DATAMATION® 84
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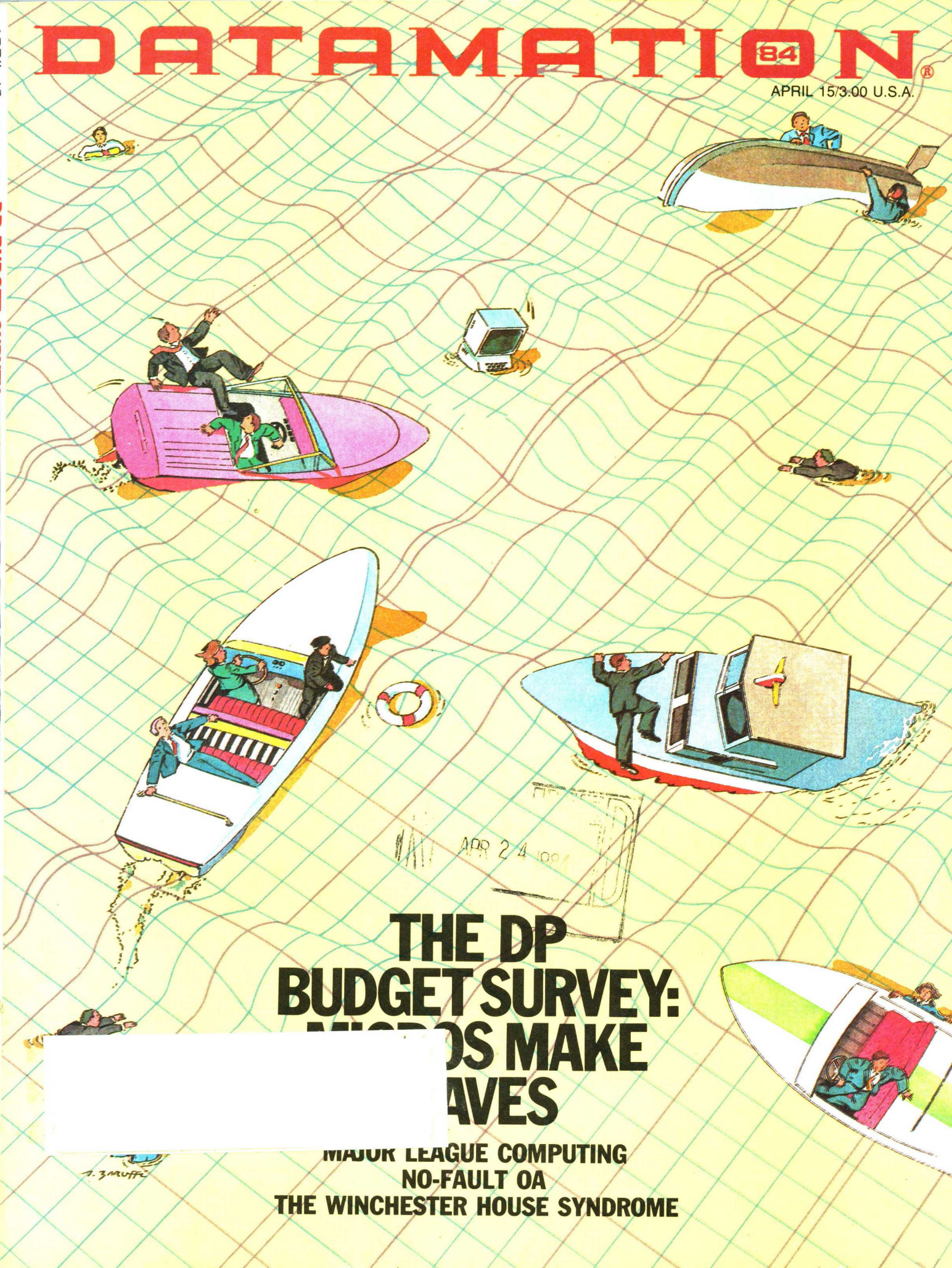


THE DP BUDGET SURVEY: MICROS MAKE WAVES

MAJOR LEAGUE COMPUTING
NO-FAULT OA
THE WINCHESTER HOUSE SYNDROME

NOW THERE'S HELP FOR MIS DIRECTORS FACING PERSONAL PROBLEMS.

Presenting the Stratus Office Solution™ (SOS). It Will Integrate Your Collection of Information-hungry IBM PCs into a Fault Tolerant Office System.

Somehow the personal computer revolution has become your personal problem, hasn't it? They're lined up with their IBM PCs demanding access...access to the corporate data files ... access to shared data and hardware...

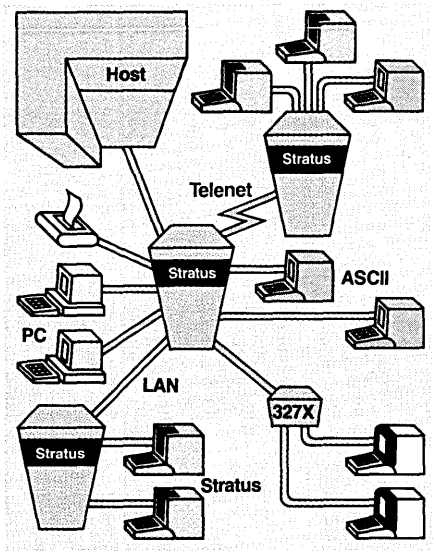
You need a solution right now and it has to be comprehensive and easy to understand. And if they're going to depend on it, it should be fault tolerant. What you need is the Stratus Office Solution (SOS).

SOS Combines Comprehensive Software and Fault Tolerant Hardware

Stratus is the company that made its mark with its hardware-based fault tolerant super-mini. Now it is offering a turn-key software package built around this super-mini that is made to order for companies with an IBM host and from 20 to several thousand independent IBM PCs and/or 3270 and/or conventional terminals.

Here's a quick look at what you get with SOS (without having to write a single program):

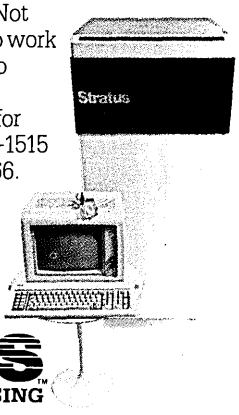
- ❑ Controlled access to mainframe data



- ❑ Data exchange between IBM™ PCs
- ❑ Conversion to 1-2-3™ or VisiCalc™ formats
- ❑ Electronic mail at IBM PC, 3270, or ASCII terminals
- ❑ Word processing on IBM PCs using WordStar,™ or MultiMate™
- ❑ Text conversion from WordStar and MultiMate
- ❑ Stratus word processing
- ❑ Shared access to Stratus printers and disks
- ❑ Calendar management at IBM PC, 3270, or ASCII terminals

SOS lets your collection of isolated PCs become part of an integrated office system. And unlike any other office system in the world, it is based on fault tolerant Stratus/32 hardware that provides continuous availability and transparent networking. Not only can you count on it to work well, you can count on it to always work.

Call Stratus today. Ask for Keith Johnson: 1-800-255-1515 or in Mass.: 1-617-653-1466. Turn those "personal" problems into personal success stories...and instant company assets.



Stratus
CONTINUOUS PROCESSING™

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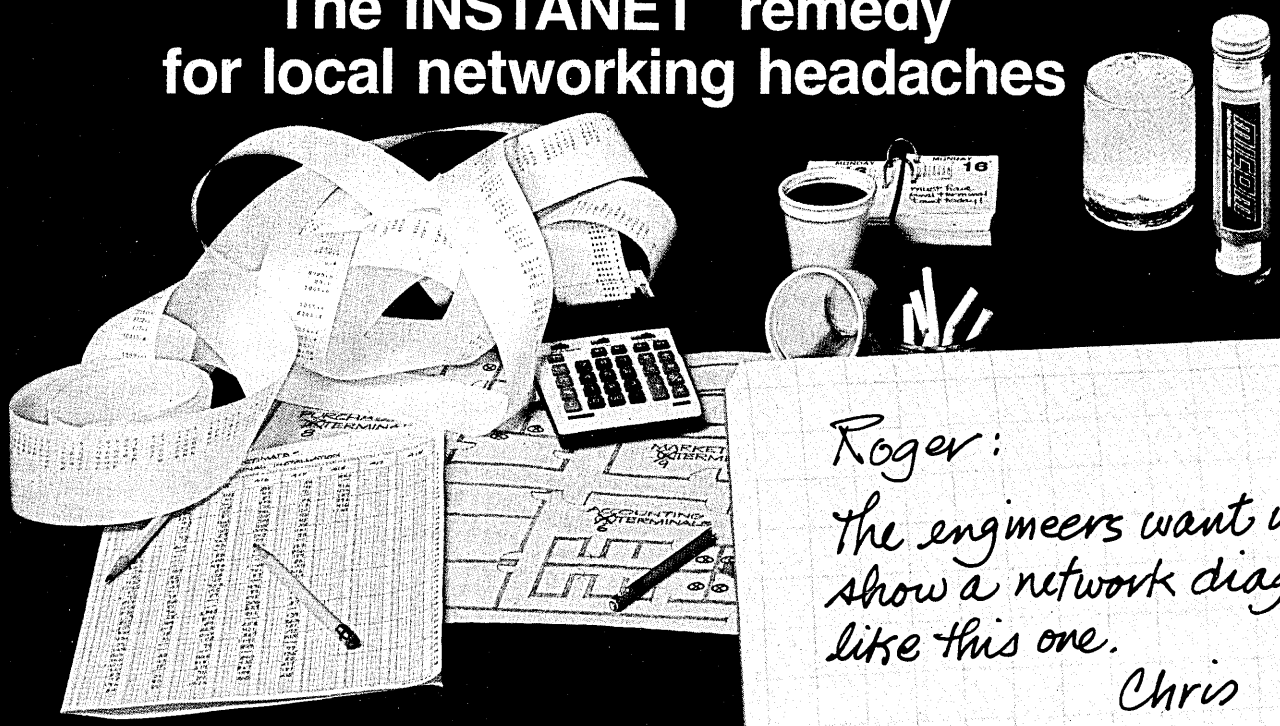
CIRCLE 2 ON READER CARD

The INSTANET™ remedy for local networking headaches



Headache

It's too early to make a long-term commitment to baseband or broadband.

We don't want to get involved with more layers of protocol and more incompatibilities.

Fiber optic cable and coax are expensive and messy to install.

We're not ready to put in a whole network now.

We already own a good deal of datacomm gear.

Division/Group DP Managers want control of their own local datacomm.

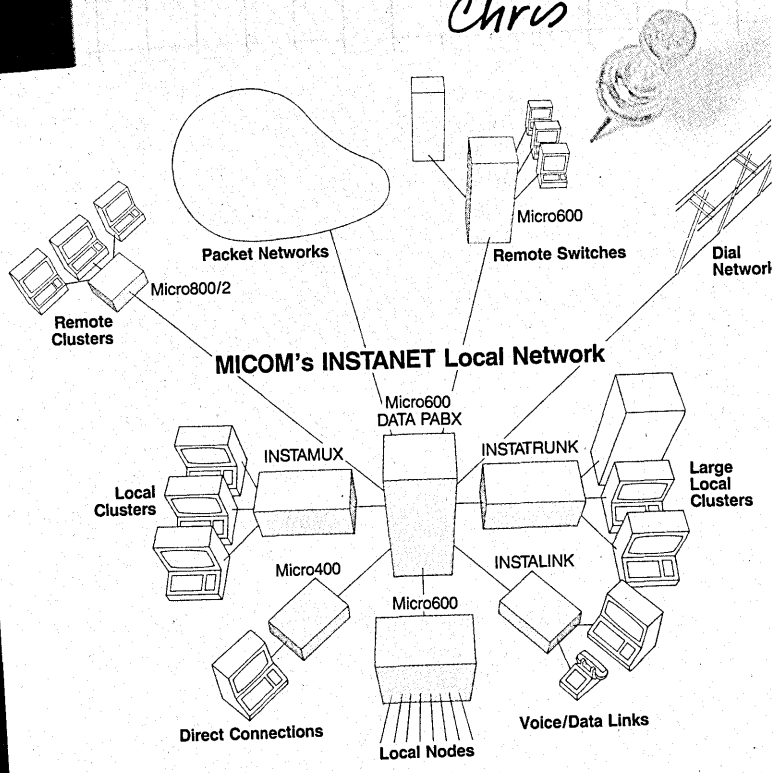
We need Gateways:

- **To the switched phone network**
- **To Packet Data Networks**
- **To other local networks.**

WE NEED IT FAST!

We don't want to spend an arm and a leg.

Roger:
the engineers want us to show a network diagram like this one.
Chris



Not in my ad!
Roger

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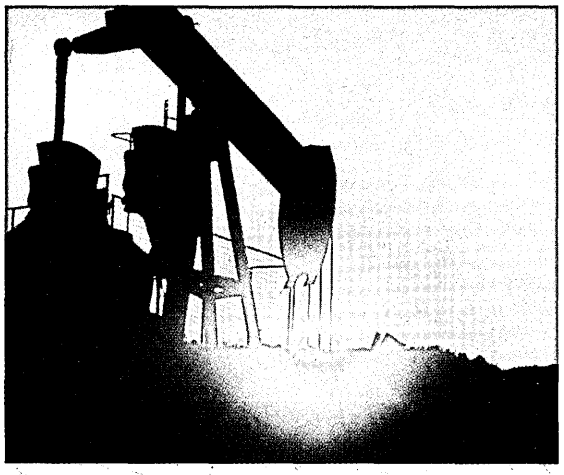
CIRCLE 4 ON READER CARD

How a petroleum company made its data production flow again.



Like many enterprises today, a major petroleum company was trying to cope with the growing demands on its data processing operation and the problem of frequent data bottlenecks. The company's DP management considered adding more channels, more memory, more high-performance disks, or even a new more capable processor.

Some were too expensive. Others were only temporary stop-gap remedies. Then the company turned to Storage Technology and the Sybercache Intelligent Disk Controller.

A 62% improvement in I/O performance.

Installed on the customer's IBM channel, the Sybercache immediately reduced device service time. Batch jobs that previously took three hours were handled in just under one. A typical five-hour production job was cut to one-and-a-half.

Overall, our customer logged a 62% improvement in I/O service time. And device busy time was reduced by 60%.

A better way to deliver your data.

Our Sybercache bypasses the mechanical performance problems of disk drives. Instead of lengthy delays locating data on a disk drive, our intelligent controller anticipates a data request, pre-fetches it from the backend disk, and stores it in a special electronic memory before the CPU requests it. This way, online response is almost instantaneous and batch throughput automatically increases.

Go with the intelligent alternative.

Sybercache ends capacity vs. performance trade-offs. With it, you load your disk drive to the maximum while you get even faster performance. So don't settle for an I/O service time of 40 milliseconds or more when Sybercache can deliver a fast 3 ms at channel speeds of 3 megabytes per second.

Sybercache clearly offers you the most effective cost per megabyte. You'll also increase employee productivity, use your channels and disks more efficiently, and cut the high costs of system tuning.

Put our system to the test.

Our Sybercache is available with 1.5 MB and up to 12 MB storage capacities. It easily attaches to all major IBM and compatible processors.

Give Sybercache a test run on your data bottlenecks. Once you turn it on, we're certain you'll never want to turn it off.

For more information on how to get your data flowing again, contact us for a Cache Analysis and demonstration: Storage Technology Corporation, Louisville, CO 80028, USA; (303) 673-4063.

The 8890 Sybercache Disk Controller

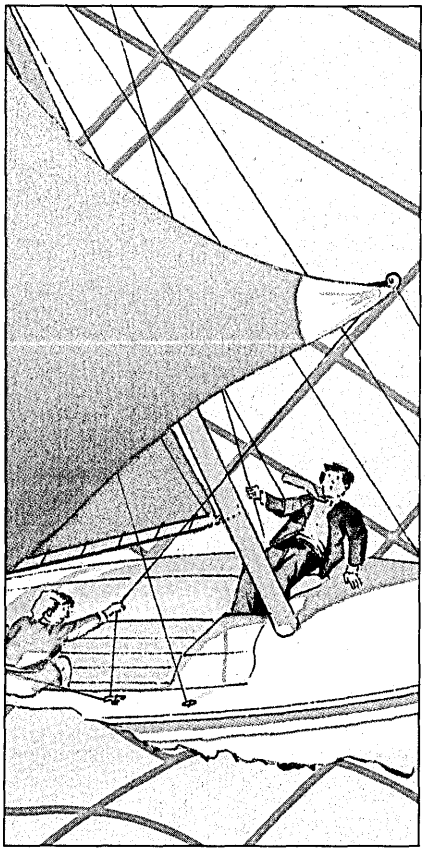
StorageTek

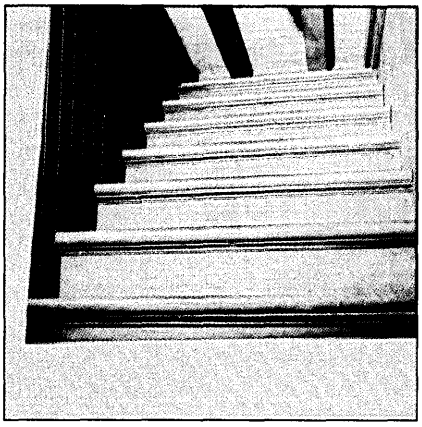
CIRCLE 5 ON READER CARD

DATAMATION®

APRIL 15, 1984/$3.00 U.S.A.
VOLUME 30 NUMBER 5
This issue, 182,100 copies

FEATURES





NEWS IN PERSPECTIVE

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OEM SUPPLEMENT 136-1

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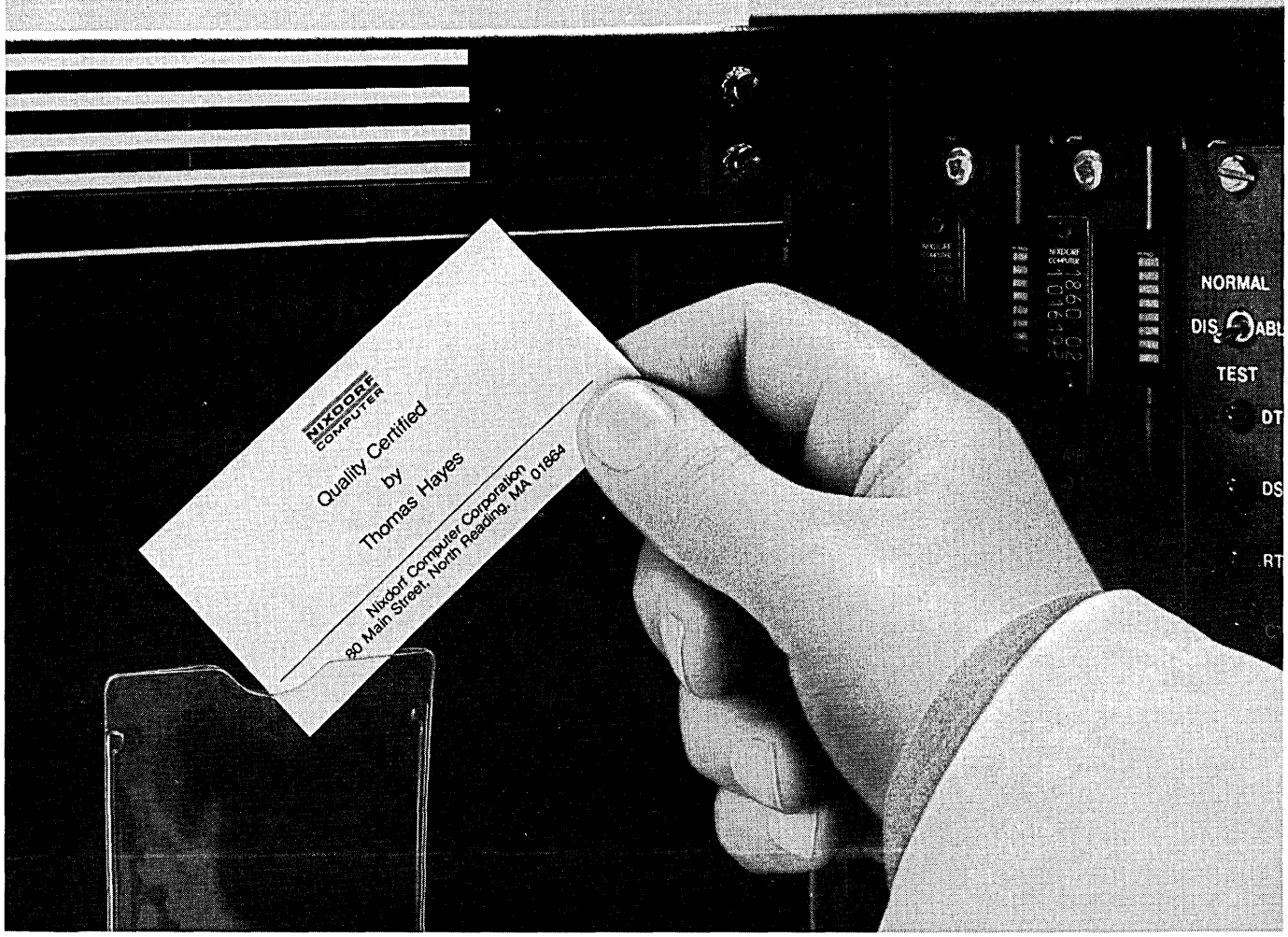
The most important part of a Nixdorf computer goes in last.



Every Nixdorf Computer system has to pass the most demanding tests in the industry. Then after that, it has to get past a very tough customer: a Nixdorf Manufacturing Quality Technician. And only when the system performs perfectly, will one of our Technicians put his or her personal card inside.

All of which means that your system will work when it's installed. And to make sure it keeps working, we back you with a support network of 386 locations in 33 different countries, including 100 in North America alone.

For 32 years, Nixdorf has been providing solutions for the information processing needs of all kinds of businesses. And today, we're a billion-dollar computer company with 16,000 people and over 110,000 systems installed around the world.

So if you want to do business with people known for quality down to the last detail, make your first call to Nixdorf.

Nixdorf Computer Corporation,
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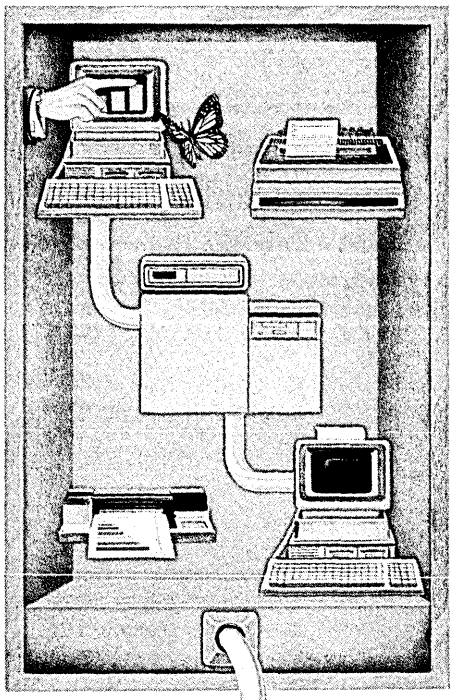
NIXDORF
COMPUTER

CIRCLE 7 ON READER CARD

Hewlett-Packa surge in office

Introducing the Perso



The principle is simple. Boost the productivity of individual PCs. Your people, your department, even your entire company will follow suit.

The first boost occurred when we introduced the touchscreen HP 150 as an office and managerial workstation. This made personal computing so much easier and faster that individual productivity soared.

Now the Personal Productivity Center combines the flexibility of the HP 150 with the power of our HP 3000 family of distributed computer systems.

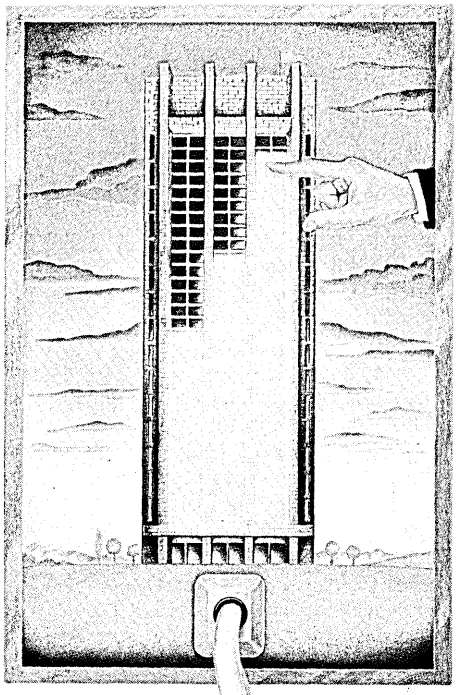
You can shape each Productivity Center just the way you want it by adding other office and computing products from our extensive range.

You can link managerial and secretarial workstations. Create impressive presentations, merging business graphics and word processing. Store them on large disc files. And print them out on laser printers and color plotters.

Your PCs also grow more productive by increasing the range of software they can run. In addition to leading PC programs like 1-2-3™ from Lotus™ and popular word processing packages, they can use HP 3000 business software like our exclusive DeskManager. This combines electronic

rd touches off a productivity.

l Productivity Center.



mail, quick memo writing, personal filing and calendar functions. And each PC can access data processing systems and large corporate data bases.

Personal Productivity Centers can communicate with similar networks in other parts of your company, as well as your mainframes. Each system can expand to handle more than 100 workstations. And you can grow without involving your programmers in any software conversion.

So if PCs alone are making your people more productive, just wait till you see them all working together.

And you can see them right now by calling your local HP sales office listed in the white pages. Or write for complete information to: Hewlett-Packard, Dept. 04191, 19447 Pruneridge Avenue, Cupertino, CA 95014. In Europe, contact Henk van Lammeren, Hewlett-Packard, P.O. Box 529, 1180 Am Amstelveen, The Netherlands.

It could turn your whole company into a productivity center.

Productivity. Not promises.

HEWLETT PACKARD

CIRCLE 8 ON READER CARD

Twenty Years Ago/Ten Years Ago

LOOKING BACK

A STAR IS BORN

April 1964: IBM announced a family of computers destined to alter the state of the entire computing industry—the System/360. DATAMATION introduced readers to the system in a three-page editorial on its configuration and features.

The six basic systems—Models 30, 40, 50, 60, 62, and 70—were source language–compatible and shared a common instruction repertoire. This included a standard set of 88 operations, 42 floating point operating codes, and eight decimal instructions. In addition, a read-only store was used to process "most" 1401 programs. Word lengths were 8, 16, 32, and 64 bits. The 360 is now credited with defining the 32-bit word as well as the 8-bit byte.

Each model of the System/360 consisted of a central processing unit (19 combinations of processing speed and memory size were available), a system console, and input/output equipment.

Every processor had a main memory; a local store in which index and address registers and arithmetic results were kept; an arithmetic section where additions and comparisons were actually done; and a control section which, in all but one processor, used read-only storage to tell the arithmetic unit how to accomplish a desired task.

Software planned for the 360 included FORTRAN, COBOL, and new programming language compilers, designed to operate under monitor control. IBM's newest family used microelectronic, or hybrid, circuits; transistors and diodes were mounted on a passive ceramic substrate a half-inch square.

The differences among the processing units were found in the range of memory sizes, the operating speeds of the processors' functional parts, and the width of the data path. The smallest machine moved only one character at a time while the largest moved eight.

The System/360 used a "hierarchy of memories," a selection of storage facilities ranging from cycle times measured in nanoseconds to core memory with cycle times in microseconds. Memories also extended to external storage devices such as drums, disks, tapes, and strip files with access times ranging from milliseconds to tenths of a second.

The System 360 set the standard for IBM peripheral compatibility and became as successful as it is now historical in the computing industry.

DON'T WORRY . . .

April 1974: Rumors that Amdahl Corp. was having serious problems were disputed by Gene Amdahl, despite the loss of top staff members and the withdrawal of its registration to go public. Amdahl waxed confident that the company's two new computers, the 470/6 and its virtual memory equivalent, the 470V/6, would be delivered in early '75, though one year past their due dates.

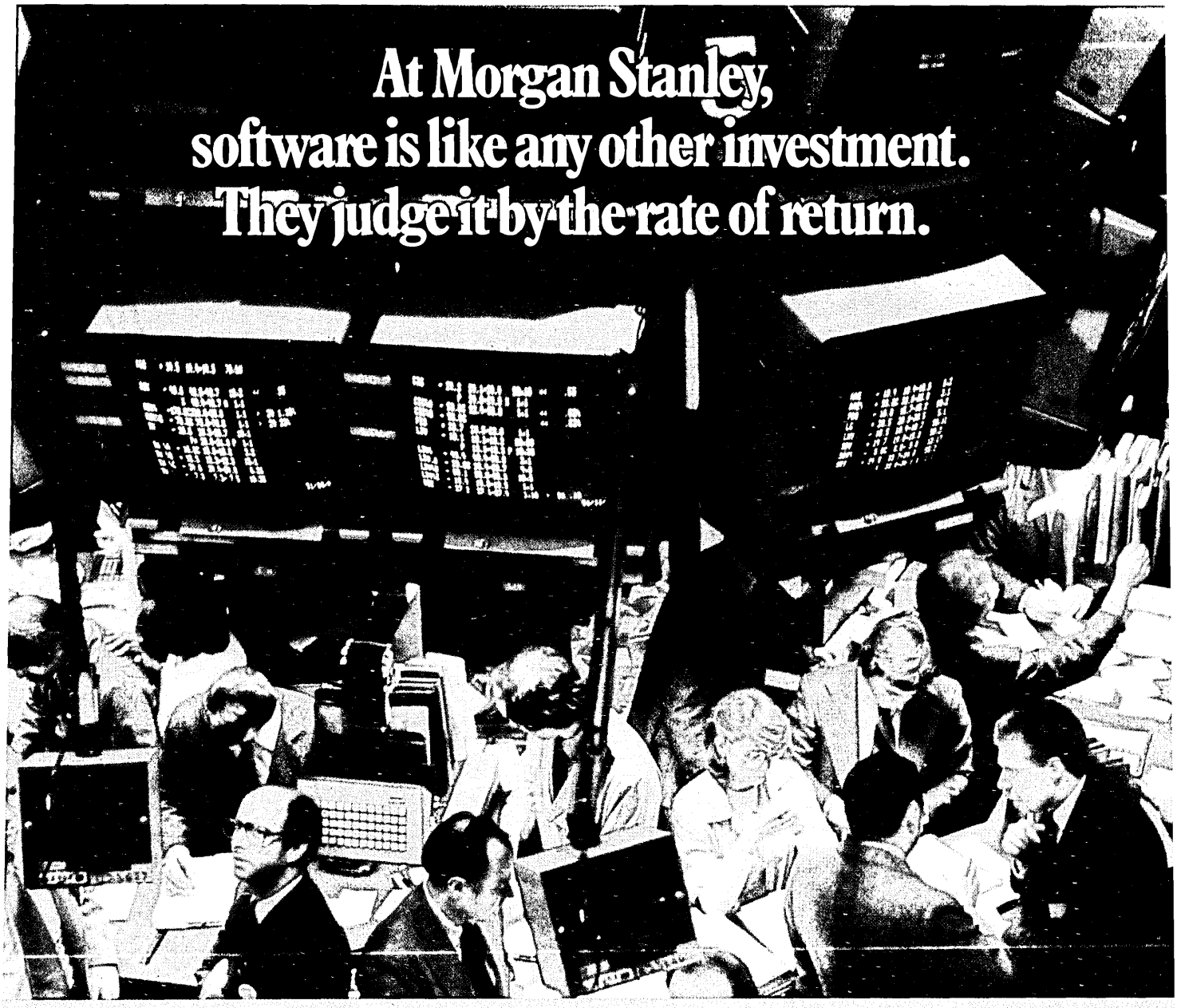
The company had recently lost its executive vp and cofounder, Ralph Rodriguez; had laid off almost 70 engineering, administrative, and manufacturing personnel; and then had lost two more members of the board, vp of finance William Mozena and secretary/legal counsel Paul Weiser. Amdahl made no comment as to whether Rodriguez had been fired.

Many people claimed the company was running out of money, but Amdahl insisted it had "good financing that's adequate to carry us at least through June." After withdrawing the registration to go public, however, the company tried to raise about $20 million through private investors. In the fall of '73, the company had received investments totaling $27.5 million but had no subsequent infusion of capital.

Amdahl, who was responsible for the architectural planning of IBM's 360s, claimed his company had letters of intent for 18 of the new systems, and that while they were not firm orders, he said, "We consider them excellent letters of intent."

Things could have been a lot worse for the firm. Companies in financial trouble can hardly afford new construction, and Amdahl made mention of the progress on a new company building, due for completion that June.

—Lauren D'Attilo



NATURAL Fourth-Generation Information Processing Systems

Ask the MIS Department at Morgan Stanley how they decide what software to buy, and you'll hear the no-nonsense logic that has made them America's leading investment bank in the underwriting, sales, and trading of securities.

At Morgan Stanley, revenues per employee have significantly increased in the last decade, thanks to a series of company-wide initiatives. MIS's contribution to this effort has been the implementation of a software approach specifically designed to make the most of each employee's time—and every dollar spent on MIS.

Implementing that approach has been helped dramatically by the use of advanced productivity tools from Software AG. With ADABAS, our relational data base management system, worldwide financial information is available instantly to meet an average of 15 million requests a day. And through the use of NATURAL, our fourth-generation information processing system, Morgan Stanley has improved programmer productivity by 500% or more.

With performance like this, no wonder NATURAL is the world's most widely installed system of its type. And no wonder that the Morgan Stanleys of the world are increasingly turning to Software AG products for their demonstrable effects on the bottom line.

Systems software can be an expensive investment. But if you're prudent, it can pay off handsomely. To find out more about ADABAS, NATURAL, and other Software AG products, call or write today.

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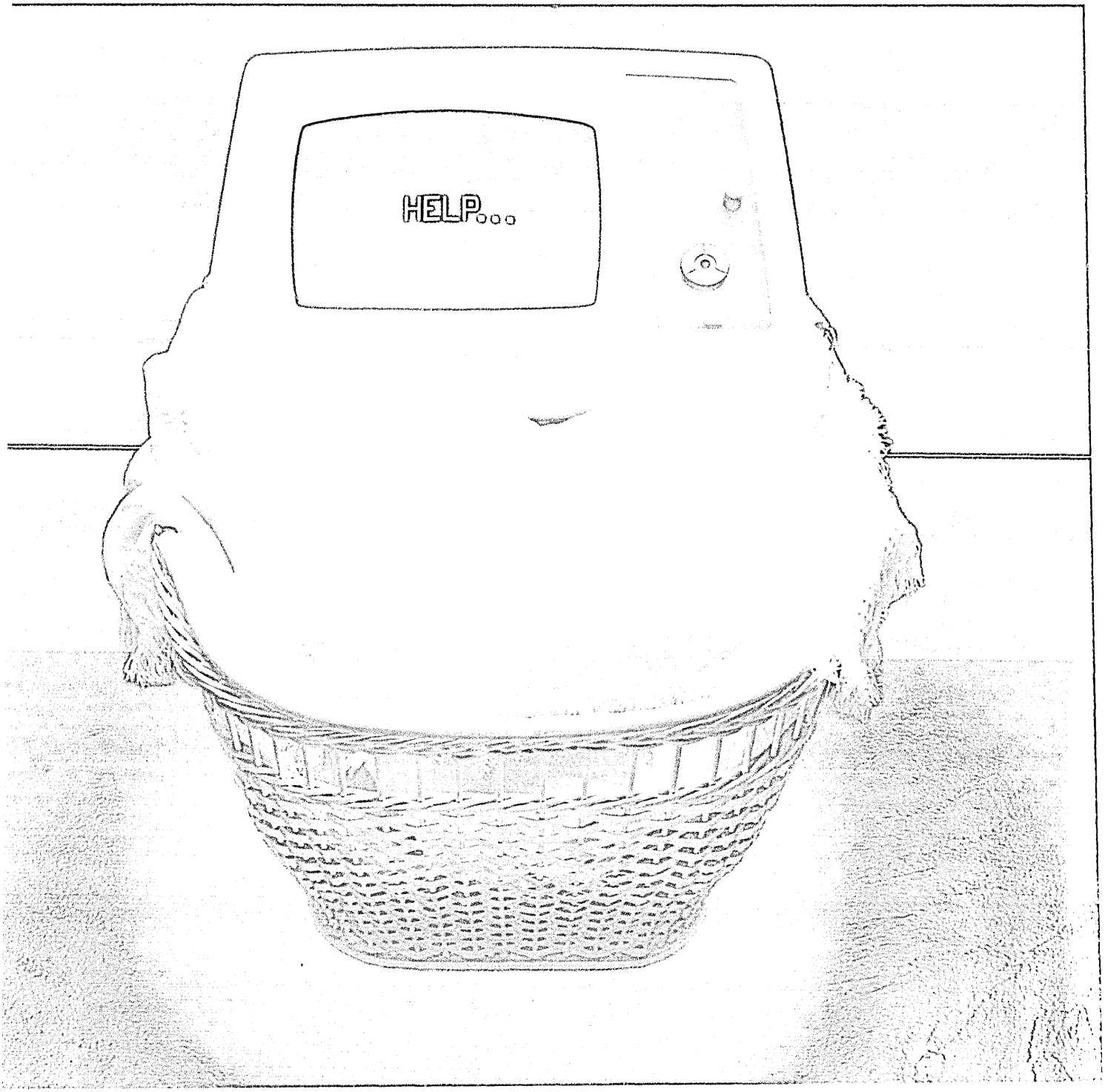
Powerful Software Solutions

CIRCLE 10 ON READER CARD

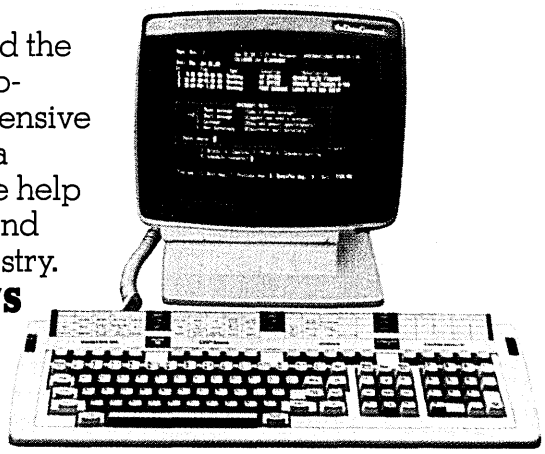
WITH DATA GENERAL YOUR COMPUTER WON'T BE ABANDONED AT YOUR DOORSTEP.



DATA GENERAL SERVICE— THERE WHEN YOU NEED IT

Some computer companies will sell you their bright new systems—and then disappear.

Not Data General. We understand the service and support needs of the automated business office. Our Comprehensive Electronic Office (CEO™) gives you a system that will run smoothly with the help of one of the most complete service and maintenance plans in the entire industry.



A SERVICE PROGRAM THAT'S RIGHT FOR YOU

Whatever the size of your office system, its locations, or hours of operation, there's a Data General service program designed to meet your needs.

With our "Enhanced Response Program," you'll have a service engineer on your site within 2 hours—24 hours a day, 7 days a week. Or choose our "On Call Service," in which a service engineer responds within 4 hours—Monday through Friday, between 8AM and 6PM.

With the 32-bit ECLIPSE® MV Family of computers, you can choose an uptime guarantee from 96% to 99%. Remote Assistance is also available to help you maintain high performance levels while saving time and money.

And, with our new DESKTOP GENERATION™, select from 16 service programs—the widest range of options for any desktop on the market. These programs will help increase productivity and keep maintenance convenient.

ALWAYS NEAR YOUR OFFICE

Data General has experience with large and small companies that have both local and distributed office environments. Whether you have one office, or a worldwide network, service is always nearby with Data General's 250 offices.

TOTAL SUPPORT FOR HARDWARE AND SOFTWARE

Data General's service organization will be your one source for handling both hardware and software problems. Our service engineers undergo extensive training every year. They'll know your system—no matter how new it is.

CALL NOW

To learn how Data General's Field Engineering Services can keep you a generation ahead, call **1-800-343-8842.** In Massachusetts, call **1-800-451-1014.** Or write Data General Service, 50 Maple Street, M.S.04 G, Milford, MA 01757.

Data General
a Generation ahead.

CIRCLE 11 ON READER CARD

"IDMS/R represents a major advance in database technology."

Dave Litwack*

Because IDMS/R is the first relational DBMS designed for both the DP professional and the end user.

**David Litwack is Cullinet's Vice President of Product Development. Mr. Litwack has contributed significantly to the many technical advances Cullinet has achieved in database software products, including IDMS/R. Mr. Litwack joined Cullinet in 1976. He is a Cum Laude graduate of Brandeis University and holds a Masters in Computer Science from Boston University.*

IDMS/R is not only a relational database management system, but a particularly powerful one. IDMS was made relational by removing all pointers and allowing the user to define data as tables and providing the traditional relational operators such as selects, projects and joins. The major benefit of a relational DBMS is the capacity to develop applications faster because the developer does not have to be concerned with the database design. IDMS/R provides this and much more.

For example, the Automatic System Facility (ASF) of IDMS/R is a major advance over fourth generation languages. The ASF is so comprehensive and easy to use that all a user need do, to develop an application, is define a relational record. The Automatic System Facility dynamically generates all necessary supporting structures including data definitions, screen formats, application processing logic, and documentation. So, the developer can witness the application being produced, literally, in seconds. This capability makes IDMS/R the perfect system for the end user.

Data processing professionals can use the ASF to help develop production applications. The ASF can be used to build a prototype that can be enhanced, using Cullinet's fourth generation language, ADS/OnLine, into a complex production application. But, when they build a complex high volume application using IDMS/R, DP professionals require outstanding performance. Typically, 5% of the data relationships (joins) in any application are accessed 95% of the time. With IDMS/R, they can simply change these relationships to predefined joins and benefit from a dramatic boost in performance. We call it Relational Fastpath. Relational Fastpath makes IDMS/R a unique DBMS and a perfect system for DP professionals' system development needs.

In addition, IDMS/R has the most sophisticated back-up and recovery capability of any DBMS, full integration with personal computers and is also integrated with Cullinet's complete line of financial and manufacturing applications.

In summary, IDMS/R was designed to satisfy the requirements of those who want to develop applications faster and those who have the responsibility of processing them.

For further information, attend a Cullinet Seminar. Mail the attached coupon or call Cullinet at 1-800-225-9930 (in Massachusetts, 617-329-7700) for a complete schedule.

Name/Title _____

Name/Title _____

Company _____

Address _____

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Mail to: Cullinet Software, Inc., 400 Blue Hill Drive, Westwood, MA 02090-2198.
Attn: Corporate Meetings.

Cullinet Software products are designed to run on IBM 360/370, 30XX or 43XX or plug-compatible computers.

DM 4/15

Database: Cullinet

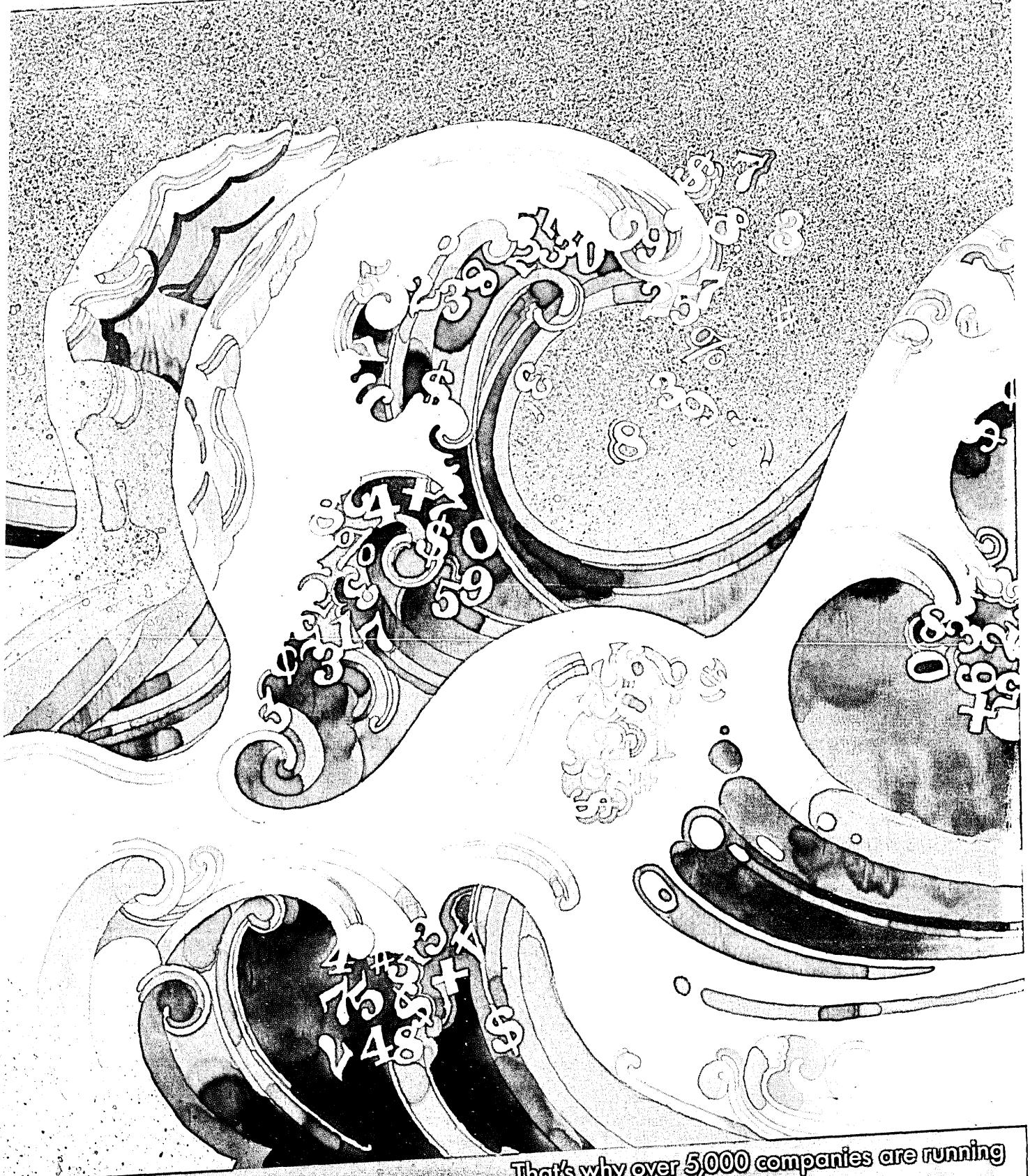
LOOK AHEAD

IBM'S 801 AT HAND	Watch out for IBM soon to unveil a proprietary 32-bit processor, dubbed 801, which may form the heart of a small business system and/or the arithmetic engine in the firm's upcoming Trout series of mainframes. The 801, developed largely at the Yorktown Heights, N.Y., research center, has been the subject of much attention within IBM lately and has been the target of certain compiler projects. Software known as the Yorktown Monitor System has been written for the machine, which is understood to run at as much as 15 MIPS.
IBM TYPEWRITER REPLACEMENT	Reports circulate that IBM is joining its Displaywriter software to an enhanced electronic typewriter of some sort. The Displaywriter, a very successful word processor, may be nearing the end of its production life, and IBM is thought to be trying to fill in the gap between it and the PC with a new machine that will be built at the Lexington, Ky., typewriter plant. IBM's electronic typewriters have been finding tough competition from Xerox's Memorywriter and several Japanese makes.
UPGRADING A NETWORK	McDonnell Douglas's on-again/off-again takeover of Tymshare Inc., Cupertino, Calif., has given the airplane manufacturer an entree into the timesharing and network services market. However, reports are circulating that major upgrades to the Tymshare network will be required in the near future if it is to maintain its competitiveness. Reportedly, Honeywell and Chrysler, two major Tymshare customers, have been complaining of too many line problems and slow service response time. Looks like McDonnell-Douglas will have to shell out even more cash than the final $307.5 million price it paid for Tymshare.
DEC ADDS ETHERNET BOX	Digital Equipment's commitment to Ethernet will take a more concrete form this summer as the company begins shipments of a terminal server that was introduced in May 1982. The server is expected to handle up to 32 lines at speeds of up to 19.2 Kbps and at a price of $1,000 per line. Unlike the DZ11 and DMF32 servers, which attached to a specific host only, the new box can connect to a local network and communicate with VAX or PDP-11s running RSX. Coming soon from DEC are gateways for SNA and X.25, both of which use the same controller board as the terminal server but different software. The new equipment is expected to make DECnet more appealing to users.

