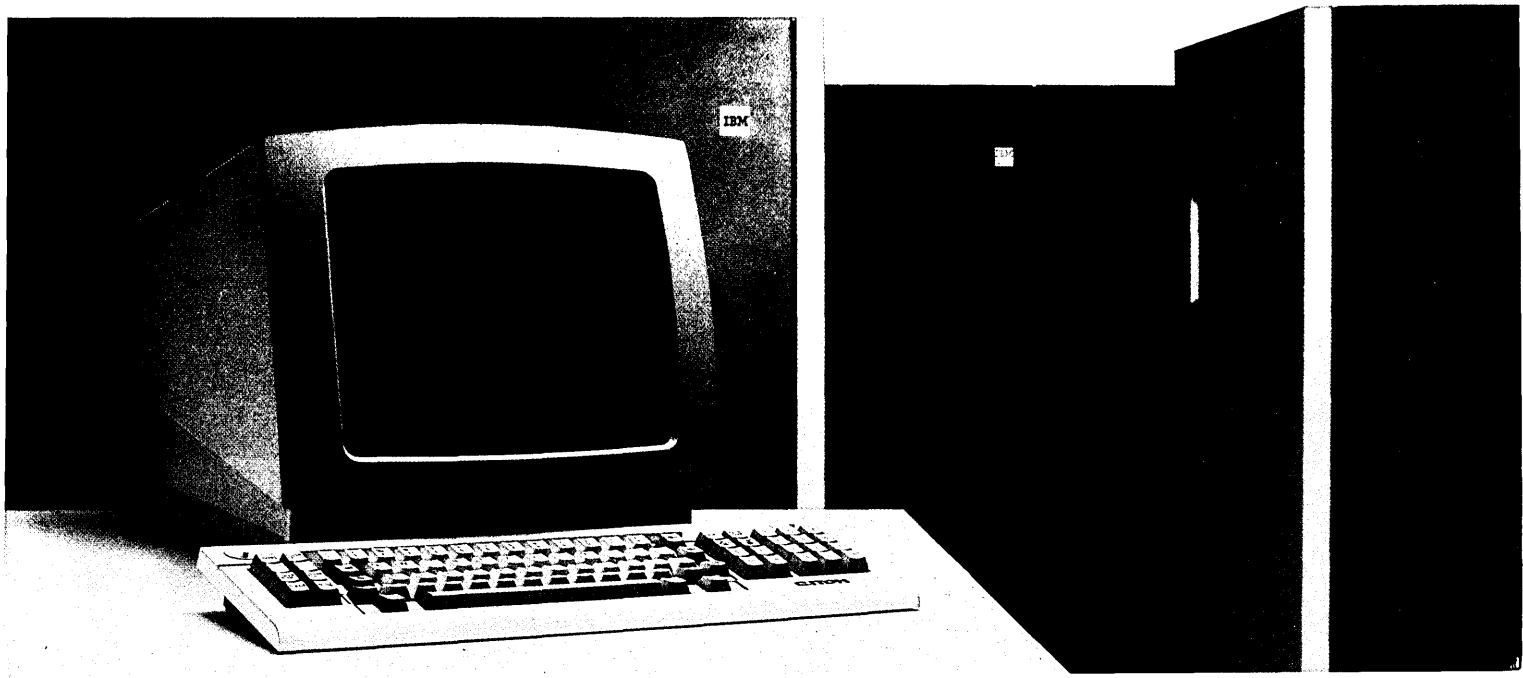

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IN FOCUS

FIG. 8

PC APPLICATIONS SOFTWARE

Query: Which pc applications software package does your organization principally use now and which are planned for use (initially or additionally) in 1985/86?

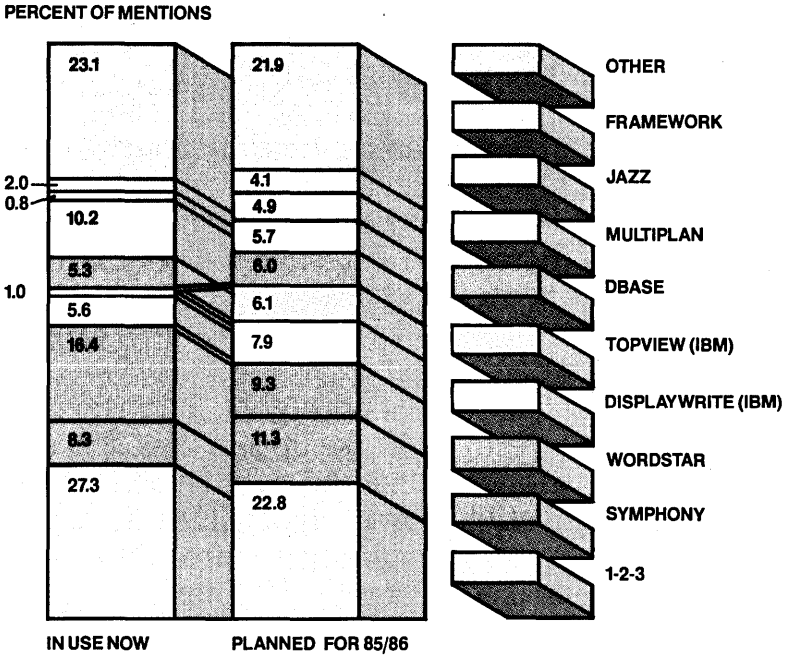
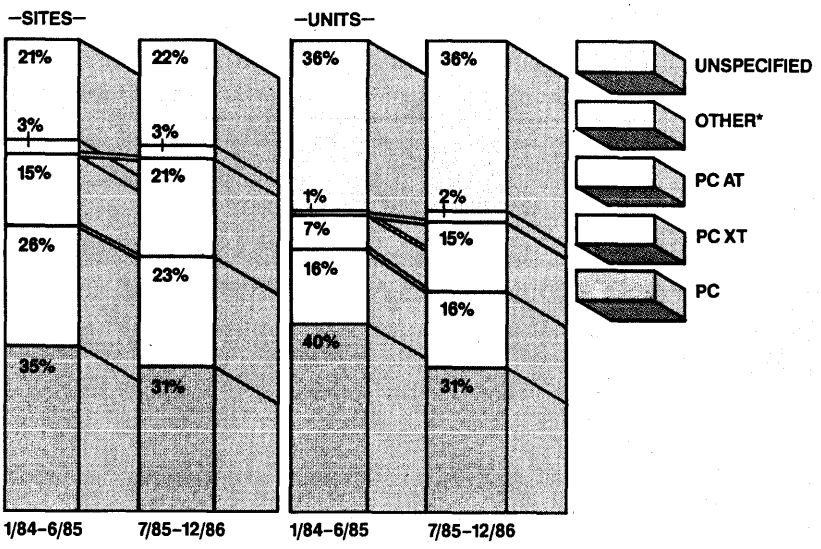


FIG. 9

IBM PC PRODUCT MIX

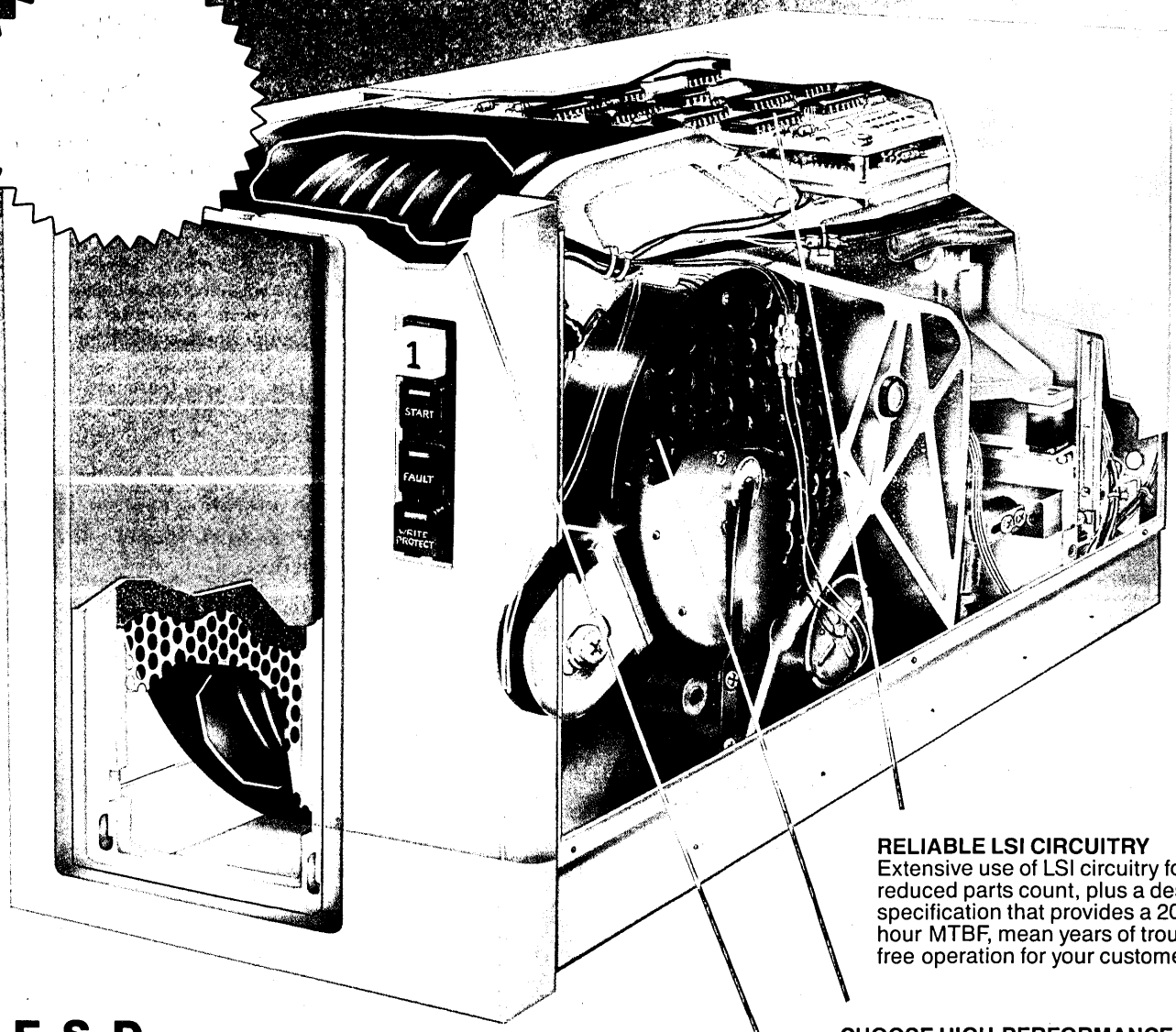
Query: How many personal computers were acquired by your organization during the past 18 months (1/84–6/85), and how many are planned for the next 18 months (7/85–12/86)?



*Principally 3270 PC

Note: PC/XT and original PC still comprise over half of respondents' personal computer unit buys from IBM.

516 MEGABYTE CAPACITY AND HIGH-PERFORMANCE IN A HALF-RACK DRIVE.



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CONTROL DATA

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IN FOCUS

IBM, 14.2% from Apple, 6.5% from DEC, and 4.4% from Zenith.

IBM will see the PC AT do well, that machine comprising 23% of the IBM PC units users plan to purchase in 1985-86; the original PC and XT versions will show a combined share of 73%. In terms of sites purchasing PCs, the AT will go to 21%, while the two previous models will go to 56%. The 3270 PC is still a low-volume product with this survey population, accounting for only 2% of planned unit purchases, or 3% of the sites.

Asked if they anticipated any major systems introductions by their vendors this year, 36% of IBM PC user sites answered affirmatively, down from the 48% recorded last year when the survey was taken just a month before the long-awaited AT was unveiled. This year's survey was taken just after IBM told customers that there would be no PC2 introduction this year.

The PC's importance to IBM showed in the fact that 62% of the projected mini/micro dollars to be spent with IBM by this year's survey respondents will go for PC equipment. Earlier this year, the DATAMATION/Cowen survey of IBM mainframe users showed that they would spend 28% of their IBM dollars for PC gear.

When it comes to pc hardware with an operating system, IBM is the hands-down winner with 60% of the sites.

As its overall market share has dropped, Apple Computer's product mix has changed. Only 19% of the specified Apple unit volume was Macintosh hardware, compared with 52% for the Apple II during 1984-85. But the following 18 months promise to see the Mac get 40% of Apple's shipments to these users, while the model II's share falls to 32%.

Peripherals purchases were down this year. In the under-20MB hard disk category, for instance, unit shipment growth over the previous year was only 12.9% (compared with the 219% measured in the 1983 survey), and in the 20MB to 100MB range, growth was 65.8% (down from 115% last year). Even worse were alphanumeric crt terminals, at minus 8%.

The microcomputer has made its biggest impact in commercial computing; it was the most frequently cited vehicle for new applications in that sector. Minis continue to be favored more heavily than pcs in scientific/technical computing. ◉

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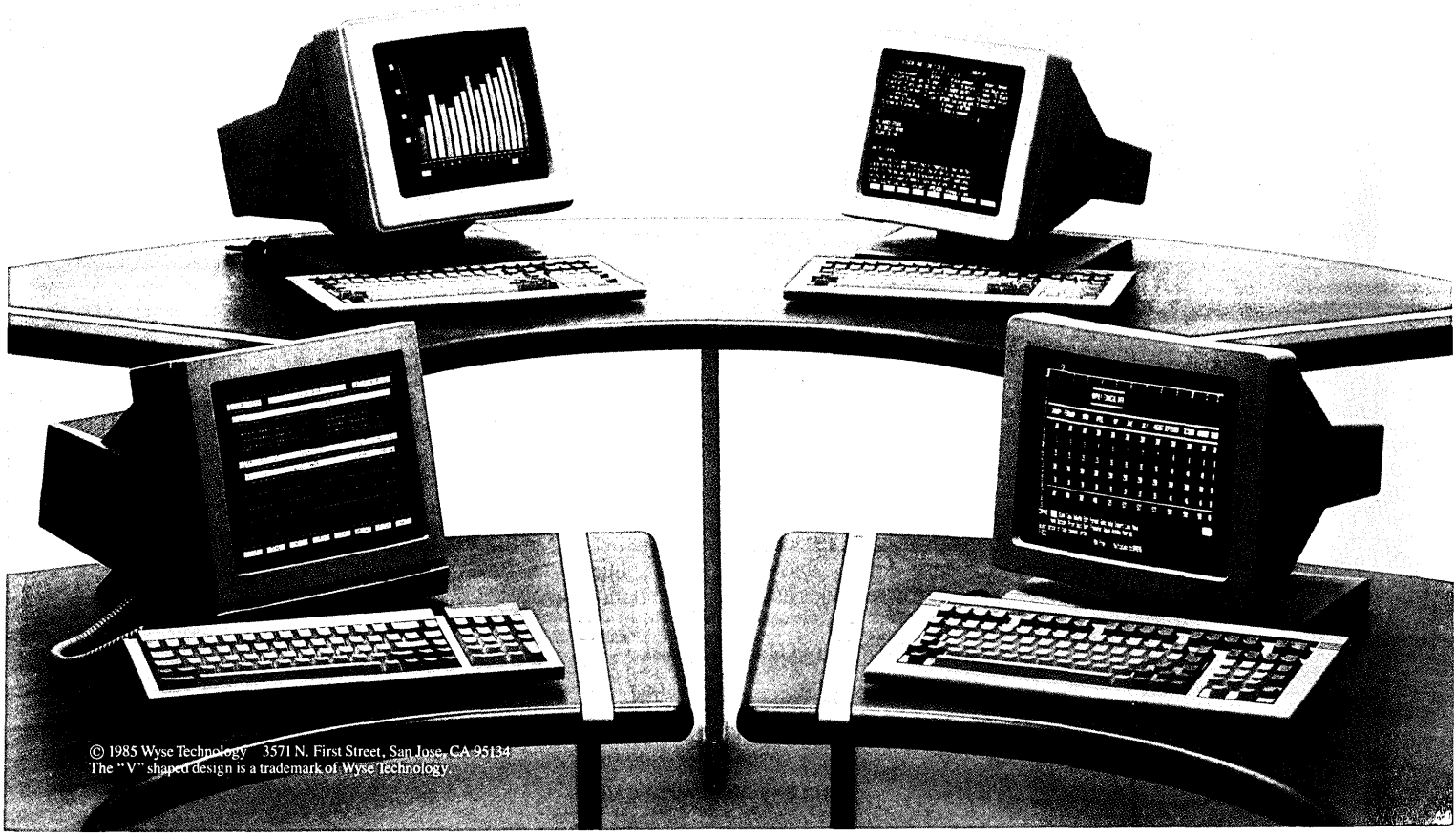

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NEWS IN PERSPECTIVE

TRADE

THE KIMONO IS OPEN

While formal trade barriers in Japan have been lowered, administrative hurdles must still be cleared. Nevertheless, there are signs of progress.

by Thomas Murtha

There's an old adage often used in Japan: *ishi no ue nima san nen.* It means sit on a rock for three years. That, in essence, is Japan's message to foreign telecommunications and computer vendors hoping to succeed in the Japanese market.

Although such homilies about perseverance and patience are anathema in protectionist-minded Washington, major companies doing business in Japan—Burroughs, Northern Telecom, Rolm, and others—have taken them to heart. In fact, major vendors have gone one step further and are saying the proverbial ball (the initiative in winning business) is now in the court of suppliers.

"American companies here in telecom and computers are not complaining anymore [about trade barriers]," says Herb Hyde, chairman of Burroughs (Japan) and president of the American Chamber of Commerce in Japan. "They are happy to see progress has been made. They realize it takes time and commitment to be successful in this market."

Adds John Sheppard, director of digital switching for Northern Telecom Japan, "Most of the trade barriers only exist in our minds. There are cultural differences. The situation here is not totally different from doing business with the old AT&T. It took us about four years to convince them we had a product the BOCs could use. So it's not unreasonable to expect it's going to take longer in Japan."

A major breakthrough for foreign suppliers occurred in September when Daini Denden Inc. announced it would purchase core network equipment, including four DEX 600 switching systems and a network control center, from Digital Switch Corp., Richardson, Texas. Although the contract's value, estimated at $20 million, may be small change in terms of the overall market, the award was unprecedented.

In late August, the Japanese government unilaterally took several major steps toward lowering barriers. These included the elimination of import tariffs on all cpus and peripherals, effective April 1986; the establishment of a private sector telecom standards committee with foreign representation; and a kamikaze drive by the Ministry of International Trade and Industry (MITI) to have 132 Japanese corporations purchase more American products. Also, a group of trade negotiators meeting in Japan last spring succeeded in devising a fairer system of interconnect standards for terminal equipment.

Trade figures provide further documentation of the changes under way. According to statistics from the U.S. embassy in Tokyo, Japanese imports of computers and related equipment during the first half of 1985 were $450.7 million, up 45.8% from 1984. Nevertheless, it will take many more of these double-digit percentage increases to close the total computer trade imbalance with the U.S., which ran at more than $2 billion in 1984.

"But it's obvious Japan is responding to American pressure, especially in the telecommunications sector," says Mark Foster, Japan counsel for the Electronics Industry Association. "If we continue to say Japanese efforts are meaningless attempts to placate their critics, we've painted ourselves into a corner.

"We must convince American companies to spend the money to take advantage of the changes that have occurred in Japan. In the past six months, it's become much clearer that real opportunities exist here in telecom. This isn't a mirage. But if the opportunities aren't used, the window will close again."

Adds Ken Suzuki, managing director of the Japan Electronic Industry Development Association, "There just aren't any significant trade problems remaining between the U.S. and Japanese computer industries. The unilateral elimination of our tariffs on cpus and peripherals marks the complete liberalization of our market to imports. But the selling side should be making the effort, not the buyers." Suzuki may be overstating just how complete the liberalization is. Although the barriers are crumbling, cultural inertia, particularly among middle- and lower-level bureaucrats, still slows efforts to open the Japanese market. A case in point is the award to Digital Switch Corp.

"If we continue to say that Japanese efforts are meaningless attempts to placate their critics, then we've painted ourselves into a corner."

When Daini Denden requested interconnect specifications necessary to use the American switches from Nippon Telegraph and Telephone (NTT), the company ran into a stone wall. It took a for-

ILLUSTRATION BY DAVID FEBLAND

mal complaint from the U.S. embassy in Tokyo and a lecture from the Electronics Industry Association in Washington to prod NTT to cooperate.

"Our decision to buy core equipment from a U.S. supplier shocked NTT and its traditional family of suppliers," says Sachio Senmoto, senior vp of DDI. "The problem is middle-level bureaucrats. They constantly resist change."

Rolm, too, had problems but managed to get them solved. "Changing the bureaucratic structure here in Japan requires a lot of detailed work," concedes Bill Crowley, vp of Rolm International Japan. "Rolm had specific problems selling digitial PBXs that were embedded in outdated rules that shut us out of several important markets. We analyzed the markets and made specific recommendations for changes. We're happy because trade negotiations were very effective in getting what we needed this year. Competing here solely on price and performance is just a function of committing the resources to removing the barriers and developing a niche in the Japanese market."

Not all foreign companies, however, have the wherewithal to tough it out. The prospect of a three- or four-year wait before making significant sales has scared off many foreign companies.

"Most smaller companies can't even think about establishing a presence in Japan," points out John Goss, president of the International Bureau of Software Test, Sunnyvale, Calif. "If we don't go to Japan and establish a company, sooner or later there will be a Japanese competitor in the same market. But showing profit from a Japanese venture in a short time period really looks difficult. If we hadn't recently been acquired by a larger firm with more resources, I don't think we could even consider getting our feet on the ground in Japan."

Although the barriers are crumbling, cultural inertia, particularly among middle- and lower-level bureaucrats, still slows efforts to open the Japanese market.

Adds Bill Smale, executive vice president of JSE International, a Japanese firm that adapts foreign software for the Japanese market, "Some American firms come here ignorant of the rules of the game and cultural differences. The big mistake is trying to dictate the method of doing business without understanding the people and doing your homework."

A lot of the homework for American companies in Japan involves unraveling the regulatory maze. But the effort could pay off, particularly in telecom products. The modernization of Japanese telecom calls for the installation of 60 million digital lines by 1995. That's at least a $12 billion market by conservative estimates. And that doesn't include the network software, switching and terminal equipment, and the surging demand for value-added services.

American trade negotiators in Tokyo, unlike their saber-rattling colleagues in Washington, are keenly aware of the potential, and are attempting to consolidate gains.

"There are healthy signs of progress on both sides, but we still have to get the administrative procedures in place to fully open the Japanese market," says Herb Cochran, commercial attaché at the U.S. embassy in Tokyo. "Pinpointing problems in standards and certification procedures requires taking advantage of the opportunities now available. Running batches of U.S. equipment through the Japanese approval system should flush the bugs out of the bureaucracy."

But there are more than just a few

NEWS IN PERSPECTIVE

MEANWHILE, IN WASHINGTON...

While foreign corporations begin their navigation through the often difficult and confusing Japanese procurement process, American legislators in Washington, D.C., no doubt sensitive to the emotional issue of jobs, are raising the prospect of protectionism.

The Senate Finance Committee, searching for ways to open what is still perceived to be a closed market, particularly in telecommunications, thinks it's found the key. Call it the telecommunications version of the eye for an eye theory. If the Japanese don't let the Americans in there, than we'll keep them out of here.

Although it is merely one among approximately 300 trade bills traveling the halls of Congress, the Telecommunications Trade Act, S. 942 on your roster, has been blessed by the Finance Committee and probably has an excellent chance of winding up on President Reagan's desk. But not even Las Vegas is giving odds on what will happen to it then.

A similar bill in the House, the Trade Law Modernization Act, sponsored by Reps. Timothy Wirth (D-Colo.) and James Florio (D-N.J.), has also drawn wide support, but is moving more slowly. At press time it hadn't budged from its original position in the Energy and Commerce Committee.

"I think the prospects for passing this [S. 942] are very good," says a source in the office of a sponsoring senator. "This isn't a protectionist bill. It's a market-opening bill. The administration is going to be a lot harder pressed to veto a bill like that."

Whether or not it's a "market-opening" bill depends upon which the side of the Pacific one is on. There's no doubt about the bill's purpose, though: "To ensure that countries, such as Japan, which have made commitments to open their telecommunications markets, fully abide by those commitments or face swift retaliation against their exports of telecommunications products and services to the United States."

The bill's major finding is that unless the telecommunications trade imbalance is corrected through U.S. firms being given substantially equivalent access to foreign telecom markets, the U.S. should avoid granting continued open access to the offending nation's products and services in our market.

To accomplish that, the President is authorized to enter into negotiations with the U.S. Trade Representative's list of bad guys. To reduce or eliminate foreign barriers to U.S. exports of telecom products and services, he can pursue most-favored-nation treatment for those products as well as equipment standards and procedures for certification of equipment that does not exceed the minimum standards and procedures necessary to protect the telecom network.

These discussions have a life cycle of two years. If they turn out to be all talk, then it's time for presidential action. CBEMA testified in favor of the bill. The Electronic Industries Association's Information and Technologies Group and the American Electronics Association both support the concept.

"There's not a great deal of opposition that's politically salient," the Senate source says. "No one's lobbying. Japanese companies aren't doing it. Local BOCs aren't around. I think unless you come from a state with a strong telecom presence—New Jersey, Illinois, Colorado, or Pennsylvania—you're not going to be too active on this one."

You are if you're the North American Telecommunications Association (NATA) or the Commerce and Industry Association of Japan (CIAJ).

"At best," NATA president Edwin Spievack told the Senate International Trade Subcommittee, "S. 942 is a 'multinational relief act,' which might help pry open foreign markets to increased sales of products made overseas by American-owned corporations.

"At worst, the bill will trigger a catastrophic trade war," Spievack said, "which will harm American consumers, devastate America's own independent distribution network, and return control of the U.S. telecommunications equipment industry to a single corporation—AT&T." Spievack further contended that even if every piece of telecom equipment in Japan were purchased from a U.S. supplier, it would not make that much of a dent in the trade balance between the countries. He estimates the Japanese telecom market to be worth $4.2 billion. That's far less than one would think for the second largest market in the world.

"This [S. 942] flies in the face of what the international trade framework is all about," charges Eric Garfinkel, the attorney for the CIAJ. "It's not a results-oriented standard. It's subjective as hell. It's a departure from any international standard I've ever seen. I negotiated trade agreements for three years at the Commerce Department and nobody tried to push crap like this on us."

For the loyal opposition, it could be worse. It could be the 25% import surcharge bill sponsored by Reps. Dan Rostenkowski (D-Ill.) and Richard Gephardt (D-Mo.) and Sen. Lloyd Bentsen (D-Texas). The Trade Emergency and Export Promotion Act (H.R. 3035) finds that "Japan has not significantly reduced its pervasive protectionism and, as a result, Japan has not, in comparison to other major industrialized countries, significantly increased its imports of manufactured products while it has significantly increased its exports of manufactured products."

This legislation authorizes the President to sock a 25% ad valorem standby duty on any country identified by the International Trade Commission as an excess worldwide trade surplus country or excess bilateral trade surplus country. That means they're ripping off the U.S., and essentially covers Japan, Korea, Taiwan, and Brazil. That would have, as ADAPSO president Jerry Dreyer notes, "a very deleterious effect on our industry." But that bill, although strongly backed by the House Democratic leadership, is expected to take second place to tax reform if Ways and Means Committee chair Rostenkowski can continue to resist the pressure to reverse the order.

Even if he stands fast, it may not matter. A resolution sponsored by Rep. Stan Lundine (D-N.Y.) and approved by the House Democratic Caucus has been put on a fast track as part of an overall Democratic trade package. It could have passed the House as early as Oct. 30. The trade sanctions are similar to those of H.R. 3035.

"I think a lot of members see these bills as leverage to have other countries come around," says a House staffer close to the situation. "But trade is becoming a public works issue. Trade issues, including telecom, are becoming tradable. I don't know if that's going to stop.

"Members are scared of the consequences of bills like the telecom trade act and the import surcharge bill. They're looking for ways around them. I don't think they really want it to pass."

Their constituents will perhaps beg to differ.

—Willie Schatz

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bugs in the bureacracy. A full-fledged feudal turf battle is raging between MITI and NPT, both of which want control over the formulation and administration of Japanese industrial standards. The new telecommunications standards committee (TTC), overseen by NPT, represents a threat to MITI, which administers the Japan Industrial Standards (JIS) system. All public organizations in Japan are required to use JIS-approved products.

The establishment of TTC, proposed by U.S. trade negotiators last April, gives private industry greater control over telecommunications standards. That means a reduced role for administrative guidance and greater participation by foreign firms. The TTC board includes IBM

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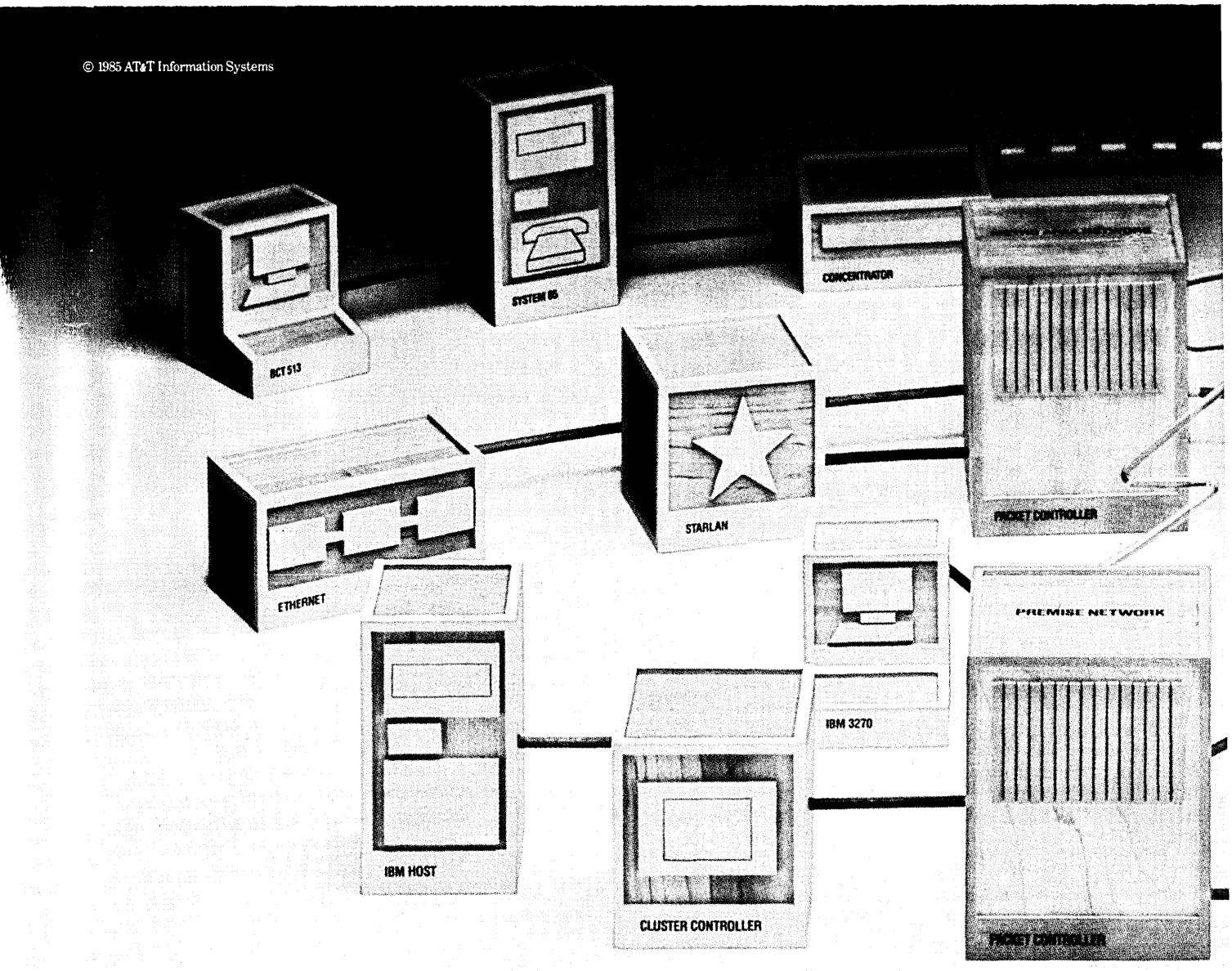

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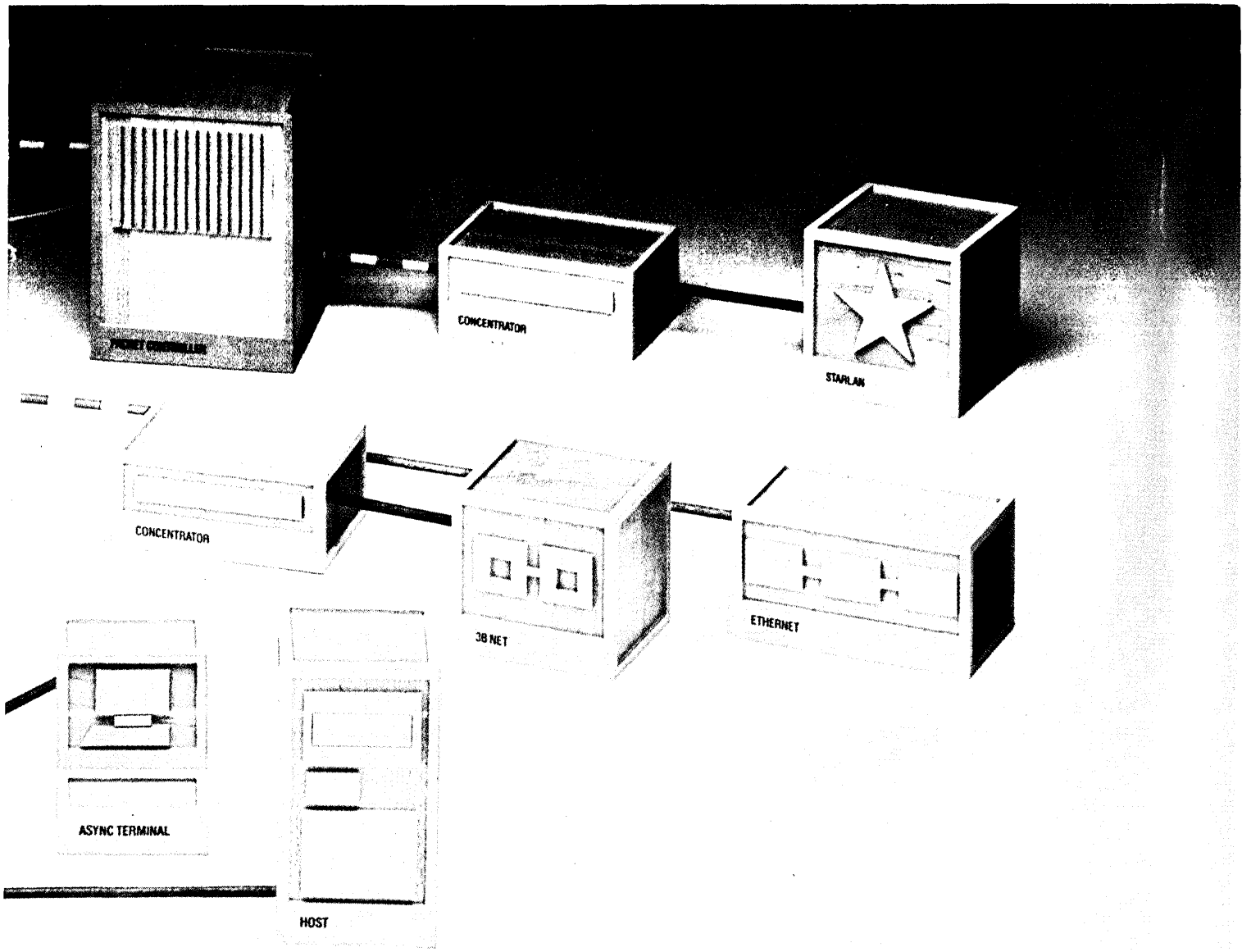

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Japan, the American Electronics Association, and the American Chamber of Commerce in Japan as well as Japanese industry representatives.

"We're working to simplify the system and speed up administrative reform," explains Mark Foster of the EIA in Tokyo. "Although it's impossible to get the ministries out of the approval system, we can shorten the queue for the regulatory process.

"There are billion-dollar companies that have shied away from this market like poison ivy. But there are now some companies that for the first time are making an effort to be more aggressive in foreign markets. They have to if only to defend their domestic markets. For example, Japanese manufacturers have identified modem technology as one area where they want to compete."

Adds Jack Osborn, executive managing director of TRW Overseas Inc., "With the trade problem and the need to be competitive, the Japanese electronics industry is really trying to get their managers to be more objective in selecting products from foreign companies. But it's like trying to turn an aircraft carrier around in a full gale. I'm convinced that responsible pressure from Washington has influenced Japanese leaders. That message is slowly getting across to actual purchasers of equipment at lower levels in the hierarchy. But you simply can't tell guys down in the ranks to change their suppliers overnight."

That is exactly what the U.S. side would like to see. But don't hold your breath. Maybe U.S. vendors should find a comfortable rock in Japan and try to come up with homilies of their own. ◉

MANAGEMENT

HARD TIMES AT CDC

Control Data is trying hard to rewrite its balance sheet in black ink.

by Karen Gullo

Winter came early to Control Data Corp. (CDC) this year. In fact, the company's bleak financial picture hasn't warmed up since last winter, when it became apparent that setbacks in its peripherals, data services, and computer systems businesses would result in a whopping 80% dip in earnings.

The first blasts of cold air came to Minneapolis late this summer when CDC restated results, posting a loss for this year's second quarter after the Securities and Exchange Commission objected to certain of the company's accounting practices. The company lost $14.8 million in the first half and from there CDC's financial picture hit the deep freeze. The company's computer services and products business saw a $16.4 million operating loss in the second quarter (the previous year it made $24.9 million before taxes), inventory grew to $900 million, debt rose by $47 million, and 4,800 employees were laid off.

The nuclear winter continues to drag on. CDC canceled $300 million in securities offerings, citing continuing losses at its peripherals operations, and now says that not even profits from Commercial Credit Corp., the company's financial services unit and one of the few strong money-makers, will offset a net loss for the year. Michael Geran, analyst at E.F. Hutton, expects a total corporate loss of $20 million, while CDC's computer opera-

tions will lose $120 million.

The problem areas at CDC—peripherals and data services—took their toll on the computer systems business, which accounts for 20% of revenues. "You've got the good part of the business being dragged down by the peripherals side of the business," Geran says. CDC has fallen way behind its competitors in both the peripherals and computer systems markets, say observers, and is now operating in catch-up mode. "They used to be a leader, and now they are following," says Dennis Thomas, senior systems programmer at Tektronix Inc., Beaverton, Ore., a large CDC user. Thomas oversees the beta testing of VE/VX, CDC's Unix implementation for the new 800 series of mainframes, a product that Thomas says should have been available five years ago.

The company lost $14.8 million in the first half and from there CDC's financial picture hit the deep freeze.

Like a majority of large CDC users interviewed by DATAMATION, Thomas says that while the company possesses the talent and technological savvy to produce innovative computer equipment, CDC has for the last five years been unable to bring technologies through product development and into the marketplace in a timely manner."It's like there are two trains [at CDC]," says Thomas. "Their technology train is passing by their supply train. We hope it catches up soon."

Loyalty runs high among CDC users. Just about everyone says the company will pull out of its slump and continue as a viable supplier. Some blame the worst of CDC's hard times on the general slump in the computer industry. But the consensus among users and analysts is that the company will have to take some very drastic steps to overcome the bleak financial picture of the last year.

CDC says its financial woes are only temporary. The company is taking long- and short-term steps to bring the company back to profitability. The steps, some of which are already being taken, will include reorganizing and consolidating the company's businesses, trimming back on operations that don't strategically fit into CDC's computer business, and raising cash by selling off certain assets, including segments of the computer operations.

"We have a fundamentally strong company," asserts Bob Duncan, vice president of market and strategic planning at CDC. "You're talking about a company whose net worth is over $1.7 billion. That's not an insignificant amount. You're talking about a company that has short-term bank debt in the $750 million range. That's not bad debt-to-equity ratio, when you get right down to it. You're also talking about a company that has a profitability problem. We're reducing the total size of Commerical Credit Corp. by a third, we're refocusing peripherals, refocusing the services business, all of which adds up to: we're positioning ourselves for profitability in 1986. We're going to be a smaller, leaner, and meaner company."

In the meantime, CDC is apt to see more than a few users stray from the fold in search of more stable pastures.

"They've lost some of their customer base because they weren't timely in introducing new technologies," says Thomas G. Kamp Sr., formerly vice chairman and director of CDC's business and technology cooperative ventures and pioneer of the company's peripherals business. Kamp, a consultant to CDC, is currently ceo at Centronics Data Computer Inc, Hudson, N.H, a computer printer maker. "The technologies did exist in the advanced technology division, but they were much too slow in translating them from there to a development team and an operating division."

Another recurring observation is that the company has spread itself too thin, sinking money and talent into ventures that are not profitable, ventures that stray from the business of making computer equipment. Plato, the company's computer-based education and training business, has most often been the target of such criticism. CDC chairman Bill Norris has said Plato is the future of the company, but many observers disagree. "From our standpoint, we haven't put too much money into Plato," counters Duncan. Duncan acknowledges, however, that the company has made some mistakes. "Any dynamic company will start new things and some of those things will fail. We've stopped many of the new ventures that have not proven out. If they can't meet our expectations of performance, we'll either change them or we'll get out of them." Duncan says the company has divested itself from a number of noncomputer businesses over the past few years, everything from valves for nuclear power plants to cable television controllers.

While users applaud the introduction a year ago of the 800 series, CDC Net, the NOS/VE operating system, and the implementation of Unix System V, they say the products are extremely late. "In terms of concentration of resources, they have to dismantle a policy of diversification that's gone on for the last decade. It's a 180 degree policy reversal," says Geran. "Faced with the realities, however, I think Bill Norris will make the necessary changes."

Larry Jodsaas, president of CDC's computer systems group, says it's company policy to give customers long lead times when introducing new technologies. "We tell our customers way in advance when products are coming down the road," he says.

How long it will take the company to pull out of its slump, and whether users will string along are matters of debate. "I know there are a number of longtime CDC users who are planning to stay with the company, and I know there are others who have needs that the company is not meeting, and those people are certainly looking elsewhere," says Elaine Litman, chief of the Scientific Computing Division at the Defense Nuclear Agency, Department of Defense. Litman is also president of VIM Inc., the CDC user group. "Most people feel Control Data is going to make it. The company needs to decide what segment of the marketplace they're going to go after. They can't spread themselves thin by trying to supply the entire spectrum of equipment from supercomputers to micros. The bottom line is that they are not big enough."

Financial troubles aside, users point to problem areas that seem to be a result of the company's having lost its focus on its computer systems business. A technical services manager at a large academic computing center with many Cyber mainframes complains that the company's tardiness in getting products to market, a lack of software for administrative data processing and, in particular, high overhead costs to maintain the company's operating systems are three big minuses for CDC.

"CDC doesn't have the software we need," says the technical services manager, who requested anonymity. "Their main administrative software package just isn't adequate. Our new idea is to go out and look for third-party software that will do what we want it to do, and then find the hardware that fits, and that might be IBM, CDC, Amdahl; we don't know yet."

"You've got the good part of the business being dragged down by the peripherals side of the business."

Other users cite a lack of traditional business application software for CDC mainframes as a problem area. "Their software in general has probably not traditionally been one of their big strengths," says Jim Presti, manager of remote computing services at Boeing Computer Services, Seattle. "They have to broaden their capabilities. Their scientific users use computer hardware for crunching but also for things like word processing and database management." The company is increasing its efforts to

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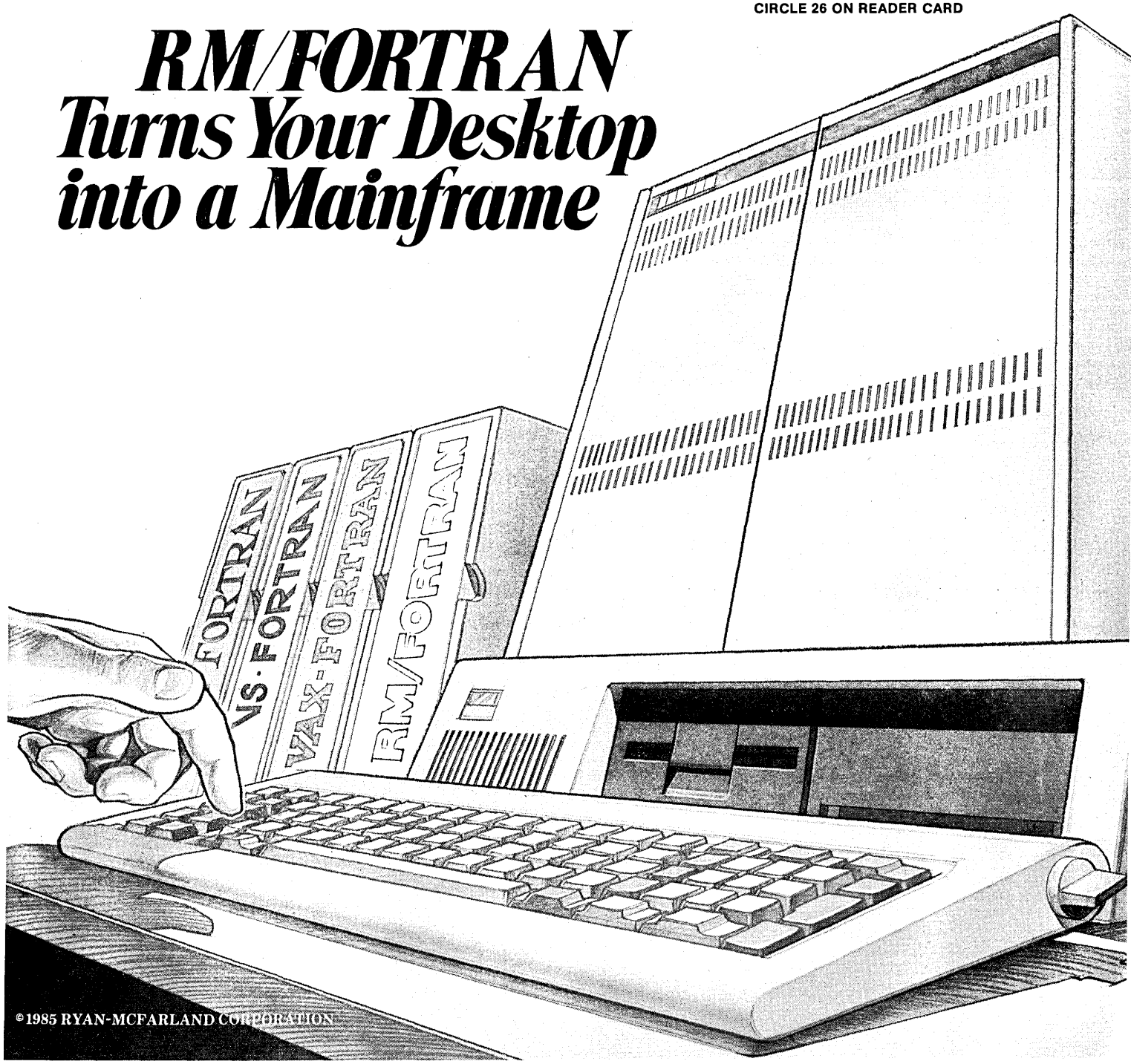

develop new business applications software with third-party vendors, but the company's financial situation right now may not look especially encouraging to third-party vendors.

