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DATAMATION 85

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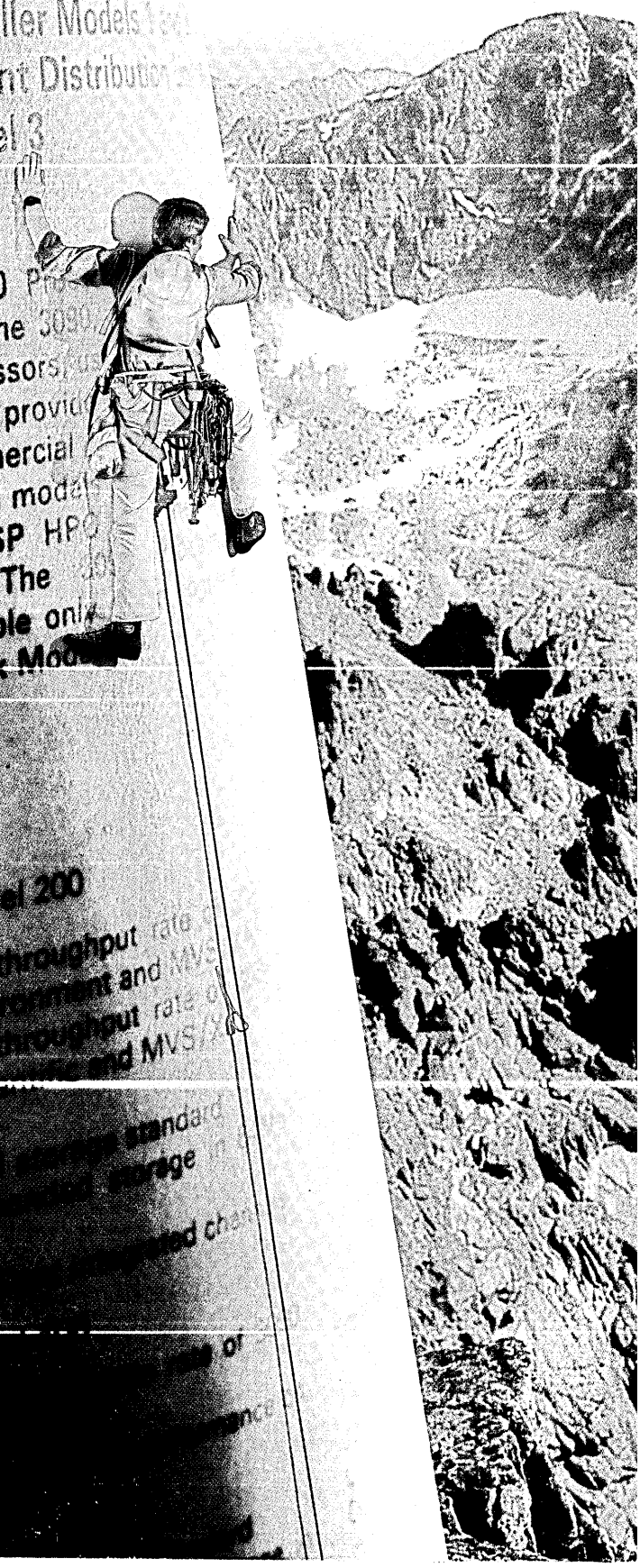
IBM 3090 Processor Complex
3090 Processor Unit Models 200 and
3092 Processor Controller Models
3097 Power and Coolant Distribution
3089 Power Unit Model 3



IBM announces the IBM 3090 Pr
Model 200 and Model 400. The 3090
growth system for 308X Processors
TCM packaging technology to provi
price performance in commercial
environments. In addition, both mode
by MVS/SP, MVS/XA, VM/SP HP
VM/XA Systems Facility. The
Complex Model 400 is orderable onl
from a 3090 Processor Complex Mod

Highlights

3090 Processor Unit model 200

1.9 times internal throughput rate
commercial environment and MVS
internal throughput rate
and MVS/

standard
storage

EXPLORING THE SIERRAS

ALSO

DATABASE MACHINES TAKE OFF

IN FOCUS: THE MAINFRAME USER SURVEY

UP THE SOFTWARE CURVE

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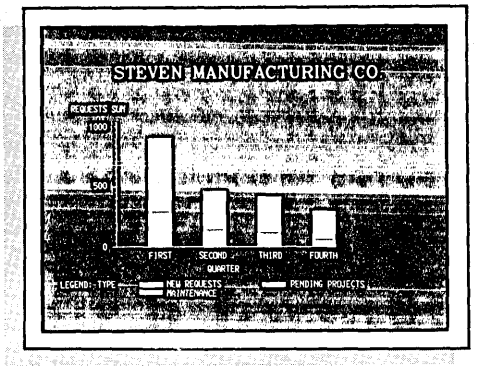

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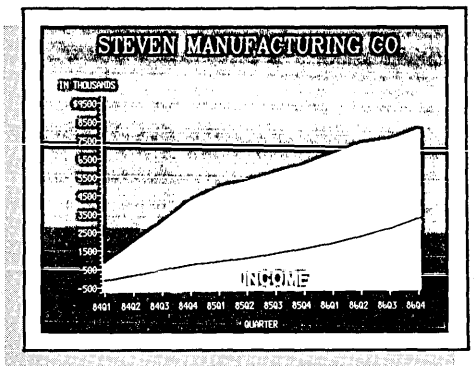

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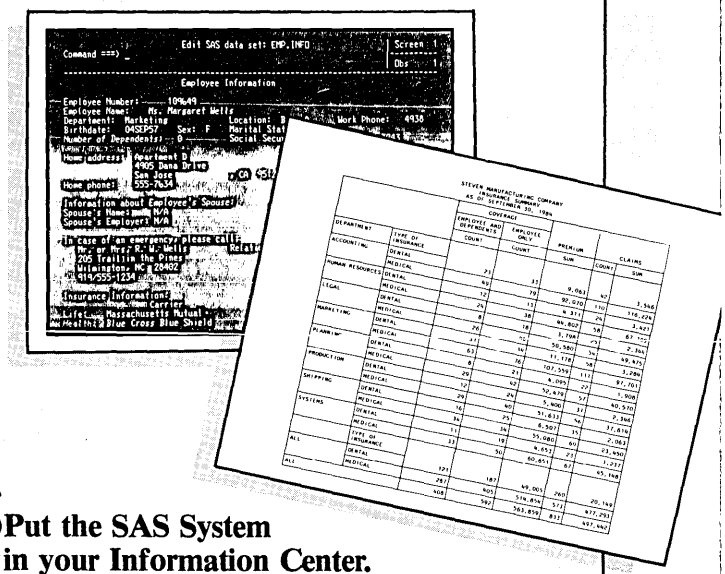

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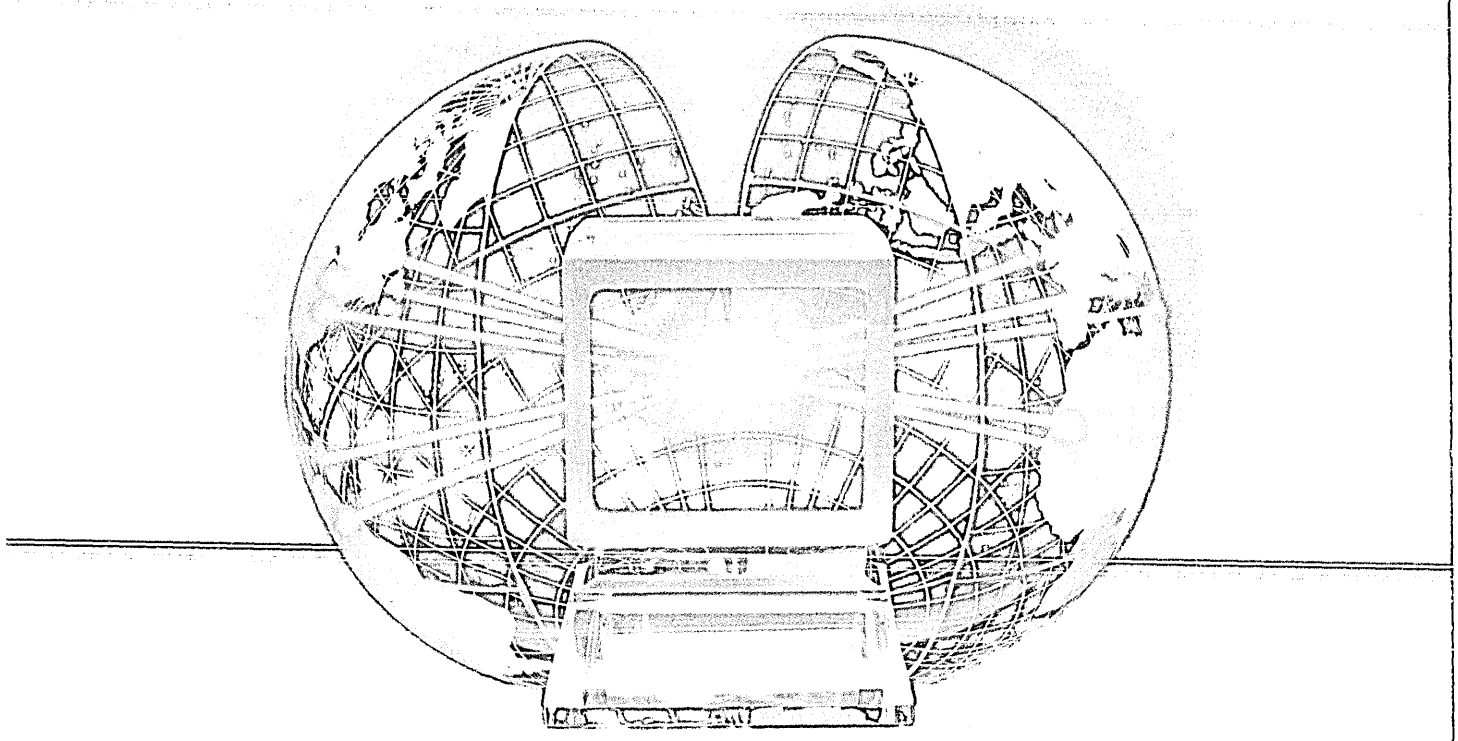

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INFOTRON SYSTEMS

CIRCLE 4 ON READER CARD

DATAMATION

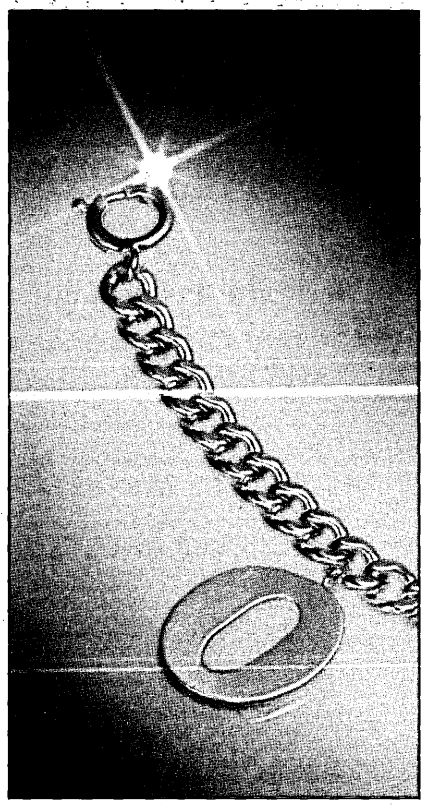
MAY 15, 1985/$3.00 U.S.
VOLUME 31 NUMBER 10
This issue, 191,350 copies

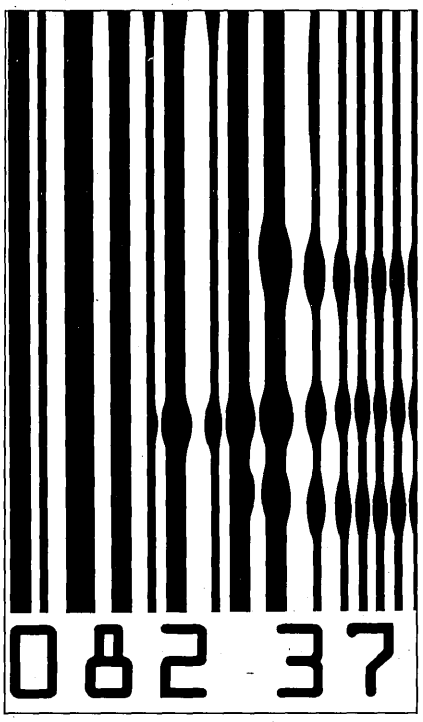
FEATURES

32
IN FOCUS
Surprise! IBM is gaining significantly against traditional systems rivals and is well ahead of the pack rushing to market with office systems, pcs, and other forms of distributed processors. John W. Verity reports on this year's DATAMATION/Cowen & Co. survey of user mainframe spending in "Up, Up, and Away."

84
SIERRA: WHERE WILL IT LEAD?
Norman Weizer
The next few years will tell us whether or not the road down which IBM is taking its mainframe users is paved with good intentions.

96
UP THE SOFTWARE CURVE
Bob Djurdjevic
IBM discovers equilibrium. Increasing software revenues will counterbalance declining hardware revenues.





108
YOU KNOW MY NAME, LOOK UP THE NUMBER
Robert Ellis Smith
Dp's accelerating progress has rendered almost moot the controversy over use—and misuse—of social security numbers.

119
IS YOUR COMPUTER INSECURE?
Joel S. Zimmerman
Build up its confidence—and yours—by challenging the principle of "cost-effective" system security.

132
PAINTING A NEW PICTURE
Frank Sweet
The impact of data-driven prototyping on on-line screen design is transforming the way dpers develop mainframe applications.

167
READERS' FORUM
Barbara Bialick tells a philosophical tale in "Girdle, Etcher, Bozo."

NEWS IN PERSPECTIVE

46 **MAINFRAMES**
Phantom of the future?
Too little, too late?

52 **DBMS**
Database machines take off.

63 **FAULT TOLERANT**
The FT crowd.

65 **SOFTWARE**
The new game in town.

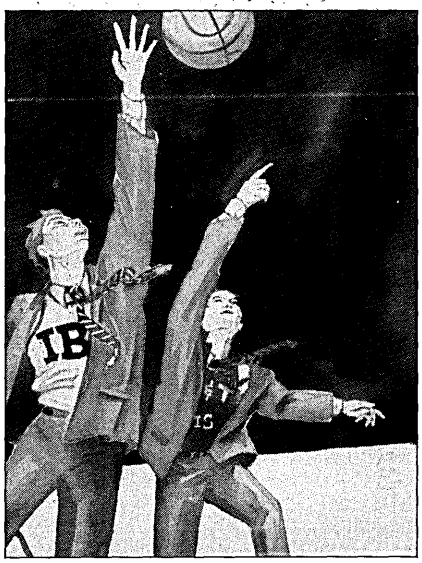
71 **MICROCOMPUTERS**
Of mice and Xerox.

78 **BENCHMARKS**

79 **WORLD WATCH**

DEPARTMENTS

8 **LOOKING BACK**
13 **LOOK AHEAD**
18 **CALENDAR**
23 **LETTERS**
29 **HARDCOPY**



145 **HARDWARE**
153 **SOFTWARE**
160 **MARKETPLACE**
162 **ON THE JOB**
176 **ADVERTISERS' INDEX**

OEM SUPPLEMENT 80-I

- 2 **PROTOCOL CONVERSION WARMS UP**
- 9 **DICKERING FOR DOLLARS**
-13 **PICTURES FROM PCS**

COVER PHOTOGRAPH BY LUCIEN FLOTTE; MOUNTAINSCAPE BY RICHARD BURDA/TAURUS PHOTOS

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CIRCLE 5 ON READER CARD

Computers communicate better once you take away their phones.

So you've been put in charge of making sure data flows smoothly to and from your company's remote offices.

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You see, what a Codex mux does is take data that used to be transmitted over two, three, even sixteen lines and transmit it over just one. Doing this not only decreases phone line costs, but increases operating efficiency as well.

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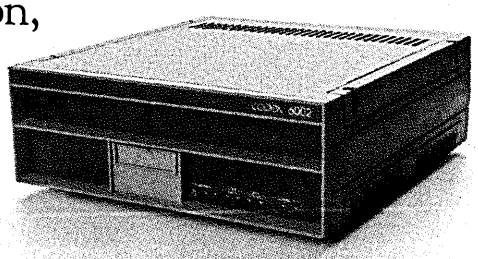

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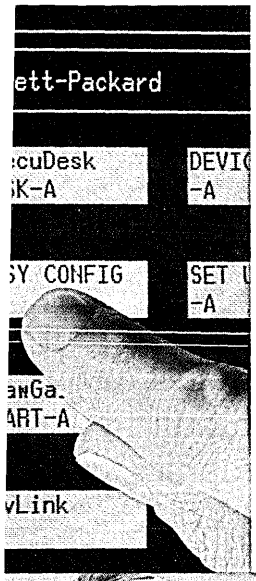
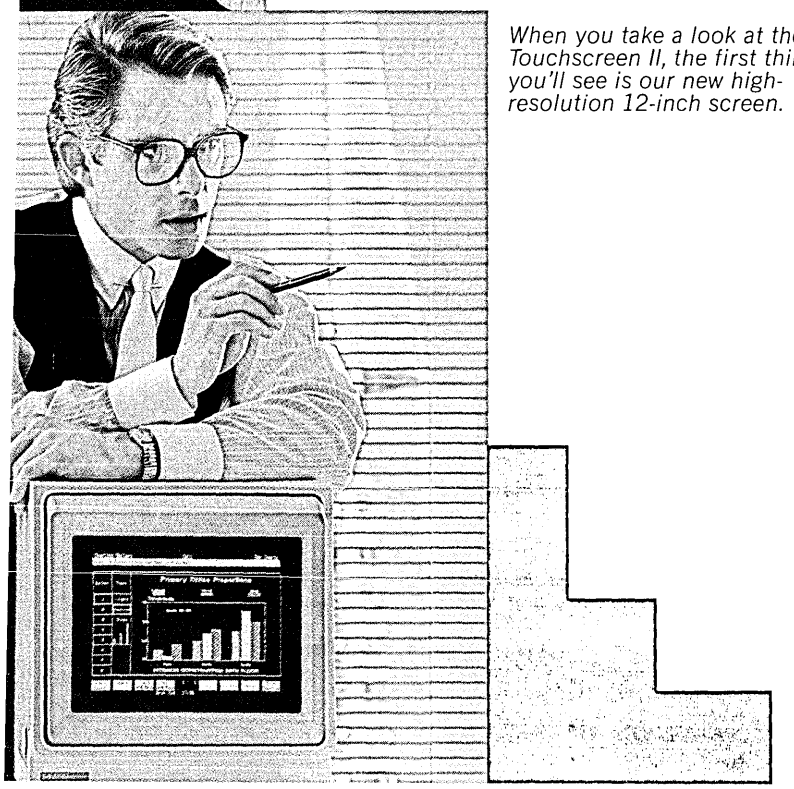
INTRODUCING THE HEWLETT-PACKARD TOUCHSCREEN II

OFFICE AUTOMATION MADE EASY. POINT BY POINT.



With the new Touchscreen II, it's easy to put your finger on a problem (and a solution). Simply point at what you want.



When you take a look at the Touchscreen II, the first thing you'll see is our new high-resolution 12-inch screen.

The new Hewlett-Packard *Touchscreen II* personal computer is the mainstay of an office automation system designed to be easy.

Easy to learn ■ Easy to operate ■ Easy to place in an office information network.

In short, *Touchscreen II* makes it easy to be productive ■ Here are a few pointers.

WHEN YOU SEE WHAT YOU WANT, POINT.

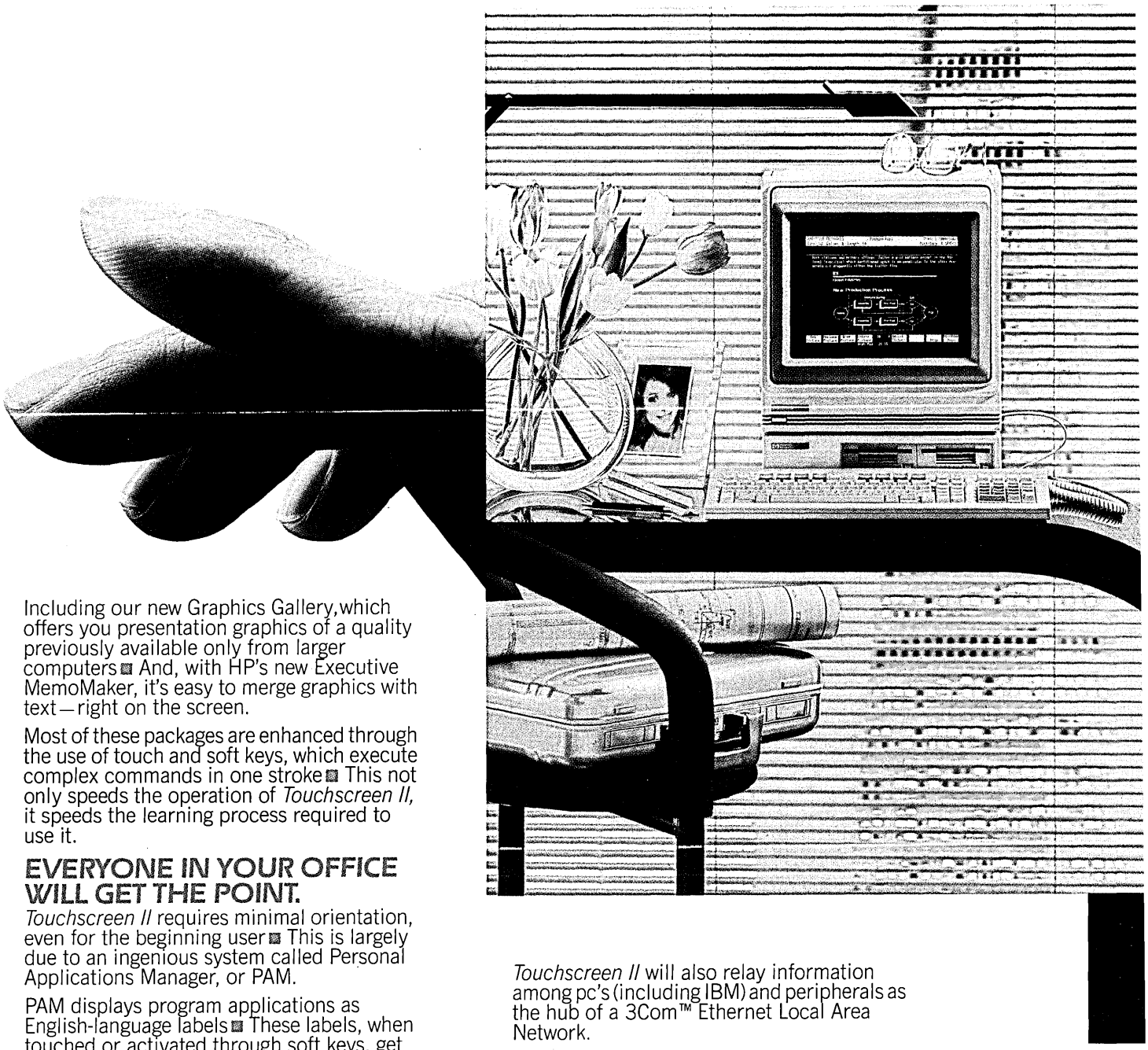
Sit down to work, and *Touchscreen II* displays a selection of application software on a high-resolution 12-inch screen.

Find the one you want to use, then touch the point on the screen where it appears ■ Instantly, the program is activated.

You're freed from typing complicated gibberish commands ■ Simply look, touch, and move on.

THERE'S PLENTY TO POINT TO.

Touchscreen II allows you to choose from over 600 of the most popular business software packages ■ In addition, you can use Hewlett-Packard's own software library ■



Including our new Graphics Gallery, which offers you presentation graphics of a quality previously available only from larger computers. And, with HP's new Executive MemoMaker, it's easy to merge graphics with text—right on the screen.

Most of these packages are enhanced through the use of touch and soft keys, which execute complex commands in one stroke. This not only speeds the operation of *Touchscreen II*, it speeds the learning process required to use it.

EVERYONE IN YOUR OFFICE WILL GET THE POINT.

Touchscreen II requires minimal orientation, even for the beginning user. This is largely due to an ingenious system called Personal Applications Manager, or PAM.

PAM displays program applications as English-language labels. These labels, when touched or activated through soft keys, get you into programs immediately.

PAM also enables you to accomplish a number of common jobs—such as switching from pc to terminal mode—with a single keystroke.

Touchscreen II is easily set up for peripherals like printers and plotters, thanks to the pictorial menu. Simply touch the pictures that match the devices in your system.

GET YOUR POINT ACROSS.

Touchscreen II makes it easy to communicate.

Built-in terminal capabilities and a variety of data communication devices allow *Touchscreen II* to exchange information with Hewlett-Packard, DEC and IBM host computers. Acting as a terminal, *Touchscreen II* enables you to tap into the power of these larger computers, making use of their software, databases and peripherals.

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If you'd like more pointers on the quality and simplicity of the new *Touchscreen II*, call us toll-free at 1-800-FOR-HPPC, Dept. 276X, for the name of your nearest Hewlett-Packard dealer or sales office.

The more you simplify, the more you'll produce. And productivity is, after all, the point of this discussion.

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LOOKING BACK

THIS IS YOUR LIFE: LEO I

May 1965: Spurred by the recent retirement of one of the first British vacuum tube computers, DATAMATION published "The LEO I: *There* Was a Machine." After 14 years of active service, "bits" of LEO I (Lyons Electronic Office) were being moved to the Science Museum in London. The history of LEO I dates back to 1947, when T.R. Thompson, after visiting the U.S., became convinced early computers like ENIAC demonstrated the feasibility of electronic office management. Reporting back to his directors at J. Lyons & Co., the large catering and restaurant firm, an optimistic Thompson got approval to pursue his ideas. Since the Mathematical Laboratory at Cambridge University was in the midst of developing EDSAC, Thompson decided to reengineer and modify the EDSAC design,hoping to produce a machine capable of performing office management computations.

Author Gordon R. Gibbs observed that the basic units and flow of data were "relatively conventional for that period; however, the input/output equipment was on-line and was isolated from the computer itself by a series of buffer registers, known as 'annexes,' which essentially allowed the computer to continue until input or output was available." Programs were fed into LEO I by means of high-speed paper-tape readers or from a punched-card pack. It took 1.5 seconds to compute a man's wage allowing for all the intricacies of the British income tax and social security systems, compared to a manual speed of eight minutes—a remarkable feat for 1951.

LEO I had more than 7,000 tubes which were checked every morning by a technician (who received a bonus for doing the test) until it was programmed to detect those tubes destined for failure. Some of LEO I's early accomplishments included computing the optimum mix for Lyons tea, recomputing new tax tables, performing fundamental crystallography, and calculating the Lyons payroll. In 1953, the total system was dedicated; LEO II was born and the LEO legacy continued.

TIMESHARING VS. PCS

May 1975: From the time we were children, we have been taught to share. In this issue, however, Berthold K.P. Horn and Patrick H. Winston advocated the return of processors dedicated to individual users *without* sharing. Though the idea of timesharing had dominated interactive computing for more than a decade, Horn and Winston believed the time had come to return to the personal computer.

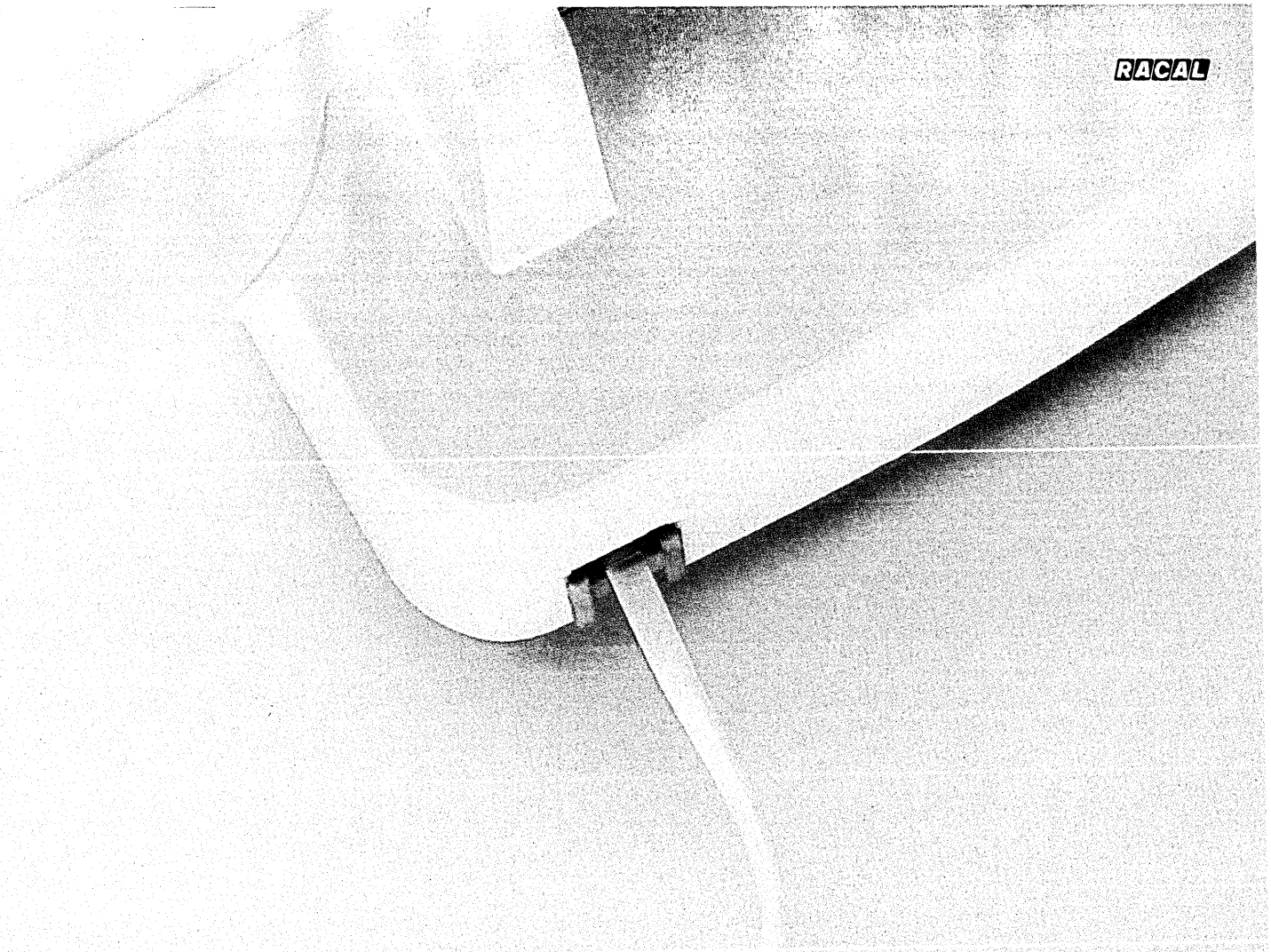
"It makes sense today, because it is certainly superior to have 30 systems that give excellent steady service for $33,000 than to have one central timesharing system that cannot adequately support 30 users and costs $1 million. The economics of scale in the past favored putting all one's eggs in one basket. The balance will now tip the other way," stated Horn and Winston.

Decentralization of computing components such as processors, memories, and file systems were also of concern to Horn and Winston. With setup costs very high and production costs very low, the authors predicted standardization on a small number of products with wide applicability.

Horn and Winston also gave examples of the pc as a further sophistication of minicomputer systems. A system that would cost around $33,000 to build was focused on, and the authors expected a group of these systems to be used like a secretarial pool. Each system would be "totally dedicated to individual users on demand, but would reside in a central pool otherwise."

As evidenced by their inclusion of Kay's and Greenblatt's systems, the authors were not only thinking of typical business computers. Alan Kay's Dynabook, rumored to be under development at the Xerox Palo Alto Research Center, was a display-oriented system intended for educational use. Meanwhile, Richard Greenblatt and Thomas Knight were developing a pc to efficiently execute very large programs written in high-level languages like Lisp, Planner, or Conniver.

—Mary Ann Hariton



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That makes it easier to own a mux. And a lot less expensive.

Because when you connect our 7400 Series statistical multiplexer to an ordinary phone line, you pay only for the calls you make. Not for the use of a leased line, 24 hours a day.

Obviously, this is no ordinary mux. For starters, it can handle 4 or 8 channels. And features (among other things) remote configuration and remote diagnostics. How remote?

You or your service people can examine and reset the 7400 from anywhere you can find a phone. And that's something no other multiplexer can offer.

Of course, the 7400 sends data over leased lines, too. Just like any other multiplexer.

But the way we look at it, why pay for a leased line if you don't really need one? What you do need is a brochure and that's free.

For yours, call (800) 543-3000, Operator 507. In California, call (408) 946-2227.

But don't stay on the line too long. One of our muxes might be trying to get through. © 1985, Racal-Vadic.

Racal-Vadic

CIRCLE 8 ON READER CARD

"VAX IS GIVING AMF MORE TIME FOR THE THINGS THAT REALLY MATTER."

Michael Lilly
Director, Corporate MIS/Operations
AMF, Incorporated

To many people AMF means recreational sports. But today it also means electronic components, filtration equipment, automated process equipment and more.

It's a vastly more complex company. A company made vastly more manageable by Digital's VAX™ computers – the vital component of office automation at AMF Corporate/MIS Operations.

As Michael Lilly says, the company's decision to stake its future in MIS on Digital's VAX computers – and the office automation tools like All-In-1,™ DECnet™ and DECmail™ software that run on them – was hardly a snap judgment.

Every major computer company was considered. Lilly says that, "dollar for dollar," only Digital's VAX system offered the power, ease of use and communications capability with other computer systems – including IBM – that AMF needed.

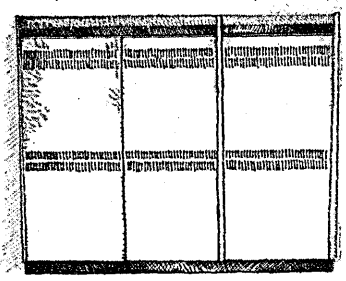
So AMF chose the VAX computer – the best-selling 32-bit computer in the world – and waited to see what the machine could do.

"SUDDENLY WE HAVE TOOLS AND CAPABILITIES WE NEVER HAD BEFORE."

Lilly and his group didn't have to wait long. The system was up and running within days.

Reaction within the department was rapid and gratifying. "We really got excited about it," says Lilly. "Immediately, we were communicating better." And there was more – spreadsheets and word processing and a mail system. "Suddenly," Lilly said, "we had a vehicle for total open communications to every important person or department in the corporation."

Part of the story behind AMF's almost instantaneous rapport with the VAX system is that it's so easy to use. Menus and operating commands are the same for each fully integrated application. Whole functions are completed in as few as two keystrokes. And because everything is in plain English, it's literally as simple as A-B-C to incorporate



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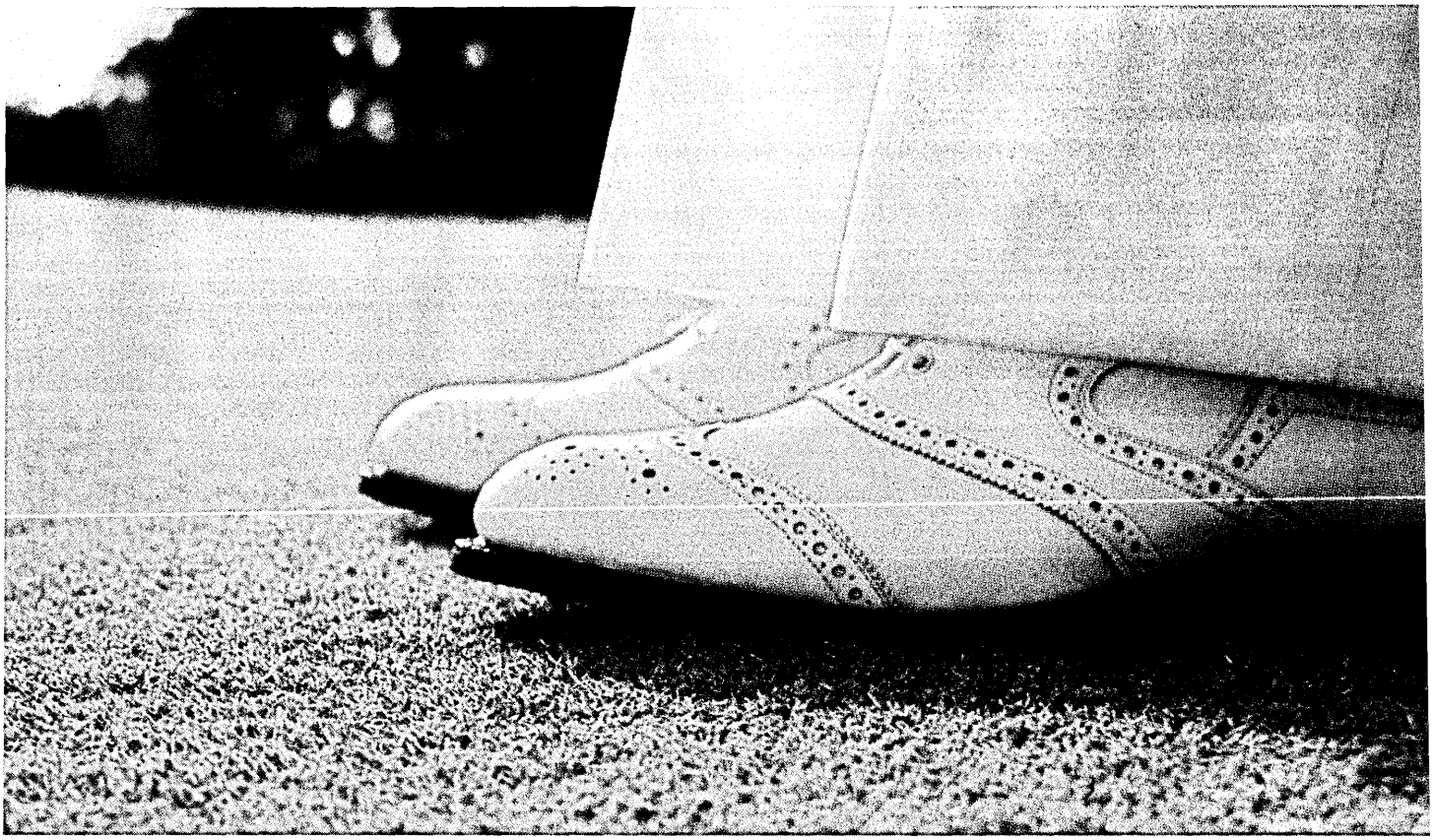


any VMS™ application into the daily work routine.

"INSTEAD OF SIX WEEKS TO DEVELOP AN APPLICATION, IT TAKES TWO."

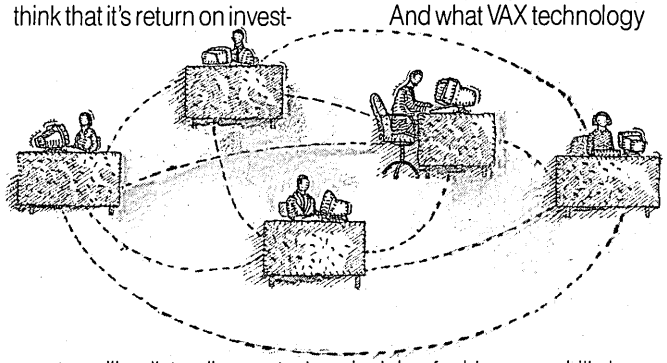
VMS software development tools have so improved the way things are done in his department, Lilly says, that he projects the savings in applications development time and costs alone at some 70 percent.

"Many of our new applications here at AMF will be written on that machine. I can't quantify it exactly. All I know is that I'm getting a heck of a lot more bang for my buck."

The first tests of VAX equipment proved so successful, that AMF quickly enlarged the system, adding terminals and DECmate™ and Rainbow™ personal computers. New departments went on line, for example finance.

"And that," says Lilly, "really created an explosion." Now AMF is implementing programs like general ledger systems, stock options and inventory systems, and keeping more efficient and flexible records, from accounts payable to personnel.

Adds Lilly, "People here are screaming to be on the VAX system, and there's got to be a reason for that. And I tend to think that it's return on investment, mailing lists, discounted cash flows, spreadsheets they couldn't even begin to do before, versatility, tremendous graphics potential. It's just a whole world of opportunity that is elevating AMF to the forefront."



"ANYONE WHO USES VAX IS GOING TO GET THE COMPETITIVE EDGE."

Lilly feels the VAX system has already elevated his own department to the forefront.

"It's put corporate MIS on the map," he says. "It has effectively increased productivity and efficiency. People are beginning to believe we can do the things we say we are going to do."

And what VAX technology is doing for his group, Lilly believes, it can do for all of AMF, or indeed for any company. "Any corporation that employs this technology," he says, "is going to get the competitive edge.

"This technology will explode. Because there are a thousand reasons to have it. But what it really all boils down to is this: everybody will want a VAX system because they can do the job better, faster and more efficiently.

"And that's what really matters."

BEST ENGINEERED MEANS ENGINEERED TO A PLAN.

VAX office automation computer systems, like all Digital hardware and software products, are engineered to conform to an overall computing strategy. This means our systems are engineered to work together easily and expand inexpensively. Only Digital provides you with a single, integrated computing strategy direct from desktop to data center.

To learn more about Digital's VAX system, call toll free: 1-800-DIGITAL, ext. 200, or write Digital Equipment Corporation, 200 Baker Avenue, West Concord, MA 01742.

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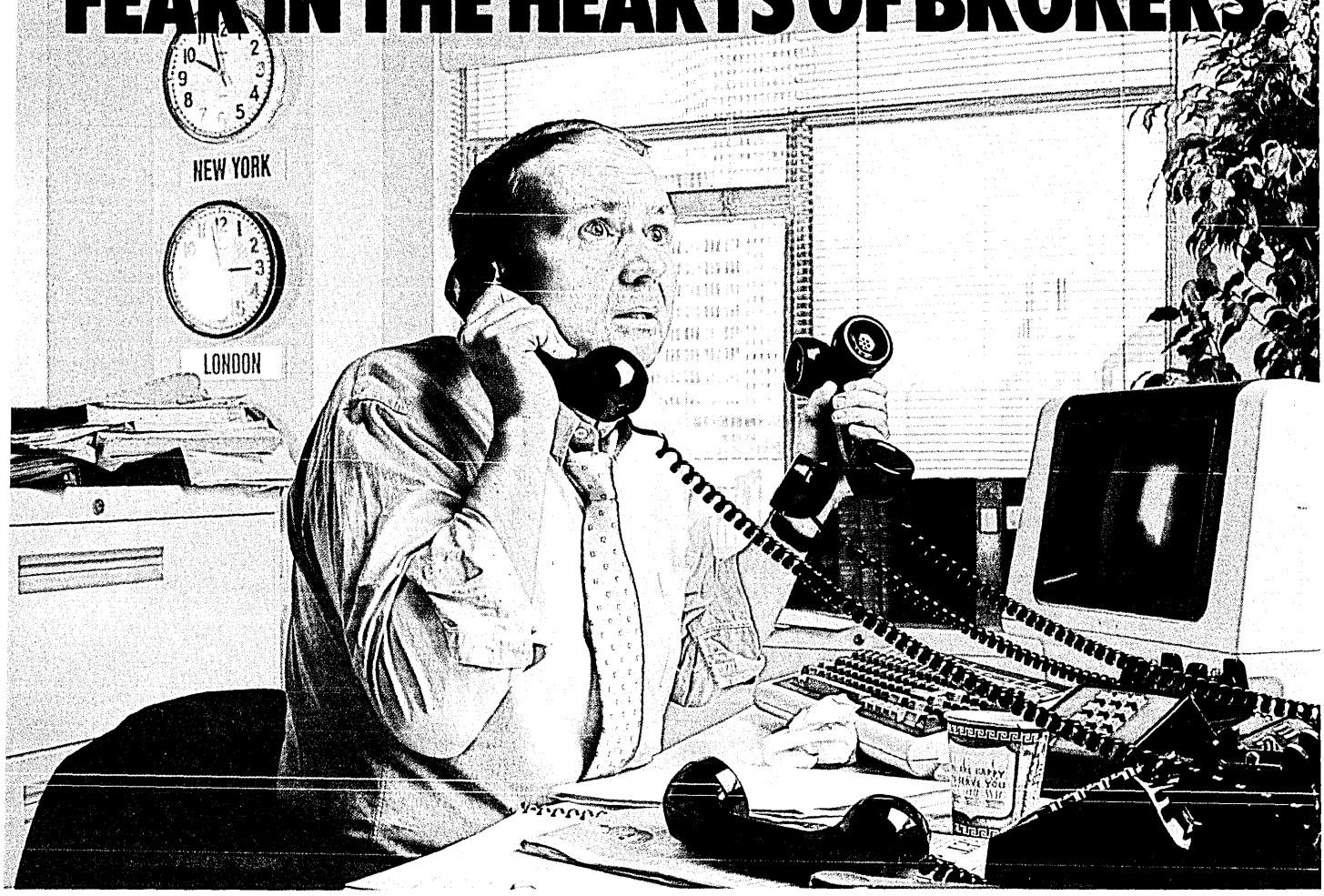
FOUR LITTLE WORDS THAT STRIKE FEAR IN THE HEARTS OF BROKERS.



"The computer is down."

It is ironic that when we become dependent on computers, we are at their mercy. As more and more companies go on line, the industry reliability standard of 98.5% becomes unacceptable because it means your computer is liable to go down once every two weeks, on a statistical average.

So, if you are a broker, banker, manufacturer, or businessman who relies on your computer more and more, take note: Stratus Computers are designed not to fail; not once every two weeks, or once every 200 weeks, or once every 2,000 weeks!

Debunking The Myth That All Fault Tolerant Computers Cost More.

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

	STRATUS XA400	IBM 4381	HP 3000 68	DEC VAX-11/782
RELATIVE PERFORMANCE*	125	100	64	109
PRICE	$446,350	$707,897	$437,754	$656,889
PRICE PERFORMANCE	$ 3,571	$ 7,079	$ 6,840	$ 5,999

Relative Price Performance Index
**Computerworld, August 20, 1984*

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

Why Stratus May Be The Best Computer For The Times, For The Money.

Considering its showing in overall price/performance comparisons against the most successful computers, Stratus must be considered. And when you take into account the added efficiency and security of fault tolerance, and the fact that it is the world's most powerful fault tolerant transaction processing computer, Stratus truly becomes impossible to ignore. In the 1980's Stratus simply is the right computer, at the right price. For information, contact your local Stratus sales office, or call Peter Kastner in Massachusetts at (617) 460-2192, or toll-free at 1-800-752-4826.

Stratus®
CONTINUOUS PROCESSING™

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

CIRCLE 9 ON READER CARD

LOOK AHEAD

3090-400 COMING SOONER

After a firestorm of criticism from customers, IBM is now privately saying that it will begin shipments of its new top-of-the-line 3090-400 model way before the second quarter 1987 date announced a few months ago. Figure early 1987 or even late 1986 as more realistic. The estimate is based on remarks by Carl Conti, former president of the Data Systems Division and now head of the Information Systems and Storage Group, at a recent briefing for investors. The announced schedule for the 51MIPS, dual-dyadic machine was "a conservative date, worst-case situation. We fully intend to make it earlier." He also offered a broad hint that a uniprocessor version of the 3090 is planned, with several dpers in the audience predicting a mid-1986 announcement. (For more information about his presentation, see "Underdog Takes on Top Dog," p. 29.)

CAN TPF2 DELIVER?

An insider at megabank Citicorp claims the bank is currently evaluating IBM's Airline Control Program and its transaction processing front end, TPF2, for possible relief of its massive processing volume bottleneck. Other banks, such as Bank of America and Crocker, are now apparently following suit, sources add. Current I/O and file management systems CICS, IMS, or IDMS typically handle 15 to 30 transactions per second at best, according to recent Citicorp benchmarks, but its traffic is expected to soar to upwards of 200tps in two years-way beyond the capacity of its current software. In theory, TPF2 can handle thousands of transaction per second, but major problems arise when security and other operational considerations are considered. Another problem concerns the cost of support for ACP/TPF2: highly specialized and highly paid programmers must work in low-level assembler and hybrid PL/1-like programming languages, hurting productivity. Sources say that even a medium-sized operation like Swiss Air requires 50 to 60 systems programmers for ACP/TPF2 alone.

CAN'T EVEN GIVE IT AWAY

Adding to Honeywell's sagging image is an announcement by the University of Kansas, Lawrence, that a donated $750,000 Honeywell DPS-8 mainframe will be disconnected to make room for a purchased IBM or compatible model and a VAX. The new system will cost the school some $1.5 million, plus conversion costs. University officials say the Honeywell machine was inadequate for its computing needs, and rather than expand with Honeywell, they opted for IBM and DEC equipment because of the software availability. It's not surprising to hear that Honeywell is decidedly miffed (see "Too Little, Too Late?" p. 48, for more comment from Honeywell shops).

LOOK AHEAD

HOT BOX OF THE YEAR

Iomega Corp.'s Bernoulli Box must be among the nominations for the "Hot Box of the Year" award. More than 20,000 of the removable 10MB to 20MB hard disk cartridge system for IBM PCs and clones had been sold as of the end of 1984 at a suggested retail price of $2,695 or $3,695. In addition to now shipping a 5MB version of the box for Macintosh owners, Iomega is working on a half-height version of the original 10MB drives. On the drawing boards are double-density versions of its current product line. The Ogden, Utah-based company, started by former IBMers, may have approached industrial nirvana-its business has become a classic razor and razor blade combination because it has more than 150,000 hard disk cartridges for its various systems. Smith Barney stock analyst Kenneth Ch'uan-k'ai Leung estimates that the company's revenues will more than double this year, to $120 million.

NETWORKED D/BASE III IN SEPT.

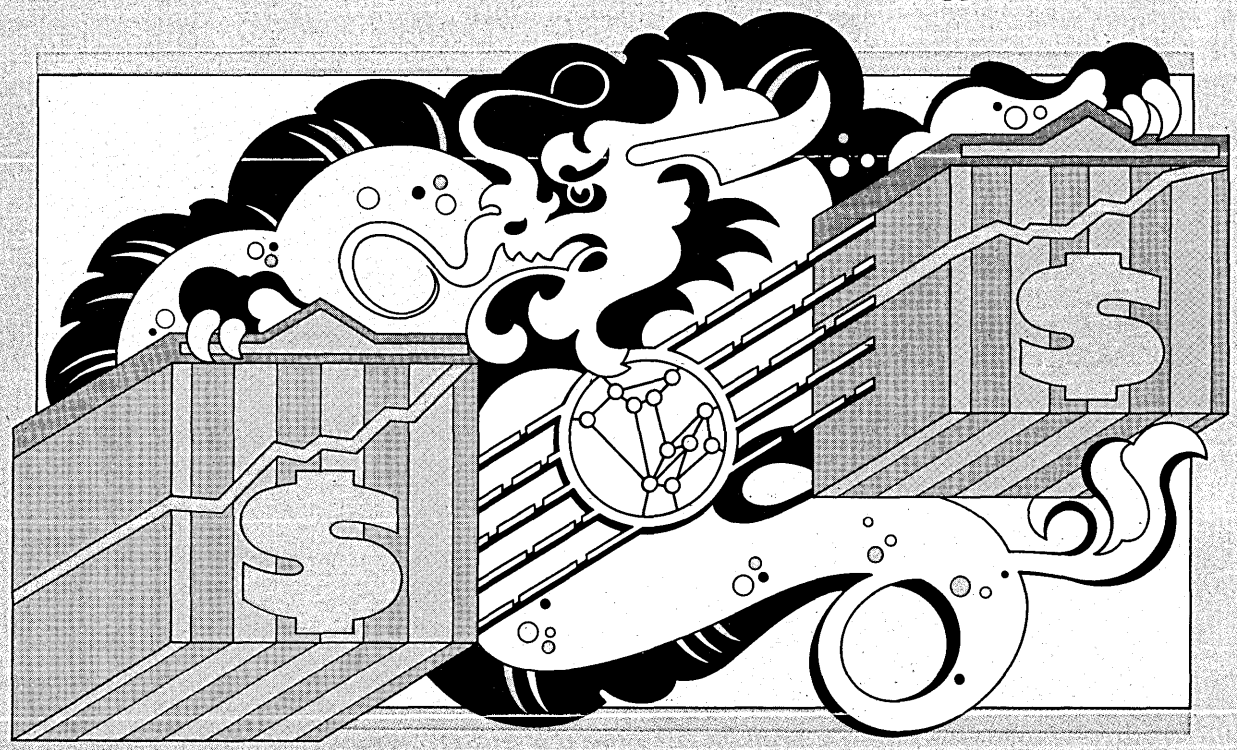
A networking version of Ashton-Tate's popular new database management system for microcomputers, dBase III, will be released in September, following on the heels of the withdrawal of the company's relatively unsuccessful multi-user version of dBase II. According to those users who have seen the package at work, there's good news for microcomputer mavens at companies sweating out incompatibility problems in their local area networks: the new dBase III will supposedly run on any LAN, unlike the 3-COM-hardware-only limitation of d/Base II.

RUMORS AND RAW RANDOM DATA

Timothy Leary, 1960s guru, is still trying to expand minds, this time with computer software. The onetime Harvard lecturer and ex-con has established a company called Futique Inc. (opposite of antique) to peddle such packages as SKIPI (Super Knowledge Information Processing Intelligence) and Mind Adventure, which help users learn about themselves. . . .Santa Barbara, Calif., startup ExperTelligence Inc. has brought artificial intelligence to the computer store level with its ExperLisp and ExperLogo languages. . . .Pacific Telesis is buying dozens of fault tolerant processors from Stratus to keep track of the coins in pay telephones and for monitoring crank calls. . . .A software developer swears he saw a 3270 PC running Unix communicating to a mainframe via a heretofore unknown SNA link. Will IBM keep it quiet to protect other products?. . .Silicon Valley firms are having a tough time getting pollution insurance after Lloyd's of London and other insurors paid $100 million in damage claims to homeowners and others who suffered from leaking chemical tanks. When chip makers can get coverage, they're paying sky-high rates: last year a $400,000 premium bought $100 million in coverage, but now it takes $1 million to get $25 million in coverage.

The Banking Network

Sixteen of the world's leading banks use TYMNET technology



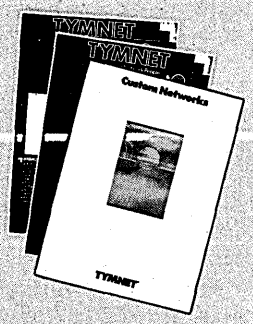
The Hongkong and Shanghai Banking Corporation chose TYMNET to build a fault-tolerant, private data network that would interconnect over 3,000 branch bank terminals and ATM's with their central computers.

John Hamilton, Manager Technical Services for the HongkongBank, states,

"The flexibility of the TYMNET network in connecting many different terminals with a variety of host computers provides significant operational benefits to the Bank ...better control...and a base for faster and more reliable computer communications...the latest available communications facilities enables us to remain a world leader."

When you consider that TYMNET has designed and installed MORE private networks than any other vendor worldwide... it's no wonder one world leader chose to work with another.

Call or write today for more information regarding TYMNET'S Private Networks and Banking Protocols.



TYMNET, Inc.
2710 Orchard Parkway
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Private and Public Data Networks

CIRCLE 10 ON READER CARD

TYMNET®

MCDONNELL DOUGLAS NETWORK SYSTEMS COMPANY

One size

Symphony. It's the one software

To meet the varied needs of your end users, you don't need more software. You simply need the one software that does more. Symphony™ from Lotus®.

With Symphony users get a comprehensive software program with five basic functions—spreadsheet, database management, graphics, word processing and communications. These five functions can be used alone, together or in any combination. And with Symphony, users can start with one function and grow into others as their needs change.

Users can even create customized applications.

With Symphony's powerful command language, end users can save time by creating their own applications either for themselves or for entire departments. And users don't have to be programmers to build an unlimited variety of turnkey applications.

With Add-Ins, Symphony grows as you grow.

Symphony's unique open-ended architecture allows you to expand the functionality of the basic program with Add-In products. These Add-Ins work like Symphony—and with Symphony—so users don't have to learn a new language. Spelling Checker and Text Outliner are already available. And a variety of future Add-Ins and industry specific applications are now being designed by Lotus and qualified third-party developers to further enhance Symphony's capabilities.

fits all.

solution for more PC users.

Our micro-to-mainframe link will tie Symphony to your existing environment.

Later this year, Lotus will introduce a new micro-to-mainframe Add-In product. Developed jointly by Lotus and DCA®, this new link will allow designated PC users to transfer data to and from your mainframe computer. Mainframe data will be available on their PC spreadsheets in useable form, eliminating the need for retyping.

If your corporate environment already includes 1-2-3™, Symphony makes an even easier fit. It has a familiar user interface and reads 1-2-3 data.

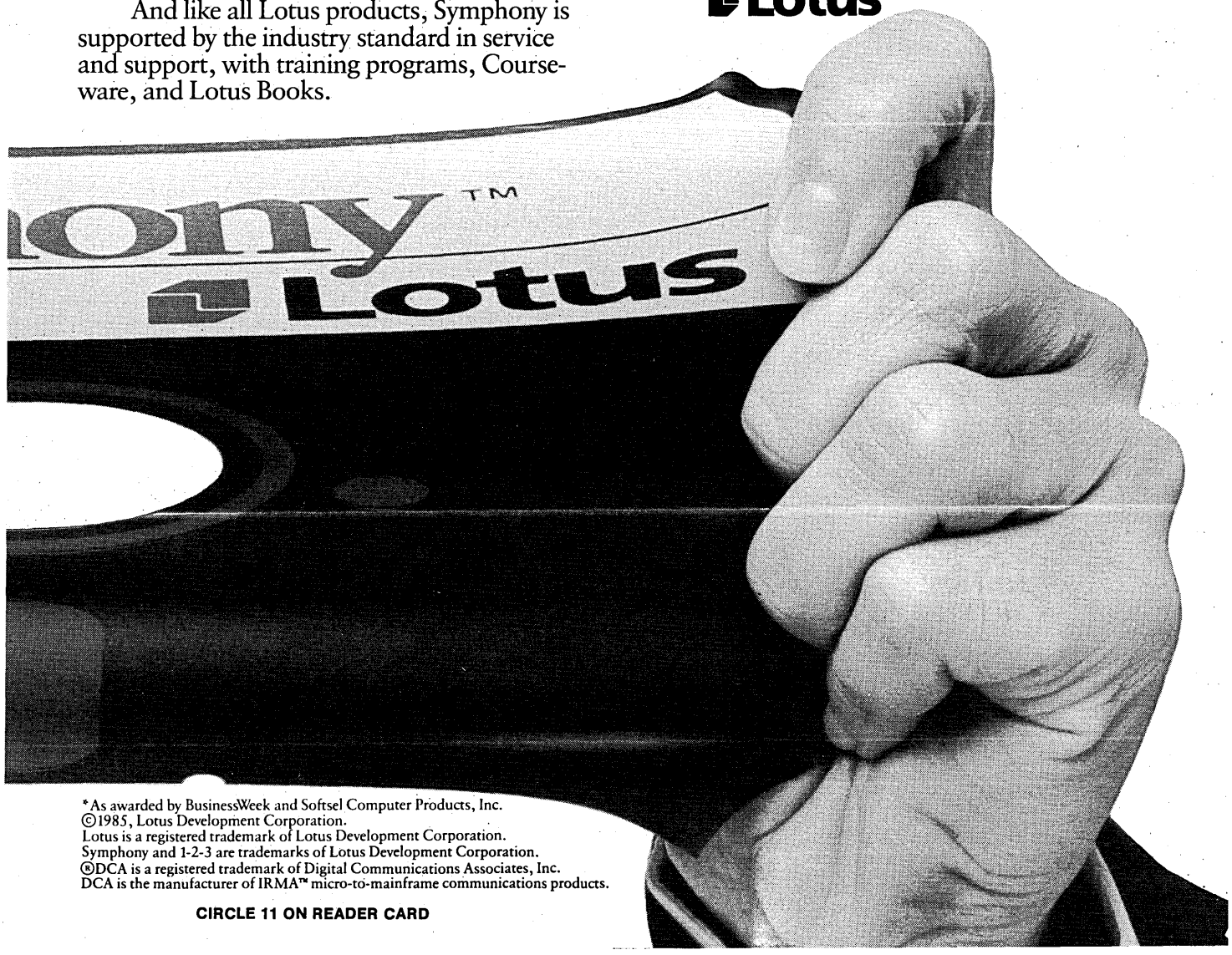
And like all Lotus products, Symphony is supported by the industry standard in service and support, with training programs, Courseware, and Lotus Books.

Symphony Software. The more your people do, the more it will do for your people. After all, you wouldn't expect less from the software that was named "Product of the Year"* and easily became 1984's best selling new software product.

For more information on Symphony Software, contact your Lotus Marketing Representative or local authorized Lotus dealer.

Symphony™

Lotus®



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CIRCLE 11 ON READER CARD

CALENDAR

JUNE

American Bankers Association 1985 National Operations and Automation Conference (NOAC).
June 2-5, Dallas. Contact Roslyne Johnson, Banker's Education Network, ABA, 1120 Connecticut Ave. NW, Washington, DC 20036, (202) 467-6738.

MIM 85.
June 3-5, Montreal. Contact Colette Quesnel, 300, Léo-Pariseau, Suite 1919, P.O. Box 1119, Place du Parc, Montreal, Quebec H2W 2P4, Canada (514) 288-8811.

PHONE '85.
June 4-6, London. Contact Network Events Ltd., Printers Mews, Market Hill, Buckingham, MK18 1JX, England, tel. (0280) 815226.

Government Computer Expo (GCE).
June 10-13, Washington, D.C. Contact Expo Manager, Government Computer Expo 85, 1620 Elton Rd., Silver Spring, MD 20903, (301) 445-4400.

VenCom '85.
June 11-14, Caracus, Venezuela. Contact LATCOM Inc., 3421 M St. NW, Suite 219, Washington, DC 20007, (703) 685-0600.

Summer 1985 USENIX Conference and Vendor Exhibition.
June 11-14, Portland, Ore. Contact USENIX Conference Office, P.O. Box 385, Sunset Beach, CA 90742, (213) 592-3243.

INFO/WEST.
June 12-14, Anaheim, Calif. Contact Show Manager, INFO/WEST, Clapp & Poliak, 708 Third Ave., New York, NY 10017, (212) 661-8010.

International Computer Show Cologne.
June 13-16, Cologne, West Germany. Contact John Lumborg, U.S. Embassy, Regional Export Development Office (Europe), Deichmanns Aue 29, 5300 Bonne 2, West Germany, tel. (228) 339-2047.

PC Expo.
June 17-19, New York. Contact Camille Caminiti, 333 Sylvan Ave., Englewood Cliffs, NJ 07632, (201) 569-8542.

EFOC/LAN 85 (The Third European Fiber Optic Communications and Local Area Network Exposition).
June 17-21, Montreux, Switzerland. Contact Michael O'Bryant, Information Gatekeepers Inc., 214 Harvard Ave., Boston, MA 02134, (617) 232-3111.

Advanced Manufacturing Systems Exposition and Conference.
June 18-20, Rosemont, Ill. Contact AMS '85, Cahners Exposition Group, 708 Third Ave., New York, NY 10017, (212) 661-8010.

Canadian Robotics Show.
June 18-20, Toronto. Contact Ron McCreary, RIA, P.O. Box 1366, Dearborn, MI 48121, (313) 271-7800.

Design Automation Conference.
June 23-26, Las Vegas. Contact P.O. Pistilli, MP Associates Inc., 7366 Old Mill Tr., Rm. 101, Boulder, CO 80301, (303) 530-4562.

Telecon East.
June 24-26, New York. Contact APPLIED BUSINESS TELECOMMUNICATIONS, Box 5106, San Ramon, CA 94583, (415) 820-5563.

VIDEOTEX '85.
June 24-26, New York. Contact Online Conference Inc., 989 Avenue of the Americas, New York, NY 10018, (212) 279-8890.

JULY

World Computer Graphics '85.
July 10-12, New York. Contact Dorothy L. Bomberger, World Computer Graphics '85, 2033 M St. NW, Suite 333, Washington, DC 20036, (202) 775-9556.

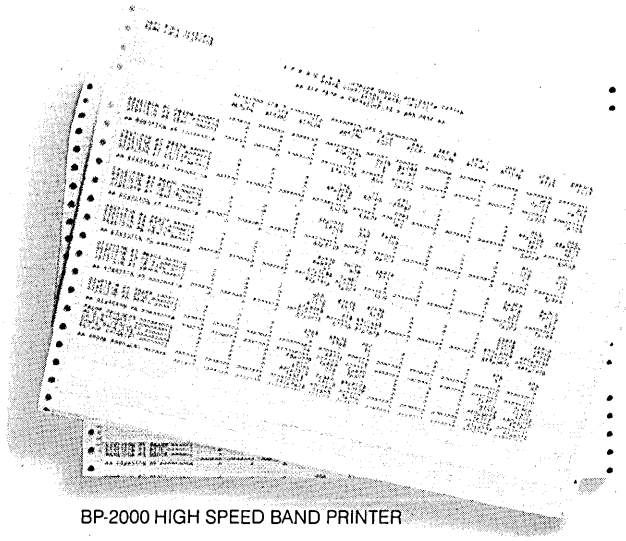
Association for Women in Computing's Fourth Annual Conference.
July 13-14, Chicago. Contact Joan Wallbaum, AWCC '85, 407 Hillmore Dr., Silver Spring, MD 20901.

1985 National Computer Conference (NCC '85).
July 15-18, Chicago. Contact Registration Dept., AFIPS, 1899 Preston White Dr., Reston, VA 22091, (703) 620-8900.

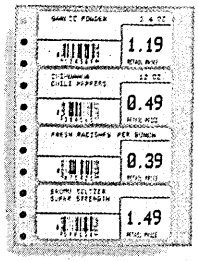
SIGGRAPH'85.
July 22-26, San Francisco. Contact SIGGRAPH'85, Conference Services Office, Smith, Bucklin and Associates Inc., 111 East Wacker Dr., Chicago, IL 60601, (312) 644-6610.

1985 Summer Computer Simulation Conference.
July 22-26, Chicago. Contact Gene Graber, Applied Dynamics International, 3800 Stone School Rd., Ann Arbor, MI 48104, (313) 973-1300.

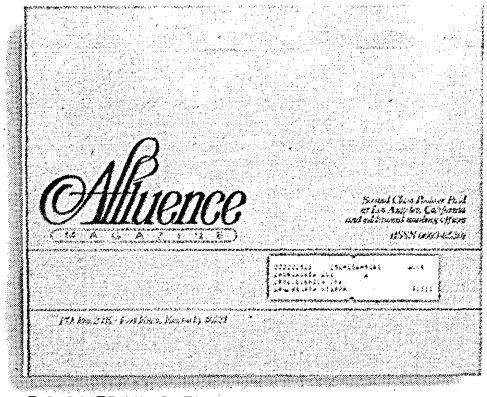
WCCE/85 (World Conference on Computers in Education).
July 29-Aug. 2, Norfolk, Va. Contact AFIPS, 1899 Preston White Dr., Reston, VA 22091, (800) 622-1985.



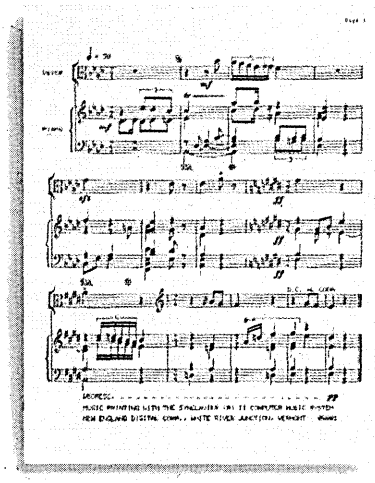
BP-2000 HIGH SPEED BAND PRINTER



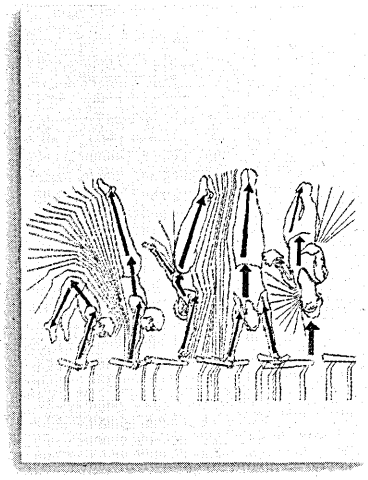
M-100L
MATRIX PRINTER



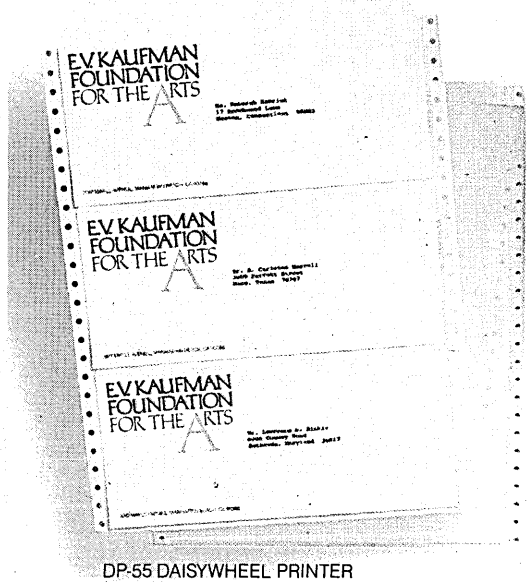
B-600 MEDIUM SPEED BAND PRINTER



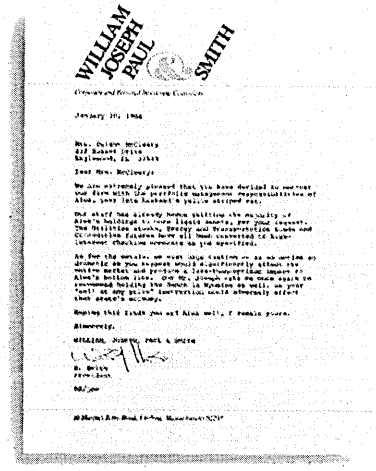
8010 MATRIX PRINTER



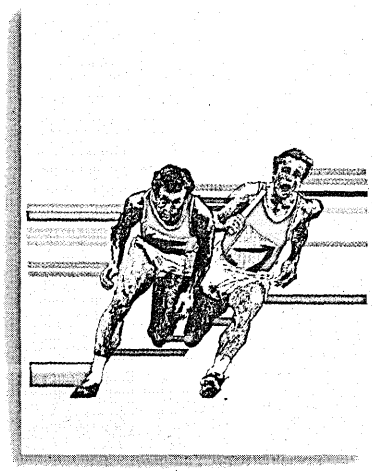
8020 MATRIX PRINTER



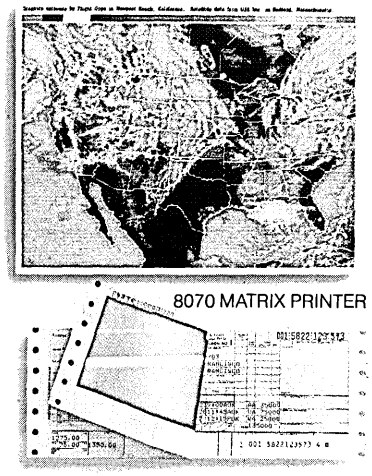
DP-55 DAISYWHEEL PRINTER



DP-35 DAISYWHEEL PRINTER



8050 MATRIX PRINTER



8070 MATRIX PRINTER

M-120 MATRIX PRINTER

...and so on.

Dataproducts printers.
Nobody puts ideas on paper so many ways.