LOOK AHEAD

ISO CHECKS OUT IBM	The International Standards Organization (ISO) is taking a hard look at IBM's document interchange architecture (DIA) and document control architecture (DCA) as potential draft standards for layer 7 of ISO network protocol. Layer 7 is the highest level of the so-called ISO model, dealing with the way application programs communicate with each other. Standards have been defined for layers 1 through 4, the transport layers, but the three top levels -- session, presentation, and application -- are still open.
HP SEEKS NEW DBMS	Hewlett-Packard has cancelled its Horizon project, an effort to develop a relational database manager for the HP 3000 line and the interim Vision series. Instead, the Pala Alto, Calif., company plans to use software developed by Esvel, a Bay Area startup founded by ex-IBMers. HP will use the Esvel software on its Spectrum line of machines, which is expected to be introduced in 1985.
NEW AT&T PBX	Keep an eye on AT&T at next month's ICA show. The giant is expected to introduce a new PBX, code-named "Gazelle," which is designed for small- to medium-sized users in the 100- to 200-line range. Sources say the machine has been on hold for several months, partly because of a shortage of particular semiconductor chips.
MONEY FOR A NEW PRODUCT	Zaisan Inc., a two-year-old Houston company that last November introduced a telephone/personal computer device, is about to complete its second round of financing and it looks big. We hear that nine investors, led by disk drive tycoon Sirjang "Jugi" Tandon, will kick in about $10 million to help Zaisan's production of its ES.1 device get rolling. The machine combines pc functions with an ASCII terminal and telephone.
RUMORS AND RAW RANDOM DATA	Look for Metaphor Computer Systems, Mountain View, Calif., to begin field testing of its manager's workstation in May or June, followed by first customer shipments in September. Metaphor is headed by Don Massaro and David Liddle, two former Xerox Office Systems executives....The computer science staff of Xerox's noted Palo Alto Research Center (PARC) has been decimated by a mass defection to a nearby lab started by DEC recently. As many as three dozen researchers left Xerox....A razzle-dazzle video conferencing system developed by Datapoint Corp. has been licensed to a spin-out company that plans to bring the machine to market independently.

Managing a Constant Wave of Facts & Figures



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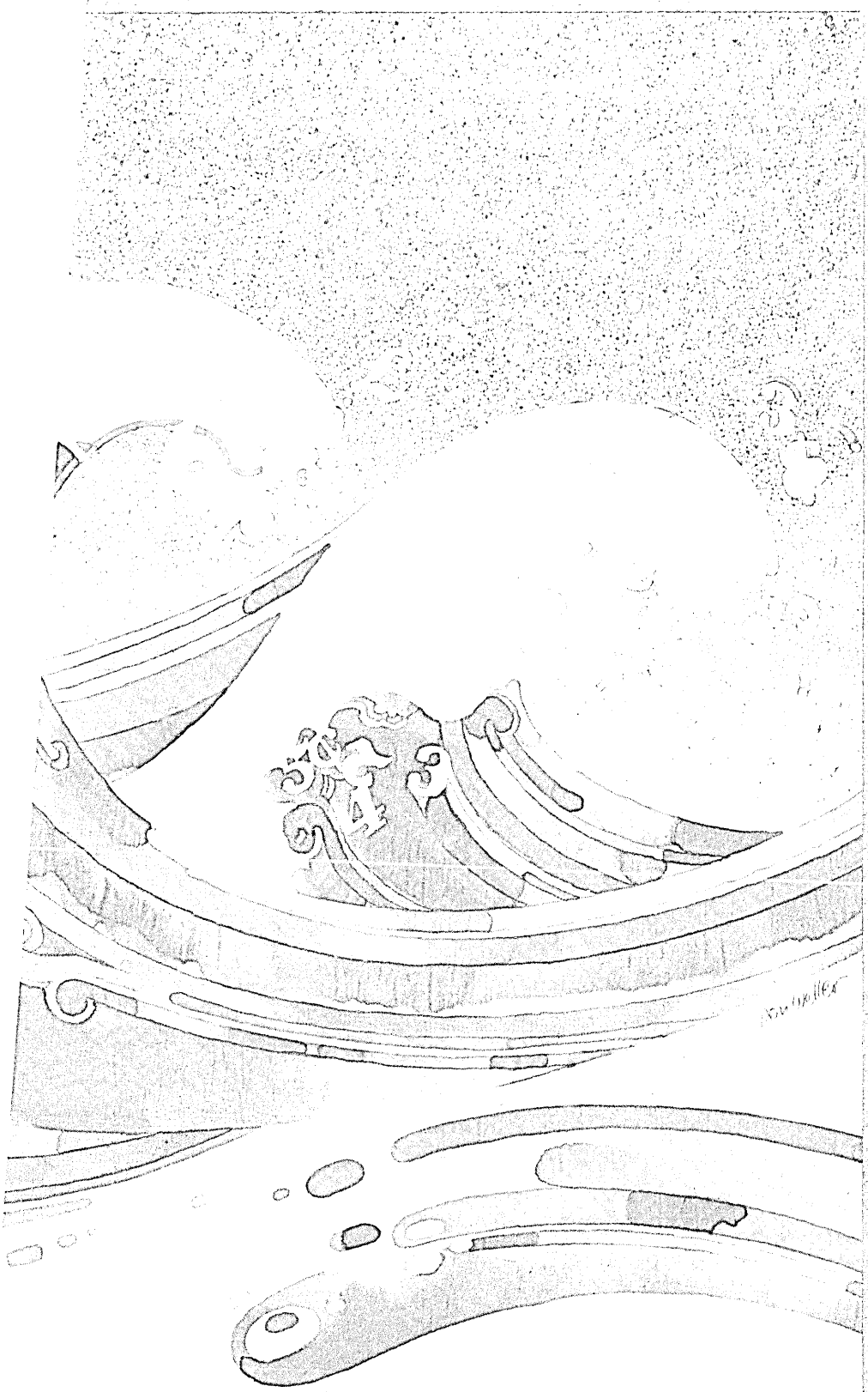

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CIRCLE 11 ON READER CARD

CALENDAR

MAY

Computer Graphics '84.
May 13-17, Anaheim, Calif., contact: Christine A. Radiske, National Computer Graphics Assn., 8401 Arlington Blvd., Suite 601, Fairfax, VA 22031, (703) 698-9600.

1984 IEEE International Conference on Communications (ICC '84).
May 14-17, Amsterdam, the Netherlands, contact: Dr. T.A.C.M. Claasen, Secretary of the Executive Committee, Philips' Research Laboratories, P.O. Box 218, 5800 MD Eindhoven, the Netherlands.

Communications '84.
May 15-18, Birmingham, England, contact: Kallman Associates, 5 Maple Court, Ridgewood, NJ 07450, (201) 652-7070; or Industrial and Trade Fairs Ltd., Radcliffe House, Blenheim Court, Solihull, West Midlands B91 2BG England, 021-705-6707.

Electro/84.
May 15-17, Boston, Mass., contact: Nancy Hogan, Electronic Conventions Inc., 8110 Airport Blvd., Los Angeles, CA 90045, (213) 772-2965.

Mini/Micro Northeast-84.
May 15-17, Boston, Mass., contact: Kent Keller, Electronic Conventions Inc., 8110 Airport Blvd., Los Angeles, CA 90045, (213) 772-2965.

The Fourth Jerusalem Conference on Information Technology (JCIT).
May 20-25, Jerusalem, Israel, contact: The Fourth Jerusalem Conference on Information Technology (JCIT), P.O. Box 29313, 61292 Tel Aviv, Israel.

BIT, USA.
May 22-26, Milan, Italy, contact: Carol Ross, Trade Promotion Officer, U.S. International Marketing Center, Via Gattamelata 5, 20149 Milan, Italy, telex 330208 or telephone (39) 2-4696-451.

MicroExpo '84.
May 22-26, Paris, France, contact: Dianne Brock, Show Coordinator–USA, Sybex, 2344 Sixth St., Berkeley, CA 94710, (415) 848-8233; or Gin Piau, Show Manager–Europe, Sybex, 4 Place Felix Eboue, 75583 Paris CEDEX 12, France, 1-347-3020.

Automach-Australia '84.
May 23-25, Sydney, Australia, contact: Society of Manufacturing Engineers, One SME Dr., P.O. Box 930, Dearborn, MI 48121; or A. Greco & Associates, 3/D "Tyrone" 80 Shirley Rd., Wollstonecraft 2065, NSW, Australia, (02) 439-4014.

Gulf Coast Computer & Office Show.
May 29-June 1, New Orleans, La., contact: James Whitsed, Gulf Coast Computer & Office Show, 119 Avant Garde Circle, Kenner, LA 70062, (504) 467-9949.

JUNE

Advanced Manufacturing Systems Exposition (AMS 84).
June 12-14, Chicago, Ill., contact: Clapp & Poliak, 708 Third Ave., New York, NY 10017, (800) 223-1956; in New York call (212) 661-8010.

Data 84/Toronto Computer Show.
June 12-14, Toronto, Ontario, contact: Lori Leivonen, 47 Lakeshore Rd. East, P.O. Box 190, Harbour Centre, Port Credit, Ontario L5G 4L7 Canada, (416) 271-1601.

INFO/SOFTWARE (Information Management Exposition & Conference for Software).
June 12-14, Chicago, Ill., contact: Clapp & Poliak, 708 Third Ave., New York, NY 10017, (800) 223-1956; in New York call (212) 661-8010.

PERCOM '84—Second International Exhibition & Conference on Business and Personal Computers.
June 19-22, Hong Kong, contact: Adsale Exhibition Services, 20/F., Tung Sun Commercial Centre, 194-200 Lockhart Rd., Wanchai, Hong Kong, telex 63109 ADSAP HX.

IBI Second World Conference on Transborder Data Flow Policies.
June 26-29, Rome, Italy, contact: the Intergovernmental Bureau for Informatics, P.O. Box 10253, 00144 Rome, Italy, tel. 770181/5916041, telex 612065 IBINF I.

PCExpo.
June 26-28, New York, N.Y., contact: PCExpo, 333 Sylvan Ave., Englewood Cliffs, NJ 07632, (201) 569-8542.

Second World Conference on Transborder Data Flow Policies.
June 26-29, Rome, Italy, contact: IBI, Department of Policies, P.O. Box 10253, 00144 Rome, Italy.

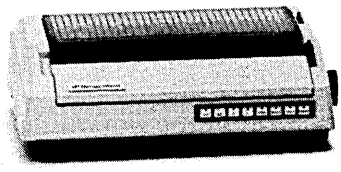
JULY

1984 National Computer Conference (NCC'84).
July 9-12, Las Vegas, Nevada, contact: Registration Dept., AFIPS, 1899 Preston White Dr., Reston, VA 22091, (703) 620-8900.

SYNTOPICAN XII.
July 17-21, Chicago, Ill., contact: Association of Information Systems Professionals, 1015 North York Rd., Willow Grove, PA 19090, (215) 657-6300.

SIGGRAPH'84, The 11th Annual Conference on Computer Graphics and Interactive Techniques.
July 23-27, Minneapolis, Minn., contact: SIGGRAPH'84 Conference Office, 111 East Wacker Dr., Chicago, IL 60601, (312) 644-6610.

From



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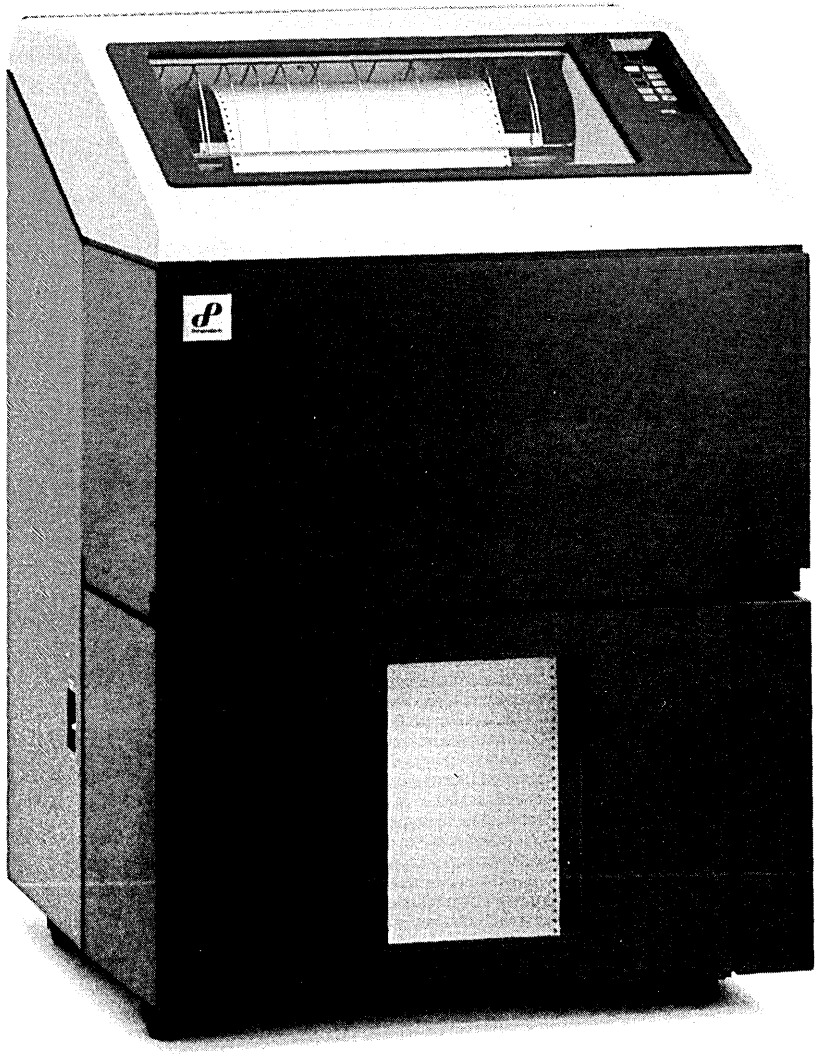

Nobody puts ideas on paper so many ways.

If you're using your printer with a personal computer, you probably need one that can handle a variety of functions.

At the same time, the price should be in line with the computer itself. Low.

The pint-sized Dataproducts printer in the picture costs about as much as one good software package.

It prints spreadsheets, graphics and illustrations, labels, multi-part forms—even letters that look like they were typed.

But let's say you're running a big computer and it's hundred-page reports you need. Pronto. Or documents by the millions.

The printer on the right finishes a full computer printout page in less time than it takes to sneeze. At 2,000 lines a minute, it prints much faster than you can see. Three shifts a day. Year after year.

In between these two special-duty Dataproducts printers are whole families of other Dataproducts printers—daisywheel printers, non-impact printers, high-security printers for the government, and more.

In fact, we make more different kinds of computer printers than any other independent printer company in the world.

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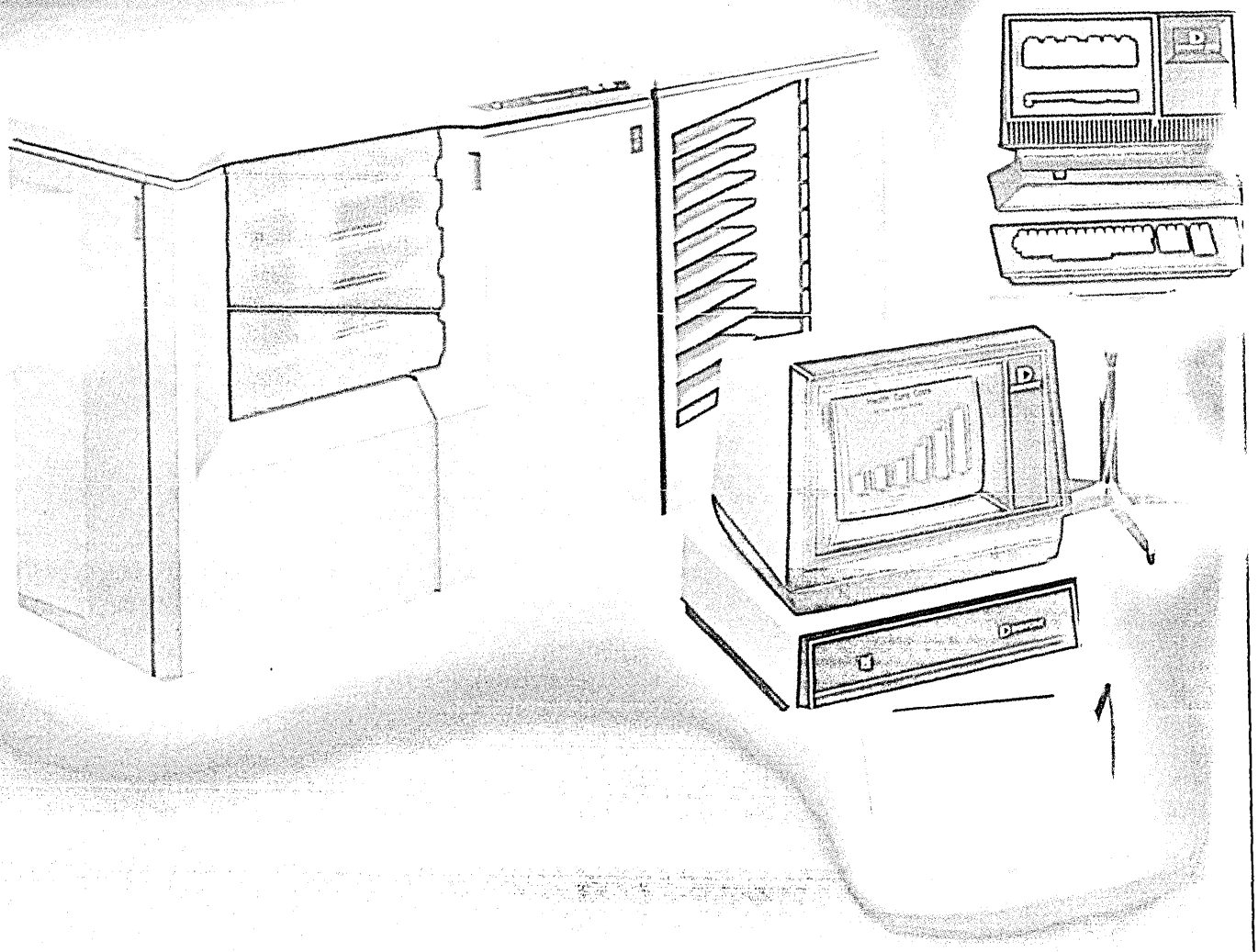

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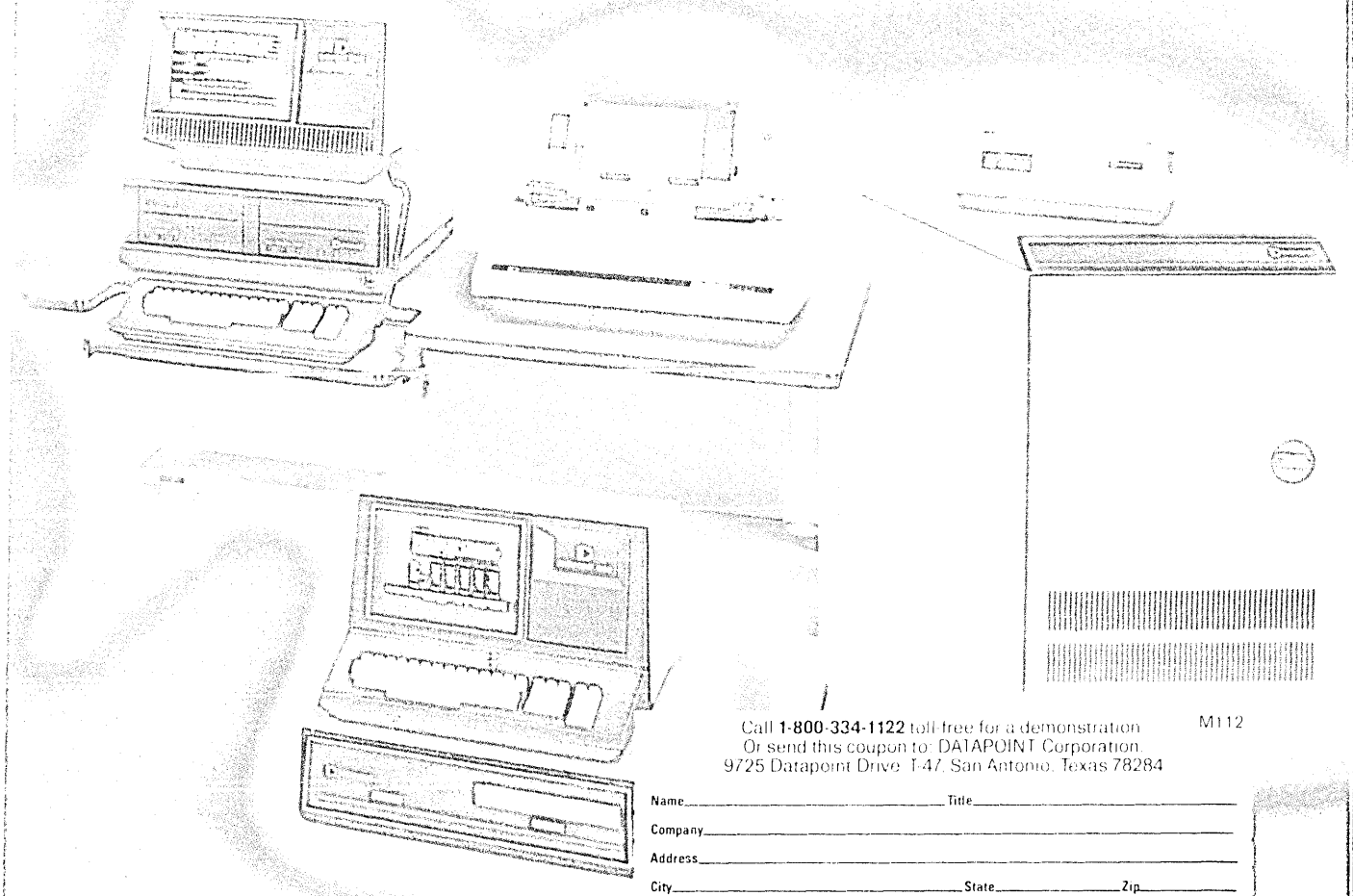

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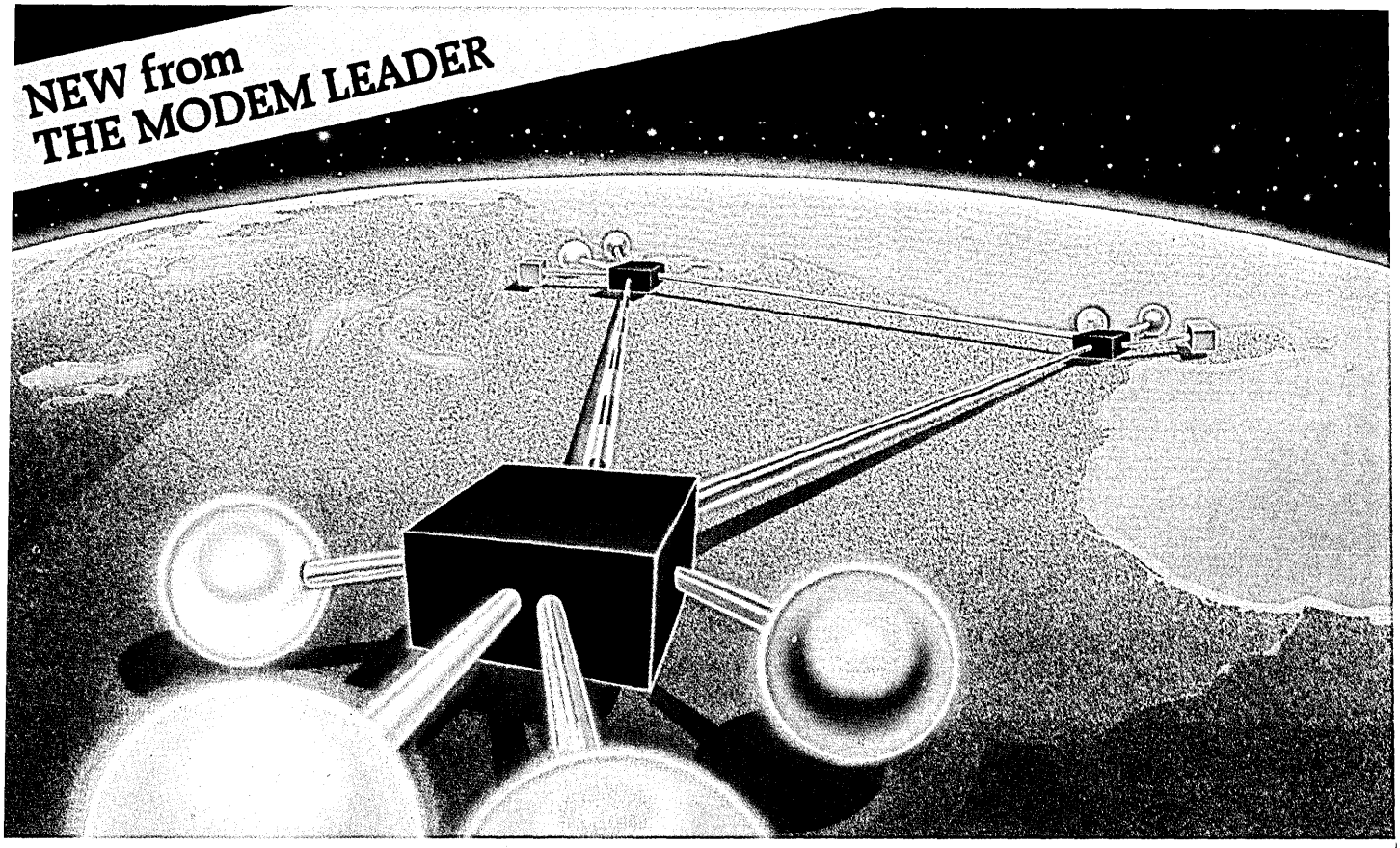

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Paradyne's series of Intelligent Networking Multiplexers is now a family of network solutions. With User Switching and Auto Rerouting, hundreds, even thousands of your employees and customers can depend on your network.

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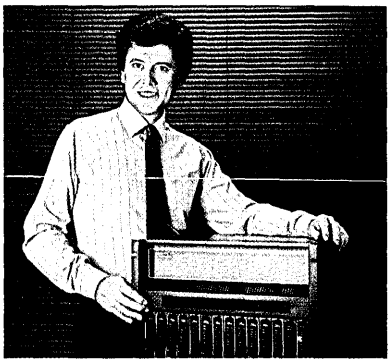

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LETTERS

TOP OF THE HEAP

When I first made the pages of DATAMATION with an article in 1961, I felt as if I had reached the top of the heap. I've had the same feeling over the years when you've published my articles and letters, or reviewed my books. Last year, I even made your 25-year history, and I thought, this time I've *really* reached the top of the heap.

But when I turned to page 108 of your January issue, I knew I had been wrong all along. There, under the headline "COBOL Dumped" was a full-color photo of a most deliciously revolting garbage dump, and right on top of that dump was a copy of my book *High Level COBOL Programming*. Considering that the book on the top of the garbage pile must have been the last COBOL book to be thrown out, I'm really flattered.

I can't speak for my coauthors, Steve Wright, Dick Kauffman, and Marty Goetz, but to me, being on DATAMATION's garbage heap is better than being published in most computer magazines. I know that everyone has wanted to dump COBOL for a long time, but thank you for holding onto us until the last possible moment.

GERALD M. WEINBERG
Weinberg and Weinberg
Lincoln, Nebraska

MUM'S THE WORD

Where, oh where are pp. 65 to 72 of my January DATAMATION? I note from the ad index that those spaces are supposed to be for NCR and I presume they are taken by an invisible ad for NCR's invisible personal computer, the inDecisionMate V. Did you have trouble gluing the invisible pages, or was it NCR's fault—late on delivery as befits the product?

MARTIN D. SHAFER
San Diego, California

TRULY PORTABLE

In reading your article, "Portable Computing: How High Can It Fly?" (November, p. 182), I was rather shocked that you failed completely to mention the wonderful machine with which I am typing you this letter as I sit in the reading room of the Library of Congress in Washington, D.C.: the NEC/PC-8201A. This little beauty is as small as a single law book, and weighs less. While not nearly as good for word processing as my Eagle PC, it gets the job done, fits in my briefcase, and carrying it is as easy as you can imagine. This appears to me to be the machine of the future, and it plugs directly into my NEC Sprintwriter to print.

For a lawyer, who sits for hours in court and elsewhere waiting and waiting, this is an incredibly productive tool. So please, give credit where credit is due.

STUART A. WEINSTEIN-BACAL
Attorney at Law
Washington, D.C.

THE INTERNATIONAL INQUIRER

I take issue with your description of ENIAC as "Eckert and Mauchly's famous vacuum tube machine, which is generally regarded as the world's first true electronic computer. . ." (January, Source Data, p. 235). I hope your offices are not awash with mailbags full of enquiries from puzzled Britons wondering whether the Enigma-cracking machine at Bletchley doesn't outrank ENIAC for some (good) conceptual reason, e.g., that it never really stored a program, or for some bad reason such as that Ceruzzi and your own John W. Verity haven't yet had a chance to catch up with what was going on there, an astonishing story kept secret until some 10 years ago.

MICHAEL W.D. WHITE
Eragny sur Oise
France

A VOTE OF CONFIDENCE

On the Time Line for 1970 in "As Time Goes By" (September 1982, p. 95) was the notation: "DATAMATION goes twice monthly causing industry collapse."

Please say your "Once a month isn't enough" isn't so. And please, I hope your current editor will not have to say, as Mr. Robert D. Forest said in January 1972: "We want to make a belated apology for causing the gruesome recession that has had our industry by the throat now for 18 months. You may not have known an apology was due. But it's pretty apparent that DATAMATION caused the fallback by going semimonthly in August of 1970. . . ."

Also, will Mr. DeWan's suspicions ". . . that DATAMATION went semimonthly in order to see how good it would feel when they stopped" (March 1972, Letters, p. 21) be revived?

GEORGE F. DALRYMPLE
Massachusetts Institute of Technology
Cambridge, Massachusetts

HAMMERING IT HOME

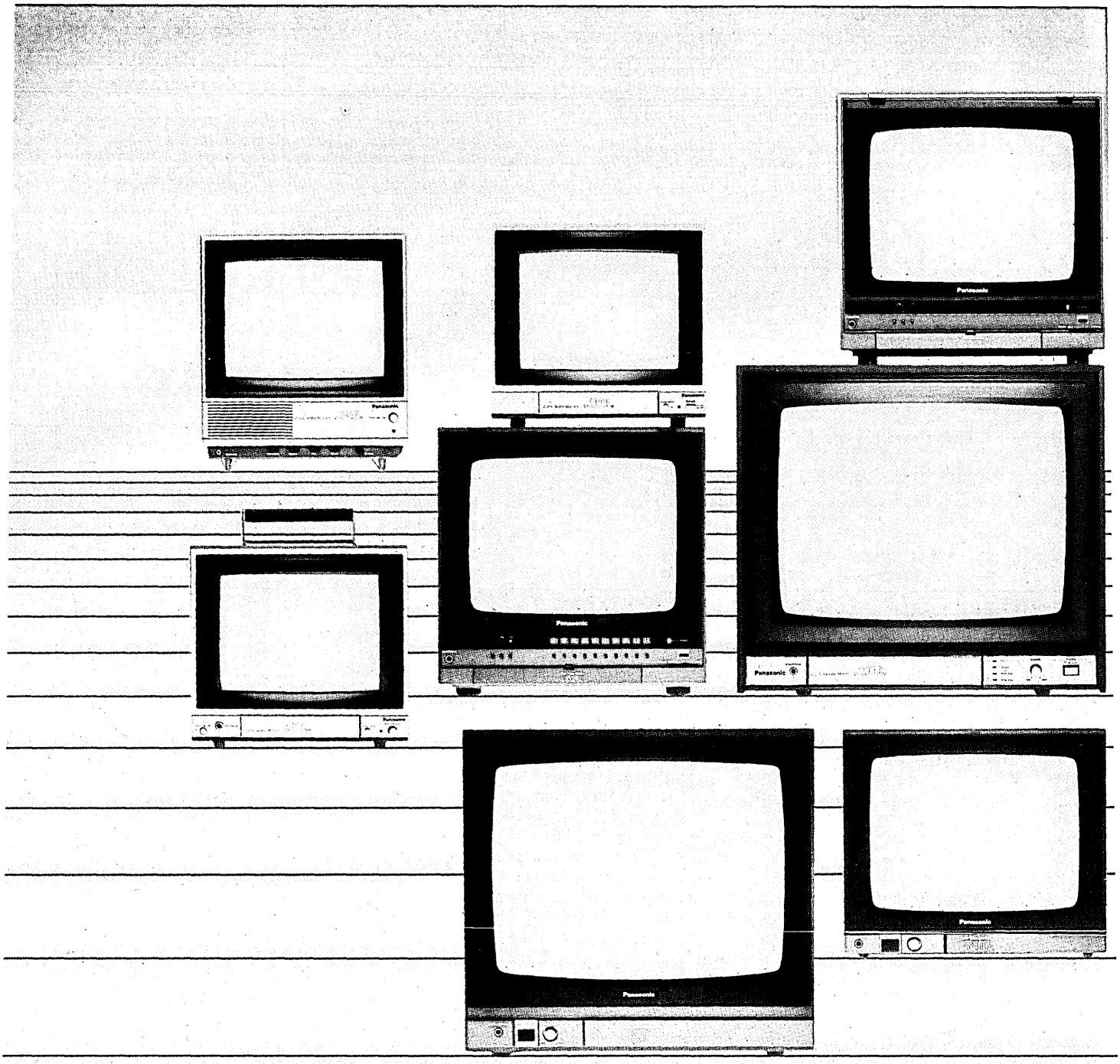
I would like to start a fan club for Dr. Michael Hammer (February, In Focus, p. 36). First, I like his reasoning. I have been preaching the same thing. Second, his writing has a beauty of expression rarely achieved by computer professionals.

Let's have more from him.

JOE M. WILEY
Tennessee Valley Authority
Chattanooga, Tennessee

CORRECTION

In "IBM's Two-LAN Plan" (February, p. 120), we incorrectly dated an issue of the Gartner Group's *Office Systems* newsletter. The issue cited for a detailed discussion of IBM's token-passing ring strategy should have been Nov. 29, 1982, *not* 1983. ❋



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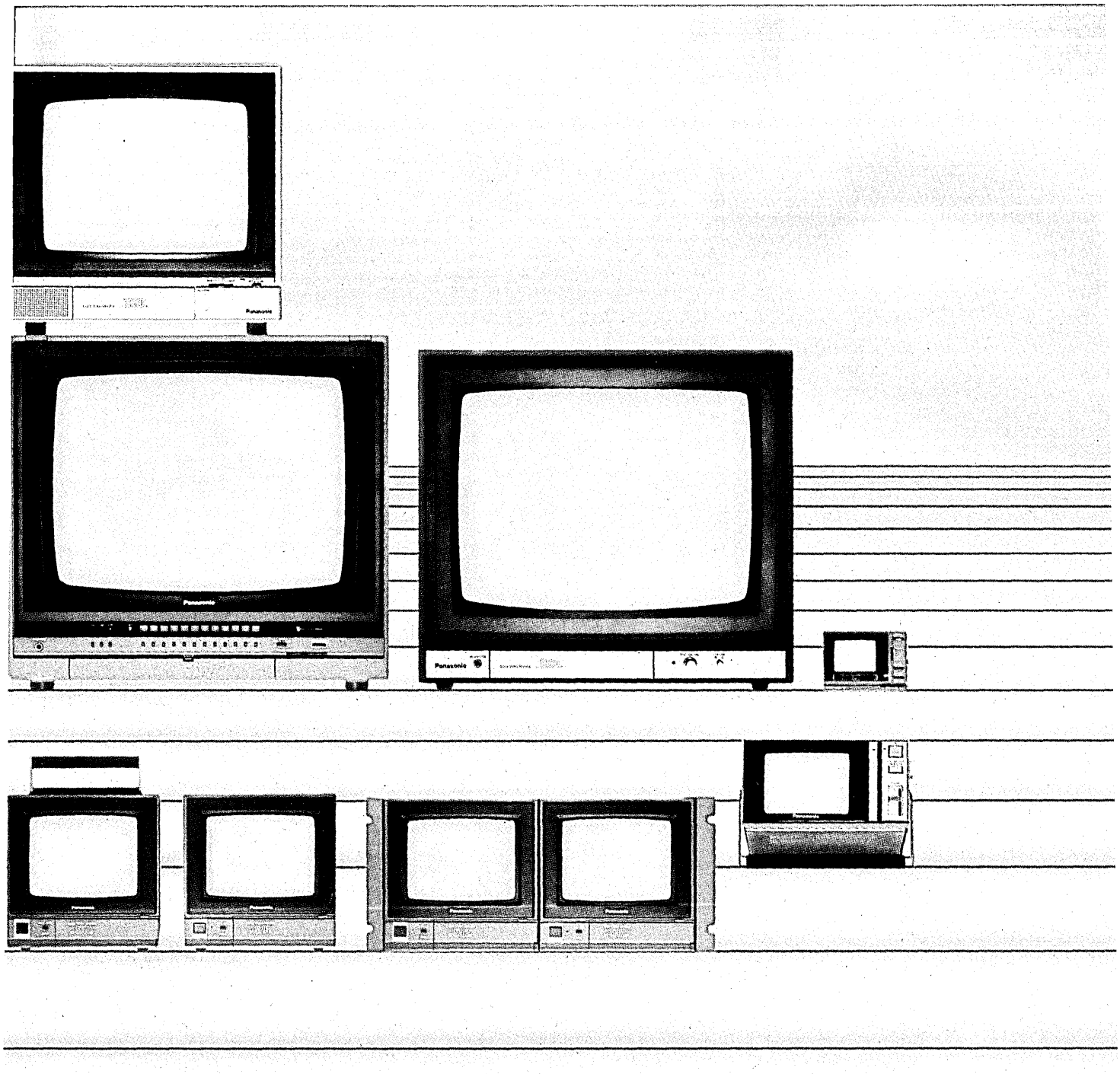
When it comes to industrial monitors, it pays to come to Panasonic. Because Panasonic has just the right monitor for just about any application or specification you can think of. But don't think monitors good enough for teleproduction also have to be expensive. Take a good look at the Panasonic BT and CT series. What you'll see is outstanding picture quality as well as a full complement of features and controls. What you won't see are high prices.

When you look at the BT-S1900N 19" monitor (all screen sizes measured diagonally), you'll see one of our most brilliant and best defined color pictures ever. One reason is our CompuFocus™ picture tube with OverLapping Field Lens gun. Another is a switchable comb filter which increases definition for easy detection of signal flaws. Behind its push-open door lies a full array of operating controls. Like a normal/underscan switch, pulse cross, horizontal/vertical centering controls and blue-only for easy adjustment of chrominance and hue.

The 13" BT-S1300N has the same great picture, controls and inputs. And our 7" BT-S700N is ideal for mobile units and outdoor production because it operates on AC or DC. It also features controls for normal/underscan, pulse cross, blue-only and much more.

The 7" BT-S701N is equipped with switchable line inputs and external sync terminals while the BT-S702 consists of two 701 monitors mounted in



a dual rack adapter.

The Panasonic CT series will also show you a picture that's clear, well-defined and brilliant in color. Because both monitors have either CompuFocus or Quintrix II® picture tubes. And, of course, all models have 8-pin video input and output connectors as well as loop-through capability for easy system adaptation.

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There are also three 10" monitors for educational, industrial, computer, medical, and scientific applications. There's the CT-1330V monitor/receiver, the CT-1330M monitor, and the CT-1350MG with NTSC composite and RGB inputs.

If you're big on 19" monitors, the CT series keeps you covered in a big way. Both our CT-1930V monitor/receiver and our CT-1920M have comb filters for increased picture definition, while the CT-2000M lets you switch from PAL to SECAM to either NTSC 3.58 or NTSC 4.43.

So, no matter what you are looking for, you can't afford to overlook Panasonic Industrial Monitors.

To see the Panasonic BT or CT series call your regional Panasonic office:
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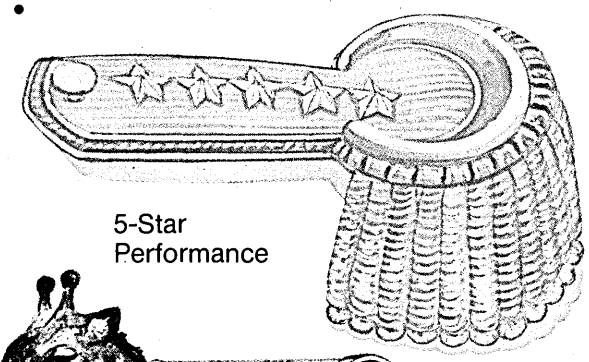

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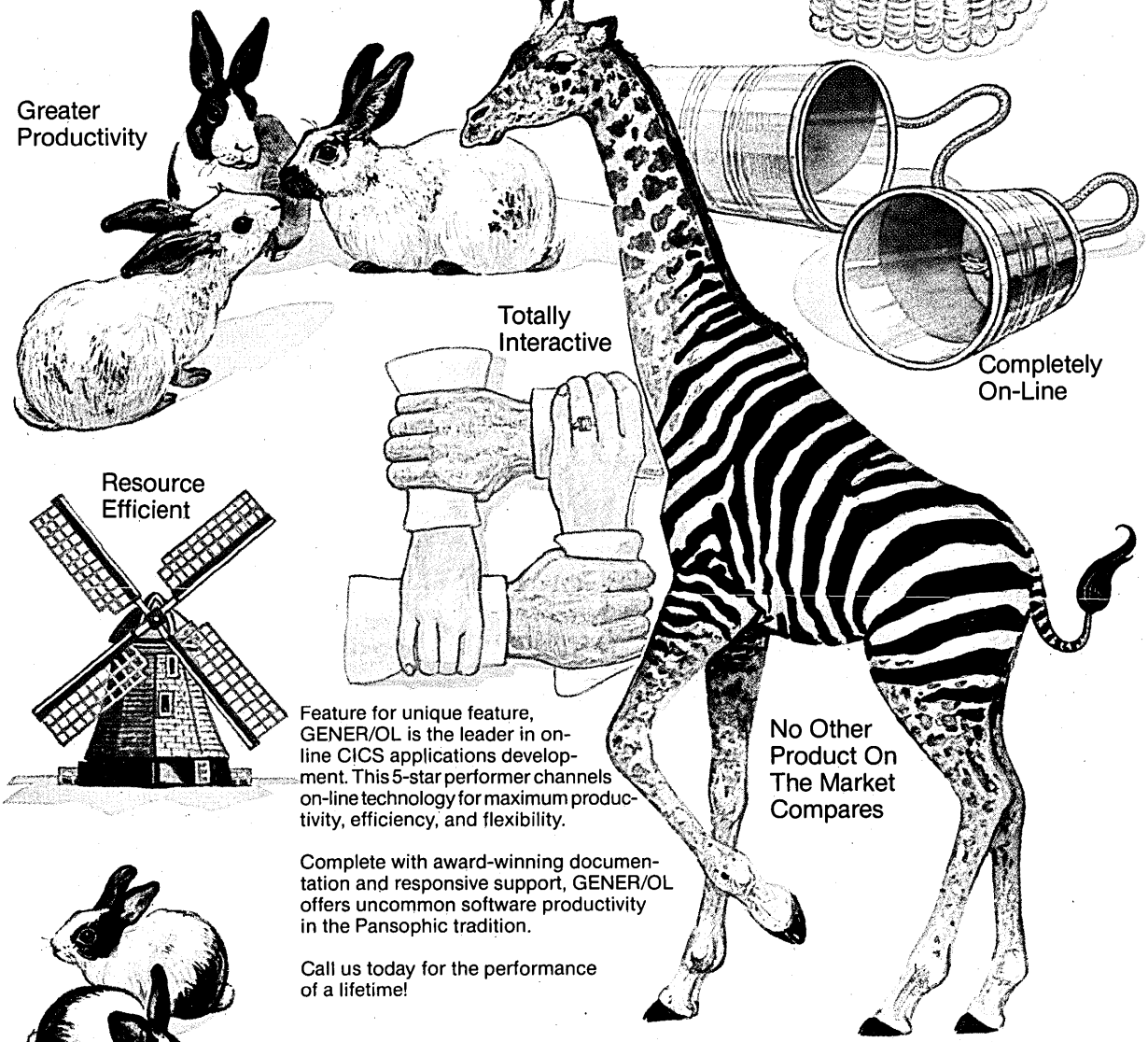

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CIRCLE 18 ON READER CARD

Rebecca S. Barna, Editor

EDITORIAL

BIG BUDGETS FOR MIDGET MACHINES

ILLUSTRATION BY DORIS ETTLINGER

Data processing budgets change slowly. Dp managers are well aware they are running production shops with strict requirements for getting work out the door—and on time. No matter how great the temptation to install the latest gadgets, dp managers historically stay with the mainstream of developments and make no sudden moves. Right?

Wrong.

Suddenly, coming out of the 1981 to 1982 recessionary budgets, personal computers arrive in full force and now claim 4.9% of the dp budget. We've looked back through previous DATAMATION budget surveys, and nowhere is there even a hint of personal computers as significant budget line items. What's more, in looking at all the years of budget surveys, we found no other example of so great a change in so short a time.

Surely, what we are seeing is a tribute to the muscle and insight of IBM, whose August 1981 announcement of its PC, now broadened to a full lineup of machines, triggered the change. So much for IBM as manufacturer; it is also a very capable computer-using organization.

In the late spring of 1981, while speaking at NordDATA 81, the annual Nordic computer conference, IBM Europe vice president David Dey casually allowed as how the company's target was one keyboard device per employee by 1985. This, even before the PC was announced. IBM's 1:1 goal has no doubt been reached, if not exceeded, by this time. What we wonder is, how many other organizations are nearing the same target?

Looks like Merrill Lynch will buy an IBM PC for each of its 10,000 brokers not already computer-equipped. That's not all. Consider Peat Marwick's recent acquisition of 2,300 Macintosh systems for its field auditors. Or Ford Motor Company's bulk purchase of 4,000 units from Victor Technologies. As senior editor Larry Marion points out in this year's budget survey, large and small companies alike are rushing into the pc era.

Dp budgets mirror technical trends, but usually a few years must pass before observers validate the numbers with practical experience. For years, the data entry department, once called the "keypunch room," has gradually been moving away from the dp budget. Of course, there are just as many, if not more, people doing data entry today as a decade ago. But the labor component is no longer on the dp manager's budget. Dp provides terminals and pcs, the end user provides personnel and floor space. The dp budget has changed, but the function remains.

Therein is the trap for numbers-oriented corporate analysts. The dp budget never totally reflected true corporate dp spending for information technology. Increasingly through the last decade, the dp budget shows only the spending directly by the dp manager. More and more dp-related expenses are hidden in accounting, manufacturing, and financial departments. How much off-budget spending? For every dollar spent by the dp department, at least 35 cents is being spent directly by end users—although generally with the advice and consent of dp.

In spite of massive consumer advertising, it is our old friend, the corporate dp manager, who is buying the pcs in most large corporations. End users may have the machines on their desks, but it is the dp manager who arranges the purchase, sets up the system, and selects the software.

The pc is obviously the hot subject, but the big picture shows those midget machines are still a small portion of total industry revenues. IBM PC maven Don Estridge may be able to produce one PC every 15 seconds of every workday—and he expects to double the pace this year—but mainframes are still the core of IBM's business. While the world watches the personal computer, IBM president John F. Akers continues to warn against what he dubs "pc myopia."

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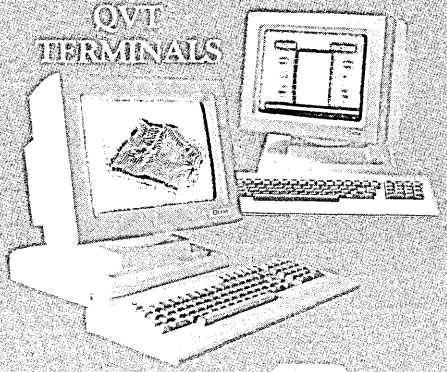

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IN FOCUS

MAJOR LEAGUE DP

They've yet to build a system that chews tobacco.

by Lee Froehlich, Willie Schatz, and Ken Klee

Spring at last, and stadia around the country resound, as they have for a hundred years, with eager shouts from the cheap seats and the crack of batted balls. If the weather isn't fine it will be soon, and in press boxes and front offices optimistic chatter combines with the happy whir of disk drives and the busy clatter of printers.

In a few parks, anyway.