"We are bringing some business and administration capabilities into the Cyber line, predominantly in the education arena," says Jodsaas. In addition, CDC announced in late summer that it would convert Century Analysis Inc. Officeware office automation software to run on Cyber 180 computer systems. Regarding ventures with third-party vendors, Jodsaas says the company's financial picture has caused "small delays" in attracting third-party software vendors, but, for the most part, CDC hasn't had too much trouble convincing software vendors to migrate their products to its mainframes. "We're finding very good reception," Jodsaas says. Internally, CDC has concentrated on developing mechanical and electrical CAD packages.

CDC finally caught up with its mainframe competitors last October when it announced its own Unix implementation. The system sits on top of NOS/VE and, according to Dennis Thomas, users can easily move between the two operating systems. "I think it's one of the system's real strengths. It offers a tremendous platform for expanding the system, it's a well-designed system, easy to use, but they should have had this three, four, five years ago."

Beta tests show that the system's performance is not up to par. CDC says it is working to bring the performance up to a more acceptable level, and will release the system in the first quarter of 1986. "The first performance of the Unix system was less than what a customer would want, but we have enhanced it a lot and will continue to enhance it," says Jodsaas.

Meanwhile, Thomas says he's concerned about CDC's commitment to the product. "There are some major things missing, and it comes down to sinking enough time and money into it to make it happen. They could make it a tighter and more cohesive product, but they haven't shown any signs of doing that yet." Says Jodsaas, "There's so much more power for the user through the NOS/VE system than there is through Unix. I want a reasonable performance

Some blame the worst of CDC's hard times on the general slump in the computer industry.

Unix shell system, but I'm not trying to get a scientific processor that is the fastest in the world with Unix."

Bright spots in CDC's financial picture include the company's engineering services division, which provides maintainance for mainframes and microcomputers; the government systems group, which supplies computer equipment and peripherals to the defense establishment; its software systems for utility and energy management; Arbitron, a data service that measures broadcast audiences; and Ticketron, a computerized ticketing business. The company recently announced that Ticketron, with revenues this year expected to reach $100 million, is up for sale. It's likely that other units, perhaps even segments of the computer business, will be on the selling block before long. Robert Price, CDC's president, has said in published reports that certain computer business assets will be sold. He has not identified which ones. He has asserted that the company does not plan to sell more than $150 million worth of the computer businesses. Price was unavailable for comment.

Michael Geran says the company's military computer business, in addition to Arbitron and Ticketron, are the

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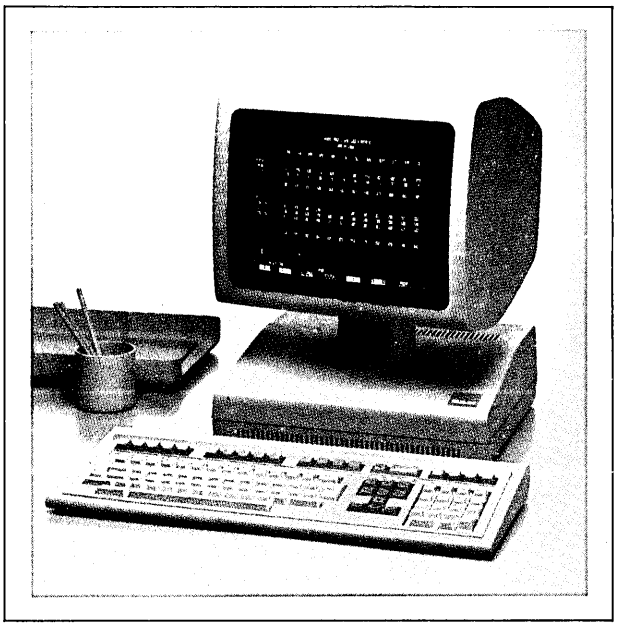

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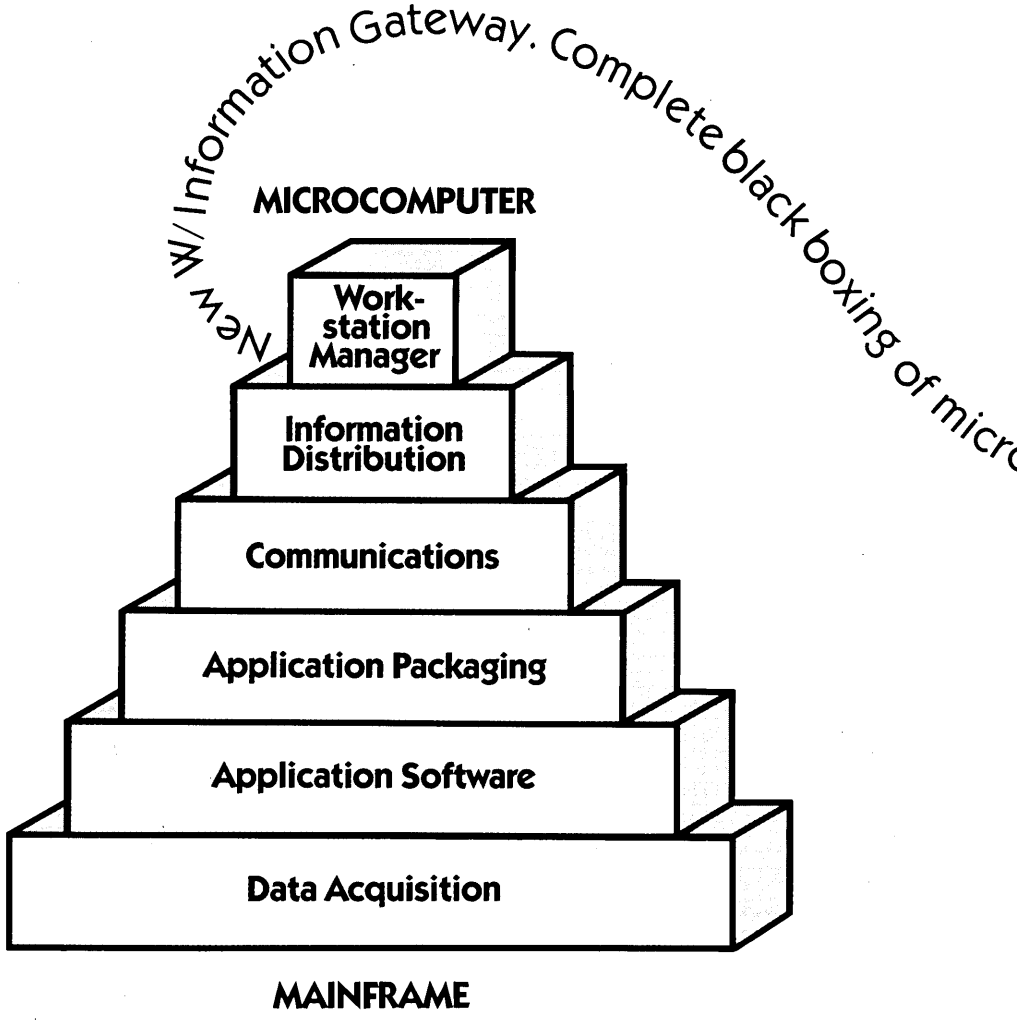

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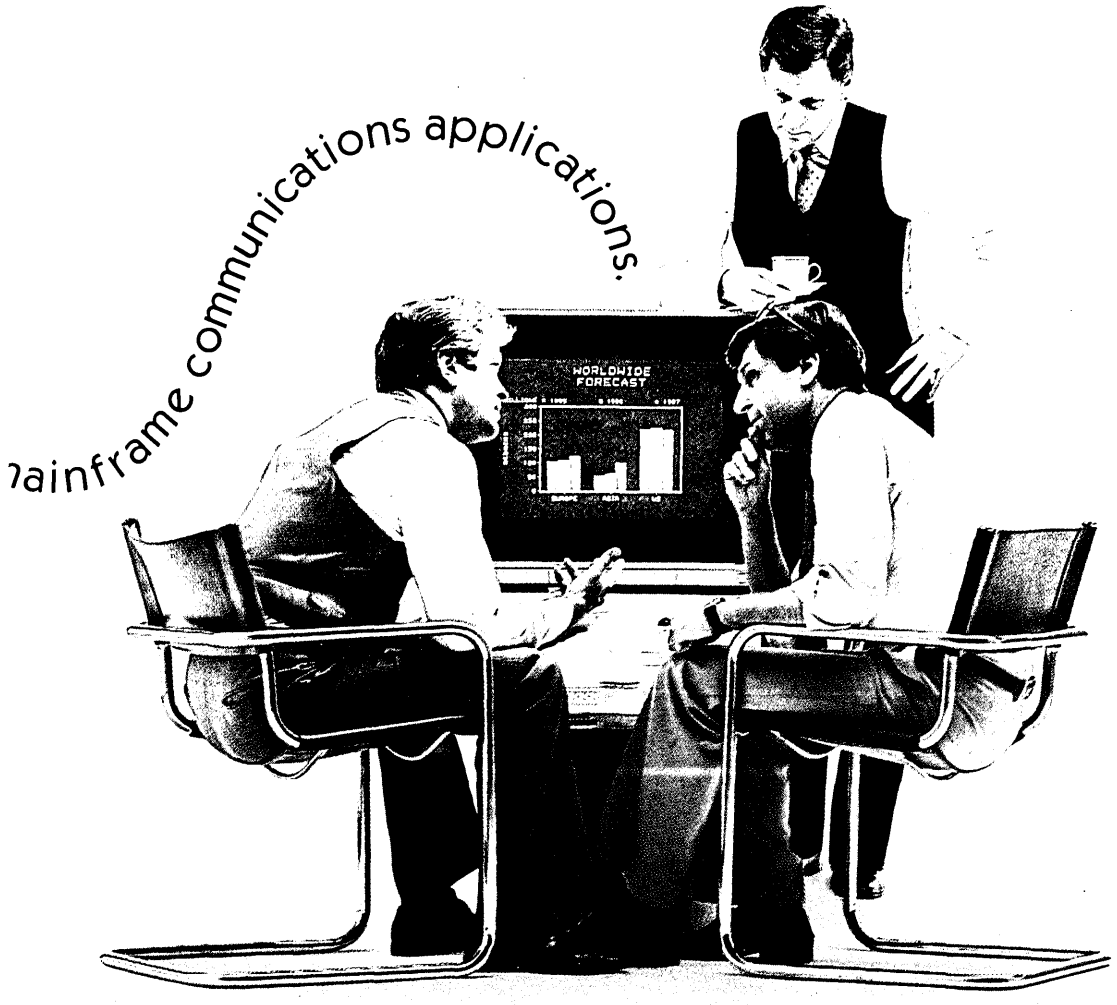

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NEWS IN PERSPECTIVE

company's most marketable assets. In a reversal, CDC says it is no longer looking for outside investors for ETA Systems, the St. Paul-based CDC spin-off that plans to release a new supercomputer in late 1986. CDC had failed to attract investors previously. The company was underwritten by a $40 million equity investment by CDC. CDC estimates that ETA needs another $100 million to develop a product.

CDC may attempt to rid itself of those businesses that are profit barren. The peripherals business, particularly the disk drive business, "turned out to be a great black hole" for CDC, says Geran. "They are probably going to lose $50 million to $100 million," he says. CDC declined to discuss this and other aspects of its financial picture. Whereas the company five years ago owned 50% of the disk drive market, today it is holding on to 29%, according to Geran. Unable to perfect certain technologies for 3½-inch Winchester drives and 33800 drives, CDC nixed these products and finally dropped out of the IBM plug-compatible disk drive business altogether, taking a $70.3 million after-tax charge in 1983.

The profitable segments of CDC's disk drive business include 5¼-inch drives in the 20Mb to 85Mb range, says Larry Perlman, president of the peripheral products company. "We continue to see demand, though not quite as strong, for some of our products that are used in large systems. The weaknesses, which everyone in this business is facing, are in the middle of the line, the 8- and 9-inch products in the 200Mb to 500Mb range.

Perlman says efforts are being made to bring the division out of its slump. Manufacturing facilities have been reduced by about 35%, and the unit's domestic work force has been cut by about 45%. Perlman declined to name which areas of the peripherals division will be sold. "Our business objective is to have a dominant position in the high-capacity and high-performance data storage products market for oems," says Perlman. "We are moving away from end-user products and trying to tear down the product line so it is focused more narrowly on the high-capacity, high-performance market segment." Perlman says the division is planning to release a line of 3½-inch disk drives in early 1987. "We're not going to let a short-term financial problem get in the way of our being a vigorous competitor."

CDC may find it difficult to sell its assets, however. With all three segments of the company's main business in financial trouble, buyers won't exactly be knocking its doors down, analysts point out. "With the state of the market and the severe price cutting going on, I would think that the only ones interested in the peripherals business would be perhaps the Japanese," says George Podrasky Jr., an analyst at Duff and Phelps, Chicago. "And the current management at CDC would be vehemently opposed to such a sale."

Many observers blame CDC chairman Bill Norris for the company's troubles, saying that his penchant for involving the company in unprofitable and diversified projects and his oft-stated commitment to social ventures have taken the company from its former position as a financially strong technological leader to its current troubled state. Others claim that Norris's willingness to take risks is what made the company great in the first place. "He did something different and made money at it, and all he's done for 25 years at CDC has been to try new things," observes a former vice president and 23-year veteran of the company who asked not to be named. "Unfortunately, it hasn't worked out well for him this time. He hasn't come up with a winner to bail him out." ◉

SOFTWARE

PUTTING THE "S" INTO IBM

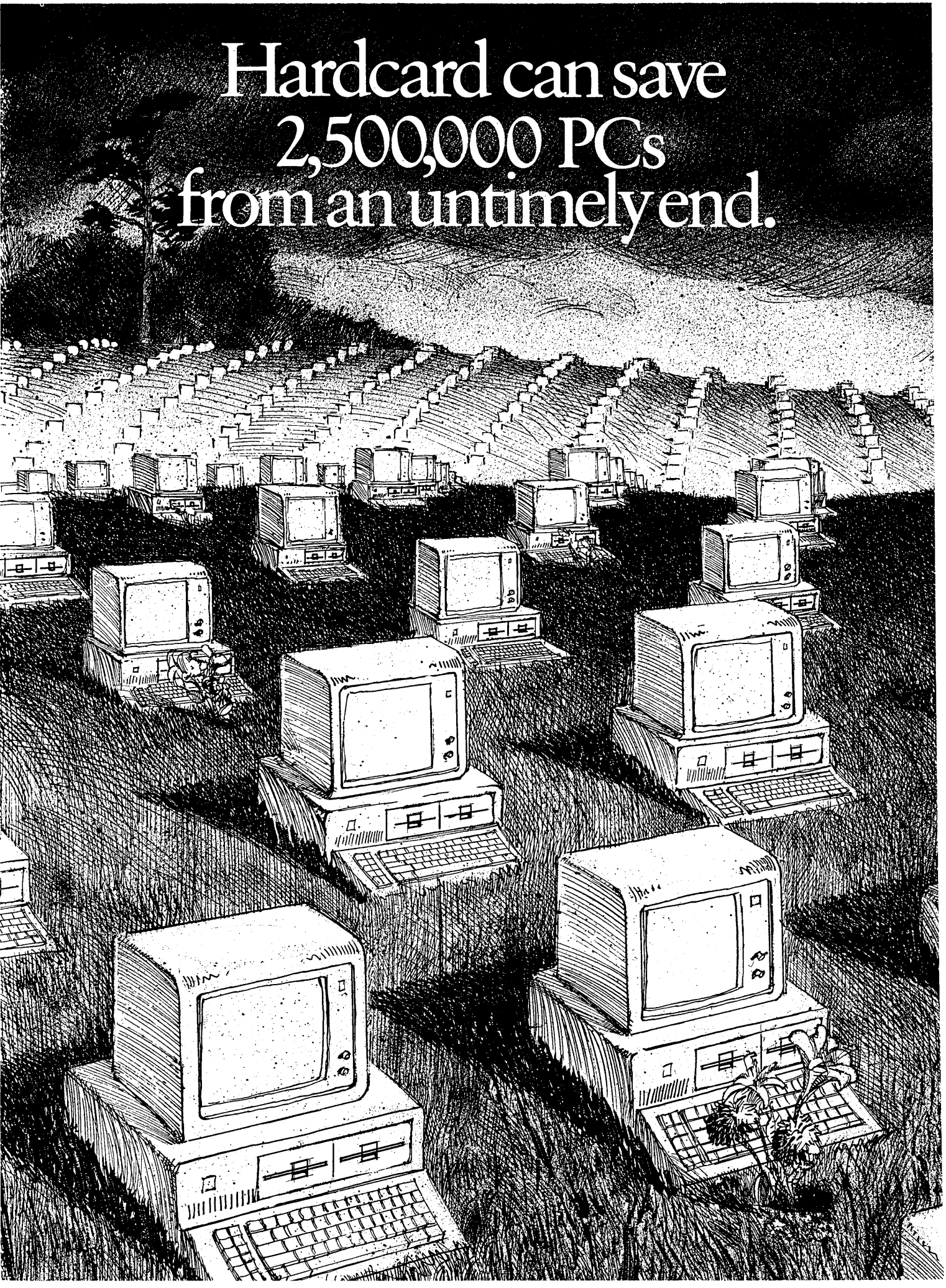
***Nomen est omen.* The name is the destiny, said the Romans. IBM was destined to bring hardware to the world, but is it fated to draw on others for today's most vital commodity—software?**

by R. Emmett Carlyle

IBM is seemingly going against its nature to create its first sales force dedicated solely to marketing software. This organizational change is the first tangible illustration of how important the software business has become to the hardware giant; it also raises the status of software in the eyes of IBM's customers.

"IBM used to give its software away to sell hardware," says John Gosden, vp of technology at the Equitable Life Assurance Society in New York. "Pretty soon it'll be the other way round."

Sooner or later, IBM comes to all businesses, and software is clearly no exception. IBM's newly created IBM Information Services (IIS) software marketing force will become a very aggressive and visible competitor, according to leading independent software companies.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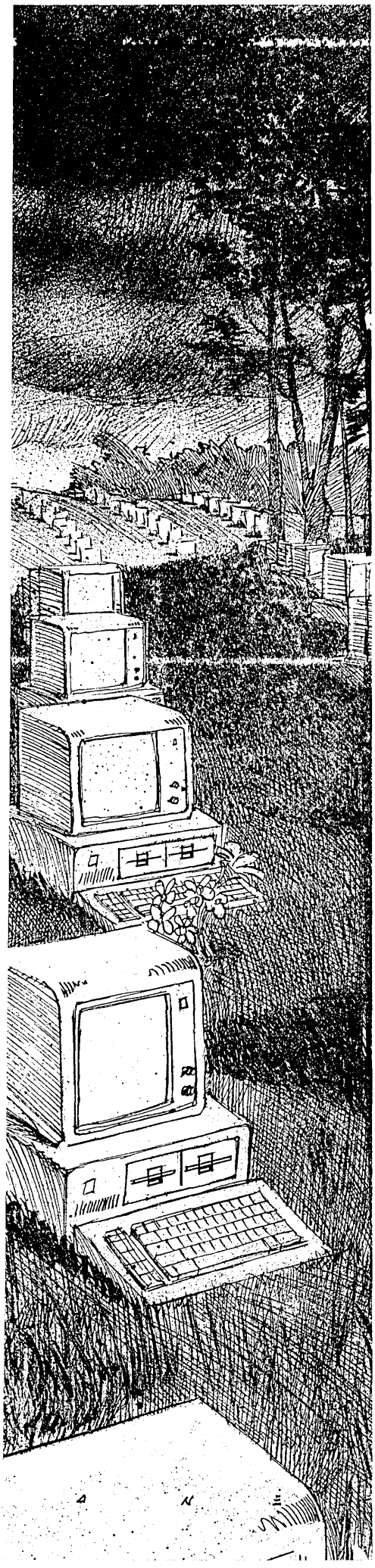

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CIRCLE 30 ON READER CARD

"But it's my bet that IBM will have to draw on the independents for the bulk of its software," says Robert Goldman, president of Cullinet Software of Westwood, Mass., alluding to IBM's mixed track record as a software producer. "The initiative is certain to open more doors for ISVs [independent software vendors] than it closes."

An IBM spokeswoman confirmed that a new IIS software marketing force was now in place in 12 major U.S. cities: Dallas, San Francisco, Philadelphia, Boston, Chicago, Atlanta, Washington, D.C., Detroit, St. Louis, Los Angeles, New York, and Bloomington, Minn. Sources claim that a staff of 80 salespeople has been trained, and that that number will more than double next year. IBM declined comment on the numbers, but did confirm that the new software sales group will draw from the company's portfolio of 2,000 program products, support value-added resellers and dealers (including retail stores), and acquire programs from ISVs.

The new IBM marketing group may have its origins in a 1981 "love-in" that the computer giant hosted for the independents at its White Plains, N.Y., facility. "It was here at this applications software summit that IBM announced that it couldn't provide all the software the industry needed," remembers John Imlay, chairman and ceo of Management Science America in Atlanta, and a DATAMATION advisor. "You might say it was the beginning of the open era."

Late in 1983, IBM created its IIS independent business unit, based in Milford, Conn., to act as an umbrella group for its software thrust. The new software marketing force, as well as a growing number of joint marketing deals with independents, has followed naturally from this.

Sooner or later, IBM comes to all businesses, and software is clearly no exception.

Recent high-level talks between IBM ceo John Akers and ADAPSO, the software industry association, have reaffirmed the corporation's commitment to ISVs, and have resulted in the creation of a standing committee to address IBM's perceived rebundling of software and hardware and the associated threat of source code restrictions.

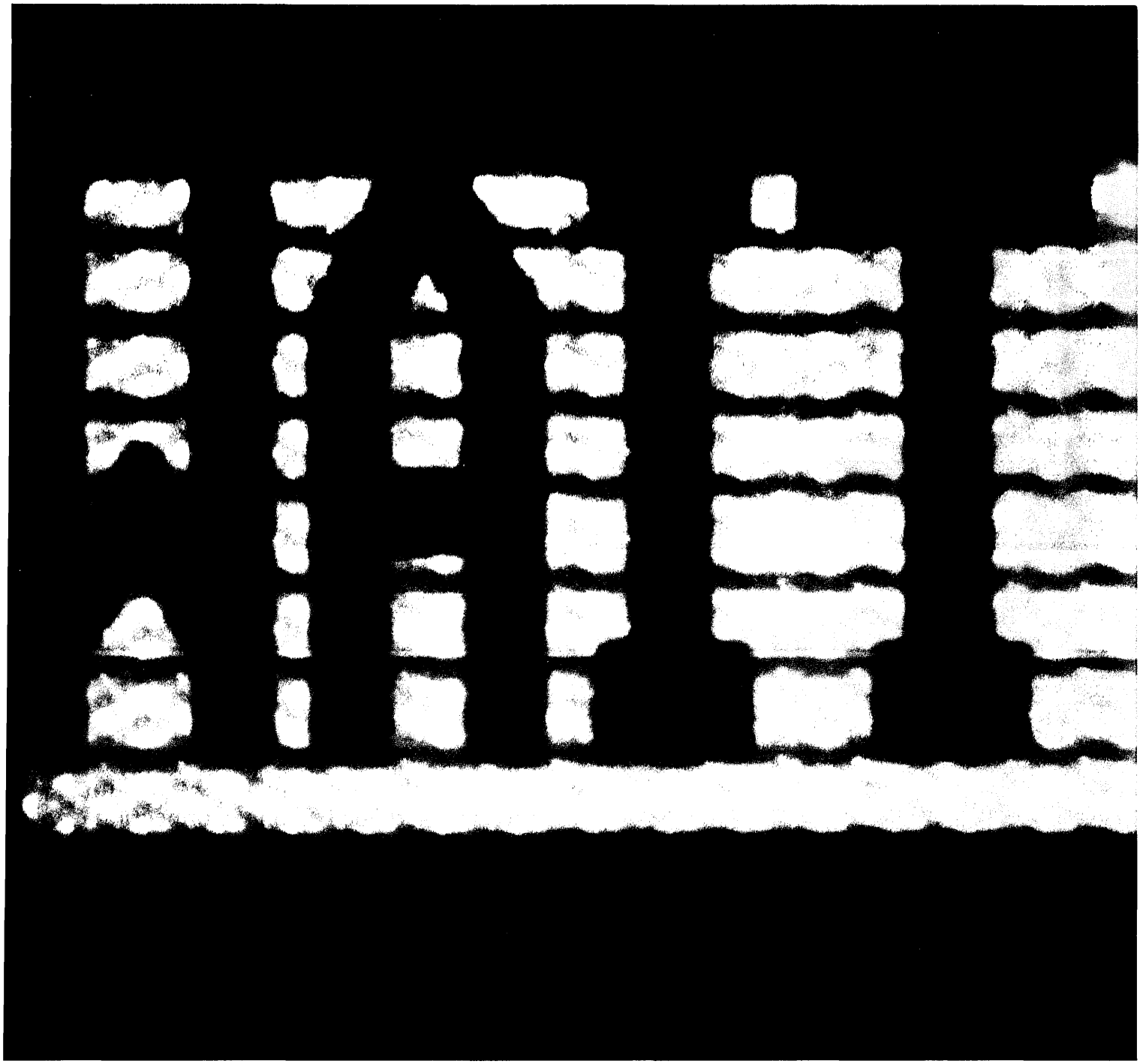
"While IBM's cordiality and openness is encouraging, one shouldn't lose sight of its intent," warns Rick Crandall, head of ADAPSO's long-range planning committee, and ceo of Comshare, Ann Arbor, Mich. "IBM still wants all the business. The question is, how much can it go after all at once?

"IBM is courting the independents because of their value as an alternate distribution channel. Our appeal to IBM is that we are close to the customer and understand the end user's needs."

IBM has told investors about its goal of a 35% compound annual growth rate for its software revenues over the next five years. Last year, the company's software revenues accounted for 7% ($3.2 billion) of total sales. At a 35% rate, revenues would top $20 billion in 1990, about 25% of total sales. And reaping the harvest will be IBM's new software salespeople, who, unlike their colleagues selling hardware, apparently think of IBM purely as a software company.

The new IIS buildup has occurred against the backdrop of IBM's second major reorganization of its marketing group in three years. Diminishing gross margins from hardware and pricing competition from Japan have forced IBM to streamline its sales force yet again to significantly reduce selling, general, and administrative expenses, analysts say.

Analysts expect to see a continuation of the 20% per year decline in hard-



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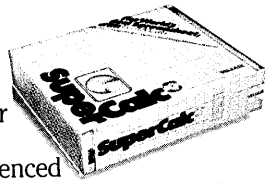

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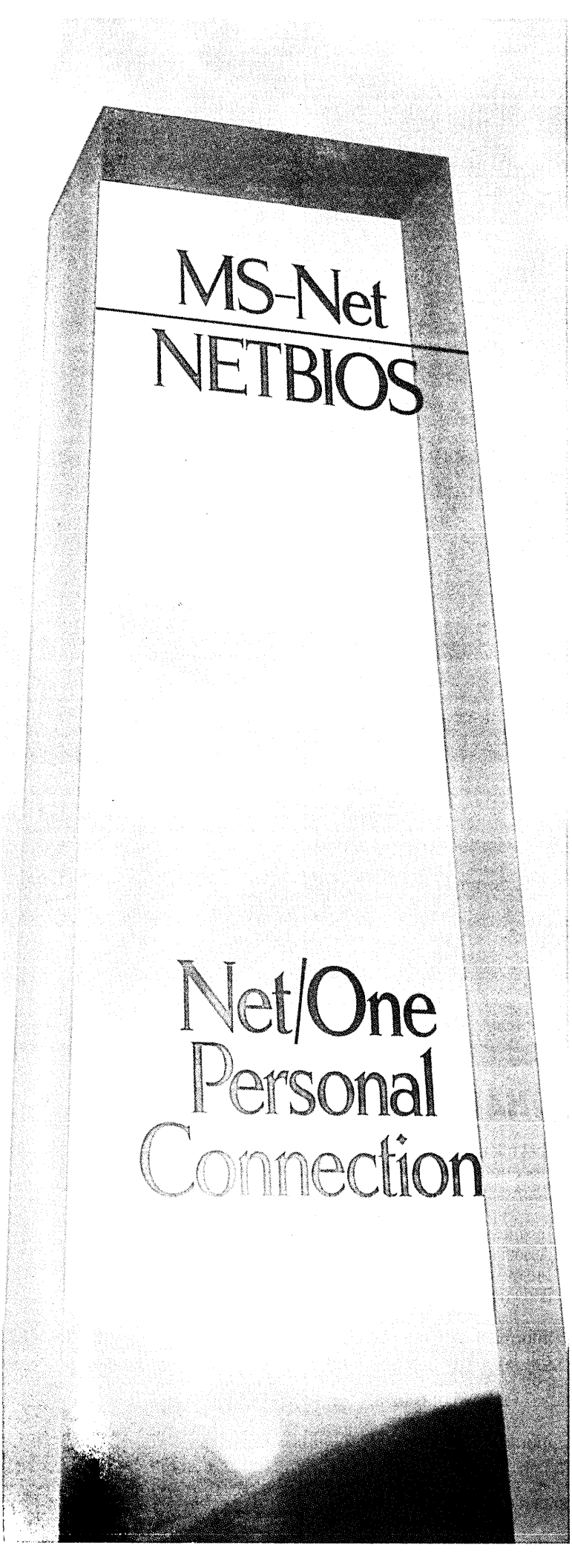

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ware price/performance. But in one product category, at least, prices are actually rising: software.

"Look at IBM's second-quarter figures," says Bob Djurdjevic, editor and publisher of the Phoenix-based newsletter *Annex Computer Report*. "The hardware gross margin [pulled down by increasing PC shipments] was 55%, while software was 70%. Software is now vital to IBM's bottom line."

"IBM still wants all the business. The question is, how much can it go after all at once?"

IBM must succeed in the software business for one other reason, says Djurdjevic, himself a former IBMer and noted expert on the company: "The company's rental business has all but vanished." So it is with a certain passion and urgency that IBM has set about raising its software prices—especially in the area of systems software, where its users are locked in—and begun introducing new programs.

Customer sources claim that IBM's new software, particularly its suite of 31 microcomputer applications programs launched with much fanfare in October of 1984, are not selling as well as the company had hoped. The Personal Decision Series and Business Management Series were rewrites of existing minicomputer and mainframe software, gathered together by IIS. "As well as being hardware hogs," says the information center manager for one large East Coast manufacturing concern, "they lack a sense of closeness to the PC user and a feel for his problems."

IBM wouldn't comment on sales of its micro software, but is known to be working on improved versions of the two families and the TopView windowing package that goes with them.

"No one should be suprised that IBM is having difficulty producing a winning software package," says Cullinet's Goldman. "The company has yet to create a successful mainframe applications package—at least I know of none." IBM has never had a major presence in mainframe-based accounting software, one of the largest and most mature software markets. The company is selling two of its own packages, COPICS and MAPICS, in the other cross-industry application, manufacturing, but users have talked of a wide range of deficiencies and anachronisms in the two products. Notable efforts in vertical areas such as banking and health services seem years away, and will probably be provided by ISVs, say experts.

"Look at IBM's second-quarter figures. The hardware gross margin was 55%, while software was 70%. Software is now vital to IBM's bottom line."

IIS has begun to fill in the blanks in IBM's portfolio with a growing number of joint marketing deals with independents; talk of acquisitions and deals with leading companies is rife, although apparently nothing has yet crystalized.

Even if IBM finds the packages it wants, there still remains the problem of integrating them. "Not only that," says Crandall, "we can get intense about our individual solutions. It's difficult for IBM to get intense over 5,000 packages."

Independents will seek the IBM seal of approval—in part to prevent its being conferred on a competitor—and hope they don't get too dependent on the computer giant.

IBM's course, too, is set. The company's destiny has been to bring hardware to the world since its incorporation in 1923. Now it seems to be the fate of outsiders to put the software, the S, into IBM. ◉

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Boston ..... Oct 15, Nov 12, Dec 11	New Orleans ..... Nov 19	San Antonio ..... Oct 23
Chicago ..... Oct 16, Dec 12	New York City ..... Oct 10, 25, Nov 6, Dec 12	San Diego ..... Nov 7
Cleveland ..... Nov 5	Newport Beach ..... Oct 17	San Francisco ..... Nov 5
Columbus ..... Oct 8	Oklahoma City ..... Nov 7	San Jose ..... Oct 24
Dallas ..... Oct 8, Nov 13	Omaha ..... Oct 24	Seattle ..... Oct 2, Nov 26
Dayton ..... Oct 9	Orlando ..... Oct 15	Syracuse ..... Nov 7
Denver ..... Oct 29, Nov 20	Phoenix ..... Oct 9	Tulsa ..... Oct 29
Detroit ..... Oct 22, Nov 12	Portland ..... Oct 10	Washington ..... Oct 10,24, Nov 7, Dec 10
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DISK DRIVES

FLOPPY FORTUNES FLOUNDER

Tandon's charges of patent violations and its ITC complaint reflect an industry in radical change.

by Charles L. Howe

When it comes to secrecy, aspects of the American computer industry sometimes resemble one of those murky espionage novels by John Le Carré. Victors suddenly become victims. Ideologies seem to count for little, and the heroes and villains tend to resemble one another to a striking degree. In the end, one is left with a mild sense of confusion and, perhaps, a degree of compassion.

So it is, say some, with the recent preliminary patent victory of Tandon Corp., Chatsworth, Calif., over a handful of Japanese double-sided floppy disk drive vendors who have been playing hardball in the U.S. market. So it is, say others, with Tandon's separate and unrelated civil action, which alleges racketeering, industrial espionage, sabotage, and corrupt business practices against defendants that include Format Corp, Century City, Calif.

Tandon's story is uncommon in that the company has gone from rags to riches with a patented product and not merely a variant upon a process, or some minor permutation of a widget. The firm was founded in a garage in Southern California in 1975 by Sirjang Lal "Jugi" Tandon and his wife with $7,000 of their own money. Tandon's idea was to use both sides of relatively cheap floppies for micros, while others were selling far more expensive rigid disk drives. While IBM unsuccessfully grappled with the technology of a two-sided floppy product in 1976, Tandon apparently solved it one year later. In 1977, Tandon filed and two years later was granted U.S. Patent 4,151,573. This patent, claims Tandon, covers all double-sided floppy disks of whatever size and whether half or full height.

At the time the patent was granted, says Tandon's initial August 1984 complaint before the International Trade Commission in Washington, D.C., the firm "was selling 90% of the available U.S. market for floppy disk drive transducers." By the end of last year, that market had been carved up by at least 35 new and mainly Japanese vendors until it resembled the carcass of a Christmas goose. The once wildly successful Tandon was in trouble, and much of that trouble, it was charged, came from people selling product for which they had paid Tandon neither licensing fees nor royalties.

The numbers seem to verify Tandon's claims of being deeply wounded. In the first six months of its 1985 fiscal year, the firm lost $35.3 million. During fiscal 1984, which ended on Sept. 28, 1984, the company earned $29.4 million. Tandon posted a $19.9 million loss for its second quarter ending March 29, and a $35.3 million first-half loss. In 1983, the firm's stock was selling as high as $42.75 per share, but even after the ITC ruling was announced, it was going for less than $6 (see "DATAMATION 100," June 1, p. 127.)

Tandon's initial complaint alleging patent infringement named the Japanese and American subsidiaries of Sony Corp., Teac Corp., and Mitsubishi Electric Corp. Tandon alleged that Sony was in violation of Tandon's patent and was now selling 80% of the 3½-inch double-sided drives in the U.S., while Mitsubishi and Teac had cornered 70% of the 5¼-inch double-sided floppy market. Without admitting any liability, Sony and Teac subsequently settled with Tandon, agreeing to pay unspecified licensing fees and royalties on drives sold in the United States. Tandon also charged Mitsubishi with predatory pricing—deliberately selling its gear for less than it cost to make.

At press time, Mitsubishi denied liability even after the ITC had ruled "there is reason to believe" that the firm may have infringed upon Tandon's patents. Until a final ruling, Mitsubishi is under a temporary exclusion order and will be obliged to pay the government a 25% bond on all disputed floppy product sold in the U.S. If a final ruling is made against Mitsubishi, and if President Reagan signs that ruling—which by statute he must decide on by early next year—Mitsubishi will be permanently barred from selling its double-sided floppy products in the U.S., and its bond will revert to the government.

The once widely successful Tandon was in trouble and much of that came from people selling product for which they had paid no licensing fees or royalties.

Forgetting about Tandon's problems of being undercut for a moment, that firm's vice president was asked if the end user would benefit as the cost per drive keeps going down and oems pass these savings along. "But don't you see," replied Ranjit Sitlanti, "these vendors we have named never made the investment in research and development that Tandon did. It's simply not a level playing field!"

RANJIT SITLANTI, vice president of Tandon Corp.

To further level that field, Tandon recently added a string of 14 names to its ITC patent infringement action. The firms cited are Qume Corp., Philips Peripherals, Tokyo Electric Corp., Epson Corp., Sankyo Seiki Manufacturing Co. Ltd., Canon Ltd., Hitachi Ltd., Victor Co. of Japan, NEC Corp., Okidata Corp., Toshiba Corp., Sumitomo Corp., World Storage Technology, and Y.E. Data. Unless these firms settle up with Tandon, an ITC interim order against them would have the same gravity as the comparable order against Mitsubishi. At press time, none of the 14 had admitted liability. Tandon's lawyers say they would be pleased to quietly settle with all 14, as they did with Sony and Teac, and as they would like to do with Mitsubishi. If no settlement is forthcoming, say the lawyers, all the holdouts will be pursued in separate civil court actions asking for substantial damages.

In a world where vendors can be as tight-lipped as a patriot facing a firing squad, one talked. Gary Beckerman is vice president of operations for Teac in Montebello, Calif., where the company has been selling its floppies in the U.S. for three years. "Basically, the settlement [with Tandon] was fairly clean," he says. "We don't admit anything." Why is Teac, without admitting liability, paying license fees and royalties that neither Tandon nor Beckerman will quantify? "We just decided to settle the case and go on to business," says Beckerman.

How can Teac, as Tandon alleged in its ITC complaint, sell its floppy drive product for less than Tandon, whose substantial operations in Singapore and Bombay are said to produce dirt cheap goods for the oems? "If you look at our drives," responds Beckerman, "I think you will find substantial improvements and substantial manufacturing cost reductions that have taken place over a long period of time." He declines to provide financial data or say to whom his firm is

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selling. Sources say Teac was manufacturing 150,000 drives monthly last year, with 57% of its output going to the U.S. Teac has also been a major maker of recording gear for the past 30 years.

Nobody knows whether Tandon's floppy fortunes will ever fully recover. Some say the money from Teac and Sony will put new life into Tandon. John Girton, a research analyst who is a Tandon watcher for Birr, Wilson, a securities analyst firm in San Francisco, hypothesizes that Tandon will get in aggregate from $12 million to $24 million annually from the two settlements. "The up-front [license fee] money will be very helpful to Tandon," says Girton. "The royalties per drive, however, are probably quite small."

Bob Gaskin, senior industry analyst at San Jose-based Dataquest, says he suspects Mitsubishi will settle up as the ITC matter goes down to the wire. Worldwide, says Gaskin, the 1985 market for 3½-inch double-sided floppy drives is probably worth $38 million at the factory revenue level and $799 million at the 5¼-inch level. When the dust finally settles, says Gaskin, Mitsubishi will still most likely be a major player in this market, along with Teac, Sony, and Tandon. "Right now, the floppy suppliers worldwide are cutting themselves to pieces competing in the market as they lower prices," says Gaskin, providing his rationale for a Mitsubishi settlement before the market gets even more competitive. Like other analysts, Gaskin doubts that any of these vendors is making any money on its floppy product.

How competitive—and how desperate—that market is getting is demonstrated by the Format affair, which, if Tandon's complaint is to be believed, has all the elements of high dudgeon, low intrigue, and a smattering of opera bouffe. In a separate lawsuit recently filed in Los Angeles by Tandon against Format Corp., that outfit, five of its principals, Gold Star-Tele Electric Company Ltd. (GST) of Seoul, South Korea, and a group of other, yet unidentified companies and/or individuals, are charged with trying to do to Tandon roughly what Kim Philby did to Britain's Secret Intelligence Service.

Tandon also charged Mitsubishi with predatory pricing—deliberately selling its gear for less than it cost to make.

Tandon alleges that two of its former employees, among others, stole the corporation's technical family jewels, set up Format, and got an advance payment of $500,000 from GST to begin a competing operation, with gear to be made in South Korea by GST and then sold in the U.S.

The scheme came a bizarre cropper, says Tandon lawyer Thomas Bourke. One of the former Tandon employees is a gentleman named Philip Tomasi, who has admitted that he was so piqued at Tandon that he did an adroit—and, until recently, undetected—spot of sabotage before leaving. Then, after a falling-out of some sort with his new cronies at Format, Tomasi laid waste to his new company's manufacturing area with a ball peen hammer. This apparently led outraged Format officials to file a $5 million damage suit charging Tomasi with the civil equivalent to running amok.

Tomasi then blandly told the whole story to a local newspaper; somebody at Tandon read it, and Tandon abruptly realized what had happened. "Without the help of Tomasi," says Tandon lawyer James Hamilton,"we would have never known what had been done to us." Tomasi has not been named as a defendant inasmuch as he is said to be cooperating in the investigation. Format apparently ran into trouble after selling

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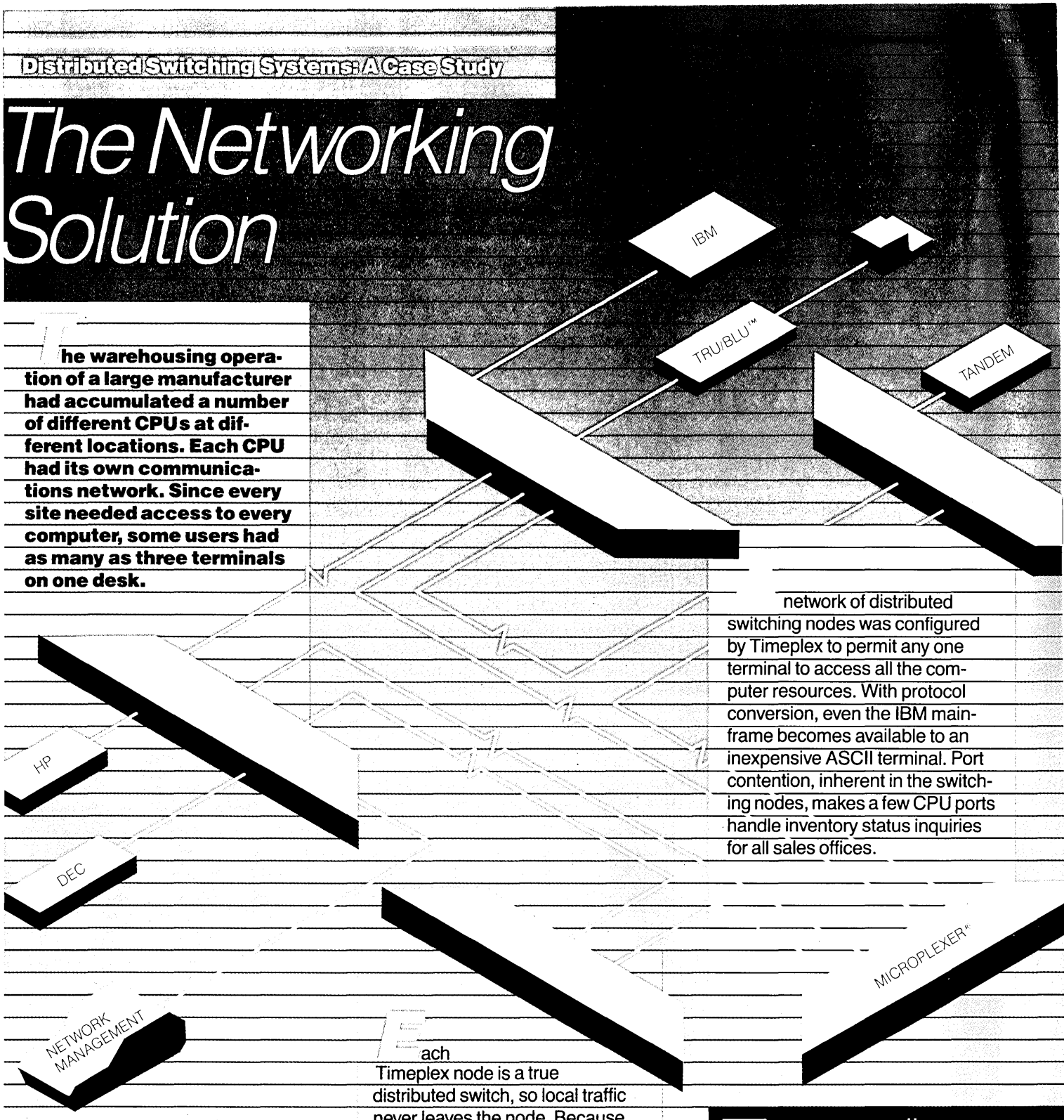

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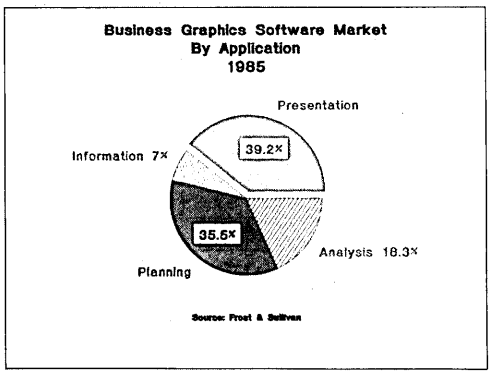

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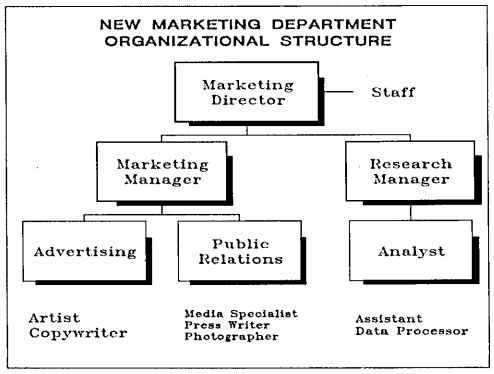

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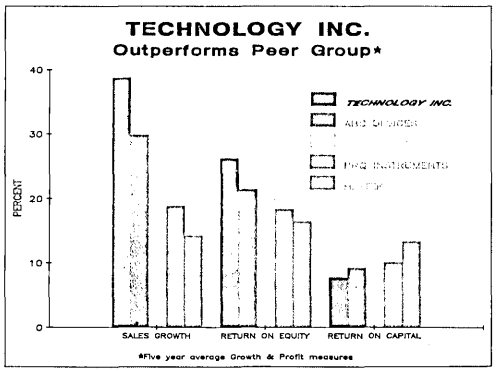

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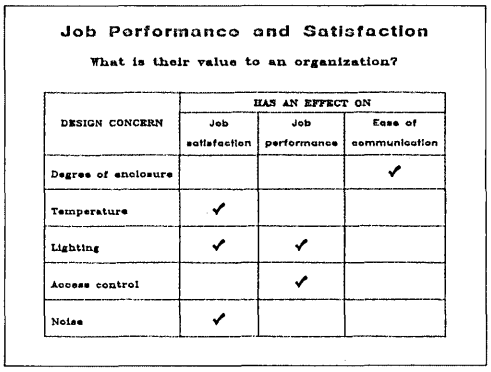

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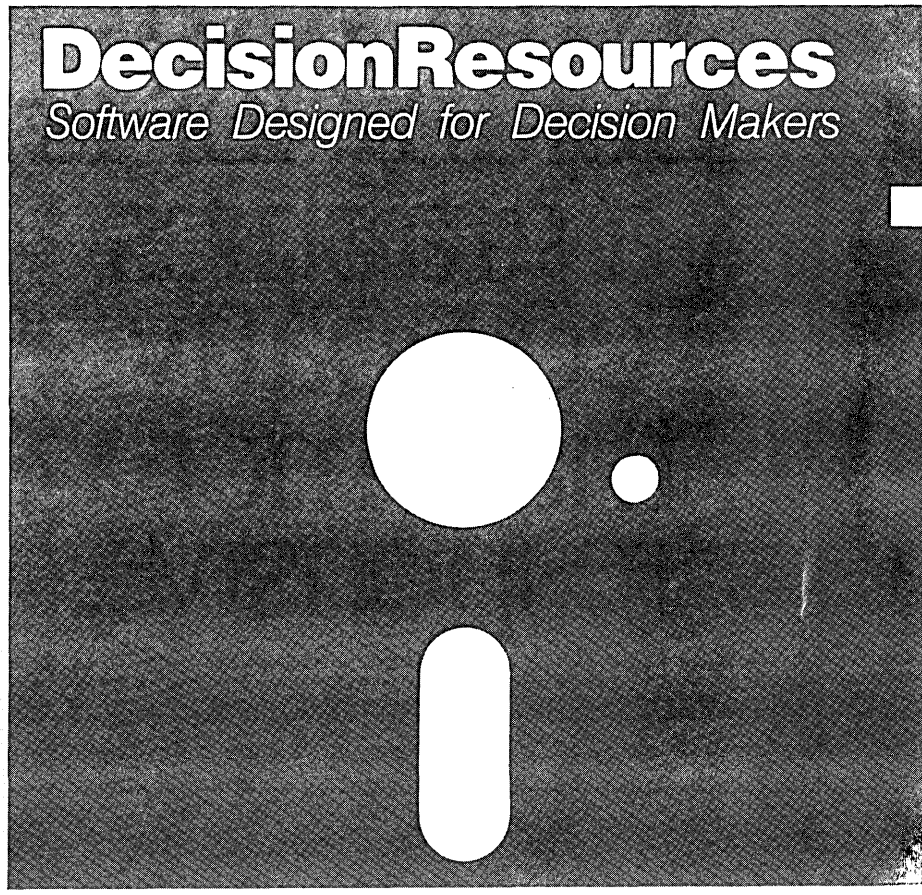

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little or no product, and its attorney is asking leave to sever himself from the case on grounds that he has not been paid. Format could not be reached.