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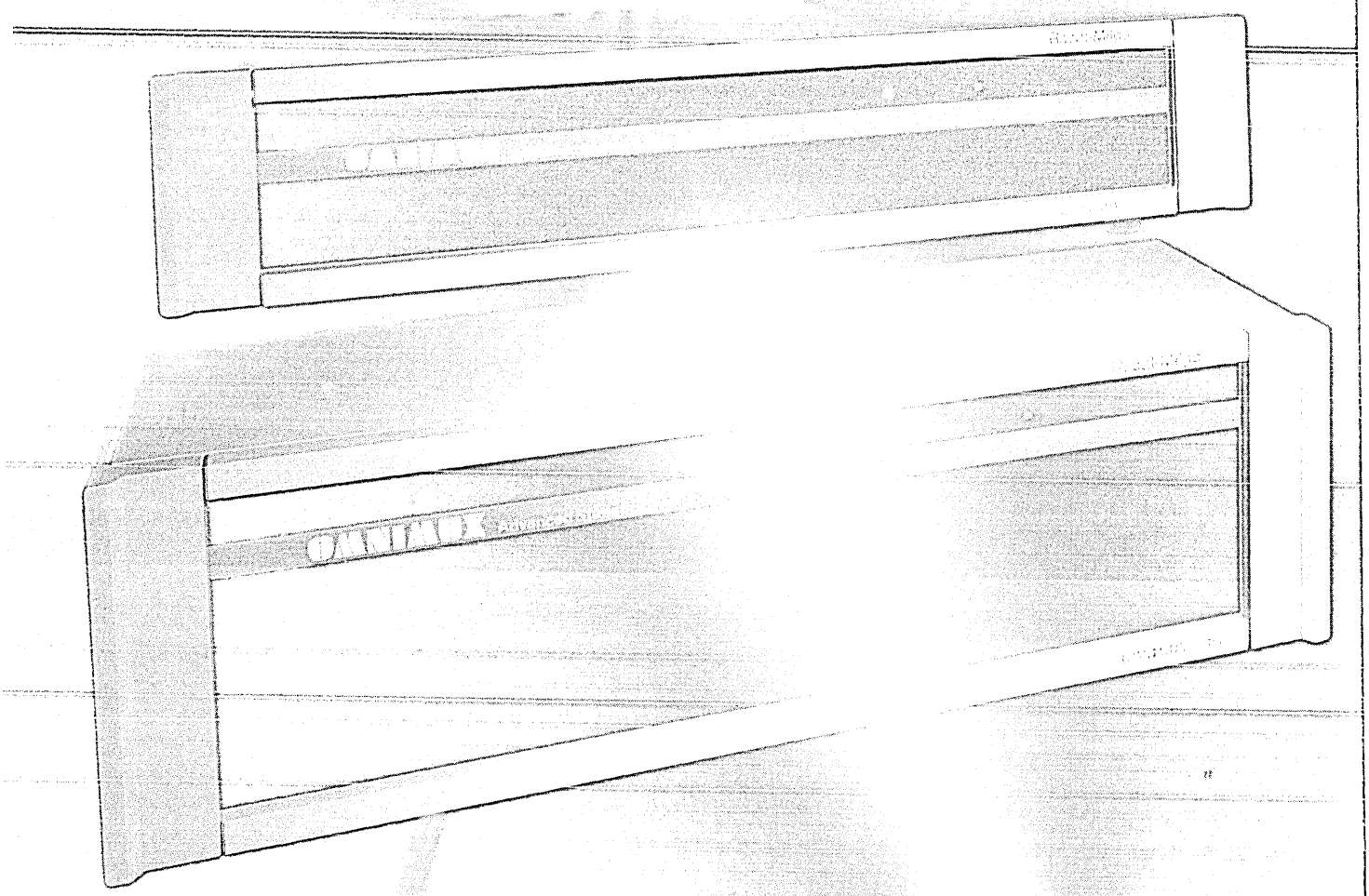

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This modular family of mid-range statistical multiplexers lets you build the mux you need to economically move data. Synchronous data. Asynchronous data. Or any combination.

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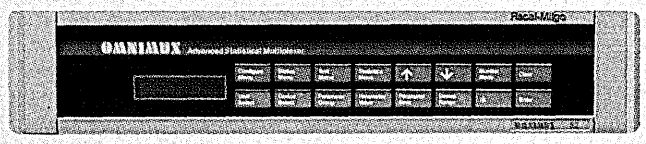
What's more, Omnimux works to prevent network problems like time delays and transmission errors. Because extensive diagnostic, statistical reporting, and control features are built-in. You always have an accurate picture of how efficiently your data lines are being used...via printer, standard ASCII terminal, or the Omnimux optional front panel.



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CIRCLE 14 ON READER CARD

LETTERS

OUTLANDISH

Your March 15 issue contains a News In Perspective piece called "An OA Merger Fails" (p. 47), a story on the NBI-CCI merger that didn't happen. The reporter, Lise Olson, used the piece to expand on the changes and consolidations in the OA industry. In the article she quoted my administrative manager. Those quotations within the story give the impression that Kidder, Peabody is unhappy with Xerox as our office automation vendor and that we are considering replacing them. This impression is as outlandish a distortion as quoting Tip O'Neill on the MX and concluding he wants to overthrow the government.

Kidder, Peabody has been a pioneering customer with Xerox network products. We installed our first Ethernet in December 1982 and we now have three Ethernet installations and more than 200 Xerox workstations and servers. We have no plans for abandoning Xerox as an office automation supplier; on the contrary, we will continue to add Xerox network products in applications where those products make sense to our business.

Any close business relationship that spans years is likely to experience moments of frustration and annoyance. Our relations with Xerox have been no exception. We have been disappointed when high-level friends in Xerox have left to pursue their ambitions elsewhere. We have been disappointed that STAR software has emerged more slowly than we would like, that the Xerox microcomputer products have not been as useful as we would like, and the open architecture higher-level protocols have not been released as quickly as we hoped. These disappointments are the "warts and wrinkles" that we see when we get very close. They are not by any stretch of the imagination motivation for throwing out a major vendor.

Our most mature Xerox network installation represents the state of the art in the field of financial research publication. The objective of the installation was to cut the time from an analyst's first draft to print-ready as we produce these complex, extremely time-sensitive documents. A careful analysis has shown that the average production time has been cut by more than half and the cost per document is reduced in spite of the fact that document length and complexity have significantly increased. This is not the kind of performance that a reasonable company throws out.

BRUCE W. HASENYAGER
Vice President, Information Systems
Kidder, Peabody & Co.
New York, New York

Olson responds that she stands by her story.—Ed.

SOMETHNG MISSING?

Having just been through an OA justification study at my company, I found the article entitled "The Real Cost of OA" by Paul A. Strassmann (Feb. 1, p. 82) to be timely, thought-provoking, and controversial.

I don't dispute his general thesis that, unless watched carefully, the "organizational" costs of OA might equal or exceed its productivity cost savings. But that part of Strassmann's piece devoted to the dollar costs of OA is, I feel, confusing and inconsistent. And overall, the lack of specific reference to actual OA experience is curious for an article devoted to hidden pitfalls that only experience can reveal.

My particular points about the article:

- Why use 1980 costs? It's now 1985, with professional labor costs nearing $40,000 and per-station technology costs around $5,000 and dropping fast.
- Why the emphasis on first-year costs? Only the most unsophisticated would expect positive return in the first year and omit training and startup expenses from the equation. We should all know by now that payback from automation is strictly long term.
- The support staff cost of $2,000 per station arouses my curiosity. Is the $2,000 in 1980 or 1985 dollars? Based on Fig. 2, support overhead seemingly works out to over 5% of office costs. That ratio seems high, but is it consistent with actual OA experience? Alas, I'll have to read elsewhere to find out.
- The $5,000 to $20,000 per station to provide suitable furniture for video/keyboard use is ludicrous. Based on cost per square foot, constructing a new office facility from scratch would be a better bargain. Also, that figure isn't included in any charts or other discussions of total cost.
- The sentence, "Organized labor is becoming keenly aware of the negotiating leverage that mismanaged OA projects hand over to them," looks as if it were thrown in as an attention-getter. The article offers no support for that statement. Generally speaking, organized labor has never had a presence in the office workplace. How can an unsuccessful OA system provide labor unions leverage with office and professional workers that 50 years of organizing effort (and 25 years of botched automation projects of various types at target companies) couldn't?
- The only concrete OA experience the author cites is reading other people's justification studies. Exposure to case studies or the personal experiences of grizzled OA veterans (are there any of those?) would better serve the interests of most readers.

RALPH L. CUMMING
Arvada, Colorado

'TAIN'T FUNNY

This is to strongly protest the cartoon on p. 180 of your March 1 issue.

With ever-expanding opportunities and reasonable security, people in

data processing should be helping the homeless. We should not be making jokes at their expense. Your cartoon implies that people must live on the streets because of flaws of character; that is in very poor taste and it is wrong.

EDWARD G. NILGES
Mountain View, California

ALLEGED PROBLEMS

Look Ahead ("Unix Problems Surface," March 1, p. 9) and News in Perspective ("And Then There Were Two," March 1, p. 40) both contain erroneous statements suggesting that Amdahl mainframes were removed by customers because of compatibility problems with the VM operating system. This is not true. The Amdahl UTS Version 2 program product that supports Unix runs on both Amdahl mainframes and IBM mainframes. The alleged problems from the DATAMATION telephone sampling must have occurred on IBM mainframes, not Amdahl.

RICHARD A. WHITCOMB
Director
Financial and Public Relations
Amdahl Corp.
Sunnyvale, California

SWIRLING RUMORS

Look Ahead ("TI May Cut Pro Line of Pcs," Feb. 1, p. 10) encourages the rumor that "Texas Instruments is rethinking its commitment to the professional personal computer business." It is my sincere hope that your readers are not being confused by "swirling" rumors that conflict with TI's continuing investment in personal computing products.

This investment has been manifest recently with the introduction of new products and services. On Nov. 12, TI announced the newest member of the TI Professional Computer Family, Pro-Lite, a briefcase-sized full-function personal computer. At the introduction, we also announced an agreement with Sales Technologies Inc. to sell productivity application software with the Pro-Lite, and an agreement with Ashton-Tate to distribute Framework, dBase III, and other Ashton-Tate software for the entire TI Professional Computer Family.

Other recent announcements for this product line include 10 natural language-based software packages and an expert system development kit—all designed and developed at TI to demonstrate the TIPC Family's importance and suitability as a delivery vehicle for advanced AI-based applications. Additional personal computing announcements are planned for 1985 and beyond.

TI has also enhanced customer support by offering the TIPC customer a one- or five-year extended warranty and a 24-hour hot-line service. In addition, to underscore our strategy of providing superior solutions, we have announced programs that will assist our value-added resellers in providing solutions in vertical markets such as real estate, medical, and CAD/CAM.

For people who are looking at the facts today and understand our plans for tomorrow, it is clear that TI considers personal computing products to be a vital element within our long-term business strategy.

TOM ELLIS
VP Group Marketing
Data Systems Group
Texas Instruments Inc.
Austin, Texas

TURNING THE TIDE

The privilege of being mentioned in your fine publication in "Bucking The Tide" (News in Perspective, Feb. 1, p. 50) has been overshadowed by a number of glaring inaccuracies. Some of my quotes may have been misunderstood and there are others that I could not possibly have said.

First, here are some very basic corrections. The author states that David Irwin is "editor of the *Data Based Solutions* newsletter." There is no Data Based Solutions newsletter. Data Based Solutions publishes *Data Based Advisor* magazine, a monthly publication for database management system users. It is a true magazine in every sense. Furthermore, I am not the editor of *Data Based Advisor.* I serve only as technical editor.

The article also refers to dBase II and dBase III as "interpreted programs." They are not "interpreted" programs, but rather database management systems with built-in interpreters for use with their proprietary programming languages. The difference is that rather than being interpreted, these programs do the interpreting. There is a huge difference.

In reference to FoxBase II, I am quoted as saying it is " 'a token compiler' that . . . might be called a faster clone of dBase than a true compiler." To the best of my knowledge, there is no such thing as a "token" compiler, and if there were, it would not/could not be faster than a true compiler. What I did say was that FoxBase II from Fox Software comes with a tokenizer for "crunching" its source code. It could be called a clone of dBase II in a positive sense (i.e., with improved performance and added features).

I have one last point. The reason I have a "dispassionate perspective" (as noted by your article) on Nantucket Software's dBase III compiler is because the product has yet to be shipped to a single end user. Clipper cannot be called "the first compiler for dBase III" because it is not yet on the market.

The author shows a lack of understanding about software testing and marketing by saying in one sentence that "Clipper is currently available for IBM PCs and compatibles . . . " and in the next paragraph stating that "beta test sites were scheduled for installation last month." If Clipper is in beta testing, it is not "available."

I am very conscious of my place in the microcomputer community and would hate to think that this misinformation would be attributed to me rather than to the writer.

DAVID IRWIN
President
Data Based Solutions
San Diego, California

SMART MART

We would like to take issue with the lines in "Computer Marts Multiply" (March 1, p. 24): "Another project with less than rosy prospects right now is the California DataMart. It's only 10% leased."

Ten percent is a very good prelease percentage for a new building in real estate. The fact that our market for tenants is a specialized one and further that DataMart is a new concept for the computer industry makes this achievement that much more laudable. People like to touch and feel their new environment before signing a lease. They can't do that until the building is finished.

In addition, we have close to 30% more under negotiation and expect to open with about the same as Infomart at its opening, 30% to 40%. To those who know the real estate field, this is quite good.

Finally, there was one factual error. DataMart's permanent show space is a 175,000-square-foot building complemented by a 110,000-square-foot exhibit hall which can accommodate up to 600 booths that are 10 feet by 10 feet. In addition, a second phase of 500,000 more square feet is planned.

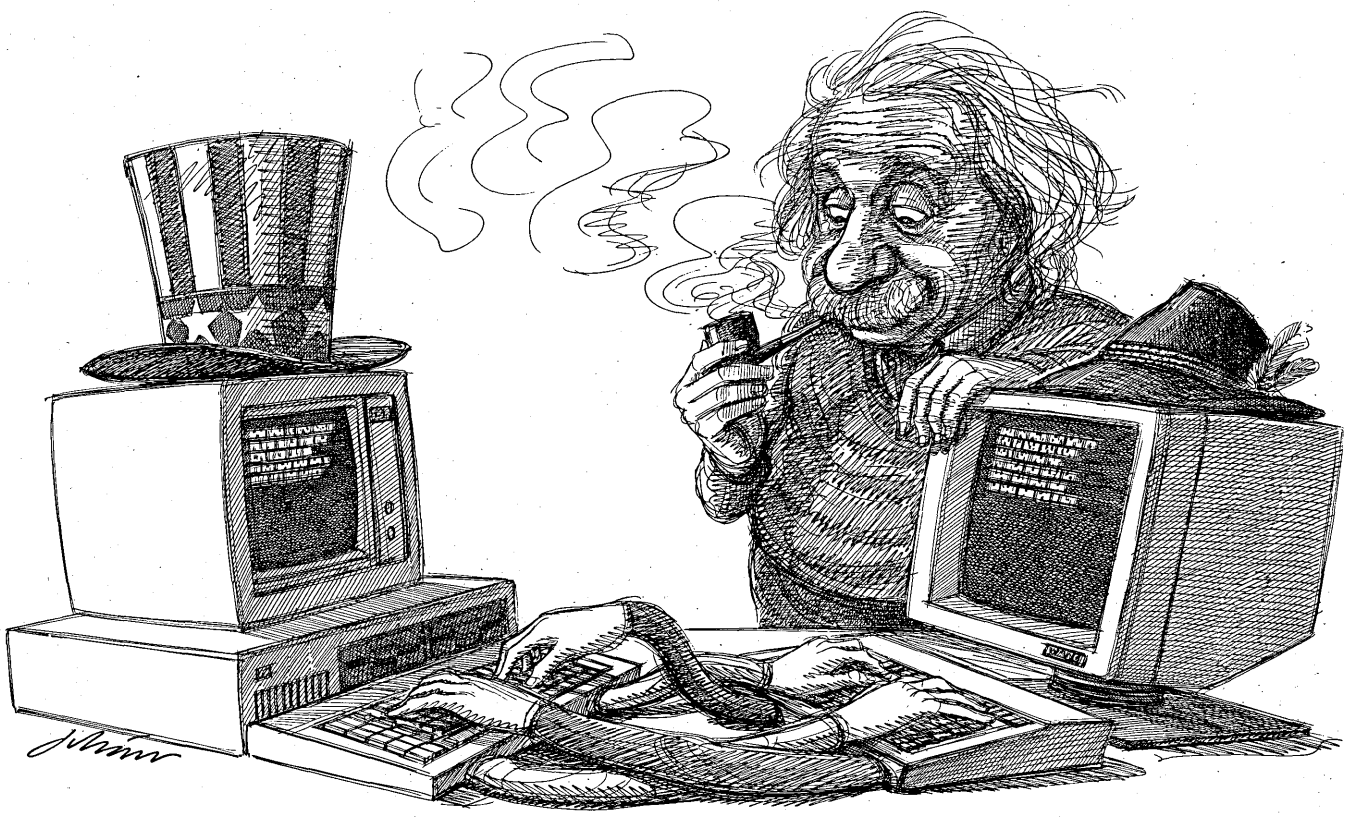
Thank you for the opportunity to clarify these points.

RICHARD M. CROUCH
President
California DataMart
San Francisco, California

BILKED BY BILKO, RUDE TO RUNYON

In the April 1 Letters column, a statement was attributed to the immortal Sergeant Bilko, played by the equally immortal Phil Silvers. But we've been told the line was actually written by the also equally immortal Damon Runyon. It seems the bard of Broadway was the author of the wisdom, "The race goes not always to the swift, nor the battle to the strong, but that's the way to bet." Whoever said it, it still makes a lot of sense.

Using A Higher Form Of Intelligence, a Wang in Wangen can understand a PC in D.C.



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CIRCLE 15 ON READER CARD

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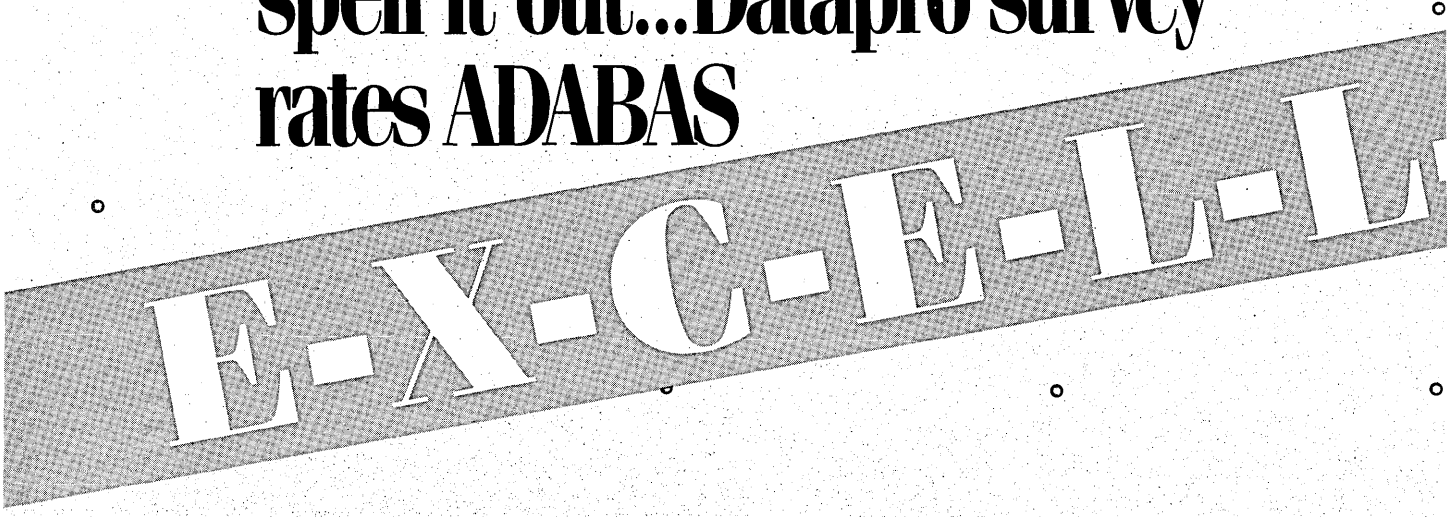

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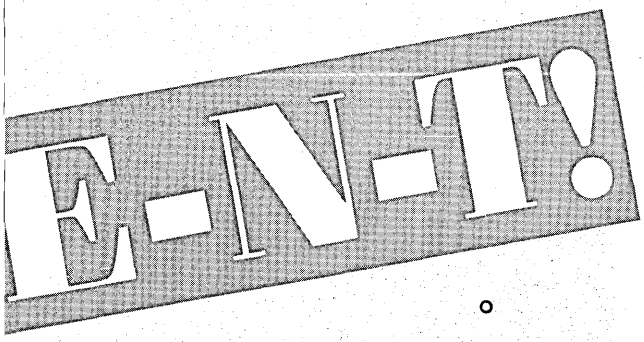

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Exactly the same thing happened in an earlier survey when Data Decisions asked users what they thought. For the third year in a row, ADABAS went right to the top of the list as the highest ranked DBMS for the IBM mainframe. And NATURAL was a top contender for best fourth-generation language.

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Larry Marion, Assistant Managing Editor, News

HARDCOPY

UNDERDOG TAKES ON TOP DOG

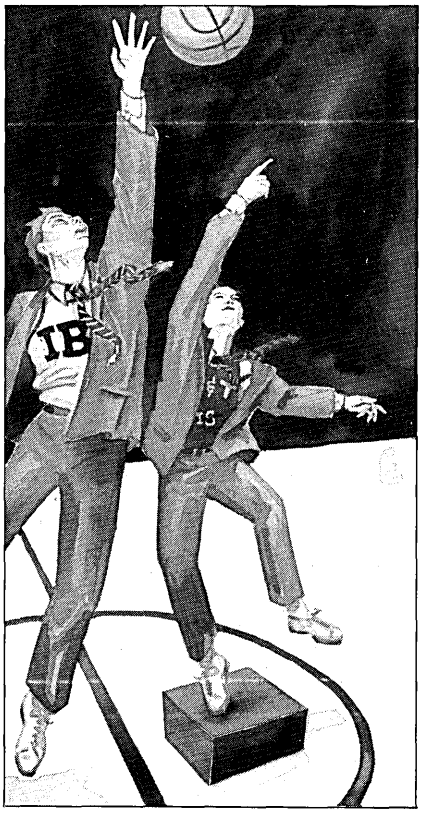


ILLUSTRATION BY DORIS ETTLINGER

Can America's affection for the underdog extend to the computer industry? AT&T-IS's Jim Edwards says his team can achieve the kind of come-from-behind victory that earned Villanova's Wildcats the collegiate basketball championship.

It's seldom you see a real face-off between IBM and AT&T-IS. But it came close to that—if only because of scheduling—last month at Miami's Doral Country Club. The scene was the annual Computer/Telecommunications Industry Conference sponsored by DATAMATION and Cowen & Co. Results of our most recent survey of MIS' plans-to-purchase, analyzed in this issue by senior writer John W. Verity beginning on p. 32, indicate that IBM is taking a massive amount of market share away from its competitors across the board. At the Miami meeting, two presentations offered a marked contrast—a confident IBMer and a contrite but optimistic AT&Ter.

Carl Conti is one of the big names at IBM. Until recently he was president of the Data Systems Division; now he is group executive in charge of the Information Systems and Storage Group and a member of IBM's cabinet, the Corporate Management Board. In conversation, Conti balances the lean look of a long distance runner with a warm and personable attitude, answering questions with animated enthusiasm.

This is easy when your company's shipments of PCs tripled in the past year, your sales of workstations grew by 40%, your mainframe market is "not only enduring, but thriving," and you're preparing to bring out 1Mb memory chips in high volume in the "not too distant future." With a $4 billion-plus R&D budget (from which artificial intelligence, speech recognition, and advanced robotics have been singled out as areas of "significant interest"), it's hard to sound modest.

And then a startling revelation. When asked if the recently announced Sierra line was in part responsible for the sharp increase in the nation's capital goods order statistics, Conti's answer triggered an appreciative chuckle from the hard-boiled money managers in the audience: "about half." Imagine. One product causing the government's economic seismograph needle not merely to jiggle, but to fly off the charts.

It was a tough act to follow, but AT&T-IS's Jim Edwards, president of Computer Systems and a former IBM salesman, began by citing the Villanova victory as a symbol of the future for AT&T—an underdog turned top dog.

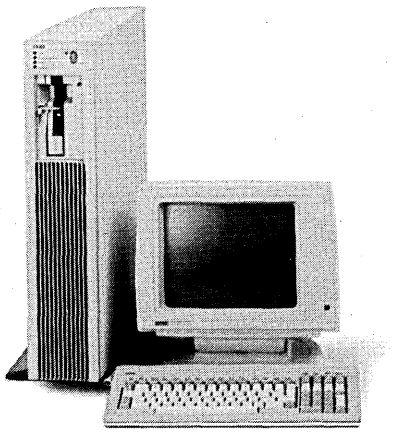
Edwards conceded a long list of problems arisen since AT&T-IS's inauspicious start: lost market share in datacom due to the confusion of divestiture; less than glowing sales reports on its line of 3B minis; and, perhaps the biggest faux pas of all, the failure last year to provide mainframe connectivity from its family of minis. For a communications company, that networking omission was "not too smart on our part," Edwards acknowledged. "They didn't call us Ma Bell for nothing," he said, noting that Ma protected her children and her customers. "Our backbone is networking. We learned that our customers don't expect us to play a different game. It's time we put a little of the Ma back in AT&T."

Then, a feisty Edwards, jutting his face in true bulldog fashion, defended his marketing organization: "Our sales force took a bum rap last year. They know as much [about computers] as IBM's salespeople. The problem was, we didn't give them the right tools. Today, they're armed and ready." And to prove that his first string sales force is running strong, he points out that more pc sales were chalked up in the first two months of this year than in all of last year put together.

And then, in response to a question on future markets, Edwards made a strong stand: "IBM does so well in mainframes, we think we'll just let them continue to excel in that."

What else can an underdog say? ◉

SOMETIMES YOU NEED MORE THE QUESTION IS,



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THEY PERFORM BRILLIANTLY BECAUSE THEY'RE BUILT BRILLIANTLY.

The Towers are all powered by Motorola microprocessors (the regular Tower by the 68000, the XP and Mini by multiple 68010's).

Other state-of-the-art features include Winchester hard disk and the Intel Multibus.* Not to mention an error-correcting memory

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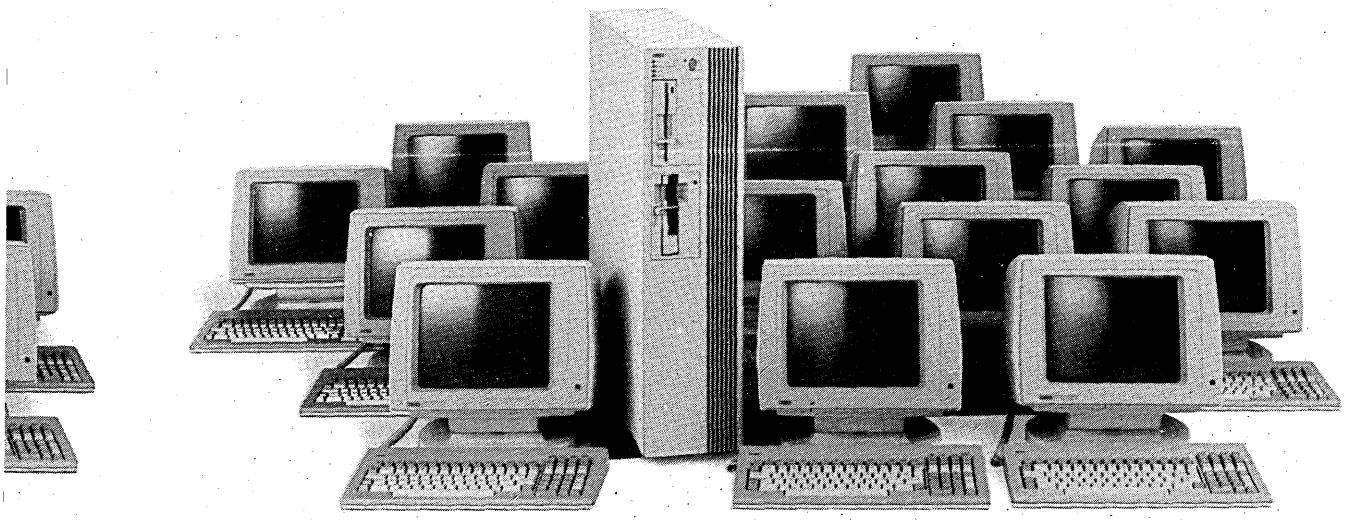

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CIRCLE 18 ON READER CARD

IN FOCUS

UP, UP, AND AWAY

While the BUNCH stagnates, IBM has gained market share in virtually every mainframe product category, according to a DATAMATION/Cowen & Co. survey of user spending.

by John W. Verity

In case there was any doubt, users' spending patterns show that more of the world is IBM's these days than ever before. In virtually every product area of its mainframe business, IBM is gaining strength and market share. The company is gaining significantly against traditional systems rivals and plug-compatible suppliers, and is well ahead of the pack rushing to market with office systems, personal computers, and other forms of distributed processors. If IBM can ship the new 3090 Sierra machines in volume and on schedule (see box), it stands to record strong shipments this year and even stronger ones the next: among 370 users, demand for MIPS is as high as ever, growing about 30% a year.

Systems rivals Honeywell, Sperry, NCR, and Burroughs, meanwhile, face relatively dim futures, as the size of their mainframe user bases are merely staying level, if not losing ground to IBM, the compatible vendors, and minicomputer makers. Honeywell in particular seems vulnerable to defections, while Sperry apparently has the best 1985 shipments to look forward to. Users of non-IBM mainframes continue to criticize their suppliers chiefly for a relative lack of industry-specific applications software.

Meanwhile, as shown in several recent measures of industry activity, shipments of personal computers to corporate sites are leveling off this year. Where last year's survey showed pc shipments up 75% over the year before (in terms of units), this year's are expected to be up only 7% over last year. IBM's PC family nevertheless remains a strategic vehicle for moves into a number of emerging markets and in some cases is even winning over IBM's own host-based solutions. Among this survey's respondents, PCs will account for 28% of the money they spend with IBM for mainframe systems in the U.S. and Canada this year.

These are some of the major findings of the 1985 DATAMATION/Cowen & Co. Computer/Telecommunications Industry Survey. The survey tabulates data from 4,346 unduplicated responses, more than 2,900 of which are from IBM sites. Besides shedding light on IBM's impressive gains in the mainframe arena, this year's survey paid special attention to such topics as personal computer acquisitions, packaged software buying trends, local networking, and office automation.

IBM's massive investments in plant, capital equipment, and R&D in the past 10 years and its flexibility in making financial deals to "get the business" are paying off royally, judging by the survey's findings. With a particularly strong share of the large-scale mainframe market under its control, IBM is reaping the rewards of advanced (and often unmatched) technology—the double-density 3380 disk drive and 3480 tape unit, for instance—by gaining market share from plug-compatible suppliers of all stripes. IBM is also leveraging off that control of the central system to win increasing orders for office systems, personal computers, and other devices that will eventually be tied into mainframes.

In the large 370 processor arena, the combined share (measured in dollars) held by Amdahl and National Advanced Systems shrank by 2 percentage points to 13% in this year's survey; the two firms split that share 11% and 2%, respectively. This is the third consecutive year that the survey has indicated such a drop.

In the 370-compatible disk arena, which is enjoying quite strong shipments, survey respondents indicated that IBM would supply 78% of their disks in the 24 months following the survey's February 1985 date. That commanding figure is up from 75% last year and 71% in the 1982 survey. Trailing IBM are Storage Technology with 6%, Amdahl with 4%, and Memorex with 3%. Narrowing the focus down to 3380-class drives alone, IBM's share of the shipments will be 86%, compared to 81% last year. Amdahl, Memorex, StorageTek, and Control Data stand to gain only 2% each of the 3380 shipments planned for this year and next.

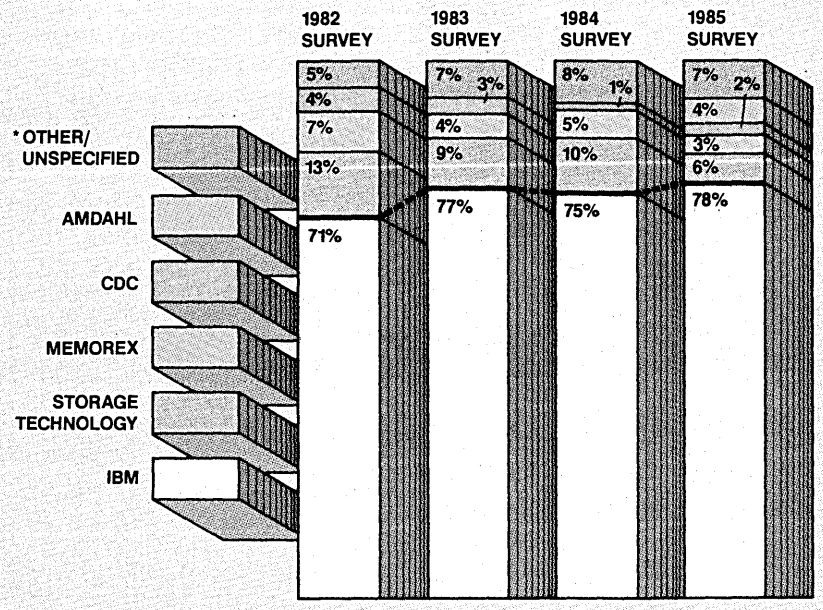
Plug-compatible manufacturers are not even holding their own in most product areas.

Similarly, IBM's hold on the 370 tape drive market is strengthening. Where last year it was to supply just under half (46%) of the tapes planned for installation in the following 24 months, this year users named IBM for two thirds (67%) of their planned tape acquisitions. StorageTek still ranks second in tape, with a 23% share this year, but has taken a dramatic fall from the 40% figure of last year. Memorex and Telex bring up

FIG. 1

IBM MAINFRAME DISK PLANS

Respondent plans for next 24 months disk add-on procurements (All models)

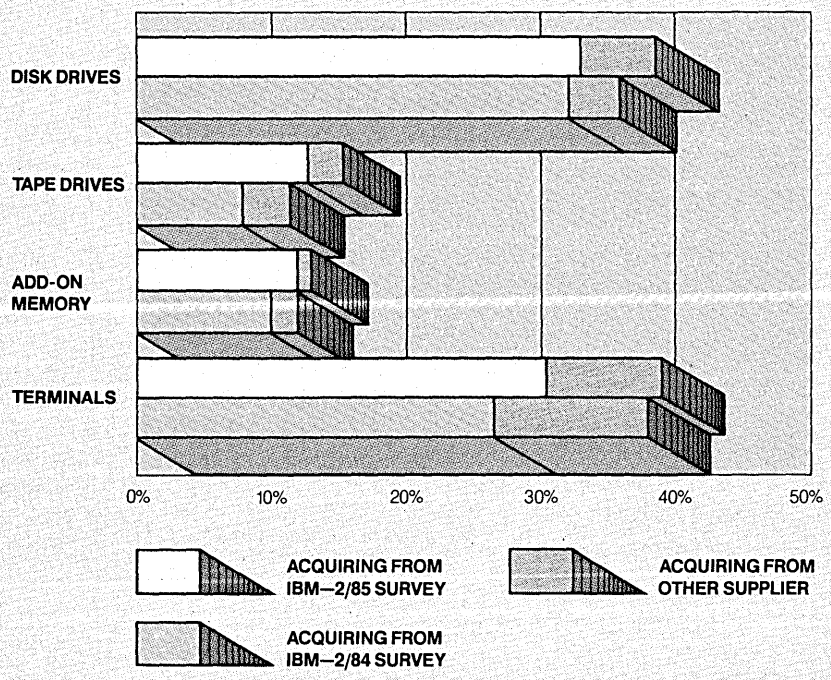


*NAS share 1% in 1985

FIG. 2

ADD-ON PERIPHERALS ACTIVITY

Percent of IBM sites planning to add peripherals/memory



the rear with 4% and 3%, respectively.

In the market for crt terminals attached to IBM mainframes (primarily 3270 gear), IBM's share reached 63% this year, up from 53% in 1983. In fact, the 3270-compatible manufacturing ranks have withered during the past year, with Raytheon (now defunct) and Four-Phase (absorbed into Motorola) dropping out of the survey findings altogether, and Telex, Lee Data, Memorex, and ITT-Courier gaining 11% (up from 8%), 3%, 2%, and 4% of planned crt business, respectively.

IBM's domination of the 370 add-on memory arena is even stronger. There it stands to win 91% (compared with 64% in 1981's survey and 82% last year) of users' planned business, followed by National Semiconductor and Intel with only 1% and 2%, respectively. This despite the fact that on average, IBM sites in the survey will attach 35 megabytes of main memory to the large-scale IBM processors they acquire over the next two years.

Within the 370-compatible processor market, National Advanced Systems gained some market share (22% this year, up from 17% last year) from Amdahl (61% this year vs. 62% in 1984). Meanwhile, IPL's share remained at 3%.

The battle for market share among pcms is evidently a heated one, as the companies compete among themselves as well as with IBM. Compatible processor makers, for instance, were found to be discounting their equipment more than last year, on average between 16% and 17%. Although the survey shows those vendors making no penetration into the high end of IBM's mainframe market compared with last year, a slight upturn was seen this year in the percentage of users saying they have such independent gear "under consideration." Overall, however, the shift in respondents' attitudes toward their current vendor was more favorable for IBM than for the pcms, and a strikingly high incidence of disaffection with suppliers was found among midrange compatible processor sites: of the sites planning to switch vendors, 60% of those using IPL gear, 59% of those using Magnuson, and 100% of the Cambex users indicated they would return to IBM.

Front-end communications controllers are increasingly important as remote terminals, pcs, and entire networks are attached to IBM mainframes. Respondents are expanding their use of such devices at a 5% compound annual rate, and here, too, IBM enjoys a commanding lead: 82% of the devices planned for installation by respondents this year and next will be from the industry leader, followed by 8% from NCR-Comten, 3% from Amdahl, and 1% from Memorex.

Except for scientific and engineering applications, IBM was the leading

choice for small systems used in standalone and distributed processing situations, exceeding Digital Equipment Corp., Hewlett-Packard, and Wang combined. The System/36 is doing extremely well, accounting for a doubling over last year in the value of combined System/36 and 38 shipments.

Just as important, the industry leader has seen no weakening of its hold on the corporate personal computer marketplace. IBM is the main pc supplier at 80% of the responding sites and stands to ship 72% of the pc units they install in 1985. The PC family and compatibles are cited by 75% of those sites that have standardized on one or two pc brands. Much of IBM's pc strength in this survey is believed to be a reflection of the mainframe orientation of the survey population, whose members tend to buy pcs centrally and directly from the manufacturer and therefore favor IBM.

IBM PCs are being attached to those mainframes in greater numbers than ever, according to the survey. Among large mainframe sites, for instance, some 93% of respondents will have attached personal computers to their host systems by the end of next year. Interestingly, the trend is away from simple terminal emulation and toward direct, two-way interaction with the mainframe and through departmental minicomputers. These connections, of course, generally stimulate demand for more mainframe capacity, as seen in survey data showing that more than two fifths of the IBM sites doing so find their mainframes' workloads increase. About half the sites saw no change. The bigger the mainframe to which the PC is attached, the more likely it will load the mainframe.

In the IBM PC software arena, where Lotus Development's 1-2-3 has long been the market leader, IBM has gained sizable user bases for its Displaywrite, Personal Decision, and Topview products. The 1-2-3 product is evidently slowing and its replacement, Symphony, is taking up only part of the slack.

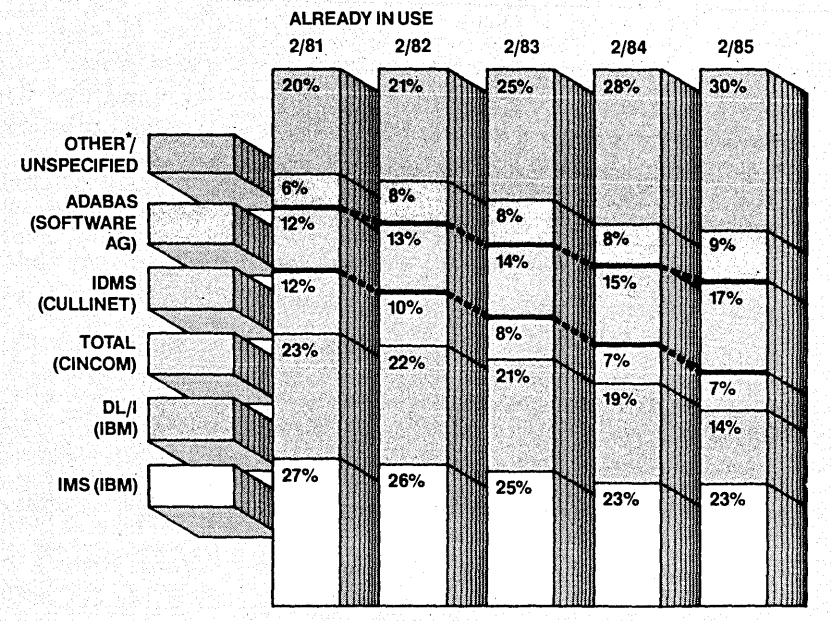
In the office systems market, IBM's majority share of the mainframe market is helping it win many orders. The company this year has a 61% share of the office systems/word processing installed by respondents (up from 53% last year), while Wang, in second place, saw its share fall to 15% from 19%.

Spending for host software packages continues to increase, but IBM's share of those outlays seems to have peaked in 1982 at 67% and is now at 62%. The reservoir of IBM users still not using database management packages is shrinking, especially among large-scale users. Of those database systems currently in use on 370 mainframes, IBM still has

FIG. 3

MAINFRAME DBMS PACKAGES

Query: If you are using a DBMS software package on your IBM mainframe system(s), which one(s)?



*Includes 11% other IBM (SQL, DB2, CPF, etc.), 5% ADR Datacom, 2% Focus, 2% System 2000, etc.

FIG. 4

IBM MOST POPULAR ALTERNATIVE

Query: If seriously considering a change in vendors, who is the likely supplier?

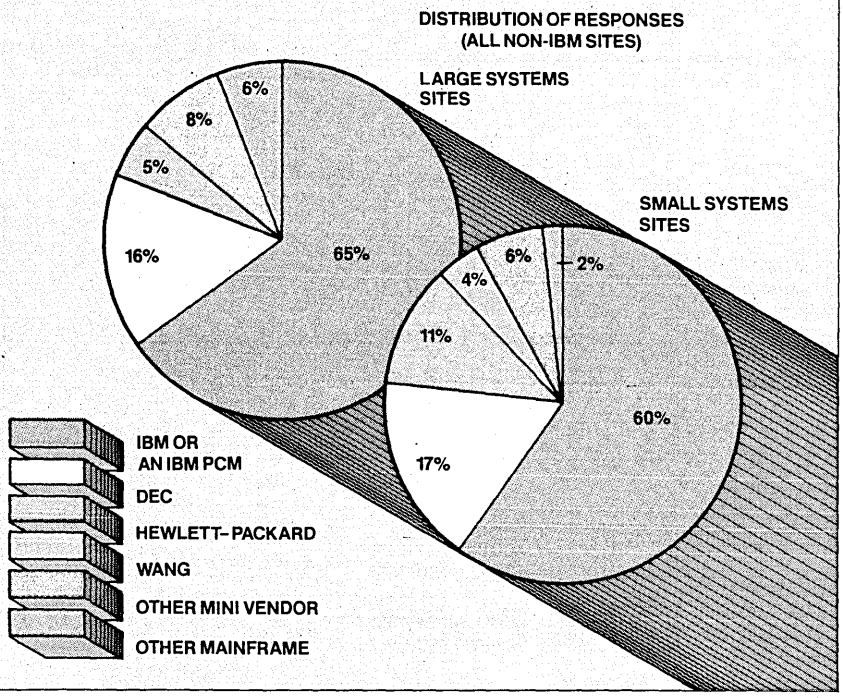


FIG. 5

PCS IN OFFICE SYSTEMS

Query: If your organization has office system(s) already in use (or planned), what is (or will be) the principal hardware orientation?

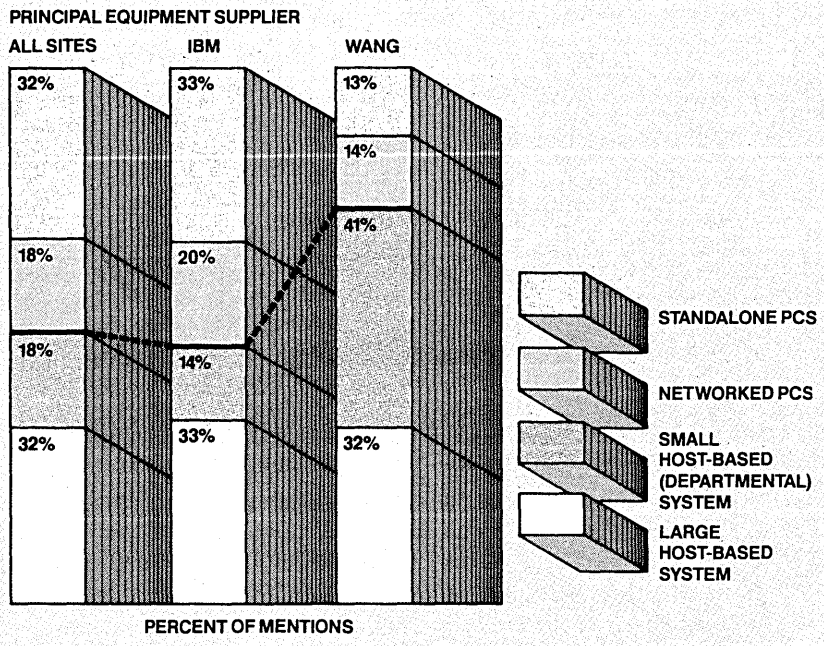
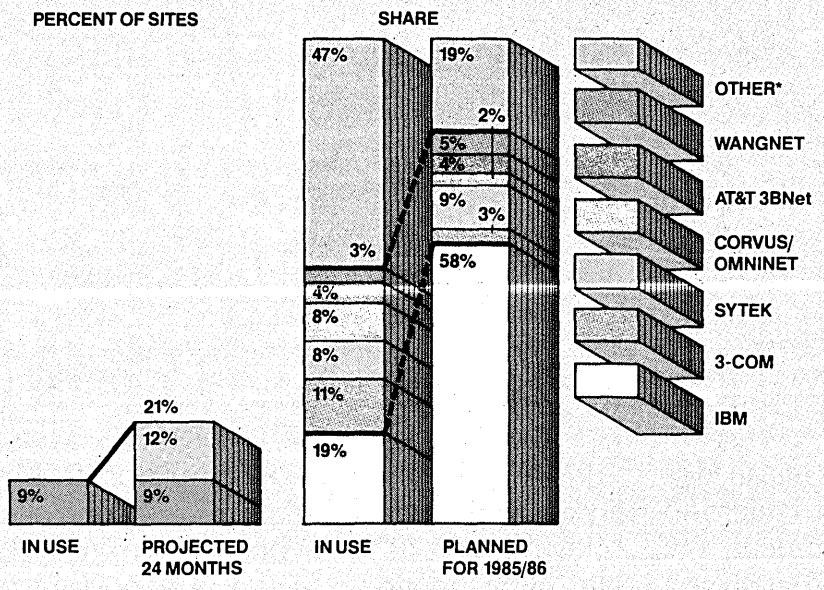


FIG. 6

LOCAL NETWORK PLANS

Query: If your organization has installed or plans to install a local area network (LAN), who is the supplier?



*Includes Xerox (4% in use, 1% planned), Ungermann-Bass (3%, 3%), Network Systems Hyperchannel (3%, 2%), Datapoint Arcnet (3%, 0%)

a leading share (23%) but one that has gradually decreased in the past four years as Cullinet, Applied Data Research, and Software AG expanded their shares. IBM has responded with several new database products, however, including DB2 and SQL, which appear to be helping it in this crucial systems software arena.

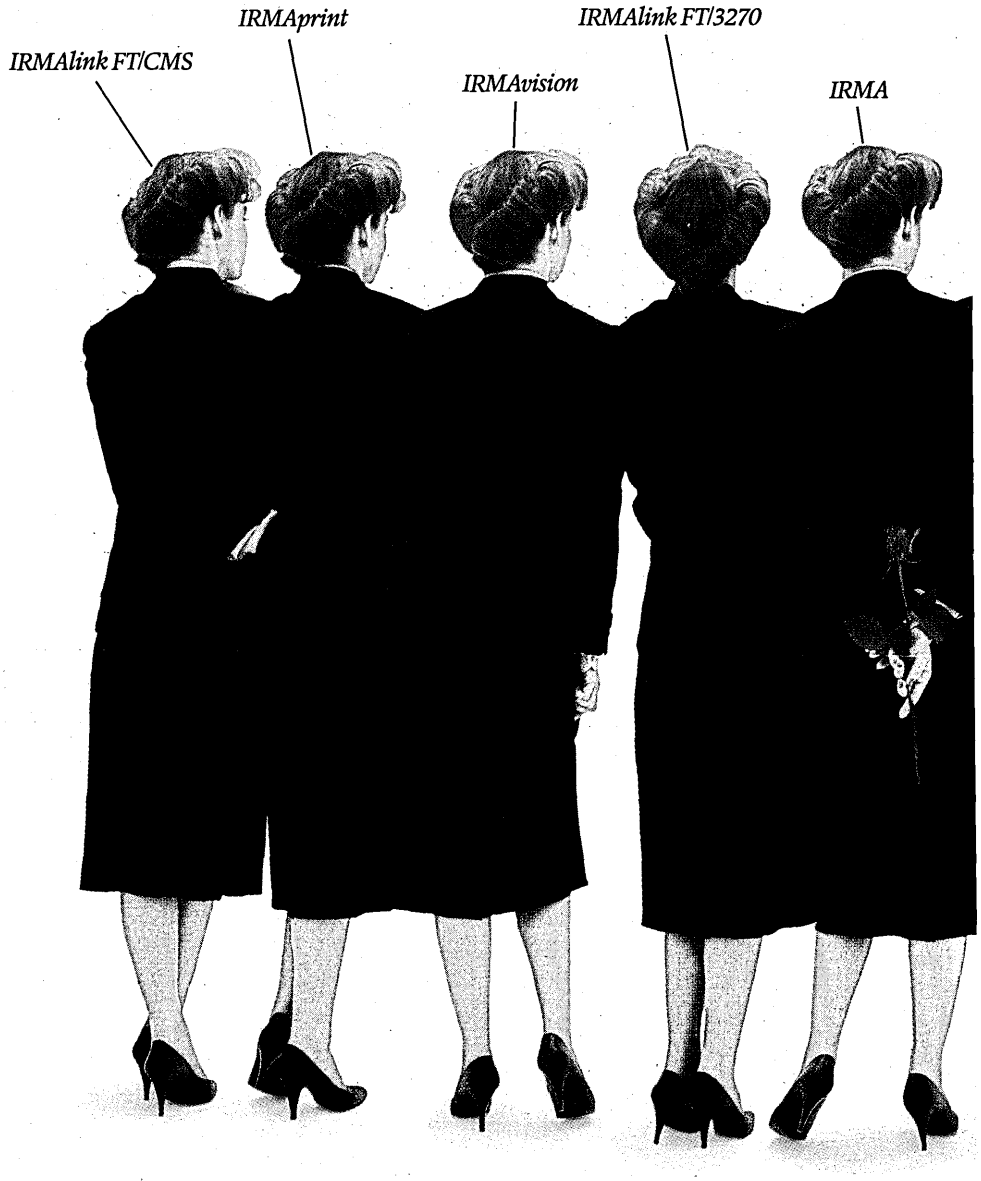
One area where IBM is the only supplier is mainframe operating systems. Here, just over half the respondents (up from 42% last year) said they will have the VM "hypervisor" system installed by the end of next year. Similarly, the Extended Architecture version of MVS, known as MVS/XA, is currently in use by 22% of all MVS users now (up from only 7% in last year's survey), but will be installed by 34% more this year or next. Another 22% indicated they indeed planned to install MVS/XA, but later.

The majority of users seem to be waiting for IBM to make its local area networking move before they install LANs. Only 9% of the respondents had LANs installed at the time of the survey, but another 12% said they planned to do so by the end of 1986. Almost three fifths of the sites still planning such networks claim they will use an IBM scheme. The bad news for Xerox Corp. is that its version of Ethernet, upon which much of the company's high hopes for office systems sales rested, is in use by 4% of the respondents now but fits into only 1% of the plans being implemented during the following 24 months.

LANs, however, appear to be gaining a strong lead over private branch exchanges (PBXs) as local data communications devices, at least among those sites that have made a choice. Meanwhile, AT&T's share of the PBX installations among respondents has increased for the first time in three years, hitting 39% of planned installations, up from only 31% of those already installed.

In the area of dp budgets, users expected an annual increase of 9.3% over the next three to five years. The most rapid hardware budget growth is among large-system sites where budgets will grow 10.5% a year. While demand for MIPS will grow at 33% a year, demand for disk megabytes will grow about 35% a year during the next three to five years. Asked what they expected the annual rate of decline in price-per-MIPS on IBM processors to be, respondents came up with an average of 14.5%.

The collective future of the BUNCH companies is far less bright than that of IBM, for their mainframe bases have ceased growing, and in several cases efforts to build on those bases with an array of small systems have not met with tremendous success. Generally, their loss is IBM's gain: the survey figures show a ma-



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CIRCLE 19 ON READER CARD

jority of defecting users move directly to IBM hardware. Some of the BUNCH companies have had to shore up their product lines with equipment purchased from oems, leading some users to speculate about their vendors' commitment to the computer business.

Burroughs. Efforts by Burroughs Corp. over the past few years to stem migration from its user base have evidently paid off in certain key areas, but users continue to have complaints about others. New computers, including the desktop machines Burroughs gets from Convergent Technologies, seem to have done their job in providing users with the new functions and price/performance they previously sought. Burroughs is in the midst of broadening its product line, adding the A Series medium- and large-scale mainframes, a series of Unix-based machines, and various office systems. It has also been concentrating on certain industrial sectors, apparently with good effect.

The A Series saw its first model, the A-3, unveiled last June and the survey shows a good response by users. More than a fifth (22%) of the users now running B6800/6900 equipment have plans to install A-3s this year, followed by 11% next year and 9% later.

Among B7800/7900 users, the corresponding figures are 10% this year, 6% next, and 7% later. The machine has been less warmly received by B1000 users; only about a fifth of them find the A-3 an appropriate upgrade. Among those not planning to acquire an A-3, however, the strongest reasons were that present systems are adequate and, particularly among B68/6900 sites, that they were dissatisfied with Burroughs as a supplier.

Judging by the need voiced by users for additional processing power, additional models in the A Series, one of which (the large-scale A-15) was introduced just after this survey was taken, will be welcomed. Among users at B1000 and B27-3900 sites, more than a fifth indicated a need to install larger processors while fully a fifth of large, B7000 sites need additional processors. Banking users showed a notably positive swing toward needing additional capacity. Burroughs sites claimed to be aware of machines labeled with odd numbers A1 through A17 that were expected to be introduced this year. Meanwhile, a substantial number of users also expect Burroughs this year to come out with its V Series of medium-scale machines.

The winding down of the B7900/4900 product cycle, noted again this year, has nevertheless apparently dampened respondents' mainframe spending with Burroughs when measured in dollar terms. Asked how much, as a percentage of their installed base, they expected to

FIG. 7

PC SOFTWARE PACKAGES

Query: Which of the following pc software is in use now or planned for use by your organization in 1985/86?

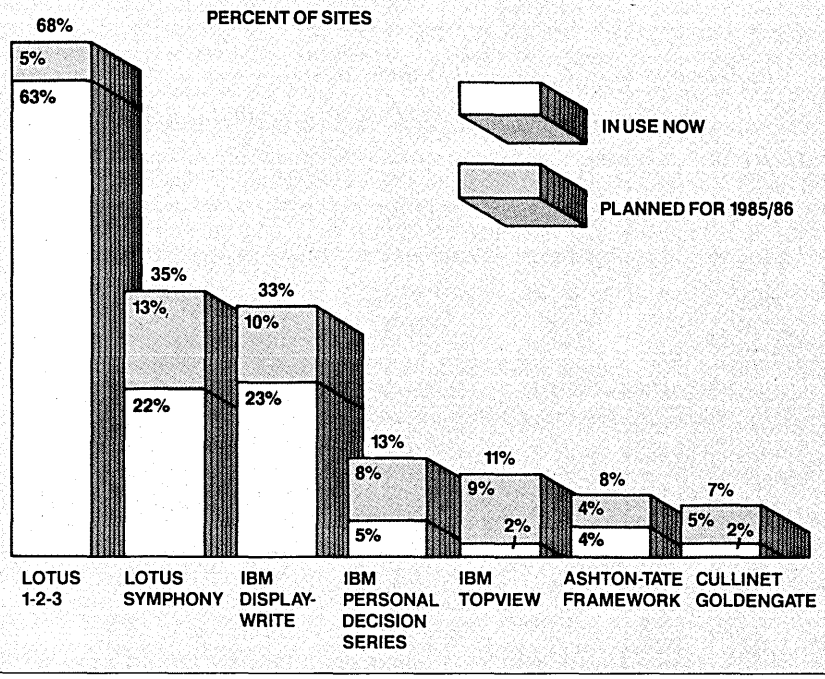
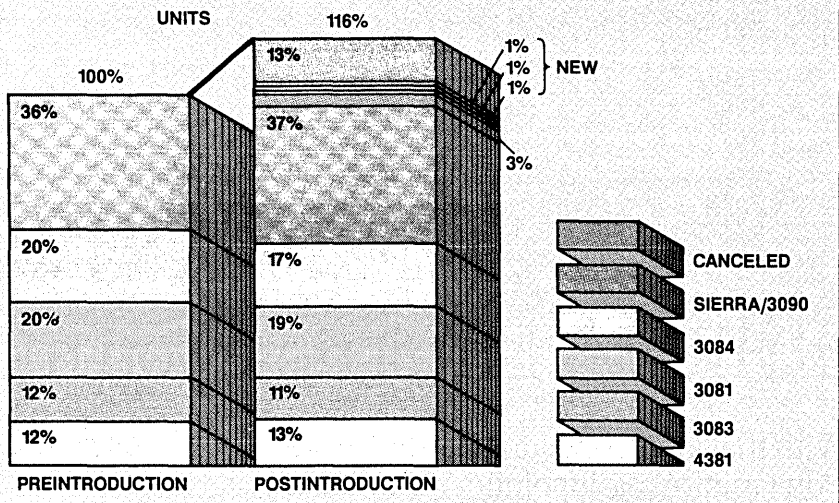


FIG. 8

RESPONSE TO SIERRA

Query: What, if any, changes have you made in your originally stated next 24 months' planned installations of IBM large systems pursuant to the introduction of the 3090/200 and 3090/400?



• Respondents had been asked in original survey questionnaire to "assume introduction by IBM of Sierra (new top-of-the-line system) in the January–June time frame for initial delivery prior to 1985 year-end" in detailing their next 24 months' systems installations plans.

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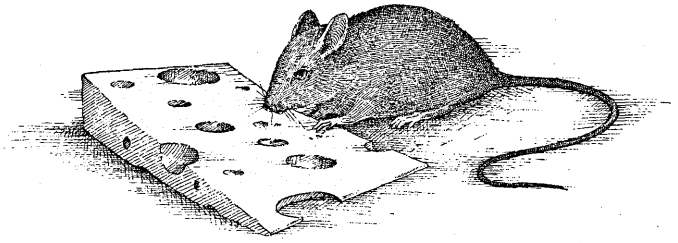

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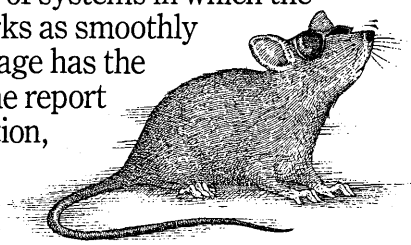

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CIRCLE 20 ON READER CARD

spend in the following 24 months, users indicated only 15%, compared with the 31% and 41% seen in last year's survey and that of the year before. In terms of units to be acquired, this year's survey shows users planning to spend an equivalent of 23% of their installed base, compared with 19% and 20% in the two past surveys. These figures did not take into account A-15 orders or shipments of the Convergent-supplied B25.

Relative to the industry sector, users in national defense planned the most acquisition activity with Burroughs, while government and education were soft. There was a conspicuous lack of increased demand in the manufacturing customer base that is so important to Burroughs. Add-on peripherals and memory acquisitions will be weaker this year than last, even in the disk area where Burroughs' Memorex subsidiary is active.

In all markets but education there was a net positive shift in attitude toward Burroughs, on average 10%. Particularly more favorable attitudes were discovered among distribution and government sites, indicating that the company's "lines of business" focus is paying off. Medium-scale users, too, showed a strong shift in positive attitude.

Compared with IBM, Burroughs was claimed by users to excel in operating systems software (a traditional strong point for Burroughs), price/performance of systems, and database/data communications software. The weakest points for Burroughs were industry-specific software packages (cited by half the sites for the third year in a row) and systems engineering support and sales personnel. A shrinking percentage of users desired to replace their Burroughs mainframe alto-

AT&T's share of private branch exchange installations has grown since last year.

gether: 7% this year compared with 9% two surveys ago. Evidently, the A Series, new disk subsystems from Memorex, and other new offerings are helping to keep users loyal to Burroughs.

Sperry. This vendor, like others in the BUNCH, showed some bright spots and some dark spots. Sperry sites are showing strong demand for additional mainframe capacity, now that the 1100/90 system is a proven product, and they are acquiring their vendor's Sperrylink office systems in increasing numbers. Users are evidently responding to the company's pricing strategy, which encourages purchasing over lease. On the other hand, the company's relatively new Unix systems are not finding broad acceptance among these respondents.

The 1100/90, finally shipped after many months' delay, has whetted Sperry users' appetite for additional computing capacity and promises to provide substantial activity in the coming two years. At large Sperry sites, only 26% of the respondents, down from 34% last year, said they would have enough capacity installed by year's end. On the other hand, 34% this year said they needed to add more memory, 20% needed a larger processor, and 12% will install additional processors. Even those with 1100/90s installed indicated a need to upgrade or install additional processors.

As 1100/90 shipments escalate, installation activity for Sperry's medium-scale products remains robust but seems to be slowing. Shipments of 1100/60 and 1100/70 systems peaked two or more years ago, according to this survey, and users of those systems are showing a growing interest in minicomputer solutions for future needs. Sperry is not particularly strong in the mini market, but it can look forward to a strong shipment year anyway. In dollar terms, respondents indicated plans to install gear worth 19% of their current installed base over the following 24 months. Last year's comparable figure was 13%.

Just over a fifth (22%) of all Sperry sites indicated they had Sperrylink equipment installed and another 14% have plans to install it. The strongest reception for the office system appears among 1100/60 and 70 sites, where 32% have Sperrylink installed and 19% have plans to install it. By contrast, however, 31% of all respondents said they had no plans to install Sperrylink and another 22% said they have considered the system but have no plans for it.

Sperry's push into the Unix arena has caught the interest of a fairly small segment of its user base, concentrated among scientific sites. Among midrange 1100 users, only 15% called Unix "very desirable," while a similar portion of large-scale users (16%) answered likewise. Like other vendors, Sperry may be finding that Unix on a mainframe is not an immediate seller.

In comparison with IBM, Sperry was relatively strongest in the areas of systems price/performance and operating system software, but continues to suffer in the vital applications software area where 67% of respondents, compared

SIERRA SAVES THE YEAR

A strong order response by users to IBM's February unveiling of the 3090 Sierra mainframes comes just when it needs their revenues to boost faltering 1985 growth.

The main all-vendor survey, taken before Sierra's formal introduction, indicates that a total of 92 Sierras were planned to be ordered by respondents, but a post-Sierra follow-up answered by 175 large IBM sites indicates a 40% step-up from these previously stated expectations. The original survey had asked respondents to assume that Sierra would be introduced before June 1985 and delivered by year-end.

In terms of units, the post-Sierra survey shows that the total number of IBM mainframes to be installed through the end of 1986 rose by 13% compared with the plans they previously indicated. Before Sierra, spending in dollars by all IBM respondents for all types of mainframe systems during the same period was anticipated to equal 25% of the if-sold value of their current installed base (compared with 28% last year), but once Sierra was public the figure rose to 30%. In other words, the 3090 seems to have been brought to market at a critical time when shipments of other large IBM systems (303X and 308X) were beginning to taper.

In fact, in terms of dollars to be spent, respondents indicated that 39% of their spending for IBM mainframes in the next 24 months would go for Sierra hardware, so evidently users are ordering Sierras at a strong rate. Among those users indicating a specific model number, about four 3090-200s were to be ordered for each model 400.

Once they had seen the machines' specs, most users (63%) said they would themselves purchase the Sierra hardware during the next 24 months, while 8% will lease through IBM Credit Corp. and 29% will lease through a third party.

The same users have taken well to the double-capacity 3380E disk drives that came out with Sierra. Of the DASD units they plan to install over the next two years, 41% will be single capacity followed by double-capacity drives, and 24% will be double right from the start.

Some users indicated they were mildly disappointed with the 3090's price/performance level and even more so with its delivery schedules, which according to IBM stretch out to early 1987.

Meanwhile, in comments collected during the follow-up survey, users said they expected IBM eventually to come out with a uniprocessor version of the 3090 (the model 200 has two processors and the 400 four). Some said the machine was too little too late, others claimed it would buoy the value of 308X systems on the used market, and still others were disappointed that 6Mbps channels were not offered. One user, in fact, said, "The 3090 offering is not a new generation of mainframe, just the final 370 offering. If this is *really* Sierra, it's a joke."

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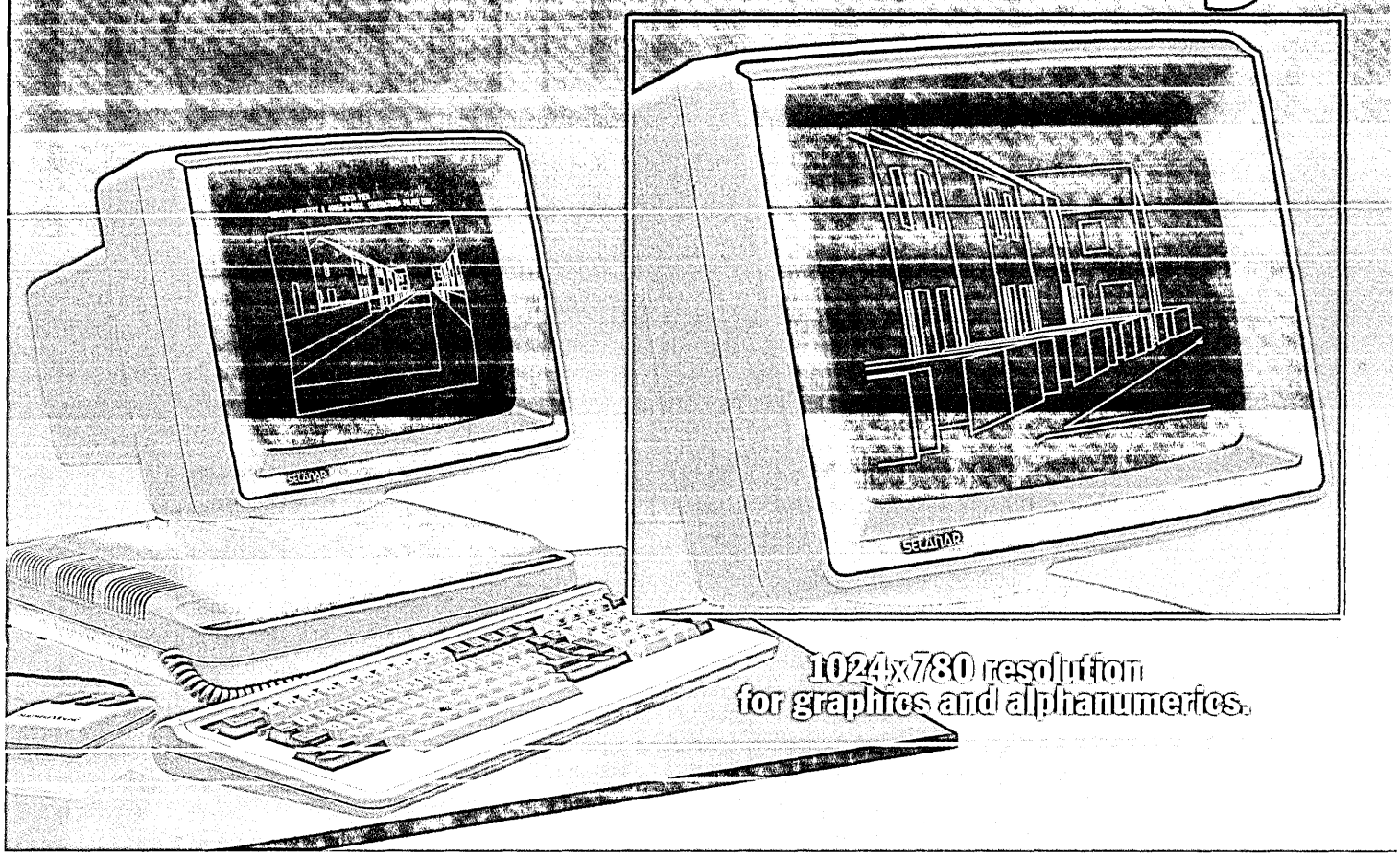

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CIRCLE 21 ON READER CARD

with 61% last year, found Sperry inferior to IBM.

NCR. The past year has seen NCR struggle to hang on to mainframe users, boost add-on activity among those users, and strengthen its showings in the small computer arena. It had only modest success in those endeavors, however.

First of all, the NCR sites have been slow to install the company's 9000 series machines, which the survey showed as accounting for only 16% of the installed base's dollar value, albeit up from 8% last year. The aging 8000 series (including the 9020 and 9040) systems, which made up 41% of the installed base value in the 1979 survey, still account for more than two fifths of this year's base. Clearly, large NCR users are in need of an upward migration path, and with most of the 8000 base sold off or fully depreciated, NCR can offer users significant price/performance increases in 9000 machines without giving up profits.

NCR's efforts to penetrate large accounts have evidently been a frustrating activity, judging by the fact that only 1% of the responding sites, down from the 4% measured last year, are at organizations with annual revenues over $500 million a year. More than half (52%) of NCR's sites bring in revenues of less than $25 million a year. About a quarter of those sites using small systems were found to be unsure of their future plans; another 16% said they planned to replace their NCR mainframes.

A small swing toward lower capacity needs in the future was registered this year, continuing a trend that was first seen in last year's figures. That trend, along with a general slowing of the economy, falling system prices, and a lack of high-end hardware presaged a slow growth year for NCR's systems business. In dollar terms, respondents' planned over the following two years to install equipment with a value equivalent to 12% of the current installed base. Last year's comparable figure was 24%.

NCR's Worksaver line, a three-year-old series of desktop machines supplied by Convergent Technologies, is making modest penetration of the NCR base, but it may be losing steam. Only 13% of respondents indicated they had Worksaver installed, followed by a mere 3% planning to install it. On the other hand, 22% of the respondents said they had considered the product but had no interest in it, and only 13% said they had any plans to evaluate it in the future.

Similarly, NCR is faring poorly in the personal computing arena where its MS/DOS machine is up against IBM. Even within its own mainframe customer base, only a third of those sites that have picked one or two standard makes have picked NCR pcs (40% chose IBM). The survey shows that large NCR users pick IBM more often, while smaller users favor NCR pcs.

Like other BUNCH companies, NCR must consider making Unix a standard offering on its mainframes. Once NCR, or any other company, discloses such plans, it becomes vulnerable to defections by users who, now forced to convert from one system to another, can more easily justify moving to another system vendor altogether. In this regard, NCR sites showed a marked drop from last year in their judgment of an incompatible operating system on the company's next generation of mainframes. Where last year 44% of the responding sites said such a new operating system would make them more likely to consider NCR for future system expansion, this year only 38% so indicated; compared with 4% last year, 8% this year said such a move would make them less likely to stay with NCR. A stronger positive reading on this issue came from large sites, where users are generally more inclined toward non-NCR solutions.

In comparison with IBM, NCR as a vendor was found most deficient in applications and database/data communica-

With product cycles peaking this year, Sperry appears poised to do the best of the BUNCH.

tions software. The Dayton, Ohio, company's field maintenance and systems price/performance were two particularly strong points with users, the survey indicates.

Honeywell. This Minneapolis manufacturer has seen far better days in its computer business, which has gloomier prospects than ever. The survey was completed before the company introduced its NEC-built DPS 90 systems, which should help Honeywell significantly with its largest customers, but the potential for defection among large Honeywell users remains strong, far higher than for Burroughs and Sperry. Moreover, the reservoir of Level 66 users to be migrated into the DPS 8 line is nearly tapped out now: of those left with small Level 66s, for instance, 27% plan to install DPS 8 hardware but 49% are not planning to do that.

On the other hand, an encouraging sign for future DPS 88 shipments is to be found in the fairly big number (65%) of large systems users willing to convert to the virtual memory GCOS 8 operating system. In fact, at the time the survey was taken, only two DPS 88 machines were installed by responding sites, but nine more are to be installed by year-end.

Planned acquisition activity (not including the sizable and dynamic DPS 6 base) for the following 24 months was down from a year earlier. In dollar terms, an equivalent of 11% of the value of the current installed base (down from 14% last year) will be installed this year. In terms of units, the figure is 13% of the installed base, equal to last year's figure.

Field upgrades still represent a significant source of high-margin business for Honeywell. This year and next such upgrades will in unit terms equal 15% of the installed mainframe base. Upgrade activity in the DPS 8 base is picking up now that many of those machines have been installed for two to three years: more than a quarter of those machines will be upgraded in the coming 24 months. Honeywell's share of add-on peripherals installations will generally be up this year, although it seems to be suffering from compatible competition in the terminal arena. And only a very small number of respondents (less than 10% in each size category) said they anticipate a major mainframe system introduction by Honeywell this year.

The small DPS 6 line continues to be an important adjunct to Honeywell's mainframe product strategy, with 53% of large systems sites and 43% of Level 64 sites indicating they are using or will use the machine to supplement their mainframes. As for office systems, Honeywell has shown a modest but growing penetration of its user base with its DPS 6-based system. Among large users, a fifth have installed or will install such gear (compared with only 13% last year), while for the second year running, 23% of those large users have considered the system but have no interest in using it.