Don't be fooled by Astroturf and Diamondvision. When it comes to conservatism, baseball finishes first in the U.S. Business League. Tradition is paramount. Franchises are called clubs, and the owners will tell you they're exempt from silly modern trends like antitrust laws.

For a long time they also thought they were exempt from computers—despite the fact that many aspects of running a ball club can be made easier with a dose of dp. "Every business in the country is being computerized," says Jack Gould, vice president of the Chicago White Sox. "Baseball has probably kept records longer than any other business, but they've all been kept by hand. Baseball's problem is that it's not any other business."

No kidding. What other business with annual revenues of $600 million could have avoided something as elementary as computerized ticket sales for so long? Could have lived by player and team statistics for a century but failed to notice how most people do statistical analysis these days? Okay, so the sport's not run in the aggregate, and individual franchises may only have the dollar volume of a medium-sized department store. The fact remains that even medium-sized department stores have been using computers for some time. Baseball, by contrast, is just getting started.

Traditional business applications tend to be the first step. Still in the minority are teams that use computers to compile and analyze the statistics many managers rely on to make decisions on the field.

"Baseball is not too receptive to computers," contends Matt Levine, chairman of Pacific Select Co., San Francisco. Pacific Select has sold its Edge 1.000 pitch-by-pitch system to the Oakland A's, Chicago White Sox, and, most recently, the New York Yankees.

"Clubs usually do not have the discretionary money," says Steve Mann, briefly Levine's cohort and now his chief rival. Mann's Baseball Analysis System has been bought by the Atlanta Braves and the Philadelphia Phillies. "So much is spent on salaries, there's too little even for scouts. Nothing is left for systems."

"They figure, we got along without it for 50 years, so why do we need it now?" Levine theorizes.

Because it might help a team win games, for starters. Football and basketball, relative newcomers to the sports scene, have not been as hidebound. The Dallas Cowboys attribute much of their on-field success to computers, as do some of their rivals. "The Cowboys' track record isn't too bad," says Dan Evans, who runs the Chisox' Edge 1.000 system. "I hope we get to the point where we're as respected as they are."

That won't happen overnight, or over a year. But as the 1984 season commences, baseball does seem to be moving—slowly, deliberately, like Herman Franks approaching the mound in the bottom of the third—toward using computers to help out on the field.

It makes sense. Many elements of the game are quantifiable, and have long been recognized as such. Science was attracted to baseball even before the nineteenth-century efforts of Princeton's Professor Hinton, who invented a smooth-bored pitching cannon (speed of pitch depended on the amount of powder charge). In 1889 Fred Pfeffer, author of *Scientific Ball,* urged managers to concentrate on defensive positioning by taking account of

"Is the intentional walk a good thing? Let's ask the computer."

percentages. Schoolboys and bartenders know how important averages are. So does Elias Sports Service in New York City, which has supplied statistics to the National League since 1920, and the Sports Information Center of Quincy, Mass., which performs the same function for the AL.

In recent years the man who has done the most for a statistical understanding of the game is Earl Weaver, manager of the Baltimore Orioles from 1968 to 1982 and author of *It's What You Learn After You Know It All That Counts* (New York, Doubleday, 1982). He never used a computer but he used statistics to blaze new strategic paths. Weaver opposed many venerable baseball practices: didn't care much for bunts, stolen bases, or any other form of playing for one run.

Weaver advocated matching the player to the situation at hand—park, pitcher, inning, score—based on the player's past performance. He kept thousands of sheets showing how each Oriole performed in specific situations, and built his Baltimore teams on the notion of platooning—starting mostly right-handed batters against

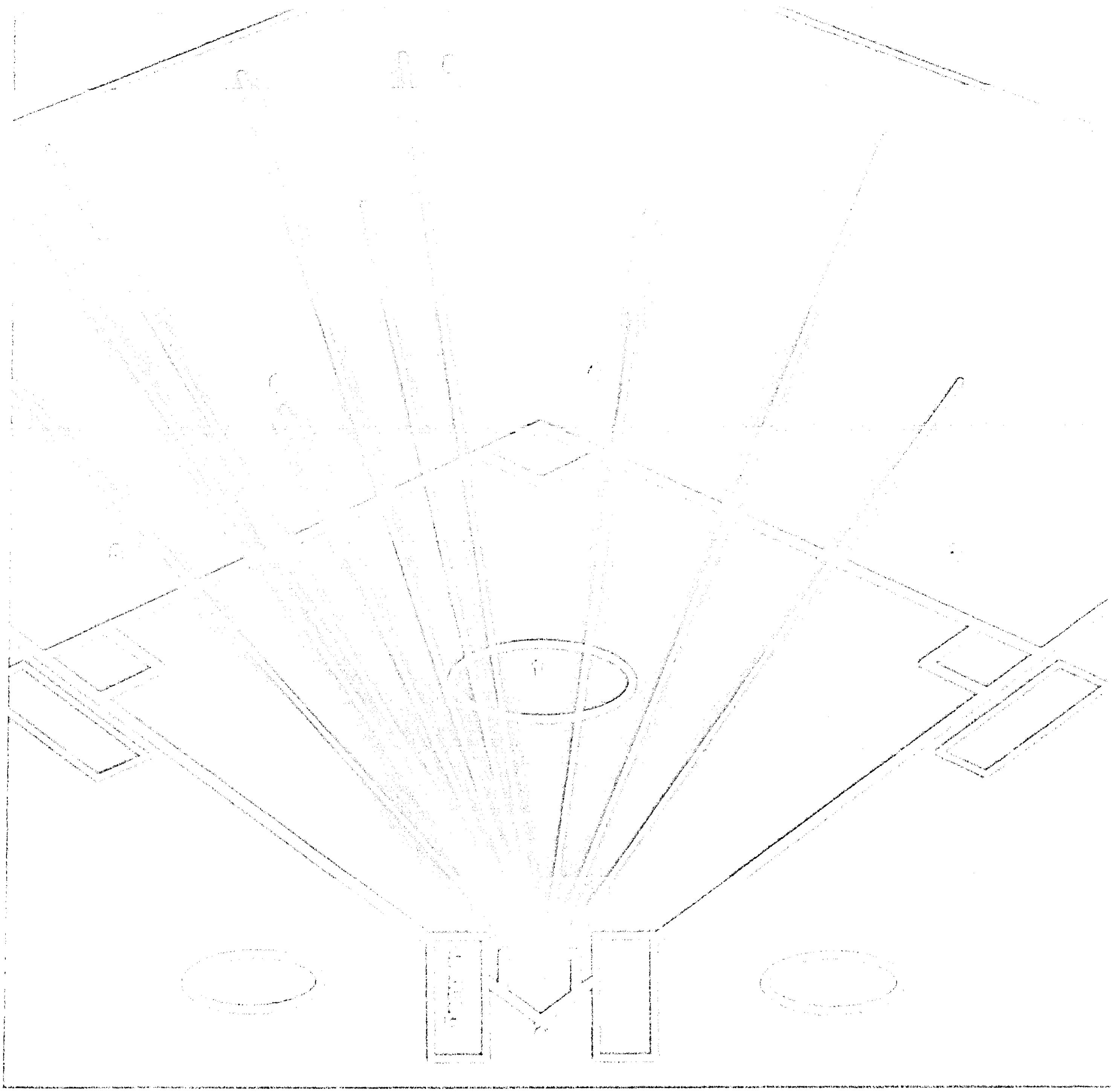
GRAPHIC BY NINA WALLACE/PHOTOGRAPH BY PETER ANIELO SIMON

BALTIMORE

Player	Pos	1	2	3	4	5	6	7	8	9
Bumbry	8	[illegible]		[illegible]						
Ford	9	[illegible]		[illegible]						
Ripken	6	[illegible]			[illegible]					
Murray	3		[illegible]		[illegible]					
Lowenstein	7		[illegible]		[illegible]					
Dauer	4		[illegible]		[illegible]					
DeCinces	5		[illegible]		[illegible]					
Dempsey	2			[illegible]						
McGregor	1			[illegible]						
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					

PHILADELPHIA

Player	Pos	1	2	3	4	5	6	7	8	9
Morgan	4	[illegible]		[illegible]						
Rose	[illegible]	[illegible]		[illegible]						
Schmidt	5	[illegible]			[illegible]					
Matthews	7	[illegible]			[illegible]					
Perez	3		[illegible]		[illegible]					
Maddox	8		[illegible]							
Diaz	2		[illegible]							
DeJesus	6			[illegible]						
Hudson	1			[illegible]						
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					



a left-handed pitcher, for example. Under Weaver the Orioles racked up the best winning percentage in baseball, and a number of managers (including several who had worked with him) began to emulate his methods.

Meanwhile, computers were getting smaller and cheaper, and people started trying to apply them to baseball.

In 1981 Pacific Select sold its Edge 1.000 system to the Oakland A's, initially for use by the team's radio announcers. It was written in Pascal, mainly by Richard Cramer, PSC's director of R&D.

In 1983 Steve Boros replaced Billy Martin as manager and started using the system. It worked like this: Statistician Jay Alves sat in the press box and entered pitch-by-pitch data on an Apple II, charting distances and directions of batted balls and the fielders' reactions to them. After the game the data was transmitted to a DEC 10 in Philadelphia; the next morning, an impressive array of stats was downloaded to the Apple.

The Yanks are mostly on-line, though their principal owner is often out of line.

Edge features hit-location graphics and color "hitdemo" zones to show a batter's strengths and weaknesses. It can give percentages such as the likelihood of a particular batter scoring a runner from third with less than two out. "Factors like the weather," says PSC's Levine, "are loaded in. We can assume a 20+ mph wind blowing out at Comiskey [Park in Chicago], and find out how it affects curveball, fastball, or junkball pitchers." By charting hit balls and fielders' positions, Edge can be used to judge an infielder's range or an outfielder's success at hitting the cut-off man.

All this flashy stuff doesn't come cheap. An Edge costs some $100,000 the first year, with support charges running around $20,000 per year thereafter. Levine also plans to offer a standalone version on a DEC micro.

Baseball Analysis Co. (BAC) of Conshohocken, Pa., already offers a standalone system. It runs on a Televideo micro and costs between $60,000 and $80,000. BAC founder Steve Mann, who was hired in 1979 by the Houston Astros as baseball's first professional statistics analyst, developed the system with Pete Palmer, a program engineer for Raytheon Corp.

Palmer, Mann, Cramer, and Levine formed a "brief coalition" in the fall of 1980. What happened? Mann explains that "Levine and Cramer saw [the computer] as a marketing tool. Pete and I were tied into intensifying and proving baseball theory." After an "amicable, out-of-court" settlement, Mann and Palmer went on to start Baseball Analysis.

Probably the most visionary of the baseball systems is Bob Welch's Baseball Analysis and Reporting System (BARS). Welch is president of Citizen's Bank and Trust in Chillicothe, Mo., and says he started his work in computer baseball in the 1960s, "when people didn't know what a computer was."

"With my system," claims Welch, who played college ball at the University of Arizona, "I can tell what a pitcher is going to pitch: fastball, curveball, slider." Last season, BARS used data from about 450 games. "This year," Welch says, "I will be able to do more games, as I already have seven full-time scouts hired, five satellite dishes, seven video recorders, and approximately 90 tapes. My scouts mail the paper charts to me and I keypunch them on the bank's IBM 4331. I do the whole doggone thing."

BARS attracted some attention with a flashy booth at last year's winter meetings in Nashville. "More than two clubs" are said to be interested, but that's about it so far.

The team that has won the most games while using computers is the Chicago White Sox, last year's AL West champs. With the help of Edge 1.000, one of the best pitching staffs around, and some productive sluggers, they went 99-63 and finished a record 20 games ahead of the Royals. What made them want to be pioneers? "We wanted to find out if the players were worth what we're paying them," says Chisox vp Jack Gould. "We thought the best way to do that was with a computer.

"Does 30 saves or a 1.37 ERA make a relief pitcher great? That's not the issue," Gould says. "It's what he does when he comes in with the tying runs on second and third that counts. Is the intentional walk a good thing? Let's ask the computer."

But even Gould, one of the more procomputer executives in baseball, doesn't give the machines credit for the half-pennant the Pale Hose copped last year. "It doesn't win every game," he admits. "It doesn't even win a lot of games. But if it wins six, that's enough."

The Sox had several examples of computer coaching last year. One was the case of a left-handed hitter for whom a pinch hitter was always sent up against lefty pitchers. When the computer revealed the batter actually hit lefty pitchers better than he hit righties (maybe because he concentrated more), he was no longer automatically benched.

The player never knew the reasons behind the decisions. In fact, the Sox operate on the theory that what the players don't know won't hurt them.

"We don't bother the players with statistics, because that would only confuse them," Gould says. "If you give a player a million things to think about, he won't accomplish a thing on the field. This way the coaches know the problems and they can approach them slowly. They never mention the computer to the players. The players know it's here, but they never pay attention to it."

That probably makes them a minority of 25. The success of the Sox has given the rest of the baseball world something to think about. "Teams are a lot more accepting of the idea," says A's statistician Jay Alves. "Baseball people follow the leader, and, because of the Sox people, are paying a lot more attention to computerizing."

In fact, the situation seems reminiscent of the office automation world: ardent vendors, a few pioneers reporting success, and everybody else wondering whether to buy, build, or sit tight. Here's a preseason roundup of what some teams are doing.

San Francisco: Giants manager Frank Robinson played and coached for Earl Weaver, and uses index cards and printouts for field decisions. Bob Brenly, the printouts show, went 9 for 10 against Pittsburgh's John Candelaria in 1982. Every time Candy faces the Giants, Brenly plays. Giants dp manager Hank Bouthiller is currently working on a new system for the team's IBM S/34. "It'll be a total redesign of the past system," he says. He figures he'll have it running by 1985, probably in time for the next players' strike.

Los Angeles: The Dodgers drew over 3 million fans last year, and have a custom ticketing system they're trying to market to other sporting concerns. They also use their S/38 to record stats and evaluations of minor leaguers, and to capture and supply detailed player statistics for the coaching staff and media. "Tommy [Lasorda, the manager] will use a printout sometimes for a decision, like a pinch-hitter," says Steve Brener, the Dodgers' director of publicity. Pitch-by-pitch charts are still compiled manually.

The Sox know the computer is here, but they never pay attention to it.

Atlanta: The Braves are in the process of computerizing their ticketing. For on-field purposes they recently purchased a system from BAC, and hope to have it ready by opening day. Assistant vp Pat Nugent has added refinements to Steve Mann's basic concepts. It will be one of the most advanced play-by-play systems in the country, but Nugent still expects the Braves to rely a great deal on the intuition of manager Joe Torre.

San Diego: Padres manager Dick Williams starts off each season with 12 shorthand notebooks, one for each NL team, which he uses for compiling color-coded charts of each game. Ticketing was computerized in 1976, but Williams, who is

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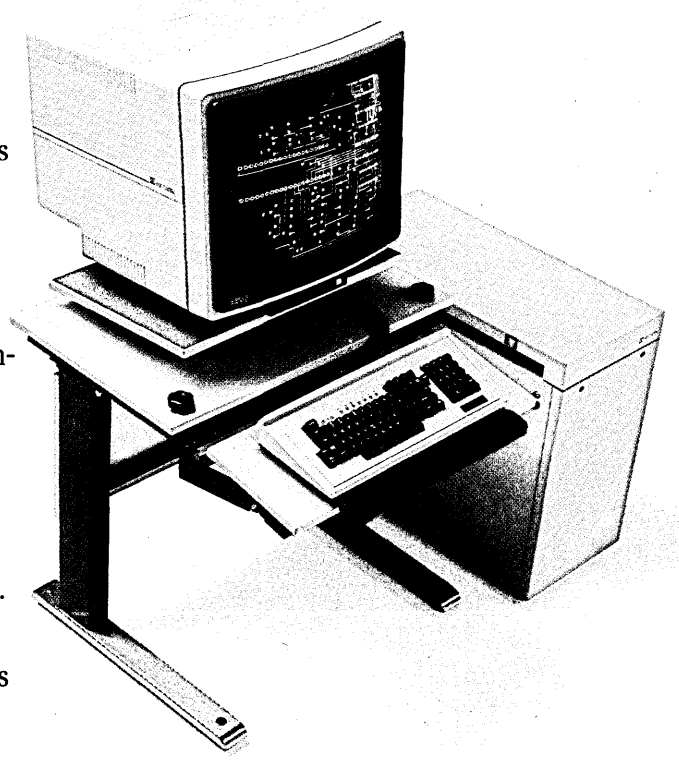

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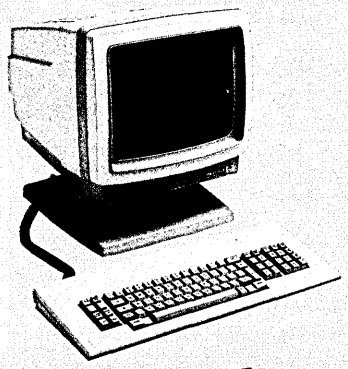

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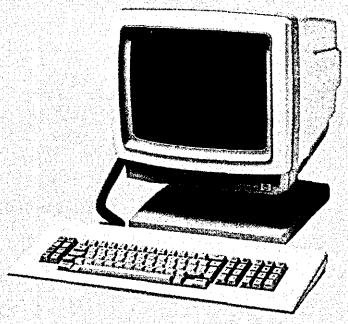

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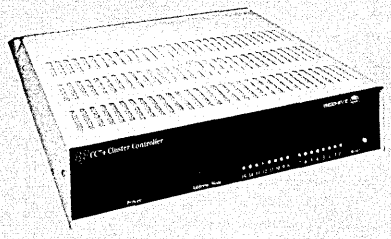

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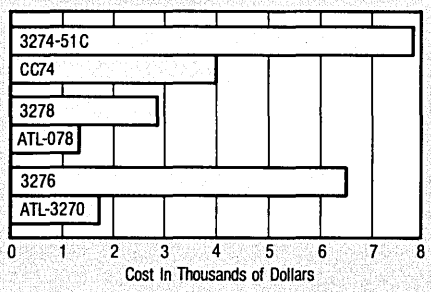

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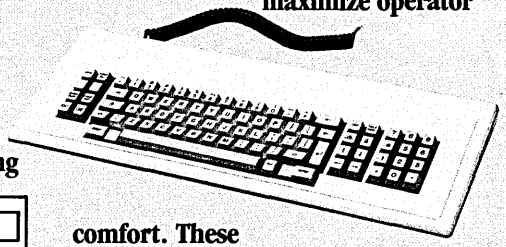
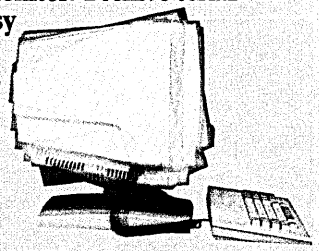


comfort. These features include tilts and swivels; detached, low profile, color-correct DIN Spec keyboard; no fan for noise reduction and of course, the "Eye Fidelity" monitor. Beehive terminals are easy to look at and easy to work with.



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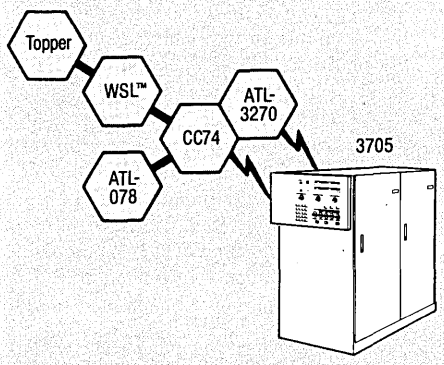

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reckoned one of the shrewdest minds in the game, is content to spend some three hours a day compiling his charts.

Philadelphia: The NL champion Phillies use BAC's system for salary support and for compiling player statistics. They are one of perhaps three NL teams solidly committed to establishing a computer system for all aspects of baseball. "We're really just getting involved," says Jeff Eisenberg, the Phils' information systems manager. Once he gets the basic applications stabilized, Eisenberg hopes to start some ambitious projects, such as a regression analysis of superior major league players that should help the team spot minor leaguers with potential, and a method for taking park factors into account (so that statistics garnered in high-altitude ballparks, say, might be more accurately interpreted).

Chicago: The Cubs, believe it or not, are pioneers. Former owner Phil Wrigley loved and preserved the tradition of day baseball but used computers for compiling year-end stats in 1979. When the Tribune Co. took over in June of '81, it complained about the older custom but embraced the newer one. The Cubbies dabbled in computer stats for field decisions in 1982, and began in earnest last season. Using software developed in part by Dan Serafini of the Tribune Co., the Northsiders crunch stats in the Tribune mainframe. Manager Jim Frey—another Baltimore alumnus—gets printouts every three games, enabling him to see how each player bats against each pitcher. He can also get answers to more specific questions, such as how a batter performs from the sixth inning on in the games or games of one- or two-run leads. Some useful facts have been uncovered: outfielder Gary Woods hits Philly southpaw Steve Carlton extraordinarily well; sophomore Mel Hall bats about 200 points higher than the rest of the Cubs against the Cardinal Joaquin Andujar.

St. Louis: "No, we don't use no computers," says an Ozark voice in the Cardinals' front office. "Whitey Herzog [the Cards' manager] is smarter than any computer." The man goes on to point out that the lowly Cubs have used computers for years. Like Dick Williams, Herzog keeps elaborate color-coded charts of each game. The Redbirds have no sales or ticketing computers, either, and no plans to get any. The team is owned by Anheuser-Busch.

Oakland: Last year the A's were a leader in computing. Statistician Jay Alves traveled with the team, and manager Steve Boros took printouts into the dugout before every game. But the A's recently decided to cut way back on their use of Edge 1.000 because it was costing too much—nearly $100,000 a year, about the salary of a utility infielder. Boros revealed he was using the pitch-by-pitch analysis in only 5% to 10% of his decisions. It's tough to pioneer.

The world champion Orioles' only computer retired after the 1982 season.

Kansas City: The Royals have been running on IBM since 1975. They started with an S/32 to handle accounting, ticketing, and financial functions, then recently upgraded to an S/34. Scouting was computerized in 1978, and the system can track up to 2,000 players. Another system tracks how each hitter does against each pitcher and gives manager Dick Howser a 20-page printout before each game. Vice president and controller Dale Rohr, who did most of the programming, says that "Howser only wants trends for now. We decided to go one step at a time rather than move immediately to a large turnkey."

New York: The Yanks are mostly on-line, though their principal owner is often out of line. Play Ball is the pitch-by-pitch system; it's their version of Edge 1.000. There's a separate scouting system that follows 5,000 players—pro, college, high school, free agent, and maybe even grade school. This season, the club's top farm team at Columbus will also be on-line. "Our scouting system is the most advanced in baseball," says Roy Krasik, the assistant scouting director. "We break every player down into four categories: definite prospect, mild prospect, hold, and no prospect." Maybe they should change that first category to "trade bait."

Baltimore: The only computer the world champion Orioles ever had retired after the 1982 season. Former manager Earl Weaver got voluminous intelligence reports on hitters vs. pitchers and vice versa. They were compiled manually after every series and analyzed in his head, which didn't have a perm then. Current manager Joe Altobelli also gets heavy reports, but doesn't use them as much as his predecessor.

Milwaukee: The Brewers are on-line everywhere but the field. A Burroughs mainframe and three Data General Nova 3s handle the scoreboard, personnel schedule, and payroll. An Apple III takes care of the accounting, injury records, and financial forecasting. Stats are received from the central American League service.

That's not all the teams, but you get the idea. In baseball, when they talk about a good dp man, they're still referring to an infielder. Which raises the question: What's life like when you run computers in the major leagues?

"When I started, people looked at me like I was out of my mind," laughs Alves of the A's. "I got teased a whole lot. They'd call me 'Mr. Computer' and 'Wizard.' But I knew when I started getting teased I was being accepted."

If Alves is a wizard, he had to become one in a hurry because he came to the job with no computer experience. So did the Chisox' Dan Evans. As a junior at DePaul University in 1981, Evans interned with the team for what he thought would be four months. The day his internship ended, the players strike began. He stuck around, and when he graduated he had a job operating the club's Edge. There was only one drawback: the man had never moved a cursor. "The computer intimidated me a little bit," Evans confesses. "But the club people knew that, and they stuck with me."

The Phillies' Jeff Eisenberg graduated from the University of Massachusetts with a degree in sports management and a similar unfamiliarity with hardware and software. Now he goes about his job with

"Remember, Miriam. This is *our* little secret."

CARTOON BY STEVE ATTOE

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the zeal of a convert, and poses a poignant question: "If the players smash water coolers, what'll they do to an IBM?"

If they ever do put computers in the dugout, they'd probably be wise to go with ruggedized, mil-spec gear. But right now nobody's studying Ada, because nobody envisions that happening. Even a procomputer manager like Frank Robinson of the Giants believes in keeping the machines in their place. "It helps me make certain choices when I'm filling out my lineup card before a game," he says, "and also when I have to make a decision during a game, such as who might be the best pinch-hitter against a certain pitcher. I don't rely on the computer totally, but it's a valuable tool to use with all the other resources I have when managing the club."

Valuable, but no panacea. People who want to model events in baseball face some inherent problems. For example, the more factors needed to describe a situation, the scrawnier the database. Start with 500 at bats, and break it down to foggy days in Wrigley vs. lefty forkballers, and you're down to five samples if you're lucky.

There's also a problem with data entry. A major league team hurls maybe 25,000 pitches in a season, and it's not always easy to tell a slider from a curve. What if the guy doing the data entry eats a bad hot dog? Will his replacement see things the same way?

Finally, there are things that are difficult to quantify—like the length of the infield grass—or downright impossible. "The machine will never tell you if someone's limping or someone's arm hurts," says Gould of the White Sox. Or if the player in question had a dozen highballs the night before. Baseball games are procedural; no two are identical. Emotion and psychology are key. It's tough to model the great clutch hitting of a Yogi Berra or a Phil Garner.

"If the players smash the water coolers, what'll they do to an IBM?"

At least one of the managers Phil Garner has played for feels no pressure to use a computer, or even to rely overmuch on statistics. Pirates skipper Chuck Tanner manages by the feel of the game, and it has worked well for him. In 1979 Tanner's we-are-family Pirates, led by the great Willie Stargell, rallied from a three-games-to-one deficit to beat Earl Weaver's analytic Orioles in the World Series.

"The computer can't tell you how a player feels on a given day," says Tanner, "and does not address the psychology of the game. Is the computer going to be right when a batter is 0 for 8 on low fastballs, and he's hit the ball hard right at somebody four times? You may have made the right pitch. Another player may have gone 4 for 8 against the same type of pitch, but got four bloop hits. So even if you made the right pitch to him, he's batting .500."

None of which is to say that the computer is irrelevant to the summer game. Even Tanner wouldn't trade for a player without inquiring about some basic numbers—say, batting average, slugging percentage, on-base percentage, stolen bases/caught-stealing ratio. That's one reason the Commissioner's office is installing an S/38. Skillful system designers like BAC's Pete Palmer may even be able to come up with a few revelations. "I've always wanted to do a model game," he says, "where two similar teams follow two nontraditional strategies, and see who wins."

But for now at least, baseball people don't seem to have forgotten what Pops Stargell is fond of pointing out—that when the national anthem is over, they don't say "Work ball," they say "Play ball!" "You don't want to get too technical," reminds John Mulcahy of the Sports Information Center. "You're not sending a guy to the moon, you're just trying to get him around the bases."

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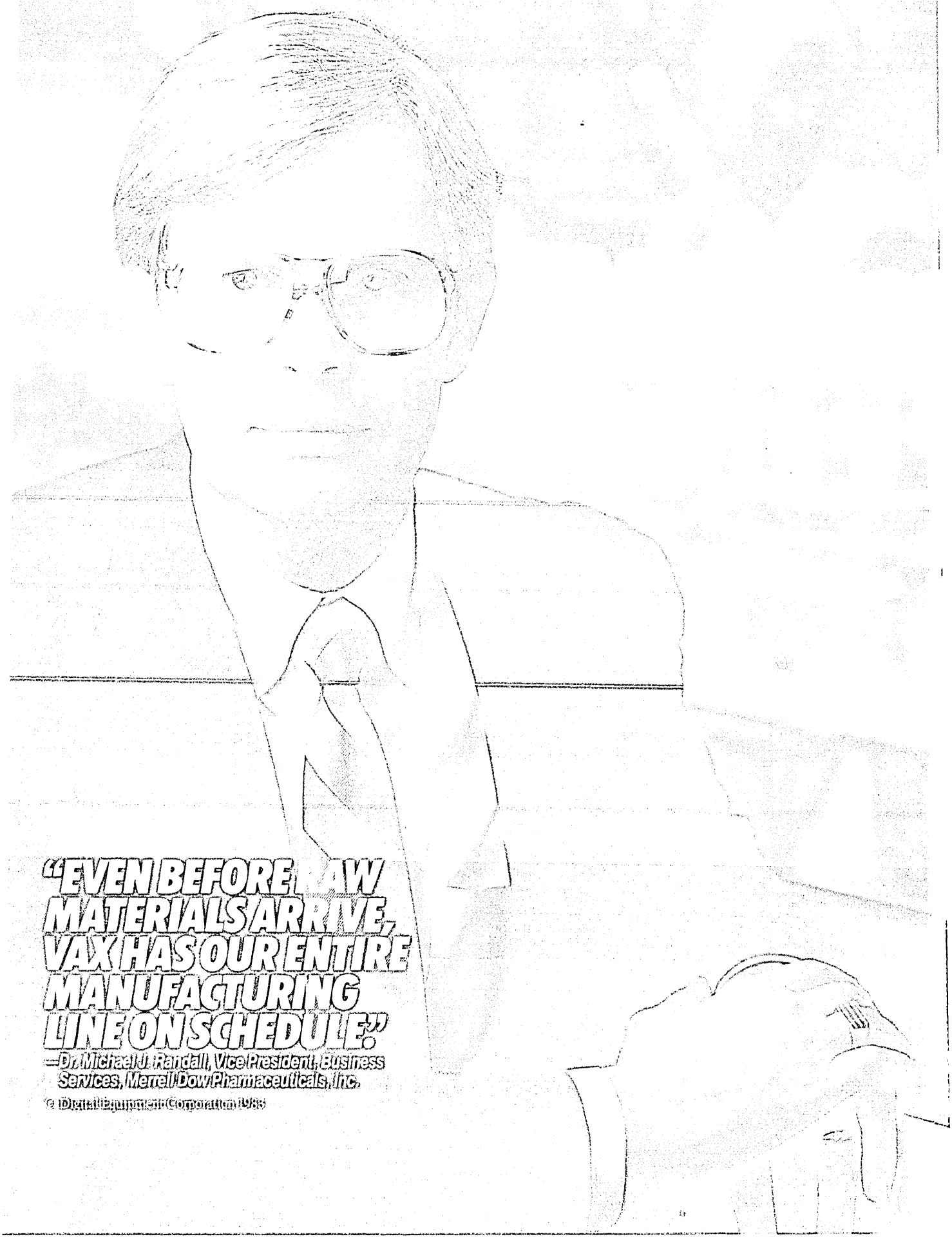
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—Dr. Michael J. Randall, Vice President, Business Services, Merrell Dow Pharmaceuticals, Inc.
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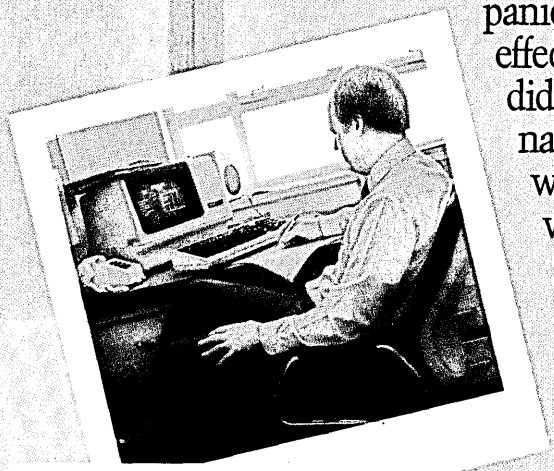
VAX

"Our goal," says Michael Randall, "is 100% operating efficiency. We're building a Manufacturing Requirements Planning System (MRP) so responsive it will manage any change by gauging the impact on every other aspect of our business—sales forecasts, manhours, raw materials, the works. We're doing it with Digital's help and a single VAX™ computer."

"Information is the key to competitiveness," Mike says. "With VAX Information Architecture, we've been able to build in real elegance. The system provides highly detailed "What . . . If" scenarios, sophisticated interdepartmental communications, snapshot views of production line status, self-diagnostics with suggested corrective action, and more. We're very impressed with how we can load up this computer."

Payback with the VAX-11/780 system has been accompanied by some pleasant side effects. Mike explains, "We didn't anticipate the extraordinary level of cooperation we would get. With everyone working on-line from a single information base, our employees have new appreciation for each other's jobs."



Merrell Dow's MRP will be a closed information loop linking every department. "At that point," predicts Mike, "our ability to coordinate marketing goals with manufacturing realities will be one of the most valuable resources this company has."

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NEWS IN PERSPECTIVE

NETWORKING

A HIGH-SPEED RACE

Network Systems Corp. finds itself besieged by new competitors in the 50Mbps local networking business.

by Jan Johnson

Ever since Network Systems Corp. shipped its first high-speed local area network in 1977 the company has enjoyed a virtual monopoly in its niche of the market—a rare occurrence in the highly competitive computer industry. But times aren't as tame as they used to be. The market for high-speed networks is expanding, competition is picking up, price wars are in the making, and the Minneapolis company is facing its first serious challenge.

First into the arena is Masstor Systems Corp., Santa Clara, Calif., challenging Network Systems' Hyperchannel, a 50-megabit baseband LAN. Next month Masstor is to unveil a line of 50-megabit network adapters called Massnet communications units (MCU). An MCU is a little black box that allows different makes of computer and peripherals to converse over the same 50-megabit bus. Also said to be in the works, though unconfirmed by Masstor, are MCU adapters to microwave transmitters and T1 carrier lines for long-haul situations.

The challenge to Network Systems is not trival. Masstor's product is expected to be "system-compatible" with Hyperchannel, but fancier—more features and functions—and costing 30% to 50% "or lower" than Hyperchannel's $40,000-per-adapter price, hints a Masstor source.

"Such an enhanced product could be a real wave maker," acknowledges Ken Thurber in the November issue of LAN industry newsletter *LOCALNetter*

Originally, Masstor had planned a January introduction for its MCU line. When news of that coming event circulated through the industry late last summer, Network Systems responded "quick and dirty," suggest several industry sources. NCS beefed up its sales bonus program and turned up the marketing pressure. It also filed suit against Masstor, charging trade secret, patent, and copyright infringements. As a result, Masstor delayed the MCU announcement.

In December, Masstor struck back at NCS with a $15 million countersuit alleging misuse of the legal system (January, Benchmarks p. 92).

The roots of that suit-slinging spat bear closer scrutiny. Some see the infringement allegations as an indication of Network System's weakness. They speculate the company is not prepared to fight a price/performance war, electing instead to buy time by using the legal system to tie up a small competitor's resources.

Judging from the claims listed in the suit (executives would not discuss details of the pending case), Network Systems is positioning itself as the good-faith partner that has been wronged. The Masstor–Network Systems relationship began back in 1981, when Masstor introduced Massnet, its network application software.

The two fit together well. Hyperchannel hardware was designed to move data between different machines. Its technology addresses the physical and data link aspects of networking. To move files or do remote job starts across different mainframes requires additional software on top of Hyperchannel. The problem with Hyperchannel, as one former Network System employee describes it, is that "a customer buys a [Hyperchannel] adapter and then spends the next year building software to make it do something."

Enter Masstor with Massnet. The strategy was to address those shops that didn't have the expertise or inclination to write their own network applications. To-

Network Systems alleges that Masstor took undue advantage of a close working relationship.

day, about 25% of the large shops using Hyperchannel to connect mainframes also run Massnet software, estimates Carrel Ewing, Masstor's vice president of marketing.

Network Systems alleges that Masstor took undue advantage of their close working relationship. Specifically, Network Systems charges Masstor with patent infringement and with breach of a contract that provided Masstor the ability to copy and modify Network Systems' microcode, diagnostics, and documentation "in support of Masstor end users." Network Systems also claims Masstor hired three Network Systems employees who had access to confidential information and that Masstor misappropriated that information, the relationships, and trade secrets and used them to its financial gain. Network Systems alleges copyright infringement of its manuals, among other documents. Finally, Network asked for an injunction to stop Masstor from selling its devices.

"Bizarre" is how *LOCALNetter* editor Thurber describes the suit. Masstor had shipped no product and no technical specifications of its MCU had been released. Yet, Network Systems was acting as if it had

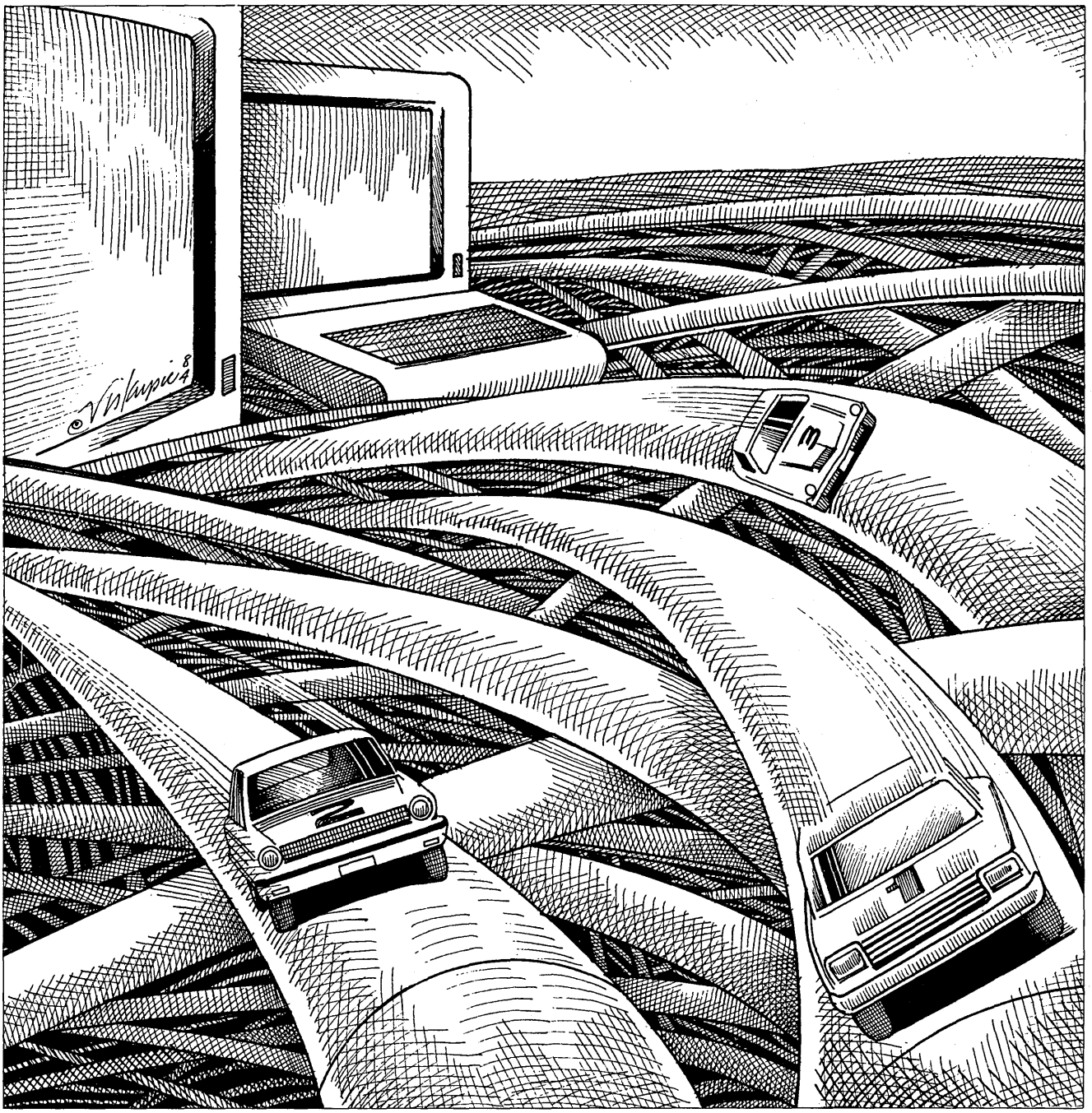

ILLUSTRATION BY GARY VISKUPIC

seen the Masstor hardware and knew it was a direct copy of the Hyperchannel adapter. A skeptical former Network Systems engineer doubts that Masstor is making a direct copy. Why copy 10-year-old technology, he asks. If it were a direct copy, Masstor wouldn't get the dramatic price reductions it claims.

As for the countersuit, sources believe Network Systems has "a good chance" of losing all or part of $15 million. "Someone who sues for marketing purposes ought to be penalized," says one industry analyst. No court date had been set and the two companies were still in the discovery stage at press time.

It's one thing to introduce a product; it's another to sell it. On that point Masstor faces some tough competitive challenges of its own. Network Systems, with its roughly 37% margin on the sale of a Hyperchannel adapter and its $61 million cash in the bank, enjoys a relatively secure and strong financial position compared to Masstor. Network Systems' direct sales force grew from some 50 people at year-end 1982 to a current estimate of 80. Masstor has under 20 salespeople.

In 1983, over 100 new customers were added, bringing Network Systems' installed base to over 330 customers, and two new products became available—Nextex, a software product that competes in the Masscomp niche, and 3270 capability for Hyperbus, Network's 10-megabit LAN.

For 1983, Network Systems posted $47 million in revenues and a net income of $10 million. The company has consistently grown at a healthy 50% to 60% a year or better. According to analysts, 1984 will be no exception: they predict revenues of $75 million and net profits in the $14.5 million to $15.5 million range.

In contrast, Masstor had a terrible year. Compounding the credibility problems created by Network Systems' court suit, Masstor ran into serious software interface problems with its M860 cartridge tape mass storage device. Because the M860 plays a key role in Masstor's shared virtual storage system SVSS sales of the SVSS

slowed as well. As a result, efforts to add new customers were stymied. The company currently claims a customer base of 50.

The SVSS is an intelligent, back-end data storage system. Its strength is staging frequently used data on fast, expensive devices, while less frequently used data are placed on machines with a lower cost per bit. SVSS also accommodates a multivendor computer environment (October 1981, p. 56).

The M860 problems were solved, says an industry analyst, but not soon enough to save Masstor's bottom line. The company posted an $8.8 million loss on $20.2 million in revenues for 1983. The previous year was better, but not great. The company showed $1.5 million profit on $19.2 million in revenues in 1982.

This year things are looking up. Masstor recently landed a $4.8 million M860 order with the Social Security Administration. Revenues for 1984 are slated to double, coming in somewhere between $50 million and $55 million, and black ink is expected back in the profits column, a projected $3 million "fully taxed," says Michael Dunmire, an industry analyst with Cable, Howse, and Ragen, Seattle.

Obviously, Masstor's competitive spear has its weaknesses: less money, fewer salespeople, and an unproven track record in building network adapters. But there are some strengths. The hardware will cost less, Masstor knows its market, and it has experience in selling and installing networks. Don't forget, Massnet software is in an estimated 25% of the shops using NSC Hyperchannel hardware.

Another significant difference between the two competitors is in their approaches to the market. Network Systems is a pure play network company. It sells only high-speed network equipment. Some criticize the company for not giving software development more priority.

Ungermann-Bass seeks a joint marketing agreement with a partner that could build mainframe software applications.

Nextex is a good example. It is a software package that resides in the computer to serve as a link between the operating system and Hyperchannel. It handles network and presentation layer protocols. The product was announced in 1982, but NSC has been slow in bringing out interfaces to different computers and their operating systems.

Former Network Systems employees insist the company "farms out" most Nextex software development. "Network Systems' strength is its hardware expertise. It is not a software company. They don't feel comfortable with it," says one source.

In contrast, Masstor is more of a systems house. "Our business is very different from Network Systems'," observes one Masstor source. The company sells a system that solves a broad storage problem. To supply that solution requires storage devices (the M860 and disk drives), back-end intelligence (SVSS), and a network (Massnet and Masstor communications units).

"We have a large storage system that solves problems for big machine rooms," explains Masstor vice president Ewing. "Once inside [a customer site] we could also offer high-speed network capabilities. When we put these two strategic products together, that opens up a whole new set of applications we were not able to do before."

The Achilles' heel that everyone is aiming for is Network Systems' hardware bias and its old technology. The company may have a 37% margin in its current pricing scheme, but several former Network Systems employees indicate the company will have a hard time eking efficiencies out of the current Hyperchannel design to meet a 50% to 60% price challenge.

Ungermann-Bass, Santa Clara, Calif., is another competitor aiming at Network Systems. UB plans to introduce a 50-megabit, baseband, token passing ring priced at 50% below Hyperchannel. Currently in beta testing at undisclosed sites, the product is expected to be delivered by summer, says Jim Jordon, vice president and general manager at UB.

"Right now we only support IBM. But the system was designed in a modular fashion. Other interfaces can be developed," says Jordon. "We just change the host side." UB says it will support standard channel interfaces.

Like Network Systems, UB is more interested in building hardware than network applications. "We don't want to do host software ourselves," admits Jordon. So UB is looking for a relationship much the same as developed between Network Systems and Masstor. "We are interested in a joint marketing agreement with a host software-oriented house," says Jordon.

Better equipped financially, UB could probably give Network Systems a faster run for its money than Masstor. But UB is not planning to sell its 50-megabit system directly to end users. Instead, it is going the oem route, focusing its efforts on mainframe manufacturers for the duration of 1984. Although the company would not reveal any names, sources say Hitachi may be among those interested.

By going oem to mainframe vendors, the competitive threat to Network Systems may be minimized. One of Network's strengths is its ability to connect multiple vendors' devices together. Chances are those who buy UB's product will not be interested in investing time and money to build an open network. An oem deal with a software house would change the picture. If UB lands a deal with an aggressive software partner, then Network Systems may have another direct competitor—but then so will Masstor.

As if Masstor and Ungermann-Bass are not enough to set Network Systems' marketing heart to pumping, enter Computer Network Technology, Minneapolis. Of all the emerging competitors, Computer Network may mature into the most formidable opponent. The company was formed last April, and one of its founders, Gene Misukanis, is a former manager of advanced product development at Network Systems. At the startup he is executive vice president, responsible for engineering.

Computer Network Technology, founded by former staffers of NSC, plans to introduce its first networking hardware next year.

Misukanis' strength is systems level programming. He was one of the lead programmers on the Hyperchannel project and, more recently, managed Hyperbus development. Misukanis brought with him Doug Kuligowski, another former member of the Hyperbus development team, who is manager for software development.

Hardware design is being led by Keith Bonn, yet another former Network Systems engineer, more recently with Control Data Corp., where he worked as a hardware designer on a special projects team involved with high-speed computing. Heading up marketing is Bob Lutnicki, who comes to Computer Network from AT&T Advanced Information Systems.

In essence, Computer Network is aiming to do what some say Network Systems should have done. Using more state-of-the-art chips and more efficient programming techniques, Computer Network intends to build a follow-on to the Hyperchannel adapter box. At least that is how sources close to the company describe it. By this summer, Computer Network hopes to field-test its product.

The adapter is to be an estimated 50% to 60% cheaper, smaller, require less power, and be "system compatible" with the Hyperchannel adapter, predict sources. The design will enable the company to improve throughput in future releases, a feature and flexibility Network Systems will not be able to match without a redesign, say informed sources. The plan is to ship to customers by year-end.

Computer Network's stragegy also includes "significant attention to standard protocols and network application software." No specifics were available.

