DATAMATION® 85
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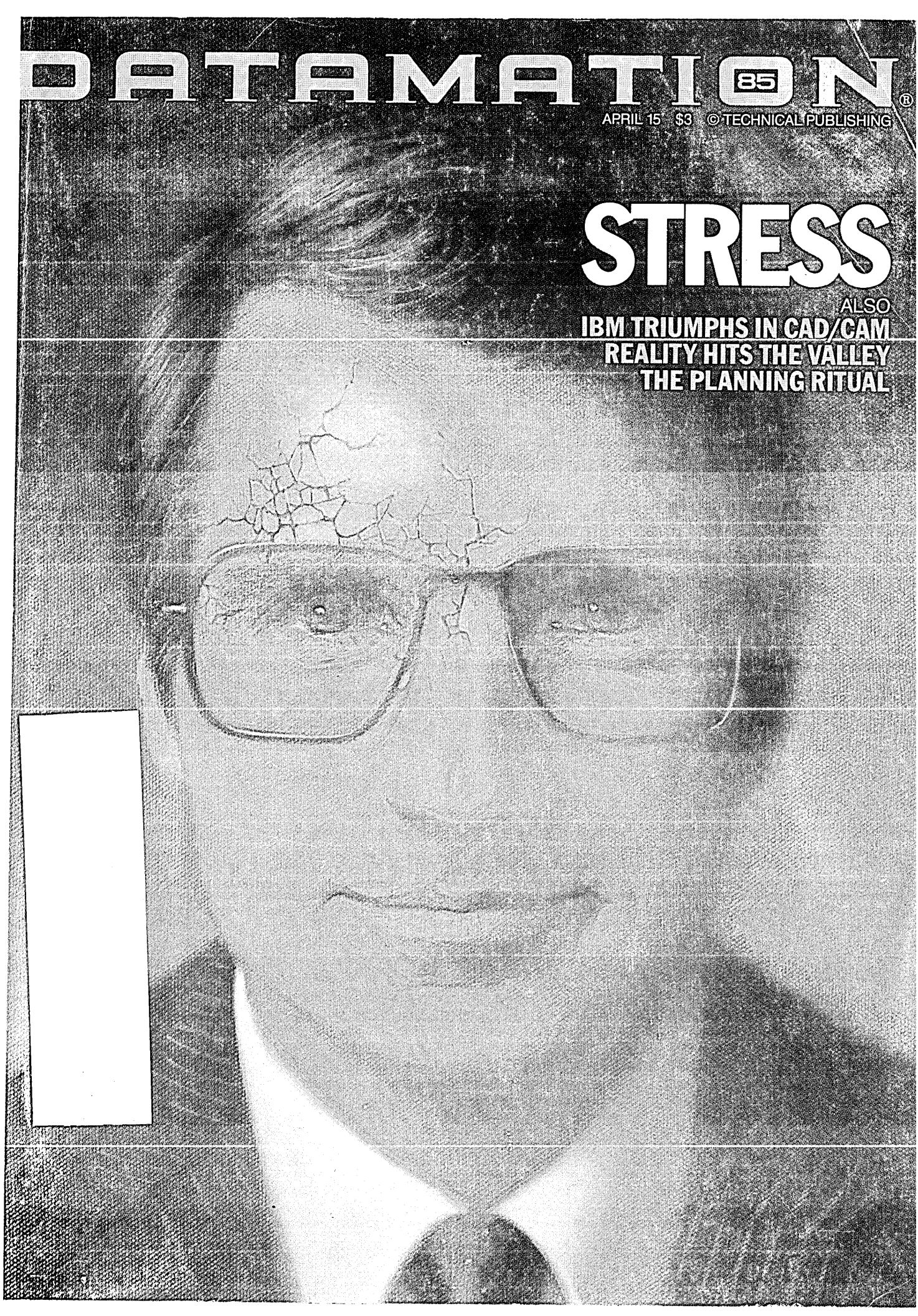

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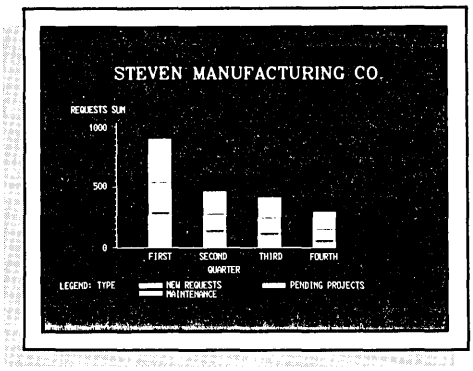

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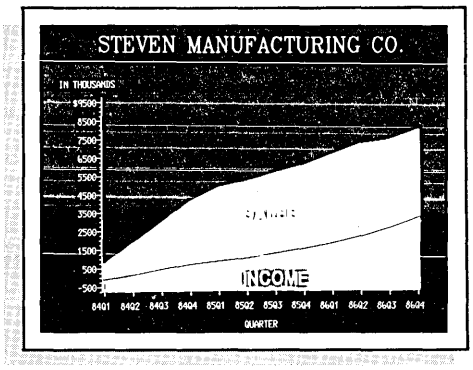

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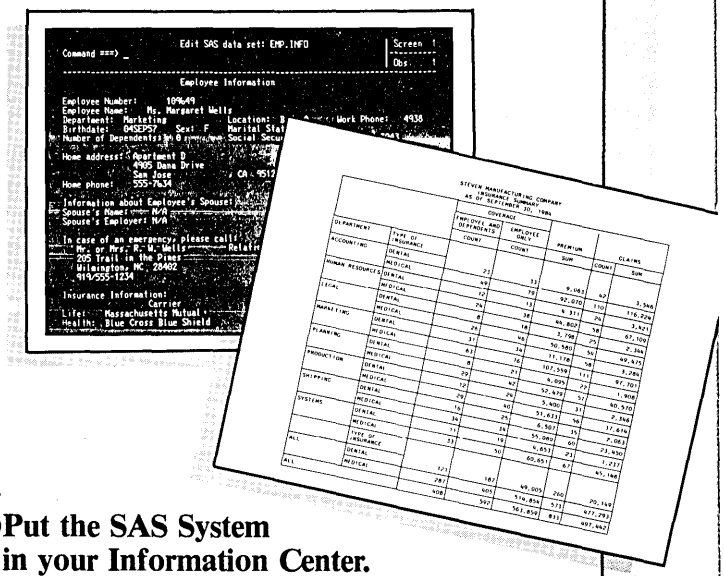

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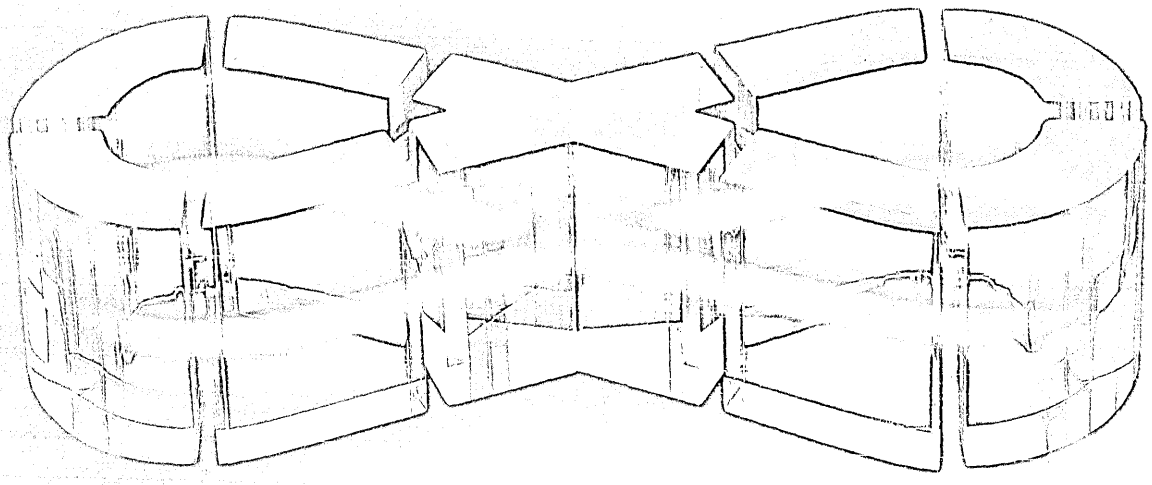
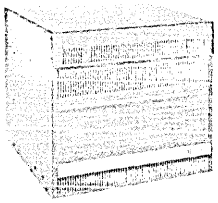
By itself, the Infotron IS4000 data switch is unusually intelligent.

As part of our networking concept, it's pure genius.





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Best of all, the IS4000 has a place in our concept for network growth. Advanced Network Integration assures you that the IS4000 connects to our network concentrators and statistical multiplexers. That Infotron products will grow with your network instead of becoming obsolete. And that you can manage your network from a single site.

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INFOTRON SYSTEMS

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DATAMATION

APRIL 15, 1985/$3.00 U.S.A.
VOLUME 31 NUMBER 8
This issue, 191,891 copies

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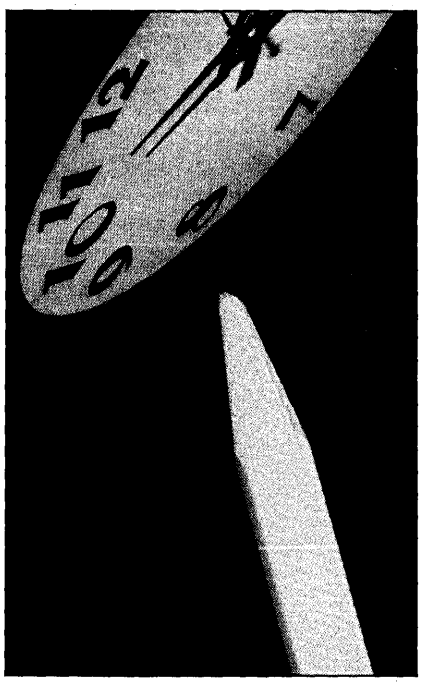

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DATAMATION (ISSN 0011-6963) Magazine is issued twice monthly on the 1st and 15th of every month by Technical Publishing, a company of The Dun and Bradstreet Corp., John K. Abely, president. Executive, advertising, editorial offices, and subscription departments, 875 Third Ave., New York, NY 10022. Published at Lincoln, Nebr. Annual subscription rates: U.S. and possessions: $50; Canada: $75; Japan, Australia, New Zealand: $140 air freight; Europe: $120 air freight, $225 air mail. All other countries: $120 surface, $225 air mail. Reduced rate for qualified U.S. students, public and school libraries: $38. Single copy: $3 in U.S. Sole agent for all subscriptions outside the U.S.A. and Canada is J.B. Tratsart, Ltd. 154 A Greenford Road, Harrow, Middlesex HA13QT, England, (01)422-8295 or 422-2456. No subscription agency is authorized by us to solicit or take orders for subscriptions. Second-class postage paid at New York, NY 10001 and at additional mailing office.

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To date, there are 20,000 COMET International systems installed around the world, serving over 100,000 individual workstations.

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All of this works to make our customers more competitive wherever they compete.

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COMPUTER

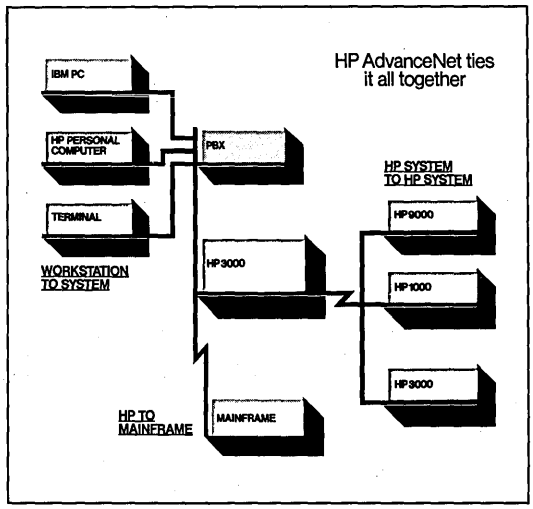
CIRCLE 7 ON READER CARD

The HP 3000 compu

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

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

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



A small, but mighty, addition.

The new HP 3000 Series 37 Office Computer, the latest member of the family, puts the power of the HP 3000 within the reach of smaller budgets.

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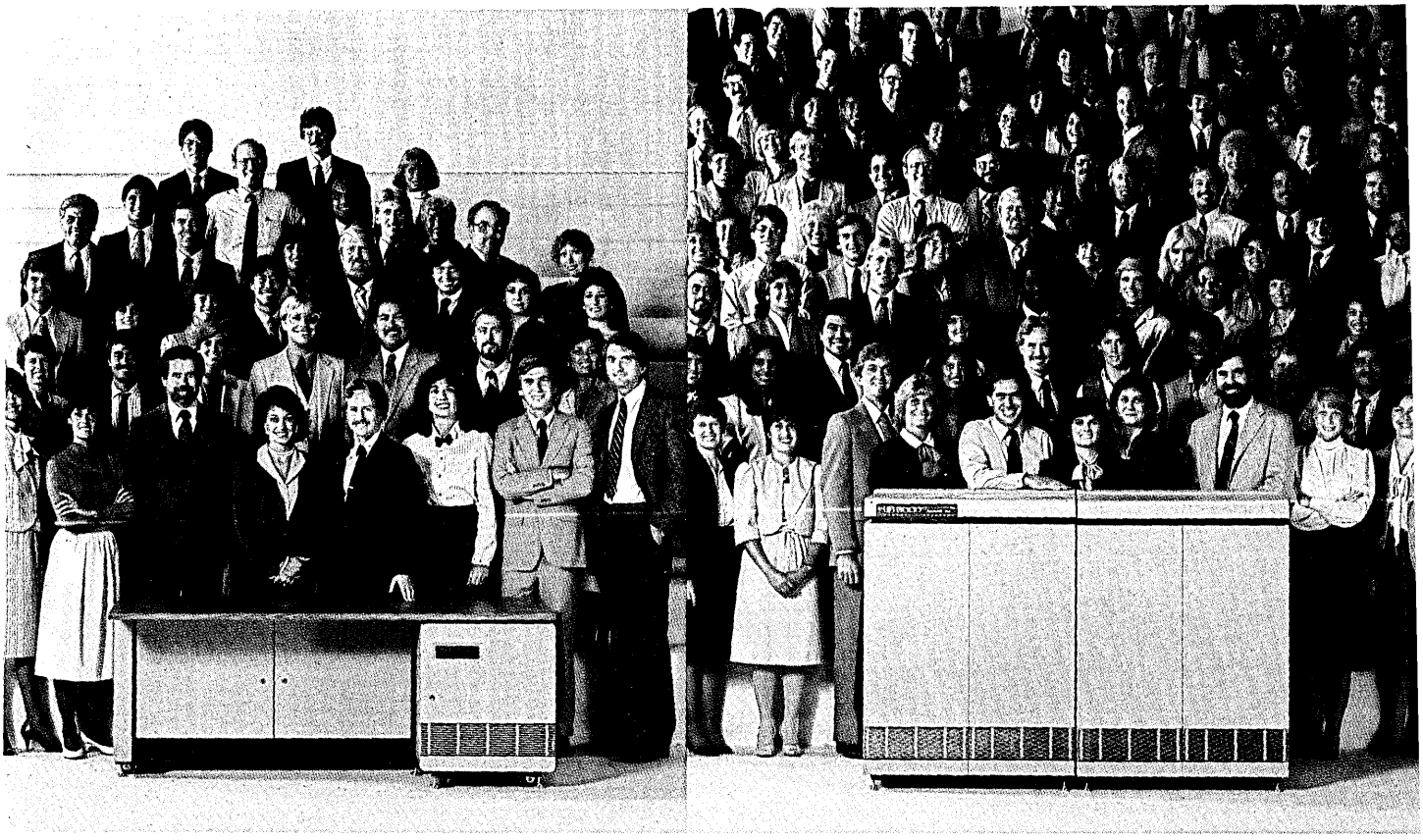
In the office, the HP 3000 is the heart of our Personal Productivity Center. This integrates the information people need to get their jobs done more productively.



ter. One family fits all.

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

You'll communicate better with HP AdvanceNet.

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

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

A Datapro poll also rated our service #1. So you get more than office automation and data processing in a single system. You get all the support you need from a single company.

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

In Europe, write Michael Zandwijken, Hewlett-Packard, Dept. 004203, P.O. 529, 1180 AM Amstelveen, The Netherlands.

We'll fit you no matter how much you change over the years.

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CIRCLE 75 ON READER CARD

Twenty Years Ago/Ten Years Ago

LOOKING BACK

PROGRAMMING THE 360

April 1965: IBM was just beginning shipments of its 360, and the arrival of RCA's Spectra 70 gave credence to industry speculation that vendors would build machines that used the 360's op codes. A highlight of these 360-class systems, featuring variable length instruction formats and data structure, was their capability to "plug in" to an assortment of devices that appear the same to the stored program. Martin E. Hopkins, a senior analyst with Computer Usage Co. Inc., New York, headed a team of programmers and analysts to check out a software package for the 9020, a 360-class machine. Hopkins said many of the project's findings would be applicable to other 360-class machines as well. He stated that advanced software would support man-machine communications, and multiprogramming and multicpu operations, but added, "Whether the 360-class machines will share a common set of software is a question I leave to the future—and to the patent lawyers."

Hopkins thought programmers needed additional information to supplement the fundamentals found in basic manuals, thus the DATAMATION article, "Programming 360-Class Machines." He discussed the instruction set, register usage, program organization, data layout, floating point arithmetic, and debugging. One critical problem Hopkins found with the 360-class machines was their need for "more than the usual amount of planning." Since there were numerous solutions to almost every coding problem, one wrong move could create chaos.

Hopkins was delighted to discover that programmers had minimal problems handling register allocation and use once they put some effort into planning their programming. Another surprise for Hopkins was finding out that 360-class programs were not a nightmare to debug.

Though initial reactions were mixed, most of the programmers involved in the analysis found the system easy to learn. Since no training classes were available at that time, programmers used reference materials and discussion groups to ease their way. The analysts generally agreed programmers using 360 computers must do their homework and use a special programming approach, but stated the machines were "interesting, versatile, and easily programmed in assembly."

PHOOLISHNESS

April 1975: Jackson Granholm amused readers with April foolishness poetry:

The Entrepreneur's Ride

(From Tales of the Ticker Tape)
Listen my children, and you shall flinch
At the current economic pinch:
  It was eighteen April in sixty-nine
  When over-the-counter went into decline.
Dreams of electronic financial heaven
Went down the tubes via Chapter 11.
  Many a thriving entrepreneur
  Was cast adrift in fresh manure.
Scarcely a man is now still sane
Who suffered loss instead of gain.
  And those who touted computing stocks
  Are pumping gas, and picking locks.

Prologue to Poughkeepsie Tales

Whan that Wattson with his doller bills
Ye mid of Huddson hath purchased to the hills,
And rounded each buildering with swich asphalt
Of which parking lotte engendered is the fault.
And radials of rubbre by Good-Riche and Good-Yeare
Ye grass hath smashed from there to here;
And smale fowles maken no melodye
From aught not sweete ye even to see;
Then goon engineirs on pilgrimages
Seeking ye holy digitale mirages;
Ye vastley intricate new circuitrey to speque
And earn, eftsoons, an inflayted paye cheque,
And specially, from every burgs ende
Of USA, to Poughkeepsie they wende
Ye blissful euphoria there to seke
The suburbia, yclept Wappingers creke . . .

—Mary Ann Hariton

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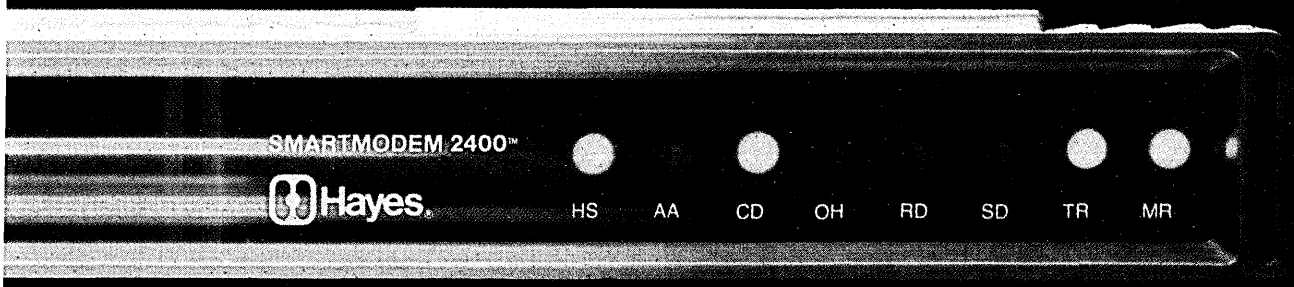

The new fast mover from Hayes. The telecomputing leader. When it comes to communications products for personal computers, we're the leader! Hayes Smartmodem 1200™ set the industry standard for quality, reliability and performance.

Now our new, faster Smartmodem 2400 goes even further to lower telephone line costs and improve user productivity. So, at twice the speed of a 1200 bps modem, it quickly pays for itself in any high-volume communications operation.

Smartmodem 2400 provides a quick link to minis and mainframes. Both synchronous and asynchronous transmissions are supported by an advanced version of the well-known Hayes "AT" command set. You can download from the IBM mainframe at the home office. Send data to the mini upstairs. And guarantee accurate transmission with information services.

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Hayes Microcomputer Products, Inc., 5923 Peachtree Industrial Blvd., Norcross, Georgia 30092. 404/441-1617.

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Smartcom II

• Hayes Verification and XMODEM protocols • Emulates DEC* VT52 and VT100/102 • Totally unattended operation • Voice/data capabilities.

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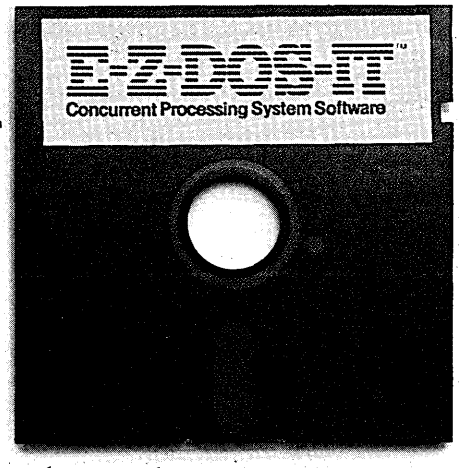
CIRCLE 9 ON READER CARD


Lotus 1-2-3
dBase II
Wordstar
PFS: File
Crosstalk
Multi-Plan
Framework
Symphony
IBM

How do you get your PC to wear many different hats at the same time?

E-Z-DOS-IT.™



Introducing E-Z-DOS-IT™ Concurrent Processing – for IBM PCs and PC compatibles.

Before today, your IBM PC (or PC compatible) could wear only one processing hat at a time. Now, with E-Z-DOS-IT Concurrent Processing, your PC can be an editor, financial analyst, and artist all *at the same time.* And you can be a writer. Or a programmer. In fact, E-Z-DOS-IT is the only concurrent processing system that can run effectively on machines with 256K and up.

Switch from one program to another at the drop of a hat.

With your current system, each time you need to access information on a different disk, you have to save your files, unload and load a program. E-Z-DOS-IT enables you to switch conveniently from one application to another instantly. With this easy referencing capability, you can quickly respond to questions, and finish projects significantly faster.

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HAMMER

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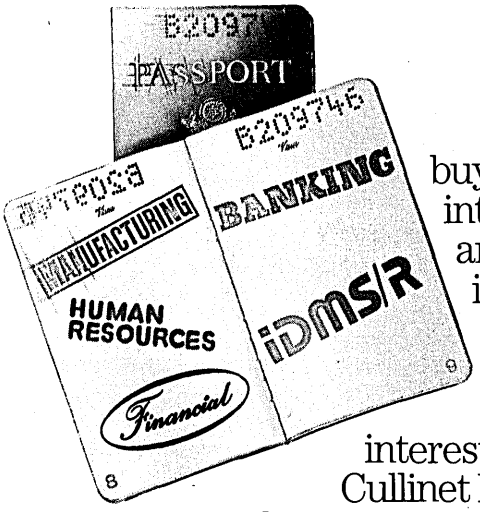
With Cullinet applications, there are no boundaries to what your company can accomplish.



It's an all too common problem. Manufacturing buys an application, and data processing is expected to integrate it with the corporate database. Finance buys an application, and data processing is expected to integrate it, too. And so it goes. Three years later, the job still isn't finished. And the ideal of a *true* database management system is still just that—an ideal.

If this problem sounds at all familiar, you'll be interested in a way to avoid it altogether—Cullinet.

Cullinet has systems in four application areas—financial, manufacturing, human resources management and banking. Each is a functionally superior product in its own right—which, of course, is a primary concern to the people who use them.

Even more important, each is built on the same foundation—our IDMS/R database. Through it, each is able to share data with every other Cullinet application. And that's something no one will appreciate as much as data processing.

By eliminating the boundaries between modules, we've eliminated the problems typically associated with applications software—duplicate data, multiple updates, file conversion and the like. The result: efficient processing throughout the company.

And if this integrated approach is the main advantage, consider also that our applications were built using ADS/OnLine, our powerful fourth generation language. This makes them easy to install and tailor.

For more information about our applications and our complete approach to information management, attend a Cullinet Seminar. You can make arrangements by sending in this coupon, or by calling, toll-free, 1-800-225-9930. In MA, phone 617-329-7700.

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CIRCLE 6 ON READER CARD

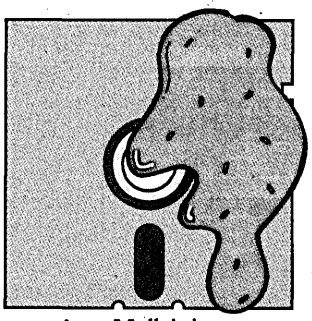
LOOK AHEAD

IS GM EYEING NAS?	General Motors is said to be considering the purchase of National Advanced Systems, the Santa Clara company that markets IBM-compatible mainframe and minicomputer processors and peripherals from Hitachi and other vendors. The deal would make sense, sources speculate, because GM's recently acquired Electronic Data Systems subsidiary is said to be NAS's largest customer for 370-type processors and its margins are paper thin, so parent National Semiconductor might give it up.
AWEIDAS RISE AGAIN	Jesse Aweida, cofounder of Storage Technology, Boulder, Colo., has formed a new company, Aweida Systems, to lease, sell, and service Japanese computer technology in the U.S. marketplace. Sources say that the new company will specialize in high-end Japanese technology, though not specifically on one Japanese manufacturer's line as National Advanced Systems does with gear from Hitachi. The new venture hopes to capitalize on Aweida's connections and sell large pcm storage systems to IBM's customers. Aweida has recruited his brother and others from StorageTek. If at first you don't succeed . . . ?
TWO YEARS FOR ASK ON 43XX	ASK Computer Systems, Los Altos, Calif., won't be able to deliver an IBM version of its manufacturing system for two years. After years of relying on Hewlett-Packard and Digital Equipment Corp. minis, ASK's new offering for 43XX class machines would be used as the engine for its highly regarded manufacturing, inventory, and quality-control software. Furthermore, an ambitious new product development effort is under way at ASK, including an interface to computer-integrated manufacturing networks and equipment made by other vendors. Project tracking, shop-floor data collection, and management-exception reporting modules are also under development.
PC2 RUMOR OF THE WEEK	No two sources say the same thing about IBM's upcoming announcement of a new personal computer, but the consensus seems to be that the basic model of the PC2 will cost $2,000 ($3,000 with a hard disk drive). The original PC's price tag would shrink to $1,000. Sources say PC2 will have Intel's 186 microprocessor and the standard 5¼-inch disk drive. A new laptop portable PC will use 3½-inch disk drives and a gas plasma display instead of the hard-to-read liquid crystals. The laptop is expected to be priced at about $1,500.

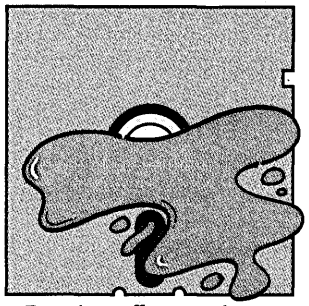
LOOK AHEAD

MSA TRIES AGAIN	While MSA has sold off its disappointing microcomputer software company, Peachtree, it is not out of the microsoftware market. A broad series of microcomputer versions of its mainframe applications software packges is due to be released soon. Trying to take advantage of its established position as a provider of accounting packages, MSA will soon introduce "Distributed Pc Applications" packages. Check writing, budgeting with templates for Lotus's 1-2-3, billing, and other parts of its mainframe systems will be offered as an ideal way for branch offices with pcs to connect with headquarter's mainframes. Basically an expansion of its Peachlink package now known as Expertlink, the system can also connect with non-MSA packages and other microsoftware.
RUMORS AND RAW RANDOM DATA	Convergent Technologies has a host of new products, over and above the desktop workstation it is building for AT&T. In the next few months, the Santa Clara company will introduce a souped-up version of its popular NGEN intelligent workstation with Intel's top-of-the-line 80286 microprocessor. CT's two multi-user processors, Miniframe and Megaframe, are also getting higher performance versions of their original Motorola micros. . . A sleeper in computer graphics could be the Burroughs' GP2000. Since September it has been marketing a model that incorporates a chip-set implementation of DISSPLA, the popular mainframe graphics package from a chagrined Integrated Software Systems, San Diego. The chip developer, Integral Research Inc., San Diego, is headed by Ian Hirshon, a cofounder of ISSCO. He says he is talking to other potential oems. . . Joseph Engelberger, the "father of robotics," with others has founded a new robotics firm targeting the service industries and avoiding the overcrowded manufacturing sector. Engelberger's new company, Transitions Research Corp., Hartford, Conn., will concentrate on robots that might prepare fast food, clean buildings, pump gas, act as the prosthetics for paraplegics, or help the elderly. . . The Reagan Administration is facing some obstacles in its attempt to offer the international satellite communications network, Intelsat, to private companies. Congress doesn't think much of the idea, and neither do Third World countries. The FCC was supposed to halt soliciting opinions on the proposal this month, but congressional pressure has forced the agency to extend the comment deadline to June. Look for congressional hearings sometime this month.

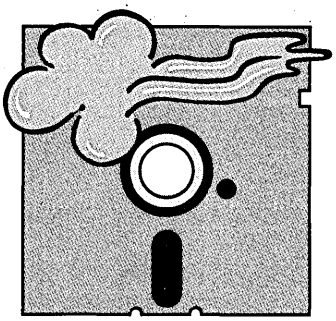
Give us your staine your filthy dirty,



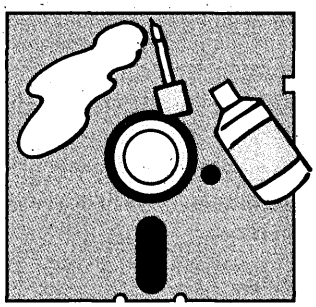
Aunt Molly's jam



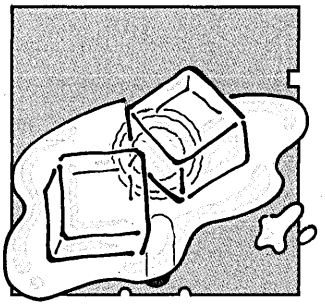
Regular coffee, two lumps



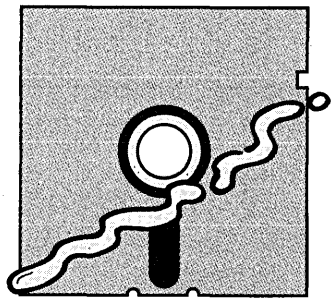
Clouds of smoke



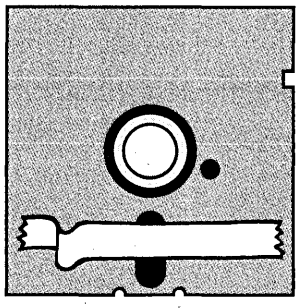
Maria's liquid cover



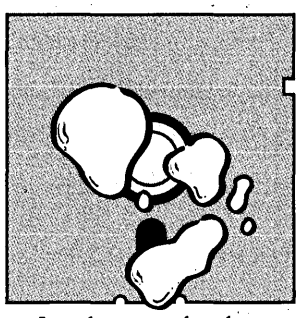
The big chill



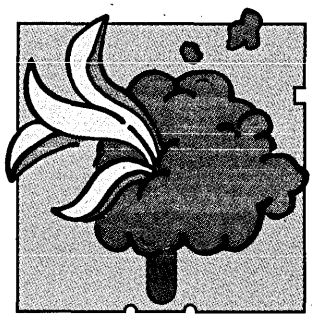
Hot dog mustard



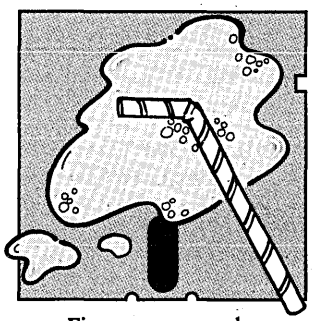
Tacky white tape



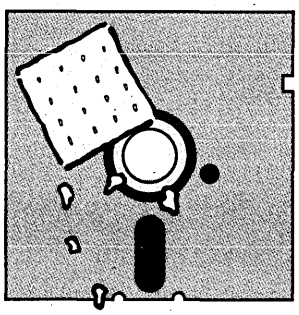
Lunchcounter ketchup



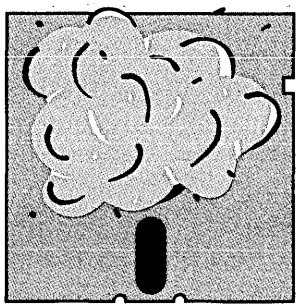
Potted plant–no pot



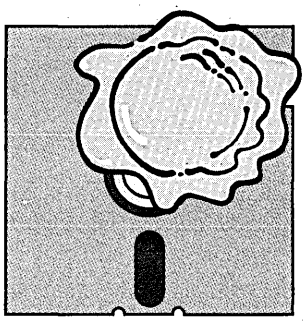
Fizzy orange soda



Cracker crumbs

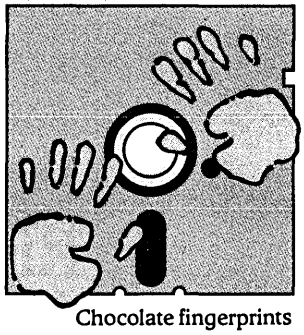


Dust (cough-cough)

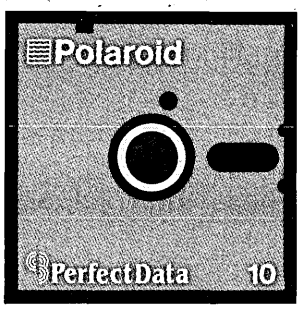


One scoop of ice cream

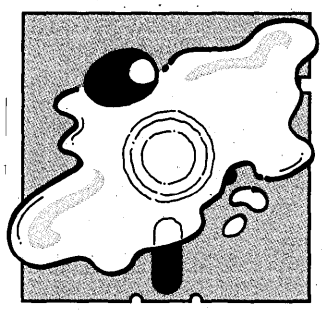
Sudsy soap bubbles



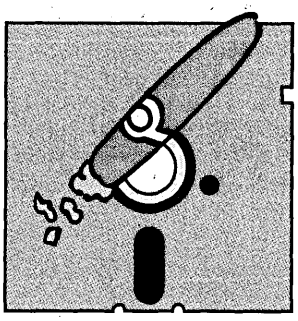
Chocolate fingerprints



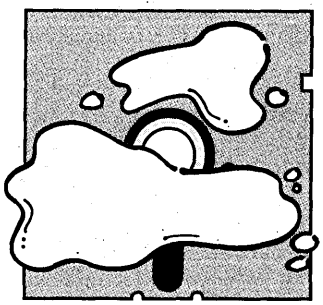
d, your dog-eared, your mistreated:



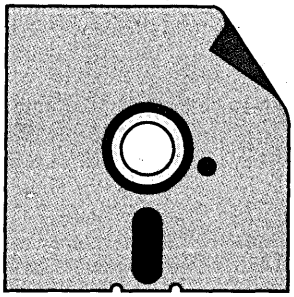
Dry martini, one olive



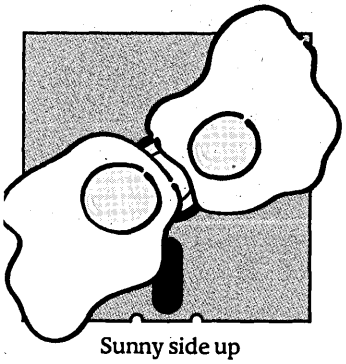
Boss's cigar ashes



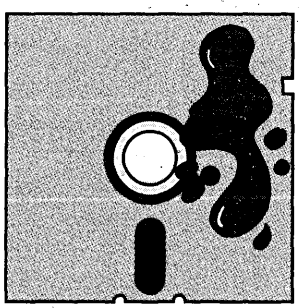
Spilled milk



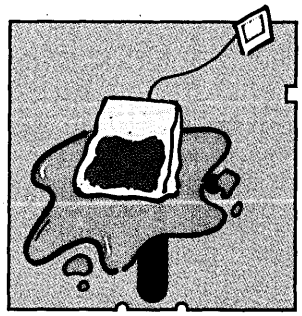
Dog-eared jacket



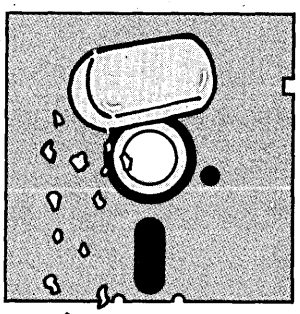
Sunny side up



Waterbased ink spots



English breakfast tea



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CALENDAR

APRIL

UNIX Systems Expo/85.
April 24-26. Contact Computer Faire Inc., P.O. Box 106, Newton, MA 02161, (617) 965-8350.

Association for Information and Image Management (AIIM) Conference and Exposition.
April 29-May 2, Washington, D.C. Contact AIIM, Department of Conference and Exposition, 1100 Wayne Ave., Silver Spring, MD 20910, (301) 587-8202.

Artificial Intelligence and Advanced Computer Technology Conference and Exposition.
April 30-May 2, Long Beach, Calif. Contact Jim Hay, Tower Conference Management Co., 331 West Wesley St., Wheaton, IL 60187, (312) 668-8100.

MAY

Scientific Computing and Automation Conference and Exposition.
May 1-3, Atlantic City, N. J. Contact Expocon Management Associates Inc., 3695 Post Rd., Southport, CT 06490, (203) 259-5734.

COMDEX/Spring.
May 6-9, Atlanta. Contact the Interface Group, 300 First Ave., Needham, MA 02194, (617) 449-6600.

EXPO L.A. '85 (Cash Management Information Exposition).
May 7-8, Los Angeles. Contact Shel Kaplan, Executive Director, Cash Management Association of Southern California, P.O. Box 60270, Los Angeles, CA 90060.

Personal Computer Exposition/Conference.
May 8-10, Montreal. Contact Personal Computer Association, 20 Butterick Rd., Toronto M8W 3Z8, Canada (416) 252-7791.

Interconnections '85.
May 15-17, Los Angeles. Contact the Independent Computer Consultants Association, P.O. Box 27412, St. Louis, MO 63141.

The Southern California Computer Faire.
May 16-19, Los Angeles. Contact Computer Faire Inc., P.O. Box 106, Newton, MA 02161, (617) 965-8350.

AAMSI Congress 1985 (Computer Applications in Medicine).
May 20-22, San Francisco. Contact AAMSI, Suite 700, 1101 Connecticut Ave. NW, Washington, DC 20036.

1985 Trends and Applications Conference.
May 21-22, Silver Spring, Md. Contact Madeleine R. Sparks, Trends & Applications 1985, c/o Systems Development Corp., 4810 Bradford Blvd., Huntsville, AL 35805.

OPTO 85.
May 21-23, Paris. Contact OPTO 85, 12 rue de Seine, 75006 Paris, France, tel. (33-1) 325-58-74, telex 260946 F.

International Computer Trade Show Europe Software+.
May 22-24, Utrecht, the Netherlands. Contact Royal Netherlands Industries Fair (Jaarbeurs), P.O. Box 8500, 3503 RM UTRECHT, The Netherlands, telephone (30) 955911, telex 47132.

Software Panorama 85.
May 22-24, Toronto. Contact W.G. Schultz, Conference Chairman, 45 Sheppard Ave. East, Suite 409, Willowdale, Ontario, Canada M2N 5W9, (416) 225-4300.

DEXPO South 85.
May 28-31, New Orleans. Contact Angela Wright, Expoconsul International Inc., 55 Princeton-Hightstown Rd., Princeton Junction, NJ 08550, (609) 779-1661.

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.

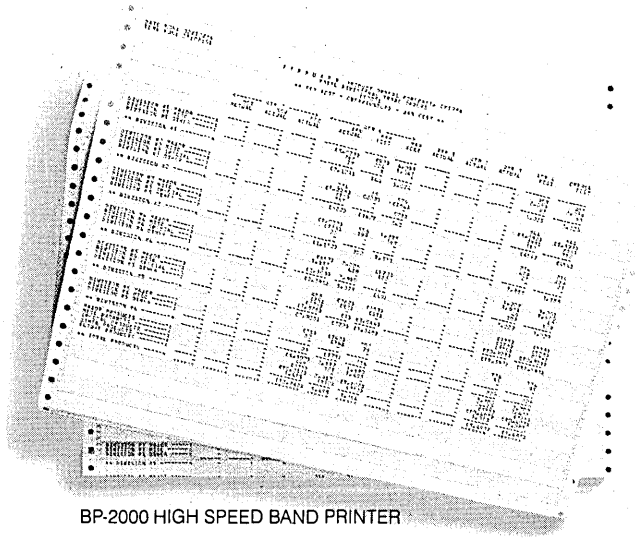
PHONE '85.
June 4-6, London. Contact Network Events Ltd., Printers Mews, Market Hill, Buckingham, MK18 1JX, England, tel. (0280) 815226.

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.

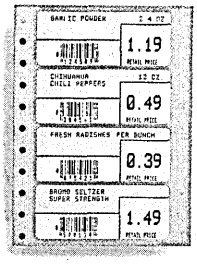
INFO/WEST.
June 12-14, Anaheim, Calif. Contact Show Manager, INFO/WEST, Clapp & Poliak, 708 Third Ave., New York, NY 10017, (212) 661-8010.

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.

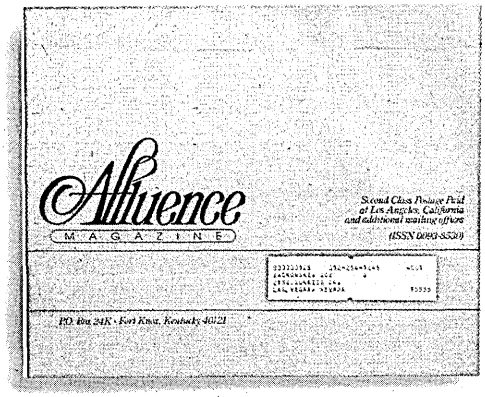
PC Expo.
June 17-19, New York. Contact Camille Caminiti, 333 Sylvan Ave., Englewood Cliffs, NJ 07632, (201) 569-8542.



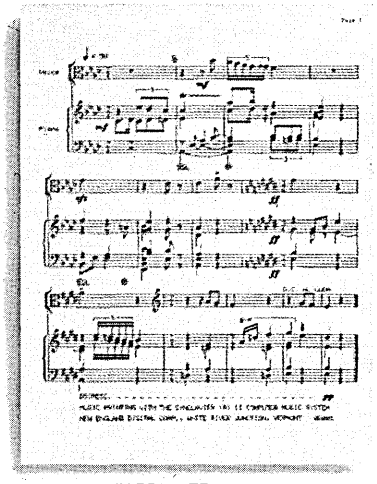
BP-2000 HIGH SPEED BAND PRINTER



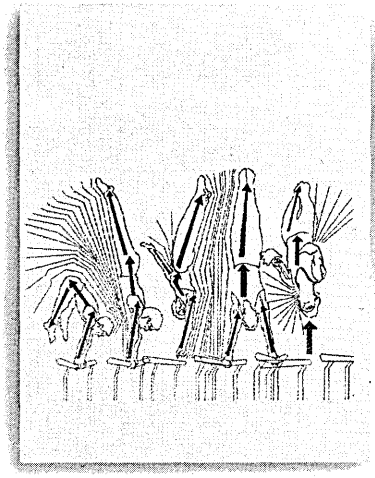
M-100L
MATRIX PRINTER



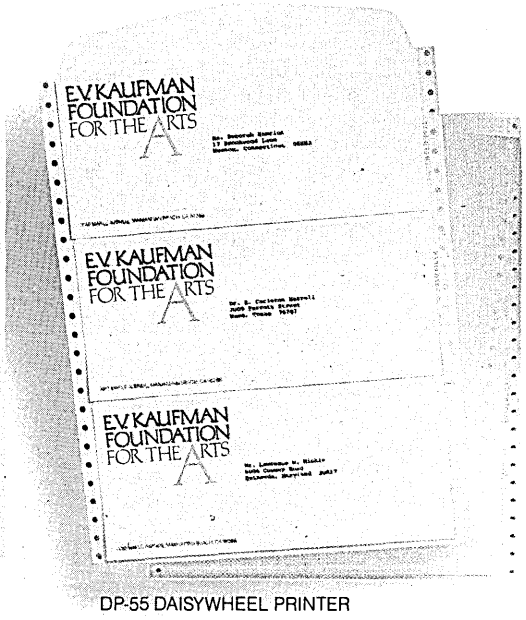
B-600 MEDIUM SPEED BAND PRINTER



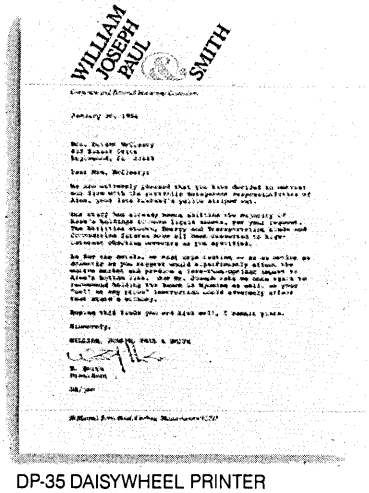
8010 MATRIX PRINTER



8020 MATRIX PRINTER

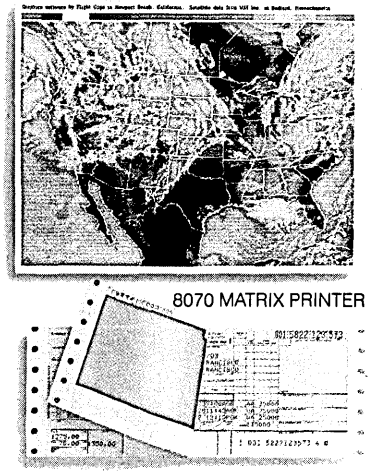


DP-55 DAISYWHEEL PRINTER



DP-35 DAISYWHEEL PRINTER

8050 MATRIX PRINTER



8070 MATRIX PRINTER

M-120 MATRIX PRINTER

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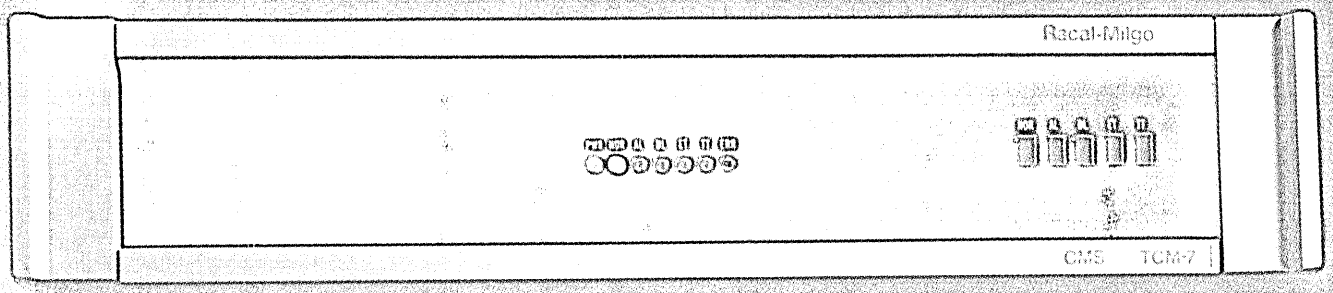
CIRCLE 13 ON READER CARD



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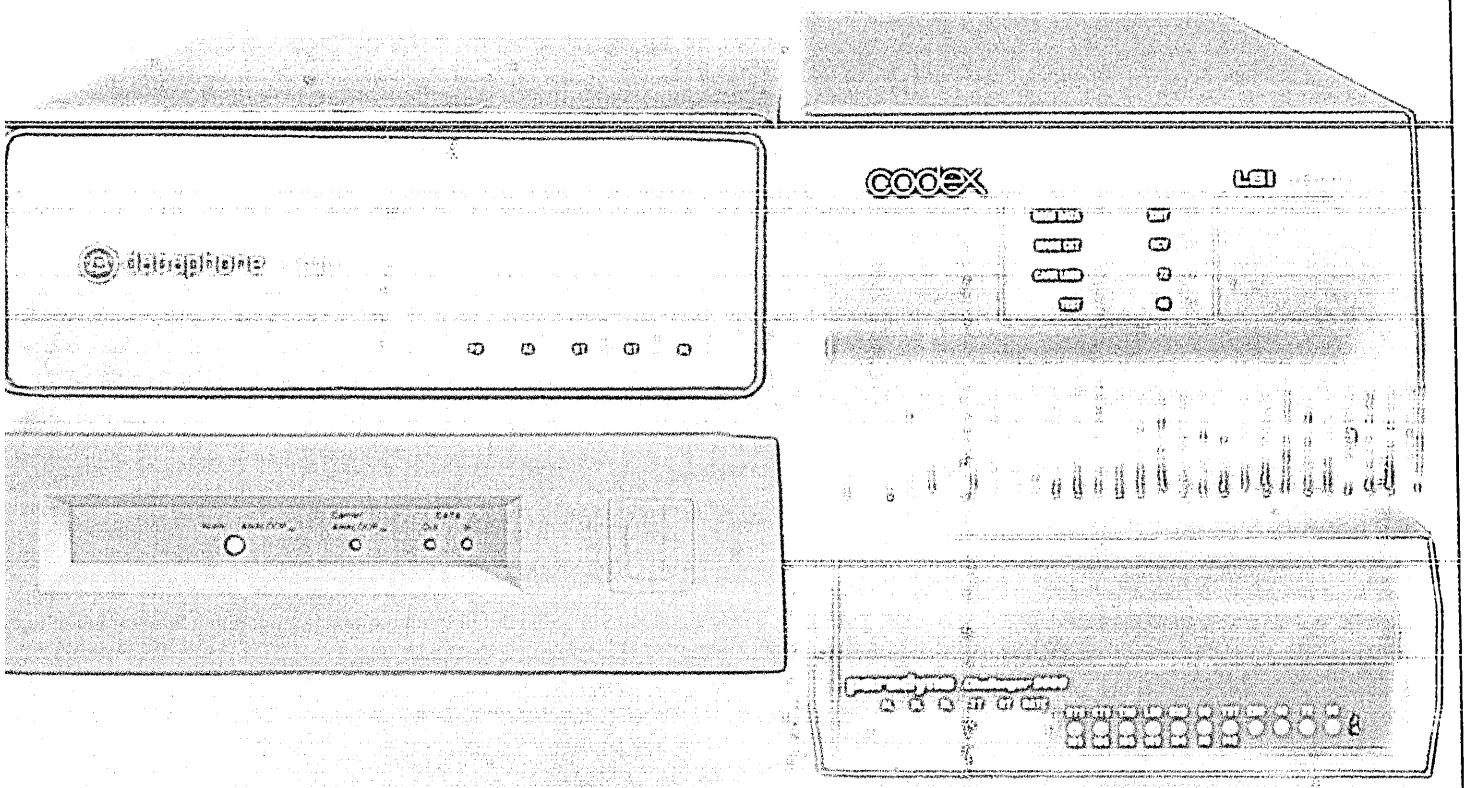

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CIRCLE 14 ON READER CARD

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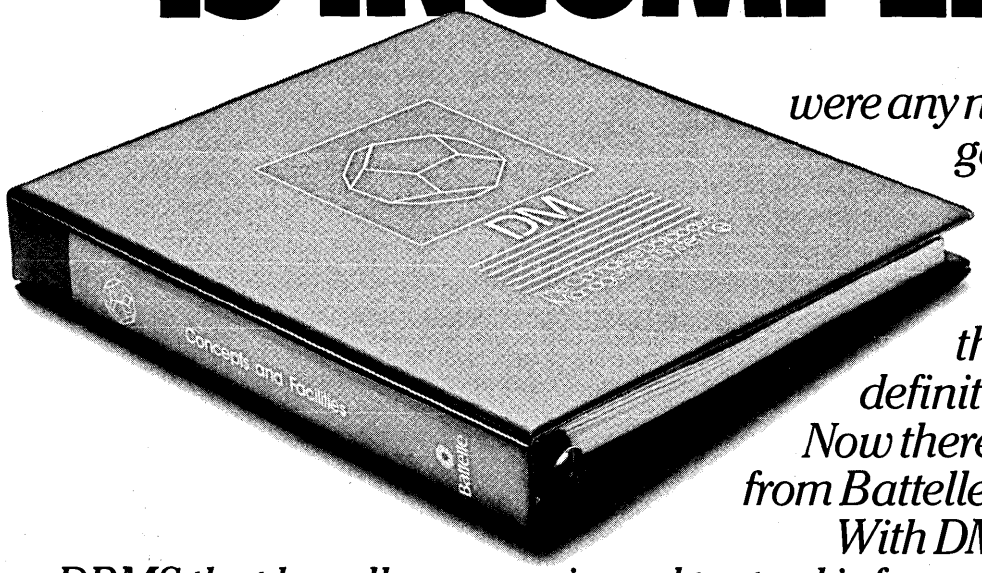

Until now there were any number of fourth generation, relational database management systems that were, by their definition, complete. Now there is only one: DM from Battelle.

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DM is available on DEC VAX/VMS and soon on CDC and IBM machines.
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CIRCLE 15 ON READER CARD

LETTERS

COUNTERPOINTS

In "The Networking Standards Collision" (Feb. 1, p. 98), I thought many of L. David Passmore's points were excellent; however, three significant points were overlooked.

1. Standards above the ISO level 3 do exist. They include layer 4 transport (ISO-IS8072/ISO/IS8073); and draft standards exist for layer 5 (ISO-DIS8326 ISO-DIS8327), and layer 7 FTAM and E-mail/messaging facilities.

2. The article overlooked the very strong end-user demand being expressed by General Motors, Boeing Computer Services, and the National Bureau of Standards. The demonstration at NCC 1984 and a follow-on demonstration at Autofact 1985 are examples of aggressive interest by these end users, reflecting even wider-spread interest from end users with less aggressive standardization policies.

3. You indicated that DEC and Honeywell are vendors that have expressed an intention to migrate to the ISO standards. The demonstrations mentioned above included DEC and Honeywell, but also a wide variety of other companies such as AT&T, IBM, HP, DEC, NCR, and Charles River Data Systems. Of those companies that have been demonstrating this capability, at least two, Charles River Data and Intel, are offering and shipping products that incorporate the ISO transport layer as well as the lower layers down to 802.3 and 802.4.

I feel your readers will find this additional information useful in understanding how the ISO capabilities are gaining the "first place" position in the non-SNA environment.

JAMES ISAAK
Director of Product Planning
Charles River Data Systems
Framingham, Massachusetts

DIFFERENTIAL

In "The Winchester Illusion" by David Morris (Jan. 15, p. 128-5, OEM Edition), Morris obviously misunderstood my comments relating to the cost differential between ESDI and SMD interfaces. Any engineer could tell you the *cost* differential between the two interfaces is not $300 to $500. What I told David was that the *price* differential of an ESDI controller vs. an SMD controller was $300 to $500. A number of Multibus vendors sell both ESDI and SMD controllers and their list price differential is about $550. At volume quantities this would translate to a $300 to $500 differential depending on the volume.

DONALD C. PETERSON
Multibus Product Line Manager
Qualogy
San Jose, California

BLUE STANDARDS

In "IBM's Standard Stand" (Feb. 1, p. 106), Fred Lamond writes that IBM "has traditionally obstructed the standards-making process" and "has always done its level best to ignore" standards. The facts are otherwise.

IBM has a long record of constructive participation in standards development. For example, IBM's technical representatives have made major contributions to CCITT's development of standards such as teletex X.21 and X.25 and also to ISO's work in open systems interconnection ever since the inception of these projects.

Furthermore, once standards in these and other areas are defined IBM has been among the first to implement them.

L. JOHN RANKINE
Office of the IBM Director
of Standards and Data Security
Purchase, New York

MEAN STREAK

Unfortunately, Ray Paseur's "Mean Letter" (Jan. 1, p. 15) contains a false "significant statistical fact of life." The correct statistical fact of life is that the median is the abscissa of that point of the axis that divides the mass in the distribution into two equal parts. To be more precise, the median is defined as the projection on the *x-axis* of the point in the *(x,y)-plane* at which the line $y=½$ intersects the curve $y=F(x)$. Every distribution has at least one median; in some cases the median is uniquely determined, while in other cases any point in a certain interval can be a median, and it is then standard practice to take the central point of the interval as the median of the distribution. Now, it turns out that if you have a symmetric distribution, then the mean (average) and the median are equal if the mean exists: e.g., the Cauchy distribution, which appears perfectly symmetrical to the eye and "bell-shaped," has no mean.

"Hello, my name is Kevin and I'll be your dinner this evening."

CARTOON BY LAWRENCE BROWN

LETTERS

In most instances, the decision-maker does not have absolute control over the population distribution—which is why samples are drawn. From these samples, statistics can be obtained as an aid to the decision process. Making comparisons based on sound data is a valid and rational manner of measuring performance and setting goals.

JIM KARAS
System Manager/Analyst
University of Tennessee Medical Center
Memphis, Tennessee

INTERNAL EVIDENCE

The editors of DATAMATION would do well to read and reread the book review, "The Plot Thickens," (Feb. 1, p. 153).

Of all the magazines I know, DATAMATION is the worst offender, constantly subordinating the data content of charts and diagrams to pretty graphics. The false third dimension added to charts is an offense specifically cited by Edward R. Tufte in *The Visual Display of Quantitative Information.*

FRANK RUBIN
Director
The Contest Center
Wappingers Falls, New York

SPELLING

In your review of *Strategic Planning, Systems Analysis, & Database Design* by Mark L. Gillenson and Robert Goldberg (Jan. 1, p. 145), reference is made to one of the planning techniques: BIAIT written by Donald C. Burnstine and D. W. Soknacki.

Don spells his name as shown above, not as written in the article.

If any of your readers wish to find him, he is the president of this company.

ZALMAN P. PUCKOFF
Vice President, Marketing
ZD International Inc.
Brooklyn, New York

ON SECOND THOUGHT

In the article, "Micro To M'Frame Blues" (Feb.15, p.43), remarks were attributed to one of our employees regarding a "Tempus emulator board." We have never used the Tempus Link software or had any dealings whatsoever with Micro Tempus Inc.

D.A. GREEN JR.
Manager, Data Center
Union Carbide
South Charleston, W. Va.

CORRECTION

Tempus is a micro-to-mainframe software package, not a terminal emulation board, as reported in "Micro To M'Frame Blues." The correct name of the product is Tempus Link; it is sold by Micro Tempus, Montreal.