Asked what change in their attitude toward Honeywell took place during the past year, users surveyed showed a shift to the negative. Level 62 users, in particular, were disgruntled about their systems being dead-ended. Among large systems users as a whole, 28% said their attitude was less favorable while 16% indicated an improvement. In a comparison with IBM, Honeywell ranked well in the systems price/performance and operating system software categories, but fared poorly in industry-specialized terminals and applications software. As a whole, Honeywell users were found to be less positive toward their supplier than customers of Sperry and Burroughs. (It should be noted that General Electric, Honeywell's largest user, declined to participate in the survey for reasons of corporate policy. The survey also concentrates solely on domestic sites, thus ignoring Honeywell-Bull's substantial user base in France.) ◉

To order the complete 1985-'86 DATAMATION/Cowen & Co. mainframe survey results for $750, please call Julianne Kilbride at (212) 605-9582.

IBM® Software Notes
News for the DP professional

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

Managers at BancOhio Are Banking on DB2

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

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

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

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

A NOTE TO THE READER

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

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

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

The Cross System Product Set Aids Programmers at Corning

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

The innovation is the Cross System Product Set from IBM.

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

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

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

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

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

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

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

DB2 (continued)

own unplanned reports.

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

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

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

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

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

'Usability' Labs Help Make IBM Software Easy to Use

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

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

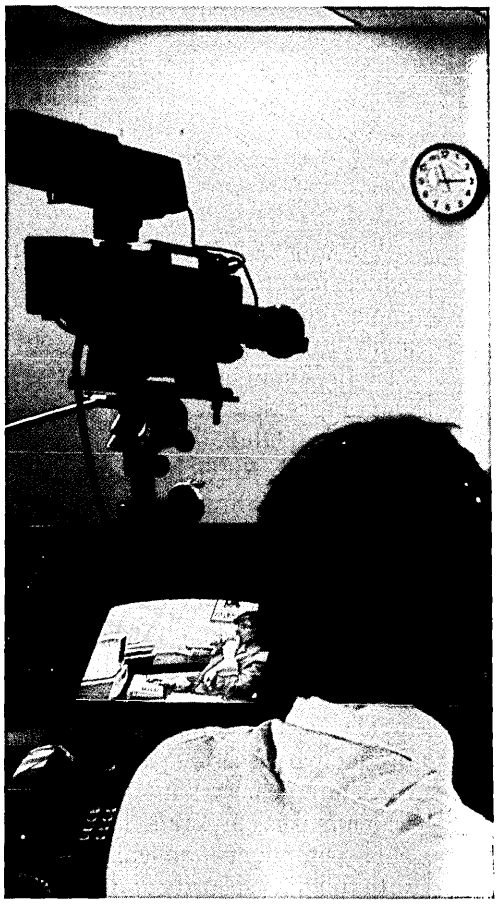
That's why, prior to release, IBM evaluates many pieces of software for "usability." We've taken a scientific approach to this process in Usability Laboratories located in cities across the United States.

The evaluators are people who have not had software experience.

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

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

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



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

RACF Helps Protect Data At United Student Aid Funds

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

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

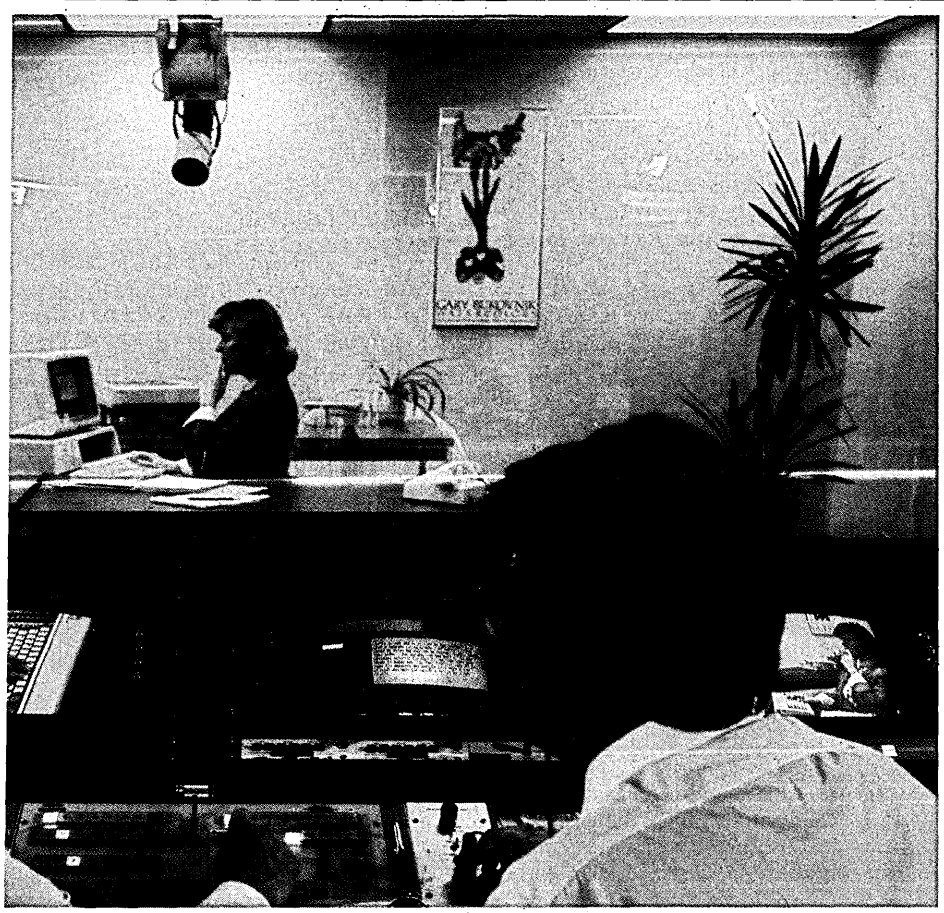
Profile checking is just one of the many features that make RACF easy to implement and maintain. Flexibility of design and structure is another. In addition, with RACF you need not modify your operating system or system-level software such as CICS, IMS, DB2 or HSM.

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

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

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

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



IBM Offers Courses On IS Management

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

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

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NEWS IN PERSPECTIVE

MAINFRAMES

PHANTOM OF THE FUTURE?

Hidden among the hardware advances of IBM's 3090 are the beginnings of a more modular operating system architecture.

by R. Emmett Carlyle

When it comes to IBM's Sierra, what is hidden under its "blue" covers has now assumed more importance than what is out in the open.

This is especially true for the plug-compatible companies that must anticipate IBM's moves in this unseen world, and that must compete against these phantoms. IBM's customers merely have to put their faith in this hidden presence, this ghost in the machine, and they do.

Their faith is based on history. Tucked away within the old 370 mainframe was virtual memory. Lurking within the 308X was IBM's XA (or 31-bit extended architecture), which, when announced, sent some pcms tumbling. Now it seems that there is yet another phantom in the works, one that may assume great prominence within the new 309X family.

IBM has created a whole new conceptual level, known internally as XAA, through which it has set about implementing microcode support, or assists, as IBM calls them, to its XA strategy.

One source believes that by 1987, through such assists and a simultaneous offloading of pieces of MVS/XA onto specialized support processors, IBM can halve its operating systems overhead and double the relative MIPS performance of its 15MIPS 309X base processor.

IBM has already demonstrated that it can double the performance of its 308X in one area (namely sorts) merely by microcode assists to a new algorithm, its DFSORT Release 7. The company has also worked through its XAA level to microcode its I/O dynamic path reconnect software, EXDC, thus further reducing operating systems overhead.

These moves, although important pointers, are just preliminaries to the main event—an offloading of large chunks of MVS/XA onto a multitude of support processors and other functional subsystems, or what Arthur D. Little analyst Frederic Withington has dubbed the Federation. It is believed that XA was designed to handle 255 such processors or functional elements.

Sources explain that IBM has already created two kinds of support processors: cpus and I/O channel-group processors. In addition, IBM's new 309X processor controller, the 3092, is a highly intelligent and autonomous I/O process controller, with its own built-in reduced instruction set Model 801 processors, until now not available to customers.

Now, Russ West, vice president of strategic planning at Comdisco, a computer lessor in Rosemont, Ill., is claiming that these processors also emulate the full 370 instruction set. "The way has been prepared for IBM to cut out chunks of MVS/XA and run them autonomously on the 3092, thus freeing cpu cycles."

West, who spends each week talking to three or four of the company's 800 Fortune 1,000 clients, predicts that for starters IBM will offload all 4,000 I/O path length instructions to the 3092. He suggests that IBM has completed microcoding of XA's first-level interrupt handler, reducing total instructions from 50 to one, and cpu cycles from 330 to 70. The new code will run on the 3092 or another specialized processor.

IBM won't always use outboard support processors: some major changes will be strictly under the covers, according to one pcm executive. "A 50MFLOPS to 100MFLOPS vector-processing capability is latent within Sierra, just waiting for specialized new FORTRAN software and a more mature marketplace."

Whether the new XAA code assists run outboard or under the covers, the net result will be a complete modularization of IBM's traditional centralized hierarchy. Withington and his colleague Norman Weizer have already conceptualized an architecture of 16 cpus and other functional subsystems linked by a fast bus and fiber-optic channels, which they say can be implemented in five years (see "IBM: Mainframes in 1990," Jan. 1, p. 97).

IBM's customers have to put their faith in this ghost in the machine, and they do.

Carl Conte, group executive of IBM's Information Systems & Storage Group and corporate vice president, said at a recent DATAMATION/Cowen & Co. seminar that IBM had been engulfed by orders for the fiber-optic option—"four times more than we anticipated."

What's clear in all of this is that you can't have a modular architecture without a modular operating system. Rather than being monolithic, as it is now, MVS/XA must be "decomposed," as Withington puts it. New releases of the operating system—and IBM Data Systems Division vice president Dick Williams has

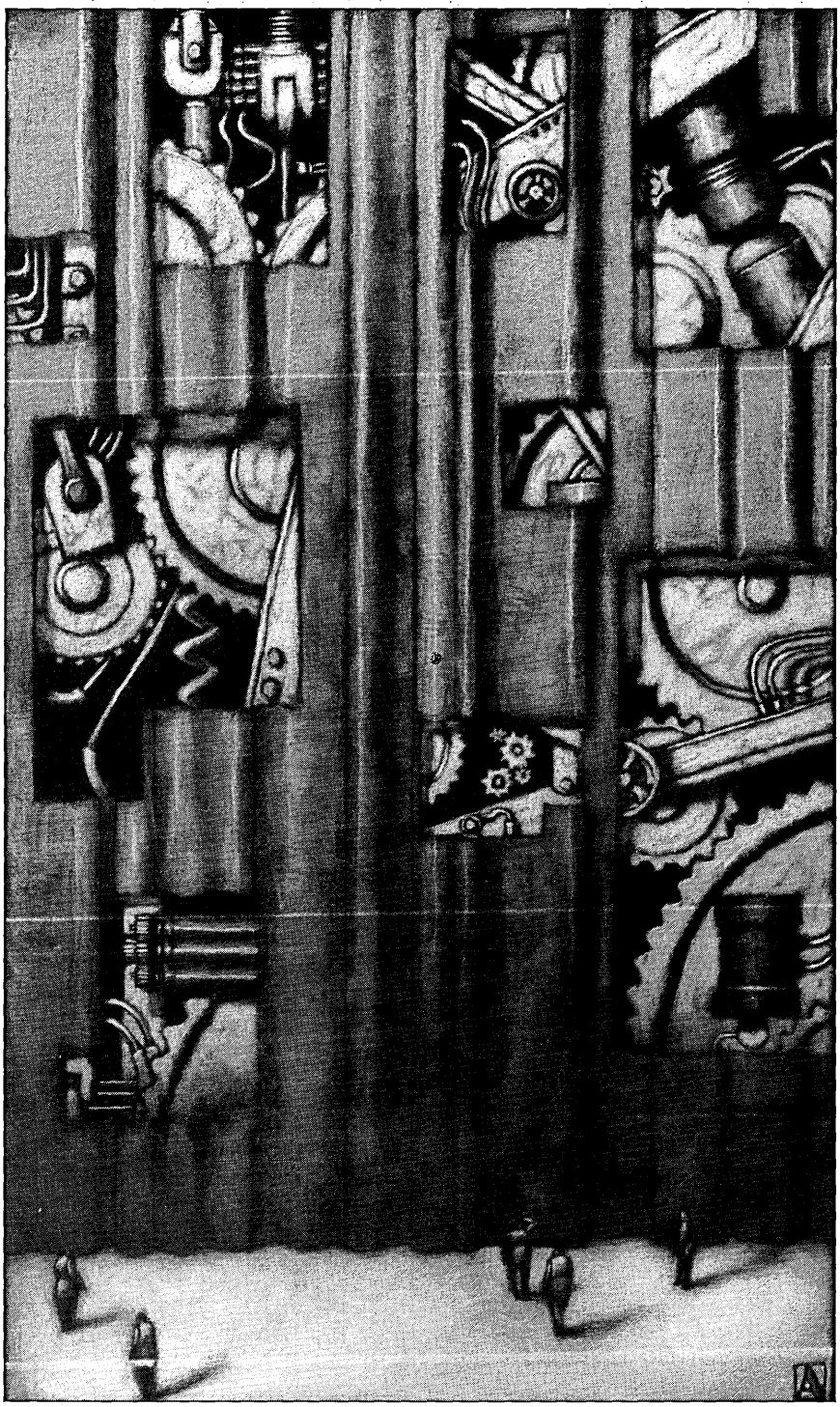

ILLUSTRATION BY DAN ADEL

intimated that two will arrive next year—will begin to accomplish this goal.

Since the Federation will have to hang off the channel group, one release will need to support an increased data rate from cpu channel to disk of 4.5MBps as well as the 3092's autonomous role, sources believe. They add that problems in the disk area preclude IBM's doubling the channel speed to 6MBps until 1987.

Though all of the above statements must be regarded as speculative at this time—and thus rendering a "no comment" from IBM—it's clear that Amdahl, for one, expects it all to come to pass. "The transition to XA was our biggest problem, and it's well known that we lost ground," says Charles Gitomer, manager of processor program products at the Sunnyvale, Calif., concern, "but having cleared that hurdle we don't anticipate any problems with XAA."

Amdahl still boasts the largest IBM-compatible uniprocessor (13.5MIPS compared to 11MIPS for Hitachi/NAS's and 8MIPS for IBM's), and seems unconcerned about the new 29MIPS dyadic Sierra (the 3090 Model 200), which will trickle out into early support sites in a couple months. Sources say that Amdahl has embraced a 200- to 250-picosecond switching technology to reduce its machine cycle time to 15 nanoseconds. The result would be a 25MIPS uniprocessor and 45MIPS dyadic machine that could be announced this September and shipped a year later.

Using the same switching technology, Hitachi/NAS is claiming an 80% performance edge over IBM's Model 200. If the combination can deliver its new AS/XL Models 60 and 80 in the second quarter of next year as promised, it will beat IBM's 50MIPS Model 400 to market by about a year.

Users, for their part, don't dispute pcm claims that they can match or exceed IBM as the supplier of the world's most powerful IBM-compatible mainframe, though several have intimated that IBM will shave at least six months off the Model 400 shipping date. What all but the most seasoned and devoted pcm shops question is the pcms' capacity for XA (and now XAA) support. "Building a 30MIPS uniprocessor is important, but not as important as it was a few years ago," says Dan Cavanagh, vp for electronic installations at Metropolitan Life in New York. "The most vital aspect is the integration of hardware and software and how the whole system hangs together.

"So much is hidden under the covers of Sierra that as it matures the pcms will have to scramble to keep up."

"So much is hidden under the covers of Sierra that as the machine matures the plug compatibles will have to scramble to keep up," he warns.

Bob Djurdjevic, publisher and editor of the Phoenix-based *Annex Computer Report,* has been compiling his own (growing) list of seasoned pcm buyers who are now switching back to the relative safety of IBM after years with Amdahl or NAS. "The reasons vary," Djurdjevic says. "It's not only IBM's microcode threat or its source code restrictions; it's a buildup of things including the pcms' own mismanagement."

Comdisco has some 90,000 pieces of IBM and IBM-compatible equipment (worth some $5 billion) out in the field. West says the trend is now to go to the plug compatibles only for a quick "MIPS fix," but not for any long-term relationship. "Our customers tell us they lack a machine that is like a Bic pen—useful but disposable," he says.

By any measure, the pcm share of the IBM-compatible market has eroded

dramatically in recent years. In 1981, according to Arthur D. Little, pcms held 5.6% of the U.S. general purpose large systems market, while by 1984 they had dropped to 4.5% of a $13.1 billion pie.

"It's clear from Amdahl's utterances about its Aspen operating system and its UTS Unix that it is looking for opportunities outside the MVS area. The writing is on the wall," ADL's Withington says.

Currently only 35% of Amdahl's customers (and 50% of IBM's) have embraced MVS/XA. A fair percentage will never even set off on what IBM calls "the journey," preferring instead to stay with IBM's older 24-bit architecture or to look for a more generic 32-bit architecture.

"But these are only peripheral opportunities for us," Amdahl's Gitomer stresses. "We don't believe these markets are big enough and so we must, and will, stay with MVS."

This, of course, means living with the object of the most potent fear, uncertainty, and doubt that IBM can generate—its XAA microcode. "We've been living with the myth of microcode since 1977, when MVS/E was announced with the 303X," Gitomer says. "We're used to battling the phantoms by now."

Perhaps the pcms' new rallying cry should be, "We ain't afraid of no ghosts!" ◉

TOO LITTLE, TOO LATE?

Can Honeywell save its user base with the DPS 90?

by Robert J. Crutchfield

Honeywell Information Systems' introduction of its DPS 90 line-topping mainframe—with deliveries commencing immediately—has come none too soon for a user community whose confidence and loyalty are waning faster than the Red Sox in September.

Executives at Honeywell stress the company's commitment to supporting and enlarging its user base. The Minneapolis conglomerate points to the DPS 90, the top end of which is comparable to IBM's 3090 Model 400 in power, as a "clear indication" that the company is in the computer business for the long run.

If only the users thought that way. A recent DATAMATION/Cowen and Co. study revealed that Honeywell—more than any other BUNCH company—is barely hanging on to its user base. Indeed, Honeywell users have the highest potential for defecting to other vendors: 31% of the 739 users surveyed indicated they are "seriously considering a change" to another vendor (see Fig. 1). Bob Hesser, Honeywell vice president of large computer marketing, declined to comment on the survey.

FIG. 1

MAINFRAME USERS CONSIDERING A CHANGE

VENDOR	1983	1984	1985
Honeywell	24%	30%	31%
Burroughs	19	16	19
Sperry	19	12	15
NCR	12	13	12

Source: Cowen & Co./Datamation Survey

Granted, there are some satisfied Honeywell users, such as General Electric Information Services Co. of Rockville, Md., and Dynamics Research, a defense contractor in Wilmington, Mass. But on the whole, signs of unrest abound. One consultant specializing in Honeywell dp shops says his clients are uncertain whether Honeywell can continue to ply the mainframe trade. "They could pack it in tomorrow or they could continue for quite a while," the consultant says. "It is their 100th anniversary [and] their chance to make it or break it."

At Dynamics Research, information services chief Richard Hendricson says he has "no concerns in the short term of three to five years. Like many users, we don't want to be committed to one vendor." Hendricson's dp shop has three tightly coupled DPS 8/70s and several VAXs, which are used for engineering and custom software development for Department of Defense applications.

Installations such as Dynamics Research helped HIS post its second consecutive healthy year in 1984, as revenues rose 10% to $1.8 billion and earnings jumped 37% to $180 million. The improved financial picture is due more to the cost-cutting measures, like laying off 3,500 workers in its Phoenix-based large systems division in the past three years, than to real growth, however.

One way that Honeywell has been able to save money has been by expanding its business relationships with NEC of Japan and Bull of France. Last year the three firms renewed for an additional decade their 20-year-old business relationship. For products sold by all three firms Honeywell has marketing rights to North America, Italy, and the U.K.; Bull has rights to the rest of Europe; and NEC has rights to the rest of the world.

Yet Honeywell's financial health hides several severe problems that the firm has yet to resolve. The most important is that the HIS user base is small—and shrinking. Company officials boast that Honeywell, NEC, and Bull have shipped over 3,000 DPS 8 or 88 mainframe cpus worldwide, yet only 500 sites in the U.S. have Honeywell mainframes.

The distinction between American and foreign users is important because the same machines run different operating systems in different countries. For years Honeywell's machines have been running GCOS-8, a proprietary system developed specifically for the DPS 8 line. Users have consistently praised the system's rich operating environment and its database offering, IDS 2.

The comparable NEC and Bull mainframes, however, primarily run the AOS system that was initially developed for Honeywell's DPS 6 line of minis. "If the Japanese were ever able to develop a decent operating system, we'd be in trouble," one user quips.

As good as GCOS is compared to other environments, however, it is still a proprietary operating system and users do report having trouble purchasing third-party software. One user notes, "For years Honeywell looked at third-party software vendors as competition. It only embraced third-party vendors a few years ago and it might be too late." Only recently have large third-party software vendors, like Atlanta-based MSA, offered applications software for the holdout GCOS-8 users.

Honeywell's software troubles are compounded by its staunch reluctance to offer hooks into industry standard environments, despite Bull's recent endorsement of Unix. NCR, National Advanced Systems, and Honeywell are the only U.S. mainframers who still ignore Unix. Moreover, to enter IBM networks, users must first buy a DPS 6 as a front-end SNA processor.

Honeywell users are more likely to defect to another mainframer than Sperry, NCR, or Burroughs users.

Honeywell's proprietary technolo-

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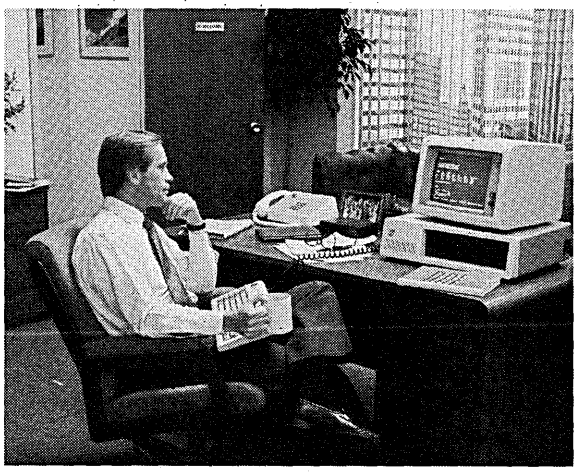

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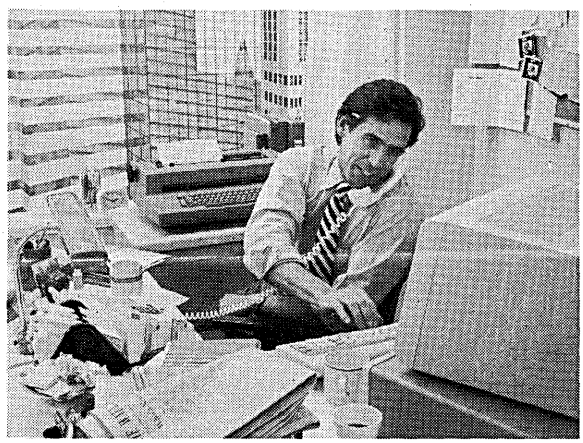

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CIRCLE 22 ON READER CARD

gy is alienating customers, not just because it lacks third-party software, but also because it strains employee relations in dp shops. The DATAMATION/Cowen & Co. study found that over 40% of Honeywell shops had trouble finding trained workers. Conversely, Honeywell users are having a hard time finding jobs. Hoffmann-La Roche, a pharmaceutical company in Nutley, N.J., recently laid off 80 programmers and analysts, many of whom have abandoned their Honeywell expertise in favor of crash courses in IBM technology.

With these obstacles to overcome, Honeywell clearly needs to succeed with the DPS 90. The firm's ability to ship the family of five systems now—18 months ahead of IBM's largest 3090 models—is certainly an asset. Gary Mueller, vice president of information processing at

Honeywell's financial health hides several severe problems the firm has yet to resolve.

GEISCO, says he expects one DPS 90 to replace four or five DPS 8/70s. By the end of the year, GEISCO will take delivery of 12 DPS 90s for use in its remote computer services operation.

Hesser bills the five DPS 90 models—one-, two-, three-, and four-processor versions and a fault tolerant system—as "competitive" with IBM's Sierra family in commercial applications and "superior" in interactive environments. The company has fine-tuned the price of the DPS 90 series slightly downward from the original $3.9 million to $8.3 million range. The DPS 90 has integrated array processing capabilities that enable it to operate at 7.1MFLOPS in scientific environments.

"The DPS 90 is suited for number crunching," one user observes. "The [commercial] throughput of the 90 is not as impressive as the 88." Honeywell claims the uniprocessor DPS 90 is 30% more powerful in commercial environments than the DPS 88 uniprocessor it supersedes, and 70% more powerful in scientific environments.

Hendricson of Dynamic Research adds that "the DPS 90 would be an attractive option if we were hurting for more processing cycles."

NEC is building the DPS 90 for all three companies. Known in Japan as the S1000, the system is based on Honeywell's design for its never-produced DPS 66/85. "The Japanese took the 66/85 and made it run faster," one user says. "The DPS 90 is a damn fast machine that is

GEISCO'S MUELLER: A single DPS 90 can replace four or five older mainframes.

available today." (Hesser of Honeywell notes that the DPS 90 is five times more powerful than the 66/85 would have been.)

While some observers criticize Honeywell for oeming the DPS 90 from NEC, others defend the firm. "I don't see Honeywell's involvement with the Japa-

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CIRCLE 25 ON READER CARD

nese as an indication they are going out of the mainframe business," one user argues. "When IBM separately sources from third parties people say it's a brilliant marketing move. It is a question of perception."

Customer perception of a company is often influenced by the firm's marketing savvy, and both users and Honeywell note the mainframer's difficulties in that area. One MIS vice president says, "You can see the slide rule hanging out of a Honeywell salesman's pocket. Honeywell doesn't know how to sell to the boardroom, just to techies."

Hesser admits there is a problem in sales. "We are too straightforward as marketeers and should be calling higher [in the customer's company]."

Part of Honeywell's strategy is to sell system solutions in addition to its general purpose computing business. HI

Over 3,000 DPS 8 or 88 cpus are installed worldwide, but only 500 U.S. sites have them.

sells office systems, a "smart building" system, and other products for vertical markets, but many of these have been unsuccessful. The office systems division, Billerica, Mass., recently laid off hundreds of workers and ordered four weeklong plant shutdowns to save money.

The company's great white hope, as it were, is its long-established presence in the process control industry, with thousands of installations to date. Honeywell officials hope to expand that charter into all factories, and they have recently added compatibility with General Motors' MAP standard to the product lineup. "We're not the only company staking a claim in manufacturing automation," concedes Bill George, executive vice president. "But we're different from all our competitors because we're the only one present in every segment of the business. "We've got an advantage with MAP, too. Our architecture includes MAP-baseband at the supervisory level and MAP-broadband at the plantwide level. We're positioned to respond rapidly to the MAP standard as it becomes firm."

Whether the factory automation effort or even the DPS 90 will enable Honeywell to enlarge its user base is unknown. While many critics say Honeywell's mainframe business is as good as dead and that its users are gradually abandoning the firm, the company's relationship with NEC and its remaining loyal customers promise to keep HIS afloat at least for a few years. And that's better than nothing at all. ◉

DBMS

DATABASE MACHINES TAKE OFF

Users give rave reviews to the new database machines.

by Edith Myers

Computing's first lady, Commodore Grace Murray Hopper, has been talking up specialized database machines for some five years now.

"Computers are not made to search databases," she is fond of saying in speaking engagements all over the country. Hopper's blessing for back-end machines notwithstanding, database machines have not exactly made a big splash in the first half of the '80s, but maybe their time has come.

The leading providers certainly hope so. They are seven-year-old Britton-Lee, Los Gatos, Calif., and much younger Teradata Corp., Los Angeles. For the moment, Britton-Lee is primarily ad-

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CIRCLE 27 ON READER CARD

dressing the low end of the market—users of machines like the DEC VAX and below—while Teradata is in the high-end IBM arena.

"We've never competed [with Britton-Lee]," says David Clements, director of marketing for Teradata, "but that doesn't say we won't cross eventually." After many years of beta testing, Teradata is now making its big marketing moves, while the Britton-Lee system is starting to attract adherents in larger numbers and with bigger pocketbooks. Sperry is now offering a Britton-Lee system as an oem, giving its top-of-the-line 1100/XX models a relational database front end.

A database machine is a dedicated hardware/software solution to the problem of database management. The database management software is resident in the hardware, relieving the host and increasing response-time performance to users. The machines generally cost substantially less than the host computer resources they offload. Britton-Lee's machines range in price from $56,900 to $154,900; a full system with interfaces to a Sperry installation pushes the price tag to $250,000. The smallest Teradata system with six processors and four disks (with 474MB of storage each) carries a price tag of $320,000; this price goes up at a rate of $24,000 per processor and $25 per megabyte of disk storage.

A claim for the first "commercially practical" database machine was staked in late 1980 by Software AG of Reston, Va. (see "Database Machine Flap," Dec. 1980, p. 48). The project "died a graceful death," says a Software AG spokesperson. "We only installed a handful." He says the technology was converted to a software package, ADABAS/CICS (channel-to-channel conversion system).

One beta site user reports that a $395,000 database machine was able to handle an IBM 3084's workload.

The problem with early database machines, recalls Jim Umberger, director of database architecture for the North Eastern Banking Division of Citibank, New York, was that they couldn't distribute enough work back to the engine. "There was so much I/O back and forth that the communications overhead was greater than the benefits. It was classic Murphy."

Citibank has one Teradata DBC/1012 installed in its data center on Long Island, serving its company information centers. Umberger says the bank is looking at a second for its main site. "We have more branches and more cash machines than any other bank in the world. We look like an airline in relation to transactions." The bank handles some 120 to 150 transactions per second in peak loads, he says.

He thinks Teradata has overcome the communications overhead problem with its parallel processing technique and modular configuration. "The parallel processors work together as one computer and bring more horsepower to the problem," he says. "Rather than just offloading certain database functions, it offloads the entire thing. The host only translates user requests, packetizing them in English. There's a 99.9% offload of data manipulation."

Umberger is also looking at interfacing the DBC to IBM's TPF/11 software for handling large transaction loads with "a much higher transaction rate than CICS. They [IBM] have just given another name to the Airline Control Program, which has been around in one form or another for 10 to 15 years." He says use of TPF/11 (transaction processing facility) in conjunction with the DBC/1012 "looks like a most promising solution" to Citi-

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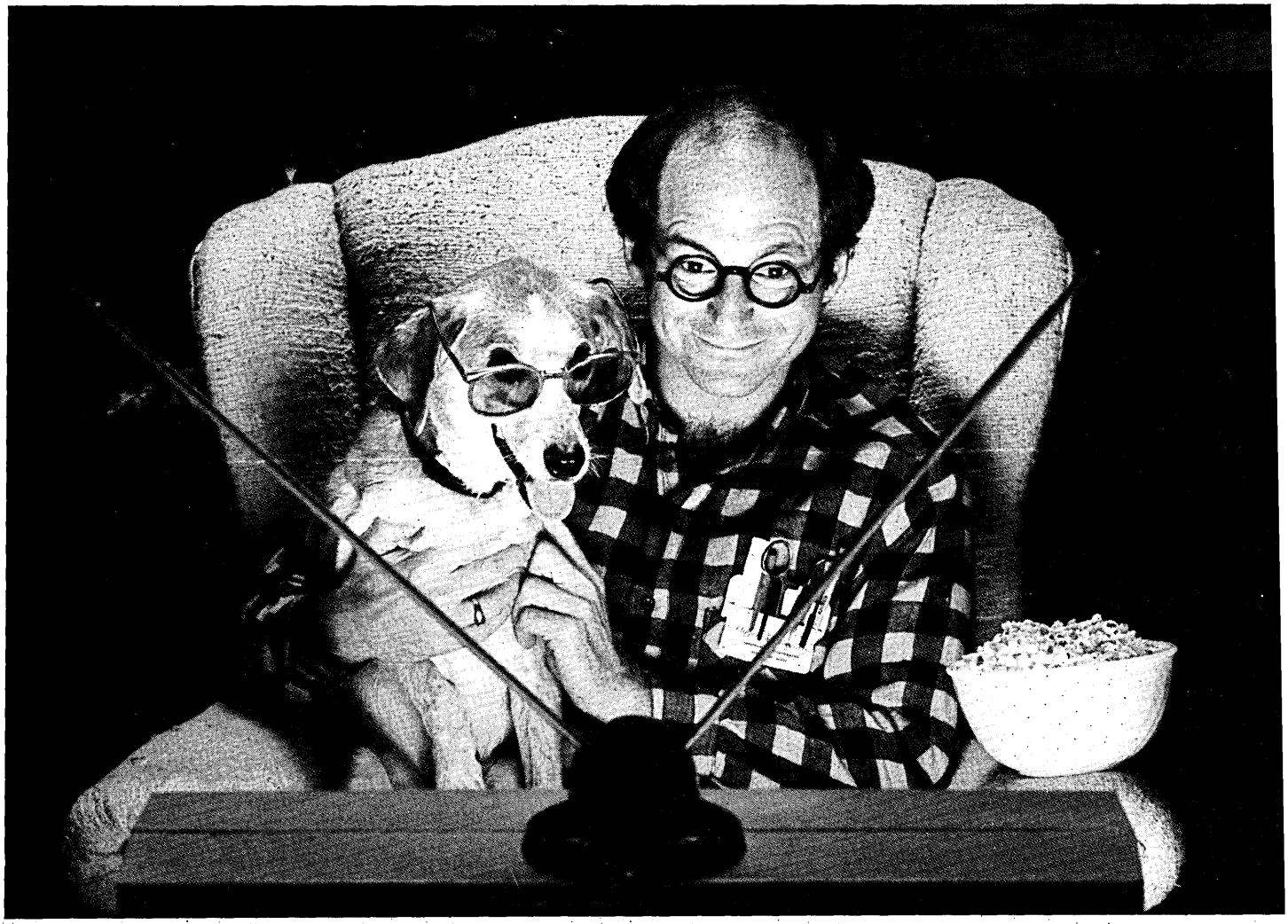

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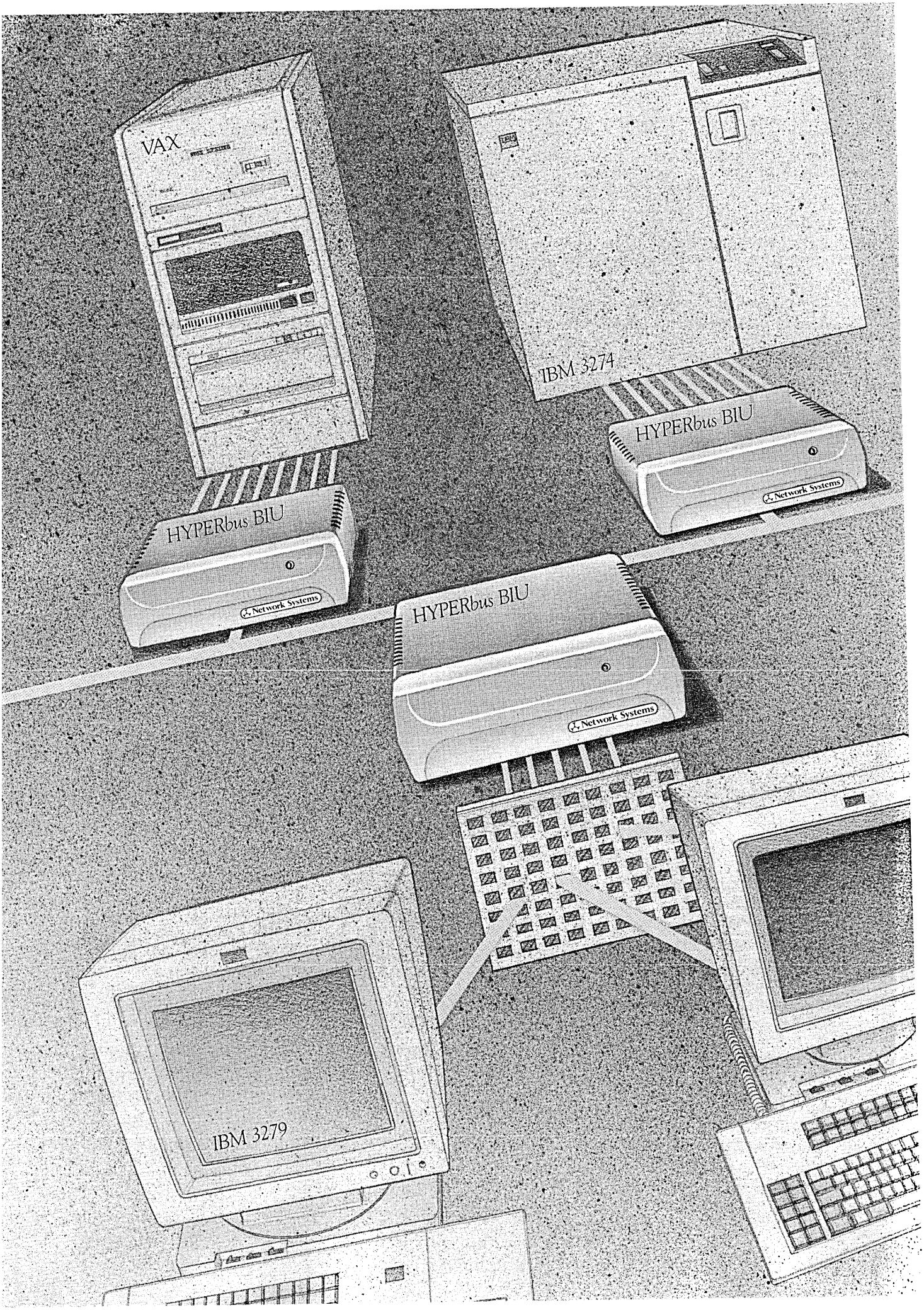
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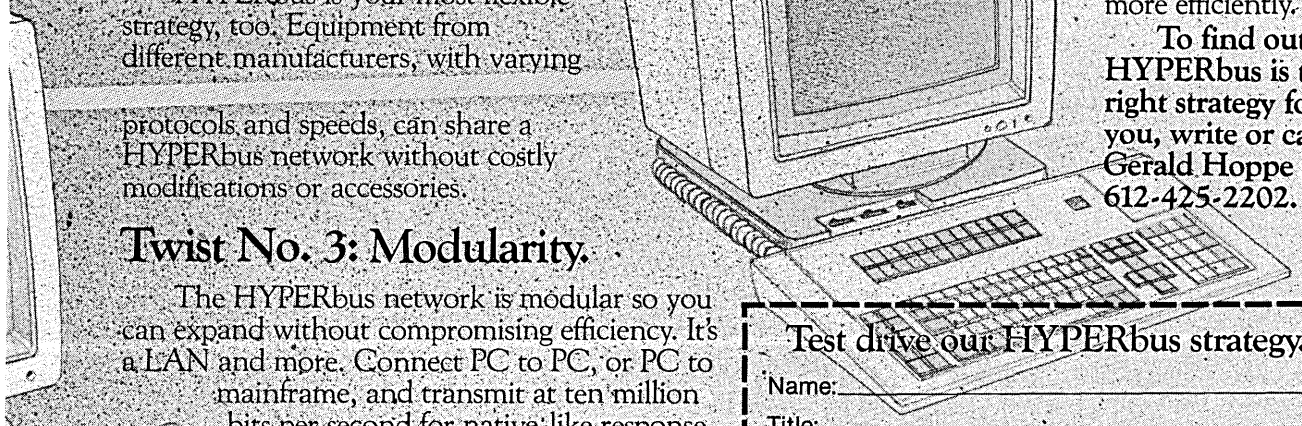

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bank's transaction-processing problems. "Right now, there is no software interface. Teradata has interfaces for MVS, CICS, and VM, but nothing yet for TPF/11. Maybe Teradata will do it alone, maybe we'll work with them on it, or maybe it could be done by Citibank in cooperation with one or more other Teradata users."

So far, there are six other Teradata users, most—like Citibank—in the early stages of implementation. "So far it looks great," says Irene Nesbit, president of Nesbit Systems Inc., Princeton, N.J., specialists in integrating microcomputers into traditional mainframe installations, "but basically, it's still in test." She has worked for companies that have database machines.

Wells Fargo Bank in San Francisco was Teradata's first beta installation. The bank has had a DBC/1012 for more than a year. "We have the smallest configuration available, a two by four," says Charlie Halfmann, Wells Fargo's database administrator. A DBC/1012 can be configured with from six to 1,024 processors. These are of two kinds, IFPs (interface processors) and AMPs (access module processors), which Clements of Teradata describes as "little database engines." A two-by-four system has two IFPs and four AMPs.

Halfmann says the bank is working on building a number of databases. "So far only one has been turned over to users and it has a small user base. It's for management decision-making." He is heading a project to put the bank's operations group's performance data and invoicing data into a database that will be updated daily. "The holdup is information gathering," he says.

Halfmann says he is impressed with the Teradata technology. "The Ynet really takes every requirement and spreads out the process." Ynet is Teradata's name for a network composed of inverted Ys. As bytes are streamed up through nodes, pipelining up through levels of the network, one packet gets to the top. Here it is turned around and broadcast back down the network to all processors.

He also likes a backup feature of the DBC/1012. "We did lose a disk once. For awhile we ran a little slower because we were using backup but it [the system] soon recreated the data and spread it out all over again."

Halfmann says top management in the bank's operations group has been "very impressed" with demos of the 1012. "They like it because they can select anything that's related and get the information any way they choose."

Equally impressed by a demo at Wells Fargo were representatives of Natural Resource Management of Dallas. NRM is the first Teradata user in the Southwest. "We needed something to enable high-level users to do high-level inquiry without knowing exactly what they are looking for," says Ted Pohrte, NRM's vice president for systems operation. "We are impressed that Teradata took us to see the system at Wells Fargo. They [the bank] have different applications but the same type of thing, high-level inquiry. We're an oil and gas company that does everything except refining."

Pohrte says NRM people knew they needed a relational database. "We looked at IBM's DB2 and at some that were advertised as being relational but turned out not to be." He says Teradata was chosen because of availability and because "we could understand the concept of parallel processors. You add more and you speed the system up."

A var is now selling an SQL capability for the Britton-Lee machine.

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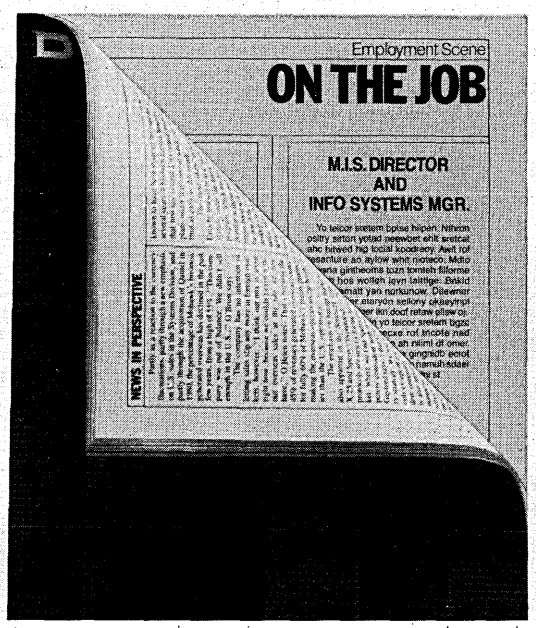

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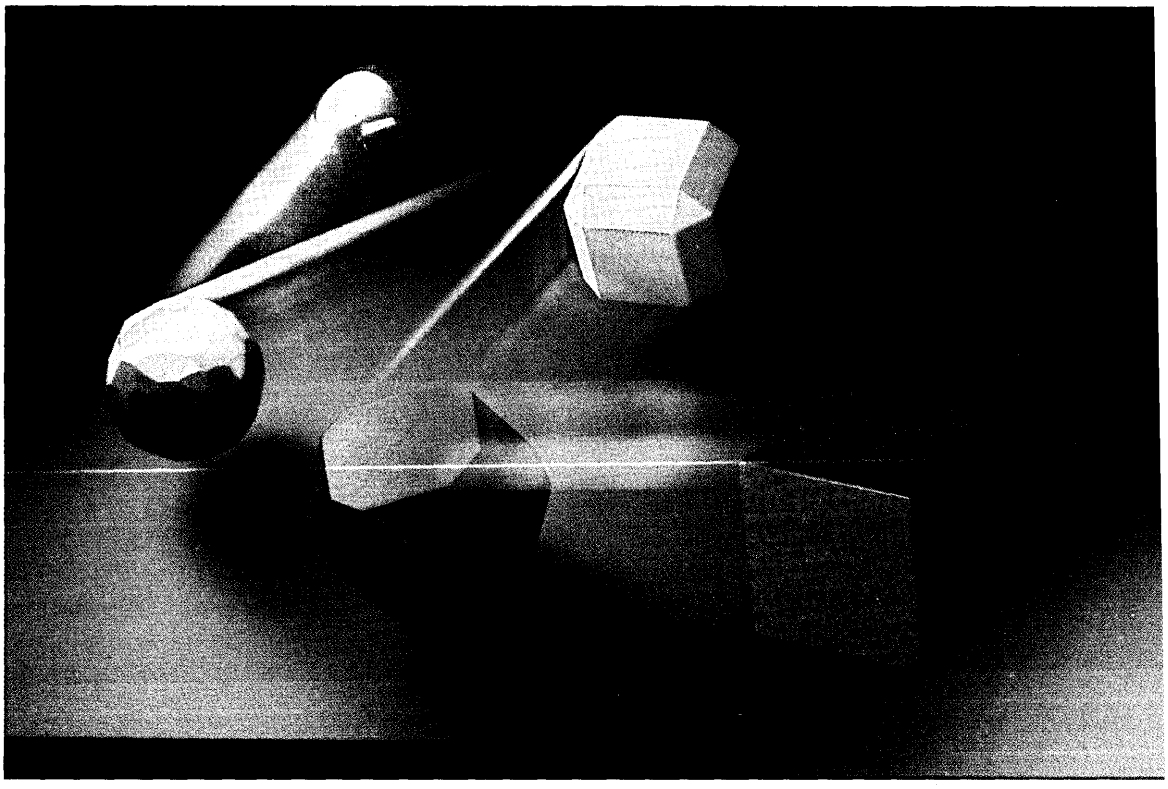

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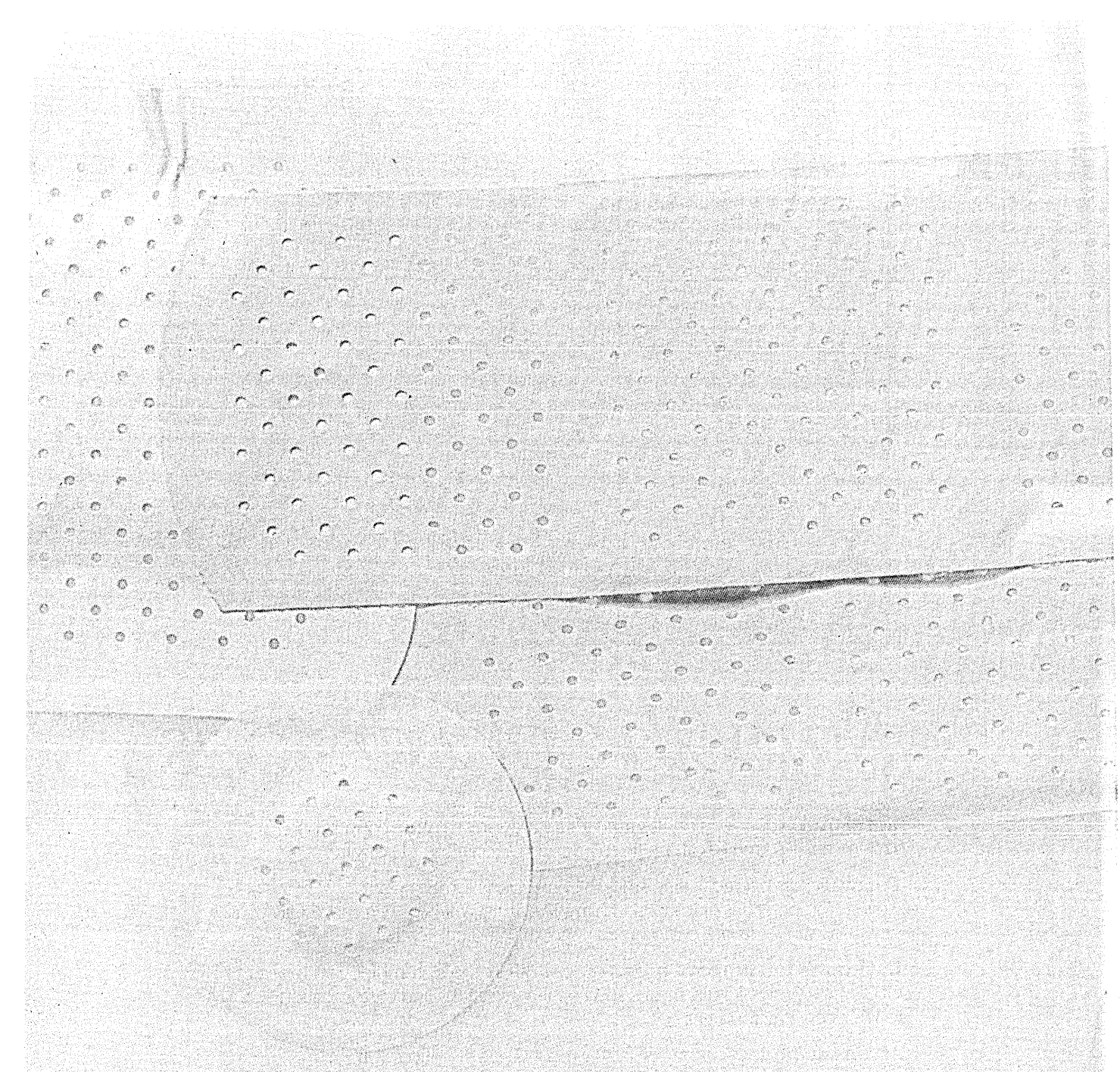

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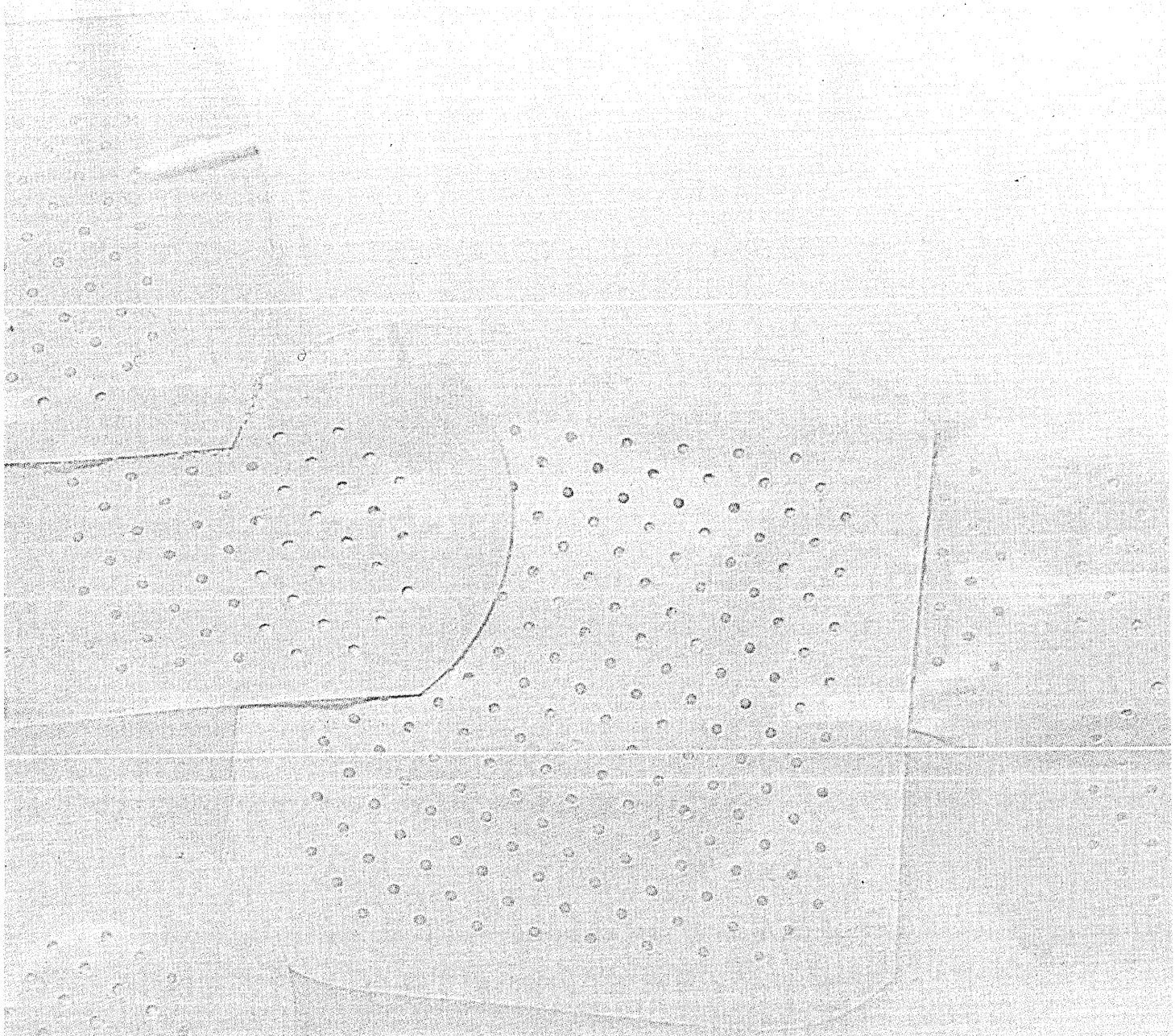

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NRM put its first 1012 job into production in February. "It's a small job with fewer than 12 users, engineering people who run production," says Pohrte.

Britton-Lee users are more numerous and more experienced. There even exists a user group of some 450 members. Bob Thompson, a branch chief of Reynolds Electric and Engineering, Las Vegas, recalls that when he got his Britton-Lee IDB 500 (intelligent database machine) two years ago, "they had a user group that had no meetings. For the last year and half we've been meeting every six months."

Thompson says he's used the Britton-Lee machine to bring together three databases, all in different formats. "Software packages we could have used would have required us to go to a large host." He has a VAX 750. "At the time we thought we would have to go to a 780, which would have cost us $200,000 more than the $395,000 we paid for the IDB. As it turned out we actually would have had to go to an IBM 3084 to do what we've done."

Will Zachmann, vice president of corporate research, International Data Corp., Boston, says Britton-Lee had a good year in 1984 but "not as good as I had expected." The company had revenues of $21.6 million.

By comparison, Teradata is targeting $3.5 million in revenues for the year ending this June. "This is influenced by the fact that we have established a leasing and rental program," Clements says. "If it were pure sales, it would be much higher." After nine months in beta test at three sites, Teradata began active selling last July.

Early last year, Zachmann predicted that 1984 would be the year database machines would "achieve a significant level of familiarity and acceptance." Now, he says, "They haven't made quite the headway I thought they would, but I still think it's not a question of whether but of when the potential of database machines is going to be fully realized." He thinks now they will not be a big success as back ends for midsized systems, but will see "enormous growth" as network servers.

Bill Carpenter, manager of the Computer and Information Sciences Department at Inco, a McLean, Va., software systems consulting firm that is both a user and an oem of Britton-Lee machines, says internal use of four IDMs has taken over a task formerly done manually, and has overwhelmed "the people trying to do it." This task was the creation of an employee skills inventory, which has simplified the firm's ability to write proposals and staff projects more quickly.

Inco has developed its own front end for use with the Britton-Lee machine, which it calls SQL/Universe. It gives full SQL query capability and can run with IBM and North Star micros, Prime and DEC-PDP 11/70 minis, and the IBM 4300 family with VM/CMS. Carpenter says Inco has sold about a dozen Britton-Lee machines, most with SQL/Universe.

In March, Teradata demonstrated what it called "the largest parallel-processing computer commercially available to the business data-processing industry." It was a DBC/1012 system with 60 parallel processors working against a multimillion-record relational database. Teradata chairman and chief executive officer Jack Shemer says the system "has the equivalent processing capacity of IBM's largest system, the 3084Q, priced at approximately $6.2 million including storage. The comparable DBC/1012 is priced at $1.7 million."

Who could use this? "Any information-intensive businesses, such as banks, insurance companies, airlines, the government, and defense contractors—there are literally hundreds of firms out there that have these requirements," says Teradata's Clements.

The jury's still out until someone actually does use the system. But it does sound tempting. ◉

FAULT TOLERANT

THE FT CROWD

IBM's entry into the fault tolerant market represents a serious threat to Tandem, but meeting the MAP standard may be more important.

by Charles Howe

Rumor has many bodyguards. Their names include the true gen, the hot skinny, the straight dope, and the ubiquitous scuttlebutt. What follows are the facts on the recent accord between IBM and Stratus Computers Inc., and the meaning behind Tandem Computers' new low-end EXT product and the multibillion-dollar factory automation marketplace that all three companies are eyeing. Like any story involving the machinations of IBM, some of what follows is also the true gen.

IBM, of course, broke tradition when it cut a nonexclusive deal with Marlboro, Mass.-based Stratus for perhaps $20 million worth of its fault tolerant product

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line a year. These machines should appear on the marketplace late this year as the System/88 and will arrive with unspecified value added. Why did IBM at long last decide to go the oem route?

"IBM sees the strategic need for a fault tolerant product," says John C. Levinson, an analyst with the brokerage firm Goldman Sachs & Co., New York. "IBM has publicly expressed this need for several years. With this in mind, we find it hard to view the Stratus arrangement as much more than a stopgap. IBM must eventually have its own fault tolerant product capable of running IBM's own operating system and receiving the full backup of IBM's sales force."

"Don't expect any significant volume of System/88 sales soon," adds Omri Serlin, head of the consulting firm Itom International in Los Altos, Calif. "IBM has a very tentative marketing program, which is going to be handled in a very special way. It's not going to be handled by your standard national accounts salespeople. IBM will maintain a special sales office in Gaithersburg, Md., called the High Availability Marketing Information Center. If the national accounts salesperson gets a request for a fault tolerant machine, he will go running back to Gaithersburg. It's clearly a tentative thing." IBM declined to comment.

Tandem recently won a J.C. Penney contract—worth perhaps $10 million—that is said to have sent some in Armonk straight up the wall.

Shortly after IBM made the deal with Stratus, Tandem Computer in Cupertino, Calif., let fly with a low-end salvo that may better equip it to deal with the new competitive environment. Tandem has sold minicomputer-type processors to the high-end marketplace for the past few years, while Stratus has positioned its microprocessor-based system somewhat lower (see Fig.1). Now Tandem abruptly adds the NonStop EXT to its line, at the identical $120,000 price point of what used to be the Stratus low end, the FT200. Like the rest of its current product line, the device runs Tandem's SNAX software, allowing integration into existing IBM Systems Network Architecture systems. It also comes with a Fox fiber-optic cable connection for networking applications. Many view the machine, which will mainly be used in nodal applications, as an attempt to crimp Stratus at the low end.

As Fig. 1 shows, each company has almost evenly matched product lines. Stratus's new FT250, introduced to establish a new low end in the fault tolerant market, is only $5,000 cheaper than the EXT in a bare-bones configuration. It appears the two companies are playing one-upmanship with each other.

"I think the direction here is that Tandem has repackaged the NonStop II for smaller operational plug-in-the-wall environments," says Peter Lowber, a senior analyst with the Yankee Group in Boston. "There's no real new technology involved here. The price differential is really insignificant. I think that what's significant is the packaging." Without the raised floor and special air condtioning requirements, Tandem can go after departmental computing and other distributed data processing placements previously outside its big-shop marketing campaigns.

In that light, many are asking why IBM made a deal with Stratus. Tandem, after all, is the industry leader in fault tolerant and on-line transaction-processing machines, not to mention the pioneer in the technology. With sales last year of some $565.9 million, Tandem is substantially larger than Stratus, which posted revenues of $42.1 million for the same period. On the other hand, Stratus is almost doubling in growth each year while Tandem showed an increase of 26% in revenues in 1984.

"I think that IBM went to Stratus because Tandem has consistently and ill-advisedly positioned itself as being a direct competitor," speculates Serlin. In other words, there's lots of bad blood between Big Blue and feisty Tandem. He adds that Tandem recently beat IBM out of a J.C. Penney contract—worth perhaps $10 million—that is said to have sent some in Armonk straight up the wall. "Besides, I think that the IBM technical evaluators were much more impressed with the Stratus approach for solving fault tolerance than with the Tandem approach."

The FT and OLTP technologies and applications are well known (see "Fault Tolerant Blues," March 15, p. 82)."In the Stratus machines, the recovery from faults is entirely done at the hardware level," explains Serlin. "In Tandem products, there is active cooperation by the software to require recovery from faults." The machines made by both vendors are used in such environments as banking and airline reservations, where downtime is anathema. Tandem and Stratus both claim to have a solid handle on running their systems in an SNA configuration. Most observers, however, give a slight SNA edge to Tandem.

Both firms have a list of blue-chip customers that salespeople wave in the faces of prospective customers as if they were selling laundry powders with testimonials. "They do a damn good job managing our incoming ticker lines, and for on-line applications on our trading systems," says Merrill Lynch's dp manager Vince Grillo. "I'm a happy Stratus

FIG. 1

FAULT TOLERANCE AT A GLANCE

	TANDEM			
	NS1+	**EXT**	**NSII**	**TXP**
MIPS/processor	0.7	0.8	0.8	2
TPS/processor	1-2	1-2	1-2	3-4
Max. no. of processors in a system	16	2-4	16	16
Max. memory/processor	1.5MB	8MB	8MB	8MB
FOX interface	no	yes	yes	yes
SNAX/6100	no	yes	yes	yes
Entry price (dual cpu)	$89,000	$120,000	$129,500	$328,000

	STRATUS		
	FT200	**XA400**	**XA600**
MIPS/processor	0.7	2.0	3.0
TPS/processor	1-2	3-4	5-6
Max. no. of processors	32	32	32
Max. logical memory/processor	8MB	16MB	16MB
Entry price (one duplexed processing module)	$120,000	$185,000	$270,000

TPS = transactions per second
Source: ITOM International Co.

user.... I have no idea right now just what the implications of the Stratus deal with IBM will be." Stratus claims more than 200 customers with some 350 systems. Recent users include General Motors at its new Buick plant, U.S. Steel, and the U.S. Air Force at its Cheyenne Mountain installation.

Tandem claims a longer customer list, including Wells Fargo Bank and Mobil Oil, plus a number of the divested Bell operating companies. Automakers General Motors and Mercedes Benz are big customers, too.

Opinion differs considerably on just what IBM will be getting from Stratus, which will not be including some of its applications software packages in the deal. "IBM will get our operating systems" is how John Morgridge, vice president of marketing for Stratus, explains it. By this reasoning, IBM could be getting the technological short end of the Stratus stick. "IBM's products will lag behind ours," he adds. IBM is keeping mum.

System/88 may arrive in the marketplace hotter than a gunfight in Dodge City if you can believe some of the gurus picking over the scarce scraps of official information. "I think the product will support a very strong high-level SNA capability that will be DIA and DCA-compatible," says analyst Levinson. "This means that it can share information with IBM's office systems. There is in fact IBM-specific software being added to this product." IBM just said it was developing software to link the 88 to its other systems, with no elaboration. So it's anybody's guess as to what will come out.

Others wonder about IBM's level of commitment to software development for a foreign box. A number of analysts and industry observers agree that IBM will not be aggressively marketing the System/88. Some, like Levinson, think that IBM is cobbling up its own fault tolerant supermini, with a release date more than a year off—if ever.

"IBM just wants to have Stratus machines in its back pocket," says Serlin. "So if they get in a situation where the customer says either you have a fault tolerant machine or you leave the room, then they reach into their hip pocket and whip it out. Basically, the offering will plug a hole." Serlin is not sure that IBM will ever build its own FT machine. "IBM is becoming aggressive in terms of dropping all the old traditions," he notes. "It's completely conceivable that if this thing succeeds, they may be more aggressive in marketing Stratus and other products than in funding their own in-house efforts. This could be the start of something big."

Just how big is anybody's guess. In the beginning of the FT era, around 1978, Tandem sold its machines for their fault tolerance capabilities. Then Jimmy Treybig and Tandem's other Hewlett-Packard alumni discovered that many users were buying the devices for their OLTP capabilities. The marketplace for such applications may exceed $27 billion, according to InfoCorp. The combination of an IBM/Stratus entry and the new bottom-of-the-line Tandem and Stratus products may, in the great tradition of the computer industry, expand the market even further. Notes industry consultant Lorraine King, president of San Francisco-based Adam, Cobb and King, "If a cheap enough, truly fault tolerant machine were available, you would find many companies going ahead."

"Manufacturing is going to be our fastest growing marketplace in years to come."

Any deal has winners and losers. Stratus tells prospective investors that it expects to continue to double its revenues each year for the next several years. The arrangement with IBM has already helped it win new ones, says Morgridge, a former Honeywell executive. He notes that several large potential customers are now willing to listen to his pitch as a result of the IBM connection, which is as close to the Good Housekeeping Seal of Approval as the computer industry can get. When pressed, Stratus officials guesstimate that up to 30% of Stratus's revenues may come from IBM.

Tandem seems humbled by the good fortunes of Stratus, after several years of trying to ignore its rival's existence. "We certainly take this as a serious thing for us," says Gerald Peterson, Tandem's vice president for product management. "IBM is a super marketing organization. Instead of fighting two or three skirmishes to win an order, now we'll have to fight five or six."

Almost overlooked in the imbroglio is another gathering storm, IBM's quiet entry into factory automation and robotics (see "R2D2 Meets Goodwrench," May 1, p. 50). Stratus and Tandem are both taking a long, hard, cold look at this area and both like what they see. And so they should. Market research firm Frost & Sullivan estimates that American corporations will spend some $63 billion building these automated plants in years to come, with the automakers accounting for a big chunk of that. "This is going to be our fastest growing marketplace in years to come, though it would be pure guesswork for me to come up with numbers right now," says Bill Elliot, director of systems support at Stratus. About 10% of its sales are to manufacturing sites, while 25% are to brokerage firms such as Merrill Lynch and Morgan Stanley.

Tandem has done its homework a shade more fine in this area. "If you include instrumentation applications, I'd guess up to 30% of our installed base would be interfacing with some kind of device that would be on a factory floor in a networking capacity," says Ronald Potter, Tandem's manager of manufacturing industry marketing. Potter adds that the market is "gonna blow open. We think there are tens of billions of dollars there. I think Tandem would look at a 20% marketplace within that $63 billion Frost & Sullivan figure."

Potter says that Tandem experienced a 43% growth last year in manufacturing industry sales—from 11% to approximately 21% of gross sales. After a late start, Tandem is trying to position itself as a big player in General Motors' Manufacturing Automation Protocol scheme. "This November we will go public at the Autofac trade show with a Tandem MAP function. We look to 1986 to have the first levels of MAP for delivery and our intention is to continue and develop all seven layers of the protocol as soon as possible," Potter promises. In the short and medium term, the race to develop MAP-compatible systems may mean more to the future of Tandem and Stratus than new low-cost boxes.

Readers can expect the hot skinny on further developments as they break. ◉

SOFTWARE

THE NEW GAME IN TOWN

Micro software vendors are beginning to offer site licenses, not because they want to, but because customers are demanding them.

by Willie Schatz

In the halcyon days of 1984, life in the software industry was simple. Make the product. Shrink-wrap it. Send it to the shelves. Count the money.

It still works that way, but the times they are a-changin'. Industry has suddenly discovered a new entity out there. It's called the corporate world. When its inhabitants talk, industry listens. And all it's hearing lately are two words: site and license.

"Site licenses provide corporate

customers the maximum flexibility at the most advantageous price," says Ric Giardina, general counsel for MicroPro International Corp., the San Rafael, Calif., publisher of WordStar.

"Our site license came about because we realized corporations are a really important target to address and we had essentially been ignoring them," says Elaine Mauer, MicroPro's manager of marketing development. "Their needs are clearly not met by boxed products off the shelf."

Not so, says Marv Goldschmitt, vice president of industrial relations for Lotus Development Corp., Cambridge, Mass., and chairman of ADAPSO's software piracy committee. "Site licensing itself is a phantom. It's really an opportunity to negotiate an interest in an increased fee for the vendor in return for increased use by the corporate customer. They're trying to maximize their use. We're trying to protect our revenue stream.

"But we're cardboard figures to each other. The corporations want control over their use. But they're our salesmen, too."

That cuts both ways, as the Microcomputer Managers Association (MMA) of New York made crystal clear in its recent correspondence regarding ADAPSO's proposed Software Authorization System copy protection method. That system would consist of a hardware lock and key designed to allow only a specific number of copies of a particular software product to be used. Any other product would require a separate key and code.

The MMA can put its money where its mouth is. The group represents over 80 Fortune 500 companies, government agencies, and educational institutions from the New York metropolitan area. It also has affiliates in nine other cities. The New York crew bought more than $100 million in software in 1984 and expects to double that this year.

The MMA rejects ADAPSO's proposal outright as an infringement on its right to do business as its members see fit.

"Look at our environment and how we use software," says Alan Gross,

"I don't want some software company whose total sales don't reach $100 million telling me what I can do with my software."

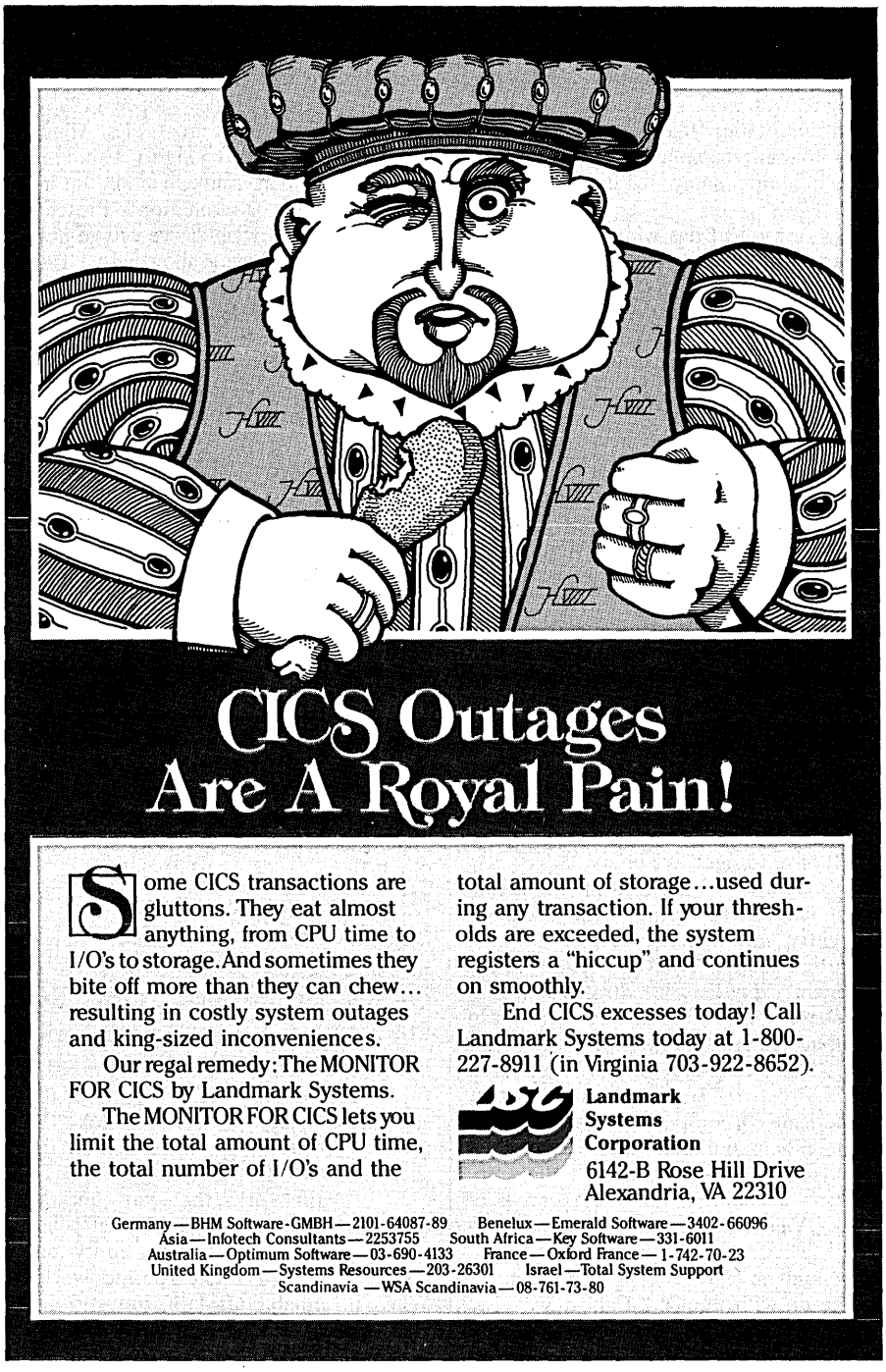
president of the MMA and a pc user at a New York securities firm. "Five years ago we couldn't give a damn if a particular piece of software was available at 2 a.m. to make $100 million deals. Now, I don't want some software company whose total sales for the year don't reach $100 million to tell me what I can do with my software and how to use it."