As for target markets, "we don't expect to displace any Network Systems

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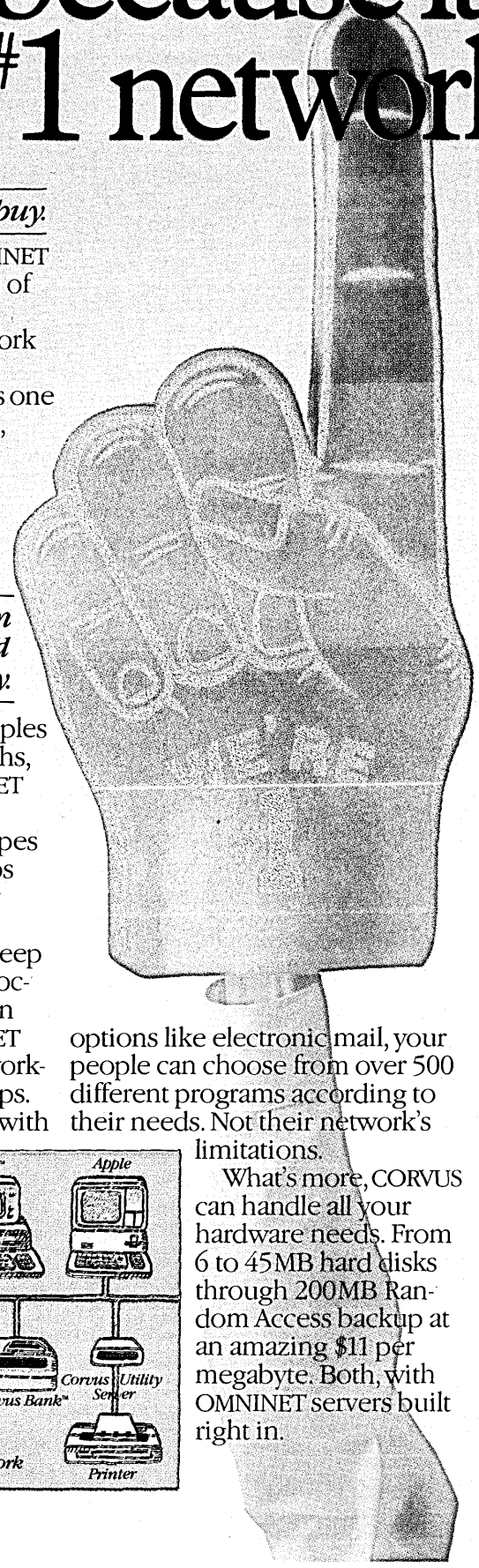

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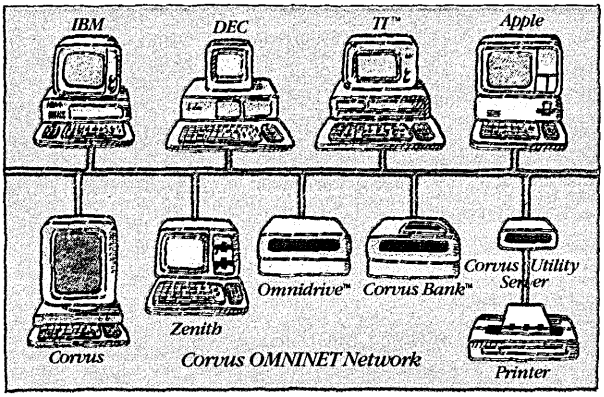

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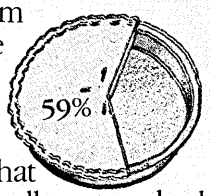

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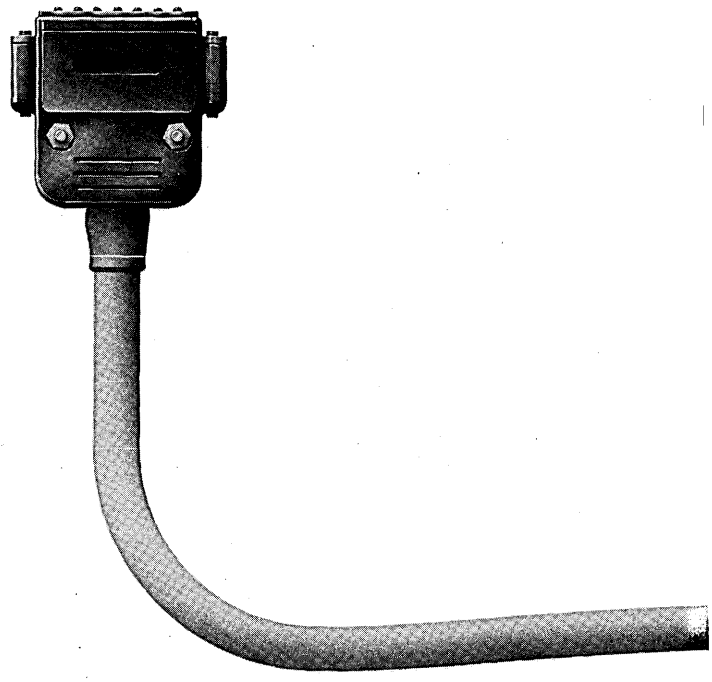

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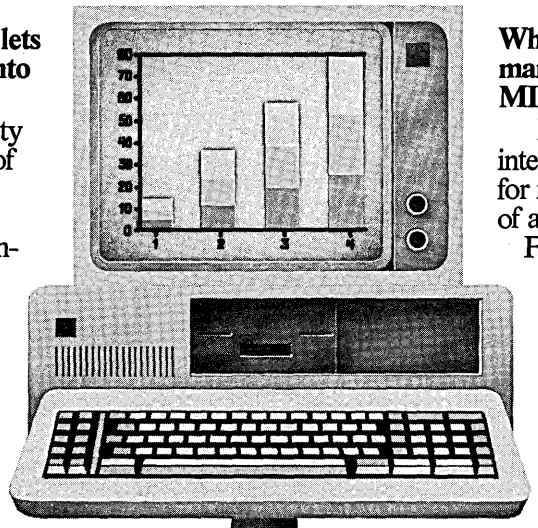

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Little Rock	Apr. 5	Charlotte	May 8	Nashville	June 5
New Orleans	Apr. 5	Cincinnati	May 2	New York	June 21
Norfolk	Apr. 10	Ft. Worth	May 3	Oklahoma City	June 7
Philadelphia	Apr. 3	Harrisburg	May 2	Omaha	June 7
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product," says Computer Network's Lutnicki. But the company does expect to compete against Network Systems and Masstor for new business and for business from customers planning to expand. All have targeted large companies. Computer Network and Masstor expect to reach an even larger market because of their lower-cost adapters and broader software offerings.

Like Masstor, Computer Network was also threatened by Network Systems, but only in a strongly worded letter, revealed an industry source. Computer Network fired back its own letter and the matter appears to have ended there.

The risk for Computer Network is that it has never produced a product and has yet to build a marketing and field service team. Initial funding arrangements are, well, irregular.

Under pressure to get products out the door before the window of opportunity slams shut, Computer Network's founders acquired the publicly traded shell of defunct Candy Co. in November. That move muddied its financial picture and set the financial community on edge. That edginess could hamper the company's efforts to do a secondary round of financing planned for June.

How is Network Systems taking all this? Its rash of hastily fired legal threats seems to indicate nervousness, yet the company commands the largest installed base, has years of production experience, and has developed an excellent reputation for reliability and service.

Comments one satisfied data communications manager with a large company: "Price reductions? We are not really so interested in price reductions. When you have a large computer system supporting a monstrous number of people, $40,000 for an adapter box gets lost. Reliability and maintainability are key. Network Systems' service is superb and their people are well trained. They are doing a fine job."

As part of Hyperchannel, Network Systems offers hardware to link to microwave and satellite systems and T1 carriers. Network Systems also offers Hyperbus, a 10-megabit LAN for hooking up high-performance workstations. Through a gateway, Hyperbus can hook to Hyperchannel.

"Network Systems is really the only company with a totally integrated, open system network, from the pc all the way up to mainframes," observes Dennis Sherva, managing director, emerging growth stocks, at Wall Street bank Morgan Stanley.

The company is currently working on a new product called Data Pipe, a 275-megabit fiber optic network. "It is aimed at accommodating multple Hyperchannel and Hyperbus networks and the next generation

"We are not really interested in price reductions. Reliability and maintainability are key," says one NSC user.

of supercomputers and storage units." says Lyle Altman, president and chief operating officer at Network Systems. "We consider Data Pipe to be the modern replacement for broadband."

Altman appears to stand firm on Network Systems' dedication to building hardware. After Nextex and a bulk file transfer facility, "we don't intend to proceed any further in that direction with software," he says.

Network Systems does plan to extend those capabilities down to personal computers and workstations on Hyperbus. "That is our direction. If you talk about going any deeper you get into application programs and that is an open-ended sink. We are a standard products company and we intend to keep doing that."

The upstarts and new competitors are banking that customers' concerns are shifting. They see network hardware be-

coming a commodity and software applications gaining importance. It's doubtful Network Systems will be left in the dust, but there are those who speculate its annual 50% to 60% growth gains soon end.

SOFTWARE PIRACY

ONLY ONE PER CUSTOMER

Software vendors are using copyright suits and advertising to stem the flood of pirated programs.

by Michael Tyler

Understanding the issue of software piracy requires perspective. No matter how many copies of WordStar you pass along to friends, at home or in the office, possibly in exchange for a copy of VisiCalc or 1-2-3, you won't get sent to the electric chair. You probably won't even go to jail.

On the other hand, you may find yourself haled into court and forced to pay a fine that's a lot more than the retail price you decided to ignore. Then again, you may find that nothing happens. You could go about your business, purloined software and all, and the publisher will never find out.

Considering how much noise they have made about their products getting ripped off, personal computer software publishers tend to agree on only one thing about the issue: they don't get no respect. How to stop piracy, what laws should be passed, who is responsible—these are question that seem to have as many answers as there are publishers.

Listen to Alan Dziejma, president of Business Solutions Inc., the Kings Park, N.Y., publisher of the Jack2 package: "I think there are about two and a half times as many Jack2s in use as we have sold. I hear about people who bought one copy and call to ask for 29 more manuals as backups. It's a real problem."

Says Kenneth Scott, vice president of Microrim Inc., Bellevue, Wash.: "Upwards of 40% of all micro software is pirated. Networked pcs especially scare the hell out of me because you can then get 25 illegal users borrowing that one copy."

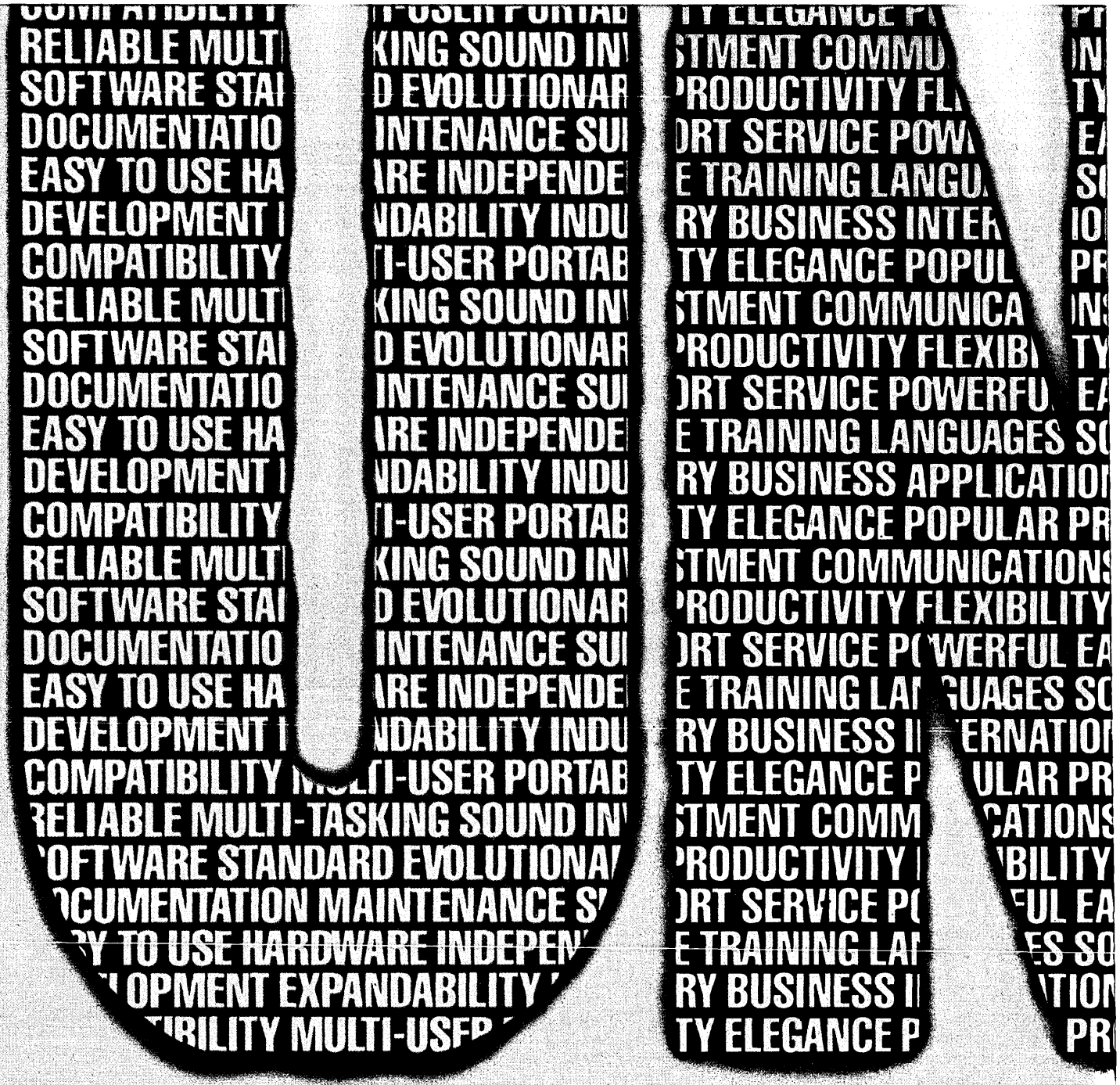
Martel Firing, founder of Noumenon Inc., a publisher in Alameda, Calif., adds, "We worry about piracy, but we don't know what the solution is, or we'd be in that business. A solution could get you a lot of money."

Users, on the other hand, often do not see software vendors as small companies vulnerable to serious damage, but as big companies who would be hurt no more by illegal copying than an employer would be by an employee making a personal phone call from work.

"The everyday user is our biggest problem," says David Cole, president of Ashton-Tate. "It's so easy to do and most people don't know they are committing a crime when they copy a software program for a friend or coworker."

As the software vendors see it, the copied program does significantly more damage than personal phone calls from work. With 1983 revenues of $2.1 billion for the pc software market, Cole says, "Between two and 10 unauthorized copies are made for every package sold, meaning a potential loss of up to $20 billion to software publishers."

Clearly, many software publishers are big companies. But it is also clear that they can be hurt seriously by piracy, and that is why several of them have begun fir-



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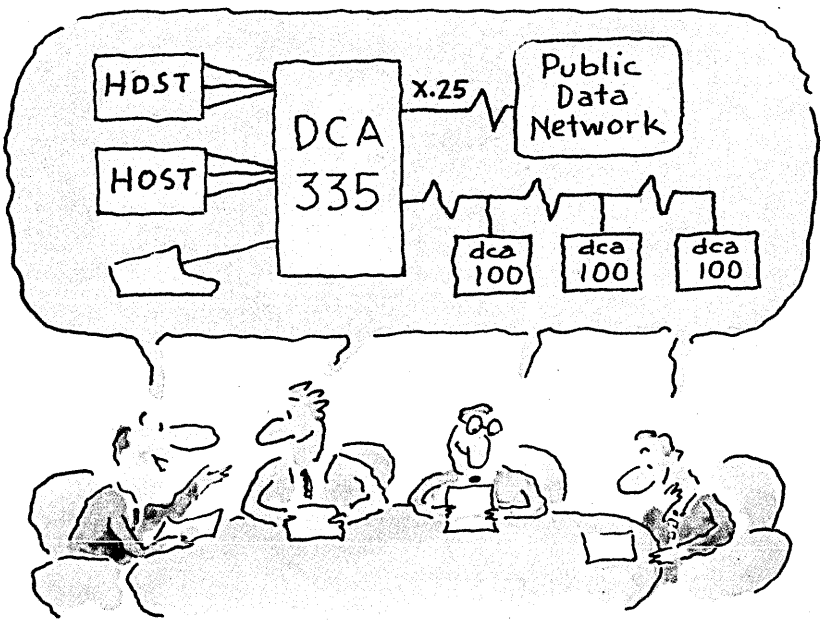

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CIRCLE 30 ON READER CARD

ing salvos of legal and financial weapons at software copiers. Lotus Development Corp., the Cambridge, Mass., publisher of the 1-2-3 package, filed a $10 million suit against Rixon Inc., claiming that the Silver Spring, Md., company reproduced and shipped illegal copies of 1-2-3 to 13 of its offices across the country. Lotus president Mitchell Kapor promises that the suit is only the first of what could be many against known corporate software pirates.

Corporate users often copy informally, but some have gone so far as to hire temporary workers to copy the disks and manuals and to distribute them to many users, Kapor says.

Reaction to the Lotus suit has been mixed throughout the industry. Microrim's Scott says, "I think they [Lotus] and we should be aggressive and sue when we have the information. Software publishers should get together and pool some money to litigate against flagrant and not-so-flagrant abusers. I hope to see a dramatic change in the approach publishers take, and I think we're prepared to take on the copiers."

David Saykally, president of Context Management Systems, the Torrance, Calif., publisher of the MBA package, holds an opposite view. "The worst thing you can do is get embroiled in a lawsuit. It will slow your business, and wrap up your management. Lotus's suit is consuming lots of its management's time. Besides, I don't think it's positive press. I think they would just as soon negotiate the suit out of court."

(At press time, Kapor said that Lotus and Rixon were in fact close to an out-of-court settlement.)

Combating piracy does indeed take time and money away from other aspects of a publisher's business, and for that reason Ashton-Tate's Cole recently set up the Microcomputer Software Protection Fund. The fund, supported by member software publishers, would work with the Microcomputer Software Association section of ADAPSO to investigate corporate abuses, to set up an advertising and public relations campaign, and "to vigorously pursue prosecution in cases of corporate infringement," Cole says.

The fund's purpose, like the Lotus suit, may sound about as subtle as a machine gun and may give the impression that the members see users as conspirators to be defeated, but that is somewhat misleading. It's not so much that publishers want to intimidate users into honesty as they want to maintain an amicable and profitable relationship with customers. The investigation of corporate abuses, for example, so far consists more of behind the scenes detective work than any overt actions. "When someone calls our 800 number, we check to see if that person has actually bought our product," says Saykally. "If not, we've caught an unauthorized copy."

Lotus's Kapor admits that Rixon's alleged abuses were discovered because "a Good Samaritan told us."

Similarly, the fund suggested some guidelines for consumer advertising that manifest a more benign attitude than the bluster of some of its members. "These ads are aimed at our customers, people who are basically honest and who must be treated with respect," the guidelines read. "We can expect [them], in many cases, to participate with us in their own education."

That education may indeed work. Says Context's Saykally, "Major corporations don't want to be subjects of lawsuits. As the corporation begins buying its micros and software through central facilities, it will start policing usage internally. The central purchasing facility will have the responsibility of making sure the company isn't the subject of embarrassing stories or suits."

And Kapor says, "We sent a mailing to two firms telling them we had evidence that they were copying. We said we were prepared to sue and asked them what they would do. Withing 15 minutes of receiving the letter, executives at the two firms called to say they would stop."

Other vendors have also found methods of coping with software piracy out of court. Dawna L. Travis, manager of client services for Management Decision Systems in Waltham, Mass., says, "You try to have a discount volume pricing strategy, so that it is in the buyer's interest to buy five copies of a program rather than to buy one and make four duplicates."

Louisiana is just one of several states considering legislation that would explicitly bar unauthorized duplication of software.

Scott of Microrim isn't sure that such a pricing strategy is indeed a solution. "We as an industry just don't know how to price or license software, especially for multiple user and networked systems. And corporate users are moving toward such systems, which makes the problem more critical." Microrim sells its R:base DBMS for the IBM PC for $500 for a single user, but multi-user systems run $1,500 to $1,900, or $150 to $200 per user. That way, users may be more tempted to go the lawful route, Scott says.

Another potential solution, he adds, is for software publishers to work in conjunction with hardware vendors so that software will read a serial number from the machine on which it runs. If the hardware's serial number doesn't match the one in the software, the program won't run. Hardware makers have so far largely resisted the notion, however.

With such a demand for some solution to software piracy, it is no surprise that over a dozen firms have gotten into the act of providing "software protection" products. The most prominent of these is Vault Corp., a two-year-old diskette producer in Westlake, Calif. The company sells publishers diskettes altered by the proprietary Pro-Lok technique, which physically identifies the diskette much as human fingerprint will identify its owner. In that way, software can only run if it is encoded on the diskette originally packaged by the software publisher. If the program is mangled, the backup copy can be transferred to the original disk so the user can continue processing.

Several software vendors have latched onto Vault's method, most prominently Ashton-Tate. The Culver City, Calif., seller of dBASE II also helped to finance Vault and currently owns some 25% equity in the company.

Similarly, Formaster Corp. of San Jose, Calif., has developed the CopyLock system, which employs electromagnetic "signatures" that can be read but not written, software concealment of major features, control of the duplication equipment, and frequent changing of protection variables. An enhanced CopyLock, which will be available this summer, will employ the National Bureau of Standards' Data Encryption Standard, the vendor says.

Enigma Logic of Concord, Calif., has also introduced a hardware/software duplication deterrent. It employs a software "lock" that is opened using information stored in a separate, handheld device. And Western Digital Center of Mesa, Ariz., and Software Protection Devices of Dublin, N.H., have agreed jointly to develop a version of the 6502 microprocessor that will have a "Copyrighter" software protection system embedded on the chip.

Any of these may stay unbroken for the time being, but "no protection system has remained uncracked by enterprising programmers for more than a few months," admits Laird Huntsman, who heads up software development for Formaster. Nonetheless, the devices do remain effective against casual corporate users, and that is where most publishers continue to concentrate. "Nobody has a total solution," says Noumenon's Firing. "We're just trying to defeat the casual copier."

When all of these methods fail, there is always the government to turn to for help. Late in February, Louisiana became the first state to introduce a bill explicitly forbidding the unauthorized duplication of software. The bill was intentionally written in broad terms to maximize its scope. Other states are also considering the introduction of legislation to extend copyright laws explicitly to software or to forbid unauthorized duplication of programs regardless of the copyright laws.

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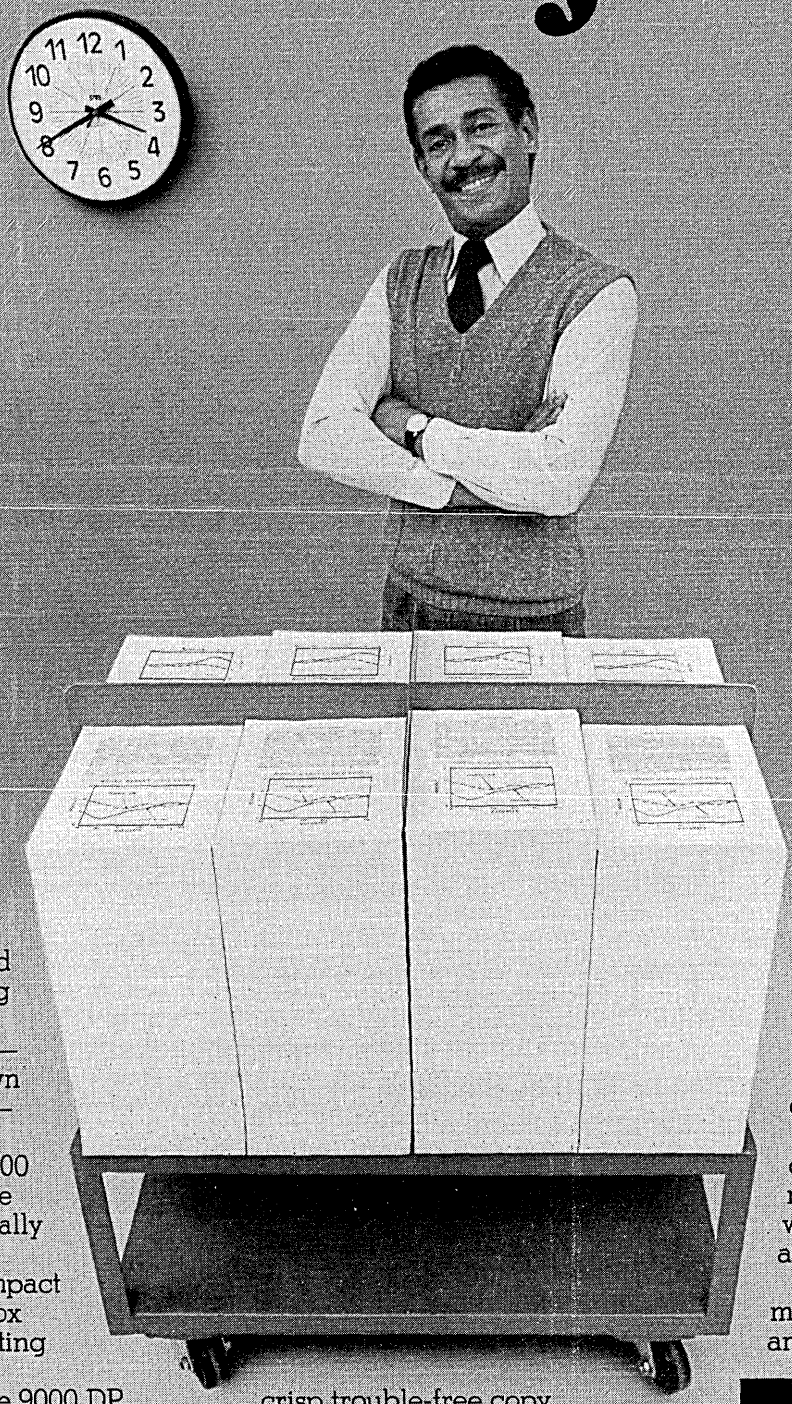

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CIRCLE 31 ON READER CARD

Yet despite all the emotion surrounding software piracy, there remain only widespread allegations of illegal copying and little hard data. The whole issue may in fact be much ado about very little. Says Saykally of Context, "People are honest, and with all the publicity I think they will be more honest. It's too damaging not to be honest."

Business Solutions' Dziejma concurs: "To a real business customer, $500 is not much to spend to get the package in its legal state rather than to copy the disk and the manual." And Travis, of Management Decision Systems says, "There is a psychology of each user wanting to have his very own Lotus with the Lotus label and the Lotus manual and so on. It's much less of a concern than other issues that don't get as much attention."

Other vendors even go so far as to say that some piracy is good for business. "If they copy one of our programs, that's one more potential customer to buy our next program," says one publisher, who declined to be identified.

That is clearly a minority viewpoint. Until big companies openly admit that they copy software, it is unlikely that much concrete data will surface to determine just how much piracy occurs and who does it. Failing that, software publishers will continue to press their case before the public through lawsuits and ad campaigns, hoping to appear as the user's advocate rather than the user's adversary. As Microrim's Scott says, "Only if we get very aggressive will piracy shrink." ✱

MICROCOMPUTERS

USING IBM'S XT/370

The desktop machine leaves some things to be desired, but appears destined to set a trend of offloading mainframe functions to PCs.

by R. Emmett Carlyle

Industry and guru reactions ranged from "groundbreaking" to "awesome" last October when IBM unveiled the PC XT/370 computer. The general thinking then was that IBM had answered a dream of 20 years, that of putting a 370 on a desk. However, an informal sampling of reactions from early users shows the machine is not quite the answer to everyone's dream.

"Yes, the machine is nice—if you don't expect too much," was a typical comment, this one heard from a large MVS shop. What is clear from talking to a handful of early users is that the initial perception of a full-functioned 370 sitting on top of a desk is misleading.

"In a sense this first version of the XT/370 is a throwaway designed to test the waters at customer sites, and among independent software companies," says one user in the insurance sector. "Because of its limitations in addressing, disk storage, and systems software, the machine at this stage is little more than an intelligent terminal." The customer, who requested anonymity, indicated that he looked forward to a follow-on version of the XT/370 in 12 to 18 months.

"You know the old IBM adage, 'Terminals sell mainframes.' "

Others contacted say they expect the software companies to iron out some of the machine's wrinkles: "After all, it is a PC class contender, and [IBM's] been more responsive so far," says one user.

To understand just exactly what these beta sites now have in their midst, it is important to trace the origins of the XT/370. IBM sources claim that the machine was conceived and first developed at the Cambridge Scientific Center, Mass., by two researchers, Tom Rosato and Arnie Miller—though neither man has so far been given any public credit.

Cambridge was the developer of CMS (originally the Cambridge Monitor System), a single-user operating system that runs in IBM's VM/370 virtual memory environment and offers the programmer an easy way to create and access files, write new programs, and run them. The VM Control Program (CP, or "hypervisor") creates the illusion that the programmer has a complete 370 and all the attached devices at his or her disposal. VM/CP controls the processor, memory, I/O, and all the physical devices. CMS, in turn, provides a user interface and file handling operating system.

Programmers at non-VM/CMS sites typically timeshare large- or medium-scale batch systems. IBM internal figures circulating at Cambridge showed that the average cost per timeshared programmer terminal was between $10,000 and $18,000. Sources add that the average is the same whether five programmers are huddled around a 4300, or 200 are sharing a large mainframe.

IBM is intent upon making CMS run on its full range of 370-like machines, from XT/370 to 308X.

The Cambridge team reasoned that for the same price range—the XT/370 typically costs around $15,000 when fully configured—a programmer would prefer to have his own virtual machine, begin to control his own destiny, and do more useful and productive work. At the same time, Cambridge could promote CMS as the most potent way of eroding the three- to four-year applications backlog that exists at central MIS sites.

From IBM's point of view this scenario isn't altogether satisfactory. "Because if the 200 programmers are at capacity on their mainframe, and a 201st is added, IBM can sell the customer another mainframe. You know the old IBM adage, 'Terminals sell mainframes.' But suppose instead the new programmer had the option of a CMS virtual workstation . . ." one former IBMer suggests.

Bob Cook, president of Virginia-based VM Software, takes up the theme. "Rather than offer a full-blown CMS machine, IBM has been careful to offer the XT/370 as an introduction to the CMS file system, and has shelved more powerful CMS systems for the time being."

Cook says that the real key to IBM's move lies in VM/CP, "which is its major account control mechanism." He says, "The VM hypervisor not only presents the illustion of an entire 370 virtual machine for the user, it also allows him to run any of the operating systems created for the 370 architecture: DOS, OS1, MVS, etc., under the CP. That's why VM is critical to IBM's migration plans; and that's why VM/370 licenses are hotter than Cabbage Patch dolls inside IBM's customer base." (Some analysts talk of a fivefold increase worldwide from 8,000 to 15,000 installations of VM/370 over the past three years.)

By becoming VM/CP's single-user operating system, CMS has become important too, and it has become necessary for IBM to introduce it to its large MVS and non-VM/370 sites without also hurting its mainframe sales. As revealed here (March, Look Ahead, p. 13), IBM is intent on making CMS as portable as possible through its line. CMS runs in 24 bits on the 4300 line, but does not yet run in IBM's 31-bit machines. Researchers at IBM's Yorktown Heights, N.Y., research lab began grappling with this problem in November 1982, and are close to completing a 31-bit CMS, sources claim.

Unlike the 4300s, which offer users 16MB of virtual memory from the 24-bit addressing range, the XT/370, according to sources who have used the machine, has a 12-bit addressing limit and delivers only four megabytes of virtual memory. In addition, the machine has a disk storage limit of 20MB (two 10MB disks). This is hardly enough capacity for compilers, which one XT/370 beta site describes as voluminous in terms of disk space on the machine, and large user programs. These large programs, as a result, must remain on the mainframe and be selectively downloaded. "Without instant access to compilers and debugging tools," says one user, "the XT/370 does nothing to alleviate the two to four second response time and mainframe outage a day we suffer now. The machine offers subsecond responses only for editing and trivial work."

There is another major reason why the XT/370 will remain a "slave" to the host for the foreseeable future. Observers point out that the XT/370's current capacity makes it impossible to mount a VM/CP on the machine—in the unlikely event that IBM would wish to do that at this stage. Instead, the simple version of CMS written for the XT/370 largely runs under the PC operating system, PC/DOS, which, it is believed, controls all I/O and data file handling.

Gerry DePass, president of the VM/CMS software and services concern Adesse Corp., Ridgefield, Conn., explains that VM/CP not only offers one virtual machine but simultaneous VM machines.

"Using VM/CF [Communications Function] and a program known as RSCS, which resides in an intermediate node, the VM/370 user can exchange files between his virtual machines and build networks." However, neither VM/CF or RSCS runs under CMS or PC/DOS, and thus the XT/370 user is isolated in his own virtual space and dependent on the host for any form of networking. One possible solution, according to Ron Ross, president of VM Personal Computing, New York City, will be for the XT/370 customer to go through PC/DOS to PC disk cluster controllers and the upcoming PC local area network from IBM. "But this takes him out of the IBM corporate world of VM and into the area of open standards," Ross points out.

Future versions of the XT/370 will have the native capacity to mount VM/CP, and thus release the MIS central site programmer from his bondage. But until this happens, the XT/370 will provide a target for more integrated workstations with networking and office automation support.

At NBI, the Boulder, Colo., manufacturer, sources claim that such an offering will be forthcoming from that company this year. Using a new COBOL/VS compiler as the bait, NBI will offer a $16,000 Integrated Work Station (IWS) offering Berkeley 4.2 Unix plus a selection of Unix software development tools, and including LAN support, office automation software, and both SNA and 3270 links to IBM mainframes. Another NBI inducement is the service and support handholding with which it has built up an enviable reputation over the past two years, according to research firms. Similar configurations are expected from Wang, DEC, and DG, among others, as they mount their own challenges to the XT/370.

Observers expect the XT/370 to remain a "slave" to the mainframe for a long time.

One NBI source says the office automation support is crucial. "Only around one sixth of the programmer's software development concerns the creation of new code. Most of the time he is writing text: preparing objectives, specs, designing and reviewing screens, and so on. The XT/370 offers him nothing for this."

Most users agree that the XT/370, though slow in most other respects, does provide more or less instantaneous response for editing on the screen, and can be used for this purpose if the mainframe goes down. But according to Cambridge figures, editing accounts for only slightly more than 5% of the total programmer's work. Is it worth spending an extra $10,000 to $15,000 for an editor?

IBM has closely monitored the beta tests and may have another ace up its sleeve that could give the XT/370 an early boost despite its performance problems. Sources expect an announcement of a Series/1 board for the machine soon, probably for an extra

$5,000. IBM is believed to have taken the process control board from the Series/1 ("The only part that isn't already offered on a PC," as one source puts it) and mounted it on the XT/370 so the machine can be used for factory automation and data collection. Sources aren't sure yet whether this move will herald the end of the Series/1 or a second incarnation of that mini. But this initiative could certainly pump extra vigor into IBM's desktop 370 challenge. ✱

APPLICATIONS

HI TECH AT THE OLYMPICS

Technology is coming to the rescue at the Los Angeles Games.

by Edith Myers

They've been billed as the "lean"—as in low-cost—Olympics by some, the "corporate" Games by others. In any case, the 1984 Olympic Games will be a feast of high technology, which seems appropriate enough considering their Los Angeles location.

Organizers have drawn heavily on computer, instrumentation, and telecommunications technologies to help meet challenges that appear at least equal to those facing athletic competitors this summer.

While the Games' cost is set at only $500 million—compared to the $1.2 billion spent in Montreal in 1976 and $6 billion in Moscow's 1980 event—a good deal of technology, much of it donated by corporate sponsors, is being put to use.

One of the biggest challenges has been the creation of a communications network to tie together the Games' 23 competition sites, some of which are located as far apart as 200 miles. The Los Angeles Olympic Organizing Committee (LAOOC) set out to bring together several corporations in order to build an electronic mail system.

AT&T's Western Electric arm and its Teletype Corp. subsidiary, two of 36 corporate sponsors at the Games, donated an electronic messaging system that includes 1,800 terminals to be located at the competition sites, the three Olympic villages, security posts, the press center, and the LAOOC headquarters. Features of the system include a menu of options in English and French, the official Olympic languages, and an interactive design that permits most operations to be accomplished with the press of a single key. Spanish and German support is also available.

Information about all events will be available to EMS users within a minute after official certification of results. Information on cultural and social events will be available shortly after LAOOC personnel enter it into the system, while updates on performances of athletes each day—both before and during the Olympiad—will be available at 7 a.m. the following morning.

A daily Games results display, customized for each sports location, will be continuously displayed at unused terminals at every location. These will list the 15 most ecently completed events, but if more than 15 events have been completed in a given day, earlier results can be recalled.

The job of integrating EMS into an Olympics electronic mail system fell to Michael Mount, vice president of support operations for the LAOOC. The end result, he says, is like "no other system in the world." The basic EMS permits Olympic family members to communicate with each other at different locations on variable schedules. To send a message, the user enters the recipient's name and affiliation, if known, and types in the text of the mes-

OLYMPIC PAIR: (Jack Strickland (left) and Dick Schultz, partners at Arthur Young & Co., discuss their efforts at computerizing the ticketing of the upcoming summer Games.

NAMES IN THE GAMES

The computer industry's presence at the Los Angeles Olympics includes more than just the products and services directly provided by corporate sponsors. Several industry executives have signed on with the LAOOC in roles completely separate from their corporate existence. Bill Lennartz, president of Computer Power Systems, Long Beach, Calif., has been a part of the organizing effort for the 1984 summer Games since early 1980.

"I'm in the sports department," he says. "I got into it because I like sports, because [LAOOC president] Peter Ueberroth is a good friend, and because I wanted to help show the world what private enterprise can do with something like the Olympic Games."

Although he considers himself a representative of the computer industry, he is quick to emphasize that he is not involved with any dp aspects of the Games. Rather, he is a sports commissioner at large, a position in which he oversees the activities taking place in Long Beach.

"I help interface to the officials of the city of Long Beach and keep a good open line of communications," he says. The sports held in Long Beach, each of which has a commissioner reporting to Lennartz, are yachting, fencing, volleyball, and archery. By June he expects to devote full time to the Olympics.

Likewise with Roy L. Ash, a founder of Litton Industries, budget chief under President Nixon, and most recently president of AM International. Ash is the LAOOC's finance commissioner.

Finally, there is Ruth Ann Poppa, wife of former Pertec president Ryal Poppa. She is working with the archery program at the Olympics.

—E.M.

NEWS IN PERSPECTIVE

sage. Editing controls allow users to correct typing mistakes. The message is stored in a computer until the recipient has accessed a terminal and requested display of his mail. Printed copies can be obtained.

When Mount earlier learned that digital pagers, donated by Motorola Communications & Electronics Inc., could be set up to receive telex messages, he decided to tie both the terminals and the pocket pagers into the international telex system so that messages received on either could be sent out to anywhere in the world. As of early spring it appeared that messages could be sent to telecopiers as well as to telex machines. Western Union International, an MCI subsidiary and Olympic corporate sponsor, is putting together the international telex link.

In the press center, journalists will have their choice of keyboards in some 44 different languages. Press headquarters for what some think will be the biggest international news media gathering in history will be in the Los Angeles Convention Center. Some 4,800 print reporters and photographers are expected to use the center. In addition, 4,200 broadcast journalists and technicians are expected. Broadcast headquarters will be in Hollywood at the International Broadcast Center being set up by the American Broadcasting Company.

Another corporate sponsor, Xerox Corp., will provide the LAOOC with copiers and facsimile machines prior to and during the Games. Some 200 copiers and duplicators will be used ranging from small convenience machines to large, high-speed duplicators. About 150 donated facsimile units will range from a portable unit to a digital device that skips over white space and transmits a one-page letter in less than one minute. More than 400 Xerox employees will provide support during the Games.

Xerox has gone so far as to hire former Olympic decathlon champion Rafer L. Johnson as its manager of community affairs for the Olympics. Five divisions of Xerox are also sponsoring Olympic torchbearers. Beginning May 12, sponsored torchbearers will carry the Olympic torch for one kilometer each to cover all 50 states and arrive in Los Angeles July 28. Torchbearer sponsors pay $3,000, to be donated to a selected youth organization.

Olympic sponsors, by comparison, agree to support the Games with funds or services in return for the right to use Olympic symbols in their marketing efforts. IBM, for example, is the official Olympic computer supplier. Big Blue has donated to the LAOOC three System/38s and an unspecified quantity of PCs.

The LAOOC also has a licensing program under which licensees receive the right to the "official" designation for their goods, for which they compensate the LAOOC with royalties from their sales.

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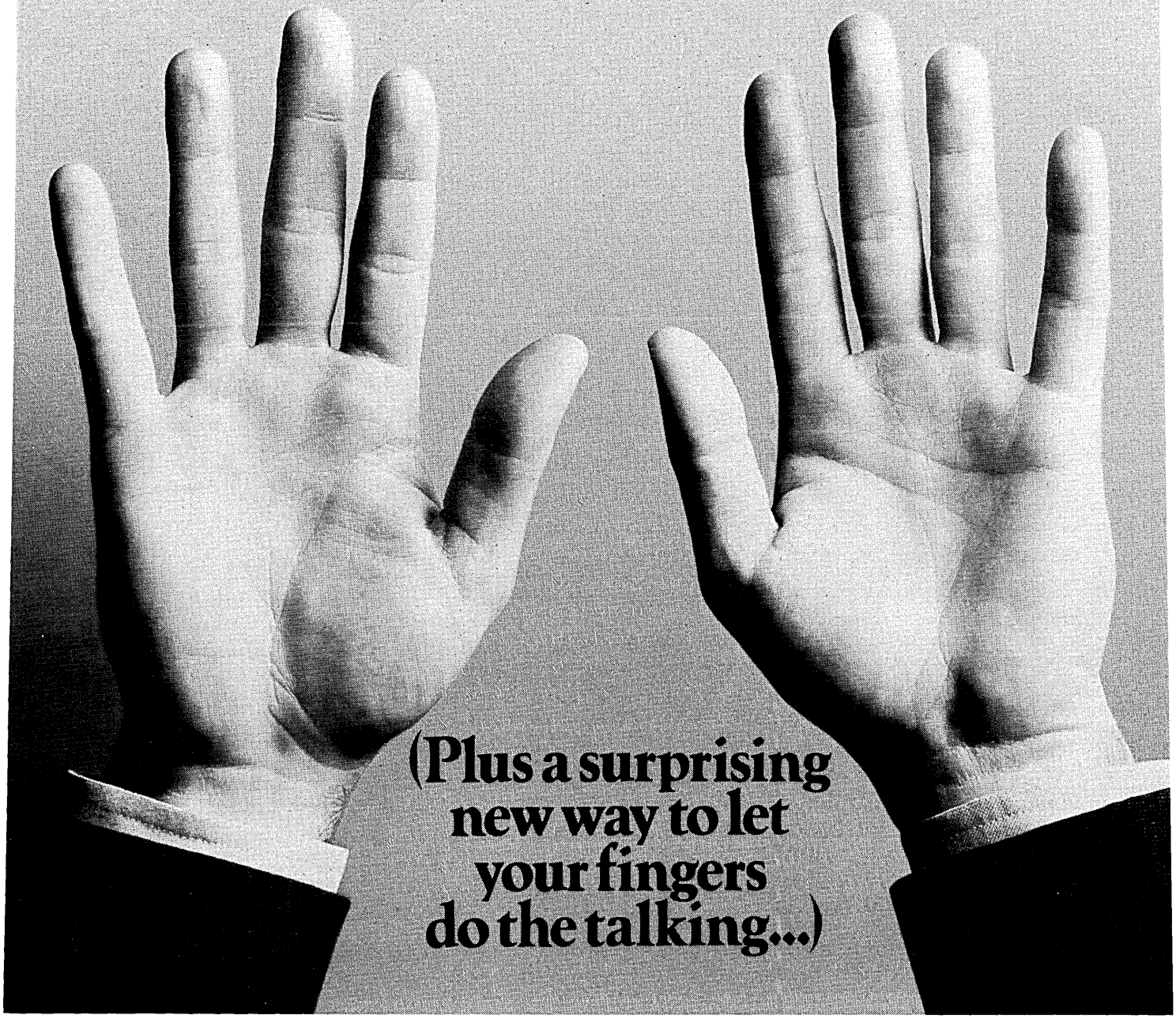

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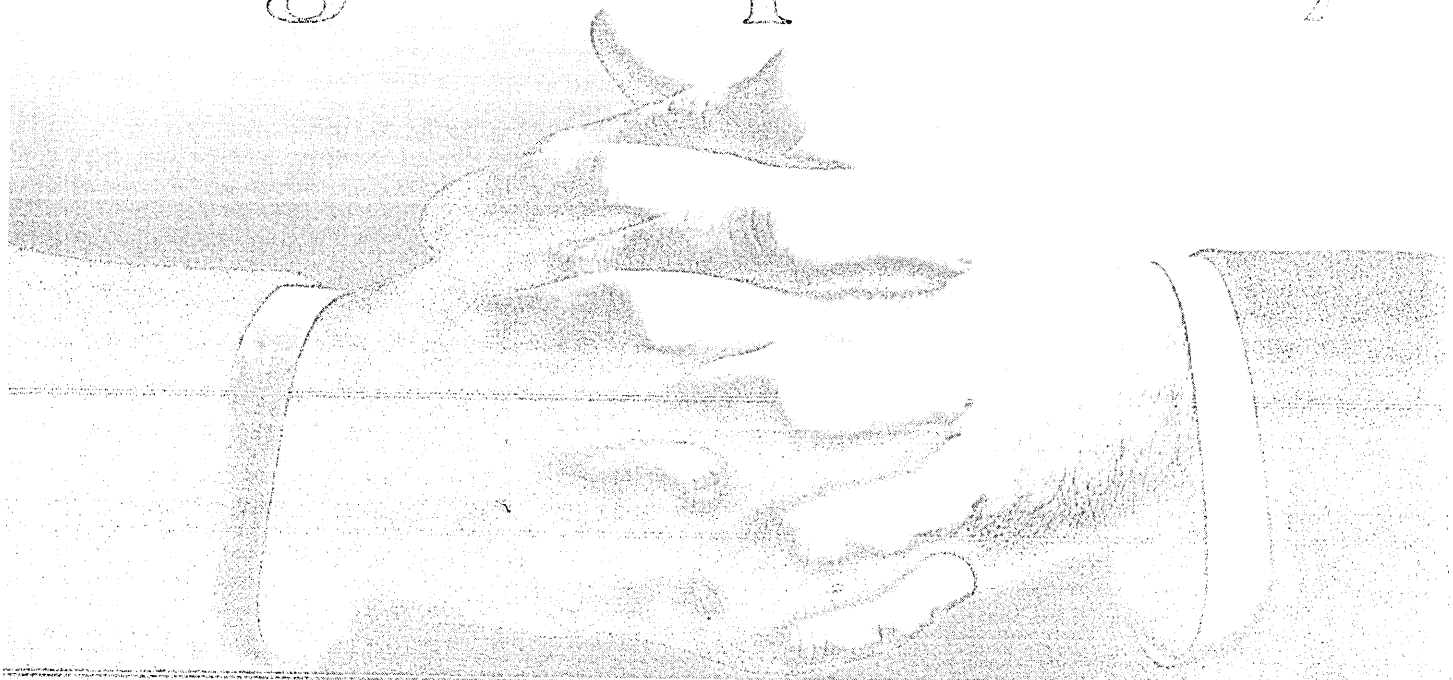

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Somewhere in between is Pay-Fone Systems Inc. of Los Angeles, which is the "exclusive payroll processor" for the 1984 Olympic Games. Lewis Greenwood, Pay-Fone Systems president, says his company has been doing payroll for Games employees since March 1983. The roster of employees is steadily growing and is expected to exceed 40,000 by late July. (This is less than half the payroll at both Montreal and Moscow because of a large staff of volunteers and activities staffed by corporate sponsors.) Payroll data currently is entered via an IBM PC at LAOOC headquarters and run on Pay-Fone's IBM 370/148. At game time, Greenwood says, each Olympic site will enter data via a PC.

The System/38s donated by IBM will be at the heart of the vital ticketing and accreditation activities of the LAOOC. The ticketing program was developed by Jack Strickland, a management services partner of Arthur Young & Co., New York City, which has acted as a consultant to the LAOOC since its inception.

Strickland was no stranger to ticketing systems, having worked on one for the Los Angeles Dodgers. "This was far more complex than the Dodgers' system," Strickland says. "It was as if the committee were starting a new business and we were automating it as they started it. With most systems design, you have something that is operational or going operational to look at. We knew very little about what was done in Moscow or Montreal. We learned a little from Montreal on what was done wrong, but there was little documentation on what was done right."

Sheer volume alone is enough to make the ticketing system complex. "We were hit with volumes," says Strickland.

A daily results display, customized for each sports location, will be available on a wide network of terminals.

"There are 28 venues. Within those, there are 370 sessions and within those, a variety of price scales all adding up to 1,100 different price scales. Of 7.7 million tickets, there are 5.3 million for the general public and 2.4 million for special order."

The latter include tickets for sponsors, National Olympic Committees, an inventory for disadvantaged youth, a number of VIP seats for government officials, the committee itself, and International Federations (by sports across different countries).