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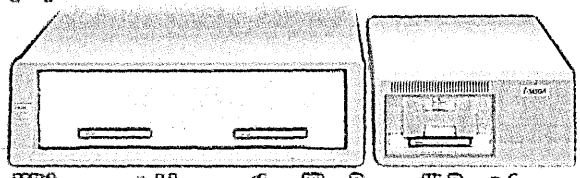

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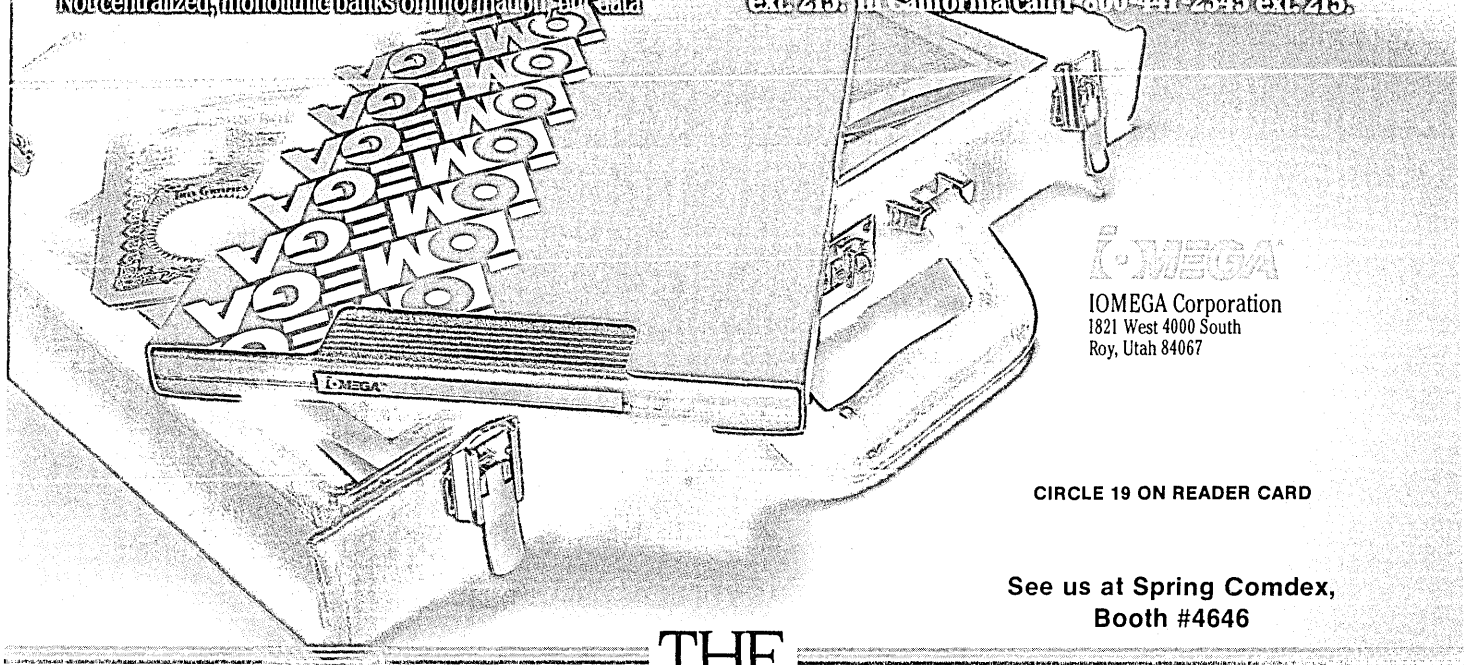

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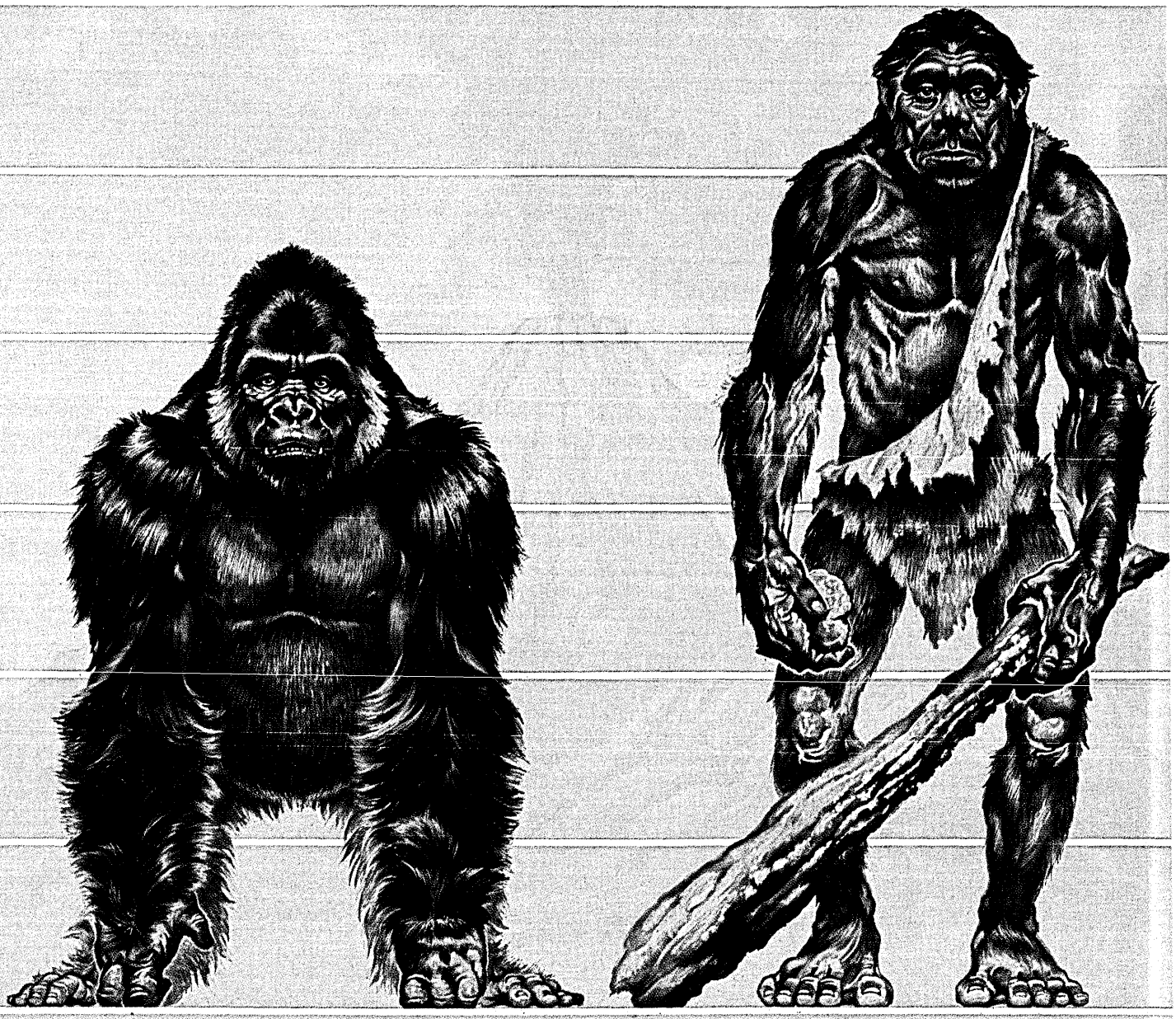

PBX
(Switchus interruptus)

LAN
(Linkus limitus)

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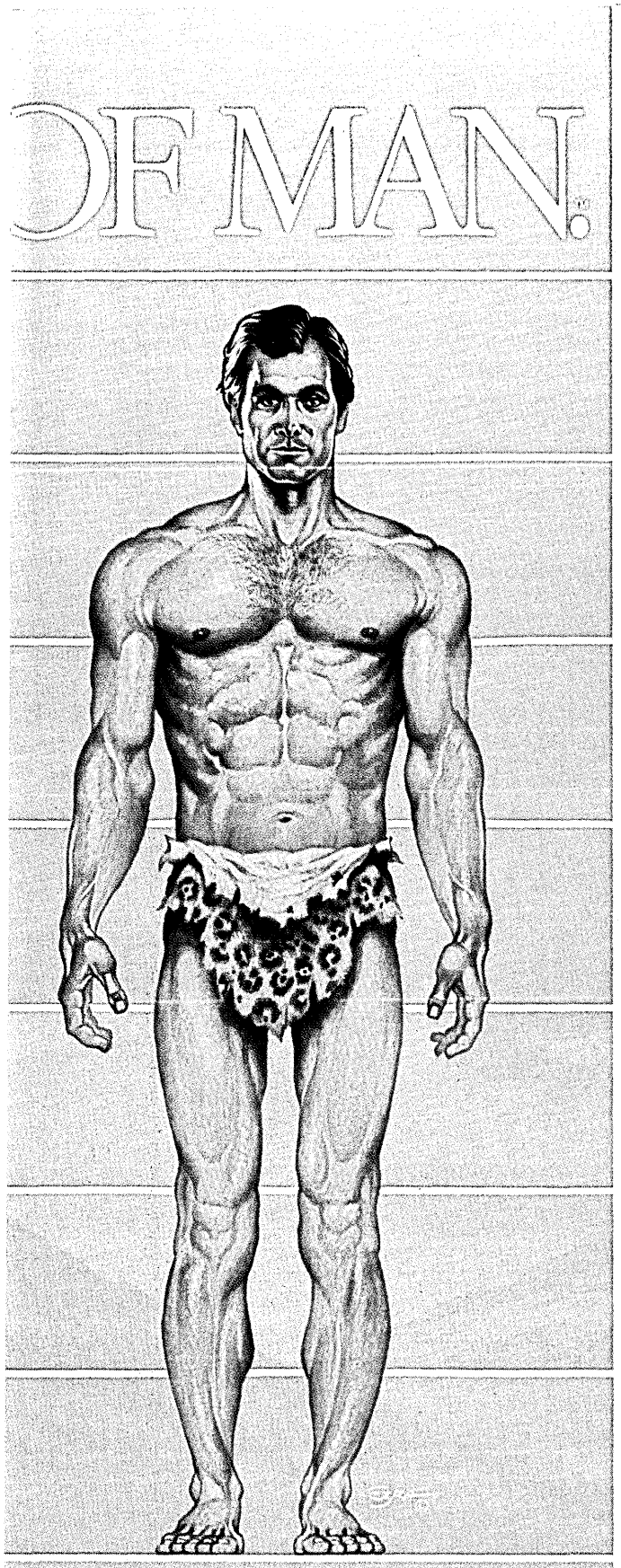
VAX is a trademark of Digital Equipment Corp.



MAN

(Connectus perfectus)

The first step up the data networking ladder was the data PBX. It was good. But not very intelligent.

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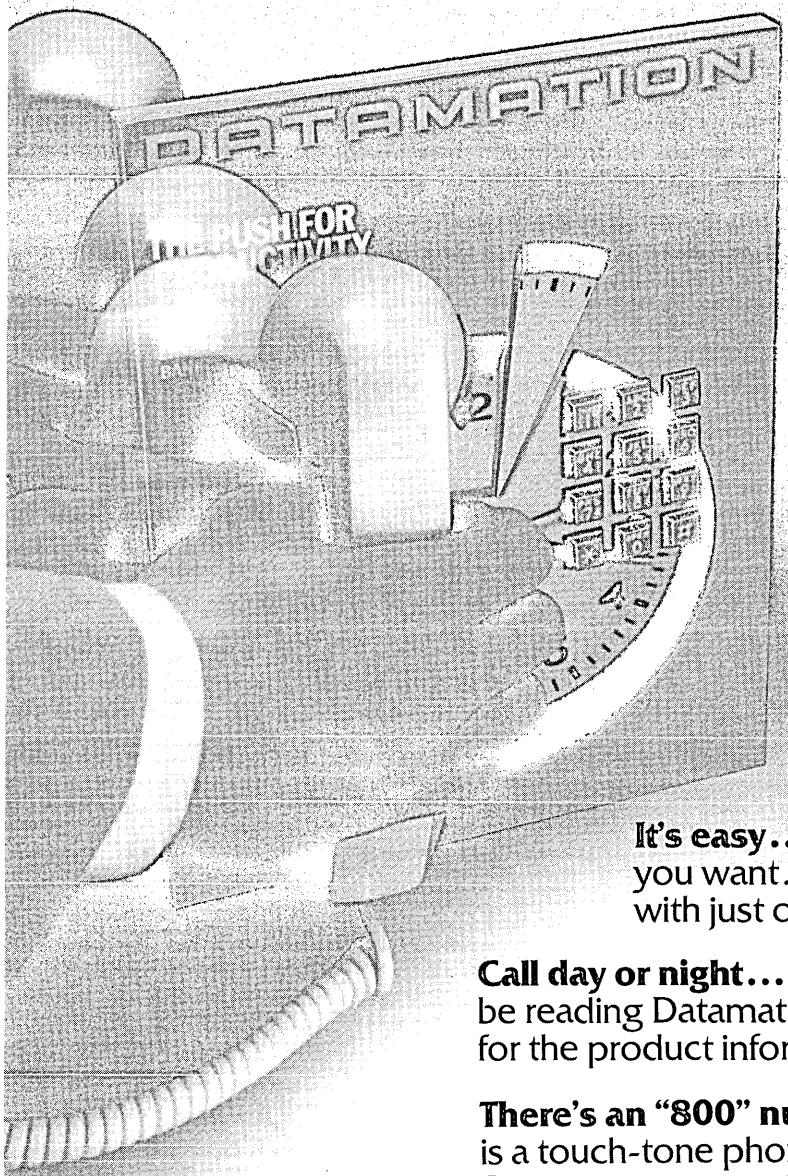

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John W. Verity, Senior Writer

HARDCOPY

THOSE SLIPPERY SIERRAS

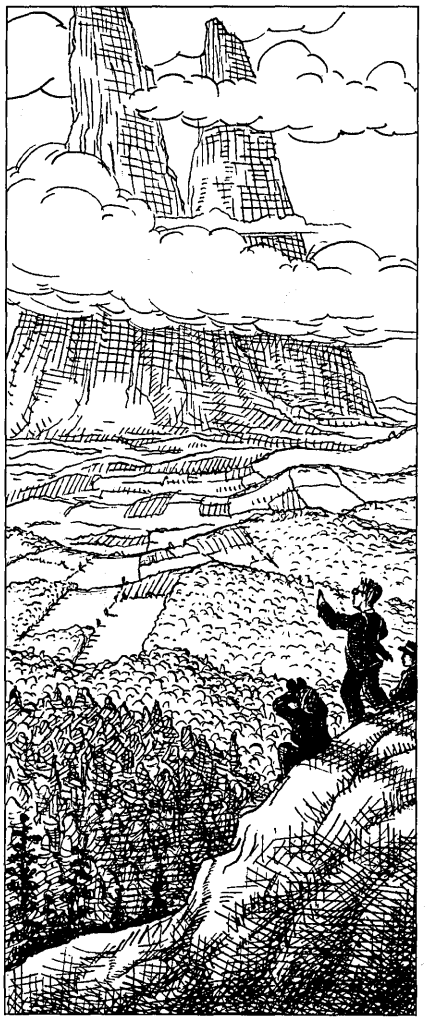


ILLUSTRATION BY DANIEL BLACK

As pundits predicted, the clouds lifted in early February and there they were, finally out in the sunshine for all to see, the twin peaks of IBM's mainframe line. The Sierras were unveiled.

Confirming reports that had been circulating for months, IBM brought out dual- and quad-processor machines that will offer performance into the 50MIPS range. Although using the same chip carriers as the 308X processors but adding emitter-coupled logic, the Sierra hardware is thought to be laying the groundwork for significant expansion beyond the designs IBM has previously offered in the 360/370 line. One major departure is the use of a large "system memory" (up to 128 megabytes) as a holding area for virtual pages. By reducing disk I/O requests, this added memory should boost throughput in taxing interactive applications. Among the most intriguing developments expected in future Sierras are special function processors—FORTRAN and COBOL engines, for instance—that would significantly boost performance of certain applications.

Observers have speculated that the 3090s unveiled in February already have a number of mid-life kickers built in, including capacity to handle 6MBps I/O channels. But it's the microcoded functions designed to enhance system performance that IBM will no doubt use to flummox plug-compatible competitors once they get to market with their own Sierra-level machines.

As intriguing as the technical details are, the ultimate verdict on Sierra comes from users. Evidently, they aren't as impressed with Sierra as much as the preceding hoopla might have led one to expect. Boston bureau manager R. Emmett Carlyle and free-lancer David Stamps were in touch with commercial and scientific users within days after the Sierra introduction and their findings are described in this issue. Although IBM emphasized the machines' scientific/engineering prowess, users in that field said they were not particularly wowed. Not only was there no vector processor, as many had expected, but the big-MIPS 400 model won't be available until the middle of 1987, more than two years away.

Such a long lead time may raise an eyebrow or two, particularly among those who recall when IBM in the 1960s was far behind in the prestigious scientific computing arena and resorted to some rather underhanded tactics to quash competition. One maneuver that got the giant into legal hot water was telling users about machines that weren't anywhere near ready for shipment and that hadn't even been proved viable. In fact, several big 360 models were withdrawn from the market before being shipped. By that time the damage had been done: Control Data had lost vital orders for the 6600.

Today's market resembles those times, at least in part. One of the most successful of the IBM-compatible processor makers, Amdahl Corp., just last year came out with a 370-compatible vector processor (see "Amdahl's Super Cpu Gamble," Nov. 1, p. 36). Meanwhile, other companies, both in the U.S. and Japan, have come out with numerous low-cost vector processors, some of the 370-compatible variety. Instead of its own vector unit, IBM has declared that the bigger Sierra won't be ready until 1987 and claims the reason is it just doesn't have enough people to fully test the quad-processor while the smaller model is readied for shipment later this year.

IBM is on record as stating it wants to "grow with the industry," meaning it wants to maintain market share. It has also publicly criticized suggestions that because of its size and power it be subject to special scrutiny, or even regulation. Does IBM expect the industry to turn its back while it introduces machines that won't reach users for more than two years? Can the industry afford not to scrutinize this $45 billion corporation, especially at a time when computers are so vital to our economy and world position?

We think not. ◉

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

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

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

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

Q. What makes a superior modem?

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

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

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

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

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

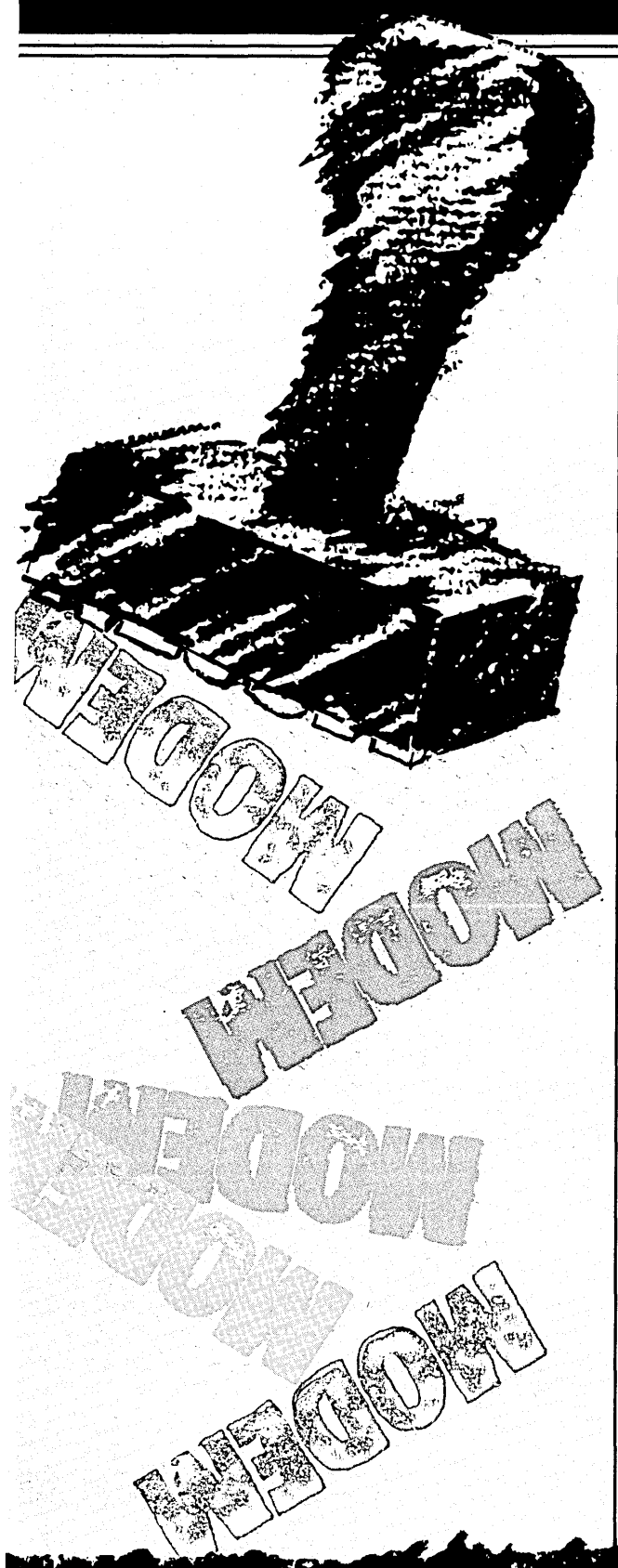
Q. Can a superior modem correct the problem of faulty lines?

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

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

Q. How can I go about proving the superiority of IBM modems?

A. Take your most troublesome line and put IBM modems on it. We believe you'll see an



impressive improvement. Which leads us to another benefit of superior modems—you'll spend less time troubleshooting your network simply because line conditions that once were considered problems aren't really problems any more.

There are a number of other good reasons why you should consider IBM's line of 2,400, 4,800 and 9,600 bps stand-alone and rack-mounted modems. Not the least of which is that we've recently announced two new modems—the IBM 3833 and 3834—which feature lower prices, smaller packaging and improved serviceability. And like all IBM modems, they can fully utilize IBM's Communication Network Management capability.

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	IBM 3833	IBM 3834
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LED Diagnostic Indicators	standard	standard
Communication Facilities	4-wire, point-to-point or multipoint	

Both modems operate over nonswitched telephone lines that can be leased (common carrier or PTT) or private.

*Must be in native mode. For full diagnostic capability, must be equipped with the Extended Diagnostic feature.

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IN FOCUS

REALITY HITS THE VALLEY

Those razzle-dazzle days are coming to an end in Silicon Valley. Blame everything from IBM to overkill.

by Tom McCusker

A fundamental part of the human condition has to do with our search for simple answers to complex questions. What will IBM do next? Is Bell Labs stagnating? Why is the bloom fading from the technological rose that is Silicon Valley?

To both residents and distant observers, it seems like only yesterday that the valley was living up to its 30-year reputation as a hotbed of high-technology startups. Venture capitalists were moving in like shoppers at a fire sale, and last year's hacker could well be next month's millionaire. Perhaps most important, this congeries of entrepreneurs was a place where innovation flourished, where button-down mentalities need not apply.

If a physician cannot precisely determine when a patient enters a terminal condition, neither can an observer document the exact moment that Silicon Valley's fortunes began to change. A little over 15 months ago a string of failures and corporate founderings began to ravage its microcomputer companies. The disk memory business, born in the valley nearly a quarter of a century ago, went into turmoil. Semiconductor companies instituted layoffs as they reported gloomy fourth-quarter results for 1984 and envisioned a flat year ahead. In the face of these events the venture capital money that had funded so many startups simply withered away.

Some blame IBM for this run on the technological bank. Osborne Computer Corp. instituted bankruptcy proceedings in late 1983, the first in a chain reaction of problems for the hardware and software companies in the microcomputer market as IBM began a series of price cuts and a flurry of new product announcements.

At the same time, the bottom was falling out of the video game and home computer market, and sales predictions for the micro market were scaled back by one third. VisiCorp in San Jose, whose VisiCalc spreadsheet software had given the personal computer credibility in corporate America, failed to produce an encore with VisiOn and had to abandon the product and merge into a smaller company. Gavilan Computer filed for bankruptcy protection after selling only 3,000 units of its portable line. Televideo, reporting a quarterly loss of nearly $8 million last fall, closed a printer plant in Sunnyvale and cut back its sales and marketing staff. Honeywell scuttled its Synertek Inc. semiconductor facility in Santa Clara because of declining sales to video games makers, including ailing Atari Corp.

On a much larger scale, Trilogy Systems Inc., in Cupertino, gave up its $220 million gamble to pioneer wafer-scale integration and build a computer faster than anything offered by IBM. In one quarter Trilogy lost $53 million—including a $43 million write-down when it quit the computer development—and in the first nine months of last year was awash in $79 million of red ink. Founder Gene M. Amdahl says, however, that the company isn't dead yet (see box).

A disappointing outlook for the microcomputer market helped to produce big losses and sharp drops in revenue for disk drive manufacturers. Industry executive Fred B. Bialek, then president and ceo and now a director of Onyx & IMI Inc., a San Jose computer and disk drive manufacturer, predicted a "bloodbath" awaits the disk drive industry this year. Then he unloaded IMI.

A report by James Porter, president of Disk/Trend Inc. of Los Altos, Calif., notes that fewer than half of the 15 U.S. manufacturers of floppy disk drives in business two years ago are still in operation today.

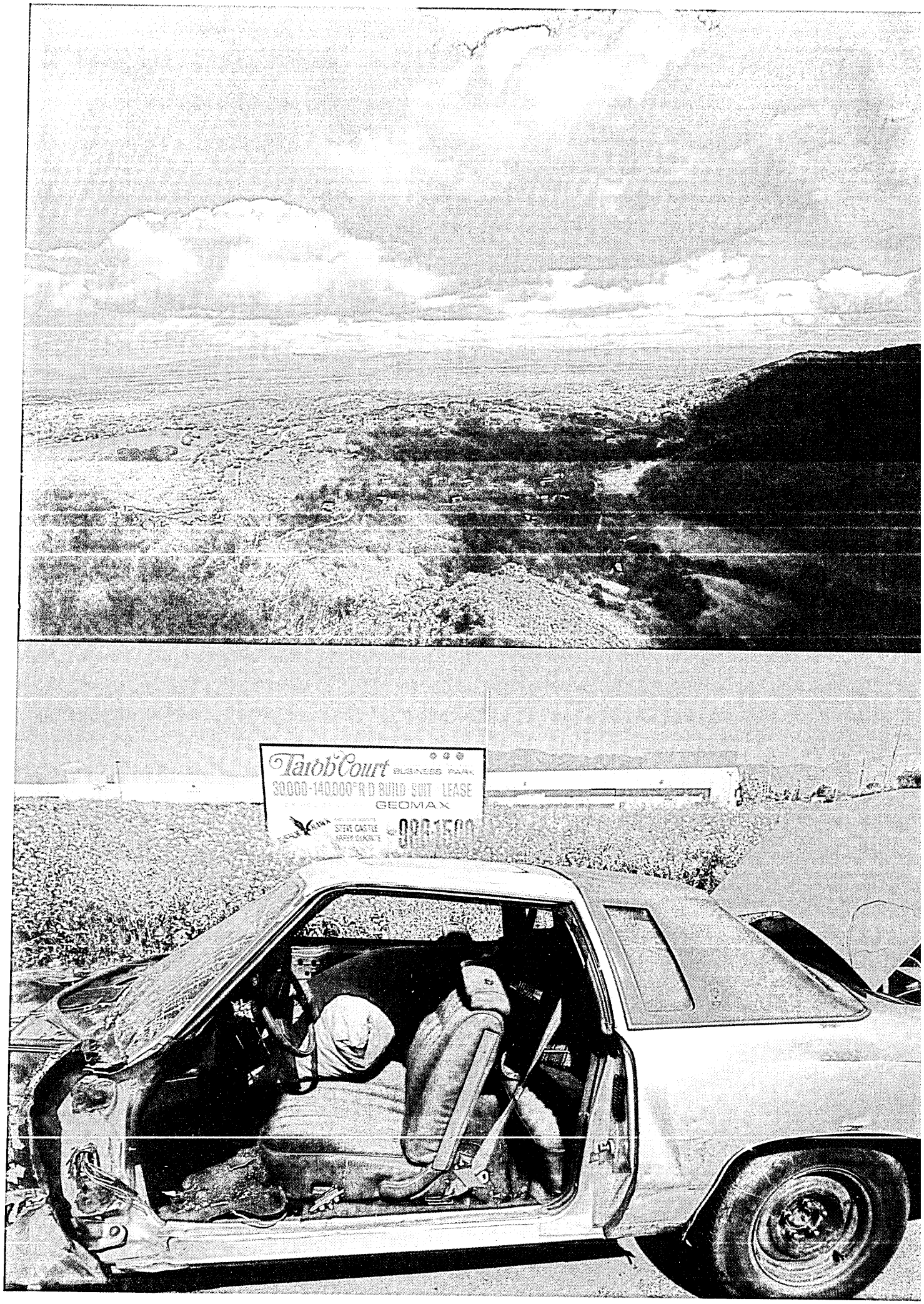
Preparing for a grim year in semiconductor shipments, National Semiconductor Corp., which has some 9,500 employees at its Santa Clara semiconductor operations, idled half of them when it

"There will be lots of shakeouts and lots of failures that will affect lots of companies."

shut down the plant for two weeks in February, and announced that it will postpone merit raises until July. Year-end losses were forecast by almost all the valley's semiconductor firms, whose orders had been climbing 25% a year for the last eight years. These orders are expected to increase by only 7% this year. The problem went beyond microcomputer retrenchments, engulfing the entire market for semiconductors. Further aggravating the earnings prospects were rapidly deteriorating prices, which fell 40% to 50% for some products last year and were expected to plunge another 20% to 30% in 1985.

Nothing new here, say the optimists. "We've been through these times before," says E.E. Ferrey, president of the

PHOTOGRAPHS BY JAMES JOERN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2,700-member American Electronics Association (AEA). "We're at the bottom of a big trough, but look at some of those peaks we hit. They were extreme and the more extreme on the upside, the more extreme on the downside."

Perhaps. Economists, businessmen and other observers, however, point to factors transcending economics. The big picture shows many symptoms of an area and an industry that has matured: hopelessly clogged freeways and highways; a housing shortage that makes it impossible for all but the wealthiest newly arrived executives to live in its residential areas; and increasing pollution and less room for expansion, two conditions that are forcing some companies to locate manufacturing operations elsewhere.

"You can't make it here on minimum wages. So production workers, chiefly immigrants from Vietnam, Indonesia, and the Philippines, are forced to live two and three families to a home."

You will not find a geographic entity called "Silicon Valley" on any map, and what many perceive as being a clearly delineated zone is in fact a loose assembly of cities and counties linked together by technology. This entity stretches through Santa Clara County, from below San Francisco on the north to San Jose on the south. Recently grown tentacles reach farther southward into Scotts Valley in Santa Cruz County and east across San Francisco Bay into Alameda County. Primarily, however, Silicon Valley comprises half a dozen fiercely competitive and independent cities, their most recent battle having been over the right to establish a $90 million technology museum. The city of San Jose triumphed over Sunnyvale and Mountain View. Other major cities include Palo Alto, site of Stanford University, an institution from which many of the area's technology greats hold degrees, and Santa Clara and Cupertino.

Santa Clara County's population has grown fourfold in the last three decades, from 290,000 in 1950 to 1.25 million in 1980. Housing construction, however, has lagged so far behind increases in jobs that planning officials are beginning to recommend that industry consider using more robots. "Robots don't need houses," says Ray Brady of the Association of Bay Area Government's regional planning committee.

Nor do they need cars. The planner cites U.S. census data showing that the number of people commuting across San Francisco Bay from Alameda County to jobs in Santa Clara rose 157% between 1970 and 1980. Those commuting from San Mateo County, just north of the valley, rose 62%. Brady notes that the county built 10,700 fewer housing units than were needed.

The housing shortage does more than create a long commute for those working in Silicon Valley. For lower-paid production workers who can't afford to commute, it's a sentence to substandard living, claims Lenny Siegel, director of the Pacific Studies Center in Mountain View and a critic of some technology companies. "You can't make it here on minimum wages. So production workers, chiefly immigrants from Vietnam, Indonesia, and the Philippines, are forced to live two and three families to a home," he says.

This summer, Harper & Row, New York, will publish Siegel's *The High Cost of High Tech*. In it he analyzes the social impact of high technology. He perceives in the valley's high-technology companies a "widening social schism" between professionals and production workers. "There is very little chance for a production person to move up to the professional level," Siegel says.

He notes that the schism will widen as production workers' skills continue to be devaluated by technology, and he says he has documented cases of at least 10,000 workers who work in San Jose sweatshops under contract to electronics companies for printed circuit board fabrication work. Several thousand other workers do unlawful subcontracting in garages and storefronts around the valley, increasing its serious pollution problem (see "Poison in Paradise," Aug. 15, 1984, p. 30.)

Explaining that the Pacific Studies Center has a mission to "raise issues, questions, and options about the future of high technology," Siegel says the growing rift between low-paid workers and professionals and their employers may be breeding a reaction from these production workers that could resemble the black ghetto riots of the 1960s. "Normally they'd fight through their unions, but for the most part production workers aren't organized. They'll therefore turn to something more forceful," he hypothesizes.

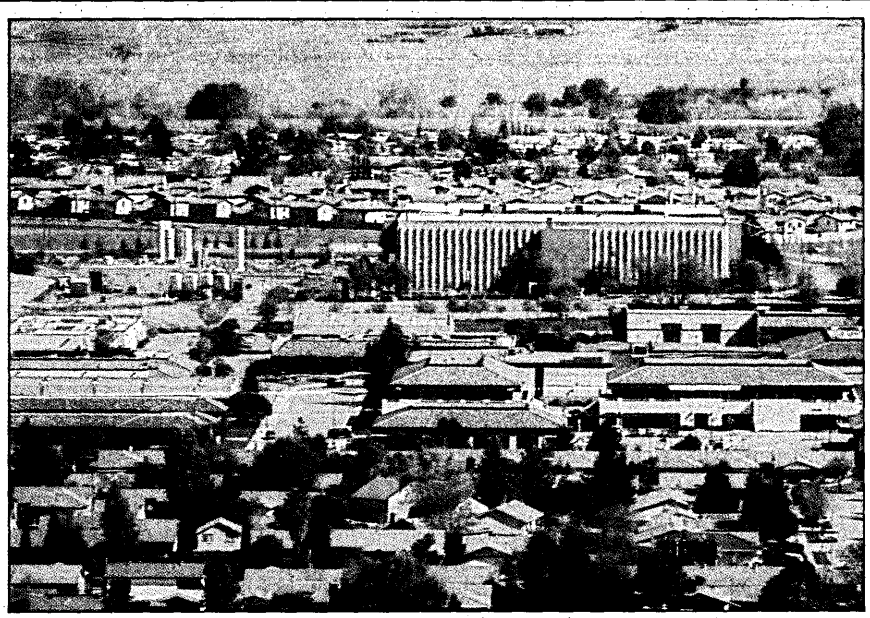
Siegel adds that Santa Clara County's solution to traffic problems—a sales tax to cover the cost of widening three main highways was levied last November with enthusiastic support from industry—is perceived by lower-paid workers as regressive. "Why couldn't the industries that caused the clogging pay through some other form of taxes?" he asks.

"The industry has this image of being a) squeaky clean and b) very humanitarian and not like the other industries—and it's not true," observes Joel Shurkin of Stanford University, author of *Engines of the Mind*, a history of the computer industry (W.W. Norton & Co., New York, 1984).

But the issue overriding all others is economics. If Silicon Valley is to continue to be the capital of technological innovation, financing must be available to assist the new ventures from which innovation can rise. Otherwise, startups will have to seek their financing through being acquired by larger organizations where new ideas are frequently much slower in reaching the market. "Mature companies are notoriously uninnovative," says Shurkin.

That is why there is so much con-

Glamorous offices with atria used to be the norm in the companies headquartered in Silicon Valley.



Chemicals stored at Fairchild's plant later poisoned wells.

Is the slower real estate market forcing developers to rent condos?

Sun MicroSystems is one of the still healthy Valley companies.

cern over proposed new federal tax policies that would raise the rate of capital gains taxes to 35% from 20%, and tax all capital gains as ordinary income, not just the 40% of that income that is now taxed. The American Electronics Association says the new policy would most affect small startups. For example, the AEA notes, in 1977—the year before the capital gains tax rate was reduced to 28% from 50%—$39 million was available in venture capital for small companies. Within 18 months, it had shot up to $1 billion. In 1983, two years after the rate had been further reduced to 20%, investors had made available $4.1 billion in venture capital.

Disasters in the microcomputer and disk drive startup business have frightened away a lot of venture capital, but it will disappear completely if the capital gains tax laws are changed. So says Albert V. Bruno, of the University of Santa Clara School of Business Administration, who tracks the valley's high-tech firms.

"Risks from venture capital are already high enough, even with the substantial gains permitted by the capital gains tax law. If they're eliminated, it makes no sense to put capital into risky situations," Bruno says.

There are those in Silicon Valley who doubt that even a continuation of favorable capital gains tax policy will help. "You'll find right now that there's no venture capital available," says Gene Amdahl, who is often called the "dean of Silicon Valley" for having successfully launched Amdahl Corp. in 1970 to compete with IBM's large-scale computers, and for his ambitious second try with Trilogy. Amdahl attributes the absence of venture capital to both investor disillusionment after recent high-tech blunders and to technical factors.

He says that investors saw other ways to maximize returns on their investments when the economy began to recover last year and interest rates didn't seem to be declining. That left venture capitalists with the need to preserve their funds so they could provide second- and third-level funding for companies where they already held positions. "You can't divide the market that many ways," adds Amdahl, "nor support all those separate development programs and the capital investment for manufacturing and marketing."

"I guess we're seeing the results of an awful lot of investments that were not well thought out," notes Bruno. "The venture capitalists didn't investigate potential competitors, so we end up with the nth disk drive company and the 20th microcomputer company having no market niches and no competitive advantage in terms of product or distribution channels."

Until things soured, the valley offered so many opportunities to venture capitalists that former bankers and vice presidents of finance from high-technology firms went into the business lacking the expertise to properly assess startup firms, says Bruno. "They lacked the ability to judge the viability of products or to understand the capabilities of the management."

The president and vice president of a software company where Bruno is now a director are 29 and 26 years old. "They're smart guys, but they haven't made the mistakes that one makes on the way to getting to be 45 or 55. They're not senior management. Venture capitalists should be aware of that," warns Bruno.

"In the last two and a half decades, startups have been through different phases in their search for capital, beginning in the 1960s, when all they had to do was talk in high-tech terms and show an EE degree." So says Charles Eklind, vice president of the AEA, and a follower of Silicon Valley development since the 1950s. "When money became scarce in the 1970s, they had to present a solid business plan. When capital gains tax reductions eight years ago got venture capital people back into the market, raising startup money entered an easier, third phase."

Some observers think that the fourth phase will be one of renewed scarcity—regardless of pending tax policies—

"You just don't expect firms that are almost 15 years old to be dying, but some of them are."

and that fewer startups will be seen as stability and maturity take over Silicon Valley. "There will be lots of shakeouts and lots of failures that will affect lots of companies," predicts Amdahl, pointing to instances where too many companies are making the same thing.

Consider the terminal and workstation business, says Amdahl. "These companies are not meeting different needs, only meeting the same need in a different way." He anticipates many mergers or terminations in this market.

With these mergers and acquisitions and with fewer startups, "there will

IN FOCUS

A VIEW FROM THE BRIDGE

Gene Amdahl gets a sense of déjà vu these days as he surveys Silicon Valley. One decade ago he faced similar problems after climbing into the big computer ring with IBM. Comparing then with now, says Amdahl, "the only difference is that this time we blew the whistle on ourselves."

Amdahl was working for IBM when he came to the valley in 1964. Ten years later, the Amdahl Corporation failed to raise its fourth round of financing. Original investors were pressed for an additional $18 million to keep the company going. Then Amdahl suddenly needed another $25 million infusion. Why? An IBM announcement forced Amdahl to drop its real memory design for a virtual memory approach to a computer that would use VLSI technology to outperform IBM's large machines. The infusion came from Japan, via Fujitsu. The rest of the story is history.

The 61-year-old chairman of Trilogy Systems Inc. recalls those times following the Fujitsu buy-in. As Amdahl started design on a virtual machine, a group of investors, headed by newly installed president Eugene White, began to hack away at costs. "Under the thumb of the investors, we went from about 500 people to 160."

He left Amdahl Corp. a wealthy man in 1979 and the next year founded Trilogy, which was at first called ACYS Ltd. Once more his mission was to go after IBM, this time on a larger scale and with a technology that would use a superchip capable of doing the work of 100 conventional-sized microchips. Trilogy dropped that effort last summer, explains Amdahl, when it found itself facing too many problems "to do it at our own rate with the money we had left. We dropped our employment by two thirds."

At that time Trilogy had $90 million in the kitty. Since then it has been reporting large quarterly losses. Two of its biggest investors—Digital Equipment and Sperry—wrote off $50.4 million of their $68 million investment in Trilogy. Trilogy wrote off $43 million more.

A more easily intimidated man might pick up his marbles and go home. "The Trilogy story hasn't ended yet," insists Amdahl.

Qualifying as a valley veteran, Amdahl says that he is amazed at the area's uniqueness as a close-knit community of technological opportunity. Few people want to leave. For example, he once considered forming Amdahl Corp. in Monterey, less then 50 miles south, but couldn't recruit the talent: Monterey was too far from the action. "There was a reluctance to go to a place where you couldn't be pretty sure that tripping would leave you with a safe fall into some other equivalently good job," Amdahl says.

He thinks the growing presence of IBM is beginning to stifle innovation in the valley. "The innovators create an appetite and IBM feeds it." In the case of microprocessors, there wasn't much of a market until a way was found by the innovative companies to build more decision complexity into the chip. IBM stood on the sidelines until it saw how the picture developed. "I was told while I studied product introductions at IBM that it is extremely difficult to develop a new market and it's quite difficult to develop a new product. It's impossible to develop both," says Amdahl.

He says that IBM waited in the wings for the pioneers to develop the product and the market and then moved in late, in 1981, with its PC.

What of the venture capital disappointments in the valley? Amdahl notes that there were already too many players in the market when IBM introduced the PC. "And it doubled after that." He thinks venture capitalists should have known that there were too many contenders, but they put their money in anyway.

Could another Amdahl Corp. or a Trilogy Systems be established today, given current market and competitive conditions? Sitting on a couch in his office on the second floor of his Cupertino plant, Amdahl answers with little hesitation: "If there was someone who could, we would know of him today."

He pauses and then explains, "To get financing, it takes someone with an extremely credible record. [The investors] have to be able to look at the record and decide they're going to risk a lot of money on that person. I'm sure someone could come close today, but I don't think he could make it.

"I don't think I could start once again. Nor after stubbing my toe here."

be a flattening out in the rate of change in all factors affecting innovation," says Bruno. The result is that more and more technology firms will simply disappear. Studies made by the University of Santa Clara of 250 high-technology firms that were formed in the 1960s disclose that more and more are going out of business each year, with only 21.6% of the original 250 firms remaining in business.

"These companies that failed were trying to maintain their markets as long as they could, and soon technology and innovation passed them by," says Bruno. "You just don't expect firms that are almost 15 years old to be dying, but some of them are." There are those who view this as a dangerous trend, one that comes with maturity.

George H. Heilmeier, chief technical officer at Texas Instruments, spoke of it in a talk at Stanford University, where he wondered if the electronics industry could be in the same position as the U.S. steel industry was in the 1960s: unaware that obsolescence and decline lie ahead unless it makes vigorous efforts in research.

"Some of the characteristics of a mature industry are, first of all, a reduction in R&D and low capital investment because not enough profit is being generated to justify new capital," Heilmeier warned.

The colossal presence of IBM in Silicon Valley is beginning to have an effect upon the innovation and independence that have characterized the valley in its short history. "Five or 10 years ago, IBM was not a factor here," observes the AEA's Ferry. It is becoming more prudent to sell to Big Blue than to compete with it. Observers say that it is virtually impossible for an electronics company to exist in the valley without some tie to IBM. When it recently acquired Rolm Corp. of Santa Clara, IBM, with about 18,000 workers, became the valley's second largest private employer—after Lockheed Missiles and Space Co.

A spokesman for IBM disagrees with the notion that it has a virtual stranglehold on the valley.

A spokesman for IBM disagrees with the notion that it has a virtual stranglehold on the valley. Many of the valley's high-technology companies exist without being obliged to do business with IBM, he says from corporate headquarters in Armonk, N.Y. Adding that this charge is often leveled against his employer, the IBM spokesman calls all such allegations "undocumented."

In its apparently insatiable quest for new customers and proven products, IBM has recently intensified its ties with companies in the area. Besides its acquisition of Rolm, it owns 20% of Intel Corp., the chip maker, and has bought $6 million in convertible debentures of Sytek Inc., a Mountain View supplier of local area network interfaces.

All sorts of software companies, from Noel J. Brown & Co. to better known firms such as Ungermann-Bass and Tymshare Inc., a subsidiary of McDonnell Douglas, add software to IBM computers and sell the resulting systems. Noel J. Brown is adding software and selling IBM-designed robots; Ungermann-Bass is selling IBM products with its local area network products; and Tymshare is

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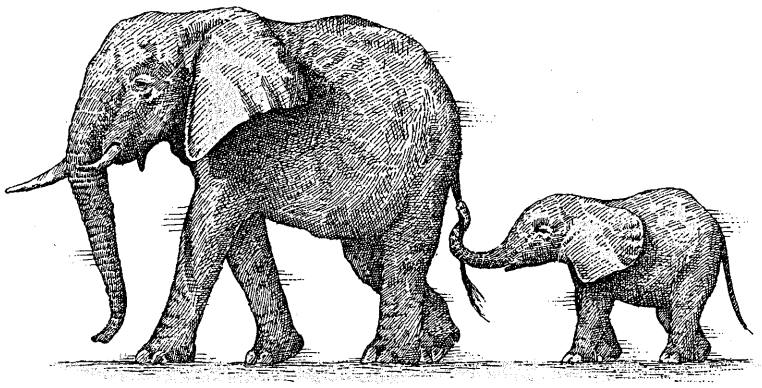

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supplying IBM PCs and Series 1 minicomputers with its remote computer services. One of IBM's stiffest competitors, the valley's Hewlett-Packard Co., is also a major supplier, selling plotters to IBM. With the notable exception of Apple Computer, in fact, hardly anybody in the valley makes anything that won't connect with some IBM product.

"Tandy's operating system is more logical and far easier to use than MS/DOS, but now they're using MS/DOS," says Stanford's Joel Shurkin. Venture capitalist Benjamin Rosen has said that IBM adds another criterion to what venture capitalists must look at: is this product likely to be in IBM's sphere?

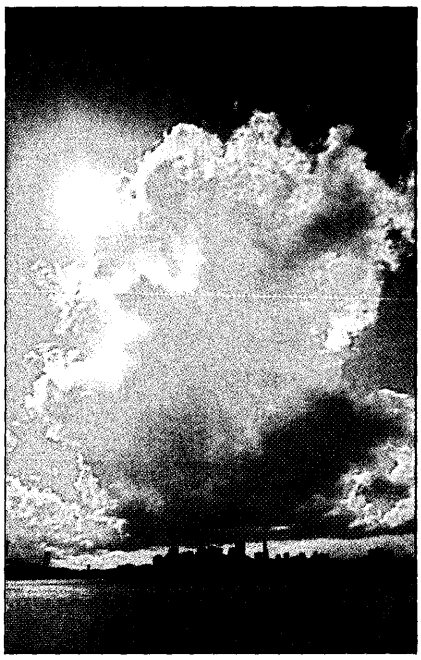
"I'm not at all convinced that they [IBM] aren't more deleterious to the U.S. electronics industry than the Japanese are," says Amdahl. "The moment they announce they are going into a field, everybody in it suddenly finds that their market disappears . . . as customers wait to see what they're going to have with IBM. Once IBM has the market in their hands without the competitive aspect, they will no longer try to serve the needs of the user, or only to the extent that it's self-serving."

IBM's man in Armonk again disagrees. "We don't take our success for granted," he says. "We will continue to do what customers insist that we do, and at prices that they can afford."

Thus, the presence of IBM is both a blessing and a curse to startups, a blessing because IBM can become a big customer and a curse because the giant could also one day be a competitor. Under that pressure, only the very strong and the very well managed can survive. Or those with a unique product and a unique market niche for it.

Talent and research and development are still the lifeblood of the valley and Stanford University is taking action to ensure that the best and the brightest continue to come here. Stanford recently opened a $15 million Center for Integrated Systems financed by 20 large companies (many but not all of them from Silicon Valley) and by the Defense Department's Advanced Research Projects Agency. A total of $250 million was raised during the four years from 1981 to 1984 in which the center went from idea to reality, and the sponsoring companies are pledging an additional $2 million a year to keep it running.

The center will provide semiconductor and computer science research facilities for 30 students working on PhDs and 100 others working for their master's degrees. Each sponsoring company has been given an office in the building and will work with the researchers. Its integrated studies will include disciplines



How long will the clouds hang over Frisco and the Valley?

such as solid-state physics, device physics, integrated circuits, very large scale integrated circuits, computer systems, artificial intelligence, and computer science.

Smaller colleges and universities in the valley will be hard put to raise that kind of money, mainly because the high cost of housing prohibits these schools from attracting faculty to staff such advanced studies. Observers think, however, that an increasing number of companies will follow a practice already under way at IBM and Hewlett-Packard: lending their scientists to serve as professors of high-tech subjects at schools such as the University of Santa Clara and San Jose State. There will be more and more endowed chairs sponsored by these companies as the area continues its evolution from manufacturing to research and development.

"Many [companies] will find and fill little niches, but damned if I know where they go from there."

The size and success of that evolution will be challenged by a multitude of Silicon Valley clones: Austin, Texas, where Microelectronics and Computer Technology Corp., a research group of 15 companies, set up shop last year; the so-called "Silicon Rain Forest" in the Northwest; Research Triangle Park, in North Carolina; and others being formed or already operating in Atlanta, Lafayette, Ind., and Albany, N.Y.

Many of the larger valley firms are building or have built offshore manufacturing sites. They are also turning to other parts of the nation for expansion. So far, only the very large companies have moved research and development out of the valley, and virtually none have moved their corporate headquarters.

Despite darkening clouds, bright young entrepreneurs continue to come to the valley. One of the most recent success stories is that of Philippe Kahn, a 32-year-old former mathematics professor who left his native France in 1982, drawn to the valley "by the myth of making millions like all the others." Venture capitalists wouldn't listen, so his firm, Borland International, went into business in Scotts Valley, south of San Jose, with Kahn's own $20,000 and two microcomputer software products called Turbo Pascal and Sidekick. Kahn sold them on a cash-in-advance, mail-order basis for $50 each, and customers couldn't resist the low price.

In less than two years his 100-person company was doing $2 million a month in sales. Looking back, Kahn says that if he'd received outside financing, he might have priced the product closer to the then going rate of $300 and ordered a BMW automobile with the profits. He now owns a Porsche.

"There's no stopping them from starting up," says Shurkin of Stanford. "Many will find and fill little niches but damned if I know where they go from there. As far as computers go, I think the age of innovation may be over—at least for a while."

George Heilmeier of Texas Instruments was looking ahead much farther when he spoke at Stanford. He thinks work in three-dimensional structures going on at Stanford could extend the growth in bits per chip, and thus the microelectronics industry, in another five to 10 years. "But while this will buy us time, it won't buy us long-term stability," he predicted.

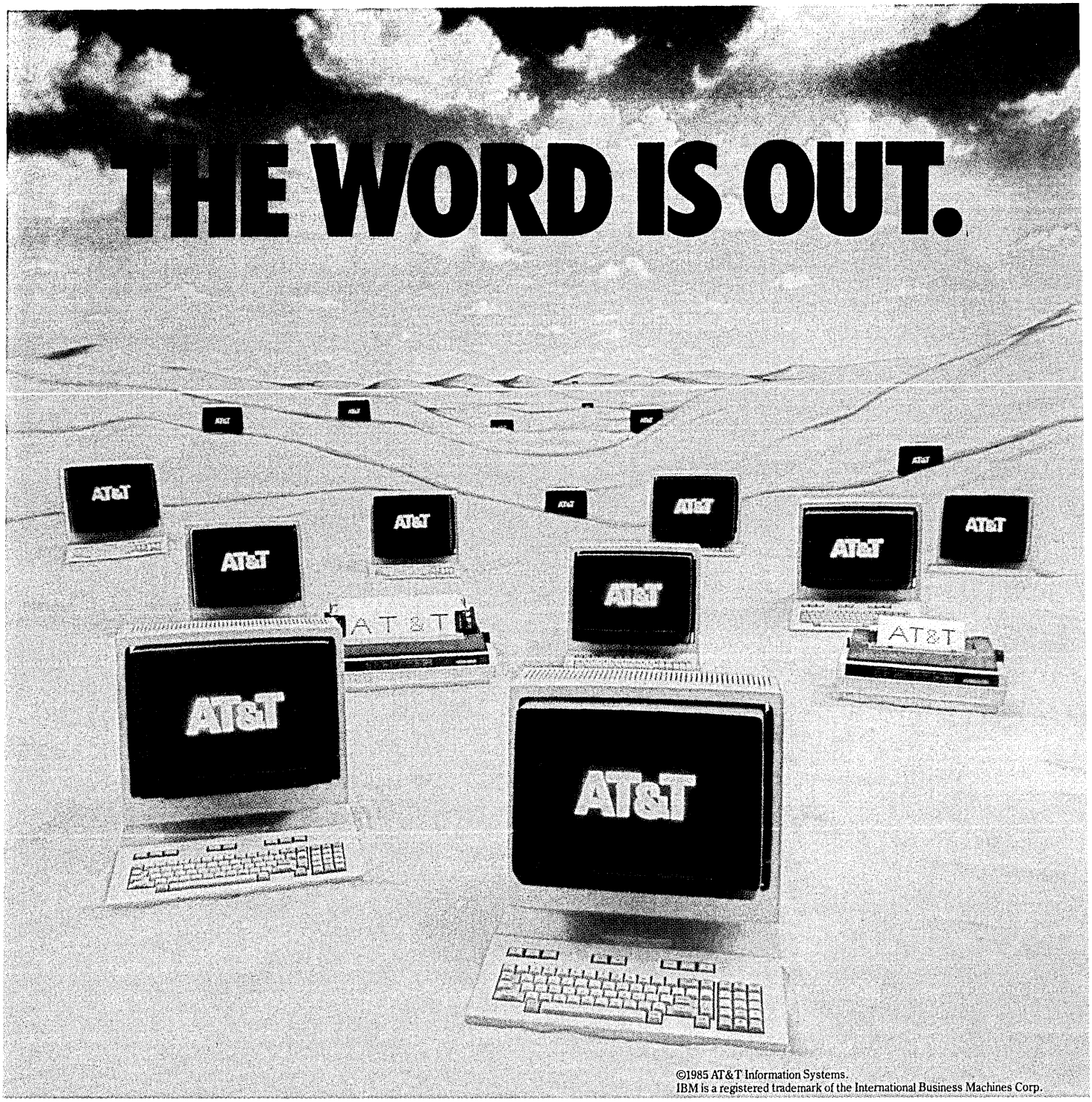
Heilmeier said the new push has to be in submicron structures. "We need much more effort in these structures. We have to start looking for them and this has not taken place yet."

Asking his audience to remember what the Japanese had done to the U.S. steel industry, Heilmeier concluded with this rhetorial question: "Suppose you had gone to the research director of a major U.S. steel industry company in the 1960s and said to him, 'You have 10 years to live before you become outmoded and outresearched and outperformed?' "

They're thinking a lot about that question in the valley these days. ⊙

Tom McCusker is manager of the western editorial bureau for Technical Publishing Co.

THE WORD IS OUT.



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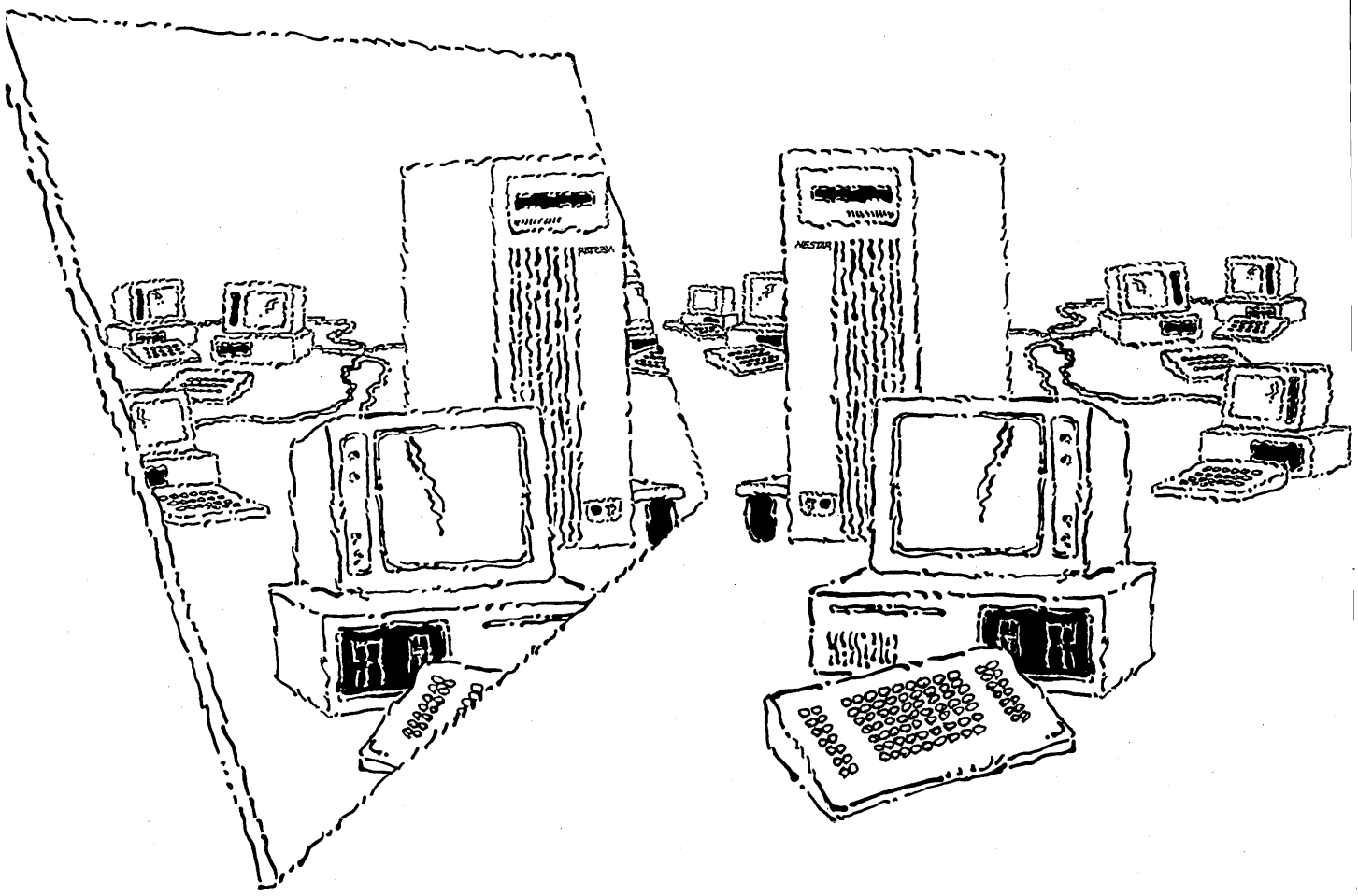

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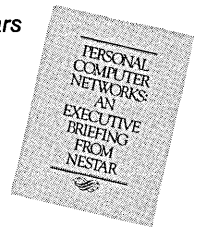

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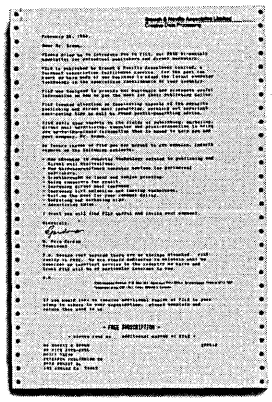

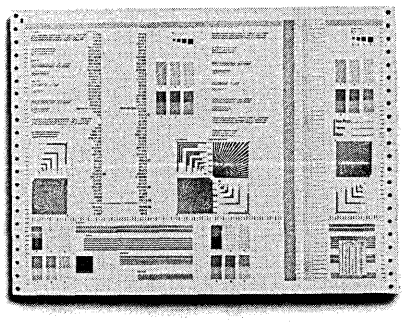

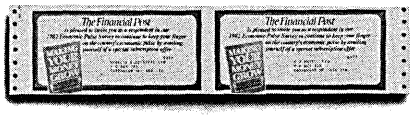

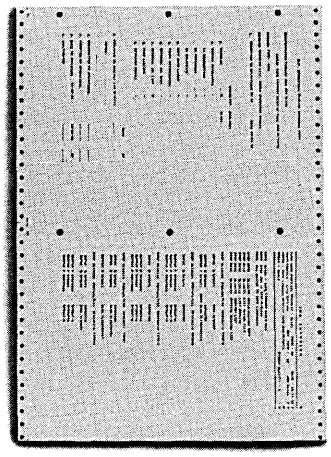

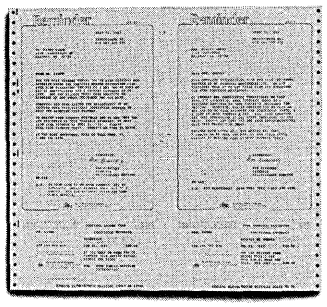

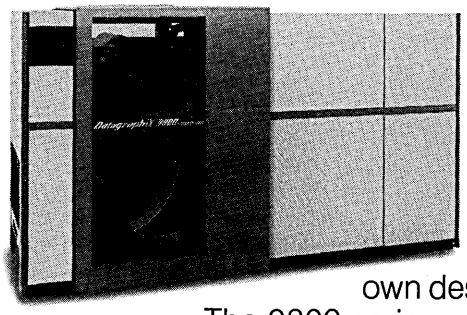

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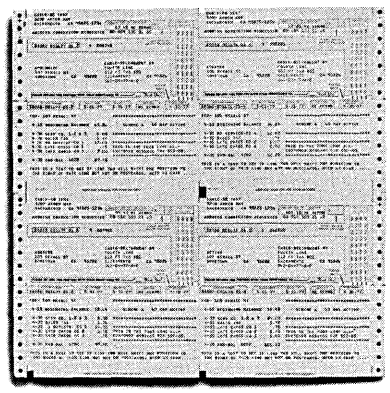

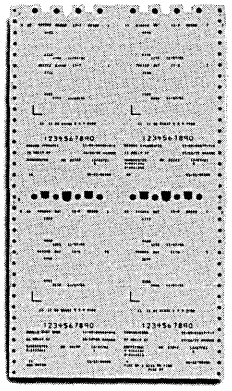

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NEWS IN PERSPECTIVE

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THE WAITING GAME

The new Sierra machines are only the beginning. Users ask, "Where is the VM software?"

by R. Emmett Carlyle

It was, perhaps, the announcement that wasn't, so muted was its tone, so innocuous its content. IBM's latest high-end mainframe family, the fourth in 20 years to follow in the footsteps of its landmark System/360, is now out in the open for all to see. Potential customers can't help wondering what has changed.