In a cross-complaint, attorneys for GST have denied all material allegations, charging Tandon and Tomasi with improprieties that include violating provisions of the California Business and Professions Code, and Tandon with distributing press releases and otherwise handling press inquiries "for the purpose of damaging and destroying GST's reputation for honesty and fair dealing." As legal lagniappe, GST's lawyers are asking the court to order Tandon to pay damages "greatly in excess of $100 million."

The Format affair, if Tandon's complaint is to be believed, has all the elements of high dudgeon, low intrigue, and a smattering of opera bouffe.

Lawyers for Tandon say they would be pleased to settle with GST out of court. If not, the trial could get under way as early as next June and it promises to be a wowser.

Quite apart from its floppy fandangos, Tandon has been too narrowly perceived by some as being a Johnny One-Note operation, says vp Sitlani. Indeed, some 80% of its total 1984 revenues of $399 million came from its assorted two-sided floppy products. Since then, of course, Tandon licensees like Shugart have gone under as competition turned the market into a maelstrom. Sitlani says that this major floppy orientation of Tandon's is rapidly changing.

Guessing that total 1985 revenues will come to around $300 million, Sitlani says he would like them divided now and in the future equally among floppies, Winchester disk product, and systems and subsystems. The company has just signed a deal worth perhaps $2 million monthly with Sears, Roebuck & Co.

Tandon's lucrative business with IBM is on the uptick. "In March," says Sitlani, "we had discussions with them and they determined that they needed more of our 5¼-inch TM 100-2 product."

Likewise, the firm is selling to Tandy Corp. private label PC XT-compatible micros marketed as the HD 1200.

"We are certainly optimistic about 1986," says Sitlani. "We also believe that there are entirely too many players in the floppy disk drive market." John Le Carré's legendary George Smiley or his archrival, Karla, could not have put it more succinctly. ◉

COMPUTERS

CPU NABS SUSPECT

But computer-based fingerprint identification systems are spreading out beyond law enforcement.

by Irene Fuerst

California's new NEC Automated Fingerprint Identification System, known as CAL-ID, took only three minutes to identify Richard Ramirez as the alleged Night Stalker, the serial murderer who terrified Californians last summer. Twelve hours after law enforcement officials published his name and photograph, a group of East Los Angeles residents surrounded Ramirez and the police took him into custody.

The Night Stalker brought nationwide attention to fingerprint computers, but the Ramirez case may only be the tip of a computerized identification iceberg.

Fingerprint systems, which read, digitize, store, compare, and retrieve fingerprints, are the rage among law enforcement agencies, but other uses for the systems are being found as well. Vendors are readying products targeted at anyone whose pocket or purse holds a key, credit card, or automatic teller machine card.

New technologies are behind much of the activity. The most modern fingerprint systems, such as California's, rely on optical disks, which have the edge over magnetic media in storage density as well as cost.

NEC Information Systems, Boxborough, Mass., and De La Rue Printrak Inc., Anaheim, Calif., are apparently among the few vendors of these systems. Both companies have patented elements of their machines, such as the algorithms used to recognize fingerprints, and both are seeking to leverage their technology into related markets.

"We're currently looking at the use of biometrics," says Richard E. Snyder, president and chief executive of Printrak. He says the company is about to launch a biometrics-based access control device that relies on fingerprints, but he declined to state an introduction date. Snyder says, however, it can be used for either physical access or data access.

Already in use at the Anaheim facility, the "personal identity verification" device—called PIV 2000 internally at Printrak—uses the same type of algo-

rithms as the law enforcement systems but implements a different scanning device to read prints directly off a finger, says Ron Hilderbrand, the company's director of operations.

"Biometrics is keyed to the electronics industry," says Snyder. If current cost-chopping trends continue, he adds, biometric technology will replace ordinary house or automobile keys with devices that verify the identities of fingerprints, signatures, voices, corneas, or palm prints, among other things. "The market appears to be opening up," says Snyder, who is eyeing 300 to 400 potential sites for fingerprint computer installation over the next 10 to 15 years.

NEC, too, is looking to both the physical and data access businesses. "That's explosive," says Joe Phillips, NEC's national program director for fingerprint systems. In Japan, he notes, NEC is very strong in banking, an area that lends itself to biometric verification with ATMs and credit cards. A highly accurate, reliable, marketable, and cheap identication method is not available now, says Phillips. "That's holding the market back," he contends. "We've got the technology. It's got to be put it to work."

While Phillips says his division's overall market is the identification market, right now he's concentrating on law enforcement. Fingerprint computers are currently providing about 10% or 15% of the yearly revenues of NEC Information Systems, he estimates. In five years, Phillips expects to be looking at a $500 million market in fingerprint computers alone. He foresees that within two years, 40% of the country's fingerprints will be earmarked for automation, if not already on-line.

Right now there are only about 30 fingerprint computers in use throughout the world, ranging from small municipal

The Night Stalker brought nationwide attention to fingerprint computers.

or county systems storing only a few thousand records to those storing the prints of several million people. But this number is expected to increase dramatically as the market matures and diversifies.

Automated fingerprint systems range in price from under $1 million to tens of millions of dollars. "Typically, in industrialized countries . . . about 10% of the population has been arrested for some felony [and fingerprinted]," says Printrak's Snyder. He contends it is now cost-effective for a law enforcement agency with 50,000 to 100,000 criminals on record to have its own system.

A computer for a city with a population of 500,000 to 1 million costs $1 million to $2 million, which factors out to about 10 cents a finger, or $1 a record.

Other companies outside the U.S. are also in the fingerprint-identification business. "The fingerprint business is very international," explains Paul Redstone, who works on fingerprint systems for British company Logica in London.

Redstone looks after Logica's main operational site for these systems at London's police headquarters in New Scotland Yard. The Logica system, installed in March last year to keep criminals' fingerprint records, comprises twin Prime 750s, four Floating Point Systems AP 120Bs, and 12 imaging workstations from British company Gresham Lion. The system runs about 1,000 tasks a day, or some 1 million comparisons.

Logica's initial system is not the final solution for London's Metropolitan Police Force, however. Another British company, Smiths Associates, is now developing a system based on the transputer chip technology launched by British semiconductor company Inmos in October. Using an array of 16 transputers, each capable of 10MIPS, Smiths is designing a system for encoding the print images.

Logica has installed another system with the Dutch police force and is talking hard to forces in the U.S., where it sees a large potential market.

North America is also the focus of much attention at French company Morpho Système. Backed by the French government, Morpho has installed a number

Within two years, 40% of the country's fingerprints will be earmarked for automation, if not already on-line.

of systems for the French Ministry of the Interior and in the old French colonies of Senegal and Cameroon.

Like Logica, Morpho hopes to cash in on the growing U.S. demand for fingerprint systems, but is hamstrung by the lack of any demonstrable system in the U.S. To solve the problem, Morpho has been looking for a U.S. partner and expects to announce a deal with an American company soon.

Printrak is the industry's old-timer. Rockwell International started the fingerprint business in the late 1960s in the course of doing research for the FBI, went commercial in the late '70s, and sold out to De La Rue in 1981. Printrak now has systems in 22 U.S. locations and in six outside the U.S.

NEWS IN PERSPECTIVE

NEC's fingerprint computer got its start in the mid-'70s, after the company cooperated with the Japanese government to develop a system for that country's national police force. After six years of research and development, NEC decided to sell the system worldwide in 1982. Besides systems in Tokyo, San Francisco, and Sacramento, Calif., NEC has one in Anchorage, Ala., and one in Calgary, Canada.

Cops love the machines. Without an automated system most latent prints—those scarcely visible fingerprints taken from a crime scene—are good only for positive identification after a suspect is caught, or when the search can be narrowed down to only a few candidates.

Ramirez was identified on a single print. "They call that a cold make. You have no suspects."

"The national average for getting a latent print identified is 1%," says Tom Wilson, director of information policy programs for Sacramento's Search Group Inc., a nonprofit criminal justice information management clearinghouse.

Ramirez was identified on a single print. "They call that a cold make. You have no suspects," says Wilson. "There are a lot of police departments that have told me they don't even try to get a cold make. . . .They pretty much just throw the print away."

"It's a hell of a tool," says Sergeant Tom McCready, of the San Jose police department, about the latent print unit's 2½-year-old Printrak system.

San Francisco's $2.3 million NEC system, the first one the Japanese company installed on this continent, has been the object of curiosity of visitors from around the world; too many visitors, in fact, for San Francisco Inspector of Police Bob Dagitz's liking. Nonetheless, Dagitz says San Francisco's computer "has proved a very successful aid in law enforcement." The system's first hit, in February 1984, was reportedly a murderer one of the inspectors had been waiting six years to nail.

Users of the NEC and Printrak systems in law enforcement agencies say both have their good points. "People who've benchmarked systems say NEC has a more accurate system," says Peggy James, latent print examiner in the Houston police department, which has had a fingerprint system since 1979. The NEC system is not as operator friendly, though. With a Printrak, she says, it is less work to enter latents into a system.

What Printrak allegedly loses in accuracy it apparently makes up for in speed. On a latent search, Printrak's matchers beaver away at over 2,000 matches a second each, while NEC's matchers are comparative sluggards at 650 matches per second each, claims Printrak's Hilderbrand.

Printrak utilizes both pipeline and parallel processing. The company's engineers cook up their own matchers and image processors, but the rest of the system is based on DEC components.

The NEC system's matchers (coprocessor subsystems) are specially built pipeline processors that process at about the speed of a Cray 2. NEC claims that with a new proprietary search and recognition algorithm, the amount of information the system uses in a search is greater than the competition's.

"The technical answer is that we're 99.99% accurate," says Phillips of NEC, adding that a system such as CAL-ID's will run at about 98% or 99% accuracy. "Human error is what causes the percent loss," he says."It's a difficult question. There are all kinds of fingers to be searched," from perfect 10s to smeared latents. Printrak also claims 99%-plus accuracy for its system.

Optical technology, meanwhile, has put the spurs to the market, reflecting the fact that magnetic media is close to its theoretical density limit. "Such a massive amount of data is required [for fingerprint systems] . . . you'd be filling up a whole building with magnetic disks," adds Johnson. Adding a billion-byte optical drive to a system costs only about $15,000, says Phillips, about half the price of a magnetic unit.

The CAL-ID system does have magnetic disks. They store mathematically encoded minutia data, which are what the computer uses for matching. Minutiae are details of the ridges that make up a print, such as the number of ridges within a loop or whorl, whether a ridge dead-ends or splits, and so on. After the system makes its choices, usually an ordered list of candidates, a trained fingerprint analyst compares the optically stored images of them to the suspect print. "The final decision is up to an expert," says Phillips.

The human element will always be a crucial factor in fingerprint identification, but the spread of computer technology in this field promises to speed up an often time-critical process. That's good news for law enforcement agencies as well as for the public at large.

In reference to the Ramirez case, Tony Doonan, project manager of the CAL-ID program, comments, "Had a system like this been in operation two years ago, conceivably 16 to 20 people would still be alive." ◉

Also contributing to this article were European managing editor Paul Tate and Paris correspondent James Etheridge.

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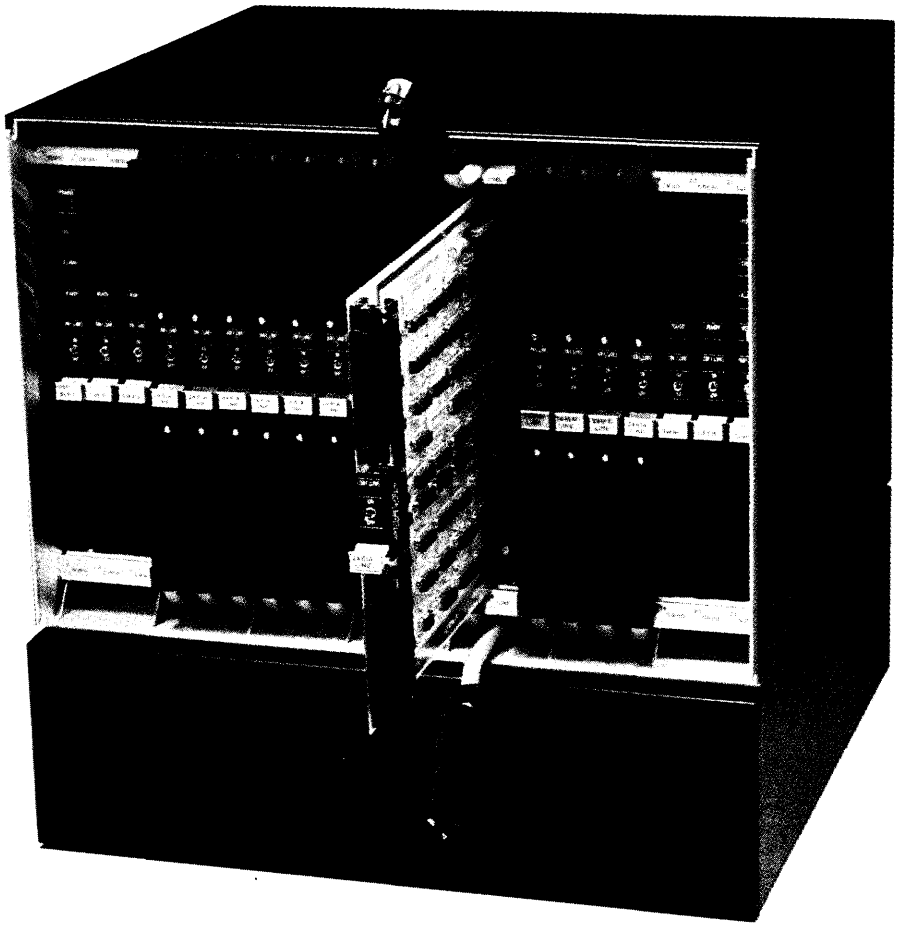

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BENCHMARKS

ENCORE'S WOES PILE UP: Encore Computer, Wellesley, Mass., has followed the loss of its biggest potential customer with the resignation of one of its three celebrated cofounders. Henry Burkhardt, the troubled startup's chief financial officer, was described by insiders as a "victim of the high-pressure work environment" that resulted from a nine-month delay in shipping the company's first computer. His resignation over "management differences" follows Sperry's decision to pull out of an oem contract (see Benchmarks, Oct. 1, p. 57). Sperry was supposedly planning to use Encore's Multimax machine as the core of a push into the Unix market. Gordon Bell, designer of the Encore Continuum system line, is not expected by associates to remain with the company in a full-time capacity. "He'll stay as an advisor and consultant, but he wants the freedom to pursue other interests," says one source. The third cofounder, Ken Fisher, is now firmly at the helm and believed to be talking with two potential oems to fill the void left by Sperry. A company spokesman said Encore's $25 million in cash and manufacturing capacity would see it through the end of FY '86 (next October).

IBM VECTORIZES: As expected, IBM pushed into the vector processor market that serves engineers and scientists performing computationally intensive jobs. With the new "vector facility" added, IBM said, 3090/Sierra processors can execute many scientific programs as much as three times faster than a standard 3090. Using emitter-coupled logic (ECL) chips mounted on three thermoconduction modules, the pipeline machine can perform arithmetic on as many as 128 vector elements at a time; its cycle speed is 18.5nsecs, giving a peak rate of 108 million arithmetic operations a second when its pipeline is primed, a spokesman stated. The company described the new product as an extension to the standard Sierra processor, not an attached processor like the discontinued IBM 3838 seismic array processor, which adds 171 new instructions to the basic cpu's repertoire. With proper programming, the vector and scalar processor portions of a 3090 can be made to operate in parallel, thereby providing further boosts in overall throughput. New software to help users take advantage of the vector facility under the MVS and VM/HPO operating systems includes a new version of the ESSL subroutines library, a FORTRAN conversion facility that helps translate from level 66 to level 77, a simulator to adapt programs written for the 3838, enhanced versions of VS FORTRAN and assembler H, and the CAEDS engineering package. A handful of independent engineering software developers have said they will adapt their programs to the vector box, IBM claimed. The new hardware can be installed at the factory or as a field upgrade. IBM noted that its marketing agreement with Floating Point Systems of Beaverton, Ore., is still in place. Deliveries of the vector facility have begun to selected users under IBM's "early support program," a spokesman said, but regular deliveries are slated for next February. Purchase price is $370,000 for the first facility and $230,000 for additional ones. Production is to take place in Poughkeepsie, N.Y., Montpellier, France, and Yasu, Japan.

Meanwhile, IBM said it has moved the first delivery date for the quad-processor 3090-400, originally slated for mid-1987, to the fourth quarter of 1986. It also boosted the maximum main memory on the 4361 models 4 and 5 to 16MB from 12MB; added a 370 version of its DisplayWrite text processing software; added two new releases of the PROFS office system, which interface with DISOSS; and came out with a document management facility for 4300 processors.

FINALLY TO TRIAL: Trial of a lawsuit over alleged infringement of a patent held by Boole & Babbage Co., Sunnyvale, Calif., for monitoring the performance of IBM operating systems was set for Feb. 3, 1986. Attempts by Candle Corp., Los Angeles, to have the patent invalidated were turned down in federal court there. The two firms compete in the performance measurement software market for IBM and compatible computers. The action was filed by Boole & Babbage in 1982, shortly after it asked Candle to stop selling a software package or to obtain a license from Boole. Candle countersued to have the patent invalidated, claiming, among other things, that the information in the invention was in use more than a year before the patent was filed in 1970. Judge Pamela Rymer turned down Candle's request.

IBM ADDS NETWORK(S): IBM Japan said it has agreed to enter into a joint venture with Nippon Telegraph & Telephone Corp. (NTT) to build a value-added network in Japan. The venture would take advantage of that country's changing telecommunications market, which, under pressure from the U.S., opened its doors to foreign suppliers recently. Competing with several other networks proposed by Japanese and U.S. firms, the IBM-NTT net would be IBM's third in that country. It has already begun working on a teleprocessing network with Mitsubishi as well as one for which it will be sole operator. Meanwhile, IBM Europe's chief executive, Kaspar Cassini, said in Paris that IBM is still gung ho about setting up a teleprocessing network in the U.K. IBM had earlier proposed setting up a network called Jove in a joint venture with British Telecom, but the British government blocked it as anticompetitive. Cassini told Reuters that he was "quite convinced that we will offer value-added services in the U.K.," but he was not sure if it would be with a partner or alone. Britain has recently revamped its own telecommunications regulations, which may leave more room for IBM, whose large market share in European nations is disturbing to many local competitors and their governments, to get its way after all.

APOLLO HICCUPS: Facing an impending introduction by IBM of its Quicksilver technical workstation, Apollo Computer Inc., Chelmsford, Mass., reported an $18 million loss for its third quarter and laid off 300 workers. The workstation company has grown quickly in its five-year history, but the industry slowdown, a change in its own product line, and reports that IBM will soon enter its market have dampened sales. The company recently came out with a new product line based on the Motorola 68020 chip, which replaces the 68010-based line and caused Apollo to take a $14 million inventory write-down. Another $4 million loss was attributed to a slump in sales to major oem customers such as Mentor Graphics, Calma Co., and Auto-trol.

EARLY DASD: Storage Technology, Louisville, Colo., said it will deliver dual-capacity, 3380-compatible disk drives in the second quarter of 1986, six months ahead of schedule. The financially troubled company said its choice of thin-film media helped improve the delivery schedule, which was disclosed two months after IBM began shipments of its own 3380E disk drives three months ahead of its schedule. In an approach similar to IBM's product, the StorageTek 8380E will boost track density to 1,400 tracks per inch from about 800tpi. StorageTek had been about a year late in shipping the original 8380 drive early last year.

JOBS SUED: The saga of Steve Jobs, cofounder and former chairman of Apple Computer, continued with the company suing the 30-year-old entrepreneur for allegedly shirking his fiduciary duties and scheming to lure away key Apple employees. Jobs has hired five engineers from Apple in an attempt to develop what is thought to be a high-performance workstation for the higher education market. Apple has charged that the new machine, details of which are still sketchy, would use Apple's proprietary technology. ◉

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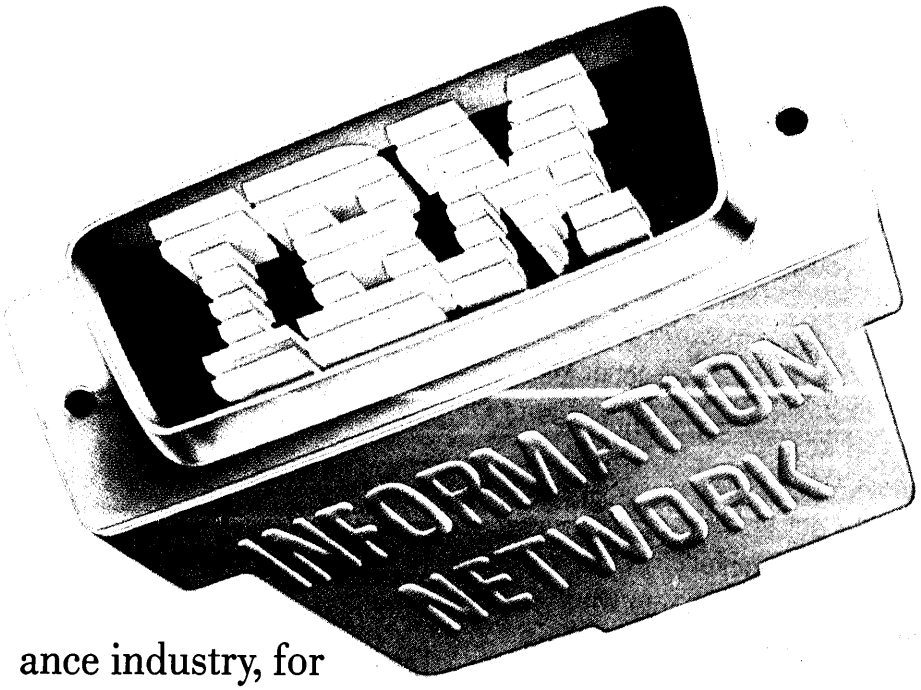

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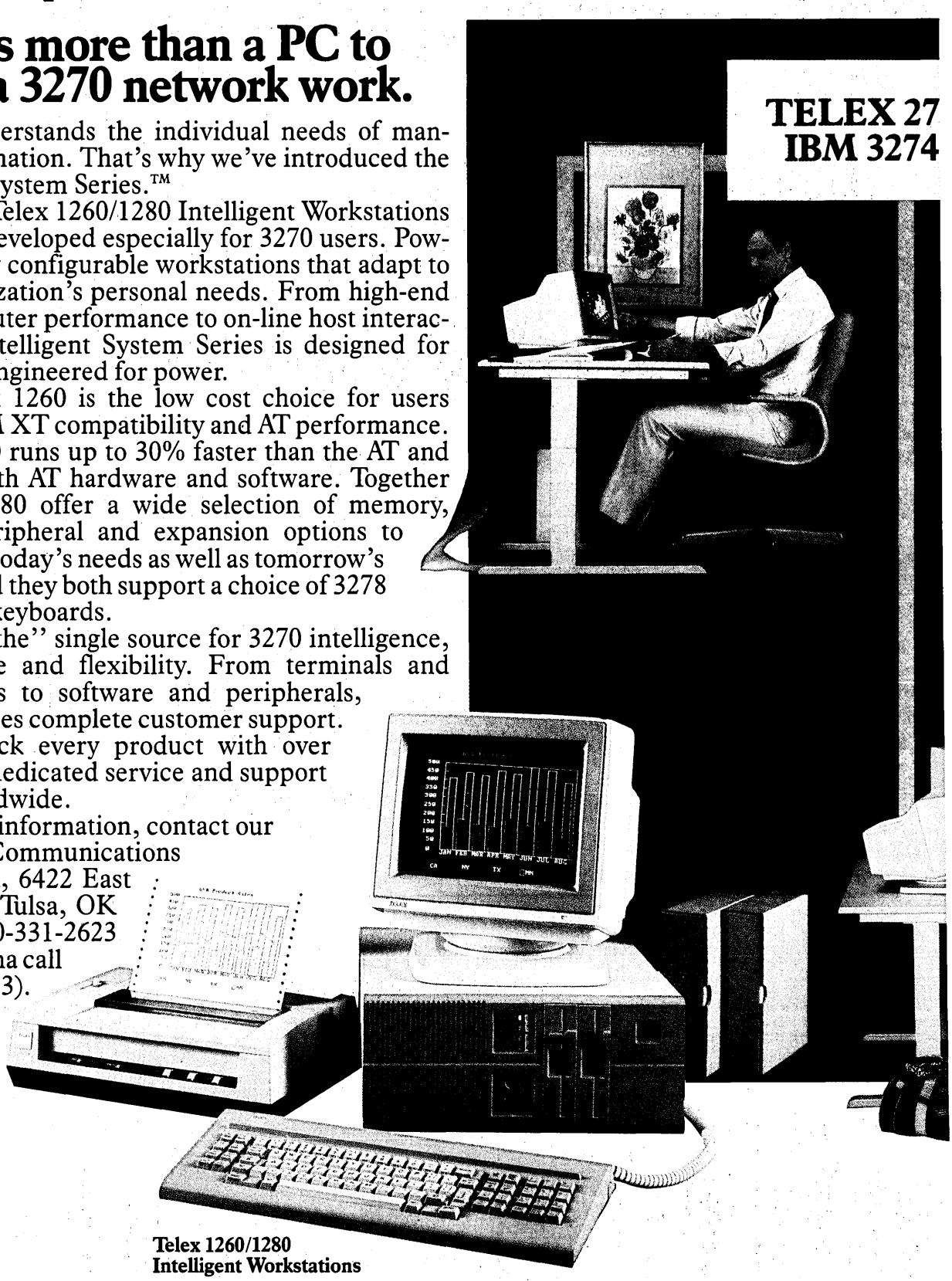

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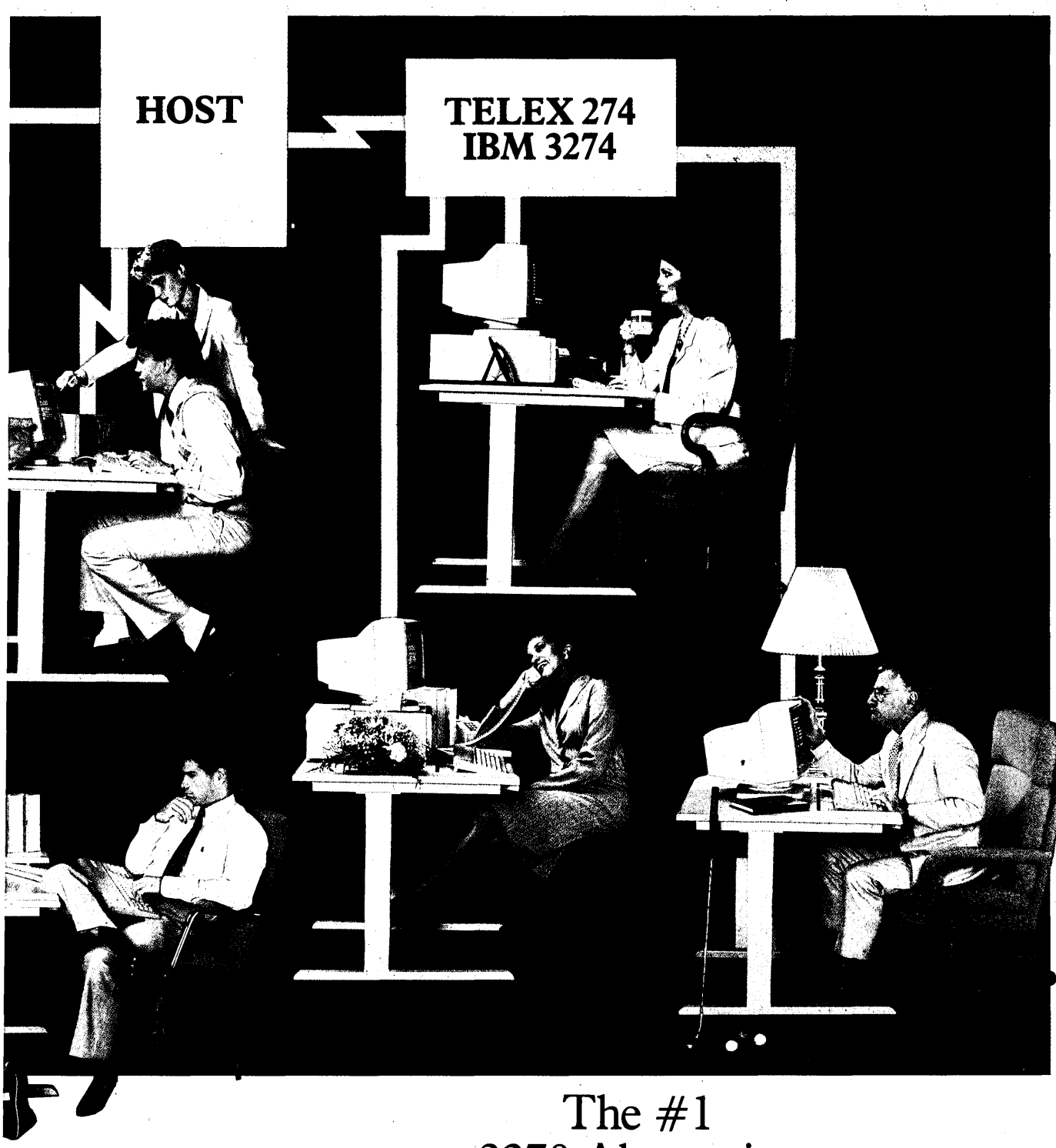

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Overly creative users are putting data to uses for which they were never intended. The results can be disastrous.

ON THIN ICE: MICROS AND DATA INTEGRITY

by Irene S. Nesbit

Information is a vital component of business. Users know this, and are acquiring an increasing number of tools with which to access information. Data processing departments are busier than ever—generating reports, building databases, distributing data. Yet there is a growing problem. There are virtually no checks on the ways in which data are used. The data may be right or they may be wrong, but they are put to use immediately.

As the technicians and developers of the data, it has become our responsibility to ensure that the data are accurate and correct. The users do not take responsibility for data integrity. They leave it to MIS.

Once it was rather simple to make sure the information was correct. In an installation where I worked in the early '70s, we could be certain that every report going out of the department was correct by having Charlie, the chief accountant, review it. We ran biweekly accounting and budget allocation systems in batch. After each report was printed, we would personally deliver it to Charlie.

Charlie would stop everything and immediately review the reports. He would look at each page, focusing his eyes on various figures and totals, sometimes checking something on his calculator. Then, with an important pause, he would pronounce the report "okay for distribution." Or he would suddenly stand up, point to something on the report and say, "No, it is not right." Then we would try to understand the problem by checking the input, the run processes, or the algorithms.

Today we are no longer in a batch world, with central controls and central management. Data are collected and distributed everywhere. Users want data downloaded, uploaded, and networked. They want data on their pcs and on their 3278s. They want data to share, to analyze, and to reanalyze. Data are now used online and disseminated almost as soon as they're collected. Information originally intended for the treasurer's office is now used by the capital planners; information that feeds the general ledger has been downloaded to pcs everywhere. And there are no Charlies to ensure data integrity.

Are there other experienced, responsible professionals who feel responsible for checking the data? Perhaps, but not as many as are needed. More typical is the financial executive who sends out month-end reports without any review. "If they're wrong," he says, "someone will holler." True—but they scream at MIS.

We need to exert new controls and develop new methodologies for the distribution of data. As the technology provides users with greater ability to share data, we must invent new procedures and methods to ensure the integrity of that data.

We have new types of users accessing and sharing data in a variety of new and different ways. To make this process work right we need to take a closer look at how data are being used—both correctly and incorrectly. If we can develop a more comprehensive understanding of the uses of data, perhaps we can then establish the institutional controls that will make data sharing work.

We can start by identifying five categories of data usage that signal trouble:

- multiple purposes,
- mixed time frames,
- big categories/small analysis,
- misunderstood definitions, and
- corporate data vs. private data.

If we can be alert to these uses, we may be able to develop more effective systems and procedures.

MAKING IT ALL WORK

1. *Multiple purposes.* Today's user wants to massage data in creative ways, and one of the forms that creativity takes is the attempt to use the same data for different purposes. This is risky business. Information collected for one purpose seldom suits another, dissimilar purpose. Critical data elements may be missing.

For example, a bank was attempting to get information on the profitability of its branches. The financial analysts decided that analysis of the customer information file was the best way to get the numbers. Each customer and each account for the customer (loan, IRA, savings, CDs, etc.) was coded with a branch code. After analyzing these data on pcs they were able to derive branch profitability by summing up activity by branch.

Some time after the analysis was complete, a bank officer informed the analysts that their numbers were wrong. Customers move around and change branches frequently. The customer file was always updated with their current branch. If a customer moved and began banking at the West Side branch instead of the East Side branch, the code in his file was changed to reflect his new home branch. The profitability of a branch had little to do with the branch code in the customer database. To calculate branch profitability, the analysts would need to use information reflecting the branch that originated the customer's loan, CD, or whatever. Used in its original purpose, the data were correct; if you need to know the number of customers in a branch, the information is there. For the new purpose, however, the data were incomplete and inaccurate.

Creative marketing types seem to do this frequently. They will use information from sales of one product to cast sales projections for a different product. The first data set is correct, but sales for one product do not necessarily function as accurate projections for the second product.

Information rarely serves multiple purposes. It cannot be used across the board for various reporting objectives. The purpose must be well defined, and then the data must be well understood. If the purpose and the data match, the answers will be correct.

2. *Mixed time frames.* Information that is timely for one purpose may not be timely for another. The "accounting close" concept does not always coincide with other accounting or reporting periods. Marketing departments often work on a different time frame from finance departments. Also, inventory is often accounted for on a different calendar from the tax people's.

Accountants like the books to be

ILLUSTRATION BY ANDREA BARUFFI

Information rarely serves multiple purposes; it cannot be used across the board.

neat. So, some companies even work on a 13-month year. Or, there is a fiscal year that ends Sept. 30. That is fine for accountants, but people work—and want information—on other, different time periods.

It is important to develop a concept of timeliness and time relative to data. For example, many organizations have reported problems in accounting for inventory. Inventory information needs to be rigorously tied to time periods. The systems that track inventory work on time cycles that may be different from the way the company tracks profit. If inventory is maintained on a month-to-month basis and the profit calculation is based on a fiscal year, there may be a timing imbalance.

Sales departments generally have sales reports that work on time scales totally different from those the accountants use. Projecting and calculating profits may require manipulation of revenue with respect to time. Persons using the profit data must know the ground rules that were employed. If not, everyone using the data will come up with different figures. This has happened. Not long ago, a financial executive with an international consumer goods company found he had four different consolidated P&L statements because four analysts had applied revenue and expense across different time periods.

CHARGING BACK IS AFFECTED

Chargeback systems are usually affected by varying time schedules. Costs may be collected on an accounting cycle and then charged back on some other time frame. A cost analyst working with chargeback data on a pc may not recognize the way in which the data change because of the change in time cycles. The analyst may believe that a department is being charged too much when the number is actually correct. It appears wrong because of the manipulation from a fiscal calendar to a regular year. The other common dilemma associated with allocation or chargeback systems is understanding what goes into the system and on what date. If a charge to a department is not reflected until three months after it was accrued, the charge will undoubtedly be debated. Users need to know when information is booked.

There are also data that change over time. Until about 1980, television ratings data always contained a code as to whether or not the viewer had color tv. Now that same code indicates whether the viewer subscribes to cable (a color tv is assumed). An analyst trying to track the number of cable homes was not aware of this, and produced a report that was quite wrong.

Time is an important variable with respect to data. Data processing people are accustomed to dating reports and even data sources. Now we may need to think about time in more detail. Each data element has an origin in point of time. There are also broader concepts to consider with respect to time. Varying schedules and time periods have an impact on data. As files are shared, extracted, and pulled apart, their original time frame becomes critically important to maintaining the integrity of the data.

3. *Big categories/small analysis.* Information may be aggregated in such a way that useful data, though present, are not explicit. Users are easily confused by this. They realize a category is composed of many groups; it appears to be possible to break out one group and analyze it, but it usually isn't.

For example, in analyzing an organization's computing costs, the capital costs are usually easy to identify and categorize. But, if the organization has a rule allowing all purchases of $10,000 or less to be expensed, certain costs cannot be broken out or analyzed. The rule is satisfactory with respect to reporting expensed costs. However, if pcs are expensed it will be impossible to identify the amount spent on pcs within that general category of "expensed costs." And then the analysis of the company's computing costs will be omitting an important cost element.

Systems analysts, when designing databases and systems, work hard to place data in categories that seem reasonable. It is only a year or two later, when an unanticipated use of the data is required, that these categories become unworkable.

A banking institution found this to be true. An analyst was attempting to determine the number and dollar amount of IRAs the bank had sold over the last year. Its general ledger had two accounts that contained IRAs, one for IRAs that earned less than 10% and one for IRAs that were to earn more. Each category, however, also contained other bank products that earned 10%, and it was impossible to subtract the IRAs from this umbrella total. The general ledger accounts were set up that way because, at the time, the focus was on interest rates and not the products themselves. Times changed and individual products became the focus. The officers were interested in the number of IRAs and not the interest rate volume. Too bad—the bank would be forced to continue to look at the interest rate.

The category was too big. Most likely the bank had good systems analysts, and the users were once asked if they would ever need to look at individual product data. They probably said no, that all they would ever be interested in was interest rate totals. Shortsighted users—but the bank officers were blaming MIS for not being able to get the data to them.

DATA MUST BE DEFINED

4. *Misunderstood definitions.* Data, even data in integrated data dictionaries, are often not fully explained. A full definition requires descriptions of the sources of the information and explanations of the processes that affect the data. In addition, we must document the exceptions, valid ranges, arithmetic, and logical operations and codes. Social scientists use "code books" to describe their data. These books are comprehensive write-ups on each data element collected. They describe each type of answer that may be possible on a survey. And the descriptions are complete—from the format of the data to their use and relationship to other elements.

Everyone can understand a social security number because the definition is widely accepted and standard. The format of the number is always xxx-xx-xxxx. Furthermore, this format is unique. The social security number is never confused with some other identification number. Everybody knows what it is.

Not all data elements are as intuitively obvious as the SSN. In fact, there are systems where no one seems to understand the numbers. We once developed a market projection model that made substantial use of weighted numbers and statistical procedures. Each month the users would call with questions. Because they could not immediately understand the output, their first reaction was that the reports were wrong. The users could never remember how missing data fields were handled. The reports were unclear as to which numbers were whole and which were percentages. There were further questions about the way the quarterly data were summed and categorized. It was not obvious how to interpret the report.

Why can't users read the reports they have helped to design? Decisions made in design meetings are quickly forgotten. I know of an application that reports on sales trends. No one can ever remember what triggers a trend category change. Does it change when a product is dropped or does it change after a certain number of months? Actually, in this system it is neither—the user has control over which category is carried through on the reports.

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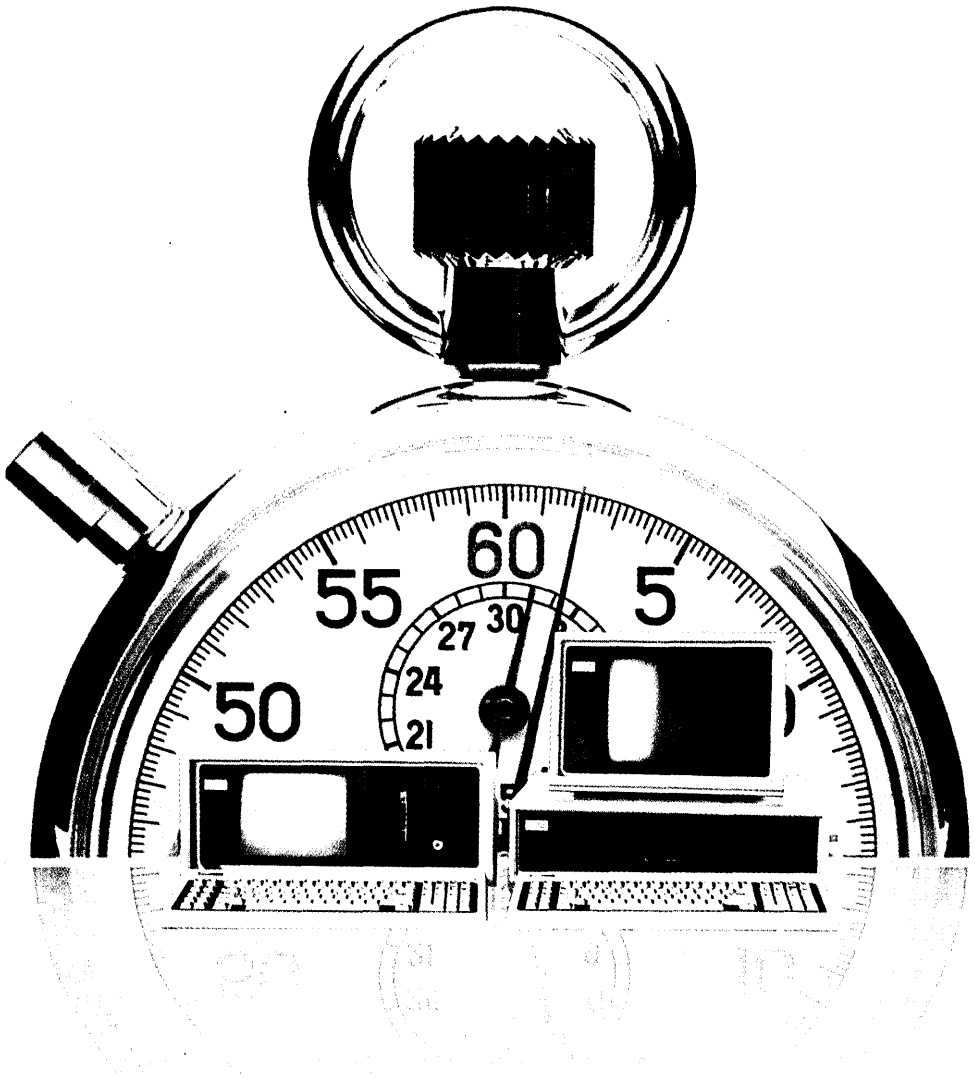

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Not all data elements are as intuitively obvious as the social security number.

around. There is little likelihood that users will remember the meaning, source, calculations, or processes applied to a piece of data. If the data element isn't immediately obvious—like SSN—users will have a difficult time comprehending its full meaning.

5. *Corporate data vs. private data.* There are data that belong to a company and there are data that belong to a person. If the two are confused, a troublesome situation can arise.

A brokerage house was maintaining margin accounts on a central mainframe. This file contained the daily dollar amount on a margin account that each customer was eligible for. The brokers found it cumbersome and time-consuming to use the mainframe to check margin accounts. So all the brokers began keeping the margin accounts for their individual customer accounts on pcs. A couple of customers got wise. They realized they could double or triple the amounts they could use by opening up second or third margin accounts with different brokers in the company. Why not? The pc files were never combined or checked. Moreover, the brokers were sloppy and forgetful about reporting the daily margin changes or additions to the mainframe system. This problem was uncovered during the audit—and only because customers began to default on margin account payments. Clearly, margin accounts in a brokerage house need to be maintained in a central version. These are corporate, not private, data.

TRW Credit is an example of a company that provides a "corporate" data service. Prior to the establishment of TRW Credit, service companies had no way of instantly checking your credit purchases across several creditors. Now, they simply call TRW Credit and receive an assessment of your credit-worthiness for that day. Every company has information that is key to running the business and needs to be centrally maintained. It is critical to define the databases that fall into this category.

CAN SOMETHING BE DONE?

Those are five problem categories; there are probably others. There is an extraordinary amount of data being collected, distributed, and shared. The issues associated with this usage are complex and wide-ranging. Can we do anything about it?

First we have to recognize that existing controls are insufficient. Stamping time and date and source of the data will not solve the problem. If the data are wrong, knowing the source may assist in tracing a problem, but it does not ensure that the data are accurate in the first place. And, if the user of the information does not see that the data are incorrect, the problem won't surface until later, when it might grow into a catastrophe.

It would be nice to think that within the database administration function MIS could impose sufficient controls and checks to ensure that data are correct no matter what happens to them or where they go. That appears to be unrealistic, however. The DBA function is no longer enough. It helps and is still necessary but, as the flow of data increases, MIS managers are losing control over what users do with information. Placing complete responsibility for the data in the area of the DBA doesn't work. The DBA does not know the data in the same way as the professional responsible for the information. We need people who can look at the information and know, from professional experience and knowledge, that the information is right and fit to be distributed.

The solutions will be as comprehensive and as broad as the usage problems themselves. The controls must begin in the planning and design phase. We need to incorporate the need for shared data into our existing methodologies for developing systems. Each phase of systems design and implementation needs to be enhanced to address the data-usage issues.

During the functional requirements and design phase we can include analytic tasks that will examine the data requirements relative to

- time,
- functions and purpose,
- secondary analysis possibilities, and
- corporate vs. private usage.

With greater understanding of the potential future uses of the information, we may be able to achieve more satisfactory systems implementation.

Within the technical design and implementation phases, it may be possible to design the databases to include indentifiers that will support data sharing. Storage is inexpensive. It may now be practical to add multiple identifiers to data elements in ways that were too cumbersome or expensive in the past.

For example, we could add many identifiers relative to time, ownership, and function. Data that are linked to time, such as inventory data, might have several time identifiers—the date the inventory element was counted, the source (and time of the source) of the data element, the time it expires, and any other factors that can be included that will fully define the timing aspects of the data element. Inventory is a moving target.