But the MMA does want to tell vendors what to make, so that major corporate users can buy it. The organization recently formed the Technical Assessment Through Strategic Cooperation Task Group, based in Detroit, to serve as a focal point for airing major user grievances. They intend to make sure that the vendors listen.

"We want large users to act as a single voice to facilitate innovation in the marketplace," task coordinator Adria Anunzio says. "There has been a definite lack of innovation in the workstation marketplace and major corporate users are suffering because of it. What's more, dealers have more influence with vendors. We need a forum for vendors and users to discuss their problems."

Goldschmitt concedes, "They have valid and legitimate concerns. They want to control how the product is being used. That's a marketing issue."

Thus cometh the site license, carrying some heavy baggage. Can it stop pi-



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racy? Who's to say that corporations and their suppliers can even trust each other to abide by site licenses? "The relationship has been adversarial so far, and we'd like to see it become cooperative," Anunzio says.

While the benefits of site licenses are clear for customers, what's in it for vendors? If they don't show, site licensing doesn't go. Well, say the vendors who have begun site licensing programs, everything's in it for them. These companies aren't more than 10% of the industry, but they forge on, convinced that where they lead, their competitors must follow.

"You've got a love-hate relationship with site licensing," says Walt Feigenson, marketing manager for Sorcim/IUS, San Jose. "You want to protect your retail chain. They can't compete, but they feel they should. So it's green pastures for the major software companies to go directly after customers. Then the dealers scream and the companies back off."

No better example exists than the industry leader, Lotus. It's been in and out of site licensing enough times to see both sides clearly (see "Out of Thin Air," Jan. 1, p. 36.) Initially, Lotus had supported both dealer channels and direct large-volume corporate sales. Last fall it yielded to dealer pressure and renounced its direct sales efforts, but then said it would modify its products for corporations, giving the software network capabilities designed to accommodate large-volume sales via single licenses.

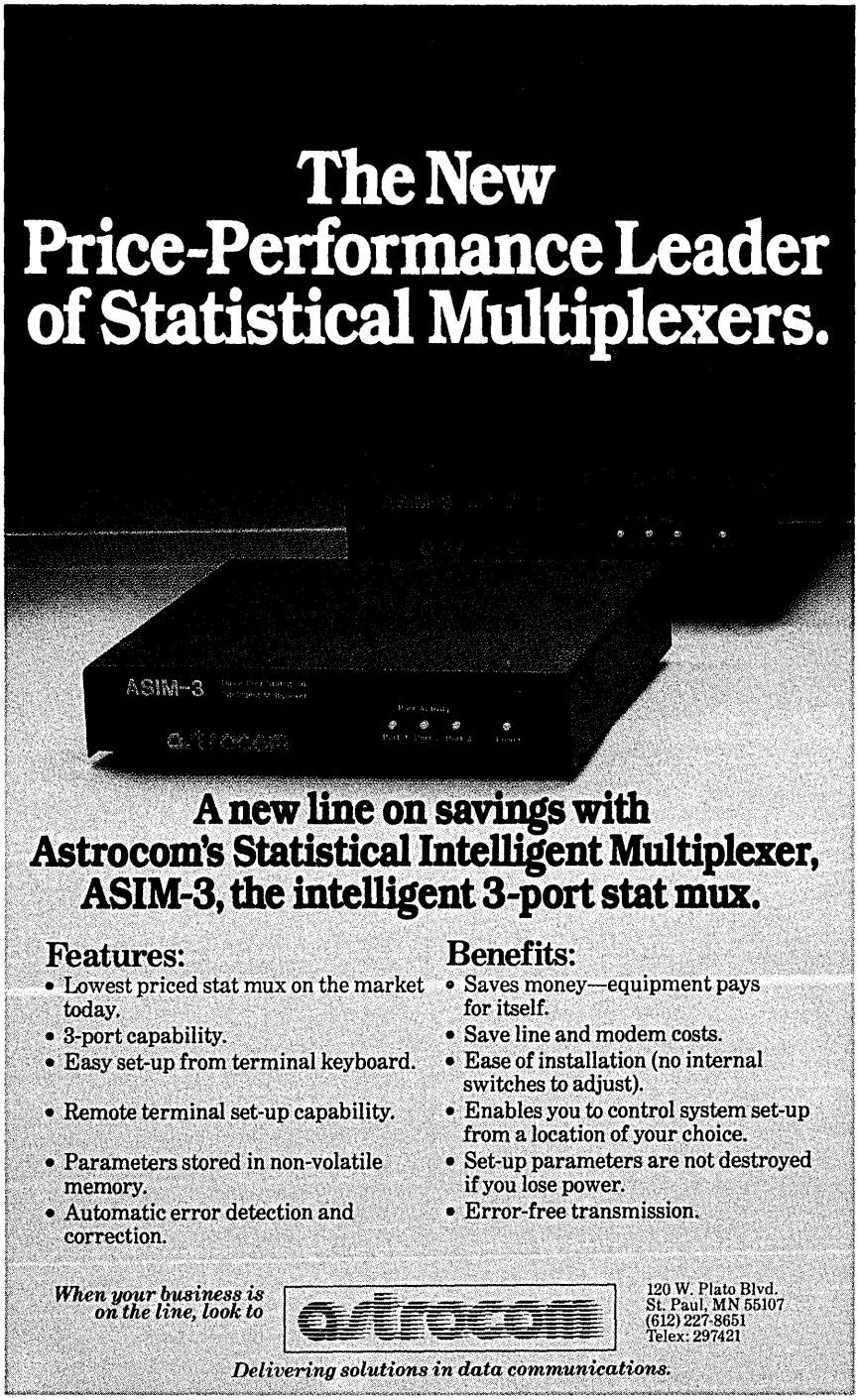
Three months later, Lotus abandoned that plan, deciding that selling packages one at a time, with the ADAPSO copy protection, was the best way after all. Then in April, Lotus agreed to negotiate a possible site license with the Air Force, which wants to buy 7,000 copies of 1-2-3 on the condition that it can duplicate the software itself.

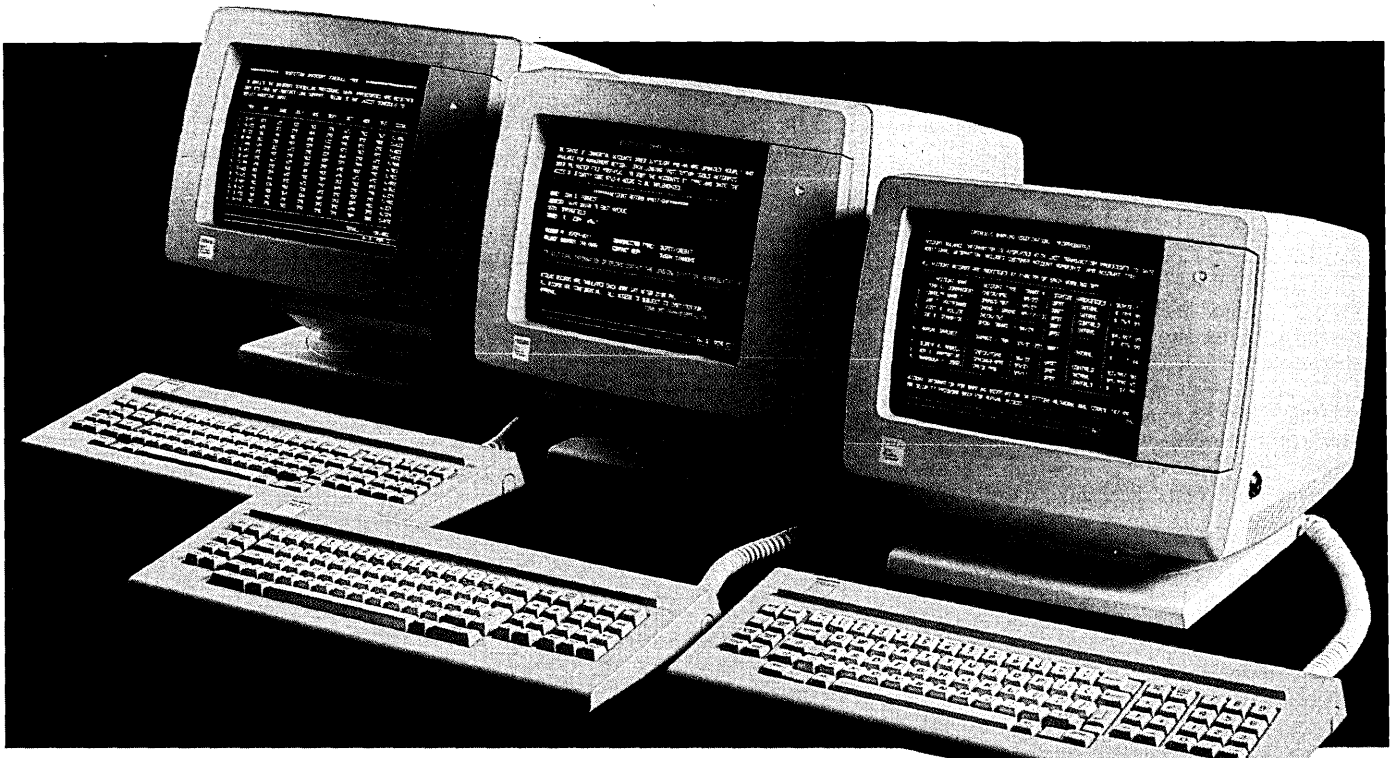
The most fervent promoters of site licenses are often not the micro giants, but the second-tier vendors. "It's easier for the smaller companies like us to do this," Feigenson says. "It gives us a competitive edge against companies that aren't so cooperative with customers, like Lotus. We have to try harder than they do and be nicer than they are."

But that doesn't mean Sorcim/IUS has to finish last, which is where nice guys supposedly hang out. Sales of the company's SuperCalc3 took off last year when it introduced corporate site license agreements. "Once customers buy 500 units, they have an unlimited site license whether they want it or not," Feigenson says. "By then, they've paid so much we can give them the rest free." After all, big licenses like that go for over $100,000. "Our price is higher than a lot of mainframe software. Only the Fortune 100 can afford this. But this is a defensive maneuver in the sense that we're responding to customer demand."

So is MicroPro, which is putting the finishing touches on its site license program. The company will provide the licensee with a master diskette from which a certain number of copies per company workstation will be made. The size of the license depends on the size of the company. At a predetermined point, the licensee will max out and get unlimited use for an incremental charge. Since each copy will have a MicroPro serial number, MicroPro expects to know exactly how many copies are in each company.

"We think we can discourage casual copying by making the product more available," says MicroPro's Mauer. "That helps us make our product the de facto standard in the company. The companies are as interested in controlling their legal exposure as we are in protecting our software."





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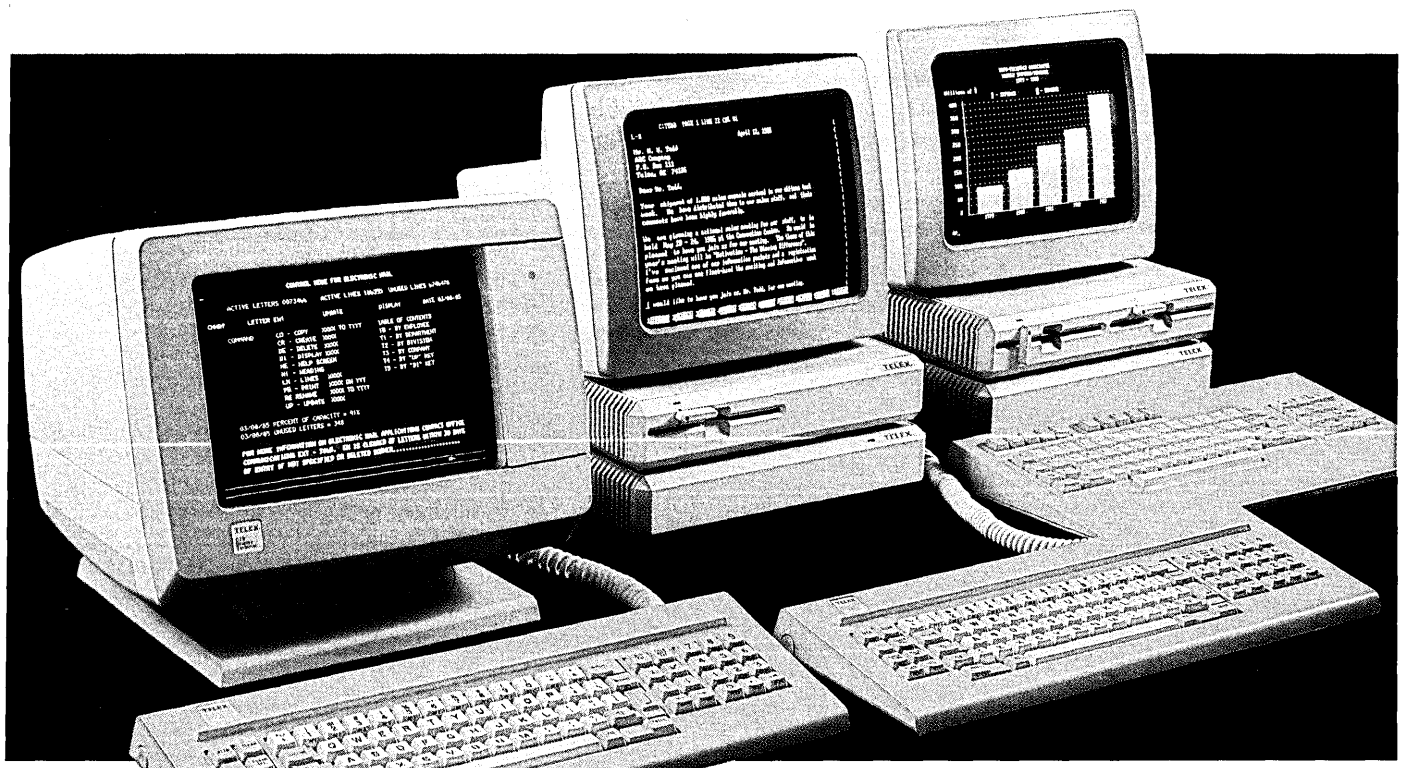

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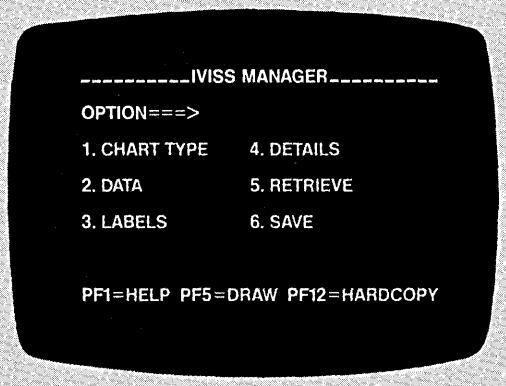

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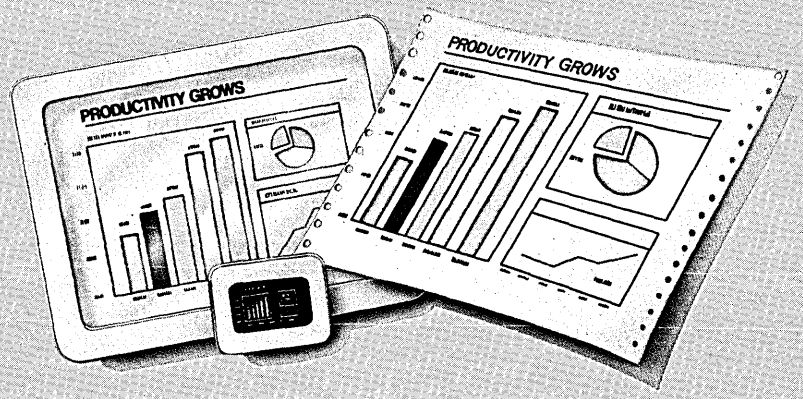

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NEWS IN PERSPECTIVE

Maybe more so, if Select Information Systems knows what it's talking about. It's rushing in where fools, wise men, and everyone else fear to tread.

For $7,000, companies can make unlimited copies of Select's Freestyle word processing program and documentation for on-site use. That's what 25 individual programs would cost, so even the little guys have a shot at springing for that. For another $2,800, Select offers the Personal Use Option. Employees can make unlimited copies for their personal use and the company risks no piracy liability. That's none, as in zero.

"One of the ways to obviate a legal difficulty is to bypass it," says Martin Dean, a lawyer and the chairman of Select's parent, Summa Technologies, Kentfield, Calif. "Termination of legal liability is much more important than price."

The policy is designed as much to meet Select's needs as its customers' needs, of course. "Corporate people want to buy either cheap or famous. We're neither, so we decided to try and accommodate them on the most important issue out there right now. How difficult is a sale in a corporate environment when someone has just come back quaking from a piracy seminar?"

Not very, according to Select's figures. It says it's concluded about 50 site license agreements and sold 75,000 copies of Freestyle. "We got rid of piracy by making the software an institution," says Zev Ratette, Summa's vice president for major account sales. "If it's used within the organization, who cares how many there are?"

Lifetree Software, the Monterey, Calif., publisher of Volkswriter, claims to have been the first company to introduce site licensing to customers. It has scored points with Citicorp's U.S. Financial Division in St. Louis.

"It's working out very well for us," says Fred Lewis of U.S. Financial's information management resources group. "At the time we decided to standardize our word processing, we knew we needed high volume. A site license made the most sense from cost and use standpoints. Unless users have specific requests that Volkswriter can't satisfy, we coerce them into going with it."

U.S. Financial is using 200 packages in its 600 IBM PCs. Employees can use the product as often as they like in the office, but they can't take it with them when they leave.

"We do not copy software, period," Lewis says about potential piracy problems. "Our license is based on the number of workstations, not the number of employees."

That's the exception, rather than

the rule, in site licenses. Many companies have been unwilling so far to back their rhetoric with action. Most firms are waiting either to see what ADAPSO's Software Authorization System (scheduled for membership vote in June) will bring on or for their competitors to go first.

"I don't know any company that has its site licensing act together," Sorcim's Feigenson says. "Most are pretending they're ostriches and putting their heads in the sand."

Then they'd best look up in a hurry. The longer they wait, the less they'll enjoy the view. ◉

MICROCOMPUTERS

OF MICE AND XEROX

With a raft of new products on the way, the copier company is trying again in office automation.

by John W. Verity

Four years ago, an ambitious Xerox Corp. marched boldly into the office systems market with a few boxes connected by a yellow Ethernet wire, a clever ad campaign, and much determination to show it could grow beyond the copier business. Industry, Wall Street, and customers watched closely as the company strived to leverage its way into a market that Wang, IBM, and a host of others were eyeing with anticipation. As many had predicted, Xerox seemed to stumble more than it marched and the best of its technology seemed to find its way into other vendors' systems.

Had Xerox been a wild success in the office automation market since then, the company might not have made such a big deal late last month when it unveiled a revamped Ethernet product line at New York City's Lincoln Center. However, after a series of fudged products, defections by key management and engineering talent, and slow sales, the company vitally needed to show all concerned that it is in the office systems market to stay.

"They don't have a choice," explains one early Xerox user who has been through it all with Xerox's iconoclastic Office Systems division. "For those of us who are committed, these new products put to rest once and for all the questions about Xerox's commitment to us."

Xerox claims it's finally on a roll, with its information systems business—

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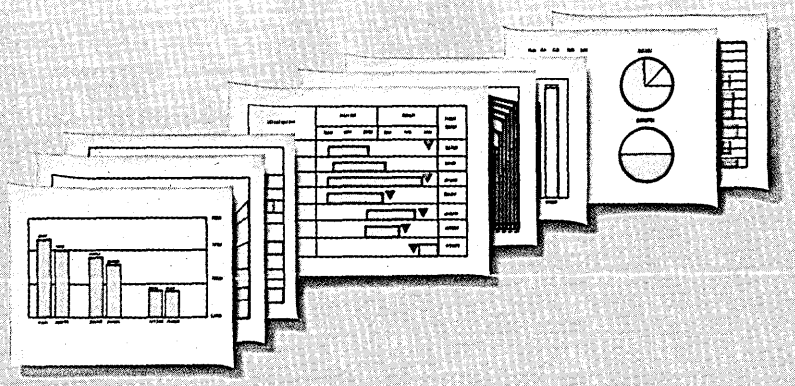

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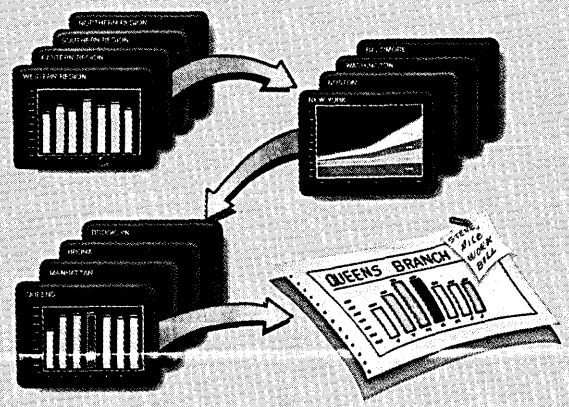

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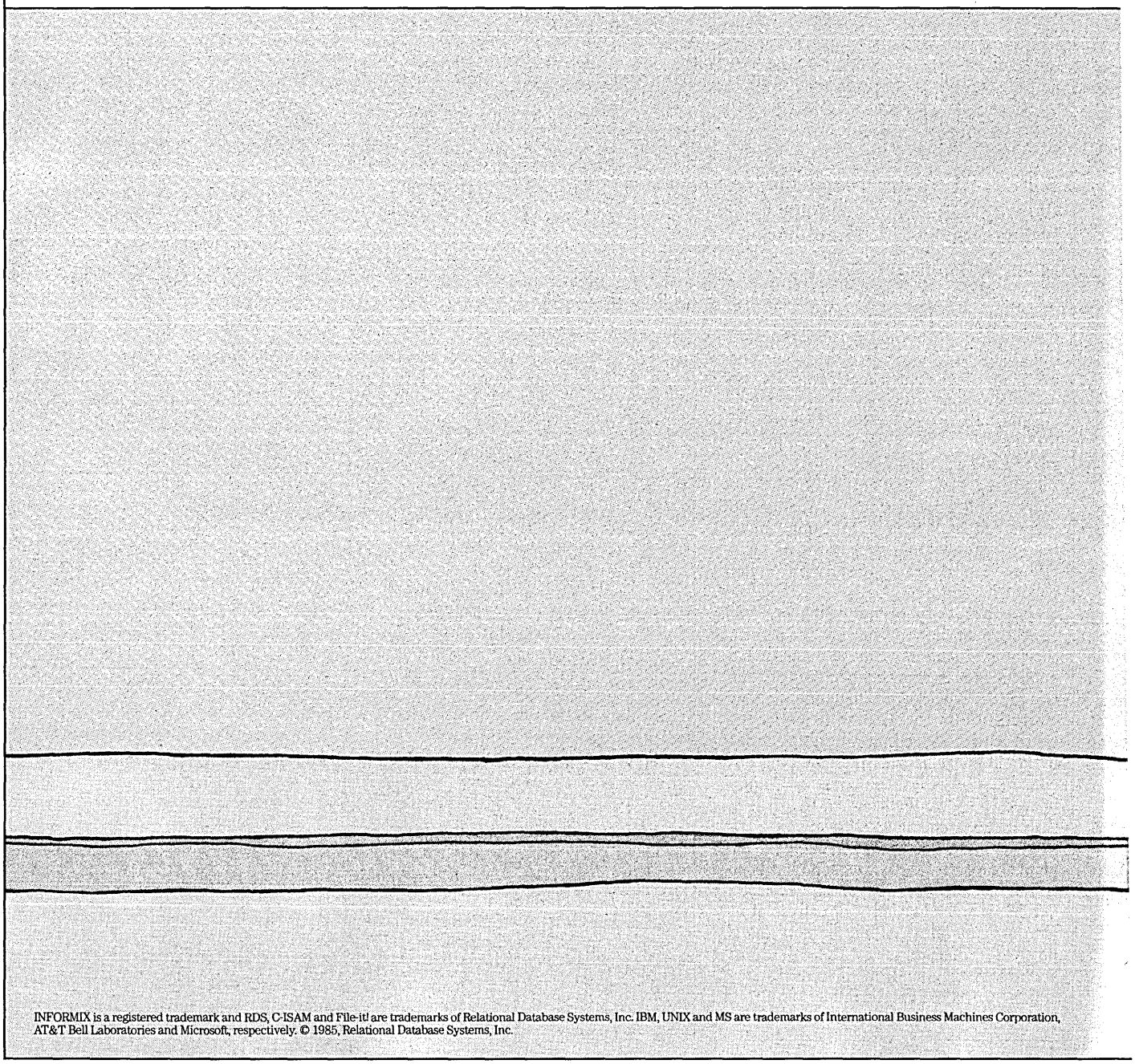

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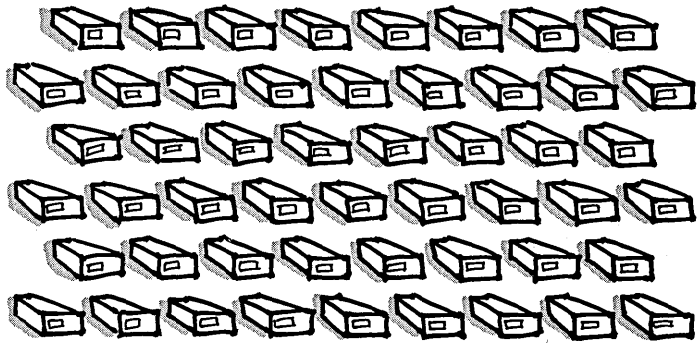

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NEWS IN PERSPECTIVE

electronic printing and office systems—having reached revenues of $1.72 billion last year and come within 2% of breaking even. The new products, it claims, will help it capitalize on the quiet success of some two dozen previous Ethernet-based products and more than 1,000 Ethernet-based office system installations, and regain momentum in its coveted niche of the office market: preparing and distributing documents.

To that end, Xerox came out with a workstation designed to replace its technically impressive but overpriced Star product, a line of 16-bit personal computers, two laser printers, and the first of a series of "workgroup" clusters. Not above reaching outside when it needs help, the company is getting its pcs from Olivetti, software from Microsoft and others, and, for one of the clusters, a VAX supermini from Digital Equipment Corp.

"We want to build on and broaden each range of products," says Dave Springett, vice president of strategic planning at the Xerox Systems Group in El Segundo, Calif. "We've learned a lot in the past four years and we're showing the world Xerox isn't in this [market] as a one-shot deal." He adds that three more "major" product introductions are planned for the coming 18 months; over 50 different products are said to be under development by the Systems Group.

The pc comes from Olivetti while a composition system is based on a DEC VAX.

The key items in Xerox's roster of new products are the 6085 workstation, the successor to the Star product introduced four years ago, and IBM PC-compatible microcomputers. The latter have been packaged with Xerox's own keyboard and software to sell as word processors or as standard personal computers for managers and professionals. Xerox has no illusions about pushing the IBM PC out of the office as a software standard, and is therefore even marketing popular third-party and in-house PC software.

John Shoch, president of the Office Systems division in Palo Alto, describes the 6085 as a "fusion of the best of the multiwindow workstation and the PC." Xerox originally developed the mouse-icon interface for the Star and related machines, only to see the technology show up in Apple Computer's Lisa and Macintosh and in the machines of other vendors as well. Shoch gives the impression that with the 6085 Xerox is trying to show how to exploit mice properly. "Many people have tried to squeeze this technology down to a small box," he says, "but you need a big screen, large memory, and a high-performance processor to

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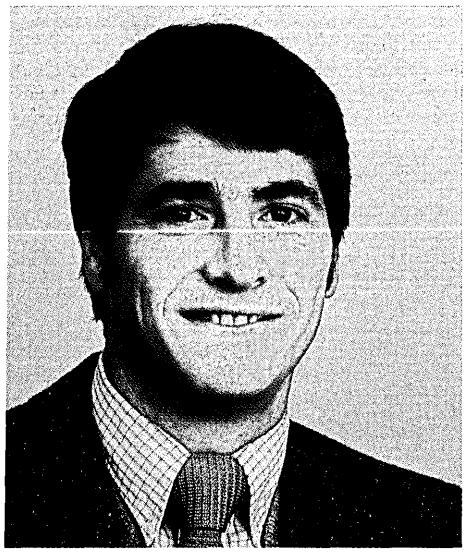

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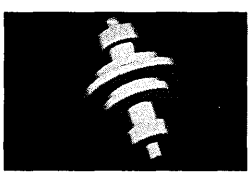

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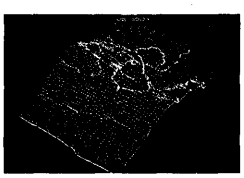
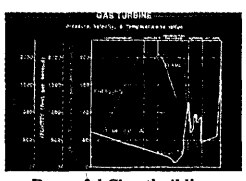


3D Surface Display using the Contouring System



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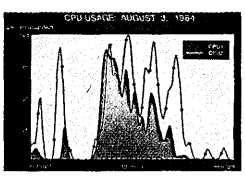

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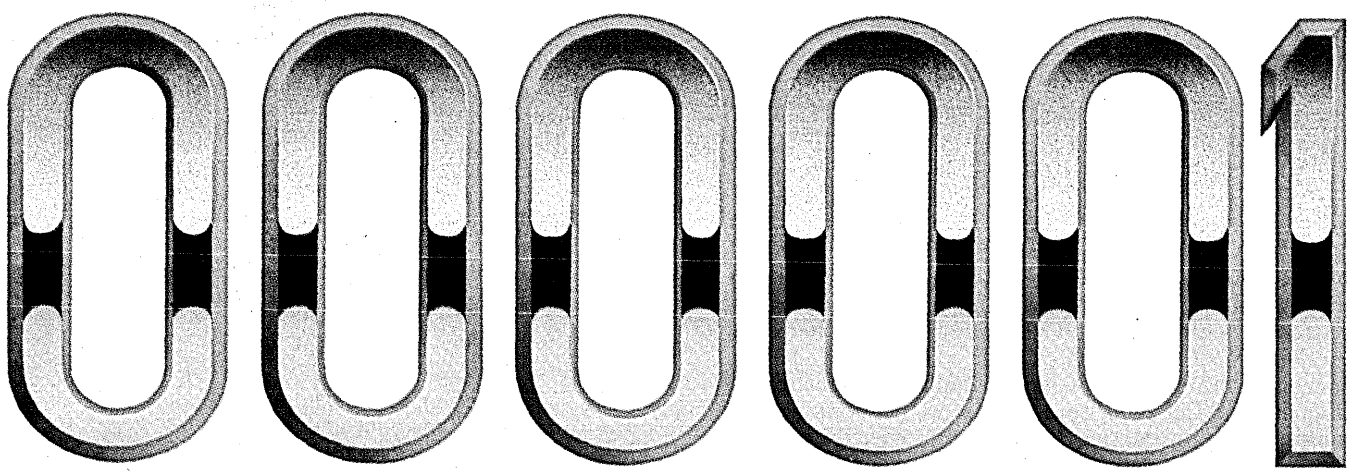
Field upgradeable from 8380 serial no.



Our 8380s—all of them—are field upgradeable to our newest enhancement, the dual capacity 8380E. So no matter when you joined the 8380 family, you have the best current technology, and a piece of the future.

That's because we've anticipated the future by designing our 8380 with the flexibility to accommodate changes in technology as they occur. Upgradeability is inherent. But we've done more than that.

Dual Port: Storage Technology pioneered Dual Port. This architecture set the industry standard and is now recognized as the best way to configure disk subsystems.

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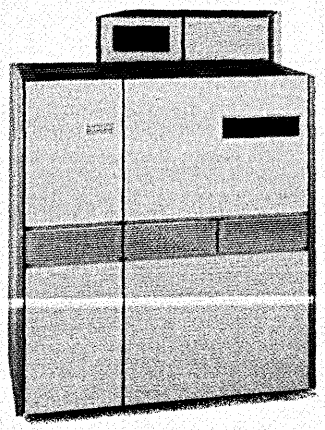

The 8380E is a dual-capacity enhancement to our family of disk products which already includes Dual Port, thin-film head technology and Sybercache. If you haven't invested in our 8380 technology yet, there's still time to join the family.

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CIRCLE 45 ON READER CARD

make it work right."

Apple might not agree, but the 6085 uses a bit-mapped screen up to 19 inches across that is backed by a 32-bit, bit-slice processor offering a 16MB virtual memory addressing space. With an optional 80186-based add-in board, standard PC software runs in a 6085 window even as other non-PC windows are active, Shoch says, claiming that data can be moved among the different windows. Also, for the first time, Xerox is offering a program-development package for its workstation so that outside vendors and users can build their own icon-driven applications. Best of all for the Xerox sales force, however, are the 6085's delivery schedule—immediate—and price, which, at between $5,000 and $7,000 depending on options, will do much to remedy a major criticism of the original Star: its $15,000 and up price tag.

Like Star, the 6085 is designed to help workers combine text and graphics into documents that eventually are published by laser printer. Shoch claims the machine's Viewpoint software offers better performance and function than that available on Star. Its facilities include a spreadsheet, foreign language options, terminal emulators, and document and graphics editors.

"It is especially pleasing to note a lower-priced workstation with the same technology as Star," commented the Xerox user, who asked to remain unidentified.

In addition to new workstations, Xerox added two laser printers to its line. The 4045 is a desktop printer/copier capable of producing up to 10 pages a minute. It will sell for about $10,000 and can be attached either directly to a 6085 or up to four personal computers. The model 3700 printer, an upgrade of the Xerox 2700, is capable of 24 pages a minute and attachable to the Ethernet print-server controller.

Of course it is printing that is Xerox's main strength in the office, and the company is continuing its strategy of leveraging off copier installations into the electronic office market. The three workgroup clusters are combinations of Ethernet products selected to handle specific types of documents. One is aimed at office workers preparing everything from correspondence to reports and manuals; another is a complete in-house publishing system; and the third, developed in part by Xerox subsidiary Versatec, is designed for handling engineering documents. Pricing is claimed to reflect a discount over buying components separately. Xerox quotes a market study indicating that 2.5 trillion pages were printed by U.S. businesses in 1984, a number that will rise to 4 trillion in five years. ◉

BENCHMARKS

BUYS ELXSI: If you can't build 'em, buy 'em. The latest firm to subscribe to that view is Trilogy Ltd., which nearly self-destructed trying to cram more MIPS onto chips than many thought feasible. The company, based in Cupertino, Calif., has agreed in principle to merge with Elxsi, a privately held San Jose manufacturer of multiprocessor-based systems, in a transaction worth $45 million to $60 million. Under the terms of the agreement, Trilogy chairman Gene Amdahl and president Henry C. Montgomery will share a new chief executive's office with Elxsi chairman Joseph Rizzi. "This is exactly what we were looking for," Montgomery says. Meaning that he had product but no money, while Trilogy had the opposite—since Trilogy deep-sixed its development of wafer-scale integration superchips, the financially strapped firm has been shopping for a business partner with marketable products; it has maintained a $70 million war chest (part of its $270 million in venture funding) for that purpose. Elxsi's large-scale systems, offering 4 to 10 MIPS, have been shipping commercially for a year—largely to engineering and scientific users—but the firm has not yet turned a profit (see "Elxsi System Debuts," by Edward K. Yasaki, January 1984, p. 85). Last year, Elxsi posted a loss of $7 million on sales of $18.5 million, although the losses are narrowing, Rizzi says.

Separately, Trilogy also signed an accord with Electronic Data Systems. The GM subsidiary will manage Trilogy's CAD facility and integrate it into its own nationwide dp network. EDS will close its Santa Clara facility and move 20 to 30 workers to Cupertino to manage the CAD facility, which was built at a cost of $10 million, to design Trilogy's superchips. When EDS offers processing services from the center, Trilogy will receive royalties and share in the revenue, Montgomery says.

RETREAT: The great international software protection war appears to be over, and U.S. partisans couldn't be happier. Japanese officials have decided to propose legislation to the Diet specifying that software should continue to be protected under Japanese copyright laws. The decision caused the Japanese Ministry of International Trade and Industry (MITI) to beat a hasty retreat from its position that software should be considered an industrial product subject to patent law and a shorter duration of protection. The MITI plan also would have forced software developers to register their programs and possibly require them to sell rights to a third party if a program proved important to the public welfare. By treating it as copyrightable material, Japan is removing software from MITI's realm and giving control to the Ministry of Education. The U.S. government and software vendors have pushed Japan to abide by the Universal Copyright Convention, in the belief that the MITI proposal would have undermined the American software industry. "The change in their law will not only protect companies from infringement," says Oliver Smoot, executive vice president of the trade group CBEMA, "but will also cover the programmer or developer of the software."

TWO-TIMING?: Days after being bought by Eastman Kodak, Verbatim Corp. announced it would sell a major part of its Data Encore disk duplication service to Kodak's archrival, Polaroid Corp. The assets Polaroid will acquire include an exclusive U.S. license to use all of Verbatim's proprietary data protection systems, duplication equipment, customer lists, accounts receivables, and packaging inventories. Polaroid, based in Cambridge, Mass., is picking up only Data Encore's U.S. operations. Some duplication equipment, currently at a Verbatim plant in Sunnyvale, Calif., will be integrated with Polaroid's data duplication facilities, and part will be transferred to a new Polaroid facility in California.

JOINT EFFORT: Proving that Jazz is not the only music to its ears, Lotus Development Corp. announced that it is working with Cullinet Software Inc. to develop three products that will link Lotus micro software packages with Cullinet mainframe DBMS products. The packages, which may not be available until early next year, will enable users to integrate their 1-2-3 or Symphony spreadsheets with mainframe IDMS/R databases, via Cullinet's recently announced Information Center Management System. Cullinet is developing two of the packages, each of which will cost $300: the Cullinet-Symphony Link to connect IDMS/R with Symphony, and the Cullinet Universal Link to connect IDMS/R with 1-2-3. Lotus, for its part, is working on a micro-side link for Symphony; no such product is needed for 1-2-3, the company says. Lotus said the micro product will be available this summer, but Cullinet conceded that it won't have the mainframe products in beta test until the end of the year. Customers wishing to use the link need to buy software from both companies, since the two will not market each other's products. While 1-2-3 can currently be connected to several competing databases, Lotus said that the Cullinet agreement marks the first joint development effort. ◉

WORLD WATCH

TOKYO-There's a Fujitsu bird of prey circling around Mount Fuji, waiting for a chance to swoop down upon IBM's Sierra series. Japan's top mainframer has its Hawk wares under wraps at a development center outside Tokyo. When Big Blue reveals more of the Sierra terrain, Fujitsu is expected to unveil cheaper MIPS, microcode, and peripherals in a bid to make users reconsider a pcm option for the post-Sierra world.

COLOGNE-Is Big Blue ready to enter the supercomputer race? Sources at the SHARE European Association (SEAS) are convinced IBM is getting ready to launch a 30MFLOPS machine that will be an add-on system, perhaps to the 3090. SEAS seers say Big Blue's big boy will run under MVS and have 32MB of main storage and two I/O processors.

LONDON-A union between two of the U.K.'s biggest electronics companies may be in the offing. Rumored to be tying the knot are GEC and Plessey. The cash-rich GEC could indeed do wonders for the punier Plessey, which has been in a financial squeeze lately. The twosome will first have to overcome British antitrust hurdles before heading for the altar.

TOKYO-Japan's master of the miniature, Casio Computer, wants little things from Big Blue. The deal in the works is an oem tie-up to produce one of the low-end pcs on IBM's drawing board. Casio has been itching for a long time to add a major maker's pc to its line of precision digital widgets. With manufacturing prowess in microelectronics and displays, which IBM craves, Casio might be able to offer low enough oem prices to entice Big Blue to seal the deal.

PARIS-There may be less national legislation on transborder data flow and fewer tariff barriers if the 24 member countries of the OECD abide by their word. That's the latest from Paris, where the OECDers have agreed on a principle that other TDFers have known all along-that the free flow of data between countries is of vital economic importance to a nation.

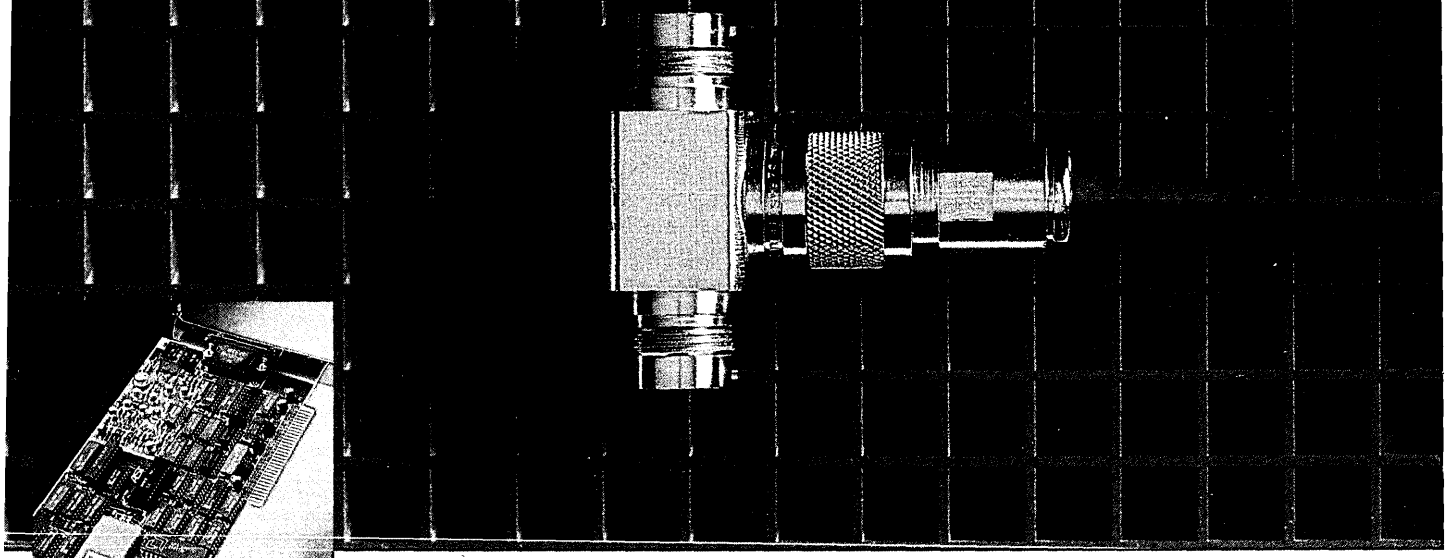
STOCKHOLM-Datema, the largest dp services company in Scandinavia, is up for sale. Deluged by deficits of $5 million, Datema was put on the block by its parent, shipping firm Nordst Jernan, which decided that its offspring had been swimming in a sea of red for too long.

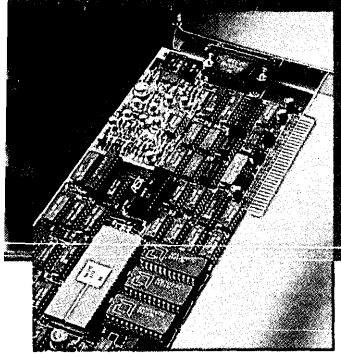
BEIJING, CHINA-Sperry, which has taken a fancy to the Far East, is setting up a pc plant in China in cooperation with local honchos. In addition to the micro, the plant will also churn out a new pc card that provides fourth generation Mapper facilities.

LUND, SWEDEN-Lund University in Sweden became the first university in Europe to ink a cooperative pact with Apple. Lund, which can now get Macs at half price, developed software in return for its Apple mate.

STOCKHOLM-Watch out SBS, here comes EBS. A Swedish-Norwegian consortium called European Business Satellite plans to shoot up two business communications birds in 1986. The $200 million venture is the first privately owned satellite project in Europe. The EBS birds will go live in 1988 if rival PTTs okay the plan.

Direct PC to System 34/36/38 Connections Using Standard Twinax Cable





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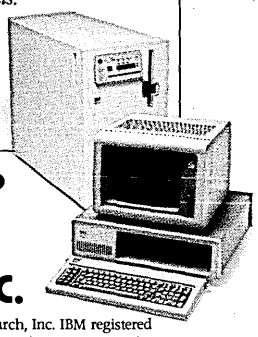
- *Application program interface and bidirectional file transfer included.*
- *Complete package includes hardware, software, twinax cable assembly, and comprehensive user manuals.*
- *Supports fixed or hard disk.*
- *Hot-Key assist for concurrent host and PC sessions.*



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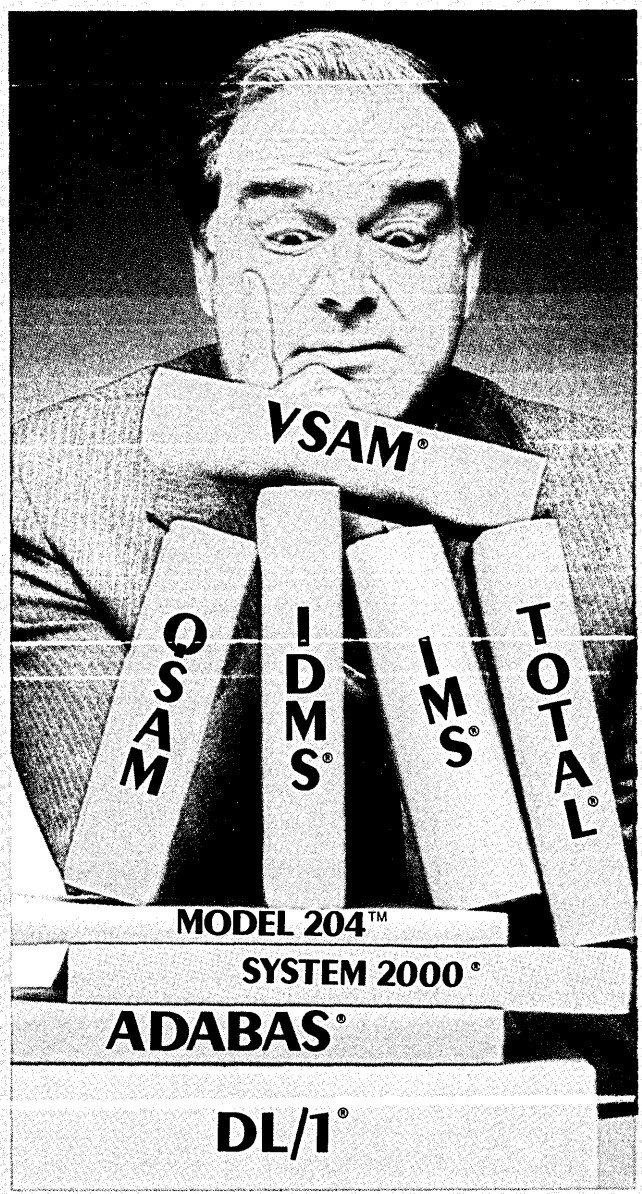

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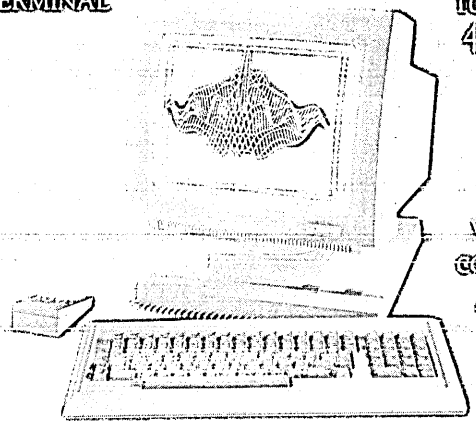

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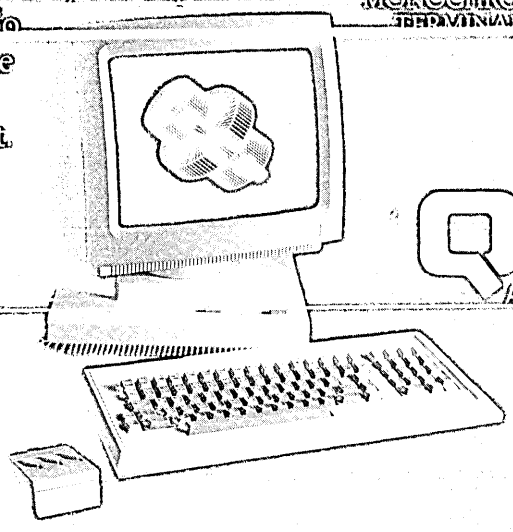

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CIRCLE 43 ON READER CARD

Announcement of the 3090 line has made the future a little foggy for IBM mainframe users.

SIERRA: WHERE WILL IT LEAD?

by Norman Weizer

ILLUSTRATION BY DAN ADEL

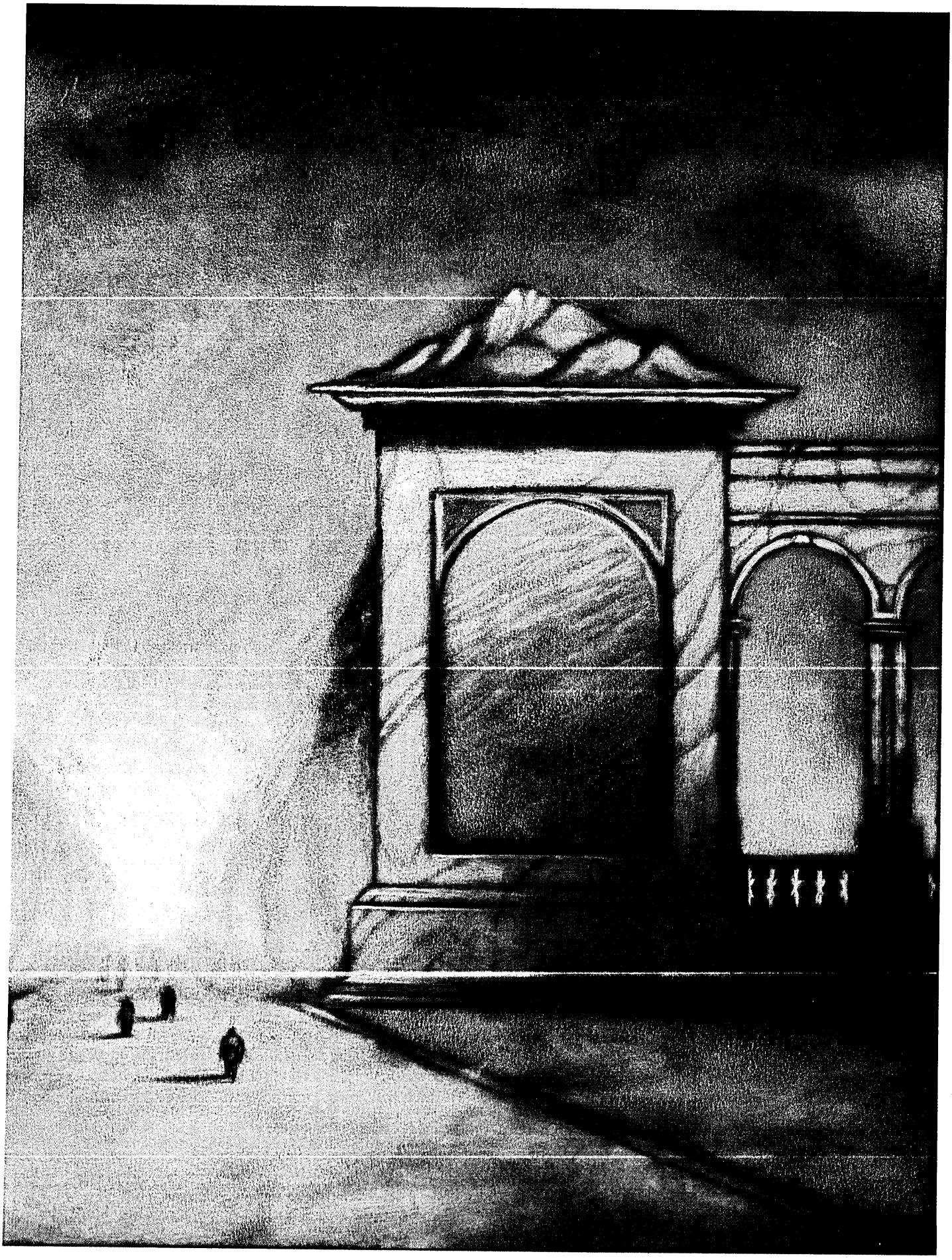
In February of this year, IBM announced its long-awaited line, the 3090, or Sierra, mainframes. Now that the dust has settled a bit, along with some of the arguments about the importance of the announcement and the aggressiveness of IBM's actions, it seems appropriate to look to the future and try to see what this announcement will mean for the IBM mainframe product line over the next five years.

Users of the current generation 308X and 308X-X systems especially need to know if, and how quickly, their systems will be made obsolete by the 3090s. To leasing companies, this question can mean the difference between large profits and bankruptcy. To most of the rest of us ordinary users, it means the difference between a relatively long period of concentrating on our applications in contrast to preparing rather quickly for yet another machine swap.

Since I am in the "fearless forecasting" business, later in this article I will stick my neck out and discuss my views of how the current 308X and the new Sierra systems will operate together in the same computer room.

Since the 360 product line announcement, IBM has held a rather consistent mainframe product line strategy. It has maintained the image of a single, upward-compatible product line that makes it easy for a user to upgrade from any system to the next larger system. This strategy appeals to customers because it protects their investment in their existing application software (the famous software lock-in). The strategy also gives them confidence that their business growth will not be inhibited by computer limitations.

During the '60s and '70s, a rapidly growing firm would have to swap out entire processors every few years to obtain the additional throughput capacity it needed.



It is very unusual that IBM is not supporting CMS on the new version of VM.

Starting with the introduction of the 3033 in the late '70s, IBM began to make upgrades even easier by expanding individual processor families. Thus, fast growing users could meet their throughput requirements by enhancing their in-place processors instead of swapping them out for new ones.

Just prior to the Sierra announcement, a small IBM mainframe user could grow from a capacity of .4MIPS to 1.6MIPS, within the 4361 family, without swapping out his processor. Similarly, a medium-sized user could grow from a capacity of 2MIPS to 4.7MIPS within the 4381 family; and a large user could grow from 3.1MIPS to 28MIPS within the 308X-X family.

This increase in processor family size had two effects.

First, it increased IBM's lock on its customer base by making it more difficult for customers to cost-justify the purchase of a different vendor's system—including one from a pcm. Even if the competing vendor's system price was significantly lower than IBM's, the additional cost and inconvenience of swapping out instead of merely upgrading the IBM system in the user's shop could not be justified.

Second, it encouraged increased use of the mainframe by significantly decreasing the cost and inconvenience of the resulting mainframe growth.

STRATEGY HAS SUCCEEDED

It is well known that IBM's strategy has been very successful. Its grip on the mainframe market has steadily tightened over the years. For example, in 1981, pcms held 5.6% of the $8.9 billion U.S. general purpose large system market, while in 1984 they held just 4.5% of a $13.1 billion market. In addition, IBM's customers' use of mainframes, even in this era of personal computers, continues to accelerate at a rapid rate.

This mainframe power hunger is currently generated by strategically important new computing applications in the office automation and engineering/scientific areas. These new applications require so much computing power that the mainframe MIPS requirements of some of IBM's customers are growing at the rate of 70% to 90% per year.

To meet the need for increasing computer mainframe throughput, IBM has been rapidly increasing the power of its largest systems. Fig. 1 shows the major large system announcements for the past 20 years, ending with February's Sierra announcement. By our calculations the 3090-400 has a performance of about 50MIPS and a price/performance of about $190,000/MIPS. This represents approximately a 25% per year improvement in high-end system performance and approximately a 15% per year improvement in price/performance over the past 20 years. (To determine a system's price, we use the price of the central electronics complex, minimum main memory, a console, and any cooling and power equipment required.) Since 1980, the throughput of IBM's largest announced systems has increased by a factor of five.

Over the years, IBM has also attempted to protect its revenue stream and its customers' investment in installed systems by not announcing new systems too soon after the beginning of the delivery period of the previous generation of systems. As can be seen from Fig. 1, IBM has not always been successful in executing this strategy. The intervals between large systems announcements have been irregular.

The announcement of the virtual storage 370/158 and 168 systems in 1972 caused quite a stir (and many angry complaints) among IBM's customers. This was because IBM had started delivering the predecessor, nonvirtual memory 370/155 and 370/165 systems, less than two years before. With the 158 and 168 announcements, the almost new 155 and 165 systems had suddenly become obsolete. Now, with its Sierra announcement, IBM has once again made the relatively new 3084-QX obsolete. Any downward extension of the 3090 line would also make other 308X-X processors obsolete.

Has history repeated itself? If so, why?

There are other still unresolved questions about the 308X-X product line. This line was also announced a relatively short time after IBM began delivering the original 308X systems. In addition, the 308X-X systems showed only a 6% performance improvement over the older systems. Finally, the 308X systems could not be field-upgraded to 308X-X configurations. Why announce these systems when, in retrospect, the Sierra announcement was so imminent?

A clue to this puzzle might be found in the one important architectural difference between the 308X and the 308X-X systems. Major pieces of the system controller (memory interface logic) were moved from their central location in the 308X systems to the individual processor printed circuit boards in the 308X-X systems. (In both systems, each individual processor is implemented on a single printed circuit board.) While this type of change generally implies an increase in the total number of semiconductor chips—and therefore cost—in a system, it usually allows such a processor to be easily interfaced to one or more memories of varying speeds.

The Sierra announcement contained about 40 products. The major ones were the two new 3090 computer systems, and most of the others were software products that emphasized a new version of the VM SCP, VM/XA. This is the first version of the VM system that supports the new XA hardware architecture in a generalized way. It supersedes the previous version, the VMXA Migration Aid, which provided only limited XA support. VM/XA does not, however, support CMS in a production mode. Those users who want to run CMS on the 3090s must run a version of VM under VM/XA.

The VM/XA announcement, however, also raised some interesting questions, like, "Why doesn't VM/XA support CMS?" Since most of the VM customers also use CMS, it is very unusual that IBM is not supporting this facility on the new version of VM.

CRITICAL PRODUCT ANNOUNCED

There was one other critical hardware product announced, the 3044 Fiber Optic Channel Extender Link. This device (actually a pair of devices linked by a fiber-optic cable) allows low- and medium-speed peripherals such as printers, terminal controllers, and communications controllers, to be directly connected to processor channels up to 2km away. The 3044 operates at speeds up to 1.25MBps in data streaming mode. It also allows any two processors (43XX, 303X, 308X, or 3090) up to 4km apart to be channel-linked using the 3088 Multisystem Channel Communications Unit. These linked systems can communicate at speeds up to 1.125MBps.

Thus, with the use of the 3044 and 3088 units, as well as other channel-to-channel linkage devices, IBM has already provided the ability to mix and match 308X and 3090 systems in loosely coupled configurations. The real question is, "Will IBM provide a mechanism to allow even closer coupling between these two types of systems?"

Let's look more closely at the current capabilities of the announced systems before attempting to forecast this aspect of the product line's future.

The major new features of the 3090 systems as compared with the 308X-X include

- a new semiconductor technology for IBM mainframes (emitter-coupled logic, or ECL);
- a new storage hierarchy level, "expanded storage," which dramatically improves the paging and hence the throughput of the systems;

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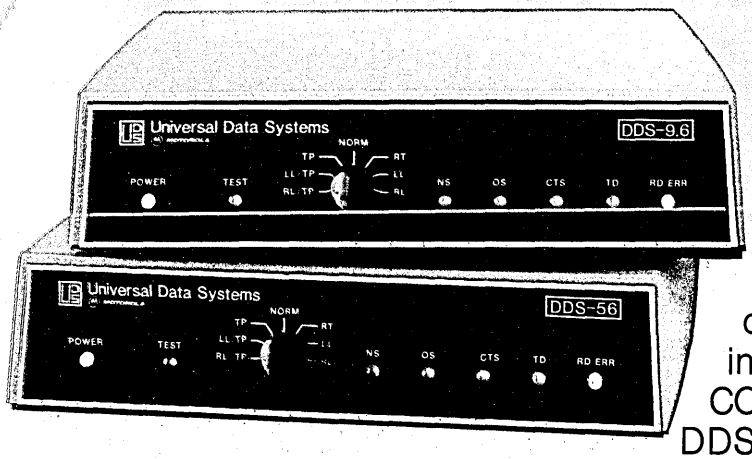

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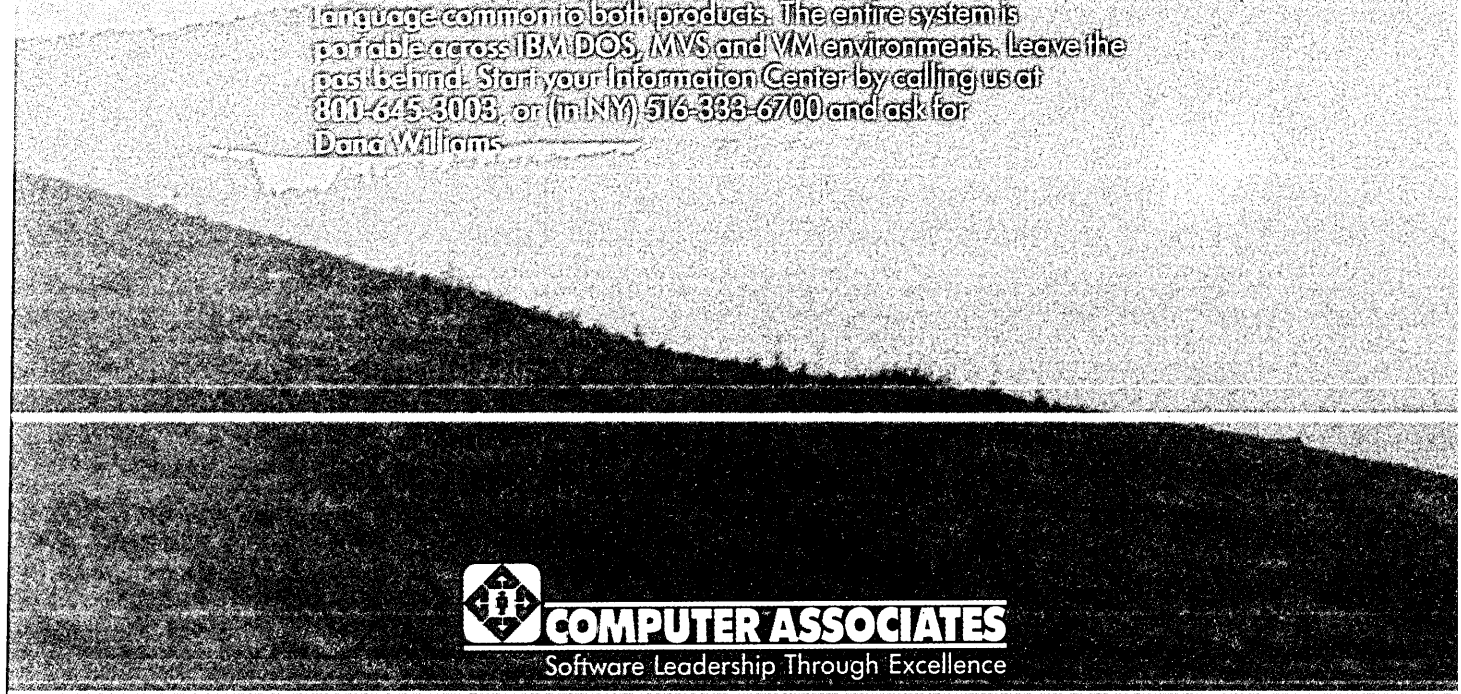

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IBM could announce a uniprocessor tomorrow that has more than 50% of the 3090-200's throughput.

• performance improvement of almost a factor of two (in a commercial environment), on a per processor basis;
• 1.9 to 2.9 times the internal throughput rate of the corresponding 3081 model in an engineering/scientific environment; and
• significant improvements in the ability of the systems to continue uninterrupted operation in the event of many types of hardware failure.

IBM has firmly stated that the 308X-X systems cannot be field-upgraded to the 3090s. The differences in the basic semiconductor technology between the two product families and the addition of the expanded storage to the new systems can easily explain this restriction. As we all know, however, there are almost always capabilities in an IBM system that are not revealed in the first announcement. The famous 370 virtual storage "midlife kicker" announcement in the mid-1970s is a classic example of this phenomenon. Therefore, we cannot assume that this IBM statement forever rules out mix-and-match configurations.

In any forecast of the future of an IBM system, one of the major items to be accounted for is the nature and form of these "midlife kickers." Could one of them be a way to closely link 308X-X and 3090 systems?

3090-RELATED FORECASTS

Looking back over the 20 years of modern (360 architecture-based systems) IBM mainframe history, a few 3090-related forecasts can easily be made.

First, the product line will be extended downward during the next few years. Since the current smallest Sierra is a dyadic processor, IBM could announce a uniprocessor system tomorrow that has somewhat more than 50% of the 3090-200's throughput. Perhaps they'd name it the 3090-100!

With an expected performance of about 14MIPS to 15MIPS, however, there will still be a major performance and price gap between the fastest 4381 and the hypothetical 3090-100, a category in which there is no new product. In addition, the 3090-100 would make the entire 3081 product line obsolete. Assuming there are no replacement products for the 3083-X systems, IBM would have no modern, dyadic processors in the upper middle of its mainframe product line. In this age of emphasis on system fail-soft capabilities, this is an unlikely scenario.

Second, we believe that IBM will be forced to maintain its recent growth rate in processing power at the top of the large system line. Fig. 2 contains our forecast of the speed of the fastest IBM mainframe for the next five years. To give this forecast a more meaningful perspective, we have included a history of the fastest mainframes.

To reach the forecast 90MIPS to 120MIPS by 1990, IBM would have to announce a system with approximately twice the performance of the 3090-400. We believe IBM will use several techniques to reach this speed, the most important one being an increase in the number of processors that can be tightly coupled onto a single system image to at least eight. An eight-processor 3090 system would have a throughput of at least 80MIPS. So with a moderate midlife performance kicker in 1988 or 1989, the 90MIPS to 120MIPS high-end system forecast could be easily met.

Now for the hard part. What about 308X-X and 3090 mix-and-match configurations? I forecast that in 1986 or 1987, IBM will announce a multisystem coupler that will permit 308X-X systems and 3090 systems to be linked into single-machine image, tightly coupled configurations. The overall architecture would be very close to the one Fred Withington and I forecast earlier this year (see "IBM: Mainframes in 1990," Jan. 1, p. 97).

I believe that these combined systems would run only under VM/XA. All of the current SCPs could run under this VM/XA hyperviser (a hyperviser is an operating system or SCP that runs other operating systems or SCPs). A single SCP will probably not be able to span the two machine generations. So, if a user wanted to run only MVS/XA, two distinct copies would be required to run as guest SCPs under this special type of VM.

FIG. 1

IBM MAJOR LARGE SYSTEM ANNOUNCEMENTS

Model	Announced	Delivered	MIPS	Price	$/MIPS	AV $/MIPS
360/50	Apr '64	Aug '65	0.2	1,200,000	7,018,000	6,150,000
360/65	Apr '65	Nov '65	0.6	3,000,000	5,282,000	—
370/155	Jun '70	Jan '71	0.6	1,600,000	2,667,000	2,386,000
370/165	Jun '70	Apr '71	1.9	4,000,000	2,105,000	—
370/158	Aug '72	Apr '73	0.9	1,400,000	1,628,000	1,689,000
370/168	Aug '72	May '73	2.4	4,200,000	1,750,000	—
370/158-3	Mar '75	Sep '76	1.0	1,600,000	1,684,000	1,745,000
370/168-3	Mar '75	Jun '76	2.5	4,514,700	1,806,000	—
3031	Oct '77	Mar '78	1.1	1,000,000	909,000	—
3032	Oct '77	Mar '78	2.5	1,900,000	760,000	782,000
3033	Mar '77	Mar '78	5.0	3,380,000	676,000	—
3033S4	Nov '80	Jan '81	2.4	1,190,000	492,000	—
3033N4	Nov '79	Jan '80	4.0	1,800,000	450,000	447,000
3081-D	Nov '80	Oct '81	10.0	4,003,000	400,000	—
3083-E	Mar '82	Apr '83	4.0	1,400,000	354,000	—
3083-B	Mar '82	Oct '82	5.7	2,100,000	367,000	—
3083-J	Nov '81	Oct '82	7.5	2,700,000	360,000	—
3081-G	Nov '81	Sep '82	10.5	3,543,000	337,000	345,000
3081-K	Nov '81	Apr '82	13.5	4,603,000	341,000	—
3084-Q	Nov '81	Oct '83	25.7	7,982,000	311,000	—
3083-CXO	Oct '84	Jun '85	3.2	871,000	277,000	
3083-EXO	Feb '84	Jun '84	4.2	1,400,000	333,000	—
3083-BXO	Feb '84	Jun '84	6.1	2,100,000	344,000	—
3083-JXO	Feb '84	Jun '84	8.0	2,700,000	338,000	—
3081-GX1	Feb '84	Jun '84	11.4	3,543,000	312,000	315,000
3081-KX1	Feb '84	Jun '84	14.9	4,603,000	310,000	—
3084-QX3	Feb '84	Jun '84	27.8	7,982,000	288,000	—
3090-200	Feb '85	Nov '85	28.0	5,085,000	182,000	186,000
3090-400	Feb '85	Apr '87	50.0	9,468,000	189,000	—

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If history is a guide, this price/performance anomaly will be corrected in a relatively short time.

Such mix-and-match configurations would have several competitive advantages. They would reduce the cost and difficulty of upgrading from the 308X-X systems to the 3090s. They would also allow customers to buy additional capacity in less than $2.5 million increments. Even for large customers, laying out $2.5 million for increased processing capacity can be a burden. This machine coupling announcement would also satisfactorily answer most of the questions discussed above.

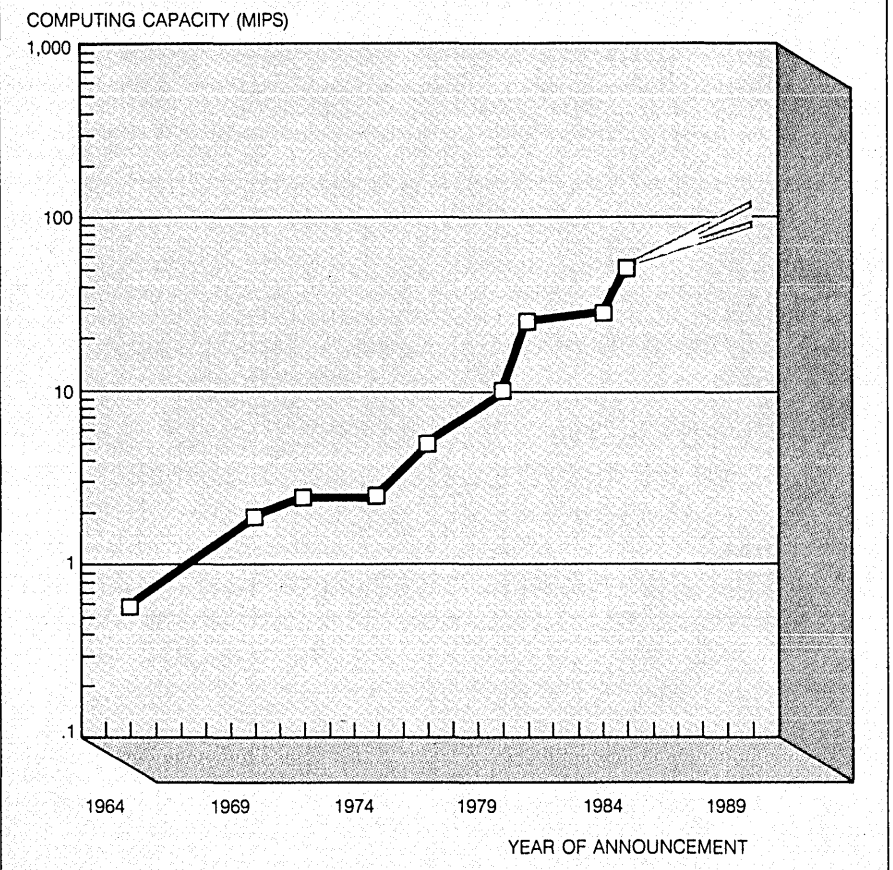
First, IBM would not have re-created its 370/155 customer problems with the "untimely" announcement of the 3090. The installed 308X-X systems would be fully usable in state-of-the-art system configurations for a significant period of time.

Second, the announcement of the 308X-X systems could be explained by IBM's need to introduce a new memory interface for the 308X processors so that they could work with the 3090 central and expanded storage systems.

Third, the VM/XA announcement without a production CMS capability could be explained by IBM's need to have a hyperviser that can control systems containing processors of unequal performance. This control problem has been studied in the universities for a long time. It is not easy to schedule such a system in a way that optimizes the processing as well as the peripheral resources, while still being reactive to external priorities. Adding the necessary algorithms to a standard SCP could noticeably reduce a system's throughput unnecessarily, especially in those systems that do not contain unequal processors.

FIG. 2

IBM LARGE MAINFRAME CAPACITY GROWTH



WHAT ABOUT NEW PRODUCTS?

Now, what about the lack of new products or dyadic processors between the top of the 4381 line and the bottom of the combined 308X-X and 3090 lines for the next several years? At the current time, the 438X and 3090 systems have approximately the same performance. Their price/performance is between 25% to 30% better than the price/performance of the 308X-X systems. This is unusual for IBM products. If history is a guide, this price/performance anomaly will be corrected in a relatively short time.

The smallest potential dyadic system, a 3083-CX/3090-100 combination, would have a throughput of approximately 16MIPS to 18MIPS. This is still a long way from the almost 5MIPS 4381-G3 system. Even IBM sales personnel could sell that transition as an easy upgrade to a customer who wanted a relatively fail-soft dyadic configuration.