"When we started design and coding," says Strickland, "the physical seats themselves had not been built yet. We worked from a blueprint. We did not know where an ABC tv camera platform might wipe out seats or cut off views. So we decided to sell space, not seats. Once seats were constructed, we had to be able to go back and match space reservations to physical seats and then print tickets."

The system had to have other constraints built in: limits of one order per address, two tickets per order on 30 premium events, and four tickets per order on 45 semipremium events; options for second and third choices with waiting list, and the ability to try to fill the order in a lower price bracket for the same event before going on

DRUG ABUSE PREVENTION

Of all the technology to be used in the 1984 Summer Olympics, that which is most invisible to the general public will be at the UCLA toxicology laboratory at the School of Pharmacy. That is where athletes will be tested for the presence of drugs banned by the International Olympic Committee.

The hundreds of banned drugs fall into five classes: anabolic steroids, central nervous system stimulants, sympathomimetic amines (adrenaline), respiratory stimulants, and psychomotor stimulants (cocaine). The UCLA laboratory will use a Hewlett-Packard computer-controlled 5987A Gas Chromatography-Mass Spectroscopy (GC-MS) analyzer for the testing. The method of chemical analysis is not new, according to HP, but computer control has speeded up comparisons. The system comes up with "fingerprints" from each urine sample that can be matched against "fingerprints" of known chemicals. Computers match these against samples of 70,000 compounds in less than a minute. The university bought the GC-MS analyzer for $250,000, and will continue to use it after the Games, officials say.

The first controls for nonmedical use of drugs in an Olympiad were established in Grenoble, France, in 1968. Since then, each successive Olympiad has seen technological advances in equipment used and increased accuracy of analysis.

Testing for the 1984 Winter Olympics in Sarajevo, Yugoslavia, was done by the University of Sarajevo, using Perkin-Elmer gas and liquid chromatographs linked with computerized laboratory systems. HP equipment was used at the Pan American Games last summer in Caracas, Venezuela.

Testing for drugs at the Olympics is randomly done during the preliminary training and also during the Games. Gold, silver, bronze, and fourth-place winners will be tested for all drugs immediately following their events. If the presence of a drug is detected in an athlete's sample, a second, more detailed analysis is made to confirm the findings. **—E.M.**

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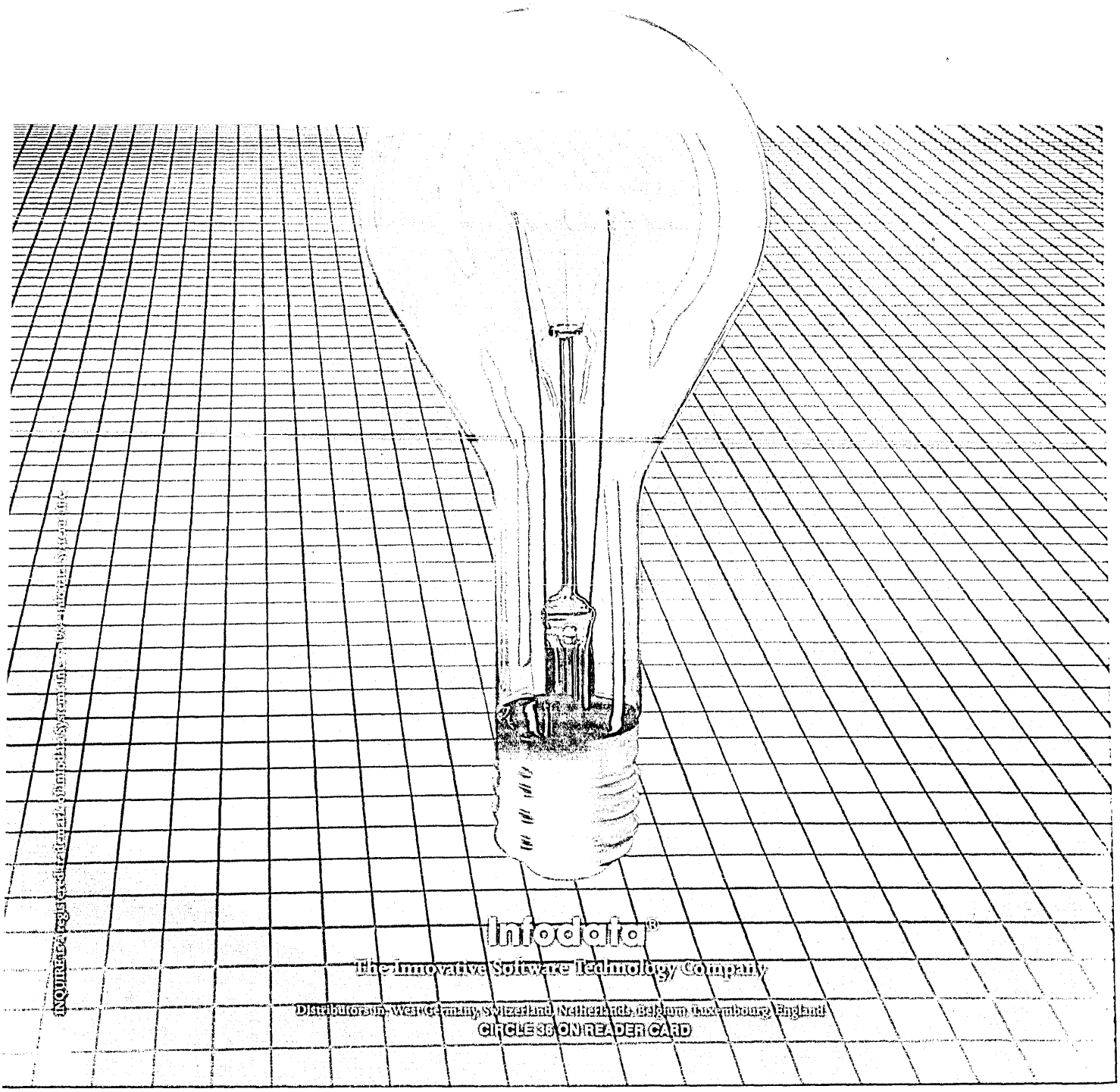

to the second or third choice; and a built-in randomizer for filling orders oversubscribed by last Aug. 15.

"The design had to be extremely flexible," says Strickland. "We were into random selection and had events cancel on us or split into two events. The system had to handle it."

The ticketing system was running last June on one of the 38s, at a secret non-Olympic site. The secrecy was nothing out of the ordinary for this Olympiad, however. "We have thousands of items to control. We didn't want people to be able to get into the system and change addresses to theirs," Strickland says. "We won't even change addresses on the basis of a phone request. We make them put it in writing and include the same personal identification information required on the original application, such as mother's maiden name and social security number."

It is largely because such personal information is in the system that it is so closely guarded. "We've had three security reviews," says Strickland. He wouldn't divulge some of the security precautions taken but emphasized that "information never leaves the system. Even if it would be nice to use one of the other 38s, we wanted no tapes floating around and no dial-up lines. In addition to the personal identification in the system, some entries contain credit card information. There is also the implied information on when people will not be at home."

Accreditation was the bailiwick of another Arthur Young partner, David I. Schultz. "There's never been an automated system of accreditation [at an Olympics] before," says Schultz. "It's been done entirely on a manual basis." The accreditation task consists of three functions: to authorize rights of access to Olympic villages and sports sites; to authorize access through means of credentials; and to provide a mechanism to support the role of security in control and in monitoring rights of access. "We give a tool to security," Schultz says.

Key to all of the above is an identification badge that carries the wearer's picture and other identifying information, as well as a bar code with access information. The badges will be worn around the neck on long chains and scanned by portable laser scanners. "The system even controls revocation and can provide for the issuance of duplicate cards in case of a loss," says Schultz.

The system is based on one of the donated System/38s with a second serving as back up. IBM PCs at all sites are also tied in. Cards have to be issued on-line in many cases, particularly for Olympic support personnel who might have a different job each day and, therefore, different access rights. Implementation of the accreditation system began last October. Strickland says that Arthur Young would keep both the ticketing and accreditation systems after the Games for adaption to large conventions.

Security for the games themselves is in the hands of a crew directed by retired FBI agent Edgar N. Best. He says that there will be more security people used than at any prior Olympiad but that they will be dressed in business suits rather than uniforms.

In the environs outside the games, security is the concern of more than 50 different law enforcement agencies. Sergeant Terry Pratt of the Los Angeles Police Department's Olympic planning staff that LAPD has purchased eight Columbia micros primarily for the Olympics, although they will be kept for later use as well.

The official computer supplier, IBM, has donated three System/38s and an unspecified number of PCs.

Cost for security incurred by public agencies is widely cited as a taxpayer burden by those who would deny LAOOC claims that the 1984 Olympics will pay for themselves, but the committee staunchly contends it will pay for those services it requests and that other funds allocated for security are strictly contingency funds.

Pratt says one of the uses LAPD has for the Columbias is the creation of a "suspicious" persons file to which "certain" people can input data at, say, commercial hotels, and which will be accessible at a variety of locations. Special software for this application was created by Thorn Bird Systems of Los Angeles using Revelation, the Pick-like operating system developed by Cosmos Inc., Morton, Wash.

Primary use of the micros, Pratt says, will be in a central information center to facilitate interagency coordination. "We'll be using dBASE II for deployment, to prepare daily rosters." Irma communications board from Digital Communications Associates in Atlanta will be used to interface to the LAPD's mainframe computers.

In early spring the LAPD was playing "what if" games with the system. What if a defector walks up to a street cop? What if a KGB plot is uncovered? What if a key street cop has to leave his post to go to the bathroom? "We've fed in all kinds of problems to test coordination between agencies, to determine who should be called for what and what backup should be," says Pratt.

While security is probably the prime Olympic concern of all levels of government, the typical Los Angeles area resident and businessperson are more concerned with the potential for traffic jams. Many companies are closing down for the July 28

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to August 12 period. Others are scheduling shorter work weeks. Still others, like First Interstate Bank, are using corporate computers to study potential commuting problems. The bank is matching employee travel information against data on projected Olympic traffic from the California Department of Transportation to develop work schedules.

Of course, there are those whose biggest concerns with the Games are their results, and McDonnell Douglas Automation Co. will tally them. McAuto is the official supplier of computerized results to officials and the news media. Data will be transmitted from the event sites to McAuto computers in Long Beach, from which they will be made available on crts and printers at various locations.

The transportable earth station operated by the Public Service Satellite Consortium and leased to SatServe (Services by Satellite Inc.) will, under contract to Western Union, make transmissions of the summer games available to broadcasters.

Pacific Bell will be in the act, too. The California phone company will provide on-site telecommunications trailers to process radio and telephone signals, telephone traffic, and data communications between computers. Pacific Telephone's current Los Angeles phone directory features an Olympic cover, and proclaims on its inside back cover that the 16 days of competition this summer by 14,000 athletes in 24 sports will make Los Angeles "the focus of the largest telecommunications event in the history of the world." ✱

WHAT THE USER EXPECTS

Generally it's way too much, and that can be bad news for MIS departments and vendors alike.

by Edith Myers

Great expectations by the new breed of corporate computer users are becoming the bane of both dp departments and vendors.

The expectations reside, of course, with corporate users of pcs, and there are those who contend that both MIS departments and vendors brought the resultant problems on themselves—MIS with its clinging to an outdated coziness with accounting and the accompanying back office, jargon-riddled attitude, and vendors with glowing promises in both advertising and sales pitches.

There is little doubt that the pc is in the office to stay, but the question in many minds is, for better or worse? Solutions are proliferating as are the problems. It generally boils down to control and planning, but who's to do it?

Mary Ann Jackson, a Los Angeles-based office automation consultant, warns that if control isn't established early on, in the 1900s "we'll be sighing and looking back on the good old simple days before the pc."

Jackson, who was with IBM's Office Products Division before forming her own company in 1976, says, "It was marvelous when the pcs first got started [in offices] because they were Apples. They were specialized. They filled the needs of people in little niches. Then came IBM. People's expectations changed. IBM meant big mainframes, networks, total systems. There was an instant need to include the pc in entire networks of information systems. It's what users expect."

They're vocal about it too with both MIS and vendors. "Customers tell us to bring in the pc as a full participant [in office systems]," said Lou Crawford, IBM's Manager of Office Systems Strategy at the February Office Automation Conference in Los Angeles.

Jackson sees the needs of pc users in corporations as falling into two areas: the need to communicate with the rest of the world and the need to access databases. "You ask them what they want and they say they want to do graphs or analysis and they do but that's the end product. What they really want is to push a button and get. . . ."

She believes the communications portion of the need is easy. "Make sure of compatibility. It's hardware oriented. The other half, database access, is software oriented and more difficult. Most of these new users have no idea what batch processing is and there are lots of companies still doing it. Then there are the programs that have been patched when they should have been rewritten. You have to give something to the pc users so you give them subsets. Sometimes they don't want to wait for batch reports to which they have input data so they manipulate their data themselves in different ways. Next thing you know you have different data floating around the company. Somebody has to be in control."

"Then there are the programs that have been patched when they should have been rewritten."

She thinks the control should lie

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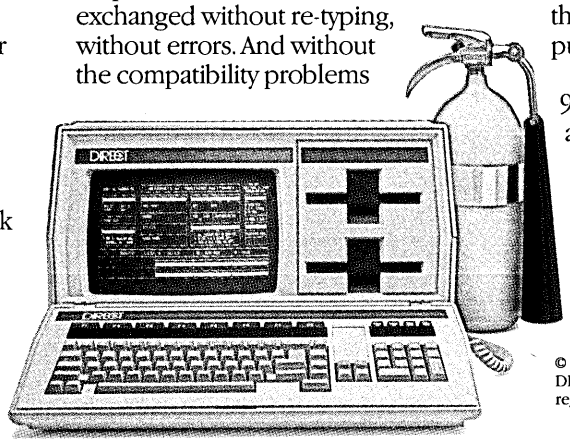

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with the MIS department. "Who else? The president isn't going to do it and I'd hate to see any big company create another large department, set up another complete hierarchy. What other department could control information so logically? It fits in." She adds, however, "Most MIS departments say we need to do something, but then they turn their heads and run."

Another oft-touted control point is the Information Center, which might fall into the category of a "new hierarchy," but most advocates of this approach caution good relationships with MIS.

"You should tell the data processing department that you complement them," says Shaku Atre, an independent computer consultant who formerly worked with IBM's Systems Research Institute.

Charan S. Lohara, chairman and president of Incomnet, Ventura, Calif., communications products manufacturer, believes the communications manager in a corporation is the logical person to be the key decision maker in the office automation process. "In today's corporate environment, voluminous bodies of computer-generated data must be delivered to executives in usable form as decision-making support," says Lohara.

"Most MIS departments say we need to do something, but then they turn their heads and run."

"But communications consumes massive amounts of time—which means money—so a great deal of planning and coordination is needed in order to reduce the soaring costs of processing information. Many people believe the dp manager should be the strategic planner and coordinate all the technology because he's familiar with computers. Data processing, however, is now a communications matter and can no longer be the exclusive domain of the dp manager, or the MIS manager. Every department has to be coordinated to work together in a cost-effective relationship, with allocated functions being carried out by each."

Whoever is in charge, Jackson believes, careful planning and the establishment of long-term goals are essential. A report by the Diebold Group Inc. on the use of word processing, electronic mail, and personal computing in large companies emphasizes the need for "central planning and coordination and the development of a 'global system concept' for the total company."

Jackson worries about the control of hardware and software selection. "You sneeze and there are 10 more software packages that could apply."

Jack Keen of Input, a Mountain Valley, Calif., market research firm, believes software products will be the largest information systems market within five years, and notes, "There is a tremendous rise in user expecttions. Users want two things, power and ease of use, and they want them right now."

He believes there is "turmoil in the software products industry" and that "Companies that have never been involved with software before will be getting in, companies that have been around a long time. Firms that seem today to be a success on the surface are living on a thin edge."

A recent input study stated that "The personal computer is a general purpose workstation that will become the backbone of companies' future information strategies." Still another Input study says office systems could offer information systems managers "the means of securing their position as *the* computing experts in the age of decentralized processing."

Jackson believes these managers must exercise more control. "Without control we'll have the biggest mishmash of information systems possible. With control we'll be able to download pesky programs.

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She believes MIS departments will have to add people to facilitate control, "people-oriented people who can move out among the department and train in a one-on-one basis." ❋

PERIPHERALS

GIVING THE 1403 NEW LIFE

The venerable IBM printer is finding new customers thanks to a small California company.

by Tom McCusker

You don't always have to advance technology to do well in the computer business.

Take Ray Lorenz, who's been making a pretty good living running Spur Products, Marina del Rey, Calif., a company that keeps IBM's model 360 vintage line printers in operation by making devices that hook the 1000 lpm 1403 printer onto non-IBM computers. Last year, his tiny 11-person company made a profit on its $500,000 in revenues. This year, Lorenz says, should be even better when Spur offers a new product: a device to hook non-IBM computers to even faster printers than the 1403.

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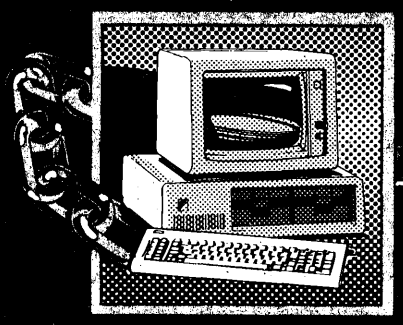

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CIRCLE 46 ON READER CARD

NEWS IN PERSPECTIVE

20 years ago by IBM with the company's 360 computer line, the 1403 immediately became the Cadillac of printers, superbly engineered, with upper- and lowercase text, fonts for COBOL, FORTRAN, OCR, and PL/1 symbols, and an overprinting technique that allowed users to print scientific symbols.

Lorenz, who was one of the founders of the independent line printer manufacturer Dataproducts Corp., left that company in 1972 to make controllers and interfaces that enabled customers with non-IBM computers to use the 1403, which was designed exclusively for the 360 computer line. His customers are large users with heavy, specialized printing needs. They include the International Monetary Fund, the Federal Home Loan Bank, American Greeting Cards, Pfizer Pharmaceuticals, and Southern New England Telephone Co.

As 1403 printers have come off lease in recent years, the price has dropped dramatically below the $40,000 IBM still charges, even though it hasn't made one for 14 years. Spur has been buying the printers from leasing companies at prices ranging from $750 to $1,000, rebuilding them from the ground up, adding a controller and interface, and selling them for $24,000. It also will service them for $325 a month, also below IBM's charge of $735.

In the last two years, Spur has sold thirty 1403s. Since the company was formed, its controllers and interfaces have been used in converting about 200 of the IBM printers to run on such machines as Digital Equipment's PDP and VAX lines, Prime Computer and Hewlett-Packard mini computers.

Concerned that his eggs are all in the 1403 basket, Lorenz has been working four or five years on a device called a Universal Subsystem Adaptor (USA) that will enable owners of non-IBM computers to use more recent vintage printers, such as IBM's 3211, the Xerox 9700 and 8700 laser printers, and Kodak's microfilm processor, the Komstar. The price is $6,000, somewhat less than what he's getting for 1403 controllers and interfaces, but that's because customers will have to own a controller dedicated to these printers.

Spur's first target machine will be the upper end of the DEC VAX line, and will be made available in July. In addition to paying $6,000 for the Spur USA, when adding a 3211 printer a customer will have to have the $53,400 model 3211 printer and a $23,580 controller, the model 3811. Spur later will target other machines.

But Lorenz won't abandon the 1403. He's now thinking of building a controller into the 1403s that his firm refurbishes, using a microprocessor and replacing hydraulic units with servo controllers. This would push the performance up to 1,300 lpm from 1,000 lpm and lower the price to around $15,000 from $24,000. *

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For most people, computers have become a way of life. Unfortunately, if the computer is poorly designed, it can mean a life of bleary eyes, stiff backs, and headaches.

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We've even gone so far as to make an adjustment for something as small (but annoying) as a key click.

Of course, this sort of attention to detail is exactly why Burroughs continues to remain a leader in the computer industry.

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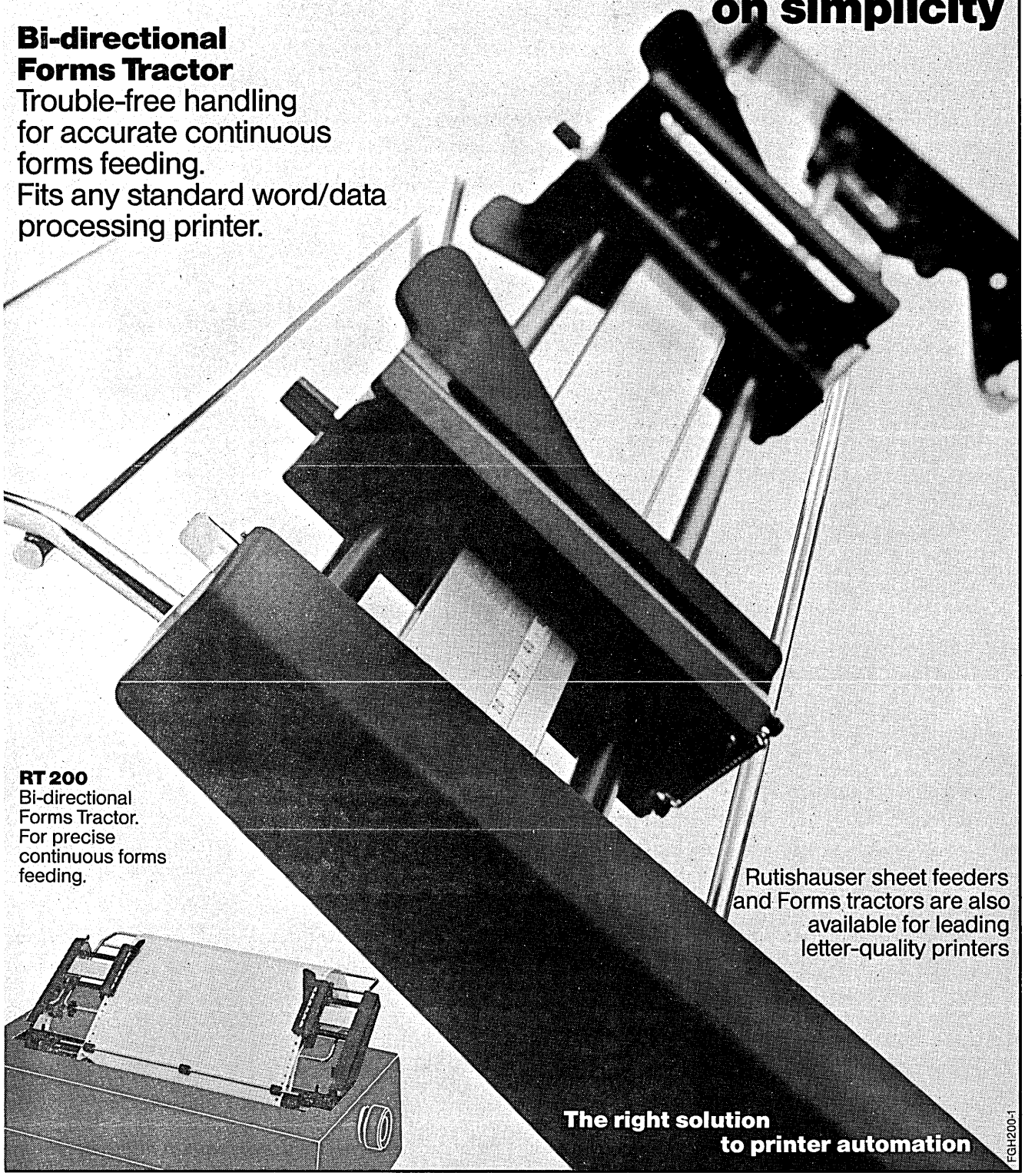
Fits any standard word/data processing printer.



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CIRCLE 33 ON READER CARD

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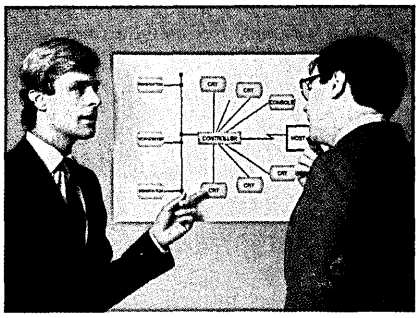
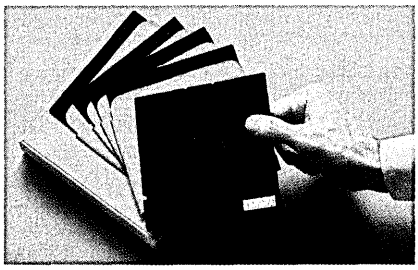
Office communications systems with support you need today and capabilities you'll need tomorrow.

Introducing the answer to your complex business communications needs. The new RCA Workstations.



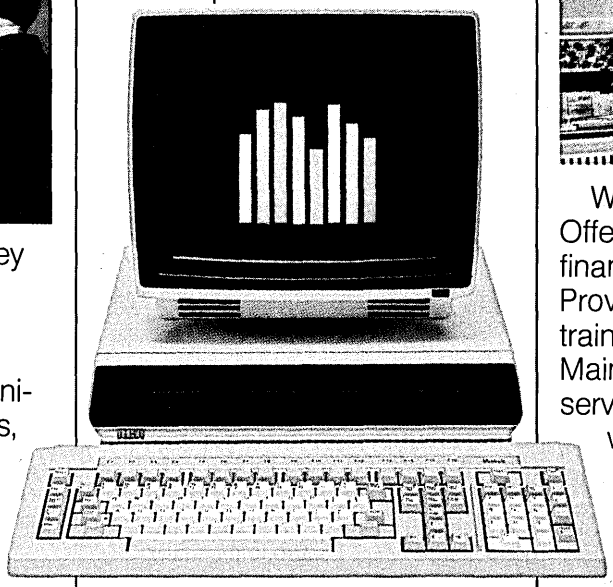
Put them to work and they become the ultimate communication tools. Designed and built for multipoint networks, they let you communicate with other workstations, terminals, mainframes and peripherals using Bell private-line, IBM 3270 or other protocols.



They're also built for the future. With modular hardware and a comprehensive software library you can migrate to a true multiuser, multitasking environment.

CIRCLE 49 ON READER CARD

Expand from communications to word processing and spreadsheet analysis, then move into accounting, financial planning and graphic design. Its powerful 16-bit microprocessor lets you adapt your system to perform just about any office task you can dream up.



In fact, there's only one thing more remarkable than the capabilities we've built into our Workstations. What we've built around them — the most extensive customer support package in the business.

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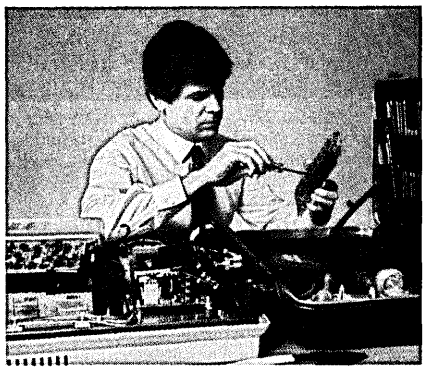

We'll install the systems. Offer the most complete financing plan in the business. Provide employee education, training and technical support. Maintain your systems. And service your entire network with our own nationwide data communications system specialists.

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NEWS IN PERSPECTIVE

BENCHMARKS

NEW NAME: HP IUG, the Hewlett-Packard International Users Group, was 10 years old last month and suffering growing pains. At its international conference in Anaheim, Calif., the group attracted some 2,000 members, most of whom had been with the group only a year. So, a new name, Interex. The renaming follows a merger of the HP 3000 International Users Group and the HP 1000 International Users Group and the subsequent inclusion of the HP Series 100 International Users Group.

AI CHALLENGE: The Fredkin Foundation of Louisville, Ky., has put up $100,000 as a prize for a computer program that makes a major mathematical discovery on its own. The prize is to be awarded "for a mathematical work of distinction in which some of the pivotal ideas have been found automatically by a computer program in which they were not initially implicit," according to Raj Reddy, director of Carnegie-Mellon University's Robotics Institute, which will oversee the prize and its award. Dr. Woody Bledsoe at the University of Texas in Austin, who is president-elect of the American Association for Artificial Intelligence, will head a committee of computer scientists and mathematicians who will evaluate potential winners.

UPS INTEREST: Fujitsu Ltd. of Japan is boosting its stake in Amdahl Corp., the Sunnyvale, Calif.–based maker of IBM-compatible cpus, to 49.5%. The Japanese had held a controlling 30% stake in Amdahl since 1972. The two firms collaborated closely in developing the semiconductor technology required to make the Amdahl machines air-cooled and thus cheaper to operate than IBM's water-cooled cpus. Fujitsu is also thought to have stopped several potential mergers of Amdahl with other companies, including Memorex and Storage Technology. The 19.5% share of Amdahl stock was sold for $189 million to Fujitsu by Heizer Corp., one of the biggest backers of Amdahl Corp. since the latter's founding in 1971. Heizer is expected to liquidate its full $270 million in Amdahl stock over time. Reportedly, an agreement between Fujitsu and Amdahl Corp. calls for the Japanese firm to limit its stock ownership at its current 49.5% level. Amdahl executives said no major changes would be made in Amdahl's management, and they noted that Fujitsu already has three seats on the Amdahl board.

GRAY CLOUD: IBM was very much on the minds of California high-technology executives during a one-day seminar last month sponsored by SoCalTen (Southern California Technology Executives Network). Concern was focused on IBM's possible reactions to threats on its horizon. "If you have one elephant in the forest," said Richard Corese, president and ceo of Alpha Microsystems, Irvine, Calif., "you can always get out of its way, but if there are two. . ." He was referring, of course, to AT&T. His expressed hope was that it will take AT&T "umpty-ump years to figure out how to work in a competitive environment." Grant S. Bushee of Infocorp, a Los Angeles market research firm, took solace in the fact that "AT&T doesn't have the access to the data processing market. Its access is to communications, and is the communications manager going to supplant the MIS manager? I don't think so." Richard P. Rumelt of the UCLA Graduate School of Management worried about the phone company upsetting IBM's umbrella, but E. Floyd Kvamme, executive vice president of sales and marketing at Apple Computer at the time, noted, "if you have an umbrella, that implies there's going to be a storm. IBM's great and that's our problem."

OFFSHORE: Tandon Corp., Chatsworth, Calif.–based disk drive manufacturer, last month laid off 1,000 production workers in California, moving the jobs to Bombay and Singapore where labor can be had for 5 cents per hour. The move followed a layoff and a similar offshore work move of 400 jobs last February. Tandon had earnings of $9.31 million in the quarter ending last Dec. 31, up 63% from the $5.73 million earned in the previous year's same quarter. Sales went to $93 million from $52.5 million.

Its move to offshore production is seen as a continuing effort to be the low-cost disk drive producer. There is speculation that the company will get a $170 million, two-year contract to provide Winchester drives to IBM at a very competitive price.

LONGER ODDS: Dr. Gene Amdahl's credibility is apparently on the line as his company, Trilogy Ltd., delayed the first customer shipment of its large-scale mainframe for the second time in as many months. The firm has also been forced to redesign the machine, making it a dyadic instead of uniprocessor. The new shipment date is mid-1986, by which time IBM is expected to make the first shipment of its upcoming Sierra/Trout series of mainframes. Trilogy had originally hoped to ship in mid-1985 a 32 million instruction per second uniprocessor based on a proprietary wafer-scale chip technology. Now, however, it plans a dual-processor machine with an expected performance of about 43 MIPS. Industry observers generally agreed that Trilogy's delay tends to make its product less competitive with IBM, but suggested that Trilogy's oem customers, Sperry, DEC, and the French Compagnie Bull, will still be able to make good use of the Trilogy technology in their own products. According to Trilogy, which had delayed the machine's shipments by a quarter last January, changes in the wafer fabrication process forced a choice between chip yield and speed. Trilogy now must raise an additional $100 million or so–primarily from current investors–to continue development of its machine.

SHORTAGES: Demand for certain microprocessor chips has outstripped supply, leading personal computer makers to change product designs and even seek licenses to build their own chips. The most severe shortages have occured at Intel, whose 8088 device forms the heart of IBM's popular PC and a host of imitators. IBM, which recently upped its interest in Intel to 18.8%, also began talks to get a license to build the key part itself. It was generally thought that IBM would like to assure itself of adequate supplies of the 16-bit microprocessor, which is used in the firm's standard PC, the PC XT, and other variations. Meanwhile, Commodore, the leading home computer maker, obtained a license from Intel for the 8088 chip and, almost simultaneously, disclosed it has obtained a manufacturing license to Canadian vendor Bytec's Hyperion IBM PC-look-alike machine. The move was perceived by analysts as signaling Commodore's imminent entry into the business pc marketplace, an arena it has assiduously avoided while winning hands down in the home market. Finally, Convergent Technologies disclosed that shortages of Intel's 80186 microprocessor had helped force it to delay its N-Gen workstation product. That product was to be supplied to Burroughs Corp., among other large Convergent oem customers, which had planned to introduce the machine as its B25 computer. Reportedly, Convergent may have to delay further orders for the N-Gen until year-end.

NEW GROUP: Having finally made a deal to buy Tymshare Inc., Cupertino, Calif., for $307.5 million, McDonnell Douglas Corp., St. Louis, said it is forming an information systems group. It will include McDonnell Douglas Automation Co. (McAuto); Microdata Corp., Irvine, Calif.; Vitek Systems; and Tymshare. The information systems group is expected to show revenues of about $1 billion this year, according to a company spokesman, who compared that to the corporation's overall revenues of $8.11 billion in 1983. The aerospace company said it would organize the group into single-industry businesses, the first of which would be McDonnell Douglas Health Systems Inc. Exploiting McAuto's strength in health care systems, the new company would include McAuto's health services division and Vitek, a maker of automated lab testing equipment. ❋

To: Ted
From: Bill
Subject: IBM Technology

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

Vacuum tube digital multiplier
IBM 603/604 calculators
Selective Sequence Electronic Calculator (SSEC)
Tape drive vacuum column
Naval Ordnance Research Calculator (NORC)
Input/output channel
IBM 608 transistor calculator
FORTRAN
RAMAC and disks
First automated transistor production
Chain and train printers
Input/Output Control System (IOCS)
STRETCH computer
"Selectric" typewriter
SABRE airline reservation system
Removable disk pack
Virtual machine concept
Hypertape

System/360 compatible family
Operating System/360
Solid Logic Technology
System/360 Model 67/Time-Sharing System
One-transistor memory cell
Cache memory
Relational data base
First all-monolithic main memory
Thin-film recording head
Floppy disk
Tape group code recording
Systems Network Architecture
Federal cryptographic standard
Laser/electrophotographic printer
First 64K-bit chip mass production
First E-beam direct-write chip production
Thermal Conduction Module
288K-bit memory chip
Robotic control language

Bill—
We have a great story to tell about our manufacturing innovations. The mass production of our large-screen plasma display is an excellent example.
Ted

AC Plas
Display
Manufactu

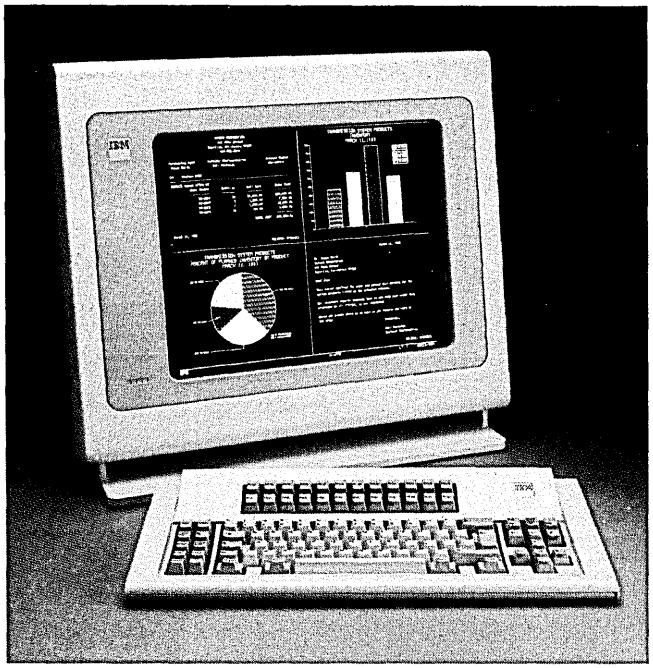


Figure 1. *The IBM 3290 Information Panel uses alternating current (AC) plasma technology, making possible high information content and distortion-free images. The screen, which is 10.7 inches by 13.4 inches, can display up to 10,000 characters and can simultaneously display four applications from one or more computers. Its great versatility allows it to mix graphics, images, and text.*

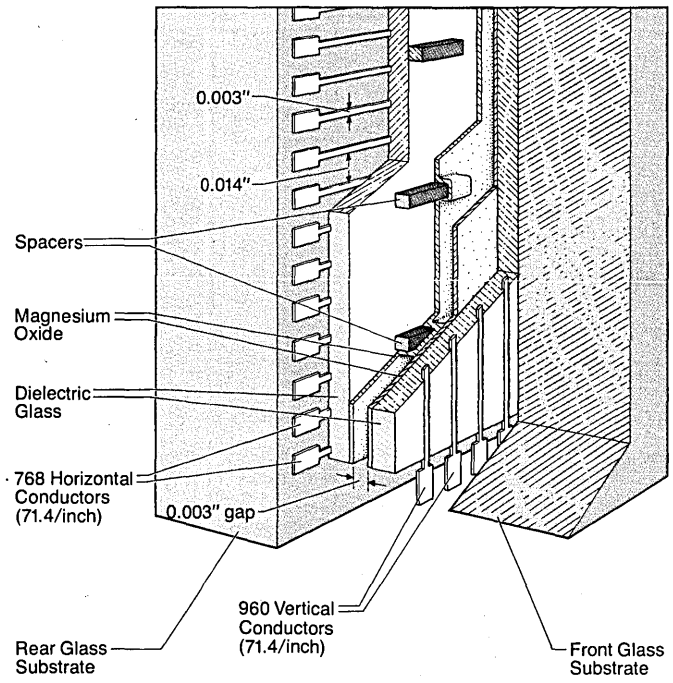


Figure 2. *This cross section of the plasma panel shows the narrow conductor lines on opposing glass substrates. Unique points on the panel can be ionized by applying low voltages to the appropriate horizontal and vertical conductors.*

Visual display terminals have had a profound impact on data processing. The IBM 3270 family of cathode ray tube (CRT) termin has become widely accepted in the industry as a basic input/output device for mainframe computers.

To display more data and to provide more advanced function without increasing space requirements, IBM has developed a new terminal using alternating current (AC) plasm display technology, invented at the University o Illinois. As a result of IBM's many manufactur- ing innovations, the IBM 3290 Information Panel, introduced in March 1983, is the industry's first mass-produced, large-screen plasma display terminal for commercial use.

HOW IT WORKS

In the IBM 3290, the plasma panel is a sealed sandwich of two glass plates: the rear plate is embedded with 768 parallel horizontal conductors and the front plate with 960 vertica conductors, thus forming a large grid. The nar row space separating the two plates is filled wit inert neon-argon gas, which glows as electrical voltages are selectively applied to any of the ove 700,000 intersections on the grid. This locally ionized gas, called a plasma, produces tiny dot of orange light. When combined in matrix patterns, these precisely located dots form images Because this plasma technology operates

Figure 3. *The proximity printer shown here is one of many tools developed by IBM to mass-produce the AC plasma display panel. This machine automatically prints the hundreds of conductor lines on the glass plate by using highly collimated light to expose the conductor pattern through a mask. This projection printing system produces an excellent image and lowers the number of defects.*

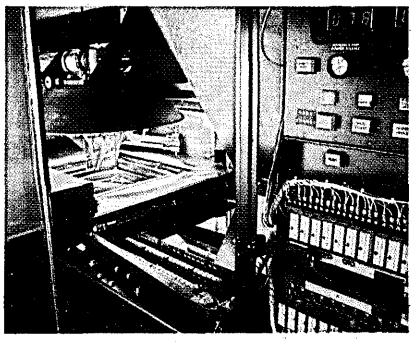
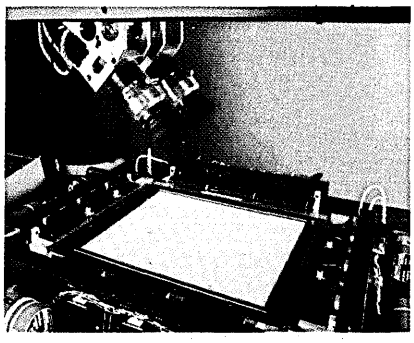


Figure 4. *To assure consistently high quality in mass production, each AC plasma display panel is completely evaluated by this automatic tester developed by IBM. The tester has a camera system that scans and tests the patterns on each panel.*



in memory mode, the images do not have to be refreshed, eliminating any susceptibility to flicker.

MANUFACTURING INNOVATIONS

IBM manufacturing engineers had to find many answers to the challenges of mass-producing large-screen AC plasma panels. For example, special techniques were required to place 2,400 feet of very narrow conductors on each panel. To ensure high yields, engineers improved the method of photoprinting the conductor pattern and devised a way to repair open and shorted lines.

The large area of the new plasma display placed more stringent requirements on both the materials and processes used to fabricate the device. The panel—a composite of glass, metal, and thin-film oxide layers—is made by sequential thermal process steps, with each step conducted at a temperature suitably lower than the prior process step. To reduce material interactions, IBM developed lower-temperature dielectric glass and seal material.

To maintain a uniform chamber gap between the sandwiched glass plates, engineers also developed a new metallic spacer technology. The spacers—about the thickness of a human hair and a quarter inch long—are automatically bonded by a tool that uses a laser to keep placement tolerances within several ten-thousandths of an inch. The metallic spacers are nearly invisible in an operating display and do not interfere with the ionization process.

Many engineers at IBM contributed to the innovations that enabled the mass production of the plasma panels used in the IBM 3290 Information Panel. Their contributions are only part of IBM's continuing commitment to research, development, and manufacturing.

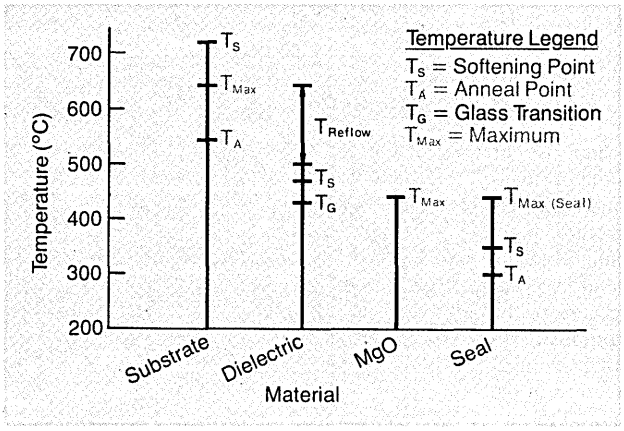


Figure 5. *To manufacture the AC plasma panel, IBM developed a lower-temperature dielectric glass and seal material to fit the thermal hierarchy requirements shown here.*

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For free additional information on AC plasma display technology, please write: IBM Corporation, Dept. 31H/978G Neighborhood Road, Kingston, NY 12401

CIRCLE 50 ON READER CARD

The ripple effects of personal computer spending are spreading throughout the shop.

THE DP BUDGET SURVEY: PCS MAKE WAVES

by Larry Marion

Several hundred lending officers, corporate finance experts, and other banking professionals are learning how to use personal computers at Continental Illinois National Bank, Chicago, this spring, not because of a virulent case of micro fever but at the behest of the data processing department. "We are unleashing 200 personal computers in the bank to cut the applications backlog," vice president for systems Edward M. Boss says with no small amount of trepidation. "We are anticipating, hoping, praying that the number of requests for mainframe data massaging will go down and we will then be able to reallocate our dp resources."

As the new move by the nation's seventh largest bank suggests, data processing managers are entering the third phase of the sometimes stormy relationship with personal computers. The first phase can be described as indifference bordering on contempt, as micros were purchased by end users without the permission or knowledge of the dp department. Phase two began when the micro users went, floppies in hand, to the dp department asking for help—access to mainframe databases, communications with other pcs, etc.—or seeking answers to questions like, "How do I copy a disk file?" Phase three, now under way at Continental and hundreds of other companies, is the active purchase of micros by the dp department to cut dp costs, increase productivity, and, in general, strengthen the corporation. The pesky microcomputer mosquito has metamorphosed into a butterfly.

Evidence that corporations are moving into phase three by the hundreds comes from a new DATAMATION survey of data processing departments. Late last year 1,083 dp managers from across the country filled out a questionnaire outlining their current budget and estimated 1984 spending. The mean dp budget increase will be 7.2% in 1984, with a range of minus 4% to 21% depending on industry. The really startling numbers, though, are those which indicate the extent of microcomputer spending by the dp department: for every dollar that a dp manager will spend this year on mainframes, another 50 cents will be spent on personal computers. In other words, mean spending for mainframes was 10.1% of the total budget, compared with 4.9% for personal computers.

RIPPLE EFFECT IN BUDGET

Furthermore, the rise of the micro on the dp manager's shopping list has ripple effects throughout the budget. Spending for personnel, outside services, and other hardware categories is under pressure, at least in part because of the influx of personal computers from IBM, Apple Computer, and dozens of other companies. "Personnel used to be one third of the Continental's dp budget, which is $115 million this year," explains Boss, "but it is now about 45%. We hope it will plateau at that level, and then decline if the pc phenomenon really takes off."