Data identifiers might also include warning codes, signaling that a particular data group cannot be disaggregated. Or they could include other codes warning about limited functions or constraints on secondary analysis. As users try to analyze more and more data, they need to know the analytic capability of the data. If a category cannot be broken out it should be clearly labeled as such. In addition, we need to identify corporate data that cannot be shared or distributed for private use.

Within the database itself, we can probably do a great deal to provide controls and information that will let users know what they can or cannot do with data.

FINAL PHASE MODIFIED

The final phases of system development can be modified as well. System documentation, training, and acceptance can all include modules to satisfy data-sharing requirements. We may need to change our entire thinking about documentation and place significant effort in "code books." Data are becoming a commodity—used and reused. If a code book accompanies the information, the user will have instructions for correct use—if the definitions for the data are complete and understandable.

Perhaps each user needs to be given a checklist that will provide guidelines for the use of data. The checklist may prompt more careful thinking in the use of information. It might include specific rules—such as "do not use the inventory file in a time frame other than calendar year."

User education, particularly for users at professional levels, should include sessions on data usage. We teach clerks how to operate systems and we give management an overview of system functions. Now, it may be time to have classes on the data associated with an application. We need to help users understand the function or purpose of a particular data set. They also need to know that using the data for some other objective may be risky.

These are not definitive answers. Once we fully understand the issues, more complete solutions may be forthcoming. Each organization has unique data and users. Each organization's solutions may vary. But, within the accepted system development methodologies, we can incorporate new analysis processes and techniques that will help to address the issues raised here. If we don't, we are likely to find ourselves adrift in a sea of meaningless data.◉

Irene S. Nesbit is president of Nesbit Systems Inc., Princeton, N.J., and a member of the DATAMATION advisory board.

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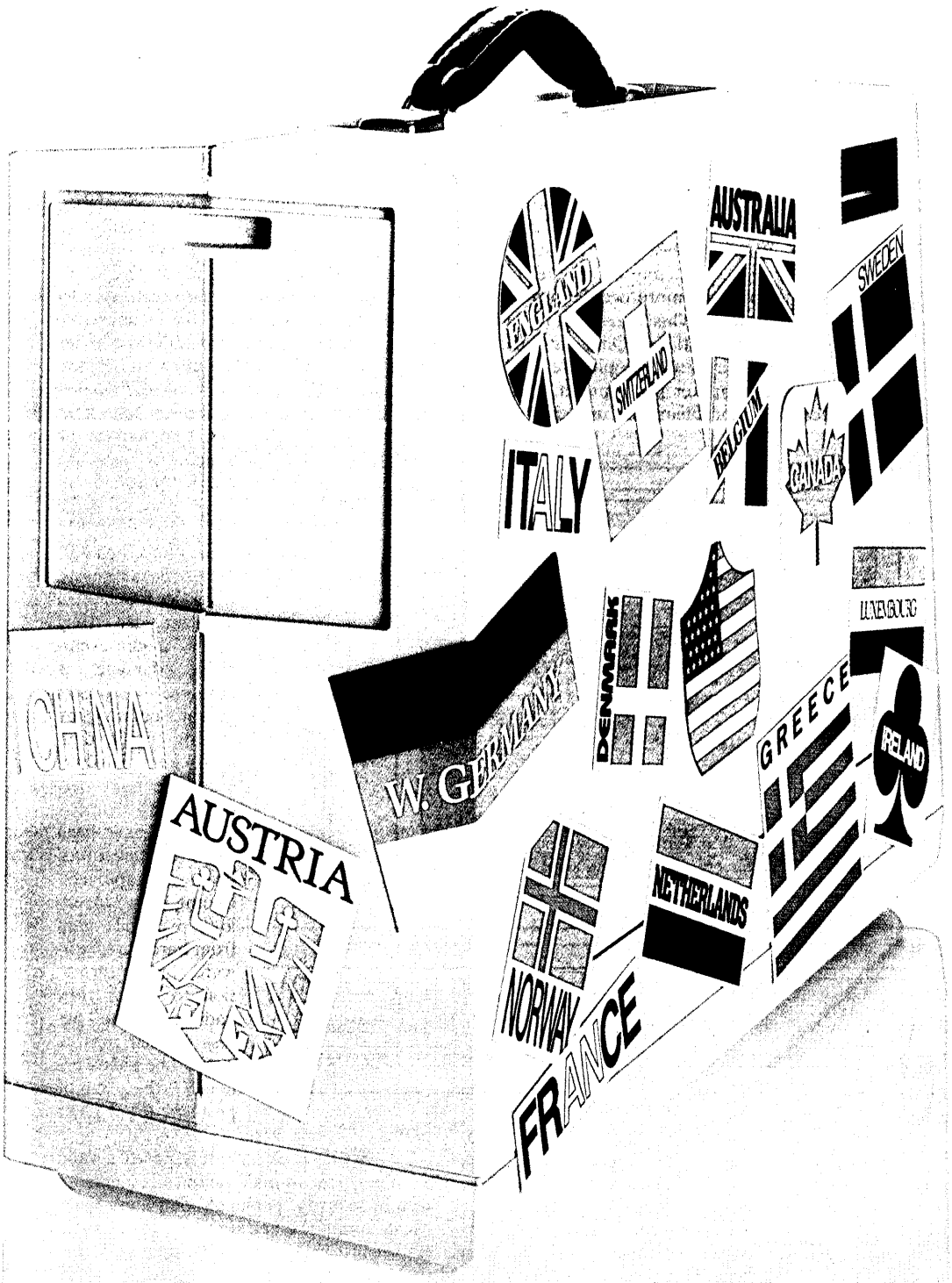

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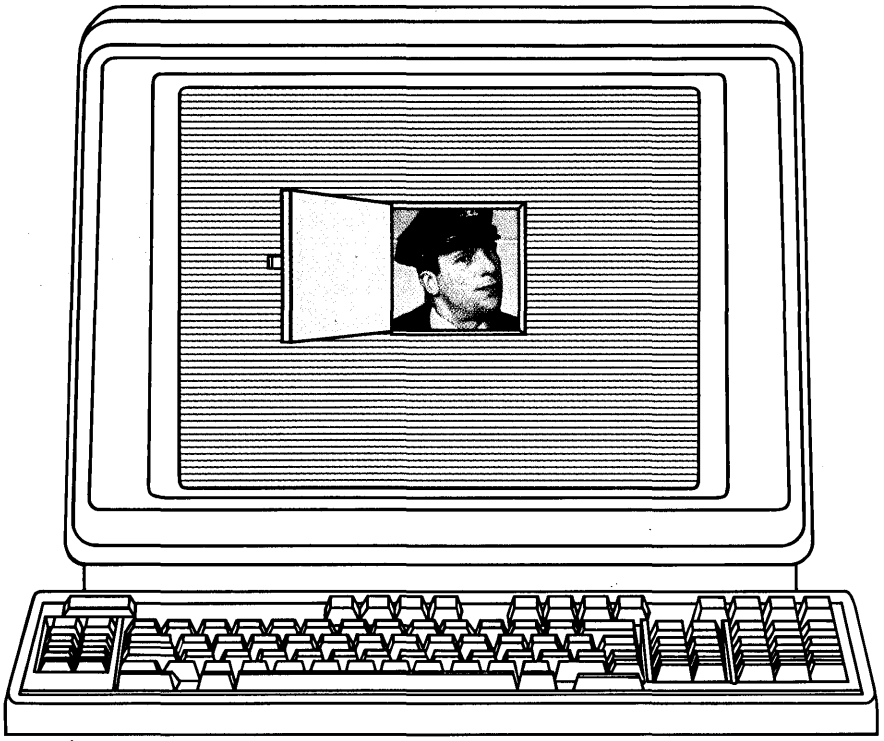
In this world full of small machines, maintaining data and system security has become a new challenge.

PC SECURITY: SO WHAT'S NEW?

by Joel S. Zimmerman

Those of us who are concerned with data security usually see the most sinister implications of everything. As young children, we were taught that in front of every silver lining there is a cloud; cleanliness is not next to godliness—it is next to impossible; the early worm gets caught by the bird; where there is smoke, there is equipment damage; and an ounce of prevention is almost useless against a pound of crime.



So it is no surprise that data security officers (DSOs) have been alarmed by the proliferation of personal computers. (These days, many companies are appointing DSOs to grapple with data security problems. For a more in-depth look at DSOs and the whole issue of who is responsible for data security, see box.) As pcs became common elements of the workplace, we instantly recognized them as something new that DSOs could worry about. The questions we asked were 1. is the security of microcomputers really any different from the security of minis and mainframes? and 2. does the introduction of pcs make the security situation better or worse? As expected, the answers were: 1. yes and 2. worse.

The biggest problem with machines is people. A true computer error is among the rarest events on earth, but human error is rampant. While people are not the cause of all computer problems (mother nature is sometimes the culprit), they probably account for about three quarters of them.

Whatever else is in dispute, everyone agrees that the microcomputer revolution has brought more people into contact with computers. This lends itself to two different interpretations. One can take the dim view that since people are the main cause of computer problems, more people mean more problems. Or one can take the more optimistic approach that since computers do their work virtually error-free, the more work that is computerized, the less people will be able to mess things up.

In truth, it seems as if the first interpretation is correct in most situations today. Microcomputers have generated such immediate problems that at security conferences, the topic of security in the pc environment dominates the discussions around the lunch tables and draws the highest attendance at elective workshops. The advent of the micro might finally be the force for which DSOs everywhere have been praying. When the media began their hype over teenaged hackers, security specialists secretly applauded the lovable little juvenile delinquents for bringing the issues of information security out of the closet. Unfortunately, the hackers' notoriety never brought with it the increased respect, attention, and budgets for which the security-minded had hoped. That should have been expected. In the grand scheme of things, hackers were never as much of a problem as they were a media event. More damage is done to computers in this country by leaking roofs than by hackers. Furthermore, the major perpetrators of crime by computer have been the organizations' own employees, finding ways to enjoy personal gain from hardware, software, and information to which they had legitimate access in their normal work. The kids were never the major problem. Their moms and pops were.

While hackers rarely posed a valid enough threat to make senior managers invest in security, personal computers have. Most companies had no exposure to hackers because they had no dial-up access, and those who had run-ins learned that protection from hackers is relatively simple and effective with today's remote access protection technology. But microcomputers are everywhere. They are popping up in offices

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like mushrooms in a moist dark cave, and they are causing problems.

DSOs are thus finally receiving real attention because microcomputers have created real problems. As usual, though, if you dance to the music you must pay the piper. Data security officers loved the attention they received from hacker hype because hackers were usually not a serious threat. The problems being raised by microcomputers, on the other hand, are actually job-threatening in nature.

BASE OF PCS IN THOUSANDS

Some organizations now have installed bases of pcs that number in the thousands. This would make the job of overseeing an organization's information security tough even if all the pc users were on their best behavior, which they are not. The typical pc user is an amateur, both untrained and unconcerned about computer security.

Because it seems the only reasonable thing to do, security professionals have reached a consensus that in the pc environment end users and data custodians must take final responsibility for the security of their own system resources. This is good theory but it may prove totally unacceptable when judged by the harsh criteria of senior managers' reactions to an actual crisis.

Suppose a highly valued employee loses critical data or makes an expensive error working with a microcomputer. Suppose sensitive data are stolen from a highly valued employee's pc. Will the DSO successfully hide behind the defense that he and his colleagues in the security community have reached a consensus that the end-user must bear final responsibility? More likely, senior managers will conclude that it is the DSO's responsibility to make sure that all pc users have enough awareness and training to care for their security needs properly. A serious security problem at any pc is likely to reflect badly on the DSO's effectiveness.

Pc security problems are not new. They are the same old problems DSOs have been fighting ever since the time of relays, vacuum tubes, and Hollerith cards. What is new is the relative importance of the problems and the way they must be controlled.

Look at the traditional security problems and compare them to problems now being faced in the microcomputer environment. Fig. 1 presents the manager's one-minute guide to information system security. Types of security threats are listed down the side: damage to physical resources (such as equipment), unsystematic information modification (noise), information destruction, degradation of information through systematic modification (loss of validity), and disclosure of information to those not authorized to see it. Two columns are used to distinguish intentional acts of malice from human error or naturally caused accidents.

Disasters and acts of vandalism that result in equipment damage or loss are hazards to pcs just as they are to large systems. But disaster planning for pcs is not taken as seriously because the losses are likely to be much smaller and easier to rectify. The damages are often confined to only one or a few pcs at most. In relation to mini and mainframe systems, any micro system is inexpensive to replace and its applications can be transferred with little difficulty to other equipment.

In the remainder of the categories shown in Fig. 1, pcs seem to have made the situation worse. Items 3 through 6 all represent cases where information is degraded either by the introduction of unsystematic error or because of its total loss. The key to solving these problems is the maintenance of adequate backups. Items 7 and 8 represent situations in which systematic error is entered into data through either incompetence or criminal intent. The appropriate controls against these threats are primarily quality-assurance checks, audits, divisions of responsibility, and the like. Items 9 and 10 represent threats of disclosure of sensitive information. Controls against these threats involve taking care to secure information behind physical and logical locks.

SIMPLIFY PROBLEM & SOLUTION

The problems have not changed; their priorities have. Another change is that people who work with micros do not have the time, skills, or motivation to become familiar with the long checklists of problems and solutions

WHO'S IN CHARGE OF SECURITY?

As companies become more aware of the importance of information security, some are creating new staff positions to handle this responsibility. Job titles such as data security officer, information security administrator, and computer security manager are being added to the organizational roster.

For companies that have had information systems based on mainframes or substantial minicomputer installations, functional responsibility for security frequently fell to the data processing section. But this has proved unworkable in many organizations. Working within data processing, the person responsible for security finds it difficult to achieve either the proper departmental support to do an effective job, or the independence of authority to do a job that is credible.

Many other approaches are being tried as well. Some organizations lodge responsibility for security within the risk management group, the audit department, or the institutional security (protective services) division, or create an independent position reporting directly to a vice president. Some groups also assign responsibility for information protection to one individual (normally a data processing manager) and add to the person's existing duties, or divide the information security functions into several categories (e.g., physical, logical, and administrative) that can be assigned to several existing job positions (e.g., protective services chief, dp manager, and internal edp auditor).

In organizations where the dp function has grown up around personal computers, the most common tactic has been to let everyone be in charge of their own security. The problem seems to be that when everyone is in charge, no one is in charge. Organizations today are just beginning to come to terms with the question of how to define an effective line of responsibility for the security of data scattered about on personal computers.

J.S.Z.

FIG. 1

THREATS TO INFORMATION SYSTEM SECURITY

	HUMAN ERROR AND NATURAL ACCIDENT	ACTIONS OF MALICIOUS INTENT
Physical resource damage	1. Disasters	2. Vandalism
Random information modification	3. Mistakes	4. Pranks and nuisances
Information destruction	5. Erasure	6. Sabotage
Systematic information modification	7. Incompetence	8. Fraud and embezzlement
Disclosure of confidential information	9. Exposure	10. Data theft

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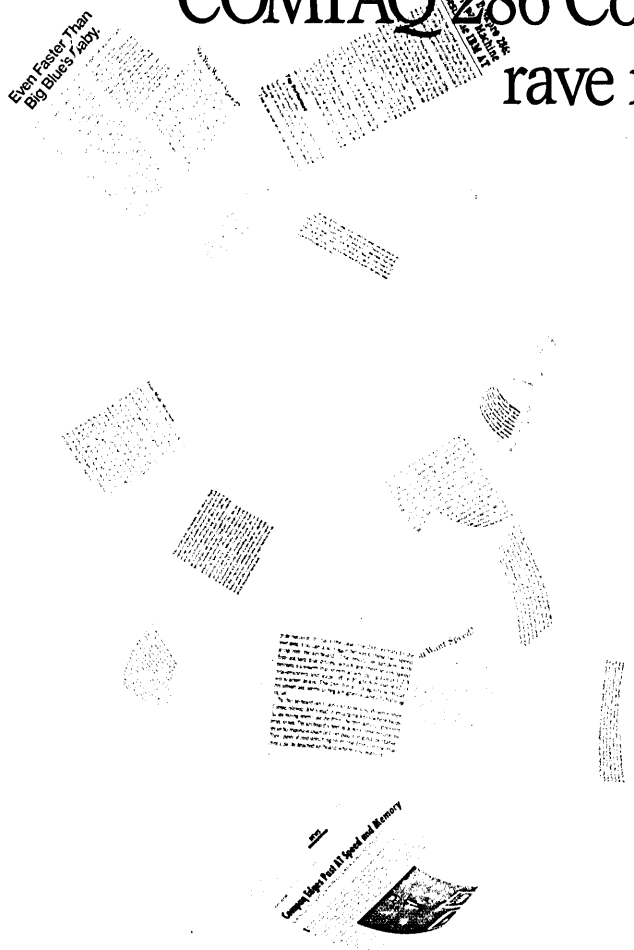

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FIG. 2

TACTICS FOR ACHIEVING BETTER PC BACKUPS

1. Although it is initially difficult to enforce, make a policy that pcs with internal hard disks will not be purchased without also purchasing a streaming tape or external hard disk as a backup. If an existing backup unit is not currently being used to capacity, it may be designated for backup in lieu of a new unit.
2. External fixed hard disks should be subject to the same policy. For removable hard disk units, a purchase may be made as long as at least one other removable disk is available as a backup and at least one other drive unit is available as a backup.
3. Organizational policy should indicate clearly what types of data and programs need A)no backup, B)secure on-site backup, or C)on-site and off-site backup.
4. Every staff person who will be using a pc should be required to attend training classes on backup management procedures. Training should cover the use of hard and floppy disk systems and provide instruction on how to make and store backups of programs and data.
5. The DSO should be readily available to consult on questions about whether and how to make and store backups for pc applications.
6. Supervisors should be required to perform periodic audits on pc backup activities. The data security officer should perform regular checks on the supervisors' audit records.

that DSOs used to foist upon the dp professionals working in large data centers. To be succcessful with pc users, you must simplify the problem and its solutions.

We can probably capture 95% of the pc security problem by focusing on the three most important concerns and their appropriate controls:

1. We are losing critical data because of the lack of proper backups.

2. We are disclosing sensitive data because they are being left exposed and unprotected from theft.

3. We are subjected to invalid and unreliable information because we fail to install quality-control mechanisms.

Based upon the unsystematic sample of my lunchtime conversations and casual observations, the most overwhelming pc security problem is loss of critical data because of inadequate backups. The major culprit is the internal hard disk.

Back in the good old days when computer mainframes ran in a controlled environment, the management of backups had graduated in status from a science to a religious obsession. Lesson number one in "An Introduction to Running a Data Center" was how to back up everything on the system. Users were protected from themselves. Even when users failed to make backup files, yesterday's system backups could always be called to bail them out.

Today's pc users have lost that old-time religion. They nod in understanding as you explain why and how backups are made. But data disks need a surprise meeting with a cup of coffee or Fido's teeth before the pc user actually begins to take backups seriously.

Internal hard disks are the worst because they impede the user's learning, allowing bad habits to build for a long time. It is simply too hard to spill coffee on an internal hard disk, and totally impossible for the dog to get hold of it. As a result, the user manages to store megabytes of data before the inevitable occurs. Whether it is a disk failure or an accidental erasure, when the learning experience finally happens, its impact is equal to that of your first visit to the woodshed with daddy.

For a variety of reasons, users do not easily learn to make backup copies of files from internal hard disks. Hard disk files can become too large for floppies and the process of copying large fixed disk files to nearly full floppies can be frustrating. Under the best circumstances, copying 10 megabytes to 25 floppy disks consumes an annoying amount of time. Of course, one only needs to copy critical files, but this presumes enough data management to know which files contain what data and how critical they are. While companies order PC XTs as a matter of reflex, few order external disks or streaming tape units as backup media at the same time.

The exposure of sensitive information is problem number two. Once again, the internal hard disk is a major cause of the problem. In many offices pcs with fixed disks are shared by several people. Of course, every file they write can be accessed by any other user—or by anyone else with a key to the office who knows how to turn on the machine. Floppy disks are also controlled very poorly in most offices today. They are left lying about during the day and frequently after working hours as well. Floppies can be copied silently and swiftly and the copies can easily be spirited away in a briefcase or purse.

Information is also exposed on the screen. Because pcs tend to be shared resources in many businesses, they are frequently located in common areas rather than in private offices. Many employees purposely leave data on display when they go on breaks or are interrupted so as to not lose their place at the computer.

LOSS OF INFO INTEGRITY

The final major problem is loss of information integrity. Information that is maintained on personal computers is not afforded the same quality control checks that mainframe data traditionally have been given. While this also makes it easier to commit crimes of fraud through purposeful data adulteration, the more frequent problem by far is just human error. Data inserted into spreadsheets and databases by business managers are seldom checked for theoretical and computational validity. The security literature is already building a repository of horror stories about important business decisions made on the basis of pc-based information that was totally inaccurate.

No one is comfortable with changes in their job responsibilities. And who would be more in need of job security than a security officer? Managing security was relatively easy when equipment and staff were centralized in a single data center. The task has become much harder now that information resources are scattered throughout the organization. Perhaps the DSOs' major concerns stem from the way that pcs are changing their jobs.

Many of the DSOs' old standby tools are out of commission in the pc environment. Risk analyses, of debatable value in the old environment, are of less value now. First, it costs more to do a pc risk analysis than to purchase an entire pc system; and second, with so many pcs around, the DSO could easily spend his or her time doing nothing but risk assessments and updates. Password administration used to be important to DSOs, but many pcs are functioning quite well without any password access systems. Contingency plans have been greatly simplified—if it breaks, we will buy another one.

The microcomputer environment calls for a new approach to the role of data security officer. It is no longer possible to enforce security primarily through mechanisms installed in the hardware and software of a multi-user mainframe that everyone was forced to use for their information needs. As personal computers have come to dominate the workplace, information security has been forced to become a grass-roots movement. More than ever before, the DSO must become involved with setting policies, promoting security awareness, and training users in security prac-

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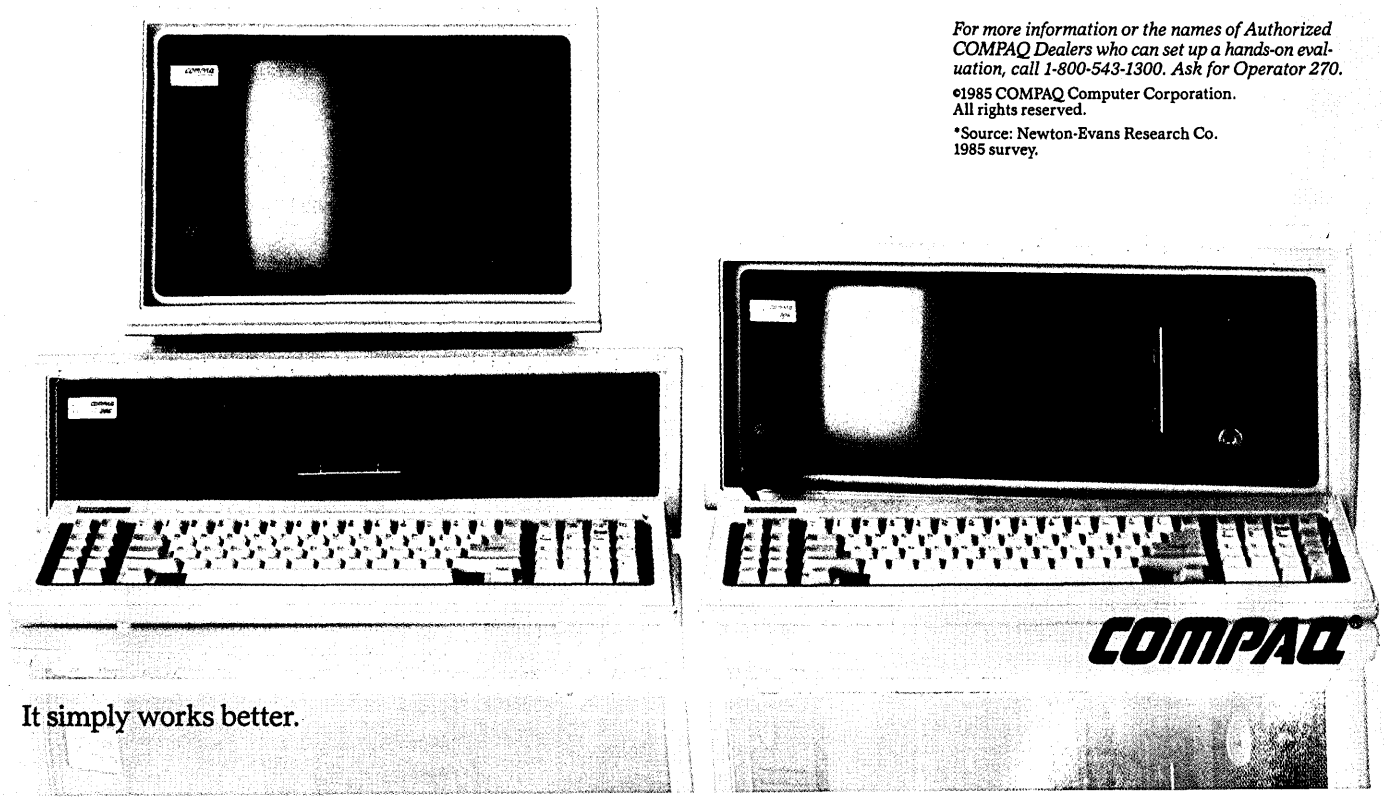

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tices. The DSO must accept the role of educator—explaining to management why policies must be adopted, and explaining to staff how they are to be implemented.

DSOs need to work within their organizations to install and enforce controls for the three major problems discussed. The controls must be simple and appropriate for pc users, people who are new to dp, concerned entirely with getting their work done, and consider computer security to be about as useful as bones in a potato.

Some tactics for achieving better pc backups are shown in Fig. 2. The general approach is to eliminate the use of hard disk systems without adequate backup resources. Policies should be established to make clear the types of data that need secure on-site backup and off-site backup.

The DSO should arrange training sessions to teach staff how to make and store backups. Good controls can be achieved by restricting the use of floppies to those disks that are specially labeled and serially numbered by the organization. There should be a standard procedure whereby, for every important data set, a permanent record is made of its file name and primary and backup disk numbers. Staff should be instructed about backing up programs, and about the laws governing program copying. Supervisors should be instructed on how to audit these backups and the DSO should check periodically to be sure the audits are being done.

Tactics for protecting sensitive data are summarized in Fig. 3. All sensitive data should be stored on specially colored floppy disks. Their distinctive color should help people remember to lock them up rather than store them with nonsensitive disks. Sensitive disks should be the responsibility of a specially designated custodian who has exclusive access to them. Individual access can be ensured either through a single set of keys to a locked area or by restricted access through a central data librarian.

SENSITIVE FILES ENCRYPTED

Sensitive data should not go on pc hard disks. If a hard disk system breaks down—an all-too-common event—it will be impossible to "scrub" the data before the disk goes out for repairs. Further, most hard disks are now shared by several users. The file protection mechanisms available for pc shared disk systems are relatively easy to defeat. Passwords, the basis for most of the shared file protection systems, are notoriously ineffective when used by dp novices in a loosely administered environment.

Encryption provides an excellent control for sensitive data. It is a supplement to, not an alternative for, securing sensitive data on floppy disks under lock and key. The careful use of encryption might make hard disk storage of sensitive data acceptable, but this is unlikely. For this to be so, the DSO must first ensure the encryption process never writes unencrypted text on hard disk, either through its own procedures or at the option of the user, a condition that rarely will be satisfied.

In the mainframe environment, great pains are taken to ensure the integrity of programmed algorithms and input data. Few of these controls have found their way into the microcomputer environment. Yet how can the computerized information be trusted without them? Fig. 4 summarizes suggestions for this third major area of concern. To ensure information validity, all databases and pc reports should be marked with time and date. All programs, particularly those generated by the users, should be tested and certified for accuracy. Independent checks should be done on the accuracy of data input and processing algorithms for all pc-generated information before it is considered acceptable as a basis for organizational decision-making. These checks would normally be done by someone at the managerial level who is familiar with the technical processes being modeled.

If the microcomputer environment can be properly controlled, it is possible that we may yet be able to accept the optimist's view of the world of pcs. If people use them correctly, microcomputers have the power to process our information more quickly, more accurately, and more safely than ever before. Until such controls are widespread, however, a large number of pessimistic data security officers seem doomed to grow many more gray hairs. ◉

FIG. 3

TACTICS FOR BETTER PROTECTION OF SENSITIVE PC DATA

1. Establish clear organizational policy on what types of data are to be considered sensitive. As a matter of policy, make sure every sensitive data set has a designated custodian to bear responsibility for its safekeeping.
2. Establish a policy that no sensitive information may be stored in a file, either temporarily or permanently, on a fixed hard disk. All sensitive information is to be recorded either on specially colored floppies or on specially designated and distinctly marked removable hard disks.
3. Make sure that a locked area or cabinet is available for all media containing sensitive information. Access should be possible only for the data custodian. Arrange this either by individually controlled locks and keys or by using a centrally secured data library.
4. Place pcs in private offices for work with sensitive data.
5. Encourage the use of encryption for sensitive data files.

FIG. 4

TACTICS FOR IMPROVING THE INTEGRITY OF PC DATA

1. All customized microcomputer programs should be validated and certified for accuracy.
2. All corporate databases, whether stored on micros, minis, or mainframes, should have user-accessible date and time fields to indicate the last time the database was modified.
3. All output from pcs should be marked clearly with date and time of production. If the report draws upon any external database, the report should note that database's date and time stamp.
4. All analytical data reports done on pcs should have independent validations of data input and embedded formulas. Analytical models are to be checked for conceptual accuracy as well as clerical accuracy. The checkers should initial the reports and note the date and time.
5. As a matter of policy, no corporate decisions shall be made on the basis of any pc-based data unless they meet all the conditions set above.

Joel S. Zimmerman is president and founder of Computer Security Inc., a Williamsburg, Va., firm that provides advisory services on computer system security and data integrity. Dr. Zimmerman is also an adjunct faculty member in the graduate MIS program at George Washington University, Washington, D.C.

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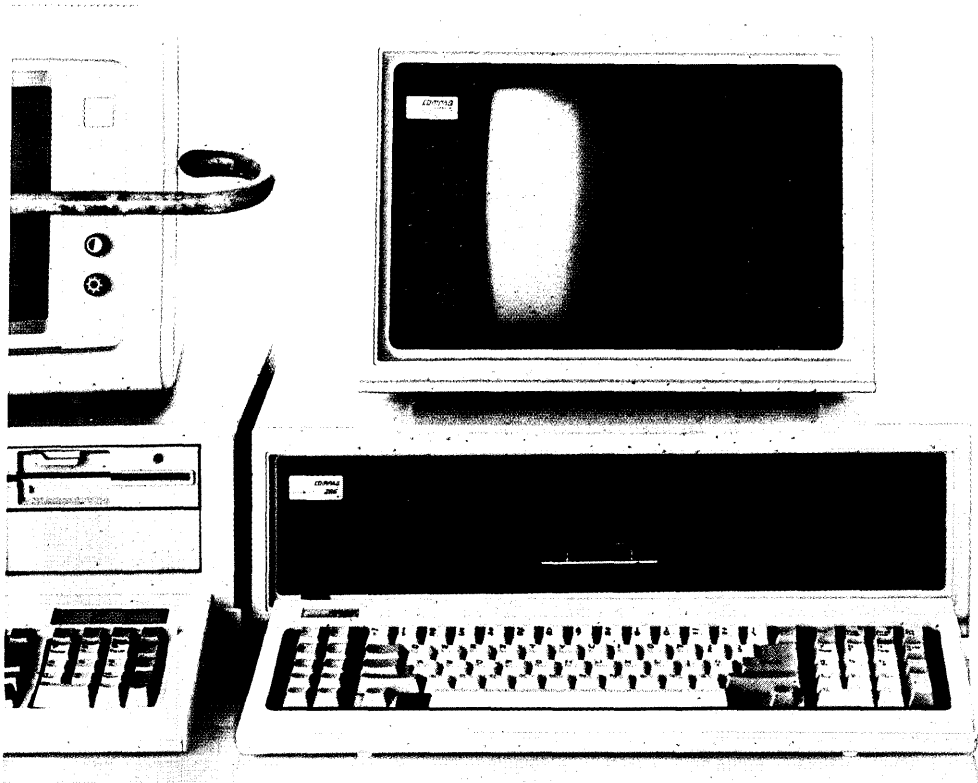

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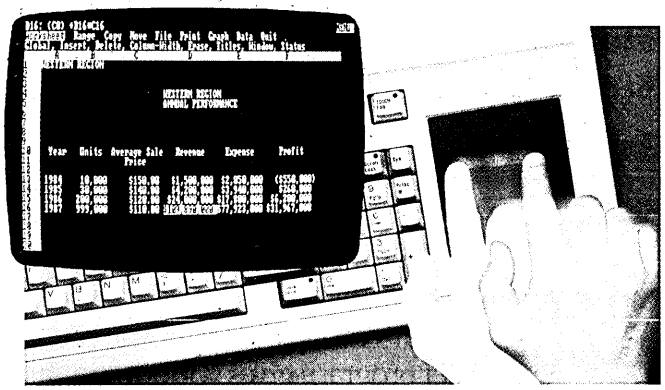
The KB 5153 Touch Pad Keyboard* is a technological breakthrough in input device capabilities. A Mouse, Digitizing Tablet, programmable Function Keys, and Cursor Pad all encompassed in an AT style keyboard, make the KB 5153 the most powerful input device yet!

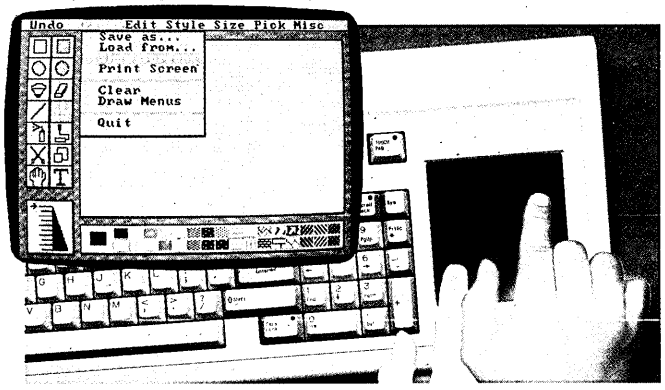
Attach this new plug-compatible KB 5153 to your IBM* PC, XT* or AT*, and you'll discover a new world of input simplicity. It's the ideal way to operate today's advanced environmental software.

The Touch Pad currently offers four modes of operation with unlimited flexibility for future enhancements through utility software.



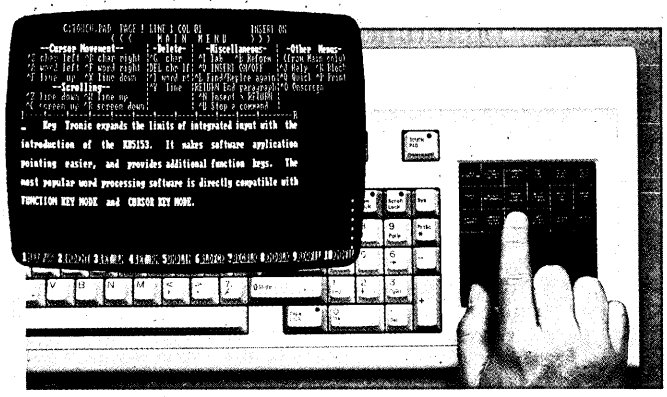
Cursor Key Mode

The KB 5153 Touch Pad makes Cursor Key operation faster and easier, and it is compatible with all existing software that accepts cursor key input. Movement of your finger or stylus across the Touch Pad is converted to equivalent cursor key strokes. The result is faster cursor movement — by a factor of 4 to 5. Imagine what that can mean in word processing and spreadsheet applications!



Mouse Mode

Consider the Touch Pad as an alternative to a Mouse. With the appropriate driver, it's compatible with all existing Mouse software. Combining text entry and pointing in a single compact unit frees up desk-top space. And better yet, it makes lap-top operation a breeze.

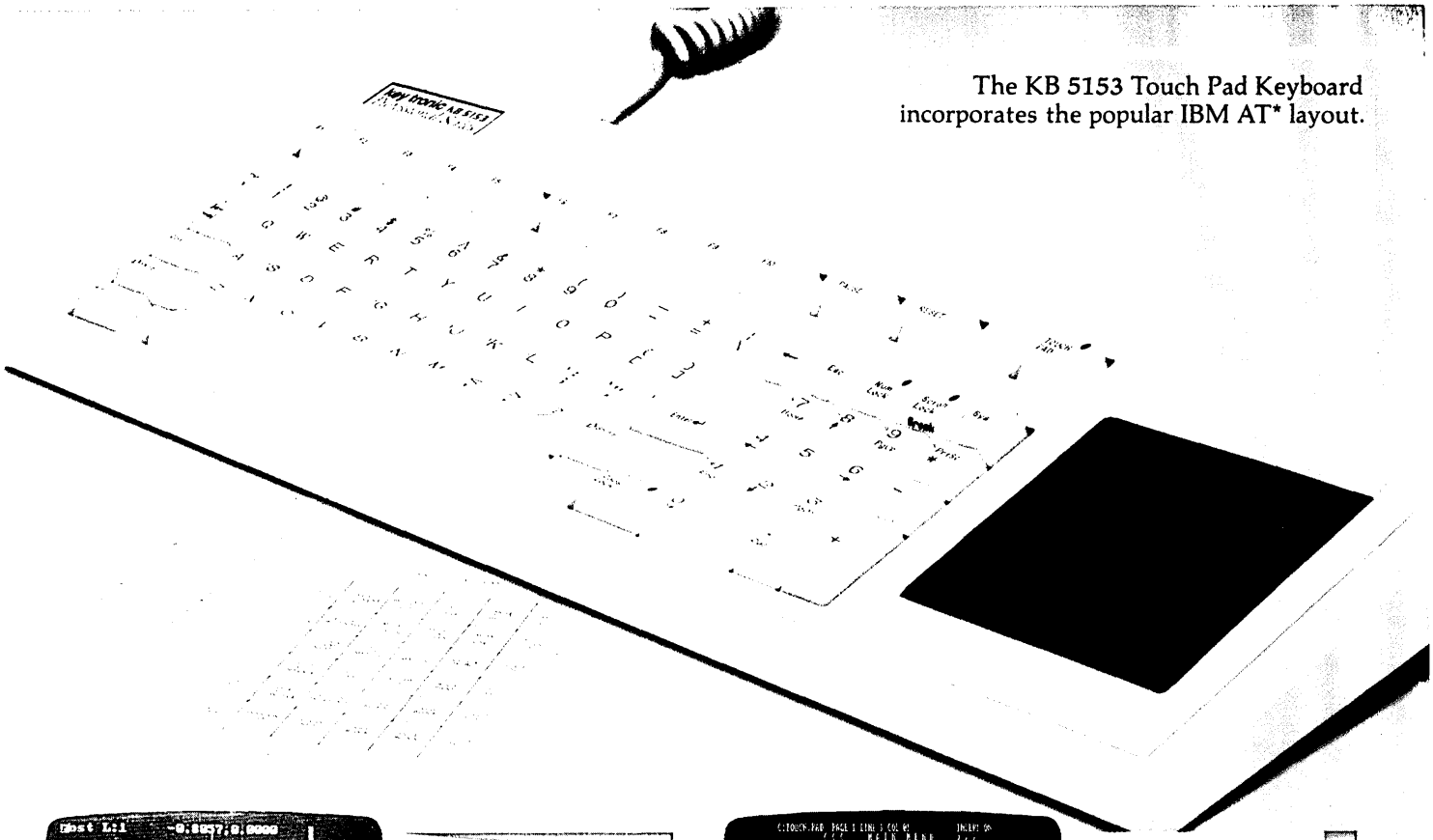


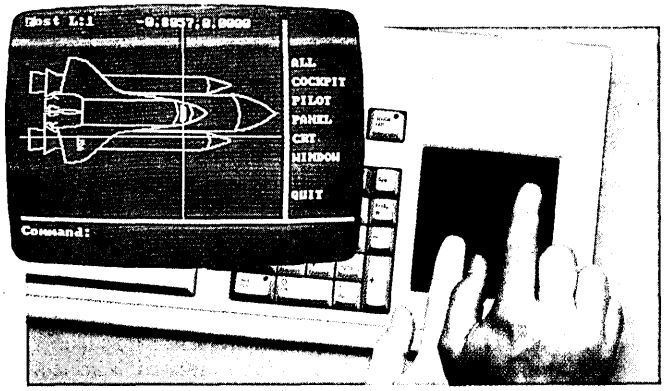
Concurrent Modes

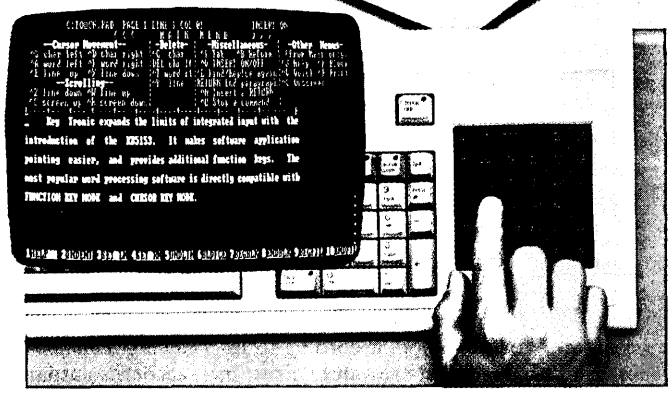
Both a pointing mode and the function key mode can be used at the same time by dividing the Touch Pad into defined areas. Or by assigning one of the function keys as a Mouse Mode key, for instance, you can toggle from a full function pad to the Mouse Mode with the touch of a finger. The powerful, new KB 5153 Touch Pad Keyboard by Key Tronic provides versatility for the most sophisticated input requirements.

*Touch Pad Keyboard is a trademark of Key Tronic Corporation.
*IBM, XT and AT are registered trademarks of IBM Corporation.
*PC Paintbrush is a trademark of ZSoft Corporation.

The KB 5153 Touch Pad Keyboard incorporates the popular IBM AT* layout.







Absolute Coordinate Mode

When direct pointing is required, the absolute coordinate mode is the answer. It's perfect for graphics applications such as CAD by providing fast, accurate pointing to direct screen coordinates. It can be a digitizing tablet or bit pad and is likely to become your preferred pointing method.

Function Key Mode

At the touch of a finger, the Touch Pad becomes a Function Key Pad. By using the easy-to-operate utility software, a programmable number of function keys can be specified. In addition, a sequence of up to 70 characters can be defined for each function key, eliminating frequent references to software manuals. Blank, snap-on overlays can be labeled for your personal application. Pre-printed popular software overlays are also available.

Key Tronic expands the limits of integrated input! Simply put, the KB 5153 Touch Pad Keyboard is the most comprehensive input device available today.

Ask your Key Tronic Dealer for a demonstration of the new KB 5153 Touch Pad Keyboard today . . . or call **1-800-262-6006** between 7am-3pm Pacific for more information. In Washington State, call (509) 928-8000.

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Providing the super software package that banks want has been an uphill climb for vendors.

A BANKING SOFTWARE STORY

by Tom Lawton

What's the largest, fastest-growing, industry-specific segment of the computer services business? You get to stand in a corner and wear a pointy hat if you didn't answer banking/finance. In particular, banking has been the staple of the computer services industry since before it deserved to be called an industry, and forecasters tell us its importance to computer services will only increase over the next five years.

In 1984, total computer services revenues were $40 billion, according to Input Inc., the market research firm in Mountain View, Calif. That was a 24% increase over 1983. A full 10%, or $4 billion, of the business came from banks and other financial institutions. No other group contributed as large a share. By 1989, says Input, the total from this sector will be over $11 billion of the $104 billion computer services industry, an 11% component. Commercial banks will be the biggest buyer of services, purchasing more than 60% of the aggregate delivered to banks and other financial institutions.

The need for new computer systems has been skyrocketing at banks for several years. This need has been fueled by deregulation; competition with retailers, brokers, and insurance firms; and a host of new applications such as automated teller machines, sweep accounts, and consolidated customer accounts.

Traditionally, commercial banks have developed systems using internal staff and large numbers of consultants and contract programmers. Many professional services firms owe their existence to bank clients. Additionally, functions easily separable from the mainstream deposit/withdrawal accounting have been farmed out to processing services firms—functions like personal trust accounting, credit card processing, and customer payroll preparation.

As new requirement is placed on new requirement, the banks' traditional approaches are faltering. The time and expense for internal product development is prohibitive. The desire to integrate all bank data makes piecemeal processing unattractive. Integration allows various applications systems to be used together with ease. Data flow from one to the other as appropriate. For example, monthly loan payments can be deducted from checking accounts automatically. The resulting data are all included in the customers' unified statements. The transactions are then entered into the banks' internal accounting systems. A change to the loan system's innards will not affect the interface to deposits, statements, or internal accounting.

Some banks see salvation in complex software products that will do the whole job—a superpackage. Data will be fully integrated, balances updated on the fly, and the supplier will keep the product up-to-date. Such a product will fetch a very high price.

From the perspective of the software vendor, banks are certainly a large enough market, and well-heeled at that. In 1983 there were 15,000 banks in the U.S. They had $1.7 trillion on deposit. That's sufficient to make any marketeer salivate—a large market composed of sophisticated customers with a need. Those customers understand the need and want to fill it by buying software products. They can afford high prices. There are enough of them so that large development costs can be distributed over a large client base by a successful vendor. The market is growing. All you have to do is put together the software and find a place big enough to store the profits. Maybe.

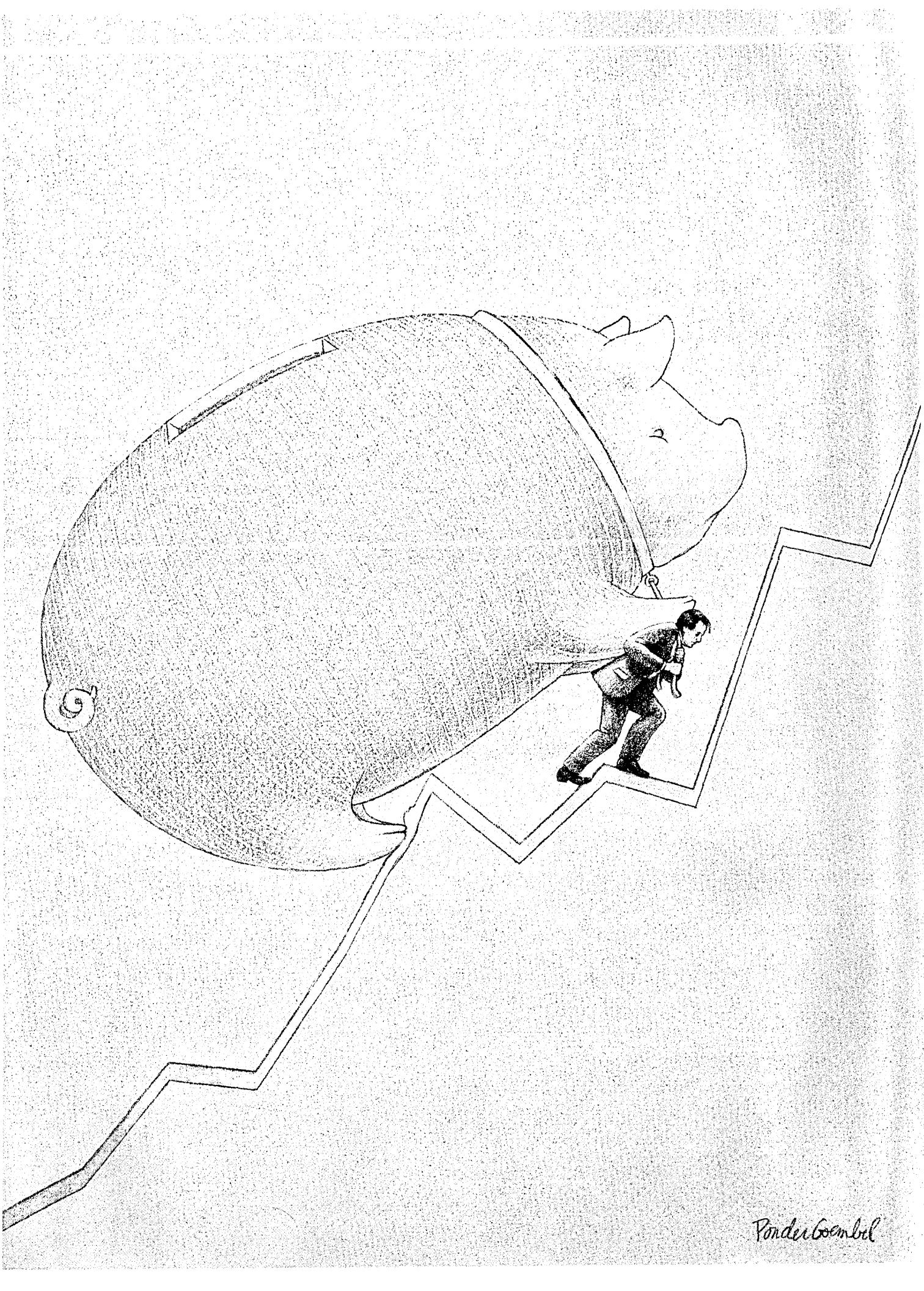
In early 1983, Anacomp Inc., Indianapolis, was into advertising. A half-page ad in the *Wall Street Journal* appeared to be the company's immodest celebration of apparent success with its product, CIS or Continous Integrated System—continous because all balances would be updated continously or in real time; integrated because any data produced by one subsystem would be available to any other. There were pictures in the ad of the 21 commercial banks that had signed up for CIS, banks like Wells Fargo Bank of San Francisco, Marine Midland Bank N.A. of Buffalo, Shawmut Bank of Boston N.A., and Provident National Bank in Philadelphia.