The preannouncement buildup for IBM's new Sierra, as the series was once known, was of Mount Everest proportions, but the mountain now in plain view is less than breathtaking, as one observer is quick to point out. With Sierra, or the 3090 as it is now called, IBM is once again emphasizing its cautious evolutionary approach, being careful to minimize the difference between its new technology and the current 308X line topper—at least for the time being.

When the first 3090 model, the 200, ships at year-end it will offer substantially the same price/performance as the computer giant's 26MIPS, four-processor 3084 QX. The real performance boost that users are seeking, the 50MIPS to 80MIPS model 400, was announced by IBM but won't be available for another two years.

For IBM's leading customers the sense of déjà vu was strong. "I've been here before," says John Gosden, vice president of technology at Equitable Life, New York, referring to IBM's now familiar pattern of conservative announcements at the high end. Even the unprecedented 27-month lead time for the model 400 failed to elicit the howls of protest one would expect from IBM's customers.

"The company could probably shave a few months off if pressed," Dan Cavanagh, vice president of electronic installations at Metropolitan Life, New York, says mildly. "IBM has left room for compromise by such conservative scheduling."

Some IBM users are convinced that the long 3090 lead time indicates a softening of demand. IBM's bulging inventories are at record levels: $6.6 billion at cost, with an estimated $25 billion street value. "IBM says the mainframe MIPS demand is growing at better than 50% a year. Maybe that isn't so," suggests a senior dp executive at a West Coast aerospace firm. A Cowen & Co./DATAMATION poll of 750 IBM mainframe sites last year contradicted the IBM number, revealing a MIPS growth of 31% through 1985. It should be stressed that demand traditionally falls several months before and after an IBM mainframe announcement, so experts are currently unsure whether the diminished growth is cyclic or reflects a general industry malaise. Some slump in orders has been noticed in the minicomputer sector and has had dramatic effects in the pc sector (see Benchmarks, p. 82).

Another reason for the delays could be that IBM is experiencing technical problems with its four-processor (dual-dyadic, in IBM terminology) model 400. "The quad 3084 QX was a difficult project to execute," says Mike Chuba, who follows IBM for the Gartner Group research firm in Stamford, Conn. "IBM still hasn't come up with VM support for any four-processor combination." Whatever the merits of this view are, users contacted in an informal DATAMATION poll after the IBM announcements weren't buying it.

"The quad 3084 QX was a difficult project to execute. IBM still hasn't come up with VM support for any four-processor combination."

"The likeliest reason for the lengthy lead time is lack of competition," says the aerospace dper. During the 1970s when IBM's pcm competition was intense, its product cycles shortened. The first customer shipment of the 303X preceded the 308X by three and a half years. Yet after pumping a record $15.5 billion into R&D and engineering and $11 billion into new plants over the past five years, IBM's product cycle has lengthened once more, to four years.

The window of opportunity would appear to be open once more for pcms, and users are certainly not counting them out. But since IBM's architecture, particularly its software and microcode, presents such a moving target, users have become skeptical. "We don't buy machines sight unseen anymore," says one. "Our attitude is show me!"

If MIPS demand picks up during the year, the 3090 delays offer the prospect of a bumper year for leasing companies, and residuals on the 308X could remain high. Bob Djurdjevic, publisher of the Phoenix-based *Annex Computer Report*, predicts the 3081 "will hardly be scratched." But he estimates the average 3084-QX owner can expect to lose close to

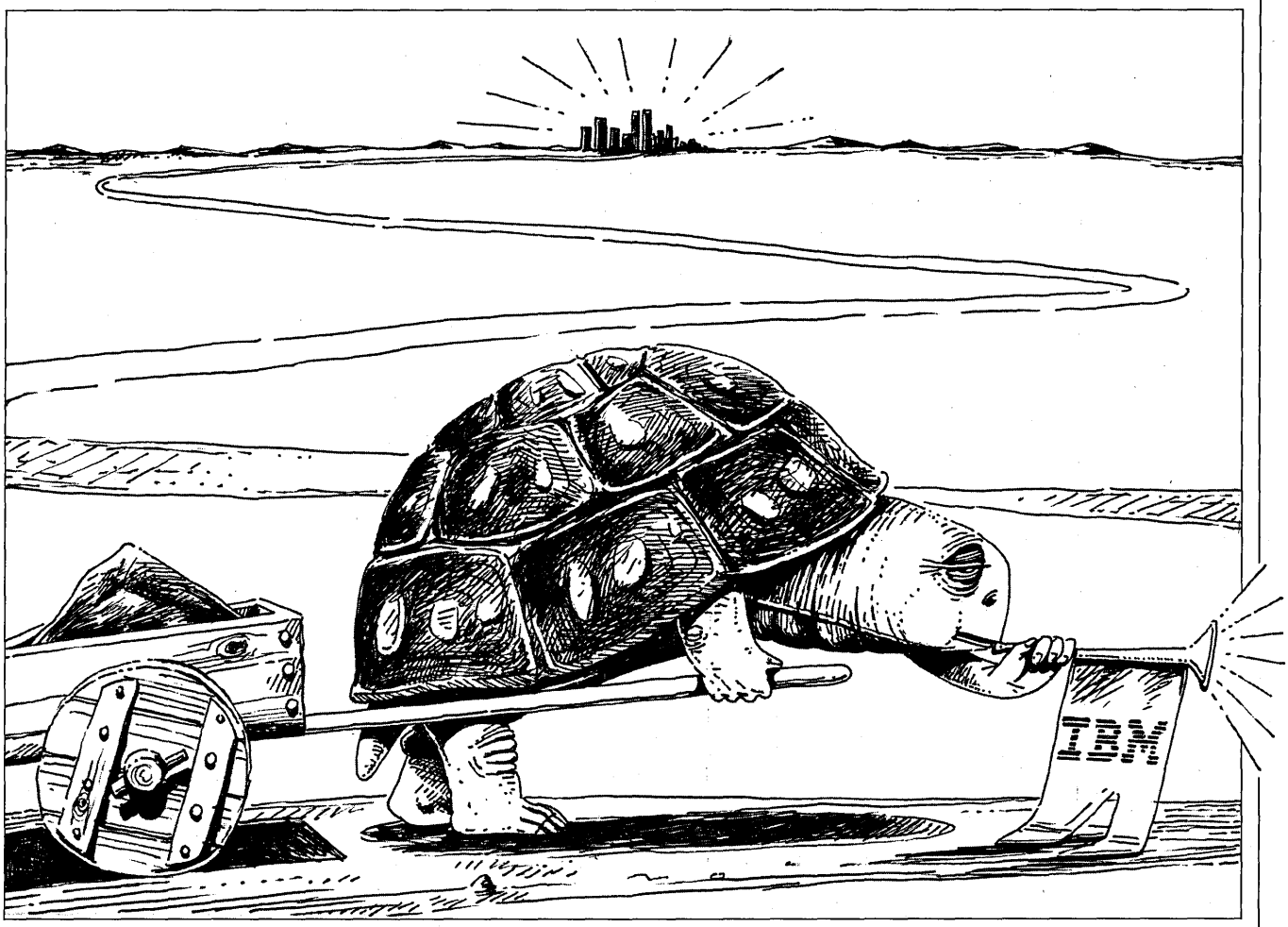


ILLUSTRATION BY JAMES R. JONES

$1.5 million in the used computer market as a result of the 3090's improved price/performance.

The most delicate question facing users is whether to buy the 3084 or wait for a 3090. Since the informal samplings of more than a 100 sites by DATAMATION, the Gartner Group, and International Resource Development (IRD), Norwalk, Conn., showed them to be free of capacity problems in 1985, the answer was clear: users may buy the odd 3081, but they aren't interested in the 3084.

"I wouldn't favor the 3090 over a 3084 on price/performance alone," Metroplitan Life's Cavanagh explains. "By announcing the model 400, IBM gave me the single biggest reason for favoring a model 200—one is a stepping-stone to the other. I can't go anywhere from a 3084-QX." Other factors cited in favor of the model 200 by Cavanagh and the others are its smaller footprint and favorable maintenance charges ("which could be reduced a further 10% in a year," notes one MIS exec).

A point raised by all the users polled was their expectation of latent "goodies" hidden under the covers of the 3090. The unannounced feature of the 308X family was extended architecture (XA), 31-bit addressing. This is one more IBM tradition users hope will be repeated. There has already been speculation that IBM has used 801 RISC processors for I/O and arithmetic units and that a 6MBps channel rate is lurking within, waiting for the right controller. As users are still months away from any form of technical specifications, no hard evidence will be forthcoming for a while.

IBM's own answer to the mystery of why the 3090 was announced with such a long lead time was "to assist customers in forward planning." IBM also added that some customers are hungry for extra MIPS capacity now. Since the Sierra announcement was so skewed to the MVS/XA side, one must assume IBM is referring to its large batch production shops.

"31-bit CMS is still a dream. The frustrating thing is that we have the hardware right now but IBM hasn't given us the software to make it all work."

"If MIPS demand is growing anywhere at more than 50%, as IBM claims, it's not in the MVS shops but on the VM side," Gary Schulz, director of computer services at Northwest Industries, Chicago, argues. "Corporations have moved to VM/CMS [CMS is VM's operating system] to create their information centers and handle their pcs and workstations; and VM/CMS was not well served in this announcement," he says.

NI and other large VM/CMS shops had hoped for VM/XA support for their CMS production systems, but none was forthcoming. Says Schulz wearily, "31-bit CMS is still a dream. The frustrating thing is that we have the MIPS, the hardware capacity, we have 31-bit machines in our shop right now, but IBM hasn't given us the software function to make it all work."

IBM did announce an extended version of its migration aid VM/XA called Systems Facility (SF), but VM users are already referring to the SF as "science fiction" because the product doesn't support CMS production programs. Enhancements to the migration aid will continue while IBM attempts to develop VM/XA proper: an interactive microcoded control program environment in which all its operating systems can sit.

Users and IBM sources claim that three years' worth of development efforts on VM/XA were recently shelved and one whole project team at Kingston was axed.

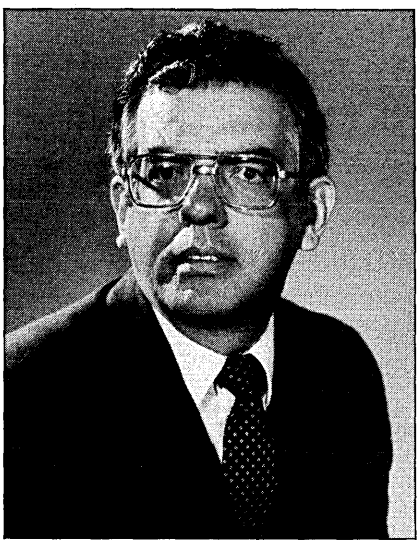
They claim IBM has begun a major rewrite of VM/XA that won't reach users until the close of the decade. IBM refused comment.

IBM makes no bones about the strategic importance of VM as its account control mechanism. It's also a fact that more than 70% of IBM's internal product development is done under VM. Yet despite this, critical VM support for Sierra's new archival storage, tape drives, and laser printer were notably absent in the announcement.

"The laser printer was developed at Dallas under VM. I had to sit and squirm while one of the developers told me that it would only initially be supported under MVS," says one VM customer.

"If IBM can't support its own hardware, how can it be expected to support the things its VM customers want to do?" asks Romney White, cofounder of the Ridgefield, Conn.-based Adesse Corp., which offers VM operating system enhancement software and support to the VM community.

GOSDEN OF EQUITABLE: A strong sense of déjà vu. "I've been here before."



CAVANAGH OF METROPOLITAN LIFE: "I wouldn't favor the 3090 over a 3084 on price/performance alone."

Because IBM's VM development has failed to keep pace with the MVS side, a growing number of CMS shops are pushing the limits of their 16MB virtual memory address space.

NI says its addressing space was completely full and there was no room to mount the latest release of IBM's graphics device software. "We've put in a request for help from IBM," Schulz reveals.

Other VM/CMS shops, such as Stanford Linear Accelerator, could be at the limit in a year. "We might be able to get relief by pushing some of our FORTRAN programs out onto VAX superminis. It's not the optimum solution, but we may have no choice," says Ted Johnston, systems programming manager at the installation.

Several of the largest CMS sites are known to be experiencing difficulties through lack of new VM function. Among those that declined to comment on their problems are the Central Intelligence Agency and Bell Northern in Ottawa.

Under the protective cloak of anonymity, however, dp managers with VM say IBM told them it has put tremendous manpower resource into VM/CMS over the past few years, and there has been some progress recently. Users highlight the IBM announcement last August of SNA support for VM. IBM admits that it is playing a game of catch-up on MVS because the batch area is where its traditional focus has always been. But users feel IBM isn't necessarily putting the *right* people on VM, or the right numbers. "They should use small, select teams rather than the large-scale factory programming approach," says a VM industrial customer.

What is vital in all of this for IBM is that through the mainframe family that is to follow Sierra, the so-called Summit series, the company wants to escape the volatile quarter-to-quarter effect on its margins it has witnessed for some years. It plans to do this by becoming more of a software company. Presently some 7% of its total revenue comes from software. IBM hopes to push this to 33% by decade's end, according to insiders. Viewed in this context, its VM software development is something of a trial balloon. Presently the company is struggling: it will take two years just to write a new release of its VM/SP operating system.

Though there seems little comfort on the horizon for VMers who are beginning to overflow their machines, their fortunes and IBM's are now closely intertwined. To secure its own future growth options IBM must take care of theirs. ◉

HO HUM FOR SIERRA

Those users demanding scientific computing power are less than thrilled with IBM's new 3090 series machines. Is vector processing on the horizon?

by David Stamps

The reaction of the scientific community to IBM's finally unveiled Sierra mainframe illustrates two alternate views of Big Blue's evolutionary—or trickle-out—approach to new technology.

There is the generous assessment from those who already have sufficient computer horsepower. "Emitter-coupled logic is a significant development for IBM," says Jack Worlton, laboratory fellow at Los Alamos National Laboratories, Los Alamos, N.M. "It opens the door to faster processing." Adds Peter Zaphyr, director of Westinghouse Electric Corp.'s energy and technology group computer center in Pittsburgh, "[It is] a very capable machine and a trend toward scientific capability that we are very pleased with."

But neither Zaphyr, who presently has two Cray supercomputers for number crunching, nor Worlton, with access to five on-site Crays at Los Alamos, is dependent in the least on IBM to ease his scientific workload. Each can afford to take an objective view.

Users who do rely on IBM for scientific processing, however, are less generous in their assessments, perhaps because they have more at stake. Scientific shops that need more processing power now tend to see the Sierra more in terms of what it lacks today—MIPS, vector processing, higher channel speeds—than in terms of what it pressages for tomorrow. Their reactions ranged from "not a blockbuster" to "ho hum."

Fred Kaczowski, data processing manager for Perkin-Elmer Corp., Danbury, Conn., admits that the new 3090 was something of a disappointment to him. As a shop that does a lot of FORTRAN computation on a timesharing basis, P-E had been hoping that IBM would announce faster channel speeds with its new mainframe.

"We've got a 3033 on a fantastic lease for another year so we'll probably just hang on to it," he says. "When we upgrade, it will probably be to a 308X series. There isn't much difference between

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the 3080 and 3090, except that in a year the 3080 will probably offer better price/performance. . . . And vector processing would have been nice, too. For the time being we'll continue to use P-E minicomputers dedicated to specific jobs to handle our computation needs."

Henry Johnson, director of Martin Marietta Data Center, Orlando, Fla., likewise confesses to some disappointment that the Sierra was not a faster machine. Johnson says he'd anticipated a machine in the 40MIP to 50MIP range, not the 30MIPs of the 3090 model 200.

That disappointment, however, did not stand in the way of Martin Marietta's placing a prompt Sierra order.

"We're like a lot of large dp facilities," says Johnson. "We're out of MIPS. We've got two 3033s whose leases are ending. We've got a lot of CADAM applications running under TSO. We can move out the 3033s, make room for a [3090] model 200 now, and have room to add a model 400 when it's available."

The fact that the more powerful 3090 model 400 will not be available until 1987 came as a surprise and disappointment to many large users. But as Johnson points out, it is still important to know that the model 400, which will be available as an upgrade to the 200, is in the works. "Yes," says Johnson, "we are already looking ahead to a model 400. The model 200 doesn't give us the raw power we need today, but it gives us the growth power we need today."

Westinghouse also plans to add a 3090, "but I don't see the Sierra having any impact on our scientific processing," says Zaphyr. Rather, Westinghouse will add the new mainframe to an IBM 3084 that it is now using in a dual-processing mode as its largest commercial system.

Westinghouse's own scientific direction lies in a series of pilot networks it is developing to link a variety of minicomputers and engineering workstations to its Cray machines. At this point, it is more interested in adding a couple of IBM 4300 systems to the network than in exploiting the scientific capability of the 3090, says Zaphyr.

"But there is evidence that IBM is starting to put more scientific capability on its mainframes and that is a trend we are very comfortable with," Zaphyr adds.

Zaphyr points specifically to a new FORTRAN subcompiler that will allow each processor in a multiprocessor system, such as the 3084 or 3090, to work simultaneously on scientific and engineering problems. IBM claims that this will allow the 3090 to more than double the throughput on scientific tasks.

"There is evidence that IBM is starting to put more scientific capability on its mainframes."

"We expect to see more in this trend toward scientific features on IBM mainframes," says Zaphyr, "but it's a slow trend because scientific processing tends to be very specialized."

"If you just look at the [Sierra] product, you make a mistake," says Worlton of Los Alamos. "I was not impressed with the hardware when I read the announcement, but the VS FORTRAN multitasking capability is actually pretty significant. A lot of the people who are expressing disappointment are maybe overlooking the importance of multiprocessing software.

Worlton includes the multitasking along with the emitter-coupled logic as features that open doors to higher performance. "The emitter-coupled logic opens the door to faster technology; 256K memory chips means larger memories," he says.

Worlton admits, however, that these "door openers" have no immediate

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impact at Los Alamos. Moreover, he says, they may seem small consolation to the IBM scientific user.

"I guess I can afford to be more philosophical about this than the guy who is relying on IBM for his scientific processing," says Worlton. "IBM is starting to postion itself to offer high performance, but there are a lot of people—even within IBM's own development group—who feel that IBM hasn't done as much as it could for the scientific user."

While concessions to the scientific user, such as Unix and FORTRAN multitasking, may position IBM for high-performance processing down the line, the post-Sierra assessment of many experts is that IBM appears still to be sitting out the large scientific and engineering computer market.

"We didn't expect the Sierra to be a Cray-class machine, but many did expect it to have vector-processing capability."

"No one expected the Sierra to be a Cray-class machine, but many did expect it to have vector-processing capability," says Norm Weizer, senior analyst with the consulting firm Arthur D. Little Inc., Boston. "They still could be planning to add it as a midlife kicker."

For vendors currently in the vector-processing market, IBM's decision to not offer vector processing—at least for now—comes as good news indeed.

Amdahl Corp., which claims it is still on schedule to deliver its own IBM-compatible vector processor in May, was particularly pleased at the Sierra's lack of vector capability.

"We don't see our own 580 as a computer for the serious scientific shops," says David Anderson, director of product programs at Amdahl. "Nor do we see the 3090 as a computer for the scientific user, even though it appears to be a little better than our 580 at scientific processing."

It is with its two Futjitsu-made vector processors—the $7.7 million model 1100, and the $10.7 million model 1200, with 250 MFLOPS and 530 MFLOPS respectively—that Amdahl hopes to crack the market of large FORTRAN shops that have yet to make the jump to a supercomputer like a Cray.

"And there is just no contest between the price/performance of our vector processor and the 3090, which is priced somewhere in the $5 million range," claims Anderson.

"The Sierra is a Band-Aid approach," adds Phil Howell, Amdahl's manager for vector product marketing. "We expect the total market for vector processing to surpass $1 billion within the next three years. For that reason, we were surprised the Sierra didn't offer vector processing. Either there could be more to come, or else IBM is still waiting to see what will happen to this market."

At Cray Research Inc. the Minneapolis firm that specializes in scientific supercomputing, the reaction is more ho hum than exuberant.

"The performance of the Sierra seems to be at the same level as the 3084, which is no great shakes, says Marcello Gumucio, executive vice president of Cray Research.

The fact that IBM has added multitasking and Unix capability validates the direction that Cray has taken with the Cray-2, Gumucio contends. Like others, he expresses some surprise at the fact that IBM did not announce vector processing on the Sierra. "Maybe there is vector capability in the product. I don't think we've seen the entire product stategy here, so it may be too soon to pass judgment," he notes.

Floating Point Systems, Beaverton, Ore., also sees the Sierra as posing no threat to its array processor approach to the scientific computational market.

"It's about what we'd expected, and it didn't do anything to indicate that IBM isn't still interested in our own processors," says Dave Vickers, product line manager for scientific and engineering products.

Floating Point Systems and IBM have shared a joint marketing arrangement for the past four years, according to Vickers, whereby the two firms can make joint presentations or IBM can make presentations on behalf of FPS. Users are buying the combination—for example, last month the National Science Foundation announced funding of four designated supercomputer centers, one of which was an installation at Cornell University, where an IBM 4381 will be linked to six FPS array processors (see Benchmarks, p. 82).

"The Sierra is a Band-Aid approach. We were surprised it didn't offer vector processing."

Some analysts say that it may be through such array processor type configurations that IBM plans to address the scientific market. According to Vickers, the recent Sierrra announcement does nothing to change that feeling at FPS.

"Put it this way," he says. "We're not overly concerned at this point about what else IBM may be planning in the scientific market. On the other hand, you have to be aware of what they do. You're talking about a company that sold $2 billion in PCs last year. They could lose us in their petty cash drawer." ◉

CAD/CAM

ANOTHER IBM TRIUMPH

From nowhere a few years ago IBM has become number two in the CAD/CAM market.

by Irene Fuerst

You aren't likely to see IBM's ersatz Charlie Chaplin on television touting the virtues of CAD/CAM or CAE systems. Computer aided design, manufacturing, and engineering systems aren't exactly flashy, mass market goods. But lo and behold, in 1984 IBM came close to being the undisputed leader in the engineering market, just as it is in personal computers, according to some new market research. Indeed, most observers expect IBM to be sitting on top of the heap by the end of this year.

IBM is "surrounding the market," according to senior editor Bruce Jenkins of Daratech, a CAD/CAM research firm located in Cambridge, Mass. Jenkins says IBM's more aggressive posture in the CAD/CAM market is based on two goals: to move more IBM mainframes into engineering environments and to maintain its grip on the low-end market.

Researchers say the CAD/CAM market is growing 50% a year. Dataquest, a San Jose research firm, estimates the worldwide CAD/CAM market will be worth $12 billion in 1988. Fortunately for IBM's competitors, the market is growing so swiftly that there's room for others to dance with the elephant without fear of breaking a leg.

"IBM is adding business that wouldn't have been gotten by others," explains Laura Canigliero, an analyst with the New York brokerage firm Prudential-Bache Securities.

"IBM is *the* actor in the marketplace. Anyone who doesn't accept that is foolish," says Steve Aucoin of Data General. He adds, however, "we can't let their course affect ours. We have to approach the market in the way that we feel best solves problems."

The term CAD/CAM covers a lot of territory. The CAD part includes computer aided mechanical and architectural design and computer aided electronics, or CAE. The CAM, or manufacturing element has been slower to take hold. Born on mainframes over a decade ago, CAD/CAM, like nearly any other application,

finds its home today on mainframes, minicomputers, and even pcs.

The biggest trend, according to Dave Burdick of Dataquest, San Jose, is the shift from shared logic systems to distributed logic. This is manifested in the increasing popularity of standalone or networked workstations, which are selling at an annual growth rate of 74%, he says.

IBM started its rise at the beginning of 1981 with an estimated 4% of the market. Ahead of IBM, according to Daratech, were Computervision, an industry pioneer located in Bedford, Mass.; Calma, now a General Electric subsidiary located in Santa Clara; Intergraph, of Huntsville, Ala; and Applicon, of Burlington, Mass., a division of Schlumberger. Big Blue began to aggressively move IBM equipment into engineering environments, an area in which it had been traditionally weak, and accomplished it without a strong workstation product.

"There's no doubt that IBM has made a strong commitment to this market," says Gerald S. Pfeffer, senior vice president of CRS Sirrine, the country's number one ranked architectural engineering firm. CRS Sirrine, located in Houston, recently purchased its first minicomputer, an IBM 4341, running CADAM drafting software. "I believe from everything I've seen that they are as serious about being as much a part of it as they are in the personal computer business," he says.

"About 70% of all manufacturers own IBM equipment already," says Charles Foundyller, Daratech's president. These mainframes or 43XX class machines are already in use for such functions as inventory or data processing. As it becomes necessary to tie these data together for production planning and other advanced functions, "it makes more sense for an enterprise to buy IBM equipment than it ever has before."

That integration of corporate management information systems into the production area naturally works to IBM's advantage: MIS executives, who tend to be IBM believers anyhow, take a growing role in the purchase decisions of engineering departments and open new doors for Big Blue. "IBM has a wonderful entrée through MIS in many instances," says Canigliero.

CRS Sirrine brought in its IBM system despite its 75-workstation CAD system from Intergraph, driven by Digital Equipment Corp.'s VAX superminis. Since the company had been a longtime user of IBM mainframes on a timesharing basis, says Pfeffer, it was an easy step for it to trade up to its own IBM. Another motiva-

FOUNDYLLER OF DARATECH: "IBM is really not after the CAD/CAM business per se. It's really after the factory floor, engineering, and industrial computation."

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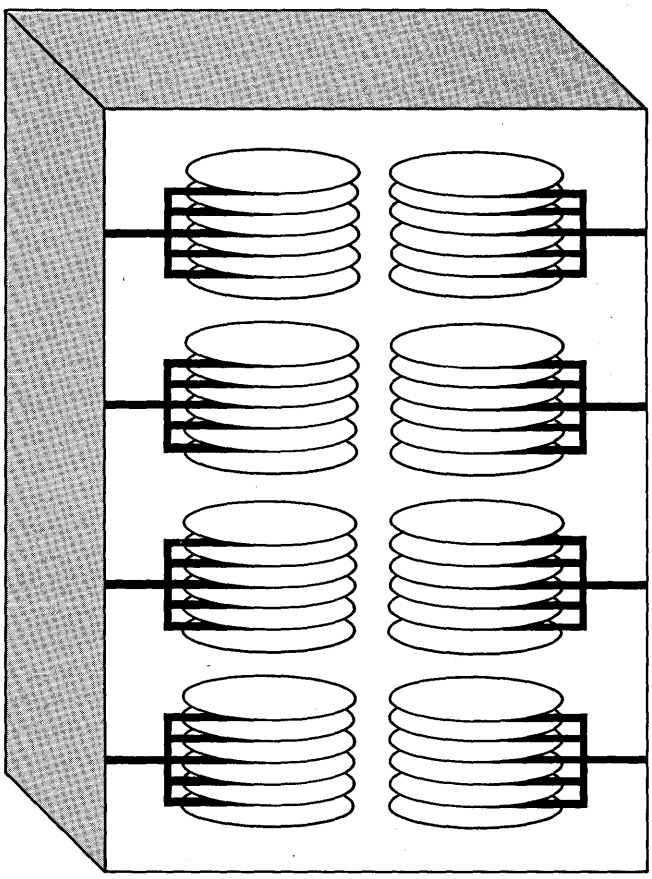

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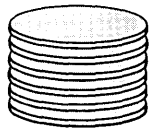

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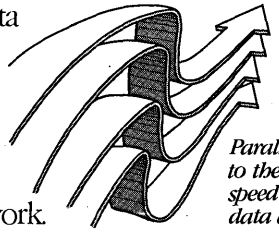

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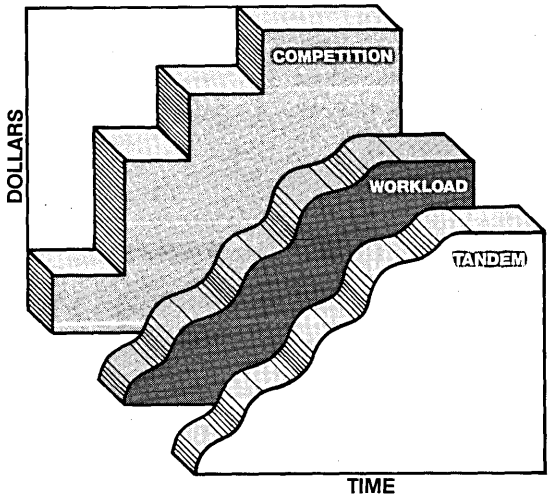

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TANDEMCOMPUTERS

CIRCLE 27 ON READER CARD

NEWS IN PERSPECTIVE

tion was the growing interest among CRS Sirrine's clients in acquiring drawings of their projects in magnetic tape form. Although CADAM was not the format most often requested, adding the IBM system (IBM distributes the Lockheed Corp. developed CADAM) made the most sense to the company.

Another factor playing into IBM's hands is the strong presence of value-added resellers, commercial oems, and other third parties into the CAD/CAM business. Daratech estimates that turnkey vendors in the U.S. garnered $2.8 billion in revenues from CAD/CAM in 1984, a significant but undetermined portion of the total, due to the difficulty in sorting oem, var, and vendor revenues. Daratech reports that IBM's sales to end users grew about 60% last year, bringing its overall market share to more than 18.9%, or a fraction of a point behind Bedford, Mass.-based Computervision, with 19.9%.

IBM began its assault on the CAD/CAM market in earnest by first acquiring the rights to software packages developed by others. After Lockheed's CADAM was entered in the IBM sales brochures, three other CAD/CAM programs appeared, modified so data could be transferred among them. These are CATIA, developed by Dassault Systems of France, which is for three-dimensional mechanical design; CAEDS, developed by Structural Dynamics Research Corp., for linear analysis; and CBDS, developed by Bell Northern Inc., for circuit board design.

Says Jenkins, "This appears to be IBM's strategy—price cuts for mainframes; expansion, such as the new Sierra line; and comarketing and value-added remarketer [var] agreements." In September, IBM cut the price of its Model 4331 and 4361 computers by over 15%. These 1MIP or so 4300 systems are the engines for IBM's CAD/CAM systems.

IBM has relied on the turnkey philosophy of selling and supporting its own hardware and software until recently. A relatively new wrinkle that is helping IBM triumph in the CAD/CAM market is in supplying hardware to independent vendors.

"At the high end, IBM is using vars to regain the engineering market," Jenkins says. IBM lost some of its share in the last 20 years when it turned away to concentrate on dp, he says.

In 1983, IBM signed up Computervision as a var for 4361 computers. Calma, another turnkey vendor, will soon follow suit, according to informed sources. McDonnell Douglas Automation Co., St. Louis, started selling its Unigraphics software with IBM 4361 computers and 5080 workstations in December 1984.

IBM's other strength is its continued lock on the personal computer market in

PFEFFER OF CRS: It was an easy step for the company to trade up to its own IBM.

terms of installed units, according to Jenkins, because its recent CAD/CAM moves follow the trend toward high-performance workstations providing engineers with low-cost systems.

The low end of the CAD market has boomed in the past year or two. Daratech estimates that sales of pc-based CAD/CAM systems priced at under $20,000 passed $58 million in 1984. New companies like Autodesk, of Sausalito, Calif., and Personal CAD Systems, of Los Gatos, Calif., market pc-based CAD/CAE systems, now known as PCAD/E. Now every mechanical, software, and electronics engineer can have his or her very own toy on his or her very own desk. After watching the newcomers and their cheap boxes steal marketplace thunder, the minicomputer-based vendors are jumping on the bandwagon. Computervision, among others, has converted its software for personal computers.

IBM profits indirectly from this activity because, as Jenkins notes, "IBM leads the way in high performance in the pc-based market." Most PCAD/E software is designed for the IBM PC, though its performance has to be enhanced with coprocessors, extra memory, and other add-ons that keep companies like Tecmar and Quadram in business. The more powerful AT should bolster IBM's presence at the design workbench, as should PC II, the yet-to-be-announced successor to the IBM PC.

"IBM realized that the PC itself is going to build the market," says Foundyller. "It's a wonderful data generator." Those data have to be stored somewhere—such as on an IBM 4361.

In the midrange, "IBM is reportedly amassing its forces to introduce a personal CADAM," says Jenkins. Daratech

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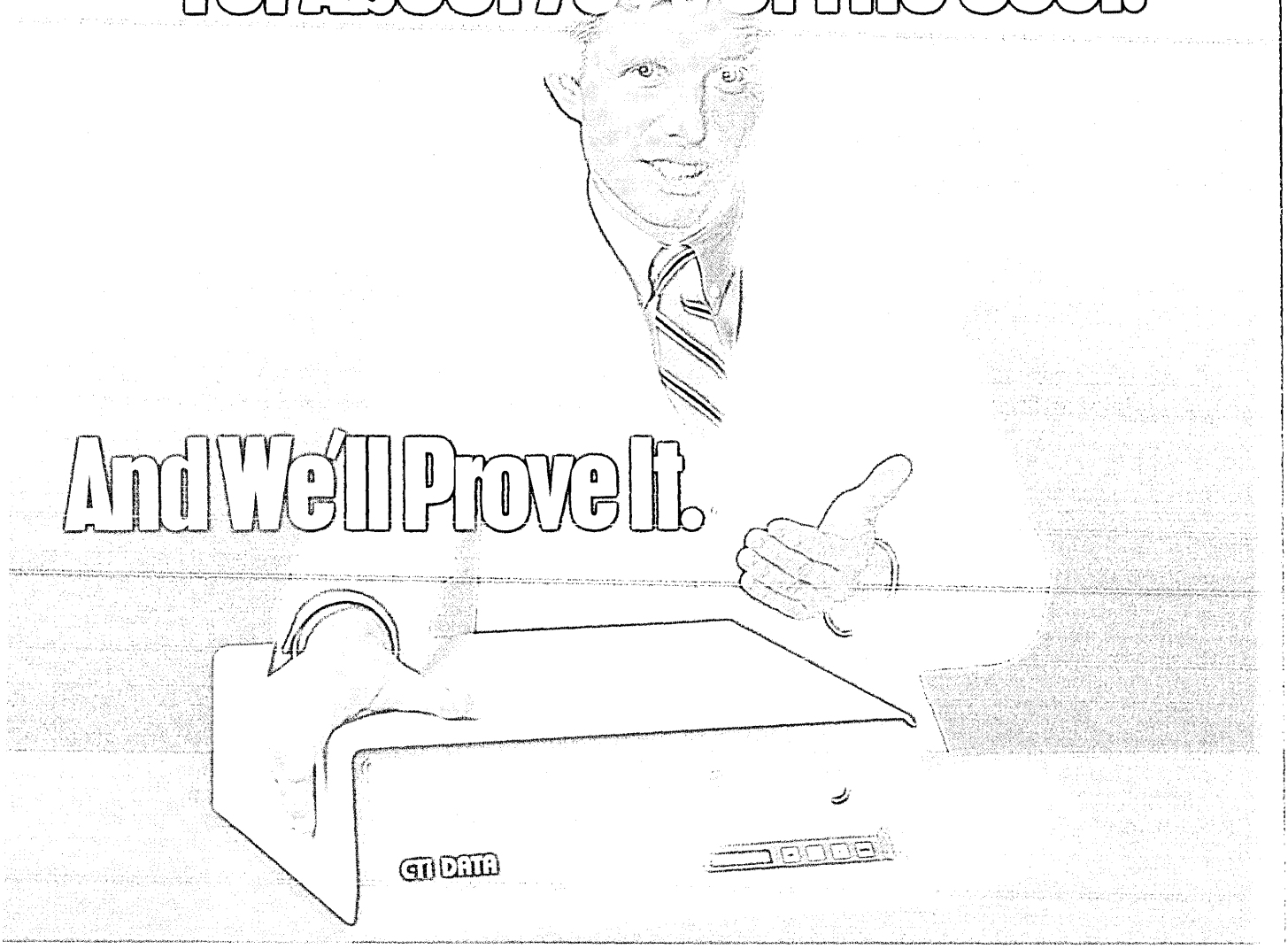

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says that Personal CADAM will probably run under Unix on a high-performance engineering workstation.

Neither IBM nor CADAM has announced what form this workstation will take, but observers think it will be priced between $50,000 and $60,000. Daratech thinks there are four possibilities: one of IBM's new, PC-enhanced graphics workstations with access to mainframe applications, such as the 3270 PCG or 3270 GX; a modified 5080 workstation incorporating a general purpose processor, such as an MC68010 with local disk storage; a desktop computer, such as the IBM PC AT or PC II; or a third-party Unix workstation.

One source says that in February IBM started selling what it calls a deskside 4361 in Germany, a low-cost 4361 that drives 5080 terminals, which could be the Personal CADAM workstation. Rumors of a 4361 on a chip, called Montana, are also making the rounds.

"On the hardware side IBM admits a lack in its product line in 32-bit workstations, an environment to which most vendors are drifting," says Pfeffer. "I've got to believe they're not going to ignore that market." The well-publicized success of Apollo computer with its 32-bit workstation network makes it difficult to ignore.

Despite the move to distribute logic, mainframe computing power is essential at large installations, especially those that are using more than 100 terminals.

IBM "is as serious about being as much a part of the CAD/CAM business as they are in the personal computer business."

"A lot of people are talking about networks. The thing to keep in mind is that there's a difference between a network and a database," says the CAD/CAM manager for an aerospace company, who requested anonymity. A network doesn't address the issue of data accessibility, he says. "A network doesn't give you configuration management. It doesn't provide control," he says. "It's just a means of moving information from one node to another."

Now that the market is growing to the point where IBM cannot ignore it, and the needs of the users revolve around database controls and all the other good stuff that mainframes are known for, IBM has no choice but to attack like a World War II battleship, with 16-inch guns blazing.

"More and more companies are realizing CAD is only part of the picture," says Foundyller of Daratech. What Foundyller is referring to is CIM, or computer integrated manufacturing. CIM is often defined as the development of a database that integrates all manufacturing functions, including design, production, and business. A CIM system would control the entire process, from raw materials to finished product.

According to Foundyller, "IBM is really not after the CAD/CAM business per se. It's really very small—just a drop in the bucket for a $50 billion company. They're really after the factory floor, engineering, and industrial computation." He estimates the scientific and engineering market is worth $15 billion.

This effort to enhance its presence in the CIM universe extends even to competing against itself by selling machines directly to end users and entering into var and remarketing agreements with competitors such as Computervision.

"If they had been serious about [just] locking up the CAD/CAM market, they wouldn't sell to their competitors," says Foundyller. "They want engineers to use IBM machines, and they don't care who sells them." ◉

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TELECOMMUNICATIONS

DATACOM FROM THE BOCS

The local telephone companies can now offer protocol conversion and packet switching services within their central offices. Vendors and customers wonder, "What's next?"

by Willie Schatz

Okay, so Computer II wasn't the Ten Commandments. But from a telecommunications perspective, it was up there. Now, what the FCC apparently cast in concrete five years ago may be history in the next five. And the old AT&T may not be dead. It may just be disguised.

"The FCC allowing the Bell Operating Companies [BOCs] to offer protocol conversion and packet switching is the first significant erosion of enhanced versus basic services," says Howard Frank, president of Contel Information Systems, Great Neck, N.Y. Computer II's raison d'être has been that if the BOCs were going to offer any enhanced service, such as packet switching, it had to be through a separate subsidiary.

But that was written in 1980—five years ago on the calendar, eons ago in the communications business. In A.D. 2 (after divestiture year two), the walls are a-tumblin' down.

"I think this is the first step in the battle for Computer III," Frank says. "The BOCs are what the old AT&T was. We're looking at seven new AT&Ts.

'It makes no sense to restrict a carrier of data from enhanced services, especially from an economic standpoint. The monopoly issue of cross-subsidization is valid. But economically and technologically it makes no sense to have separate subsidiaries."

Amen, concurs the FCC. Thus its recent BOC decision gave something to everyone but everything to no one.

The decision granting the former BOCs' petitions for waiver (Section 64.702 of the FCC rules governing Asynchronous/X.25 Protocol Conversion on your docket) will theoretically allow microcomputer users to access large mainframe databases in a packet switched mode via protocol conversion devices located within local telephone company offices. Until now users, both corporate and private, either had to hook into a value added network like Tymnet or GTE Telenet or do it themselves with lots of duplication of devices. Neither alternative necessarily offered the best byte for the buck.

Along came nine BOCs—Pacific Bell, Southern Bell, South Central Bell, New York Telephone, New England Telephone, New Jersey Bell, Pacific Northwest Bell, Southwestern Bell, and the Ameritech Operating Companies—and said they could do it for less money. Not necessarily better, just cheaper.

How would they accomplish this wonderful feat? By putting the conversion facilities right there in their homey little offices. And there was the rub. Competitors deluged the FCC with objections, claiming severe anticompetitive effects on their economic well-being and citing the structural separation commandment of Computer II.

"The BOCs are obviously seeking a competitive advantage," charges Phillip Walker, GTE Telenet's general regulatory counsel. "They're in a better position than anybody else to survive regulation."

Adds a lawyer representing several parties to the commandment-breaking event, "clearly the FCC is worried about and nervous that what it's doing will have severe anticompetitive dislocations."

Maybe the FCC didn't lose any sleep over packet switch providers going out of business, but it tried to take care of them as much as the rampant deregulatory atmosphere allows.

The agency "conditionally" granted the waiver petition, although that meant little more than final editorial cuts and pastes prior to issuance of the final order last month. Some BOCs went a step further, offering asynchronous/X.25 protocol conversion through their operating companies' subsidiaries in conjunction with existing or proposed basic packet switching services. A few requested that the FCC allow the async/X.25 protocol conversion to be offered under tariff as a basic service. They said that would enable them to offer inexpensive local datacom service to customers without access to value-added networks (VANs).

Even the FCC couldn't buy that one. It conceded the BOCs had proved public interest would be served by allowing them to provide the enhanced service of async format-compatible packet switched data transport, using async/X.25 conversion in facilities colocated with their central office. This will allegedly result in lower prices to consumers and at some future time—how long was undefined—mean no additional construction of facilities would be necessary. That, in turn, means your phone bill won't go up.

But that wasn't the wipeout some competitors had feared. The FCC imposed three conditions on the BOCs. First, they must give the data networks the same local rates. The BOCs had wanted to charge other users private-line tariff rates, usually three to five times higher. Second, the FCC said async/X.25 conversion must be higher priced than X.25-to-X.25 service. Last, the agency ruled that any special enhancements the telco offers users of its conversion service may not be bundled with its standard conversion rates. The enhancements must be offered to all users and competitors on equal terms.

The FCC did toss one final bone to the BOCs. It said that they could charge a lower price reflecting savings from colocating the packet switching equipment with existing voice network equipment.

So now what? At least one BOC, Pacific Telesis, has been beta testing packet switching equipment since last summer. Using a Northern Telecom SL-10 switch, it plans to run protocol conversion services in eight central offices in Los Angeles and another eight in San Francisco. Southern Bell will also provide the service over its existing PulseLink service in southeast Florida. But other BOCs are playing it cool.

Still the competitors aren't about to fold up their tents and go home."This was an unexpected development," admits Jim Mullen, vice president of Tymnet's private network division. "We didn't expect protocol conversion to be allowed by the FCC. But we're willing to let anybody enter the competitive field provided they don't fund it from monopoly funds.

"We have a substantial technical advantage over them. They're limited by what they can buy on the open market. They can't do it themselves because of the software development cost and lead time. Being big and having a lot of money to throw at the problem doesn't mean you're going to develop software faster. They've got a real uphill climb."

"This is not a trivial business. It's not a game for gifted amateurs."

Pacific Telesis' former parent has already tried to scale the network wall with little success. Remember ACS? Don't feel bad if you don't. It was barely around long enough to be noticed. Its successor, NET1000, hasn't exactly been a supernova either. One major company using Tymnet had tried NET1000 out of courtesy to AT&T. They decided to dance with what brung them.

"Not much is going to change for us as a user," says the MIS vice president at a major New York financial institution. "It's going to provide another opportunity for us. It's probably going to keep Tymnet and Telenet on their toes. They're already international networks, which is a distinct advantage for them. I

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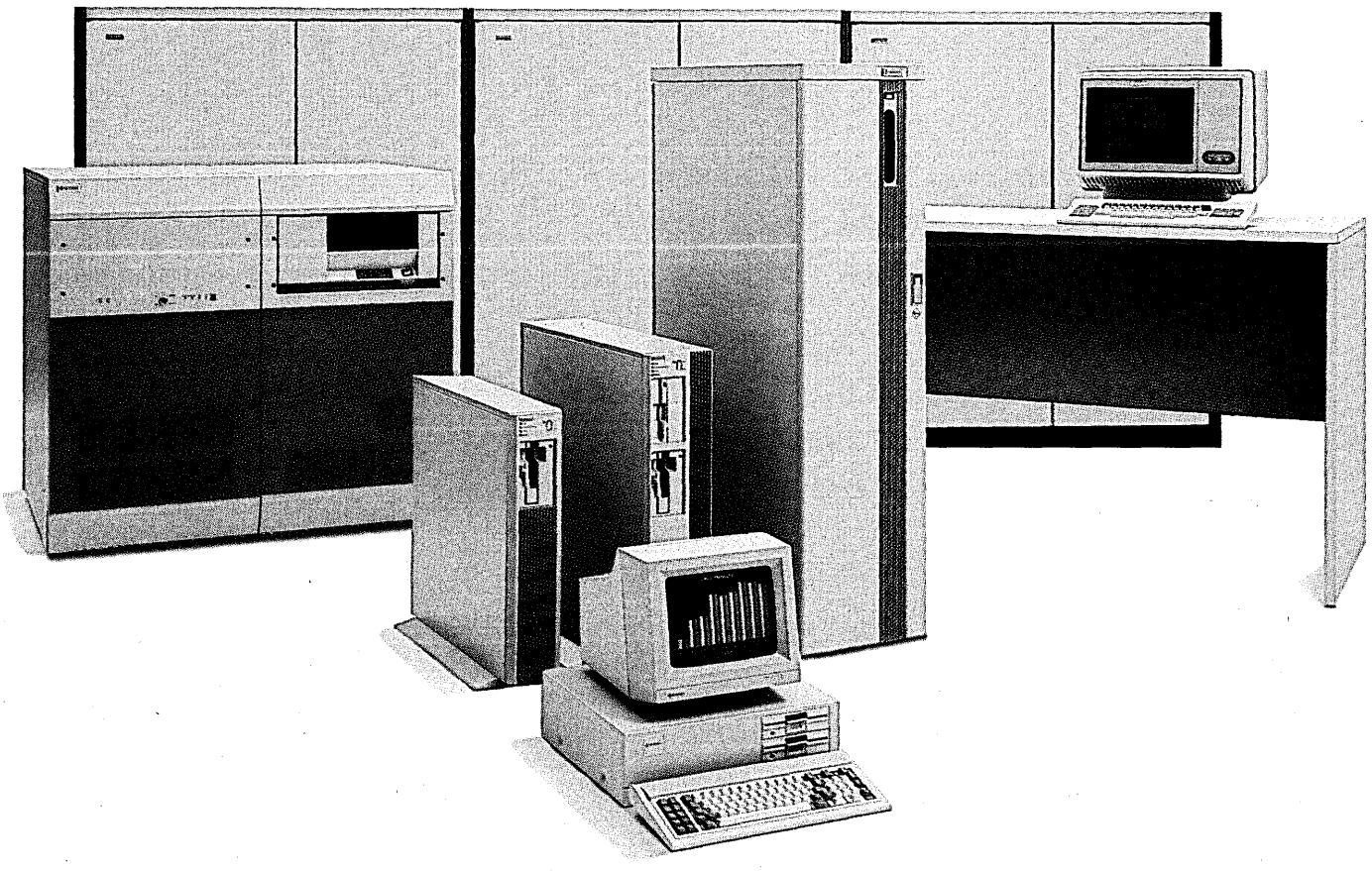

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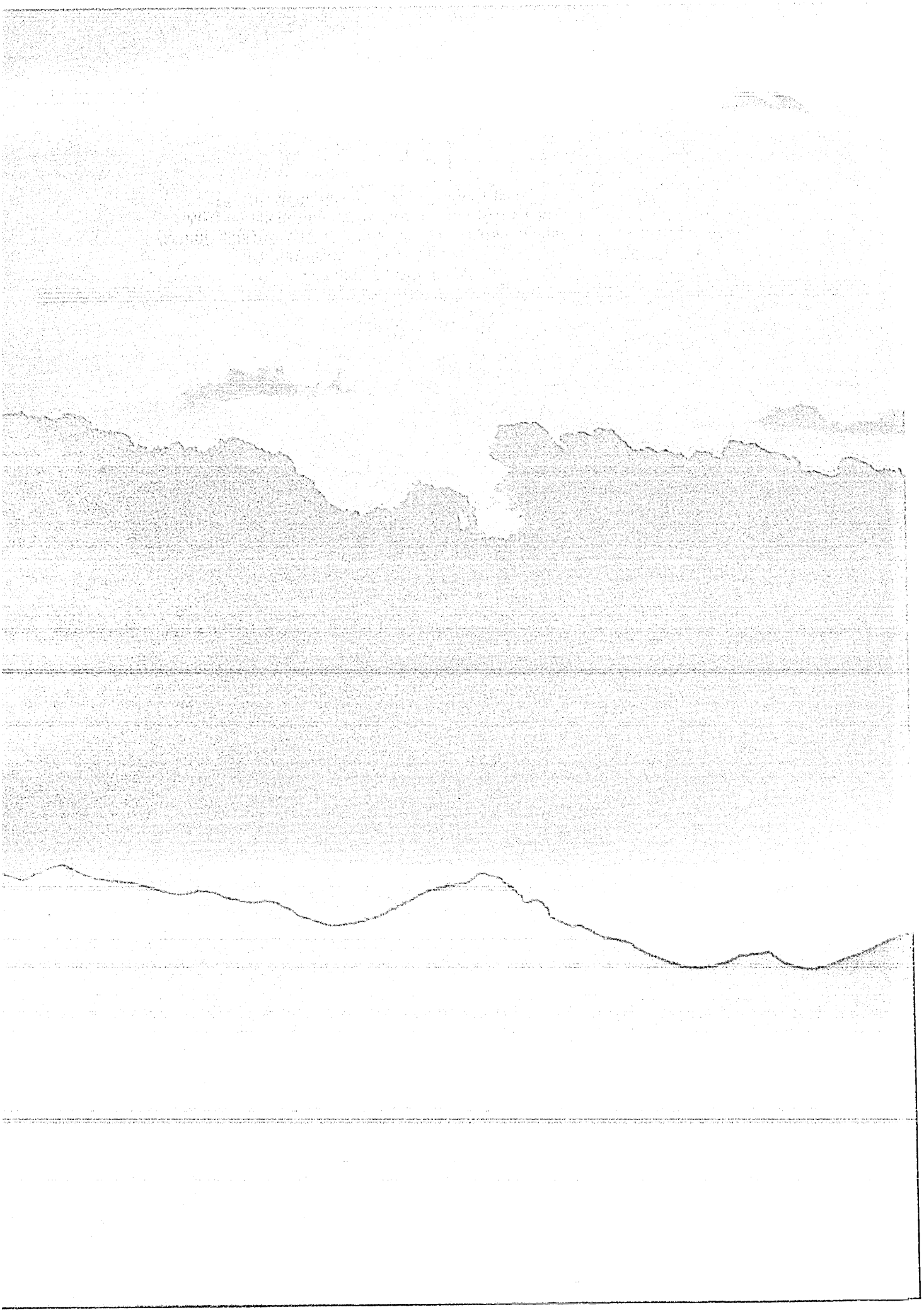

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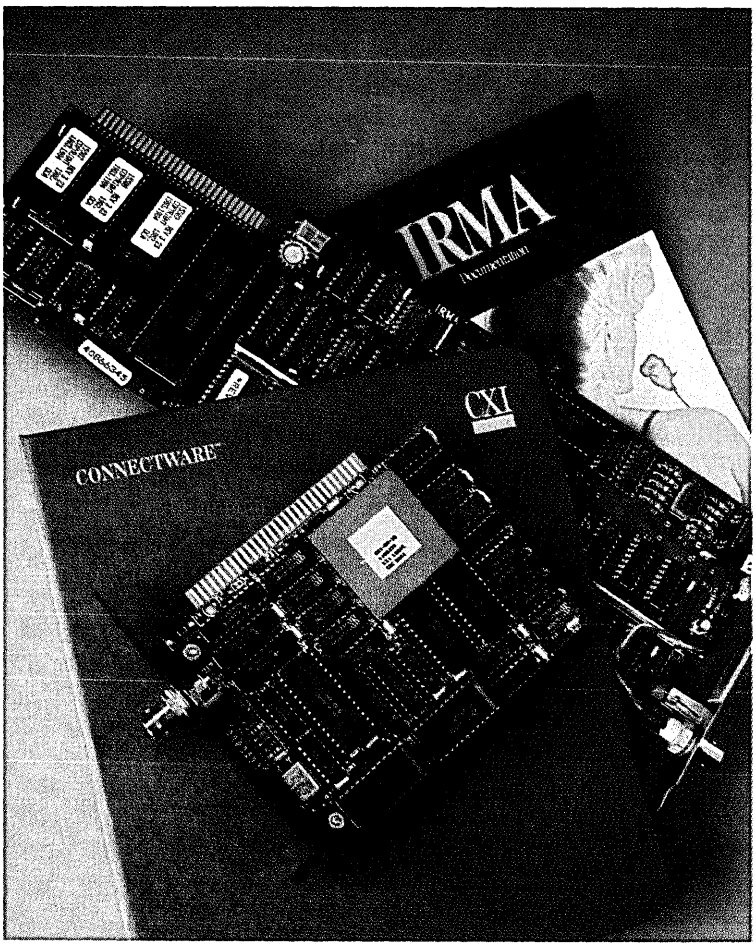

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think it's going to be more of a quandary for vendors than users. Users have to benefit because there's more alternatives. In chaos there's opportunity."

There may also be some twisted pairs. Take Telesis, for instance. It insists customer reception "has been very strong." But Lance Myers, Bank of America's systems designer and one of Telesis' largest potential customers, says he wouldn't run his California services off it. An X.25 carrier handling BofA's heavy traffic from San Francisco to L.A. "would just curl up and die," Myers says.

So to stay alive, Pacific Telesis may very well become partners with Tymnet, Telenet, or both. One source indicates the BOC is interested in its competitors' customer lists. What better indication that it may have to get by with a little help from its friends?

"If I were running a BOC and got the opportunity to do packet switching, I'd rather buy services than start it up on my own," says the MIS vp. "This is not a trivial business. There are not a lot of folks who understand how this works. It's not a game for gifted amateurs."

Asks the Washington telecom lawyer, "Is this a significant early erosion in the Computer II rules? Yes. It's an enhanced service and the BOCs got it without a separate subsidiary. Is it a direction? Absolutely. But no one's sure where it's going."

The FCC seems to be. The agency may not have buried Computer II, but it's looking mighty dead. ◉

NETWORKS

OSI-AS FAR OFF AS EVER?

It may be five more years before the full seven-layer model architecture for Open Systems Interconnection is finished.

by John Lamb

Eight years ago, when the International Standards Organization first began kicking around the idea of Open Systems Interconnection, it sounded fine. But as ISO committees grind their way through the seven-layer model they constructed in 1982, the original aim of free love between different makes of terminals and computers seems as far off as ever.

Product announcements are expected this year from those manufacturers who already support OSI. Intel, Charles River Data Systems, and others have announced chip and processor products in what is shaping up as a worldwide protocol standard for computer-to-computer communication. The U.K.'s ICL, for one, is preparing a bus local area network that conforms to standards up to layer four of the seven-layer model. The British Microcomputer Manufacturers Group recently proposed to develop an OSI local area network ready for market within 18 months.

There are also plans to repeat a more sophisticated version, involving 22 vendors, of the mixed systems experiments carried out at the behest of General Motors and Boeing at the NCC in Las Vegas last year. Due at the AutoFact show in Detroit in November, this presentation will feature two interconnected LANs, one demonstrating office automation and the other factory automation. Despite all the shows and hoopla, most users have yet to get much from the dance of the seven veils, as OSI is sometimes called.

"OSI is still a concept at the moment," says Ray Walker, general secretary of the U.K.'s Information Technology Users Standards Association. "Just how long it will be before that concept is turned into a reality I just don't know. I can't see it taking less than five years." Indeed, one U.S. government official recently warned that the OSI development will continue indefinitely, as the seventh layer is continually modified for particular industry segments.

So far, ISO and its associated national, trade, and government standards committees have reached layer five in the seven-layer model. But the standards setters have found the going tough. "There has been some ax grinding and some misguided decisions," says Dr. Tim Wells of the U.K.'s National Computing Center.

One of the biggest problems with OSI is that wherever the committee persons have failed to agree, they have produced options. For example, in the transport layer (layer four), which is concerned with end-to-end control of data, suppliers building OSI systems can choose either to automatically recover from a

"There's been some ax grinding and some misguided decisions."

systems break or to begin a conversation all over again.

"The great freedom in OSI which is its great strength is also its great weakness," admits one OSI adherent.

Systems builders have a choice. They can either try to cover all options, which is impossible until OSI protocols can be packed on silicon and tacked onto any system, or they can go for a limited number of options.

"To get a working service you need to pick options from each layer and to define the protocols and services you are offering," comments Wells

To ensure compatibility, suppliers will have to go through a second standardization process (see box, "Lining Up for OSI," p. 68). In Europe and Japan this is already happening. A dozen major European manufacturers who are committed to OSI and who form what is known as the Round Table Group are attempting to thrash out which options and subsets of OSI they will put in their products. These knights are considering a set of 31 so-called functional standards that set down how OSI will be used in practice. Features like packet switching, circuit switching, local area networking, gateways, and teletext can be provided using existing standards and OSI options, according to the material being prepared by the modern-day Lancelots. In packet switching, for example, present standards straddle both the applications and telecommunications

WHAT IS OSI?

The key document for OSI is the basic reference model, a theoretical construct of the operations of communicating systems. To help in devising protocols that operate independently of a system's architecture, the International Standards Organization divided its model into seven layers.

The lowest layer, known as the physical layer, is concerned with plugs and basic control procedures. The next level, the data link layer, covers the business of setting up and disconnecting conversations. It also covers error correction.

The third or network layer is designed for communications like packet switching, in which some systems act only as intermediate nodes. The protocols in this layer cover the routing functions needed to operate such networks.

On top of the network layer is the transport layer, which is concerned with control of data flowing from one system to another outside the scope of the network layer.

The fifth layer, the session layer, moves on to the dialog between systems that is essential for actual exchange of data. It deals with the synchronization and management of a data exchange.

Above the session layer lie two more layers concerned with interworking between application programs. The presentation layer covers the manner in which data is presented by one system to another, while the application layer serves as a window onto OSI for application programs. —J.L.

areas of OSI, and the group recommends which combination of existing packet switching standards should be used to achieve an OSI service.

European manufacturers have been more enthusiastic than most about OSI, and with good reason: they see it as a commercial lever against Big Blue, although they do not like to put it quite that way.

"The real battle," says Andrew Hallan, a consultant at ICL's Brussels office, "is between those who think standards are so important to society that they have to be decided on by everyone and those who believe the best way you can get a standard is to leave it to the dominant manufacturer. We are giving the lie to that with anticipatory standards, by trying to get ahead of the technology with support for technology not yet in our products."

But will they and their U.S. counterparts like AT&T be able to make OSI stick? The omens are not good. When X.25, the packet switching protocol that is also an OSI standard, was first introduced, European postal, telegraph, and telephone authorities (the so-called PTTs) implemented it in different ways. The upshot was that suppliers had to go through a separate testing procedure for each European market. Only last year did they agree on a final standard.

A dozen major European manufacturers are attempting to thrash out which options and subsets of OSI they will put in their products.

"In my view things always tend to diverge," says Wells, "unless standards are very tightly written. The standards-making process has not had the commercial pressures on it that it would have benefited from."

Vested interests also threaten to weaken OSI. One of the major divisions could be between computer companies and the PTTs. As PTTs begin to plan for integrated services, digital networks, too, are beginning to thrash out standards covering some of the areas of OSI. The big question is whether the PTTs follow ISO or go their own way. So far, thanks to some deft footwork, the two organizations are in line. But since the PTT's forum, CCITT, decides on standards only once every four years, there is plenty of scope for divergent standards before the next meeting, scheduled for 1988. One difficulty in keeping PTT plans for digital networks in line with OSI is the fact that OSI is not concerned with voice requirements as much as data.

OSI supporters argue that their standards are bound to change with practical

LINING UP FOR OSI

Much of the international ballyhoo surrounding OSI standards over recent years has come from European manufacturers, U.S. users, and, more recently, the Japanese government. But to assume that U.S. and Japanese suppliers, and especially IBM, are not interested in the OSI work is a gross misconception.

Many have been involved in international standards work for years and have watched closely the development of the manufacturing automation protocol networking standard championed by General Motors. Then, in December, 12 of America's finest gathered together in Paris at the behest of the European OSI support group to learn more about how pervasive the OSI standard had become. Attending were Xerox, Wang, Hewlett-Packard, Honeywell, Burroughs, Control Data, AT&T, NCR, Tandem, ITT, Digital Equipment Corp., and IBM.