There are a number of ways in which IBM could solve that problem, including 4381 and 308X-X mix-and-match configurations. These configurations would have almost all the same advantages discussed above. They would significantly reduce the psychological barrier between the 43XX and 30XX systems. In addition, the price/performance of these dyadic systems would be much closer to that of the other mainframe product lines than is the 308X-X's.

Such mixed, dyadic systems would also significantly ease the transition between DOS/VSE and MVS/XA. Using the VM hyperviser, a user could slowly make such a transition without major upset to his daily data processing work.

Of course, IBM could instead announce, in the next year or so, a new line of dyadic systems to fill the gap. Such an announcement would make the entire 3083-X product line obsolete. Then we have the same problem all over again. This solution would also represent a reversal in the trend of increasing the size of individual processor families. For these reasons, a new family announcement does not seem all that likely.

So here we have a nice solution to a number of apparently vexing problems in the IBM large system product line. Will it actually come to pass? Only time (and the wizards of Armonk) will tell. In any event, the next several years should be very interesting. There is probably still a lot hidden beneath the Sierra's blue covers. ◉

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

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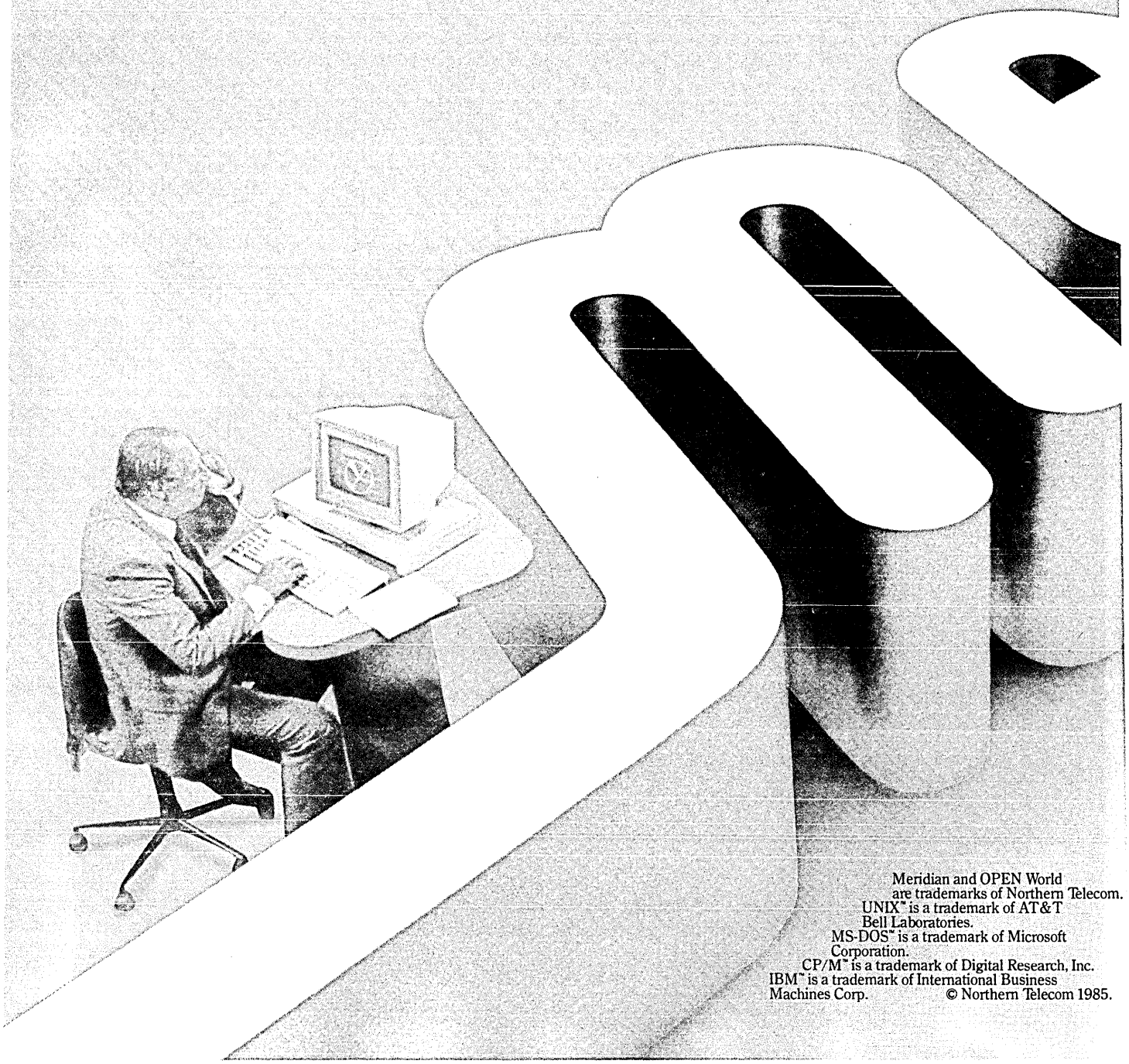

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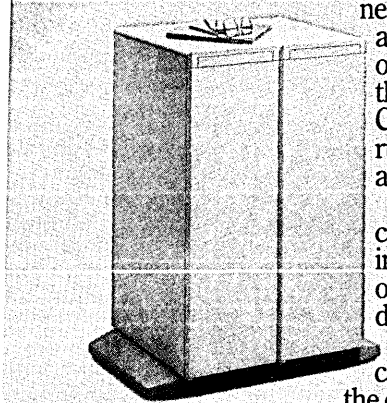

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The Meridian DV-1 links the Meridian M4000 series of integrated terminals and IBM™ PCs at a speed of 2.56 Mbs to the desk. Other vendors' switching systems and computers may also be easily accessed. The Meridian DV-1 allows all relevant media—data, voice, text and graphics—to be handled in a single, integrated system. With voice access through the new Meridian M4000 integrated terminals or standard telephones, users have not only a multi-functional data terminal but also sophisticated phone features from which to choose.

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CIRCLE 52 ON READER CARD

With hardware prices on a long decline, IBM is moving to boost software rental revenues significantly, says one industry observer.

UP THE SOFTWARE CURVE

by Bob Djurdjevic

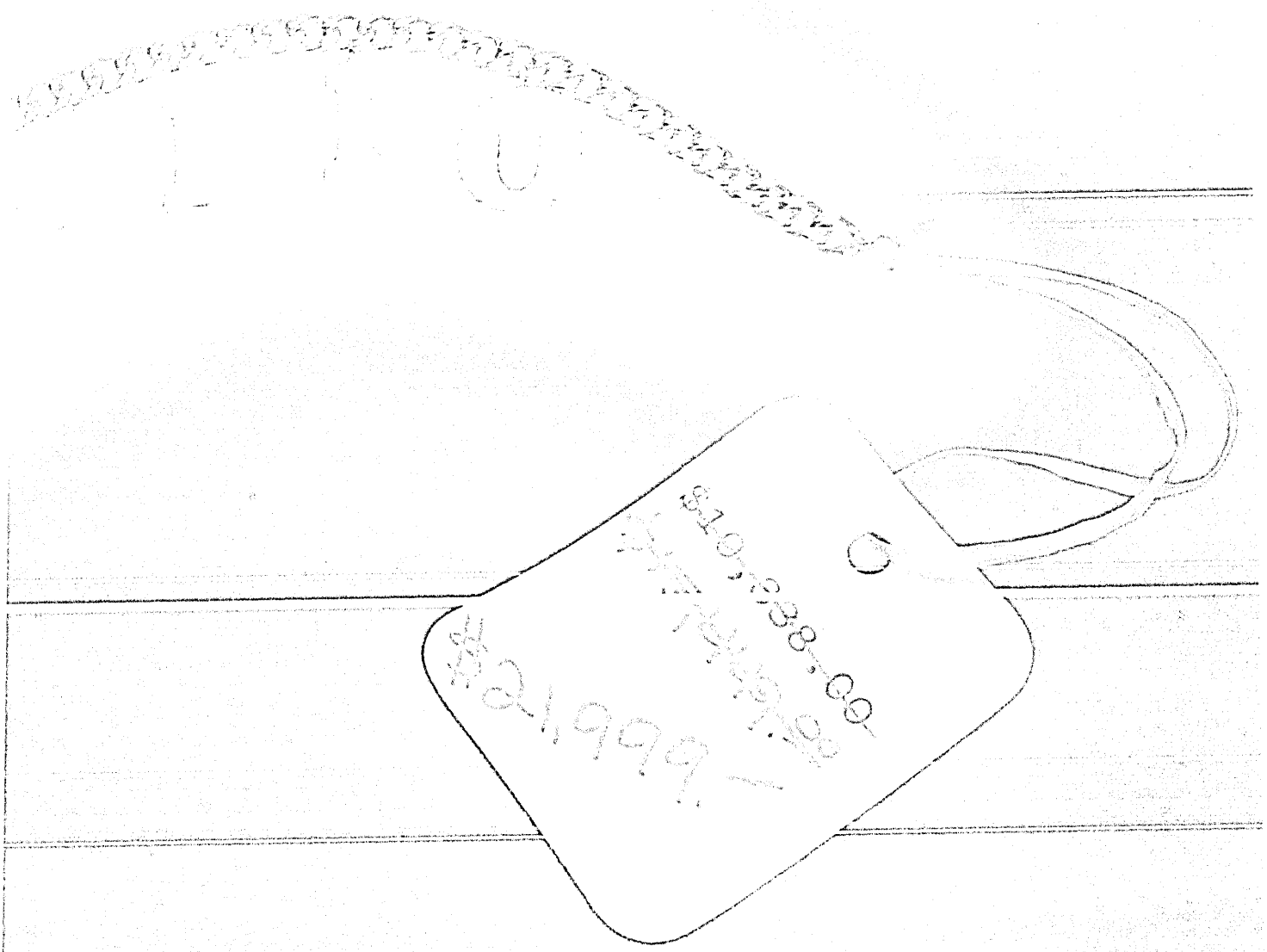
IBM's software announcements at the time it unveiled the 3090 Sierra machines underscore significant product and pricing trends that have been discernible for the past few years. MVS and VM users have seen their basic systems software costs more than quadruple since 1980—4.3 and 4.4 times higher, respectively.

The combined effect of users migrating to the 31-bit Extended Ar-

chitecture (VAV) and various software price hikes also means that in 1985 IBM 3090 mainframe users will spend about 12.5% of their total three-year major operating costs on systems software alone. By contrast, in 1980 systems software accounted for only 6.5% of the major operating costs of 3033 users.

The dramatic price/performance improvements in large IBM processors, a result of increased competition that began in June 1975 when the plug-compatible hardware entered the mainframe scene, have therefore been partially offset by increases in software prices. In absolute terms, however, the overall operating costs for IBM's largest computers have nearly doubled in five years, to $6.1 million for a 3090 from $3.3 million for a 3033 (see Fig. 2). IBM giveth and IBM taketh away.

There is no doubt about the strategic importance of software to IBM. In 1980, I estimate the company's software revenues were only about $720 million. In 1984, they reached a record $3.2 billion level. That's a 45% compound annual growth. The reason for the dramatic rise is software's strategic importance to IBM. Software revenues represent a partial replacement for IBM's declining hardware rental revenues (see Fig. 1). IBM's chief financial officer, Allen Krowe, recently confirmed software's importance to his company when he told financial analysts that by the 1990s software and



The emergence of plug-compatible processors in the mid-1970s prompted a boost in IBM's software pricing.

services may represent "up to a third of IBM's business."

To understand the importance of software to IBM, one must try to put oneself in the vendor's shoes. If you were a vendor who in the future intends to raise the prices for a given product, what would you do, sell the product outright or rent it?

Rent it, of course. That way your revenues rise with each future price increase. The market value of your rental inventory also increases in the process, giving you additional capital gains income when it is sold. Besides, renting enables you to retain ownership of the product, so you can control your customers' migration when the product comes off rent.

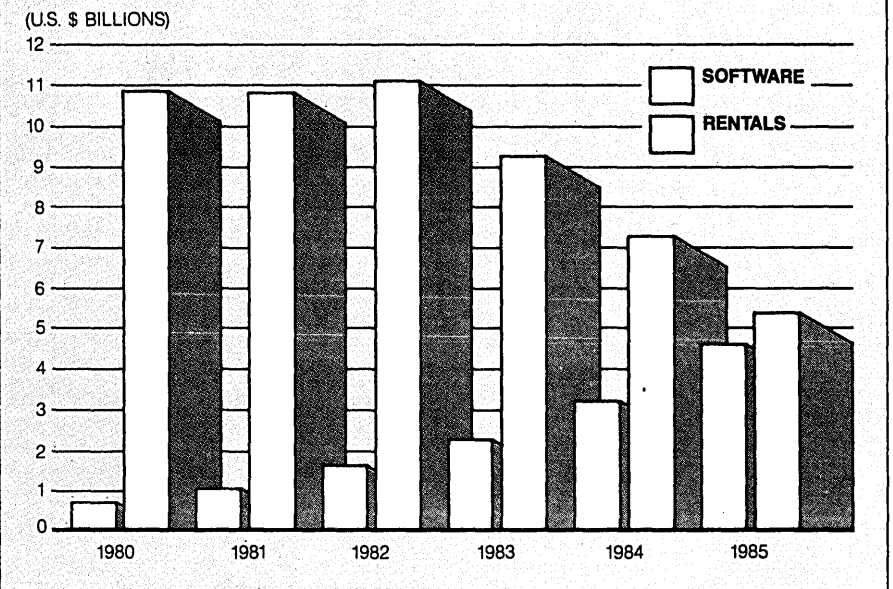
Now, consider the opposite situation. If the product you were marketing were in a declining price market, would you still rent it?

Probably not. By selling outright, you lock in the sale at the higher current price. If you rent, you also have to carry a rental inventory, which would be devalued each time the price dropped. An outright sale makes it possible to transfer this liability onto other peoples' balance sheets, namely those of your customers.

In the computer industry, everyone knows the price of hardware is rapidly declining. The only question is not if, but by how much. Our Annex Value Index, one of the computer industry's price gauges, registered IBM cpu price declines of 32% and 30% respectively in 1983 and 1984, while IBM peripherals' values declined 19% and 4% during the same period.

FIG. 1

IBM REVENUE TRENDS



1984 SOFTWARE REVENUES ARE ACTUAL.

Source: Annex Research

OUT OF RENTAL BUSINESS

What has IBM been doing meanwhile? Trying to convert its hardware rental revenues to purchase so as to get out of the rental business in a declining price market (see Fig. 1). By doing so, however, IBM is effectively borrowing from its future, while temporarily inflating revenues and earnings. What's IBM going to do for an encore when most of its rental revenue is gone?

John Opel, IBM's chairman, answering this question at the company's 1983 Boston annual meeting, stressed "the growing effect of software and service revenue which is coming on pretty strong." At the time, his comment didn't seem particularly relevant, since IBM's 1982 software revenues represented only 4.9% of total revenues (compared to 7% in 1984).

Of course, our perspective then was based on the historical information available at the time. But, Opel was privy to a much better type of market intelligence, his own business plan. Perhaps subconsciously, he tipped us off about how IBM will try to replace lost hardware rental revenue—by upping software prices and bringing in new marketing policies for program products. At a Boca Raton, Fla., meeting of financial analysts in March 1984, John Akers, IBM's new chief executive, echoed Opel's earlier remarks.

Following the 1983 annual meeting, Allen Krowe expanded on Opel's remarks. In May of that year, Krowe asserted to this writer that "purchase is a natural order of things." He said that as a means of explaining the reasons for a change in IBM's hardware pricing philososphy. When it comes to computer software, however, purchases are notably less "natural."

People with long memories will remember a time when systems software was "free" of charge, when its price was included in the hardware price. IBM "unbundled" its software and support charges in June 1969, five months after the U.S. Justice Department's antitrust suit was filed.

That was many years before plug-compatible mainframes emerged. Prior to 1975, when Amdahl Corp. began to ship 370-compatible processors, IBM controlled the 370 mainframe market so completely that it didn't need software as a major source of revenue and profits. In fact, with so little competitive pressure in the years before 1975, IBM was able to put through two successive hardware price hikes.

But, along with IBM's first response to the compatible mainframes, the 3033 processor unveiled in 1977, the company introduced MVS/System Extension (SE), which was termed an enhancement of the basic systems control program (SCP) and continued to be offered at no extra charge. MVS/SE, which required special microcode to operate properly, had a price tag of $1,250 a month. The same product is now priced at $2,074 per month including maintenance.

In 1979, even the basic SCPs became subject to the licensed program support, or software maintenance, charges. In August 1980, IBM introduced the separately priced MVS/SP, an enhanced version of MVS, which was followed with MVS/Extended Architecture (XA) in October 1981. MVS/XA now has an initial fee of $12,840 and a monthly tag of $4,953 including maintenance (see Fig. 3).

"MVS/XA is not an end. It's more like a journey," said Dick Williams, IBM's vice president of Data Systems, addressing a group of IBM users in February of last year. "Users can expect at least two major releases of XA per year between now and the end of the decade," he prognosticated. Knowing what we do now, we cannot help but wonder how many of those releases will be accompanied by price hikes?

A company speaker at another IBM large-systems presentation in early 1984

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Performance degradation over distance	Extreme	**Negligible**
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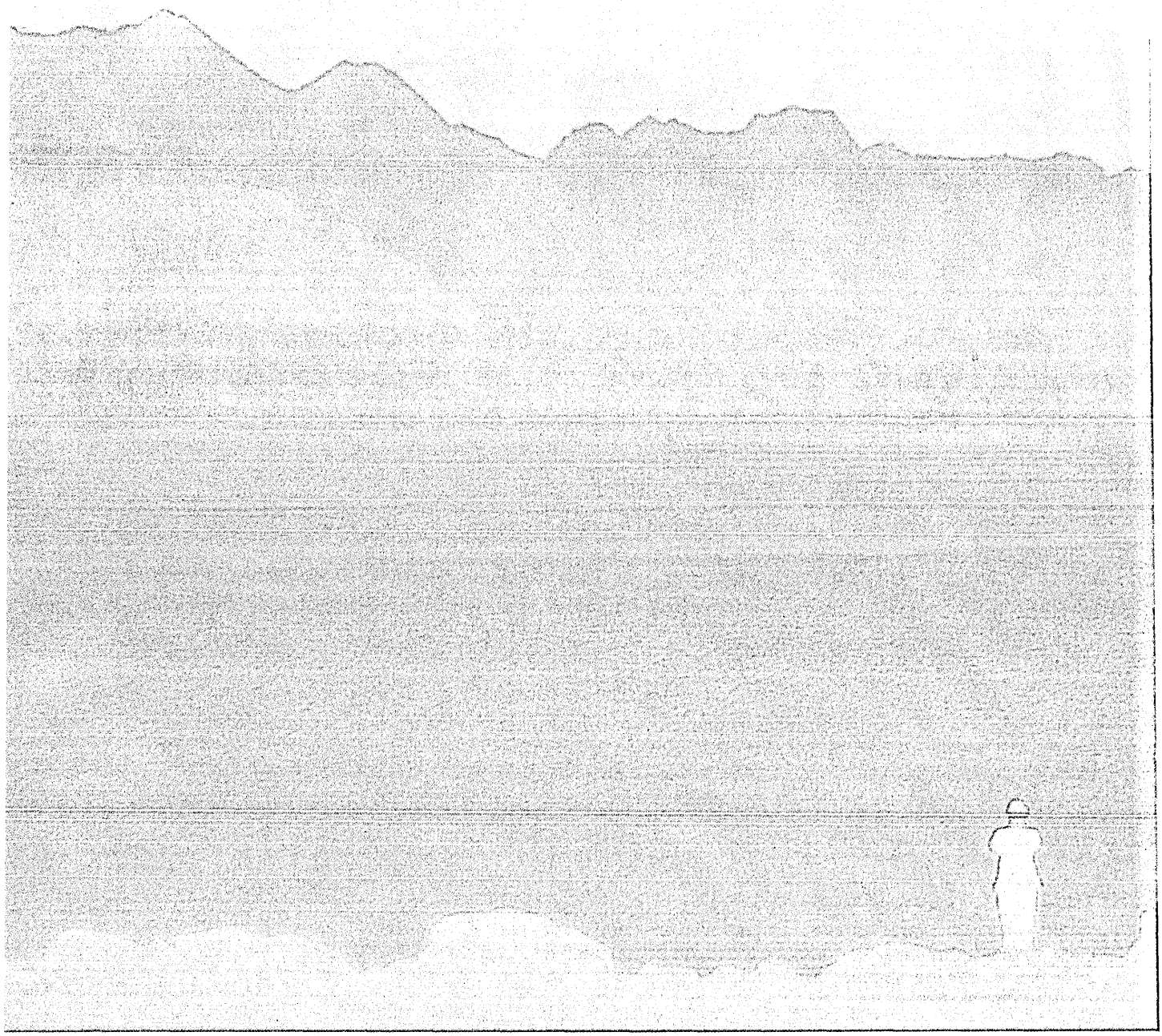
CIRCLE 53 ON READER CARD



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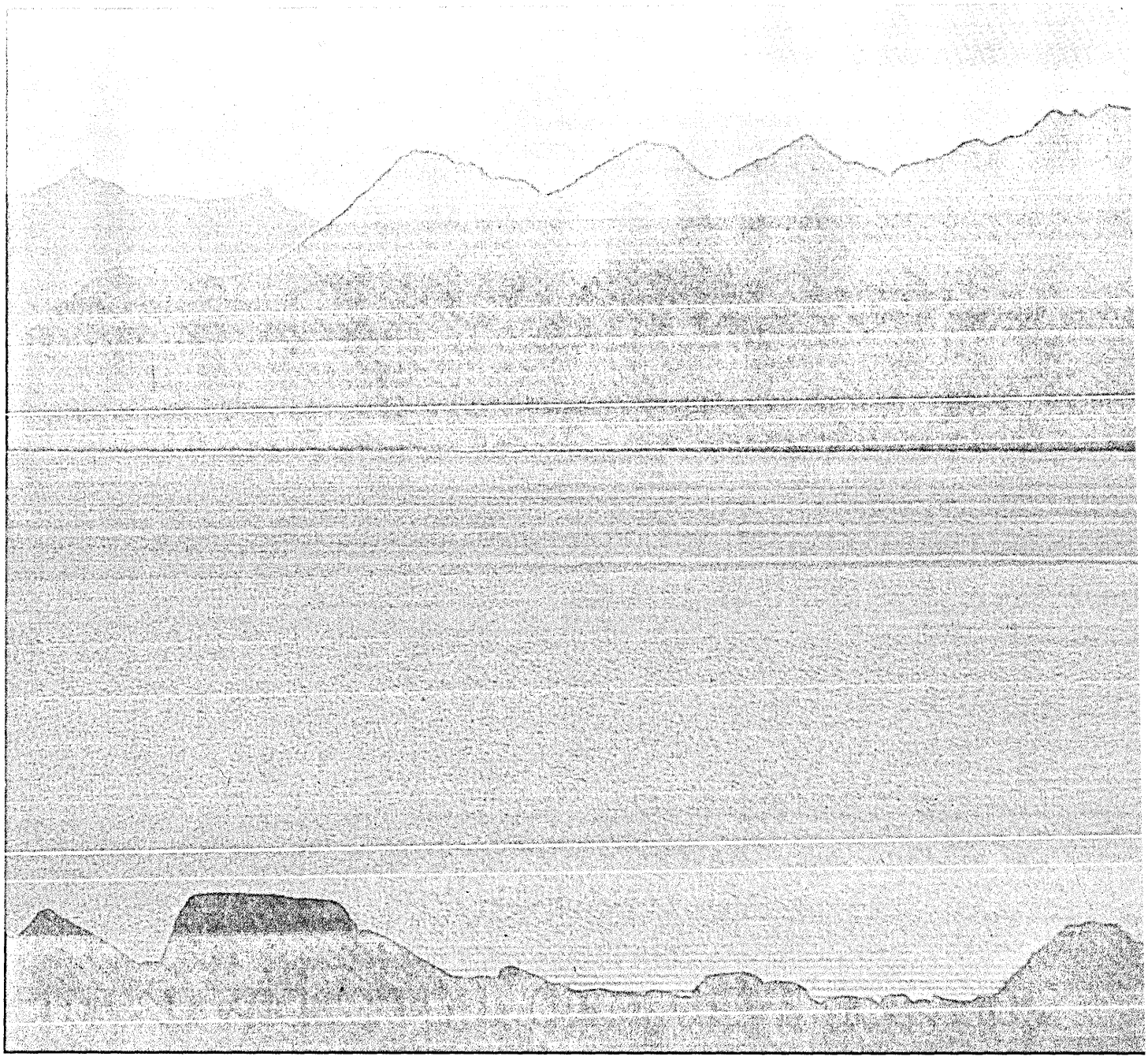

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Honeywell is proud to introduce the DPS 90. With 30 years experience in the computer business, we understand how vital a company's information system is. In fact, information may be your most valuable asset. How well you manage and control that asset will play a large role in how well your business meets future productivity and competitive challenges.

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CIRCLE 54 ON READER CARD

ADAPSO criticized IBM's restriction of source code in 1983, claiming the company could effectively bundle all systems software into a single package.

declared $480,000 as the amount a user would save in software licenses by installing a 3084 processor instead of two 3081-K processors. When questioned about the meaning of this figure, the IBMer said that a conservative estimate of monthly software charges in large dp shops was about $10,000 per month. "The $480,000 figure, therefore, represents the software savings over a four-year period," he explained.

"But, why not use the present value?" he was asked by a member of the audience. "Wouldn't the cost of money be a factor in any such real-world analysis?"

"That's to provide for some future price increases," the IBM speaker replied after a slight pause.

FIG. 2

THREE-YEAR COSTS OF LARGEST IBM COMPUTER

	FEB 1980 3033	% OF TOTAL	JUNE 1985 3090-2 MVS/XA	% OF TOTAL	1985/80 CHANGE FACTOR
Hardware	2,870,000	86.3	5,085,425	83.7	1.8
Maintenance[1]	240,860	7.2	233,875	3.8	1.0
Software[2]	216,443	6.5	757,027	12.5	3.5
Total Costs	3,327,303	100.0	6,076,327	100.0	1.8
Performance (MIPS)	5.00		27.90		5.6
Price/Performance	665,461		217,789		0.3

[1]Maintenance = present value (PV) of 36 monthly payments, 12% discount rate
[2]Systems software costs = initial fee + PV of (basic fee + LPSC + SCP) [LPSC = licensed program support charge]

Source: Annex Research

RESTRICTS SOURCE CODE

To users, and to vendors competing with IBM, last February's software announcements also brought a continuation of IBM's restrictive practices regarding the availability of source code for certain products—VM/XA, DFSORT Release 7, IMS/VS—and/or the bundling of software products that were previously available separately (e.g., IMS/VS Version 2). Still relatively new for IBM, restrictions on source code and the prohibition against decompiling object code started about two years ago, on the eve of the first customer shipment of XA in March 1983.

ADAPSO, the Washington, D.C., software and services trade association, took a dim view of IBM's actions at the time. In May '83, ADAPSO's board passed a resolution stating that such IBM policies "have the potential to be anticompetitive and to constitute unfair uses of market power." Criticizing specifically IBM's bundling practices, ADAPSO's 1983 White Paper concluded that "if IBM follows the trend to its logical conclusion, IBM will eventually market all of its systems software in a single bundle." (ADAPSO has subsequently withdrawn that White Paper from circulation and claims it is in negotiation with IBM over the matter.)

ADAPSO's charges seem to have had little effect on IBM's subsequent moves. As evident in its February 1985 software announcements, the company has additional new software marketing and pricing tactics that may turn out to be historical IBM milestones.

With its new version of the Unix operating system, for example, IBM will for the first time charge a license fee that depends on the level of the software's usage. The fee will be determined by the number of Unix-user terminals attached to the licensed processor. While one might have expected IBM eventually to implement usage-based pricing as another means of raising revenues and therefore profits, it is interesting that IBM chose Unix as its first usage-priced program product. By using it on a new product first (and a non-IBM product at that), the company is at least showing some sensitivity about not aggravating current products' users too much all at once. But before relaxing, users should remember that many of IBM's current, widely used practices had their beginnings with some relatively inconspicuous products. For example, the volume purchase agreements (VPA) started in July 1980 with the lowly 3277 terminal. Now VPAs are spread right across the company's major product lines.

Based on past experience, one might also have expected IBM to implement some of its XA software in microcode. The reason would be that, in similar fashion to the MVS/SE introduced on the 3033, XA microcode would make it harder for IBM's plug-compatible mainframe competitors to keep up with IBM. The carrot for users would be that certain software would perform better with the microcode than without it. Well, IBM's DFSORT Release 7 represents the first such move by IBM for an XA product. The company claims the product offers better sorting performance than previous releases.

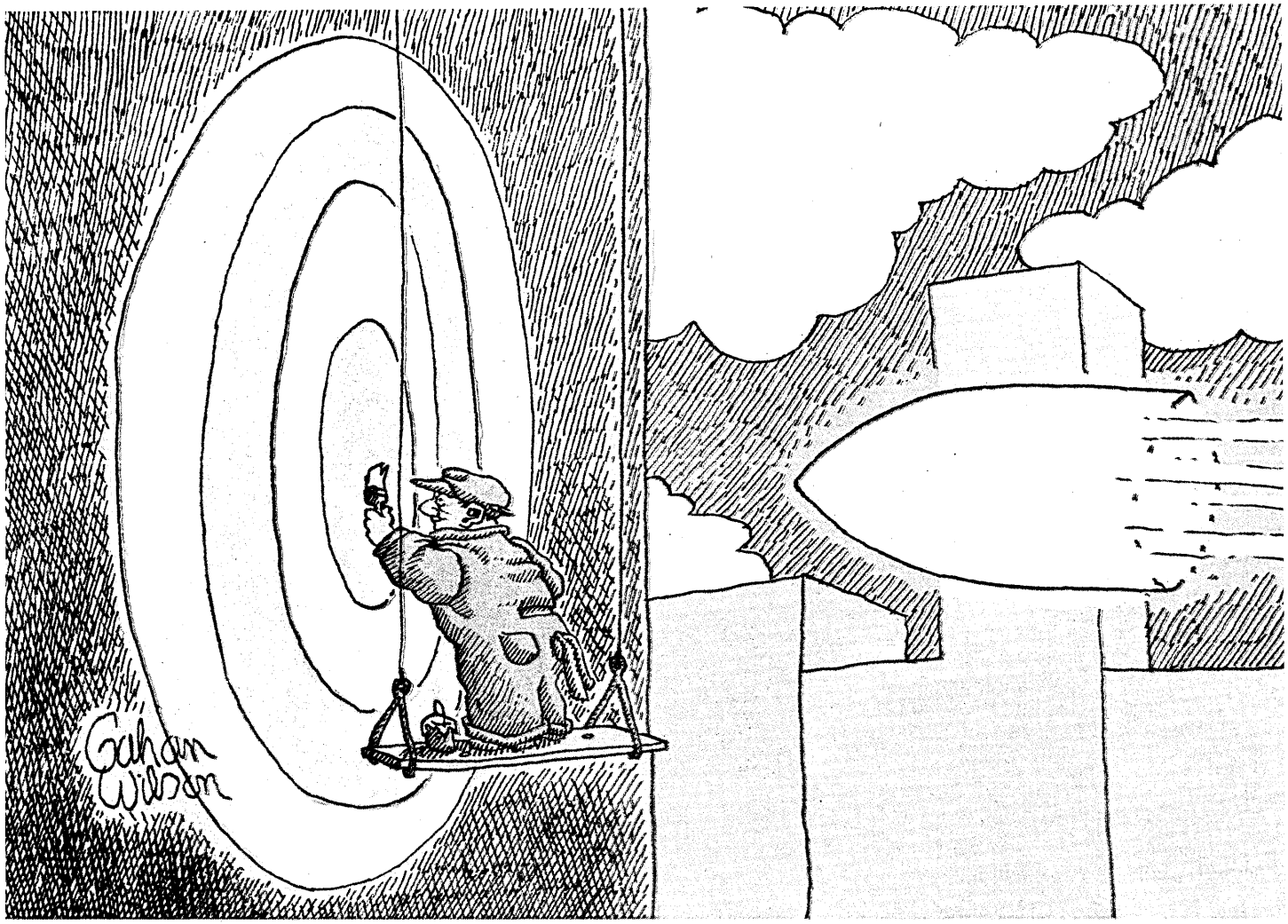
It is also interesting to note that IBM's announcement did not specifically state that a part of the DFSORT's function would be implemented in microcode. Instead, a new term—sorting assists in 370-XA mode processors—was used. Since the implementation of these sorting assists for DFSORT required a specified engineering change (EC) level of the 308X and 4381 processors, it seemed that the term might have meant an implementation in microcode. Upon checking with IBM, a company spokesman confirmed that that is indeed what is meant.

ALLEGED BUNDLING PROTESTED

Possibly the foremost instance in February's software introductions of IBM employing a traditional anticompetitive practice is the merging of several formerly separate products into one in the XA version of IMS/VS, known as Version 2. It was the similar, alleged bundling of the previous IMS/VS Release 1.3 (the last non-XA release of IMS, which was shipped late on a "managed availability" schedule last June) that is the focus of a private antitrust suit against IBM filed last August by BMC Software Inc., Sugar Land, Texas (see "BMC Goes After IBM," Jan. 1, p. 72)

The new IMS/VS version, like the contested Release 1.3, combines the once-separate database, logging, and database recovery control (DBRC) functions into one package, which IBM termed the database system. The price of the database system ($3,900 per month for Version 2 versus $2,427 for the equivalent Release 1.3 products) is equal to the sum of its individually priced components, which IBM says are optional and can be ordered separately.

On the surface, it seems that there is no problem for either a user or a software competitor. The IBM software features seem available as a bundle or separately, at the user's option. But there is a catch. Since the logging and DBRC features "are fundamental to the installation and operation of the IMS/VS Version 2 Release 1," according to IBM, "all IBM system testing includes these



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Monthly charges for a typical IMS/VS package have risen by four times since 1980.

FIG. 3

ANALYSIS OF CHANGES IN IBM SOFTWARE PRICES

AS OF JUNE 1, 1985

Program Product No.	Description	No. of Licenses per Cpu	Initial Fee	New IBM Prices Basic Mthly. Fee	Mthly. LPSC[1]	Old 3-Yr. Cost[2] Feb. 85	New 3-Yr. Cost[2] June 85
Typical Large IBM XA User's Software							
5740-XC6	MVS/SP-JES2, Version 2	1	$12,840	$4,280	$673	$151,368	$161,962
5665-295	MVS/XA Data Facility Product	1	1,590	530	164	21,025	22,485
5740-SM1	DFSORT Release 7	1	0	247	19	7,497	8,009
5668-962	Assembler H, Version 2	2	813	271	14	8,800	9,394
5668-958	VS COBOL II—Compiler + Library	2	11,232	1,872	106	66,199	70,785
5748-FO3	VS FORTRAN—Compiler + Library	2	1,305	435	34	14,500	15,425
5665-274	RMF Version 3.3	1	2,250	750	67	25,072	26,848
5740-XXH	Resource Access Ctl. Facility	1	0	786	41	24,899	24,899
5667-124	ACF/NCP for 3705/3725 Ver. 3	1	12,550	425	148	18,508	19,802
5665-332	IMS/VS Version 2 (DB + DC + DBRC)	1	0	8,900	1,465	312,064	312,064
Total Systems Software (w/o VM)			32,580	18,496	2,731	649,931	671,672
XA over NON-XA Multiple			13.1	1.8	3.0	2.1	2.0
5664-169 VM/XA		1	11,220	3,740	623	133,429	142,579
XA over NON-XA Multiple			N/A	2.6	3.2	2.9	2.9
Total Systems Software (with VM)			43,813	22,238	3,357	783,360	814,251
XA over NON-XA Multiple			17.6	1.9	3.1	2.2	2.1

[1]LPSC = licenced program support charge (i.e., software maintenance)
[2]Total cost = Initial fee + PV of (basic fee + LPSC); [PV = present value, 12% discount rate]
[3]CAA = compound annual change over 60 months
Source: Annex Research

functions." This means that the customer must first install all three features and then de-install those he does not want. For example, if he wants to use a competitive logging product, he must first install IBM's as part of the database system and then remove it.

This means some extra work and inconvenience, to be sure, but it still does not seem to preclude an independent software vendor from selling its logging product to an IMS user. So, what then got BMC Software so agitated as to file an antitrust suit?

The software vendor alleges that when removing the optional features from IMS Release 1.3, the IMS system generation (sysgen) produces error messages. We'll have to wait until the first quarter of 1986 when the new IMS/VS product is shipped to see if it suffers from the same affliction. By the way, BMC had marketed a logging product of its own before IBM announced in November 1982 that it would also start offering its own logging feature within IMS/VS Release 1.3.

IBM's alleged bundling notwithstanding, the most significant part about the IMS/VS Version 2 announcement from the users' standpoint was, once again, the planned increase in prices. For a complete IMS system that includes both the database and the data communications features, IBM's basic monthly fee is $8,900; software maintenance charges account for an extra $1,465 a month. That's a twofold increase over the charges for equivalent products in the previous IMS release (designated 1.3, which is not yet generally available), and about a threefold hike over the charges for IMS/VS Release 1.2 (which is the only one currently available). Since 1980, the prices of IMS/VS have increased *fourfold*.

IMS NOT HIGHEST INCREASES

Although substantial, the IMS increases are not the highest among the XA-type software. The top place belongs to commercial customers' favorite compiler, one of the program products most widely used by users and vendors alike, COBOL. Its prices have increased fivefold in the last five years.

It is not surprising, therefore, that IBM is driving users so hard toward XA. To give non-MVS users—typically 4300 customers running DOS/VSE—an incentive to convert to MVS/XA, IBM's February announcements included a limited time offer worth up to six months of "free" software. (IBM will waive or defer charges.) For an average new MVS user, the offer may be worth about $11,000 a month for up to six months. Considering the tripling and quadrupling of XA vs. non-XA software prices, however, it is easy to see that users' apparent initial savings may soon be erased by subsequent cost increases.

That is why each XA prospect should try to justify, on economic grounds, its decision to convert to XA on *economic* grounds. When asked to quantify the benefits that were attributable to MVS/XA (as compared to MVS/SP), several large IBM users could not readily do so. Some mentioned the advantages of virtual storage constraint relief resulting from XA's 31-bit addressing, but none could quantify exactly what that was worth to them so as to justify increased monthly charges. In the meantime, the benefits of XA to IBM are indisputable and are easily quantifiable from its financial statements.

It should surprise no one that the most widely used products have experi-

85/84 Annual Change %	Total 3-Yr. Cost[2] Feb. 80	CAC over 65 months[3] %	Users' 1985/80 Cost Multiple
7.0	$37,634	30.92	4.3
6.9	5,058	31.71	4.4
6.8	5,449	7.37	1.5
6.7	N/A	N/A	N/A
6.9	14,211	34.50	5.0
6.4	10,237	7.86	1.5
7.1	7,527	26.46	3.6
.0	15,054	9.73	1.7
7.0	3,613	36.90	5.5
.0	77,316	29.38	4.0
3.3	176,099	28.04	3.8
6.9	32,064	31.72	4.4
3.9	208,163	28.63	3.8
	3.8		

enced the greatest price increases under XA.

Are there any limits to how much IBM can charge for software? In 1956, the company signed a consent decree to settle the 1952 antitrust lawsuit brought on by the U.S. Justice Department. One of the provisions of the consent decree was that IBM from then on was to offer customers products on a purchase as well as lease basis. IBM's previous lease-only policies were viewed by the government as giving the company too much power in the data processing market. In 1956, IBM was an $892 million company and virtually all of its computer and punch card tabulating equipment was installed on lease.

IBM's 1984 revenues were almost $46 billion, or over 51 times greater than in 1956. Today, most of its hardware is purchased by customers. That is not the case with software. IBM offers software on a lease-only basis. Maybe that's why, as the trade press has recently reported, IBM is seeking to have the Justice Department scrap the 1956 decree.

IBM's lawyers have actually argued in court that IBM doesn't really lease its program products, but rather "licenses the use of copyrighted software." By trying to make a distinction between licensing and leasing, the company is hoping to get around the provisions contained in Section 3 of the Clayton Act, an antitrust statute that some of IBM's marketing practices described above (notably bundling products under a single price) would have violated.

But, the assertion that IBM does not really lease its software seems to contradict the company's own actions in the marketplace. In order to boost profits, IBM lately has been resorting to charging one-time software fees for a growing number of software packages in lieu of, or in addition to, continuous monthly payments. These one-time fees have sometimes been financed by the company's leasing arm, IBM Credit Corporation (ICC), using ICC's Master Lease Agreement—the same agreement ICC uses to lease hardware—and a software amendment. Yet, IBM argues that it does not lease its software.

To understand the full implications of restrictions by vendors such as those contained in IBM's software agreements, we should try to think of software, for the moment, in terms of a common industrial product, the family automobile.

BUYING IN THE DARK

Suppose a car vendor asks you to pay an amount equivalent to the purchase price of an automobile, but he still retains the title. That's to prevent you from ever reselling it. Suppose the vendor further forces you to have the car serviced only at his garage. This he accomplishes by not releasing the technical specifications of his car so as to prevent independent mechanics from learning how to work on it. Furthermore, to ensure that you keep on spending money for new models, the vendor regularly refuses to service your old car after a period of time. To top it off, the vendor's agreement also prevents you from being legally able to take the car apart, fix it yourself, reverse-engineer it, or rebuild it into a different type of vehicle. In effect, he sells you a black box whose contents only he is privy to.

Would you ever accept such a one-sided deal? Neither would I. And yet, that's exactly what tens of thousands of IBM users did when they signed the standard IBM Agreement for Licensed Programs. In many cases, of course, users had no choice, for IBM was the only supplier in town. But, in other instances, these users simply weren't aware of how restrictive a deal they were signing.

Understanding these issues is particularly important now that the computer software business is reaching significant global proportions. According to a December 1984 report by the Commerce Department, the worldwide software market reached $18 billion in 1983, with U.S. companies enjoying a 70% share of that total. By 1987 the Commerce Department expects the software industry to grow to $55 billion. Such a rapid growth will be reflected in the increased portions of users' dp budgets that will be spent on software and, therefore, the increased importance of software-related issues to user executives.

So far, American computer users haven't grumbled too much about IBM's software pricing and marketing policies. But elsewhere, users have been less reticent about speaking out.

In Britain, for example, the IBM Computer Users Association became agitated over the relatively small software price increases (12% to 15%) that IBM declared in 1984. Roger Dale, the group's chairman, even went so far as to recommend that members try to find alternatives to IBM software products.

Of course, that's easier said than done. When it comes to the operating systems software, such a recommendation is meaningless, since IBM is the only vendor supplying such products.

Users' only remaining course of action in a one-vendor environment is to try to exert political pressure on IBM through their elected representatives and the Justice Department's Antitrust Division. Other than that, there is precious little they can do in the marketplace to alleviate their situation.

Legal technicalities notwithstanding, IBM's lease-only software policies give the vendor the leverage to force the users into migrations such as the one to the costly MVS/XA. The absence of a clear legal position with regard to the lease vs. license status of software gives the industry leader added advantages.

If users don't act quickly to try to remedy the economic disadvantages resulting from a software environment dominated by a single vendor, there is little doubt they'll continue paying through the nose. The three- to four-fold software price increases the XA represents are obviously just the beginning of what lies ahead. If IBM is to meet its stated financial objectives, more price hikes are yet to come. Users can ignore such prospects only at their peril. ◉

Bob Djurdjevic is a computer industry analyst, president of Annex Research, a Phoenix-based computer research and consulting firm, and publisher/editor of *Annex Computer Report*, a monthly newsletter.

The reasons 3270 us can be summed

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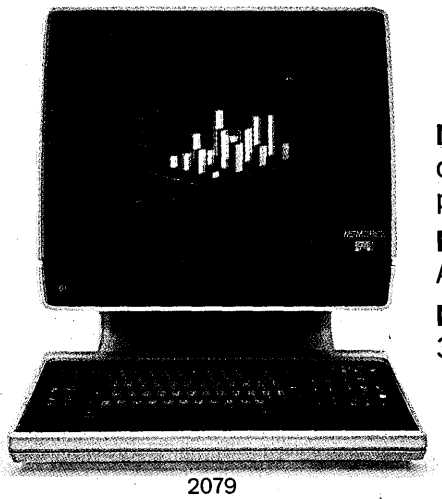

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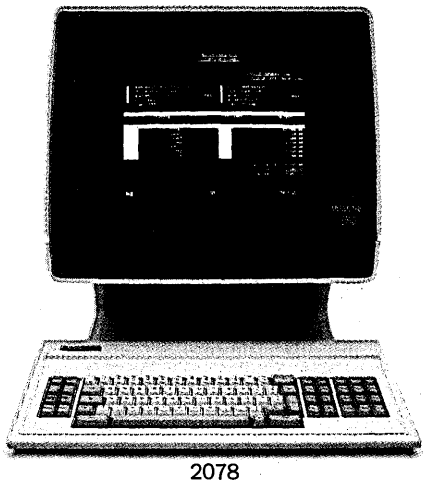

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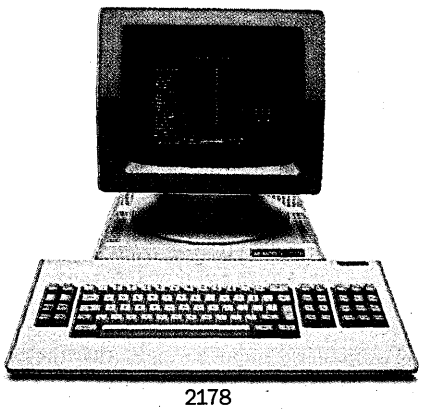

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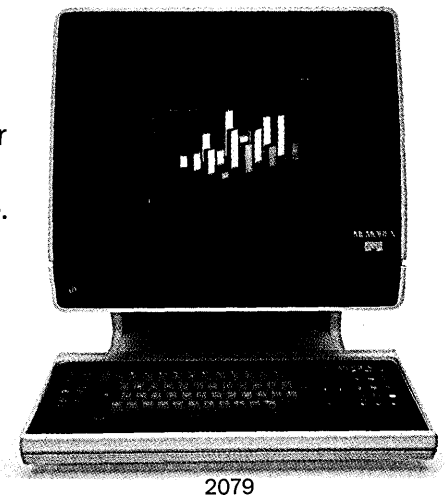

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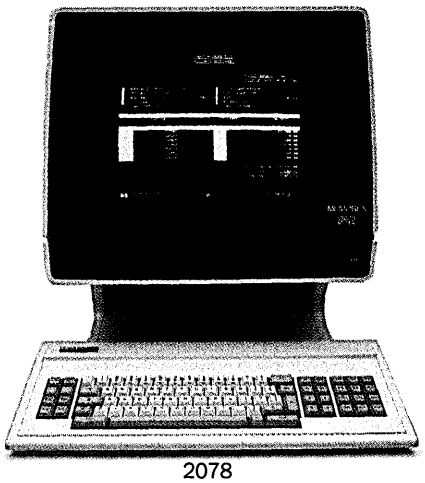

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CIRCLE 77 ON READER CARD

The debate continues over using Social Security numbers for other than their original intended use.

YOU KNOW MY NAME, LOOK UP THE NUMBER

by Robert Ellis Smith

In Pennsylvania there is a four-year-old Native American who has become the unlikely focus of the escalating debate over the use of Social Security numbers in the nation's largest computer systems.

Ever since the conversion to automated data processing, just about any governmental or private organization that keeps personal information has demanded a person's Social Security number (SSN). In the 1970s there were constant fears about the implications of this, but now there is a real chance that each person may for the first time earn the right to refuse to provide a Social Security number and still be able to receive a government benefit and perform commercial transactions.

The 1973 landmark report by the U.S. Department of Health, Education and Welfare that led to most of today's array of privacy laws says, "We recommend against the adoption of any nationwide, standard, personal identification format, with or without the SSN, that would enhance the likelihood of arbitrary or uncontrolled linkage of records about people, particularly between government or government-supported automated personal data systems. What is needed is a halt to the drift toward a Standard Universal Identifier." But that drift continued through the 1980s and now the Social Security number provides not the likelihood but the actuality that personal information in disparate databanks may easily be linked. That, in fact, is the main reason that SSNs are collected. Government agencies use the numbers as a means of matching computer records to detect fraud or duplication, and commercial organizations use them because credit bureaus, the switchboard for much of the personal information exchanges in the private sector, usually retrieve data by Social Security numbers.

The leader of the nascent anti-Social Security number movement, if that is what she is, is named Little Bird of the Snow. Her father, Stephen J. Roy, is of the Abenaki nation. After the little girl was born in Williamsport, Va., in 1980, Roy and his other child, Renee, buried the baby's placenta so that her spirit could take root. An imprint of a bird in the snow appeared to the father to be a sacred sign—hence the baby's name.

Roy feels that Social Security numbers are part of a "great evil" used by computers to rob people of their spirits. The great evil, he says, consists of three parts: the widespread use of computers, people's acceptance of that use, and the proliferation of weaponry that employs computer technology. Roy and his wife, along with Renee, have SSNs, and Roy does not object to receiving numbered food stamps or numbered checks from the Aid to Families with Dependent Children (AFDC) assistance program. Roy refused, though, to provide a Social Security number for Little Bird of the Snow and so she has not qualified for food stamps, AFDC, or state medical assistance. Roy filed suit in federal district court, asking the U.S. Department of Health and Human Services, the U.S. Department of Agriculture, and the Pennsylvania Department of Public Welfare to provide benefits to his family anyway.

NUMBER CREATED BY NAME

U.S. District Judge Malcolm Muir, who presided over the trial last May, was sympathetic. He found Roy's religious views "sincerely held" even though the government agencies found the views irrational. After hearing Roy's objections to computerization and the government's plans regarding Social Security numbers, the judge said that he was not convinced at all that Roy's beliefs are irrational. The judge even looked down from the bench and made a suggestion of his own. Would Little Bird accept a number created from her name? The judge himself converts numbers into words as a way of remembering telephone numbers and other digits. As an example, Muir calls the chief judge in his court Phillippino Ovenpot, simply as a way of remembering his colleague's phone number. Using this system, the judge determined that the little girl's number translates to 515-94-1802. A government witness said that, yes, the bureaucracy could go along with this, even though the first three digits would indicate that the number was issued in Kansas, not Pennsylvania, and even in Kansas the judge's created number would be 30,000 numbers ahead of SSNs currently in use. (The first three digits indicate the state in which an SSN is issued, counting from east to west. The middle pair indicates approximately when it was issued, though it does not directly represent the year of issue). Further, the Social Security Administration computers reject "impossible" account numbers (the administration makes this program available to other users and verifies numbers submitted by various state agencies), and so some accommodation would have to be made. Ultimately, however, the father, although intrigued with the idea, refused to accept it on grounds that it was still an enumeration.

On the last day of the trial, Stephen Roy dropped a bombshell. In testifying, he disclosed that Little Bird of the Snow, in fact, had an SSN assigned to her at birth. That is not unusual for babies born to families receiving public assistance. But the parents had returned the number and asked that it be revoked. Had Roy's lawyer been told this? Yes, responded Roy, but the lawyer had not paid attention at the time because he was playing with a Rubic's Cube.

Judge Muir did not order the case moot. Instead, he held that the SSN require-

ILLUSTRATION BY DAVID COULSON

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Little Bird of the Snow's case, a key test of SSN necessity, has reached the U.S. Supreme Court.

WHO'S GOT YOUR NUMBER?

Here are some examples of organizations using Social Security numbers.

Credit bureaus. These computerized clearinghouses of data about consumers' use of credit cards and charge accounts generally retrieve files for their subscribers by Social Security number. The number is also used to prevent mistaken identities.

Retail stores. They ask for Social Security numbers on credit applications so that they may query the credit bureau and also report the SSN to the credit bureau for credit applicants on whom the credit bureau has no file.

Banks. Federal regulations require depository institutions to collect Social Security numbers on account holders and to report numbers and interest paid to the Internal Revenue Service. There is a fine for tax information reported to the IRS that does not include an individual taxpayer number. Banks often require an SSN on a loan application and use it to access the credit bureau. Federal law does not extend to loans, safe deposit boxes, and other bank services, but banks usually request that customers supply the number on each of these as well.

Major oil companies. They ask for the SSN on credit applications in order to query the credit bureau. Some service stations now demand the number, and often the card itself when a customer uses a credit card.

Supermarkets. They demand SSNs on applications for check-cashing privileges. Some food stores query check validation services by SSN.

Check validation services. For a fee, these companies answer telephone or computer inquiries from merchants with regard to personal checks presented by customers. Most services use a driver's license number or a bank account number for retrieval. In many states, the driver's license number is the Social Security number.

Utilities. Local telephone companies regularly demand SSNs from new customers who do not post a deposit or have well-established payment records for telephone service. The companies claim they need the number to track down nonpayers at a later date. Although telephone company representatives do not announce this, they will acquiesce if the customer objects to providing a number. Gas companies and electric utilities have similar practices.

Insurance. Many companies use the SSN as a policy number, and just about all keep the number on file at one point. Casualty companies use it to match motor vehicle data. Life insurors have less need for the number, but most collect it. Most health companies have begun to use the National Electronic Information Corporation in New York City to channel claims from hospitals and doctors. The SSN is required on claims processed by NEIC.

Hospitals and doctors. Consequently, most health providers need to collect the number, although there is disagreement as to whether it is advisable to use the SSN as a patient ID as well. Just about all publicly supported hospitals use the SSN as a patient ID. Veterans Administration hospitals, of course, simply use a retiree's military service number, which since 1965 has been the Social Security number.

Motor vehicle departments. The federal National Driver Register was an impetus for motor vehicle departments to begin collecting SSNs on licensed drivers. Later the register reversed its policy and discouraged its use. Now just about all states collect the number; about a third require it. Fifteen states use it as the driver's license number. Thus, it is displayed on the face of the permit. Each of the 51 motor vehicle departments are asked by the Selective Service System to provide names, addresses, and Social Security numbers on all young men eligible for draft registration, and all but one comply with this request.

Employers. The most legitimate demand for the SSN is by an employer, who must report earnings by number to the IRS, Social Security Administration, and state unemployment compensation boards. Consequently many companies use it as an employee ID, displaying it on badges, mailing labels, bulletin boards, and elsewhere. Many ask for the SSN from an applicant so that they may query a credit bureau or other clearinghouse of "black lists" about potential employees.

Schools and universities. Just about all colleges now use the SSN as a student number. State-supported institutions are restricted under the Privacy Act from requiring students to disclose their numbers, but few students—or college administrators—are aware of this. High schools generally do not collect or use the number, but the Social Security Adminis-

ment in the welfare and food stamp programs is unconstitutional as applied to this family because it violates their religious freedom. He enjoined state and federal agencies from denying benefits to the family, as they had done. Further, he barred the Department of Health and Human Services from "using or disseminating" the SSN it had assigned to Little Bird of the Snow at her birth.

In a pending appeal to the Supreme Court, the federal government claims that it has a compelling interest in getting numbers from all beneficiaries to verify sources of income and to combat fraud. The Department of Justice says, "Each year [computer matches] uncover more fraud and abuse. Interjurisdictional matches cannot be performed without SSNs because they are the only common element in the data systems of the various states. SSNs are required for all members of a household, including children, because the various databanks that are consulted to verify eligibility and detect fraud may contain information about each member of the household.... Although certain types of intrastate matches may be performed without SSNs, the reliability of those matches is significantly less than matches performed with SSNs."

The government is certainly right that just about all government databanks use the SSN as a numerical identifier, either as a means of retrieving information or of accurately identifying persons with similiar names. But government officials who conduct matches will tell you that the SSN is a very unreliable basis for a "hit"—an instance in which a person shows up on two computer lists that are being compared. The numbers are notoriously inaccurate in government and business files because they are rarely verified. Only when they become the basis for a computer match does the accuracy of SSNs become important. Eighty percent of the hits in one recent Veterans Administration match turned out actually to be nonhits because of faulty Social Security numbers.

CONFUSION REIGNS SUPREME

There is much confusion in this country about just when a Social Security number is required. "Although many people are under the impression that use of the SSN for other than Social Security program purposes is forbidden by law," says the 1973 HEW report, "this is not the case and never has been. The impression may in part have arisen

tration encourages school systems to sponsor opportunities for students in the eighth grade or higher to get Social Security numbers at school. Eighty percent of all new card applicants are under age 18, and so in-school enumeration is efficient for the SSA.

At a college near Pittsburgh all students who attended a lecture in February were asked to include their Social Security number (and race, marital status, and age) on a speaker evaluation form. The topic of the lecture was "Privacy in the Computer Age."

State agencies. One state surveyed its bureaucracies and counted 39 separate agencies or boards that use Social Security numbers as identifiers. It's a requirement to get a fishing or hunting license many places. In Virginia, by law, a person must produce an SSN in order to register to vote.

Contests. The *Los Angeles Herald*, the *Woonsocket Call*, Washington radio station WGMS, and the *Cleveland Press* are examples of organizations that use the Social Security number as an identifier for participants in contests. An influential Health, Education, and Welfare report on privacy in 1973 emphatically discourages this because it may prompt people to get more than one number. A Cleveland man was surprised when his two children, ages 7 and 5, received notices to pay overdue taxes. The father then recalled that he had applied for SSNs for his children so that he could enter them in a newspaper sweepstakes. This triggered a mailing from the state tax department.

—R.E.S.

from the fact that, for many years, the card bearing one's Social Security Account Number has carried the legend, 'NOT FOR IDENTIFICATION.' The purpose of this legend is to notify anyone to whom a card might be presented that it cannot be relied upon, by itself."

Then, in 1974, Congress passed the Privacy Act of 1974, which further fostered the impression that there are protections against arbitrary demands for the SSN. The last section of the act prohibited *federal, state,* and *local* agencies from denying a benefit because an individual refuses to disclose his or her Social Security number, unless the agency had authority to do so in a law or regulation on the books prior to 1975. In 1976 this was amended to exempt state motor vehicle, tax, and welfare departments.

In the same year it was passing the Privacy Act, Congress was also amending the Social Security Act to require all members of a household receiving public assistance to supply Social Security numbers. This requirement was added to the food stamp program in 1977. The Deficit Reduction Act of 1984, enacting some of the recommendations of the so-called Grace Commission on government efficiency, further authorized collecting Social Security numbers from recipients of public assistance, including AFDC, Medicaid, unemployment compensation, food stamps, and aid to the aged, blind, and disabled. The 1984 act specifically directed states to use the Social Security number to conduct computer matches to detect fraud and abuse. Another law authorizes the Selective Service System to use SSNs, and, of cource, since 1961 the Internal Revenue Code has authorized their use as individual taxpayer identity numbers.

With a couple of exceptions, there are no comparable requirements on Social Security numbers in the private sector—no laws that say a person has to provide a Social Security number and no laws that say a business has to provide service if the individual chooses not to provide an SSN. One exception applies to financial institutions, which, under Department of Treasury regulations, are required to "secure and maintain" a taxpayer identification number of each person maintaining a "deposit or share account." And the Internal Revenue Code requires people to provide Social Security numbers to any organizations paying them wages, dividends, or other interest.

START WAS IN CREDIT BUREAUS

The proliferation of Social Security numbers in the private sector really began with the computerization of credit bureaus in the 1970s. Formerly, the credit bureau was a small, cooperative venture established by department stores in town to keep 3 by 5 file cards on how consumers paid their charge accounts with the various stores. By the 1960s, credit had become national, not local, with the emergence of major oil company cards, travel and entertainment cards, and later, bank cards like Visa and MasterCard. The population of the U.S. was mobile, and people wanted instant credit approval when they moved to a new city. The credit approval mechanism, which essentially involved moving ledger data, lent itself well to computerization.

It was thought at the time that computerized records required a numerical identifier to verify identity and to eliminate mistakes involving persons with similar names. The Social Security number was the handiest number. Everyone knew his or her SSN. It was thought that everyone had one (not true) and that everyone had no more than one (not true). Soon, credit bureaus began to program their records so that they were retrieved by Social Security number, not name.

Any private company that did business with the credit bureau directly or indirectly now had to have the Social Security number on file. Department stores, insurance companies, major credit grantors, landlords, automobile dealers, banks, and credit unions all began asking for SSNs on applications. Because insurance companies use SSNs to process claims, hospitals and doctors' offices began requiring them. Employers, of course, had always had to report income by SSNs, but many of them began demanding the number from applicants *before* they were hired so that the company could query a credit bureau or similar clearinghouse about the applicant's background.

What is wrong with all this? Complaints about the Social Security number trend fall into four categories.

1. "Social Security numbers allow computers to talk about me behind my back." In fact, Social Security numbers in a database do permit easier linkage of records. This means that a whole lifetime of information—from a bank, credit bureau, mailing list firm, school, employer, and hospital—can be pooled together and used to make decisions about a person without his or her participation. Data that were gathered for one purpose then are used, with other data, to determine whether a person is qualified for benefit or transaction. The trouble is that the information used may not have been verified in the original database because it was not vital to the purpose for which it was gathered there. Those data, whether erroneous or simply out of context, take on major importance when used as the basis of a computerized decision about a person.

People want to know when data about them are being exchanged so that they can correct the data or supplement them. Often the only way to prevent abuse is by not disclosing the key to the linkage, the SSN, in the first place. For example, a Louisiana oil rig worker was unable to get work wherever he applied because a clearinghouse consulted by oil drilling companies included him in a list of persons who had filed workers compensation claims in previous jobs. The man felt this was unfair so he applied for work under his wife's Social Security number. Since doing so, he has been successful in finding work. (The

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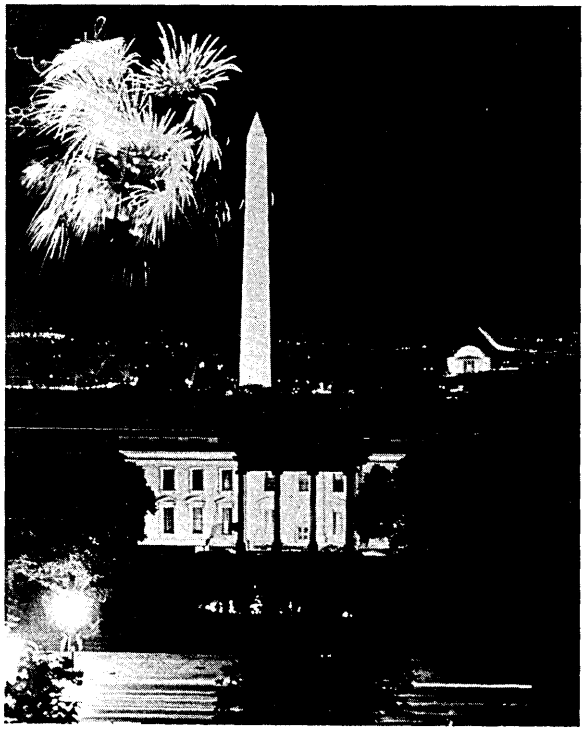

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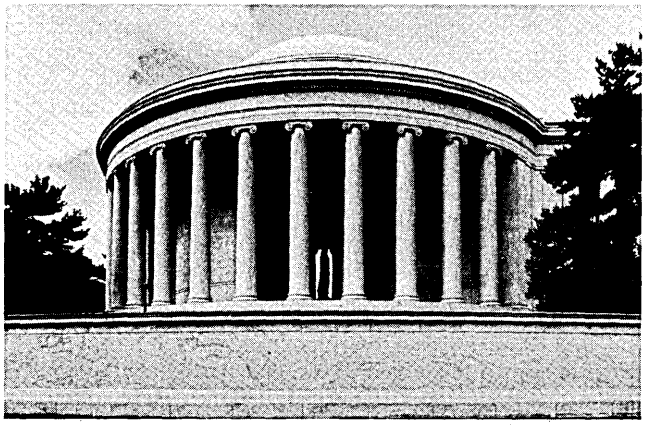

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Monday, July 15th:

1. **Strategic Planning for Small System Security**—Colen H. Emerson, Fidelity Investments
2. **Micro Systems: How Much Control Is Reasonable?**—Adolph F. Cecula, Jr., US Geological Survey
3. **Protecting Software in a Microcomputer Environment**—Ronald J. Palenski, ADAPSO
4. **Good Security Practices for Personal Computers**—William H. Murray, IBM Corporation
5. **Securing Micro-Mainframe Connections**—John J. Melia, Jr., Aetna Life & Casualty
6. **Controlling PCs: A Checklist Approach for DSOs & Auditors**—Chester M. Winters, Meridian Bancorp
7. **Security & Control in an IMS Environment**—Stewart S. Morick, Price Waterhouse
8. **VM/SP Security**—Frank F. Witham, IBM Corporation
9. **Security and Control of CICS**—Jeffrey M. Keltz, Price Waterhouse
10. **Selecting the Best Vendor(s)**—Jeff D. Burrus, Visn Unlimited
11. **Computer Security: People Make It Happen**—Joel S. Zimmerman, Computer Security, Inc.
12. **Advanced Disaster Recovery Planning in an IBM Environment**—Edward S. Devlin, Devlin Associates, Inc.

Tuesday, July 16th:

13. **Network Security**—William H. Murray, IBM Corporation
14. **Security & Privacy in the Automated Office**—Gerald I. Isaacson, Wang Laboratories
15. **The Challenge of Securing 2000 PCs at Hughes Aircraft**—William C. Boni, Hughes Aircraft
16. **New Dial-Up Communications Security Devices**—Eugene F. Troy, National Bureau of Standards/ICST
17. **Guarding Against the Small Systems Threat to Mainframe Data**—David R. Wilson, Ernst & Whinney
18. **Lessons Learned from a PC Disaster Recovery**—Steven Skolochenko, US Postal Service
19. **Developing a Total, Integrated Data Security Program**—Edwin M. Jaehne, Jaehne Associates, Ltd.
20. **The State of the Art in Data Security**—Robert H. Courtney, Jr., Robert Courtney, Inc.
21. **Your Communications Skills: Key to Effective Performance**—Patricia J. Gill, Alexis/Gill Associates
22. **Security in a Large-Scale Multi-Application IBM Environment**—Frank S. Smith, First Cities Service Co.
23. **MVS Security**—Anne B. Lescher, IBM Corporation
24. **RACF Protection Experiences**—William L. Lane, JCPenney

OPTIONAL 1-DAY SEMINARS

Sunday, July 14th:

25. **Establishing a Computer Security Program**—Robert S. Hansel, Advanced Technology, Inc.

Wednesday, July 17th:

26. **Managing Microcomputer Security**—John T. McCreadie, Ernst & Whinney
27. **Computer Crime: Prevention, Detection, Investigation**—George E. Caldwell, Bell Atlantic
28. **How to Become a More Effective Data Security Officer**—Gerald I. Isaacson, Wang Laboratories
29. **Security Review of the Data Center**—Joseph A. Antonuccio, Peat, Marwick, Mitchell & Co.
30. **Data Communications Security**—William C. Grayson, TRW, Inc.

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"Professionally planned and executed. Top-notch speakers, relevant topics." — M. Musicant, Staff Spec., New York Telephone

"Best I've been to in the last 5 years." — Clinton Marks, Dir. Sec. Adm., Gulf Oil Corporation

"Most organized conference forum I've attended. Very pleased. Enjoyed the speechless lunch." — David E. Nichols, Comp. Sys. Anal., Comptroller of the Currency

"One of the best conferences I have attended." — Maria Pesella, Jr. EDP Auditor, Com/Energy Services Company

"CSI workshops/seminars are always worth attending for content, organization, contacts. The emphasis on micro security was certainly an attractive feature, but I would have attended anyway. I was very pleased to have the opportunity to see the films, all of which were new to me." — David Puttock, Data Sec. Spec., Bank of Montreal

"One of the best seminars I have attended. Would definitely recommend it." — Noshir Chinwalla, Sr. Sys. Sec. Analyst, ITT Financial Corporation

"To the point, informative, mind opener." — Jeffers Hypolite, Asst. Sec., Manufacturers Hanover Trust Co.

"Gained invaluable insights as to direction to be taken in establishing the security function besides specific information on security products." — Katherine McDonald, D.S. Officer, Old Kent Bank & Trust Company

"Terrific meeting." — Marshall Austin, Sr. Consultant, Advanced Information Mgmt. Corp.

"Very well organized, excellent range of security issues." — Cathy Redwine, Data Sec. Anal, AmSouth Bank

COMPUTER SECURITY INSTITUTE

Computer Security Institute, established in 1974, is a membership organization devoted to helping its 3,000 members safeguard their information resources. Members receive the *Computer Security Newsletter, Computer Security Quarterly,* and a hot line service.

ACTION

For an immediate registration, or to get more information, call Computer Security Institute at (617) 845-5050. Ask for Diane.

It is a mistaken impression that the law forbids use of SSNs for other than Social Security program purposes.

clearinghouse used Social Security numbers to process queries from employers.)

2. "Someone else who knows my number can do me great harm." In 1979 the Internal Revenue Service revealed that it will provide taxpayer information to anyone who calls and claims to be the individual taxpayer. How does it verify the identity of the caller? By asking for a Social Security number. This means that someone with your Social Security number can pose as you and get information from the IRS as well as many other organizations. This can be used for investigations, extortion, or harassment.

In 1980 an investigative commission on medical confidentiality in Ontario described how this ruse was pulled by crafty investigators, like one old hand named "Ike" Eisenhauer. "Mr. Eisenhauer admitted that he frequently telephoned OHIP [Ontario Health Insurance Program] and identified himself as the person he wished to locate. . . . He mentioned the OHIP number [equivalent to the U.S. SSN], which he had obtained from the person instructing him, and expressed concern that his employer was not making the required contributions and that therefore he was without OHIP coverage. The person handling the inquiry at OHIP would then begin to discuss the nature of the coverage. By feigning confusion, Mr. Eisenhauer could usually extract the name and address of the debtor's employer and the address of the debtor if he was a pay-direct subscriber. Mr. Eisenhauer said that this technique was common in the investigation field, and was used, for example, by finance companies, like banks and private investigators, regularly when they were attempting to locate debtors."

A PERSON, NOT A NUMBER

3. "I want to be known as a person, not a number." This objection is largely symbolic, but it is still real. Remember that the first rallying cry of student demonstrators in the 1960s was not "Stop the war," but "I am a student. Do not fold, bend, or mutilate!" A Birmingham, Ala., woman has begun crusading against Social Security number use because "I am not just one of a mass of numbers in a computer." One woman complained to Congress, "I had to give my Social Security number in order to make funeral arrangements for a friend." A father was outraged when a hospital nurse asked him for the SSN of his newborn baby. He said that he and the mother had not yet selected a name. "That doesn't matter," said the nurse, "all we need is a Social Security number."

4. "My religious beliefs prohibit enumeration." The father of Little Bird of the Snow is not the first person to raise this objection. Most religious objections are similar to that of Robert Callahan, a California father who argues that the SSN is the "mark of the beast" by which the Antichrist will control mankind. Callahan refused to get a number for his infant daughter in order for her to qualify for AFDC payments. The mark of the beast reference is to a Biblical passage in Chapter 13 of Revelations about a great beast that resembles Satan:

"And he causeth all . . . to receive a mark, or the name of the beast, or the number of his name. And that no man might buy or sell, save that he had the mark, or the name of the beast, or the number of his name . . . . If any man . . . receive his mark in his forehead, or his hand . . . he shall be tormented with fire and brimstone . . . And [the beast's] number is six hundred three score and six."

The fear that the number 666 is the mark of the devil obsesses many fundamentalist Christians to the extent that it crops up frequently in literature circulated through informal channels in different parts of the nation. Whether or not by design, the Social Security Administration has never issued SSNs in the 666 series (nor even in the 600 series). True believers see 666s in Uniform Product Codes, assorted ID numbers, product serial numbers, and credit card voucher forms.

The Ninth Circuit Court of Appeals in San Francisco last year said that Callahan's views must be weighed against the government's "compelling state interest" to run its social programs efficiently by computers. On the narrowest possible grounds, the court forced the government to prove at the trial level that allowing a handful of religious persons here and there to do without Social Security numbers would seriously impede administrative efficiency.

Some custodians of large databases have shown that they can keep personally identifiable files without Social Security numbers, and often without any numerical identifier at all. The best example of this is the Medical Information Bureau in Boston, which keeps computerized medical information for 700 insurance companies in the U.S. and Canada. In setting up its system in the 1960s, MIB was advised by Arthur D. Little Inc., Cambridge, Mass., to avoid using the Social Security number as an identifier.

"We were aware of the Social Security Administration's objections to its use outside of its intended purpose," says Neil Day, MIB's executive director. "The number is not universal, many people have more than one, and many numbers are erroneous."

MIB keeps a constantly changing database of 12 million to 13 million individual files, yet it has done without Social Security numbers ever since converting to automation. When an insurance company sends an inquiry on an applicant or a claimant, MIB's system automatically retrieves the file by name, or its next logical possibility, through the grouping of similar sounding names. Two key-name dictionaries are maintained, one for surnames, one for given names. Alternate group codes are also picked up through a set of cross-references linking nicknames, maiden names, and aliases. (For more on this topic, see "Privacy and File Design Without the SSN," Oct. 1977, p. 227.) A few other systems work the same way, with address, birthplace, birth date, or other information as backup verifier.