The ad copy stated that CIS was "the first software system to provide all major retail banking applications. The first to offer a complete picture of every banking activity initiated by your customer. First to post transactions continually, 24 hours a day, seven days a week, thereby eliminating costly nighttime batch processing. . . . With CIS you can expand services. Cross-sell existing customers. Sharpen your handle on customer profitabililty. . . ."

FIVE-YEAR SPENDING PLAN

A month later, there was another half-page ad in the *Journal* detailing Anacomp's planned expenditures for software and related services for the financial industry. It was a five-year projection starting with development costs of $59 million in 1983 and ending with development and support expenditures of $186 million in 1987. The plan also called for assignment of 1,300 employees to new product development by 1987. Certainly, no one could fault Anacomp for thinking

ILLUSTRATION BY PONDER GOEMBEL


Ponder Goembel

It looked as if Hogan Systems was to be the biggest beneficiary of Anacomp's problems.

small. Neither of the ads mentioned that when development of CIS started in 1979, the product was scheduled for delivery in late 1981. Then it was April 1982. Then it was slated for early 1983. Then it was late 1983.

In Anacomp's annual report for the year ended Sept. 30, 1984, in a footnote to the financial statements, was the following:

"During fiscal 1984, Anacomp installed CIS for the first time in a customer location. A small portion of that bank's accounts was converted to and processed by CIS. The system did not perform to the customer's expectations and installation efforts ceased. . . . The problems experienced with the development and sales effort for CIS over the past year have led Anacomp to conclude that it may be difficult to realize . . . the carrying value of assets related to CIS. . . ."

Anacomp wrote off $38 million in "unusual software-related items," and reported a loss of $116 million on revenues of $132 million. For all practical purposes, CIS was dead.

Until Anacomp started chasing the elusive bank software product bonanza, it had been one of the hottest computer services firms, albeit one often criticized for its accounting practices and use of tax-shelter partnerships to fund software development. Sales grew from a negligible $130,000 in 1969 to $172 million in fiscal 1983. It was and still is the largest provider of computer-output microfilm services in the world. It offers processing services to banks and to state and county governments. It still sells a range of software products to banks.

In January 1985, its founder and chairman, Ronald Palamara, died of cancer at just 46 years of age. Some say Anacomp might have found a way to salvage CIS if Palamara had not fallen ill. Under the leadership of chief executive Louis Ferrero, Anacomp has returned to profitability, earning $4 million on sales of $63 million during the six months ended March 31, 1985.

Ferrero says the company is still committed to CIS and is working with some banks to complete the system. The problem, of course, is funding. Banks or other investors will have to foot the cost of the effort and no schedule can be prepared until that funding is in hand.

When Anacomp's delivery schedule for CIS began slipping in 1982 and 1983, many banks began looking at alternative suppliers. They quickly identified a vendor that promised a system as powerful as CIS but with pieces of that product already operating at customer sites. That supplier was Hogan Systems of Dallas.

Hogan Systems was founded by Bernie Hogan in 1977. He had been an officer at a commercial bank and saw the need for bank software products that were oriented to terminals and easy to modify. He raised $250,000 in venture capital and began development. The first product was delivered in 1980. By the middle of 1982, Hogan boasted 55 installations. Sales for the year ended March 31, 1982 were $9 million vs. the previous year's $3 million. By the end of that year, Hogan was public. Bernie himself sold out and moved on to other things.

The year ended March 31, 1984 produced sales of more than $36 million with earnings of $7 million. The company had 360 products licensed to 120 customers. It looked as if Hogan Systems was to be the biggest beneficiary of Anacomp's problems. The only thing that could stop Hogan now was Hogan.

FLEXIBLE, EASY TO UPDATE

Hogan delivers its systems in modules, such as the Integrated Deposit System that processes deposit transactions, the On-Line Delivery System that supports teller terminals, the On-Line Collection System that automates monitoring and collection of all types of delinquent payments, and the Preferred Client Services System that generates combined financial statements. Individual modules are integrated through "middleware," software that provides an interface between various Hogan systems and the client's systems software. It's a method that provides flexibility and easy updating. The total system can be assembled in a reasonable amount of time and be put together reliably.

In February 1984, Hogan began shipping its newest module, the Integrated Loans Processing System. Priced at $500,000, the system had been under development for three years. Hogan said it had an order backlog of $6 million before the software was completed. Installation testing was performed at Society National Bank in Cleveland.

Steve Stibbens, a Hogan vice president, says premature release of the loan system was "suicidal." The product went to 40 client sites. With over 500,000 COBOL source statements, it was the most complex loan system ever developed, integrating consumer, mortgage, and commercial loans. And it didn't work reliably: it had never been thoroughly tested. In one fell swoop, Hogan lost a large measure of the credibility it had taken seven years to build.

In the fall of 1984, Hogan pulled its loan product out of production. Enormous financial damage was wrought. In the year ended March 1985, Hogan reported that sales fell 23% to $28 million, and profits turned to losses of over $19 million before inclusion of tax benefits. It has been running the product at six validation sites and was expected to have been released again in September.

Hogan's chairman, Richard Streller, expects the firm to recover fully from the loan system fumble. He says Hogan's problems are not similar to Anacomp's. First, says Streller, Hogan has many successful client installations. As of June 1985, 76 were in production, doing bank customer accounting on a daily basis; that's 65% of Hogan's total client roster. Second, continues Streller, Hogan's troubles stem from premature delivery, not failure to deliver at all. The rerelease of the loan package will get Hogan back on track.

But if Anacomp is out and Hogan is down, is there another computer service firm waiting in the wings with the superpackage the banks want? There are certainly some possibilities.

Consider UCCEL of Dallas. That's the old Wyly Corp./University Computing. With new management recruited from General Electric Information Services Co. in the spring of 1983 there came a new image, a new name, and an emphasis on software products. UCCEL had been selling applications packages to banks for some time. Now it emphasized its bank products.

In late 1983, UCCEL acquired Financial Software of America Inc., Orlando, Fla., for over $5 million. FSA had sales at the time of just $4 million, but UCCEL wanted its development capabilities. The knowledge and products of FSA were used to assemble a group of bank products called Infopoint. In 1984, UCCEL's sales of applications products to banks totaled $28 million, according to Don Steele, vice president of the company's application software division. In 1985 that is expected to grow to over $30 million, a 20% increase.

More important, says Steele, UCCEL is spending $6 million in 1985 on development of its bank products, part of a total $20 million development commitment over the next few years. Infopoint is essentially a transitionary system and new products will be moved in as they are ready. It's a gradual upgrade.

In 1984, UCCEL's sales totaled $173 million. Net earnings were $12 million. Sales of systems and applications software products contributed $88 million, or 51% of total revenue. The bank applications software, $28 million, was 16% of sales.

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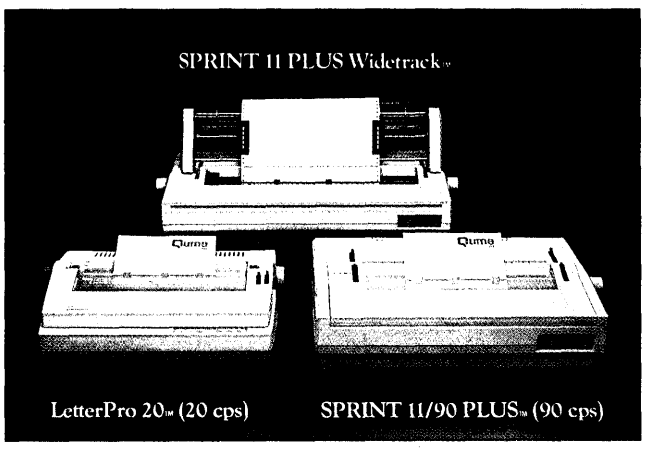

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In five years things may slow to the point where a single vendor can supply most needs.

pendent provider of bank software, with sales in 1984 topping $50 million. A private firm, Kirchman operates as a holding company for five operating subsidiaries, all selling software and services to banks. Its largest subsidiary is Florida Software Services Inc. in Orlando, whose sales, all software products, were about $40 million in 1984.

NOT A CONTENDER FOR PRIZE

Kirchman isn't usually considered a contender for the superpackage prize because it is regarded as a supplier of small- to mid-sized banks. But Kirchman president, Bonnie McIntire Smith, says the firm also sells to large banks, and its growth amounted to 45% in 1984. She says Kirchman understands product development for banks better than anyone else in the business because the company's been around since 1969, doing real-time updating of bank balances. Kirchman has the expert personnel the banks need for their data processing development. It will be a major contender.

There are many other firms participating in the bank software package market. There's Cullinet Software, Westwood, Mass., which recently bought Bob White Computing and Software, Oakbrook, Ill. Bob White's sales were about $2 million in 1983. Cullinet bought the firm to integrate a set of bank applications around the IDMS database that it sells. Cullinet is always a tough competitor.

Sterling Software, Dallas, commenced business just two years ago. It was founded by Sam Wyly and has acquired several bank product companies. It has not announced any intention to do the sort of development required for the total bank package.

Systematics, Little Rock, Ark., is a facilities management supplier to medium-sized banks. It recently started selling its software separately. SEI Corp., Wayne, Pa., sells processing services to banks. It might well move to software.

After severe hemorrhaging by Anacomp and Hogan, will banks rush to scoop up another superpackage? Probably, even though there's a bit of hesitancy just now. Boston-based Shawmut Bank was one of the original Anacomp clients. Shawmut is a big bank (it ranked 59th in *Fortune*'s June listing of the 100 largest commmercial banking companies, with $6.5 billion in assets as of Dec. 31, 1984). William Schrader, executive vp of Shawmut's corporate operations, says the bank was and still is one that buys most of its applications software. It depends on vendors to update that software. Sometimes it buys systems that include hardware, such as a mutual fund processor and a trust system. Schrader says Anacomp claimed, in effect, that it could produce all the software Shawmut needed, integrate the applications so they worked together, and maintain it all. That, says Schrader, proved to be too large a task. Now, he continues, Hogan seems to be trying the same thing.

Today, Schrader believes no one supplier can satisfy all, or even most, of Shawmut's needs. He cites insurance and discount brokerage as two applications neither Hogan nor Anacomp supports. Shawmut also wants to continue to offer some products through service bureaus, so the bank will buy applications from a variety of vendors and perform its own integration. Schrader says that in five years things may slow to the point where a single vendor can supply most needs. But never all. The world will continue to change too quickly for that.

First Tennessee Bank of Memphis (which ranked 82nd in the *Fortune* listing, with assets of $4.7 billion) is a very satisfied Hogan client, but it has no intention of buying all of Hogan's offerings. Ken Youngblood, senior vice president, says the bank is "very comfortable" with the loan package it bought from UCCEL. It tied that system to others through Hogan's Client Services System. Youngblood doesn't see banks dealing with one vendor in the near future. He does think there will be fewer vendors to deal with, though, as the existing suppliers merge.

Considering the market potential, there aren't that many firms chasing the bank software product market, at least the market for what we call the superpackage. That's interesting. In 1983 and 1984, companies were unabashedly spending money to produce products for microcomputers that looked just like other companies' products. People complained about how difficult it was to find a market big enough to interest investors.

Maybe satisfying the desires of the banks is too tough a job for most firms to contemplate. On the other hand, perhaps people never look at the obvious. One thing is certain—the bank superpackage will not be developed in a garage. ◉

"Thirty days hath September and you."

CARTOON BY HENRY MARTIN

Tom Lawton is editor and publisher of *Computer Services Report*, a four-year-old business and financial monthly for the computer services business, based in Belmont, Mass. He has 25 years' experience in the computer services business in management and technical

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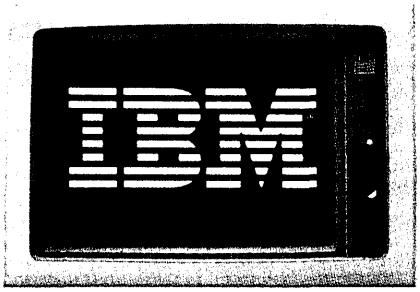

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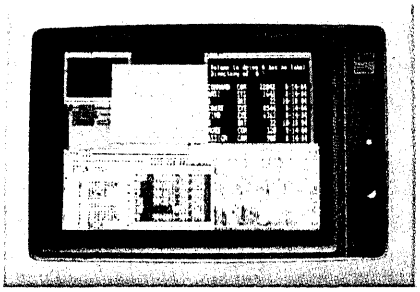

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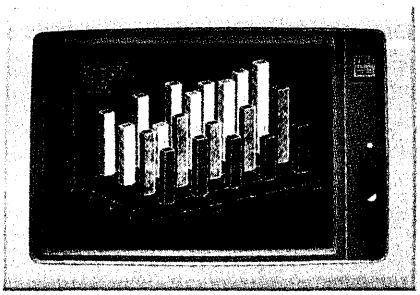

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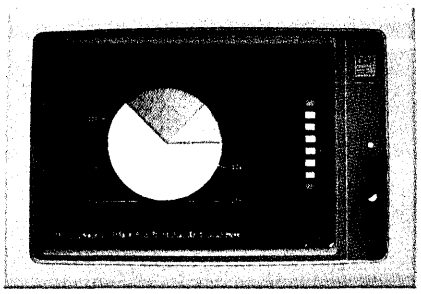

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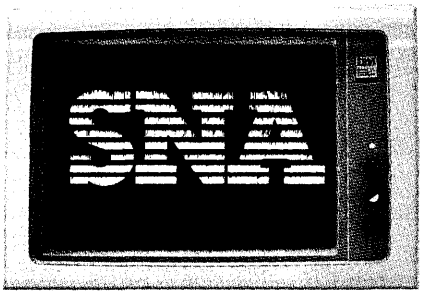

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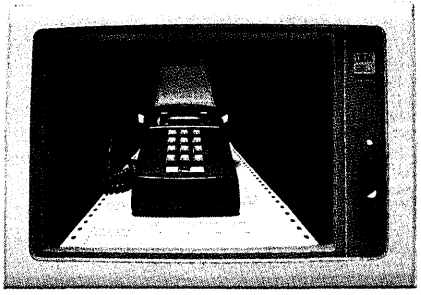

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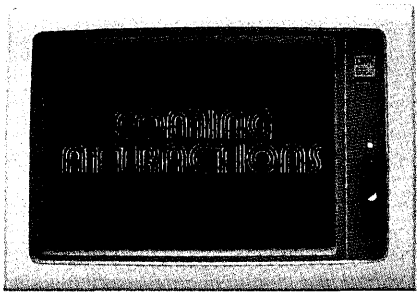

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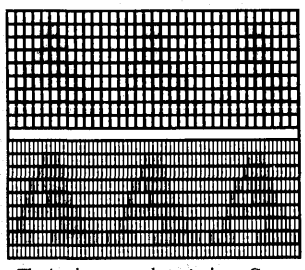

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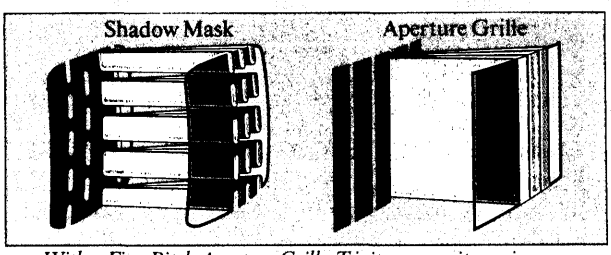

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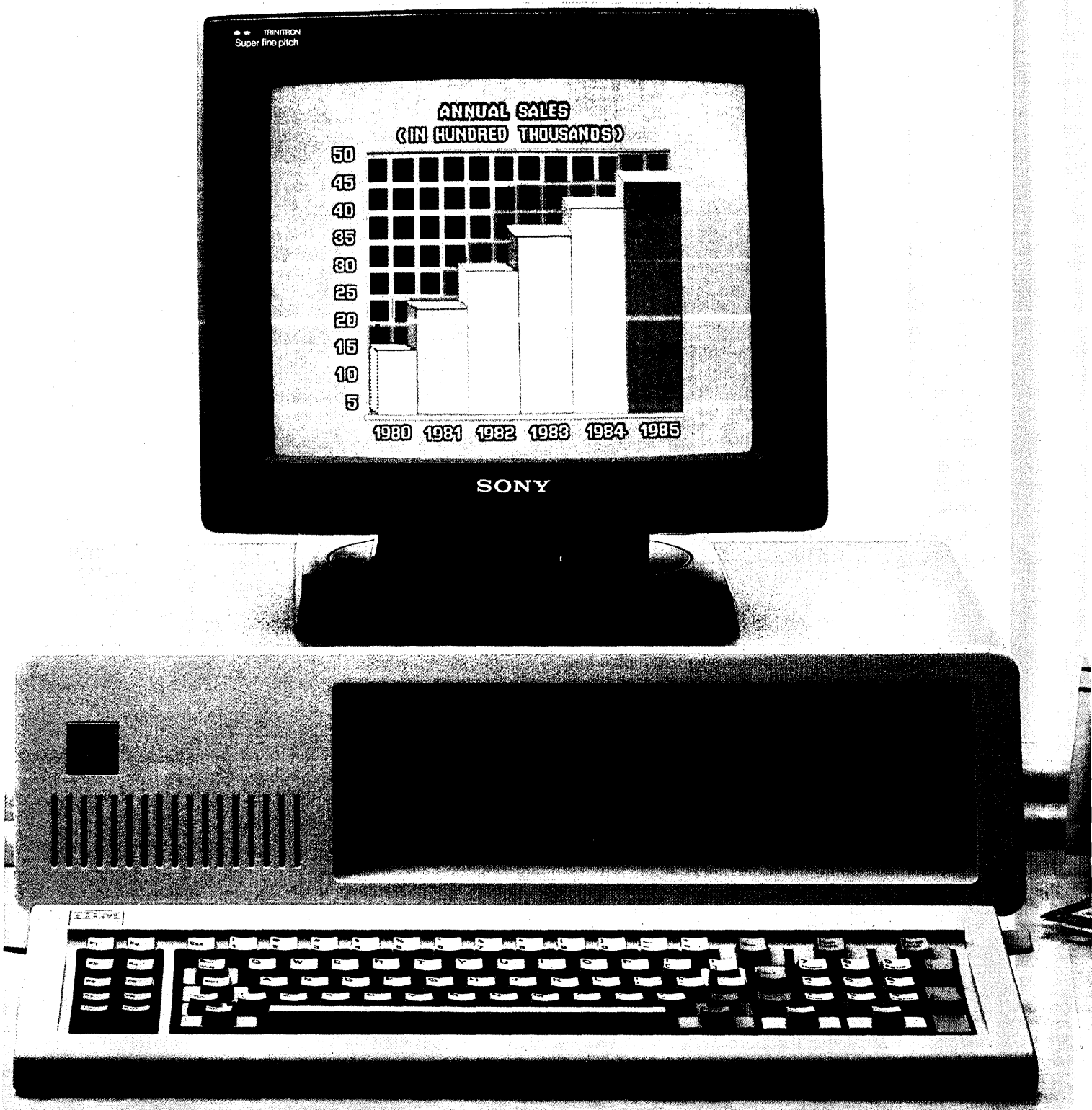

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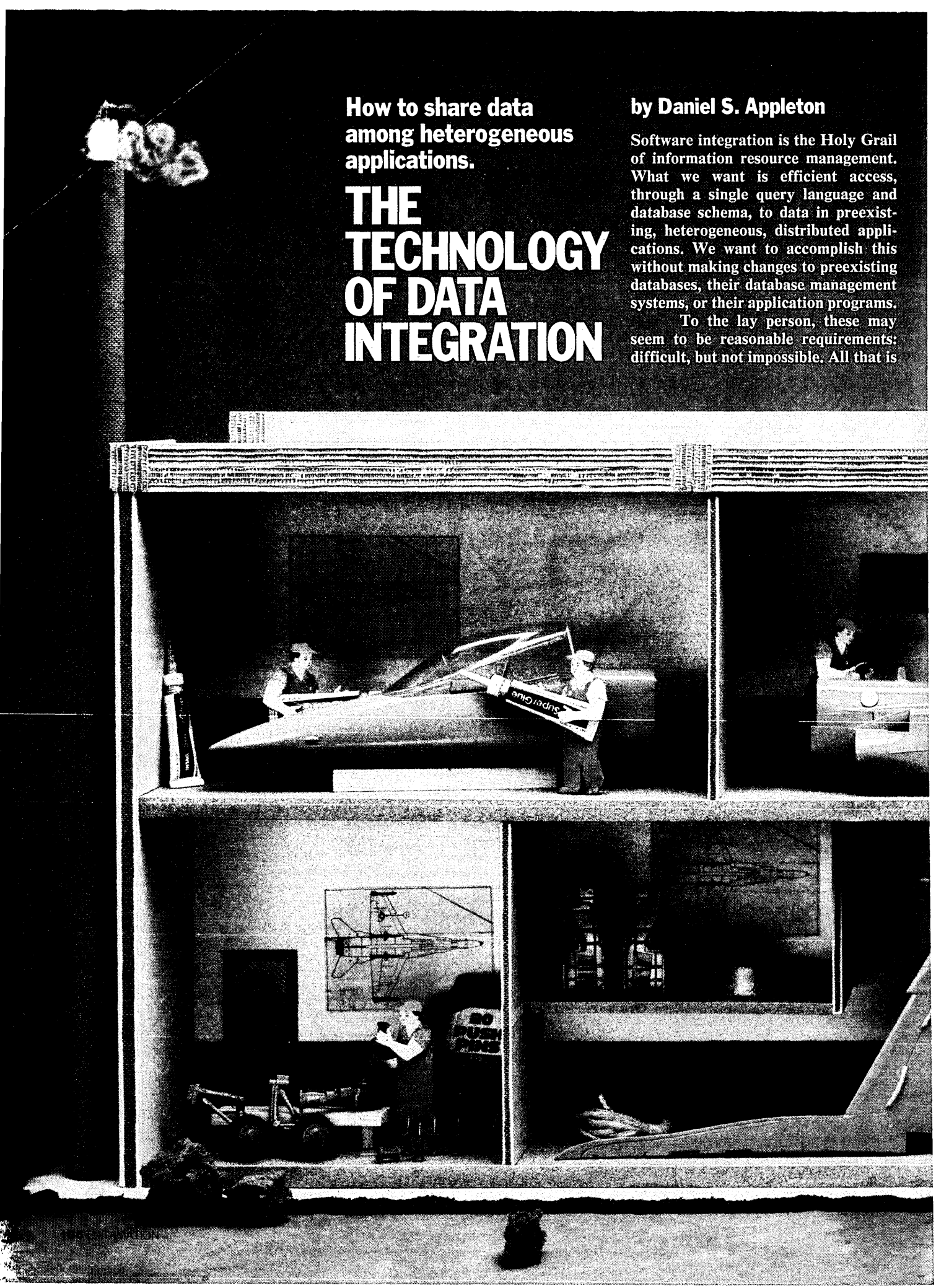


How to share data among heterogeneous applications.

THE TECHNOLOGY OF DATA INTEGRATION

by Daniel S. Appleton

Software integration is the Holy Grail of information resource management. What we want is efficient access, through a single query language and database schema, to data in preexisting, heterogeneous, distributed applications. We want to accomplish this without making changes to preexisting databases, their database management systems, or their application programs.

To the lay person, these may seem to be reasonable requirements: difficult, but not impossible. All that is

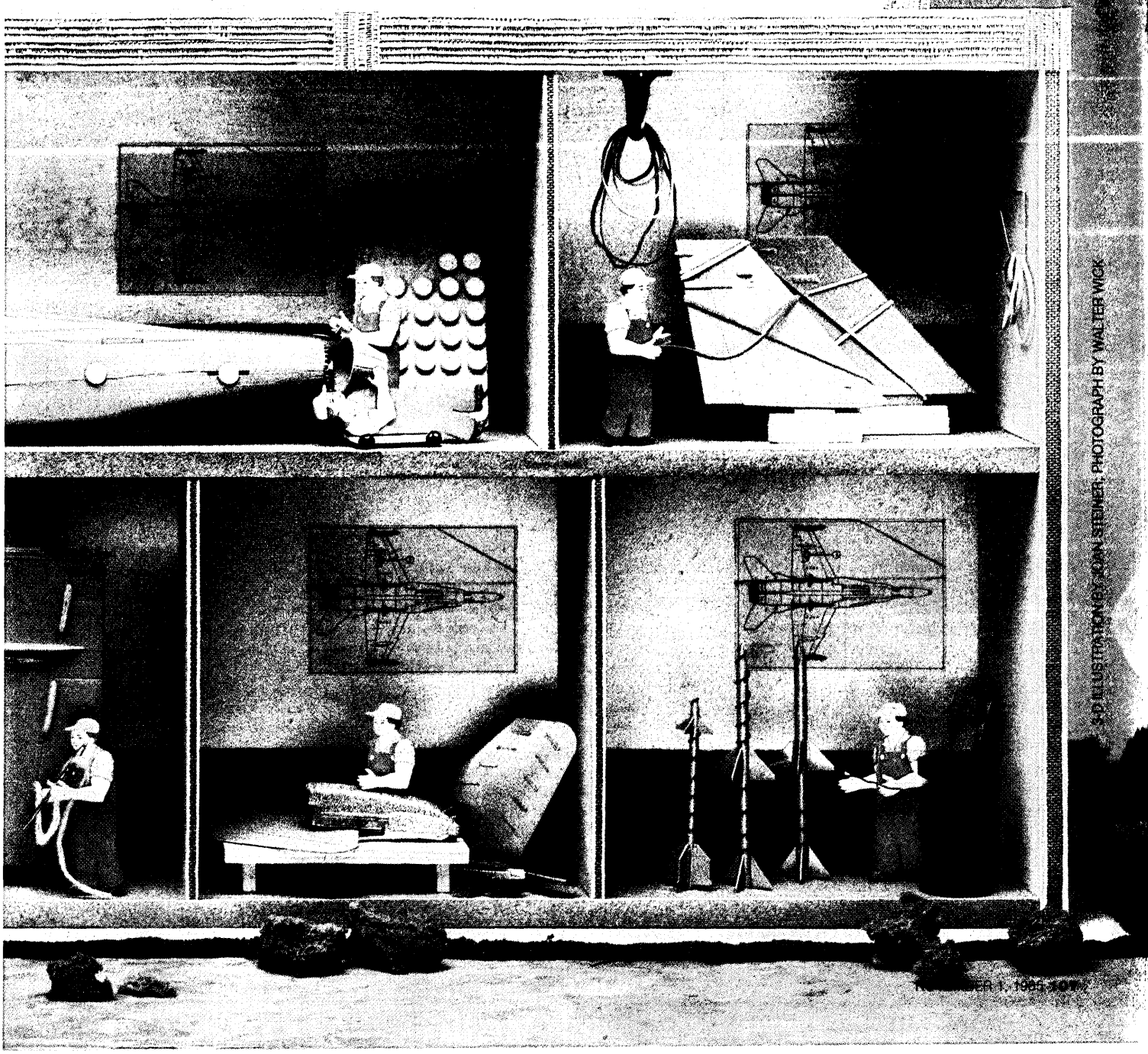
required is a software system that presents the user with the illusion of a single, integrated, consistent, nondistributed database. Simple. But no one, not even IBM, has succeeded in building such a software system, even though most information resource management professionals would give their left incisor for one.

The problem of building such a software system is so enormous that no one has been able to tackle the whole thing. Over the last five years, it has resolved itself into four separate but highly related subsets of technology: 1. user interface technology, 2. distributed heterogeneous data management technology, 3. network transaction management technology, and 4. interprocessor communication technology (see Fig. 1).

While the main focus of this article is on distributed, heterogeneous data management technology, a brief review of each of the four subsets of integration technology will prove helpful.

Interprocessor communication technology provides communications primitives (that is, the building blocks of protocols) that enable different computers to send and receive messages among themselves. This technology generally spans levels one through six of the OSI communications reference model.

This is the only subset of integration technology that exists below level seven of the OSI model. In fact, the emergence of the other three subsets gives rise to speculation that the seventh layer—the applications layer—should be redefined as the applications services layer, and that applications should be in an eighth lay-



2-D ILLUSTRATION BY JOAN STEINER; PHOTOGRAPH BY WALTER WICK

The problems of integration in this industry are particularly acute because manufacturing automation is not predominantly IBM-based.

er. Therefore, the remaining three subsets of integration technology contain most, if not all, of the functions of the applications services layer of the OSI model.

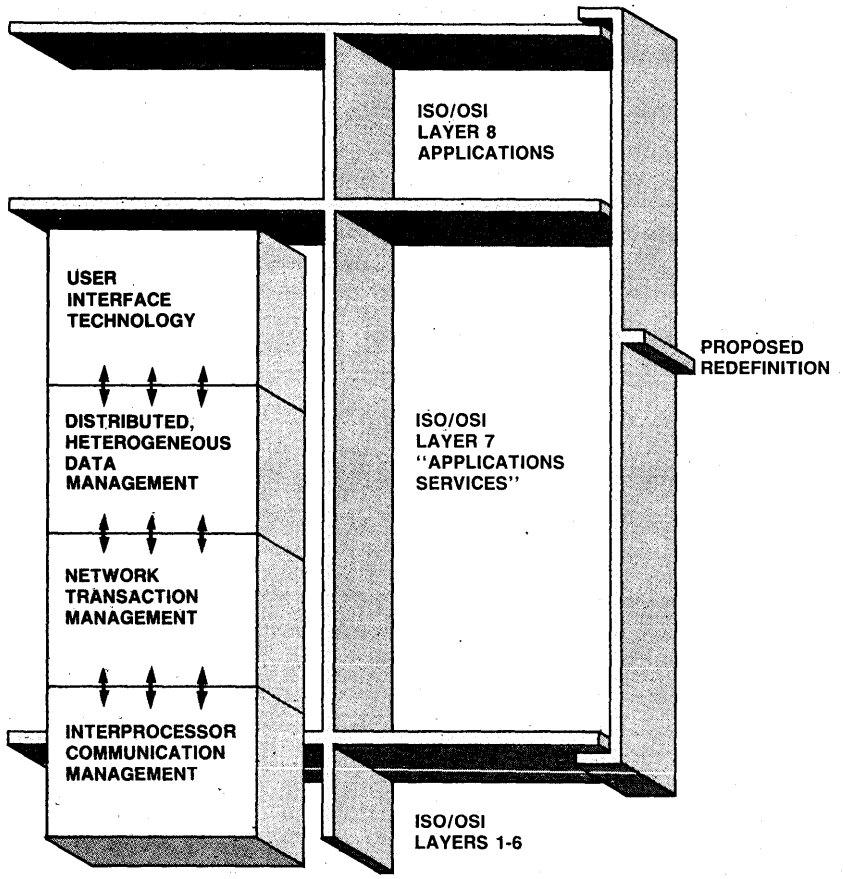
Network transaction management technology enables one process to send messages to another process, identified by a logical name, without specifying whether that process is on the same host or on a different host. Besides message transfer, it provides for functions such as job transfer and file transfer. Transaction management technology also provides many of the functions of a distributed operating system, including system-level resource accounting, recovery, security, and initialization.

User interface technology allows users to construct and use a wide variety of features, including windowing, searching, graphics, and report writing, using one standard language. A virtual terminal interface enables the user to use any terminal type to perform all of his language functions, regardless of what make or brand of terminal or terminal software he may have.

Distributed heterogeneous data management technology provides for the retrieval and update of data distributed throughout the environment. Through its data dictionary, it knows which data are where, what the logical and physical structures of those data are, and how to access them. It consists of a global, or neutral, data definition language that describes common data, and a global, or neutral, data manipulation language that manipulates those descriptions to provide access to the data, whether they are stored in a database management system (DBMS) or under a specialized file control system. The data dictionary can be either passive or active, i.e., it can be used to compile network programs or it can be active at run time.

FIG. 1

THE FOUR SUBSETS OF INTEGRATION TECHNOLOGY



A SPECIAL SOFTWARE SYSTEM

What does integration technology integrate? Two things. First, there is the current automated environment. Integration technology can be viewed as a special software system whose sole purpose is to integrate an existing environment of heterogeneous hardware, system software, DBMSs, file control systems, application systems, programs, databases, and data. When inserted into an existing environment, integration technology tends to stand out in that environment.

The second thing integrated by integration technology is the future automated environment. Future projects must use the technology as part of their development. In this way they share the integration technology. It is embedded within them. It constitutes the "parts they have in common." In future environments, integration technology will not be visible. It will just be there.

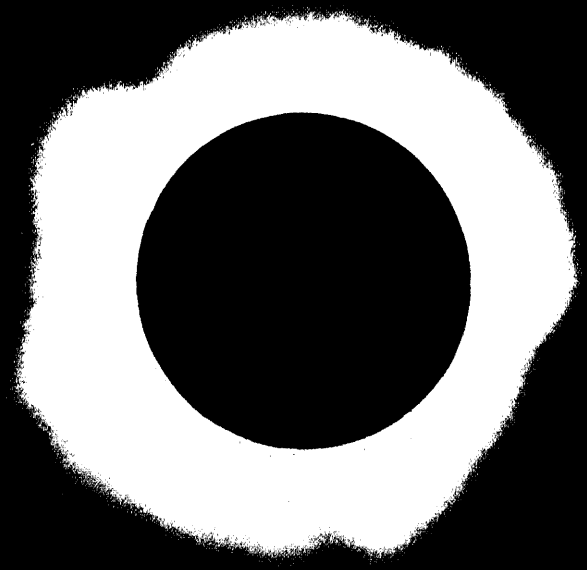
No one believes it is possible to build a single software system that will totally integrate all existing environments. Most researchers believe, however, that some degree of integration is possible for all existing environments. They also believe that if future additions and changes to the existing environments are implemented around such a software system, an optimum level of integration can be achieved. Environments exhibit varying degrees of hostility toward integration technology. Least friendly are those where specific hardware and data management technologies have been implemented just because they supported a given application. These environments can hardly be interfaced, much less integrated.

Environments built from a technology plan that standardizes DBMS software, as well as hardware and operating systems, are much more friendly to integration technology. Network and relational database management technology are much more integratable than are hierarchical database management technologies or environments with no DBMS technology at all.

Progress has been made in all four areas of integration technology. The ISO/OSI reference model, for example, has helped in setting standards for interprocessor communication technology. In the area of user interface technology, concepts such as SQL, QBE, and lexical report writers have helped to transcend application particulars.

But to find the Holy Grail, the really tough problem of distributed, heterogeneous data management must also be solved. Reference models and standards must be established so that particular software systems can be designed and built.

Reference models and standards evolve from projects that invent and test possible solutions. To date, probably $50



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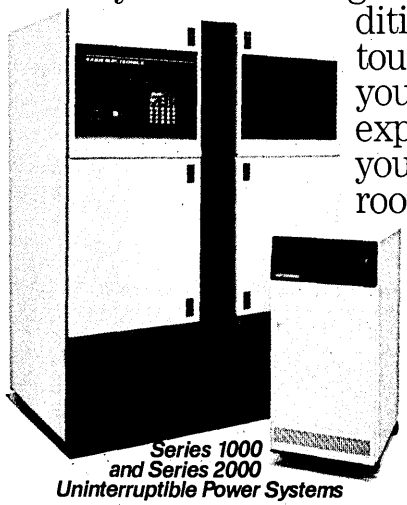

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There is no general agreement among commercial software vendors as to what the executive functionality should be.

million has been invested in four public projects, each of which is attempting to expand our knowledge and technology for dealing with distributed, heterogeneous data management. These projects are Multibase, sponsored by DARPA and the U.S. Navy; the Integrated Information Support System (IISS), sponsored by the U.S. Air Force; the Integrated Manufacturing Distributed Database Administration System (IMDAS), sponsored by the National Bureau of Standards; and the Integrated Design Support System (IDS), also sponsored by the Air Force (see box).

It should not be a surprise that most (though not all) of these efforts have their roots in the manufacturing industry. The problems of integration in this industry are particularly acute because, unlike most other industries, manufacturing automation is not predominantly IBM-based. The problems of integration revealed themselves early in manufacturing. But with the exception of integrating business data with technical (geometric) data, the technologies for integrating distributed, heterogeneous databases are not peculiar to the field.

TWO DISTINCT CONCEPTS

There are two distinct concepts and approaches to distributed, heterogeneous data management. Very generally, they could be portrayed as the interfacing approach and the integration approach. The key difference between them is that in the interfacing approach there are no technological controls over data integrity; in the integration approach, data integrity in a distributed heterogeneous environment is a major issue.

Interfacing technology is done with what is called a two-schema approach. This approach builds a cross-reference table or a matrix between each pair of physical files, databases, or systems to be interfaced. This matrix is used to transform one physical structure into another, as required. Thus, there are $N \times N - 1$ matrices and transforms required in the environment, where N equals the total number of physical files or databases to be interfaced.

Interfacing can be accomplished through either transaction passing or controlled redundancy. In transaction passing, the source database automatically dispatches transactions to the destination database. The destination database usually handles schema transformation, having received transactions as if they were normal output files or reports.

If controlled redundancy is used, snapshots of the source database (or a subset of it) are created and stashed at various locations throughout the network. These snapshots can be accessed by destination databases, but they cannot be updated by them. They are periodically replaced by new, updated files.

Both transaction passing and controlled redundancy must be managed by special software systems. These systems perform certain executive functions such as transaction initiation and redundancy management. These executive functions are beginning to find their way into data dictionary/directory software packages. Thus, we are beginning to hear about global, network, and master data dictionaries. These data dictionaries include special two-schema functionality for distributed, heterogeneous data management.

There is no general agreement among commercial software vendors as to what this executive functionality should be. This, of course, is where the standard reference model comes into the picture. Developing and evaluating this functionality is what the IDS, IISS, IMDAS, and Multibase projects are all about. Thus, all four programs use strategies like those listed above. But those strategies are good only for interfacing data structures within the existing environment. They do not integrate them. To do so requires a three-schema approach. The third schema is focused on data integrity.

The three-schema approach to data integration is being developed by all four of the integration technology projects. It introduces a "conceptual schema" into the technology picture. The conceptual schema defines a consistent set of business rules that are needed to manage integrity in shared data (see "Business Rules: The Missing Link," Oct. 15, 1984, p. 145).

The conceptual schema is always defined by an entity relationship or semantic data model. IDS and IISS use IDEF1-Extended, IMDAS uses SAM*, and Multibase uses DAPLEX.

ALL DATA IN ONE SCHEMA

All of the data in the environment under the control of the integration technology are defined in one global conceptual schema. The conceptual schema is mapped to many file and DBMS structures (internal schemata), as well as to many user views (external schemata). All three schemata and the transforms among them are managed via a three-schema data dictionary.

The data model required for the conceptual schema is a very powerful data definition language that defines the global (sometimes called a "neutral") conceptual schema in terms of objects, events, and states (in time). It also defines integrity constraints on the relationships and dependencies.

INTEGRATION TECHNOLOGY RESEARCH PROJECTS

Multibase

Multibase is a prototype software system that provides a uniform, integrated interface, which allows the user to reference data in distributed, preexisting, heterogeneous databases with one query language over one database description. Practical applications of the prototype are being made at General Dynamics (i.e., the CAD/CAM Database Management System) and at Rockwell International. The project is being conducted by Computer Corp. of America (CCA), Cambridge, Mass., and is jointly supported by DARPA and the U.S. Navy.

Integrated Information Support System (IISS)

IISS is a software system that achieves control of and access to information in preexisting, distributed, heterogeneous databases to allow data shareability and to provide a means for improving data quality and data timeliness. Practical applications of this technology are being made by Boeing and McAir. IISS research is being conducted by Boeing, DACOM, SDRC, and CDC under contract with the U.S. Air Force at Wright-Patterson Air Force Base in Dayton, Ohio.

Integrated Design Support (IDS) System

The IDS project is chartered to assemble various off-the-shelf tools and to add technology as required to support the management and control, update, and retrieval of existing and future technical data for the B-1B aircraft. These technical data are distributed in heterogeneous databases. The technical project is being conducted by Rockwell, DACOM, SDRC, and CCA for the USAF at the Wright-Patterson base in Dayton.

Integrated Manufacturing Distributed Database Administration System (IMDAS)

IMDAS is a prototype software system that provides update and retrieval services over preexisting, distributed, heterogeneous files and databases. The project is being sponsored as part of the National Bureau of Standards' Advanced Manufacturing Research Facility and is being conducted by NBS (Gaithersburg, Md.) and the University of Florida. **—D.A.**

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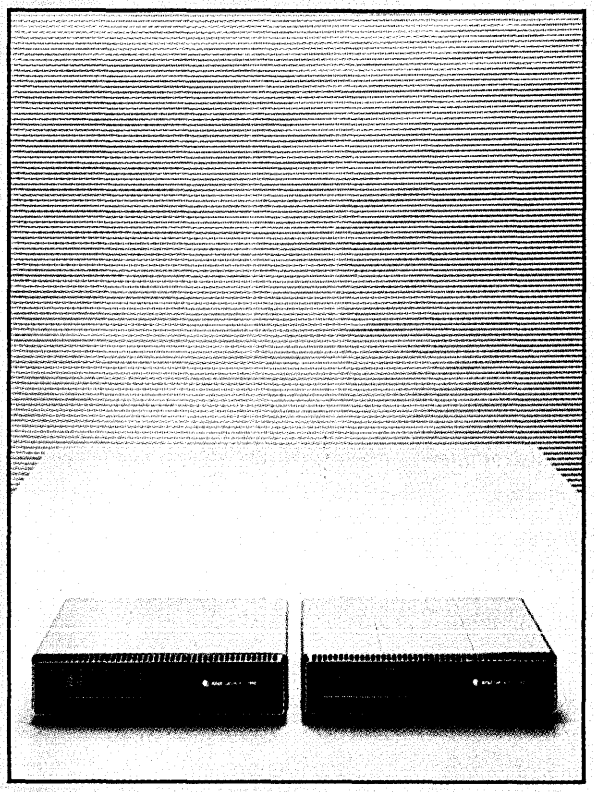

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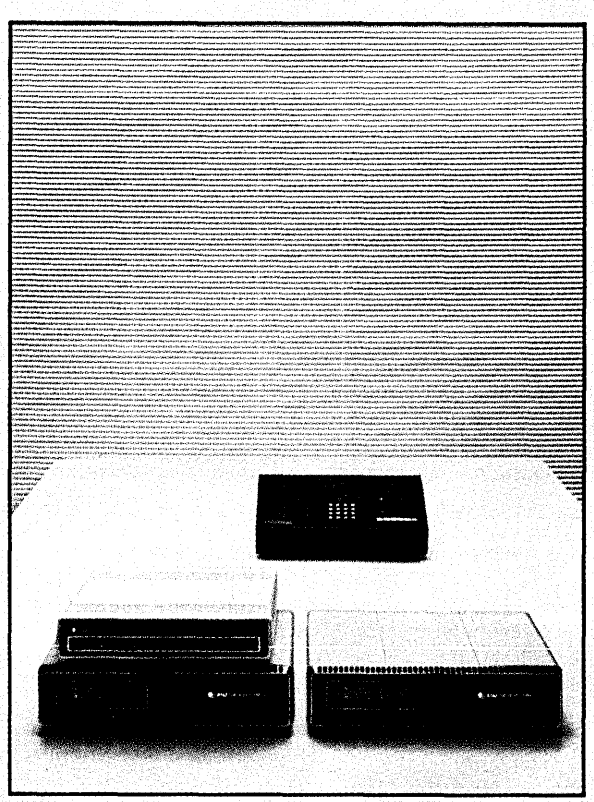

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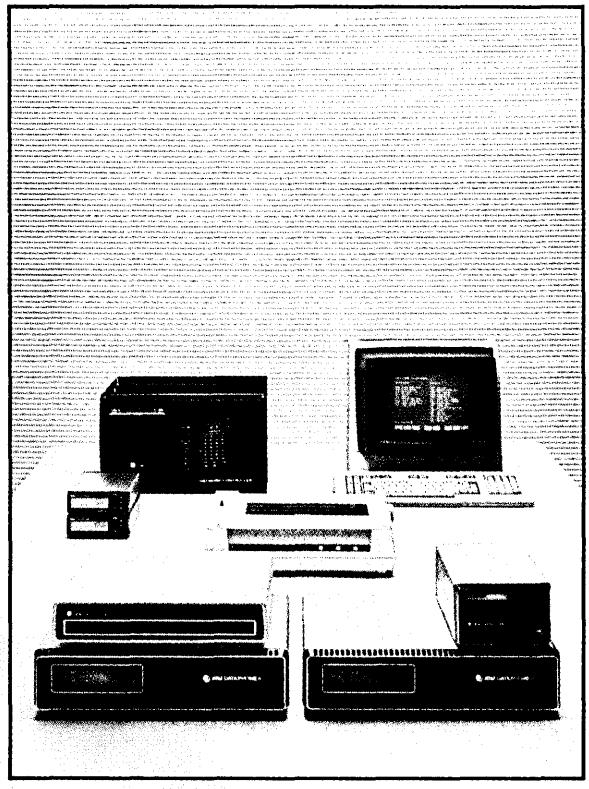

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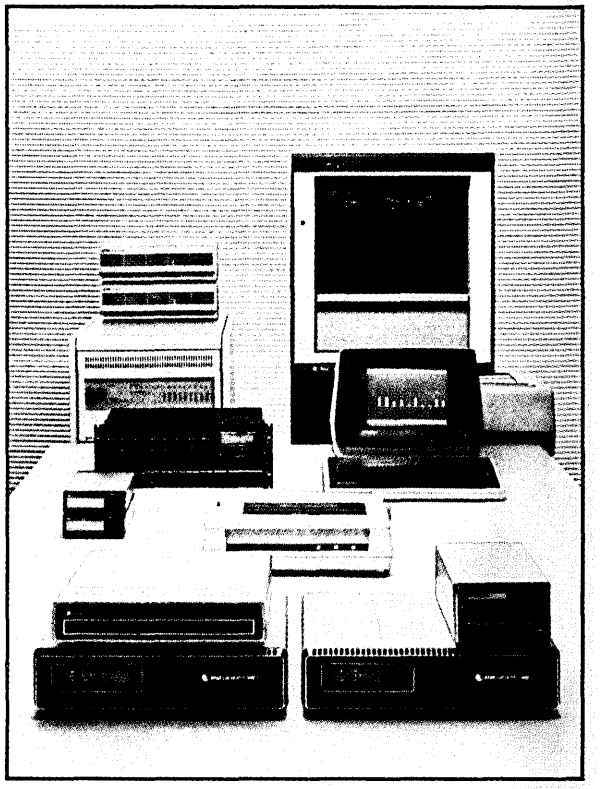

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The data dictionary is a major issue for integration technology.