The Paris gathering was merely a briefing session on OSI and no firm result was expected, but it created a level of interest that caught even the Europeans unaware. "I'm surprised that this movement in the U.S. has developed so quickly in so short a time," confesses Emmanuel Derobien, head of the International Standards Group at French computer firm Bull and the chairman of the European Standard Promotion and Application Group, the working group of the Round Table.

The Europeans naturally welcome greater U.S. involvement. "Our interests and those of the Americans are the same," says Derobien. "Any company contending for contracts knows it has to adhere to the agreed norms and that is what OSI is all about." CDC, one of the American companies attending the Paris briefing, has already requested another briefing in June this year to further the increasing dialog between the European OSI advocates and American vendors.

The Japanese are uniting behind the OSI protocol in part to give them the opportunity to attack a market with the size to guarantee the economies of scale they always seek. Late last year, the Japanese agency charged with reviewing telecommunications hardware and software announced its support of OSI for domestic use, and has been working with the major dp and consumer electronics vendors such as Fujitsu, Hitachi, Matsushita, and Sony to develop a common version of the OSI protocol for small computer networks, with an eye toward export as well as internal markets. For example, their product entries will offer a choice of either 2,400 baud or 4,800 baud. Sources say the Japanese officials intend to urge the CCITT to adopt the Japanese OSI package as a world standard at the June meeting of the Telematique Study Group Eight, in Kyoto, Japan. "We have made every effort to be compatible with current and proposed international standards," says Toshiyuki Take of the technical policy division of MPT, the agency responsible for telecom regulation. "Since there are various options within OSI, we have chosen ours with the objective of creating a simple, practical, and powerful standard for personal computer communications."

IBM, meanwhile, is covering all its options—as usual. Already a long way down the road with its own networking standard, Systems Network Architecture, IBM realized last year that the OSI bandwagon was running too fast to ignore, particularly in Europe. In one of its many statements of direction IBM recently stated, "Software is under development in Europe for System/370 support of selected functions in the OSI layers four and five," adding that "testing in conjunction with third parties would begin in 1985."

This work is now being carried out by IBM in France. In September 1984, IBM Europe announced that development of OSI interfaces was to be part of the mission of its European Telecommunications Research Center in La Gaude, France. The areas of study would include IBM terminal to non-IBM terminal links, program to program connection, and file transfers. There is also the likelihood that IBM will announce actual OSI interface products on the European market this year as a result of that development work in La Gaude.

On the surface, it looks as though the much-vaunted battle between IBM's SNA and the OSI lobby is over before it really began. But many in the European industry are still not convinced that IBM's commitment to OSI is all it seems. IBM may regard supporting the standard as a competitive necessity in multivendor sites. It may also continue to lock users into SNA through the release of strategic software products that make interfacing with OSI possible only at certain levels in the overall dp structure.

There's another factor. OSI ultimately looks forward to the time when there is truly global networking among international dp users. In this environment—which is not as far away as people imagine—satellite communications will become the prime mechanism of communication. IBM already owns more satellite channels than anyone else in the world—through its share of Satellite Business Systems—and is well positioned to dictate the networking standards that make such links possible and effective. So for anyone who thinks the SNA-OSI battle is already won, hold onto your seats; with SNA, even the sky may not be the limit.

—James Etheridge, Tom Murtha, and Paul Tate

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use and as the technology itself changes. "There isn't an end point for OSI," says Hallan. "The point is, do you have public change control or do you leave it to marketing muscle?"

So far, there's been a mixed level of interest from users in preparing OSI standards. General Motors took the OSI basics and built its Manufacturing Automation Protocol around them, and many other major multinationals in the U.S., such as chemical giant DuPont, have lined up behind it.

The U.S. government also is behind it. "This is what will be the international standard," notes a Defense Department official responsible for monitoring OSI developments. "Government has no choice but to go in that direction."

So far, there's been a mixed level of interest from users in preparing OSI standards.

There is some evidence, though, that certain factions within DOD are looking for a unique protocol to satisfy the military's particular needs until the seven layers are finished. Despite the agreement made last year between DOD and the NBS to work together for a convergence of protocols, the Defense Communications Agency recently awarded development contracts to Honeywell, Control Data, Gould, IBM, and several others. The companies will be developing systems matching a new four-layer DOD protocol—network access, internet, host to host, and process/application—built on X.25 or some other existing platform. Commercial users, though, seem to be adopting a more passive wait and see attitude.

OSI supporters are keen to get government backing for their efforts. In addition to the U.S. Defense Department and other government agencies actively involved in the OSI process, the Japanese Ministry of Trade and Industry recently announced its support. The proof will be in future procurements—insistence on OSI standards would give them a big boost.

"We hope that European and U.S. procurement versions of OSI will match up," says Hallan.

In the meantime, the open systems dream still hovers tantalizingly out of reach. "In the end, success or failure will depend on the will of the industry to develop standards and bring them into use," says Bryan Wood, chairman of the British Standards Institution's OSI committee, "and on the support provided by national governments for their efforts." ◉

EDUCATION

DBMS FOR KIDS

Spreadsheets, database management systems, and other adult microcomputer software packages are here for the tricycle set.

by Edith Holmes

Programs for kids and their teachers are growing up. Driven by educators' demands for quality software and the success of some initial programs, companies creating products for this market are beginning to move beyond the drill-and-practice software commonly found in elementary schools and the programming languages that dominate high school classes. Firms are writing basic tools—including databases and spreadsheets—for children, and several of these products are scheduled to be available this spring.

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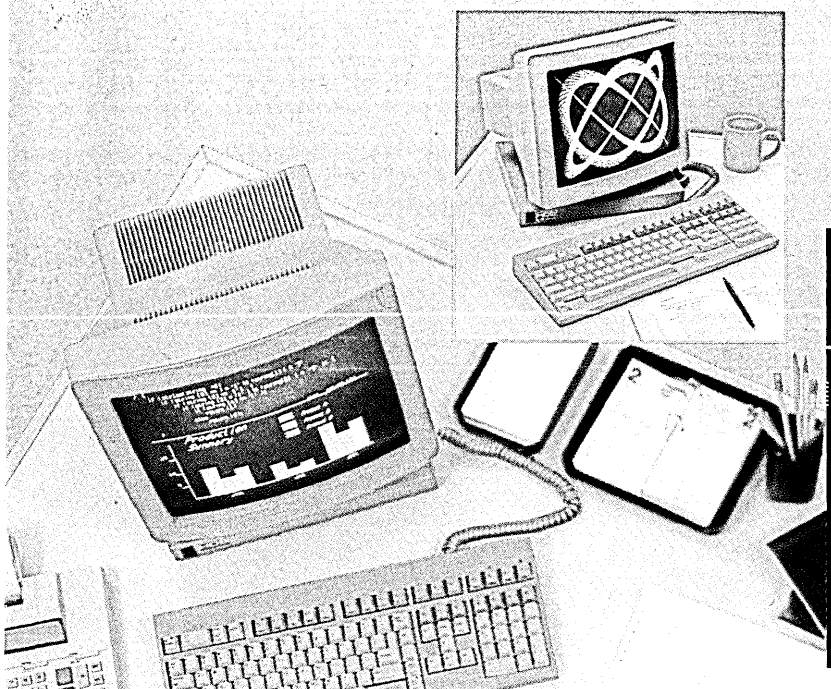

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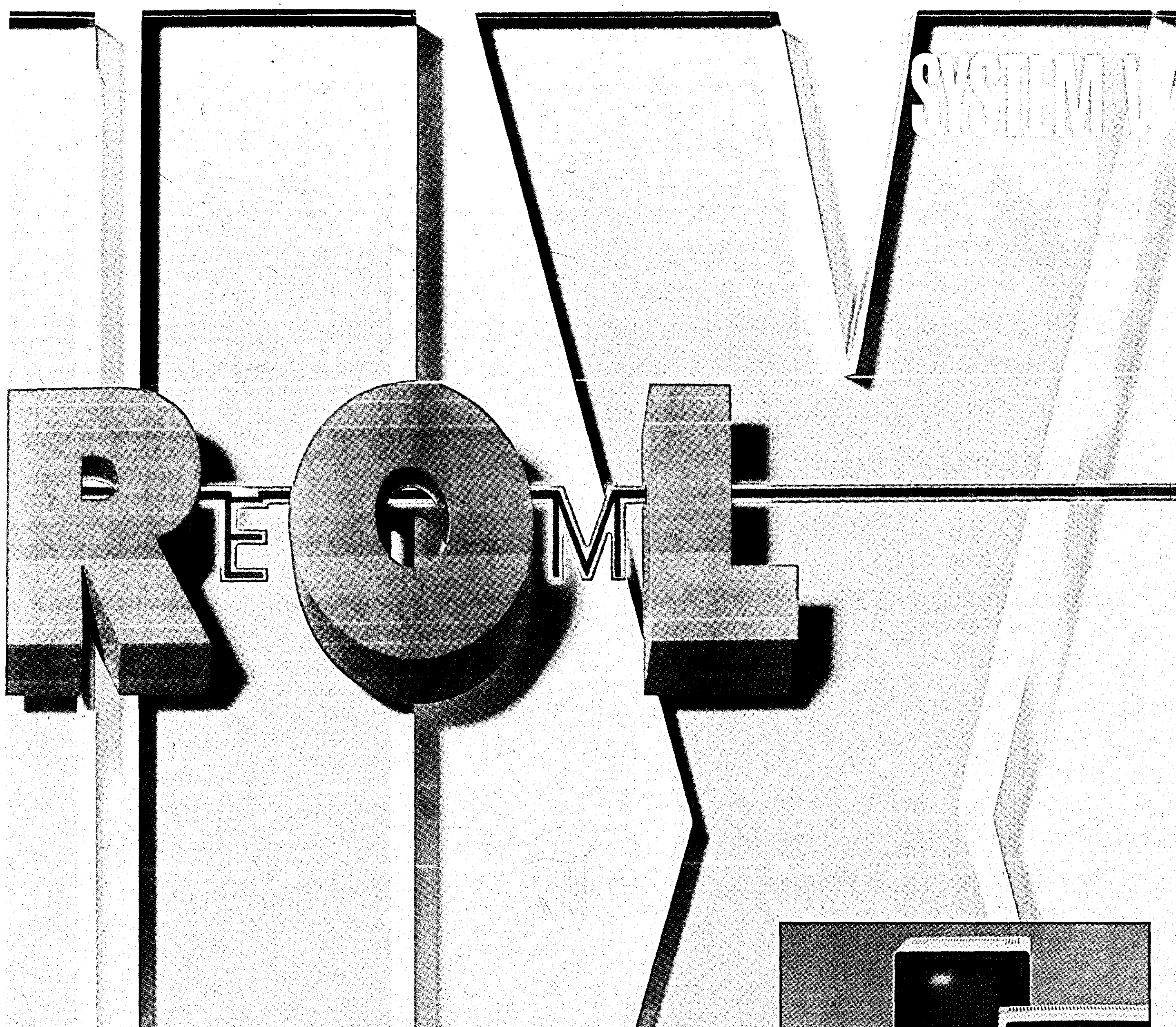

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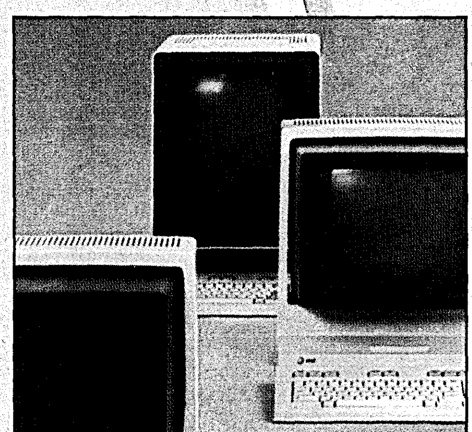

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The success of one package in particular is spurring on the industry. Bank Street Writer, a word processing program codeveloped by Intentional Educations Inc. of Watertown, Mass., and Bank Street College and marketed by Broderbund Software and Scholastic Inc., has taken U.S. schools by storm. All told, some 300,000 copies have been sold to approximately 70% of the 67,000 elementary and high schools with at least one computer (see "The Old School Sell," March 1984, p. 158).

The success of one package in particular, Bank Street Writer, is spurring on the industry.

"The schools seem to have settled on Bank Street Writer for word processing," says Anne Wujcik, director of educational research for the market research firm Talmis, based in New York. She adds that "until another company comes up with a dynamite new product, this program has the market sewn up." She estimates the total potential market value of such educational software in 1984 to be $97 million, a 100% increase over the prior year.

Recognizing Bank Street Writer's dominance, other firms are hard at work developing different types of tools for the classroom. Scholastic of New York is repackaging the pfs series of business software packages from Software Publishing Corp. of Mountain View, Calif., and will sell an education-oriented version of these programs to the schools with ready-made databases on diskette. Tarrytown, N.Y.-based Scarborough Systems Inc. has added a database package to its popular Master Types series, which includes word processing and programs on figures and formulas. And Grolier Electronic Publishing Inc., a division of Grolier Corp. of New York, is introducing a simple spreadsheet program, as well as a database tool and data diskettes. Talmis's Wujcik contends that Grolier's spreadsheet, which will be available in April, is the first of its kind especially created for the education market.

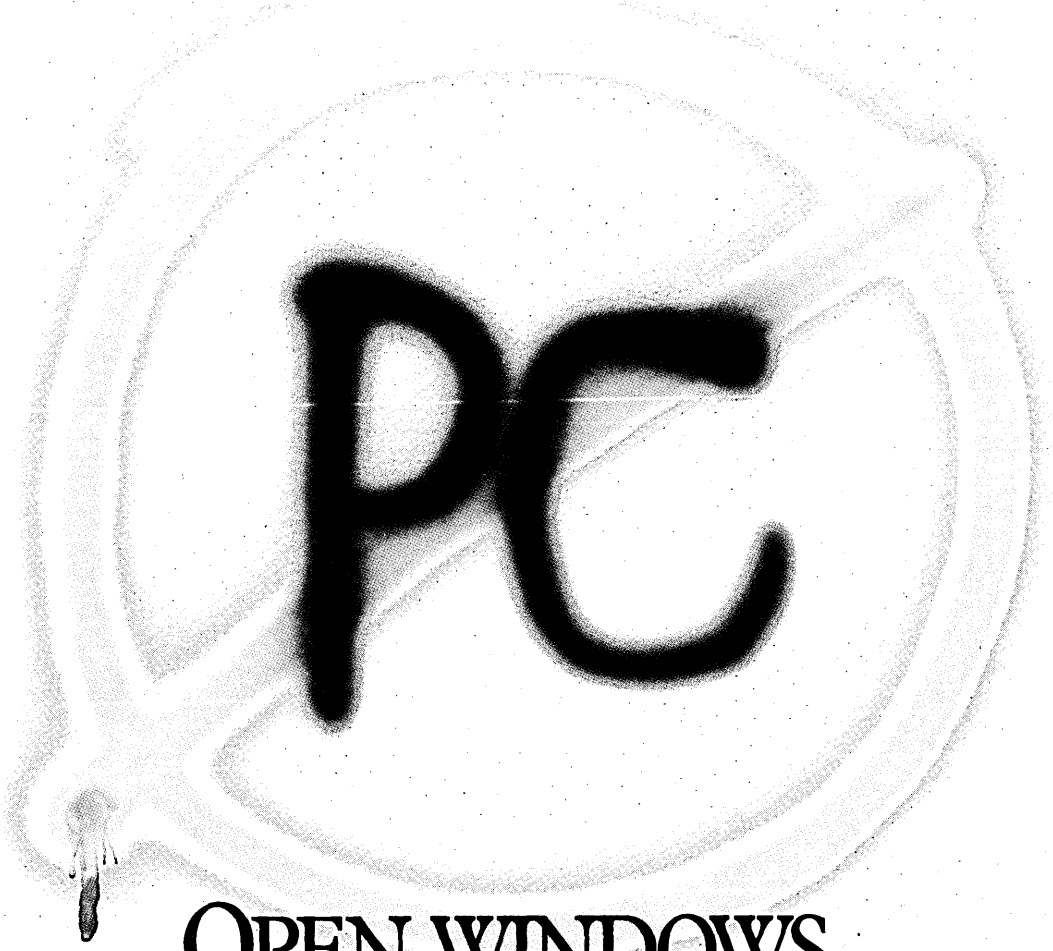
Scholastic reached its agreement with Software Publishing last fall. "Software Publishing officials came to us because they felt there was a strong market for their products in the educational field," says Scholastic spokesperson Avery Hunt. "We agreed."

What is being called the Scholastic-pfs series will begin with word processing, database, and report programs.

A database program includes data disks in four subject areas—history, life science, physical science, and U.S. government—in effect creating a computerized encyclopedia.

Aimed at students in grade six and up, these packages consist of the pfs disk with documentation and manuals written by Scholastic specifically for educators and their students. The database program, which is called "Scholastic-pfs: file," will be accompanied initially by data disks in four subject areas—history, life science, physical science, and U.S. government—in effect creating a computerized encyclopedia. Scholastic expects to develop additional database files as well as a spreadsheet product.

All of this software will run on Apple Computer's Apple II machines, found in more U.S schools than any other micros today. Scholastic is debating whether to make its pfs series available for Commodore and IBM personal computers. "Scholastic-pfs: write," "file," and "report" cost $115 when sold separately; "Scholastic-pfs: file" and "report" together are available for $185; and all three



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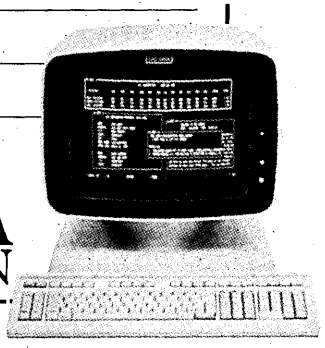

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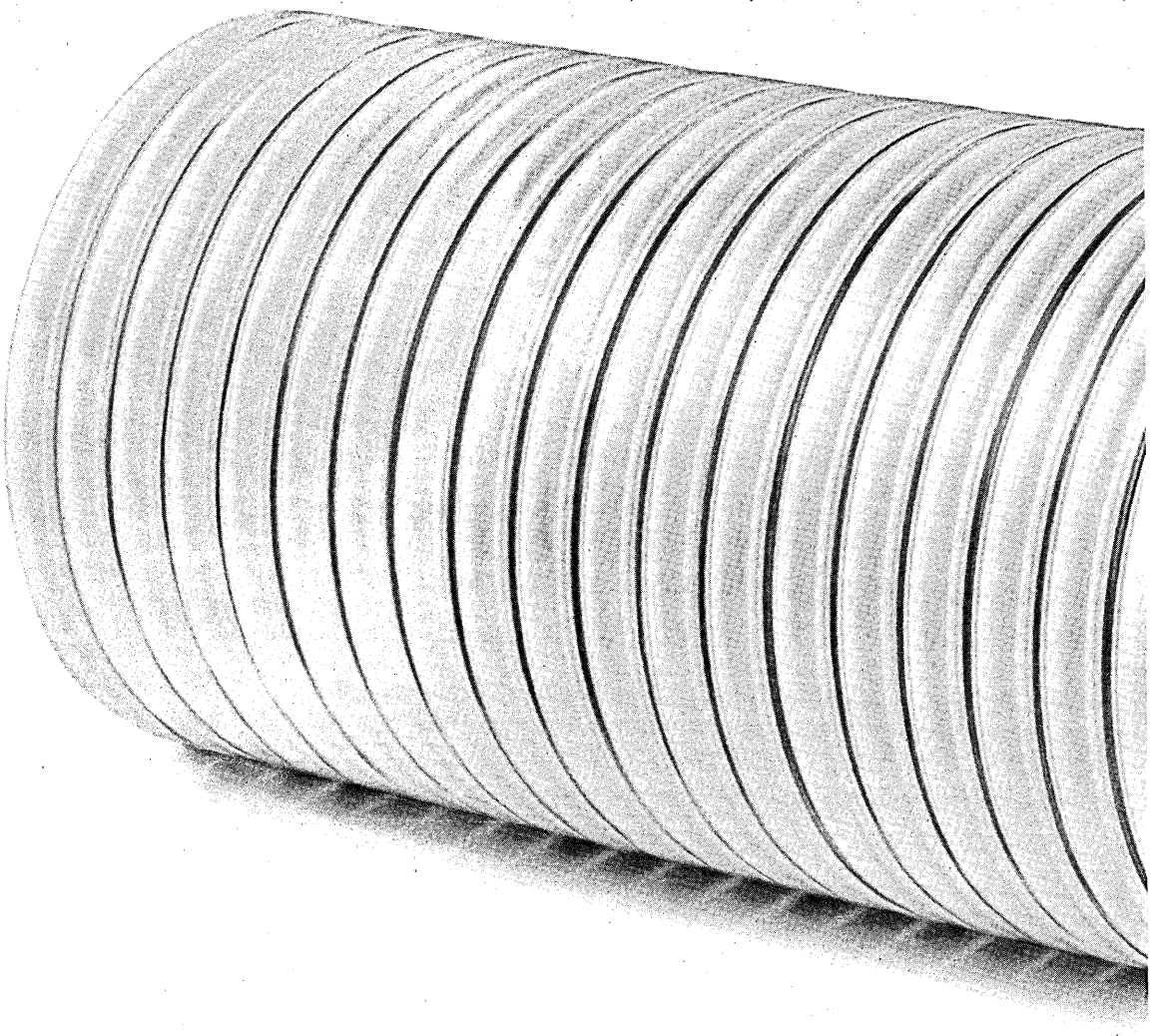
For fast relief



Most computer tapes are a pain.

Because they're abrasive.

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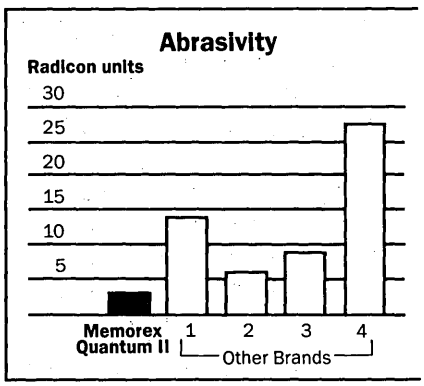
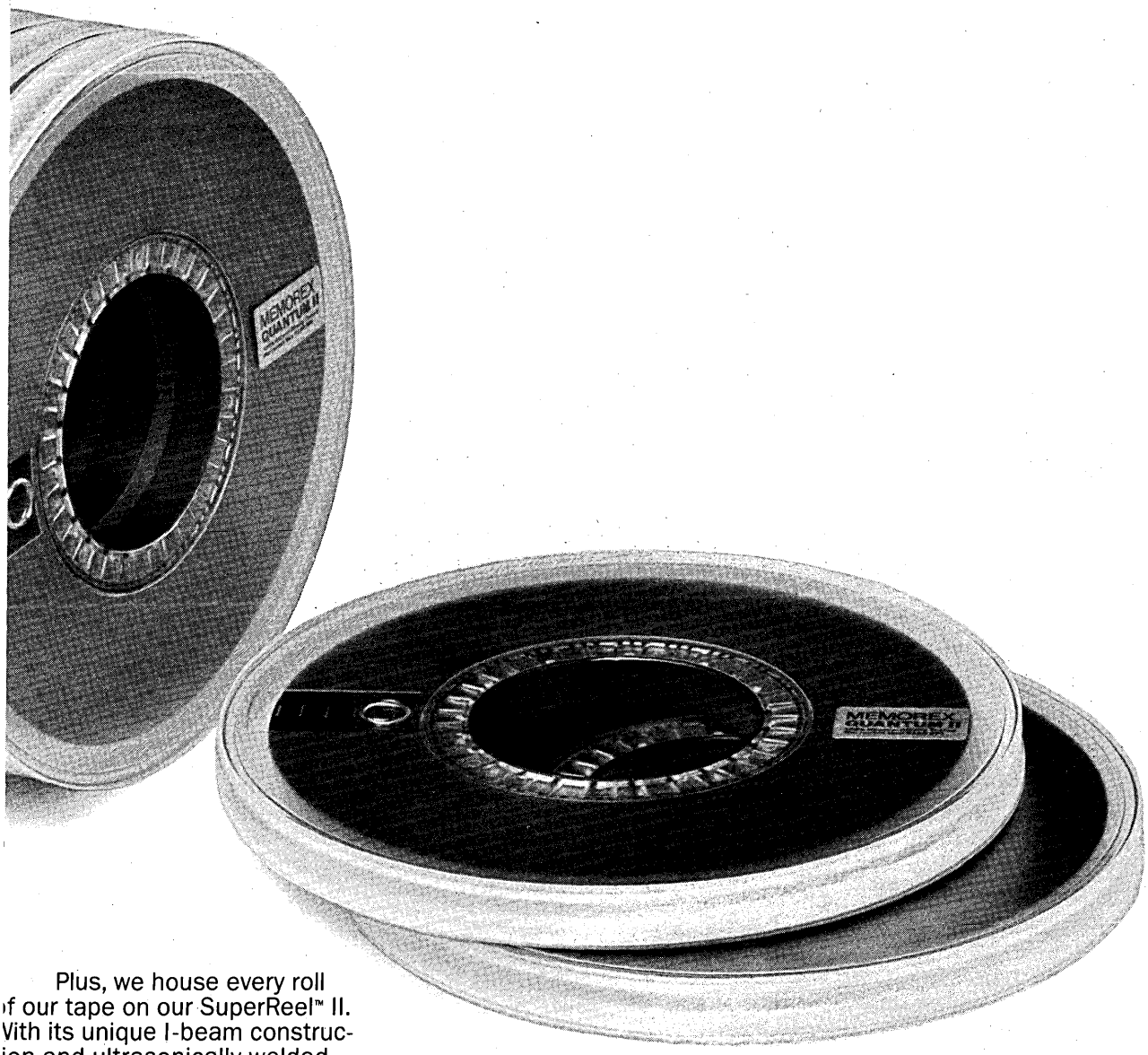


Radicon Test measurements above are obtained by running different computer tapes over an irradiated tape drive head. The higher the count of irradiated particles rubbed onto the tape, the more abrasive the tape.

# of head aches.



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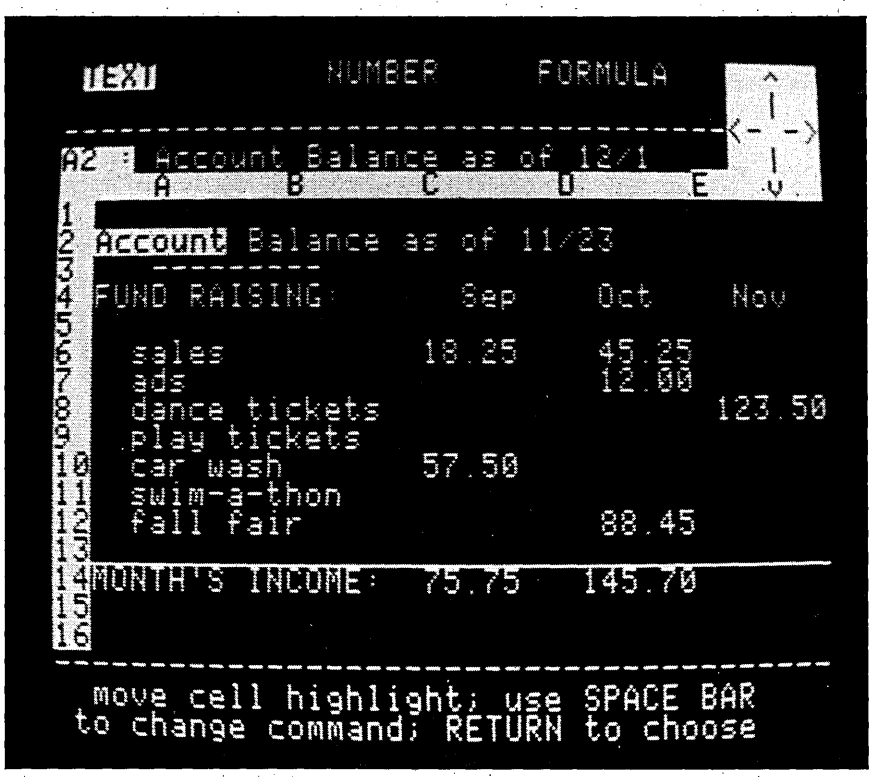

A TEENAGE SPREADSHEET: Grolier's EduCalc package for children and adults offers the basics of accounting and budgeting.

are bundled for $285. The data disks or files cost $125 each.

Scarborough Systems meanwhile has also picked up a database program intended for young people and incorporated it into a series of programs. The firm recently revamped its Master Types series to include Phi Beta Filer. The $39.95 package has a built-in quiz mode that lets teachers and parents test students. Developed by Lizzy Corp., Cambridge, Mass., and marketed by Scarborough, the program, now called Master Types Filer, runs on the Apple II series, the Commodore 64, and IBM's PC, PC XT, and PCjr.

"We're convinced that teachers are sick of drill and practice programs and games."

Not to be outdone, Grolier Electronic Publishing is also putting together a set of tools for children. Two of its products are already on the market: Friendly Filer, a database management program with room for 360 records, and Easy Graph, a beginning graphing tool that generates bar, pie, and pictographs. Both packages are written for children in the third grade and up; each is priced at $39.95, plus $10 for a backup diskette. Three data diskettes, called Friendly Files by Grolier, have been created for use with the database program.

Acknowledging Bank Street Writer's success, Grolier didn't develop its own word processing package. Instead, it contracted Intentional Educations, one of the developers of Bank Street Writer, to write its tools. "As a result," says a Grolier spokesperson, "our products are very similar to Bank Street Writer."

Grolier's next tool will be its spreadsheet, called EduCalc. Priced at $49.95, plus $10 for a backup diskette, the spreadsheet is designed for children 12 and older, as well as for adults who are computer novices. Built-in tutorials explain basic spreadsheet concepts and vocabulary. Next year, Grolier will publish templates for EduCalc that will give the package administrative applications; curricular applications in such fields as math, history, and science; and extracurricular applications, including sports and yearbook planning.

A software tool dubbed Notetaker, designed to help students write research papers, will follow EduCalc in Grolier's new product lineup. The publisher claims to be committed to putting as many new tools as possible at the disposal of educators. "We're convinced that teachers are sick of drill and practice programs and games," says Grolier's spokesperson. "They want to start integrating computers into their classrooms."

As usual, optimism reigns supreme for the vendors. Exclaims Carol Bunevich, marketing director for Scholastic Software, "we expect to make many millions of dollars on this product line."◉

A. Jones. *Patrick Henry Delivering His Speech at the House of Burgesses.* Courtesy The Bettmann Archive.

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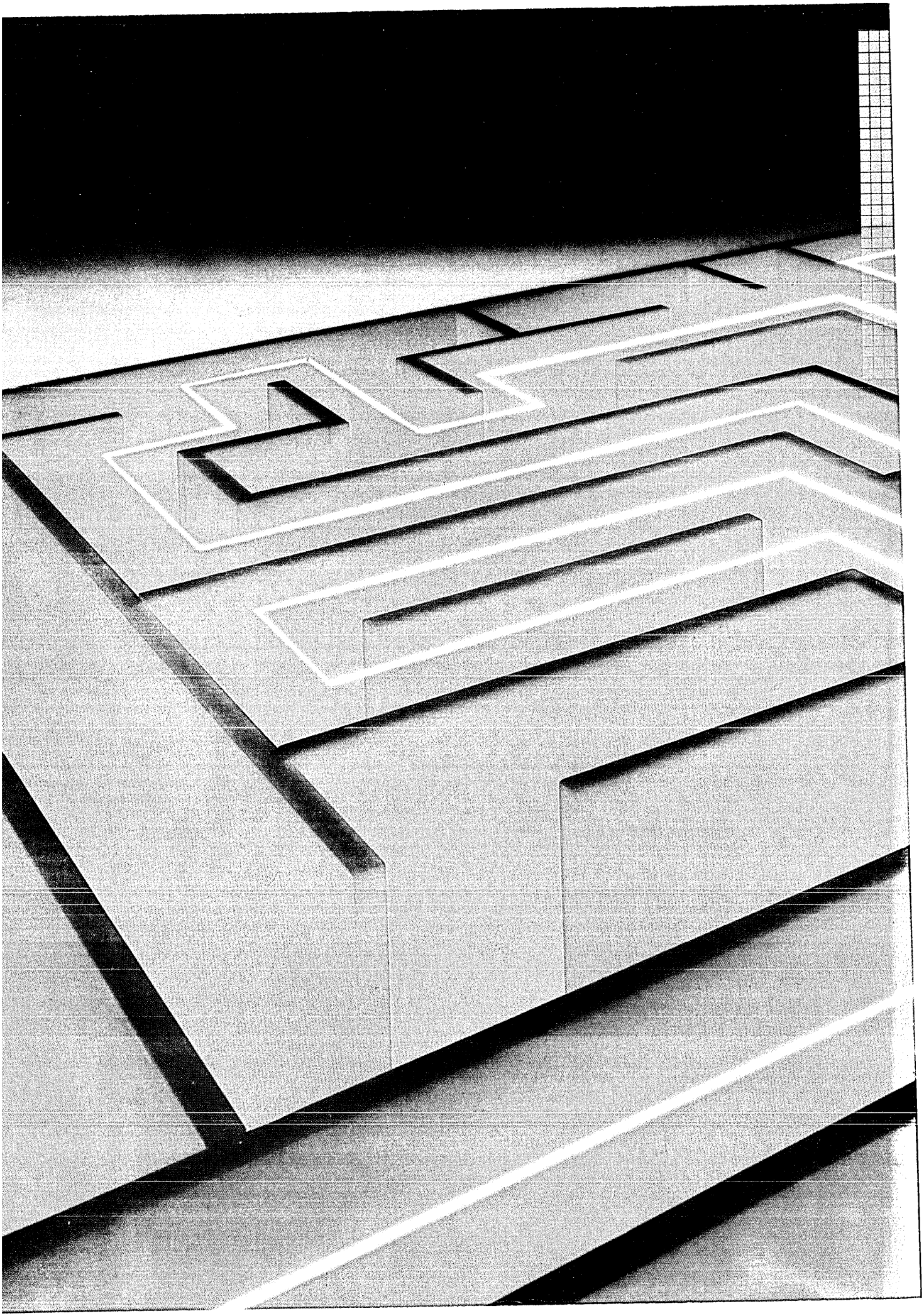

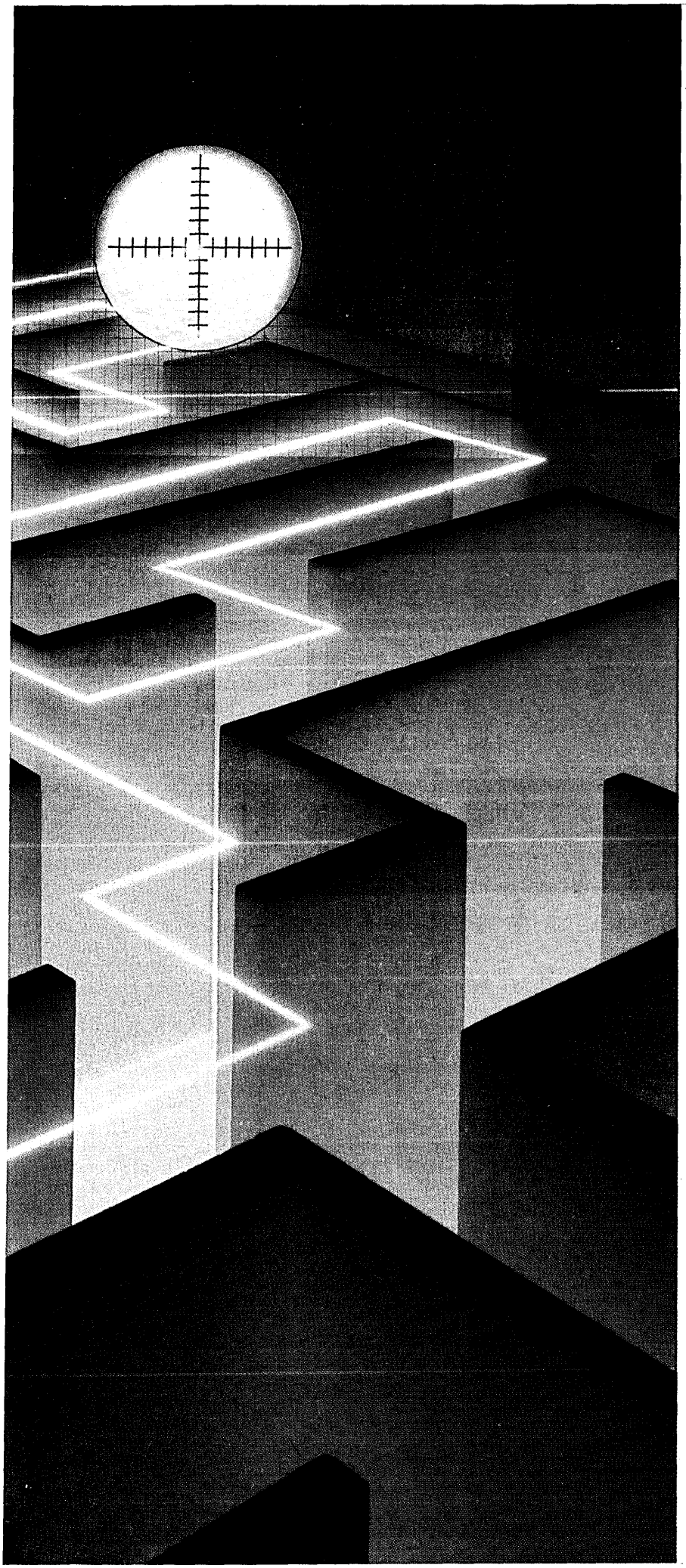

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CIRCLE 43 ON READER CARD

NEWS IN PERSPECTIVE

BENCHMARKS

IBM WANTS MORE: Fees for IBM equipment rental and licensing go up 7% as of June 1 for its midrange processors, peripherals, and software. Not affected by the increase are the large-scale 308X processors and its line of pcs. Maintenance agreement fees also will climb, to 10% from 5%, the company announced.

ITT SHOPPING: ITT Corp., New York, announced the end of acquisition negotiations with Sperry Corp., reportedly after a disagreement over whether the computer pioneer was worth $3 billion plus. For the past two years ITT has been trying to restructure its massive conglomeration of disparate businesses by, for example, selling its Twinkies baked goods company and its forest products division, and by strengthening its data processing operations. The announcement fanned expectations that Sperry is on the auctioneer's block only months after its own restructuring (see "The New Sperry: Unixvac?" Jan. 15, p. 44). With Sperry merely a marketing, distribution, and service organization for the micro and minicomputer products of other vendors, analysts speculated that ITT was interested in the company's installed base and its lucrative military contracts.

EXXON SELLING: Oil industry monolith Exxon Corp. waved the white flag after four years of losses in the computer business. Exxon Office Systems' domestic sales, service, and support business was sold to Harris Corp.'s Lanier business products group, Atlanta, for an undisclosed amount of cash. Earlier Exxon's overseas office products business was sold to Olivetti. Harris officials say they hope this acquisition, combined with the Lanier operations and its own higher-end dp lines, will give it the critical mass of customers necessary to compete with the other full-line office automation suppliers. A massive review of Harris's dp businesses is now under way, with the goal of trying to find a sensible combination that will lead to the long-hoped-for synergies between the three organizations. Separately, Harris's Information Terminals Group, Dallas, announced an extensive line of 3270 plug-compatible terminals, including controllers capable of networking 32 devices.

FEW BIG MAC ATTACKS?: Apple Computer Inc. announced a one-week shutdown of four factories to reduce inventories. Production of its line of Apple II and Macintosh personal computers was halted, the company said, because distribution channels were clogged: dealers had ordered excess stock prior to Christmas and had not yet cleared their shelves. Reportedly the company recently began a special dealer-incentive program to boost sales with a rebate program, similar to that used in the automobile industry. The disappointing sales come amid reports of a general slowdown in microcomputer and minicomputer demand by business and consumers over the past few months, which some say will continue through the first half of 1985.

SYSTEM/1 ON A DESK: Further tying its personal computer line to the rest of its office automation products, IBM announced a chip-level implementation of its Series/1 small business processor on a PC AT or modified XT. The new 16-bit logic chip, together with assorted additional memory and housekeeping circuits on a second card and new software, converts an XT or AT into the network node controlling up to four terminals and two output devices. The boards cannot be purchased separately, but are part of new PC versions of the popular system, and are called the Series/1 model 5170 or 4950 models. Channel attachment cards were also introduced to interconnct PCs with the Series/1 and then to other IBM machines at a comparatively low 400Kbps transmission rate. At the same time IBM further muddled its attitude toward the Unix operating system by introducing its Unix System V-based package, Interactive Executive, on the Series/1 only months after announcing another type of Unix, the Xenix system from Microsoft, would soon be available for the PC AT.

LAN VENDOR MERGER: Micom Systems Inc., Simi Valley, Calif., acquired Interlan Inc. of Boxborough, Mass., and almost immediately introduced a LAN offering integrating data PABX and cable-based technology. "We'll be the largest local area network supplier outside of IBM," says Chris Kenber, president of the merged company's sales division. Instanet/Plus combines Micom's Instanet LAN—a twisted pair, low-speed system based on its Micom 600 data PBX—with Interlan's Net Plus, a high-speed Ethernet-type cable system. "The marriage of Instanet and Net/Plus will allow Micom to tailor LANs to meet the needs of each customer, rather than trying to promote a single technology as the panacea and in some way the best LAN for every application," noted Roger Evans, Micom's executive vice president. Indeed, Interlan supports both the Xerox Network Systems' Internet Transport Protocol and the Department of Defense's Internet Protocol/Transmission Control Protocol. It also offers a link to interconnect Ethernets in the form of its Network Communications Server, which provides transparent transmission of data between two or more Ethernets at speeds up to 224Kbps. These are big pluses for the combined company offerings. Ultimately, says Kenber, "our strategy is to be above all these debates [over protocols and media]. Our systems will accommodate any or all of them."

$40M FOR SUPERS: Two years and 22 applications later, the great supercomputer sweepstakes is history. The National Science Foundation's chosen quartet will receive $10 million each to cover the startup costs of establishing supercomputer centers. Consortia representing Cornell, Princeton, the University of Illinois, and the University of California at San Diego survived NSF's rigorous screening process and are expected to begin operating the facilities late this year or in early 1986. The $40 million is only the opening salvo in NSF's effort to slow down what it perceives to be a closing of the supercomputer gap between the U.S. and the rest of the world. By 1990, when completion of the centers is expected, NSF plans to spend $200 million. NSF director Erich Bloch, a former IBMer, notes that the U.S. leadership role "is being challenged by our trading partners abroad and it has become clear that strengthening our research base to meet that challenge will depend in large part on access to modern instrumentation and equipment, such as supercomputers, by our scientists and engineers." Both the San Diego and Illinois facilities will be centered around Cray XMP machines. Cornell, AKA the Center for Theory and Simulation in Science and Engineering, will be offering an IBM 3084 QX attached to array processors from Floating Point Systems, Beaverton, Ore. This is the first time this configuration will be implemented. The John von Neumann Center near Princeton will be based around a Control Data Cyber 205, which will be upgraded to an ETA Systems ETA-10 when it becomes available in 1987.

SEEKS FUNDS: Encore Computer Corp., Wellesley, Mass., registered for its first public offering of stock in a bid to produce a multiple microprocessor-based supercomputer. The company is trying to raise about $30 million in new funds on top of the $30 million or so already invested by Sperry and other vendors. As expected, Encore officially said it is preparing a reduced instruction set computer architecture to run on National Semiconductor's advanced 32-bit micro, the 32032 (see "Risc-y Business?" Feb. 15, p. 30). In the stock prospectus, Encore claimed its products would have a capacity of between 1.5 and 10MIPs and a price range of $120,000 to over $1 million. ◉

WORLD WATCH

APELDOORN, HOLLAND-Dutch electronics giant Philips is scouring the States for a minicomputer and systems vendor that can replace the phased-out Four-Phase. Prime targets on its takeover list are Prime, Data General, Computer Automation, and Tandem. Philips needs U.S. mini might to strengthen its marketing muscle across the Atlantic and to fill in the hardware gap in its grandiose Sophomation data processing and datacom scheme.

TOKYO-Rumor has it that IBM Japan president Takeo Shiina is in danger of getting the boot from Armonk. Shiina is apparently taking the heat for losing sales to its feisty competitors, Fujitsu and NEC. An influx of Yankees has also created confusion at Big Blue in Japan.

CAMBRIDGE, ENGLAND-Following in the footsteps of America's Gene Amdahl, British maverick entrepreneur Sir Clive Sinclair is setting up a wafer-scale integration company with ICL chairman Robb Wilmot acting as chief executive. Unlike the troubled Trilogy, Sinclair's stab at wafer-scale integration is based on partially tested designs that he hopes to fine-tune and take into production by the end of next year. But his stingy startup financing of $55 million may cause his wafers to disappear into thin air.

MUNICH-Siemens is set to announce support of it's own BS 2000 operating system on the large IBM-compatible Fujitsu mainframes it peddles in Europe. Denying that it's biting the Big Blue bullet, Siemens says the move is designed merely to give its mainframe users an upgrade path to a new high-end system that it will unveil later this year.

TOKYO-Look for electronic mail ventures to take off in the wake of Japan's new telecom deregulation drive that got under way this month. Japanese firms are eager to lock up commercial E-Mail services for microcomputer users. But local talent is not enough, so Japanese companies are courting The Source and CompuServe for their services. Expect a major linkup later this spring but don't be surprised if it's heavy on the Japanese side.

BRASILIA-If you want to do business in Brazil, you must play the technology transfer game with the locals. That's exactly what Control Data and Hewlett-Packard have done to capture CAD/CAM contracts recently awarded by the government. In the related realm of robotics, 23 Brazilian firms have asked for manufacturing licenses, 11 of which will be using high-tech help from outside.

OSLO-It's a case of Scandinavian synchronicity, as Norway's Norsk Data teams up for the first time ever with Sweden's Ericsson to bid on a lucrative local post office automation contract. Pitted against eight other companies, the dynamic duo will be pushing a network of Norsk Data minis along with Ericsson terminals.

MOSCOW-A Soviet official recently disclosed that there are now over 10 million people in the U.S.S.R. waiting for a telephone. Perhaps they haven't been toeing the party line.

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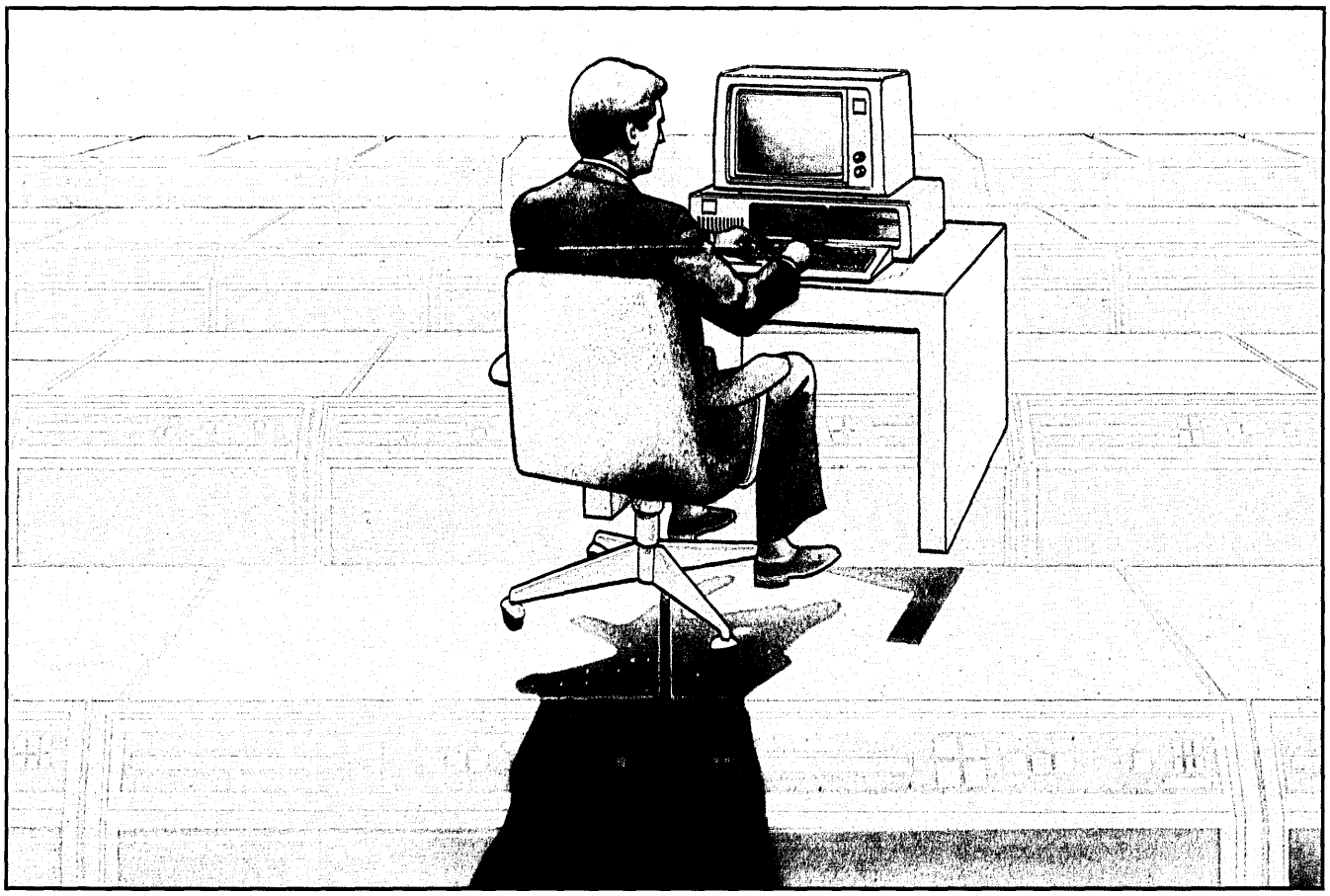

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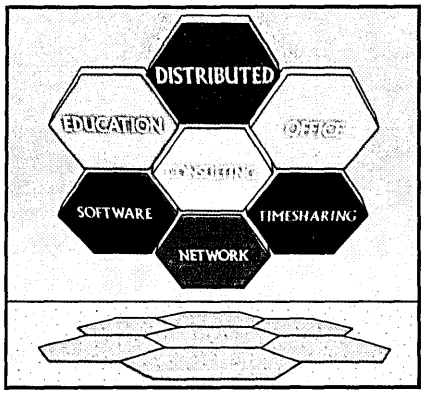

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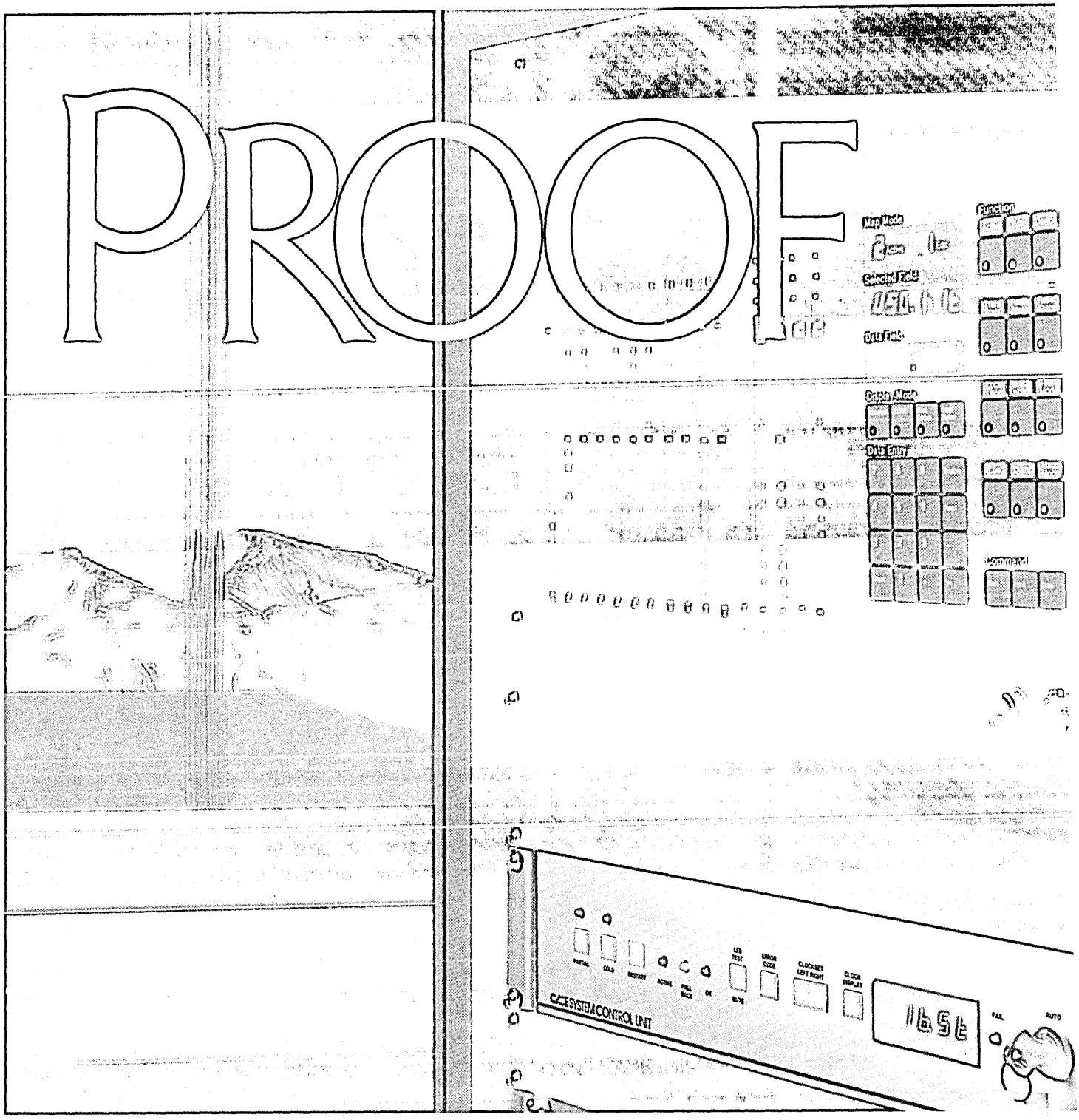

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No doubt about it: data processing is a nerve-wracking profession. The good news is that there's something you can do.

STRESS

by D.D. Warrick, Donald G. Gardner, J. Daniel Couger, and Robert A. Zawacki

In this era of complexity and rapid change, stress is a problem for many individuals and organizations. It seems especially troublesome for those in the field of data processing. Our research on stress and our experience with dp departments suggest that dp jobs contain a large number of potential stressors. While there is some evidence that certain people actually thrive on stress, the potential personal and organizational costs of unmanaged or mismanaged stress are significant.

Fig. 1 is a lengthy list of potential stressors present in dp jobs. Their consequences are many and varied. On a personal level, being overstressed can result in physical, psychological, and behavioral problems. In fact, stress has been identified as a major contributor to psychosomatic illnesses and in particular to high blood pressure, ulcers, heart disease, headaches, and even cancer. Organizationally, stress can produce declines in productivity, motivation, work quality, and morale, and increases in mistakes, accidents, absenteeism, interpersonal conflicts, and turnover. The bottom line is that stress management should be a legitimate concern of dp managers.

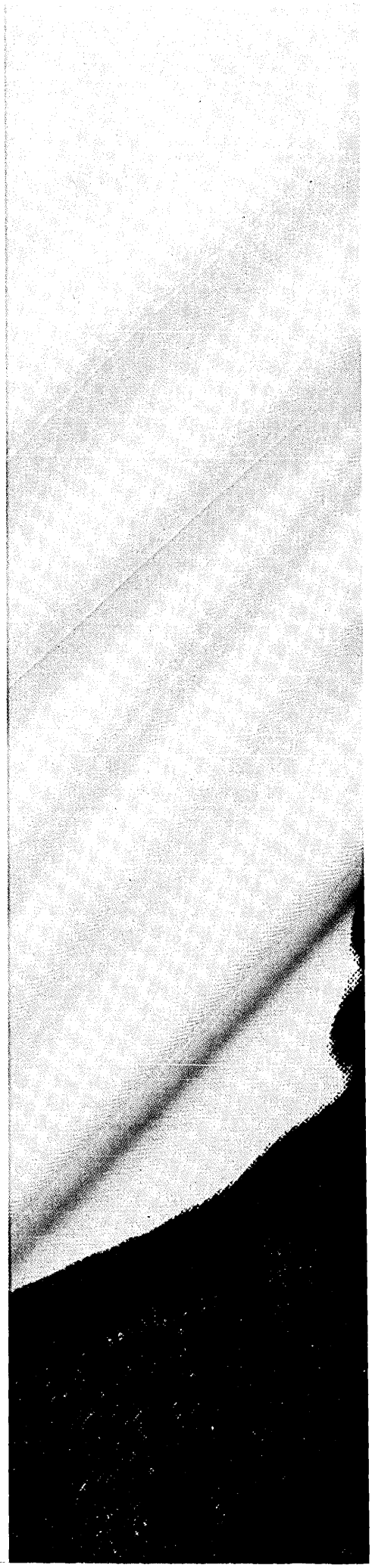
What is stress? It is your mental, emotional, physical, and behavioral response to anxiety-producing events. The perceptual process is crucial here; negative thinking increases stress because the negative thinker tends to interpret events in such a way as to produce anxiety. Positive thinking minimizes or eliminates stress because positive thinkers rarely perceive events as stressful. Your emotional response to stress depends primarily on your mental response (emotions are mainly stimulated by what we are thinking), your emotional habits, and your ability and willingness to deal with your feelings in constructive ways. Emotional self-control reduces stress while lack of self-control increases it.

The physical effects of stress are many. They include changes in the nervous system, blood flow, blood pressure, blood composition, breathing, body chemistry, glandular secretions, and muscle reactions. These changes can be harmful, but they may also be helpful, adaptive responses, depending on how the stress is managed.

The behavioral effects of stress are also varied. Mismanaged stress can decrease performance, motivation, and alertness, but managed stress can increase alertness, sensitivity, and effectiveness. Those who mismanage stress may become overly aggressive, passive, or moody; may try to avoid the stressor by eating, drinking, smoking, socializing, blowing off steam, or becoming rebellious and uncooperative; or may deny reality and cover up by suppressing problems or blaming them on others.

An overview of the stress process is shown in Fig. 2. The process begins with anxiety-producing events (stressors) in one's personal life or job. Stress in one's personal life might come, for example, from financial or family problems; stress at work might result from time pressures or lack of challenge. Fig. 3 identifies major personal and job stressors.

Susceptibility to stress varies considerably with one's personal characteristics. In *Type A Behavior and Your Heart* (Fawcett Crest, Greenwich, Conn., 1974) Drs. Meyer Friedman and Ray Rosenman showed that Type A personalities (aggressive, impatient, competitive, controlling, perfectionist, temperamental, self-serving, always in a rush) are far more stressed than Type B personalities (calm, relaxed, pa-



PHOTOGRAPH BY STEVE COOPER

tient, even-tempered, unselfish). In fact, a Type A person is three times more likely to have a heart attack than a Type B.