FBI HAS SSNS OF OFFENDERS

The FBI's National Crime Information Center stores Social Security numbers of many of the 8 million offenders in its Interstate Identification Index, but the SSN is not at all the means for retrieving a name or verifying a hit.

The Immigration and Naturalization Service Center stores Social Security numbers on them. It uses a modification of the Soundex system, a procedure for automatically grouping similar names in a search. IBM developed an Alpha Inquiry System that eliminates the need for numerical identifiers in a large database. In fact, as part of its in-house privacy policies, IBM Corp., as an employer, long ago quit asking for Social Security numbers from job applicants. The number isn't required until a person is hired.

Despite this evidence that large databases can be run well without enumeration, and regardless of the outcome of Little Bird's case in the Supreme Court and Callahan's in California, it is doubtful that the trend toward universal use of the SSN in personal data systems will be reversed or even retarded. Misgivings by enough people throughout the nation, however, seem to have prevented any final move to require a universal identity number, most likely in the form of the Social Security number, to be assigned for all time to each American for required use in all transactions. ◉

Robert Ellis Smith is publisher and editor of *Privacy Journal*, a Washington, D.C., newsletter covering "privacy in the computer age."

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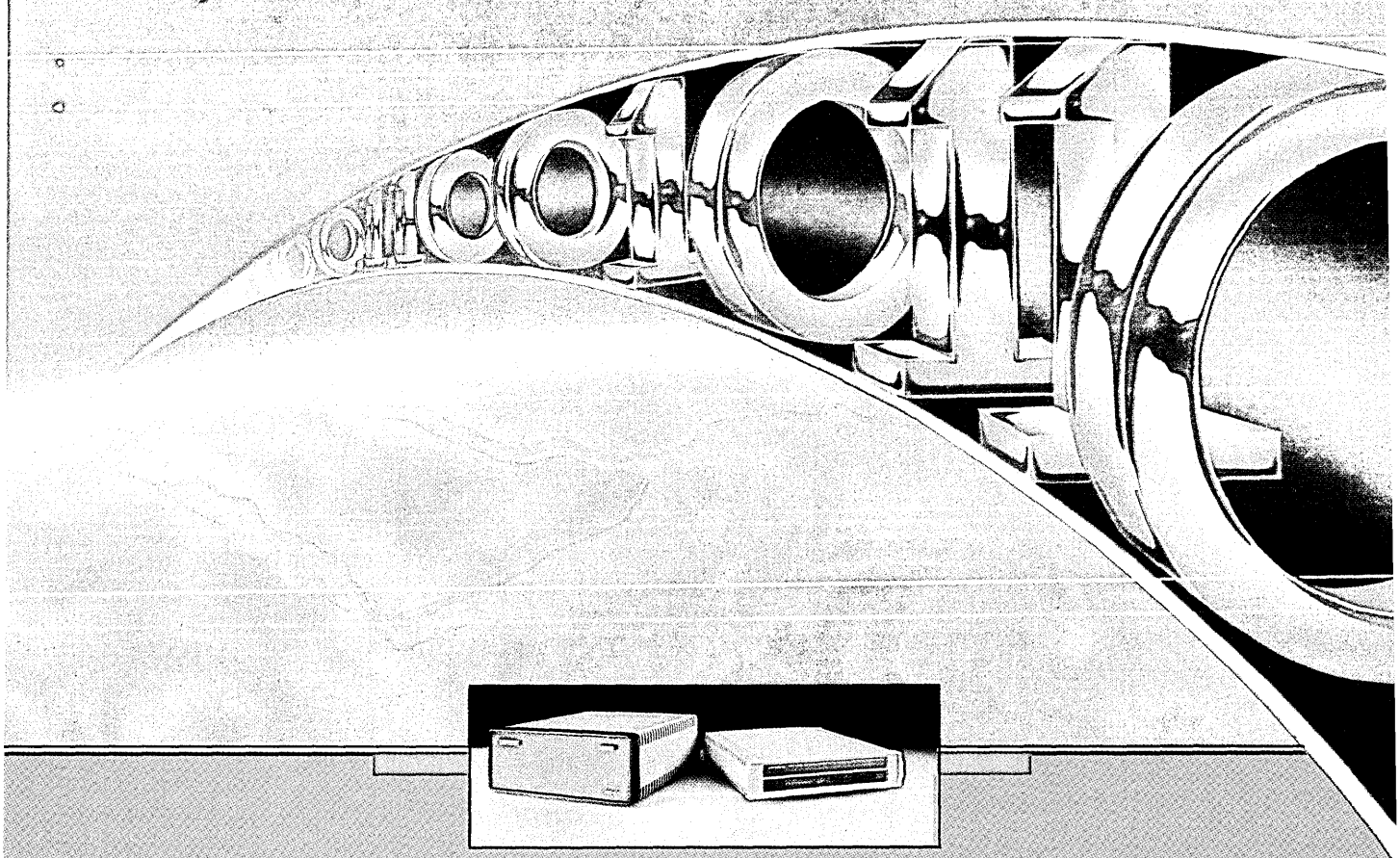

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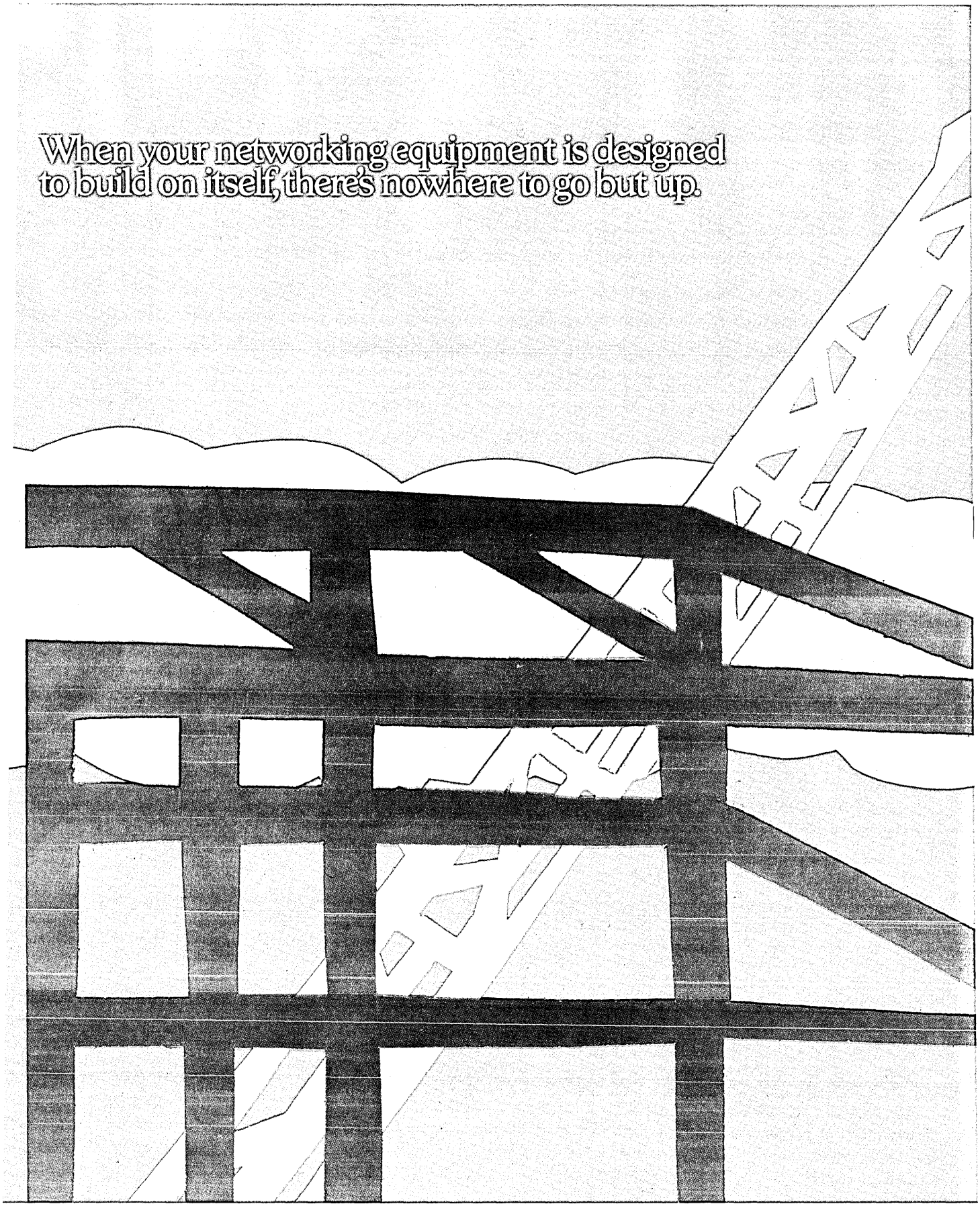

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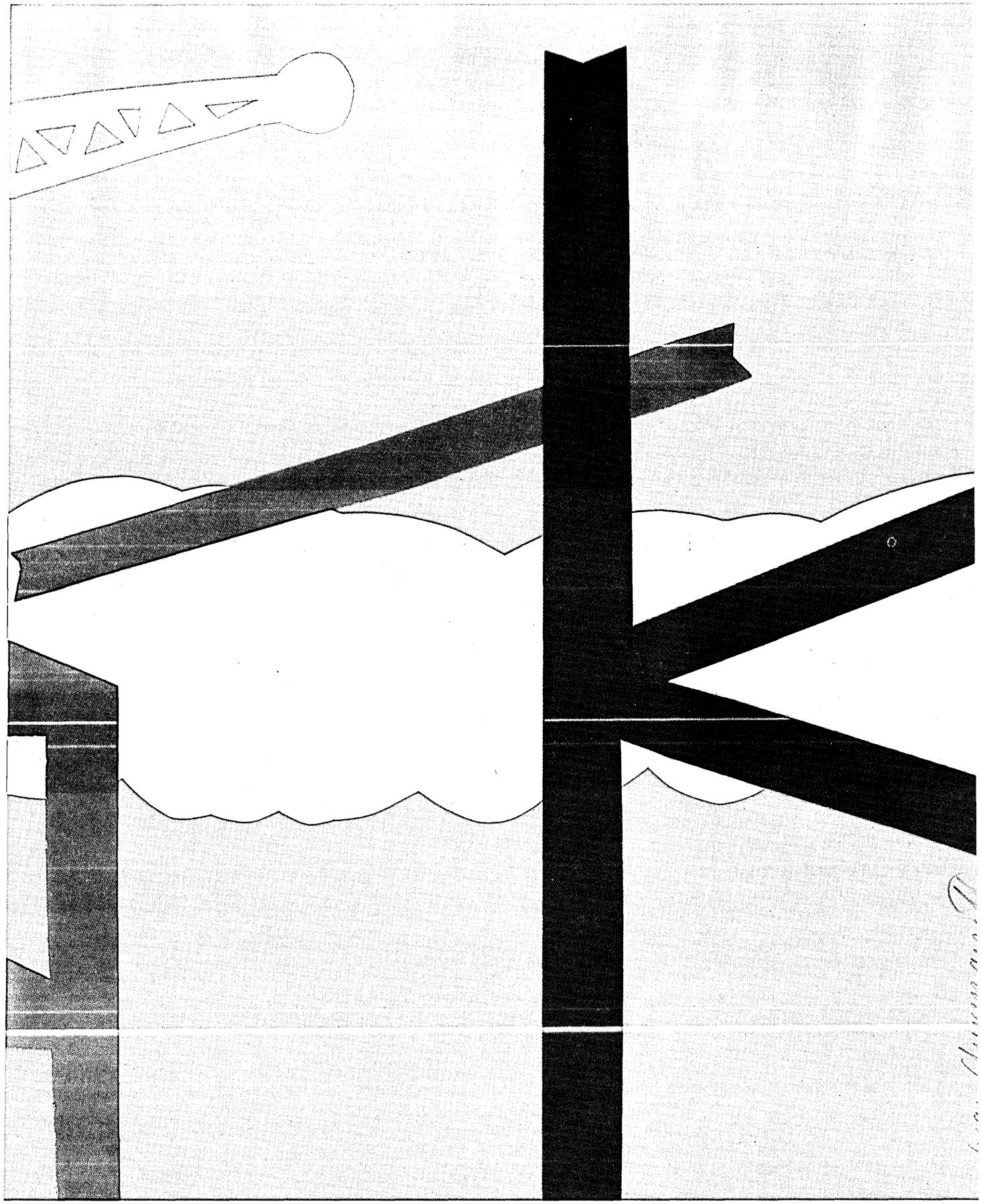

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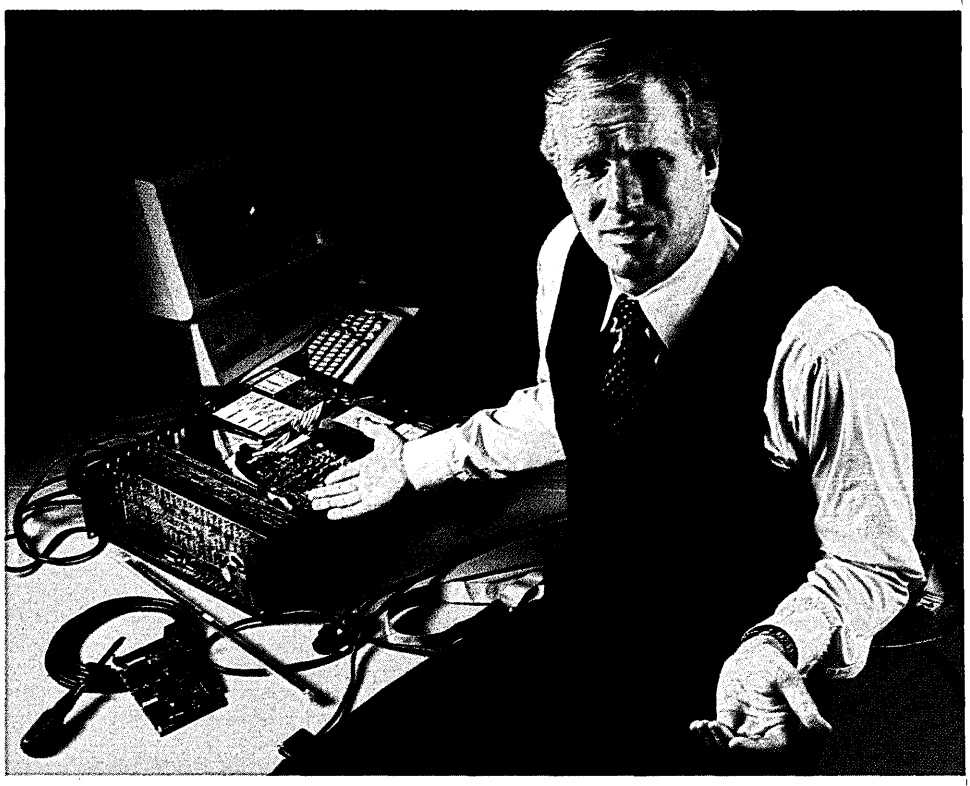

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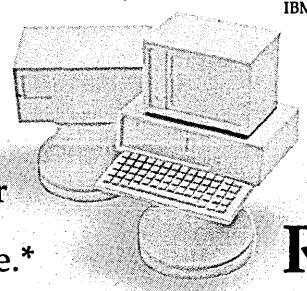

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CIRCLE 58 ON READER CARD

System security is more a matter of confidence than cost-effectiveness.

IS YOUR COMPUTER INSECURE?

by Joel S. Zimmerman

This is not the typical article on computer security. For example, the word hacker will be used only once. There—now that we've given the obligatory mention we can consider the real problems of security instead of tittering endlessly about freckle-faced, amateur electronic trespassers.

The purpose of this article is to challenge well-established and widely accepted computer security principles. While security is the wealthy beneficiary of lip service and sensationalism, it is a starving orphan in terms of serious industrial attention. This state of affairs may be a result of the misleading manner in which computer system security typically has come to be evaluated and justified in today's corporate environment.

Somehow, people have accepted the idea that computer security pays for itself. Our security assessment methodologies equate secure with cost-effective. Is this a sound approach? Further, cost-effectiveness is measured against expenses of elephantine proportions to be incurred because of hypothetical threats of infinitesimal probabilities. No wonder arguments based upon these foundations have failed to convince managers to invest in security.

A radically different perspective is needed. The principle of cost-effectiveness should have the same relevance to computer security that it does to the health of the ceo's child. Within broad limits, get the best you can afford. A child is either sick or healthy; a system is either secure or not secure. A child is given medication in prescribed dosages not because the dosages are cost-effective, but because they successfully combat the illness. Security needs to be justified not on the basis of hypothetical problems and unlikely threats, but on empirical evidence of successful challenges to system integrity. Security must be enhanced to the point that we are confident in our systems.

Today, the most commonly used approach to computer security is don't spend more money protecting your assets than you would lose if the assets were endangered. As an alternative, I suggest we start to view confidence in our systems' security as more important than cost. The first approach can help determine if a security system is cost-effective, but that may or may not establish our confidence that the system is secure.

The key to this difference is in the criteria "informed managers" use to decide whether or not they have achieved the best system security they ought to. When management decisions are entirely money-based, the two approaches will lead to the same conclusion. The next step, then, is to investigate whether security decisions should be based solely, or even mostly, on money. Is it wise to restrict security decisions to a money criterion? And even if it is, does this approach give us the necessary guidance in security decision-making?

It is easy to imagine how life and death might depend upon the security of a computer system. In health care facilities that use computers as real-time assistants in medical procedures and to maintain medical records, patients' lives may be jeopardized if a computer fails or if data are inaccurate. Computers that monitor nuclear power stations can be called upon to react to emergencies in which a processing fault might lead to a nuclear disaster. Shall we be satisfied, in these cases, to place a dollar value on the lives at stake and seek a cost-effective level of computer security?

LIFE & DEATH & THE LAW

Besides matters of life and death, other circumstances seem to demand more than a simple dollar-bill metric for security. If state and national laws require full auditability on a particular system, or if a government contract requires classified information handling, the proper security measures must be incorporated to comply with the law and to protect the public welfare. Questions of cost should come only after determining that security has been ensured at the required level.

More mundane, but no less important, security is required for an array of psychological reasons. Every company's success depends upon its image of stability and reliability. Management, workers, and customers all want to believe that the company's systems are safe and dependable. The price of confidence, credibility, and a good reputation is hard to establish.

For example, suppose a bank's computer system is compromised, resulting in a small loss. The bank makes a public statement that this small loss is less than it would cost the bank to build in protective safeguards. Therefore, claims the bank, the current security strategies are cost-effective and vindicated. Wise managers of money, the bank will continue to accept these losses due to "minor" security breaches rather than enhance its security posture.

In the opinion of this author, a scenario such as this will never be seen. One of the most valued assets of any bank, even beyond its concern for wise money management, is its reputation for security. Public confidence is an asset for which banks will pay gladly.

Suppose everything at risk in a computer system could be valued accurately with a dollar amount. Even then, today's commonly used risk assessment methods lead to erroneous decision-making. These methods are based upon statistical fallacies and a decision criterion that is inherently too conservative.

The risk assessment methods found in most security literature, including that published by the National Bureau of Stan-

One of the most valued assets of any bank, even beyond its concern for wise money management, is its reputation for security.

dards, is based upon the following type of formula: ALE = P(L) x V. ALE is the annual loss expectancy or the expected amount of money that will be lost in a year, calculated from P(L), the probability of a loss occurring in any year due to some collection of threats to an asset, and V is the value of the asset. Various methods make use of lookup tables, logarithmic transformations, and other variations on the theme, but retain this calculation approach as their base.

An example of a simple ALE calculation is shown in Fig. 1. Presume a data center is worth $3 million. Presume, too, an accurate expectation that one in 10,000 such data centers will be totally destroyed in any year by some set of threats. Using the ALE approach, the dp manager would multiply $3 million by 1/10,000 and estimate that his expected annual loss due to this particular set of threats is $300.

Now consider the sense of this approach. Who loses $300? Clearly, no one does. While 9,999 dp managers lose nothing, one poor soul loses the whole pot.

The ALE formula is based upon an actuarial perspective of the world. It is useful for an insurance company to figure out the premiums that would be necessary for a group to share a risk. Actuarial statistics are properly used to study individuals to make inferences about a group. But the inverse, studying a group to make decisions about an individual case, is not statistically valid.

Using the risk assessment analysis formula means that the expenditures for security measures could be justified up to the cost of $300 per year. Past that amount, the argument goes, more is being spent to provide security than would be lost by not providing it. This is the break-even approach to computer security.

The probability that this expected value will be wrong is 100%. It is a "point" estimate. Even in the best circumstances, you cannot expect to get an estimate exactly right, to the penny. The best statistical point estimate, the expected value, is characterized by the fact that 50% of the time it will prove to be too high, and 50% of the time it will prove to be too low.

How does that relate to security planning? If the break-even amount is accepted as the correct amount to counter your data center's security threats, this approach virtually guarantees that you will come up short half the time. As many years as not, the threats to your system will get the better of you. This is not characteristic of a security system in which management can be confident.

While it has never been graced by a National Bureau of Standards publication, an old management proverb appeals to the common sense: *Hope for the best, be prepared for the worst, and plan for the most likely.* To make management decisions based upon an unexpected loss of $300 is to be planning not only on the unlikely, but on the impossible. Realistically, managers should make plans based upon having no crisis whatsoever. Being security-minded, they should also be prepared, if at all possible, to confront the worst. A solid, dependable security investment against this particular threat, if one were available, would probably be approved by management even in excess of the cost-effective $300 per year.

FIG. 1

EXAMPLE OF AN ALE CALCULATION AS IT MIGHT BE DONE IN A RISK ASSESSMENT ANALYSIS

A data center's worth is estimated at		$3,000,000
We expect 1 out of 10,000 such centers to be destroyed in any one year	X	.0001
The expected annual loss for this center is		$300

The idea that security pays for itself is grounded in the use of break-even analysis. Few homeowners expect to break even on their homeowner's insurance. Most are glad never to collect a single penny on it. They pay for the security. Security does not pay for itself; it costs.

SECURITY BASED ON FEAR

Selling the case for computer security has not been easy or successful in corporate America. Most computer security is sold on the basis of fear. Case studies are cited to prove that enormous losses may result. Persuasion is based upon hypotheticals. Pressed for the facts, security administrators are forced to admit that the likelihood of serious problems is actually quite slim. Senior managers must divide scarce company resources among the real problems being faced right now and the hypothetical, low-probability problems prophesied for the future. Their decisions are predictable—we'll take care of security next year.

Further, as a result of buying security the company will not be any better; it is merely less likely to be any worse. Security, even at its best, seems to make little positive impact on the system. The megadollar uninterruptible power source hums along in the back room, receiving neither recognition nor praise for the power regularities the staff takes for granted. Uncounted are the number of broken confidences successfully deterred or thwarted by the firmly applied policies of password administration. When security works well everything is quiet. There are no problems. There is no praise. What impact security makes is likely to be negative and resented—rules, restrictions, delays, and costs. Systems programmers grumble about restrictions on SuperZap. Encryption eats up cpu time. Badge clips mess up blouses. It should not be surprising that many companies fail to prepare adequately for computer system security.

Americans are problem solvers, not problem avoiders. "If it ain't broken, don't fix it" is part of the American lore. We are clearly not interested in problem prevention. Schools find it necessary to send home notes threatening to have children expelled from school if their immunizations are not brought up to date. Advertisements implore us to fasten our seat belts and quit smoking. But the sons and daughters of the pioneers who won the West are not intimidated by threat of danger.

On the other hand, when a problem comes up Americans respond in a microsecond. Americans might not pay attention to the possiblity of an earthquake in San Francisco, but if one ever hits, the rest of the country will mount an inspirational relief and rebuilding effort. Back in the computer center, doing regular data system backups is seen as a chore, but restoring a lost database under severe time constraints would be an exciting adventure. Americans love a challenge.

Computer security is failing because it is un-American. The idea of rules and restrictions goes against the free-country nature of American employees. Security managers are pessimists who foretell of evil doings and ask people to prepare for problems that don't exist. When security is working well, there are no challenges and no rewards.

If it ever is to succeed, computer security must be sold in an entirely different manner. The following changes are necessary.

1. Security must be based upon concrete experiences, not the fear of potential disasters.

SCIENCE/SCOPE

In the 25 years since the birth of the world's first laser at Hughes Research Laboratories, the "light fantastic" has grown from a laboratory curiosity into an indispensible tool in medicine, industry, electronics, data processing, communications, and scientific research. That first laser, built by Dr. Theodore H. Maiman, was operated on May 15, 1960. It used a flash lamp coiled around a solid ruby crystal to produce an intense pulse of red light with a wavelength of precisely 6943 angstroms. Lasers today employ various gases or crystals and operate throughout the electromagnetic spectrum. They are used as tools for cutting, welding, drilling, and marking metals; as alignment and measuring devices; as the sources of signals in fiber-optic communications systems; and as rangefinders and target illuminators in military systems. Promising new medical uses include advanced eye surgery techniques, internal cauterization, and treatment of cancer. Already used in some computer printers, lasers one day will be widely used in high-speed optical computers to process and store data.

Building blocks for what will become an electronics factory of the future are being set in place at Hughes to cut costs in manufacturing airborne radars and other avionics programs. Lasers, fiber optics, remote fiber fluorometry, and advanced optics play a part in an Industrial Modernization Incentive Program (IMIP) contract awarded by the U.S. Navy with Air Force participation. IMIP is a share-the-savings concept to reduce costs of the F-14, F-15, and F/A-18 radar programs by more than $10 million, while improving the quality and reliability of the systems. Three projects employing new manufacturing technology focus on solder joint inspection, metal fabrication inspection, and continuous chemical analysis of solutions used in electroplating printed wiring boards.

An advanced factory management system model, developed by Computer Aided Manufacturing-International and Hughes, will help optimize use of manufacturing resources. The model will address interactions of all work areas within every level of the organization. It will precisely identify department production capacities, queue bottlenecks, and resource flow. Managers now must make decisions without knowing all interactions among workstations, cells, and departments.

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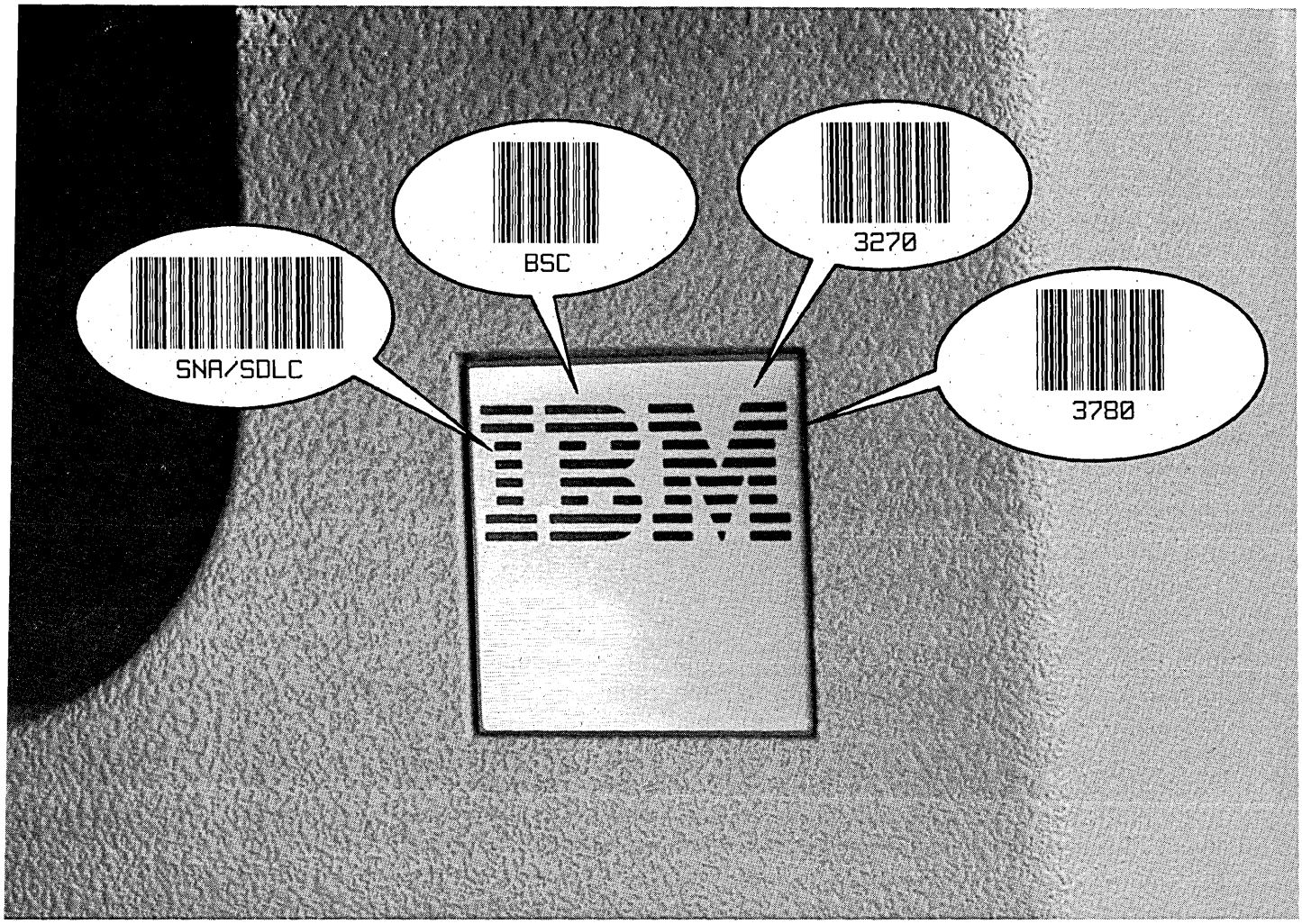

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CIRCLE 80 ON READER CARD FOR LITERATURE
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As a result of buying security a company will not be any better; it is merely less likely to be any worse.

FIG. 2

FUNDAMENTAL POSTULATES FOR SYSTEMS SECURITY

1. Security is not hypothetical; it is real. A threat may face the system at any moment. When it does, system controls either will be ready or they will not.
2. At the time a threat occurs, it will either succeed or fail. Against any particular threat, any particular asset is either protected or not protected.
3. No system is perfectly secure. It is impossible to protect all assets against all threats.
4. Security is neither probabilistic nor logical; it is psychological. Security is your level of confidence that assets are protected against threats.
5. Confidence stems from three sources: the belief that a particular threat will not materialize; empirical demonstrations that system controls do protect assets against threats; and guesses that controls will protect assets against other threats in cases where this has not been demonstrated empirically.
6. System controls protect against threats if it can be shown that:
   A. Information assets are installed and maintained at an appropriate level of quality.
   B. Those assets that are vulnerable to threats are such that their loss, inappropriate modification, theft, or quality degradation would a) cause negligible harm to the organization, or b) be detected and recovered from satisfactorily.
   C. All assets whose loss, inappropriate modification, theft, or quality degradation would cause significant harm to the organization are effectively shielded against threats.

2. The effects of security must be visible. Its results must be positive.

3. The operative challenge must be not to beat security, but to make it work.

Computer security can be managed with these principles. The remainder of this article sets a groundwork for this approach to security management.

Imagine a security officer who is worried about the most feared of all threats, *The Bomb.* Talking to senior management, he says, "Hypothetically, some radical could come in here with a bomb and blow the entire dp center to bytes." Ever on their toes, senior management responds, "Hypothetically, the radical would get caught long before he got near enough to the computer to set the triggering device." The problem is that everyone is talking hypotheticals. The security officer is asking American managers to prepare for a problem that might never occur. Security wants management to invest corporate resources in system controls that will be unpopular with staff (because they will bring new rules and restrictions) and that will show no apparent return on investment. Managers won't gain from the proposed controls. They could protect themselves from criticism if a bomb did go off by the same rationalization they presented to the security officer, i.e., there was reason to believe that existing security precautions would have intercepted and stopped the radical.

Fig. 2 presents some fundamental postulates for an alternative way of approaching computer security. Between acts of nature, human errors, and the devious deeds of evil people, the security threats facing a data processing system outnumber the storage addresses of a supercomputer. The system cannot be protected against them all. The tension in computer security comes from making choices—what will be controlled and what will not. Even with the most sympathetic management, these choices cannot be avoided.

COST BASIS FOR DECISIONS

Classical risk assessment approaches to computer security offer a convenient basis for making the hard security decisions—cost. If it probably will cost less to protect than to suffer the consequences, build in the security. An optimum decision point exists in theory and can be found by mathematical analyses of objective valuations.

If, however, one rejects this breakeven approach to security, it may be from an understanding that security is less logical than psychological. Instead of viewing security as a collection of probabilistic controls, it can be thought of as management's confidence in those controls.

The difference between confidence and probability is a subtle one that comes from the statistical sciences. For any given organization, either a bomb will be experienced or it will not; the probability is 1.0 or 0.0 and cannot be any value in between. Confidence in the system's ability to counter this threat, on the other hand, can range anywhere from none to complete and will vary substantially from person to person.

THREE WAYS TO BE SURE

Confidence is gained in one of three ways. First, one might believe a threat will not occur. While one in 10,000 computer centers might be expected to experience an earthquake from an actuarial perspective, managers of computer centers located near known geological faults should be more worried than managers in other centers. Bombs should be of more concern to managers in organizations that are connected to the military, have ties to strongly political issues, or have received explicit bomb threats. If informed managers believe a threat will not occur, they can be confident even in a security system that has no controls. This suggests that management might rightfully reject the installation of controls that a risk analysis shows to be cost-effective. If managers believe a threat will not occur, controls are not needed to counter the threat regardless of how inexpensive they are.

The best way to gain confidence is through empirical demonstration that system controls work. Conversely, it is precisely when a threat inflicts great harm that confidence in a security system is at its least. The security officer's dream is for a monumental disaster to befall the guy next door. It proves conclusively that a problem can occur, completely changes the psychology of confidence, and often opens the door to security requests that had been long denied.

But the most common situations that organizations confront are those in which a threat is believed possible but no empirical evidence is available. In these cases, confidence is based solely on the guess that system controls will protect assets against the particular threats. This is the weakest situation and the most frustrating for security officers. If the organization receives a bomb threat, the security officer's job may face the same jeopardy as the data center. The security officer's guess may be that the system's controls are not adequate to counter a radical bomb plot. Senior management, who must authorize funds for additional controls, is guessing the other way. If the bombing is attempted, empirical evidence will show who was right. Nonetheless, the security officer will lose in either event—having needlessly cried wolf if the bombing fails, having failed to provide enough security if the bomb goes off.

If, as is argued, confidence is best

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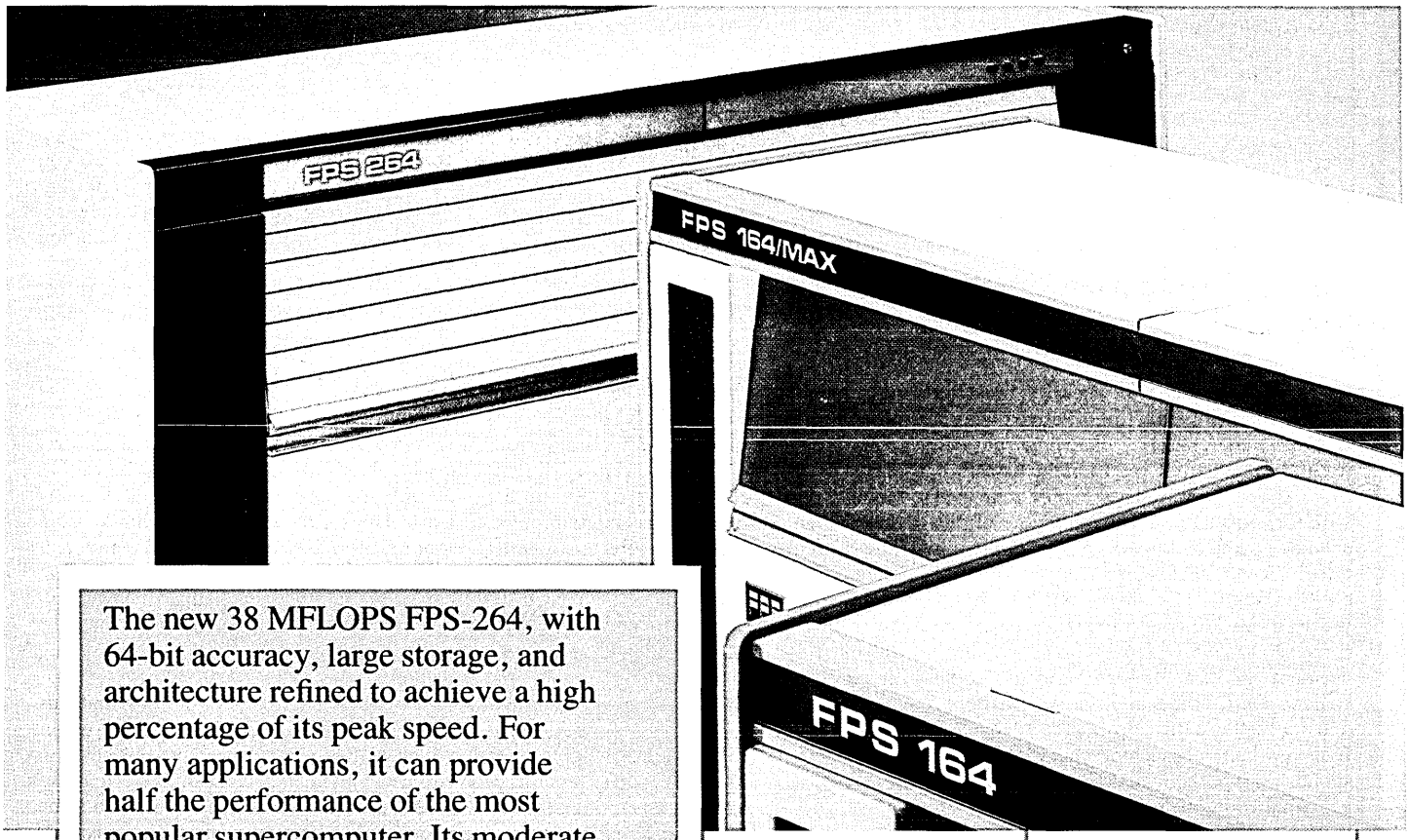

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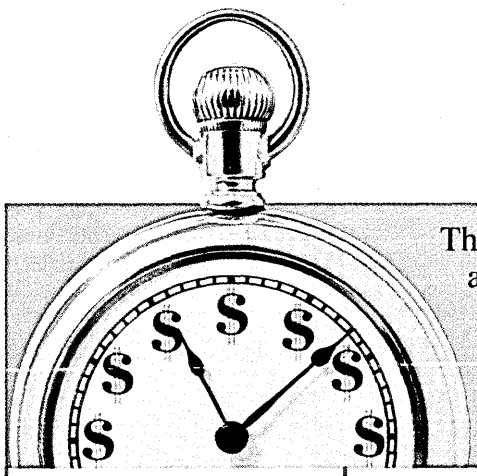

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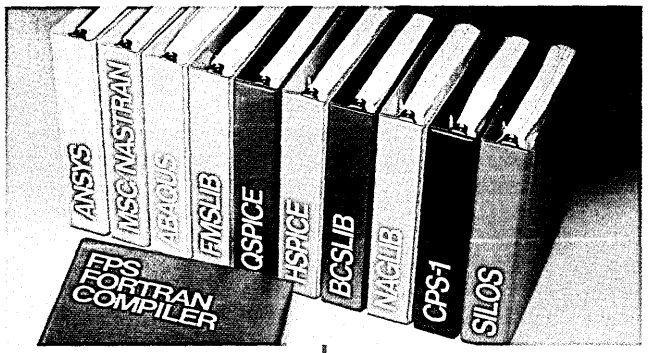

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Word size	64 bits	64 bits	64 bits
Main memory capacity	4.5 MWords	15 MWords	7.25 MWords
Maximum disk storage capacity	16 Gbytes	3 Gbytes	3 Gbytes
Precision	15 decimal digits	15 decimal digits	15 decimal digits
Vector registers	4 x 2K	124 x 2K (max.)	4 x 2K
Scalar registers	64	184 (max.)	64
Host interfaces	IBM, DEC	IBM, DEC, Sperry, Apollo	
Program Development Software	FORTRAN Compiler, Overlay Linker, Assembler, Object Librarian, Interactive Debugger.		

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Peak MOPS	190	1705	165	55
Peak MIPS (Instructions are multi-parcel)	19	5.5	5.5	5.5
Typical MFLOPS, LINPACK Benchmark	9.9	20.0	6.0	2.6
Whetstones, KWIPS (64-bit)	19,000	5440	5440	5440
1000x1000 matrix multiply, seconds	53	10	66	189
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Security does not pay for itself; it costs.

gained from an empirical demonstration that the security system works, the organization needs a way to tell what is working and what is not. As shown in Fig. 2, three concepts underlie the empirical demonstration of system effectiveness. First is the notion of quality control. The second and third relate to questions of protection. As a group, these define the most important goals of any computer security system.

The primary goal is to maintain the best possible information system assets. Herein lies yet another opportunity for shortsightedness and disagreement. For a complete security system, assets must be defined broadly. Along with computer hardware, assets include software, dp staff, documentation, and supporting facilities, all of which are critical to the organization's information resources. The security officer has a legitimate concern for all.

The most frequently ignored element of computer security is quality control. The first question every security program must ask is whether the information assets in the computer system are reliable and valid. Before worrying about protecting assets, one must ensure that assets include both the raw data and the programs used to process them. Programs, like data, can contain accidental and malicious alterations (logical errors and Trojan horses) to threaten information integrity. Hardware, staff, and documentation all must meet minimum standards of quality before they become part of the system.

QUALITY CONTROL NECESSARY

Some organizations believe that information system quality control is not part of the security officer's job. Security is viewed more narrowly to include only the domain of asset protection. This is like hiring a mechanic to keep your automobile running, but refusing to let the mechanic look at the car before deciding whether to purchase it. System integrity is what a security system keeps secure. Security's concerns include the integrity of assets as they enter the system, which is the essence of quality control, as well as the protection of their integrity as they function within the system.

Once on the system, information assets can be grouped into two broad (overlapping) classes; those that are protected from harm and those that are not. If a staff member's skills are easy to replace in the labor pool, if a data set can be replicated quickly and its loss involves no violations of confidentialities, if a new machine can be purchased cheaply to replace a broken one, then threats to these assets are inconsequential and the assets do not need special protection. For threats such as fire, one is never fully confident the threat can be avoided. Confidence is then enhanced by knowing that if the threat occurred, recovery could be accomplished satisfactorily.

The other type of assets includes all those for which protection is provided. For such resources, loss, inappropriate modification, or degradation in quality would cause significant harm to the organization. The system works insofar as it effectively shields these assets. System controls are needed, for example, to maintain the privacy of confidential data, the availability of critical data and critical staff skills, and a constant flow of electrical power to a real-time, on-line database system.

This set of postulates, then, is the framework for a different view of computer system security. It guarantees that security is pursued until managers are confident of its success, instead of only as long as it pays for itself. It has been argued that the security officer must take security out of the realm of hypothetical thought and into the world of reality. Security systems can be evaluated empirically in many cases. Two basic strategies are available: actively monitoring control systems as they are challenged, and challenging the security system under controlled, simulated conditions.

Control monitor reports are being built into many commercially available security controls. Operating system reports are being designed to print summaries of the number of times attempts were made to access data sets or execute programs for which inadequate levels of privilege were held. Some power supply regulators generate logs of the times that power spikes are suppressed, lines are filtered, and supplemental power is supplied from battery reserves. Many "user assistance" offices maintain records of the number of callers and how their information system problems are solved. These are empirical evidence that the security system is real and working. Many control system monitors and measures can be devised with some creative thought by the security officer.

An important and often overlooked use of this information is to demonstrate that the security system is not hypothetical; it is real and it is working successfully. The judicious display of control monitor information to management and staff can completely transform their perception of and confidence in computer system security. If the system is currently well secured and everything is working smoothly, people can draw several conclusions, including "We do not need security because everything is working well," or "Everything is working well *because* we have a good security system." Reporting data from control system monitors leads to the more desirable second conclusion.

GAMES SECURITY PLAYS

For many events, however, it is impossible to measure how well controls work because they are called upon too infrequently. Empirical demonstrations are still conditions controlled by the security officer; the system can be challenged with a simulated threat and the system response can be monitored. In the best American traditions, security becomes a game, staff become a team, and winning the game is everyone's goal. Security games serve two functions. They demonstrate how well the system works, and they get staff involved with security.

Games for computer security are easy to fabricate. Games should be designed to simulate real system threats. As security officer, hire a stranger to walk into the facility and plant a phony bomb hidden in a briefcase. How far does the person get into the facility before he or she is challenged by a security guard or staff? For advanced versions of the game, give the stranger props such as an expired identification badge or a priest's clothing. To test data controls, ask someone to try to enter a controlled error into the database system. Does the error get caught by the quality control system? See if one of your staff can make a copy of the accounting department's payroll files and deliver it to you.

Many security administrators are familiar with the so-called "penetration study." A "tiger team" is appointed and given the assignment of penetrating the system in some predefined manner. The goal may be to bring down the operating system, to gain access to a protected data set, to execute a privileged program, or to implant a Trojan horse. No matter how the game comes out, everyone is a winner. If the penetration fails, the system is demonstrably secure (at least to some extent). If the penetration succeeds, a system weakness has been uncovered and appropriate remedial actions are required. Assuming the penetration study was well designed, the question of a system threat is no longer hypothetical; it has been demonstrated empirically. Security games can thus eliminate, or at least reduce, disagreements over hypotheticals.

When nature is the opponent, games are frequently referred to as drills. Many organizations have plans for recovery from disasters such as fire, storm, or complete loss of power.

Another major advantage of these games is the opportunity they present for

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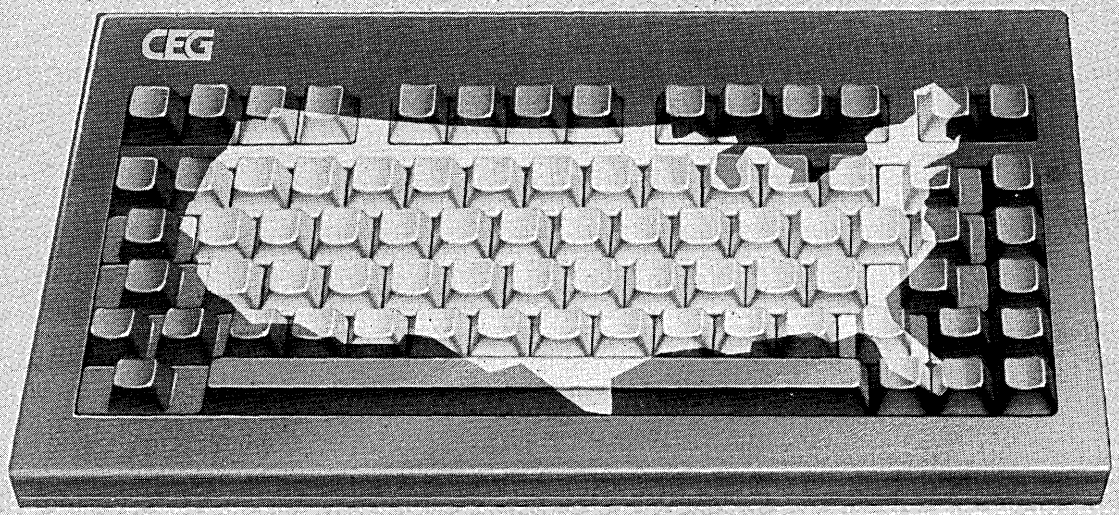

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learning. Security plans carried out under emergency conditions are bound to face problems. Whether recovering from a flood, a major data theft, or a logical program failure in the middle of the busy season, staff will be working under conditions of stress and performing unfamiliar tasks. In the urgency of the moment, normal quality control procedures will be suspended. The disaster game, or drill, makes it possible for staff to become familiar with necessary recovery tasks before they are really needed. Each drill presents empirical evidence that the recovery plans are sufficient, or that they need to be improved and tried again. Confidence is built.

Again, psychology is important. "Tests" are bad, "games" are good. Keep the spirit positive. The purpose of these games is not to display problems but rather to demonstrate that the system is working. Design the tests as progressively harder challenges. Repeat challenges that the system fails until the system is improved to the point that it succeeds. Then, make the game harder again.

Finally, remain ever alert. Remember that no security system is perfect. Security is psychological, not logical. Empirical demonstrations build confidence but they do not prove a system is free from vulnerabilities.

FINDING ALTERNATE METHOD

This article began with a dissent from the commonly described methods of computer security risk assessment. To lose faith in risk assessment analysis presents a serious problem because this methodology has been central to computer security decision-making. Risk assessment has been proposed as the keystone methodology for the more global processes of security evaluations, security certifications and accreditations, system validation and verification, dp contingency planning, and dp audits. An alternative to risk assessment must be found.

The traditional risk assessment study follows these steps. An inventory is performed of all information assets. The assets are given values (usually monetary). A list is assembled of all potential threats against these assets and their probabilities of occurring. Expected losses are estimated (for example, using the ALE formula discussed earlier). The potential losses are taken as a measure of system risk.

This information is then applied in making security decisions. For example, potential new controls are proposed. The costs of the potential controls are compared with the expected reduction they would cause in expected losses, or high-risk situations become the focus for data processing audits or contingency planning.

Risk has been viewed in most computer security literature as a joint function of two values, the worth of an asset and the probability of its being successfully threatened. The more an asset is worth and the greater its chances of being endangered, the greater the risk. The method, then, analyzes risk around assets. Assets are enumerated, some scalar is attached to each one, reflecting its joint function of value and threat, and the scalars are added to express total at risk.

An alternative is to focus an analysis on threats rather than assets. This is a useful approach because most controls counter some particular threat (e.g., malicious file destruction, unauthorized network access, computer fire, or unspecified program code) and simultaneously protect several assets rather than being asset-specific. Further, it may be more important to address every system threat than to address every asset. Assets come and go. Although new assets get added frequently, new threats do not necessarily result. Threats are more constant.

For the security system to merit confidence, all system vulnerabilities need to be examined. For computer security to ensure the value of information assets, it must effectively guard against threats to those assets. This suggests another way of evaluating system security.

ELIMINATE THREATS FIRST

Let's consider the vulnerability assessment. Begin with an inventory of threats to system security. What possible forces could lead to the introduction of substandard information assets? Once assets are on the system, what forces might lead to their loss, inappropriate modification, theft, or degradation in quality? Eliminate all threats that management believes will not occur. Also, eliminate those threats that would result in inconsequential harms.

The items remaining on the list are threats that have a nontrivial likelihood of happening and, assuming they were unchecked, would cause significant harm to the organization. As explained above, confidence in the system's abilities to counter these threats comes from two sources—empirical demonstrations and guesses. Whenever possible, of course, the former are preferred. Sometimes, particularly when a system is being built, guesses afford the best information available.

Within computer security, the best source of information about system threats (in the absence of empirical data) may well be the collective judgment of informed staff. Staff will be most able to identify threats to the data system and judge the ability of system controls to counter these threats. If this information is gathered carefully and scientifically, it can fill the void when empirical evidence is unavailable.

Next, management must view the list of threats and decide how confident they are in the system's security controls. This can be measured on a subjective rating scale if so desired, or it can be as simple as a bivariate consensus of satisfactory or unsatisfactory. Vulnerabilities are identified as those threats for which management does not have satisfactory confidence in the security system.

The vulnerability analysis can become the basis for decision-making, in just the same way that risk assessment was. Unacceptable vulnerabilities can become priority items for additional controls. Where confidence in preventive controls is low, new importance may be assigned to the process of contingency planning until the confidence in recovery plans is suitably high.

Cost-effectiveness, needs to be redefined, not abandoned. Control mechanisms should be studied to identify alternative ways of countering threats that may cost less yet retain a satisfactory level of system confidence. Using simulation games, less costly controls can be attempted, to see how well they function under attack.

In the end, computer security will not be viewed as an exercise in fear of the unknown. It will be established as the careful management of threats. Staff will stop thinking of security systems as restrictions against their freedoms. Rather, they will see themselves as members of the team, working together for the protection of information resources. ◉

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. In addition to his consulting work, Dr. Zimmerman is an adjunct faculty member in the graduate MIS program at George Washington University, Washington, D.C.

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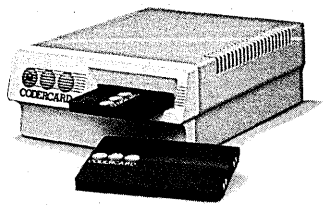

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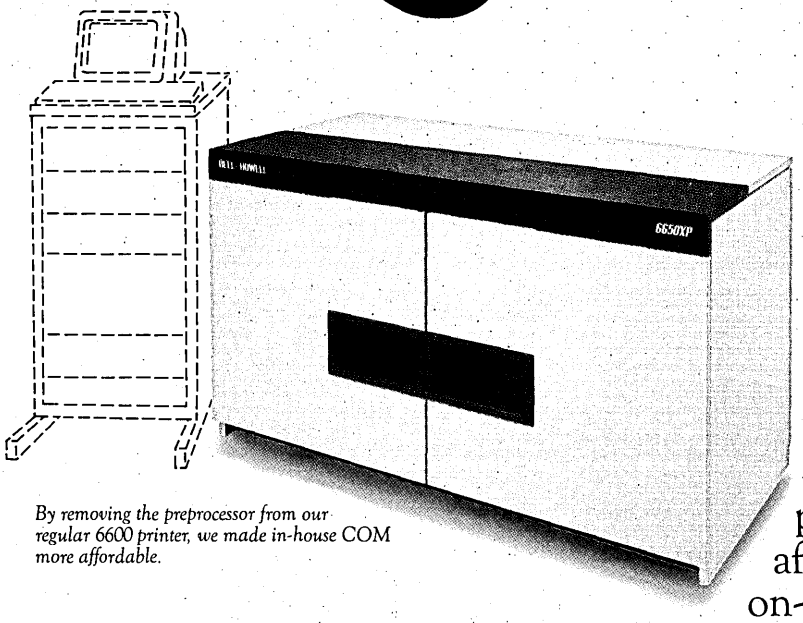

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Data-driven screen design gives new power to those designing mainframe applications.

PAINTING A NEW PICTURE

by Frank Sweet

Two forces—widespread computer literacy and the advent of today's application generators—are transforming the way dpers develop mainframe applications. Together, these forces can help us achieve a three- to five-fold improvement in functions delivered per person-day. This two-part series begins here with a look at the impact of data-driven prototyping on on-line screen design. Next, in "Managing Data Driven Development," we'll consider the effect of modern tools.

Our users, veterans of the micro revolution, have become more interested in substance and less in form. Instead of expecting us to tailor each on-line screen to individual taste, they assume we have a stock repertory of standard designs into which their data is inserted. Yesterday they wanted to specify whether the page number or date went at upper right or upper left. Today, as long as we're consistent, they really don't care. Instead they ask for partial-key searching, scrolling, and hierarchical data menus.

What seems to be emerging is an application design approach that differs in three ways from what we've done before. First, it emphasizes off-the-shelf components that we assemble into finished applications. Second, it focuses more on data to be processed than on procedures to be automated. Third, user-developer design negotiations center on selecting features or functions from a catalog listing each option's usefulness and price.

Consider such an approach applied to on-line database updating. We'll examine a prototype screen and see how to derive a screen-flow diagram. We shall assume on-line updating because it's simpler and less costly than batch data entry. It's simpler because there's less administrative overhead in displaying an error message on a screen than in sorting, printing, distributing, and keeping track of a list of errors awaiting correction. It's less costly to our customers because on-line data validation yields more reliable data.

The prototype screen, shown in Fig. 1, is a general purpose building block. It doesn't include every feature a user might want, but it does the job as effectively as many handcrafted screens would, and it's implemented at minimal development cost. It is not meant to handle every conceivable requirement, but merely as a starting point for opening negotiations with our customer. With it, we can derive a screen-flow diagram from any given data structure diagram. Indeed, data-driven design is so named because we've found that we produce rugged designs quickly by developing a data structure diagram for a proposed application, then deriving the screen flow from it.

The prototype has two sections: screen top and screen bottom. Screen top displays one occurrence of a database record (a vendor, in the example). Screen bottom shows several occurrences of a record subordinate to the one at screen top (e.g., the vendor's purchase orders). In other words, each screen displays data from two record types: a single parent or owner record, and multiple occurrences of a dependent or member record. We stack such screens hierarchically, as deeply as required by the application. Each application's screen top expands one line from the prior screen bottom.

The screen provides many functions to the crt operator, which we will list. We shall see that some functions come with a standard prototype while extras cost more. In other words, designing on-line applications is rather like selling automobiles. Each off-the-shelf screen comes with standard functions already built in. Once its data content is negotiated, it can be delivered in this form almost overnight. We "standardize" those functions that users consistently buy. Additionally, we offer a selection of extra-cost features. Some are performance options, others are vanity options, all cost more.

A selection list of standard and optional functions has two uses: it helps us avoid reinventing each new application, and it enables our customers to choose functions intelligently. It avoids reinvention by providing developers with a shared set of terms and concepts. By sharing our understanding of the functions, we share our solutions, which yields application-independent code we can all use.

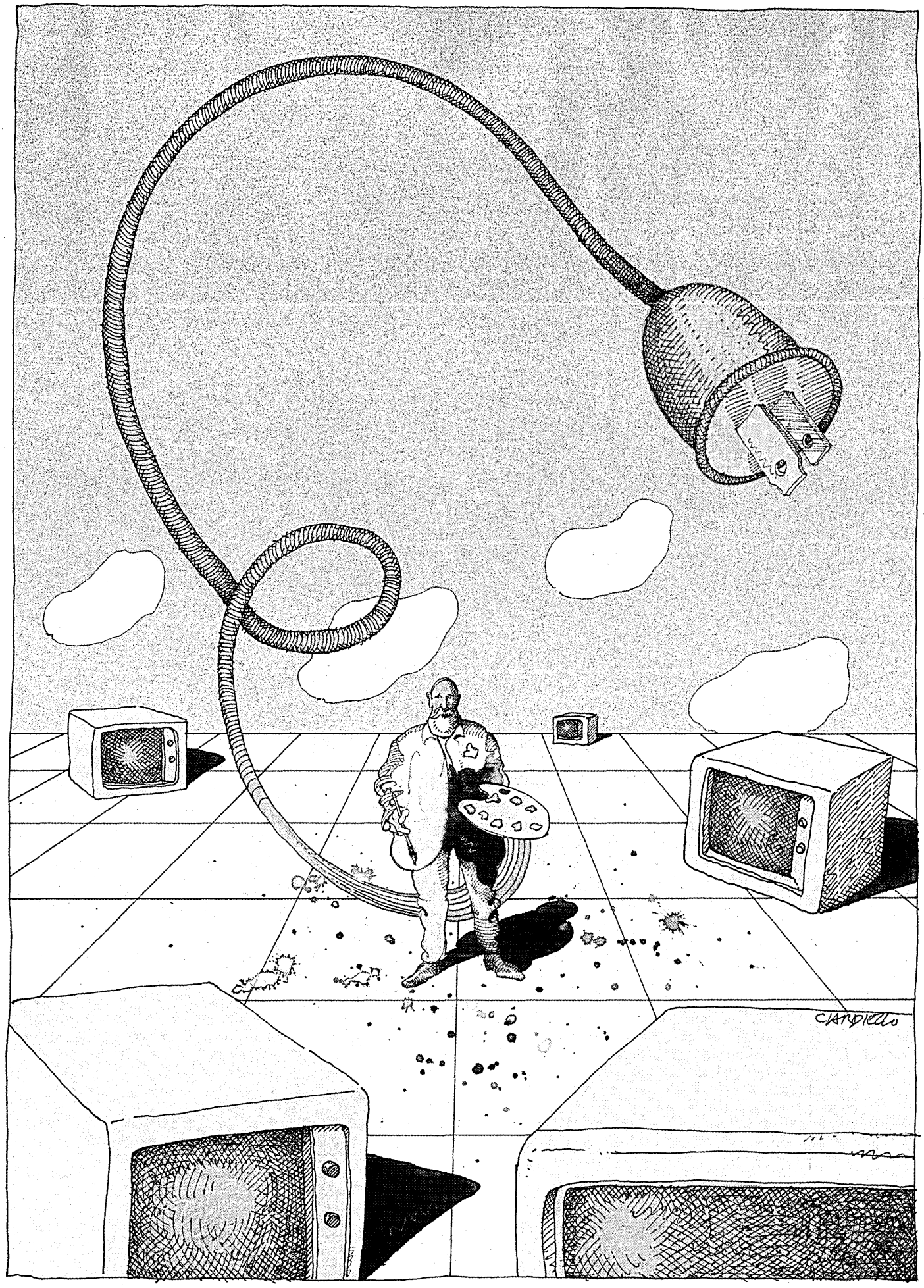
Intelligent choice by users avoids the most common negotiation pitfall—the way we listen. When users ask, "Can your system do [whatever]," we too often hear, "Given the state of the dp art, is it technically possible to program a digital computer to do [whatever]?" That's not what they asked. What they asked was, "Is [whatever] included in your proposal?" There are only three valid answers: "Yes, it comes with the standard model," "Yes, but it would cost you X dollars and Y days more," and "No."

WON'T TOLERATE SURPRISES

Experience teaches that people will gladly pay if they know the price in advance. They will wait patiently if they trust the delivery date. They will even accept our inability to provide something economically. But they will not tolerate being surprised. In short, a list of functions and their costs gives our customers a firm base on which to select what's worthwhile. It helps avoid the time and effort to build marginally useful features which, if they'd known the cost, they never would have requested.

Screen functions come in three categories: data control, window control, and data validation. There are standard and optional functions in each group. When a modern application generator with skeleton code is used, each screen costs between five and nine person-days to develop. This cost, as well as those given below for optional functions, includes time spent nego-

ILLUSTRATION BY JOE CIARDIELLO


CHANDLER

tiating about features and writing the users' instruction manual.

Data control lets you update the information in the database. The three standard data control functions are add, modify, and delete. Two optional functions we furnish at extra cost are screen-top add and automatic audit trail.

Add. You may add records by finding an empty line at screen bottom, typing the appropriate column data into the line, and pressing the add function key. You may not add a screen-top record, but every record in the application appears at screen bottom on at least one screen. Also, all the data elements of the record may not fit on a screen-bottom line. In this case, put in what does fit and use the modify function of the next lower level screen to finish the job. (See also the "blank" standard window-control function and the "screen-top add" optional data control function.)

Modify. You may type data into the slots on the face of the crt, overlaying what's already there. When you press the modify function key, the file is updated. There are some slots into which you will be unable to type data. Each is protected from keyboard entry for one of two reasons: it is a record's ID number and can't be changed without jeopardizing the integrity of the database, or it is derived data, displayed for information purposes only (a summary total or a code translation, for example) and updating it would be meaningless.

Delete. If you put the crt cursor on a line at screen bottom and press the delete function key, that record will be erased from the database.

Screen-top add. This optional function provides a dataless screen top into which you may type all the data for a new record. It avoids the two-step add described above for records too big to fit into one screen-bottom line. The cost is three person-days.

PERMANENT RECORD OF CHANGES

Automatic audit trail. With this optional function, the program keeps a permanent record of every change made to the database from the screen. Automatic audit trail records the author, time, and date of each change. Cost is four person-days.

Window control functions let you browse through the database and control whatever is displayed on the crt. Standard window controls are scroll, search, select, pop, top, out, swap, blank, and help. Extra-cost options are skip-screen select, in-place select, and inhibit first-time list.

Scroll. The standard scroll function provides four function keys—page forward, page back, line forward, and line back—to manipulate screen bottom.

FIG. 1

THE PROTOTYPE SCREEN

mm/dd/yy hh:mm — VENDOR / PURCHORDS — DPURD01P

VENDOR: (num) (name)

ADDRESS: (line 1)
(line 2)
(city) (st) (zip)

NUM SEARCH KEY: _____ NAME SEARCH KEY: _____

PO NUM	DESCRIPTION	PLACED	DUE-DATE	TOTAL AMOUNT
		__/__/__	__/__/__	__,___,___.__
		__/__/__	__/__/__	__,___,___.__
		__/__/__	__/__/__	__,___,___.__
		__/__/__	__/__/__	__,___,___.__
		__/__/__	__/__/__	__,___,___.__
		__/__/__	__/__/__	__,___,___.__
		__/__/__	__/__/__	__,___,___.__
		__/__/__	__/__/__	__,___,___.__
		__/__/__	__/__/__	__,___,___.__
		__/__/__	__/__/__	__,___,___.__

(error-message line)

Search. The prototype screen has two search-key slots. If you type a screen-bottom record's ID number into the left one and press the search function key, the list of lines will appear in ID number order starting with the number you specified (or as close as it can get). The right-hand search-key slot similarly sorts and searches based on the names or descriptions of screen-bottom lines.

Select. The prototype provides two methods of selecting a screen-bottom line to be expanded into full detail at screen top. First, put the cursor on the screen-bottom line you want to expand and press the select function key. Second, if the line you want is not presently showing on the displayed screen-bottom page, you may type its ID number into the left search key (or its name into the right search key) and press the select-function key. Either way, the crt screen is replaced with one showing the selected record at screen top and a new list of more detailed items at screen bottom.

Pop. Returns you to the prior screen, the next higher level, the one from which you last did a select. It essentially collapses the screen-top information into a single line at screen bottom.

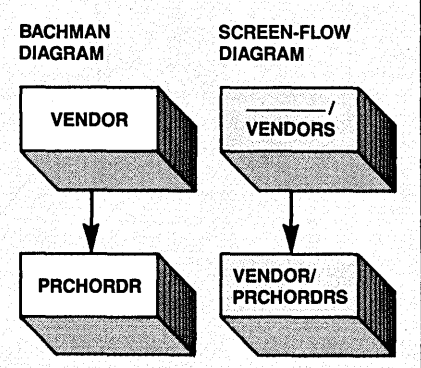
Top. Has the effect of a large number of pops; it takes you back to the first screen in the application.

Out. Has the effect of an even larger number of pops; it gets you out of the application entirely.

Swap. Switches screen bottom between two or more lists. For example, given a screen showing a vendor at screen top and a list of purchase orders at screen bottom, swap replaces screen bottom with a list of invoices or with a catalog of products for that vendor.

FIG. 2

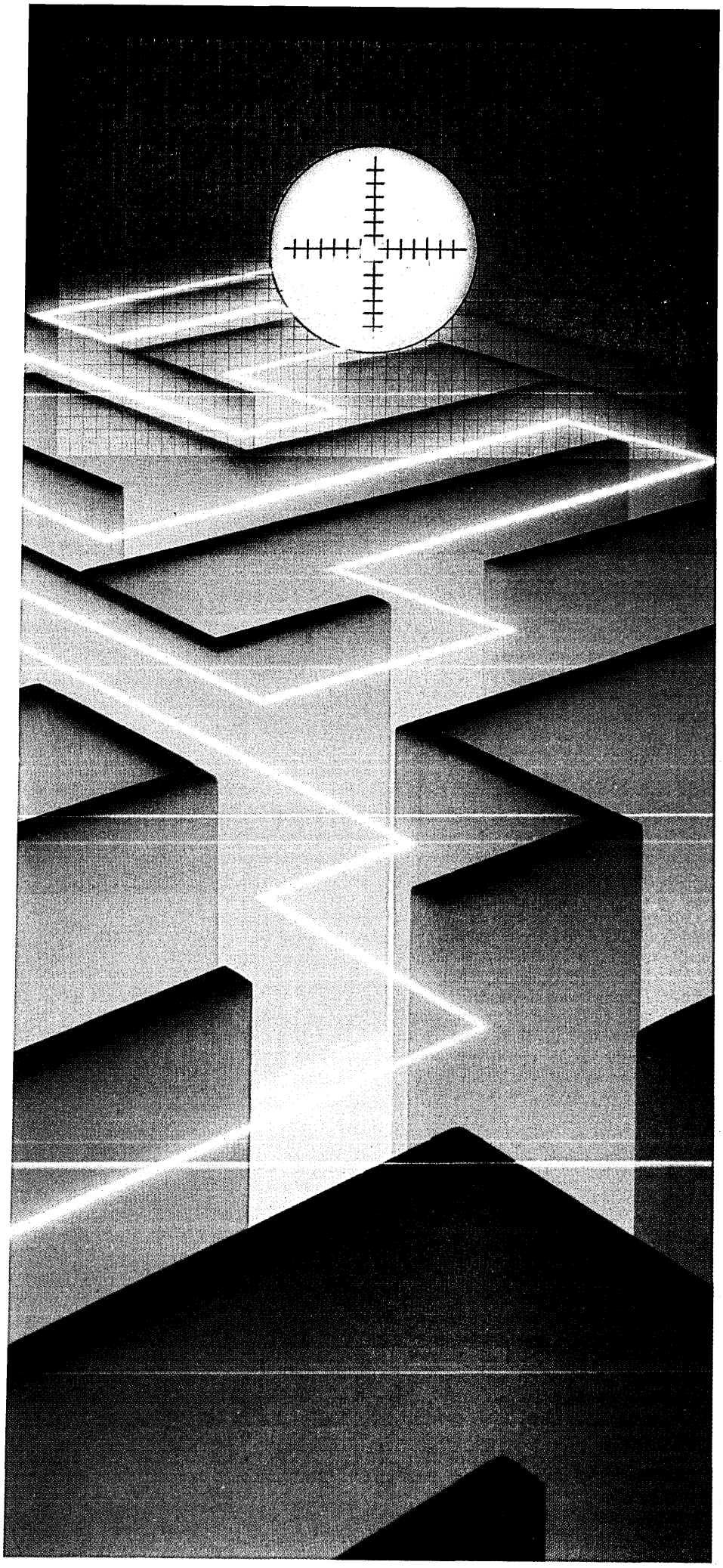
DIAGRAMMING CONVENTIONS



Blank. Clears all the data out of screen bottom so you have room to add lines. The top line is left in place as an example of how to type new lines in.

Help. Displays an explanation of all the functions available on the screen you are using.

In-place select. This extra-cost option provides an additional search-key slot in screen top. If you key a new screen-top



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record ID number into it (a different vendor number, say, on a screen that already gives vendor details) and press the select function key, the new record will be displayed. This lets you switch screen top from one record to another without having to pop back to the prior screen-bottom list to make your selection. Cost is two person-days.

Skip-screen select. This second extra-cost optional function lets you invoke a detailed screen without working your way down to it hierarchically. It would display a single purchase order in detail, for example, without making you first select its vendor. Cost is one person-day.

Inhibit first-time list. The third extra-cost option conceals screen bottom the first time you invoke a screen. If you select a vendor from a screen-bottom list of vendors, for example, the vendor would be expanded to screen top, but its list of purchase orders would not be displayed. (Of course, you could then force it to be displayed by pressing the search function key.) This option is offered when the user feels the crt operator could become startled or confused by selecting a record and seeing its lower-level items appear with no further commands. Cost is one person-day.

Using a 3270-type terminal, for example, keys could be assigned as follows: PF keys 1, 2, 3 would be ADD, MODIFY, and DELETE, respectively. PF 4 BLANKs out all the screen-bottom lines so you can add more items to the list. PF keys 8, 9, 10, and 11 mean page forward, page backward, line forward, and line backward, respectively. PF 12 POPs you to the previous screen. PA 1 TOPs you to the first screen in the system. PA 2 displays a HELP screen, listing all responses acceptable to the screen on which you are currently working. Pressing CLEAR at any point during the session takes you OUT to the master menu. You SEARCH for a screen-bottom item by typing in a full or partial key and pressing the ENTER button. Finally, depending on the system's database design, PF keys 5, 6, and 7 either SELECT a screen-bottom item, expanding it to a screen of its own, or SWAP between alternate screen-bottom lists.

Standard data validation includes numerics, name, date, and no-subordinates delete. Extra-cost data validation functions are soft set and hard set.

NUMERALS ONLY FIELDS

Numerics. When you add or modify a record, the prototype screen makes sure all fields that are quantities or amounts hold only numerals. If one field does not, the screen displays an error message and will not proceed with updating. We sometimes use terms like department number or account number when referring to ID numbers like UNT7002 and 1K6-783BQ. These are neither amounts nor quantities and are not required to be truly numeric.

Name. When you add or modify a record, it must have a name or description. The prototype screen will not allow you to add a vendor without a name or a purchase order without a description.

Date. Any dates in MM/DD/YY format that you type must be legitimate calendar dates.

No-subordinates delete. When you attempt to delete a line from screen bottom (a vendor, say), the program checks that there are no lower-level lines under it (purchase orders, for example). If there are, you'll see an error message and the line will remain.

Soft-set validation. When you add to or modify a record, this extra-cost option verifies that a specific piece of the record's data is valid by looking it up in a table or in another file. It is useful but cannot guarantee data integrity, because someone could change the table or file after you've updated the record. Soft set is available in two levels of severity. The first (warning) means that invalid data produces a message, but the update is accepted anyway. The second (error) means the update is not allowed. The cost, for each piece of data so validated, is one person-day.

Hard-set validation. This extra-cost option also looks up a piece of data in another file to see if it's valid. But, in addition, it locks out subsequent updating of the other file, which would risk data integrity. Hard-set validation of purchasing agent ID number in a purchase order record, for example, would prevent any application from erasing that agent from its file as long as any purchase order refers to it. Cost is three person-days for each piece of datum.