The schema is a very special logical data model. It must be consistent, accessible, extensible, and transformable. It derives these qualities from the data model in which it is defined, and from the procedures used to build and maintain it.

Because the conceptual schema is in a well-defined entity relationship or semantic construct, it can be transformed into user views by a "global" data manipulation language that is very similar to relational or extended relational algebra. This transformation is called the conceptual-to-external transformation, and it generally is integrated into the user language of the software system.

The other transformation, conceptual to internal, is the hard part. Generally, transformations of both structure and form of the schema must be made to handle the wide variety of DBMSs and file control systems (FCSs) in the environment in which the schema is being implemented.

Since not all of the environment's DMBSs and FCSs are of equal quality, the conceptual-to-internal transformations are performed by software at each node, and data are moved through the network in the conceptual form. This is more economical anyway, since nodes can always expect to transmit and receive data in the same form.

The data described by the conceptual schema are viewed by many users as different external schemata. The data described by the conceptual schema are physically implemented in many databases, each described by an internal schema. In the IDEF1-Extended notation, each box represents an entity; each arc represents a relationship. A "big dot" indicates that the relationship is "one to many."

The conceptual schema describes a neutral, integrated view of the shared data resource. There is one global conceptual schema in an enterprise. It is independent of physical database structures and boundaries and is neutral to the biases of individual applications. Each internal schema represents a user or applications view of data. Requests are made against external schemata.

The following are the objectives of a conceptual schema:

- Data standardization—by defining a consistent, extensible, and transformable set of business rules to be used by all data projects.
- Data integration—by pulling together facts in multiple databases.
- Data sharing—by supporting multiple user views (i.e., external schemata) of the data resource.
- Data quality—by specifying and enforcing data integrity constraints.
- Data administration—by documenting the meanings in the data resource.
- Data independence—by isolating data structure changes (i.e., changes to internal schemata) from user views and programs.
- Data growth—by evolving consistently as its scope is extended.

The data dictionary is a major issue for integration technology. In fact, all four of the integration technology research projects determined that they had to build special data dictionaries to handle the distributed, heterogeneous data management problem. Existing commercial data dictionaries fell far short of their requirements.

All commercial data dictionaries are basically two-schema data dictionaries. They have little or no capability to define or store a conceptual schema and its transforms, much less to use them for anything. Most commercially available data dictionaries are designed for one DBMS only, and they are not even designed to handle physical distribution of the data in that DBMS.

All four integration technology projects are building and using three-schema data dictionaries. Typical of the three-schema data dictionary architecture is what IISS calls the CDM (Common Data Model) subsystem. The CDM subsystem consists of two software modules. The CDM dictionary is a database that describes shared data (the conceptual schema) and the network environment. The CDM processor is software that accesses the CDM dictionary and transforms users' data requests into transactions that can be processed by the local DBMSs or FCSs. The CDM processor is the distributed database manager of IISS.

All four technology projects have tackled what they call the retrieval problem. They all employ their data dictionaries to access data in the environment.

SCHEMA AS ROSETTA STONE

The objective, of course, is to use the conceptual schema as a Rosetta Stone to translate user queries that require data distributed over heterogeneous hardware nodes, DMBSs, and application databases. The user query is unaware of where and how the data are stored. These systems process both ad hoc and standard queries, and they have built-in security and access controls.

The retrieval problem is simple compared with the update problem, because retrievals do not affect database states; updates do. The three-schema data dictionary, therefore, has to worry about concurrency problems and about backup and recovery problems. These problems can be aggravated depending on how much the system uses redundancy to improve efficiency.

IISS, IMDAS, and IDS are committed to attacking the update problems. To do this, they will use dependency and relationship constraint logic embedded in the conceptual schema to ensure the integrity of updates.

Obviously, the ideal is to have a three-schema data dictionary that controls updates and retrievals in a distributed, heterogeneous environment and that operates in-line with all application programs. To do so, it would have to operate at run time. Few commercial data dictionaries operate at this level today. Most of them are passive, i.e., a precompiler takes metadata out of the data dictionary and puts them into the source code of a program, which must subsequently be compiled into object code. Some of them are active, which means they are used by language compilers.

Three of the four research projects have requirements to develop run-time, three-schema data dictionaries for both update and retrieval. Today, however, they are content to achieve active status on retrievals (both ad hoc and standard) and on updates. In-line is still a ways away.

There is no doubt that the demand for integration technology is very high. This demand is driving all four subsets of the technology—interprocessor communications, network transaction management, distributed heterogeneous data management, and user interface technology—in clearly defined directions.

While progress is required in all four areas, individual businesses are attempting to assemble their own integration software subsystems from technological pieces that are currently available. Some organizations are attempting to build three-schema master data dictionaries using relational DBMSs or 4GLs. Others have chosen one of the many data dictionary products such as the IBM Data Dictionary, Data Manager, or the ADR Data Dictionary, and have performed surgery on it to turn it into a master data dictionary. Depending on the data dictionary, this surgery can be a simple appendectomy or a difficult quadruple heart bypass. The degree of difficulty is also dependent on what they want the final product to be: a two-schema or a three-schema master data dictionary, or both. Before this can be decided, some key architectural commitments must be made.

The first commitment is what I call the commitment to heterogeneity. Some businesses believe they can solve the integration problem by committing the future automated environment to one single hardware or software vendor. They believe they can solve their current integration prob-

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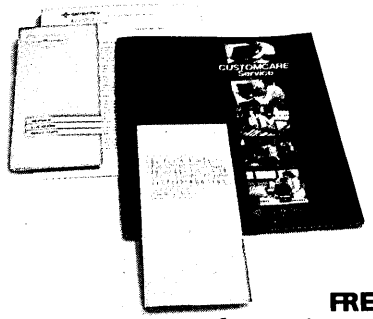

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A commitment to data integrity means a commitment to data management by thorough business rules.

lems by committing to build a homogeneous environment, e.g., a single "total integrated application."

MYOPIC BUSINESS PLANNING

Businesses that think and plan their automated environments in this way have no commitments to heterogeneity. They are, in my opinion, unrealistic and myopic. No environment is more dynamic than the information environment. No technology moves more quickly or in more directions. Businesses need to take advantage of these dynamics, not defend themselves. A commitment to heterogeneity will provide the context for taking advantage of all opportunities.

The second commitment is what I call a commitment to standards and the reuse of assets. Most businesses still see IRM standards as controls and constraints to creativity and progress. This is because of the way they have traditionally been developed and implemented by dp departments. Good standards enable creativity and progress. They are offensive, not defensive. Without a commitment to standards and reuse of assets, no concept of integration is even remotely feasible.

The commitment to standards and reuse of assets means first that special organizations, which I call asset engineering organizations, must be commissioned to build assets that are reusable. This requires an investment in asset development. Such an investment program requires significant changes in traditional IRM planning, system engineering, financing, performance management, staffing, project definitions, and project management processes.

The final commitment is what I call a commitment to data integrity. The most valuable information assets are data. In fact, today, the asset engineers in the IRM world are the database administrators and managers. (Maybe we should start calling them that.)

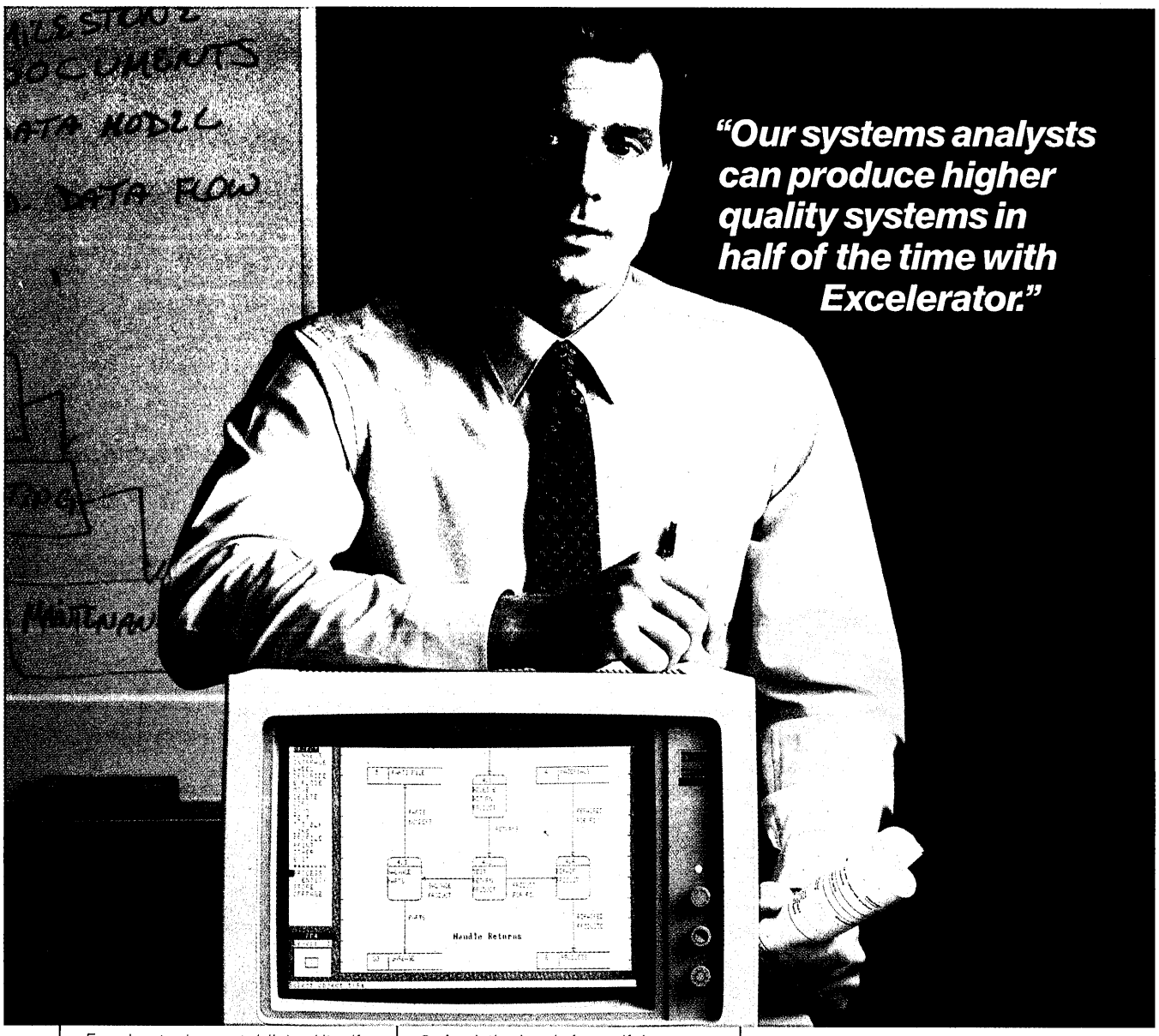
A commitment to data integrity does not mean standardizing the names of data elements. It means a commitment to data management through business rules and a focus on common and shared data (see "Law of the Data Jungle," October 1983, p. 225). This commitment is what "data-driven" information resource management is all about.

Most businesses are stepping up to these commitments. The excuse I most often hear for deciding against making all three commitments is that "the technology is not here to support the commitments." But it is.

There are major technological movements in all four levels of integration technology. Some vendors even claim to have active three-schema data dictionaries, and more vendors are advertising that they have them in the works. But these technologies are not self-implementing.

Technology is holding nothing back. Cultural changes and changes to traditional IRM beliefs and processes are the real inhibitors to integration. But those are changing too—as I will explain in my next article. ◉

Dan Appleton is president of DACOM Inc., a Manhattan Beach, Calif., firm specializing in manufacturing information resource management. He is chairman of the CASA/SME Technical Council.



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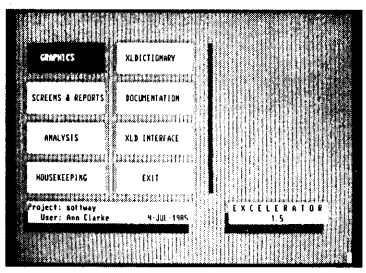

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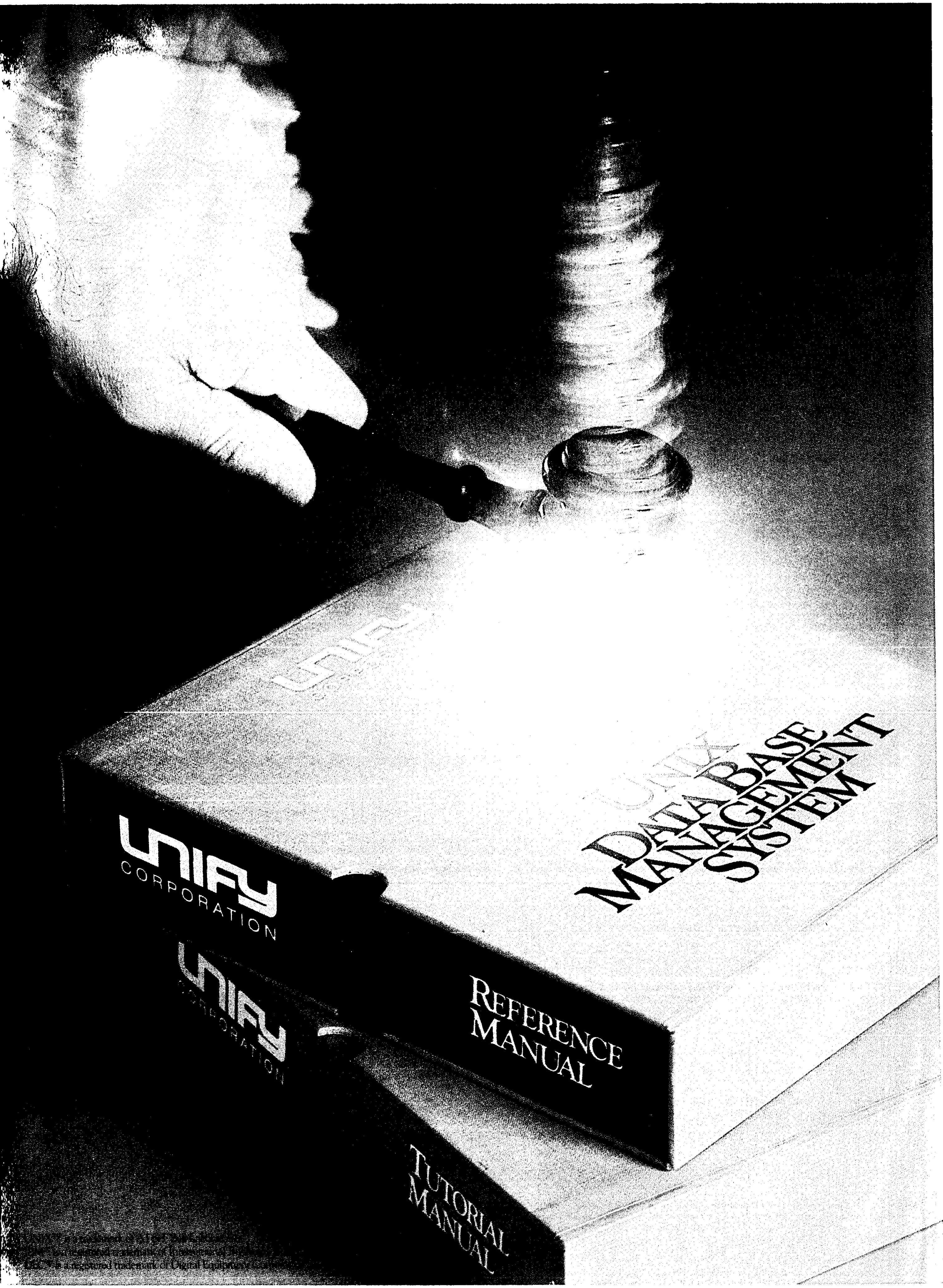
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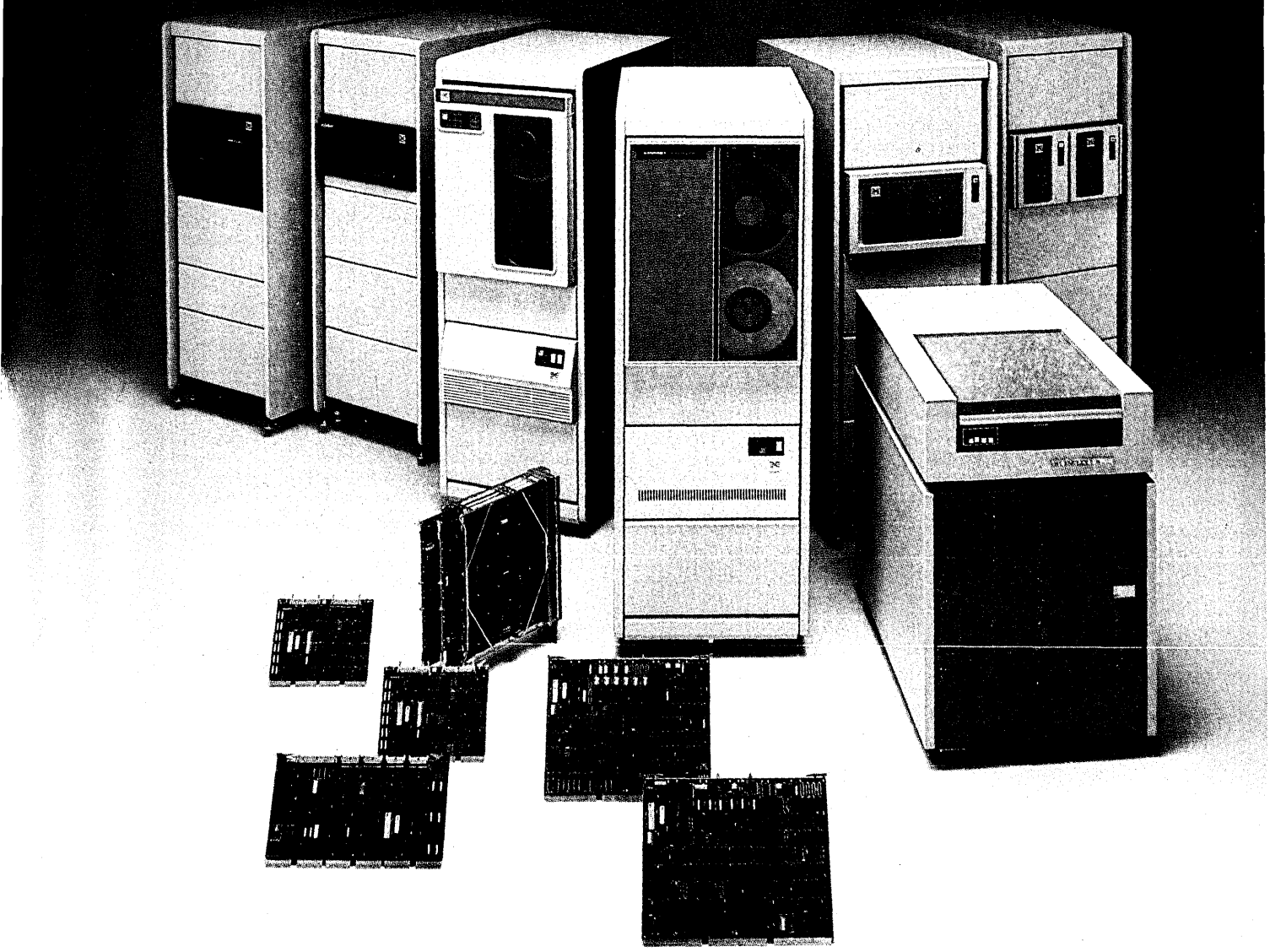

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Here's a way to determine which systems projects will be most important and profitable to your company.

PROJECT EVALUATION MADE SIMPLE

by Donald Spadaro

All companies have limited amounts of resources for doing systems projects and must therefore carefully choose the best projects. We can define the best projects as those that are most important to the company and contribute to higher profits. But before committing to a seemingly important project, companies should carefully evaluate the project's probability for successful completion.

Projects that fail to deliver what they promised or, even worse, deliver nothing at all represent a staggering amount of waste to corporations all over the world. In the United States alone, software development is estimated to cost corporations over $20 billion per year. It is also estimated 15% of these projects deliver nothing! Assuming that the completed projects delivered 75% of their intended benefits, we can estimate that some $3 billion to $7 billion is wasted on software projects each year.

This article proposes a new simplified approach toward accurately evaluating the merits of project requests. It is an important responsibility of every director of information services to ensure that his company uses a reliable and quantitative method of selecting IS projects. Failure to do this will probably result in an ever-increasing project backlog, dissatisfied users, loss of the IS director's hair, or worse yet, his unexpected early retirement.

If you're like most information services department heads, you are probably constantly frustrated by the never-ending stream of new project requests. Backlogs of two to three years are not uncommon. You may be one of the only people in your company who appreciates what an enormous effort it will take to satisfy your project-hungry user community. Generally, you won't get much sympathy from your boss either; after all, he didn't approve that last hardware upgrade and the additional maintenance programmer you requested.

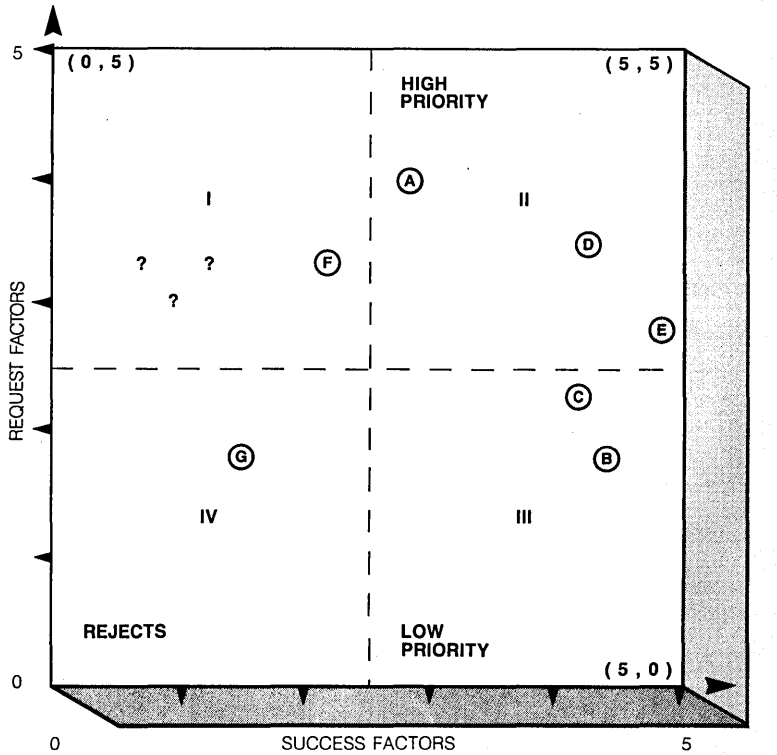
Your boss has asked you to make a list of the open projects to help him decide which have the highest priorities. You will find the users are indeed very prolific at thinking up new projects, and consequently, the list will continue to grow. You certainly won't be able to complete projects faster than the users can request new ones.

Hence, you are hopelessly fighting a battle that appears to be heavily stacked in the other guy's (the user's) favor. What do you do? Hire more programmers and systems analysts? Ignore the user requests? An alternative is to reduce the number of open projects by doing a careful, objective analysis using the request-success grid shown in Fig. 1. You will find that the results of the grid analysis will reduce the number of really good projects dramatically. The grid will also identify the real dogs that should not be done at all. Likewise, the low-priority projects can easily be identified and put on the back burner until there is nothing more worthwhile to do. In short, the use of the grid will reduce your backlog immediately while making sure that your company is working on the best projects.

A secondary benefit to using the grid is that it is an excellent communications aid for discussing project priorities with top management and, in general, the user community. Top managers are likely to have been exposed to grid presentations, especially if they have ever employed out-

FIG. 1

THE REQUEST-SUCCESS GRID



The aim of the grid is to quantify the project's value to the company.

FIG. 2

PROJECT APPRAISAL WORKSHEET (FACTORS VALUES 0 → 5)

PROJECT NAME	REQUEST FACTORS & WEIGHTS			SUCCESS FACTORS & WEIGHTS				
	CO. NEED	ROI	WEIGHTED SCORE	PROBLEM RESOLUTION	USER AVAILABILITY	DEVELOP TIME	DEPT. SPANNED	WEIGHTED SCORE
	.60	.40	R.F.	.60	.40	−.20	−.20	S.F.
(A) Billing system	3	5	3.8	4	3	2	2	2.8
(B) Pricing analysis	3	0	1.8	4	5	0	0	4.4
(C) Customer profitability	4	0	2.4	5	4	2	0	4.2
(D) Investment planning	4	3	3.6	5	4	2	0	4.2
(E) Sales analysis	4	1	2.8	5	5	0	1	4.8
(F) Fixed assets	4	2	3.2	3	2	2	0	2.2
(G) Computerized scheduling	3	0	1.8	3	1	2	0	1.8

side business consultants. There are, to be sure, many famous grids that have been developed over the years to help in management decision-making. One of the most famous is the Boston Consultants Group market share/business growth grid. And, of course, there is the Blake-Mouton management grid, which sought to classify the different types of management styles.

FILL OUT REQUEST FORM

The best bunch of people to do the grid evaluation is the company's information systems planning committee. (If you don't have one yet, you should start one as soon as possible.) The requesting user department should fill out a systems project request form that outlines the nature of the request and its expected benefits to the company. The information services department should then work up a preliminary time estimate both in man-days and in calendar months.

The request-success (R-S) grid is a two-dimensional analysis of the merits of a particular systems project. Its aim is to quantify the project's value to the company and to ascertain its probability of being successfully completed and implemented. The grid's Y-axis represents the project's request factors or, in other words, why the project should be done at all.

The X-axis represents the project's success factors. These include factors related to the project's ability to succeed, such as problem definition and resolution, user availability, etc.

To use the grid, one must assign a rating from 0 to 5 to each of the request and success factors (see Fig. 2). The rating is then multiplied by that factor's weight. The results of each multiplication are then added together to form the weighted scores—the X and Y coordinates on the grid. Next, simply plot these coordinates on the grid. The maximum weighted value for either coordinate is 5. Therefore, a project that scores a 5, 5 is theoretically the best possible project to undertake. Conversely, a 0, 0 score would indicate an extremely poor project choice. Projects with long development times or those that cross several departmental boundaries tend to diminish the probabilities for successful completions and would therefore carry negative weights.

In general, a rating of 0 means minimum and a rating of 5 represents maximum. Here's how to do it:

Company needs. Assign a 5 if it is absolutely vital to the company's survival. A 0 means you really don't need it.

Return on investment. Assign a 5 for a project that promises a huge ROI, say, over 40%. Assign a 3 for a 15% to 20% return, and so on.

Problem resolution. Assign a 0 if nobody knows how to solve the problem. Assign a 5 if you and the user understand exactly how to solve the problem. Use your judgment for relative levels of understanding in between 0 and 5.

User availability. Assign a 0 if the user is never available (i.e., he's on the road four days a week and won't delegate the systems definition work to a subordinate). Assign a 5 if he's a former systems man and is always there when you need him.

Development time. Assign a 0 if estimated development time is less than one month and a 5 if it is greater than 18 months. The reasoning here is that lengthy projects involve a much higher degree of risk than do shorter ones. Organizations change and company business objectives may also change the systems requirements. Choose appropriate ratings for projects between one and 18 months. Thus a rating of 5 multiplied by the negative .2 weight will reduce the score that a project can have for its success factors by one point. If the development time is short, a rating of 0 will not decrease the success factors of problem resolution and user availability.

Department spanned. If only one department is affected by the system, assign a rating of 0. Assign a 5 if more than three departments must participate in the system definition, design, and implementation. Choose intermediary ratings 1 through 4

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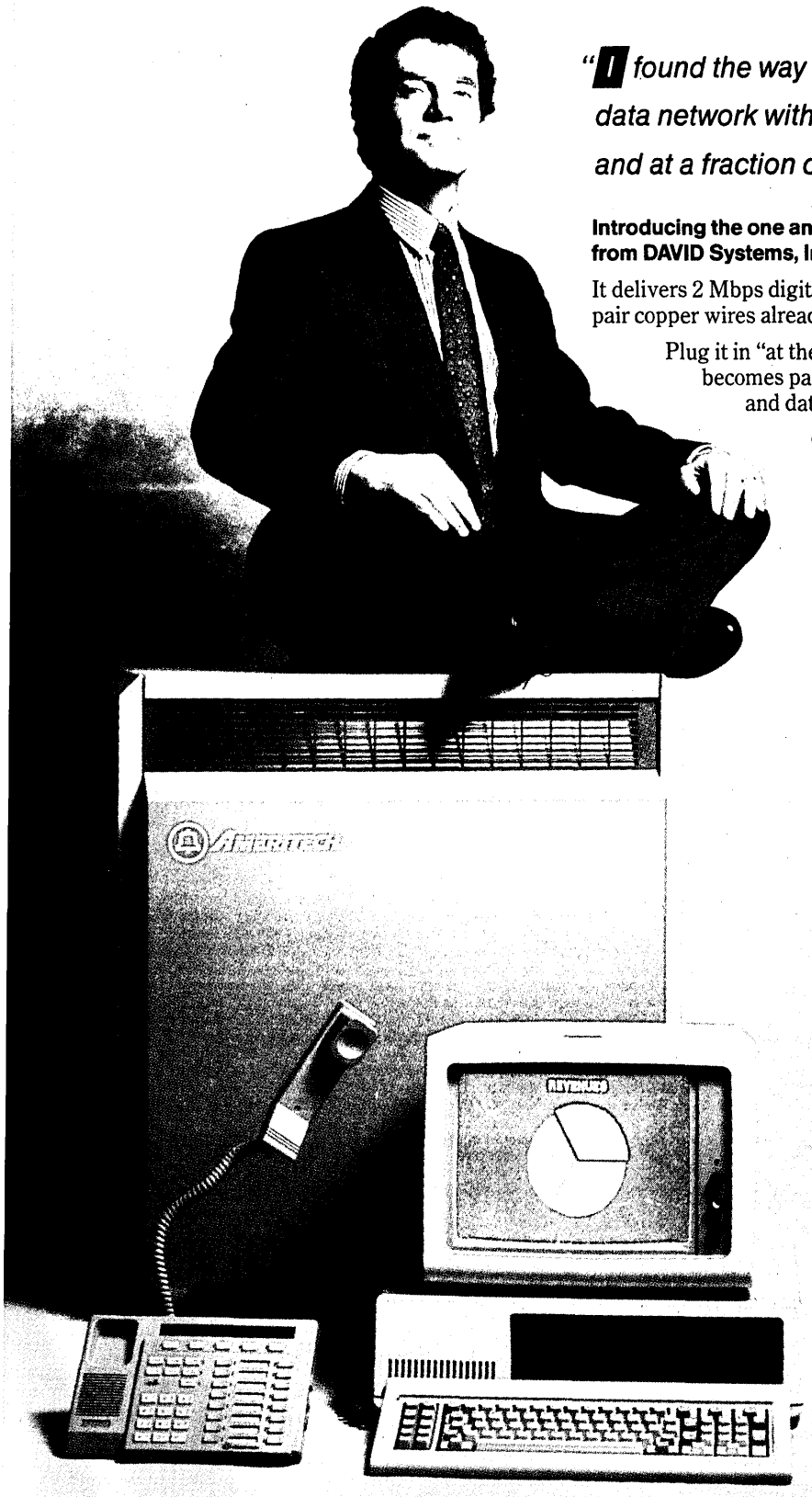

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Knowing which are the most profitable customers should be of utmost importance to companies.

depending on the number of departments and the extent of involvement required. Like the development time factor, this factor has a negative .2 weight. This means a high rating (many departments involved) will reduce the project's overall success factor score.

SCORING ON THE GRID

Fig. 2 shows the project appraisal worksheet with seven evaluated projects. Fig. 1 shows these projects (A through G in circles) plotted on the request-success grid. The grid is divided into four quadrants.

Projects A, D, and E are in quadrant II, which means they are high-priority projects—they are strongly needed and have a strong probablity of succeeding. Note that project E, sales analysis, could not clearly demonstrate a quantifiable return on investment. Its high company need rating (4), however, insured that it would be above the midpoint coordinate of 2.5. And, since its success factors equaled an extremely high score of 4.8, the project should be given a high priority.

Projects C and B fell into low-priority quandrant III. But project C, customer profitability, is obviously a borderline case, which could easily be treated as a high-priority project. Knowing which are the most (and least) profitable customers should be of utmost importance to companies. In this case, the user was unwilling to commit himself to a measurable ROI, hence the return on investment factor was rated as a zero, causing the project to attain a total score of only 2.4 for its request factor coordinate. Therefore, with good management there will be some tangible return on investment from using these reports.

Project F, fixed assets, fell into quadrant I. This quadrant is labeled with three question marks. There is a strong need and ROI for this project, but the company's controller is always busy and doesn't feel he can delegate the systems responsibilities to a member of his staff. In this case, the quadrant I project can easily move accross the line into quadrant II and become a high-priority project, provided the user problem is resolved.

Project G, computerized vehicle scheduling, is rejected because of a low score in both the request and success factors. It is important to realize that a rejected project may in fact be accepted at a later time. Business conditions always change, new users are employed, and technologies improve. Rejects should be reviewed once each year to see if their ratings have changed.

The use of the request-success grid will help company administrators organize their thoughts concerning the project selection task. If used properly, it should weed out some of the projects that often result in many man-months of wasted time. In addition, as mentioned, this methodology has the important benefit of improving communications and hence relations with the users. It's not going to solve all of the MIS director's problems, but it will help. ◉

Donald Spadaro is director of information services at AGA Gas Inc., Cleveland. Before joining AGA 10 years ago, Spadaro was with Airco Industrial Gases, Murray Hill, N.J., in both systems and programming management positions.

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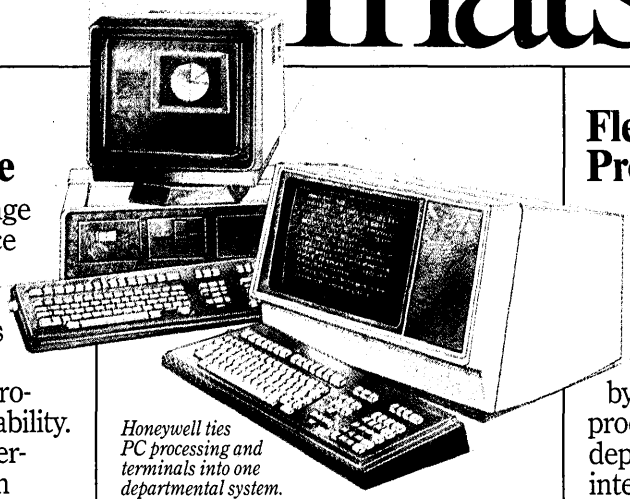

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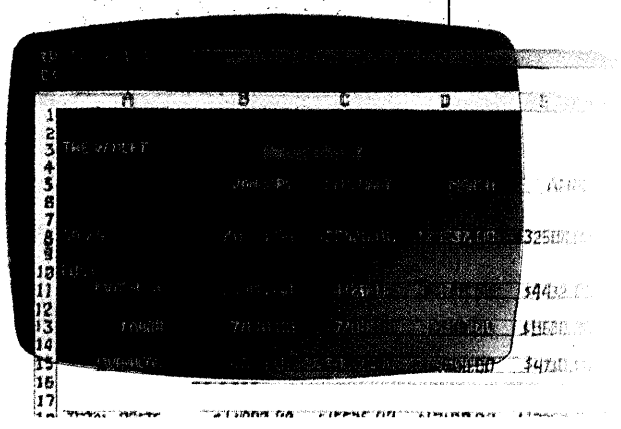

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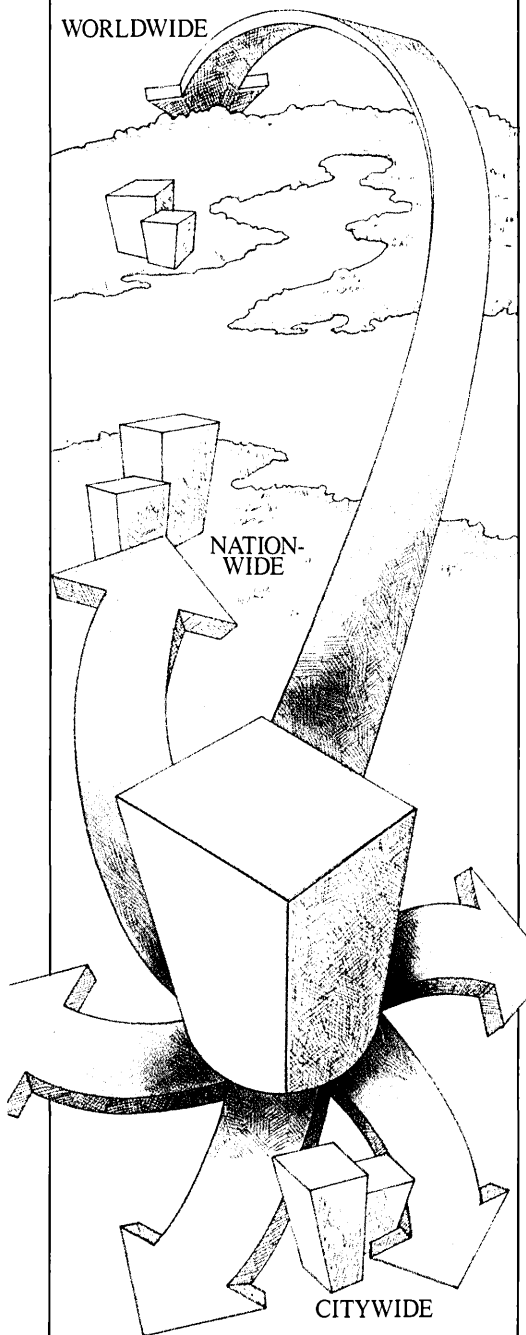

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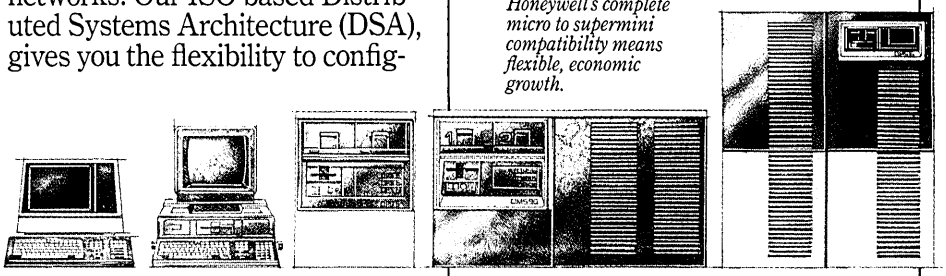

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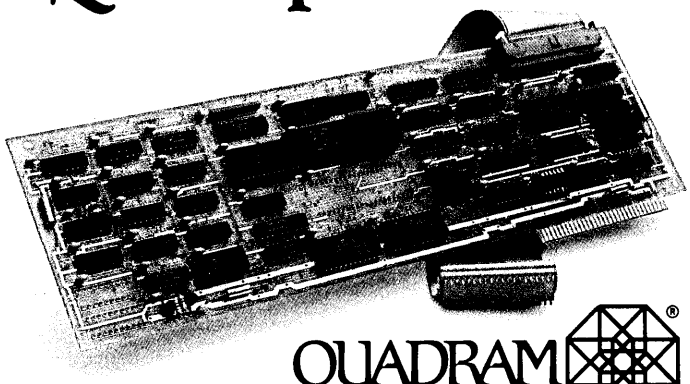


QUADRAM®

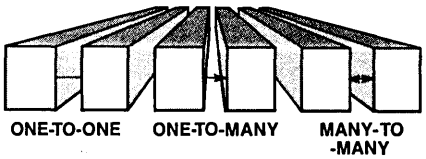
CIRCLE 63 ON READER CARD

We continue our exploration of database design in parts six and seven of this 14-part series, Process-Driven Data Design.

HEADLESS AND OPTIONAL ARROWS

by Frank Sweet

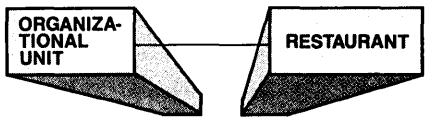
Bachman diagrams show relationships (arrows) among information entities or records (boxes) in conceptual database design. Now, symmetry seems to demand that real-world relationships should come in three flavors:



The idea is so appealing, in fact, that to say only the one-to-many flavor really exists seems to imply an irrational universe. Yet this is the case. Douglas Adams, author of *A Hitchhiker's Guide to the Galaxy,* theorizes that if anyone should discover the purpose of the universe (what it's good for), it will instantly vanish and be replaced by something even more bizarre and inexplicable. I believe this has already happened. In conceptual database design, only one-to-many relationships actually exist for long. The other two are simply intermediate design steps that must be resolved into one-to-manys.

We looked at the many-to-many relationship last time. We showed that such a two-headed arrow tells us we are not finished. It points out that there's an intersection record missing which, when identified, resolves the two-headed arrow into two one-to-many relationships.

The one-to-one headless arrow tells us that there are too many boxes present. Consider the following design modeling a restaurant chain:



Every restaurant is also an organizational unit of the firm. Moreover, each one is only one such unit. Not all units are restaurants, of course; there are also offices, warehouses, districts, and so on. But for every unit that is a restaurant, it is only one restaurant. Some units, like districts or regions, may have several restaurants reporting to them but these aren't the same thing as the restaurants themselves. We first model the situation with a one-to-one relationship, and then consider: are retail stores and organizational units really different entities? No. The terms used are merely context-dependent names for the same class of real-world tangible objects.

The general rule is that when we find a one-to-one relationship between two boxes, we replace them with just one box. The headless arrow means that we are really dealing with one entity. The final criterion, based on normalization, is that if every data element in both boxes can be uniquely and unambiguously determined by the key-field of either box, then you really just have one record type.

For example, the four boxes, "CICS User," "Insurance Claimant," "Credcard Holder," and "Computer Programmer" are all just different views of "Employee." "Inbound Shipment" and "Outbound Shipment" just mean "Shipment."

In physical database design, we do sometimes implement one-to-one relationships in order to conserve core, disk-space, I/O, or cpu cycles. Consider an employee record with fields for executive stock options and bonuses. Since these data apply to only a few employees, the record would have much empty space for most personnel. Wasted disk space at $2 per megabyte per month (3350 rental) is not as costly as it once was, but it's still irritating. We could compress the employee record, but that costs cpu cycles and makes restructuring more difficult. A cleaner solution is to hang a smaller record off it, to hold the fields that apply only to executives. Only an employee record that needs those fields would own such a subordinate record and, at most, it would own just one.

As another example, Ken Thorn, of Giant Food Inc. in Washington, D.C. asks, "What's the relationship between 'states of the union' and 'governors of states'? Clearly, they bear a one-to-one relationship with each other yet they are not the same entity (one is more organic than the other)."

Part of the problem yields to better definition: if it's an American history database, for example, where we store political biographies, a one-to-many relationship is revealed. Each state, since its entry into the Union, has had many governors. If, on the other hand, we only mean to capture data about current officeholders, then normalization tells us that they are truly the same information entity, despite intuition.

But now we're sailing the treacherous shoals between theory and reality. For, even if our users earnestly promise that all they'll ever want is current data, experienced database designers would still make them separate physical records. History-keeping (audit trail) is eventually required by almost every application and it would be easier to add it if the volatile portion (elections in this case) were separate. That way, you could add an effective-date field to the governor record and keep historical occurrences alongside the current one.

But these one-to-ones are made to fit the conceptual design into the limitations of our software, hardware, or planning ability. In a theoretically perfect conceptual design, neither the headless arrow nor the two-headed arrow would exist.

PART 7: SPLITTING A BOX

Now, as we begin part seven, let's look into how we go about splitting a box in two when an optional arrow appears.

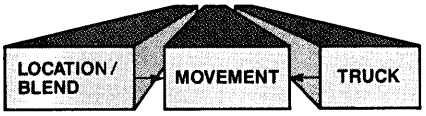
We've been manipulating data structure, and operating conceptually on Bachman diagrams while designing a database. In part five we saw how to derive a new data entity (a box) with the two-headed arrow rule. Just above, in the headless arrow discussion, we showed how to eliminate a box by merging two entities into one. Both rules are reliably objective; like arithmetic, they always work.

Next, we'll inspect two more manipulations: splitting entities with optional arrows and merging those with similar relationships. These rules are more subjective than the prior two. In other words, they

We consider splitting entities with optional arrows and merging those with similar relationships.

indicate solutions that are likely, but not absolutely certain. They warn us to investigate further.

Consider the following database design for a pipe-tobacco wholesaler. Cut tobacco is stored in warehouses and distributed in trucks.

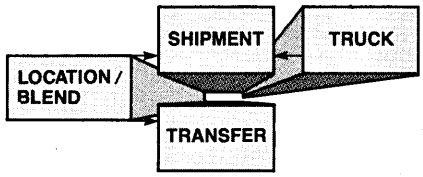


The location/blend record tells how many pounds of one tobacco blend there are at a specific warehouse. If there are 20 warehouses and 50 blends in all, we could have up to 1,000 occurrences of this record (perhaps not every blend will be stored at each location). Any blend may be shipped or received many times. Similarly, each truck may be involved in many movements. But, by definition, each movement represents an occasion where a single location's inventory of a blend was either incremented because tobacco arrived or decremented because some was sent off. Also, each movement involves only one vehicle.

The situation seems straightforward. The fields in the location/blend record include location number, blend number, inventory balance, and the like. Truck record holds vehicle number, cargo capacity, miles-since-maintenance, etc. And movement contains date, quantity shipped, and an in-or-out flag. But doesn't the truck-to-movement arrow mean each movement must involve a truck?

Think about transferring tobacco within a location. Many pipe tobaccos are produced by blending others—that's why they're called blends. The process is one of simply shoveling a measured amount from one hopper to another and, though it certainly affects the inventory balances, no vehicle is involved. The truck-movement relationship is then optional in some sense. Only one truck is involved in any shipments that go by truck, but some shipments do not involve trucks at all.

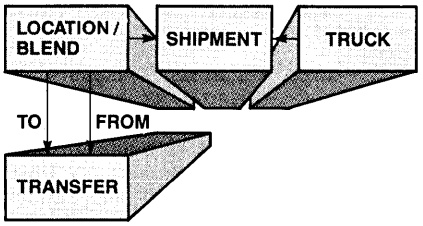
The optional arrow is a warning that the movement box, in an information modeling sense, could represent two fundamentally different entities. Redrawing it as two boxes, we have:



Shipment and transfer tell about different real-world events. As we refine the design further, their record layouts continue to diverge until, eventually, we find the only data common to both are date and quantity.

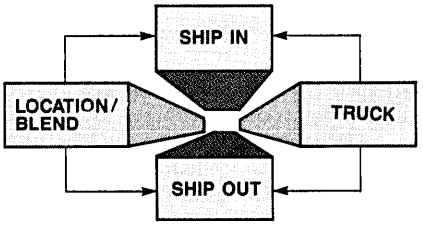
Our first indication of their duality was that optional arrow.