COPING RESPONSE IMPORTANT

Stress is also modified by the way an individual deals with difficult situations. Clearly, positive thinking and problem solving are constructive responses, while negative thinking and temper tantrums are not. What's less obvious is the multiplex effect that one person's coping response can have on others in the dp department. Some individuals may deal with their own stress by stressing others. This kind of response can be addictive, since it may actually provide relief—until the next stressful situation arises. People

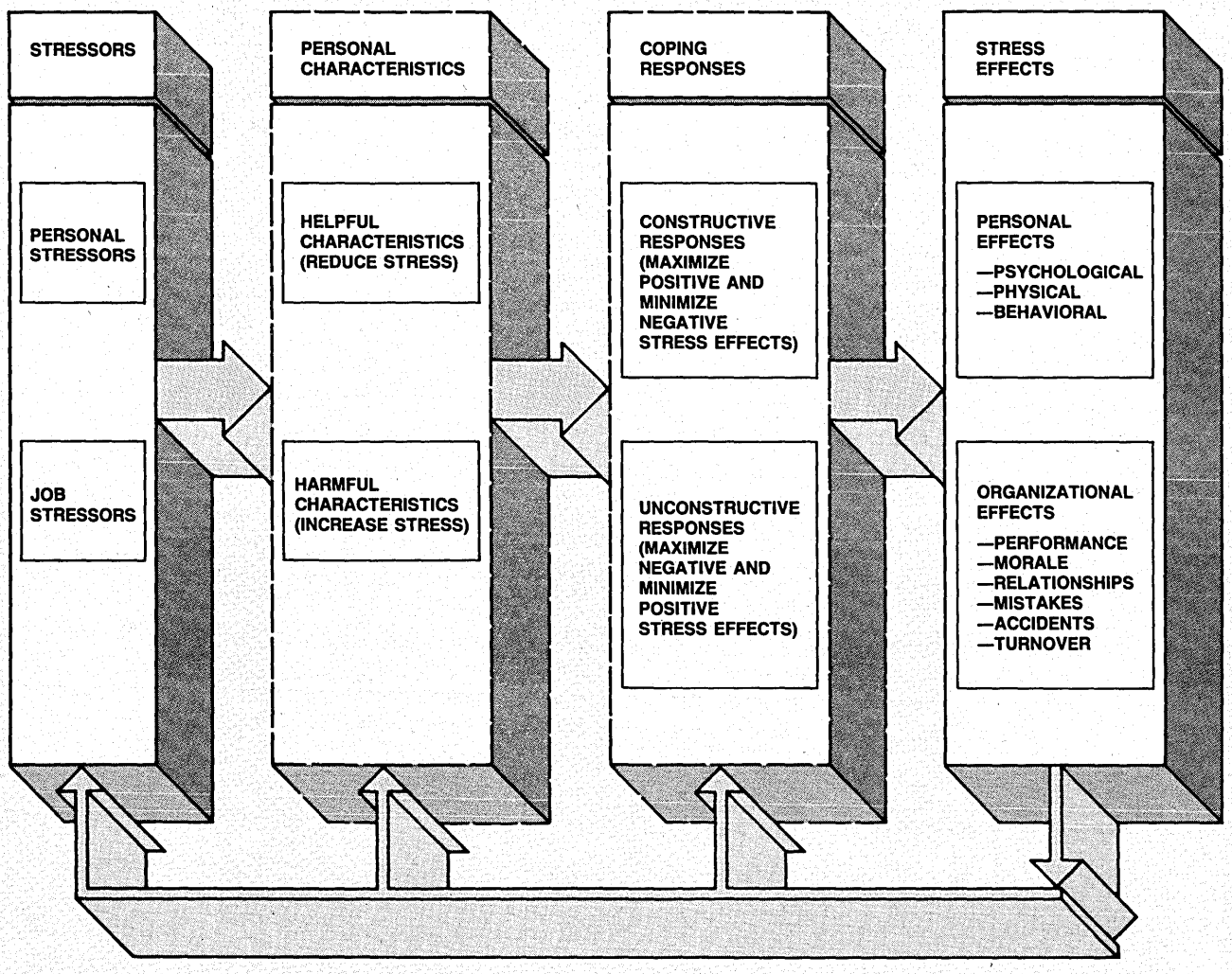
FIG. 1

COMMON DP STRESSORS

- Constant and often unrealistic deadlines
- Role overload or underload (Too much or too little to do)
- Frequent peaks and valleys in the workload
- Varied task quality (Work can be interesting and challenging or boring and routine)
- High visibility of mistakes and narrow margin for errors
- Continuous problem-solving emphasis
- Potential for frequent conflict with users
- Need to keep up to date with a constantly changing technology
- Growing work backlog
- Frequent job changes
- Disruptiveness of hardware failures
- Long, irregular work hours
- Ill-defined career paths
- Lack of understanding and acceptance of dp within the organization culture
- Dp department mismanagement
- Need to adhere to tight standards

Fig. 2

THE STRESS PROCESS



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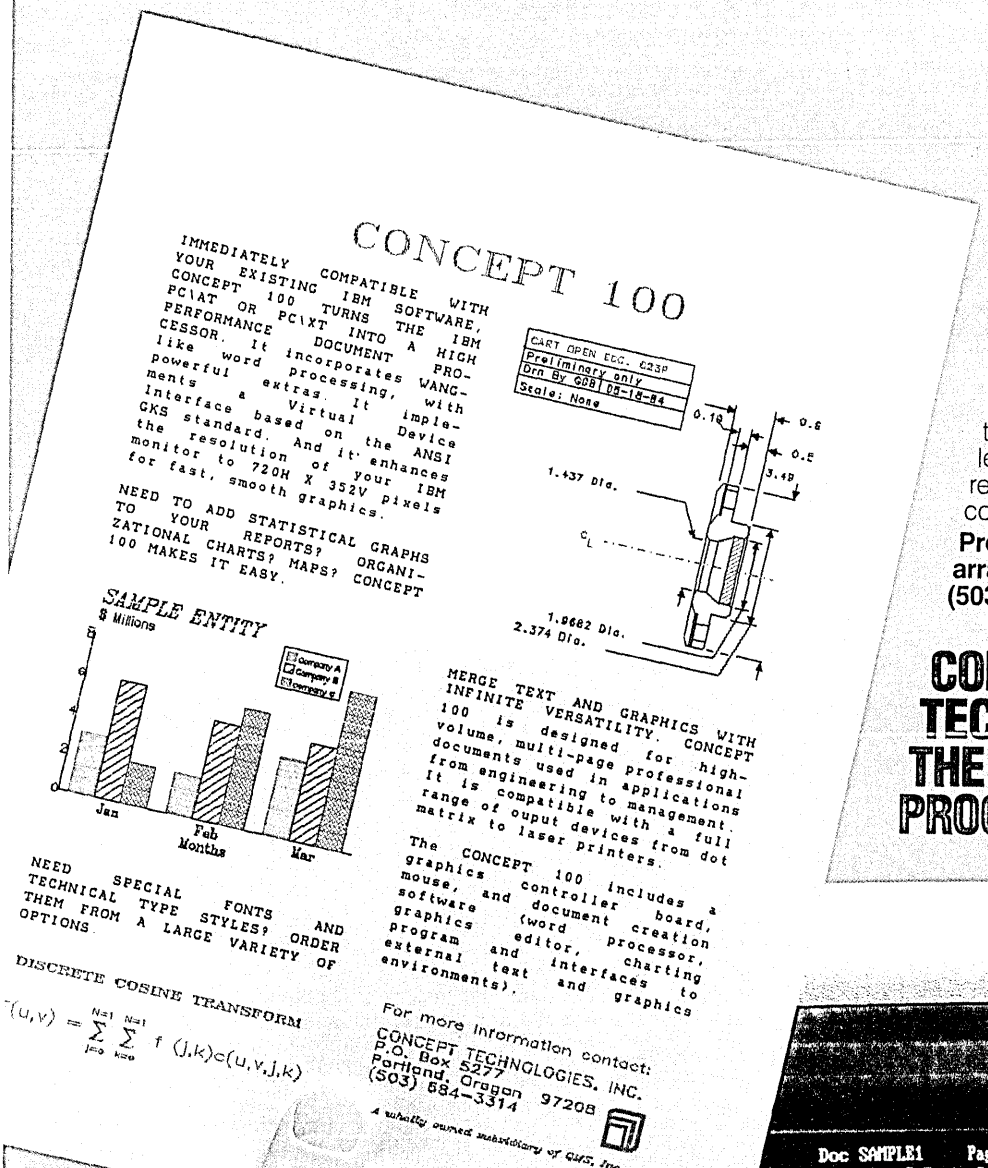

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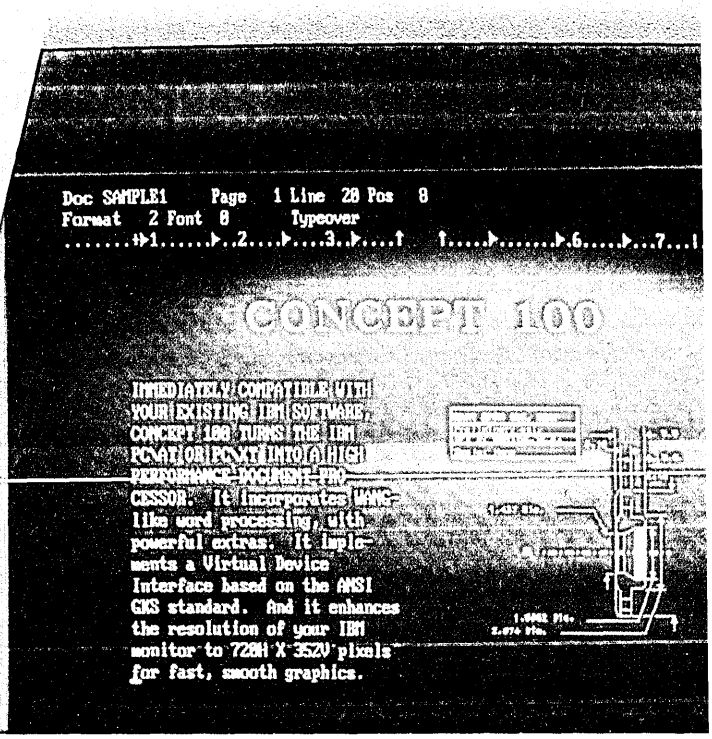

Mismanaged stress can decrease performance, motivation, and alertness.

FIG. 3

MAJOR PERSONAL AND JOB STRESSORS

PERSONAL STRESSORS

- Not feeling valued
- Lack of direction and purpose
- Family problems
- Frustrated needs
- Lack of time
- Monotony
- Life out of balance or control
- Unresolved past and present problems
- Spiritual conflicts
- Frequent change
- Uncertainty
- Fear
- Physical problems
- Interpersonal conflicts

JOB STRESSORS

- Too much or too little variability in workload
- Ambiguously defined job
- Too much or too little to do
- Poor job design (Job characteristics, variety of work, importance of task, job autonomy, accuracy and frequency of feedback)
- Ineffective management
- Poor person/job fit
- Job insecurity
- Ineffective organization structure
- Unpleasant work climate
- Poor working conditions
- Unfair reward system
- Unfair or ineffective performance evaluations
- Frequent change
- Undesirable work hours

who cope constructively, by contrast, can reduce stress for themselves and others.

Several symptoms may indicate that your staff is overstressed. Watch for patterns of fatigue, irritability, increases in mistakes, missed deadlines, and drops in motivation or productivity. Low morale, frustration with the organization and with management, and high turnover are indications of organizational stress.

What can you do about personal and departmental stress? You can learn to understand and manage it—but not by means of gimmicks. Our research indicates that programs that use stress sensors and encourage fantasizing and group therapy techniques may actually increase stress. A more sensible approach for dealing with personal stress is to

1. Educate yourself to consequences of stress;
2. Identify your major personal and job stressors and evaluate their effects and the manner in which you cope with them;
3. Select those stressors you can do something about, and take action with a plan for reducing, eliminating, or managing them. These should be both external problems, such as a person who causes you stress, and internal ones, such as a negative attitude or an addiction to cigarettes;
4. Develop a plan for coping with stress and practice it until it becomes your normal way of responding in stressful situations.

Organizational stress can be attacked in a similar manner. You can discover the main stressors in the workplace through questionnaires, interviews, or workshops. Then, in a meeting of management and employees, evaluate the survey results and identify those stressors that you can and are willing to do something about. Develop and implement a plan to deal with them.

Many organizations will find it useful to go through these steps once a year. Things change fast in dp shops—which is one of the reasons they're so stressful. ◉

All four authors teach at the University of Colorado, Colorado Springs College of Business and Administration. Don Warrick is associate professor of management; Donald G. Gardner is assistant professor of management; J. Daniel Couger is distinguished professor of computer and management science; and Robert A. Zawacki is professor of management and organization.

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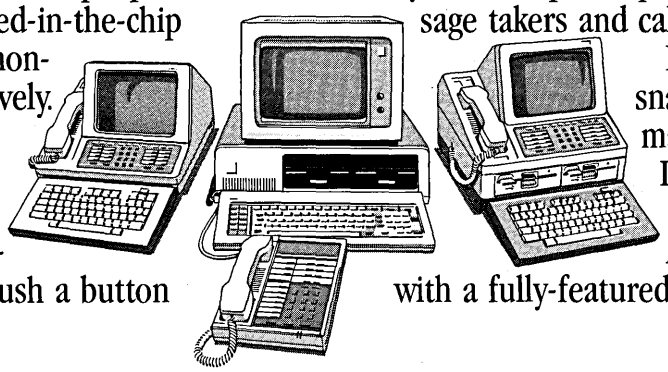

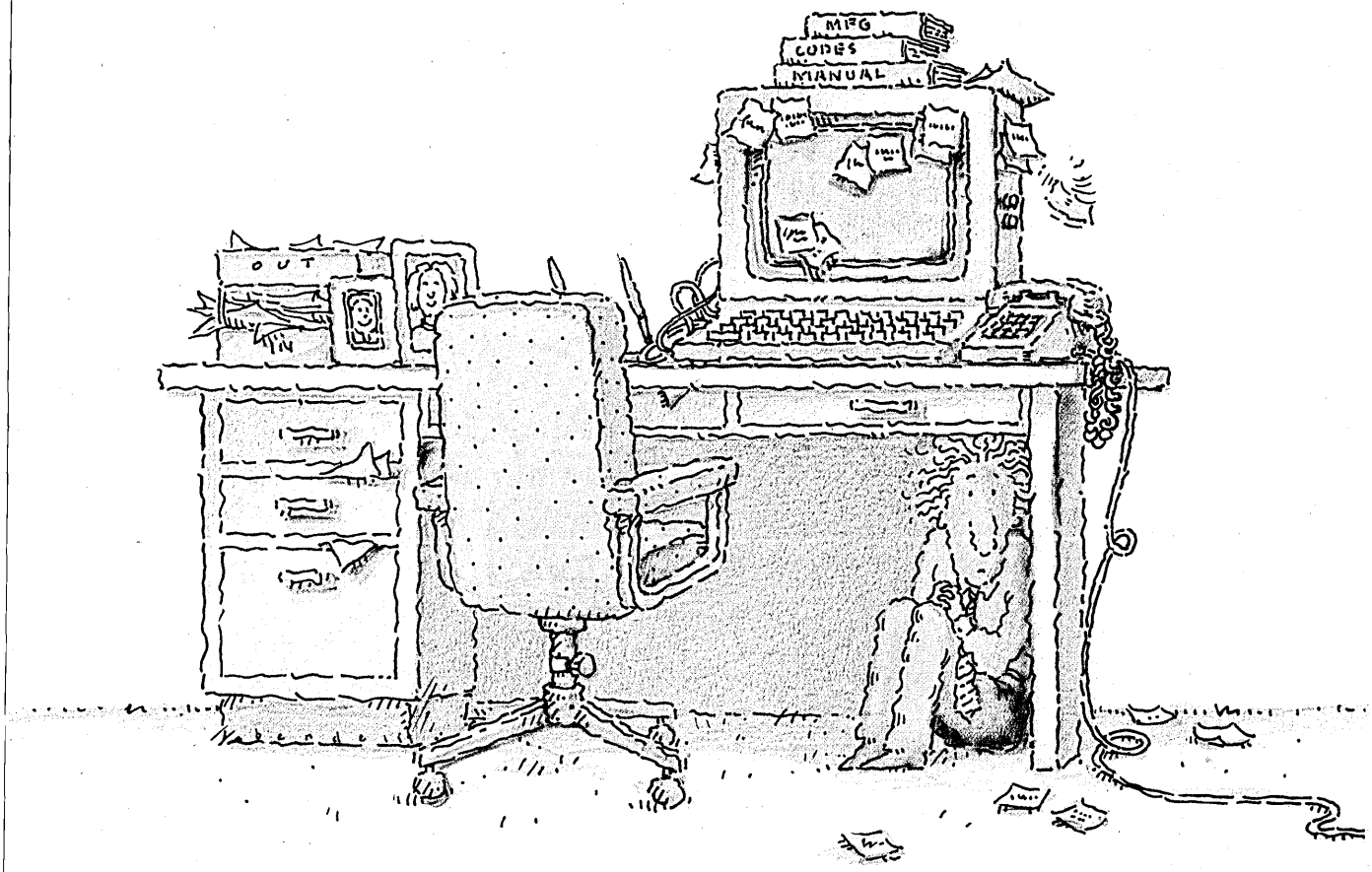

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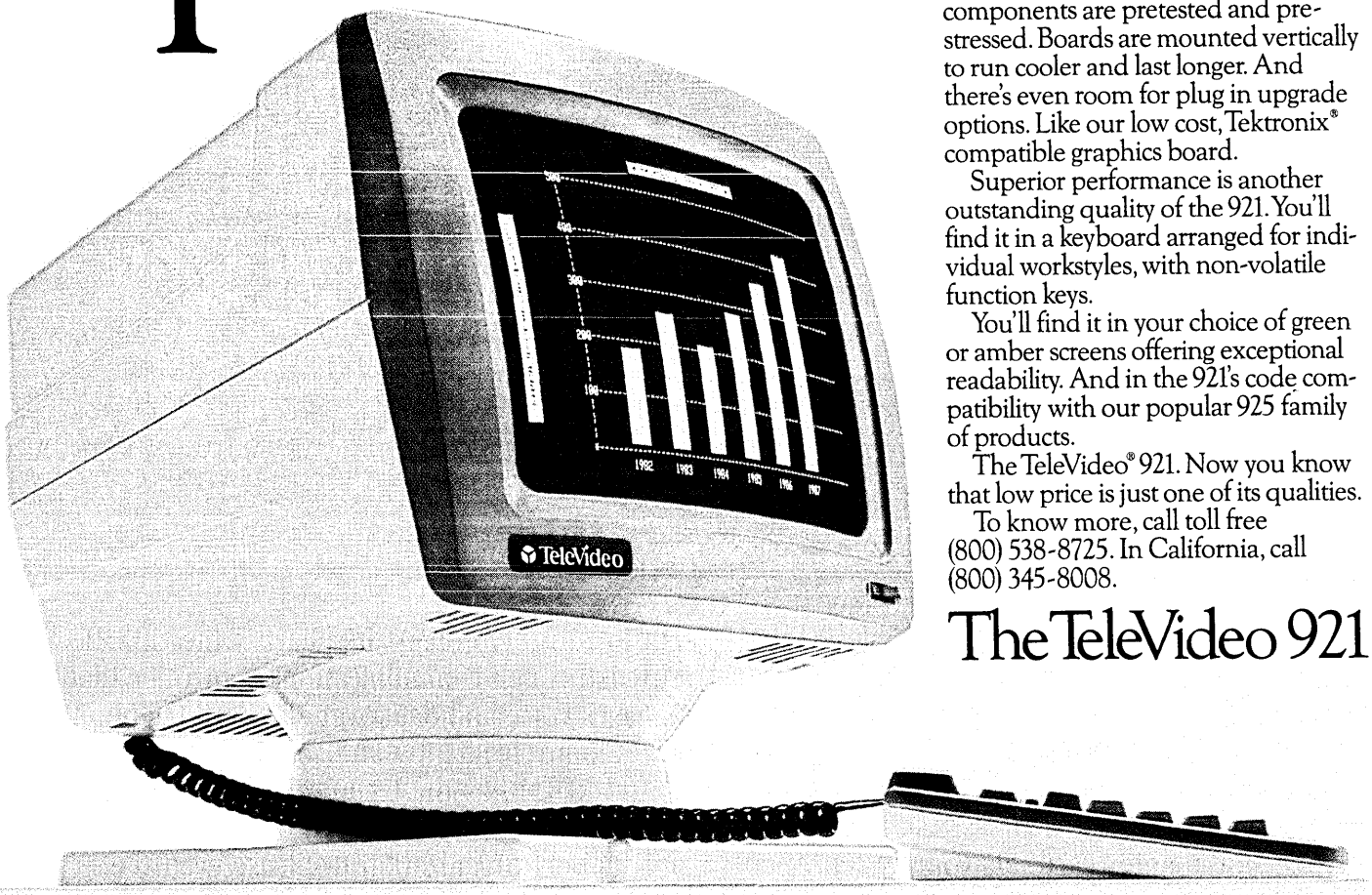

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CIRCLE 52 ON READER CARD

Most computer people seem to thrive on the speed, excitement, and stress that abound in their business.

HIGH TECH, HIGH STRESS?

by Shirley Marks

Stress and data processing: some think the words are synonymous. Dp people usually work at a frantic pace, and even when they can slow down, most of them prefer not to.

"Everyone is an expert on stress because everybody has it," says Mary Lou Vogel. As director of social services for Los Robles Regional Medical Center, Thousand Oaks, Calif., Vogel visits local businesses to talk about stress management. She emphasizes that our bodies can't tell the difference between positive and negative stress; they know only the intensity of it. We are under stress when our level of stress is high, whether we feel inspired or threatened.

It's impossible to avoid some degree of stress, claims Hans Selye, a Canadian doctor noted for his study of the body's physiological response to different demands. Merely maintaining life requires energy to adapt to changing external influences and to resist aggression. In his 1974 book, *Stress Without Distress* (Harper & Row, New York), Selye says there is a parallel between the body's physiological reaction to some environmental pressure and the individual's personal behavior. On either level, we react in one of two ways—by adapting or by resisting the pressure.

The pressure that a programmer, a manager of computer operations, or a database administrator experiences may never be as continuously intense as the pressure an air traffic controller faces, but there are special demands in these and other dp jobs. Some of these demands can create undue stress and interfere with job performance and satisfaction.

To manage stress, we need to separate the stress sources that are integral to dp from those we make for ourselves. Some of the latter reflect modern society's zeal for achieving more and more at a faster and faster pace. People who succumb to this disease of our times display Type A behavior, identified by doctors Meyer Friedman and Ray H. Rosenman. The cardiologists reported in their book, *Type A Behavior and Your Heart* (Alfred A. Knopf, New York, 1974), that more than half of urban Americans suffer from "hurry sickness."

A particular problem for Type A personalities in the dp setting is their conviction that extreme competitiveness and performing tasks with the utmost speed are the keys to their success. "Actually their talents, skills, and efforts are the reasons for whatever they achieve," says Mary Lou Vogel. "They would be more successful—and last longer—if they unlearned the destructive Type A mode of behavior."

What is it like to work in data processing? "It's weird," says Kate M. Kaiser, an authority on management information science at the University of Wisconsin, Milwaukee. As partial evidence she offers some answers to a survey question, "Is dp stressful?" The answers show quite a bit of pride: "We create stress because we like it. We want to solve the problem, find the bug, get the job done. 'Workaholic' is the badge of dp." And a sense of danger was also evident: "An error is a destructive accident that could cost the company millions of dollars. You are on call, have ambiguous performance criteria, and moving target dates. It has to be perfect to work."

MANAGERS DISCUSS STRESS

To amplify these views, I visited a variety of dp organizations to talk about stress with managers who have risen through the technical ranks. At a medium-sized, nonprofit research corporation, the head of the computer services department said, "Dp's more like a service organization here than, say, a manufacturing operation. Yet where stress is concerned, the dp manager corresponds to the head of manufacturing. There can be a call at home because it's a 24-hour process, whether it involves computer operations, applications maintenance, or systems development.

"Take an on-line system that fails at midnight and the operator hasn't enough information to restart. The operator and manager communicate with a telephone receiver on one shoulder and the terminal in front. The manager may even have to go in to fix the problem. That's stress."

How is this different from an assembly-line breakdown? "There usually is some slack between the end of the manufacturing process and the point of sale. With dp, the point of sale may be the on-line users. There's a greater time pressure to decide what to do—should we keep the damn thing down until we fix it? Or should we bring it up on the chance it can work to a degree, while we hunt for the trouble and maybe risk damaging data files? The manager can't let the users assume the burden of deciding. Just giving out status information isn't easy when you have a system with maybe 500 users."

Advancing within the dp environment is also quite stressful, according to the departmental manager. "The head of a dp organization is generally at the end of the corporate line, unless it's a dp company or one where information is recognized as a vital part of the business. In our department, a technical person goes into management based on technical competence, of course, but more because of managerial potential. There's possible stress for the programmer who doesn't qualify for management. We have to give rewards for both kinds of talent. We can't insist a manager earn more than those managed."

The applications support manager in the same department was having lunch at her desk ("I find it a good time to get some work done without a lot of interruptions"). When asked what kind of people she hires, her reply was, "Almost never computer science graduates. We're more interested in an aptitude for the research process." Her longtime programmers think the new kids, who are used to higher-level languages, lack the basic knowledge of how a program works at the machine level. They anticipate the difficulties newcomers will have using creative problem-solving techniques and debugging programs—both of which lead to reduced productivity.

"Everyone is an expert on stress because everybody has it."

The applications support manager believes "the most successful applications people like variety and are under stress if they can't have it. They prefer working on different kinds of projects to a narrow specialization that ends up boring them. Change isn't upsetting. They have a lot of initiative." The programmer, however, always has to juggle costs of programming time and computer time. "Some are uneasy with this," she says. Also, "new people in dp must learn that mistakes are to be expected. They're part of the way we do our work."

Project managers at this research company typically come from the research staff. This arrangement can introduce stress inside and outside the dp center. Researchers aren't interested in a support programmer's professional development, yet the researchers are the people who rate the programmer's performance. Ordinarily there's not much feedback on how the programmer is doing unless something's wrong. Then there's finger pointing at the programmer or the computer. "Researchers aren't skilled in people management. They're not aware of the necessity to be."

GRIPING TO WRONG PERSON

Programmers gripe to fellow programmers more often than to someone who could resolve the controversy. Sometimes, the applications support manager steps in and acts as a soft-sell arbitrator who can listen to each side rant and rave. "No one gets mad at me, which relieves my stress too." Programmers going into management should realize there are other ways to feel successful besides the satisfaction of having their code work.

The president of a software company says part of his firm's philosophy for running a successful, happy, and profitable small business is that "one of management's functions is to provide employees with a working environment that acts like a protective umbrella." That means "keeping the office B.S. off the troops" so they can concentrate on their technical jobs. "All we have to sell is people. What they can produce depends on their morale."

This company has a management team of four: president, manager of marketing, manager of contracts and administration, and a general manager who acts as line supervisor for the staff of about 30. One management responsibility is to monitor every task on a government contract by supervising the quality of the software they design and accounting for the cost and time it takes to produce the software. He showed me a contract with 65 tasks currently defined. To find and keep track of the right resources for a contracted project, the company established a project manager position. Rather than being a personnel title, this is strictly an ad hoc role lasting for the duration of the particular project. Programmers report to their project manager on software matters, but take up personnel questions with the line supervisor.

Many things add up to stress for programmers. According to the president, "Billing for work is a pressure on a programmer. Then there's the difficulty of the job—it's hard mental work to accomplish a complex task, and get it done on schedule. The programmer thinks, 'Am I adequate?' " As for errors, "We used to fix a bug in a production system and an old one would come back. We'd constantly be going in a circle." Then they implemented a three-stage "system release" discipline, which has removed the "pain, anxiety, and remorse" from the change process.

The four founders had been through the aerospace industry experience, so their primary objective was to smooth out the bumps caused by government booms and busts. "In eight years, we've never laid off anyone for lack of work." Naturally, this policy can create anxious moments when a long-running project is terminating and they have to carry some staff on overhead for a time.

From the software company's tiny building set among verdant agricultural fields, I traveled to the vast acres of aerospace country. There I met with an MIS department manager whose staff is comprised of applications programmers. His end users are involved with internal business operations and administrative support.

Although the users proposing a system specify a completion date, this MIS manager doesn't allow them to dictate the actual date because it will depend on system constraints. "The users almost never like the schedule, and it's really tough not to try to win them over by compromising. It's less stressful for us to make sure the users understand what's going to happen and that they're part of the development process." Educating users can be difficult since some of them habitually panic. "We don't respond well to the panic mode, because we can't do things quickly on big systems."

What does he look for in a programmer? "Hiring computer science majors is like hiring a crew of architects to build a house. For designing programs, you need more than theory. In fact, you usually need only a few architects and lots of plumbers, carpenters, and electricians. Everyone comes into this business expecting to be an architect, yet has no experience in design. This attitude can make it very rough when dealing with non-dp users.

"And how can users trust us when the preponderance of projects are late and over cost?" Of course, this situation exists outside dp as well, but the MIS manager believes it is more often "accepted in the building trades because specialists are licensed, and there are building codes and inspectors to check compliance. In dp, there are no accepted uniform standards of practice."

BALANCING CUSTOMERS, STAFF

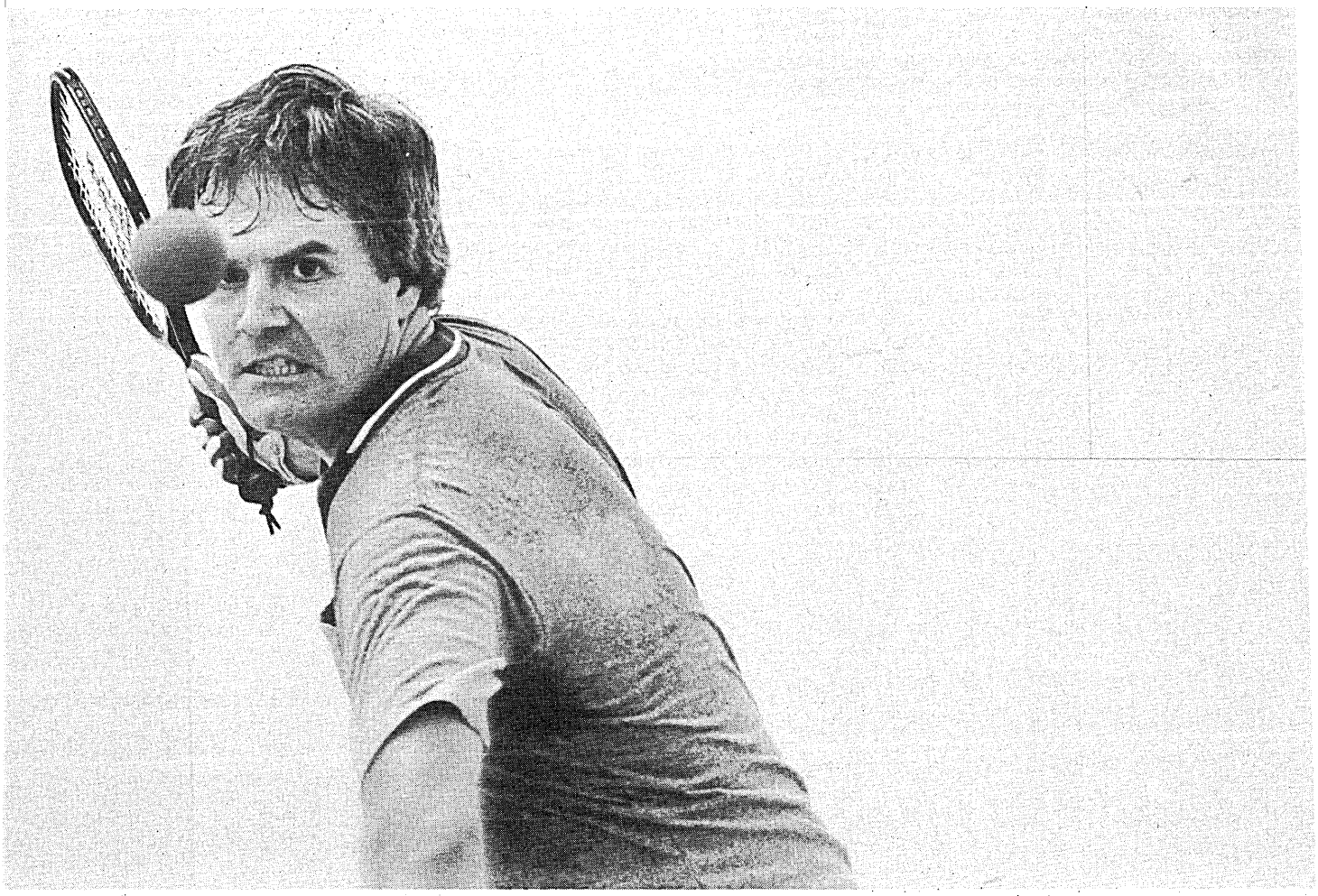
On the dp side, "programmers are in the trenches, so managers get protective. A good staff is scarce and mobile. You have to balance keeping customers and staff happy." But in addition to the stress resulting from politics is that resulting from the frustrations of dealing with a mercurial and at times uncooperative technology. As the manager says, "That computer doesn't always respond as I want it to. You have to be so damn precise. It's like putting your penny in the old 'claw machine' and having only two minutes to grab your prize."

The vice president for employee relations with a major bank provided a dp outsider's perspective on dp stress. "They estimate the space needed, but they always need more. First the cubicles get smaller and increase in number. Then they move the whole operation geographically." Dp personnel are always unhappy about such moves; they complain about having "no place to go to eat or walk on a break, and having to work in a large, gray, anonymous cube."

Inside, there's no resemblance to the rest of the bank. "It's a different culture," the vp says. Frequent reshuffling of the dp organization charts "drives the rest of the company nuts." What's more, dp professionals are often impatient for personnel action. "They resist, avoid, or ignore the rules of the host." Host? "Yes, that's how they think of the bank as a whole, with themselves as a separate entity."

He conceded to being somewhat defensive about the dp department. "Dp makes a facile verbal analysis of a data processing request. The requesting bank people have to take it on faith that the dp expert understands what's needed. Then, when dp doesn't come through as promised, their explanation is in jargon." The banking industry took on electronic information management to stay competitive, and that's when the data centers separated from the rest of the organization. The vp sees a communication blockage because dp

To some, it's just a racquetball they're belting. To others, it's Driscoll in the MIS group.



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"One of management's functions is to provide employees with a working environment that acts like a protective umbrella."

professionals have fragile egos, yet present themselves as oracles.

I consulted one of the oracles—an enthusiastic vice president of telecommunications—at the bank's main data center. "We're truly entrepreneurs. Take a look at what we're doing: avant garde technology. There's a tendency of banks to just get bigger and more costly. We're trying to drive down the cost of dp." That's why they're now part of a new bank subsidiary, with the bank as one of the principal customers. Is the realignment clear to dp employees? "Certainly, although they hate the constant changes." At his level, he doesn't mind the changes, but many people at the lower levels are worried about benefits and job security; in fact, a few employees even left the company because of these worries.

This telecom vp puts a lot into his career. "My workweek is a minimum of 12 to 14 hours every day," he says, "with probably 12 more on the weekend." Does he enjoy that pace? "This is part of the price you pay if you want to get ahead in a company. Maybe someone who does a repetitive job takes less time because the work is predictable. I don't know exactly what will happen next. Putting these ideas together is very demanding."

Does he think it's the work or his approach? "I'm a typical Type A personality," he said with a grin, confessing that his doctor is always after him to get more exercise and to slow down. He's concerned that his drive sometimes exceeds his capabilities, but he gets bored quickly and needs a lot of different things to do. "I do so many things, yet I can't often step back and feel satisfied. A lot of things never end. It's not like getting to see your ship launched."

Whether or not he is typical of the successful dp professional, many are challenged, like him, to outdo themselves by designing complex systems, making them run, and keeping them running. Those not suited to such dp demands may feel the same pressures as negative stress. Frustrated in their efforts to succeed, they work harder, yet may become robotlike instead of imaginative.

Even for those who are most adaptable to dp stress, there is anxiety when management structures and attitudes deny support and recognition to the workers and impede communication with them. Poor communication was listed as the most significant source of negative stress in a study reported at the Twentieth Annual Computer Personnel Research Conference, sponsored by ACM at the University of Virginia, Charlottesville, in November 1983. Researchers John M. Ivancevich and H. Albert Napier of the University of Houston and James C. Wetherbe of the University of Minnesota compiled responses from 580 information systems professionals in 18 large corporations from the Midwest and Southwest. Respondents' ages ranged from 19 to 68, and their information systems experience from one to 30 years.

OTHER CAUSES OF STRESS

Ranked after poor communication, in order of decreasing levels of stress, were inequities in rewards and promotions; too much work and too little time to do it properly; personal conflict among professionals as well as between MIS personnel and users; poor definition of one's job in terms of goals, responsibilities, and authority; too many changes in day-to-day activities and in the state of technology; and lack of opportunities for career development.

The study found that managers at various levels feel higher stress from work overload and time pressures than do systems analysts or programmers. The latter, however, experience more stress because of poor job definitions than do managers. The higher the position, the greater the difficulty in releasing job-related tension.

As for the Type A syndrome that afflicts so many Americans, and to which dp people may be especially vulnerable, Mary Lou Vogel suggests a kind of self-inoculation. "Provide time for a breather between activities—a change of pace from mental to physical, from creative to routine. Learn to live with unfinished tasks. Know your priorities so you can say no to new responsibilities that would overload you. Make the job pleasurable within the parameters of getting the work done."

My own serene afterthought: once in a while, take a user to lunch. ◉

Shirley Marks is a free-lance writer based in Thousand Oaks, Calif.

"Please, Dad — we *gotta* go home now."

CARTOON BY NICK HOBART

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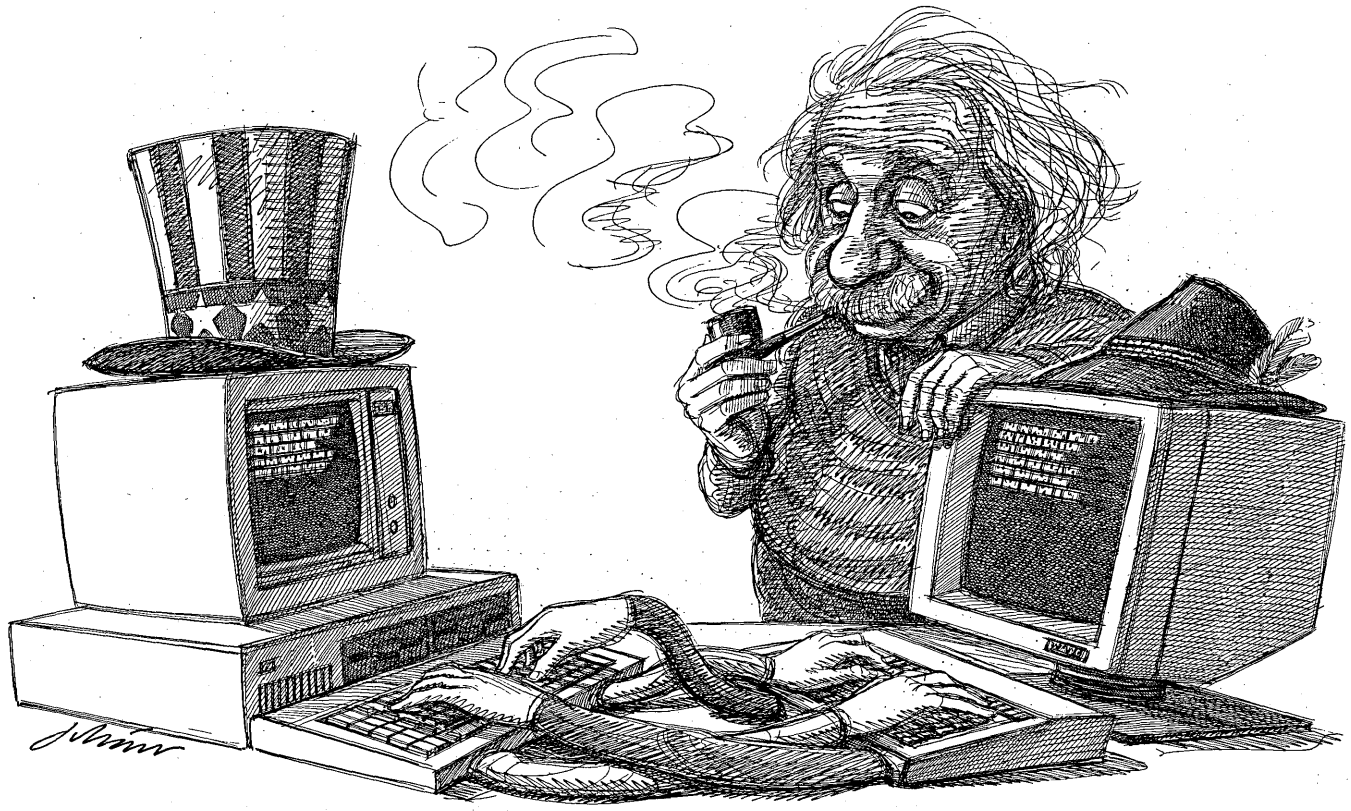

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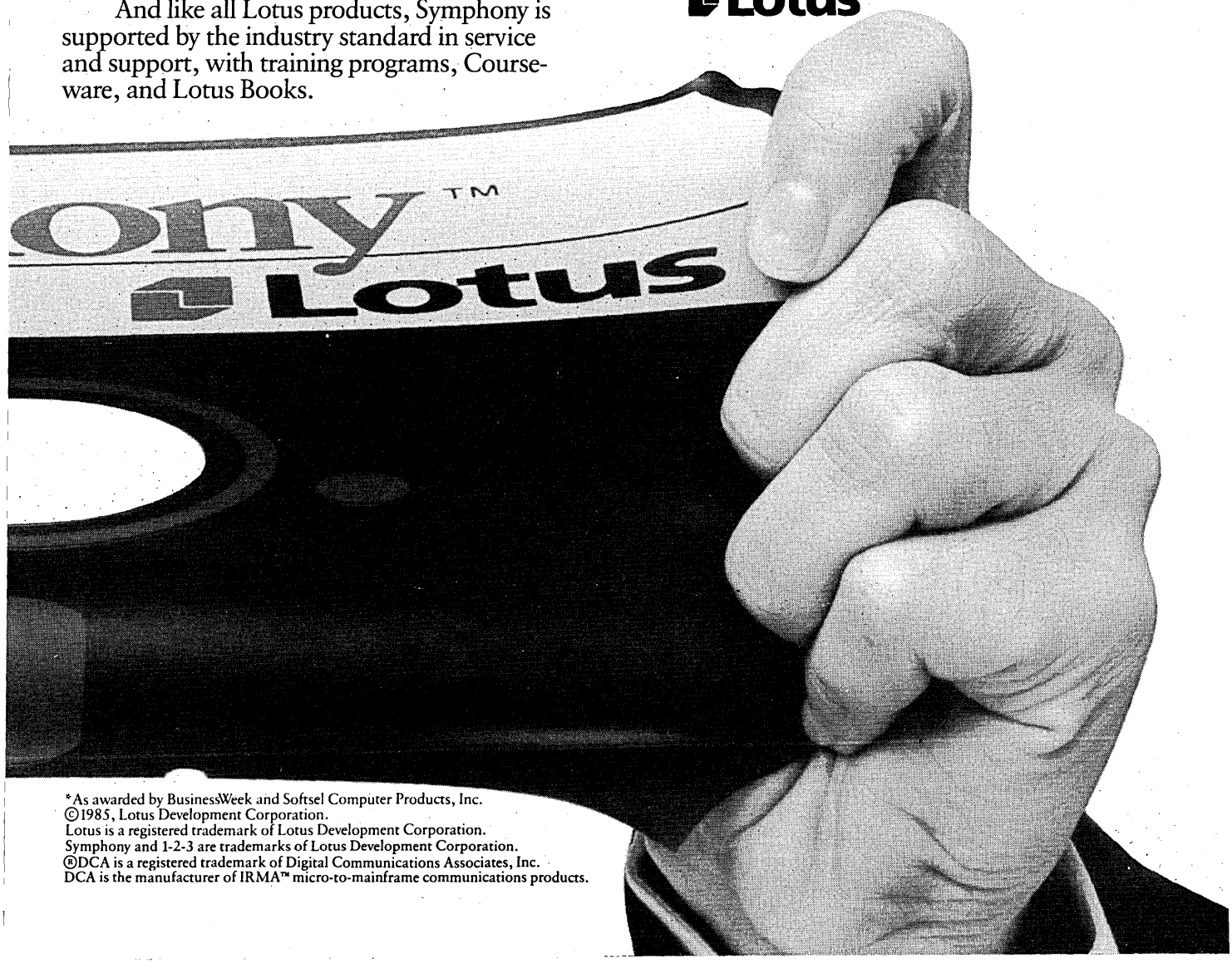

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Stress strikes both sides of the corporate house.

USERS ARE PEOPLE TOO

by Lorraine King

Karla Spitzer, a former data processing manager who's back in school majoring in psychology, doesn't believe that environmental factors are an important cause of stress among computer users. "Many people suppress psychological symptoms," she explains, "and translate them unconsciously into physical ones." The computer consultants and academics seem to agree with her. The real culprit is the manager who shows less regard for the intelligence of his human staff than for the efficiency of his computer.

In today's user world, most managers recognize that stress is both real and counterproductive, but they still hesitate to acknowledge its existence. They know that the cure for stress requires a fundamental change in their own autocratic management style.

Studies about stress always concentrate on physical factors and repeatedly conclude that vdts are not inherently harmful. Even if stress is undeniably demonstrated among computer users, studies consistently show that it is a symptom of antiprogress hysteria. The repeated selection of the vdt over any other factor as a target for study is most likely a symptom of management's fear that the stress will be proven, the real or imagined benefits of the computer will be quantified, and management's role in generating stress will be publicized.

Independent studies carried out by academic and labor or employee organizations reveal that computer users are under the most stress and therefore are probably the most unproductive of all office workers. The *Harvard Medical School Health Letter* reported in 1983 that the incidence of complaints from vdt workers is greater than the number of complaints from a comparable number of air traffic controllers.

The 9 to 5 National Survey on Women and Stress, issued last year by 9 to 5, the National Association of Working Women, reported that out of 40,171 women surveyed, only 5% rated their jobs as not at all stressful. A parallel survey that examined the use of office automation equipment found that almost half the respondents regularly used automation machinery. Those whose performance was monitored by computer had been absent from work due to illness 50% more than those whose work was not monitored by machines.

The stressed vdt worker is less likely to complain about the machine than about factors related to what the Harvard report calls a "lack of planning" by managers and supervisors. "Stress really is a management problem," agrees Richard Telesca, an administrator at Aetna Life & Casualty of Hartford, Conn. "You cannot tell people about desks, etc. This is just a side issue. I haven't any problem with vdts: it's the management of the system's implementation and usage. Some managers won't accept it until you make them sit down and do the job themselves." Telesca was formerly a consultant in the People Technology Programs area at Aetna.

The introduction of technology puts user management under great pressure. Executives are just as afraid of job losses as the most junior operators, clerks, and secretaries. Youngsters who are adept at operating new technology upset the assumption that age brings wisdom, or at least competence. The manager may be panicked into putting even greater distance between himself and his staff than previously existed. At this point, orders are issued to machines and people in the same draconian style, and the staff's stress level mounts.

MANAGERS AREN'T INVOLVED

"Many managers . . . do not operate in a more participative fashion because they do not know how," says Rosabeth Moss Kanter, professor of sociology and of organization and management at Yale University. "They do not give secretaries more opportunity to be part of a team because they have never been part of the team themselves. They don't give office workers more information about the place of their work in a whole project because many of them do not get similar information from their own bosses. . . . This unfortunate picture is still true of too many American companies."

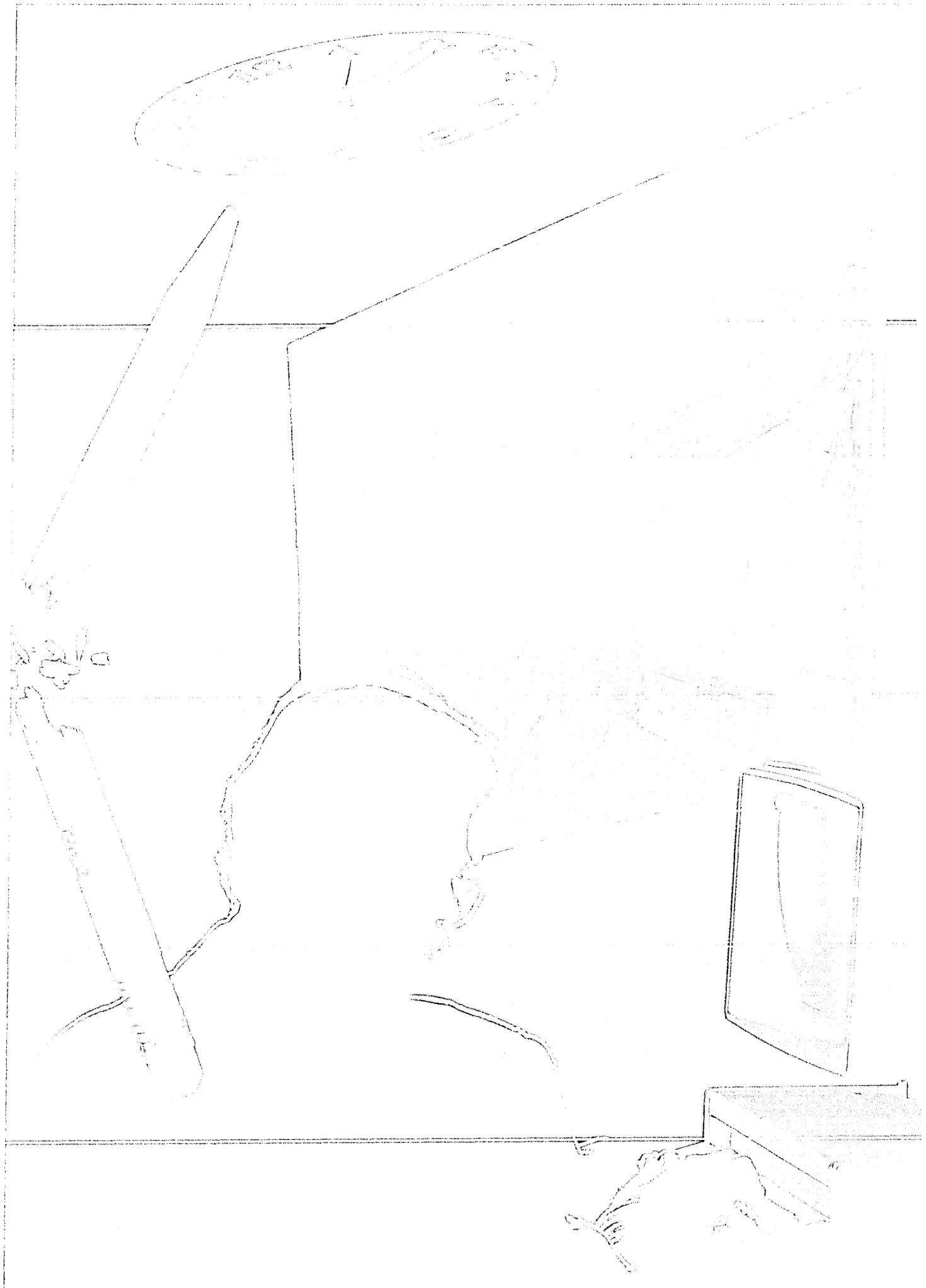
The Office Technology and Research Group of Pasadena, Calif., has found that the first task is to get the manager to admit that he is stressed. Only then is it possible to persuade him that the intervention of technology is inevitable and that he should become better educated in its possibilities, limitations, and management.

"There are always problems with the introduction of something new," says John Connell, executive director of the group, "but one that is occurring now is the fear of being left behind. Managers see nothing being offered to them to let them catch up. It is always left to them to learn in their own home. Some corporations today value their managers by their ability to use a machine, not by their ability to manage. We find this attitude is more prevalent in the U.S. than in Canada or England."

The vdt operator sitting day after day before the monotonous screen may feel that his immediate supervisor is the cause of his distress. The supervisor probably blames her manager, who in turn probably blames *her* manager, and so on. The president of the company might be the type who burns the midnight oil at a personal computer in his living room while he seethes with resentment in the daytime about the rejection of his managerial skills and the abuse of his severely limited private life. What he doesn't recognize, however, is that he brought it on himself by his anxiety to be seen as a leader among a newly prestigious social group—the technocrats.

When people are told nothing in an environment of fast and visible change, they assume the worst. Because computers are publicized as reducing the work force, employees assume that when a computer system is introduced into their department, layoffs are ahead. Computers are increasingly advertised as having arcane powers of

PHOTOGRAPH BY STEVE COOPER



Aetna managers who get too pushy are told, "That's it—lay off."

intelligence; employees assume that the computerization of their tasks will make human intelligence redundant, and are intelligently insulted. Computer literacy has become a way to measure social status; people who have no need or use for a computer run out to buy techno-toys they can ill afford.

"We've made a problem for ourselves with the terrible advertisements you see on tv," says Telesca. " 'If you don't have a computer you'll lose your job.' I get really wild when I see this. People are already very upset and angry about it. Now we're beginning to hear about AI the same way. If we go on pushing it like this, we're going to see some real problems, and rightly so."

Other companies besides Aetna have already seen enough problems to persuade them to set up stress-relief programs. Unfortunately, most of these programs address the cosmetic, environmental factors that are least likely to cause poor productivity. Companies also assume that the user will give her own time to the program and will return to the vdt a rejuvenated enthusiast. While Aetna and Control Data Corp. would seem to be honorable exceptions, companies generally do not try to prepare employees before their department is computerized. Nor do they pull those responsible for the problem—the managers—into the program. "NCR recognizes that new technology causes stress and that it has to pay attention to the psychological drag time between the introduction of technology and its acceptance as a useful tool," says Doug Bartlett, director of employee benefits, U.S., at NCR's Dayton, Ohio, headquarters. "But we can't expect managers to become psychologists, to concern themselves about staff stress, and to stop moving forward."

CDC TAKES MANAGERS ASIDE

CDC takes a different approach and monitors all types of stress problems that are brought to its advisory service. When the number of problems emanating from one department exceeds a certain level, the manager is discreetly taken aside. "We may find that a particular manager is doing a lousy job of management," says Jim Cline, manager of employee advisory resources at CDC. "Without turning him or her in, we can look into the manager's training file and see if we can train the person to take a better approach toward staff. The managers used to attack us for being against them. Now everyone sees us as an ombudsman, as being impartial."

At Aetna, unsympathetic managers receive little or no sympathy. "If we find the manager's getting too pushy," says Telesca, "we tell him, 'That's it—lay off.' Managers try to sweep it aside as a humanistic issue. We tell them it's profits. There's no way you're going to profit from a system if the people won't use it. Sometimes managers are willing to do something, but only as lip service. We say, 'Don't get started unless you are willing to go all the way. If you're not prepared to start right at the front with management, don't bother.' "

For corporations without internal programs, "bothering" may mean hiring a consulting firm that offers stress analysis and management techniques. This new advisory service has attracted some questionable amateurs who offer dubious cures, such as lunchtime gymnastics or costly office redecorations. A manager may pay dearly for demonstrable Band-Aids that he can cite as proof of concern. He unconsciously papers money over the true problem: himself.

"Managers who do not care and do not understand want the $39.95 solution," says Richard Koffler, principal of the Koffler Group, Santa Monica, Calif. "They won't look at the basic problem, which is poor management structures and poor relations with employees." Koffler is also frustrated by the American tendency to trust anything presented as numbers on a piece of authoritative paper—a trait he believes allows the less professional consultancy to profit from little more than trickery.

"In human factors, there are no measurements you can present on pie charts or histograms," he warns. "People in the U.S. say, 'Give me a precise, mathematical formula.' When you can't, they say they can't understand it [stress], do anything about it, or that it does not exist. They want something like, 'You will get a 25% improvement in productivity,' or they don't want to know. If I gave people a statement like this, I would be lying."

Managers who use formulas to monitor staff productivity cannot even define productivity—with or without a computer—and are asking for trouble. "Being paced by a machine annoys the user," says Ben Schneiderman, professor at the Human-Computer Interaction Laboratory of the University of Maryland. "As systems become faster, they push the user to type and respond faster, and this creates stress and anger. Errors increase and it may become more productive to slow the system down."

Monitoring the number of keystrokes means speed is more important to management than quality. "The worker says, 'Why are you measuring me against this B.S.?' and becomes angry and indignant," observes Koffler. "Statistics are often inaccurate, poorly interpreted, and irrelevant. But if managers can count it and measure it, they'll pay for it."

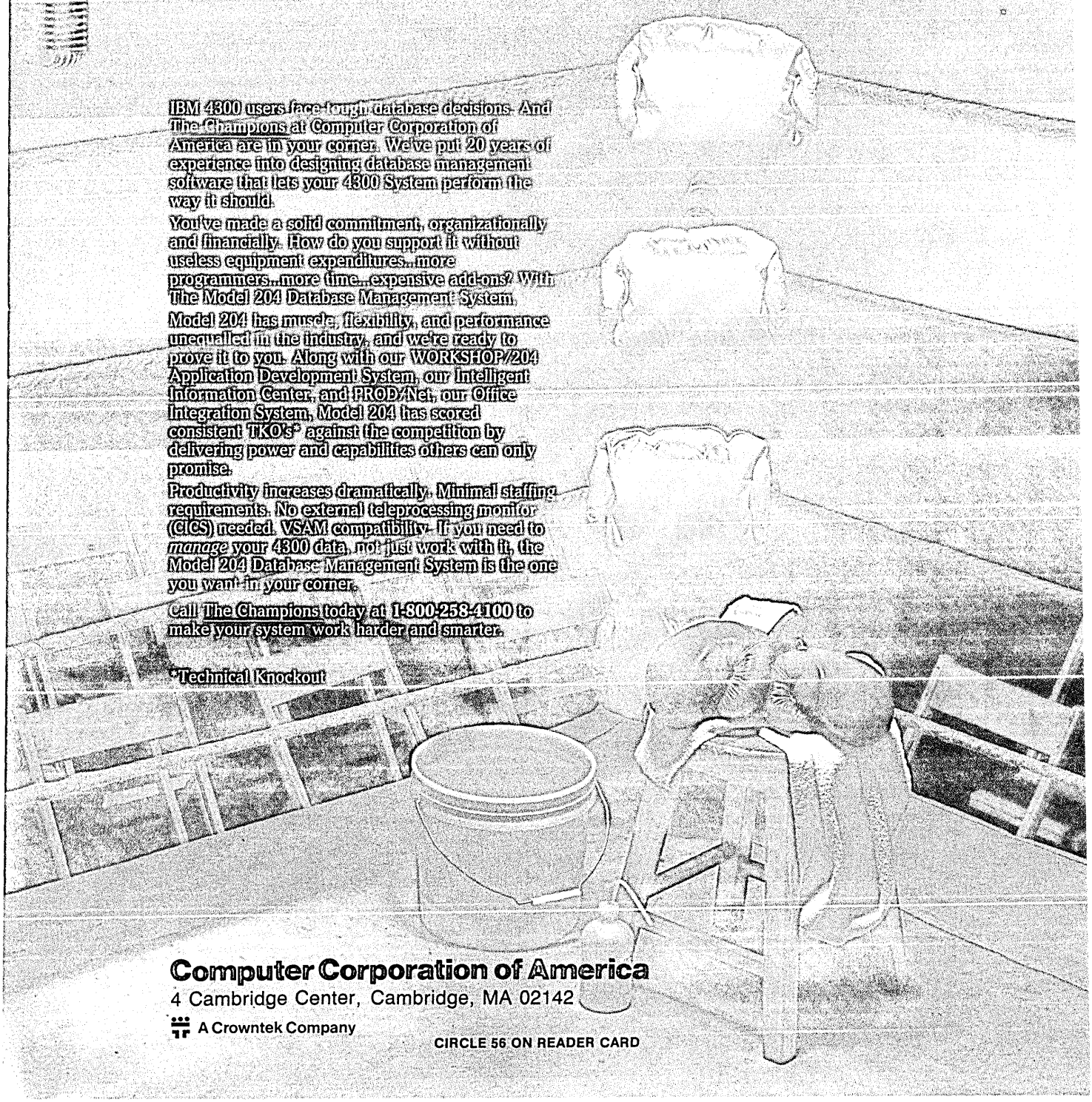
The search by managers for concrete, measurable reassurance has been observed by Gary Brown, vice president of

FIFTEEN COMMON CAUSES OF STRESS AMONG USERS

- Autocratic, depersonalized management style
- Lack of planning and communication before system implementation
- No deference to users in the selection, design, or installation of the system
- Fear that automation will cause job losses within the company and within the immediate community
- Loss of opportunity to take pride in work and to contribute individual skills to the company because product quality is sacrificed for speed with automation
- Lack of training before implementation and inadequate cutover period when old and new systems run in parallel
- Increasing work load, particularly of work previously done by contractors, with increasingly long hours
- Increasing level of repetitive, boring work without human interaction (vdt operation and the abusive use of electronic mail systems)
- Disappointment with the actual ability of the computer when contrasted with the vendor's advertising and sales talk
- Resentment at being treated as less valuable and of lower status than a machine
- Resentment at being abused by discourteous software messages while being expected to learn codes (common words could have been used just as easily)
- Loss of individuality and decision-making power as a result of the installation of off-the-shelf packages common to dozens of firms
- Fear of being made to look stupid in public by not understanding computing and resentment at having to spend personal income on a machine to learn at home
- Mistrust of data processing staff and of their ability to make rational decisions acceptable to "normal" people, when the software they program is allowed to make decisions that affect the management of the company
- No in-house support service provided to answer questions and solve problems with the new system.

—L.K.

In Your Corner.



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CIRCLE 56 ON READER CARD

"Advertising has created a lot of cognitive dissonance between what higher management believes and what is real."

Crwth Computer Coursewares, Santa Monica, Calif. Crwth offers courses on the use of computer systems. Brown says that stress often creates learning blocks. The new user at any level of the hierarchy may demand paper to relieve the abstraction of the computer's ephemeral screen. He becomes exasperated by the computer's pedantry and regards it as the ultimate nag. The final insult is when the machine that is purveyed as man's smart slave turns out to be a moron that demands its master dance to its tune.