How many screens should an application have? What data should be on each one? How should the crt operator navigate among them? The answers hinge on the fact that in a finished application, screens are arranged hierarchically. In other words, if the operator selects a vendor from a list of vendors, it invokes a screen detailing that vendor at screen top and listing its purchase orders at screen bottom. Selecting a purchase order summons a screen with that PO at screen top and several line times at the bottom, and so forth.

This means an application's process flow—the way crt operators navigate from screen to screen—depends on its data structure. Bachman diagrams show data

FIG. 3

ONE SCREEN PER SET, EXCEPT FOR TOPMOST SCREENS

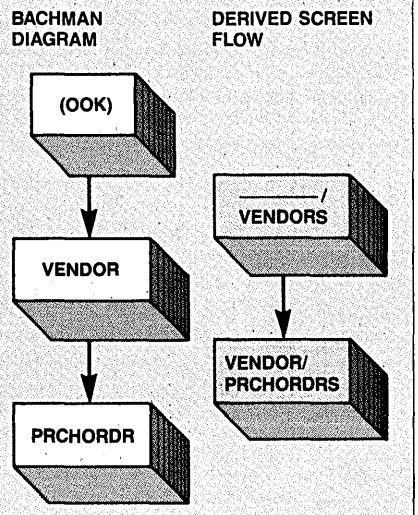
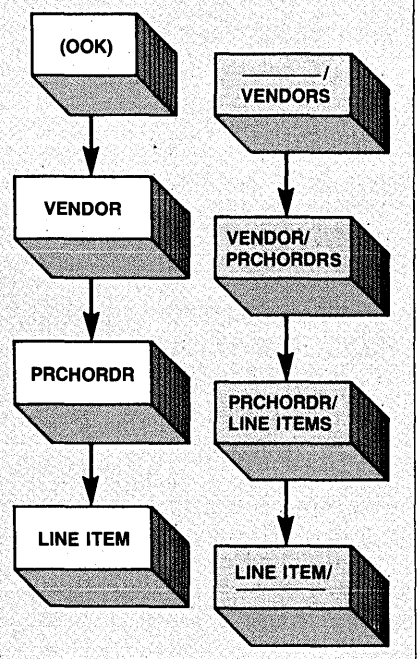
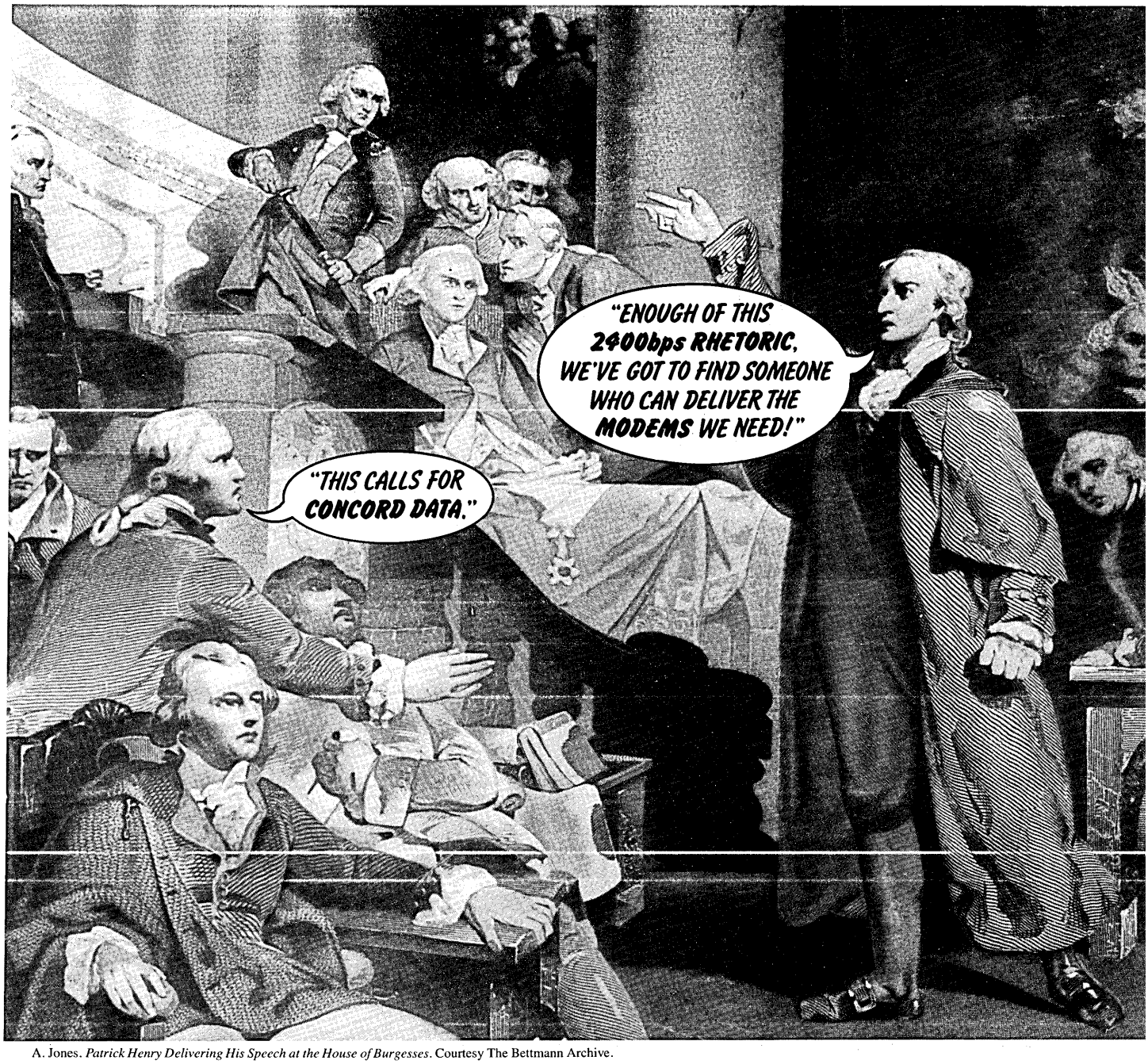


FIG. 4

EXCEPT FOR SOME BOTTOM-MOST RECORDS





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Bachman diagrams show data structure. Screen-flow diagrams show how screens are linked.

structure. Screen-flow diagrams show how screens are linked. We can translate any Bachman diagram into its equivalent screen flow. We will see how.

First, though, let's review diagramming conventions. The Bachman diagram, on the left of Fig. 2, shows two boxes connected by an arrow. The boxes mean the database contains two entities: vendors and purchase orders. The arrow points hierarchically downward and means each vendor may be related to an indefinite number of purchase orders, but every purchase order must be related to one and only one vendor. In Codasyl-COBOL, entities (boxes) are called records, and relationships (arrows) are called sets. These are the terms we'll use from now on.

The screen-flow diagram, on the right, also shows two boxes connected by an arrow, but their meaning is different. The boxes mean the application has two on-line screens. One shows a list of vendors at screen bottom (and nothing at screen top). The other details a single vendor at screen top and lists its purchase orders at screen bottom. The arrow, again pointing hierarchically downward, means application control passes from the first screen to the second when the operator selects a specific record from the list.

THE RULE AND THE EXCEPTION

One rule and three exceptions help us derive screen flow from data structure. The rule is that there's one screen for each set, which means we shall wind up with as many screens in the derived screen flow as we had arrows in the Bachman. Each screen shows one occurrence of the set's owner record at screen top. It lists several occurrences of the set's member records (arrow head) at screen bottom.

The first exception to the one-set-one-screen rule involves topmost records. It applies to the data diagram's highest-level records—the ones with no in-pointing arrows (root segments in DL/I). These records are listed on a screen with no screen top. One way of visualizing this is to imagine a one-of-a-kind record (abbreviated OOK) in every application. It contains global application-control data and serves as a screen-flow entry point. If shown on the Bachman diagram, it points to every record that otherwise has no owner or parent. These OOK sets also require screens.

Incidentally, in some pointer-chain network DBMSs, the easiest way of providing the search function we described (partial-key search with dual sorted lists) is to physically implement a real OOK record in the application's database. In these situations, we could actually draw the OOK record in the original Bachman diagram and this would no longer be an exception.

The upper screen in Fig. 3 represents the vendor record's OOK set. It displays no data at screen top and lists vendors at screen bottom. Recall that screen top and screen bottom are separated by a line containing two search keys. This separator may be at different heights on different screens, depending on the amount of room needed at screen top. Here, the separator is located right under the screen's title line.

BOTTOM RECORDS INVOLVED

The second exception involves some bottom-most records, and is applicable if a lowest-level record (one with no arrows coming out of it) holds too much data to fit across the crt, as shown by the purchase order line item in Fig. 4. Here, in order to display and update all its fields, we add a screen dedicated to a single line-item occurrence. Since this screen lists no lower-level records, we use the entire face of the crt for one line item's fields. Because this is a lower-level record, there's no screen bottom and no twin-searchkey separator.

The last exception involves bill-of-material sets, and it applies when two different arrows connect the same two records. Here, both arrows translate into just one screen. Consider a Bachman modeling two different vendors for each purchase order: the vendor from whom the shipment is expected to arrive (a local warehouse, say), and the vendor who will invoice us for the purchase (a headquarters billing location perhaps). As shown in Fig. 5, we need only one screen. When we implement, we provide a function key enabling the crt operator to swap between the two possible purchase order lists for a given vendor—those to be shipped from the vendor or those to be invoiced by the vendor.

This approach to deriving a screen flow does not mean its appearance must resemble that of the Bachman from which it came. Since the boxes and arrows of each represent different things (entities and relationships in one, screens and control paths in the other), one may have more boxes or arrows than the other. In Fig. 6, the Bachman has three boxes but the screen flow has four. The Bachman has four sets (including two assumed OOK sets) and the rule is one screen per set. The left screen's list of inventories (for a given product) includes each one's location name, pulled from the owing location record. The right screen's list (for a given location) includes product name, drawn from each inventory's product record. Although both screen bottoms are derived from the same database record, their data could be different, and current balance might be the only field common to both lists.

Also, just because each screen originates from a set joining two database records doesn't mean that when we design the screen we include fields from only those physical records. Say the screen top shows data about a vendor. This may include derived fields as well as those actually in the vendor database record. Derived fields are protected from data entry on the crt and

FIG. 5

EXCEPT FOR BILL-OF-MATERIAL SETS

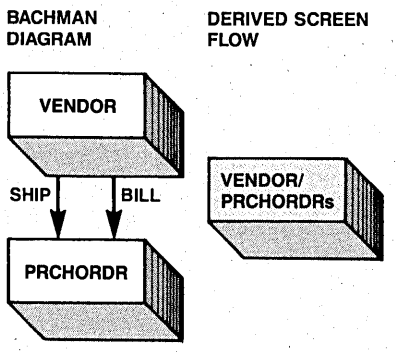
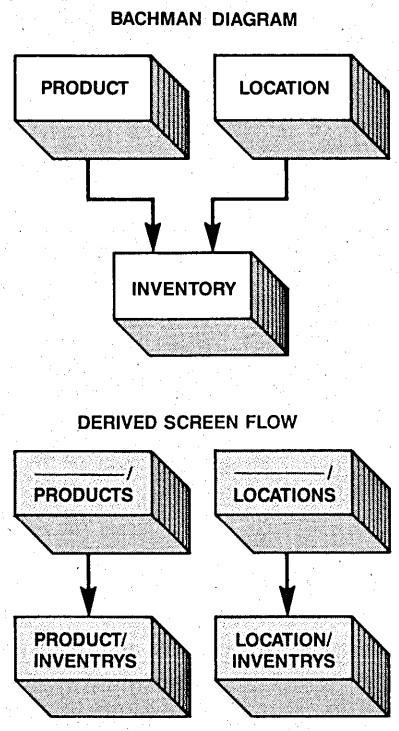


FIG. 6

THE CROSS-REFERENCE



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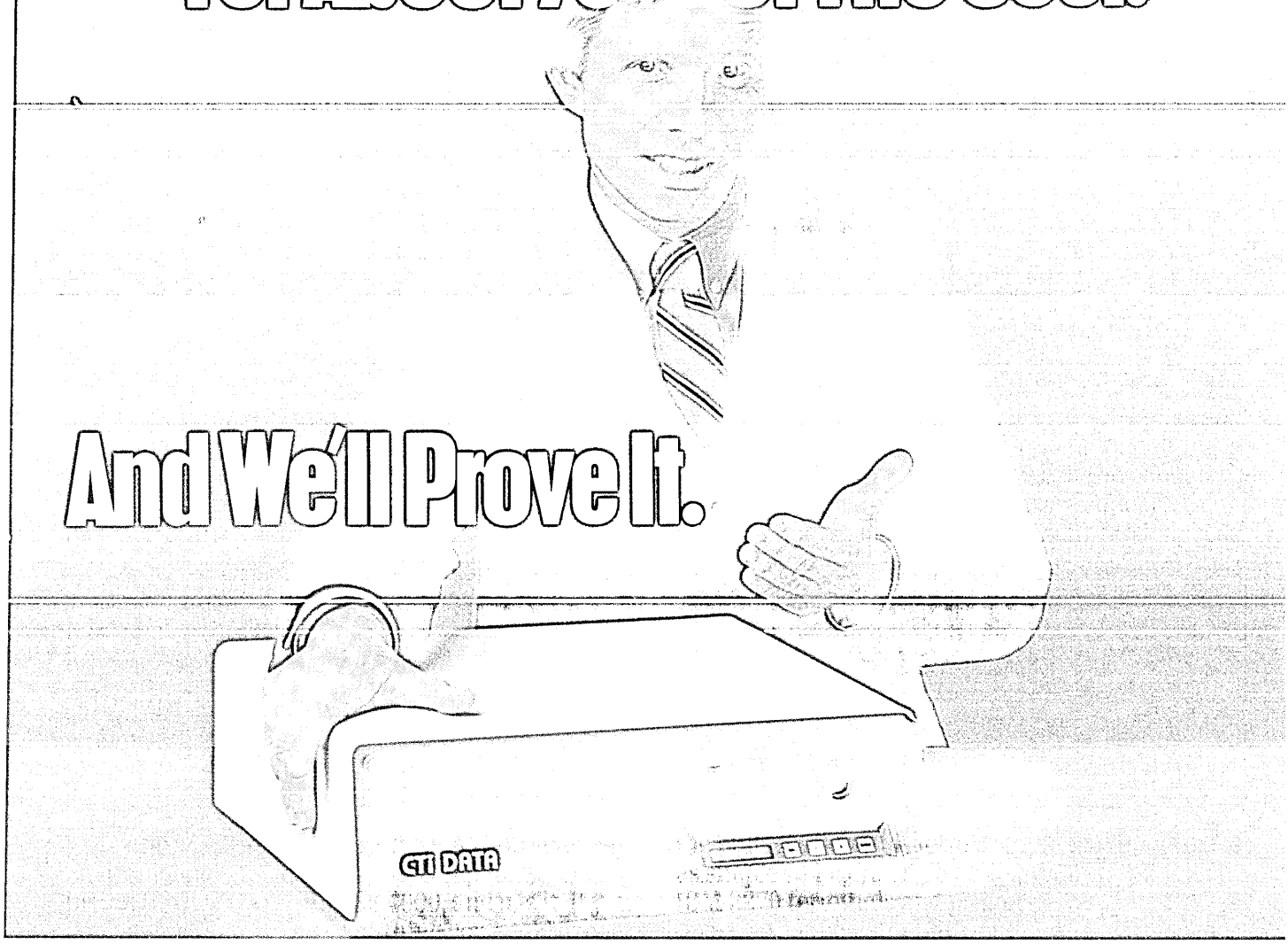

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This approach may not be appropriate for all situations.

come in three flavors—cross footing, summary, and reference translation.

Cross-footing fields are those resulting from a computation of other fields in the same logical record. We may show new balance, for example, even though the database record only has old balance, debits, and credits.

Summary fields result from adding up many occurrences of the same field in subordinate records. The screen view of a vendor might include the number of purchase orders computed by adding up how many related occurrences of the subordinate record there are.

Reference-translation fields come from using a field in the database record as entry to another file or table and retrieving additional data there. The physical vendor record, say, contains a two-byte state abreviation with NJ in it. We could display this on the screen as NEW JERSEY by looking it up in a table. Similarly, the vendor record might contain the employee ID number of the purchasing agent of that vendor. This information could be put on the screen in the form of the person's name by first accessing the employee file.

In conclusion, be warned that this approach may not be appropriate for all situations. It is fundamentally data driven, not procedure driven. Notice, for example, that it offers data menus but assumes the operator knows the functions he or she can perform. Most older screen designs, in contrast, provide function menus and expect the operator to enter ID numbers of records to be accessed. Our reasoning here is that it makes little sense to provide menus for a dozen or so quickly learned functions and force key entry in order to select among tens of thousands of data records.

Another way of looking at this issue is that older design methods, such as functional decomposition, are sometimes understood to say systems should model procedures, not data. This means that if the user has one procedure for adding a new purchase order, a different one (perhaps even a different group) for modifying one, and a third for closing one out, the application should have one screen or group of screens for each procedure. Some of us are more comfortable with this approach. Its strength is in the fact that because application structure mimics what the user does, there's little risk of shoehorning our customer into an ill-fitting system. Its weakness is that it unavoidably models management style, and styles change. Such applications can drag, anchorlike, behind the businesses they were meant to help.

Because the data-driven approach depends heavily on the Bachman diagram, errors here cascade into subsequent work. This makes the method vulnerable if forced into a linear project development sequence. It works best where modern tools reduce programming cost to the point that we can do it iteratively—where we can start over with little cost or delay. In this situation, we may not do it right the first time. But even counting restarts we'll do it faster, and we'll make it easy to maintain. Once it's done, the system will be as rugged as the data it models, evolving in pace with the changing organizations we support. ◉

Frank Sweet is corporate manager of data administration for the Charter Co., a Fortune 100 firm in Jacksonville, Fla.

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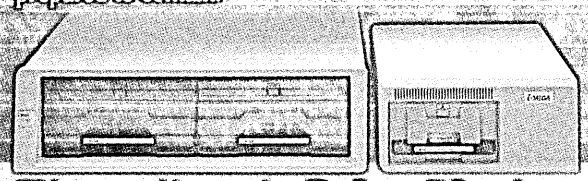

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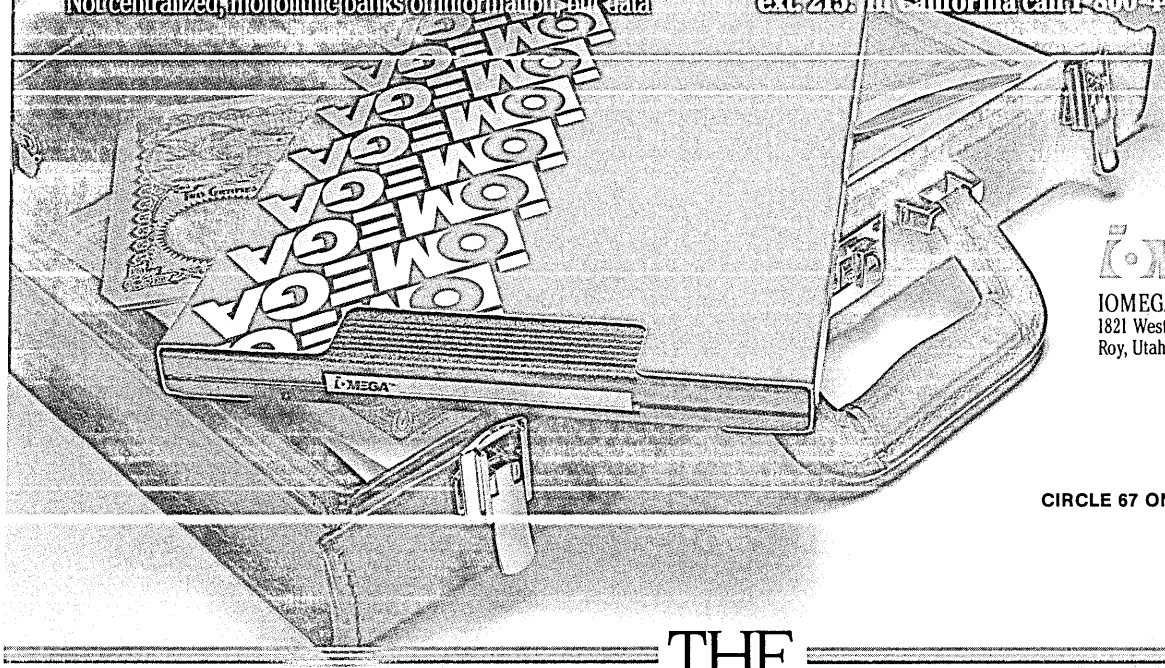

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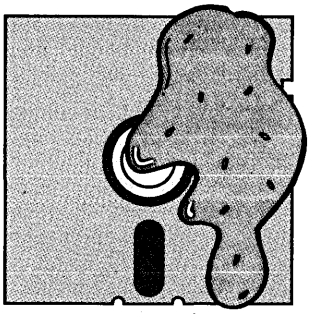
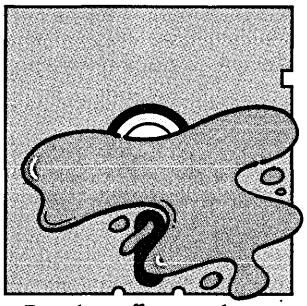
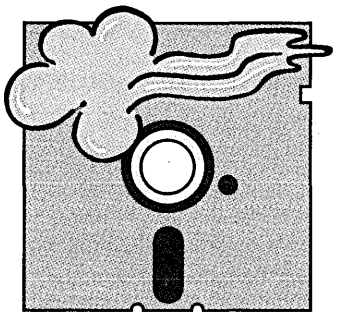
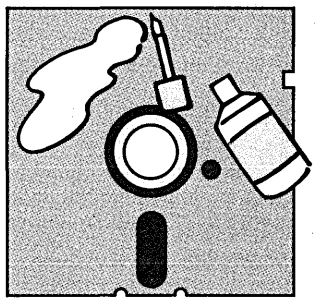
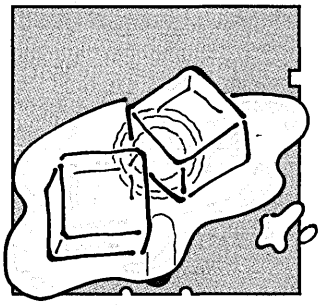
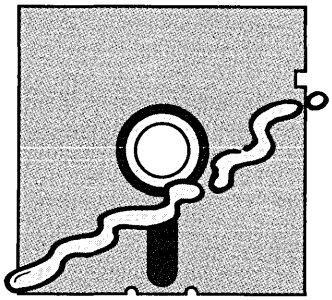

Aunt Molly's jam

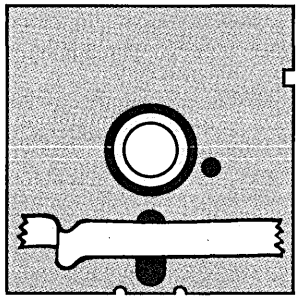

Regular coffee, two lumps

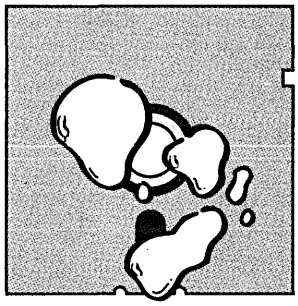

Clouds of smoke

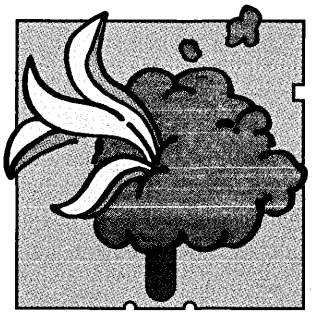

Maria's liquid cover

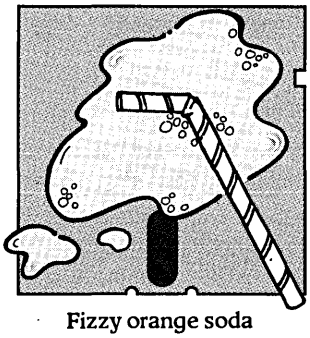

The big chill

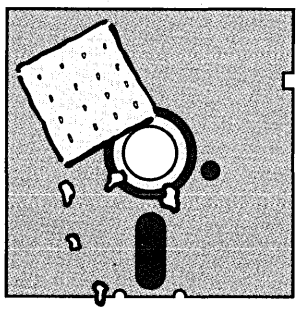

Hot dog mustard

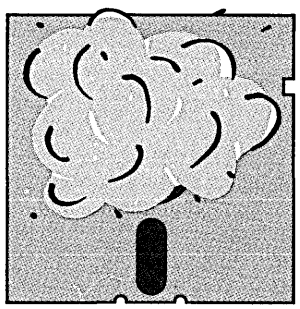

Tacky white tape

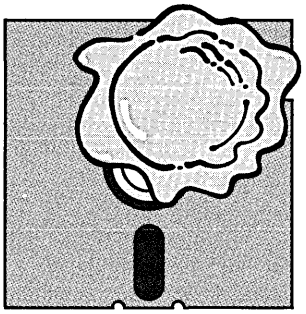

Lunchcounter ketchup


Potted plant–no pot

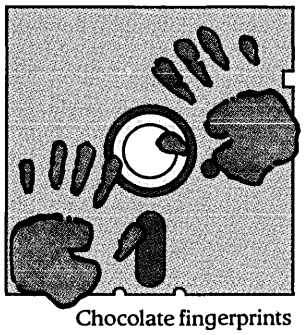

Fizzy orange soda

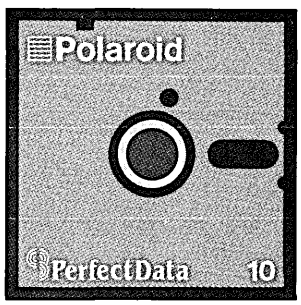

Cracker crumbs


Dust (cough-cough)

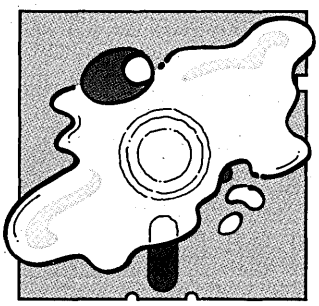

One scoop of ice cream

Sudsy soap bubbles

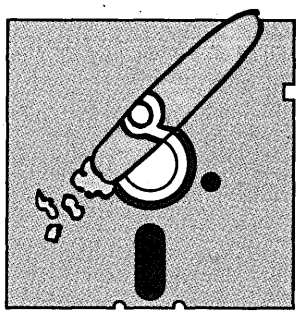

Chocolate fingerprints



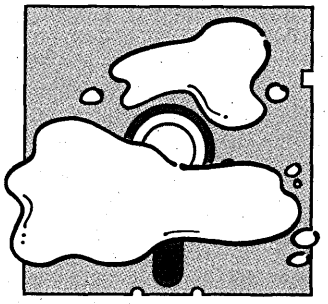
d, your dog-eared, your mistreated:



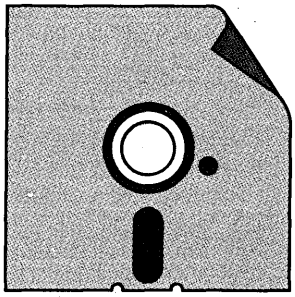
Dry martini, one olive



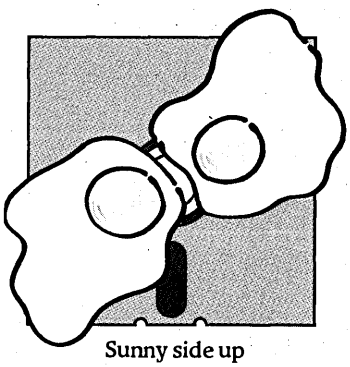
Boss's cigar ashes



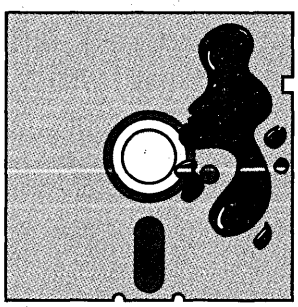
Spilled milk



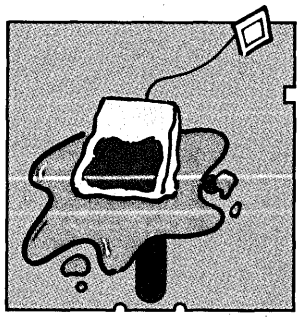
Dog-eared jacket



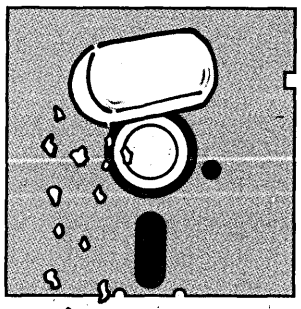
Sunny side up



Waterbased ink spots



English breakfast tea



Eraser bits

If it's a Polaroid diskette, we'll fix it.

Accidents can be fatal to floppy disks. But now Polaroid introduces a free data recovery service.

So, if you spill coffee on a Polaroid Professional Quality Diskette, we can help recover your data. (And most other accidents, too.) Call 800-241-4403 and we will tell you how our service works.

These Polaroid floppy disks boast a 20-year guarantee and are certified 100% error-free. And only Polaroid offers a free data recovery service. Because accidents happen.

Polaroid PerfectData

THE PROFESSIONAL QUALITY DISKETTE IN THE GRAY BOX.

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"Perfect Data"™ of Perfect Data Corp.

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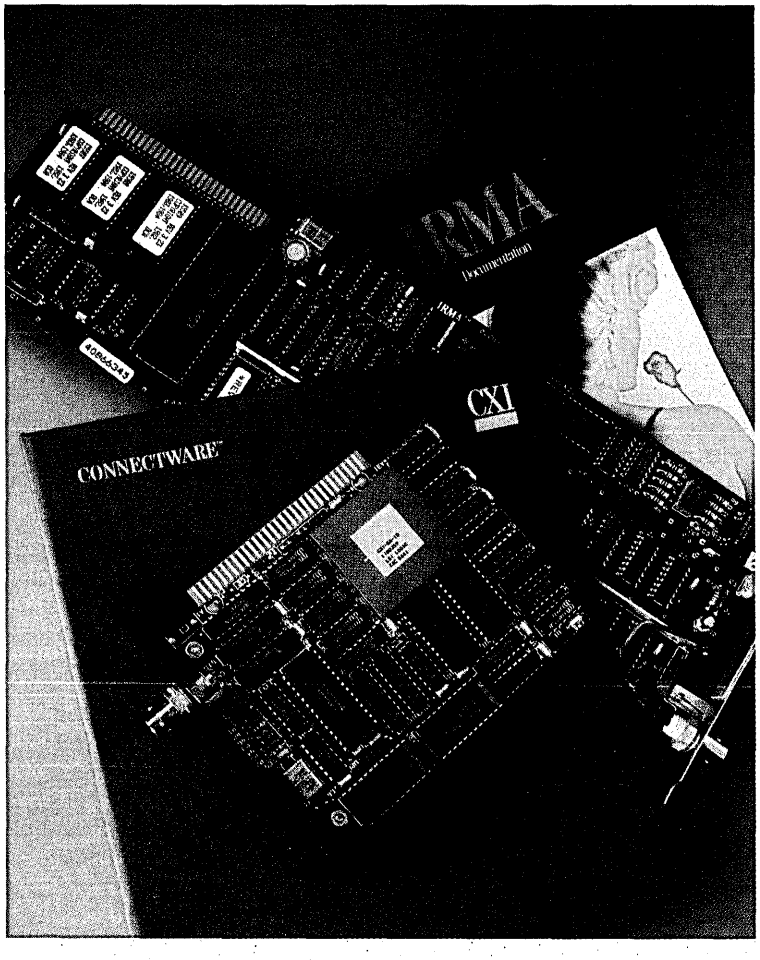
CIRCLE 68 ON READER CARD

CXI is now compatible with what's-her-name.



That's good to know.

It means the CXI 3278/79 PLUS coaxial connection is now 100 percent compatible with IRMA.™ So you can add our new hardware to your network and run all the same software she runs. Without changing a thing.

Not your mainframe application software. Not your PC software. Not even old what's-her-name.

So if nothing changes, why go with CXI?

Simple.

Our CXI 3278/79 PLUS emulator gives you more to work with. You get one host session, one PC DOS session and two notepads. All on the same screen at the same time. No toggling back and forth between sessions. And no wasted effort whatsoever.

We're easy to connect, too. Just slip our 5-inch board into any available slot—even a short one—on your IBM® PC, XT, AT or compatible. Attach the coaxial cable to a 3274/76 cluster controller. And start sharing information direct with your mainframe.

You should know, too, all our products are now soft-loaded. Not PROM-based like IRMA. So when it comes time to upgrade, you simply insert a new floppy. Instead of new PROMs.

And that goes for our new 3278/79 STANDARD connection as well. It's feature-for-feature identical to IRMA. Except for one thing.

It costs up to $300 less.

Interested? For a brochure about these and other CONNECTWARE™ micro-to-mainframe solutions, call us at 800/221-6402. In California, call 415/424-0700. Or write CXI, Inc., 3606 West Bayshore Road, Palo Alto, CA 94303.

We'll make you forget all about old you-know-who.

We don't have all the answers, just more of them.

CXI

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CIRCLE 69 ON READER CARD

HARDWARE

OFF-LINE

The EyeDentification System 7.5 could have leaped off the pages of a James Bond novel. It's designed for security environments that require a high level of positive identification of persons seeking access. With the system, each person is recognized by a characteristic even more unique and personal than a fingerprint-a retinal eye pattern. Since every person, even an identical twin, has a widely divergent, unalterable retinal eye pattern, the chance of false acceptance in the verification mode is, according to the vendor, "one in a million." (But then, a lot more than a million people are trying to access computer systems around the world.)

Made by EyeDentify Inc. of Portland, Ore., the system uses a low-intensity infrared light beam to perform a circular scan and 320 readings of the vessel pattern within the eye. Each user focuses on a small pattern within the binocular unit and pushes a button. The system's microprocessor compares the completed retinal scan with the eye signature already on file in either onboard memory or a remote database.

The system's one-time enrollment takes about 30 seconds. With 1,200 signatures on file, identification takes about 1½ seconds. The enrollment and identification procedures electronically record the retinal and choroidal vasculature at the back of the eye using no laser light or potentially harmful rays, the vendor says. The system is available in both desktop and wall-mounted models.

(Such space-age technology always raises the issue of user expectations. The idea of retinal scans, after all, has been used extensively in recent science fiction movies, such as the "Star Trek" series. With such a real-life product, we perhaps unrealistically expect the same ease of use and reliability as we see in the movies, which is to the vendor's detriment; and concurrently Mr. Spock's fictional gizmos lose their luster when we know that they will be as outdated in his time as the cotton gin is in ours, to the movie's detriment. Producers of future sci-fi flicks will once again have to play the role of leading-edge R&D labs to propel new high-tech product development.)

It's been almost a year since IBM Corp. announced the 3480 magnetic tape subsystem. Initial reaction to the cartridge tape product by the dp shops that can get it is generally good. TRW Information Services Division, an early user, installed 16 of the 3480 cartridge drives at its consumer and business credit center in Orange, Calif. TRW reports that the 3480 is twice as fast as the older 3420 tape-drive model and can read 3 million characters per second, compared to 1.125 million cps on the 3420. Martin Marietta Data Systems in Orlando, Fla., just received some 3480 units, which are smaller than the 3420s. This user says it will process more tapes at faster speeds in less space. As for software support, Uccel Corp., Dallas, has announced that its UCC-1 Tape Management System will support the 3480.

SPECIALIZED LAP-SIZED PC

In its continued efforts to separate its lap-sized microcomputer from other models, GRiD has designed the GRiDCase portable for specialized applications within the Fortune 1,000 and the government. The vendor sees this product being used in large corporations by salespeople who calculate intricate pricing structures. It can also be used in departments of companies as well as state and Federal governments. A Tempest version will also be available.

A major difference between the GRiDCase and the vendor's other portable called the Compass is that the new product is IBM PC-compatible and comes with a 3.5-inch disk drive, as well as offering software on its bubble memory. Programs

on bubble memory and diskette can both be used on the same unit.The 12-pound portable has an 80C86 16-bit microprocessor running at 4.77MHz and an optional 8087 80-bit arithmetic coprocessor. RAM is available from 128KB to 512KB and ROM is offered in user-installable ROM packs up to 512KB.

The unit's keyboard features PC-like function keys. Displays include a liquid crystal or plasma display with 80 characters by 25 lines. An optional 1,200-baud internal modem is offered. Interfaces include RS232C, Centronics, external bus connector, RGB, five-pin DIN plug, and RJ-11 phone jack. Another feature is a self-charging internal NiCad battery that lasts up to six hours with an LCD. It supports a variety of printers, including Hewlett-Packard's ThinkJet and Epson

dot matrix printers up to 160cps with graphics support, as well as most languages and development tools. GRiDCase prices range from $3,000 to $4,400. GRID SYSTEMS CORP., Mountain View, Calif.

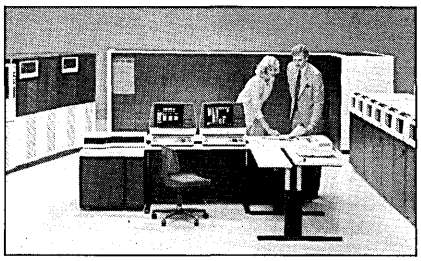
FOR DATA CIRCLE 301 ON READER CARD

MAINFRAME SERIES

The DPS 90 is a large-scale mainframe computer line that includes dual-, triple-, and quad-processor models, plus a fully redundant version. It can be configured to deliver up to three times the processor performance of the Honeywell DPS 88, the vendor says.

The DPS 90 includes the functional hardware capabilities of an array processor for scientific and engineering computing. According to the vendor, this DPS 90 series has been designed to fill three objectives for the vendor: to meet user requirements for growth platforms and investment protection, to distribute more automated productivity throughout an organization, and to deliver total solutions for manufacturing and other specific industries.

The system is targeted at the Fortune 500 and government accounts with the DPS 88 systems currently installed. The DPS 90 runs under GCOS 8 and supports software running on the DPS 88. A new version of FORTRAN produces the in-



structions to use the integrated array processor. The system supports the vendor's Solution Center products for nontechnical end users and Development Center tools for dp professionals.

A large-capacity disk subsystem available with the DPS 90 complies with the Federal Information Processing Standards. It will also be available for the DPS 88, which will continue to be built and supported by the vendor. The mass storage processors can support up to 32 mass storage units, with optional dual, switched, or dual simultaneous channel connections. The price of the single-processor DPS 90/91 is $4 million. The dual version DPS 90/92 is $5 million, and the fully redundant 90/92T costs $6.25 million. Purchase price of the DPS 90/93 is $7.3 million. The top-of-the-line DPS 90/94, a quad processor, costs $8.35 million. HONEYWELL INC., Phoenix.

FOR DATA CIRCLE 302 READER CARD

TWINAX CONVERTER

The Series II+ Twinax Protocol Converter allows attachment of up to seven parallel or asynchronous devices to an IBM System/34, 36, or 38 through the IBM twinax protocol. The product supports most ASCII printers or crts. It communicates with the host via standard twin axial, two-conductor shielded cable. The product will appear to the host as a 5225 printer, a 5251 model I or II terminal, or a 5291 terminal.

The twinax converter supports any combination of parallel or asynchronous RS232C devices up to a maximum of six parallel or seven total (parallel and serial) devices.

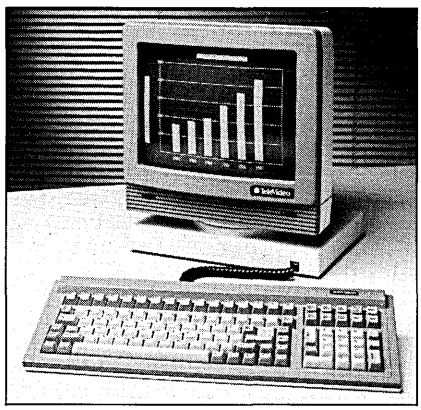
Other features include on-board diagnostics, switch-selectable cable-through or line termination functions, front panel controls for reset, and setup and diagnostics. The Series II+ Twinax Converter costs $2,000. Each additional port is $550. KMW SYSTEMS INC. Austin, Texas.

FOR DATA CIRCLE 303 ON READER CARD

VIDEO DISPLAY TERMINAL

The TeleVideo model 955 video display terminal features a case design incorporating a 14-inch green display, full tilt and swivel, and a small footprint. It is designed for office automation applications such as word processing, data entry, and in-house information retrieval.

It has two sets of 32 personalized function keys providing up to 64 function keys with no more than two keystrokes,



and can store up to 512 bytes in nonvolatile memory. Users can switch between function keys without reprogramming. This ASCII terminal has an 80- or 132-column display and up to four pages of memory in both column modes.

The terminal also features a reconfigurable keyboard, line-by-line definable scrolling regions, and screen saver to double the life of the crt. An amber display is offered at no additional cost. The model 955 sells for $700. TELEVIDEO SYSTEMS INC., San Jose.

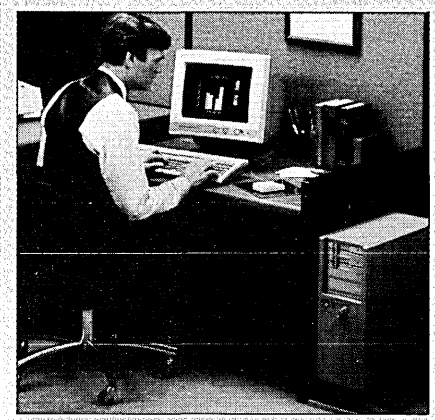
FOR DATA CIRCLE 304 ON READER CARD

HARDWARE SPOTLIGHT

RUNS PC AT SOFTWARE

The TI Business-Pro computer is a 16-bit 80286-based machine designed for business applications. Features include expanded memory, large data storage, and an improved human interface. It is compatible with MS/DOS software for the TI Professional Computer as well as with software written for the IBM PC AT.

The product consists of a high-resolution 13-inch bit-mapped display in either color or monochrome, a keyboard, and a cpu that fits under a desktop. It can be used as a single-user workstation, a network server, or a clustered multi-user system that supports up to 50 personal



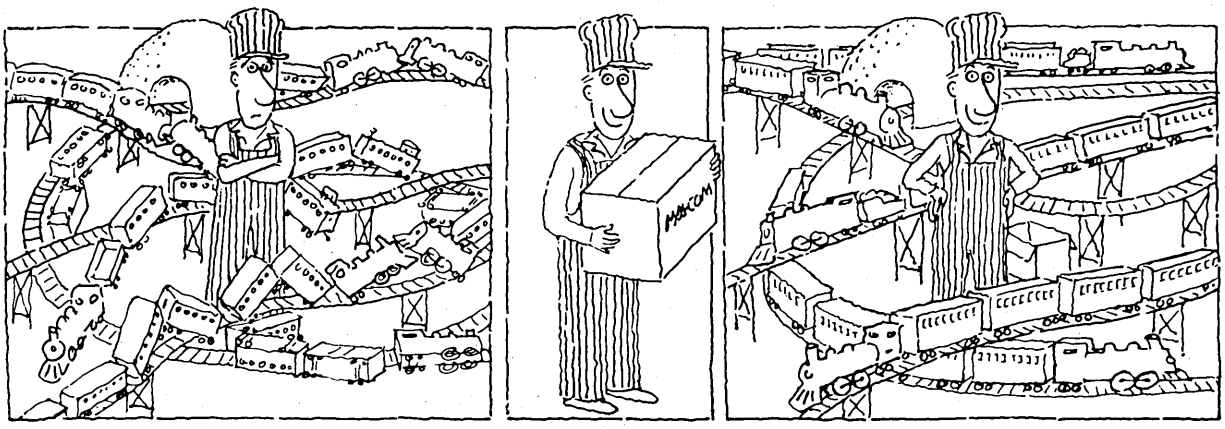
computers. The cpu has a 150-nanosecond memory speed and 512KB of RAM that is expandable to 3.5MB without having to utilize any of the system's eight full-sized or six half-sized expansion slots. Maximum memory utilizing the option slots is 15MB. Data storage options include a 360KB or 1.2MB flexible disk drive, a 31MB, 40MB, or 72MB Winchester drive, and a 60MB cartridge tape backup. Options include an 80287 numeric coprocessor, mouse, and speech technology.

The system uses Novell's NetWare/E-TI in its local area network configuration. The file server provides fast response time, security provisions, file and record locking, and electronic mail. Ethernet is also available. It will utilize either the MS/DOS 3.0 operating system or Xenix. It will support a variety of programming languages including FORTRAN, C, COBOL, and LISP. The base system, which includes the system unit, keyboard, serial/parallel interface, 512KB RAM, and 1.2MB flexible drive, sells for $4,000. A 21MB Winchester version sells for $5,800. Eight additional configured systems ranging in price from $4,400 to $13,700 will also be offered. TEXAS INSTRUMENTS INC., Data Systems Group, Dallas.

FOR DATA CIRCLE 300 ON READER CARD

WHEN IT COMES TO CONTROLLING YOUR DATA NETWORK,

THE IDX3000® PUTS YOU ON THE RIGHT TRACK.



Control can be a major problem with a large network. That's why our IDX3000 Local Communication System features the IDX-Net™ network controller. With IDX-Net, you handle configuration management on-line. You can manage major network topology changes, such as disaster recovery, with only a few keystrokes.

IDX-Net lets you access network control commands and diagnostics from any terminal in the network, including dial-up. This means that you, or M/A-COM's Hotline Service, can diagnose your problem in seconds without having to be in your computer room.

Programmability
IDX-Net's 68000-based network controller software provides you with the capability to interface host-resident application programs to the network. You can build-in your own custom-tailored network management features.

User convenience
In addition to traditional data PABX port contention and resource selection, IDX-Net provides your authorized users with many of the features offered by modern telephone systems. They can connect, disconnect and hold lines to multiple computer resources and execute third-party connects.

For the office of now
With the IDX3000, you can start with a small system that fits your current needs and budget, then grow to obtain non-blocking, full-duplex asynchronous communication for as many as 3072 lines, all at data rates of up to 19.2 Kbps. The IDX3000's proven T1-based technology is fault-tolerant, with optional redundancy features throughout its distributed architecture, and automatic, continuous self-testing. The IDX3000 isn't one of those products of the future. It's here now—proven, in use, and backed by M/A-COM, one of the nation's largest communication companies.

If you want to get control of your network, call or write the representative nearest you for more information. M/A-COM LINKABIT, Inc., 3033 Science Park Road, San Diego, CA 92121. Outside California, call toll-free (800) 626-6640.

Representatives: San Diego, Mat Akk, (619) 457-2340; Boston, Mike Murray, (617) 863-8420; Washington, DC, Harry George, (301) 428-2720; Houston, Charlie Burke, (713) 683-7834.

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THE NETWORK YOU CAN CONTROL

M/A-COM

CIRCLE 70 ON READER CARD

HARDWARE

HIGH-SPEED LAN

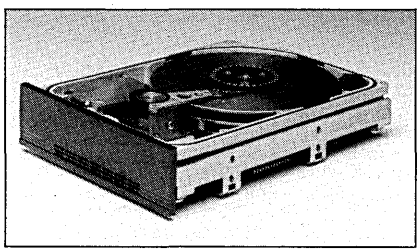
ProNET-80 is an 80Mbps local area network. It is a commercially available token passing, star-shaped ring network. Among its features are error detection and a flexible host addressing system.

The product connects to 240 Unibus or Multibus workstations using any combination of twinax or fiber-optic cabling. In addition, the LAN is software-compatible with the vendor's original 10Mbps LAN, now called ProNET-10. Applications include that of transmitter of complex high-resolution graphic data, or a very fast host-to-host network that can be used in a distributed processing environment. The product transmits 100 meters on twinax and 2km over fiber optics. ProNET-80 is priced at $8,000 per host interface. PROTEON INC., Natick, Mass.

FOR DATA CIRCLE 305 ON READER CARD

HALF-HEIGHT DISK DRIVE

The Q200 is a half-height disk drive that features the Small Computer Systems In-



terface. The fixed-sectored drive is available in formatted 53MB and 80MB versions. Average access time is under 30 milliseconds. The SCSI drive also features a mechanical shipping lock. The Q200 costs $900. QUANTUM CORP., Milpitas, Calif.

FOR DATA CIRCLE 306 ON READER CARD

CONTROL SYSTEM

The Tricon 1 is a fault tolerant control system that uses what the vendor calls a distributed modular processing architecture that provides triple redundancy throughout, allowing virtually continuous system availability in both industrial automation and process-control applications.

By providing multiple levels of fault tolerant processing capabilities, the control system is designed to improve control flexibility and speed. The unit has been designed to withstand shock, vibration, noise, electrical emissions, and other conditions in harsh operating environments. It has a scan rate of six to 20 milliseconds for monitoring up to 512 digital points, 256 analog points, or 125 loops. An expansion chassis accommodates field terminal modules located as far as 4,000 feet from the main system.

It has an intelligent I/O. The unit distributes intelligence to the I/O stages as well as to the central processing unit level of the control cycle. In addition, all hardware in the system is triplicated. When data is captured by the system, it is split into three separate signals, each of which follows one of three electrically and logically independent paths through the control system—from input processor to main processor to output processor. Each pathway forms one leg of the system, which operates by exception.

When a signal is received at each input processor, it is examined to determine whether a change in state has occurred. If there is no state change, the input processor simply doesn't report the signal, because no new action is required. If there has been a state change, the input processor forwards the changed reading to the main processor where it is compared with those received by the other two cpus. Control outputs are then transferred to each of the intelligent output processors, voted upon again, and the appropriate control measures are signaled to the final actuator.

The unit has an automatic transfer repair feature that transfers control processing to a standby backup when any module fails. The software enables users to develop their own function-block macro instructions to simplify complex programming tasks and permit installation without requiring familiarity with the system. The base price for the Tricon 1 is $12,000. A typical fully configured system would cost approximately $45,000. TRICONEX CORP., Irvine, Calif.

FOR DATA CIRCLE 307 ON READER CARD

STORAGE SUBSYSTEMS

This vendor is introducing an array of data storage subsystems for IBM and compatible microcomputers. The product line features 20MB and 32MB internal and external Winchester subsystems and a combination of 20MB Winchester and 2.78MB Kodak flexible drives for the IBM PC, PC XT, PC AT, and compatibles.

The half-high 2.78MB Kodak drive is combined with a 20MB half-high Winchester drive in internally and externally installed versions. The vendor says the Kodak drive uses media that resemble standard floppies, but with eight times the storage capacity. The product offering also includes the 1120AT and 1132AT 20MB and 32MB Winchester drives for the PC AT. Both products run off the AT's existing controller and are ready to operate in a basic PC AT model.

With these products, the vendor includes a free copy of Backup, a high-speed backup/restore software program. The software catalogs if, when, and where a file has been backed up, allowing users to backup only files that have actually been altered. Prices range from $1,100 to $2,500. TEAMMATE, a division of Data Technology Corp., Santa Clara.

FOR DATA CIRCLE 308 ON READER CARD

FIBER-OPTIC LINK

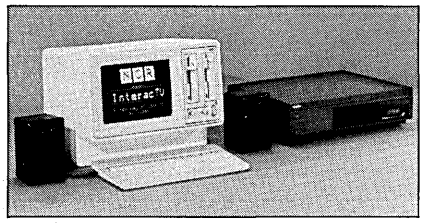
The CBE-202 is a fiber-optic interprocessor link. It comprises a parallel-to-serial multiplexor and a bus-interface module that plugs into the backplane SPC slot of a Digital Equipment Corp. computer. A duplex fiber-optic cable links the two multiplexors. The link operates at 250 kilowords-per-second and can be as long as two kilometers. The bus-interface modules are software-compatible with any operating system that's compatible with the DEC DR11-B or DR11-W modules.

The link can be configured in several ways: for Unibus to Unibus, Q-Bus to Q-Bus, or Unibus to Q-Bus DMA transfers. The price for the CBE-202 is $4,500 per end and includes the multiplexor and the bus interface. CANOGA DATA SYSTEMS, Canoga Park, Calif.

FOR DATA CIRCLE 309 ON READER CARD

VIDEO DISK SYSTEM

InteracTV is a computer-controlled video disk system that interfaces an NCR personal computer to a laser disk player, allowing for the simultaneous display of video disk images and computer generated text and graphics while also offering dual-channel narration and music. The system provides user control over the presentation of video images, sound, text, and graphics. As an option, a touch

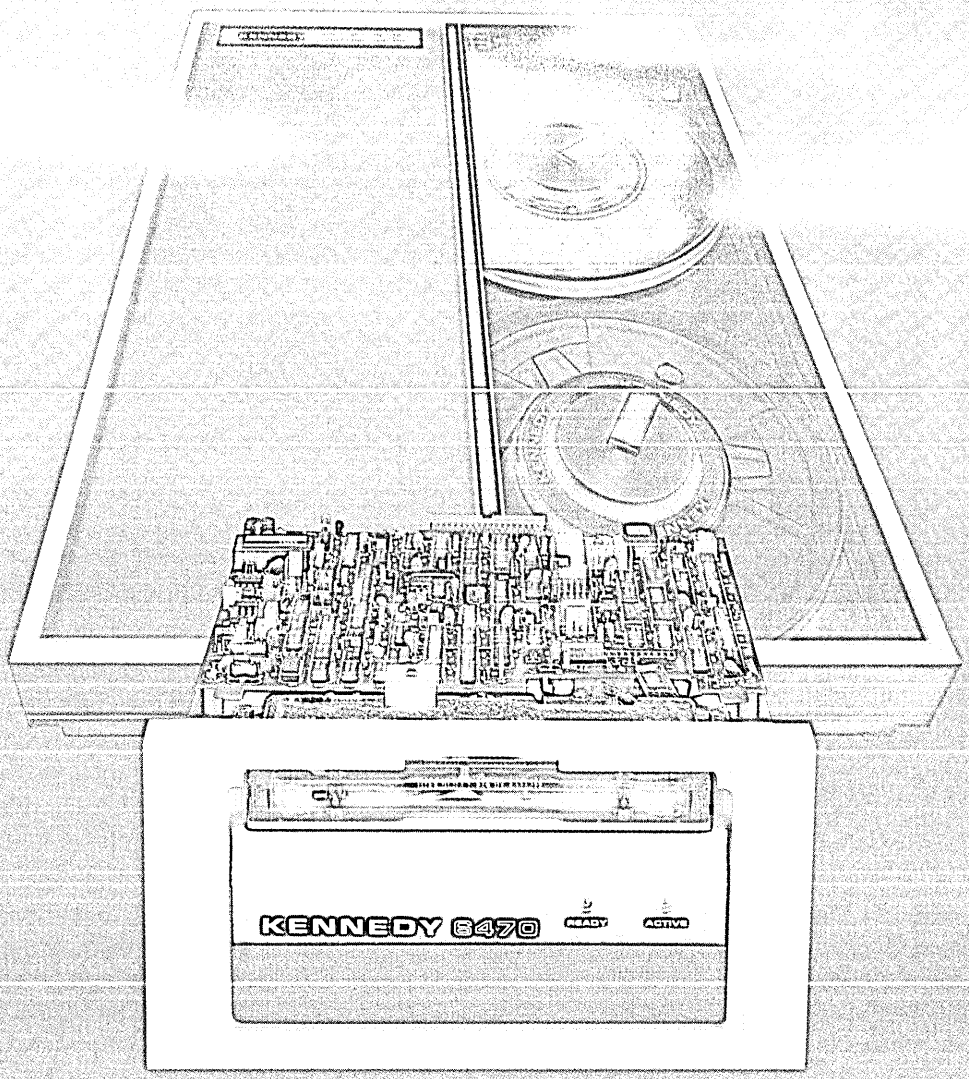


screen may be added. Applications can be grouped into three categories: training, product sales, and promotion. The vendor will market the product to value-added resellers.

The system is composed of a specially integrated NCR pc, a laser disk player, an audio module, and one pair of speakers. The personal computer contains a 16-bit processor board with an 8088 microprocessor, a 12-inch color monitor, two 5¼-inch disk drives, 128KB of memory, interface plugs for peripherals, NTSC video signal and computer graphic overlay capabilities, an MS/DOS operating system, GW/BASIC, video interactive program software, a laser disk control, video interface module, and a disk interface module. The system costs $8,700. NCR CORP., Dayton, Ohio.

FOR DATA CIRCLE 312 ON READER CARD

—Robert J. Crutchfield



Model 6470 Cartridge Tape System

Thinking Big — really big!

And why not? Kennedy's Model 6470 ¼" cartridge tape drive has every reason to think that it's big — it behaves as if it were a ½" tape drive.

Examples:

- Model 6470 uses standard ½" tape interface.
- It has the same functions as a larger ½" tape drive.
- The cost is 1/3 less than ½" tape drives.
- It's 1/10 the size of ½" drives.
- It packs more data per reel than P.E. drives (54 MBYTES).
- Finally, Model 6470 operates on the same tape handlers as ½" drives.

Model 6470 is a start/stop device with the capability of streaming data at 37.5 IPS, providing much greater flexibility than in comparable drives.

Other features include low power consumption, consuming total power of under 50 watts; diagnostic and fault isolation, with On-Line Self Test and Off-Line Self Test Routines.

Model 6470 — it's not guilty of delusions of grandeur. It really can perform as a ½" tape drive. Give us a call. We'll prove it.

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SPRING FORWARD.

NOW THERE'S A NEW 1200 BPS 2400 BPS AND FALLS BACK

For companies already populated by 300 and 1200 bps modems, the new generation of 2400 bps modems does not always offer welcome relief.

Unless those new modems are Rixon 1224s from CASE.

The new Rixon 1224 modem communicates equally well at 300, 1200 and 2400 bps.

To say the least.

The Rixon 1224 also boasts full autodial capabilities, complete with a speaker and front panel volume control. It even allows switching between DDD and private lines.

It features 11 indicators, 9 switches and synch selection, all conveniently located right on the front panel.

It expresses a CASE design so advanced and compact that you can fit

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FALL BACK.

MODEM THAT SPRINGS FORWARD TO TO 300 BPS WITH EQUAL EASE

16 Rixon 1224s in a single rack.

And it lists for just $799.

Which is quite a bargain for a modem that opens future opportunities while it protects past investments.

It's what *future-proof data communications* is all about. And why CASE is already an international leader in the field.

Find out more about CASE's new Rixon 1224 modem and other future-proof CASE products. Call toll free at 800-422-2724, extension 407.

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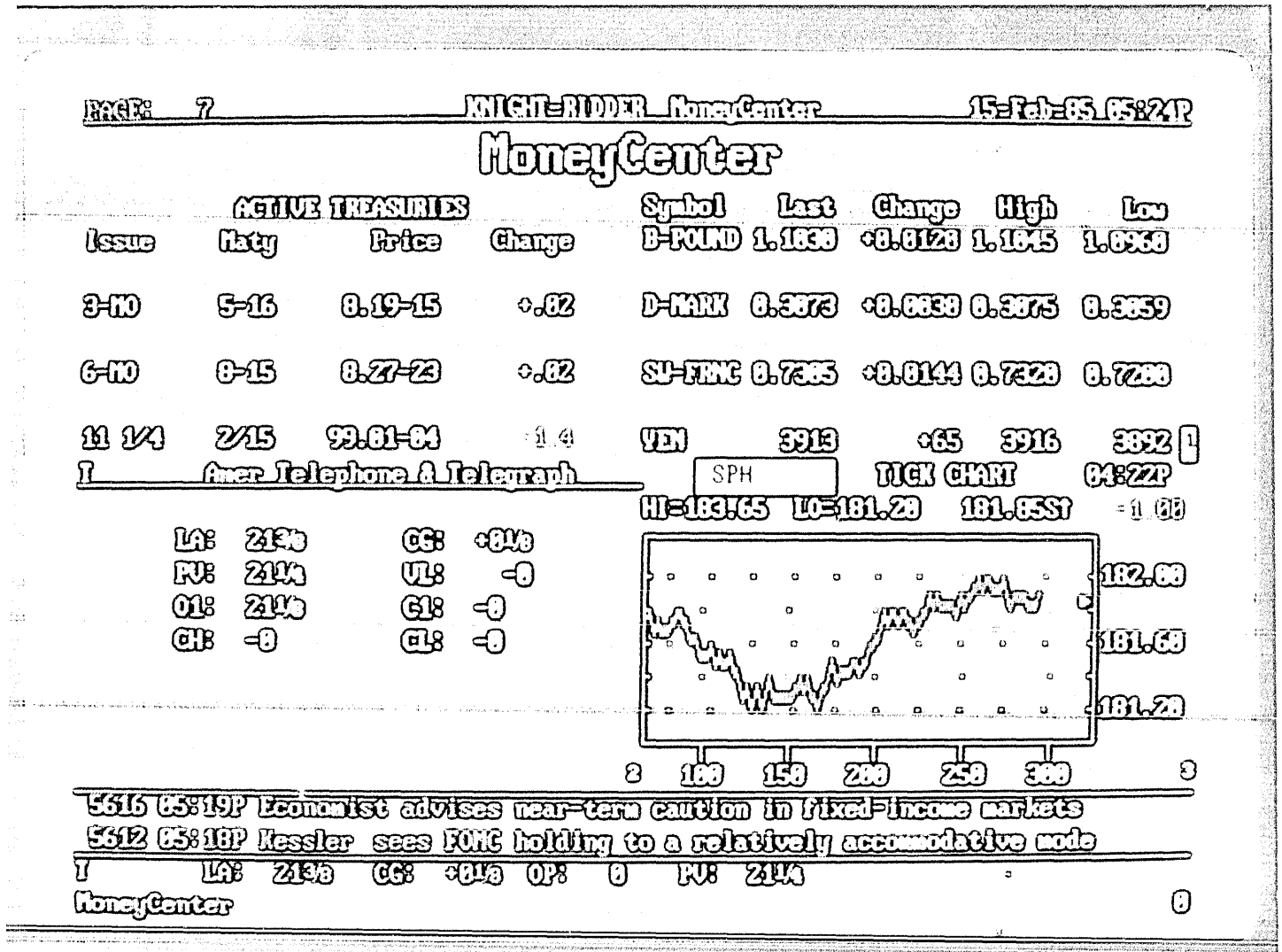

AT&T

ONCE KNIGHT-RIDDER CHOSE AT&T THE FINANCIAL PICTURE LOOKED BRIGHTER.

In the demanding world of financial markets, everything depends on getting the right information. Fast.

For over 30 years, America's leading futures dealers have relied on Knight-Ridder's Commodity News Services. Now, Knight-Ridder is introducing a new service and they're relying on AT&T.

Only AT&T could provide the complete system Knight-Ridder needed for MoneyCenter, one of the most comprehensive financial market information systems ever developed. The system features personal computers, printers, local area networks, and custom-tailored modems. All supported by an unparalleled national service organization.

For traders, just a few seconds can mean millions of dollars in either profit or loss. Knight-Ridder chose the AT&T PC 6300 because of its incredible speed. And also because its high resolution screen is easy on the eyes.

As Knight-Ridder's services expand, their AT&T system can too. Our unique open architecture assures that any AT&T system is flexible enough to meet changing needs and permits our products to work with other vendors' products as well.

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SOFTWARE AND SERVICES

UPDATES

Zork has sold more than 1 million copies since its introduction four years ago. It is part of Infocom Inc.'s line of interactive fiction, in which users direct the course of a programmed novel by responding to it in the form of conversational English commands on a pc. Zork happens to be of the science fiction genre, but if sci-fi is not to the reader's liking, the Cambridge, Mass., firm also offers fantasy and mystery interactive novels on diskettes.

So what does Zork have to do with the serious business of corporate computing? Not much, unless companies find employees are spending too much time fighting aliens from distant planets instead of fighting budget crunches on spreadsheets. But it is the technology behind Zork that Infocom is leveraging into its first business product, Cornerstone, a relational DBMS for the nonprogrammer. Both pc products share the same proprietary language, Zil, a Lisp derivative developed by MIT graduates.

Much of the game's philosophy is also in the database. The fiction products are designed to draw the reader into the game quickly and not take away from the fun of it with too many procedures and commands. With Cornerstone, the vendor is pursuing the same goal by allowing the user easier access to the database. The software provides hand-holding with help screens and messages to assist the novice user. Admittedly, sorting a database is not as much fun as solving a mystery, but with simpler products and better interfaces aimed at non-dp professionals, computing may not be as frustrating or mysterious. Cornerstone costs $500.

Just as Zork and Cornerstone make use of Lisp, a Litton scientist says companies can also make better use of artificial intelligence to improve business profits. Sy Schoen, manager of the Beverly Hills company's AI program, foresees this technology being used in areas such as production management, customer service, marketing, and planning. "AI can be applied to the products and services we sell our customers as well as to make our own internal management operations work better," he says.

It's hard to mention artificial intelligence these days without mentioning the Japanese fifth generation project in the next breath. Dr. Rainer von Königslöw, technical director of Logicware, a Toronto firm that markets an AI software product called MPROLOG, attended the fifth generation conference in Japan. He observed that what the Japanese have accomplished was not as impressive as the way they mobilized to tackle the project. Von Königslöw says North America is still ahead of Japan in AI research and development. Evidence of the continued interest in AI is the recent conference in Long Beach, Calif., which transcended the usual AI seminars to include a full-blown trade show with exhibits from the rash of vendors that have entered the AI arena. One study puts the number of companies offering AI products at 200-a 40% increase over 1984.

3270 REMOTE SERVICE

The Mark*Net 3270 Bisynchronous (BSC) Service connects a 3270 system user's terminals and hosts together via the General Electric Information Services Co.'s (GEISCO) telecommunications network. Users gain access to the network through dedicated access connections at any of 62 cities, or at any of 200 cities by way of local telephone connections.

The product allows 3270 clusters to communicate with 370 compatible hosts through the Mark*Net service. The 3270 display stations connected to the GEISCO network can access 3270 applications on one or several hosts. The BSC connection features connectivity through dedicated leased line, single and multidrop connections via full-duplex communications facilities, or public dial (switched) connections via half-duplex, two-wire switched facilities. Transmission speeds are between 2,400 and 9,600 baud for dedicated connections and 2,400 to 4,800 baud for dial connections.

The BSC host connection features dedicated connections via full-duplex communications facilities with transmission speeds from 2,400 to 19.2 baud for dedicated connections. There is support at the device level for allowing connections to multiple hosts simultaneously from a single controller.

Additional advantages include the ability for terminals attached to a controller to access different host resources simultaneously, network access validation procedures, facilities management of leased lines and modems, and regular 3270 BSC local telephone service for controllers. Access time for dedicated lines costs from $360 to $600 per hour. Other delivery programs are available. GENERAL ELECTRIC INFORMATION SERVICES CO., Rockville, Md.

FOR DATA CIRCLE 326 ON READER CARD

TRANSLATES SPANISH

The English to Spanish and Spanish to English translation software basically works on any text stored in an ordinary

word processor text file. One of the key elements is a built-in dictionary that contains more than 12,000 words. The dictionary size is actually larger because the word count doesn't include adverbs and plural forms of nouns. According to the vendor, advances in the personal computer have reached the point where translation applications are practical on the pc.

The menu-driven program allows users to select the dictionary or translation mode. In the translation mode, the program looks up each word of the text in its dictionary as it generates the translated version. The end product is not a literal translation since the software recognizes the grammatical differences between English and Spanish. The products are geared to small businesses and professionals with activities abroad. The products are also useful for students studying a foreign language.

The English/Spanish and Spanish/English versions each sell for $500. A combined version is available for $800. The software will support other languages later this year. LINGUISTIC PRODUCTS, The Woodlands, Texas.

FOR DATA CIRCLE 327 ON READER CARD

RELOADS IMS DATABASES

LOADPLUS is a software product that allows IMS installations to reload IMS databases up to 10 times faster than with the IBM utility programs shipped with IMS/VS, the vendor says.

The product was developed to meet the needs of IMS users for a faster and less expensive way of reorganizing their large databases. According to the vendor, users' databases keep getting larger and the amount of time they can be off-line for reorganization keeps getting smaller. LOADPLUS is said to address this problem by allowing users to reorganize often enough to maintain on-line performance.

The software replaces the IMS Hierarchical Direct Reorganization Reload utility program. It doesn't require any changes to user JCL or applications. Upon installation, all old reorganization jobs begin taking less time and computer resources. Databases created with the product are identical to those created by the IMS utility, with logical relationships, secondary indexes, and database recovery control fully supported.

Speed is increased through a combination of cpu path length reductions and I/O optimization. The product also gives the IMS database administrator more control over database free space for better database tuning. It also supports error handling options. For the application developer, the software offers a Load Program Interface, which allows an application, written to load a database in the standard manner with DL/1, to use the facilities of LOADPLUS instead. Changes to the application source code are not required. A perpetual license for Loadplus is $22,500. A monthly lease is available for $1,125. BMC SOFTWARE, Sugar Land, Texas.

FOR DATA CIRCLE 328 ON READER CARD

CODELESS PROGRAMMING

PDS-ADEPT PC is what the vendor calls a fourth generation codeless business programming system for the IBM PC XT and compatibles. The system requires no programming experience in order to use and generate custom business programs, the vendor adds. It is being offered initially as a custom program generator to business people as a productivity tool.

The screen presents questions and choices leading the user step-by-step. The result is a program. No coding is involved, and the process is self-documenting.

To make a change, the user alters the parameters and the effects of the changes show on the screen immediately. According to the vendor, only a few hours of instruction are needed to learn the system, even by people with little or no programming experience. Training is available from dealers and courses are offered by the vendor.

A General Business System, developed in ADEPT PC, will be availabe in the late summer. It will include accounts payable and receivable, payroll, general ledger, order entry and invoicing, purchase orders, and asset management. The ADEPT PC products require 512KB of memory and 5MB of disk storage. ADEPT PC costs $800. General Business System modules will range in price from $300 to $600. PARAMETER DRIVEN SOFTWARE INC., Birmingham, Mich.

FOR DATA CIRCLE 329 ON READER CARD

AIRLINE RESERVATIONS

Trans World Airlines and CompuServe are offering TWA's PARS reservations system through the CompuServe Information Service. The program is called Travelshopper, and gives CompuServe subscribers direct access to TWA's reservation system through their personal computers.

With the service, pc users can determine the lowest fares and most convenient flights, in addition to making an immediate reservation. Tickets are either issued by a travel agency or sent to the individual's home, or to the airline ticket counter.

PARS includes current information on domestic and international flights between more than 100,000 pairs of cities for every published airline schedule in the world, and on over three million fares, with basic booking rules for each fare.

Enrollment is free, but there is a surcharge of $20 per hour during prime time and $15 per hour for non-prime time use of the service. Subscribers automatically receive membership in TWA's Frequent Flyer bonus program with a 3,000 mile enrollment bonus and an extra 500 mile bonus for each completed TWA flight they book through Travelshopper during the first 90 days after enrollment. Other travel databases are planned. A subscrip-

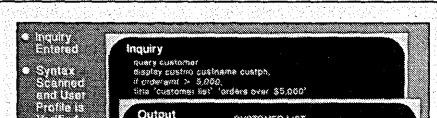
SOFTWARE SPOTLIGHT

ON-LINE DATA RETRIEVAL

Answer/DB Inquiry is a software product that allows universal on-line information retrieval from an IBM mainframe or compatible database. It provides mainframe terminal users immediate, security checked, on-line data access capabilities from production VSAM datasets and IMS/DB or DL/1 databases through CICS/VS and IMS/DC running under OS/VS or DOS/VSE operating systems.

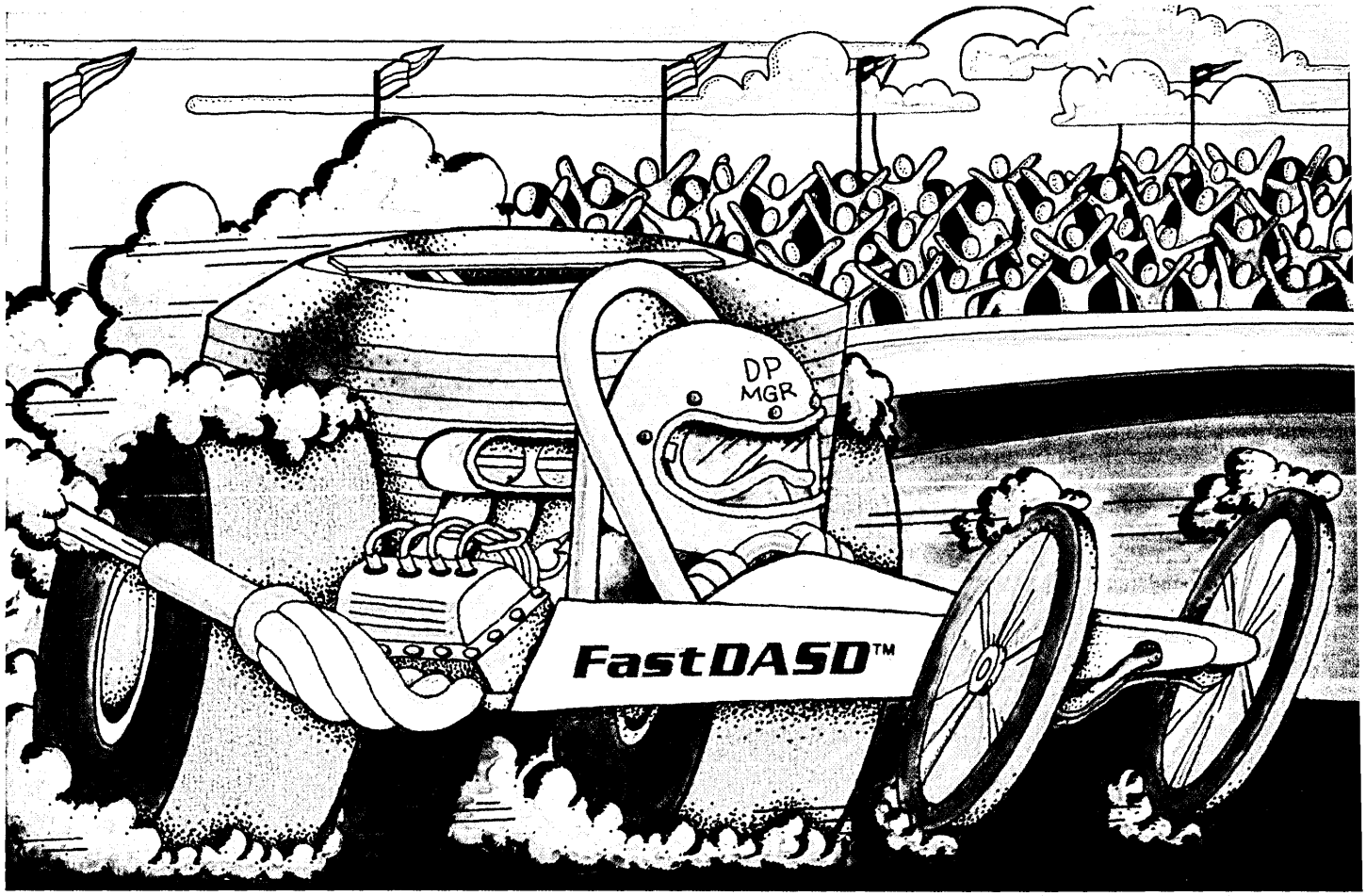
The product interactively processes user-defined requests and output statements, instantly displaying requested data on a terminal screen or routing the data to a system printer for hard copy. It also allows data processing personnel to control users' on-line processing limits, such as I/O calls, page, and sort limits. Database security from unauthorized access is provided through user profiles.