Now look at the arrow between location/blend and transfer. We can't say each transfer is associated with only one location/blend because the transfer event affects two different balances. It decrements the inventory balances and increments the location/blend balance it goes to.



The diagram does not mean that each transfer is related twice to the same location/blend, by the way. On the contrary, each transfer has two different relationships with two different location/blend record occurrences—a "from" relationship with one and a "to" with the other.

Merging records with similar relationships is basically the reverse of the process just described. For example:



Both intersection records, inbound shipment and outbound shipment, hold the same data elements and are related to everything around them in precisely the same way. This situation warns us to look at them more closely and see if they're not really modeling the same class of real-world event.

Next time, we'll look at hard sets, soft sets, and summary fields. ◉

Frank Sweet is corporate manager of data administation for the Charter Co., Jacksonville, Fla.

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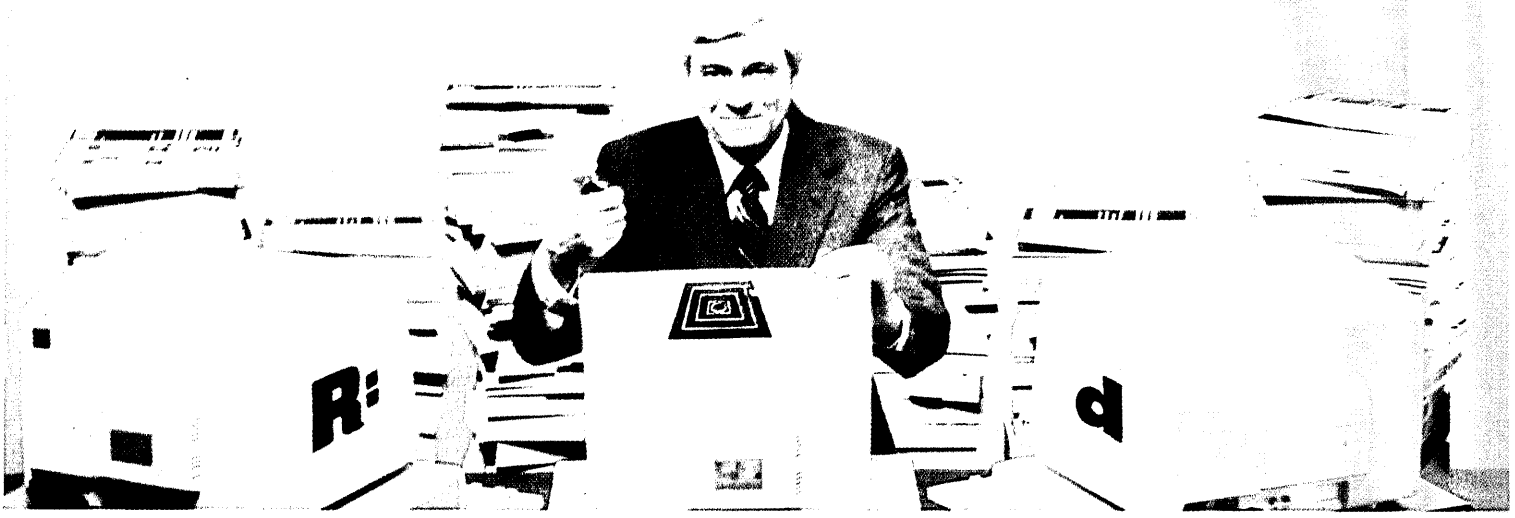

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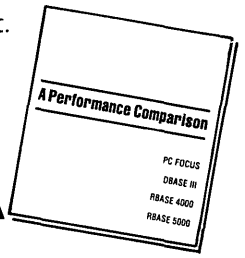

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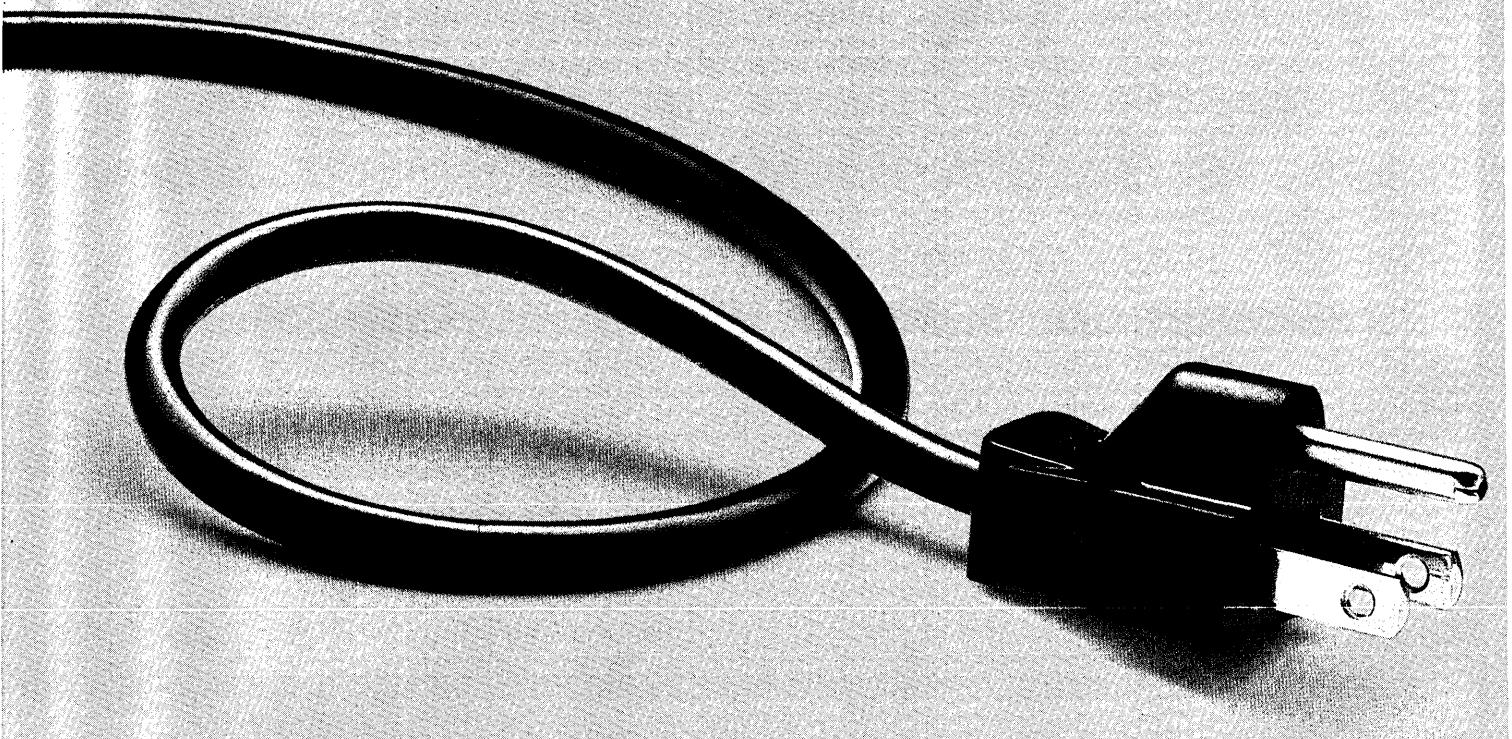

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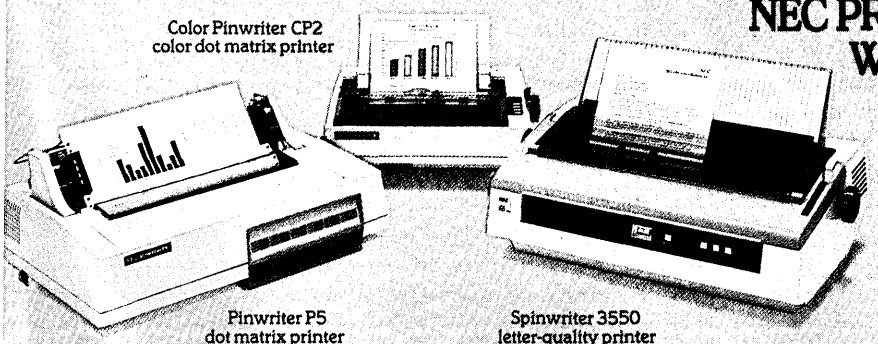

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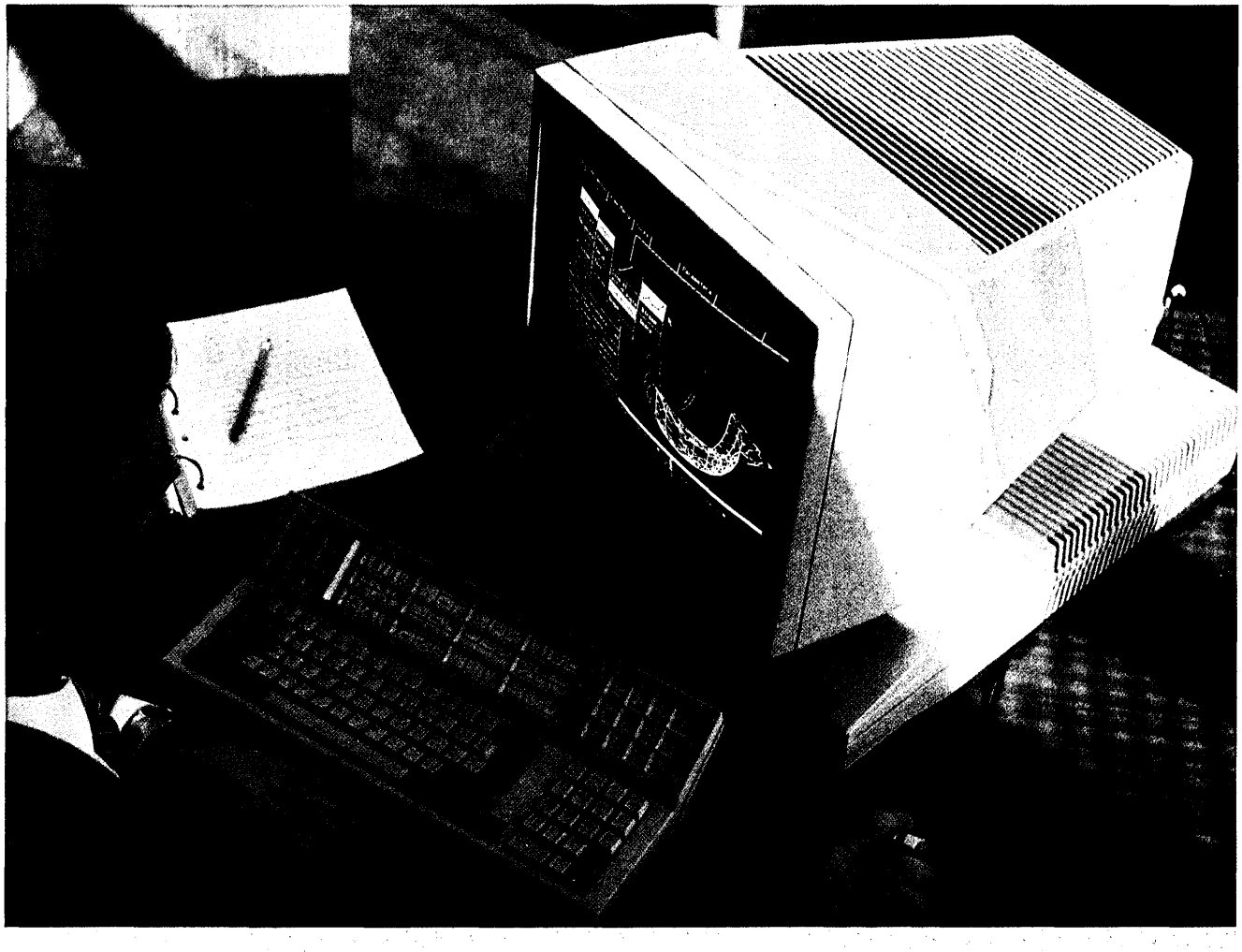

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GETTING THE PRICE

There are not many happy stories emanating from Silicon Valley these days. Vendors of chips resemble the Little Match Girl in the dead of winter, and various computer vendors continue trying to flog their wares to empty stands long after the crowd has headed home. Unsold inventory gathers dust and the bankruptcy courts are clogged with terrified petititioners. In this darkest of all seasons, please welcome Ross Dove.

It is doubtful that the successful Dove knows Ethernet CSMA/CD from Olof Soderblom's token ring, but then there is no good reason for him to know the difference. In a world where dreamy technocrats have invented schemes that still await a proper application, Dove's is the voice of brisk reality. In a land where spreadsheet-driven marketing types run amok with lavish projections, Dove is the man who eyes mountains of moldering widgets and offers a way out of corporate travail. Ross Dove is an auctioneer. He takes electronic white elephants and turns them into money.

Thirty-two-year-old Dove comes credentialed. He is named after the cofounders of a 38-year-old furniture and restaurant equipment auction house—grandfather Harry Ross and father Millard Dove. The San Mateo, Calif.-based Ross Dove, whose company is called Ross Dove Inc., knew absolutely nothing about the computer industry back in 1983, when Osborne Computer Corp. got into trouble, but he knew enough to pick up the phone and call them.

"Osborne was trying to reemerge from bankruptcy proceedings and I had a mailing list," Dove recalls. "After I convinced them that an auction wouldn't hurt their standing—big oil companies have them all the time—I went to work. We were lucky because Osborne had competent personnel to help out. They taught us the technology and we taught them how an auction works."

ROSS DOVE: "Heck, I've sold whole computer rooms a couple of times."

Dove, his father, and his brother, Kirk, raised $1.4 million at two Osborne auctions last fall and may well have provided enough seed money to let the micro maker have another shot at immortality. "In all, we had something like 12 auctions," says Dove. "We sold the entire plant. We even went on the road, grossing something like $450,000 more selling 750 new 8-bit Osbornes."

Triumph followed triumph. When Dynabite sought to lean upon the everlasting arms of Chapter 11, Ross Dove was there to see the Milpitas, Calif., vendor through. He sold off some $250,000 worth of its unique machines that offer both 8- and 16-bit microprocessors.

It was about then, says Dove, that he began to perceive another vertical niche for his salesmanship. Suppose that one contacted a company that merely had a great deal of high-tech gear sitting around in inventory, and used the vehicle of an auction to sell it for them. "Up to 60% of our business is now from very healthy companies," says Dove. "They just use us as a marketing tool—a fairly inexpensive tool, actually—to sell off a helluva lot of stuff. We tell them, 'Look, maybe we can get you 30% more our way than you can get on your own.' "

Buying Ross Dove's talents involves a commission of from 7½% on multimillion-dollar consignments to up to 20% on small auctions. Other costs include the preparation and mailing of brochures showing the gear. Dove uses a special mailing list he swears by. "That list represents people who have in aggregate spent around $30 million, and it's worth its weight in who knows what? I've had people ask to rent it, but no soap. It's not for rent or sale."

Who ends up with what? A typical buyer might end up with a radar tracking system for $8,000 that originally cost $25,000, or a System/38 computer that went as a virtual steal, says Dove, at $110,000 including an IBM maintenance agreement. "IBM was very cooperative on that one," he says. Or consider a Fuji auto inserter, a $200,000 gadget formerly owned by Apple that stuffs circuits onto boards. "Heck, I've sold whole computer rooms a couple of times," notes Dove.

A computer auction is not the kind of high-jinks affair associated with, say, peddling bales of tobacco. Dove's voice rings out loud and clear as he may entice a lackluster crowd with the cry, "Awful cheap, awful cheap." A crowd, incidentally, is given two days to inspect the gear, which is then sold on an as-is basis. Ninety percent of the time Dove does not set a minimum bid for openers, and cries out, "Are you all done?" after a raised finger, a flapping auction card, or even a discreet wink signifies a final bid. Does anybody really get a steal at an auction? "When the gear is highly specialized, you probably can," says Dove. ◉

—Charles L. Howe

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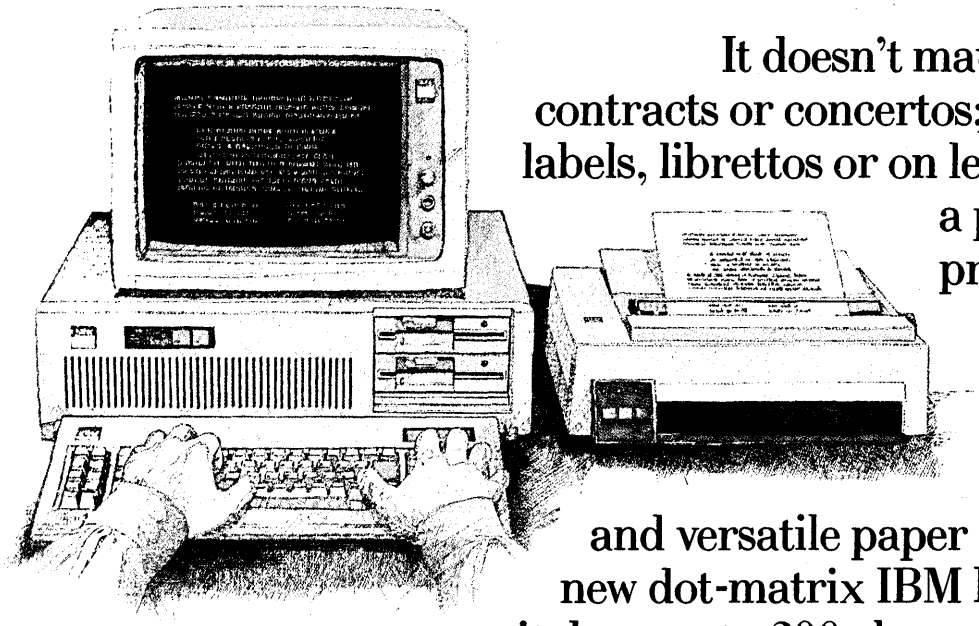

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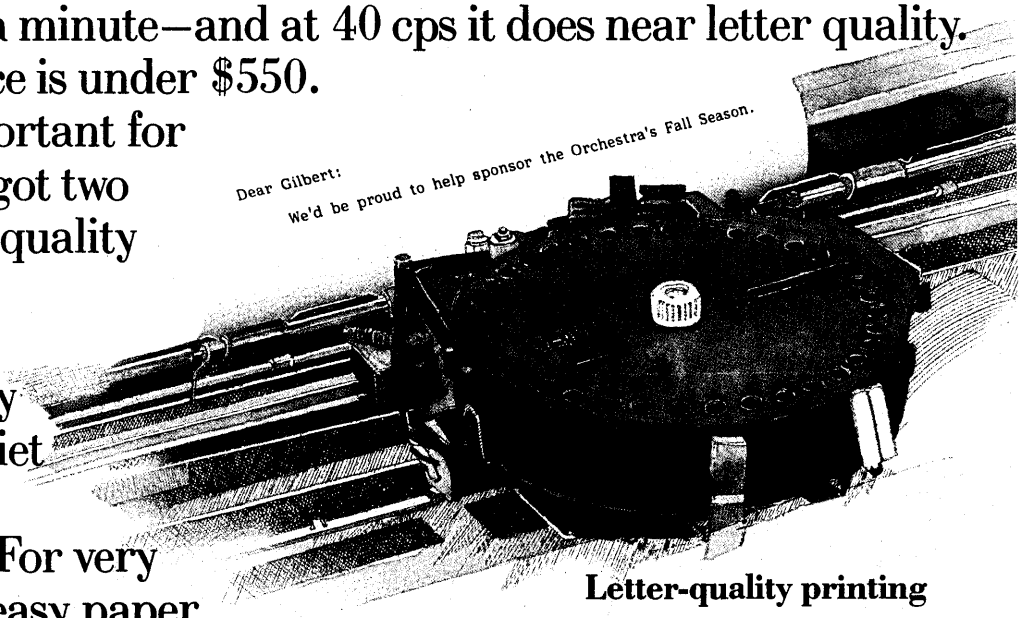

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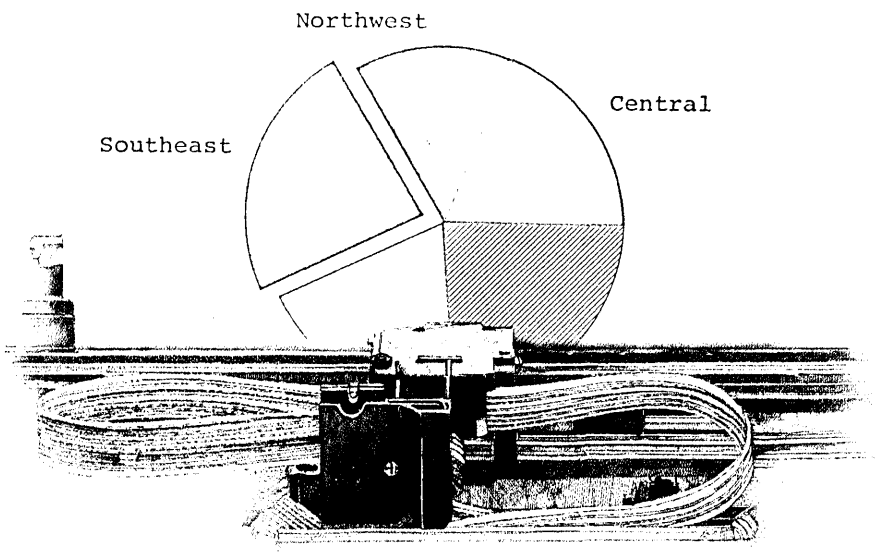

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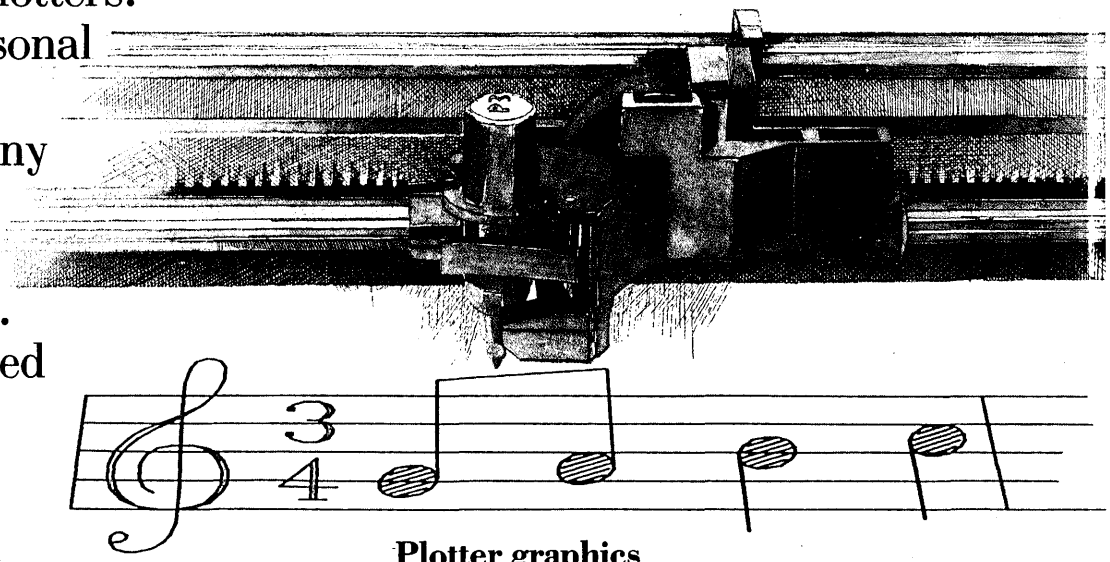

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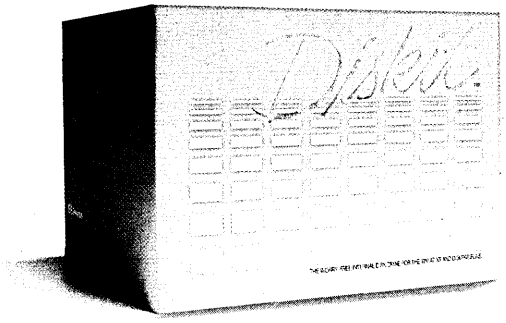

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HARDWARE

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One of the more satisfactory ways to form an alliance between industry and education is to create a buffer zone: the institute. A little over a year ago, just such an organization was established at the University of Santa Clara in California.

Named the Institute for Information Storage Technology, its existence rests on two fundamental assumptions: first, that the storage and retrieval of rapidly increasing quantities of information is basic to the evolution of information processing systems, and second, that the demands on the technology will become increasingly complex.

The institute's codirectors are Raymond Yarborough, a longtime faculty member at the university, and Albert Hoagland, who has spent most of his working life with IBM and is recognized as one of the leading experts in the field of magnetic storage.

Their charter is to make the institute a key technical resource for the information storage industry. They are focusing on applied, rather than basic, research to solve today's technical problems and unearth future applications.

About 10 projects are under way at the undergraduate level; at the graduate level, two projects involve low-end Winchester technology--an integrated read/write circuit for thin-film heads, and research into improved fault isolation for small files. In addition, because of the dearth of materials concerning video recording, the institute is developing a series of courses covering this discipline. These will join the short courses and seminars already being provided by the institute to the data storage community.

Sponsor and associate companies--including Seagate Technology, Quantum, IBM, 3M, Control Data, Memorex, Cybernex, Verbatim, Ampex, and Applied Magnetics--support the institute through financial contributions, service on an advisory board, and participation by their technical personnel in various institute programs. Annual membership is $50,000 or $20,000 a year, depending on the level of commitment. More information is available by writing to either of the codirectors at the Institute for Information Technology, University of Santa Clara, Santa Clara, CA 95053.

Speaking of universities, Purdue in Lafayette, Ind., is high on our list of contenders for the Developers of the Most Nifty Application of the Year Award. Using a Control Data Cyber 205 supercomputer, they have made a computer-generated map of the common cold virus. In a Sept. 12 Wall Street Journal article, one of the team members said that the "results provide insight into how a virus works and may suggest ways for developing vaccines for the common cold, as well as other viral pathogens."

The article reports that the scientists used the Cyber to construct a three-dimensional map of the atomic structure of human rhinovirus-14, one of about a hundred known strains of the common cold virus. As applications go, it's nothing to sneeze at.

NETWORK AUDITORS

The 8030 Network Auditor provides network measurement, control, and configuration functions. As devices and users are defined to the network, the product maintains an authorization table to control and manage access. Each user, port, logical unit, and communication line can be monitored and statistics can be collected to provide a record of system activity. Users, lines, and authorization levels can be enabled, disabled, or changed by the system operator at any time. Security features include application disconnect, activity tracking such as the number of unauthorized attempts to access an application, and the number of times a user has been rejected by an application. The 8030 can connect up to 32 devices to both bisync and SNA networks. The system comes with a 10MB Winchester disk.

The 8100 system provides 3270 protocol conversion and gateway services for personal computers, ASCII terminals, and graphics devices. It supports both bysync and SNA protocols concurrently and can be upgraded to the 8030. The price of the 8100 starts at $9,900; the price of the 8030 begins at $14,900. DATASTREAM COMMUNICATIONS INC., Santa Clara

FOR DATA CIRCLE 301 ON READER CARD

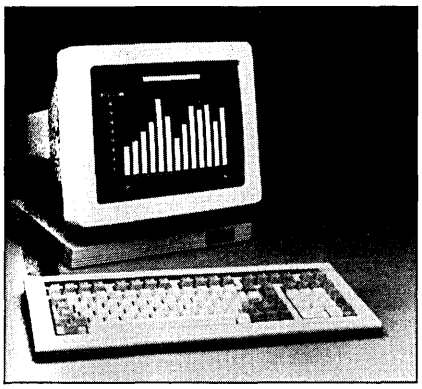
ASCII TERMINALS

The WY-30 is an ASCII terminal designed for the entry-level market, which features a mechanical switch keyboard, four dedicated function keys, 41 programmable functions, an 80-column display, a printer port, smooth scrolling, horizontal spilt-screen capability, and a 14-inch flat screen. In addition to Touch-Tilt, a screen-tilting mechanism, an optional arm allows the screen to be adjusted to various angles and heights.

Besides its native WY-50 mode, which is compatible with the Lear Siegler ADM 3A/5, the WY-30 is also compatible with the ADDS Viewpoint, TeleVideo 925, and TeleVideo 910+ terminals. The terminal can send data at 38.4KB.

The WY-50+ contains a number

of enhancements to the vendor's WY-50. The display buffer memory has been increased to two pages, with four pages as an option. Terminal compatibility modes now include the IBM 3101, the Data General 200, and TeleVideo 950 terminals.



With the dynamic allocation of 256 bytes over the WY-50+'s 16 function keys, each function key can be programmed up to a maximum of 64 bytes. A bidirectional auxiliary port has been added allowing any peripheral in which data flow both ways to be attached to the terminal. Wyseword, designed to make WordStar easier to use, is standard on the WY-50+.

Price for the WY-30 is $399. The WY-50+ is priced at $699. WYSE TECHNOLOGY, San Jose.

FOR DATA CIRCLE 302 ON READER CARD

WORKSTATIONS

The Sun-3/75M workstation is designed to function as a "diskless node" in a distributed computer environment or as a standalone system. The 32-bit architecture is powered by a 16.67MHz MC68020 processor and a 12.5MHz MC68881 floating-point coprocessor. Two MB of main memory can be expanded to 8MB; a 71MB mass-storage subsystem is also an available option. The operating system is the vendor's version of Unix based on Berkeley 4.2BSD. Using Ethernet, several workstations can operate without a local disk drive and share other resources. The Sun-Link option provides an SNA or bisync link to IBM mainframes. Price is $12,900.

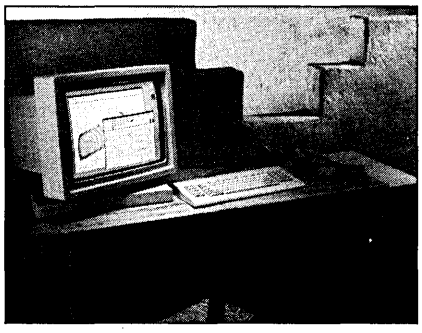
An optional mass-storage and disk subsystem starts at $8,500 for 71MB with up to 142MB of on-line storage available.

The Sun-3/160M workstation includes all the features of the Sun-3/75M as well as a 12-slot card cage, which allows the system to be customized for oem and end-user applications. This monochrome workstation comes standard with 2MB of main memory and memory expansion options up to 16MB. Price is $20,900.

At the top of this line is the Sun-3/160C workstation, a color display version, which comes standard with 2MB of main memory, and up to 16MB of memory. Price is $31,900.

Mass storage for the 160C and 160M is available in tape and disk configurations from 71MB to multiple 380MB drives for a total of 1.5GB.

Additional products include the Sun-3/160S Fileserver at $17,900 and the Sun-3/180S Fileserver, a rackmount version, at $18,900. A Floating Point Accelerator, which is said to increase floating-point performance by four times the base-



line MC68020/MC6881 performance, lists at $4,900 and is available for Sun-3 models 160M, 160C, and 180S. SUN MICROSYSTEMS INC., Mountain View, Calif.

FOR DATA CIRCLE 303 ON READER CARD

HARDWARE SPOTLIGHT

INTERACTIVE FAMILY

The HostStation Family includes workstations, associated network communications computers, and software for interactive computing. The HostStation 110 displays 1,056 by 864 pixels on a 19-inch monochrome screen and adds the capability to download custom bit-mapped fonts to the company's already announced 100 system. The system permits users to preview and edit documents containing high-quality graphic images and text of typeset quality, according to the vendor. Drafts can be printed on an optional laser printer directly from the screen, or from the host for camera-ready copy. Price for the 110 is $3,795.

The 110 is capabable of being upgraded to the HostStation 550 interactive workstation. The 550's standard features include floating-point and memory management units; 1MB of main memory expandable to 2MB; 41MB of internal hard disk storage expandable to over 370MB; integral Ethernet and Cheapernet LAN interfaces; three RS232 ports; compatibility with VT100, REGIS, Tektronix 4010/4014, and ANSI 3.64 terminal protocols; and a tilt-and-swivel monitor with detached DIN-standard keyboard. The system operates under Umax, the company' Unix-compatible operating system. Initial software includes C, FORTRAN, and Pascal compilers, the vendor's Ally application development system, and CGI (VDI) and GKS graphics protocol support. Other optional hardware is available. Price of the 550 is $14,000.

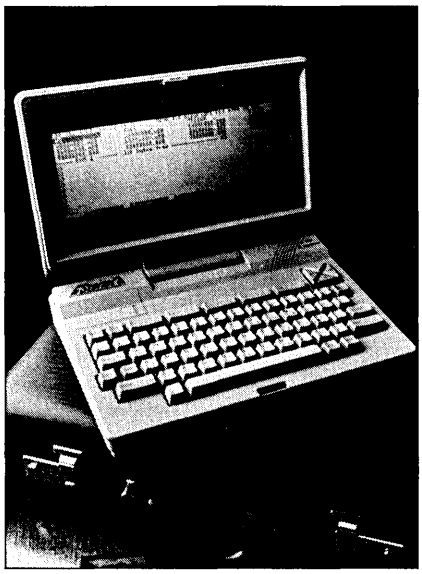
The Annex network communications computer is a 32-bit subsystem for connecting up to 16 38.4KB serial ports to any IEEE 802.3 LAN (Ethernet) using TCP/IP protocol. The Annex UX is compatible with all Unix systems using TCP/IP and rlogin. Price is $6,000. The Annex MX Multimax input-output processor is priced at $8,000.

The Multimax family of 32-bit superminicomputers has a performance range of from 1.5 to 15MIPS in 1.5MIPS increments. The system permits 20 main processors to share a single, high-speed memory. Memory capacity is from four to 32MB, and the system contains from one to 10 I/O channels. The Multimax's Umax 4.2 operating system is based on Unix 4.2. System prices begin at $112,000 for a dual-processor (1.5MIPS) system with 4MB of shared memory, one I/O channel, one 515MB disk drive, and one 6,250bpi ½-inch tape drive and a HostStation 110 display or console printer. A large system with 20 processors (15MIPS) configured for parallel processing, and 32MB of memory with the same peripherals, is priced at $340,000. ENCORE COMPUTER Corp., Marlborough, Mass.

FOR DATA CIRCLE 300 ON READER CARD

LAP-TOP COMPUTER

The PC-8401A-LS "Portable Office" computer features an LCD screen, which produces characters up to 63% larger than the typical lap-top computer on the market today, according to the vendor. In addition to the 16-line by 80-column display, the machine features 64K RAM, a 300 baud modem, an expansion slot to connect optional 3½-inch disk drives for external data storage, optional 1,200-



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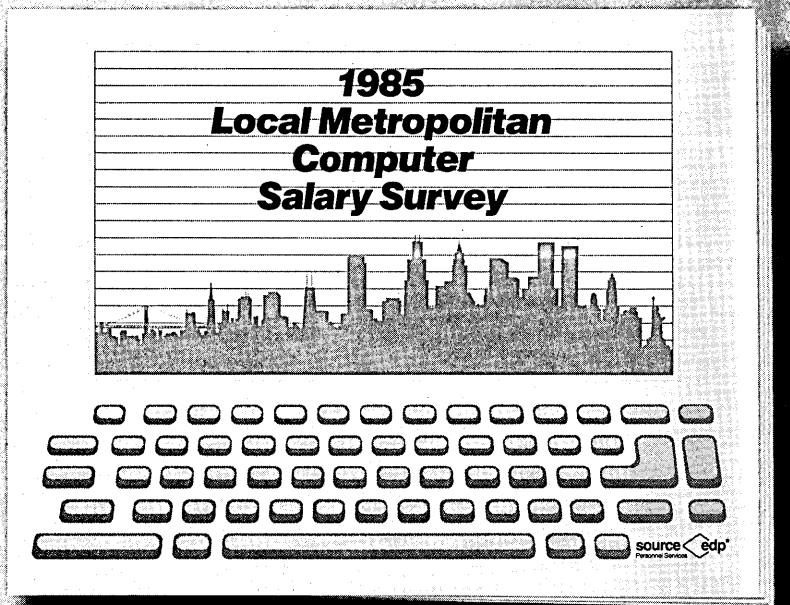

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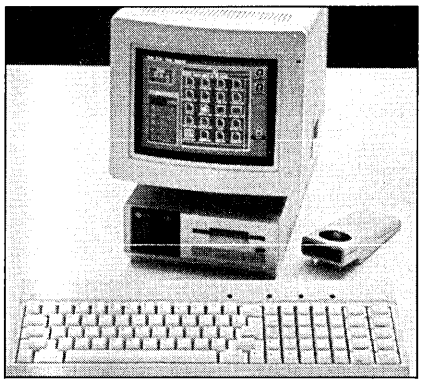
FOR DATA CIRCLE 304 ON READER CARD

APRICOTS AND GEMS

The Apricot F2 and F10, 512K RAM microcomputers capable of running color, use 3½-inch microfloppies and are bundled with the GEM Collection of software, systems software, communications and file transfer utilities, and an infrared trackerball mouse. The F2 is an MS/DOS twin half-height micro priced at $1,495; the F10 features a 10MB Winchester disk drive with a double-sided, 3½-inch microfloppy drive and is priced at $1,995.

The GEM Collection, which includes GEM Desktop, GEM Write, and GEM Paint, is a set of microcomputer soft-



ware from Digital Research Inc., Monterey, Calif. APRICOT INC., the U.S. marketing and distribution arm of U.K.-based Apricot Computers, Fremont, Calif.

FOR DATA CIRCLE 305 ON READER CARD

AUTO-DIAL MODEM

The 2400PA-S, according to the vendor, is the only auto-dial 2,400-baud modem compatible with the IBM bysnyc communications protocol. The unit provides dial-up, unattended communication for IBM 2780/3780 remote job-entry systems, and is aimed at host-to-host and micro-to-mainframe applications.

The full-duplex synchronous modem eliminates the need for personnel to initiate and monitor communications and allows the transfer of large batch files at night. Pulse or tone dialing are automatically selected, and the speed of the host computer is matched at either 1,200bps or 2,400bps. Complete call progress information is displayed and a tandem dialing feature permits dialing through PBXs and connection to the various long-distance services. Options, including EIA signal timing that customizes the EIA interface for use with multiplexers and port contenders, is stored in nonvolatile memory. Diagnostics include automatic self-test, analog lopback, local and remote digital loopback, and a built-in test pattern generator. Price is $795. RACAL-VADIC, Milpitas, Calif.

FOR DATA CIRCLE 306 ON READER CARD

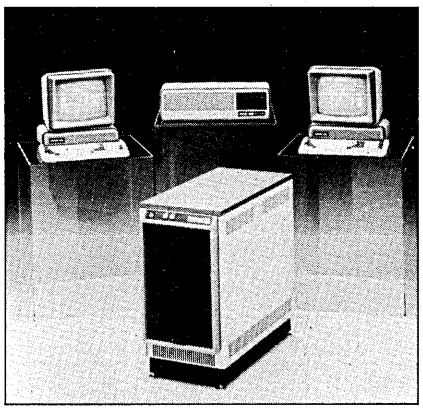
DISK CACHE PROCESSOR

A disk cache processor option for users of Honeywell's 16-bit DPS 6/75 and 32-bit DPS 6/95 minicomputers manages disk caching on a "global" basis instead of assigning a disk cache buffer to individual disk controllers, according to the vendor. It is claimed that by being able to access all of a system's disk data, the buffer is not limited by the addressing range of a given controller, thereby increasing system throughput and cpu utilization and improving terminal response time. Use of the processor is transparent to the user so applications can run unmodified. On the DP 6/75, the disk cache processor price, with 2MB of cache buffer memory, is $18,000 if factory installed and $22,000 if field installed. Additional buffer memory, in increments of 2MB, can be added for $10,000 up to 6MB. On the DP 6/95, the price is $12,000 if factory installed, and $16,000 if field installed. Users must allocate at least 2MB of system main memory for the buffer; the system can support up to 14MB of disk cache buffer memory. HONEYWELL INC., Waltham, Mass.

FOR DATA CIRCLE 307 ON READER CARD

ADDITONS TO THE FAMILY

Cable computer system models 3250 and 3260, with over 600MB of Winchester disk storage, are additions to this vendor's multi-user MC68000-based 3200 line.



These floor cabinet models can support as many as 32 users with up to 4MB of memory. Backup options for the models include half-inch magnetic tape and streaming cartridge tape. BASIC (Basic Four and SMC-compatible) and RM/COBOL are supported and can run concurrently as well. Additional software offerings with these systems include networking, application development tools, and data communications. Prices start at $26,000. PERTEC COMPUTER CORP., Irvine, Calif.

FOR DATA CIRCLE 308 ON READER CARD

BROADBAND CONTROLLER

An intelligent broadband controller (IBC) allows Data General Eclipse MV/Family computers to connect with Ungermann-Bass Net/One broadband local area networks. The IBC is an IEEE 802.3 standard interface that performs protocol handling and other communications tasks. The 15-inch board includes 256KB of RAM, a microEclipse processor, a data channel interface, and a serial I/O section. Price is $6,500. DATA GENERAL, Westboro, Mass.

FOR DATA CIRCLE 309 ON READER CARD

FREQUENCY CONVERTER

The RFC Silenced Frequency Converter supplies 415Hz of power to IBM 3090 and other large IBM computers as well as Amdahl and NCR computers. An acoustic cabinet reduces the noise level to 58dba. The inherent inertia of the RFC allows it to ride through power failures of 0.5 seconds, which, the vendor says, eliminates most computer power problems. Manual switching and PSC automatic paralleling switch gear provide redundancy for eight cpus or more." Standard power ratings are 40KVA and 74KVA with larger ratings optimized for system loads available. Price, depending on configuration, ranges from $30,000 to 35,000. POWER SYSTEMS & CONTROLS, Richmond, Va.

FOR DATA CIRCLE 310 ON READER CARD

CHANNEL EXTENDER

The MBX-2501 channel extender for high-speed peripherals used with large IBM computers provides two-way host-to-peripheral data communications at the standard block multiplexer channel speed of 10 million bps for up to 2,000 feet. Compatible with existing IBM system software, the system requires no additional programming or software modification by users; channel extension systems are transparent to mainframe operation, functioning as sophisticated high-speed extension cords. The device operates over both coax and fiber-optic cable. The MB-2501 consists of two self-powered controllers that are plug-compatible with standard IBM connectors. The controllers function as serial/parallel and parallel/serial converters with high-speed handshaking and communications protocol. Price is $60,000. MEGABIT COMMUNICATIONS INC., St. Paul.

FOR DATA CIRCLE 311 ON READER CARD

—John L. Kirkley

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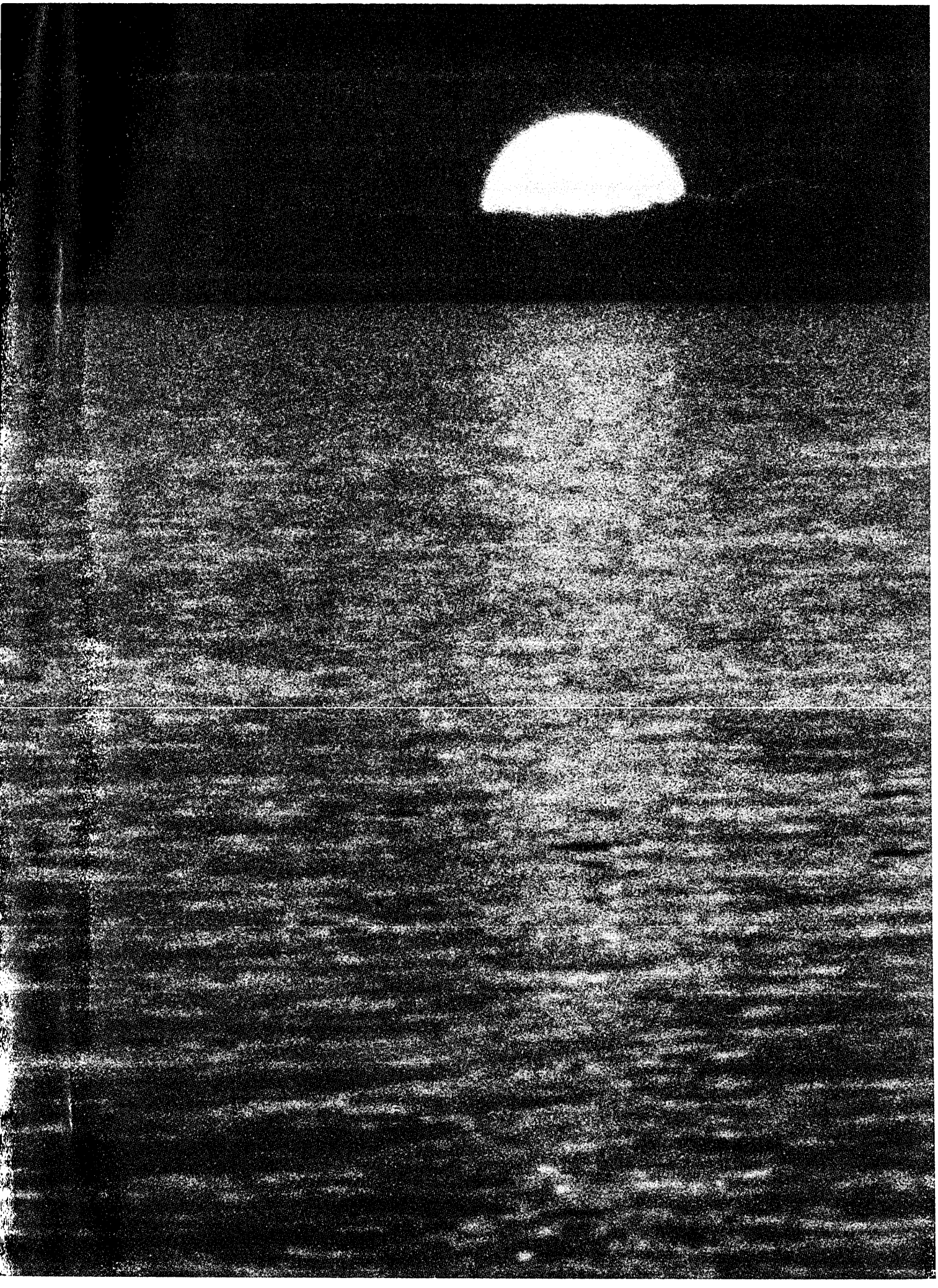
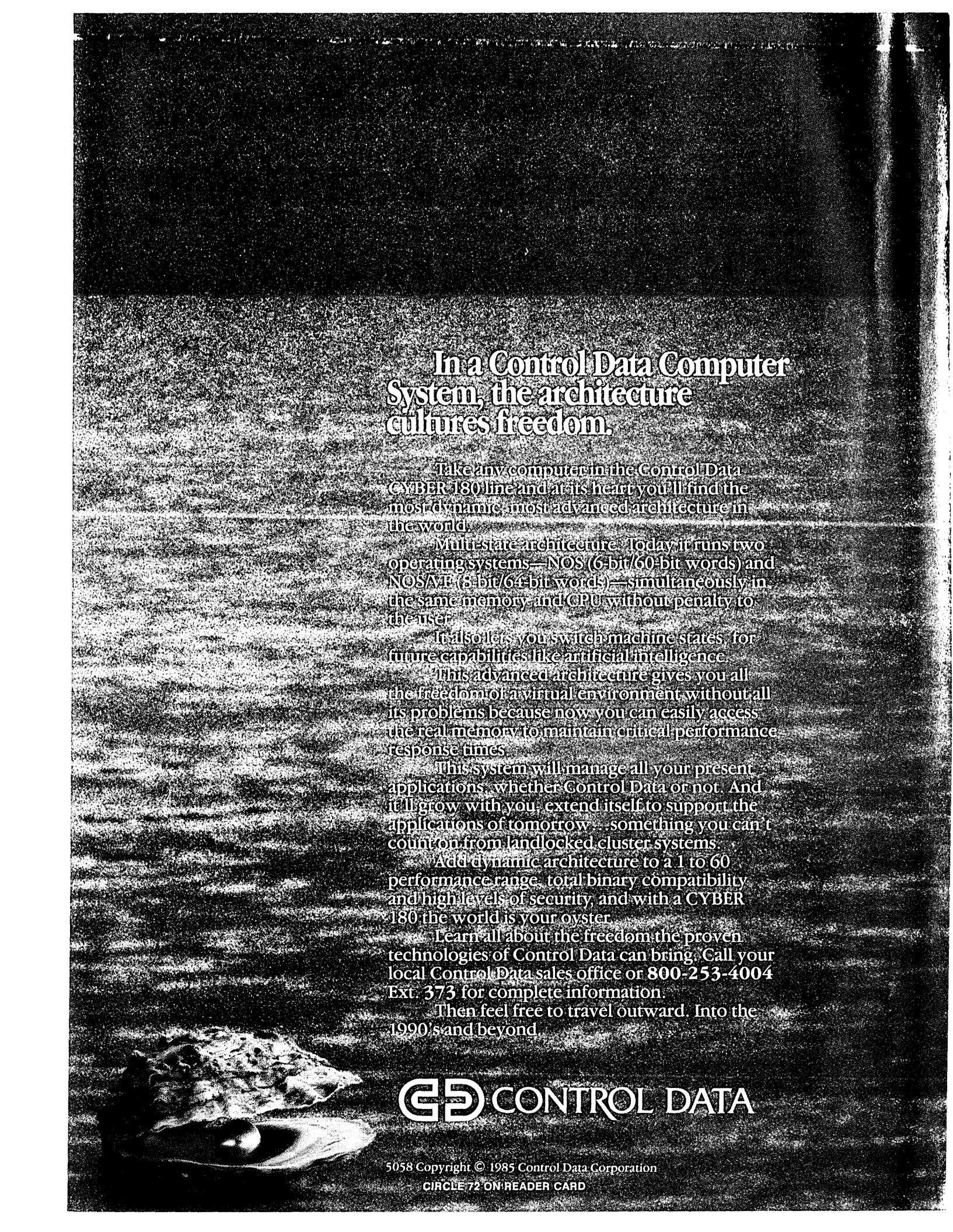
CIRCLE 71 ON READER CARD

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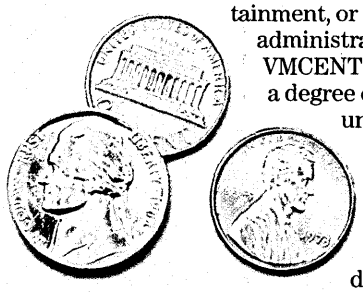

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SOFTWARE AND SERVICES

UPDATES

The potential in the office automation market is enough to make any vendor's eyes glaze over. All those offices still slogging along using nineteenth century techniques. All those white-collar workers, all those middle managers, desperately in need of advanced office technology. You'd think that a vendor with aggressive management, excellent products, inspired marketing, and a comfortable cash reserve couldn't miss. But without LU 6.2 and PU 2.1, the unprepared vendor may find that his optimistic projections have turned into a Chapter 11 filing.