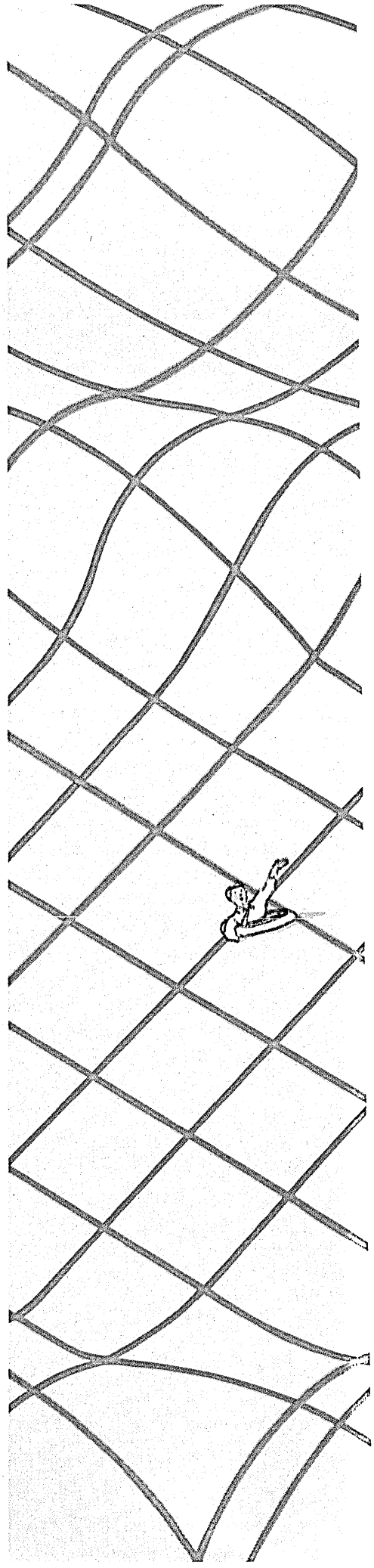


ILLUSTRATION BY ANDREA BARUFFI

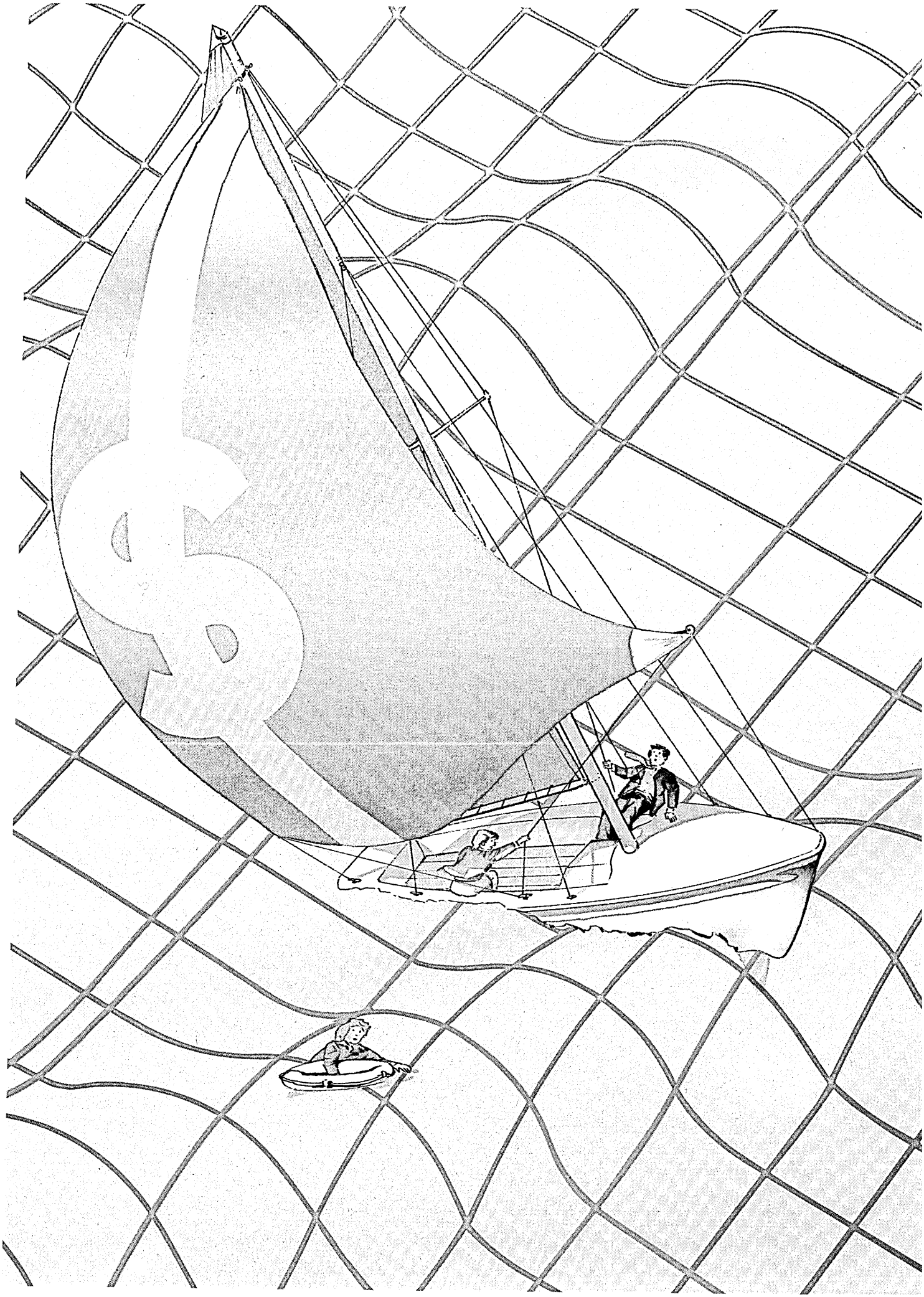
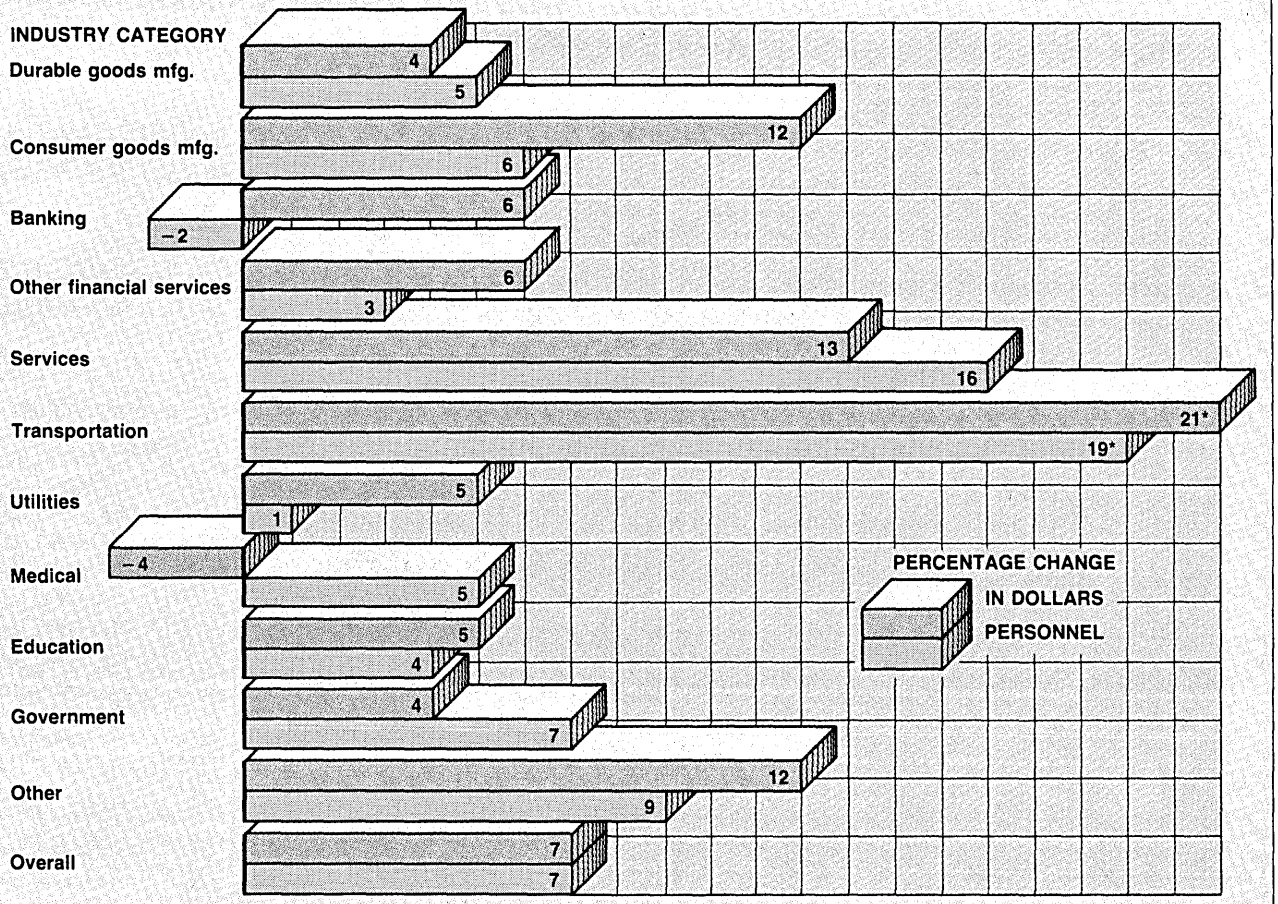


FIG. 1

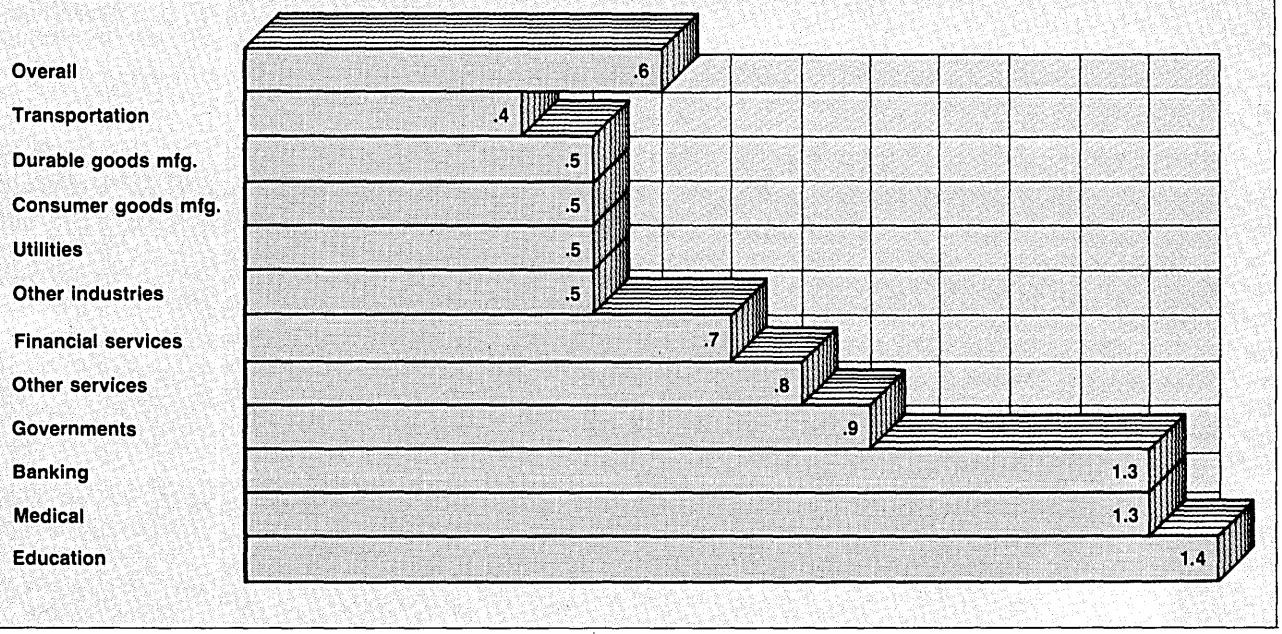
1983 VS. 1984 DP DOLLARS AND PERSONNEL BUDGET CHANGES



*Only 19 companies report

FIG. 2

DP BUDGETS AS PERCENTAGE OF REVENUES, BY INDUSTRY



THE BIG PICTURE

Determining data processing budget priorities must make MIS managers feel a little like President Reagan confronting the federal budget—there are few real choices when it comes to priorities. In Washington these days the Social Security Department budget is sacrosanct, and dp managers know that cutting the personnel ranks is impossible. Each line item in the federal or dp budget has its special interest groups fighting to increase its funding and prevent cuts. "MIS managers have had to make some hard choices," notes David Dell, director of research services for dp consultants at The Diebold Group, New York City.

Coming out of the 1981–82 recession, dp managers were able to achieve modest gains in the budget. All but one industry category show increases for dp spending (see Fig. 1). The 7.2% average masks the wide differences in the average rate of increase, from minus 4% for medical centers to 21% for transportation firms. The variation reflects the differing rates of recovery in sectors of the economy.

The 12% increase in dp spending by consumer goods manufacturers reflects sharply increasing revenues from sales of automobiles, appliances, clothing, and other personal items. As employment increases and unemployment declines, consumer spending soars. The companies that make the machinery used by consumer goods manufacturers won't see a surge of orders until the car and appliance factories are capacity constrained. The 3.8% increase in dp spending in 1984 by the durable goods companies will pale beside the increases expected in 1985.

The anomaly in the survey was the medical sector. The estimated 4% decline in data processing budgets may not reflect what those dp managers think will happen this year, but what they told their bosses. "Due to new government policies on cost controls, many hospital administrators made blanket statements to cut costs by a certain percentage across the board," explains Sheldon I. Dorenfest, a medical technology consultant in Highland Park, Ill. "We don't believe that they will be able to reduce their costs. For the hospitals that do their own systems development, their budgets will definitely increase, but at a slower rate than in the past. They may be answering the questions with their wishes and hopes, but the results will be different."

At the same time that dp managers are juggling the cost cutting directives, the computer center is being viewed as an increasingly important part of the organization's strategic planning. Information processing is a new mandate that forces the dp manager to shoulder a whole new set of responsibilities, and sometimes a small increment in funding.

The traditional measure of dp's importance to the overall organization is dp spending as a percentage of total revenues. The 1% of total revenues guideline reflected industrial organizations, with financial institutions at a higher level and low-tech fields like food wholesalers at the lower end of the spectrum, say .3%. Because of the statistical bias of the DATAMATION survey sample—50% of the dp shops were small, with an annual budget of $500,000 or less—the dp spending percentages in the table underestimate spending at large organizations. Adding three or four tenths of a percentage point to the figures in the chart will indicate the kind of dp spending that goes on in large companies with large dp centers.

Indications that the 1% tradition is now on the low end come everywhere. "The average large brokerage firm spends 2% of its revenues on dp in a typical year, but 1983 wasn't typical," explains a highly regarded dp consultant to Wall Street. "The boom in sales in much of '83 was not matched by huge spending increases becaues it takes a while for equipment to be delivered and installed. That's part of the reason why the industry made sinful profits in 1983—some of the dp costs didn't show up until this year." Securities firms such as Merrill Lynch and Shearson are spending hundreds of millions of dollars on new computer centers to handle the growing load of transaction processing requests, resulting in part from the increased stock market trading. Only a few years ago the industry thought that its dp capabilities were more than adequate, with on-line systems capable of processing the trading of 150 million shares a day on the New York Stock Exchange. Within six months of the bull market last year, plans were under way to increase capacity by 67%, to 250 million shares over the next few years.

In the past, Wall Street added clerks to handle the paperwork blizzard, but employment ranks are not growing as fast as in earlier boom times. Dp spending has increased at a 20% annual clip for the past four years, though. "Nowadays more and more of the costs of running the house are embedded," notes the MIS vice president of a major New York brokerage firm. "You can't lay off computers, like you could lay off clerks in the old days."

The rising importance of MIS is seen even in areas once considered to be dp backwaters. Stephen Adams of Jewel Cos. in Chicago says that dp spending, currently more than $20 million, is rising at a faster rate than revenues because "there is an acknowledgment that there is leverage to be gained with information." Using the product sales information stored in the checkout counter scanners is a tempting target of the new information revolution at the supermarket, he suggests. "We are trying to find ways of using the information."

—L.M.

Investment in personal computers now ranks as the fifth largest spending item, after personnel, mainframes, minicomputers, and supplies. It may seem hard to believe, but in general, the mean budget allocation for personal computers now exceeds that of terminals, desktop systems, or mass storage devices and is triple the level of 1981.

The absolute numbers are not as absolute as they look. Several reasons account for this. Some dp departments do not have a pc budget category, as the expenditures are funded out of end-user budgets. The numbers do give a strong indication, though, of a trend toward consolidation of micro hardware already in the company: the 4.9% overall mean for pc spending in 1984 is the same level as in 1983. "1984 will be a year of digestion," claims David Dell, director of research at The Diebold Group, New York. "Dp managers are trying to figure out what they want to do and present a long-term plan because the numbers are getting so large. It is harder to justify the ad hoc spending of the past."

Spending for pcs and the degree to which they are acknowledged as friends, not foes, of the dp department, varies from industry to industry, but evidence of the new pc-dp relationship permeates the corporate landscape. "Between now and 1990," forecasts Dell, "corporations will spend between $12 billion and $20 billion on personal computers." A few examples:

- An estimated 25% of all potential users in the securities brokerage business are already sitting behind a PC, Apple, or Clone keyboard, according to industry observers, and corporate purchases are starting to supplant out-of-pocket spending by brokers, investment bankers, and other financial industry professionals. "There is this incredible infection of micros in our industry," gushes Pim Goodbody, Jr., vice president of the Securities Industry Association (SIA), New York City. "It is going like gangbusters." At a recent SIA conference on micros, rumors swirled around the exhibit hall that industry giant Merrill Lynch & Co. would buy an IBM PC for each of its 10,000 brokers not already equipped, beginning in 1985.
- "Hospitals had been slow to pick up on the use of personal computers, but that is rapidly changing," contends Sheldon I. Dorenfest, founder of dp facilities manager Compucare and now head of a medical technology consulting firm in Highland Park, Ill. "Personal computers are having a tremendous impact in hospitals. There is a recognition by dp managers that they are an inexpensive solution to intradepartmental needs and enable hospitals to defer big cpu purchases."
- Areas once considered dp backwaters, such as wholesalers and retailers, are rapidly gearing up. "We are spending a sig-

Merrill Lynch may buy a PC for each of its 10,000 brokers not already equipped.

nificant amount of money towards understanding how pcs can be used in stores," says Stephen Adams, corporate vice presdent for information systems at supermarket and drug store chain Jewel Cos. Inc., Chicago.

MICROS SWEEP DP DIVISIONS

It becomes apparent then that microcomputer investments by the dp department are more than just a narrow-minded pursuit of lower labor and equipment costs. An all-encompassing productivity enhancement mission by the entire corporation is being implemented with micros. The impact of pcs on white collar productivity has now swept up the dp department. "Our rule of thumb three years ago was that a simple machine with VisiCalc would pay for itself in six weeks to three months," recalls John Gosden, vice president and technology officer for the Equitable Life Assurance Society of the United States, New York City. Last year Equitable bought 200 IBM PCs for its agents and middle managers, and another 200 are on order for 1984. A typical productivity and efficiency benefit: the end of the year closeout of the books was a nightmare of late night sessions with a pencil and a spreadsheet, but no more. With Lotus Development Corp.'s 1-2-3 integrated spreadsheet package and the PCs, the numbers from the various offices are consolidated without the aggravation of the past.

Increased productivity also comes from the pc effect on the invisible backlog—the data processing jobs users never bothered requesting because the computer center was always two years behind schedule. "Projects done with pcs were never done on the mainframe because users couldn't get the dp shop to produce," concedes Robert E. Kistner, vice president of information systems and services at Combustion Engineering, Stamford, Conn. "So 1-2-3 has done a lot of things to improve the productivity of people" (see "The Micros vs. the Applications Logjam," January, p. 96).

Dp managers who previously fought against the arrival of an IBM or Apple now concede that, for the good of the corporation, end users should be given the opportunity to muddle through poor documentation, to troubleshoot bugs, and to endure the tedium of source data entry. Says the MIS vice president of a major New York City financial services company, "We are discouraging the sales force from buying personal computers because we can give them personal *computing* without the hassles of a pc, but we would rather have them buy a pc than use pencils."

Of the industry segments where pc spending continues unabated, nowhere is the frantic rush toward the "one person, one box" goal more pronounced than in financial services. The 7.4% of their budgets set aside for pc spending puts the little number crunchers at the same priority level as minicomputers and just a shade under the position of mainframes. Productivity and cost control are only part of the explanation for Wall Street's pc bullishness.

FIG. 3

THE TYPICAL DP BUDGET

BUDGET ITEM	PERCENTAGE 1983	1984
Mainframe cpus	11.1	10.1
Minicomputers	9.4	8.4
Mass Storage	3.0	2.9
Terminals	4.7	4.5
DeskTop Systems	2.0	1.7
Personal Computers	4.9	4.9
Consultants	1.8	1.6
Outside Services	4.3	3.3
Data Communications	2.7	2.9
Applications Software	4.3	4.6
Systems Software	2.6	2.8
Supplies	6.2	6.1
Personnel	29.4	28.4

Note: Percentages do not add up to 100 because of "other" components of dp budgets not specified, such as cost of energy and office space.

In the past year or so, brokerage firm managers realized that they were in a pc race in the intense competition for the best securities salesmen. Offering to buy a computer for a salesman is now an important inducement. "The firms must work to get salesmen and keep them, and part of the job requirement is for technology." notes Goodbody of the SIA. "Firms are trying to do a lot of things to keep people, and having to keep up with the technology to keep people is sending shivers through the executive ranks." They keep writing the checks, though.

The impact of personal computers on the rest of the dp budget menu is graphically illustrated by the sharp drop in the portion of spending for minicomputers. In the financial services sector, the minicomputer line lost four percentage points, to 7.4% of the total budget. This was the largest single change in the dp budget universe. Part of the change can be attributed to shifting technology—while a Tandem fault-tolerant processor may appear to be a minicomputer in a dedicated transaction processing application, a string of 16 Tandem processors cannot easily be called a minicomputer. "At that point, it's a hell of a machine," says a Wall Street MIS executive. "Meanwhile, traditional minicomputer applications can be embodied in high-end micros like the Motorola 68000, while a VAX 11/782 solves mainframe problems."

At Coulter Electronics, Hialeah, Fla., MIS director Michael DiBeneditto reports that several minicomputer-based applications are being transferred to either micros or mainframes. Records of a leasing subsidiary are moving to a micro, while general data processing chores are being restored to a mainframe after several years on a distributed dp network. "We save money with centralized applications," he explains, "even though it makes for a higher terminal budget."

Technological evolution is also behind the decline of the minicomputer. Ddp, timesharing, and other network approaches to computing power are an anachronism, notes the New York MIS executive. "They were created when cpu power was expensive and communications cheap, but now the scarce resource, MIPS, is common and the other is dear." And while many large corporations equipped their information centers with minicomputers to handle the load of end-user applications requests, a shift to higher capacity mainframes is under way to accommodate all the computer curious popping out of the woodwork. "The minis that ran our info centers are inadequate for the role, and are being replaced with mainframes," notes Gosden of Equitable Life.

The technology evolution of lower-priced cpus also continues to eat away at the service bureaus, despite their efforts to join the microcomputer bandwagon ("Bureaus Sell Micros," April 1983, p. 134). "We've pretty much stopped using remote computing services," remarks Kistner of Combustion Engineering. "Most of our work is now done in-house, and pcs will help stem the tide still further." Adds Gosden of Equitable Life, "Pcs may have eaten severely at our timesharing budget." Apparently Equitable is profiting from pcs in two ways–its employees are working at home on their "off hours" and using relatively cheap pc power instead of expensive computer time. "Once people are on pcs, they do not want to deal with outside vendors," explains Nick Martino, manager of systems planning at Raymark Corp., Trumbull, Conn. "They just want to tinker with the numbers on their own."

HOSPITALS INVEST IN SYSTEMS

Overall, service bureaus enjoyed a 4.3% chunk of the mean dp budget in 1983, but that segment shrinks to 3.3% this year. Personal computers are only part of the story. The most dramatic decline in outside bureau spending—more than two percentage points—occurred in the medical sector, which nevertheless continues to be one of the biggest users of such services. "More hospitals are trying to

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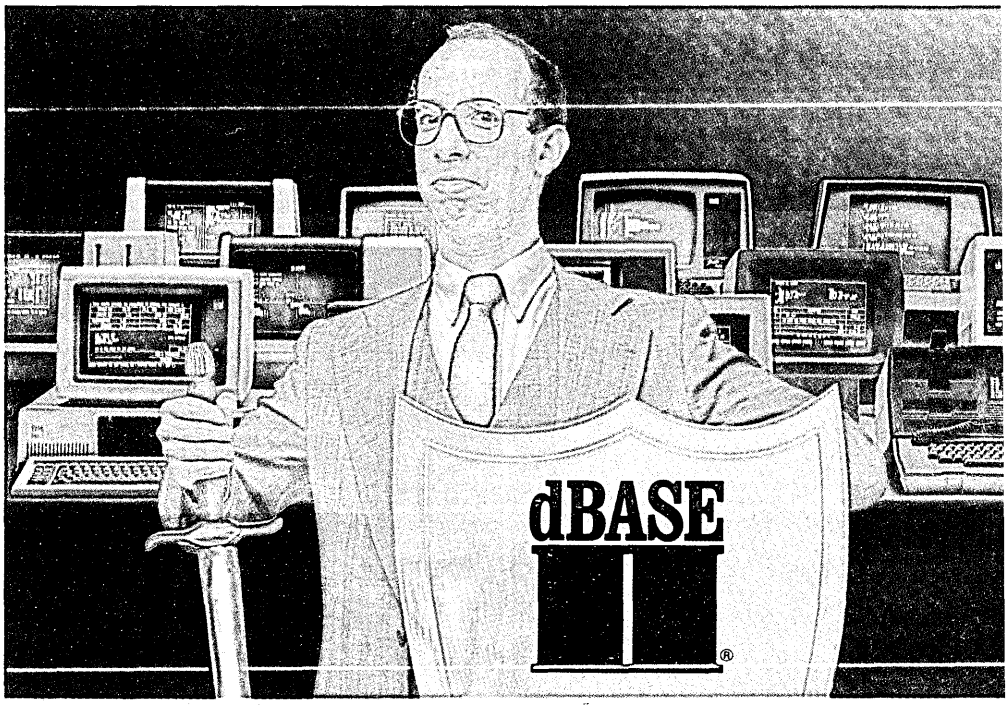

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"Fifteen years ago we had 80 people doing data entry. Now we have 20."

FIG. 4

PERCENT CHANGES IN DP BUDGET ALLOCATIONS, 1983 TO 1984, BY INDUSTRY*

BUDGET COMPONENT	OVERALL		DURABLES		CONSUMER		BANKS		FINANCIAL SERVICES	
	1983	1984	1983	1984	1983	1984	1983	1984	1983	1984
Mainframes	11.1	10.1	11.3	9.4	12.8	11.7	12.5	13.6	9.0	7.6
Minicomputers	9.4	8.4	9.6	8.4	7.9	7.2	4.1	4.4	11.5	7.4
Storage	3.0	2.9	3.5	3.9	2.5	2.5	3.7	3.9	2.8	2.8
Terminals	4.7	4.5	5.1	4.5	3.6	3.0	3.5	4.0	3.8	3.5
Desktop Systems	2.0	1.7	1.4	1.4	2.4	1.9	.1	.7	2.0	2.8
Personal Computers	4.9	4.9	3.2	3.4	2.4	2.7	1.0	1.4	6.7	7.4
Consultants	1.8	1.6	2.0	1.6	1.2	.8	3.7	3.8	1.4	1.3
Outside Services	4.3	3.3	2.9	2.3	3.3	2.0	2.6	2.6	6.2	5.1
Data Communications	2.7	2.9	3.1	2.9	3.4	3.0	4.8	5.4	3.5	3.8
Applications Software	4.3	4.6	4.8	5.0	4.9	4.2	3.4	4.8	2.9	4.2
Systems Software	2.6	2.8	2.9	3.1	2.2	2.1	1.9	2.0	2.9	2.8
Supplies	6.2	6.1	6.5	6.0	7.4	7.7	6.5	7.1	6.4	7.5
Personnel	29.4	28.4	29.0	28.0	32.1	31.4	27.8	29.0	23.5	25.1

*Budget percentages do not add up to 100 because of to deletion of miscellaneous categories like energy and office space costs.

FIG. 5

ESTIMATED DP SPENDING OUTSIDE OF DP BUDGET

	PERSONAL COMPUTERS	OTHER H'WARE	S'WARE	PRO-GRAMMERS	SERVICES	CONSULT-ANTS
Mean	$64,800	82,300	47,100	59,200	72,400	34,900
Median	$17,500*	25,000	7,000	25,000	24,000	17,500

*Approximate

bring things in-house," explains consultant Dorenfest, as new government regulations further tighten the purse strings of hospital administrators. Hospitals are big users of remote services because of their large system and complex software requirements. As cpu costs decline and the volume and quality of hospital management software increase, more hospitals are making the internal investments. Software spending by hospitals will increase to 7.1% of the 1984 budget from 6% last year (see Fig. 1). "Until recently, the movement toward in-house systems was slowed by the lack of good software, but that is changing," he says, and predicts an accelerating decline for outside services, based on a survey of 250 hospitals.

Changes to the portion of the dp budget devoted to personnel stem from a number of factors, and the microcomputer invasion cuts both ways. Managers and professionals analyzing data on terminals, desktop office automation systems, or pcs are rapidly depleting the data entry ranks. "Fifteen years ago we had 80 people doing data entry," relates W.F. Weprin, manager of information sytems for Peoples' Gas, Chicago. "Now we have 20 people and it's declining fast, as we make more and more use of source data entry." Adds Dell of The Diebold Group, "There are far more people doing data entry now than in the past, but they are not in the dp department."

And, as many dp managers feared, while phase two of the microcomputer influx progresses, demands for help from new end users leads to more, not less, personnel expenses in the short term. "It is taking me more time to service these people," cries Martino of Raymark. He rapidly ticks off the costs of new personnel: "I need a systems programmer to answer questions, an applications programmer for downloading data, and a trainer. And, to top it all off, I'm starting to see more end-user requests for highly specialized data crunching programs." As his pc users explore the powers of an electronic spreadsheet on a microprocesor, they approach the limits of capacity relatively quickly. Then they come to him. The New York City MIS vice president sums up the phenomenon by saying, "The dp center is losing a lot of the simple applications development requirements to end-user microcomputing, but gets stuck with all the big problems."

To avoid the expense of adding systems development programmers and analysts and inflating the personnel costs, many dp managers are flocking to canned software and applications development tools. The applications software budget component is rising to 4.6% of the 1984 total from last year's 4.3% because it is cheaper to buy a package than to built it from scratch, according to some.

"In three years nobody will be doing program development work," declares Kistner of Combustion Engineering. "Due to the modular nature of fourth generation packages, it is easy to modify them for customized services. I can't afford to create from scratch an MRP program or other general purpose applications software. The days of the $4 million to $5 million cost of homegrown software are over." While others disagree, saying that the cost of modification and customization necessary to match a product to a company offset the initial purchase price, Kistner is the first to admit that some of the productivity aids on the market are less than ideal. "The advent of VM/CMS to improve program testing hasn't had a hell of an impact on code costs," he says. "If you look at total system development costs, the savings haven't occurred."

General business conditions are leading to the soaring software budgets in certain industries facing new markets and competitors. Banks can now sell stocks, and stockbrokers have offered quasi-savings accounts for several years, so the software budgets and software development personnel rosters are

OTHER SERVICES		TRANSPORTATION		UTILITIES		MEDICAL		EDUCATIONAL		GOVERNMENTAL		OTHER	
1983	1984	1983	1984	1983	1984	1983	1984	1983	1984	1983	1984	1983	1984
5.9	6.2	11.1	9.9	18.2	15.2	13.1	12.1	11.8	10.8	15.1	13.5	9.9	9.3
9.4	7.2	10.7	7.6	4.5	4.2	9.8	8.2	11.9	11.0	7.0	7.9	10.3	9.9
2.4	2.5	3.3	3.0	2.1	3.1	4.7	4.0	3.0	2.0	3.2	2.9	2.8	2.6
5.6	4.7	6.6	5.6	6.0	7.7	4.0	3.8	3.9	4.3	6.6	5.9	3.9	4.0
2.3	2.4	.1	.1	.1	.2	.4	.4	1.7	1.6	1.5	1.6	3.5	2.3
9.9	9.1	.5	.5	.7	1.8	3.0	1.8	6.0	5.5	2.4	3.1	6.3	6.6
1.4	.9	1.8	1.6	1.1	.8	1.5	1.3	.7	1.0	1.0	.7	2.8	2.6
4.4	3.5	4.3	1.8	1.1	1.4	12.8	10.5	4.1	2.5	7.2	5.7	3.1	2.6
2.8	3.1	2.1	2.6	1.7	3.0	1.7	1.5	1.6	2.1	3.3	3.2	2.5	2.8
6.1	5.1	2.5	2.8	5.4	4.1	4.3	4.6	3.4	4.3	4.3	4.6	3.7	4.6
2.9	2.7	4.4	5.5	3.5	3.3	1.7	2.5	3.0	3.5	2.7	2.5	2.2	2.5
5.8	6.4	4.9	4.6	7.2	7.6	4.8	4.4	8.3	8.2	4.8	4.8	5.6	5.3
27.9	27.3	38.2	33.0	28.2	27.3	30.6	27.2	29.1	26.6	30.7	30.8	29.3	28.2

climbing faster than the federal deficit. "In banking, we have to stay competitive, so to be on the leading edge we have to develop software internally," explains Ed Boss of Continental Illinois. The mean applications software budget allocation for financial services companies responding to the survey was 4.2%, up about 50% from the 1983 level; for banks, the increase was almost as large. Similarly, personnel costs are also up a few percentage points.

REDUCING SUPPLY COSTS

Pressure to control costs during the recession and in the current drive for profits is focusing much attention on a more mundane topic than microcomputers or software productivity aids. Dp managers report a growing effort to control the cost of paper, ribbons, magnetic media, and other supplies. A slight decline in the portion of the total dp budget going to the vendors, reported by the survey respondents, is the result of a variety of housekeeping efforts.

Kistner of Combustion Engineering reports a 15% to 20% savings on corporate paper costs by arranging for volume purchases from a limited number of vendors. Weprin of Peoples' Gas says he cut the corporate computer paper budget by 50% by installing duplex printers. And anybody looking for a roll of 8½ by 11-inch printout at electrical equipment maker Square D of Palatine, Ill., will have a hard time finding one. Manager of MIS administration John Stenger cut back on the number of inventory items in his supply rooms last year, dropping the standard-size paper. Volume purchases of the longer 8½ by 14-inch forms saves the company money, though it must make the letter-size file cabinets a bit bulkier. His defense: "Supplies are a variable expense and we generate a copious amount of paper reports."

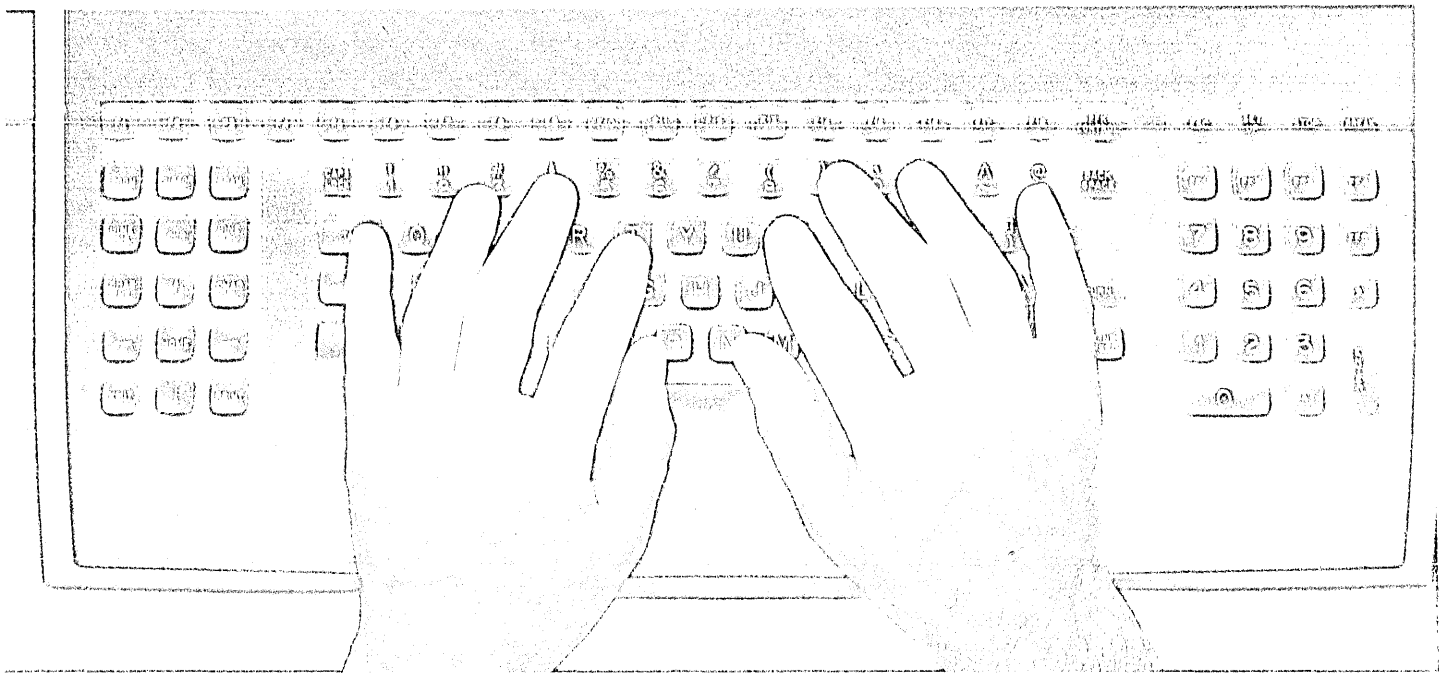
Mandates to cut costs, trim supply budgets, and substitute source data entry for a legion of clerks reflect another aspect of dp spending—the rising tide of off-budget payments. While a 20% rule of thumb was evident a few years ago, the average organization's outside spending is expected to reach about a third of the mean dp budget of almost $1 million this year.

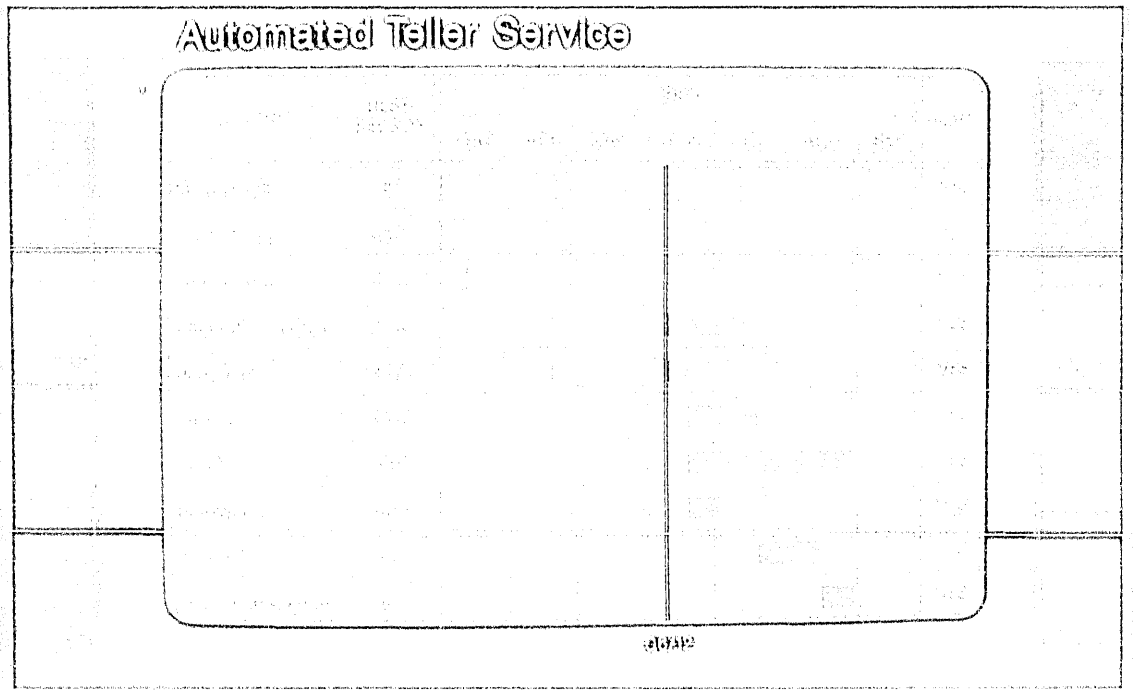
There is some good news for dp executives watching the flood of dollars outside of their realm: the outflow for pcs may be slowing down. Dell of Diebold estimates that the ratio of outside pc spending to the dp budgeted amount was about eight to one, but the DATAMATION survey indicates that the ratio is more like three to one this year. The discrepancy may, in part, result from the broader horizon of 1,083 users vs. the Fortune 500 focus of the Diebold studies. Indeed, the median spending level of pcs, outside of the dp budget, was about $17,500, or substantially less than the amount allocated in the mean dp budget. Subtract the personal computer from outside spending and the total falls back into the 20% level.

A smaller but significant reason for the sharp increase in off-budget spending comes from the cost of applications software. Many dp shops are not mandating which spreadsheet, word processor, or database management package must be used. "We may be spending more than we need for outside software, but the alternative, hiring a staff to evaluate packages, would result in diseconomies," notes the MIS vp of a major New York brokerage firm. The large majority of survey respondents guessed that outside applications software spending runs at least $7,000, while the mean figure of $47,100 reflects the huge costs of mainframe- and minicomputer-based packages for manufacturing, medical, and other specialized applications.

It would appear that with all the indirect costs of personal computers, peripherals, software, and supplies paid by end users, the average corporation, university, or other organization is collectively spending more on microcomputers than on mainframes this year. That's not happening, of course. IBM's 308X models are not taking a back seat to PCs. The mean numbers do not reflect the fact that there are hundreds of dp shops without a mainframe budget item, or, for that matter, a personal computer category. Among the shops with mainframes, the median budget segment is about 20%. But the trend is crystal clear—personal computers are making w in the dp budget pool. *

The 1984 DATAMATION budget survey is for sale in report form. It contains 78 pages of statistics and an executive summary prepared by the Market Research Department, covering 1,083 data processing center sites in 12 industry categories and including spending priorities for 13 different dp budget items. Single copies are $100. For more information, contact Laurie Schnepf, Research Director, Technical Publishing Co., 875 Third Ave., New York, NY 10022.

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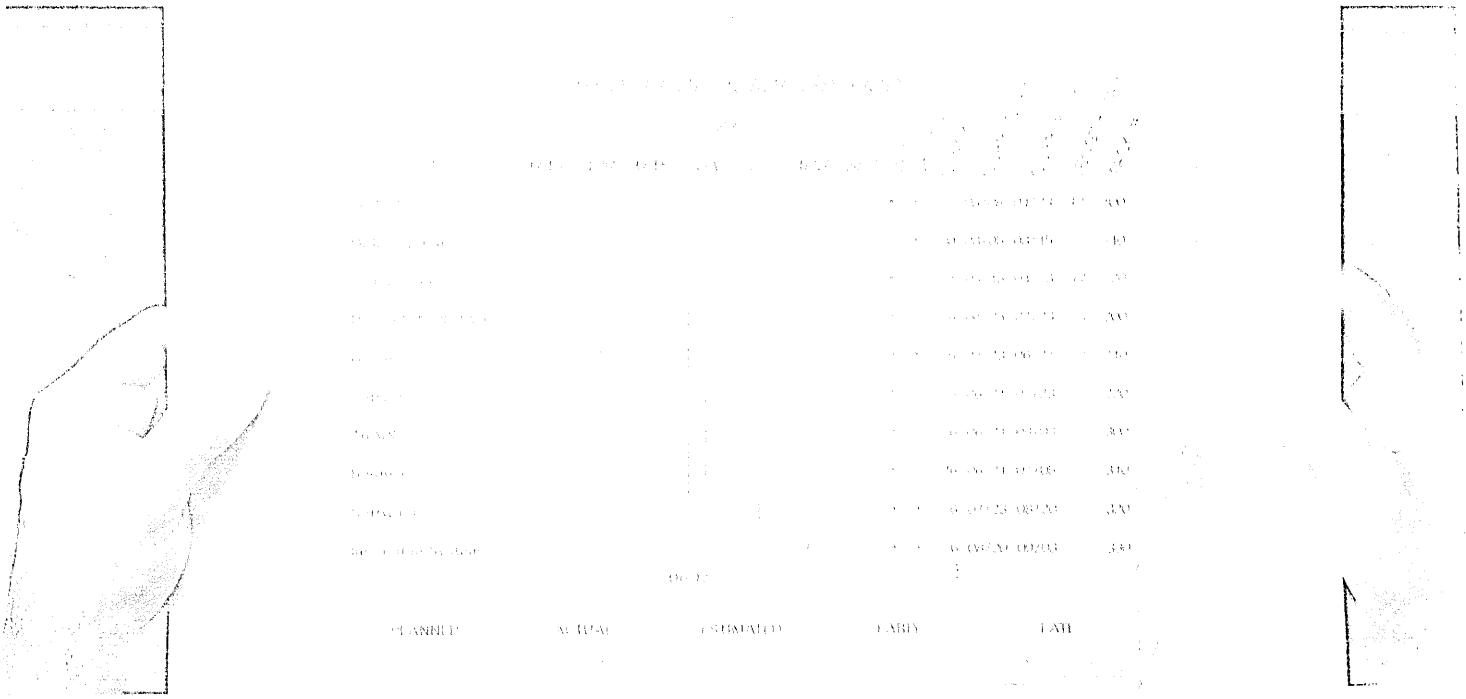

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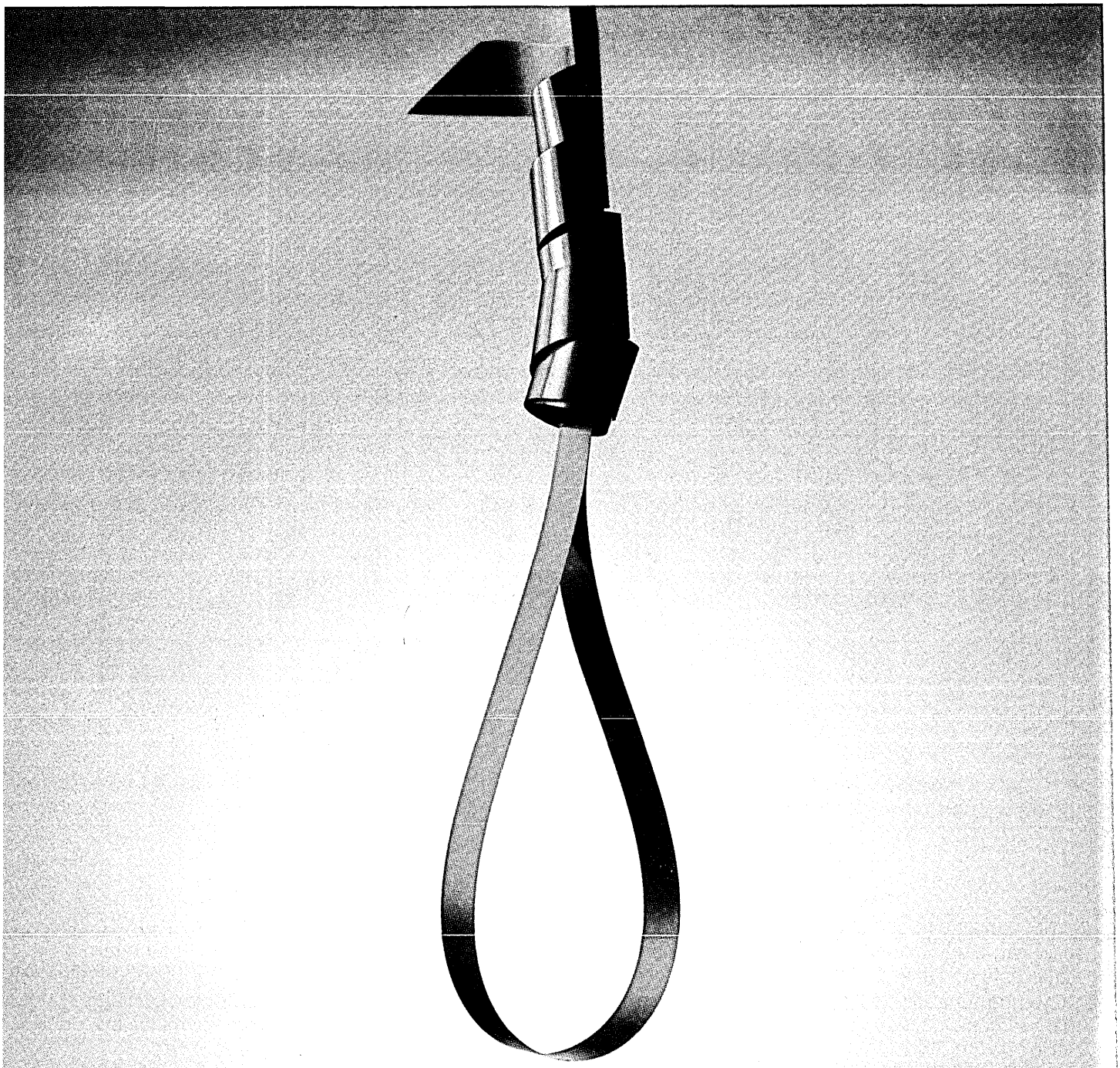

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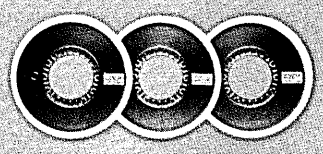

How one big company insures that office automation serves its business objectives.

AETNA PLANS FOR "NO-FAULT" OA

by Richard J. Telesca

In October 1980, Aetna Life & Casualty's senior management met to discuss the long-term impact of technology on Aetna's business. There was little disagreement that technology and office automation were playing an ever expanding role in business operations. But management also recognized that a critical factor in successfully applying such technology, then and in the future, would be the employees' ability and willingness to use it. If work was to be done in dramatically different ways, Aetna employees were going to be significantly affected. Senior management wanted to know what that impact would be and how they could make the introduction of technology a positive experience. They decided to create a unit that would assess the impact of technology on Aetna employees and develop programs and policies to address the issues found. The unit was called People/Technology Programs (P/TP).

Addressing the ergonomic and human factors issues that can arise when people must interact with machines is not an easy task anywhere. At Aetna, it is more complicated than at most companies because of the size of the organization.

Aetna Life & Casualty, based in Hartford, Conn., is the nation's largest investor-owned insurance and financial services institution, based on assets of $47 billion. The company's six divisions, including subsidiaries, employ 53,000 workers nationwide. Assisting these employees are 23 large-scale computer systems, processing approximately a half million transactions a day and supporting a network of about 12,000 visual display units (vdus). Combine those 12,000 vdus with about 2,000 word processing and personal computer workstations and Aetna has a terminal-to-worker ratio of approximately one to three. By 1990, Aetna anticipates it will have one terminal for every worker it employs. P/TP was mandated to handle issues pertaining to both the personnel and the data processing departments, yet it does not clearly fall under the purview of either department. But because most of the knowledge and experience with technological issues at Aetna reside in the data processing areas, the unit reports to the company's vice president of the Corporate Administration Division, the top information systems executive.