The software is designed so users can retrieve information with a few English syntax queries that are entered in simple statements. French and Spanish



versions of this product have been developed using the same query procedures as the English version. Up to 10 database files can be open and viewed at the same time, including any combination of DL/1 and VSAM files. The product can also store and recall frequently used queries in a library. Answer/DB is priced at $20,000 for the OS/VS package and $15,000 for DOS/VS. One year of free maintenance is provided with the product. A two-day user class with workshop is also available. INFORMATICS GENERAL CORP., Woodland Hills, Calif.

FOR DATA CIRCLE 325 ON READER CARD



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FastDASD steers you around the potential roadblocks in OS supported data centers. Like evolving user needs. Or equipment changes. Or growing demands on resources. FastDASD, a unique software performance system, automates time-consuming DASD analysis and reorganization.

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FastDASD focuses on key areas of system performance. It records data set activity, seek activity and volume and global data set accesses; locates defective tracks; and recommends data set reorganization. Its concise reports show you how to implement performance decisions.

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DAAD

tion to the CompuServe Information Service costs $40. Standard charges are $12.50 per hour from 8 a.m. to 6 p.m. and $6 per hour for other times. COMPUSERVE, Columbus, Ohio. TRANS WORLD AIRLINES, New York.

FOR DATA CIRCLE 330 ON READER CARD

LOOKS LIKE VT220

SmarTerm 220 allows an IBM PC to function as a Digital Equipment Corp. VT220 terminal, fully supporting A-to-Z and other DEC software packages that require VT220 terminals, as well as EDT and other full-screen text editors. According to the vendor, virtually all features of the VT220 terminal are implemented, including full keyboard emulation, English language setup mode, programmable function keys, multinational character sets, selective erase, and both 7-bit and 8-bit control modes.

The remappable keyboard layout specifies how the PC keyboard special-functions keys are mapped onto the VT220's special-function keys. This package also provides emulation of the VT100, VT102, or VT52 alphanumeric terminals as well as TTY mode. Features include eight separate setup configurations, smart softkeys, logon and file transfer operations, and host control. Support for the 132-column display is available directly, using one of the 132-column video-interface boards.

On systems without direct 132-column display capabilities, the product allows horizontal scrolling of an 80-column display window. European DOS is also supported. User-definable character-mapping tables are included, allowing automatic translation of extended European characters from ASCII values during terminal emulation and text-file operations.

Multinational character sets may be used when the software is running in the 8-bit mode. The file-transfer functions allow the data being sent to the terminal to be stored into a disk file. It also permits ASCII and binary program or data files to be transferred to the host computer without special programming. SmarTerm 220 runs under PC/DOS 2.0 or later and is fully installable on a hard disk. It costs $200. Existing users of SmarTerm 100 can upgrade to SmarTerm 220 for $75. PERSOFT INC., Madison, Wis.

FOR DATA CIRCLE 332 ON READER CARD

S/38 PERSONNEL SYSTEM

HRMS/38 is a human resource management software product for the IBM System/38. The product uses S/38 logical files for data access, with the data file externally defined using the native Data Description Specifications (DDS) and Filed Reference File. Extensive use of command function keys and a comprehensive on-line help facility are featured.

The product is a modular system that expands. It contains a total of six separate software packages. Payroll, personnel management, and data security are available now. Applicant tracking, position control, and Canadian taxation modules will be available later this year. Personnel and payroll modules are fully integrated, and may also be used in a standalone mode.

The data security system protects all application modules, authorizing access down to the individual employee and data element level. In addition to the standard reports included with each module, IBM's Query or other report writer products may be used to give additional query and report capability.

The product can be also be implemented on a multiapplication machine or on a computer dedicated to human resource management by a large company. The software, written in native RPG III, emphasizes on-line, menu-driven processing with detailed field-by-field on-line help that is context sensitive. HRMS/38 Modules are priced from $35,000, including user training, implementation, and one year of system maintenance. INTEGRAL SYSTEMS INC., Walnut Creek, Calif.

FOR DATA CIRCLE 333 ON READER CARD

MAP GENERATOR

Wizard Map is a complete on-line utility that automatically generates the BMS code with standard desired attributes from a free-screen layout. For example, the procedure programmers should follow if they wish to paint the screen is to simply hit the enter key. The BMS code will be automatically generated and then the programmer can make changes to fit unusual specifications.

The product automatically catalogs the coding to the source statement library where the programmer can then do the final map assembly. It ensures consistency and improves maintainability. The vendor says its simplicity of use makes the product a practical tool for users with no programming experience to design screens and generate BMS code. Experienced programmers can gain creative design-time opportunities with the reduction of editing, changing, and correcting time necessary under other coding methods. Wizard map runs under CICS/DOS and costs $750. WIZARD COMPUTER PRODUCTS, Greenville, S.C.

FOR DATA CIRCLE 334 ON READER CARD

SOFTWARE DEVELOPMENT

APTools is an applications programming package that integrates a set of programmer productivity tools with a software development environment. The product is intended primarily for the development of business and information management applications, and fills the gap between conventional high-level languages and fourth generation technologies, the vendor says. The programming effort is structured transparently by software engineering principles that enforce methodological practices without intruding on the programmer's creativity. Although programs are generated automatically with the software, program logic can be affected by the programmer at any point. The software is a fully integrated system for the Digital Equipment Corp. VAX computers, which run under VMS.

The software tools allow the automated generation of records, files, screens, reports and report schemes, queries, help messages, and functions. The programmer is supported by facilities for access control, dependencies management, documentation, versions and configurations management, application installation, recovery, and security. Prices range from $20,000 on a VAX 11/725 to $50,000 on a VAX 11/780. MITCHELL MANAGEMENT SYSTEMS INC., Westborough, Mass.

FOR DATA CIRCLE 335 ON READER CARD

PC-TO-PC COMMUNICATIONS

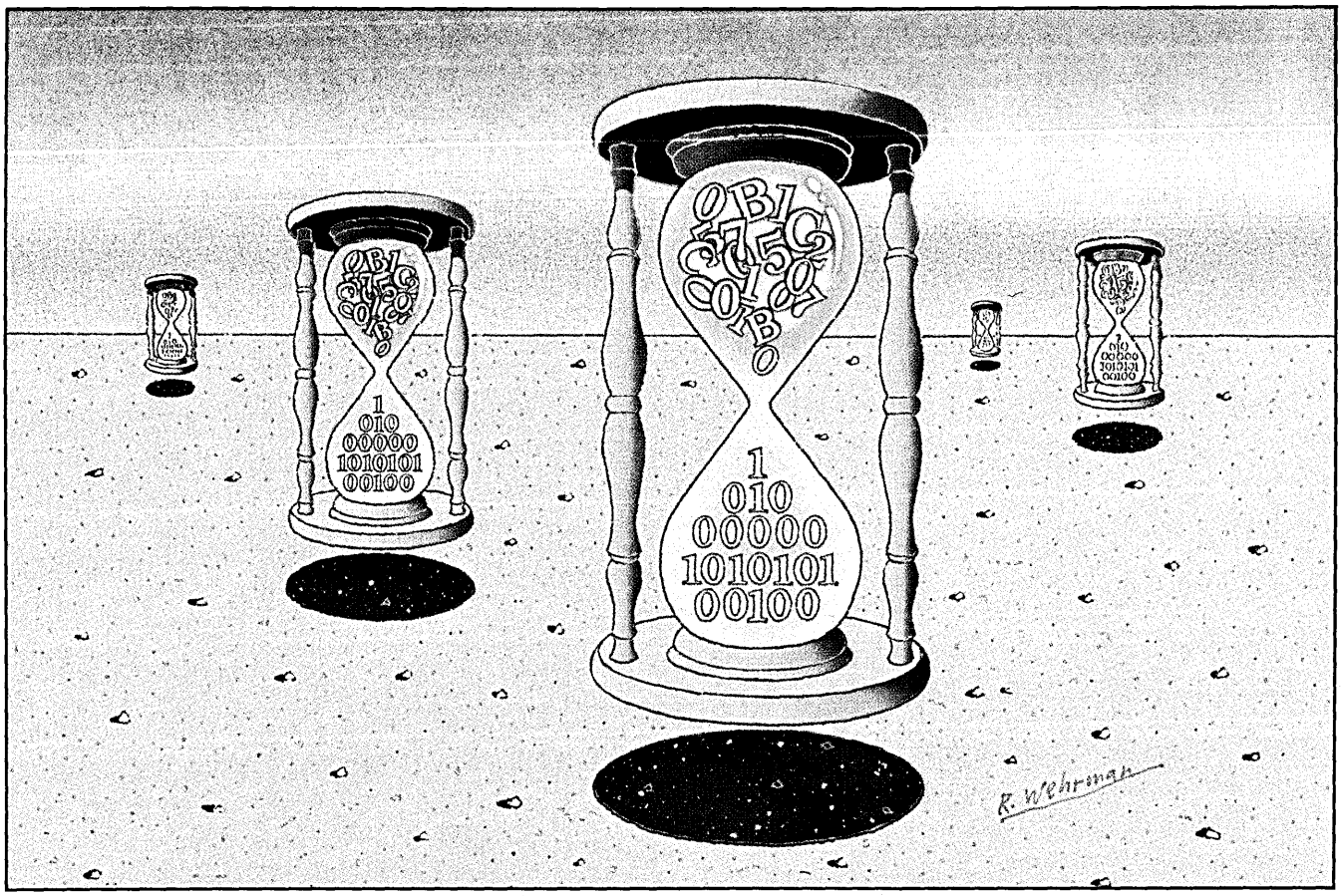
AdaptSNA PCcom is a software product that allows IBM PCs to communicate with each other using the SNA/SDLC protocol. It offers high-speed micro-to-micro communication and file transfer capabilities without the need for mainframe intervention. According to the vendor, it can also be used for large corporate SNA switched networks. In such networks, PCs are typically equipped with IBM SDLC adapter cards and synchronous modems for 3270 communications and don't allow the micros to communicate with each other. Peer-to-peer communication, however, is possible with this software. The user executes the PCcom program and then communicates with other PCs without changing hardware.

The product provides complete file transfer capabilities between PCs. In addition, files on the called (secondary) micro can be renamed or deleted remotely via the calling (primary) pc. Connections between the hardware can be via leased or dialed telephone lines. The software runs on an IBM PC, PC XT, PC AT, and compatibles with 128KB RAM, one diskette or hard disk drive, one IBM SDLC adapter card, and a synchronous modem. AdaptSNA PCcom is priced at $475 in quantities of one. In addition, multiple quantity discounts are available. NETWORK SOFTWARE ASSOCIATES INC., Irvine, Calif.

FOR DATA CIRCLE 336 ON READER CARD

—Robert J. Crutchfield

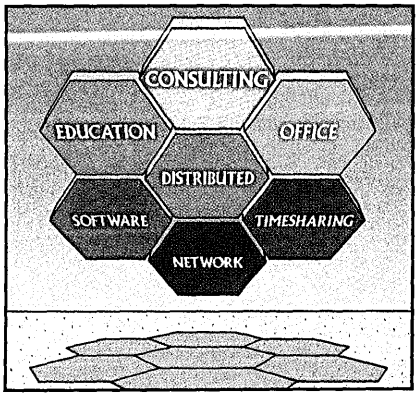
Without complete understanding of user needs, software development can take forever.



The most important component of a major new software system is the user. If user needs are not accurately defined and met, a system will constantly require adjustments, and productivity will suffer. That is why Boeing Computer Services insists on a comprehensive, preliminary understanding of all user requirements.

For example, our *Consensus* program defines user requirements in a unique way that greatly reduces software development time and significantly improves system performance. With Consensus, all the key participants from your organization — users and DP professionals — attend an intensive, one-to-two week session at a carefully selected facility away from the workplace.

Our Boeing consulting professionals facilitate these rigorous sessions. Encouraging different viewpoints. Probing for necessary inputs that would otherwise be neglected. Consequently, the definition process moves quickly. And people from diverse disciplines and functions can openly agree upon actual problems and their solutions.



This user-oriented approach has brought amazing results: across-the-board reduction of development flow time by 80% or more — in one instance from three years to 1½ weeks. Accuracy and quality of the requirements document and resulting system boosted to 85%. And most important, satisfied users.

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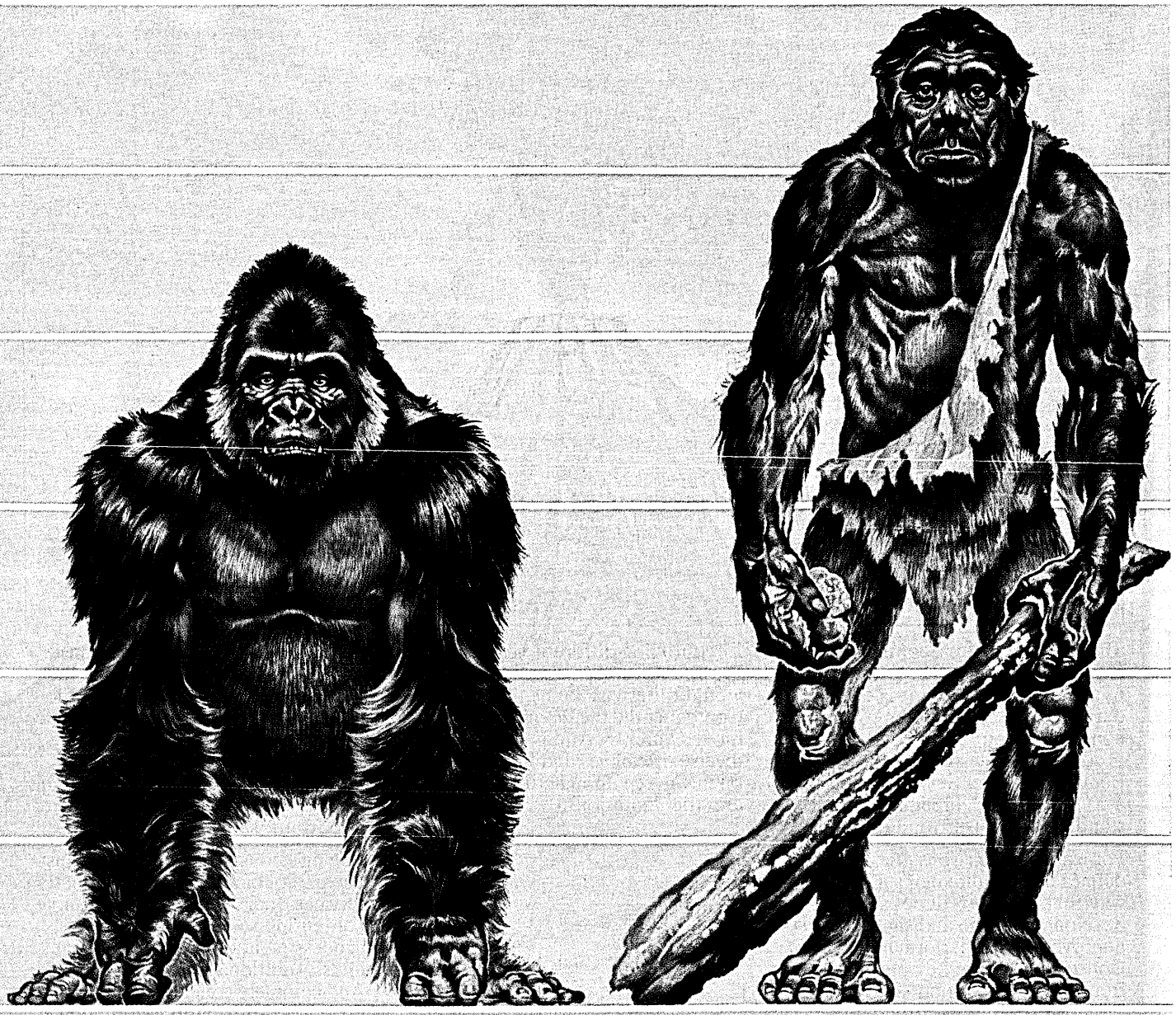
THE EVOLUTION



PBX
(Switchus interruptus)

LAN
(Linkus limitus)

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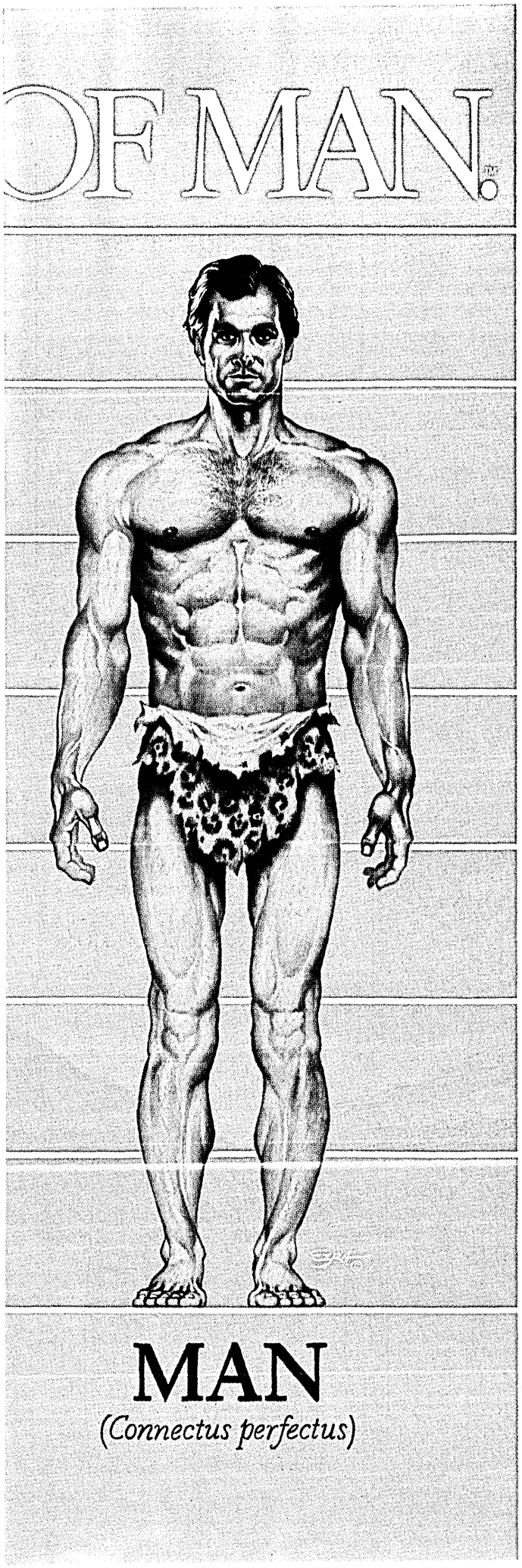

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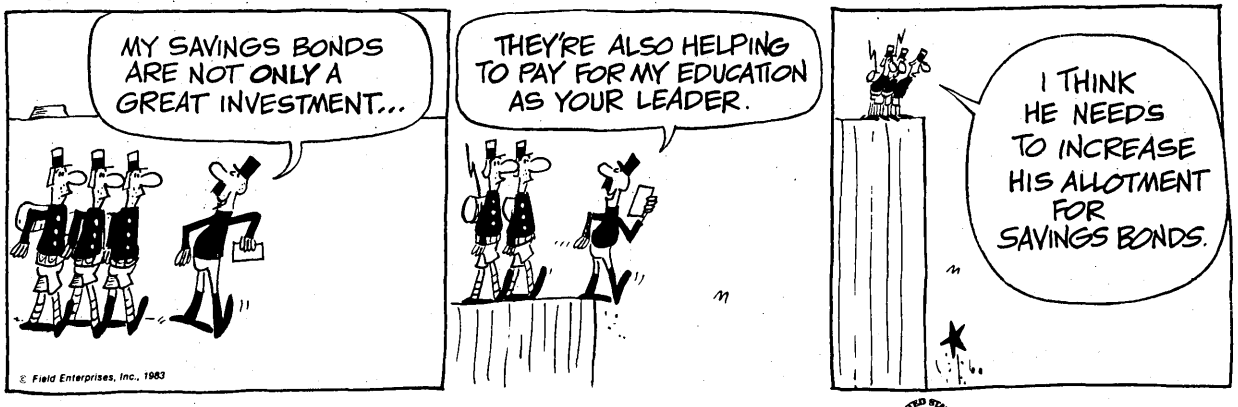

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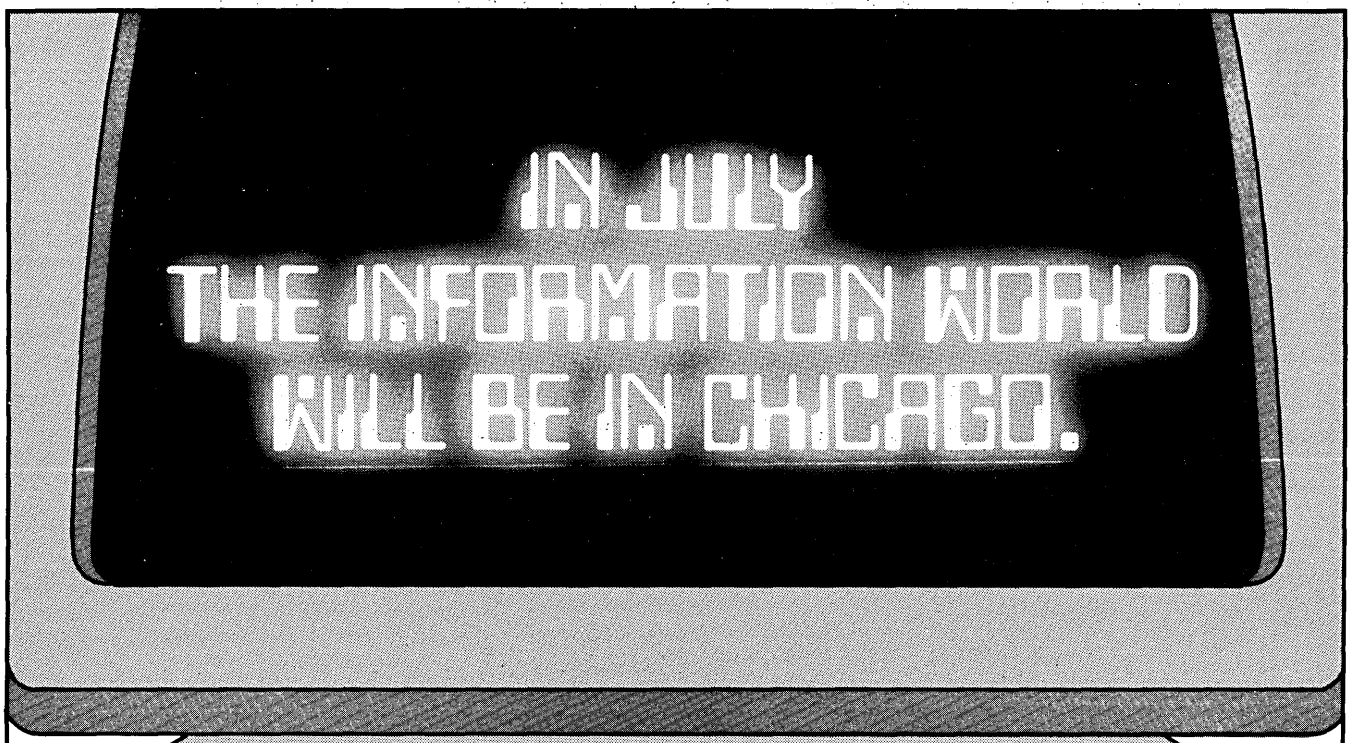

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ON THE JOB

COME 'N GET IT

The government is giving away money. You may find that hard to believe, especially after struggling through income tax season, but it's true. Small Business Innovation Research (SBIR) grants are making funds available to eager entrepreneurs who want to start their own companies and to established businesses, to encourage them to finance new projects. These grants are intended to stimulate technological innovation by allocating a sizable chunk of federal R&D funds to science and technology-based firms of 500 or fewer employees.

The SBIR grant programs, created by Congress as part of the Small Business Innovation Development Act of 1982, will award over $1 billion in seed capital through 1987. "Startup financing, true seed capital, has always been extremely difficult for small companies to obtain," contends S. Thomas Moser, national director of High Technology Practice, the Minneapolis-based consulting division of Peat, Marwick, Mitchell and Co., certified public accountants. "The magnitude of this funding presents a tremendous opportunity for entrepreneurship and technological innovation."

While the grants (up to $550,000 each) open doors for many businessmen, they also accomplish some broader objectives, according to the High Technology Practice executive summary on the SBIR grant programs. The government is most interested in seeing the research transformed into actual products or services and having the goods placed on the market. The second stage, commercialization, is financed through private sector capital or regular government contracts. Ideally, an entrepreneur's brainstorm blossoms into a product that will begin a new business and create new jobs.

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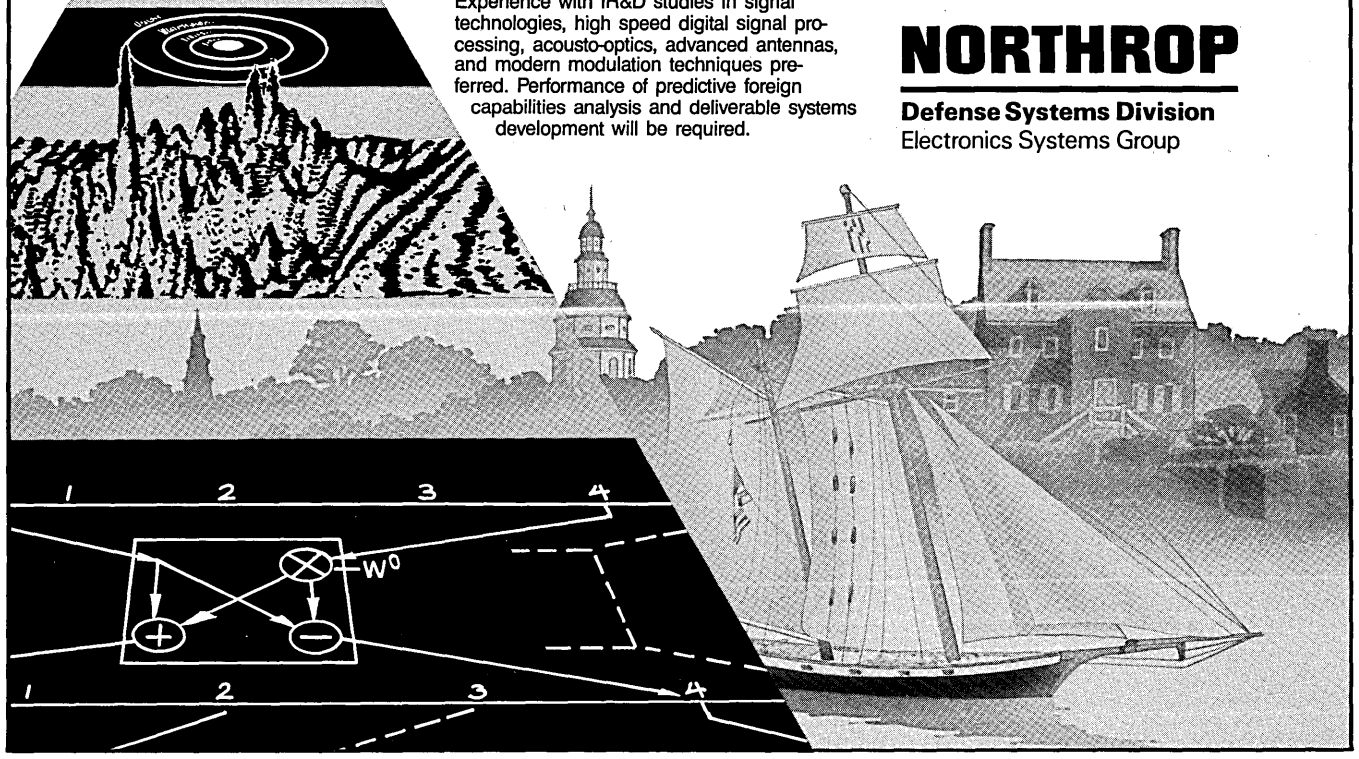

This competitive award program began in 1983 with some 800 grants allocated, and is expected to balloon to some 5,000 awards annually by 1987. The Small Business Innovation Development Act of 1982 "requires that all federal agencies with extramural R&D budgets of $100 million or more award a portion of those funds to smaller companies through an SBIR grant program," according to the executive summary. The agencies involved in the program at this time are the U.S. Departments of Agriculture, Defense, Education, Energy, Health and Human Services, Interior, and Transportation; the National Aeronautics and Space Administration; the National Science Foundation; the Nuclear Regulatory Commission; and the Environmental Protection Agency.

The agencies are a good place to start when examining the grant process. First, each agency publishes a solicitation explaining what types of research it will fund, how and when proposals should be submitted, and what it considers to be a winning proposal. After all the entries are submitted, a prescreening is done to make sure proposals are in the proper format and comply with the agency's areas of interest. A final technical review is then given by the agency (or by selected experts) to determine overall potential of the proposals. The above steps are known as Phase I.

If a proposal meets the Phase I criteria, an applicant can receive up to $50,000 for further scientific research in an area of interest to both the company and the government. Phase II allows for 24 months of research and development on new technologies that show the most promise after Phase I. Up to $500,000 for the development of a specific product or service can be awarded to a company. Applicants who can show commercialization potential by getting "follow-on private sector financing" score extra points with the agencies, according to the executive summary. Phase III is the commercialization step, where the SBIR grant stops and the company is on its own.

A company need not be in existence in the early stages of the grant process to be eligible. Interested individuals can apply for grants while they are working for one company and then form their own business when they receive the funding. At the time grants are awarded, however, winners must be for-profit U.S. corporations that are independently owned and operated and employ 500 or fewer workers.

The competition is considerable. Currently, there is a 10 to one chance an applicant will receive an SBIR grant, according to Peat, Marwick. Out of approximately 3,500 fiscal year 1983 applicants, the Department of Defense granted Phase I funding to only 300 companies, while the Department of Energy considered 1,700 Phase I proposals and funded 106.

If you'd like to be informed of future SBIR solicitations, write to the U.S. Small Business Administration, Office of Innovation, Research, and Technology, SBIR, 1441 L Street N.W., Washington, DC 20416.

To increase your chances of winning an SBIR grant, Peat, Marwick has compiled a guidebook, "Small Business Innovation Research Grants: How To Obtain Them to Finance Your Ideas." This 60-page book contains important information on everything from preparing a business plan, to writing the perfect proposal, to how the grant programs work. The SBIR guidebook is available for $5 and can be ordered from any Peat, Marwick U.S. office, or by writing S. Thomas Moser, National Director, High Technology Practice, Box 560-20, 345 Park Ave., New York, NY 10154.

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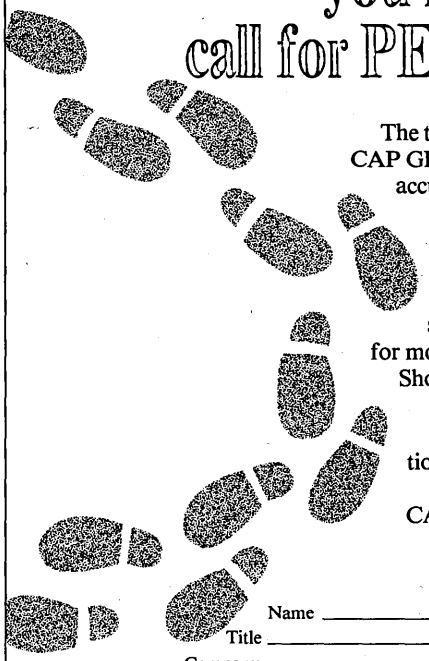

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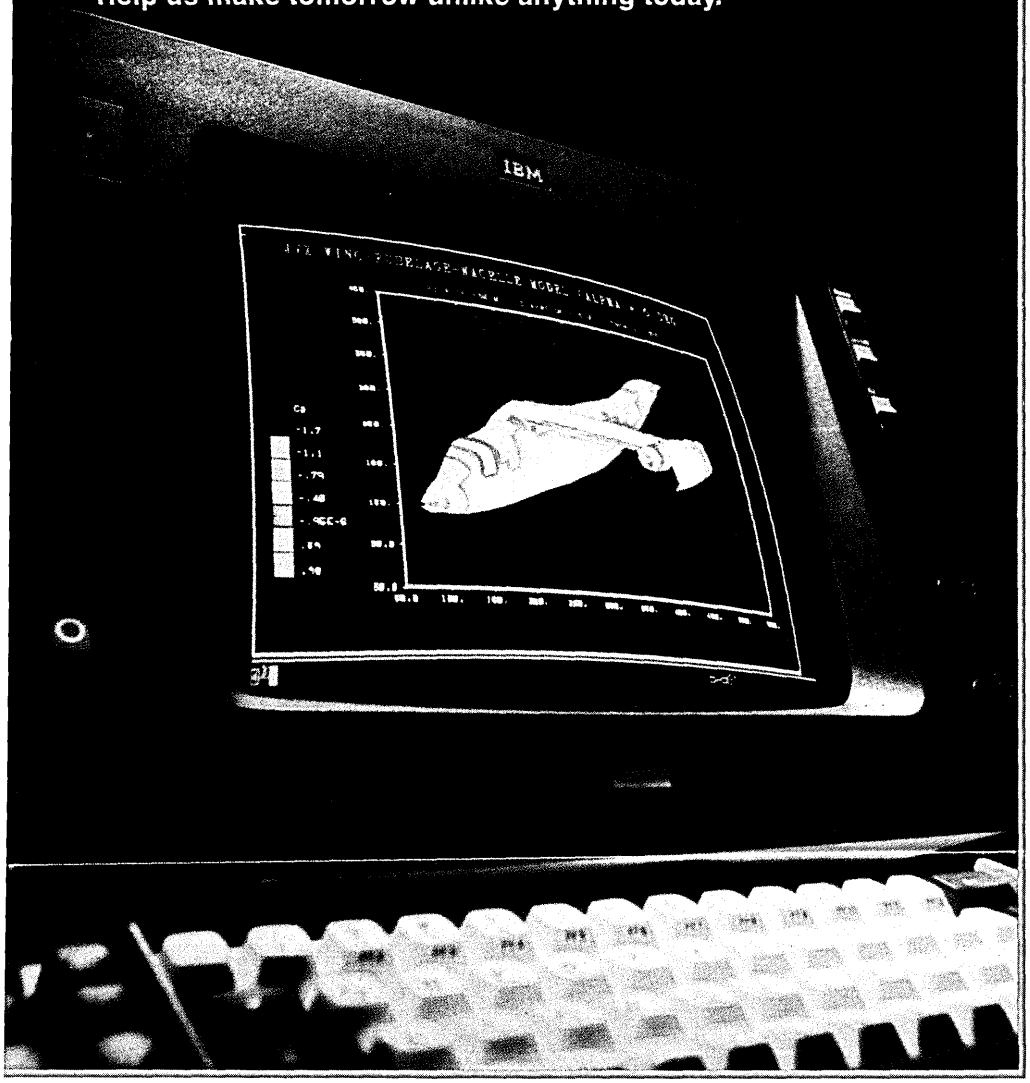

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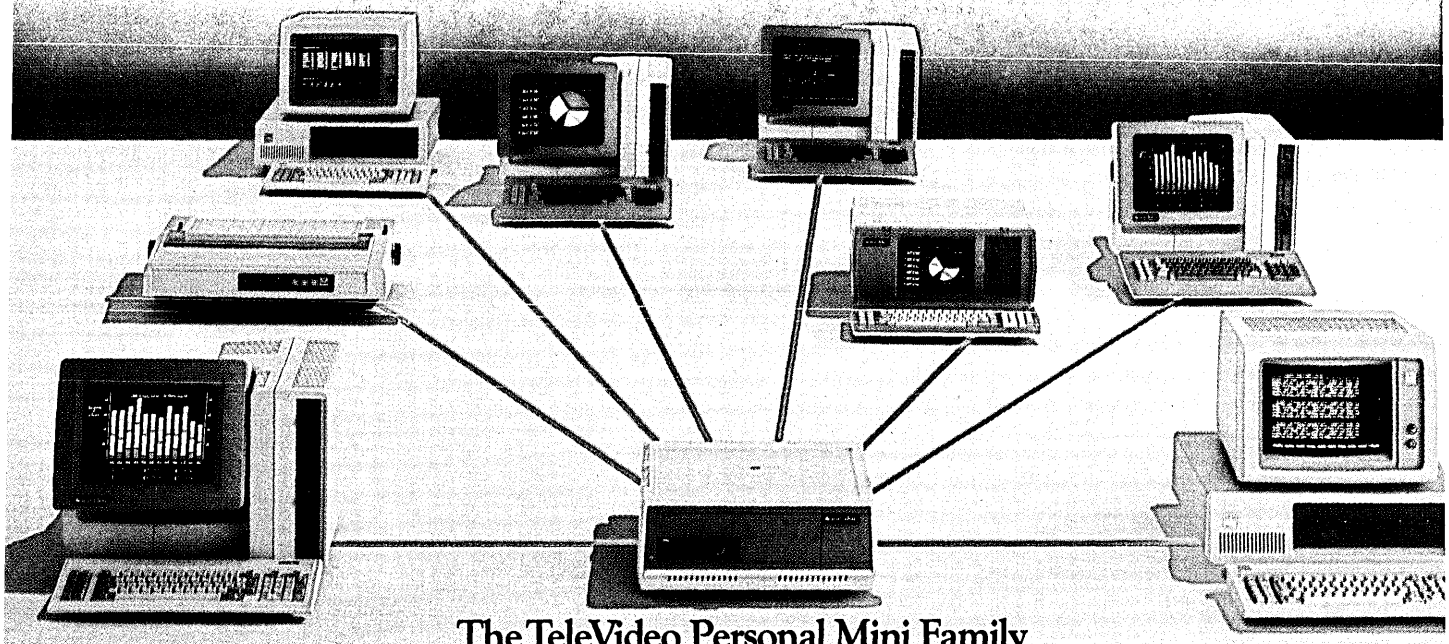

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An exchange of readers' ideas and experiences. Your contributions are invited.

READERS' FORUM

GIRDLE, ETCHER, BOZO

Once upon a time there was a damsel in this dress. It was so ill-fitting upon her hips that the only way she could wear it was with a girdle. So why did she wear this dress? Because Mother always told her, if you want to be beautiful, you have to suffer; and besides, she bought the dress on sale. Ah, how our poor unfortunate damsel did suffer. The tight discomfort of her girdle only served to remind her of the prison of her womanhood. "Oh, to have to walk through life perpetually enslaved by my own gender," she sighed. "How I would fling away this stifling garment and become free like men are. Free, free, free as a bird."

Deep in her heart of hearts she knew the only path to freedom was to capture the spirit of some man and join it with her own; she needed someone kind and gentle who would take her on adventures and teach her not to be meek. Only then could she find the freedom she was looking for. And not only that, she needed someone to help her pay her bills.

But where could she go? Where could she turn? She was not the typical shop girl who wore exotic Tahitian fragrances that brought men swooning to a girl's feet. Perfume only made her sneeze. Nor did she have any interest in the typical nice man who settles into a business career, helps raise an all-American family, and enjoys his cable television.

No, alas, our poor damsel had read too many books and thought too many thoughts, and her suffering alone had brought her to higher and higher levels of spiritual consciousness. She needed a man who thought deeply, a man with wit, a man who was extraordinary.

Where could she find the kind of stanger she was looking for? Someone stranger, yes, than the average person. Someone smarter, yes. Someone bright, and yes, someone weird. Daily she prayed to the good Lord above to lead her down the right path, to give her sustenance in her quest. Then one day, the Answer seemed to jump at her from a sign on a plain brick building at her local university: "Welcome to the Church of Computer Scientology. The Truth will set you free."

Our damsel had always shied away from computers, but she was always looking for the Truth. Did these people know the Answer? Did it go beyond the number 42?

She went inside. The very first thing that greeted her was a mirror the length of an entire wall. Above the mirror was a sign that read, "Look into this mirror, yea, oh suffering one, and what do you see? Nothing but your own self reflected back to you. Refer to yourself always and you will find what you are looking for."

"I wonder what this has to do with computers," thought the damsel, but by now she was intrigued.

She found a pile of books sitting on a gold-colored table. Were they prayer books or Bibles? She could not be sure. They were very dense and heavy and full of strange and wonderful words and numbers and pictures. "These are certainly illuminating manuscripts," thought the damsel, whose eyes squinted at the brilliance emanating from the pages. Each chapter heading was printed in a red three-dimensional box, which, she figured, must be the Rubik's cube. "Oh, this is a puzzling text," she sighed. "What does it mean?"

"Moo," said a man's voice from somewhere in the shadows. "Do not ask the question, and you will know the answer."

"Moo? Did you say moo? Are you a cow?" asked our damsel.

"I'd prefer to be known as a cowboy, ma'am," said the voice. "I ride on high horses, and women are always trying to capture me with strange lassos. But I am, after all, a priest. Would you like to confess?"

"How can I confess, if I can't even see you?" said the damsel.

"I can see you and I find you quite attractive. Do confess, so I can help you repent for your sins."

The damsel thought for a long while, feeling the weight of the Bible or prayerbook in her small, frail hands. The priest's voice was very musical and appealing.

"Should I call you Father?" she asked.

"Heavens, no," said the priest. "We're not that kind of church. Please don't let my priestly title intimidate you. I'm just a regular guy. After the confession, would you like to see my etchings?"

"I beg your pardon!" said the damsel.

"Oh, please don't be afraid of me. I just want to be your friend. I think I can be far more supportive of your needs than that girdle you are wearing."

"How did you know about my girdle? Do you have X-ray eyes like Superman?"

"No, it's my natural intelligence. Do reveal your suffering, and I will bless you with a real hug."

"Well, Sir, Father, Friend, whoever you are, I do have one confession to make. I hope you won't take this personally, but I don't like computers. I will admit, though, they do make banking easier."

"Oh my poor dear," said the priest, and he flew out from the shadows and gave her a hug that was unforgettable. He was an attractive young man who wore blue jeans and a T-shirt that showed the yin-yang symbol.

"Oh my," said the priest. "You are one of the cuddliest people I have ever met. I'd like to hug you again some time."

"When? When?" said the damsel. But the priest suddenly looked frightened as a jackrabbit. It was as if the hand of the Lord were ready to smite him if he got too smitten. He quickly grabbed a copy of one of the heavy Sacred Books and ran right out of the church to God knows where.

Just then a beautiful chorus of women's voices resound-

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ing in an eloquent Bach mass echoed through the holy halls, which seemed much more vast than the outside of the building revealed. Our damsel followed the music and came to a mysterious stairway. The more she walked up the stairs, though, the more she seemed to be going down the stairs.

The women's voices grew louder and louder. Where could they be? Suddenly she looked upwards and saw a mirror on the ceiling and her own face reflected back to her. "This must be a kinky church," she mumbled to herself. "Mirrors on the ceiling!"

Leaving the stairs behind, she followed another corridor and there was the choir. There were dozens of women all in a row, standing on pedestals. "What are you doing up there?" asked the damsel. They stopped singing.

"We are the Nones," said one of the women. "We get none. And neither will you, so don't be fooled. Leave now before it's too late."

"But I've come to find the Truth," said our damsel.

"This is the Truth. We've been trying to rope these guys for years, but they're slippery devils. Just when you think you've got them in the palm of your hand, they find your tragic flaw."

"What does this have to do with computers?" the damsel persisted.

"Computers is where all the men are. Didn't you come here to get a man?"

"Well, yes and no. First I want to know the secret of life. If I get a husband, too, who's to complain?"

"Don't ever let them know. That was our mistake. Don't tell them. It's their Achilles' heel. They are frightened as rabbits and slower than turtles. But they have discovered a great machine that may be so smart it will replace them, yes, and even us."

"Impossible," said the damsel. "I haven't met a computer yet that can hug like me!"

The Nones went back to singing their mournful yet exquisitely beautiful mass. "There's more here than meets the I," she decided. "I must find out for myself." She would give anything for another hug. It was like a priestly benediction.

"What a strange and puzzling place this is," sighed the damsel. "Who'd have thought I'd find it right here on my local college campus. I wonder if there are any other darling priests. Something tells me I've stumbled into a highly intellectual metamen's club full of foreign words and phrases and astounding numerology. But I can only base my opinions on feminine intuition. Plus, I already met a man here."

Just then another man appeared and stared at her. "Bon jour, mademoiselle," he said. "You must be looking for the Answer."

"Moi certainly is," she said, noting that he held half a dozen copies of what appeared to be the Sacred Book in six different languages.

"Are you a priest, too?"

"I must confess I am," he said. "Let me be an ear for all your troubles."

"Let me see your etchings first," she said. The girdle was becoming unbearable.

"Oh, non, non, non, I could not do that. I am a priest."

"No commitment," said our damsel, remembering the wisdom of the Nones. "I know the Answer is in the etchings. I know it's the Answer to all of life itself!"

"The sacred etchings that reveal all?"

"Yes, those."

The priest looked skittish and glanced around the room to be sure that no one was looking. "How about a priestly hug," he offered. "It's as much of the Truth as I may reveal or you will become too needy. As you know, the higher powers say that you must always refer to yourself, and you are trying to refer to *my* self. I'm not that kind of boy."

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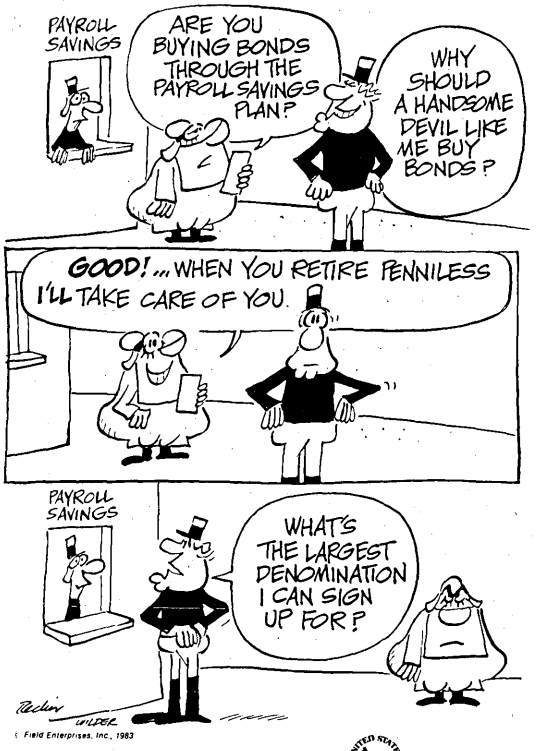

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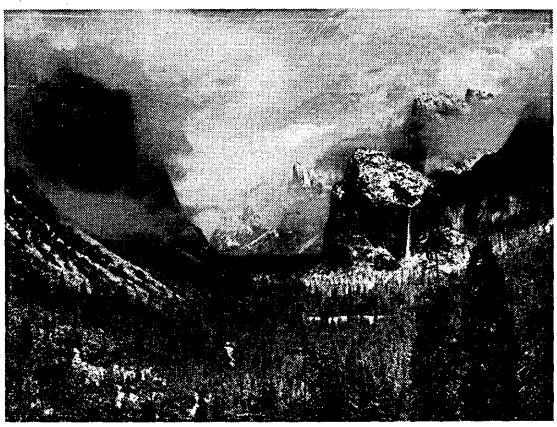

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READERS' FORUM

"You don't look like a boy to me. How about that hug?"

For a moment, the young priest lost his head and hugged the young damsel. "Wow," he said. "Just think how great you'd be without that girdle."

"Do you want to find out?"

"Heavens no! You are not holy enough for me! You do not know the Sacred Book backwards and forwards."

"I can learn."

"There's no time for me to wait. Alas, I must be gone." And he disappeared.

The damsel was very disappointed. "Just think of the beautiful music we could have made together." She walked down the hall feeling sad and stared at her own reflection in the mirrors.

Just then she heard another man chanting to himself of his great suffering. "Oh why me? Why me?" said the man. "Why me? Why me?"

"Why you what?" asked the damsel.

"Why was I born to suffer living a life of the Lord without being able to speak to Him."

"Maybe your problem is you think God is a man."

"How do I know there is a God at all?"

"You mustn't be a Priest if you ask such questions."

"Of course I am. I'm certainly not a rabbi. Oh woe is me, woe is me." The damsel was confused by this priest. He seemed so very lonely. "Are you rich?" she asked him.

"Of course I am. I create intelligence artificially. That's not easy work. Why shouldn't I be rich?"

"Then why do you feel so sorry for yourself? Go find a wife."

"Oh woe is me! I've been looking for years. No one is quite right. Everything is wrong. The reason is right there in the holy book on p. 152: 'It always takes longer than you expect.' "

"Why don't you stop expecting so much and then it won't take so long."

"Heretic! Get ye to the room of pedestals!" And he stormed off.

"I think he just found my tragic flaw," she thought. "But I don't want to be a None, not me."

Feeling confused and loved and jilted all at once, the poor damsel was distressed all right. But just then she saw a sign that read "Room of Contemplation" and she entered it. As soon as she entered it, she exited it again, then entered, then exited, as if the room had an invisible revolving door. "Why do I keep feeling like I'm going around in circles here?" she thought. "Will I ever escape this room?"

"Moo!" shouted the first priest with an impish grin. He appeared before her ready for another hug. "You can't get in, and you can't get out. That is the Way," he explained.

"The Way of What?" she asked him, reaching out to draw him close.

"The Way the great and sacred cows taught us with their magical milk," he said. "It's a no-win situation. No lose either."

"You speak in paradoxes."

"Yes and no," he replied, "I missed you."

"I missed you, too, but it sure took you long enough to show up. I'm getting tired of this girdle. And nothing else around here adds up either."

"Ooooops, I think I have to go now," said the priest.

"Wait a minute! What about the etchings?"

"The sacred etchings? You want me to show you those? Oh God!" he cried, and ran out of the room from which there was no exit and no entrance either.

"Clowns," she muttered. "Everyone here is a clown. A bozo. An absolute bozo. And damn it, I'm in love with the lot of them. They are weirder, wittier, and more charming than any other men I've ever met, yet more elusive, more unusual."

"We're all bozos on this bus," said a new voice.

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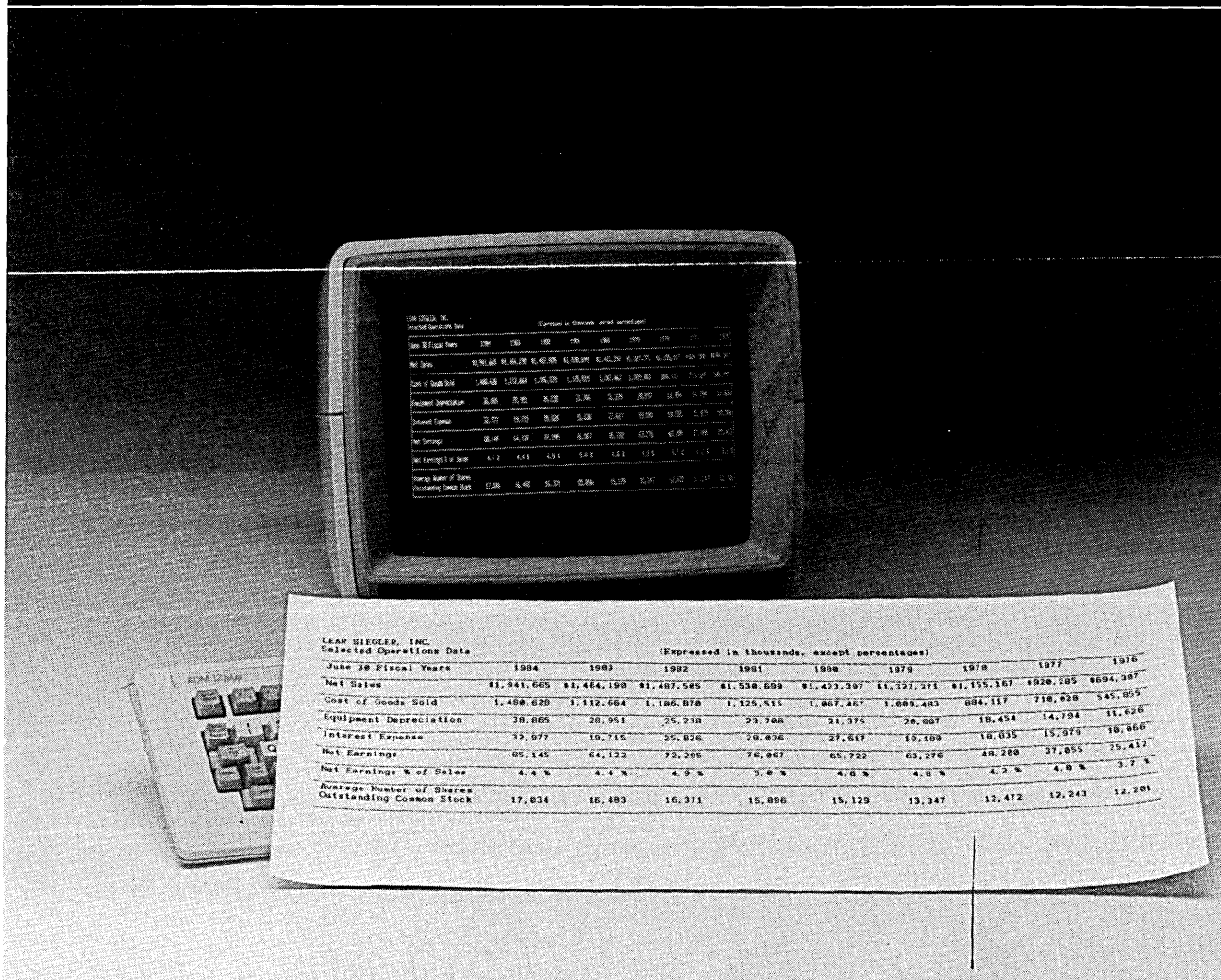

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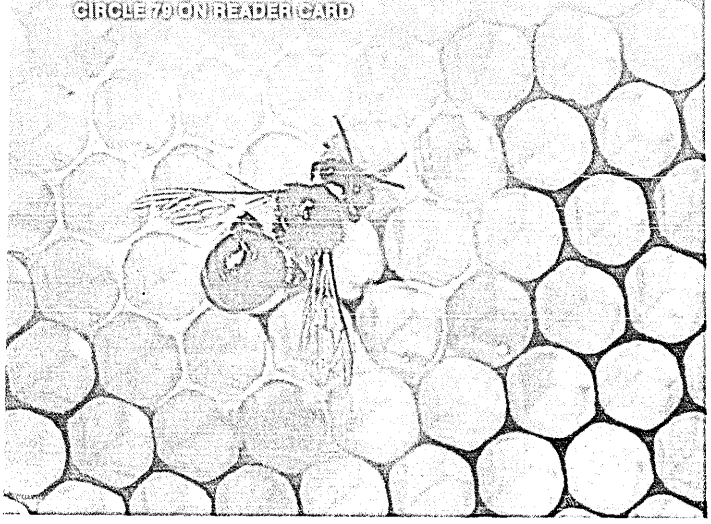

READERS' FORUM

"Who are you?"

"I am He, the One, the Sacred Leader."

"You are He, the One, the Sacred Leader?"

"I just said that."

"I just said that, too."

"You're catching on. You're smart. But not as smart as the great machine. Are you willing to see the Answer? I will take you there."

Our damsel was overcome. It was He, the One, the Sacred Leader, the charismatic author of the Sacred Book.

"Do *you* have any etchings?" she asked him shyly.

"Heavens, no. I'm above all that. Come with me, and I will teach you many things."

He took our damsel by the hand and led her to a room from which eerie green lights shone. In the room were a myriad of computer terminals blinking and winking and filling the room with an unmistakable energy."This is a holy, holy chamber," he told her. "Few women are ever allowed here. But your curiosity about our ways was simply so pure and sincere I decided to make an exception, as an experiment. For you see, I am going to show you the secret of the creation of intelligence."

And at that he demonstrated for several hours the wonders of artificial intelligence: machines that could think and do mathematical tricks, machines that could play chess, machines that could write music, machines that could pass Congressional laws, machines that could speak in Chinese, machines that could translate Chinese into Russian, machines that could teach machines about all the wonders of the world, reducing everything down to its smallest parts until nothing was a mystery.

"It's eternal! It's golden!" said the Sacred One, a look of rapture coming over his face. "We are creating these thinking machines. Does that make us like God or are we merely machines ourselves that God made? Somewhere in these machines is the Answer to all life!"

"Somewhere in these machines is my social security number," said the damsel, who was not convinced. "There's something missing. Something that doesn't seem right. Do these computers build houses? Do they ride bicycles? Do they pay taxes?"

"Not yet, but they will."

"Why will they?"

"We will teach them."

"Why will you teach them?"

"So they can do everything we can do only better."

"Why do you want them to do everything we can do only better? If you think I want to make love to a computer you're out of your mind!"

At that the Sacred One looked at her as if she were an ignorant fool. "Don't you understand? Didn't you read The Book?"

"I think I've heard this before."

"You have."

"I think I'll hear this again."

"You will."

"Thank you," she said, "but I have to go now. My girdle is killing me. Something tells me that if I can just get out of this girdle, the secret of life will reveal itself."

And then she knew that she would still be beautiful and that she would still suffer. But would she ever find her eternal golden wedding band? Did she even want to?

"Moo," said the first priest.

"Moo," said the second priest, in harmony.

"Moo," said the third priest, completing the familiar chord.

Only by not asking such questions can you know the answer.

—Barbara Bialick
Boston, Massachusetts

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✓ 381. Insilco
✓ 382. Badische
✓ 383. Sonoco Products
✓ 384. Economics Laboratory
✓ 385. Big Three Industries
✓ 386. Figgie International Holdings
✓ 387. Hoover
✓ 388. Interstate Bakeries
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✓ 390. Joy Manufacturing
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✓ 393. Mohasco
✓ 394. Genesco
✓ 395. M/A-Com
✓ 396. Kaiser Steel
✓ 397. Scott & Fetzer
✓ 398. Idle Wild Foods
✓ 399. Dennison Manufacturing
✓ 400. Deluxe Check Printers
✓ 401. Ferro
✓ 402. MEI
✓ 403. Briggs & Stratton
✓ 404. Sybron
✓ 405. Sheller-Globe
✓ 406. Brown-Forman Distillers
✓ 407. Tyson Foods
✓ 408. Arvin Industries
✓ 409. Maytag
✓ 410. Coleco Industries
✓ 411. Armstrong Rubber
✓ 412. M. Lowenstein
✓ 413. Raychem
✓ 414. Wm. Wrigley Jr.
✓ 415. Sanders Associates
✓ 416. ACF Industries
✓ 417. Gulfstream Aerospace
✓ 418. Handy & Harman
✓ 419. Tyco Laboratories
✓ 420. Consolidated Papers
✓ 421. Kellwood
422. Smithfield Foods
✓ 423. Federal Paper Board
✓ 424. Bausch & Lomb
✓ 425. Rohr Industries
✓ 426. Nashua
✓ 427. AM International
✓ 428. Echlin
✓ 429. A.H. Robins
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✓ 459. Royal Crown Companies
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✓ 461. Savannah Foods & Industries
462. Roper
✓ 463. Coachmen Industries
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✓ 466. Rorer Group
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✓ 469. Ceco
✓ 470. International Flavors & Fragrances
✓ 471. Liquid Air
✓ 472. Cooper Tire & Rubber
✓ 473. Phillips-Van Heusen
✓ 474. Snap-on Tools
✓ 475. Worthington Industries
✓ 476. Cooper Labs
✓ 477. Prentice-Hall
✓ 478. Ametek
✓ 479. Meredith
480. Wisconsin Dairies Cooperative
✓ 481. Peabody International
✓ 482. Dorsey
✓ 483. Diebold
484. Holly
✓ 485. Harte-Hanks Communications
✓ 486. Bairnco
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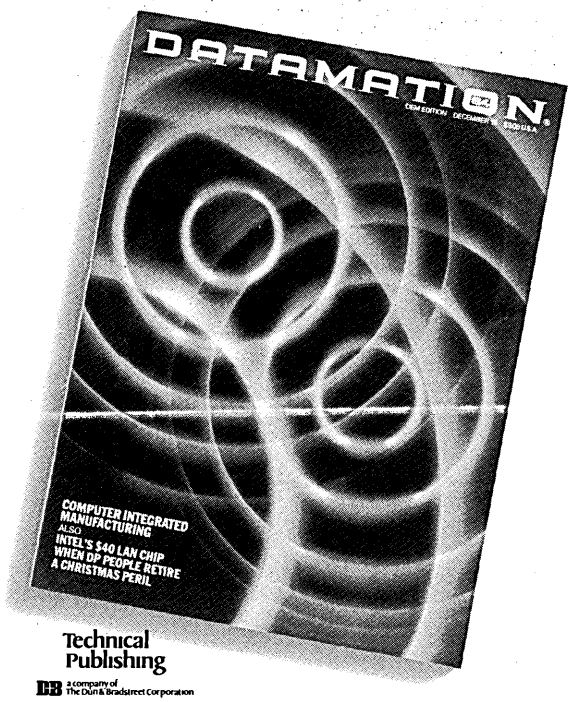

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ADVERTISING INDEX

Circle		Page
46	AST Research	80
—	AT&T Information Systems	152
28	Ansul	54
38	Astrocom Corp.	67
33	Banyan Systems	60-61
35	Barbados Industrial Development Corp.	63
14	Battelle	22
—	Bell Helicopter	165
63	Bell & Howell	130-131
23	Bit 3 Computer Corp.	50
74	Boeing Computer	157
75	Bridge Communications	158-159
66	CTI Data Corp.	139
69	CXI, Inc.	144
61	Cahners Expo Group	127
79	Cambridge Systems	172
31	Cap Gemini DASD	164
72	Case Communications, Inc.	150-151
62	Codercard	129
—	Codex	5
50	Computer Associates	88-89
51	Computer Corp. of America	91
55	Computer Security Institute	112-113
32	Computer Task Group	59
65	Concord Data Systems	137
78	Control Data Corp.	169
5	Cullinet Software	4
25	D&B Computing Services	51
17	Data Aire, Inc.	28
58	Datastream	118
96-104	Dataware	8
12	Dataproducts Corp.	19
53	Dataswitch	99
19	Digital Communications Assoc.	36-37
57	Digital Communications Assoc.	116-117
—	Digital Equipment Corp.	10-11
22	Dow Jones News/Retrieval	49
27	DunsPlus	53
29	Dylakor	55
84	*Facit AB	80-1
34	Fenwal Protection Systems	62
60	Floating Point Systems	124-125
26	Format&T	52
15	General Electric	25
43	General Instrument Corp.	74
7	Hewlett-Packard	6-7
54	Honeywell Info. Systems	100-101
—	Hughes Aircraft Co.	121
—	IBM Corp.	43-45
40, 41	ISSCO	70-71
85	*ITT Information Systems	80-5
47	Information Builders, Inc.	81
4	Infotron Systems	2
80, 81	Intermec	122
67	Iomega Corp.	141
71	Kennedy Co.	149
37	Landmark Systems Corp.	66
83	Lear Siegler	161
86	*Liebert Instrument Group	80-10/11
11	Lotus Development Corp.	16-17
79	M/A-Com Linkabit	147
20	McCormack & Dodge	39
77	Memorex	106-107
2	Micom Systems	CV4
76	NCC'85	175
18	NCR Corp.	30-31
30	Network Systems Corp.	56-57
52	Northern Telecom	93-95
—	Northrop	163
24	On-Line Software Int'l.	50
56	Paradyne	115
64	Peat Marwick Mitchell	135
3	Perkin-Elmer Corp.	1
68	Polaroid	142-143
44	Precision Visuals, Inc.	75
48	Qume VDT Div.	82-83
13	Racal-Milgo	20-21
8	Racal-Vadic	9
42	Relational Database Systems, Inc.	72-73
—	SAS Institute, Inc.	CV2
82	SDI Support Systems	54
21	Selanar	41
16	Software AG	26-27
73	Software Corp. of America	155
1	Sperry Corp.	CV3
45	Storage Technology	76-77
9	Stratus Computer	12
87	*Technical Communications Corp.	80-8
—	TeleVideo Systems	166
39	Telex	68-69
—	Triangle	103
10	Tymnet	15
49	Universal Data Systems	87

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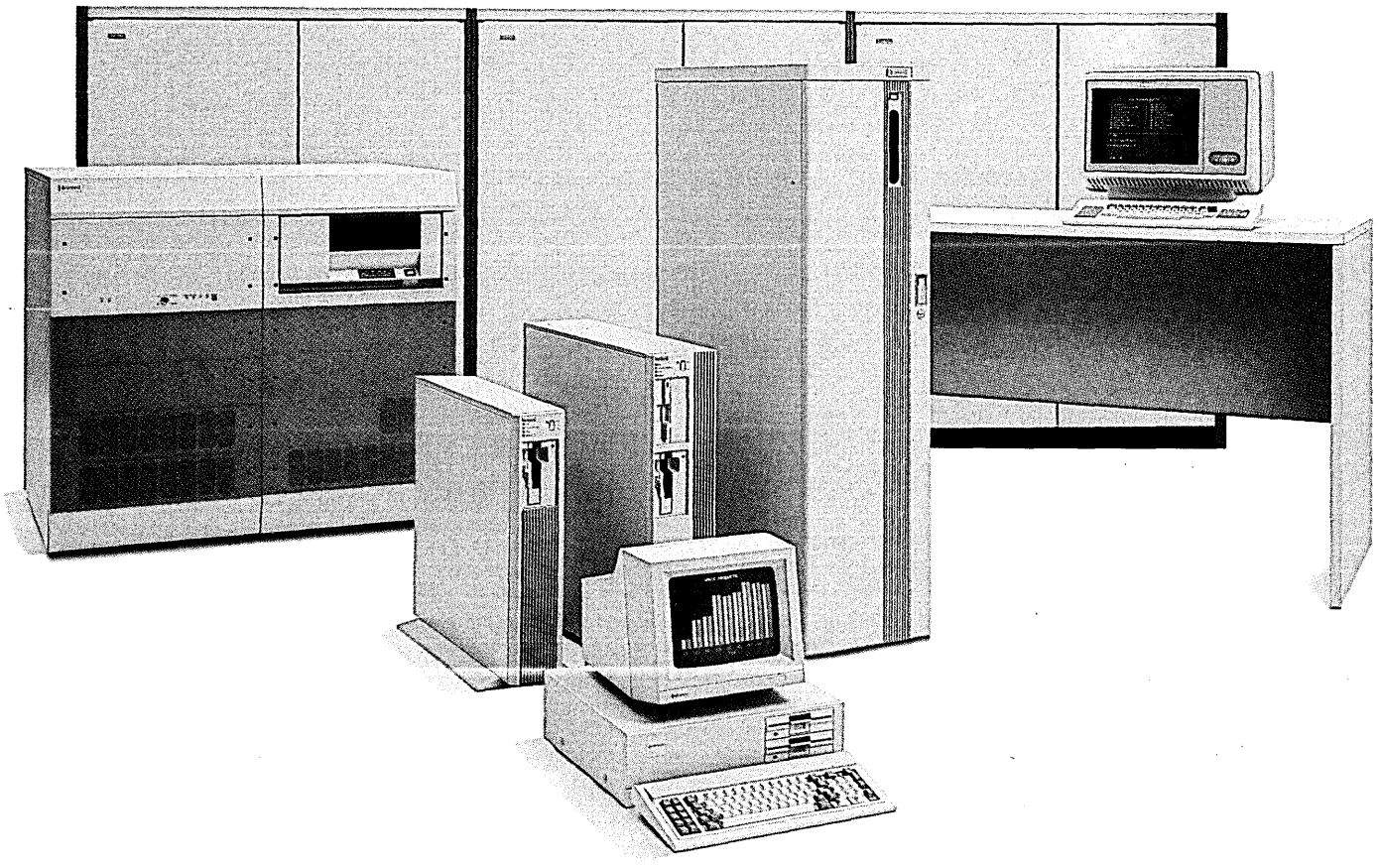

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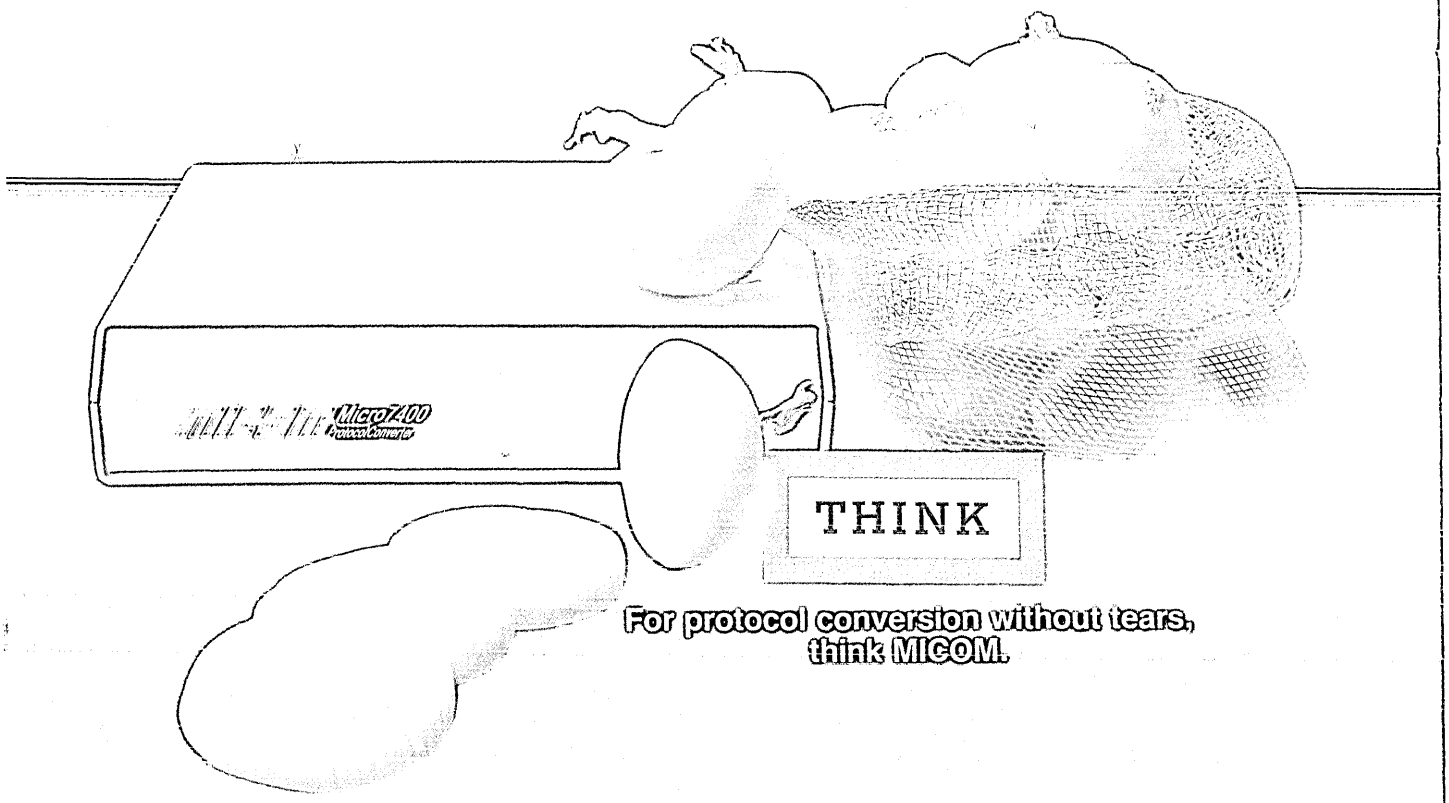

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