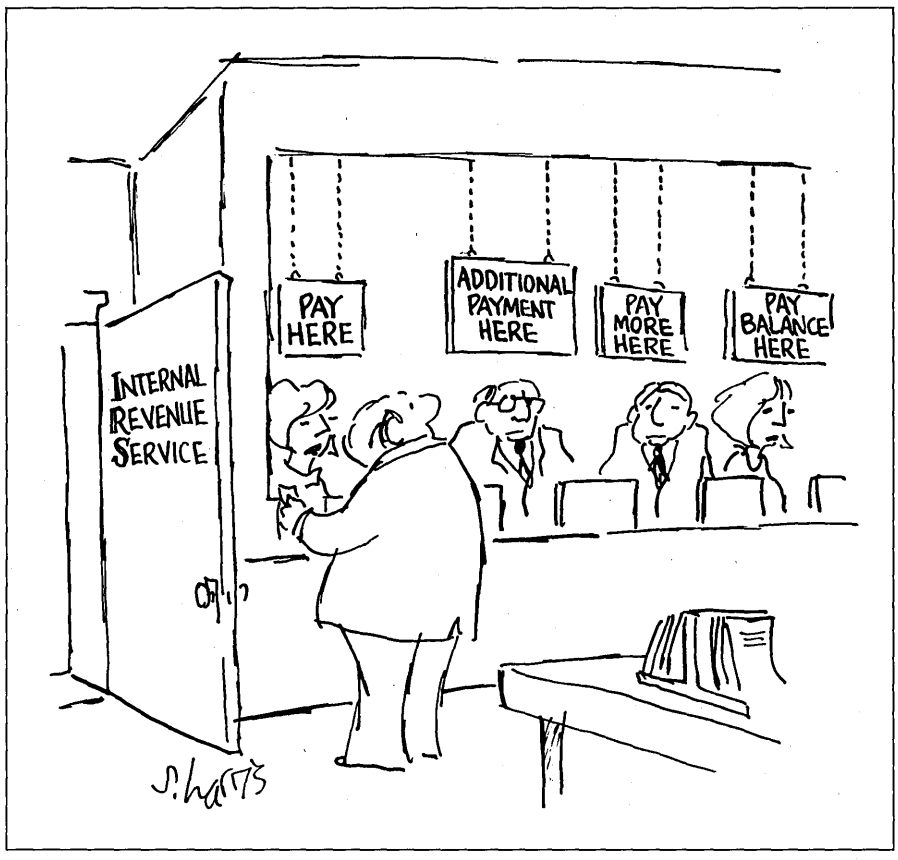
PEOPLE MODIFY TO MACHINE

"People expect a HAL of *2001,* which in reality can only be produced in a multimillion-dollar demo," says Brown. "The computer's limits then frustrate, because expectation of its capability was initially so high. People will have to go on modifying to the machine, and not the machine to the people, for at least this century."

The hype and thunder of the past three years have created a "microchasm" between user expectations and the reality of computers. No one falls more readily into this gap than the pressured manager looking for an external solution to his problems. If he believes the vendor's promise that the computer will save on the company's payroll, he and his staff are in for a very stressful time. "Usually, computers generate more staff, not less, because someone has got to handle all those numbers," says Brown.

Systems portrayed as saving personnel costs often have a nasty way of insulting the personnel who stay. They are the delight of data processing teams that regard their systems as babies to be protected from all nonadorers. "The author of the program, the programmer, has created an artificial world and sees the users' errors as a violation of his world," says Ben Schneiderman of the University of Maryland. "But people don't like the dramatic messages—Fatal Error, Run Aborted—and the meaningless codes. The messages should be changed to be more courteous."

Whenever expectation conflicts with reality, stress spirals and cooperation and productivity plunge. Perhaps the manager brought the new system in on the grounds of lower payroll costs, and he now fears for his job. He may accuse his staff of computer incompetence and add his own rebukes to the insolence of the software. Ultimately, his line management tires of acting as a buffer between junior staff and higher management and walks out.



CARTOON BY SIDNEY HARRIS

"I tried to explain to upper-level management that their machine was not capable of achieving what they wanted and that nothing could be achieved without front-end discipline and a reasonable time span," says Karla Spitzer, the former dp manager. "I also fought their wish to treat lower-level staff like pieceworkers. I object strongly to treating intelligent people in this way. It just doesn't work. I succeeded to some degree, but not enough to allow me to stay happily."

Like many other data processing managers, Spitzer found that she had to work around constant complaints from staff who were expected to work in front of a screen all day while trying to wring miracles out of an undersized machine. The problem is "partly straight ignorance and largely advertising hype," she says. "The advertising has created a lot of cognitive dissonance between what higher management believes and what is real."

Another cause of stress that Spitzer and Schniederman highlight is the personality gap between the programming mind and the management mind. "Programmers only think in a linear way," says Spitzer. "For them, the computer's limitation is a relief and is needed. Many dp people are socially atypical. They have low socializing ability and the pressures upon them from above cannot be translated in their minds. It's a two-way street. Managers do not understand computer management and computer people cannot communicate their feelings and knowledge."

This bleak picture is confirmed by consultants who are increasingly called in to act as interpreters between user management and the dp departments. There are many ways to ease the situation, such as staggering vdt work hours, offering extensive preimplementation training, adding postimplementation advisory services, and banning mechanized monitoring schemes. These merely help the symptoms, and do not necessarily remove the cause of stress.

Once a manager admits he feels stressed by a new system and realizes that his staff is experiencing the same stress, he may feel more capable of enjoying the role of supportive leader on an equally contributing team. He may also give more time to improving old-fashioned verbal communication, which has always been the distinction of excellence in management. ◉

Lorraine King is president of Adam, Cobb & King Inc. of San Francisco. The company provides marketing services to the computer industry and implementation management to users of high-integrity systems.

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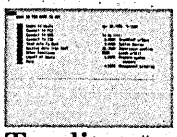
CIRCLE 57 ON READER CARD

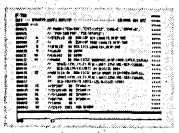
Where program their

If you want to take a look at programming from a different point of view, take a look at a Smart Desk equipped with an IBM 3270 Personal Computer.

The screen of the 3270 PC can be divided into several windows—including multiple PC sessions and up to four host sessions from the same or different computers.

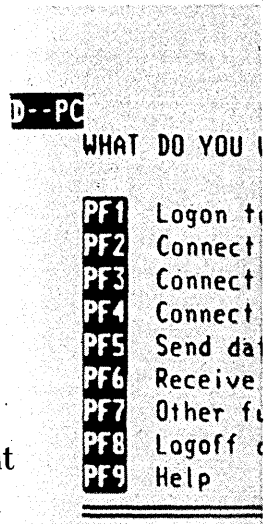


In the blue window you can keep a menu of your function keys. It's easy to log on and connect to a host system for browsing a program listing in the yellow window. To edit a second program, a single function key can download the source code to a PC session in the red window.



And, when you're finished editing, another function key can send the revised program back to the host. These multiple windows are available in eight colors. They are ideal for reviewing more than one program at once. Or for the concurrent viewing and testing of source code.

The end result is faster and more accurate programming with less demand on the host.



Any window can be viewed full screen for detailed analysis. Or it can be sized and moved to any area of the screen, so you can create the screen format that works best for you. You also get two handy notepad windows.

And, of course, the 3270 PC is backed by IBM's commitment to service and support.

One more point to keep in mind: The 3270 PC is available in quantity discounts. Your IBM marketing representative has all the details.

And if you want to receive literature on how the 3270 PC can expand your programming capabilities, call 1 800 IBM-2468, Ext. 82 or send in this coupon.

4-15

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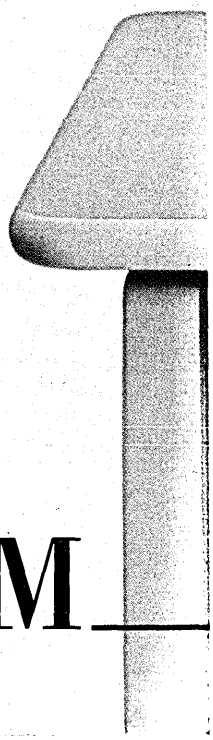
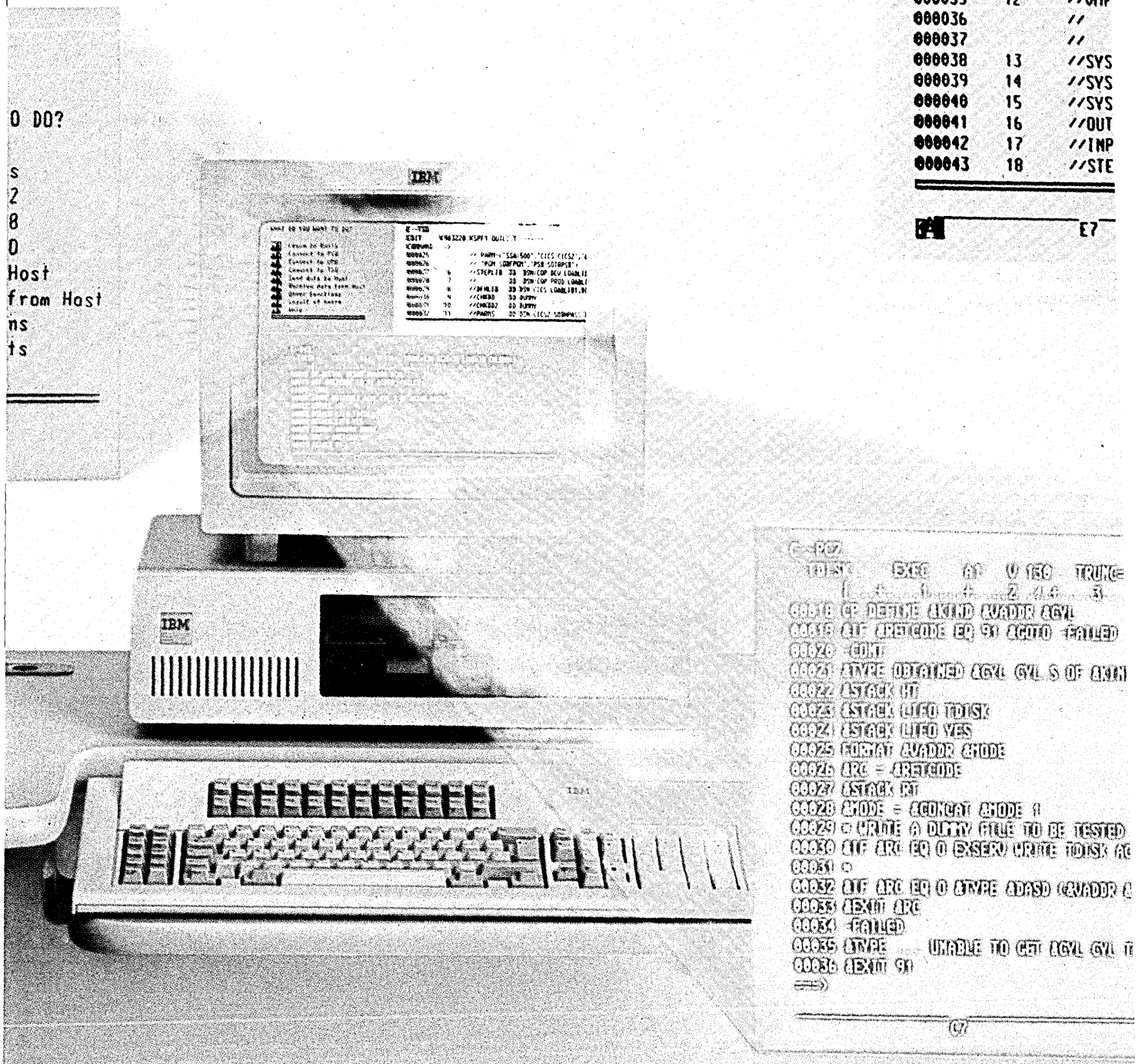
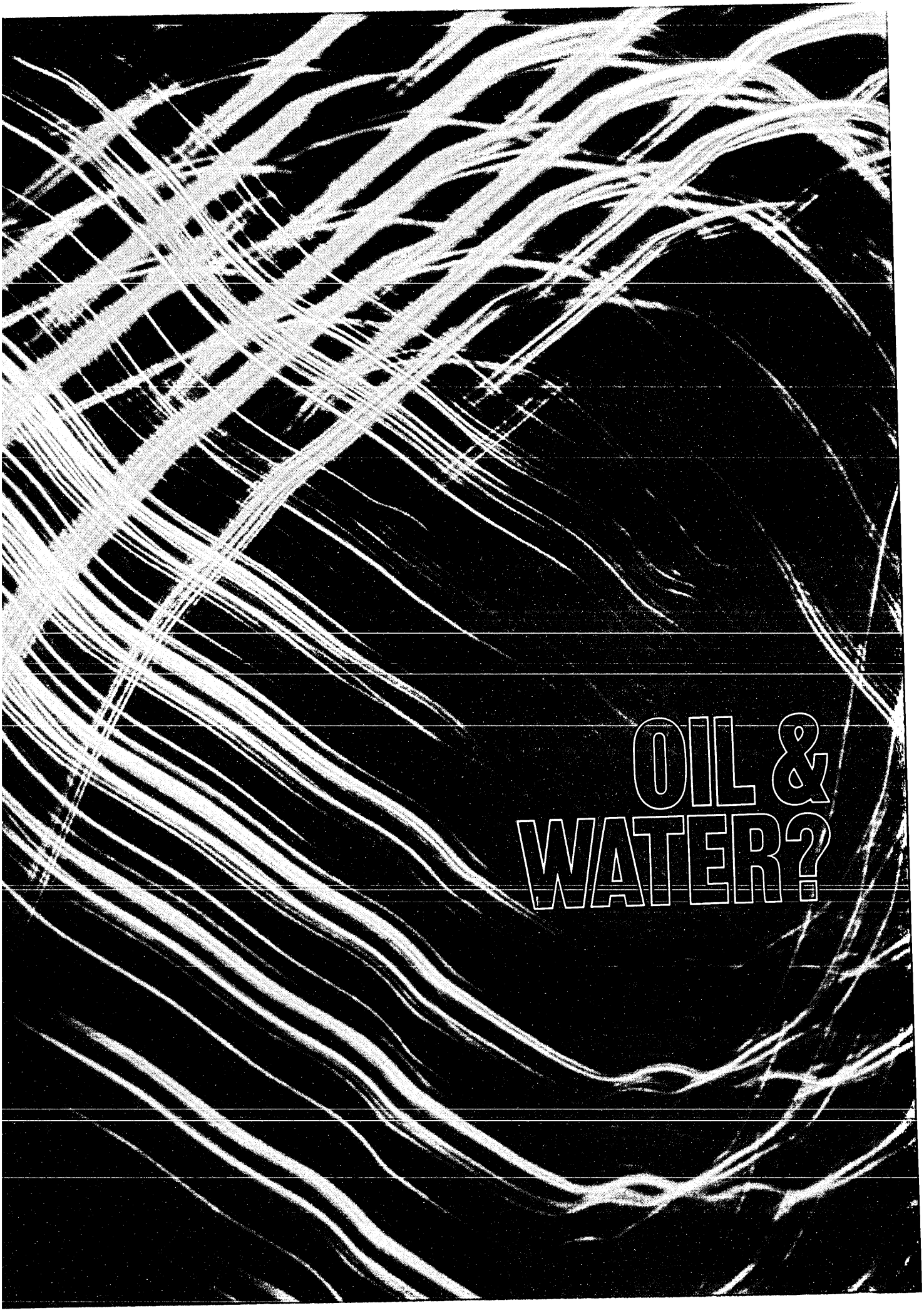


The Smart Desk from IBM

mers can expand fields of vision.




OIL &
WATER?

Voice and data do mix, but users don't seem too excited about the new combination.

by Stephen A. Caswell

Today, the hottest concept in workstation design is the integrated voice/data workstation. IVDWs have been on the market since 1981 when Northern Telecom, Nashville, introduced its Displayphone. Already, virtually every major company in the industry has a voice/data workstation on the market or on the drawing boards.

These companies include IBM, AT&T, Sperry, Tymshare, GTE, Wang, Mitel, and Digital Equipment Corp. In addition, a number of well-funded startups have jumped into the market, including Zaisan Corp., Houston; Ambi Voice/Data Systems, Stamford, Conn.; Davox Inc., Billerica, Mass.; and Cygnet Technologies, Inc., Sunnyvale, Calif.

Unfortunately for the many IVDW vendors, shipments of these devices have been very poor. In a market with something like 10 million workstations (both terminals and pcs), there are less than 100,000 IVDWs installed. This represents a total market penetration of 1%.

While this can be explained away by saying that the real heavies haven't launched their marketing campaigns yet, the truth is that even today there is far more enthusiasm for IVDWs inside vendor camps than there is within the user community. Recent startup Zaisan, for example, has raised a total of $20 million in venture capital from the cream of the investment community. This places it within the top 10% of venture capital funded firms in history, yet it has no proven market for its product, nor can it point to a predecessor company with any success.

Something strange is going on. The IVDW has so far been a market failure, attracting only minimal enthusiasm from users since 1981. Vendors nevertheless consider IVDWs a product necessity in order to survive the 1980s—and the market research firms have backed them up, estimating that shipment values will reach the billion-dollar mark before the end of the decade.

Why does this divergence between shipments and enthusiasm exist? What do IVDWs have going for them that makes them a sure bet? And if they're so great, why has the market been slow to accept them?

FOUR CLASSES OF IVDWS

Before we examine these questions, however, let's take a closer look at these devices. There are four classes of integrated voice/data workstations: integrated telephone/terminals, integrated personal computer/telephone/terminals, devices that attach to existing personal computers to give them integrated functionality, and intelligent workstations designed to integrate with central integrated office systems. All of these devices are now on the market.

The first integrated voice/data workstation, Displayphone, was introduced by Northern Telecom in 1981. A look at its design reveals what the integration of voice and data is all about.

Displayphone, which is still on the market, connects a dumb data terminal with an intelligent telephone, creating a new series of functions designed to ease communications. Displayphone has a built-in 300bps modem, an auto-dialer, internal storage for about 30 telephone numbers (or log-in routines), a calendar to schedule events, and two telephone lines so that it can function simultaneously as a terminal and phone.

This product also introduced an important design concept to terminals—soft function keys, which appear on the bottom line of the crt screen and change as the operation mode changes. When used as a terminal, for example, the soft keys perform tasks like sending a break down the line or disconnecting the call. When used with the directory of names, the soft keys control the addition of a new name, the deletion of a name, or initiation of a call.

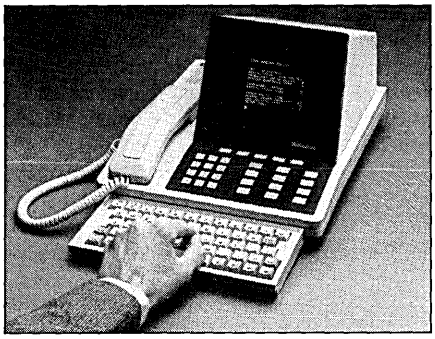
While Displayphone was a great concept product that set imaginations on fire within the vendor community, its price of $1,500 made users balk. Even though the price has dropped to about $1,200, shipments have been disappointing. In a telephone market that measures success in six-figure shipments, the Displayphone has shipped an estimated 25,000 units in its four years on the market.

Since the introduction of Displayphone, at least 10 vendors have jumped into the market with similar devices. These vendors include Televideo, Tymshare, Basic Telecommunications, Ambi, Zaisan, Davox, GTE, AT&T, and Rolm. None of these vendors has had any success selling to end users, even though the capabilities and price/performance ratios have improved considerably.

Today, most telephone/terminals have a 9-inch crt screen rather than the 7-inch screen on the Displayphone. Options include 1,200bps modems, memory expansion to well above 100KB of internal storage, cassettes for off-line storage, VT-100 and IBM 3270 terminal emulation, RS232 interfaces for connection to outboard modems, text editors capable of storing a few pages, and full electronic mail capability between devices from the same vendor.

PHOTOGRAPH BY PETER ANGELO SIMON

The limited functionality versus the high price is the most important drawback today.



Northern Telecom's Displayphone.

Prices range from about $895 to $2,300.

Why have integrated telephone/terminals failed to attract users? There seem to be three reasons:

- limited functionality versus price,
- lack of integrated voice/data "roadways" to deliver missing functions, and
- lack of a suitable distribution channel.

The limited functionality versus the high price is the most important drawback today. Telephone/terminals, when all is said and done, deliver nothing that isn't done manually today. Users are hesitant to spend $1,000-plus for a device that automates dialing, has a calendar, and houses a tiny Rolodex of users.

More important, the telephone/terminals compete for the same desktops as personal computers, which provide word processing, spreadsheets, databases, etc. For users, there is barely a choice. They buy the pc every time. While telephone/terminal vendors say that their devices are designed for executives and knowledge workers who don't require the more expensive pcs, it is doubtful that such a market exists.

In other words, telephone/terminals do not meet the minimum nutritional processing needs of the overwhelming majority of today's professionals, knowledge workers, and executives. This leads to the second problem—no integrated voice/data roadway to use in connecting these terminals to centralized hosts, so that processing power can be delivered without putting expensive pcs on every desk. Until then, it is doubtful that the simple telephone/terminals have much of a chance in the mass market despite all the investment dollars and hoopla that surround them.

CHANNEL TO USERS MISSING

Still, many telephone/terminal vendors will disagree with this analysis and that leads to the third problem. Even if a market does exist, there is no distribution channel that leads to potential users. At present, the major distribution channel has been telephone system distributors.

PBXs and telephone systems are sold directly or via independent distributors to telecommunication managers in large firms or office administrators in small and medium-sized companies. Typical telephones range in price from $80 handsets to $600 phones with auto-dialers and speakers. The telephone/terminal is double the price of existing devices, which makes it difficult to sell as part of a family of telephones.

The telecom managers also have little experience dealing with the end users who ultimately purchase the terminals. While telephone/terminal vendors, for example, have signed deals with numerous PBX vendors and distributors, including New England Telephone's Sonecor, ITT Telecommunications, Bell Atlantic, and Stromberg-Carlson, nobody has developed a strategy to put the terminals in front of their users.

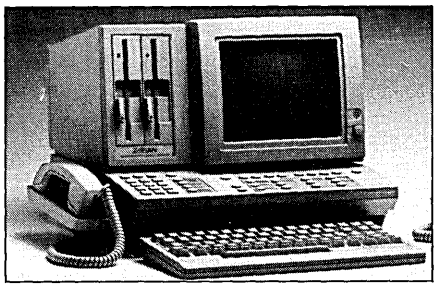
Edward Horrell, president of Mitchell & Horrell, Memphis, a well-known telecommunications management consulting firm, says that telecommunications managers are unlikely to attempt to sell these products to their users, but will wait, instead, until demand comes from the end users. To back up his claim, Horrell told of one company that purchased an SL-1 from Northern Telecom and received two Displayphones free of charge. They were installed in the president's and chief financial officer's offices. The president had the Displayphone taken out and the cfo would not consider large purchases of telephones over $1,000.

Until this situation changes, the most logical approach to the market is via integration with a personal computer. In this way, users add terminal and telephone functions to a device with primary applications like word processing and spreadsheets. Unfortunately, there are pitfalls with this approach as well.

All popular installed pcs are single-tasking. An integrated IVDW, however, requires the ability to perform multiple tasks like searching a list of numbers, checking a calendar, and dialing, which is a strong part of their cost justification.

While the argument may have merit, this is of little value to single-tasking pcs that have to change programs every time a function must be performed. They're slower than manual systems. As a result, IVDW vendors have either built their own pcs with voice/data integration or developed add-on devices that overcome the single-tasking limitation.

In 1982, PBX maker Mitel introduced the Kontact, which was the world's first full-function integrated telephone/terminal/personal computer. Kontact was released, however, without an industry standard operating system, although Mitel introduced programs for word processing, spreadsheets, and data management.



Zaisan Corp.'s and ES.3.

Despite its functionality, which included a mini-electronic mail system and an easy-to-use interface, it was virtually ignored by a market that requires an industry-standard operating system. Mitel also chose an 8-bit microprocessor instead of the 16-bit one used by IBM on the PC. As a result, while Mitel subsequently added CP/M to the Kontact, the market passed it by with MS/DOS. Today, there is an installed base of about 3,000 Kontacts in North America, and while Mitel still markets the machine, it is all but dead.

Since the Kontact, a few vendors, including Zaisan and Rolm, have introduced IVDW personal computers. Those two face substantial distribution hurdles. The Zaisan ES.3, for example, is an IBM PC clone that is fighting for shelf space along with a dozen other clones. The Rolm Cedar is sold only to Rolm PBX users. AT&T is also readying its long-awaited Safari workstation (which is being developed by Convergent Technologies) and faces the same hurdle. In a pc market dominated by IBM and Apple, it is hard to establish a presence.

FACE A CIRCULAR PROBLEM

Ken Dickens from Cygnet, a company that markets an add-on IVDW device for the IBM PC, said that vendors face a circular problem. Users aren't aware of the benefits of integrated voice/data devices, which makes the cost of publicizing them expensive for any firm, even an AT&T. Most dealers, however, are responding to demand from users, rather than trying to lead the market by finding attractive new products. As a result, Dickens says it is almost a herculean task to establish any new pc on the market, even one with capabilities that far surpass those of a single-tasking pc.

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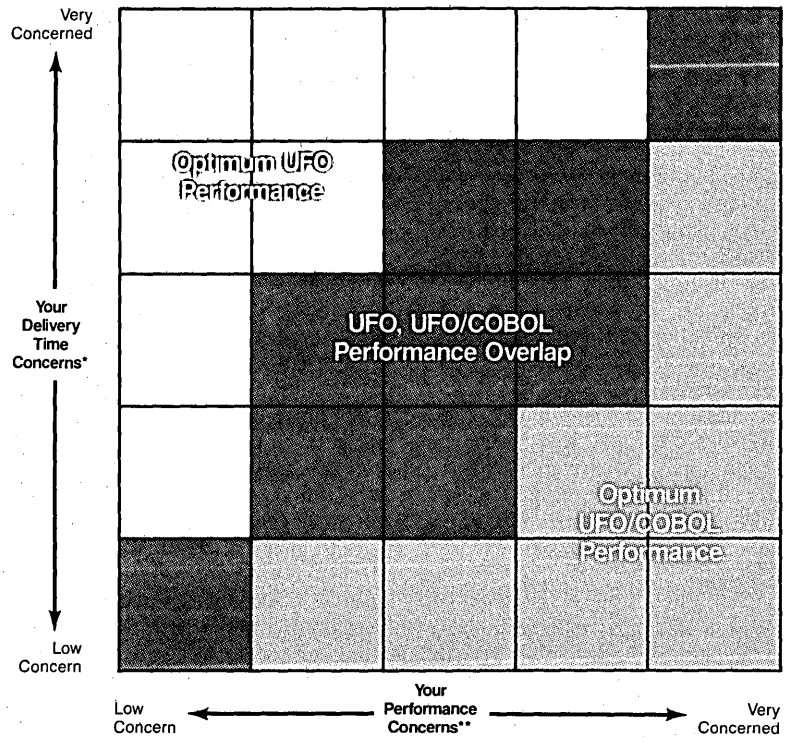

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CIRCLE 58 ON READER CARD

Most dealers are responding to demand from users, rather than trying to lead the market by finding attractive new products.

most sensible in today's market is to develop an add-on device for personal computers. Cygnet has led the charge into this market with the Co-System, a complex device that blends sophisticated software with a high-powered telephone/terminal. Cygnet is a blue-chip startup whose founders include Federico Faggin, developer of the Zilog Z80, which was one of the mainstays of the early pc era.

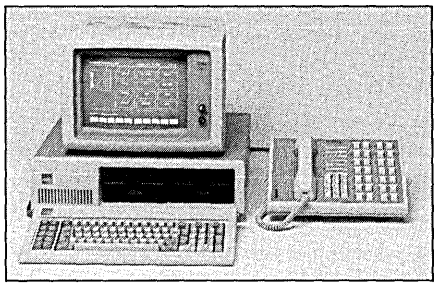
The Co-System is linked to an IBM PC via an RS232 port and includes software that allows an application program running in the PC to be put on hold so the user can perform telephone/terminal functions. When the IVDW function ends, the user is instantly switched back to the PC program. Co-System is far more than a simple telephone/terminal. It has a text editor and mini-mailbox to allow it to exchange electronic mail with other Co-Systems. It also logs incoming and outgoing calls, allows the user to add an account number, and produces reports on usage. It can send a program to another PC, with dual cursor control, so that two people can talk together while they simultaneously make changes to a spreadsheet or word processing program.

The Co-System's biggest problem is its price. With a 1,200bps modem, the Co-System costs about $1,900, which is $1,400 more than just adding a modem and foregoing all the other sophisticated capabilities. This gets to the crux of the IVDW issue—are they really worth the price for their functionality?

When users see IVDWs in action, there are mixed reactions. Few people dislike the capability, but most aren't willing to pay $1,000-plus for devices that do little more than automate existing manual functions. Vendors can argue about productivity gains until they're blue in the face, but users see the gains as being marginal at best and specious at worst.

Let's say an IVDW saves 30 seconds per call and that a user makes 20 calls per day. The total time saved is about 10 minutes. For a manager who costs a company $60,000 per year or $270 per day, that would improve productivity by 2%, saving $5 per day or $1,100 per year. In theory, an IVDW would pay for itself in a year.

While the argument is probably valid, the IVDW's "savings" are in soft dollars of time, rather than hard dollars of overhead. How many managers in the world are so disciplined that they would benefit from a device that saved them 10 minutes a day? Most managers probably fritter away far more than the 10 minutes they would save with an IVDW. Even if 20 minutes a day were saved, most managers question whether the savings would be put to practical use.



Cygnet Technologies' Co-System with an IBM PC.

IVDW vendors who expected the world to beat a path to their doors have had a rude awakening. Cygnet, for example, expected a warm reception from pc dealers and even developed a plug-in card for the PC XT that used voice synthesis to allow the Co-System to demonstrate itself. The dealer didn't even have to train sales personnel to sell it. Cygnet's retail program has been a total failure nevertheless. The general market has simply not been interested.

Cygnet has found modest success in selling a few thousand Co-Systems to closed user groups in communications-intensive environments. The main selling feature, according to Cygnet's Dickens, is the electronic mailbox, not the user directory, terminal, calendar, or accounting subsystems. Companies using the Co-System include the Internal Revenue Service; the investment banking firm Hambrecht & Quist; ComputerCraft, Houston, a computer retailer; Eaton Corp., a manufacturer of electronic components; General Electric's Lighting Business Group; and select high-powered professionals primarily in the finance area.

TELEPHONE TAG IS WIPED OUT

At the IRS, in Washington, D.C., for example, about 30 staff members in the Office of the Assistant Commissioner use Co-Systems to ship messages among each other and also to automate their personal communications. Ron Renoud, the system's planner, says that the Co-System is justified because it eliminates the rounds of telephone tag that formerly plagued department staff members.

Dan Goldman, the director of training at ComputerCraft, said his firm added Co-Systems to a network of 41 IBM PCs that already had modems to allow communication between their various stores. The Co-Systems are cost justified, he said, because they allow unattended transmission and reception of documents, which include sales reports, price changes, special sales prices, and other time-sensitive material. Their previous network required people to stop their processing task, load the communications program, receive the document, and print it out.

Another vendor, Davox, has shipped about 3,500 of its Data/Voice terminals to IBM users. The Davox terminal merges an IBM 3270-compatible terminal with telephone capabilities. It is used by firms like Morgan Stanley and Co., Owens Corning, Polaroid, General Motors, Michigan Bell, Cummins Engine, and Uniroyal for applications such as customer service, telemarketing, brokerage, market research, financial planning, freight tracking, and purchasing. To justify the workstation, each application requires the operator to use the telephone while simultaneously accessing the IBM host.

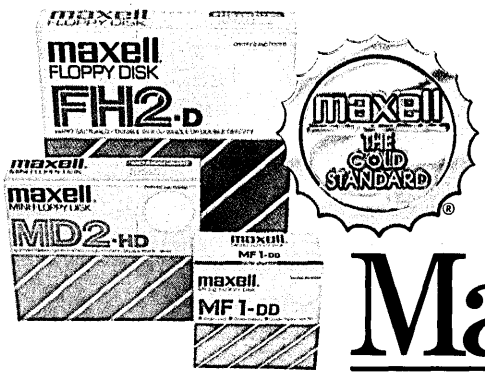
Despite the millions invested in developing IVDWs, the reality is that they are little more than niche market products for two groups: executives who like the latest electronic gadgets, and the select closed-user groups that value IVDWs for electronic mail applications. The reason for the low shipment level is price, however, not the perceived value of their functionality.

As microcomputer operating systems increase in sophistication, it becomes far less expensive to develop add-on IVDW devices for personal computers. Both Cygnet and Ambi, among others, are working on low-cost phones to plug into pcs. But the real proof of this demand comes from the success of the latest micro software craze—desktop accessory packages.

Borland International, Scotts Valley, Calif., opened up the market with a package called Sidekick for $79.95 (or $49.50 with copy protection) that allows a calculator, notepad, calendar, directory, ASCII table, and phone dialer to function concurrently with an application program in an IBM PC. Telephone dialing is done through the PC's existing modem, which must be connected to a telephone handset. The product was introduced in November and sold an estimated 85,000 copies in three months.

This new market segment is developing so fast that Sidekick is already obsolete. San Jose-based Amber Systems has developed a package called Homebase that has 13 more desktop functions, including the ability to emulate a communications terminal.

Apple's Macintosh is also a prime machine for IVDW software. The Mac comes with a set of desktop accessories built in, including a notepad, clock, and calculator. Third-party vendors like Cali-



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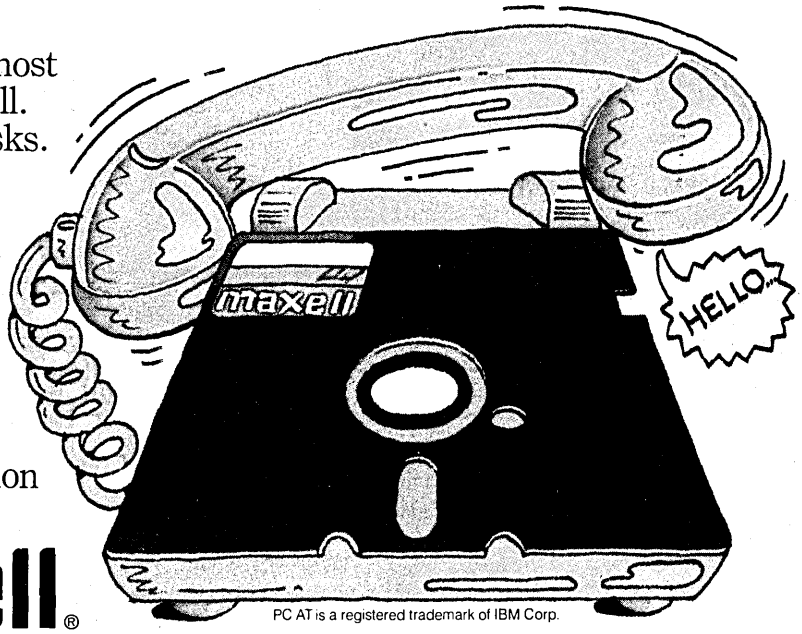

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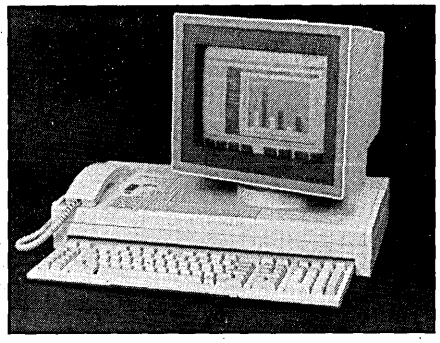

Northern Telecom's Meridian 4020.

Wang and InteCom's IVDW prototype.

The Ambiset, by Ambi Voice/Data Systems (also available with 9-inch crt display).

fornia companies Haba Systems of Van Nuys, EnterSet of San Francisco, and Intermatrix of North Hollywood are developing calendars, phone dialers, and other productivity tools to function on the desktop, allowing the Mac to run a program and use the accessories simultaneously.

Intermatrix has several different desktop packages. Its flagship product, Harmony, combines a complete database management system, telecom software with auto-log-in capabilities, telephone dialer, time manager and calendar, project and account manager, and a print spooler. When used with a Mac 512, the package is coresident with other Mac applications programs, including Lotus Corp.'s Jazz.

By midyear, it is likely that desktop accessories from a few dozen companies will flood the IBM PC and Macintosh markets. Shipments of packages in the $50-$200 range could easily reach 1 million units by year-end, topping $80 million in sales. In short, while today's IVDW terminals are selling slowly, price again seems to be the barrier. When price drops to an increment of $100 to $200 above the cost of a modem, demand increases noticeably for even limited functionality.

While price is one key to IVDW functionality in pcs, the ultimate key for IVDW devices will be integrated voice/data roadways, which are also just reaching the market. Advanced PBXs like AT&T's System 75, Intecom's IBX, Mitel's SX-2000, Rolm's CBX, and Northern Telecom's recently announced Meridian Family should open the doors wide to IVDWs, although it's still not certain how quickly users will jump in.

At this writing, Northern's Meridian family is the most advanced in terms of available functionality, although the other PBX vendors are close behind and the OA vendors are also approaching the market via projects with PBX companies. The Meridian is far more than a telephone switch. It is an integrated office system that also happens to switch voice calls. For starters, the Meridian has pathways from the switch to the workstations that operate at 2.5Mbps, making it as much a LAN as a PBX. While it has its own IVDW, it can also handle IBM PCs operating as a central server to store programs and files. Meridian comes in three flavors. The DV-1 model is available as a standalone unit for up to 100 users. The SL-1 and SL-100 models are designed to integrate with Northern's existing base of PBXs, so any terminal connected to the PBX can access available services.

The Meridian has built-in application processors that provide users with a directory, calendar, integrated text/voice electronic mail, and forms management. The directory houses the names of users, system resources, and company contacts. Each user can also create his own personal directory, consisting of numbers in the central directory and private numbers. Whenever numbers in the central directory are updated, the changes are automatically reflected in users' personal directories.

The electronic mail system, which adheres to the recently adopted CCITT X.400 messaging standard, integrates text and voice messaging via a common in-box. The user sees a list of incoming messages and picks up the handset to listen to voice messages or reads the text messages on the screen. The forms management capability allows a company to create electronic versions of forms that are circulated manually throughout the office, thereby greatly speeding up the delivery of such forms.

MANY MORE PACKAGES PLANNED

The Meridian also has application processors that deliver full office automation functionality to any terminal on the network. Northern already supplies Quadratron's Q-Office integrated office package, along with the Informix relational database package, and will be releasing many more packages during the next few years.

Today's IVDWs are mavericks, so it's still too early to say whether they really improve productivity the way vendors claim they can. As someone who has used IVDWs as beta testers and also had a hand in designing a number of the IVDWs on the market, I personally believe that they'll prove to be most of what the vendors claim. But the truth, as I see it, is that nobody will be able to cost justify IVDWs any better than anyone has been able to cost justify the telephone. To this day, there has never been a study that has put a dollar value on installing telephones for everyone in a company. Nevertheless, there aren't many people who would conclude that telephones aren't worth their price. The same is likely to happen with IVDWs.

The major players in the office automation, computing, and PBX worlds are all converging on a central point—integrated office systems. In aggregate, they have spent a few billion dollars to develop these systems.

The real bottom line is that these products are just now hitting the market and it will take as much as a year or two for users to digest their implications.

IVDWs are really just one tiny piece of the movement to integrated voice/data systems, which are likely to generate as much hoopla and high-pressure sales noise as mainframes generated in the 1960s and MIS systems generated in the 1970s. ◉

Stephen A. Caswell is a principal of the Trigon Systems Group, Toronto, and the editor of the *EMMS (Electronic Mail & Micro Systems)* newsletter. Since 1981, he has been involved in evaluation, development, or testing of numerous IVDWs, including Northern Telecom's Displayphone, Mitel's Kontact, Zaisan's ES.1, Cygnet's Co-System, Ambi's Ambiset, and a number of the IVDW desktop accessory packages.

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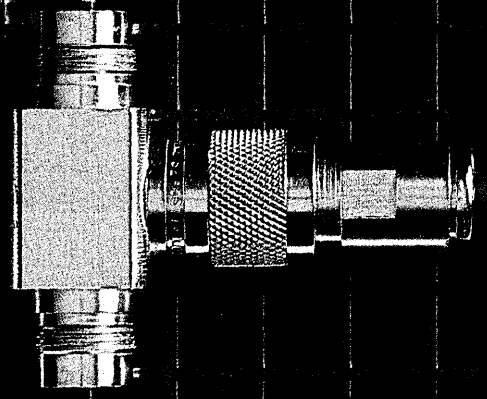

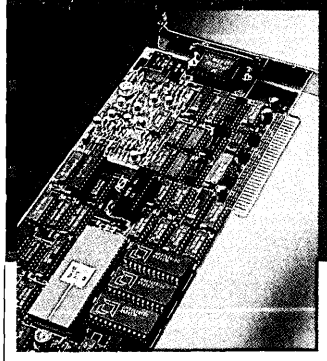

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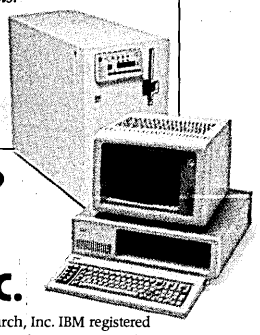

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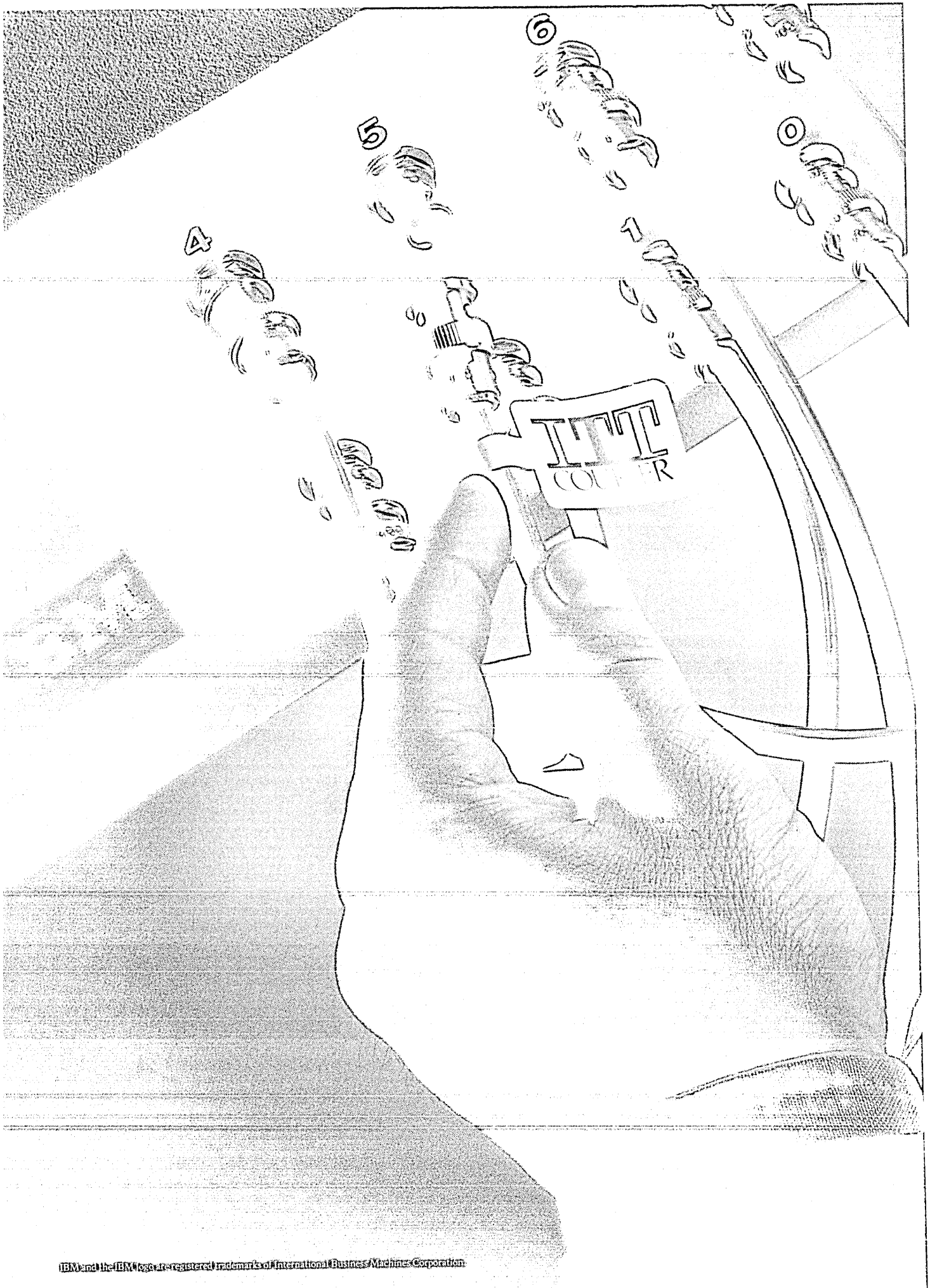

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Extended planning is in most cases an unnecessary and sometimes dangerous rite.

THE PLANNING RITUAL

by Stefano Nocentini

The data processing revolution of the past 20 years has made software development a priority item for large and small organizations. Since the late '60s, research has been undertaken to make that activity a regulated discipline based on structured methods. The methods are now well known, codified in various guidelines, and widely described in the literature.

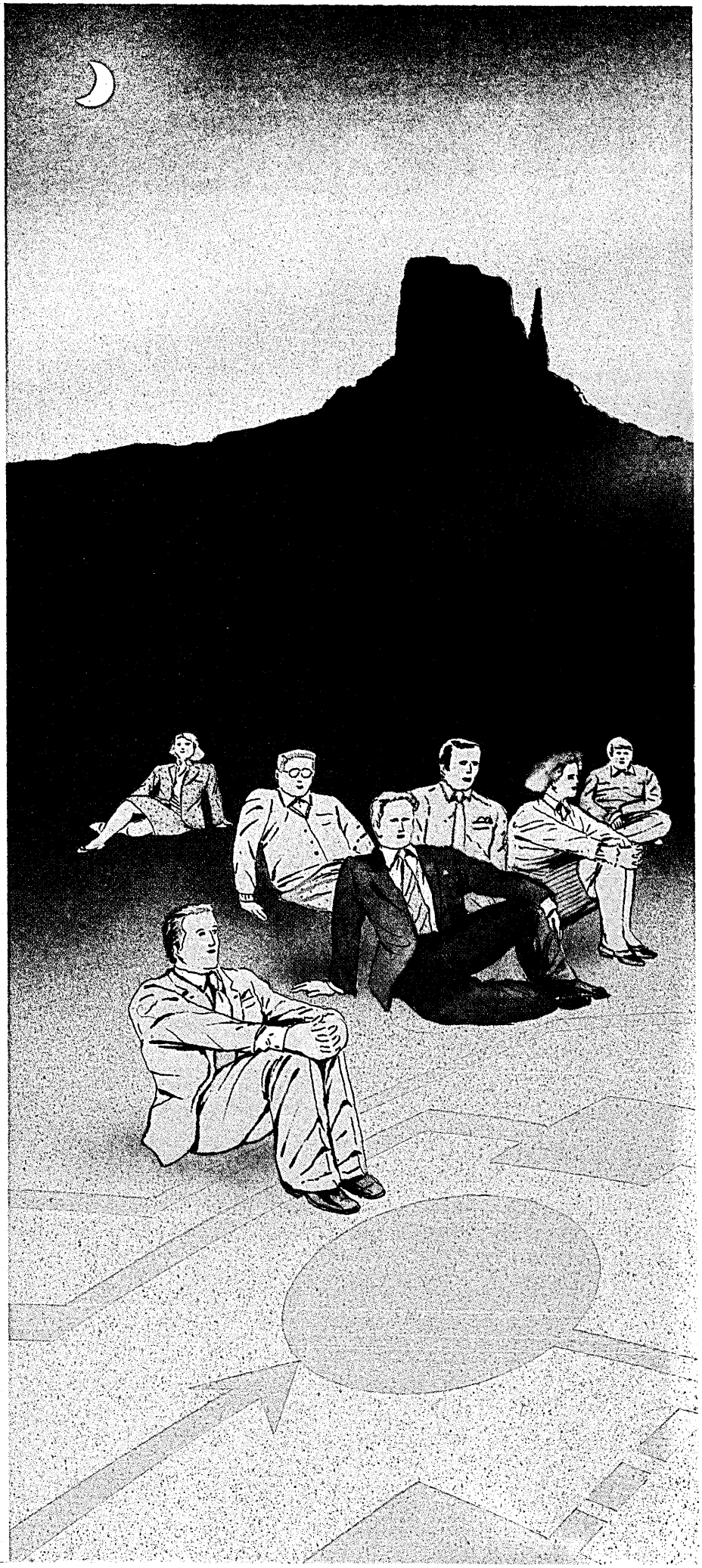
Nevertheless, companies realize more and more that software development today is far from satisfactory. Investments continue to grow, but obtaining really good software products out of the dp department is increasingly difficult.

What's wrong?

The world around us is changing. There is less structure, attention is moving away from internal problems to external reality, complexity and fragmentation grow, unpredictable changes take place, companies are organized more relationally than hierarchically, small flexible units are taking over from large staff groups. Quality, not quantity, is most important. It is now time to examine software development to see if it is evolving at the necessary speed to keep up with these changes. As a matter of fact, I am convinced that the main problem in software today is the heritage of the early '70s' emphasis on internal structuring, planning, and controlling, and the lack of attention to the reality outside the development shop.

It is time to point out that the emperor is unclothed. In the modern business environment, planning, controlling, and engineering disciplines have little to do with effective project management and the product's success.

I know of no case where a software project has been successfully completed by following the original plans laid for it. Contingencies, buffers, prudential estimates—nothing is enough to match plans with real life. Invariably, real life proceeds independently of good or bad plans, and the latter are adjusted to reflect the former. Further-



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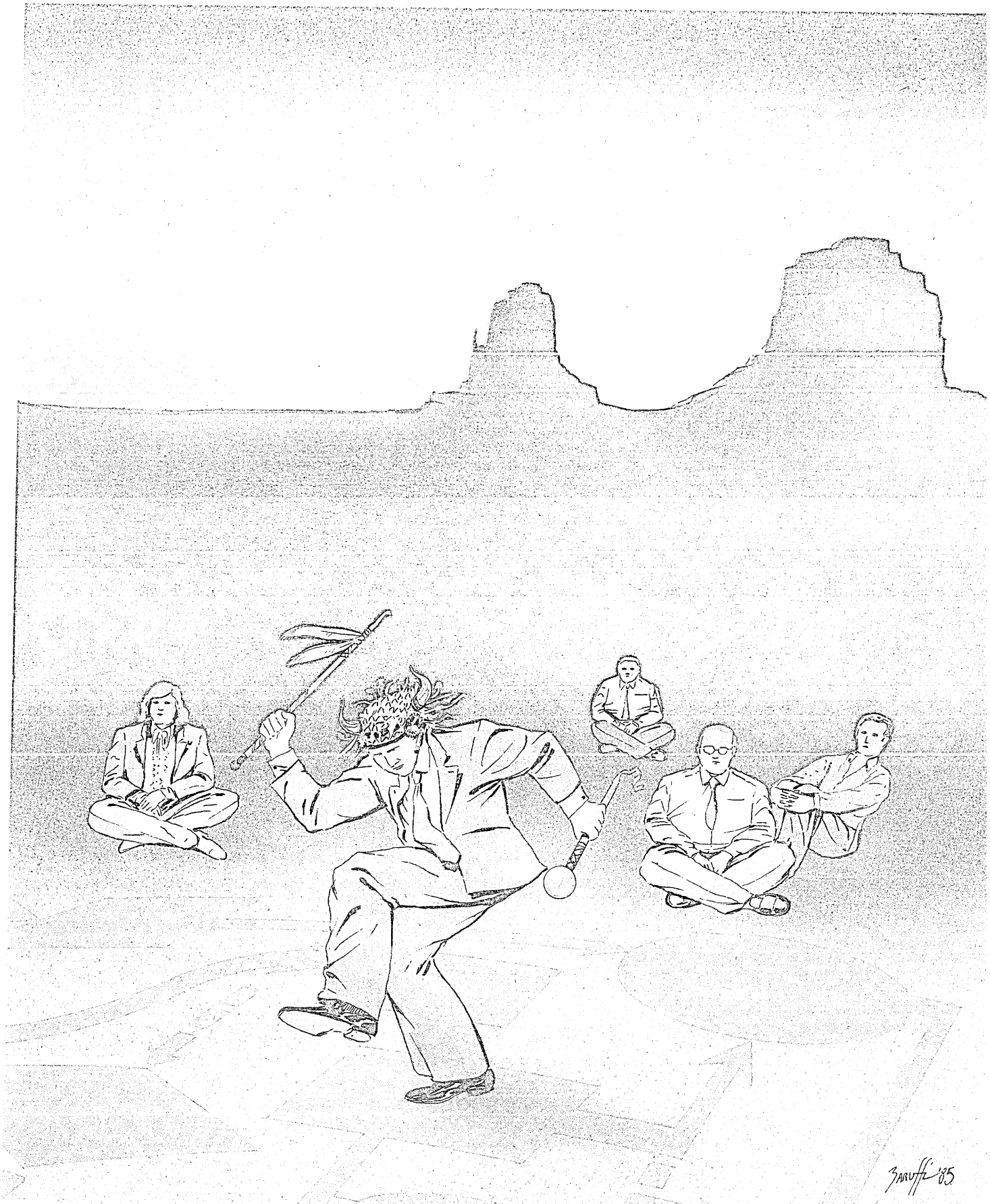
Baruffi '85

There is a scarcity of fairies handing out crystal balls and magic clocks.

more, it is not constructive to do something just because "it's in the plan." In each circumstance, the project manager has to decide what is feasible and perform it.

Planning in software development tends to become ritualistic. This happens when one is not able to realize that planning is just a tool, and cannot take the place of good management. I use the word ritual in its original sense, recalling the sorcerer planning agricultural projects in a primitive community. The first thing he does is plan for rain. It is important that it rain in given periods, and not in others, and that the right quantity, not too much nor too little, falls. The sorcerer is very accurate in his methodology: he knows that the smallest error will irritate the gods, and that then the rain will not come, or that it will rain too much. He dances following very accurate guidelines, and produces all that's needed in terms of dancing figures and sacrificed animals.

Will the agricultural project succeed that year? Maybe yes, maybe no. Certainly success will not be guaranteed by the wizard's planning to make rain fall when needed, but rather by the countrymen's attitude and their ability to exploit whatever situation that may arise.

FORCING REALITY'S PATHWAY

Nevertheless, no top manager of a tribe will ever allow the start of an agricultural project without adequate planning. The fact is that both sorcerers' and project managers' rites are based on the same theory—that is, "magic by imitation," a symbolic reproduction of reality whose scope is to "force" that reality to follow a desired path. By symbolically reproducing the natural phenomena of real life, either by dancing figures or by numbers on paper, nature will have an indication of the desired behavior and cannot escape homeopathically reproducing it. Too strong is the ancestral terror that, without magic planning, reality will get out of control, and possibly the sun will not rise the next day.

Planning is more successful than reality in software development because it satisfies one of the more urgent needs of human psychology. Plans are a reassuring simplification of reality. They are able to show that everything is understandable, foreseeable, and under control. They allow the project manager to easily perceive himself as the master of the play.

How reassuring, how obedient to the project manager's will are the numbers on a piece of paper! One can easily change them, sum, and manipulate them in all manner of ways. Do you need to change the job of one or 10 men? A keystroke and it's done. By adding or subtracting a number in a row, one has the consoling confirmation that each man is a constant resource and that they are all equivalent. Although insulting to people and false, these rough generalizations undoubtedly tranquilize the project manager.

Furthermore, difficult and suffered planning gives one the feeling of being "good," efficient, and engaged. Having done one's planning duty, one can sleep the sleep of the just. If one worries enough about the future, and there's any justice, then things will go better.

Extended planning is in most cases an unnecessary and sometimes dangerous management effort. In the best case, it may be a stimulating and amusing exercise, although not very relevant to a project's success. In the worst case, it may kill creativity, enforcing the concept that good management means only adhering to the prepared scheme. In this case, planning of the future becomes a substitute for actual effectiveness. The plan becomes more important than reality. As H. Cleveland writes in *The Future Executive* (Harper & Row, 1972), "If you try too carefully to plan . . . the danger is that you will succeed—succeed in narrowing your options, closing off avenues of adventure that cannot now be imagined."

A central item in the planning ritual is the estimating game. Estimating a software project means guessing the effort required to achieve it and deducing the project's schedules and costs. So said, the concept seems completely reasonable. On the contrary, it has always been one of the most misleading concepts in software development, a primary source of frustration and failure. Let's see why.

The strange inability of software project managers to produce "correct" estimates is well realized by such managers themselves. As reported by software theorist Tom DeMarco, a survey showed that the average dp project manager rates himself "substantially below average" as an estimator. This contradiction suggests there is something wrong in the estimating game itself.

Some authors write of an illness called "software optimism." Fred Brooks, in *The Mythical Man-Month* (Addison-Wesley, 1974), writes, "All programmers are optimists. Perhaps this modern sorcery especially attracts those who believe in happy endings. . . . So the first false assumption . . . is that all will go well, i.e., that each task will take only as long as it 'ought' to take."

Now, I think that project managers have had many opportunities to review their so-called optimism on schedules, and that the failure in estimating really comes from applying a deterministic approach to a creative process.

DETERMINE USING MAGIC

Let's assume for the sake of discussion that the software development process can indeed be considered deterministic. With the help of a magic crystal ball that a fairy has presented to him, the project manager is able to foresee and list all the project activities in their exact succession. It is possible that the fairy helps him again with the gift of a magic clock. But, if the fairy fails to arrive, he has to guess the needed times on his own. Now, the time needed for any single activity has a minimum T, which is the sheer technical time required to perform a task, assuming that all goes well, without any problem or interruption. On the other end, there is no upper limit. Unquantifiable events of any nature can increase the required time by orders of magnitude, and the duration will rapidly approach infinity. In that case, the activity is impossible to accomplish, so it is better to cancel it and begin to explore another path.

Where to position between T and infinity becomes a key question. Whatever value the project manager chooses, he will never be able to demonstrate that it is the right one. Only one value is rationally demonstrable: T. So, fatally, each activity is assigned its technical value. And, since the project is approached as a sum of its activities (another error), the total estimate will be the minimum technical time required to accomplish all activities.

In fact, there is a scarcity of fairies handing out magic crystal balls. The "exact succession of all the required activities" is a chimera. The software development process is not deterministic, as chemical processes are. It is the creative process, not manuals, that brings success. Development paths can vary widely (and they do) depending on the result of preceding activities, and any attempt to identify them all explodes very soon.

But where fairies fail, science can help. So, the manager decides to use one of the "scientific" estimating procedures available in the marketplace, which call for a procedure somewhat like this:

1. Determine the number L of executable lines of codes in the final program.
2. Increase L by a contingency factor—30% works in most cases.
3. Compute M=L/P, where P is the man-month productivity (lines of code written by the average programmer in an

SCIENCE/SCOPE

After slowing from 107,000 miles per hour to subsonic speeds in just two minutes, NASA's Project Galileo Probe will take the first direct samplings of Jupiter's atmosphere later this decade. During its plunge through the brightly colored clouds, much of the Hughes Aircraft Company probe's forward heat shield will be eroded by temperatures of several thousand degrees. Once the probe has slowed, a mortar in the rear heat shield will fire to deploy a parachute. This parachute will pull off the back cover, releasing in turn the main parachute. Small explosives will release the front heat shield from the descent module. The parachute will slow the descent as the shield continues into the interior of the planet. Data will be transmitted to an orbiting spacecraft for relay to Earth. Project Galileo is set for launch in May 1986 and is scheduled to arrive in August 1988.

An antenna system made entirely of composite materials is operating on LEASAT, a communications satellite launched last year from the space shuttle. The antenna's structural elements and fittings are made of carbon powder, fiber, and epoxy. This approach eliminates metal pieces that cause spurious signals when impinged by many different high-energy radio signals. The carbon powder also improves the conductivity of the outer surface of the antenna and prevents arcing, the harmful build-up and discharge of static electricity. Hughes built the 7.5-ton LEASAT for operation by a subsidiary, Hughes Communications Services, Inc. The Navy leases capacity for all U.S. military services.

A new 5-volt-only, 256-bit nonvolatile random access memory combines the data retention capabilities of an EEPROM with the convenience of a CMOS RAM. The Hughes circuit, designated H13500, is designed for such applications as reconfigurable systems and fault protection without battery back-up. It is organized as 64x4 bits. Both the read and write operations are performed as in a standard CMOS RAM. A single store operation transfers all data in the RAM cells in parallel to the background EEPROM array. The recall operation restores data in parallel to foreground RAM cells.

A new laser that better penetrates battlefield smoke, haze, and dust will let tank gunners determine the range of any target they can see with a thermal imaging system. The laser is the first carbon dioxide laser rangefinder developed in the U.S. for tactical military applications. It determines range based on the few millionths of a second it takes a laser pulse to reach a target and reflect back. During advanced development tests, the rangefinder demonstrated greater performance under obscured battlefield conditions than the solid-state lasers currently used for military rangefinding. Because the laser and the thermal imaging system operate in the same wavelength, they have the same performance characteristics under battlefield conditions and bad weather. The Hughes laser is also harmless to the human eye and can be safely fired during training exercises. A development model has been configured for evaluation in the M1 Abrams main battle tank.

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Software development is a creative process, not a deterministic one.

average month), giving total man-months.

4. Parcel M among software development phases using standard percentages.

These kinds of tools are quite successful with numbers-oriented project managers. In fact, they are able to produce hard and unambiguous numbers, and allow supporting the estimates by claiming the usage of a "mathematical" procedure. But, frankly, they are a perfect example of garbage in, garbage out.