P/TP was established as a small but permanent unit rather than as a temporary task force. Assigning employees on a permanent basis allows them to concentrate full time on the human issues, and not treat the assignment as an ancillary task, subordinate to other responsibilities. P/TP's director, Emmett McTeague, felt that the task force approach to these issues in other companies had been unsuccessful.

P/TP's initial strategy was to focus on what we saw as four basic areas of concern: ease of use, health issues, the manager's role, and the data processor's role.

Ease of use—or the term we prefer, normal to use—pertains to the usability issues of both hardware and software. P/TP felt that while normal to use may be an unfamiliar term compared with easy to use or user friendly, it defines a system's character more accurately. A normal-to-use system incorporates the language and procedures that are familiar parts of given business functions; they make a system "normal" though not necessarily the "easiest" to use. The normal-to-use system also recognizes that some things are worth doing on a computer even if they are somewhat difficult (see box, p. 94). Health issues include the familiar radiation concerns, as well as musculoskeletal aches and pains that have been associated with vdu use. Other concerns include the role that lighting, ventilation, and furniture plays in the office environment. We also review research on the psychological aspects of stress, which some experts believe contributes to many physical ailments.

MANAGER IS KEY TO SUCCESS

The manager is the key to successfully handling the relationship between the worker and the work environment in the automated office. P/TP helps managers understand and manage the new workplace and the new problems and procedures that may accompany it. We encourage managers to become more involved with systems development than they traditionally have been, and more aware of the available technology. We are also concerned with the human issues involved in getting managers to use the new technology themselves.

Finally, we are trying to understand how the traditional data processor's role is changing. The proliferation of the microcomputer and the growing computer sophistication of end users has led to application development in areas other than systems. As users take on greater responsibility, the dp professionals—long the doers and experts—are assuming the role of consultants. During this transition, it is important that dpers understand that putting computing power in the hands of those on the front lines does not devalue the skills or responsibilities of the professionals.

With a staff of three, it would be virtually impossible for P/TP to study every human factors situation at Aetna. Therefore, rather than being human factors implementors, we are charged with being catalysts and communicators. Also, by drawing on other resources within Aetna, we can increase our effectiveness without creating additional beaureaucracy. P/TP's approach has been one of knowledge development, influence, and support.

P/TP personnel act as catalysts and communicators rather than as human factors implementors.

PRINCIPLES OF A NORMAL-TO-USE SYSTEM

Normal to use may be an unfamiliar term compared to easy to use or user friendly, but it is more accurate in defining a system's temperament. A normal-to-use system incorporates the language and procedures that are familiar to workers, and part of a given business function. The system's screens, messages, etc., are more effective when expressed in the language of the customer and when they follow business procedures employees are familiar with. The normal-to-use system may—or may not—be the easiest to use, but it should be the most effective for its particular customer. The normal-to-use system recognizes that some things are worth doing on a computer even if they are not particularly "easy" or "friendly."

Many "easy to use" systems are not necessarily easy to learn, and "easy-to-learn" systems may not be easy to use. For example, an easy-to-use system for experienced employees may involve the use of multiple key combinations or special codes to make operations quicker, yet these keys and codes (mnemonics) are not standard business operations and must be committed to memory over time. On the other hand, much easy-to-learn software incorporates extensive menu systems. Menus, while important for the novice, can become cumbersome and annoying to the experienced operator if an alternate means of system navigation is not provided.

A normal-to-use system should be easy to learn because it is designed along business lines with intellectual procedures that workers are comfortable doing. Learning and use becomes almost intuitive.

The normal-to-use system would typically include the following elements:

A menu system. Menu systems (list-selection dialogues with optional overrides or command languages for the more experienced user) offer an advantage for novice users because user training is minimal compared to that required by a command driven dialogue. When using a menu dialogue, it is important to seriously consider which type of menu is best: fill-in-the-blank, cursor-select, or soft-key defined menus are examples. These are all comparably easy to use, but some may require fewer keystrokes than others or may be more comfortable for a particular group of users (e.g., managers vs. claims processors). Assigning menu defaults that allow the system to suggest the next step or screen in the process is helpful to novice users.

But the experienced worker should be provided with an alternative to menu navigation. Such an alternative could take the form of a command language, such as having predefined key words which, when typed in, cause a process to occur, or special function key procedure, whereby pressing a particular key causes a specific process to take place. This allows the worker who is more familiar with the system to bypass the menus and work at his or her own pace.

Other alternatives to menus include question and answer, query language, natural language (English), or interactive graphics. However, (except for natural language) these require more training or sophistication on the part of the user.

A useful systems design feature might provide operators with the ability to choose the level of assistance needed from the system. For example, the system may have a novice level with menus and tutorials to assist new operators and a level that foregoes the use of menus and operates on a command basis for those operators thoroughly experienced with the system. These systems should be flexible enough to allow operators to change levels between screens.

Good screen design concepts. Careful design of the way in which information appears on the screen for a given operation maximizes user productivity, eliminates or reduces input errors, and promotes user satisfaction. Good screen design includes consideration of four particular items: format (arrangement of the data on the screen); content (the subject matter); layout (arrangement of screen content); and style (the way in which data are presented on the screen).

The application of color can be a factor in good screen design. Color can, in some instances, simplify the use of a system; however, care should be taken to determine that the colors used are relevant to the operator's task (e.g., highlights important data on inquiry screen) and meet the expectations of the user (e.g., red for debits or errors). Color must also be used consistently to provide for color-blind users, users with tinted glasses, and the occasion where an application will be used on a monochrome, as well as a color crt.

Consistency in operation within and between systems. As much as possible, the same result should occur every time a particular key is depressed to allow the transfer of experience from one application to another.

Dialog in the vocabulary of users. The terms used in the system menus, data entry screens, and inquiry screens must be expressed in the language of the user (as often as possible in simple English). Jargon and mnemonics should be avoided to eliminate confusion and reduce the need for training, unless they are the only succinct way to convey information or they are a part of an alternative to a menu. This principle is true for accompanying system documentation as well.

The use of symbols or icons. Graphics make it possible to use symbols in place of text. In some applications, an operator may be able to recognize a symbol more quickly and accurately than a printed word. Any symbols used should be natural to the operator and not totally new.

Prefilling of input fields with data when possible. The operator should not have to enter data the system already has. For example, given a policy number, the system should determine the insured's name and other constant data when it has this information available.

Clear and useful information and error messages expressed in the language of the user. Messages should explain clearly what the system requires to continue processing or how to correct an error. Data on the screen to which an error message refers should be highlighted in some manner as soon as possible.

For the first several months after P/TP's creation, the staff studied nonstop, trying to get a firm grasp on the issues. Since then, knowledge development has been a continual process and is accomplished in three ways.

First, P/TP monitors the most current articles, studies, and other publications dealing with human factors. It subscribes or has access to most data processing trade publications and magazines. As well, we are a member of the Human Factors Society.

Second, P/TP monitors government activity in the United States, Canada, and Europe. More important, we carefully review results of studies on the health effects associated with the automated office from government agencies such as the National Institute for Occupational Safety and Health (NIOSH), the Center for Disease Control, and the Food and Drug Administration. We also try to keep abreast of European standards for data processing equipment and work environments.

Finally, we meet with experts from the vendor and academic communities and from other user companies. We talk with ergonomics experts from firms with long histo-

Soft or special function keys. Keys that can be set up to perform a specific function with one keystroke are convenient and require less memorization than commands. The purpose or function of such keys must be clearly explained within the system.

The use of a "mouse," joystick, or touch-sensitive screens. This equipment can reduce error rates and increase productivity in some situations. However, the long-term value of such tools is, as yet, undetermined. When there is a need for minimal use of the keyboard, such equipment can be faster than a typed command or menu system. It can also be used in conjunction with menu selection.

The touch-sensitive screen appears to be the most natural and convenient of the three. It allows the most direct hand/eye interaction and does not require additional deck space or other devices.

Indications of what the system is doing. An operator should not have to stare at a blank screen and wonder if anything is happening. The system should inform the operator of what is happening at all times.

Natural breaks. Too often workload capacity is set by the machine and not by the operator using it. The system should provide a natural break in processing similar to that which occurs, for example, when a form is completed in a manual process. These breaks provide a reference point that indicates work is completed. In a manual process, there is usually some physical evidence (a stack of forms, for example) showing completion. With crt work, this does not always exist. Many operators need some physical reference, so "task completed" messages may give the operator a sense of completion. The natural break also gives the operator a stronger sense of control over the work rate. The break allows an operator to know when reasonable progress (and productivity) is being achieved. He or she can then decide whether or not to go on to the next assignment. The natural break reduces the stress of crt work, and a reasonably relaxed operator is less likely to make errors.

Interrupt/resume function. Such a function allows operators to interrupt what they are currently doing to access data through a different system or function. Once they have done so, the operators can return to their original operation without having lost their place or data. This is similar to the hold button on the telephone.

Error correction. It should take no more effort to correct an error than it took to make the error. When this is not possible, erroneous data should be highlighted and the operator provided with relevant information in plain English on why the item is in error. "Undo" or "backup" commands that reverse or help to reverse the last process are useful.

Help facilities. This facility is necessary to provide assistance for almost any situation. It should be easily accessible from anywhere in the system and should provide the novice user with a reference to system commands, give an overview of system operation, and define data fields used on the screens.

A normal-to-use system incorporates relevant terms, procedures, and processes of the current business functions into an automated system. Workers familiar with the business process thus already possess some knowledge of how the system will work. Training on the new system becomes easier and, in turn, allows an operator to become productive faster.

Normal-to-use systems also help to minimize operator fatigue and stress associated with the extended use of crts. Clear and consistent presentation of data decreases the number of necessary eye movements that can contribute to eyestrain. Errors decrease and productivity increases because eyestrain and its associated general fatigue is reduced, and because the system is well integrated with the user's natural, business-oriented view of the process. Stress is reduced because the operator has some control over the work experience, and the similarity between the old and new systems minimizes fears of the unknown and fears of failure.

—R.J.T.

ries of human factors expertise (for example, Kodak, IBM, Digital Equipment Corp., and Bell Labs), and hold discussions with leading academic experts from across the country (from institutions such as New York University, Stanford, and the Hartford Graduate Center). More important, we consult with the real experts—Aetna employees who use the technology.

P/TP takes the knowledge derived from these various sources and applies it throughout the company. We use manuals, articles, presentations, and individual counseling and consulting. For example, in the past year we worked with our facilities management department to review the various types of ergonomic furniture available. P/TP also provided technical design and screen reviews for various information systems areas, and produced a paper on ergonomic software. We've worked with corporate communications to create an article for our employee newspaper about what studies have shown to be the insignificant levels of radiation from vdus.

With the personnel department, P/TP has helped analyze the current status of work-at-home issues and is developing a workshop called Managing Technology Through People, based on concepts addressed only briefly in a company-sponsored Seminar on Information Systems. P/TP is also routinely involved in employee relations activity dealing with the use of technology. We produced a booklet for managers on "How To get the Most from Vdts," which deals with the ergonomic issues. P/TP is now working on a paper addressing how human factors relate to productivity at Aetna.

SERVICE-ORIENTED UNIT

While we are quick to point out that P/TP is a corporate resource, available to provide service to all divisions, it is important for our customers to understand that we are a service-oriented unit, not corporate watchdogs. One reason we feel we have been successful in getting cooperation throughout Aetna's divisions is our guarantee that we will not slow project schedules. We will make suggestions or comments yet defer to the project team in regard to any action.

One question we always receive when discussing P/TP's role is, "How do you accomplish anything if you do not control the project and only make suggestions?" Clearly our involvement is not passive. We are candid in our comments and press hard to get problems solved. We do run the risk of alienating those we work with, but so far this has not happened.

What are the personnel issues associated with using technology, and how do they affect the work environment? As stated earlier, we find that the manager's role is essential in handling the personnel issues effectively. But before the manager can attempt to find a solution, he or she must understand the problem, which is in itself no easy task. It takes time and attention to sort good information from misinformation. Most technology-oriented literature, like advertisements for hardware and software, glowingly indicates there is nothing technology can not do. The popular press and a new body of human factors literature, however, have suggested that technology is not so wonderful. Vendors' effusive claims are contradicted almost daily by news stories detailing the hardships inflicted on workers by technology.

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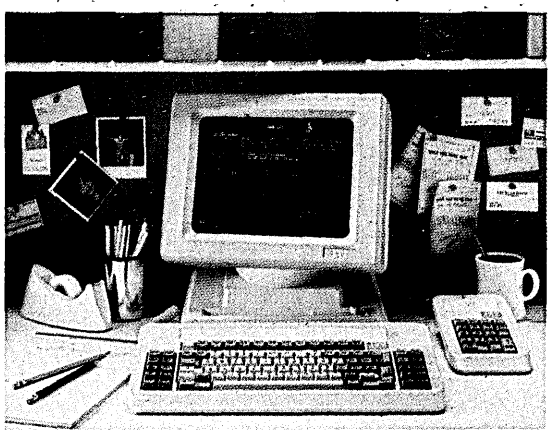

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CIRCLE 54 ON READER CARD

Employees who did not welcome OA had had no choice as to whether or not technology would be introduced.

ures from all sides, we decided to get another perspective. Since we had not heard many complaints from our own employees, we decided to get their opinions on the technology. We found that while many were undecided or unconcerned about technology, employees' opinions generally fell into two camps: those with problems, and those without problems.

Characteristically, employees without problems were those who had participated in decisions to automate. These were typically the technical people, the dpers. Others who welcomed the help technology can give were secretaries who had requested word processors because they had grown tired of retyping documents when bosses kept "changing their minds." Or they were the seekers, people who change jobs just to use new technology and who by nature prefer change.

Those employees with problems often had had no choice about whether or not technology would be introduced. They were never involved in the decision to automate, and they had been happy with the way things were.

ERROR RATE INCREASES

While we felt reactions were consistent with any major change, we did recognize complicating factors where technology was involved. For example, the impact of a 5% error rate was increased because each employee did significantly more work and, as a result of shared databases, that work was more likely to be tied into other work. Finding and correcting errors became more difficult because of the complex and often inflexible automated systems. Employees were never sure who was responsible for errors. Was it the programmer? Did the operator make an error? Did the manager fail to provide adequate training? The phrase "the computer did it" became popular. Because dependency on computers has increased so much, we believe many people cannot recognize an error if they see one. In too many cases, "garbage in, garbage out" has become "garbage in, gospel out." Jean Brun, a French philosopher, once said, "The evidence of authority seems to prevail over the authority of evidence." This appears to be true in relation to the computer's perceived authority.

An awareness problem was perhaps most important on this list of complicating factors. Line managers did not understand what was happening to business information. Too often they hadn't gotten involved with the technology.

It has traditionally been a systems department responsibility to design and develop a system. For the end users it was an esoteric, "magic" process. In all fairness, however, business managers, in general, have come a long way on their own. Their awareness is growing as they have researched and sought out experts to help them understand how machines work. The fact that there is significantly less "magic" to the newer systems can only improve on this progress. The modern data processing person who better recognizes the ultimate business objectives of systems is also helping managers increase their awareness in this area.

As a result of our studies, we became convinced that a basic reason for many of the complications brought about by technology rested in the nature of work itself.

People and machines have very different needs in regard to the structure of work. For machines, work needs to be simplified or broken into its smallest parts, with little variation, centrally controlled and maintained, and performed in one way—the experts' way.

This is similar to the Taylorite view of management, which breaks work into its smallest parts. It is also strikingly similar to the policies established in factories following the industrial revolution.

Unlike machines, people prefer to have more challenging and interesting work. They like variation. It gives them the opportunity to learn new skills and to avoid boring, repetitive tasks. They like to be in control of what they do, to make decisions and share in the responsibility for the end product. Perhaps most important, they want the freedom to adopt a working style that suits them best.

Historically, dpers, responding to machine limitations, have been oriented toward the simplification of work. Such has been the nature of programming, a structured, logic-intensive exercise. Work tasks have been broken or fragmented into their component parts. This can lead to boring repetitive jobs for the end user.

How do these concerns affect the manager? The business manager must balance the needs of both the people and the technology. Our employees offered varying views of their managers. Some felt their management really listened. They cared enough to get answers or solutions to problems. Other employees felt their managers had either no knowledge of the problems or had some knowledge but were unaware of what could be done. A few thought their managers just didn't care. One interesting discovery answers the question, "Why don't we hear more from employees who experience some discomfort?" Most employees are simply very reasonable about the discomfort they experienced while working on vdus. They see the discomfort as part of the job, and since the discomfort is only temporary they feel they can live with it occasionally. In many cases, however, we found that vdu-related discomfort could be quickly and inexpensively remedied. However, the concerns of those employees who didn't feel managers were handling technology well were cause for attention. What are these concerns?

FEAR OF BEING REPLACED

Employees fear that technology will replace them. This fear is very real at Aetna even though the facts do not justify it. Our experience shows that oftentimes technology produces additional jobs and offers oppotunity to develop new skills.

Employees worry about job devaluation. Take the case of an employee who has been doing the same job for 25 years and is consdidered the department expert. Whenever a problem arose, everyone turned to this person for help, even the supervisor. Then along comes an information system that can answer all the questions our 25-year employee can. Suddenly our expert feels he has little to offer.

Fear of complexity is the most common concern. Many people are afraid of failure. They are concerned they will not be able to operate the new equipment. They fear that their peers who can use the technology will lose respect for them.

People who judge their managers to be uninvolved with technology are more likely to feel that adequate training has not been provided.

Many employees don't know who decided to bring in the equipment, or why it was introduced. These employees had not been involved in the decision-making process. When employees feel involved, a system becomes *their* system, not *the* system.

Workers are confused by the jargon that accompanies the new equipment. They must learn a whole new vocabulary in addition to learning how to use the equipment. Like a teenage son or daughter's speech, this language is confusing: it definitely says something, but what does it mean?

These concerns can distract people, a company's most valuable asset, from productive efforts. So what's the answer? People are the foundation of our business, and helping them to help us is how we will succeed. As a member of the Japanese Management Association who visited our office so aptly commented, "The heart is more important than the machine." The recent best-seller *In Search of Excellence* points out that one reason the model companies are so successful is their effective policy of involving and motivating employees.

Therefore, most of the problems that arise from the introduction of technology relate to good management practice. We have made these suggestions to our managers:

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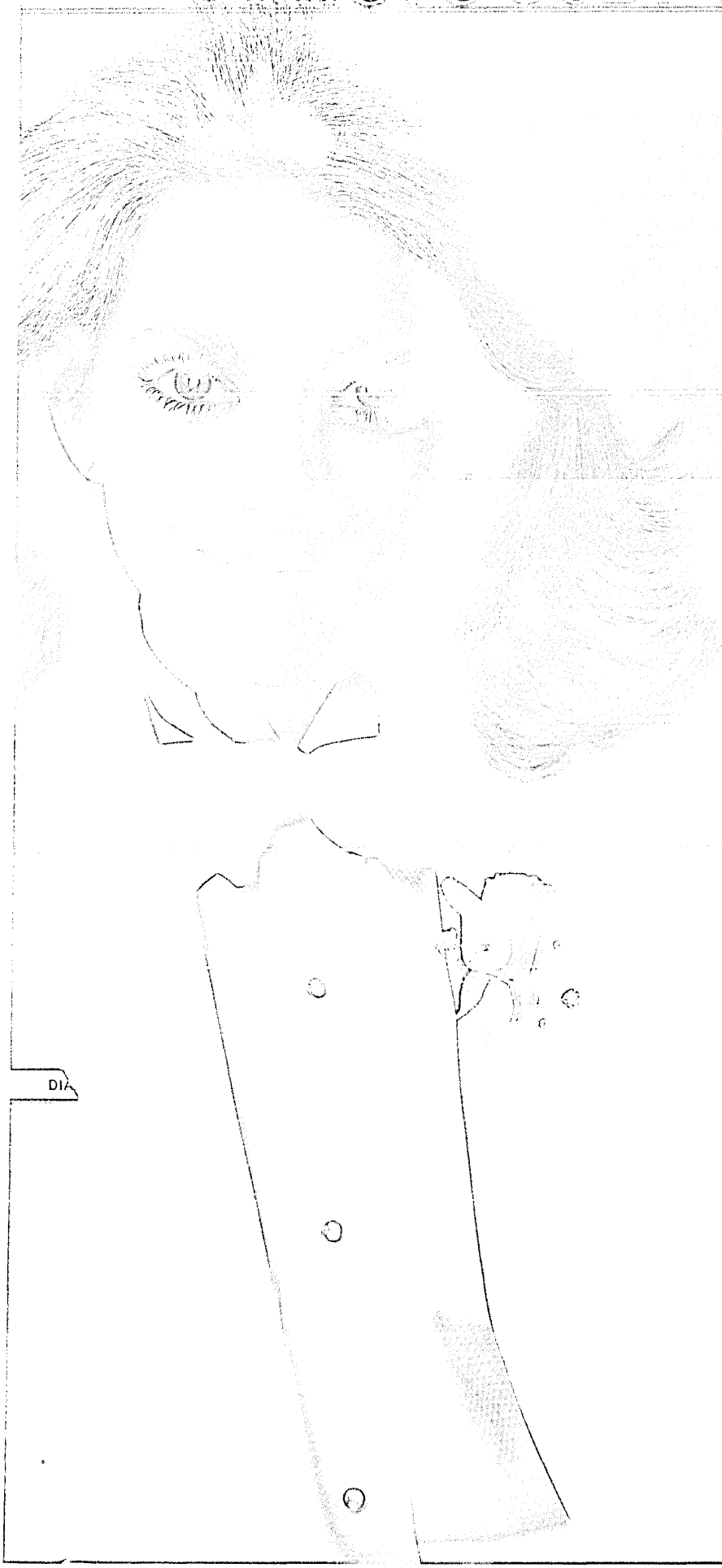

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CIRCLE 55 ON READER CARD

When employees feel involved in the decision-making process, a system becomes *their* system.

• Managers should use the GOAL process, Go Out And Look. They should talk to employees and peers, ask questions, and deal with issues.

• We suggest that managers be willing to admit that sometimes they don't know the answers or understand the problems. Some managers are embarrassed to admit there is something they don't know. Yet it is critical that they ask questions.

• We remind our managers that they need to listen to employees, and respond to what they have to say. Involving the employees in decisions to automate is one way. Our Employee Benefits Group Division does this by giving desks in the systems-development areas to end-user project-team members so they can be involved in the development process.

• Most important, we suggest to our managers that they value their own business expertise. These managers have something to say. They know the business, and the system must meet their business needs. Managers must make sure that this happens by taking responsibility for the systems that serve their areas.

While the above suggestions may apply to almost any major change, there are special concerns that managers must address for computer-related changes.

INPUT IN SYSTEMS RESIGN

First, managers should be involved in the design of systems and screens. Because screens are the primary interface between workers and systems they must be clear and understandable to those who use them. Systems should be designed so they are "normal to use."

We also ask managers to involve themselves in the environmental issues like the physical problems of eye care and musculoskeletal fatigue. While these have not been given much attention in office work in the past, they have existed since the introduciton of the typewriter. Nor can psychological issues such as stress be ignored. Experts increasingly agree that stress is a significant health-related issue in the office environment.

Most important, the way in which technology affects people should be considered a business objective and not just good employee relations. It is impossible to separate the business success of the company from the employees' willingness to use technology effectively.

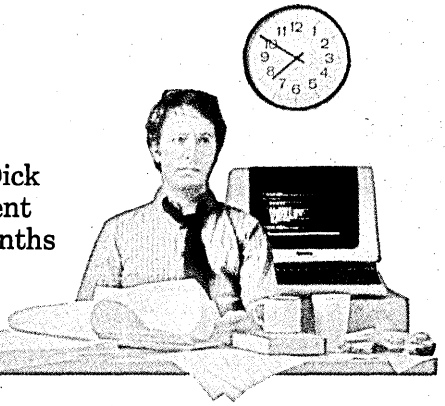
In the electronic office of the future, the successful manager will be able to recognize and address these issues before they affect the work environment. The result will be an office where people can effectively apply the power of technology to accomplish the business objective.

The People/Technology Programs unit exists to remind managers of what they already know—that people are our most valuable resource. The successful use of this resource called technology must be balanced with the needs of the people who use it.

Success rests in the manager's hands.

Richard Telesca is a consultant in the People/Technology Programs Department in the Corporate Administration Division of Aetna Life and Casualty. He is responsible for evaluating the human impact of hardware, software, and other aspects of the electronic environment, and assists in structuring Aetna's response to the issues involved.

See COBOL.



Dick is a COBOL programmer. Dick is bored. Harried. Dick struggles with trace and debugging routines. Nonexistent documentation. Mainframe logjams. So Dick is four months behind schedule. And users are upset about turnaround times. They yell and make Dick upset. They make Dick's boss upset. Nobody is very happy.

See COBOL Run.

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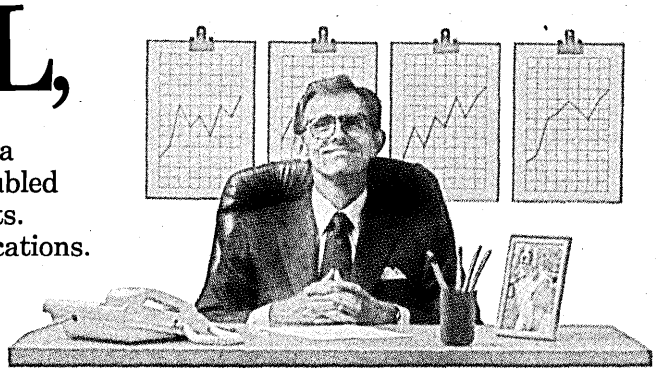
Run, COBOL, Run.



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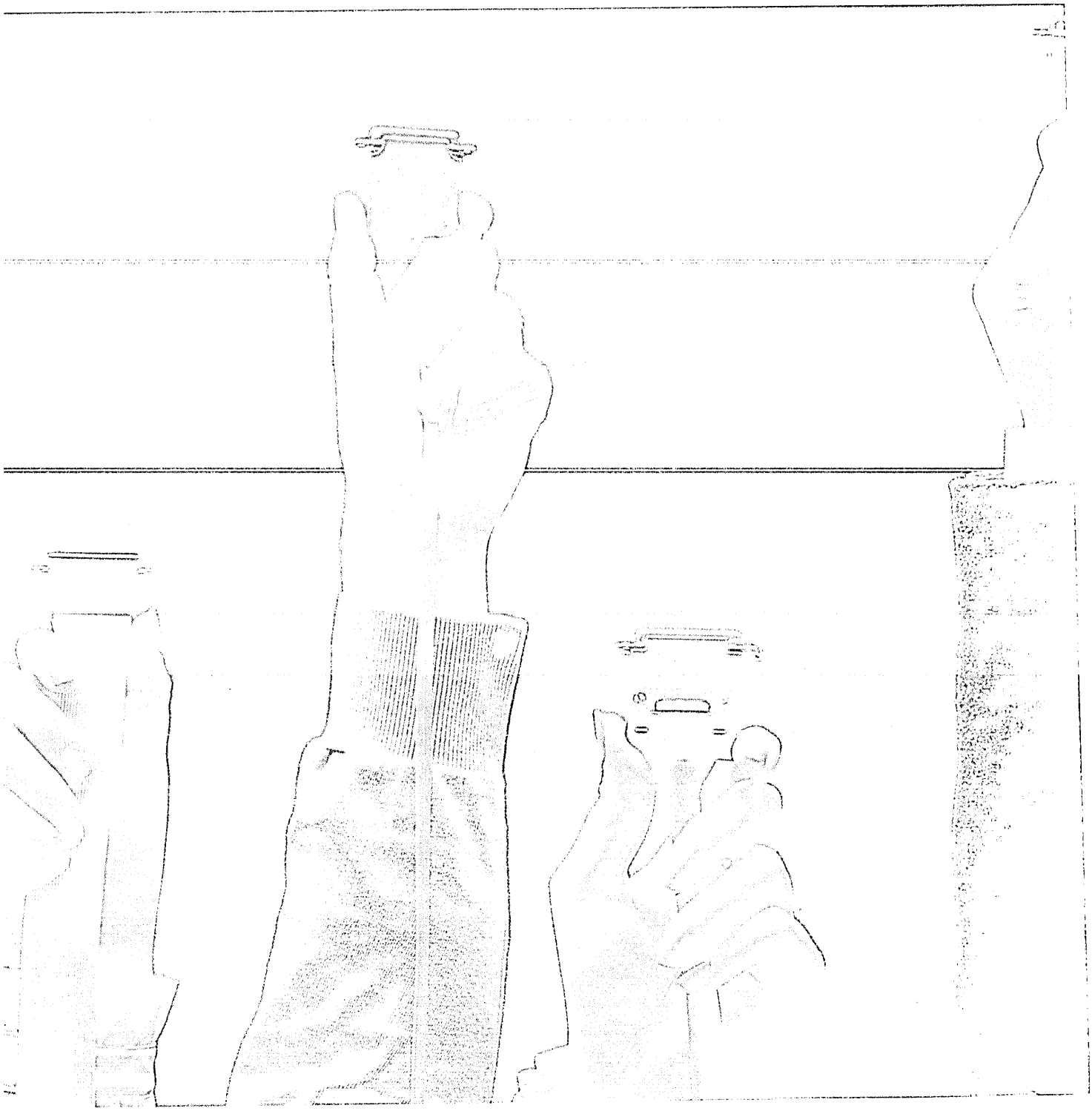

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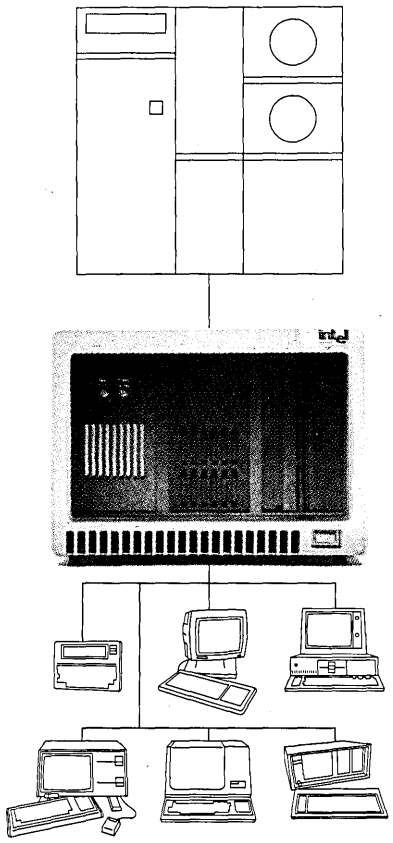

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CIRCLE 58 ON READER CARD

If you build a database without a carefully concocted architecture, you could end up out in the cold.

THE WINCHESTER HOUSE SYNDROME

by Frank Sweet

Why do you need a global database architecture? To avoid building a database afflicted with Winchester House Syndrome, a database with details marked by craft and elegance but made essentially unusable by the lack of a coherent master plan.

In 1881 William Winchester, son of the famous rifle manufacturer, died leaving $20 million to his widow, Sara. During her mourning, she consulted a fortune-teller. The seer revealed that Sara's own survival depended on the construction of a house: as long as work on the house continued, Sara would live and prosper. Workers continued to add new wings and rooms until Sara's death 36 years later.

The still unfinished house has 160 rooms and covers six acres in San Jose, Calif. It has blind chimneys, doors that open onto blank walls, stairways that lead to ceilings, windows blocked by later construction, and countless oddities that suppress any sense of the unity normally associated with the notion of a house. It's an interesting phenomenon, a freak, an example of on-the-fly design. The materials and workmanship of each room are the best that money could buy. But, built without an architectural plan, it cannot function as a house.

Some MIS/dp shops are like Sara Winchester: they plunge into database implementation without prior planning. Survival seems to be their only aim. They'll bring up applications without ever developing an overall architecture for their pool of shared files. Perhaps this is because planning can seem like little more than unbillable work. Or perhaps it's because long-range plans, once finished, can collect more dust than kudos.

Awareness of these risks is half the battle. You can produce a simple, durable, and useful global database architecture in just a few weeks. Strategic data planning is rather like documentation: when done well it's fantastic; when done poorly, it still beats nothing at all.

Join me and we'll spend the next few minutes developing a global database architecture for an imaginary manufacturer.

Four questions give us a beginning:

- What is a global database architecture?
- Why do it?
- How do you go about it?
- How do you know when you're done?

The architecture is a documented agreement that identifies the shared automated files that will exist in your shop.

But keep it simple. Strategic plans that are ignored usually owe their fate to their complexity. If a plan cannot easily be grasped and communicated, no one will try to grasp or communicate it. It will be left on the shelf, unused. The goal is a document that's used as a road map, not as ballast for your file cabinet.

The finished architecture should consist of just two deliverables: a one-page diagram and a presentation. The diagram pictures the major data entities in your firm as well as the relationships among them. (Data entities are the things about which you plan to store business data, such as customers, employees, and products.) The presentation is simply a one-hour talk in which you explain the entity relationship diagram and the steps you took to develop it.

DIAGRAM INCLUDES BASICS

The diagram is a broad yet shallow view of your firm's data. It need not include every entity and every relationship but must cover the major operational ones. Operational entities (e.g., products, customers) are those that are fundamental to your business. They're included because they don't change. Administrative or control entities such as ledger accounts and standard costs are left out; they depend on management style and can appear or vanish at the stroke of a pen.

Also, the diagram must include agreed-upon names for every entity shown, but should omit record layouts. Since they're costly and time-consuming, record layouts are best left to individual development teams, and not made part of the architecture.

Why will this help?

On one hand, MIS/dp cannot justify designing a file unless it will satisfy a specific user's need. On the other hand, each new file must dovetail neatly into an overall complex of shared files. It's rather like the story of the three bricklayers who, when asked, "What are you doing?" replied: "Making $8 an hour"; "Laying bricks"; and "Building a hospital." Though each project team may work for one user/application in isolation, the team must recognize that the system it's constructing is part of a larger coherent whole. Must we then choose between individual project justification and overall system integrity? Not necessarily.

A database architecture can reconcile the conflicting goals. The entity-relationship diagram outlines a skeleton of the entire multiapplication database's arrangement. Its audience is your shop's application team leaders. Its sole purpose is to let designers see precisely where each new system will fit into the whole. An easily grasped architecture can make the difference between systems plagued with functional overlaps and (worse) underlaps, and a cohesive integrated application portfolio.

How do you go about it? There are four steps: understand the business you're in, name the operational entities, identify their relationships, and negotiate ID number formats.

First of all, understand the business you're in. (Sounds like the recipe for a Romany omelet, "First, steal a dozen eggs.") Can you quickly sketch your firm's major day-to-day information flows on a one-page data-flow diagram? If not, familiarize yourself with your environment before attempting to develop a database architecture for it. If you were to hire a professional to do the architecture, the bulk of the consultant's time would go into interviews building this familiarity.

So let's assume that you are familiar with your business. While our examples will

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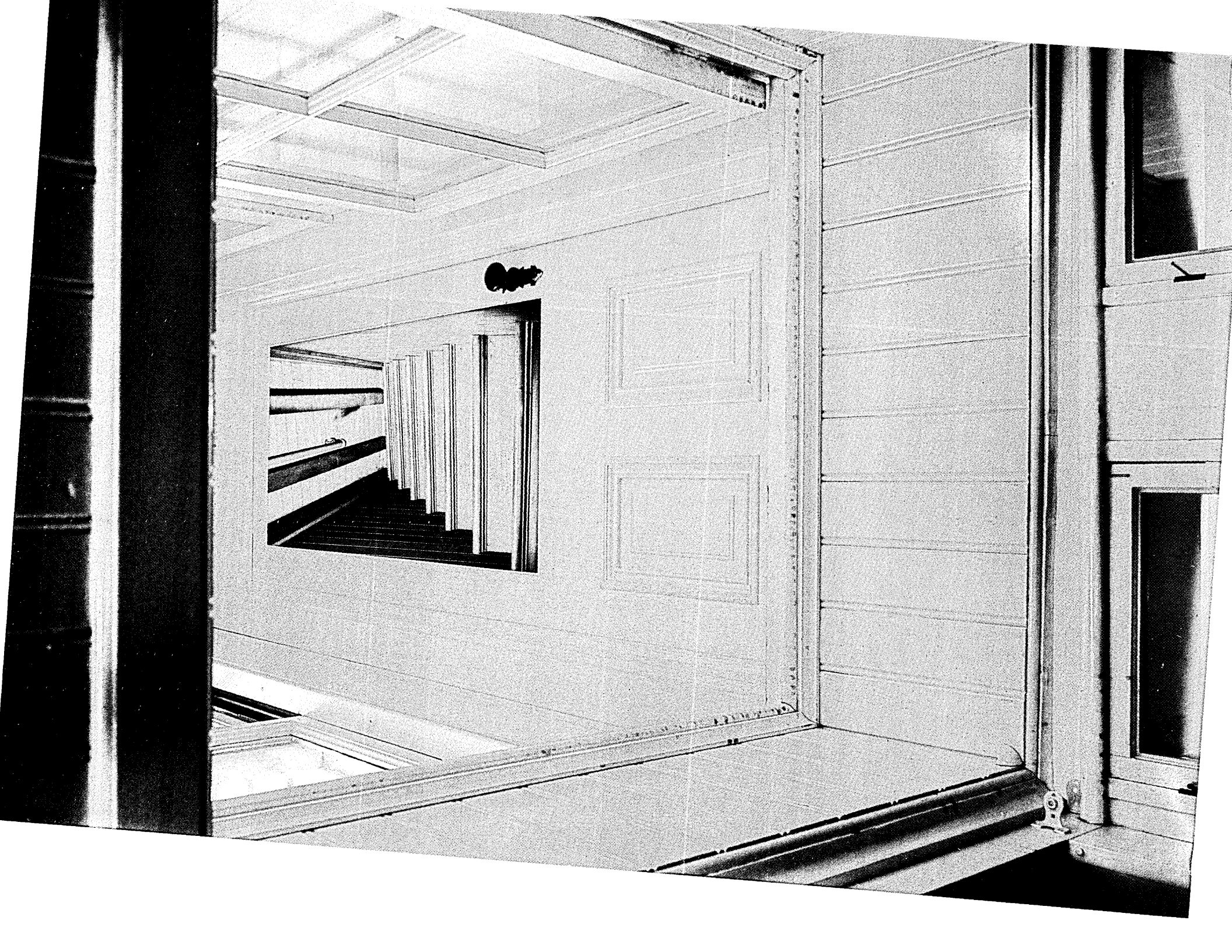
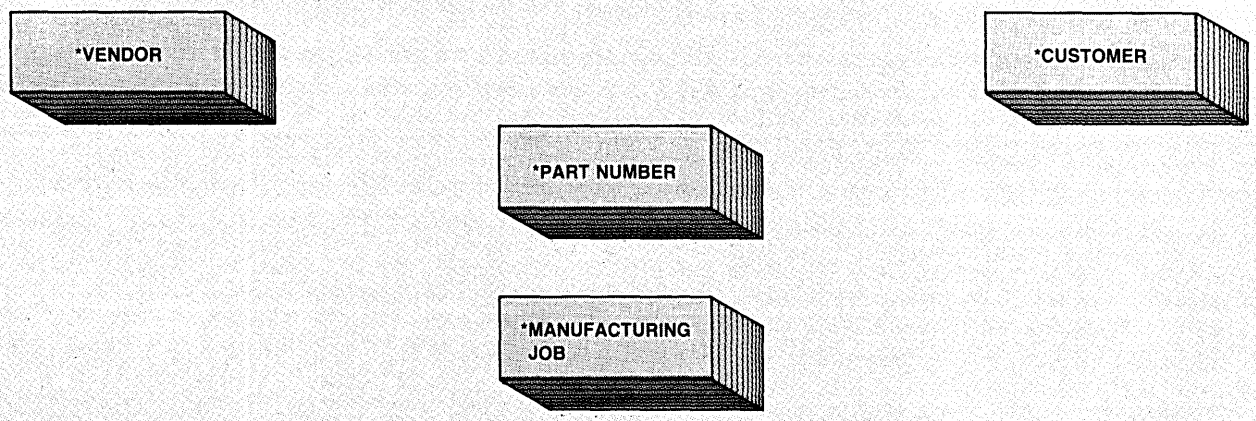


Is there a choice between individual project justification and overall system integrity?

FIG. 1

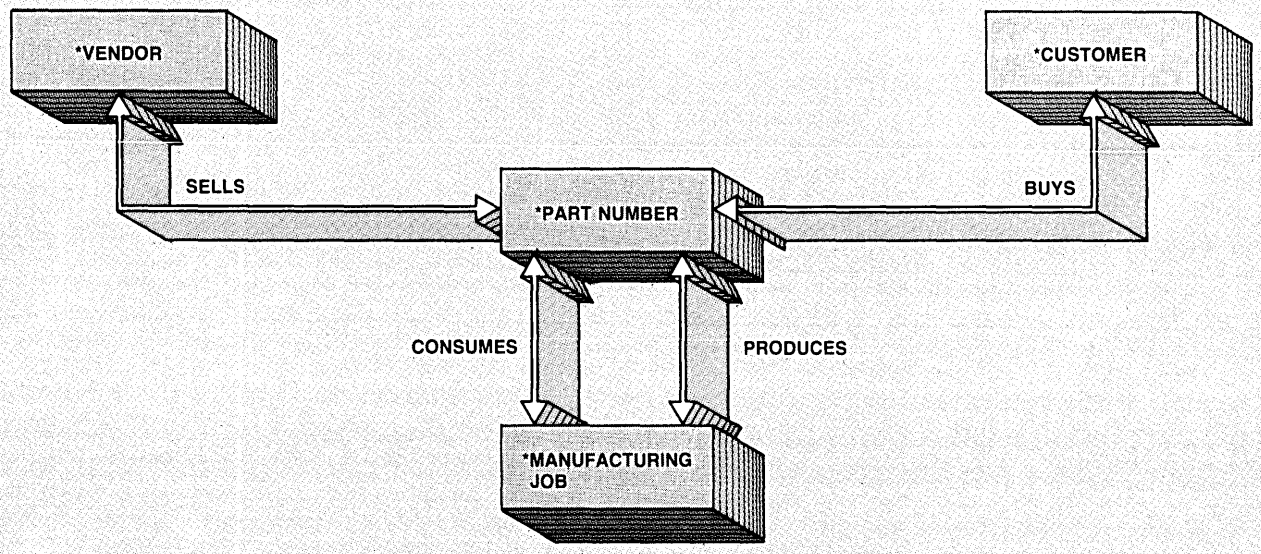
OPERATIONAL ENTITIES



*ENTITIES THAT REQUIRE UNIQUE, UNAMBIGUOUS ID NUMBERS.

FIG. 2

THE OPERATIONAL ENTITIES RELATED



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use assembly manufacturing (components are turned into subassemblies that are constructed into products for sale at a profit), the steps we will describe serve equally well for hospitals, schools, banks, or government agencies.

A note on Bachman diagrams: we use them because they pack so much information into a succinct, easily reproduced form. Following the convention set by Charles Bachman, father of database planning, we'll use boxes to represent the entities, each box meaning, "We plan to store data about our customers in a single sharable file." The COBOL term for the storage of data about something, by the way, is "record." So, if you speak COBOL, each box represents a record. Other languages use terms such as "segment" or "tuple" for analogous concepts.

The overall architecture should include one box for every major operational data entity. Data entity, we've said, is simply a "thing about which we want to store business data." But consider the notion of operational vs. control again.

Operational activities are those that occur in the day-to-day life of the firm, in direct association with the products you sell. They are the events that would still happen even without resource limitations or performance goals. You must obtain materials, pay employees, bill customers, and make and ship products. These essential events are the

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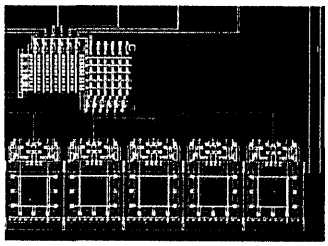

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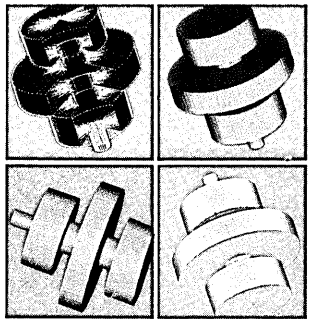

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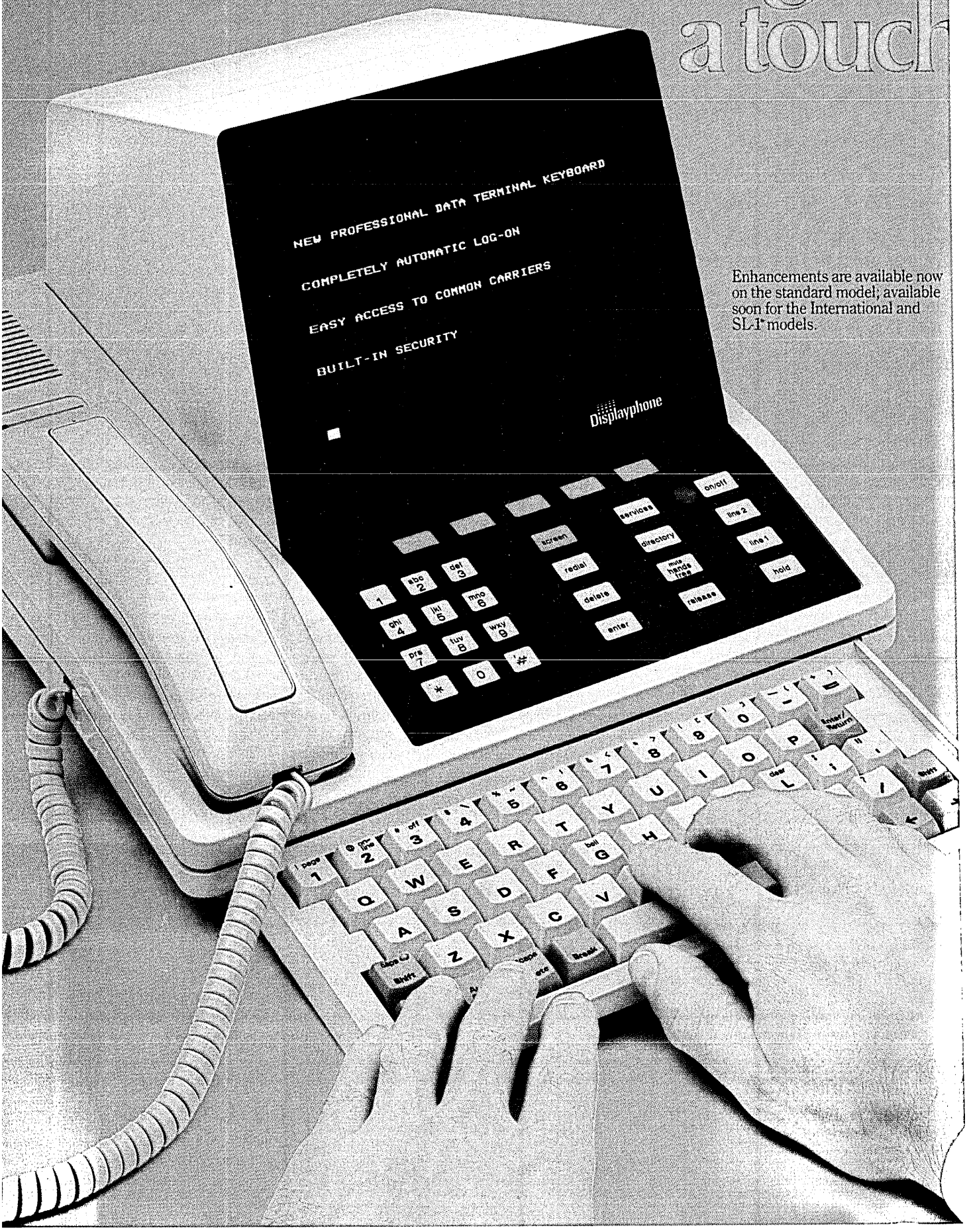

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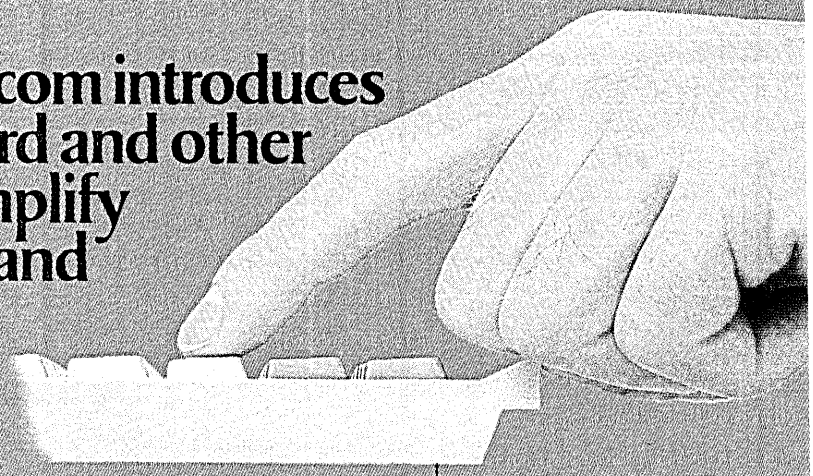

Two years ago, Northern Telecom introduced the Displayphone* integrated voice and data terminal—the first of its kind in the world.