Most industry pundits agree that the office automation marketplace for the foreseeable future will be an IBM environment and that SNA, for better or for worse, is the communications key. And IBM's communications protocols, Logical Unit Type 6.2 and Physical Unit Type 2.1, are emerging SNA standards. Any vendor who wants to compete in the office automation marketplace must implement these protocols, or find itself on the outside looking in.

Consultant Dale Kutnick of Wayland, Mass., explains that the protocols allow communications between various devices on the network without going through the host, a high-overhead requirement of earlier LU and PU protocols. Because all the terminals, no matter what their resident intelligence, had to appear dumb to the host, such key office automation functions as intelligent file transfer, remote device host sign-on without polling, and the building of subarea SNA nets within the primary SNA communications link were not allowed.

All this now becomes possible. LU 6.2, says Kutnick, is IBM's precursor to its token ring local networking strategy.

Vendors such as Digital Equipment, whose financial futures depends on a strong showing in this marketplace, are busily implementing their compatible versions of the protocols on their gear; others are looking for outside help.

Several companies, including Rabbit Software in Malvern, Pa., Communication Solutions in San Jose, and the Orion Group in Berkeley, Calif., are addressing themselves to providing a third-party source for these critical protocols. Orion's president Paul Rampel claims that "IBM's new enhancements are going to make the SNA network the key to office automation. These network protocols have been identified by IBM as a point of convergence for all its equipment, and no hardware vendor will be able to ignore it."

Understandably, Rampel has high hopes for Orion's new product, sna62 Peer Communications Facility, which he claims is the first third-party product to implement the protocols fully in software.

No matter what the source, it's quite clear that all the major office automation contenders will have to incorporate LU 6.2 and PU 2.1 into their architectures . . . or face being locked out of what may become one of the fastest growing market of the next decade.

EXECUTIVE INFORMATION

Three enhancements have been added to Command Center, a system that simultaneously resides both on a mainframe and on microcomputers and is used by MIS departments to develop executive information applications. The system, initially a DEC Vax-based offering, will now run on IBM mainframes under VM/CMS, the principal IBM environment for decision support and Information Center software products, according to the vendor. Price for the IBM version is $125,000. A Prime version is also available and is priced at $75,000.

Three specialized applications packages combining graphics, text, and tabular displays, have also been added to Command Center. The Competitive Analysis application allows managers to review the relative performance of their company against user-selected competitors. Raw financial data and key performance measurements are used to evaluate corporate leverage in terms of human, financial, and physical resources. The Corporate Productivity Analysis application uses a variety of value-added, output/input, and financial leverage measurements to chart productivity ratios. The Economic Analysis application allows users to combine economic information with internal company data. Corporate models can be generated to forecast the impact of economic change on both the company and its industry. Price for the applications is about $5,000 each. PILOT EXECUTIVE SOFTWARE, Boston, Mass.

FOR DATA CIRCLE 326 ON READER CARD

RESOURCE MANAGEMENT

Quantum RS is a resource management system that combines department and project resource accounting, budgeting, and chargeback, with features such as performance analysis, capacity planning, and cost tracking, on single VAX systems, VAXclusters, and networked VAXs connected via DECnet.

Billable resources include connect time, cpu time, page faults, buffered and

direct I/O, volumes mounted, pages printed, and disk storage. The software also maintains information on 35 resources and over 30 statistical measures.

The package uses both summary and session accounting procedures simultaneously; it also tracks VMS systems processes that contribute to overhead, such as DECnet, job controller, and all print symbionts.

The system handles chargeback and budgeting, featuring royalties, discounts, flat charges, and minimum and maximum rates. Included is a login defeat capability, warning messages, and up-to-the minute user budget and session cost displays. A virtual logging utility allows users to change projects without going through logout/login procedures and provides the capability of accounting for multiple projects for a user name. Quantum RS prices start at $2,500 with site and corporate license prices available. COMPUTER INFORMATION SYSTEMS, Braintree, Mass.

FOR DATA CIRCLE 327 ON READER CARD

REMOTE COMPUTING SERVICE

ForumOne, a nationwide remote computing service, is available to all users of docForum and eForum products. The network is accessible through a variety of terminals and microcomputers by a local phone call from more than 300 U.S. cities. ForumOne is operated by Automated Data Processing (ADP) and provides 24-hour service and access to NETI products over the AutoNet system. NETI TECHNOLOGIES INC., Vancouver, B.C.

FOR DATA CIRCLE 328 ON READER CARD

GET YOUR CICS

CICS Manager is a real-time monitoring, tuning, and analysis system for the CICS environment running under DOS or MVS. Real-time monitoring is accomplished through overview screens. For quick inspections, a problem screen examines areas ranging from short-on-storage to transactions waiting on VSAM strings.

Other screens report on activities, transactions, files, storage, terminals, programs, and DL/1 activities (DOS only). Many of these areas can be expanded to show more detailed information. The system also incorporates a batch reporting facility with over 350 reports, for the storage and later analyisis of data in hard copy form.

Also provided are over 330 on-line bar charts; thresholds for all graphic representations are established by the user and a warning appears when a service level is exceeded.

Network operators are assisted with menus, help screens, and an on-line glossary to monitor response time and solve such problems as bringing into service or taking out terminals, opening or closing files, and canceling tasks. The DOS version of CICS Manager is priced at $8,000; the MVS copy costs $22,000. BOOLE & BABBAGE INC., Sunnyvale, Calif.

FOR DATA CIRCLE 329 ON READER CARD

CICS/Swap allows users to swap back and forth between two CICS transactions with a significant reduction in logging on and off, and moving in and out of menu selection screens, according to the vendor. The system allows changes to be made to either transaction or for information to be transferred without backing out of either transaction. No extra ports in the terminal control unit are needed and system overhead is claimed to be minimal. Price is $995 for MVS and $695 for DOS; annual leases are $395 for MVS and $295 for DOS.

Show and Tell is a CICS aid for trouble shooting, security, training, and documentation. The Show function indicates what is currently on another CICS terminal, allowing programmers or technicians to see a user's screen without having to be at the user's location. A Spy function can be used by internal auditors for quality control or by security personnel to monitor terminal operators. The Tell function echoes a series of transactions run on a master terminal, on other terminals, or on printers, and the MAPS function displays and prints CICS maps. Data may also be entered. The product runs on IBM or compatible mainframes with DOS, OS, and MVS. Price is $695 or $295 for annual lease. MACKINNEY SYSTEMS, Springfield, Mo.

FOR DATA CIRCLE 330 ON READER CARD

INfoMAN is a fourth generation utility that enables users to alter and expand screen display data to create tutorials, help screens, coding schemes, security access control, and data validations without programmer intervention. Text and table editors provide on-line tools to fix problem CICS applications software and bring problem programs up to user requirements. The system is priced at $3,500 for DOS/VSE installations and $4,500 for OS/MVS applications. INfoCENTIVE SYSTEMS, Temple City, Calif.

FOR DATA CIRCLE 331 ON READER CARD

SQL/DS INTERFACE

W/SQL Pipeline interfaces to IBM's SQL/DS database management system. Targeted primarily for companies using SQL/DS as an information center product, W/SQL Pipeline provides a data view from the vendor's System W to SQL/DS databases, allowing either read-only virtual access or extraction of data. The system replaces intermediate extract files, eliminating the process of loading and unloading extracts for end-user applications.

Other features include direct use of SQL/DS security, concurrency, and data

SOFTWARE SPOTLIGHT

WP PLUS SPREADSHEET

Framework II is an integrated spreadsheet and word processor that includes an 80,000-word spell checker with automatic correction, visible page breaks, and a built-in mailmerge capability. The two primary functions are supported by fully integrated telecommunications, database, outlining, and graphics modules.

The product's spreadsheet is claimed to operate on average twice as fast as the vendor's earlier Framework product, introduced over a year ago, and is two to five times larger using the same amount of random access memory. The spreadsheet uses sparse matrix implementation; that is, unfilled cells within a spreadsheet take up little or no memory. Additional workspace may be accessed from either a hard disk or add-in memory boards such as the AST RamPage! and Intel Above Board. The spreadsheet can handle a maximum of 32,000 by 32,000 columns.

The word processor's record mode allows users to record and store frequently used words or phrases as abbreviations for single-keystroke retrieval. It also provides built-in mailmerge and label printing along with a style library for creating and storing different print formats. It incorporates menu-driven print formatting and can print and format spreadsheets, graphs, and text on the same page.

A special library cabinet includes all recorded abbreviations, macros, and a phone book.

The program's telecommunications module can be accessed from a pull-down menu that includes single-key access to Dow Jones, the Source, and Compuserve. This function freely converts and exchanges data with the spreadsheet and word processing modules.

A variety of import/export formats are provided, as is room for additional formats.

The system runs on the IBM PC, XT, AT, 3270 PC, and compatible systems with 384 bytes of RAM and two 360KB floppy drives, or a single 360KB floppy and a hard disk. In addition to the AST and Intel boards, the product supports four different modes of the IBM Enhanced Graphics Adaptor; a monochrome or color monitor; PC DOS 2.0 or higher; and more than 100 different printers, plotters and graphic cards. Price is $695. ASHTON-TATE, Culver City, Calif.

FOR DATA CIRCLE 325 ON READER CARD

Full implementation and high performance make Waterloo C the right choice

Waterloo C is a production-quality implementation of the C language, C run-time library, and C macro preprocessor. Waterloo C runs on IBM mainframes under VM/SP CMS, OS/VS2 MVS, and MVS/TSO.* Waterloo C has been in production use for over a year at sites around the world.

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dictionary capabilities; full screen facilities for browsing through windows of SQL/DS data using W/Datman, System W's relational data manager; and explicit or conditional selection of SQL/DS rows and columns for DSS applications processing.

The product runs on 4300 series or larger IBM machines and requires SQL/DS Release 2 or 3 and a minimum System W configuration that includes W/Datman. Price of W/SQL Pipeline is $7,500. COMSHARE INC., Ann Arbor, Mich.

FOR DATA CIRCLE 332 ON READER CARD

SOFTWARE FOR VMS USERS

Five products and enhancements to base SAS and SAS/GRAPH software are targeted at end-users and programmers working under VMS for Digital Equipment Corporation's VAX 8600 and 11/7XX series.

SAS/AF is an applications development facility that allows novice users to interact with the SAS System and can be used to developed computer-based training. Annual fees, based on machine classification, range from $1,000 to $3,000.

SAS/FSP provides tools for interactive data entry, query, reporting, and spreadsheets. Data entry screens can be designed to look like invoices, forms, or questionnaires. Included is a letter composition and storage facility for combining letters with mailing lists. Annual fee is $1,500 to $4,000.

The SAS/OR project optimization tool allows users to schedule projects based on structural, time, and resource constraints. Distribution, transshipment, and assignment problems can be addressed; the GANTT procedure monitors the progress of projects and can be used to produce line printer or graphic output. Annual fee: $1,500 to $4,000.

SAS/ETS is used to analyze time-dependent data, including econometric and business data, and to perform planning, forecasting, financial modeling, and row-and-column reporting. Version 5 of this product includes prewritten procedures for creating nonlinear models, fitting polynomial lag models, and handling maximum likelihood estimation and output confidence limits. Also provided are the Holt-Winters forecasting method and financial functions, including depreciation. The annual fee is $1,500 to $4,000.

SAS/IML, an interactive data manipulation language, operates on entire matrixes of values, with the most commonly used mathematical and matrix operations built into the software. Users can transcribe formulas almost directly from matrix algebra notation into SAS/IML statements, according to the vendor. Annual fee is $750 to $2,000.

Enhancements to version 5 base SAS software include a data management, report-writing, and statistical analysis tool; streamlined installation procedures; the ability to store data sets on magnetic tape; and a facility for user-written file interfaces to third-party vendor databases, indexed or keyed files, and data dictionaries. The annual fee is $1,500 to $8,000. Enhancements to SAS/GRAPH allow users to place multiple graphs on a page, define multiple axes and legends, and manage graphics output more efficiently. Annual fee: $1,500 to $6,000. SAS INSTITUTE INC., Cary, N.C.

FOR DATA CIRCLE 333 ON READER CARD

QUERY/REPORT WRITER

Access+ is a dictionary-driven, query/report-writer system for IBM mainframe users. The product provides on-line query or hardcopy report output, and allows users to cross several applications in one request. End users are able to design their own querys/reports without assistance from dp personnel, according to the vendor; dp staff controls security and the number of I/Os allowed. Access+ DOS is priced at $22,000; the OS version is $28,000. LAWSON ASSOCIATES, Minneapolis, Minn.

FOR DATA CIRCLE 334 ON READER CARD

TERMINAL EMULATOR

Enhancements to Honeylink, a terminal emulator for Honeywell VIP Series terminals, which operates on IBM PCs or compatibles, include form storage capabilities; off-line data entry; and enhanced file transfers, including binary file transfers between Honeylink and Honeywell mainframes. The vendor claims the forms storage feature improves terminal response time by storing the forms locally on the PC's disk. Rather than transmitting more than 4,000 characters per requested form, a 10-character command sequence tells Honeylink to retrieve the form off the IBM PC's disk and display it on the screen. The added file transfer capability allows eight-bit program or data files to be transferred to and from a Honeywell host. The key to disk feature allows for subsequent file transfer of the key to disk data to the Honeywell mainframe. Price for Honeylink 7800, including the enhancements, is $995. PARADATA COMPUTER NETWORKS, Farmington Hills, Mich.

FOR DATA CIRCLE 335 ON READER CARD

NETWORK OPERATING SYSTEM

Advanced NetWare/G, a network operating system compatible with IBM's PC Network and PC/DOS 3.1, runs on Gateway's G/NET LAN designed to interconnect IBM PCs, XTs, ATs, and compatibles. G/NET, developed by Novell Inc., provides LAN-to-LAN local and remote bridges, micro-to-mainframe links, and a multi-user X.25 LAN gateway to public data networks. The system supports up to eight file servers per LAN and also provides electronic mail, remote workstation access, full-function printer spooling, system security, and applications development support. The product is priced at $1,595. GATEWAY COMMUNICATIONS INC., Irvine, Calif.

FOR DATA CIRCLE 336 ON READER CARD

INTEGRATION PACKAGE

Super-Link is a micro-to-mainframe processing package consisting of a master microcomputer control program, a library of mainframe subroutines that handles the microcomputer interface, and a microcomputer screen management program. The package, according to the vendor, is designed specifically for the mainframe applications developer of on-line systems. The screen management program permits the developer to paint user screens, create validation criteria for the data fields, and generate the source code (in PL/1, FORTRAN, or COBOL) to define the application data. Super-Link will support any IBM mainframe computer running VM/CMS, TSO, or CICS, as well as any micro running S1 or PC/DOS. The system also supports all programmable interface boards for synchronous communications. Prices range from $10,000 to $30,000, depending on the mainframe and the operating system. MULTI SOFT INC., Edison, N.J.

FOR DATA CIRCLE 337 ON READER CARD

DISASTER RECOVERY

Based on a database management design, Recovery/1, a micro-based product, provides the tools needed to create, maintain, and execute a disaster/recovery contingency plan. Plan elements, such as company and personnel names and addresses, primary and backup computer equipment inventories, recovery team structure and duties, and production control requirements, are interrelated by a set of user-defined action plans covering a variety of potential problem events. The system is menu driven and data entry forms allow fast access to the various plan data for review and modification. Available reports include company and personnel profiles, activity schedules, call lists, and primary and backup site equipment comparisons. An additional feature allows the user to generate "quick" reports based on specific needs. All reports can be directed to the screen or system defined printer. Recovery/1 operates on all IBM microcomputers and compatibles, and other non-IBM micro systems. It requires a minimum of 256KB of memory and two floppy disk drives. Price is $3,000. COMPUTER PERFORMANCE INC., Tolland, Ct.

FOR DATA CIRCLE 338 ON READER CARD

—John L. Kirkley

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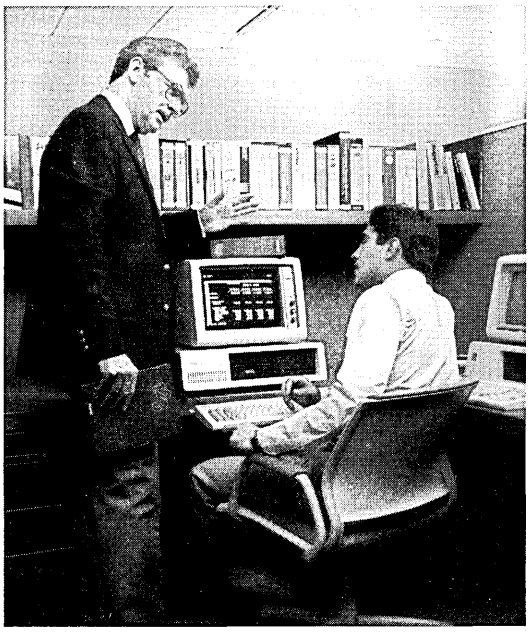

Suggested retail price of 1-2-3 Release 2 is $495. 1-2-3 Release 2 requires 256K RAM. Minimum requirement for 1-2-3 Release 1A is 192K.

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BOOKS

MEASURING PROGRAMMER PRODUCTIVITY AND SOFTWARE QUALITY

by Lowell Jay Arthur

Every book on software productivity and quality is important, necessary, and useful; at the same time, every one of those books fosters hopes that can't be fulfilled, frustrations, and sometimes cynicism. Each book and article on the subject helps to increase the awareness of the need to improve productivity and quality and creates demands from customers and managers that will force software producers to higher levels of excellence.

Those very same heightened expectations, however, increase our realization that creating software is currently a craft, a task requiring artistic skill, dependent on the unique abilities and motivations of individuals. Likewise, the process used to construct each product is unique. Therefore, measurements taken on one process with one group of developers provide little guidance to other groups using other process variations.

Benefits from measurement will occur only when the total process, or specific steps within the process, can be replicated so that learning can occur each time the process is performed. Functional specialization will also help, allowing people to learn from past experience and become experts in specific process steps rather than be the proverbial jack-of-all-trades and master of none. Both productivity and quality will be maximized when we assemble new systems as much as possible from proven, prefabricated, standard modules. We learned this lesson in building cars and ships; until we apply these lessons to software, our efforts toward continuing improvements in productivity and quality will be erratic, at best.

It is also important to note that the optimum software development process should encompass the entire software cycle, from initial customer/user specifications through support/maintenance and enhancement. Program coding and testing, on which most productivity and quality efforts are focused, account for less than 25% of the life-cycle costs. In addition, fully 80% of maintenance costs are required to adapt and perfect the system to suit new or misunderstood specifications, rather than to correct development errors (see Martin and McClure's *Software Maintenance*, Prentice-Hall).

Measuring Programmer Productivity and Quality adds to the call for software management awakening. The text is readable, well illustrated, and focuses on information systems, not computer science or scientific computing requirements. Arthur tries to be prescriptive as well as descriptive and provides, in the back of the book, examples of good programming style in assembly language, COBOL, and PL/1. His scope is broad but appropriate as an introduction to software productivity and quality issues. Real accomplishments will require additional research by technical specialists.

Arthur presents his topics from a specific viewpoint. For example, in the preface he justifies a focus on programming by saying that "Code is the one thing that influences productivity and quality beyond all others." I disagree with this limited view, preferring to look either at the entire process or at least at design and support issues in addition to those in coding. From my viewpoint, it is the difference between doing the right things and doing things right. Quality code may ensure an efficient, maintainable system, for example, but the system may fail because the specifications and design caused the wrong system to be built. I do agree, however, that code is important, and at the very least, code productivity and quality can be a place to begin a company's software quality efforts.

Arthur also creates some limitations by defining quality in terms of quality metrics and criteria. This definition provides the basis for a technical set of quality standards, but omits the linkage between quality and the expectations of the customers. To me, the ultimate measures of quality are made by the customers; if their expectations are not fulfilled, quality is not achieved, regardless of the products' technical merits.

In spite of its title, the book gives productivity only passing mention, and focuses mainly on quality after Chapter 2. (Those interested primarily in productivity might consider Arthur's first book, *Programmer Productivity*, John Wiley and Sons, New York, 1983.) Chapter 2 provides a broad overview of productivity issues, enough to orient the novice. Significant by its omission, however, is mention of the measuring concepts introduced by Tom DeMarco in *Controlling Software Projects*, (Yourdon Press, New York, 1982). DeMarco's concept of what is appropriately called "software cost accounting" is really basic to any discussion of software productivity measurement. (Surprisingly, DeMarco is quoted once in another part of Arthur's book, but reference to the text is somehow omitted from what is an otherwise superb bibliography.)

As noted above, Arthur defines quality in terms of software metrics and criteria. These are essentially the same in form and substance as software "attributes" introduced by Barry Boehm et al, in 1978 in *Characteristics of Software Quality* (Elsevier North-Holland Publishing Co., New York). Boehm uses attributes to define expectations in all parts of the software life cycle, while Arthur focuses on coding considerations.

Arthur's metrics are defined in terms of 11 characteristics, including correctness, efficiency, flexibility, and integrity. Criteria are components of metrics; Arthur lists 22 criteria, including auditability, consistency, expandability, and modularity. A metric is defined as a function of its criteria.

Arthur points out that projects can be focused on different metrics, and he provides a simple System Quality Analysis Worksheet for use in assigning different weights to the various metrics. He recalls the famous Gerald Weinberg experiment *(Psychology of Computer Programming*, Van Nostrand Reinhold, New York, 1972) in which different groups of programmers, when presented with the same programming problem but different

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optimization objectives, each solved the problems so that the optimization objective was met. This experiment basically proves that software projects can be managed, and Arthur's metrics/criteria and Boehm's attributes make up the language used to define management expectations.

A chapter is devoted to complexity metrics, based on the assumption that quality is inversely proportional to complexity. Well-known complexity measures by McCabe and Halstead are reviewed. Each of the next 11 chapters expands one of the quality metrics showing how each of the criteria can be achieved. Some characteristics can be examined automatically; others can be reviewed only manually at walkthroughs or inspections. The points made in these chapters are excellent, but their narrative format requires each reader to search for the key points. The text would be vastly improved by one or more checklists in each chapter, highlighting key issues.

Some of the metrics and criteria are mutually exclusive. It would be useful to note, for example, that setting high priority on the efficiency metric may compromise performance on maintainability.

After all the metrics are discussed, Arthur inserts a brief chapter on the management aspects of software productivity and quality. He discusses management of both the project and the people, suggesting different measures for systems analysts and for programmers. It is hard for me to fault his general ideas, but I am very comfortable measuring a system, a project, or a process; I am less comfortable measuring people directly. It would probably have better impact somewhere before the chapters on metric details.

In aggregate, this book adds its weight to the call for software productivity and quality. It provides a valuable introduction that can lead readers to improve their work. But its limitations mirror the limitations of the state of the art (at least in the U.S.), and until software development processes can be stabilized, standardized, and replicated, we will improve only in small steps, dependent on the learning curves of each new development team. John Wiley & Sons, New York (1985, 325 pp., $34.95).

—Joseph L. Podolsky

BOOK BRIEF

THE SACHERTORTE ALGORITHM AND OTHER ANTIDOTES TO COMPUTER ANXIETY

by John Shore

As far as I'm concerned, the arrival of this book was pure serendipity. Some weeks ago, my sister asked me to recommend a basic text on computing. She said that, despite some trepidation, she felt obliged to learn something about computers because everyone in the world seemed to be studying, working with, or buying them and she was beginning to feel left out. She cautioned me that the book had to be a very elementary one that made no assumptions about the reader's previous knowledge of the field. The very next day, along came *The Sachertorte Algorithm.*

I won't deny that as a lover of Viennese pastries, I found the title of John Shore's book immediately appealing. (To enlighten those poor souls who have never tasted a Sachertorte, it is an unforgettably delectable, rich chocolate cake.) But while Shore is undoubtedly a chocolatophile, he is also a scientist and a lover of language. A theoretical physicist, he is currently a research scientist at the Naval Research Laboratory in Washington, D.C., specializing in information science. His admiration for good writing is such that at one time, he says, "Had there been a Strunk and White ashram, I would have been there."

Nor has he forgotten his own introduction to computers and computer anxiety at Yale in the sixties. "To those who've never experienced it," he writes, " 'keyboard paralysis' sounds like a joke. But it's a real problem for many people, both those who want to use computers and those who'd rather not."

With this background, Shore is able to present his subject clearly, deftly, and with never a mention of a term without an explanation. He progresses from jargon and terminology to interfaces, languages, and programming, winding up with the work computers will do in the future in areas like artificial intelligence.

The title comes from the fact that Shore calls the exact directions needed to follow Aunt Martl's vague Sachertorte recipe an algorithm, which he then defines as a precise description of a method for solving a particular problem.

With a guide like this book, the kickers and screamers will surely go gently into the good night.

This, then, is the book I plan to give my sister. It would be a good present for the uninitiated on your Christmas list. (Give them some Sachertorte, too.) Viking Penguin Inc., New York (1985, 270 pp., $16.95).

—Florence Lazar

REPORTS & REFERENCES

NATURAL LANGUAGE APPLICATIONS

Getting machines to understand free-form natural languages has been a major goal of computer scientists for years, but only recently has it become a commercial reality. In this widely researched report, totaling 459 pages of facts, interviews, product and company profiles, research reviews, and market analysis, is provided what is probably the most comprehensive and literate overview of the natural language field yet.

Topics include natural language interfaces, content scanning systems, talkwriters (typewriters that need only be spoken to, which are expected to surface as products shortly), text editing systems, and machine translation from one language to another.

Market projections show the entire natural language business will hit $1 billion annually in the U.S. before 1993. A must for investors, product planners, and curious users, *Natural Language Computing: The Commercial Applications* sells for $395 (payment must accompany all orders), and includes airmail. The book can be ordered from Ovum Ltd., 44 Russell Square, London WC1B 4JP, England.

VENDOR LITERATURE

THE POWER SUPPLY JUNGLE

How to Get the Best Value for Your Power Supply Dollar provides circuit, system, and instrument designers with advice on selecting power supplies and a power supply vendor. This eight-page brochure, which is published by Computer Products Inc., examines such topics as basic selection criteria, current industry trends, determining long-term reliability, and what to look for in a power supply company. COMPUTER PRODUCTS INC., Pompano Beach, Fla.

FOR DATA CIRCLE 350 ON READER CARD

PLANT MANAGEMENT SYSTEM

An eight-page brochure from Honeywell Inc. explains how process plant efficiency can be improved through the coordination of computers and control systems. Entitled *Integrated Plant Management,* the brochure introduces the Plant Management System, an information processing network that integrates process control and plant information. HONEYWELL INC., Minneapolis.

FOR DATA CIRCLE 351 ON READER CARD

STATIC-SAFE STORAGE

Stanley-Vidmar Inc. has published a four-page brochure describing its electrostatic discharge (ESD) protective cabinets and workstations for the storage and handling of static-sensitive electronic components. *How Do You Store Your Static Sensitive Components?* describes and illustrates modular storage drawer cabinets and additional components for static-safe workstations. STANLEY-VIDMAR INC., Allentown, Pa.

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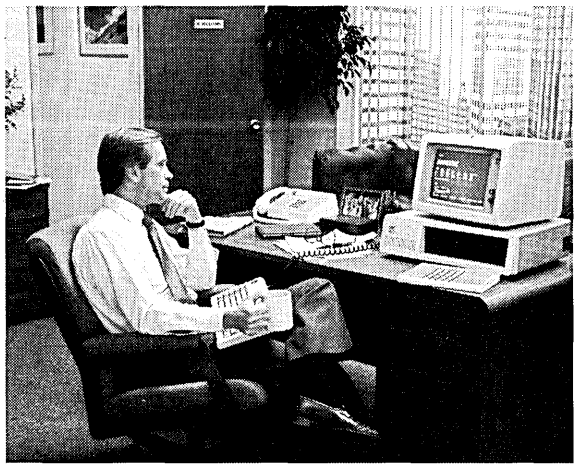

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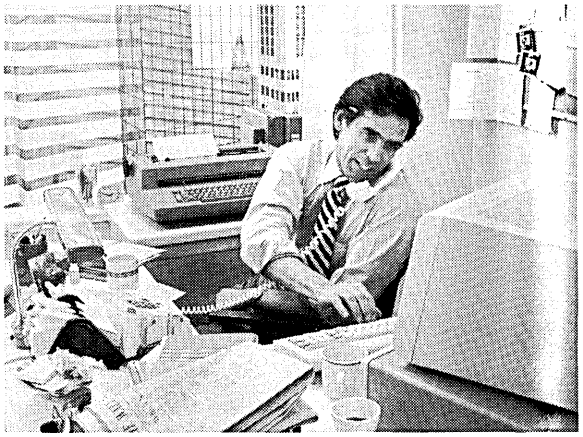

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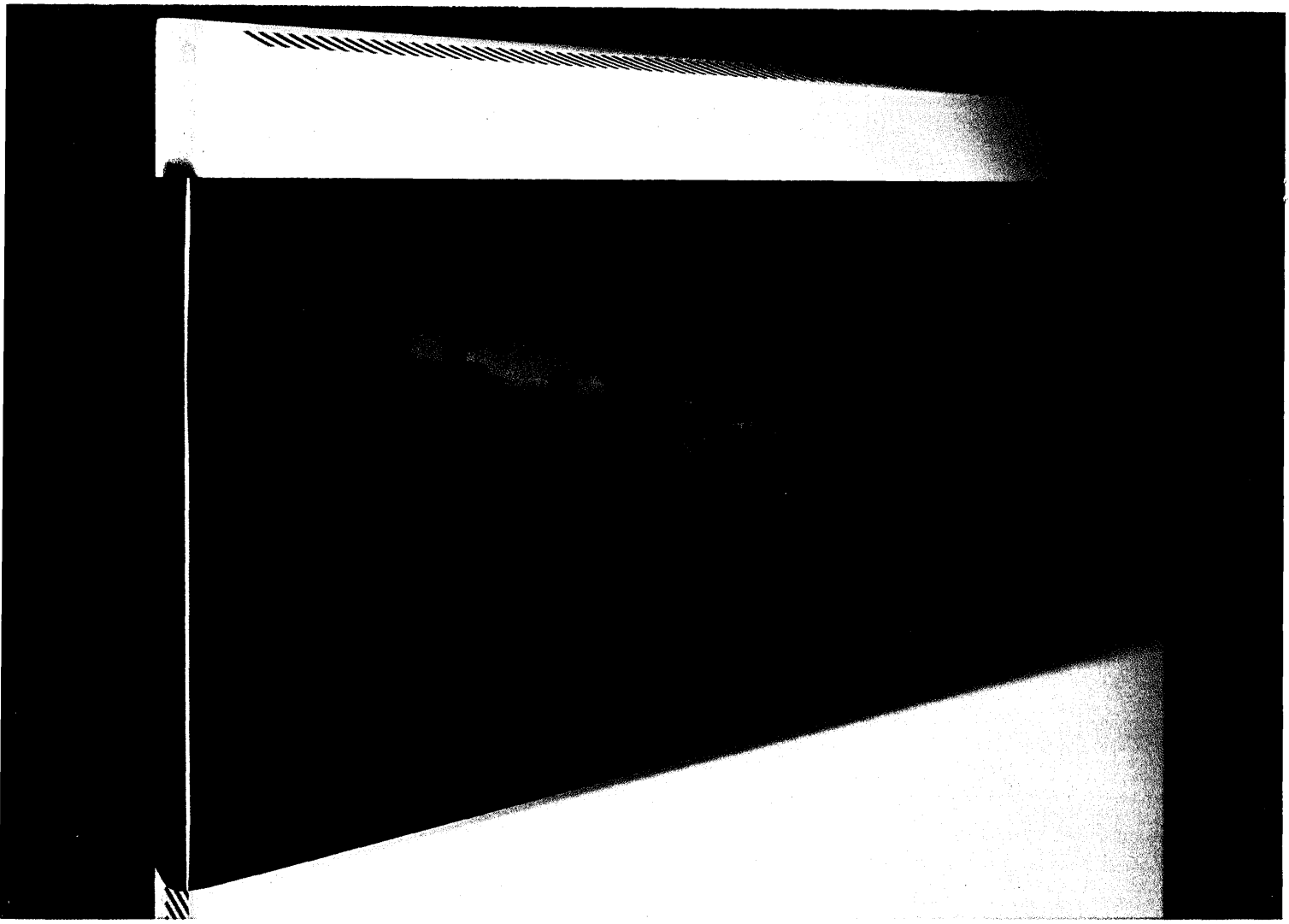

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CIRCLE 78 ON READER CARD

Now that the world relies on computers it needs a computer it can rely on.

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READERS' FORUM

COMPUTER ERROR

"Ah ha!" my mother began. "You always told me computers don't make mistakes. Look at this letter from the bank." As a maintenance programmer, proud of my profession, I had long ago given up trying to explain to my mother what I did for a living, much less how computers work. During one discussion, I tried an extensive analogy comparing programming to figuring the odds on roulette wheels and in bridge games. Her horrified reply: "Four years of college and you hang around casinos repairing slot machines?"

I thought I had made one point, though: that computers don't make mistakes; people do. I read the letter as we sat down to dinner.

"Dear Customer: Enclosed is an additional interest check for $72.53. Last week our computer made an error in calculating the monthly interest on your CD. We hope you were not inconvenienced and apologize again for the mistake our computer made. Sincerely, James Branscome, Chief Teller."

"Well, there's certainly something fishy going on here," I replied. "I'll call the bank next Monday and find out what's going on. This beef Stroganoff you made is really delicious, Mother."

Monday, after solving five weekend crises, I decided to look at my appointment book to see what might be on line for the rest of the day. The famous letter was stuck inside. I called the bank and talked to Mr. Branscome. "My mother got this form letter from you. Why did you say the computer made a mistake?"

"Ah, yes, we had a little problem. And I'd like to personally say we're sorry she may have been inconvenienced. We assure you it won't . . . ."

"Now look, Mr. Branscome," I interrupted, "I myself am a computer programmer. You can't snow me! What happened? An abend, perhaps? A control clerk out to lunch?"

"Oh. Well, what actually happened is that an operator overlooked a weekly tape in the monthly interest run. We didn't notice it until after the checks had been mailed. The next release of this program will feature an extensive calendaring module."

"But you're contributing to the public's misunderstanding of computers! You can't anthropomorphize them! Computers are simply tools. Why didn't you admit there was a human error?"

"Perhaps, sir, you haven't heard of the problems certain banks in the Midwest have had? Confidence is essential. We discussed the phrasing of that letter for several hours here in the bank. Finally, we decided that it would be better to put the blame on the computer. People like to think that computers make mistakes—it makes them less frightening.

"Besides, if we admitted it was a human error, our customers might take their money to an institution where the bankers don't make mistakes. By the way, I'd just like you to know that my own mother was delighted when the bank computerized a few years ago. She had imagined that we had rows of clerks with quill pens figuring the interest, like in a Dickens novel. And she assures me that her washing machine never feels a thing when she kicks it."

What more could I say?

Next Sunday I was again having dinner with my mother. "Say, dear, did you ever find out what happened at the bank?" she asked.

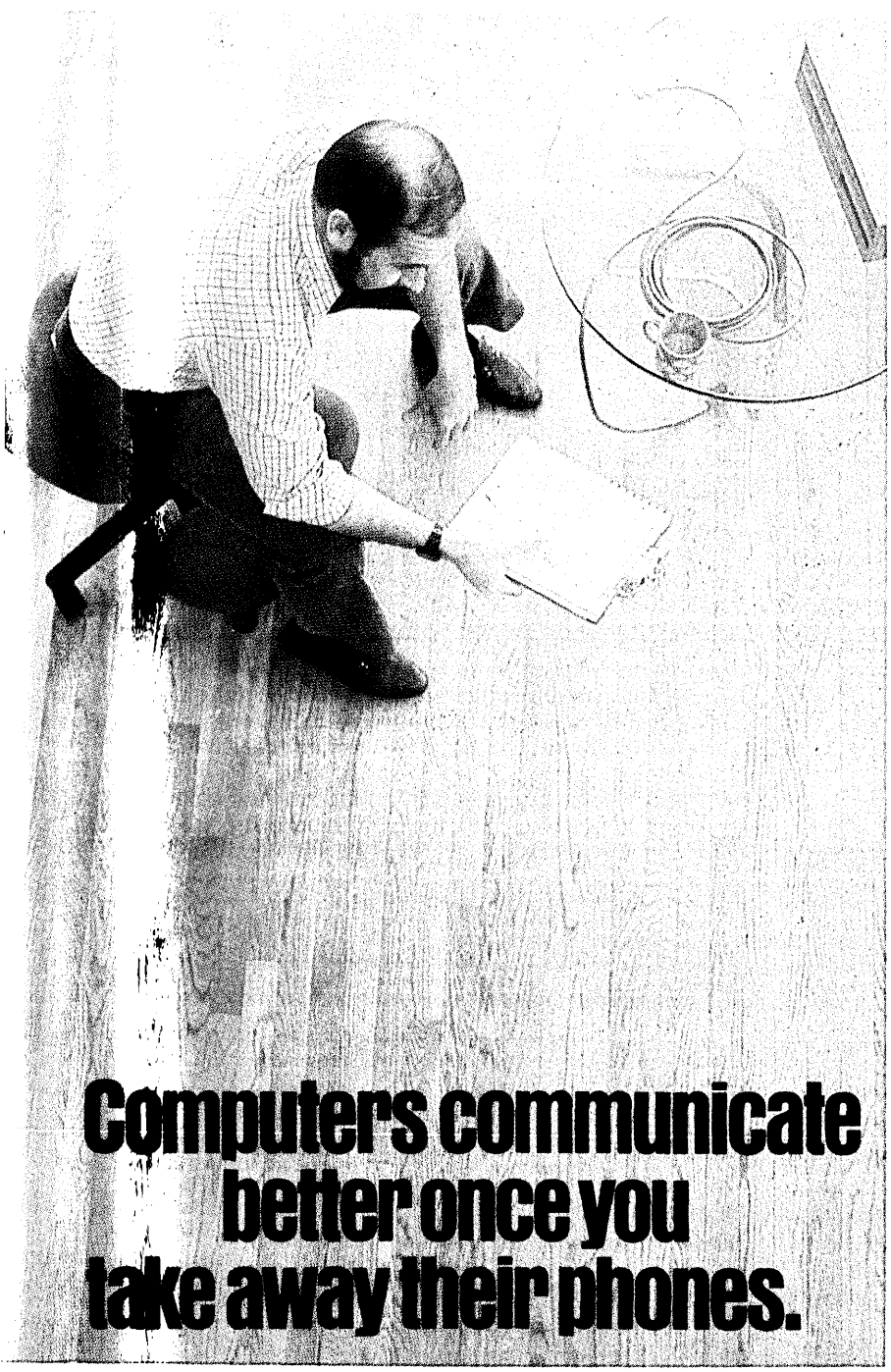
"Yes, I did, Mother. There was a computer error. Say, this chicken is excellent. Is it a new recipe?"

—W.B. Ward Arrington
Coconut Grove, Florida

THE ACRONYM: A USER'S LAMENT

"What's in a name?" wrote W.S.;
What's in acronyms is anyone's guess.
With acronyms, one does save space,
But loses hope—as one tries to trace
Back through the pages, perhaps to glean,
Just what in heck the darn things mean.
Acronyms help our technicians
Avoid the verbal repetitions.
But how 'bout us, the uninitiated—
Those whose code books are outdated?
We float alone, and too pathetic,
In a soup that's alphabetic.
Our overload becomes more terrific
With each new high-tech hieroglyphic.
A "ROM" or a "RAM" or even "DISOSS"
Keeps us from sounding too verbose.
But to me, it seems beyond belief
That we'd go to such lengths to try to be brief.

—Jo Ann Oravec
Madison, Wisconsin



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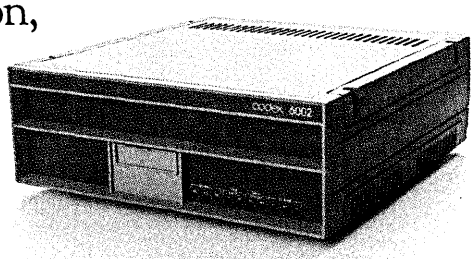

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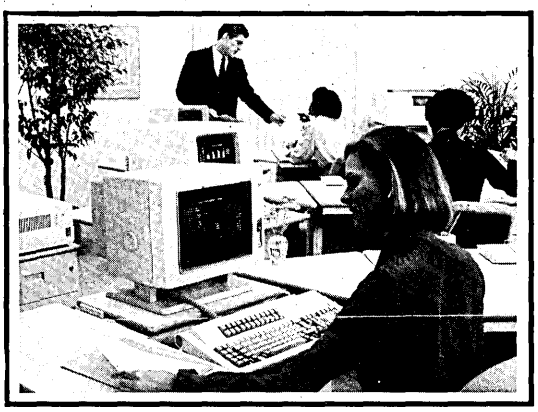

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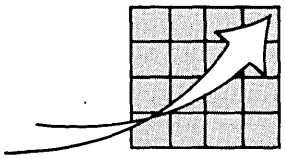

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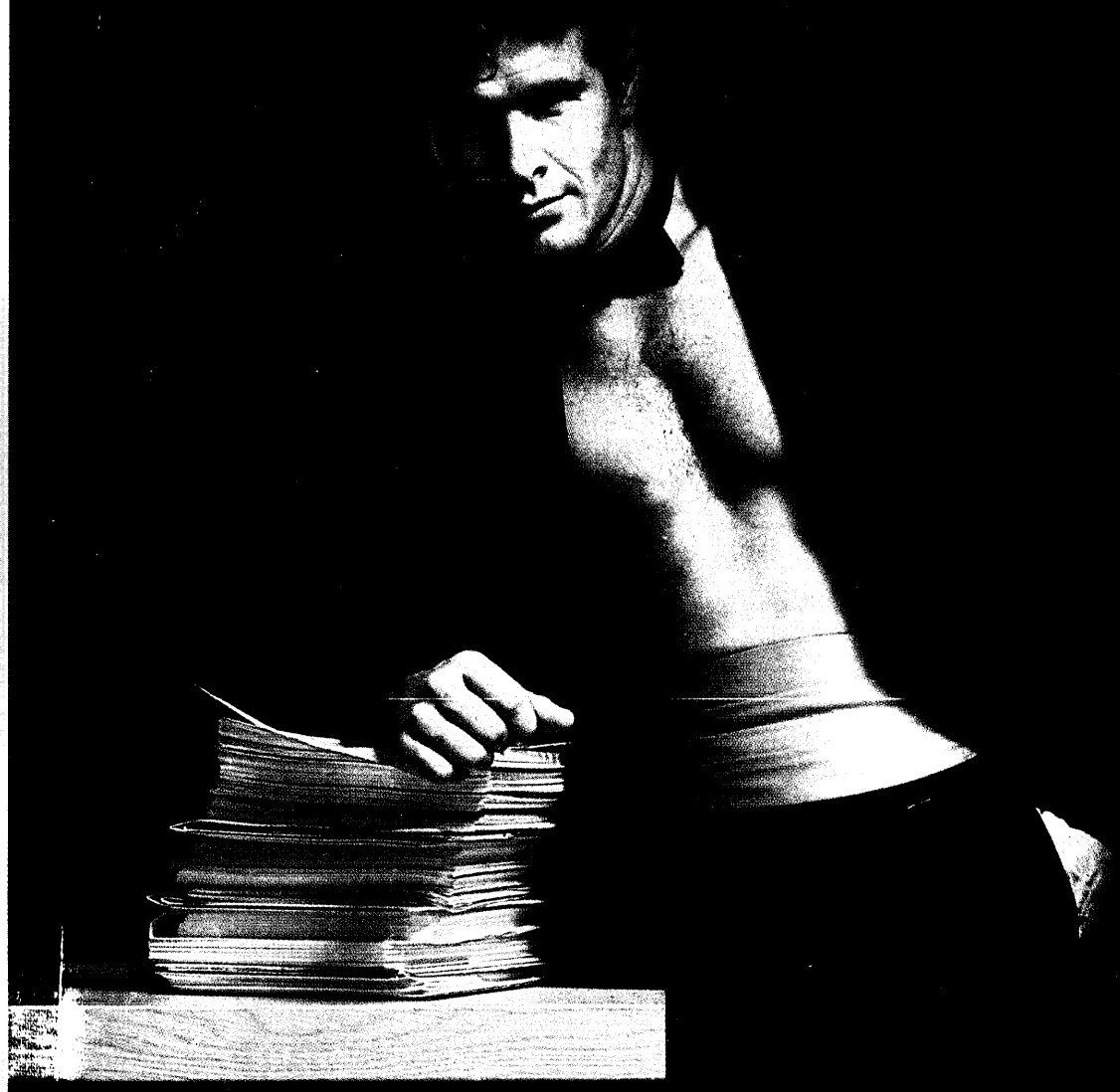

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