As a matter of fact, using classic arguments it is easily shown that the variables L, P, and M have little meaning at all: one can only know the number of lines of code at the end of a project, not at the beginning. Lines of code have a different meaning for different languages. The productivity of two programmers can differ by an order of magnitude. Men and months are not interchangeable; nine women do not bear a child in one month. Above all, the assumption that software development is a deterministic process influenced only by two basic variables is not even an acceptable approximation. There is no "correct estimate" but rather an infinity of combinations and activity paths.

Now, the project manager has some numbers, although he realizes that there is little chance they have any sense whatsoever. Anxious and doubtful, he reports to his boss. The boss listens patiently to the project manager's considerations, but when the numbers come, her face hardens, the smile disappears, and the project manager is invited to reconsider his estimates. Four, five, six different plans, based on different assumptions (more manpower, fewer functions, any combination), are produced and examined each day with a frantic rhythm. When the whirl of numbers stops, the project manager, now submerged in paper, doesn't realize where he is. Later on, in discussions with the boss, he will realize that the restrictions have been mysteriously reabsorbed, and that the assumptions have been backed up to their original form, even though the estimates are now substantially reduced.

ESTIMATE USELESS, HARMFUL

Notice that the competitive estimate is not only useless for real management, but is detrimental. If the estimate is low, project people will strive to respect it anyway, at the expense of quality. If the estimate is large, they will merely take it easy, and that will not ensure respect of the schedules because of last-minute problems.

Exiting the contention process, the project manager has no idea if there is any possibility at all to meet the "accepted" estimates and schedules (no magic balls and clocks are available). Anyway, he is happy being finally allowed to start real work, and stop fighting over crazy numbers. Furthermore, his boss smiles again, giving him a confusing feeling of being appreciated and supported. "I have no idea if the accepted estimates can be met, but I will do my best," he thinks.

The boss has no idea either if the "accepted" estimates are right or wrong. She suspects that both the original and the accepted schedules are fairly optimistic and probably unattainable. She lost her illusions long ago and knows that any estimate is probably rubbish, but she is satisfied with having lowered them, because she thinks that the shorter the schedules are, the harder the project manager and his group will work.

Furthermore, what is better than project estimates to enforce control? They are expressed in terms of unequivocal numbers. They are not subject to interpretation. And, finally, the numbers have been produced by those people being managed, so by definition they are accepted and shared by them.

As soon as the estimates are produced, they are included in a presentation to top management. The numbers are used to calculate costs and demonstrate profitability. Now, top managers are not always experts in software projects, and maybe they don't fully understand what the project really means, but they are diabolically able to remember the numbers. However banal it may seem, the awareness that the top manager will not forget the presented schedules and costs is a powerful deterrent to making changes later. So disrespect of the accepted estimates becomes the number one taboo in the department, and the mechanism of the accepted estimates as objective is strongly reinforced. Initial plans, budgets, and programs become immediately "the thing to do" and take the place of creative choices.

When the project manager realizes that the accepted estimates are not considered "best guesses" at all, but his working objectives, he loses the sense of the "real" project. He knows that respecting the schedules is not his only objective, but he also knows that the other objectives are not so immediately measurable and evident as a schedule's slippage. His attention will not be focused on producing a good product, but on being on schedule.

I have seen projects in which the criterion for success was the adherence to quantitative, predefined standards, and the orientation to schedules approached frenzy. The project manager can, for example, give every person on a project a time-scheduled objective and then periodically score them on how well they've met their goals. By posting the scores on a bulletin board where all can look at them, peer pressure comes into play. The higher the score, the better the developer. One can also proclaim the "Developer of the Month," the "Half-wit of the Week," and so on.

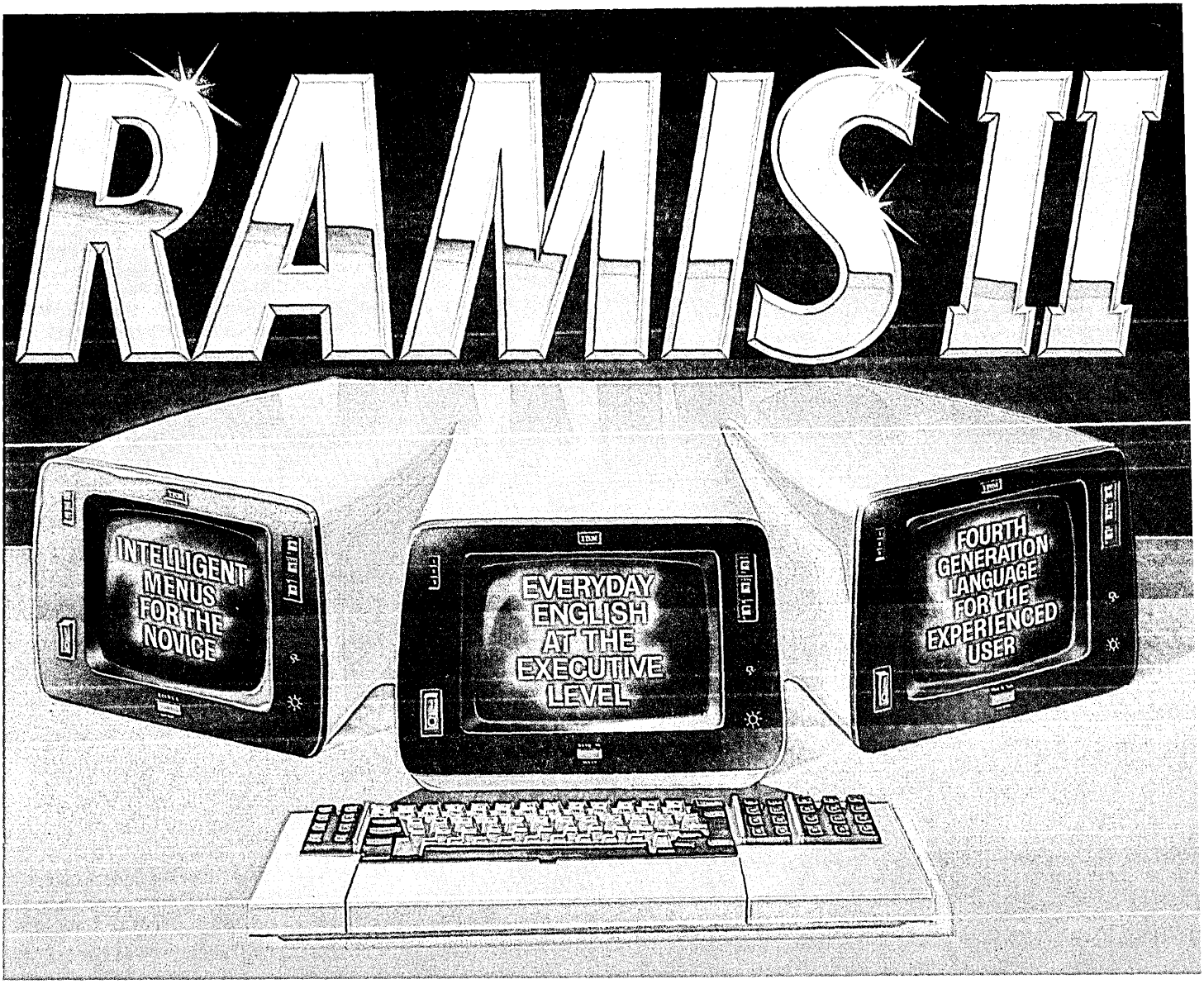
This of course has nothing to do with real product quality, but there is a confused hope that this competitive mood will make things better anyway. No end user will ever be happy with an irrelevant product that successfully respected the schedules. Bad criteria do not become good just because they are easily quantifiable and measurable. That kind of approach paves the way for failure. And, sometime after failure, unfailingly someone will again wonder why the project managers are so optimistic in their estimates.

CELEBRATE PROJECT REVIEW

The planning and controlling religion not only has its dogmas, but also its celebrations, which are called "project reviews." The official aim of this ritual is to check the project's current status. But, as always in religious practices, there is a deeper and more significant symbolism at work. In this case the mystic value is that of a collective celebration, a showing to the gods that rules and commandments are accepted and respected by everyone. Checking is done against internal parameters and data, the schedules, rules, and guidelines that constitute the bible of the religion. If all the priests agree that the rules have been respected, then the product will be "good" and worthy, and therefore successful. The expected return on this investment is that the gods will realize the faith of their people and guarantee success and prosperity.

The project review celebration has another hidden function. Like the Catholic confession, it is cathartic. The project manager is asked to admit all his sins, such as slipping schedules and other deviations, and if he shows firm resolution never to sin again, he is forgiven and leaves the review with a clear and relieved conscience. Everyone knows that he will sin again, because man is fallible and the flesh weak, but for the moment he can resume his work with renewed spirit.

Notice that all these expensive celebrations do not produce any improvement in real management or the chances for product success. The religion's credo, "A software product's 'goodness' depends on adherence to the plan and to a predefined set of rules and guidelines," not only



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The most important planning papers reside in a drawer in the desk of the project manager.

doesn't improve products, but is a formula for planned mediocrity.

The planning and controlling syndrome has produced a number of project managers afflicted with the "numbers sickness." It is a diffuse behavior, not easy to define, but like the apricot's flavor, you will recognize it as soon as you taste it.

Here are some characteristic phrases that point to the affliction:

"Fact, not opinions."

"Tell me what, who, when, where, why, and how."

"How many . . . ?"

And these are the major symptoms (beware, they are contagious!):

Rationalism. Anything rational and explainable in logical terms is accepted; if not supported by a rationale, it is rejected. When asked to explain an event or situation, the rationalist doesn't explore its real meaning, but tends to figure an answer reasonable and satisfactory from a logical consistency standpoint.

Intolerance of ambiguity and of uncertainty. Does not accept indetermination. Needs to have all numbers (plans, people months, costs) accurately determined even before the project is started. All must be clear and exactly specified in writing. Emphasis on detailed "action plans," on short-range objectives and checkpoints, on "getting things done anyway," rather than on doubt, thought, and thorough analysis. Need for dividing everything into two mutually exclusive groups. Alternatives are always between yes and no, black and white.

Overorganizing, perfectionism. Detailed description of everybody's tasks, schedules, job profiles, leaving no space for free contribution. Doesn't allow anyone to go beyond the bounds of his specific job. Satisfaction with formal exactitude, formal respect of milestones, brilliant appearance, aggressive presentations, mathematical intelligence.

Excess of planning. Everything must be identified and foreseen a priori. Every task, every date, every expense must be calculated in advance. Programmed schedules, fixed expiration dates, mandatory commitments. In the extreme, can show coercive programming of any action, dangerously near to mental disease. If plan and reality do not coincide, the project manager is inclined to think that reality is wrong, not the plan.

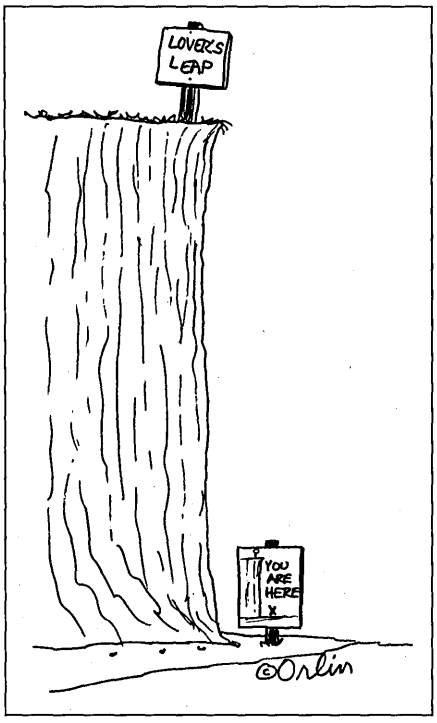
Quantification. Bad but "hard" numbers and facts are better than good but "soft" ideas and opinions. If something cannot be expressed in terms of numbers and quantities, then it has no real value; it does not exist. Emphasis on words, written papers, description, cataloging. Asks to know things "as they are" rather than discussing and exploring in a creative way.

PLANNING CONCEPT DANGEROUS

In short, the traditional concept of planning is not only not helpful for effective project management, but dangerous, and has to be changed. Cleveland states, "The future executive will need a definition of planning: improvisation on a general sense of direction."

In complex environments, problems are solved through successive approximations rather than through precise, invariant definitions. Most of the variables in play are not clear; the elements the project manager has are a mix of data, ideas, feelings, and tendencies. He operates in a multiform world that he has to filter through experience gradually to form a complete framework. Real, complex things are not always exactly quantifiable. Alternatives are not always between a yes and no. A certain degree of ambiguity and uncertainty is normal, unavoidable, and positive.

There is no need for complicated PERT networks covering all the walls, or of extended forecasts spanning months and years, in order to maintain control. Essentially, the project manager needs to have very clear ideas of what he wants to do, of the objectives he wants to attain, the strategy he wants to enforce, of the major problems he will have to face and solve. He also he has to maintain an operative plan that covers a short, manageable period.



The bureaucratic papers around software projects are not dangerous by themselves: they are rather neutral, like the rain dance. It won't make the rain fall, but neither will it prevent it. The truly useful paper tools of a project are not in any of these hundreds of pages. They are in the project manager's desk drawer and consist of some pages that he has personally and carefully produced and updated by hand. With the exception of really large and complex projects, which I strongly discourage, this is the only indispensable paper needed to support good project management.

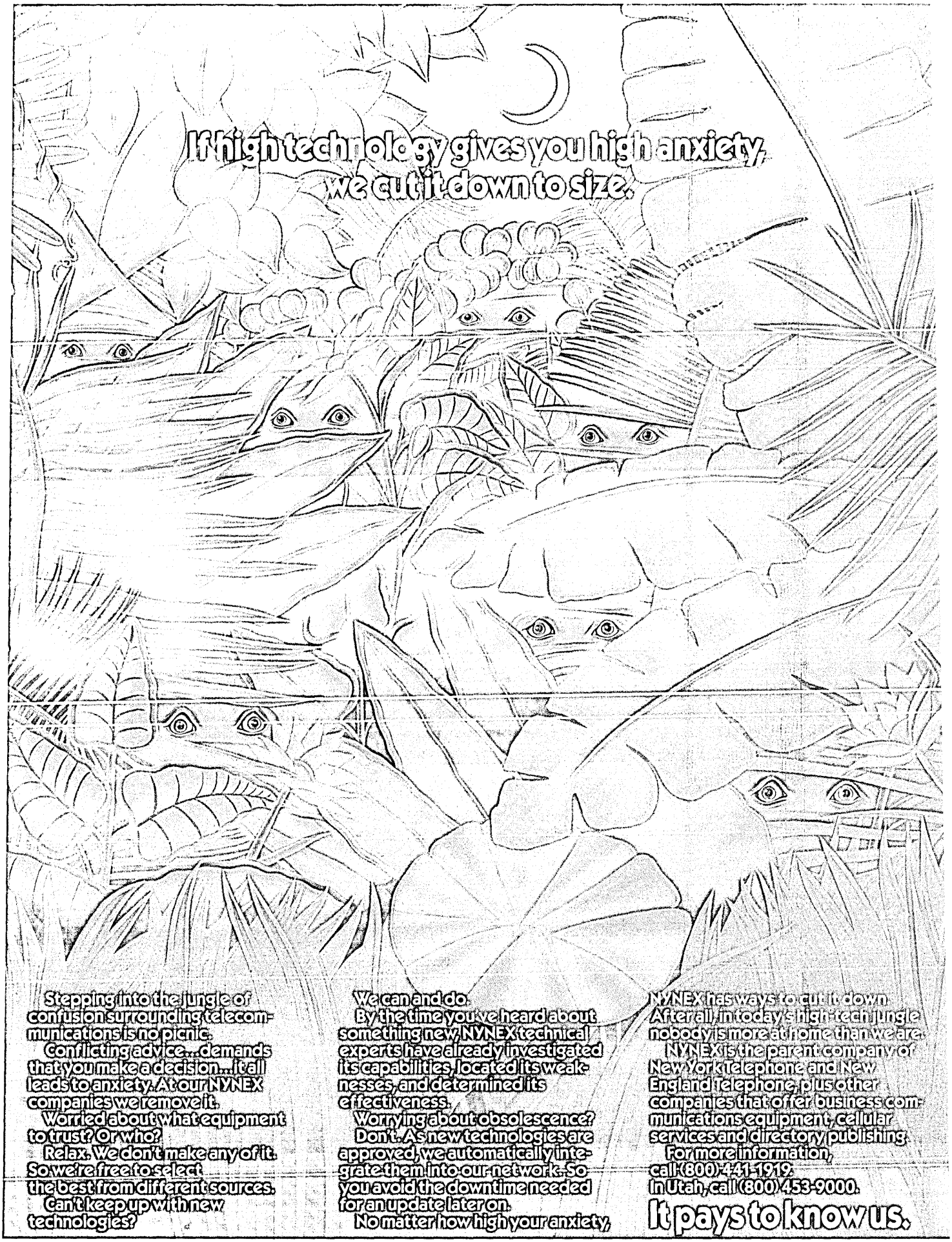
The key points for redirection are the identification and the education of future managers. Only an evolving approach is suitable to pave the way for change. On the contrary, a training/learning approach can only perpetuate the existing situation, by transmitting consolidated techniques. This is a sure way for an unsuitable system to reproduce itself.

It is necessary to stimulate doubt, criticisms, reflection on the fact that nothing exists definitively. The concept of a knowledge that can be purchased and memorized, rather than be personally conquered, is not effective for creative software development. The key point is developing the human potential of future managers, not their knowledge. It is not relevant to improve the quantity of their notions, but the quality of their personalities.

This way, their ability to face the challenges of the modern environment will automatically be strengthened, and they will use it in a creative way whenever the circumstances demand it. And their action will certainly be more effective than resorting to rules, guidelines, and control, however extended and detailed. Managerial effectiveness cannot be obtained through specialization. It is an easy and natural by-product of a life that is culturally rich, mature, and intense. In our society of growing complexity, unpredictable changes, and less structure, software will soon be called to play a decisive role. Renaissance men and women, rather than specialized thinkers, are required to manage this challenge. The accent should be shifted from mindlessly ritualistic quantitative concepts to true quality. ◉

Stefano Nocentini works at IBM's Florence, Italy, software development facility. He has managed development of an interbank communications tool and various applications packages. He lectures at the IBM European Systems Research Institute at La Hulpe, Belgium. This article reflects his personal opinions, not those of his employer.

CARTOON BY RICHARD ORLIN



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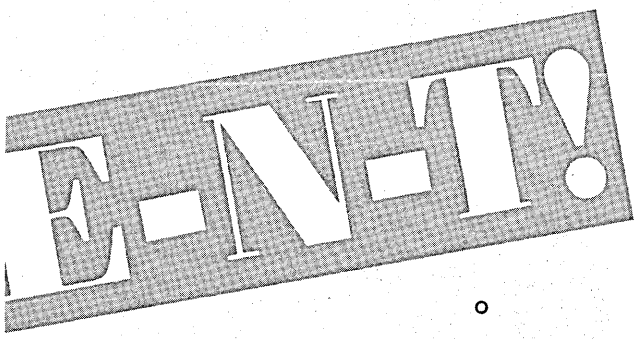

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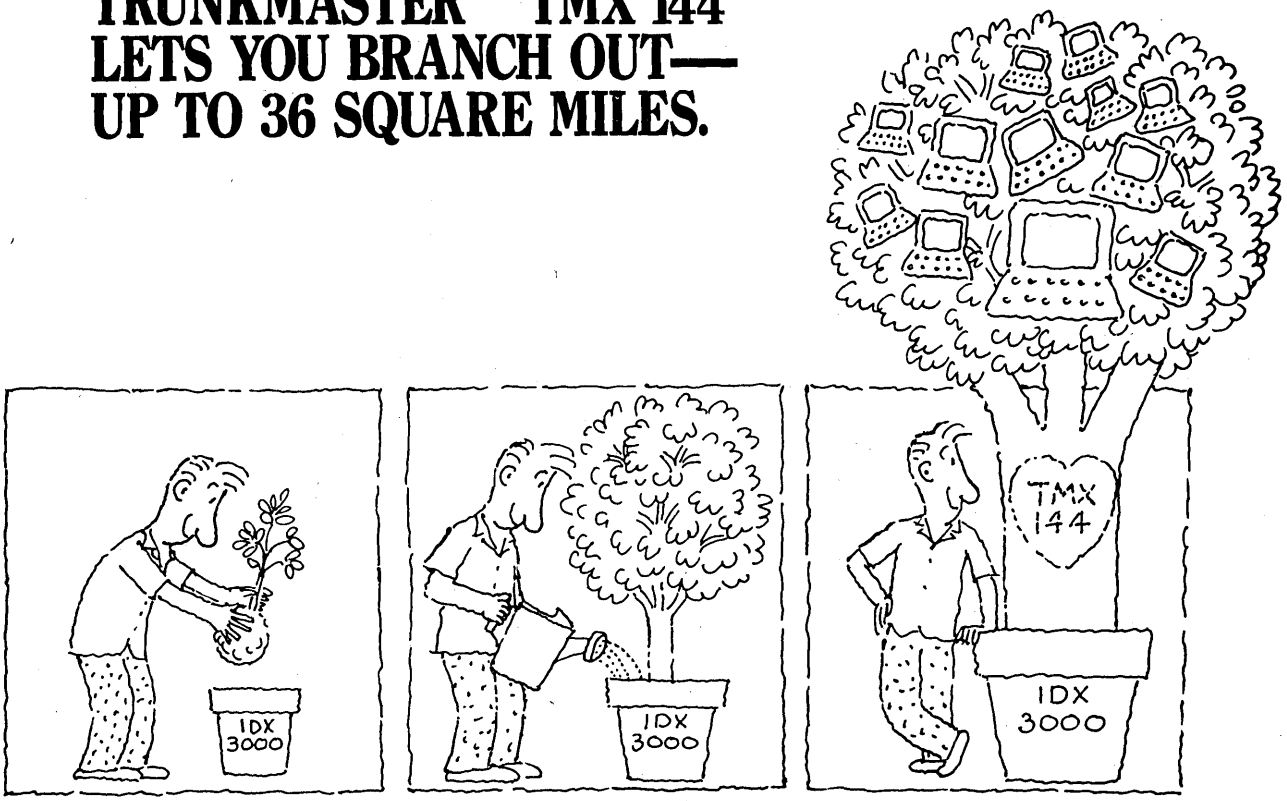

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It doesn't make sense to measure a group's productivity by the output of 10% of its time. There must be a better way.

MANAGING SOFTWARE DEVELOPMENT

by Patrick Brown

The real difficulty in managing software development is the fuzzy concept of exactly what is being managed. Development is typically managed using a phased development model, and a common form of productivity measure is the KLOC/month. Yet it is not clear that either phase development models or productivity measures actually represent development activities.

Development is often broken into several discrete efforts, sometimes called phases. Common phases are requirements definition, external design, internal design, code and unit test, and integration and system test. Managing this process involves the formal review of the products of each phase.

Requirements, external design, and internal design produce documents describing the results of analysis and design activities, constraints, assumptions, and future work plans.

The product of code and unit test is the delivery of tested code to the integration/system test group. Other than a check to make sure all components have been delivered, this phase is normally not reviewed.

Integration and system testing usually involves exercising all or most of the delivered system and either formal or informal evaluation of the test results. Generally, a sign-off or formal acceptance of the product ends the testing period.

It is interesting to note that a number of diverse skills are required to use the phase development process. Analysis and design are intended to be the primary activities in the requirements and design phases. The product being reviewed, however, is always a result of documentation skills. Documentation skills are necessary since poor documentation can ruin a good design. In the code and unit test phase the products are indeed program components that require coding and testing skills. The integration test phase has no tangible product but requires experienced testing skills and good data processing background.

There are severe problems with the phase management process. Documentation of the product is becoming an enormous burden. It is not uncommon for projects to produce design documents thousands of pages long. Producing such documents costs far more than any value they may have to anybody, including the authors. Few development groups use external design documents after internal design efforts have been completed.

Internal design documents share the same fate. The cost of maintaining a current version of the document is simply too large to make it feasible. Most groups resort to informal methods—or worse, no method at all—to keep track of changed designs. The document is normally of less value to outside groups than to the authors. Usually, an outside group wants to know about a small part of the entire product. Should a person read a 1,200-page design document to find the format of a single interface?

Another significant problem with the process is that documents are rarely compatible with one another. In many cases the production of the external design document is a separate effort from the requirements document. Similarly, the internal design document is a separate effort from external design. This makes continuity in design difficult. It is a rare development group that can trace every feature in a product back to a requirements statement, or that can demonstrate that every requirements statement has been satisfied by some design component.

An approach to explaining the problems is that while the phase process demands documentation, the development process requires information. Documentation is not a substitute for information. This will be soundly endorsed by anyone who has waded through a few hundred pages of documentation looking for a parameter format.

MANAGING DESIGN PROCESS

Additionally, emphasis on documentation encourages managing the design process as if it were a publishing business. Instead of creating hierarchic levels of design detail, we are faced with the problem of publishing design documents—volumes 1, 2, and 3—with associated draft and publishing deadlines. An examination of work plans for design groups will uncover tasks like "produce preliminary draft" and "edit final draft." More appropriate tasks might be "integrate all design components" and "cross-check components for consistency and completeness."

Measurements of programming efforts are imprecise at best and in many cases probably meaningless. Though the industry recognizes a need for productivity and quality measurements, there are no clear ideas about what should be measured. A commonly accepted concept of productivity is lines of code per unit time. But using lines of code (or KLOC per month) creates a major problem in terms of consistency in counting. A few of the variables are different languages, comments, statements vs. card images, executable statements vs. all statements, and differing levels of complexity.

Even more important than inconsistency is the question of whether lines of code is an appropriate measure of software development. Coding, the production of lines of code, normally occupies about 10% of project time for new development and perhaps 1% to 3% of maintenance time. How can it make sense to measure a group's productivity by the output of less than 10% of its time? Certainly the design phase must have been productive or the project would not have been undertaken. A true measure of productivity must account for the activities of all phases.

It is not uncommon for projects to produce design documents thousands of pages long.

It may be argued that lines of code are used as a measurement because it is the only tangible feature of the delivered product. This argument, however, only reinforces the idea that the phase process is an inappropriate technique for managing software development. Each phase of the development should produce some tangible, measurable product.

Quality measurements suffer from similar faults. Typical quality measurements refer to error density and mean time to failure. These kinds of measurements are suitable for manufacturing environments, but software is not mass-produced. Error density in software might be analogous to measuring the number of defective bricks or the number of sticky doors in a new office building. The owner of a building is not interested in counting defective bricks, he is interested in how well the new building meets his business needs. Software quality is not measured by counting defective building blocks; it is a measure of how well the new system meets the needs of the business it was designed to support.

As sad as the current situation is, the future promises even more problems. Current techniques simply will not support emerging methods of development that bypass many traditional phases.

Take, for example, prototyping. Prototyping has received increasing attention in recent literature. The theory is that by quickly building a model of the target system, much of the requirements and design phase can be bypassed. If a prototype can be built in six weeks, it makes little sense to spend six to eight weeks producing a requirements document for the system. Spending additional time developing comprehensive external and internal design documents about an existing system may not make sense either.

AS CHEAP TO BUY AS DEVELOP

In addition, many companies are purchasing software instead of developing it. Not only is it nearly as cheap to buy code as to develop new code, purchase does not require the acquisition and maintenance of development resources. To what extent should a development organization provide design information to the software vendor? Internal design information may not be appropriate. External interfaces are certainly important for custom-built systems. The traditional phase development process does not easily deal with such questions.

Automatic application generators are advertised as able to increase productivity by large factors. But many generators produce neither usable internal designs nor source code. It is not reasonable to measure the output of an application generator in the same fashion as we measure a programmer writing applications. Once again, the traditional management process and traditional measurements do not easily handle this situation.

It would be nice if one management technique could handle all kinds of development work. Unfortunately, this is probably not feasible, but a few simple guidelines provide at least a consistent approach to the problems of diverse development methods.

- Manage what you produce.
- Measure what you produce.
- Strive for information rather than documentation.

It would be convenient to have one model to use in managing software development work.

Fig. 1 represents a minor redefinition of the traditional development process. Rather than aiming the development process toward producing lines of code, it can be viewed as producing a workable design for a problem. Notice that the traditional definition and the proposed definition are not incompatible. They are simply different ways of looking at the same activities.

The design process may be redefined as the specification of a design, which will either solve a stated problem or fulfill stated requirements. Traditionally, it was viewed as the specification of code that would perform a business function to solve the problem. The code and unit test activities may be viewed as the implementation of the design. Integration testing can be thought of as verifying that the implementation of the design actually meets stated requirements.

(A word about the difference between validation and verification. Validation ensures that an implementation of a design actually behaves as the design intended. Verification determines that a design has been consistently stated and constrained throughout its life cycle. In practice, verification should occur at every step in the life cycle. Most programmers confuse the two concepts but they always perform both kinds of tests.)

Unit tests normally make sure the program behaves the way the programmer intended it to behave. Integration and system tests ensure that all programmers used the same design specifications.

The redefining of the process has several appealing aspects. It allows new technology to enter software development. Purchased software and application generators no longer fall outside of the management model. The definition of requirements and the generation of specifications fall into the design process. Implementation simply replaces coding with, say, purchase of software or generation of application code. And validation of code may or may not be appropriate, depending upon circumstances.

Prototyping can be considered an alternate form of design expression. A prototype is a working model of the function, interfaces, and data required for a new system. If one considers the information contained in a prototype rather than the method of capturing the information, then prototyping falls into the design phase.

The redefinition of the phases focuses attention on meeting the needs of the business rather than on the act of creating a document or writing a program.

Using the new definition, software developers are now positioned to eliminate the verification step. Typically, integration and system testing will occupy 20% to 35% of the project development time. By focusing attention on the design, back-end testing may be no longer necessary. If, over a period of time, developers can demonstrate that their designs are consistent and complete prior to implementation and the implementation can be validated, then verification after implementation becomes redundant.

Errors in software will be reduced. Estimates of errors introduced in the specifications phase range from 40% to 60% of all software errors. Increased attention to the verification of design statements should significantly reduce the number of errors in the software.

MEASURING DESIGN PROCESSES

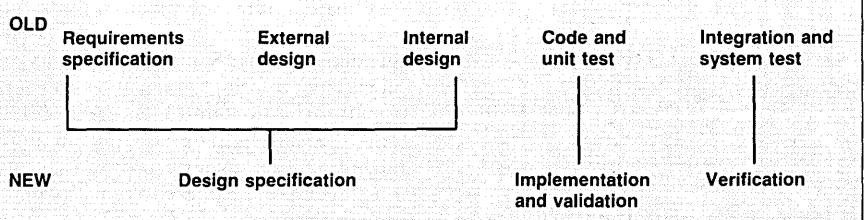
Knowing what to measure is just as important. Measuring design processes is not very well understood. Any attempt will be experimental in nature. The best one can hope to do is to try several alternatives and evaluate which, if any, seem to make sense.

Hardware developers use measurements such as MIPS and bits per inch, which provide some standardized idea of how much utility is being delivered to the customer. Software developers don't have any standard measures of utility, nor do they mass-produce standard products. Some measures of delivered function have been attempted, notably function points. Although not universally accepted as a valid measurement, function points are the most widely known estimator of delivered function.

The disadvantage of function points is that they are imprecise and often misunderstood. Many people perceive a function

Fig. 1

REDEFINITION OF DEVELOPMENT PROCESS



point figure to represent the function delivered to the user. In fact, it represents the amount of function imbedded in the specific design of the system; much of the imbedded function may be invisible or not utilized by the user. Indeed, different designs meeting the same set of requirements may have widely different function point counts.

An approach to quantifying design content would be a design methodology that yields consistent designs. The data-oriented design methodologies like the Jackson and the Warnier-Orr methodologies can be used to derive consistent design data. Several people working on the same problem will develop very similar designs using the data flow techniques. Functional decomposition techniques often yield vastly different design approaches to the same problem.

The advantage of consistent design products is that they will all deliver the same level of detail and can be examined for complexity by counting the number of transformations. Thus, a design could be measured by quantifying the number of transformations and low-level elements it required. The disadvantage of the data-oriented design techniques is that they are unsuitable for some classes of problems.

The use of a design tool or a design language would simplify the problem. If a design is expressed in a consistent fashion, then some measure of its contents can be made. For example, PSL/PSA uses expressions about data objects, processes, inputs/outputs, and system structure to create a design database. A measure of interfaces, processes, and data at several hierarchic levels might be used to quantify the scope of a design. Completeness and consistency can be expressed in terms of mismatched interfaces and processes, or by the data a process uses. SADT (structured analysis and design technique) defines a system as a collection of objects and events. It allows any system to be described as a mapping between the objects of the system and the events in the system. Measures of the scope and consistency of the system could be derived from the SADT database.

DOZENS OF TOOLS AVAILABLE

There are dozens of languages and tools available. The tools not only enable the developer to collect data consistently, they allow him or her to manage the process over the period of the development process. Once the design is consistently expressed in the database, changes to the design can be consistently and completely implemented. Additions or enhancements can be applied and the database reviewed to determine their impact on other parts of the system. If a hierarchy of design detail is used, each level can be expanded into increasing detail and checked for completeness, e.g., for processes without inputs, data elements that are not used, and so forth. The expansion of requirements into design and design into detail design will provide some confidence that requirements can be traced to specific design features.

Measurements of the implementation process will make certain that the implemented (coded, purchased, or prototyped) product matches the lowest level of design specification. The process for performing these tests will vary depending upon the kind of specifications used. A data flow design can be validated by ensuring that every input/output mapping is correct. An event-driven design can be tested using the mapping of all specified triggers and events. If the design is specified in terms of logic sequences or flowcharts,then the test group may be reduced to attempting to test logical paths through the system.

Measurements of validation can be expressed in a relatively noncomplex manner if we simply make a statement about design specifications that were implemented incorrectly. An approach to implementing such a philosophy might be organized as follows.

- Coding milestones are the completion of major design points instead of the completion of programs or transactions.
- Unit test milestones are the validation of major design features.
- Errors are expressed in design features not delivered or delivered incorrectly.

This approach encourages programmers to be clear about the specifications they are trying to implement. This is important because we have noted that a large proportion of all errors are design errors. It also encourages the inspection/review process to concentrate upon meeting the design criteria rather than on critiquing coding styles. Finally, it provides a statement of errors that is of interest to the customer.

The customer is interested in a statement that the system works or that parts of it don't work. A measurement showing that there is one error per KLOC is unlikely to be of interest to a user except to make him wonder which lines of code aren't working. A statement that all critical interfaces work properly and that all minor errors are itemized is more likely to instill confidence in the customer. To be useful, a measure of the validation process must address the activity of validation, not some abstract concept of error density.

Measurements of the verification process should express some concept of the consistency of the design across the development process. Such a metric should at least attempt to correlate initial requirements statements and low-level design statements. One approach might be to identify user interfaces in relation to requirements statements. Another might be to show the expansion of design for each component in the requirements. Certainly the measure should ensure that the interfaces between components are stated consistently.

ORGANIZE TO REDUCE ERRORS

Any kind of comprehensive completeness or consistency checking would probably have to be automated for all but very simple designs. In the absence of a design tool to provide automated verifications, it is possible to organize the design to reduce opportunity for error.

- Hierarchy, modularity, and data independence make designs less complex and less affected by changes to specifications.
- Whenever possible, specify functions in terms of hierarchies of data flows, input-process-output, or similar constructs rather than control-logic flows.
- Define interfaces between components at each hierarchical level as soon as possible.
- Consider using a set of data access mod-

ules rather than imbedding accesses in functional modules.

All of the preceding techniques will simplify the verification, either manual or automated, of the design package.

The industry seems to be unable to distinguish between the information needed to produce a product and the documentation that is simply regurgitated in response to a request for information. Rather than publish phase documents we might attempt to utilize a design methodology that captures the required information and makes it available in easily comprehended sections. Some development organizations are using design tools to capture the information and then dumping the database, editing the result, and adding minor prose sections instead of writing phase documents. In response to requests for specific information, it is possible to generate reports from the database. The requester can be sent a soft copy of the specific design information he requested instead of an entire document.

Control is a necessary part of all management processes. In fact, the phase development process came about as a way to control software development. But the cost of control functions is becoming disproportionately large in relation to the cost of development activities.

In general, avoid control-oriented tasks as much as possible. Try to produce control information as a result of normal activities. For example, by using a design database the number of people needed to draft and edit a review document is reduced. The database can be used to produce the design information, to write the prose, and edit the entire package. The use of a database eliminates the need for "writing" a design document.

At requirements time some kind of review ought to be held regarding the scope and anticipated cost of the project. During the design phase, there may need to be a review of the external interfaces and expected performance of the target system. If coding is to be done, then some sort of verification of the detail design is appropriate before beginning coding. Certainly a validation of the implemented system is necessary before it is delivered to the customer.

While management attention has wandered until control of the process has become more important than delivery of the system, the concept of the phase review process is still sound. But shifting attention from controlling the development process toward managing the development of a design will provide a clear understanding of the tasks and issues involved in the development process. The development process should provide an environment in which necessary control information can be generated without extra effort on the part of the developers. ◉

Patrick Brown is a programmer/analyst in the Information Systems Group at IBM.

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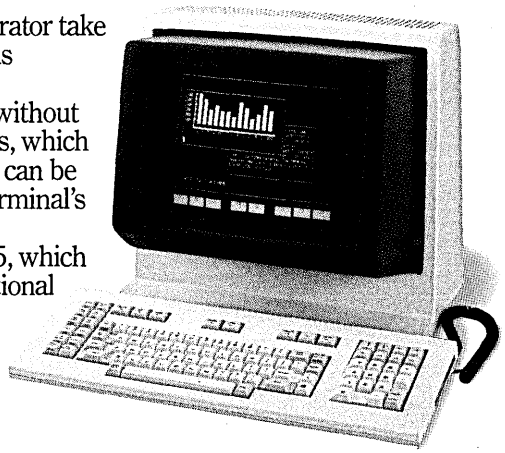

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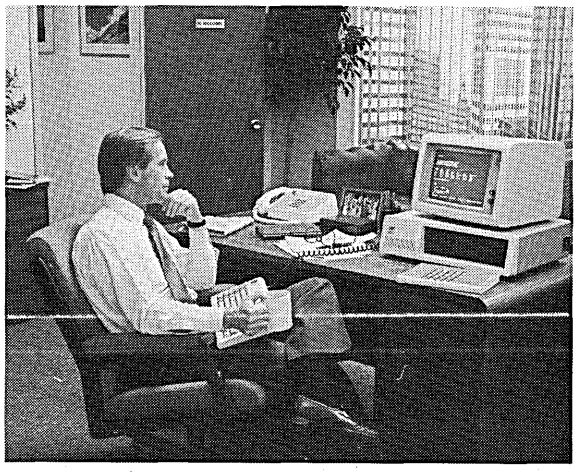

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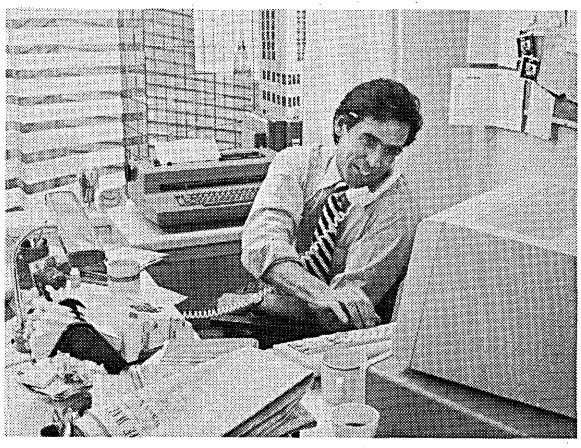

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Dan Timm

"IBM, DEC or Control Data systems—when you need computer service, Control Data will be there. Absolutely. You get a full line of service, including installs and deinstalls, even on mixed-vendor environments.

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Besides the quality, there's one more factor. Control Data has a 26-year track record. We'll be there when you reach us—where you need us. I wouldn't sign my name to something I couldn't live up to.

Call Control Data Engineering Services—we won't let you down. 1-(800)-328-0101 ext. 58C. In Minnesota (612/925-4400) ext. 58C. Outside the U.S., Call your local office.

CONTROL DATA

CIRCLE 67 ON READER CARD

HARDWARE

OFF-LINE

Microcomputer vendors are beginning to learn one of the bitter lessons the mainframe BUNCH companies have known for years: software sells computers. And if there is no third-party software available for the machine, few will buy it no matter how much it outperforms IBM's many offerings.

Software available for personal computers that are not quite IBM PC compatible has been slow in coming and has hurt companies like Texas Instruments and Hewlett-Packard. Both vendors' MS/DOS-based noncompatible machines have suffered in the marketplace despite general recognition of technical parity.

HP was so frustrated by the general perception that its HP 150 touch-screen computer lacked software that the company held a press conference just to tell the world that there are more than 1,500 packages available for its machine. Only 560 are available in the United States, but who's counting? From its introduction, a major drawback of the HP 150 has been its use of the 3½-inch disk drive while the rest of the world, including IBM, was standardizing on the 5¼-inch disk. Over the past two years HP has worked with third-party vendors to overcome that drawback by moving software over to the 150. Until February, fewer than 200 third-party software packages were available for the micro. Then HP announced an additional 282 software packages developed both internally and by independent vendors for the 150. Third-party software includes 1-2-3, VisiCalc, WordStar, and The Dow Jones Spreadsheet link. Internally developed software includes business graphics, which the vendor says will be a $1 billion market by 1990. Some third-party packages include interfaces that take advantage of the vendor's touch screen, plotters, and printers. But then again, some don't. (Does that make the 150 compatible with IBM but not with itself?)

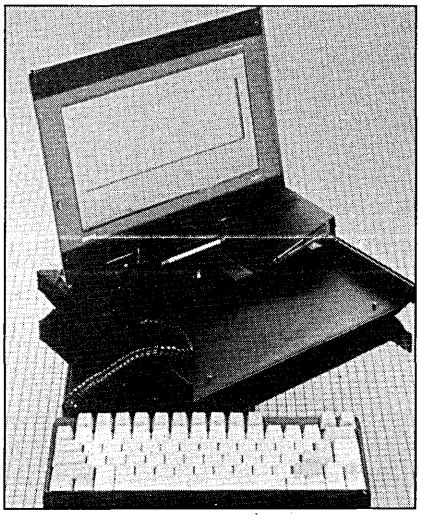
TI is in the same boat. Through third-party development programs, TI can now claim that 1,000 packages are available for its personal computer.

Now, 560, 1,000, or 1,500 software packages may seem like an awful lot of software, even if two thirds are not available in the U.S., but consider that there are more than 7,000 software products available for the IBM Personal Computer. Those 7,000 or so packages are also available to the fully compatible pcs such as those made by Compaq and Corona.

Just in case 7,000 packages were insufficient for the industry leader, HP itself developed five software packages for the venerable machine. The products include HP Message, Personal Card File, MemoMaker, Text-Charts, and AdvanceLink. The PC introductions reflect part of the company's marketing strategy. HP has all but conceded that IBM has won the battle for the desktop. William Murphy, marketing manager of the personal computer division, says that if HP can't capture the entire desktop, it will go after "a piece of the desk" with its printers, plotters, and now, even software.

LAPSIZE FOR MASSES

With the introduction of the Kaypro 2000 microcomputer, the vendor will attempt to do in the lapsize arena what it already did in the micro market—offer a complete system with lots of bells and whistles at a sharp price point. And it appears that Kaypro will market its portable this way.



The IBM PC-compatible portable has an adjustable LCD screen that displays 80 characters by 25 lines. The graphics resolution is 640 by 200 pixels. It comes with 256KB of RAM expandable to 640KB. It uses the 8088 processor at 4.77 MHz. An 8087 math coprocessor is also available. It supports the 3.5-inch disk with 720KB capacity. The portable has a detachable, typewriter style keyboard with 75 keys, including function and cursor keys. Keyboard commands include system on/off, adjustment of LCD viewing angle, dial and communication capability via an optional internal 300/1,200 baud modem, which is Bell 103A and 212A compatible. It also has a serial port.

The product runs at 110V and 240V at 50 cycles and 60 cycles. The battery runs for four hours and an audio and visual alarm is activated when the battery life is down to one hour. The drive turns

NOW THAT THE PC FAD IS OVER, IT'S TIME TO GET DOWN TO BUSINESS.

Like hordes of locusts, the PC swept the business community. Corporations bought them like electronic calculators by the thousands to improve the productivity of their executives. Portables were carried home from the office every evening and on trips. Computerization was even affordable to the small business for the first time. Programmers put their unique genius to work to develop some of the best software ever written. Productivity tools like word processing, electronic spread sheets, data base management and accounting was placed into the hands of new computer users. Productivity improved for everyone. From the CEO . . . to his staff . . . to the salesman . . . to his secretary. Forecasts for continued PC growth were nothing but highly optimistic. One at every desk. One in every home. What happened?

"Networking won't solve the multiuser problem either economically or functionally."

Like the first crust of any marketplace it saturated quickly. Those that are the first to buy almost anything new and promising, bought. There are no more computer hackers and hobbyists to sell to. They all have one. Applications for the home that made any sense didn't develop. Corporations found that they needed PCs to "talk" to each other. That solution is distant because networking won't solve the problem either economically or functionally. Most available networking does nothing more than messenger floppies around. The small business found that as soon as its first PC was operational and productive, a second one was needed to satisfy demand usage. The PC, with all its promises, turned out to be a dead end for the business environment. The PC and clones just haven't been the godsend for business that was predicted. Why?

The PC is a personal computer. Just that. Not a business computer. That's because PCs are single user computers with single user software. Good for one person but not good enough for a whole company. Even if the company is two people.

Every computerized business has someone entering information while someone else is looking up information. That's two users. And every business has more than two users who need access to the computer. That's a multiuser computer environment.

"The small business needs a second PC as soon as the first one is working."

It's now hard to justify PCs in a business environment. A multiuser computer capable of supporting up to five users is available for the price of a single IBM PC XT. It has more storage and a business oriented operating system. Supermicros are available that have the power of minicomputers without the accompanying price tag. Ten unconnected PCs, sitting around worth about $50,000, doesn't make sense when for much less you can get a lot more computing power in a supermicro that accommodates 20 or more users. But don't let even that price tag scare you. On a per user basis, multiuser computers cost about $1500 less than a PC. New users can be added for less than $600 with a dumb terminal. And they're upgradable.

"A six port multiuser computer is now available for the price of a single IBM PC XT . . . microcomputer systems cost $1500 less per user than multiple PCs."

Multiuser computers communicate with each other. They share the same data base, software and peripherals. They have sophisticated business features such as record locking, user accounting privilege levels and system security. They are business oriented and priced well within the reach of the first time computer user.

But what about all the PCs already in place? Don't ask the PC manufacturer for a solution. They're concentrating on selling more single user systems. The real solution is to get started with a true multiuser computer in the first place. With multiuser business computers now in the same price range as a PC, it doesn't cost any more to make the first step the right step.

The PC has seeded the next wave. It's here now. Supermicro multiuser computers that can support up to 32 users. If you don't believe it just look at the new product introductions from IBM, DEC and AT&T, let alone the smaller companies like Altos, Plexus and IBC. Big system features for every end user. Software for every conceivable specialized business application. That's not the end of it. New challenges are there for everyone. Opportunities abound. Software companies are already applying their talents to multiuser operating systems, disk conversion and even more powerful and productive software. Companies are shifting their emphasis to provide multiuser system enhancements as they did for the PC. Value added resellers and specialist dealers will give the end user the support that's been terribly lacking from department store retailers. It's a great day for someone who needs a multiuser computer. And everyone does.

"Multiuser computers share everything . . . they have business features such as record locking, user accounting, privilege levels and system security."

Thanks PC! You've whetted the appetite of a large new business environment for computerization. One that is bigger, more demanding, and more sophisticated than we've ever seen before. There's no turning back now. You were a fad, but now it's time to get down to business . . . multiuser business.

Randy L. Rogers

Randy L. Rogers
President and CEO
IBC/Integrated Business Computers
Manufacturer of Multiuser Computers
Chatsworth, California.

CIRCLE 68 ON READER CARD

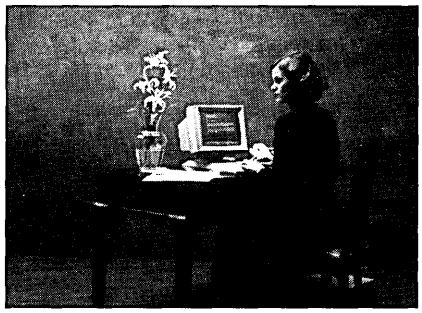
off when not in use. Also, the computer turns on and off when the cover is opened and closed. Other power conservation features include the ability to power down if no keystrokes, display changes, or disk accesses are detected in one minute.

The 11 pound portable is 12.5 inches wide, 2.6 inches high, and 11 inches deep. It has a self-contained case with carrying handle. With the product, the vendor is bundling MS/DOS, GW/BASIC, word processing, and business application software. The Kaypro 2000 retails for $2,000. KAYPRO CORP., Solana Beach, Calif.

FOR DATA CIRCLE 301 ON READER CARD

OA SYSTEM

The Lanier Concept 6000 clustered network controller is a file-server system that can tie up to 28 workstations or mini-network controllers in an office environment. According to the vendor, a key feature of the system is its library services



capability. The archival retrieval service searches large databases for documents, using identification criteria such as names, subjects, and dates.

Potential users include those whose primary work group requirements are electronic filing, document retrieval, data communications connectivity, personal computing, peripheral resource sharing, and word processing. Shared resources include printers, disk drives, data communication services, and application processor attachments. It can be configured with a variety of workstations and personal computers.

Software options include a complete line of office automation, word processing, library services (to access archived database information), personal computing applications, clustered word processing, and the Xenix applications programs. The Xenix applications library includes specialized packages for the medical, legal, and accounting professions, plus Informit and Unity database management programs. MultiPlan is also offered.

The system runs under the Xenix operating system and supports the HarrisNet local area network. It has an 80186 and Z80B microprocessors. The system is offered with RAM memory from 256KB to 1.24MB. A variety of Winchester disk drives are also supported. A sample configuration including a 6000 processor with 1MB of RAM and 96MB of storage is approximately $22,000. LANIER BUSINESS PRODUCTS INC., a division of Harris Corp., Atlanta.

FOR DATA CIRCLE 302 ON READER CARD

GCR TAPE SUBSYSTEM

The Telex Model 9270 Shamrock is a GCR tape subsystem. It offers full-size performance by utilizing LSI gate array and microprocessor technology. According to the vendor this product fills a gap for a 75 ips start/stop tape drive that overcomes streamer and cache buffer concerns. It is also designed for archival applications.

The unit is a 75 ips start/stop, autoload/autothread, vacuum column tape drive with embedded GCR formatter. Dual- and tri-density (6,250/1,600/800 BPI) models are offered. The peak throughput rate at 6,250 BPI is 468.7KBps.

Fully compatible with the vendor's 9250, the 9270 offers Pertec, STC, and Telex interfaces. The brushless, DC direct-drive pneumatic system is insensitive to change in voltage, altitude, and line frequency, or variations in barometric pressure. Its diagnostic functions are controlled by microprocessors that monitor and make necessary adjustments. The 9270 is priced at $16,000 in single quantities, and volume discounts are available. TELEX COMPUTER PRODUCTS INC., Tulsa, Okla.

FOR DATA CIRCLE 303 ON READER CARD

LOW-END MINI

The Eclipse MV/4000 DC is the vendor's low-end 32-bit minicomputer. It has increased expansion capability over its predecessor, the MV/4000 SC, with twice the memory and three times the disk capacity. The system supports up to 16 users.

It is for entry level departmental computing. The system is suited for work

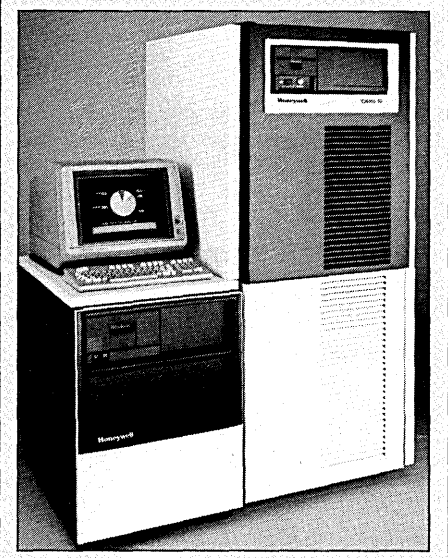
HARDWARE SPOTLIGHT

PLANT MANAGEMENT

The Plant Management System is an in-plant information system for process industries that bridges the information gap between process control systems and off-site computers.

The system is composed of a network of Honeywell DPS 6 minicomputers running packaged application software. The product addresses a plant's need for on-site decision support, process optimization, and production management tools. Services offered by the vendor during implementation include planning, engineering, installation, and startup.

Under the Plant Management System architecture, the 6 minis will be interconnected on an Ethernet plant information network. Baseband and broadband versions of the General Motors Manufacturing Application Protocol (MAP) will also be supported.



Vendor-developed, user-written, and third-party application software programs will be supported. The system will access and exchange information with a plant's existing process control systems, as well as with its administrative, laboratory, inventory, scheduling, and personnel management systems, regardless of whether they are supplied by Honeywell or another vendor. Specific applications offered include production scheduling, utilities management, material movement and storage, and maintenance management.

The FORTRAN processing facility of the DPS 6 (COBOL and Pascal are also available) will enable users to write their own routines and programs to supplement the packaged applications. The link between the plant management system and the process is called the Plant Management Module (PM60). The PM60 contains the interfaces to other computers in the plant's laboratories, tank farms, warehouses, and offices. In addition, it will be the plant's connection to the company's corporate computers. The PM60 can use either the the Binary Synchronous, SNA, or the vendor's Distributed System Architecture (DSA) communication protocols to transfer data files between the plant information network and the corporate mainframe. Cost for implementing the system varies. A small system performing data acquisition would cost approximately $80,000. A typical full-scale system ranges in cost from $750,000 to $1 million. HONEYWELL INC., Minneapolis.

FOR DATA CIRCLE 300 ON READER CARD

groups that require a small processor. It can be used in office automation, distributed data processing, or software development applications. The product can be networked and connected to a user's mainframe. It supports the vendors AOS/VS operating system and optionally runs Data General's Unix operating system (DG/UX and MV/UX).

The CEO software package runs on the system, which is fully compatible with the vendor's 32- and 16-bit products. It can be configured to support up to 16 users, 8MB of main memory, two 5¼-inch Winchester disk drives (240MB formatted total capacity), two 96 tpi 737KB floppy diskette drives, and one 15MB cartridge tape drive. The mini also offers a connection to IEEE 802.3 local area networks.

There are two communications configurations available. One supports up to 16 intelligent asynchronous terminal or serial printer ports, and two synchronous communications ports. The second supports up to eight asynchronous terminal or serial printer ports, four synchronous communications ports, and one parallel line printer interface.

An optional floating point unit is available. The MV/4000 DC sells for approximately $6,000 per workstation, which works out to $80,000 for a 14-user configuration. DATA GENERAL CORP., Westboro, Mass.

FOR DATA CIRCLE 304 ON READER CARD

MULTIFUNCTION TERMINAL

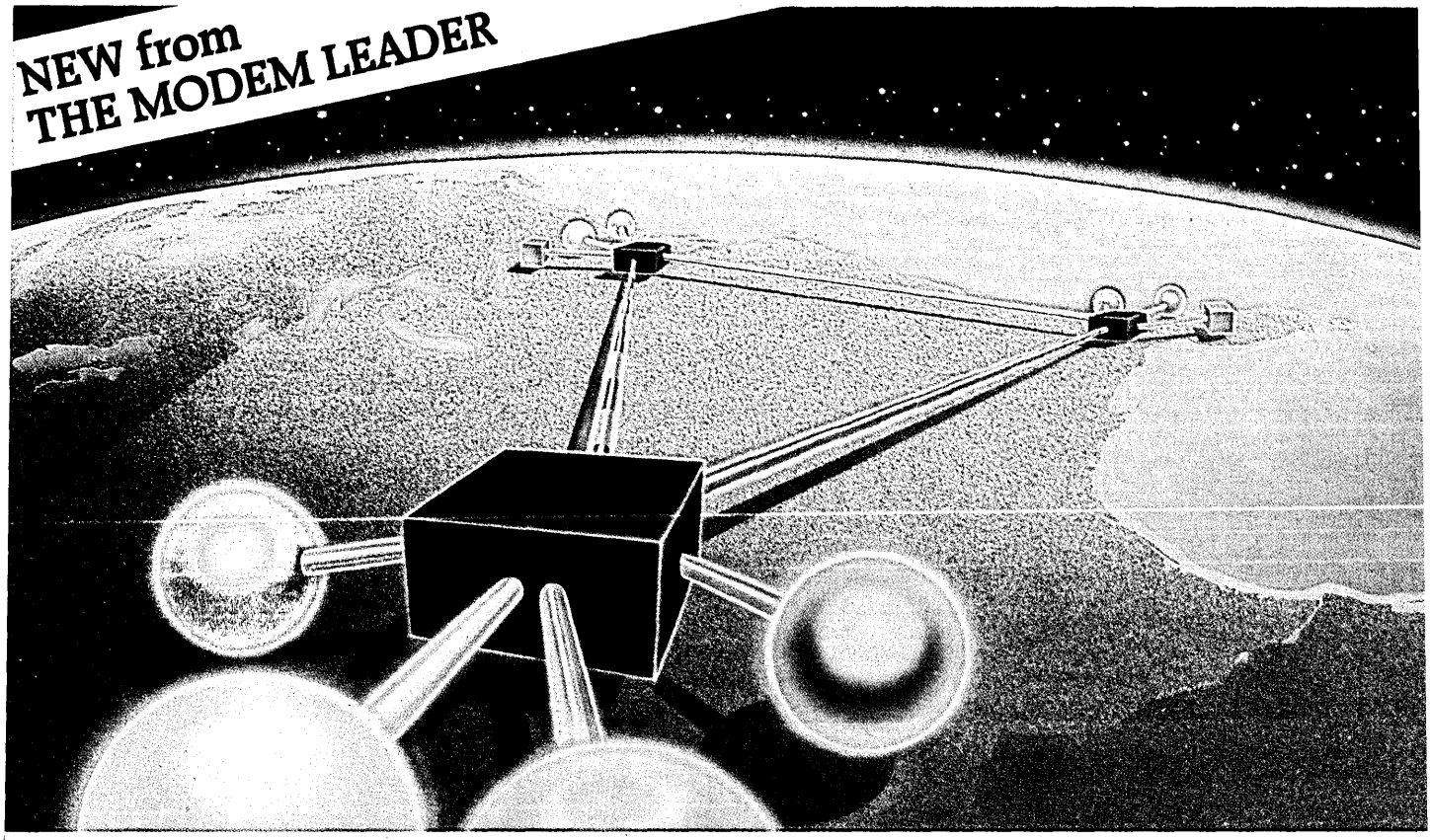
The PDX Messenger Series is a line of terminal workstations with 3270, networking, and personal computer capabilities. The series interfaces with several communication architectures, including SNA, X.25, and the vendor's PIXNET communication network.

The series includes several different models that can be upgraded. Models range from a monochrome to a full-color terminal with pc graphic capabilities. Local storage options provide standalone pc functions to the workstation. The local storage options may be located beneath the base of the terminals to house two half-height 360KB dual-sided, dual-density floppy disk drives, or a combination with a Winchester hard disk. The 109-key keyboard features full 3270 functions and pc capability. The product utilizes the Concurrent PC/DOS operating system (C/DOS), a multitasking operating system that allows combinations of up to four different PC/DOS or PDX terminal emulation tasks to run concurrently. Applications can be run as foreground tasks or monitored on screen using windows, or run as background tasks. PDX Messenger Series prices range from $1,500 to $3,600. PARADYNE, Largo, Fla.

FOR DATA CIRCLE 305 ON READER CARD

COMMUNICATIONS PROCESSOR

The Comten 5620 is a small-scale communications processor with capabilities including switching, routing, polling, automated dialing, error recovery, and data concentration. Designed for small or remote network sites, it doesn't require computer center conditions and can operate in a standard office environment.

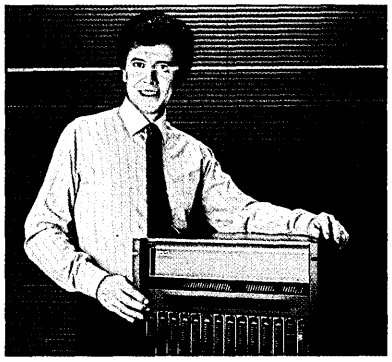


Statistical Multiplexers From Paradyne

Paradyne's series of Intelligent Networking Multiplexers is now a family of network solutions. With User Switching and Auto Rerouting, hundreds, even thousands of your employees and customers can depend on your network.

User Switching For Efficient Communications. To be productive you need computer resources. User Switching provides a way for users to tap into the variety of your company's resources, regardless of where those computer resources are in the network. Paradyne's DCX multiplexers find the most efficient communications path to each computer.

Auto Rerouting Means Increased Productivity. Auto rerouting maintains the connection to the computer and insures user productivity in the face of degraded telco lines. When a link fails, DCX automatically looks for alternate routes in the network to reroute communications traffic, insuring continued productivity.



Advanced Networking Diagnostics. Paradyne offers the most advanced networking diagnostics in today's market. Both data and controls can be viewed to and from any channel in the network. Problems at a remote site can be isolated and diagnosed through DCX, quickly and easily.

Productivity and Efficiency. Another Paradyne systems solution. If you would like to know more about Paradyne's Series of Intelligent Networking Multiplexers call **1-800-482-3333**. We'll answer your questions and give you the location of the Paradyne sales office nearest you.

DCX 815...four or eight channels. **DCX 825**...four to 32 channels. **DCX 840**...240 channel data networking exchange. **DCX 850**...240 channel intelligent networking processor. **DCX 861**...four or eight channel statistical multiplexer with an integrated 9,600 bps modem. **DCX 871**...four to 32 channels with integrated 9,600 bps modem. And Paradyne's **NEW T1 Multiplexer**...combining the channel capacity of T1 facilities with the versatility and networking capabilities of the DCX product line.

Meeting the Communications Challenge of the 80's

paradyne

Paradyne Corporation P.O. Box 1347
8550 Ulmerton Road, Largo, FL 33540

CIRCLE 69 ON READER CARD

Personal computers have become a valuable asset in business. The problem is that most personal computer systems are originally sold with "personal printers"...printers built for home use, not for heavier business work.

These "personal printers" are too slow for many business needs. They can tie-up your computer for extended periods of time...time you could be using to do other work.

Another problem is durability. In business, you need a printer that can produce high volume output over a long duty cycle. The common "personal printer" will often just quit under such continuous operation.

That's why Genicom has created the 3014, 3024, 3304 and 3404...professional printers built for personal computers.

Price/performance matched for small business systems, the Genicom 3000 PC printers are designed to increase productivity and maximize the value of your personal computer.

The 3000 PC printers provide 160-400 cps draft, 80-200 cps memo, and 32-100 cps NLQ printing...performance for both high productivity and high quality printing.

The 3014/3024 models print 132 columns. The 3304 and 3404 models give you a full 136 column width, and offer color printing as well.

Each printer is easy to use, lightweight, functionally styled and attractive. And you can choose options from pedestals and paper racks to document inserters, sheet feeders and 8K character buffer expansion, plus more.

Genicom 3000 PC printers feature switch selectable hardware, dual connectors and dual parallel or serial interfaces. Plus the 3014 and 3024 emulate popular protocols for both Epson MX with GRAFTRAX-PLUS™ and Okidata Microline 84 Step 2™, while the 3304 and 3404 emulate popular protocols for Epson MX with GRAFTRAX-PLUS™. So your current system is most likely already capable of working with these Genicom printers without modification.

Most important, the Genicom 3000 PC printers are quality-built, highly durable printers designed for rapid, continuous duty cycle printing. So take some personal advice. Get a Genicom professional printer for your personal computer today.

Genicom Corporation, One General Electric Drive, Dept. C421, Waynesboro, VA 22980. In Virginia, call 1-703-949-1170.

GENICOM™

The New Printer Company.

For the solution to your printing needs call

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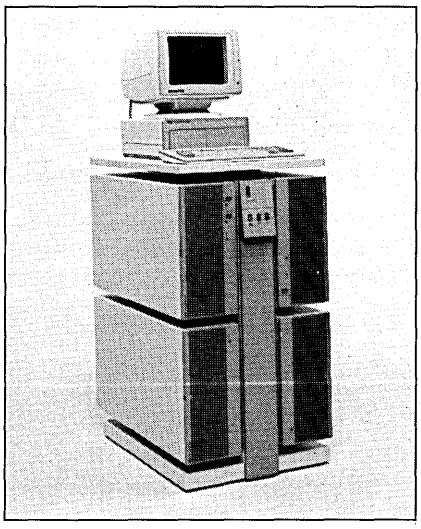
Okidata Microline 84 Step 2 is a trademark of Okidata Corporation

CIRCLE 1 ON READER CARD

HARDWARE



The product, which uses VLSI technology, consists of a set of modular components that, when fully configured, can support up to 32 full- or half-duplex communications lines and one or two host computers. It also has built-in self-test programs to isolate faults to a specific board.

The 5610 is a full communications processor. It provides users with application switching and routing functions for error control and recovery. Communications facilities include support for X.25 networks and satellite links. When used as a nodal processor in a pure SNA environment, it functions as an SNA PU Type 4 via standard SNA trunk protocols. It also attaches to the vendor's proprietary Communications Networking System (CNS) procedures. When used as a nodal processor in a pure SNA network environment, the unit functions as an SNA PL/1 Type 4 via standard SNA protocols.

The modular components of the product include a central processing unit, a channel interface unit for host connection, a communications subsystem that supports up to two communications base cabinets, each capable of supporting up to 16 communications lines, a fixed disk drive, and an optional system console for network control capabilities. With the console, users can have centralized or distributed network control.

The system uses the the vendor's Comten Communications Operation System 2/20 (COS2/20) system software. Networking software includes the Advanced Communication Function/Network Control Program (ACF/NCP), Multiple Access Facility (MAF), MAF with Remote Host Option (MAF/RHO), Subarea Routing Manager (SRM), and the Comten X.25 interface to public data networks. Prices for the Comten 5620 begin at $22,000. NCR COMTEN INC., St. Paul.

FOR DATA CIRCLE 306 ON READER CARD

COLOR PRINTER

The Model 1310 is a color graphics matrix printer for use with the vendor's Series 70 Personal Workstation. It provides eight-color images of personal computer graphics and 3279-SS3G host graphics.

The unit has three levels of text printing, including letter quality at 35 cps, correspondence quality at 110 cps, and draft quality at 200 cps. The printer is suitable for pc data processing, financial spreadsheet, and word processing applications. Under software control, the unit can also print documents containing color business graphics and text.

In the same graphics mode, the printer functions using programmed symbols, bit-mapped graphics, and block graphics. Programmed symbol graphics support 3279-type graphics applications and can be printed directly from the screen using a single keystroke. Charts and graphs can be designed using graphics software compatible with the IBM PC. The Model 1310 costs $1,960 for a single unit. LEE DATA CORP., Minneapolis.

FOR DATA CIRCLE 307 ON READER CARD

—Robert J. Crutchfield

ARE IBM'S NETWORK DIFFICULTIES INTERRUPTING YOUR REGULAR PROGRAMS?

There's a lot of talk about local area networking at IBM. Unfortunately, that's all there is.

Because IBM doesn't have local area networking yet. And who knows when they will.

The question is, why wait for IBM to catch up with technology that Wang has today?

WANG OPENS COMMUNICATION CHANNELS WITH LOCAL AREA NETWORKING.

When you use Wang computers, including the members of our VS family, you can have local area networking today. We call it WangNet. And we've already installed it in hundreds of businesses.

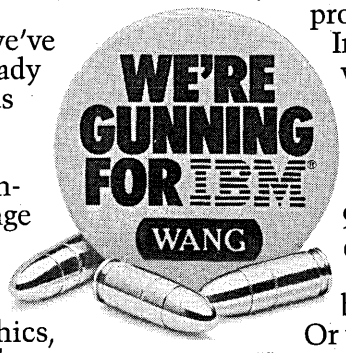
FEATURES	WANG VS 85	IBM SYSTEM 36
Migration without conversion up to 192 users	Yes	No
32-bit Architecture	Yes	No
Cache	Yes	No
Object Code Compatibility	VS 15, 25, 45, 65, 85, 100, 300	36 only
Virtual Memory Operating System	Yes	No
Removable Storage Options	Yes	No
Local Area Networks	Yes	No
Architectured for OA/DP	Yes	No
Relational Data Base	Yes	No
Industry de facto Standard Word Processing	Yes	No

WangNet permits the concurrent exchange at up to 10 megabits per second of data, text, graphics, electronic mail, even video. It ties all your departments together, whether they're in one building or several.

And WangNet is just part of Wang Systems Networking, a complete communications framework for sharing information among Wang systems and other systems. With a three-tiered design that's flexible enough to meet any company's communication needs.

JUST GIVE US ONE SHOT.

WangNet may be the beginning. But as the chart in this ad suggests, there are other reasons why you should let Wang handle your distributed data processing.



Including Wang's worldwide service and support program.

So call Wang at 1-800-225-9264 and give us a chance to prove ourselves in a benchmark test.

Or write to the Wang Business Executive Center, One Industrial Avenue, M/S 5413, Lowell, MA 01851.

WANG

CIRCLE 71 ON READER CARD

SOFTWARE AND SERVICES

UPDATES

It's too late to fret over how much of your new pc is tax deductible this year, but it's not too soon to anticipate your 1986 tax return. The IRS now requires home users of pcs to document their write-offs by keeping daily logs of their pc use. To help users comply with Uncle Sam's new dictum, Bellsoft Inc. of Bellevue, Wash., has developed TaxLog. Users tell the product what they are about to do when they start a pc session. The $40 software keeps track of how much time is spent on each activity, calculates the percentage of tax deductible use, and prints a report in a format meeting tax code rules. "Of course, we can't promise our customers that they will survive a tax audit," president Richard Leeds demurs, "but we can offer them a tool for keeping track of how much time they spend at their computers." The software "helps users avoid compounding the absurdity of the tax law with the absurdity of keeping a handwritten logbook next to their computers." Imagine telling that to the IRS.

The Financial Accounting Standards Board is hardly a colorful organization, but the venerable institution has become embroiled in a grand brouhaha indeed. The ruckus began in December, when the FASB recommended that software development costs be considered a capital investment rather than an engineering expense. The proposal would hurt software vendor earnings "by increasing the likelihood of asset write-offs," says Sandra Kraus of Kidder, Peabody.

The draft was not, to put it mildly, highly acclaimed. After an unusual postdraft hearing in January, the FASB wavered. Four of the seven board members now seem to favor expensing over capitalization, Kraus says. The next step is another public hearing in two weeks, but don't expect that to be the end of the saga. It will likely continue all year, as the two factions in this arcane debate tangle in hearings, public comment periods, and future draft proposals. It just goes to show that even accountants sometimes get their feathers ruffled.

In no area do the real and ideal seem to clash more than when users define software requirements for the MIS shop to implement. To reduce the dissonance of the clash, Performance Resources Inc., Alexandria, Va., has come up with a methodology, creatively called The Method, to get users and the dp shop communicating with each other. It has nothing to do with Lee Strasberg or the theater, but group dynamics is employed in The Method's use. As an interactive design process, The Method combines the group setting, problem-solving techniques, and aspects of a structured system-design methodology.

It creates a forum for technical developers and business users led by a trained and certified Method leader to create a requirements document. The package includes a guide, handouts for users, documentation, and presentation slides. It also includes pc-based software designed to aid the group leader in selecting, scheduling, tracking, and managing design projects.

PRESENTATION SOFTWARE

PC Storyboard is a productivity aid designed for users in business and education who need to prepare and give presentations. The product is made up of four modules.

The Picture Taker captures images from other pc software products for inclusion in the presentation. Picture Maker is used to create a screen of text, figures, and graphs. It also enables the cut and paste of symbols from a pictures library. Pictures can be developed for both RGB and Composite modes.

The Story Editor organizes pictures into presentations using a wide range of display and dissolve techniques. Users can vary the individual display times of parts of pictures or entire pictures, use subroutines and loops, and vary colors when creating presentation. Story Teller permits users to distribute stories for presentation to the appropriate audience.

The product runs on an IBM PC, PC XT, PC AT, PCjr, Portable PC, XT/370, and the 3270 with 5272 color display and graphics extension. The system requires 256KB with PC/DOS 2.0 or 2.1, 320KB with PC/DOS 3.0, and 384KB with the PCjr. It works with output devices including an RGB monitor, composite monitor, large screen projector, standard tv, graphics printers, and color printers. PC Storyboard costs $250. IBM CORP., Rye Brook, N.Y.

FOR DATA CIRCLE 326 ON READER CARD

DATA SECURITY

COMSAFE-X is a data security software package designed for data communication and information management applications. It is a software-based privacy and authentication system which can be used in networks for communicating securely and privately with another user.

The product also assures the integrity and authenticity of received data, creates and verifies the source of a received message, implements a secure electronic mail system, and protects sensitive data

from disclosure. According to the vendor, this software is useful in financial and medical networks, local area networks requiring security, and cellular telephone networks.

Users can implement the product to provide automated security and data assurance between IBM PCs and compatibles in private and public networks of all kinds. The product combines the vendor's RSA Public-Key Cryptosystem with the National Bureau of Standards Data Encryption Standard (DES) algorithm.

It can also be used to assure integrity and authentication of transmitted data, such as interbank financial transactions, home banking, and corporate cash management transactions. The menu-driven program is written in C. The cryptographic techniques provide the desired levels of protection and authentication while keeping most of the cryptography invisible to the user.The vendor says a communications protocol, also invisible to the user, assures that all transmissions are error free and protected from eavesdropping or tampering with the communication line. A file can be scrambled so that it can only be unscrambled by the user who has the appropriate RSA Public Key—which is like a digital signature that verifies authenticity. COMSAFE-X costs $500. RSA SECURITY INC., Sunnyvale, Calif.

FOR DATA CIRCLE 327 ON READER CARD

SOFTWARE INFO NETWORK

The One Point computer information network, an on-line computer product information service, is designed to allow retailers to enhance service to their customers. The electronic service focuses on hardware and software for business applications and lists up-to-date information on more than 7,000 major IBM PC, PC-compatible, and Apple Macintosh microcomputer products. It includes product descriptions, evaluations, and reviews of hardware, software, and peripherals.

With a microcomputer, modem, and boot-up disk, a salesperson can access the information service and answer a customer's questions about what products are available for, compatible with, and appropriate to the user's applications. The service also allows salespeople to check inventory and pricing and to order products directly from the distributor.

For several months, this service has been used as an information source and product distribution service by corporations. The vendor's agreement with First Software marks the first time retailers will be able to order from their distributors directly through the service. First Software will underwrite the stores' usage of the on-line service. Under the terms of the agreement, One Point will create a special version of its information network called First Software Information Network, which will contain special First Software information on products and vendors in addition to the One Point information. There is no charge to vendors who want to be included in the service, and retailers pay a flat fee of $30 per hour to use the network. ONE POINT, Walnut Creek, Calif., FIRST SOFTWARE, Lawrence, Mass.

FOR DATA CIRCLE 328 ON READER CARD

SOFTWARE SPOTLIGHT

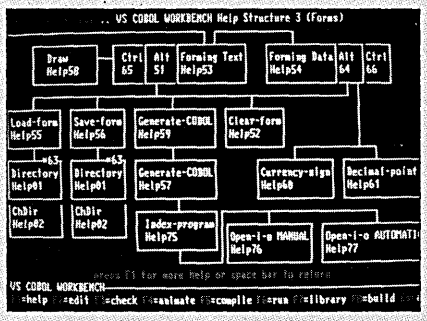
PC COBOL DEVELOPMENT

The VS COBOL Workbench enables users to offload software development work from the mainframe to the microcomputer. The combination of the software product and an IBM PC provides a distributed programmer workstation.

The product allows uninterrupted development, testing, and maintenance of programs downloaded to a PC. The programs are then uploaded to the mainframe for integration testing and running. According to the vendor, programmers experience few delays during program development and module testing because they are working with a PC dedicated to the program development task.

The system supports many features of the COBOL language as implemented in IBM's OS/VS and VS/COBOL II compiler, as well as the high-level ANSI '74 COBOL present in the vendor's other products and IBM-specific extensions including its new COBOL compiler, which incorporates elements of the yet to be finalized ANSI '80x standard. It allows OS/VS COBOL and VS/COBOL II syntax to be used separately or to coexist in a single program, and allows conversion of OS/VS COBOL programs to VS/COBOL via flags that report errors in code compiled from one syntax to the other.

Other features include the ability to allow programmers to test calls or embedded host command languages (exec statements), and to host database/data communications services such as IMS, CICS, DL/1, SQL/DS, and D82. This enables programmers to simulate the mainframe's response to the calls by storing test data values inside the product, thus permitting the programmer to continue developing through to module and program testing off-line on the PC. Application testing is done with the session recorder feature. It allows automatic recording to disk of all keystrokes made by the programmer during a test session. The keystrokes may then be played back for regression testing, and even edited to keep in step with program changes.



The product integrates, in a closely coupled manner, many of the vendor's programming tools. Programmers switch between tools with a single keystroke. Tools include the Animator, for interactive program analysis, and Forms, for prototyping interactive displays. The program will also be integrated with the micro/SPF, a mainframe-like editor. The product runs on an IBM PC, PC XT, PC AT, Portable PC, and 3270 PC models G and GX. The VS COBOL Workbench costs $4,000. MICRO FOCUS LTD., Palo Alto, Calif.

FOR DATA CIRCLE 325 ON READER CARD

MS/DOS AND PC/DOS AID

HelpDOS, the help system for MS/DOS and PC/DOS, enables users to find out what DOS can do and how it can be used. The menu-driven program provides on-screen reference information and examples for DOS commands, special keyboard commands, and batch subcommands.

The product features menus of DOS commands, batch subcommands, and special keyboard keys providing users with an overview of the DOS facilities. A technical directory explains the terms that users encounter with DOS and personal computers. A hints feature helps users find the right DOS facility for the task. For example, when a user selects "print" from the hint facility, the product shows a menu of the ways the user can print using DOS.

A single keystroke is required to make a selection from the menu. New help files and menus can be added allowing it to be used as a general help tool. According to the vendor, this provides a consistent way to organize and file on-line documentation for special programs, procedures, and batch files. Any text file stored in standard DOS (ASCII) format can be added to the product. It fits on one double-sided diskette and allows users with hard disks to create a system diskette that contains most or all of the DOS commands needed plus the product. HelpDOS requires MS/DOS or PC/DOS version 2.0 or higher and costs $50 with volume and educational discounts available. HELP TECHNOLOGIES, Palo Alto, Calif.

FOR DATA CIRCLE 329 ON READER CARD

MULTIFILED?

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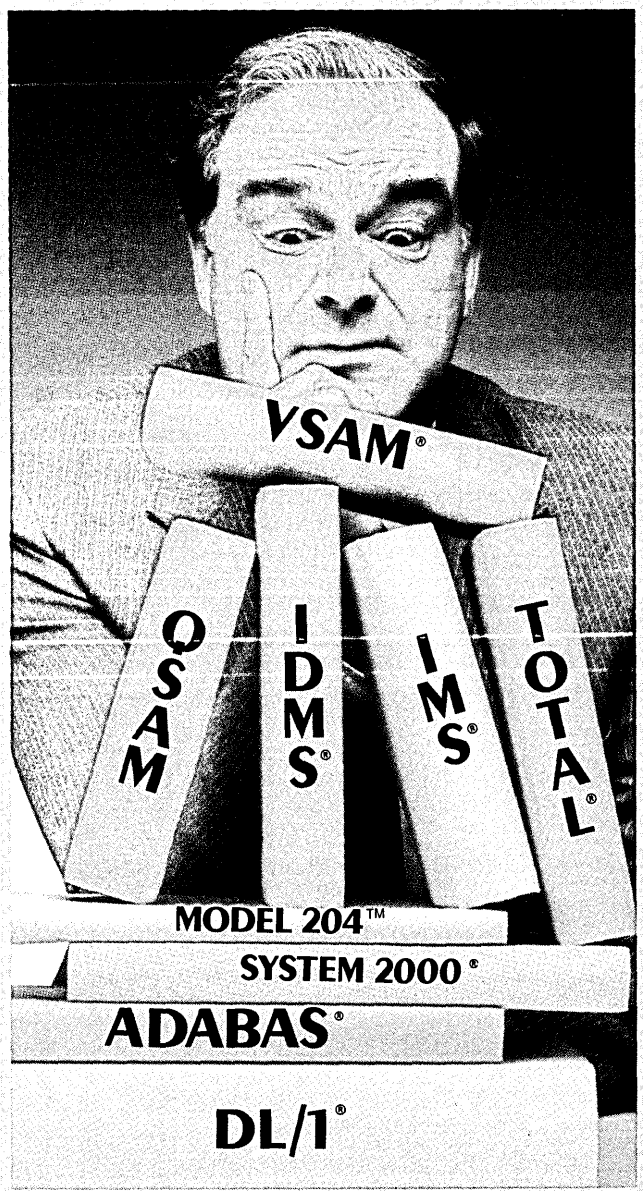
YOU'D NEED TO KNOW ALL THESE PROTOCOLS



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CIRCLE 36 ON READER CARD

SOFTWARE AND SERVICES

DEVELOPMENT TOOL

EASEL is a program development tool used to create independent pc-based user interfaces to remote mainframe applications. For the user, the product makes mainframe applications and databases easier to access and use. For the developer, the software allows enhancement of mainframe software without modifying the existing application.

Version 1.1 offers a number of enhancements. It allows programmers to create independent, symbolic user interfaces for the personal computer. The product front-ends any mainframe database or application. With its interfaces, PC users interactively access, manipulate, and manage mainframe applications via action-oriented symbols, like a traffic symbol or question mark, rather than computer commands.

The product can be used with color graphics, a touch screen, or a mouse. Both the programming tool and resulting interfaces run on the IBM PC, PC XT, PC AT, Compaq, AT&T 6300, and other IBM compatibles under PC/DOS and MS/DOS. According to the vendor, this product allows nontechnical users to access and fully utilize corporate information stored on the mainframe.

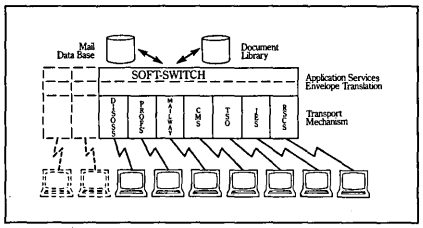
Other enhancements include support for the Diablo ink-jet printer. It has built-in textual regions for inserting, moving, editing, and deleting blocks of text on the screen. The product also has a faster drawing speed and concurrency under DOS so one or more applications can run simultaneously. EASEL Release 1.1 costs $24,000. INTERACTIVE IMAGES INC., Woodburn, Mass.

FOR DATA CIRCLE 330 ON READER CARD

DISOSS BRIDGE

This software bridge links DISOSS to the Soft-Switch electronic document system. In a multivendor integration environment, it provides a revisable form DISOSS link to systems from Wang, Xerox, NBI, and MultiMate. Likewise, non-IBM users can send revisable documents to users on the DISOSS network.

The product, running on an IBM host computer under MVS or VM provides translation, distribution, and library services to word processors, host attached terminals, and personal computers. It is designed as a software solution and requires no additional hardware. The DISOSS bridge provides transparent distribution between Soft-Switch users and DISOSS users. With this system, DISOSS users perform standard DISOSS distributions and Soft-Switch users perform standard Soft-Switch distributions.



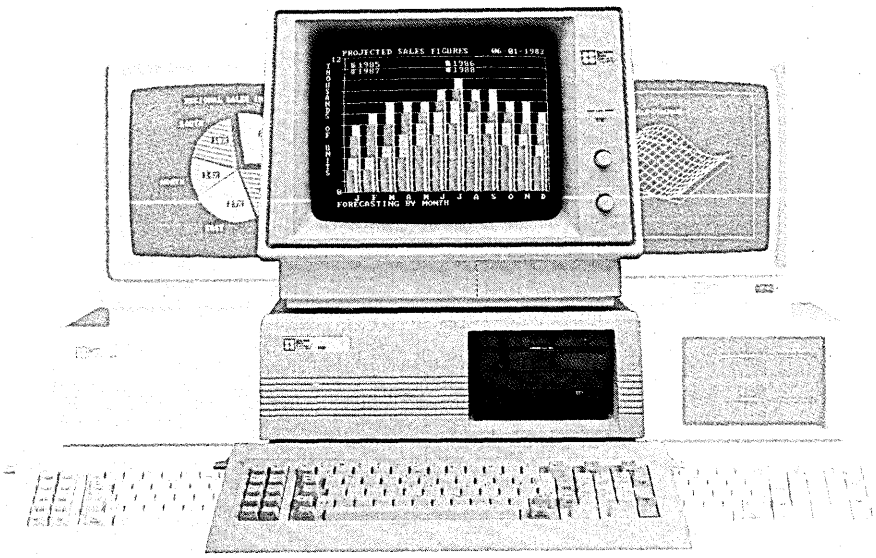
The software incorporates IBM's office architectures. Revisable Format Text (Level 3) Document Content Architecture (RFTDCA) is used as the medium for translation. Soft-Switch uses the Document Interchange Architecture (DIA) as its interface for communication with mail systems, including DISOSS.

The currently supported environments include Wang's WPS, OIS, VS, IBM's Displaywriter, 5520, 6640, 6670, OS/6, Displaywrite II, DCF, PROFS, DISOSS, Xerox 860, NBI 3000, Print Image, and MultiMate.

The Soft-Switch product line is priced per module. A typical starter system is $49,000, including installation, training, and maintenance. The DISOSS interface is $10,000 for users with the DCA translator and $20,000 for users without it. SOFT-SWITCH INC., King of Prussia, Pa.

FOR DATA CIRCLE 331 ON READER CARD

INTRODUCING DECISION DATA'S DUAL-PURPOSE COMPUTING WORK STATION



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CIRCLE 72 ON READER CARD

SOFTWARE AND SERVICES

UNIX FOR MAINFRAME

Amdahl Corp. is now offering Unix-based software for its mainframes. The product is called UTS/V, an implementation of Unix System V, Release 2, for use under the VM/SP control program on the vendor's 580 mainframes and other System/370 architecture machines. UTS/F, a companion product to UTS/V, enables full-duplex ASCII communications support. According to the vendor, these products will enable Amdahl to address the growing Unix marketplace on mainframe computers in dp shops.

Because UTS/V operates under VM/SP, it can share the processing resources of the mainframe with other system control programs. In addition to supporting the features of Unix System V, the product also provides support for the 3270 line of terminals. The Documenter's Workbench software for document preparation is also included.

The UTS/F software runs on the Amdahl 4705 Series Communications Processors, and provides full-duplex ASCII communications support compatible with other Unix systems. UTS/F allows UTS/V to process data from ASCII terminals one character at a time rather than in large blocks. License fees for UTS/V range from $10,000 per year for academic versions to $25,000 per year for commercial source licenses. The license fee for UTS/F is $2,500 per year. UTS/V and UTS/F are available for shipment now, the vendor says. AMDAHL CORP., Sunnyvale, Calif.

FOR DATA CIRCLE 333 ON READER CARD

E-MAIL FOR MINIS

Western Union's EasyLink will now be available to IBM System/34, 36, and 38 users. The software interfaces will provide IBM mini users with direct access to the EasyLink electronic mail network and to worldwide and domestic Telex. Developed by Orion Software, these packages will be available as individual communications software programs and as modules of Network Orion—networking software that provides data file and software transmission, telemessaging, text management, and database extract capabilities for the middle range of IBM systems.

The software provides the necessary protocol conversions to the System/34, 36, and 38 to access the Telex network. According to the vendor, until now users of these minicomputers have not been able to communicate with worldwide telex due to protocol incompatibility. The systems support bisynchronous and SDLC protocols; Telex transmits in asynchronous mode. The software handles all log-on, password, and communications exchanges.

According to the vendor, the service and the software provide a transparent means by which users can access EasyLink for computer-to-computer electronic mail, domestic or worldwide Telex, Cablegram, and EasyLink/DHL two-hour Express Document service.

The product allows users to create, address, transmit, and receive EasyLink electronic mail files. Users can compose text and data messages of any length with the text-editing function, then send the messages by entering the appropriate address data and selecting the delivery means from a screen menu. Users can send print files or messages created by various applications programs to EasyLink addresses. Licenses for System/38 software will be priced from $5,100 to $6,300, depending on user requirements, while 34 and 36 licenses will range in price from $3,400 to $4,200. The software packages will be marketed directly by Western Union and Orion Software. WESTERN UNION, Upper Saddle River, N.J., ORION SOFTWARE, Cambridge, Mass.

FOR DATA CIRCLE 334 ON READER CARD

—Robert J. Crutchfield

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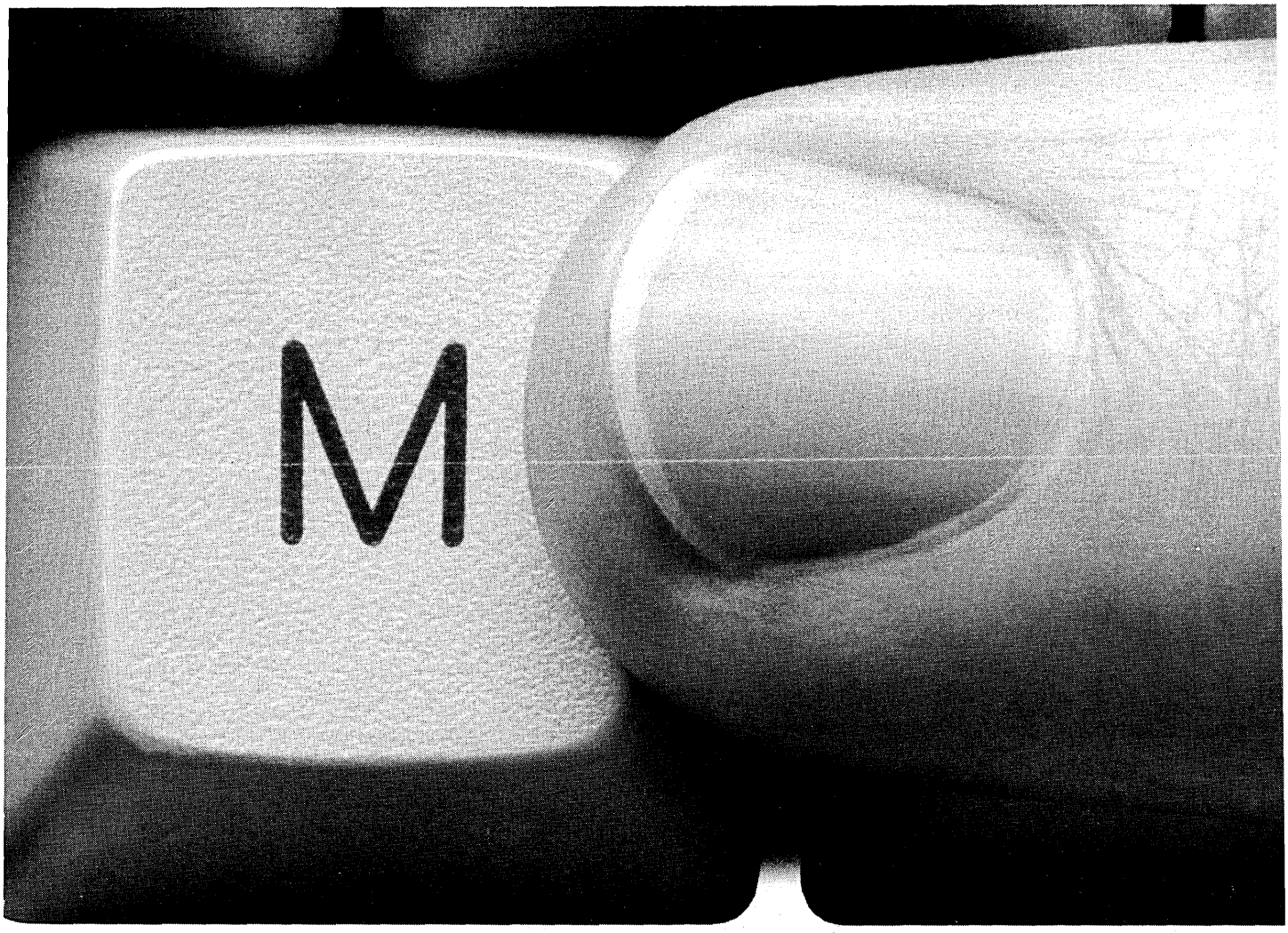

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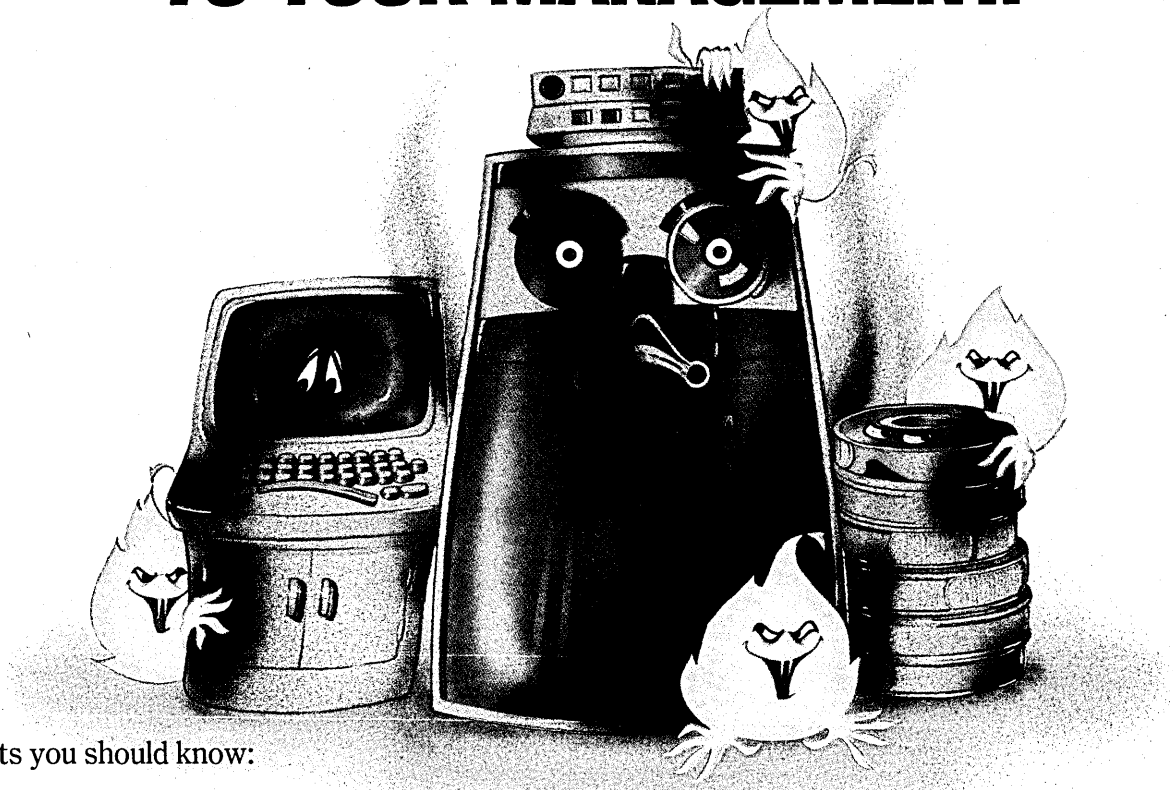

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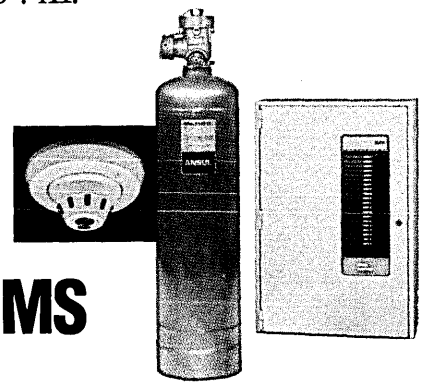

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The Marketplace... JOB MARKETPLACE

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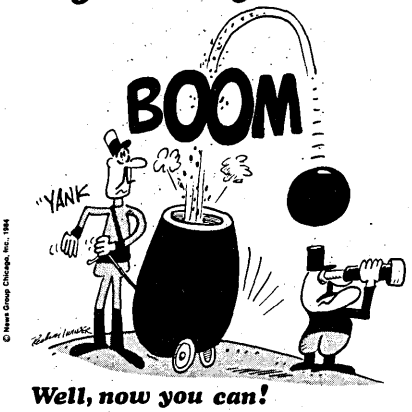

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ON THE JOB

CHANGING WITH THE TIMES

Sufficiently frustrated by the number of orders it could not fill for temporary office workers trained in word processing, Manpower Inc. decided to join the automation age and it has been changing with the times ever since. One of the largest suppliers of temporary office help, Manpower is expanding its pool of typists and stenographers to include word processor and computer operators. In an effort to keep up with the automated office, Manpower, with headquarters in Milwaukee, is teaching office temporaries how to operate IBM Displaywriters, Wang systems, Xerox 860 Word Processors, and other word processing equipment.

This move toward automation began in 1976 when 28-year-old Manpower was sold to Parker Pen Co. by its founder, Elmer Winter. The new president of Manpower, Mitchell S. Fromstein, noticed that the market for temps with word processing skills was increasing, so he became the company's advocate for automation. Fromstein believed Manpower should train its employees in the word processing skills they'd need to remain marketable. He learned, however, that there was no place for these people to get that training.

So Fromstein came up with a plan. He decided that Manpower would set up its own word processing training program. Two and a half years later, after an initial investment of $5 million, Skillware

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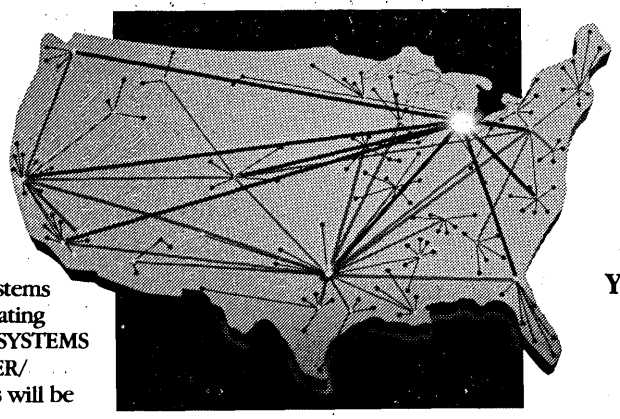

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was introduced. Skillware is a series of floppy diskettes that enable trainees to learn at their own speed on the actual equipment they'll be working with at their temporary placements. The average time required for basic function training (the trainee's first encounter with the equipment) is between eight and 15 hours. Skills such as document preparation, editing, and printing are stressed because they are in high demand by companies that require trained operators.

The Skillware program, which is free to Manpower temps, has trained over 20,000 temporary office workers since its inception, and everyone's happy about that. The temps make more money as well as receiving free training in an up-and-coming field. The client companies are being supplied with competent people who do not need to be trained. And Manpower's worldwide sales exceeded the billion-dollar mark in fiscal 1984, and sales are continuing to grow, running 62% ahead of last year. According to Fromstein, in 1984 over 20% of the Manpower assignments demanded some type of automation skills. He projects this figure will rise to over 30% in 1985.

Every Manpower domestic office has at least one word processor available for trainees. In addition to the word processor training diskettes, Manpower is introducing training diskettes for IBM, Wang, and AT&T pcs. Fromstein said the IBM PC's fast-growing installed base of clerical workstations convinced Manpower to address the pc issue aggressively over the past year. "We see the pc as the standard workstation equipment in the years ahead," Fromstein commented. "IBM says they will produce a business PC every seven seconds this year—with our new training series, we will be able to train a pc operator every 70 seconds. That means that Manpower alone can supply temporary replacement operators to cover 10% of the installed base—just about the total need caused by absences or work overloads."

Manpower is not the only supplier of temporary office help that trains its workers in word processing. Olsten Corp. and Kelly Services Inc. (see On The Job, February 1984, p. 236) are Manpower's biggest competition at this point.

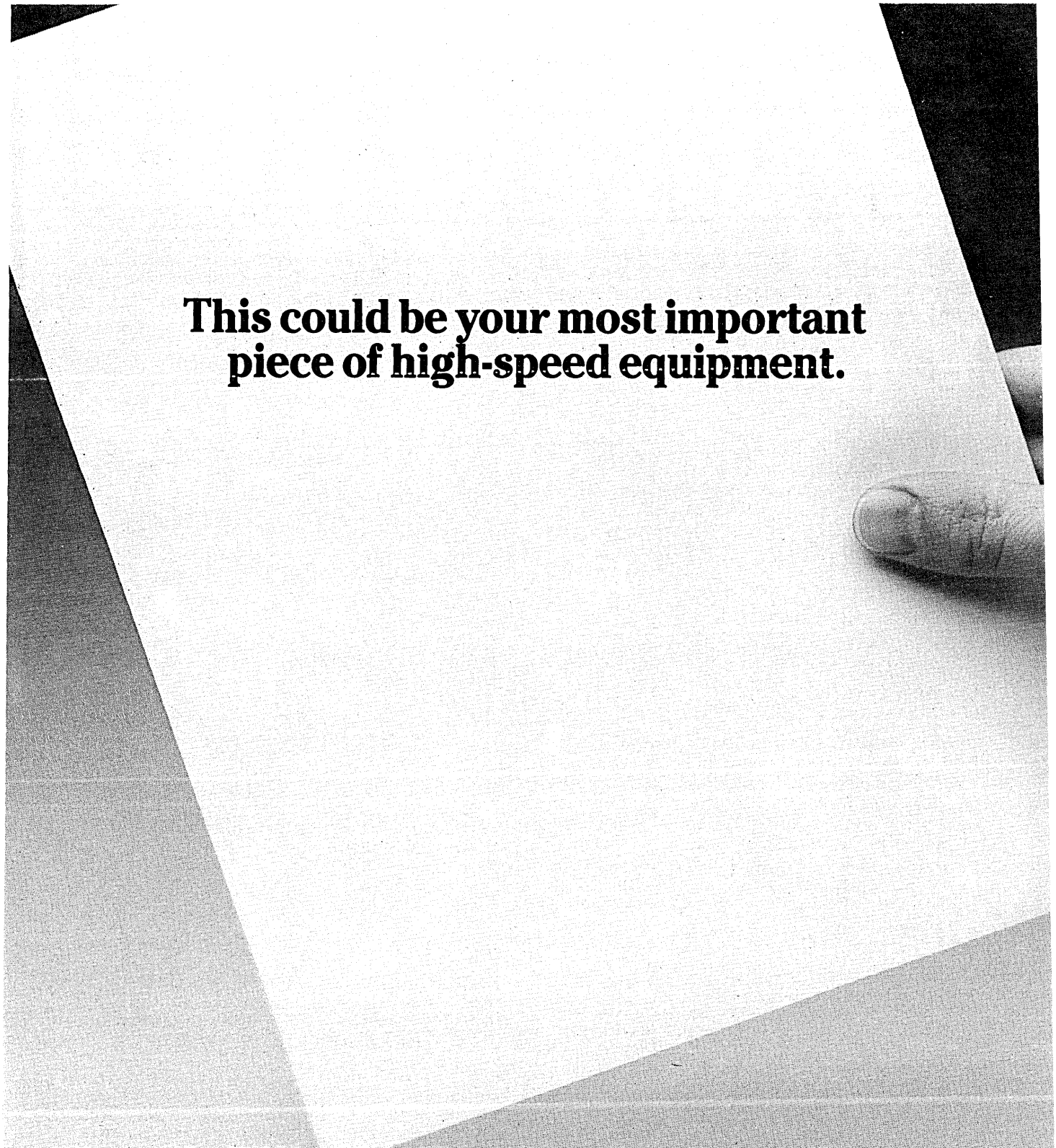
Fromstein's ideal is to have a "reservoir of people being trained . . . to keep up with whatever comes on the market that appears to be important."

LIGHTS, CHAIRS, ACTION

Does anyone suffer from the bad attitude syndrome in your office? The remedy for this office plague could be as simple as allowing your employees to choose their own chairs or just adding a light fixture at each desk, according to Mary Knackstedt, an office design specialist. The idea is to give employees some control over their work area, which in turn improves attitudes. Employees are individuals and expect to be treated as such, Knackstedt says. Consequently, employees who are allowed to express themselves through their choice of pictures or other personal work area objects will often do a better job for their company.

The increased use of computers is behind the move to make offices more people oriented, according to Knackstedt. Designers have begun to realize that technology and people must be intelligently combined. For example, consideration must be given to the type of support a chair offers, the placement of vdt screens, and the proper lighting in the office. For a copy of the article on office design, published by the Administrative Management Society, send a self-addressed, 37-cent stamped envelope to Office Design, AMS, 2360 Maryland Road, Willow Grove, PA 19090.

—Mary Ann Hariton



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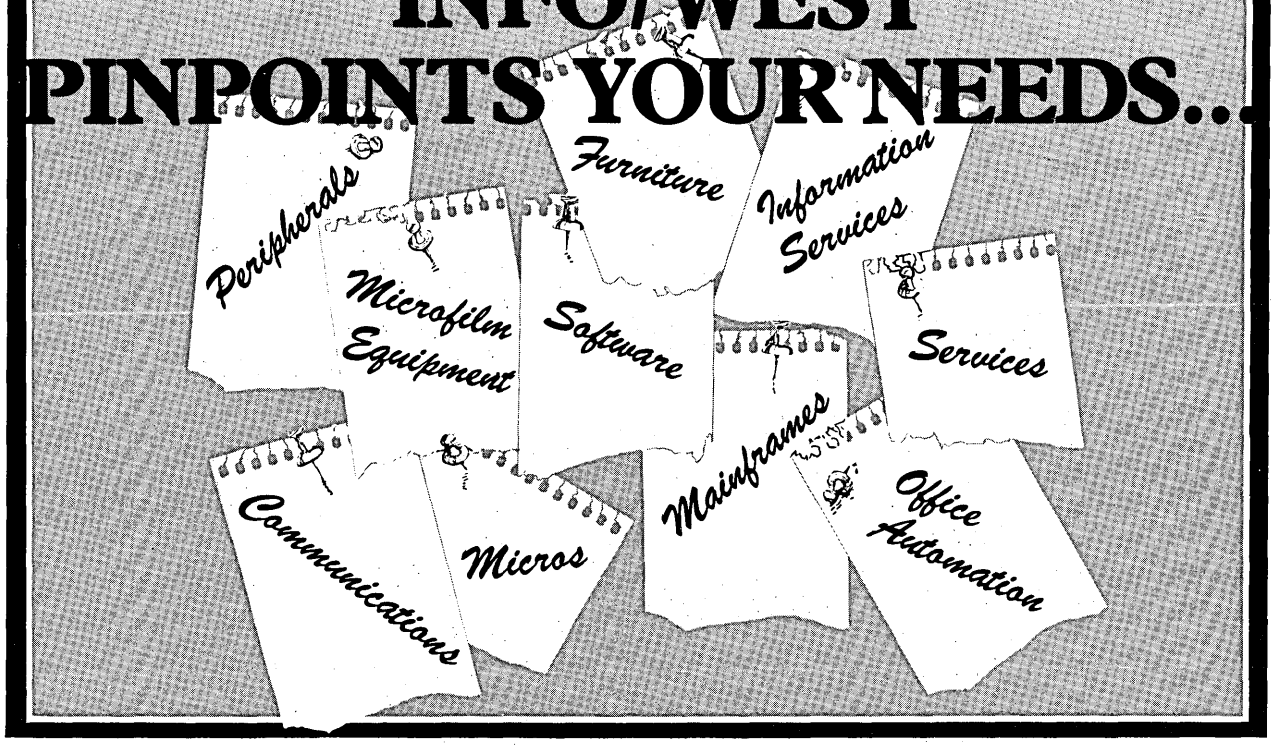

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E

An exchange of readers' ideas and experiences. Your contributions are invited.

READERS' FORUM

TALES OF THE DP INN

In an old New England inn there was a gathering of data processing professionals. That night, as a storm howled outside, a few old-timers sat around the fireplace with some of the newer members. Each of the weary travelers told his tale of too much to do and too little time to do it in. This is the tale of one old Yankee IS manager who had weathered many storms.

"Don't feel that you're alone. Your stories sound a lot like mine. I too was about to jump off a bridge or be institutionalized if things didn't change. I don't have all the answers but I think I'm finding my way out of the rough seas—at least I see a light up ahead.

"A couple of months ago I was sitting in my office after another argument with a user department and thought: I'm in charge of information systems—right? I'm supposed to control dp operations on time, on budget, with a high degree of state-of-the-art technical quality—right? So how come in the last month finance called and said that if their programs weren't running immediately, the auditors would close the plant and the responsibility would be on my shoulders; two of the new programmers I hired quit before they started and took similar jobs at a 20% higher salary; personnel told me to hang tough on salary negotiations ('We can't afford the ripple effect of raising dp salaries,' they said); the president's nephew came in as a summer intern and put an Apple pc on the chief's desk and now the boss is asking how come I can't produce nice color graphics as easily, and why he can't access the IBM mainframe; Computerama, across the street, just delivered five more pcs and I didn't even know what kind they were, or to which departments they went; I canceled my vacation for the third year in a row and at home they were barely speaking to me (nobody particularly appreciated it at work either!)?

"I just felt that I was going downhill and was out of control. I was overwhelmed! For the past year I'd been hiring more and more body-shop programmers from whatever source I could find them. You can imagine the effect that had on budgets and morale.

"I was in for the annual company physical when it hit me that if my physical health were in as bad shape as my managerial health I would have called a doctor long ago. I finally realized that I had to work smarter, not harder, and the time to start was right then.

"I had been hearing about concepts of relational databases, fourth generation languages, prototyping, information centers, and so on. I considered most of this to be pie-in-the-sky stuff. I'd just gotten us converted to standard COBOL packages from a mishmash of systems. I'd also been hearing from a variety of salespeople who had the-latest-software-packages-that-would-solve-all-my-problems. Every one of them was expensive and if I even took the time to evaluate half of them I'd be another year behind in the work.

"I decided to call in a systems doctor—a qualified professional consultant. I interviewed free-lance quacks, still-wet-behind-the-ears interns, academic theoreticians, and only a couple of true professionals who would roll up their sleeves and tackle my problems my way. It was time well spent. I selected one from a firm with a good track record who had the depth of talent to help me out of my mess.

"Pat S. Green was the one I chose. Pat came to us with an open mind and a breadth of experience to draw upon. It wasn't long before we started calling him PSG, for professional systems guru. Because of PSG we began thinking about our problem from a different perspective.

"We had been looking at our jobs as a series of projects. As a matter of fact, we prided ourselves in being just about the best project management group around. Every one of our managers had been through productivity management training and we had established consistant standards and procedures across projects—but that's what was killing us. PSG taught us how to stand back and look at the operation as a whole to see how we went about project development.

"It really shook me when PSG said one of the things we really needed to do was automate our dp shop. I could hear myself talking to the accounting department. I had recently told them how their work could be made easier and they told me that they couldn't worry about draining the swamp when they were up to their keisters in alligators. I thought they were resisting automation. Now I was hearing it about me!

"We came up with a deceptively simple process for looking at where we were, where we wanted to be, and how best to get there. As I told you, where I was was painfully obvious. Where I wanted to be took a little discussion. Originally, I thought I wanted 50 more talented COBOL programmers and three times the hardware I had. I came to realize that it was better to say I wanted to get the right information to the right people in a timely and efficient manner as well as to run the production jobs.

"It was then that I realized there were several options to meeting the objective. It seems that we had three alternatives:

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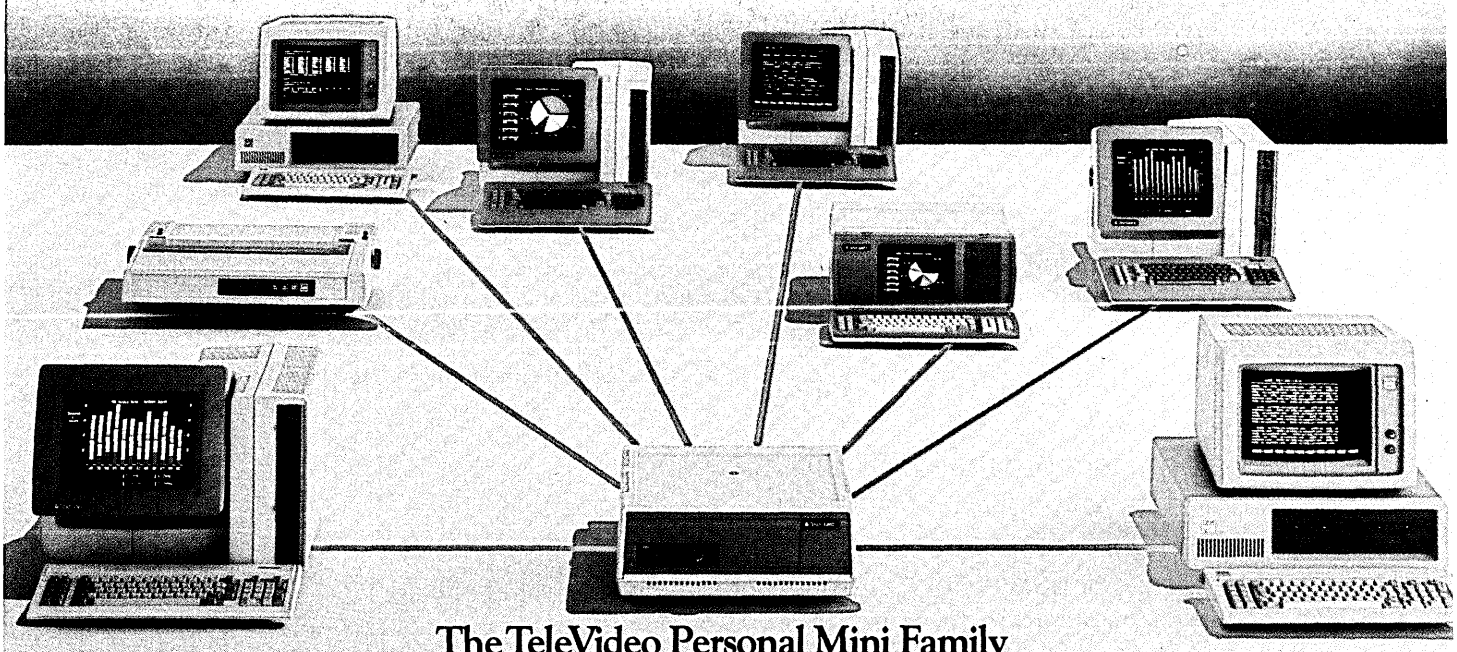

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READERS' FORUM

2. Let the users satisfy some of their own needs.
3. Automate some of the dp functions.

"In the short run we decided we did need to hire more staff and work harder to clean up some of our backlog and do some of the conversion work. We agreed, however, that these were temporary measures to be taken while we pursued the other alternatives.

"Letting the users do their own work was a concept I had mixed, no, actually negative feelings about. I've had nightmares about some hotshot with a little programming knowledge getting into our system. I even spent an additional $20,000 last year to improve security. I was a tough convert, but, in the end, it made sense.

"We decided upon two basic approaches to user self-help. The first was to actually encourage the use of pcs. Many applications that we have now or can reasonably anticipate could be handled off-line on pcs. It is in the company's best interest, however, to help users choose compatible hardware and the appropriate software and applications. And yes, we even have plans for them to access the database. The second approach was for us to develop an information center where users would be able to directly access the database using fourth generation languages. We estimate that we can satisfy 20% to 30% of future demand through these techniques, maybe more.

"The last major concept was to automate the dp shop. We needed to shorten the life cycle of projects. The first step was to eliminate many of the wasted steps we had in working with users. We found that we spent a great deal of time finding what we thought the user wanted, then designing, coding, and testing it, only to have the user say, "That's nice but...." Then we would go back to the drawing board, more COBOL, more changes. This ate up a lot of resources.

"Through prototyping, using system utilities, and fourth generation languages, we'll be able to approach users with a method that allows several midcourse corrections and a model of the final product before we start detailed system coding. What's more, once we understand the final product, we can decide what is the most efficient and effective way to do system

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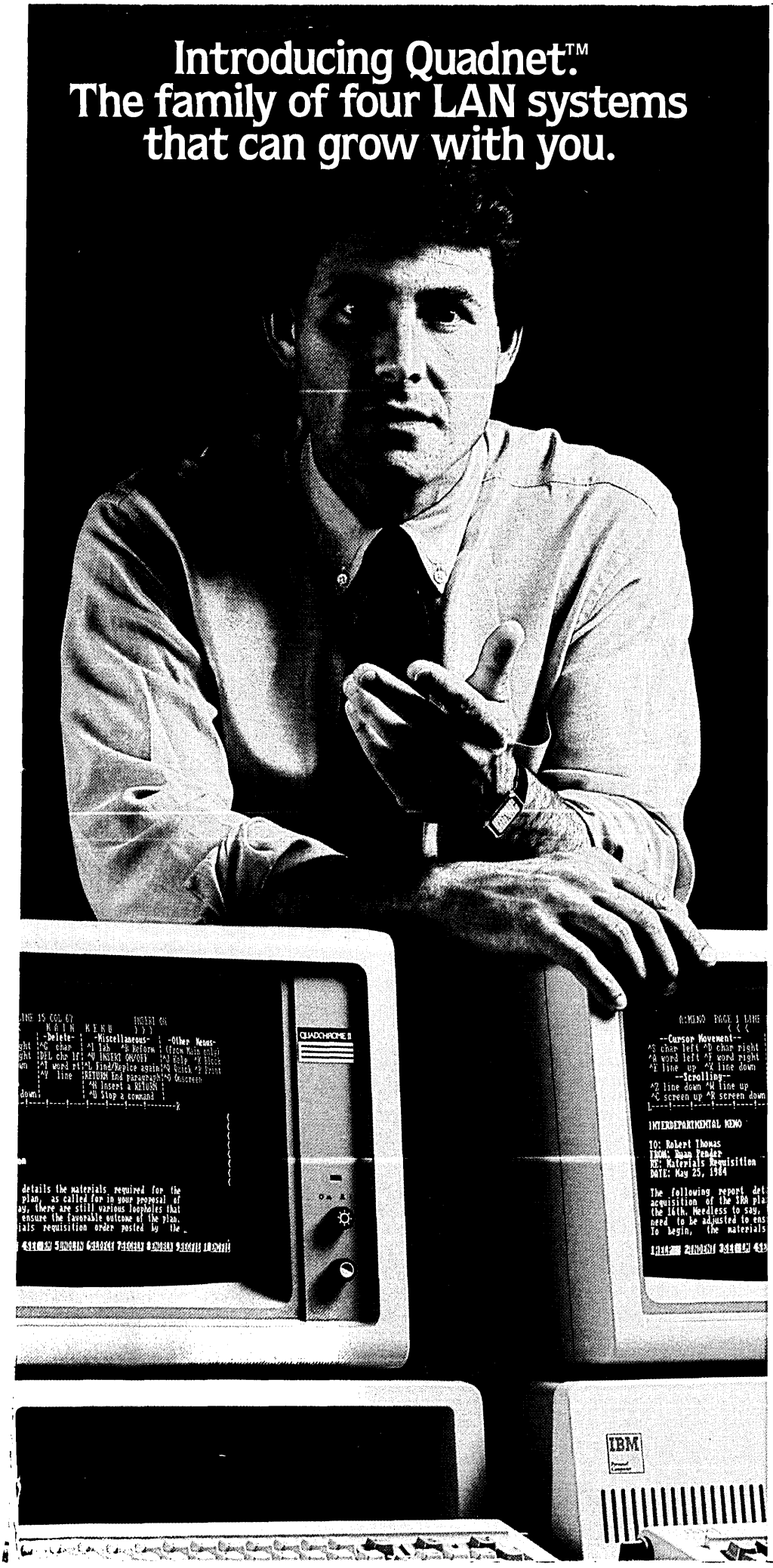

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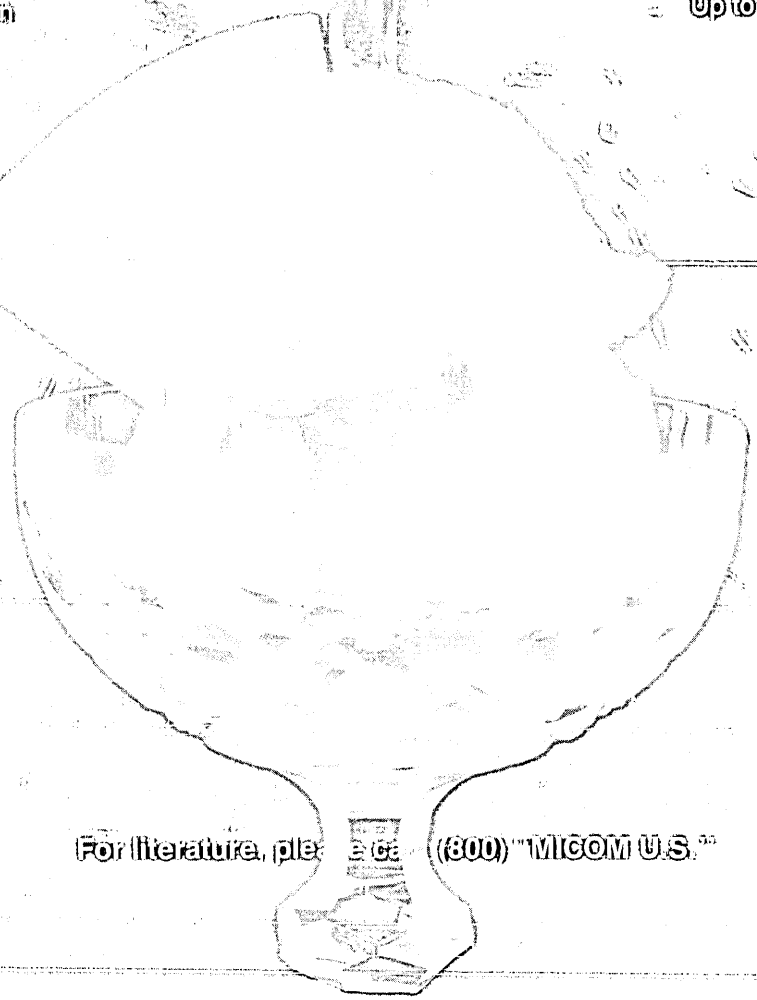

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