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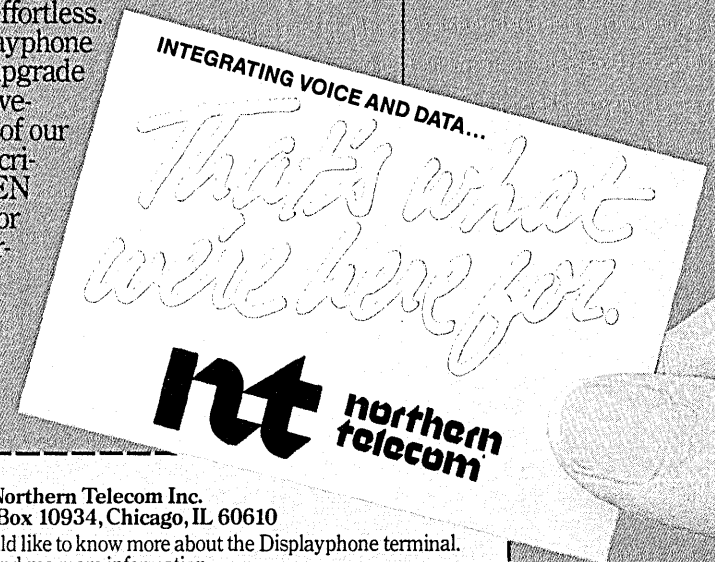

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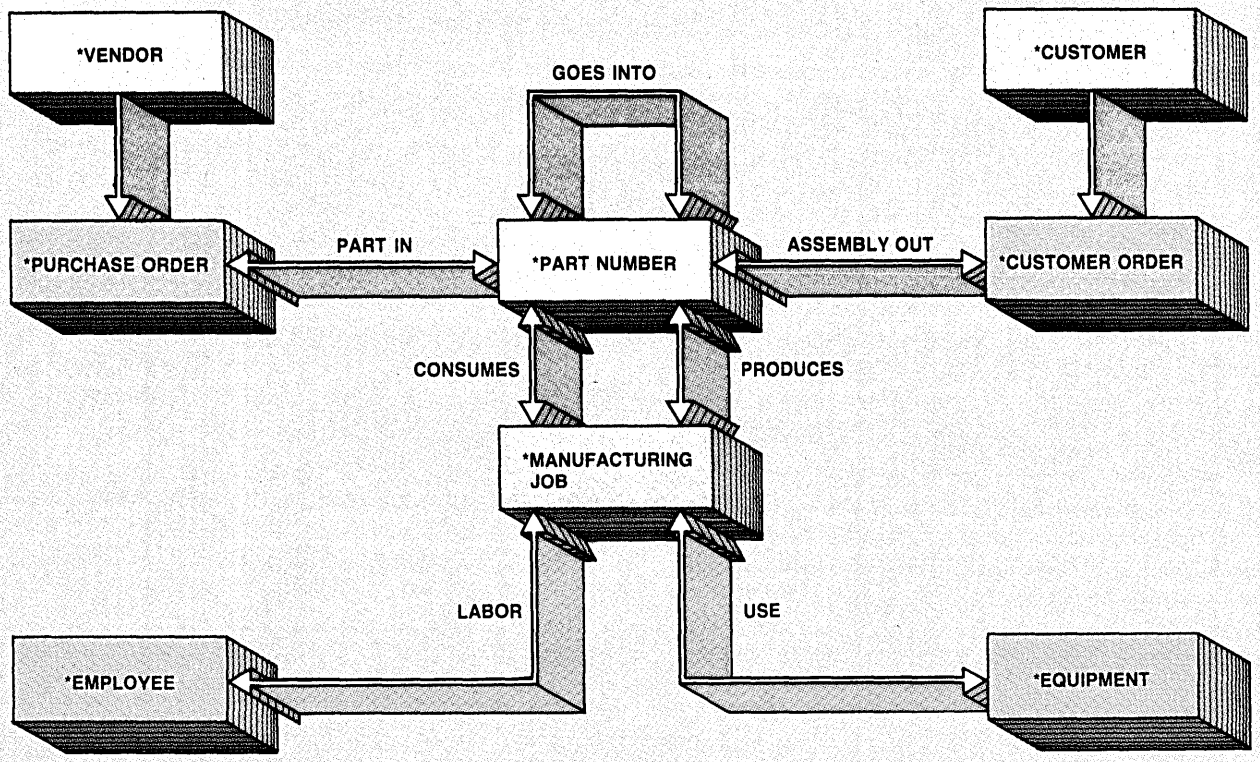
FIG. 3

MORE BOXES AND ARROWS ADDED



*ENTITIES THAT REQUIRE UNIQUE, UNAMBIGUOUS ID NUMBERS.

primary source of all data about the firm.

Control activities, in contrast, are those that occur in order to meet objectives. They monitor and regulate the operational activities so as to make a profit. Control activities relate to capacities, rates, quantities, tolerances, costs, and budgets. They depend on data from operational activities. The reverse is not true. Your machine shop could still work if the accounting department disappeared. Accounting would vanish without a machine shop.

Dp people often make the mistake of focusing their planning on control entities, the reason being that we're usually contracted by users involved in control activities. MIS/dp (a control activity) supports other control activities, seldom operational ones. Our users are accounting, treasury, payroll, inventory planning, top management, and the like. The truck driver who hauls products to a warehouse is not a user. Since our users are control activity managers, we're often seduced by organizational structure, management techniques, and charts of accounts. But managers come and go, and change their styles even when they stick around. Accounting methods follow the latest fashions, and organizational structures turn topsy-turvy from one day to the next. (No, your company isn't unique in this. It's the nature of organizations. Control activities adapt to fit the changing business environment.)

So, boxes for divisions, departments, and the like should be avoided. A database architecture for your firm that included separate boxes for each level in the hierarchy would be demolished by the first major reorganization. Instead of three levels between the ceo and the first-line manager, you could have two or 20. Instead of divisions, departments, and groups, they could be called regiments, battalions, companies, and platoons. It all depends on management style, and management style is the most changeable thing in any company.

INCLUDE BOX FOR PRODUCTS

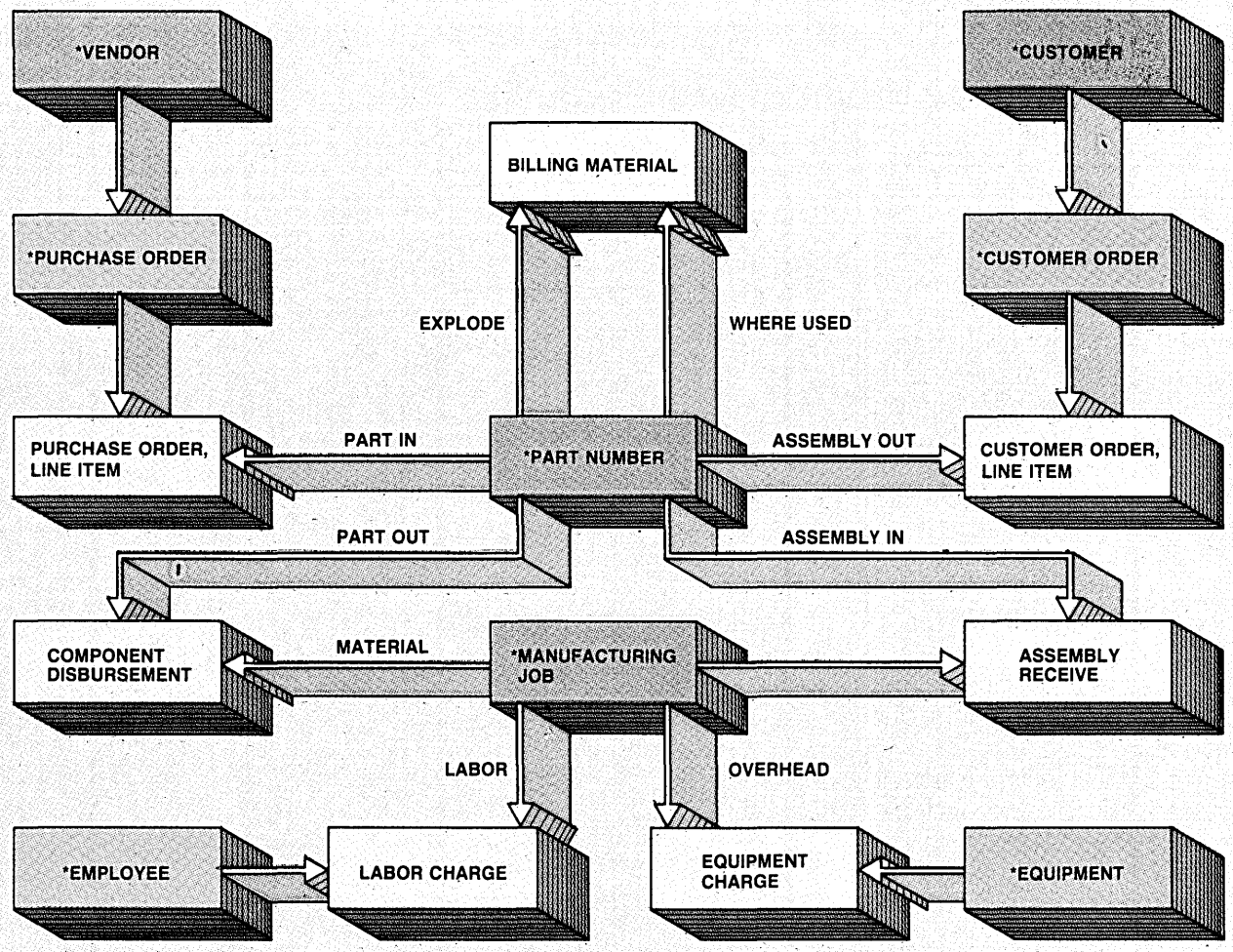
But a box for products should be included. It is about as basic as you can get. You buy, transform, distribute, and sell stuff for a profit. It's a safe bet that, as long as your firm exists, you will continue to do so. It is unlikely that your major business will cease to focus on that stuff. (Again, note that we've assumed a manufacturing operation for the purpose of illustration. Other organizations have analogous inherent entities.)

For years, database planning consultants have taught that if you do a good job of capturing the operational events and entities, those for control will take care of themselves. If you try to model control, you'll be shooting at a constantly moving target, and the operational entities will never be nailed down. (Incidentally, the author believes this seminal discovery was first made by that most eminent database planner, Leo J. Cohen.)

Fig. 1 shows a typical group of operational entities for manufacturing. The boxes indicate that we plan to develop integrated files for our customers, vendors, products, and manufacturing jobs. In a way, it seems trivial; the files are fundamental, after all. But recall that we're doing this for an audience of application development teams. We aren't trying to win the Nobel prize in database design. We simply want the project teams to be aware of all the major files and to know just which ones they're working on.

FIG. 4

THE GLOBAL DATABASE ARCHITECTURE



*ENTITIES THAT REQUIRE UNIQUE, UNAMBIGUOUS ID NUMBERS.

The third step is to identify relationships among the entities. Again, use Bachman's convention and employ arrows to show the relationships. The arrowhead is the "many" end of the relationship. There are three possible flavors of arrow in all: a headless arrow for one-to-one situations, a normal one for one-to-many cases, and a two-headed arrow for many-to-many. Fig. 2 shows only the two-headed type.

Each arrow expresses a relationship between two boxes. The arrow between vendor and purchase order in Fig. 3 means that these two entities are related to one another in some way. The arrowhead shows that there may be many purchase orders for any given vendor. The arrow stem means that there is one and only one vendor for each purchase order. Note that the arrow has nothing to do with any sort of flow. It does not mean that data or control or access moves from vendors to purchase orders. It does not mean that, given a purchase order, you can retrieve its vendor nor vice versa (although, barring write-only memory, you should be able to). It simply means that the two entities are related in the way described.

But don't get deeply enmeshed in this. There are finely grained techniques for manipulating boxes and arrows to derive a detailed database design. For example, headless arrows are eliminated through normalization, and each two-headed arrow is changed into two normal ones by adding an intersection entity. Depending on your database management system, you'd transform the boxes and arrows into headers and details, records and sets, segments and parent-hoods, or tuples and domains.

But don't do it now. These steps are best left to application project teams since, like record layouts, they're time-consuming and can be charged to a justified project.

Fig. 4 shows the major operational boxes and arrows commonly found in manufacturing. Remember, though, getting there is half the fun. Don't hope to clip the picture from this magazine to use as your own global architecture. Oh, it's perfectly usable by a manufacturing operation, all right; it's just that you haven't done the haggling yet. Recall that each box means, "We plan to store data about our vendor(s) in a single sharable file." Who plans to do so? You alone? All MIS/dp? Your users?—All of them?

Every box and every arrow documents an agreement among users and appli-

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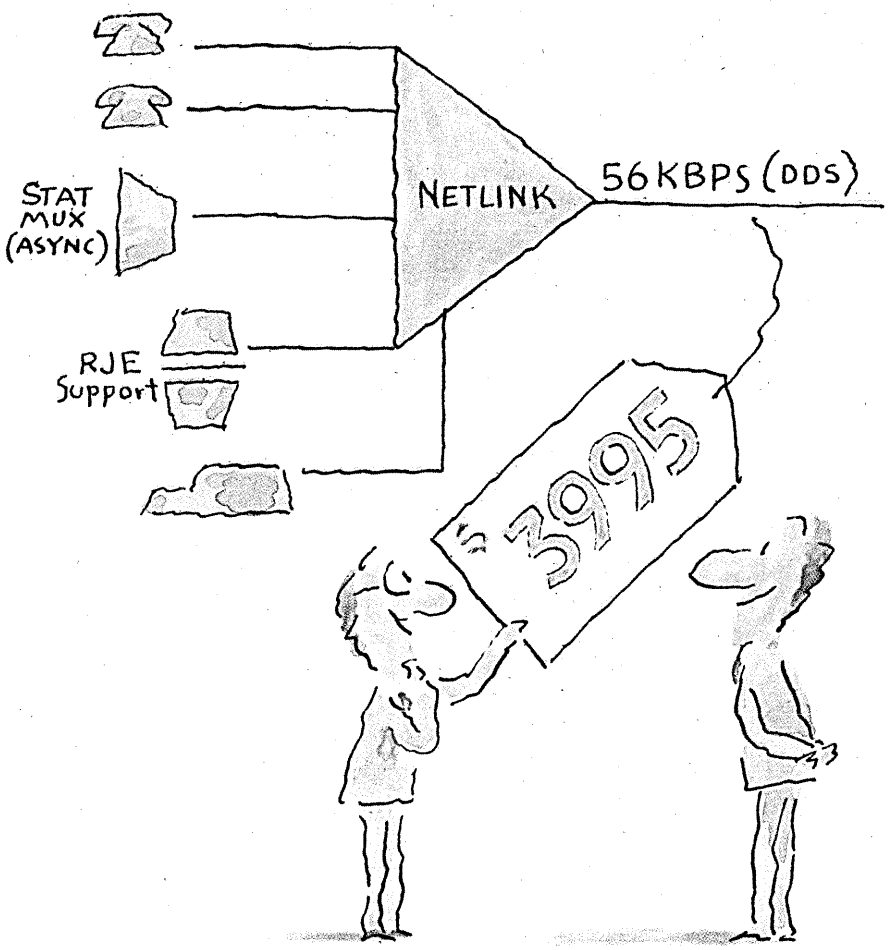

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cation developers. The finished diagram is like a business contract; it's simply a succinct way of recording an understanding you've reached with others. Agreement without a document is easily forgotten, but a diagram without prior agreement is meaningless.

If you're familiar with your firm's business, the diagram should not take more than a couple of days. The time-consuming tasks are coming up with a widely acceptable name for each entity and getting agreement that each entity will be shared among users. Both require you to persuade others that computerized data is a companywide resource rather than the property of any one department. Depending on whether your users trust each other, this step can take from several days to several years.

The last step in developing the architecture is to negotiate ID number formats.

So far, we've avoided stating just what it is we plan to record about customers or vendors or products. We know, of course, that we'll have customer name and product quantity on hand. But our architecture does not document this. We've stressed, in fact, that data elements are best defined during detail design, not global planning.

TRY FOR INTERUSER AGREEMENT

Let's now bend the rule and make an exception. Many of the entities will require a unique and unambiguous ID number. That's how you tell them apart. They're the ones marked with an asterisk in the figures. You should try to get interuser agreement on the format (appearance) of every ID number before saying you're done. The reason has nothing to do with database design techniques. It's simply that negotiation about ID numbers will reveal concealed disagreements about data sharing itself. It's amazing how a roomful of managers will calmly agree to share a common, central vendor master as long as they consider it an abstraction. But ask whether its ID number should be five digits or seven, and watch the fur fly.

ID number discussion sheds light on existing manual or automated systems. Two users with different existing files might easily agree to share a central vendor file. Yet each might honestly assume that his or her familiar numbering scheme is the only natural one, unaware that the other's is different. The hidden assumption is revealed as soon as they must agree on ID number format. In short, raising ID number formats as an issue, though baseless in data design theory, is an effective way of compelling people to see a planned database as a concrete goal rather than a vague abstraction.

Why is it important to get each hidden disagreement out in the open? Because, sooner or later, it will emerge. Would you rather face it now, when all you've invested is a one-page Bachman diagram, or wait until a project team has put two man-years into your new accounts payable system?

Finally, how do you know when you're done? What yardstick can you use to measure your success as a database architect? The criterion is a simple and merciless question: Is it used?

At one extreme, your diagram and hard-won agreements might wind up on the shelf next to the last three long-range plans. If so, it's unlikely you ever really had agreement or understanding.

But if you keep it simple, explain it 15 or 20 times in the one-hour presentation, and make sure that users as well as dpers understand what you are trying to do, you will see results. One by one, copies of your diagram will begin to appear, Scotch-taped to cubicle dividers. When referring to new files, people will begin to use the names you contrived.

You'll know you've really succeeded when you overhear programmers from two different teams discussing how to stop one user's system from erasing a shared record that the other still needs. The answer isn't difficult. The question itself is what's rewarding. It's asked only by those who are committed to an integrated database.

CARTOON BY HENRY MARTIN

Frank Sweet is corporate manager of data administration for The Charter Co., a Fortune 100 firm in Jacksonville, Fla. He also publishes *Boxes and Arrows*, a monthly newsletter for DBAs using IDMS.

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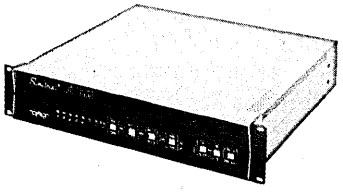

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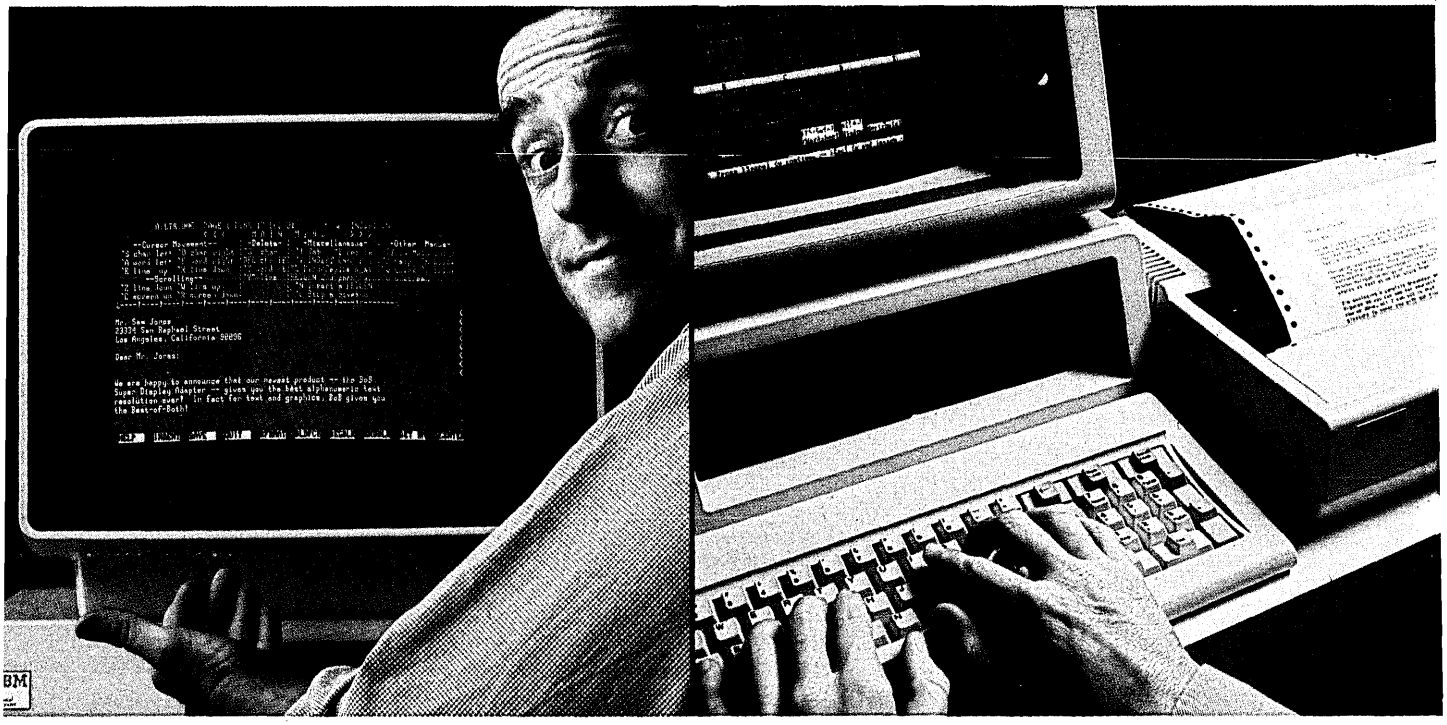

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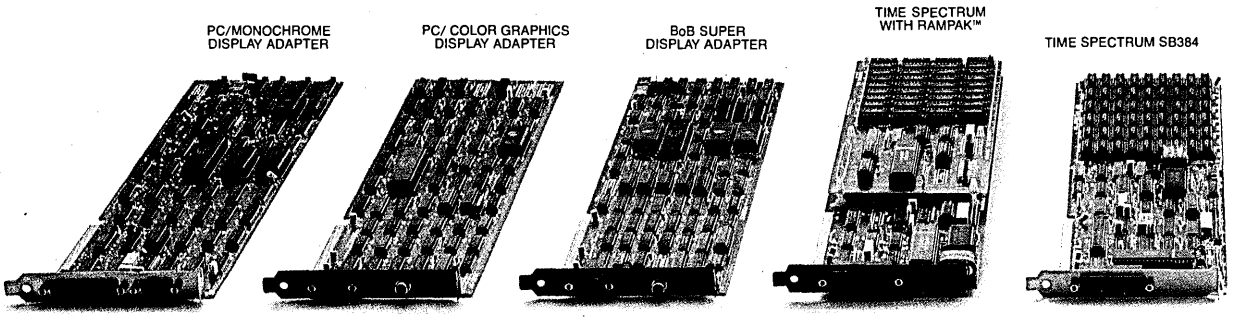

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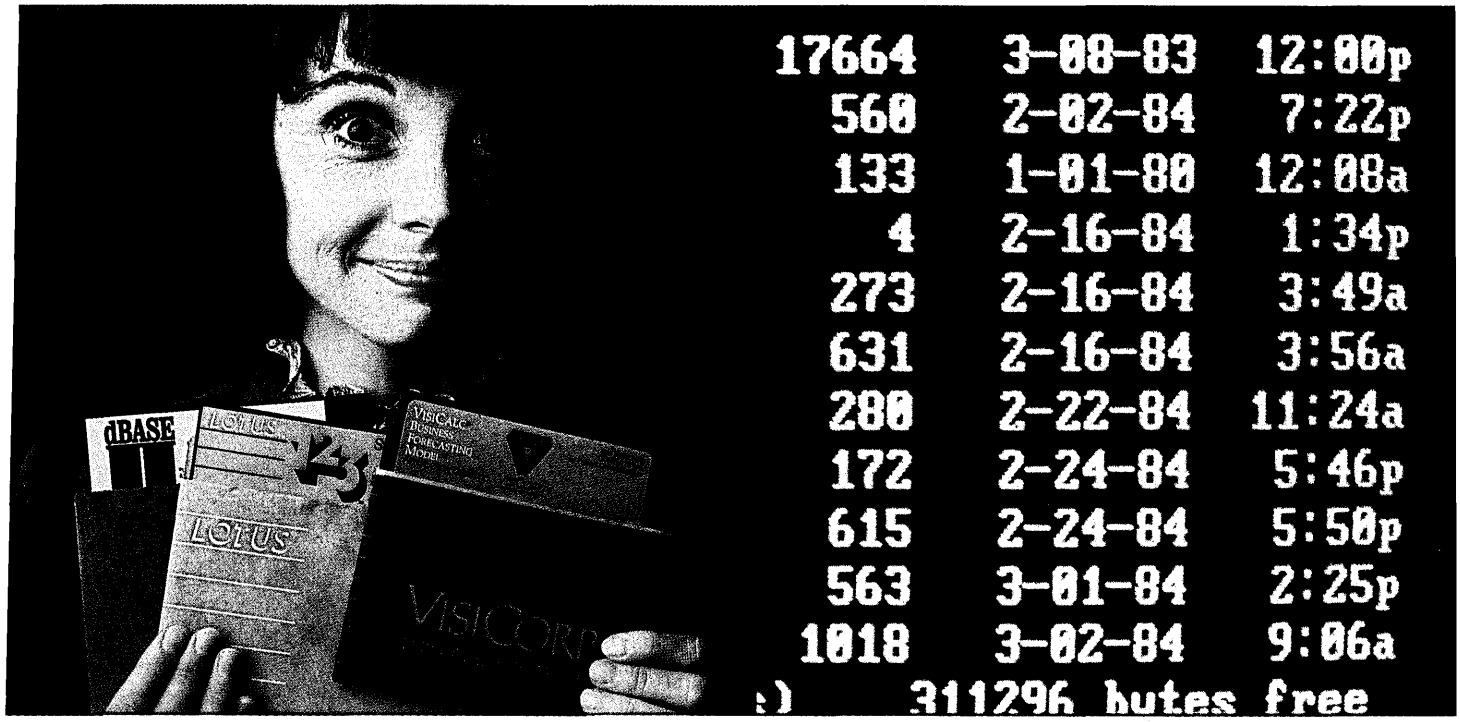

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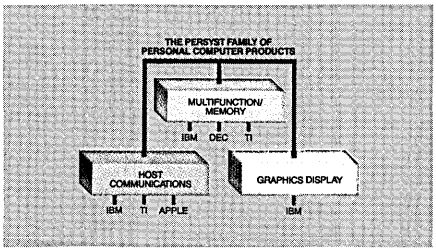

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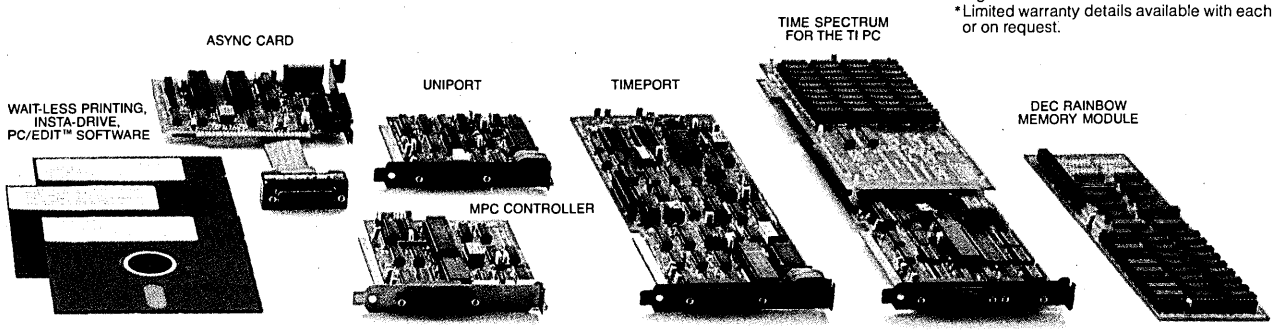


CIRCLE 65 ON READER CARD

A 17-year-old free-lance programmer describes his induction into the world of micros and video games.

"WELL, I WAS YOUNG..."

by Corey Kosak

It all started in sixth grade. My teacher learned that the junior high school had just set up a computer system. Sensing in me an intrinsic talent for computers (or perhaps realizing that it would keep me away from her class for a while), she decided to send me there every morning to play with the computers. The school had just purchased a Teletype (a real Teletype, not one of those sissy dot-matrix ones) and a Lear-Siegler ADM-3A terminal. These were hooked up via modem to a minicomputer at the Lawrence Hall of Science (LHS) in Berkeley, Calif.

At first I played a lot of computer games. LHS had an impressive library of games, from Hangman to Star Trek, and I played most of them. Thinking back, I marvel at the fact that something printing at 110 baud all in uppercase could be so interesting. Well, I was young.

A few months later the school purchased a Commodore PET microcomputer. The PET was one of the first personal microcomputers. It was friendly and relatively inexpensive. I wrote my first computer program on the PET in a language called Microsoft BASIC. The program was one line long and printed out the words, "Hi there. My name is Corey."

It worked perfectly the first time; it was absolutely flawless. This turned out to be the only time I ever wrote a bug-free program in one shot.

About this time Radio Shack introduced its first microcomputer, the TRS-80 Model I. Every day after school I would hike up to the local Radio Shack store and play with the computer. This was back when computers were still a mystery to most (normal) people, so there really wasn't much competition for using the TRS-80. I told the manager I was with the Department of Defense and he let me alone.

I learned a great deal about the TRS-80 and BASIC during the next several months. In fact, I learned so much that the manager began referring me to small businessmen with micros who were looking for programmers. I did a few projects for different people (for a startlingly low fee), and one day I got my big break. A businessman with an Apple II computer called, and needed a programmer.

Through some quirk of incredible generosity, the businessman with the Apple said I could have it for six months to learn all about it, and, afterwards, I could write his program. During that period I learned what an incredibly versatile machine the Apple is. This marked the beginning of my love affair with the Apple, which is still my favorite microcomputer.

Next, I got involved with the Marin Computer Center, Marin County, Calif. This now-defunct, nonprofit corporation aimed to acquaint the public with computers. David Fox, the founder of MCC, and I wrote a program that (ahem) extends the capabilities of Applesoft BASIC by adding features found in larger, more advanced versions of BASIC. We named this program (cutely enough) Apple Spice, and it was published by a company called Adventure International. Apple Spice was my first published program.

One weekend David and I went to a meeting of the San Francisco Apple Corps to demonstrate Apple Spice. Coincidentally, the president of Broderbund Software Inc., San Rafael, Calif., was also there, demonstrating the video games published by his company. After the meeting, David suggested I call Broderbund and ask for a job.

The rest is history.

Since I joined Broderbund I have written one game conversion and am presently working on an original game. A conversion means that a certain program exists for one computer but must be rewritten for another. Broderbund has a game for the Apple called Labyrinth; I rewrote the same game for Atari 400/800 computers.

Broderbund publishes software for almost all the major microcomputers, including the Apple II, the Atari home computer series, the Commodore 64, and the IBM Personal Computer. The company was started on Feb. 25, 1980 by brothers Gary and Doug Carlston, in Doug's living room. Gary was 28 at the time, and Doug was 32. Gary's experience with computers consisted of a FORTRAN IV class he took when he was 12. Doug, the company's president, was somewhat more advanced—he had worked at the Harvard computer center and owned a home computer. Gary says they started the company because "Doug wanted to get into computers, and I wasn't really doing anything else at the time." They decided to call the company Broderbund, which is a variation on the Scandinavian word for brotherhood. Broderbund's first product was a program called Galactic Empire, written for the TRS-80. Gary and Doug did their own production and marketing from the living room.

MOLDING A WINNING PRODUCT

Broderbund Software now employs 73 people. Although much of the company's work is packaging and producing products, it also performs editorial functions. Broderbund can take a rough game idea that shows promise and mold it into a winning product. When the people at Broderbund receive a game submission, they review it and, if it needs improvement, provide suggestions to the game author. The author then looks over the suggestions, either heeds or ignores them, and sends a revised version back to Broderbund. This back-and-forth process continues as the game evolves, until finally (both parties hope) it becomes a marketable product. Although Broderbund is willing to put a lot of creative energy into a game, the program and programmer must be fairly unique.

Gary Carlston, who is in charge of product development, makes the final decision about publishing a product. That's why everyone is nice to him. To help him make his decision, however, Gary gathers opinions from other people in product development, marketing, and from Doug.

The competition is pretty stiff. There are many software publishers nearby, such as Electronic Arts, San Mateo, Calif., and Sierra On-Line, Coarsegold, Calif. Some large

PHOTOGRAPH BY TED STRESHINSKY

Game authors are convinced they have super-awesome megahits, and wonder why their games aren't accepted.

companies, like Twentieth Century-Fox, are also beginning to publish video games. One reason Broderbund has such exacting standards for its video games is because it keeps it ahead of the competition.

What first struck me when I began working for Broderbund was that most of the people there were quite young. The founders of the company are both in their thirties, and most of the other employees are also relatively young. The situation at most other microcomputer software companies seems the same, which isn't too surprising, since none of these companies existed five or six years ago. At 17, I am the youngest person working for Broderbund.

I was also struck by the creativity and energy exuding from everyone. Being a programmer, I began to associate with the other programmers and discovered that in their case I was wrong—what I had mistaken for creativity was actually severe mental decay.

The programmers at Broderbund have a collective sense of humor that is prankish, deranged, and just darn funny. You can see signs of it everywhere, from the fake (but realistic-looking) retina scanner set up on the door to the programmers' area, to the sign on the door of Gene Portwood and Lauren Elliott's office (official titles: "Creative Consultants"), which reads "Department of Redundancy Reduction Department." Some of us also engage in "Mitel Wars," in which we harass one another, other departments, and the world in general with the company's PBX system.

The most far-reaching prank I ever pulled was what we at Broderbund call the Poppi letter. Let me give you some background. Bill Budge is something of a hero in the Apple world. He's been around since the Apple first came out, and most of the programs he's written have become classics. Well, I thought a person like that should have a teen following, like rock stars and other important people have. So I wrote a letter to *Softalk* (the Apple-oriented magazine read by everyone who's anyone) signed by a hypothetical Poppi Kosak, which read as follows:

"I think Bill Budge is a gorgeous hunk! Why don't you call him up for an interview some time, and pretend you're going to talk about his new *Pinball Construction Set*—but instead just take lots of pictures. . . ."

The letter goes on and on, but you probably get the gist of it. You can imagine my surprise when this letter was taken as genuine and actually published in the May 1983 issue of *Softalk*. There was enough information in it for people who knew me to know that I wrote it.

Most people thought it was funny. Others kept their children away from me.

CREATING A HIT GAME

I spoke with two accomplished programmers at Broderbund, Chris Jochumson and Robert Cook, about the creation and implementation of video games, and what makes a game a hit. They agreed the most important thing is that a video game must be fun to play. (And I thought it was the documentation that sold it!) The graphics must be state of the art, colorful, fast, and great-looking, and the game must play well and have a good "feel."

It is difficult to predict how well the program you're working on is going to sell. One way to get an idea of approximately how well it might do is to compare it objectively with other games on the market. It is important to be realistic, and not to let your ego get in the way of your judgment. Broderbund receives a lot of submissions from authors whose programs are okay but not good enough. For some reason, the authors are firmly convinced they have super-awesome megahits, and wonder why their games aren't accepted for publication.

One of the least defined areas of computer game design at Broderbund is originating game ideas. Cook says he tosses several ridiculous game ideas around in his head, discards most of them, and develops the rest. Unlike a business program, which is completely planned well before it is written, a video game evolves as it is programmed, and new features are added all the time.

Jochumson has two different ways of writing a game. One is to take a neat-looking effect he notices in one of his routines, and build a game around it. Another method—the "formula" technique—is to look at other popular video games, figure out what made them so popular, and then incorporate those ideas into his own game. He does not explicitly copy other games, but rather uses the basic concepts, such as being chased, hopping over things, climbing up things and sliding down them, and so on. Increasingly popular games are ones in which the player controls a person instead of, say, a spaceship. Several popular games involve controlling a little person who must run around and shoot things, or avoid robots, or dig gold.

A video game can take a year, or sometimes even more, to write. Although most programmers are inspired by their projects at first, their enthusiasm usually wears off pretty quickly. A great deal of effort goes into putting the final touches on a video game, like working out the little bugs and making the graphics look clean and smooth. Most program authors say they wouldn't finish their games if they weren't being paid for them. Another motivation for finishing a game is the feeling of accomplishment that comes with completion. You look at all the intricacies and doodads that work and cooperate with one another, and you know you are the one who designed the whole thing, even if you can't remember quite how. Being recognized by other game designers and the public is also fairly important.

Jochumson says one of his goals is to create a game he enjoys playing. Usually a designer is so tired of his game after working with it for a year that he never wants to see it again. Game designers also know all the tricks in their games; Jochumson wants to create one that is unique and challenging every time it is played.

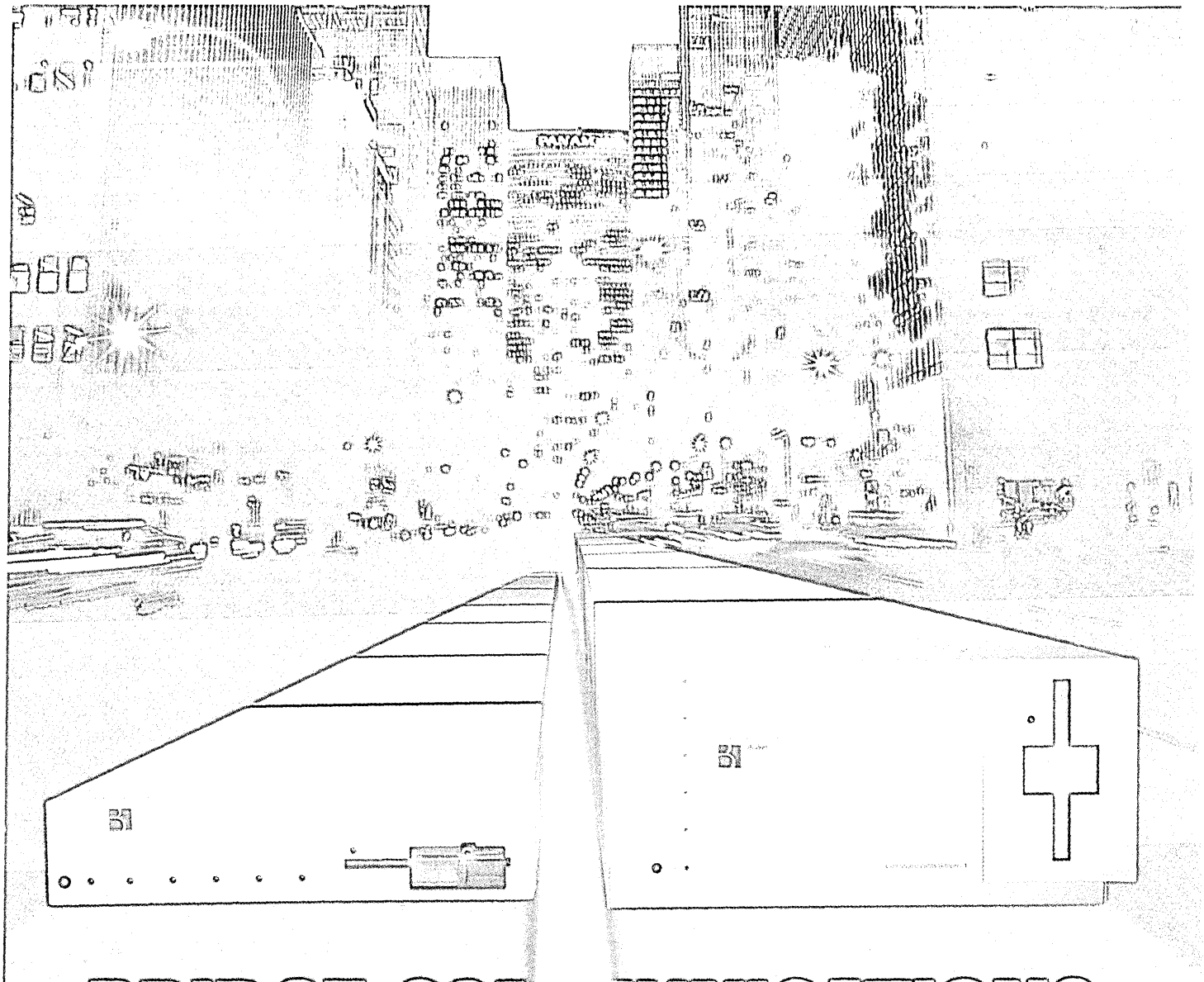
Another of his aims is to be financially secure so he never feels *forced* to write another game. Most games are written under financial duress—the author must write another program to earn money to support his family, or other things . . . (have you any idea what the upkeep on a Ferrari is?). Jochumson's ultimate ambition is to work on a video game as a pure art form, without having to worry about whether the game will be popular or a money-maker.

How does a person actually create a video game? To answer this, I talked with Robert Cook about his game Gumball, which was recently released by Broderbund. In the game, colored gumballs enter a maze of pipes at the top of the screen. The player must sort the different colored gumballs into the appropriately colored bins by opening and closing the gates that connect the pipes. If a gumball is sorted into the wrong bin, the manager of the gumball factory comes out, shakes his fist, and empties the bin of all its gumballs. As the game progresses, new colors of gumballs and bins are added, along with rotten gumballs, gumball bombs, and other distractions.

The basic idea for the game came from Doug Carlston, who envisioned a machine that would sort objects into different bins depending on their color. Robert then expanded on that idea, making the player a sorter at a gumball factory. He spent his first week designing the background screen, which consists of chutes and the gates that connect them. Although he later added many details to the background, the basic layout of the pipes and the gates remained almost completely unchanged throughout the rest of the design process.

The most significant part of the design process was programming the game itself. Among a thousand other details, Robert had to program the movements for all the gumballs, making sure they went through the chutes properly; add provisions for scoring events such as gumball bombs; and program the movements of the factory manager.

Writing the game program is an ongoing process that continues until the game is



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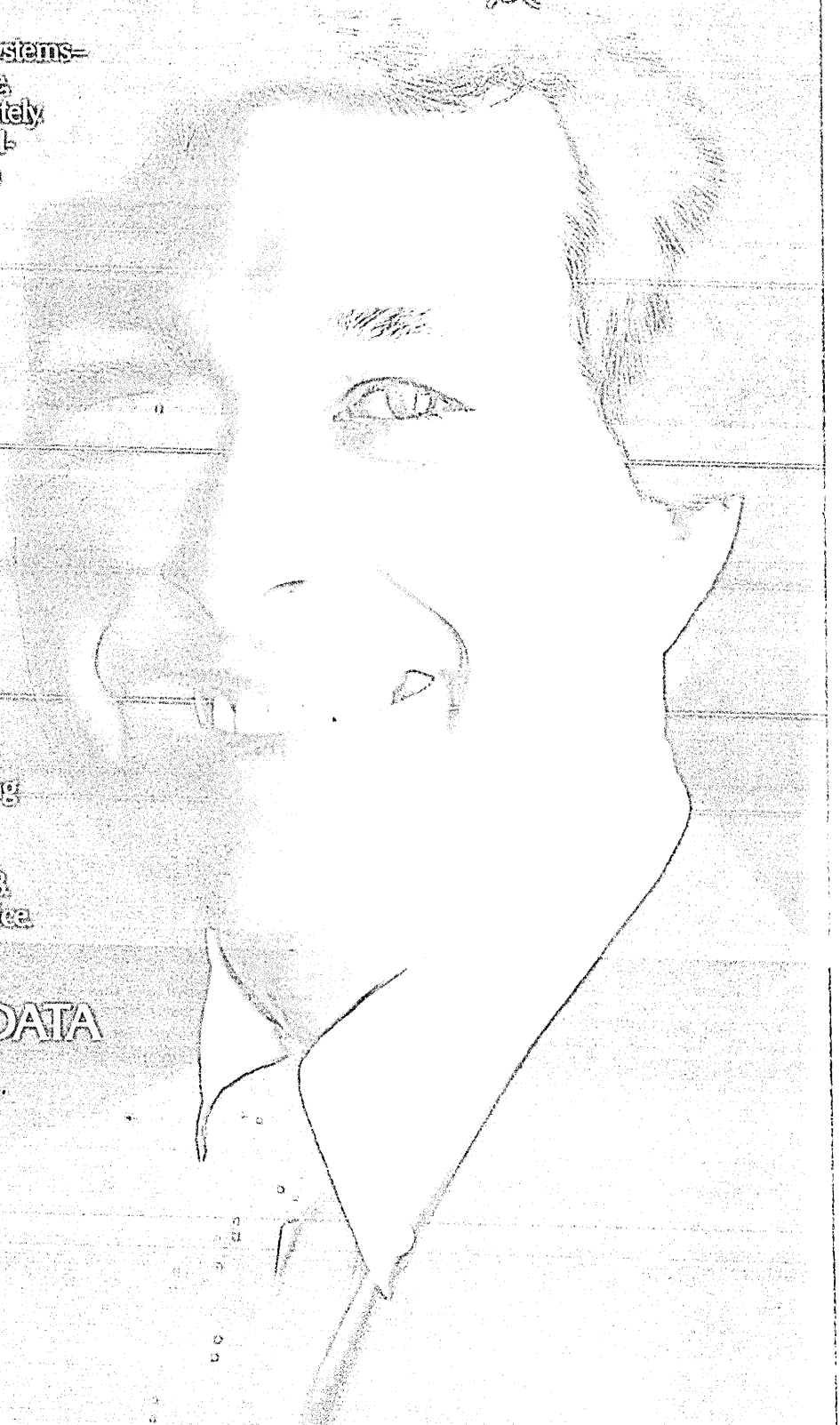

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CONTROL DATA

CIRCLE 67 ON READER CARD

published. There are always program bugs and details that need to be worked out; certain actions need to be speeded up or slowed down, and the graphics can always be more complex or attractive.

After the program worked reasonably well ("well" in the sense that the game could be played without seriously damaging the computer), Robert started adding several smaller features, including music and sound effects, some background animation like moving conveyor belts and gumball pullers-up, and scorekeeping. Of course, every time a new feature was added, new bugs had to be dealt with.

While working on the new features, Robert began work on Gumball's title page. The title page is usually a flashy animated sequence that shows off the game and grabs the attention of passersby. Robert also started to design the cartoons that are displayed between the levels of the game.

The game progressed to the point where it actually became fun to play. Earlier, all the features worked, but the game didn't really have the challenge and addictiveness that make a game fun.

ADDING FINISHING TOUCHES

Robert then began to add features that made the game more interesting. One part of the program, the method for catching gumball bombs, went through several changes. At first he had a claw that hung from an overhead track. The player could control the claw and try to grab the bomb. Robert trashed that idea and tried a grabber that would travel around on the pipes and zap the bombs when it got to them. Robert didn't like that idea either, and ended up using a crosshair the player could aim and fire at the bomb.

He also added different levels to the game; each one contained new colors of gumballs and more dangers. Robert also added a quota and time limit to each level. To move on to the next level, players must sort a certain number of gumballs by 5 p.m. (the end of the factory's workday). If the players don't meet their quotas, they lose.

Robert then submitted the game to Broderbund for final product testing. The game testers tested it for two weeks, discovered three small errors, and suggested some minor changes. Robert made the changes, fixed the problems, and submitted the revised version. Broderbund had already begun printing the documentation, the labels, and the boxes for the game, and by the time it was approved by the game testers, they were ready to begin shipment.

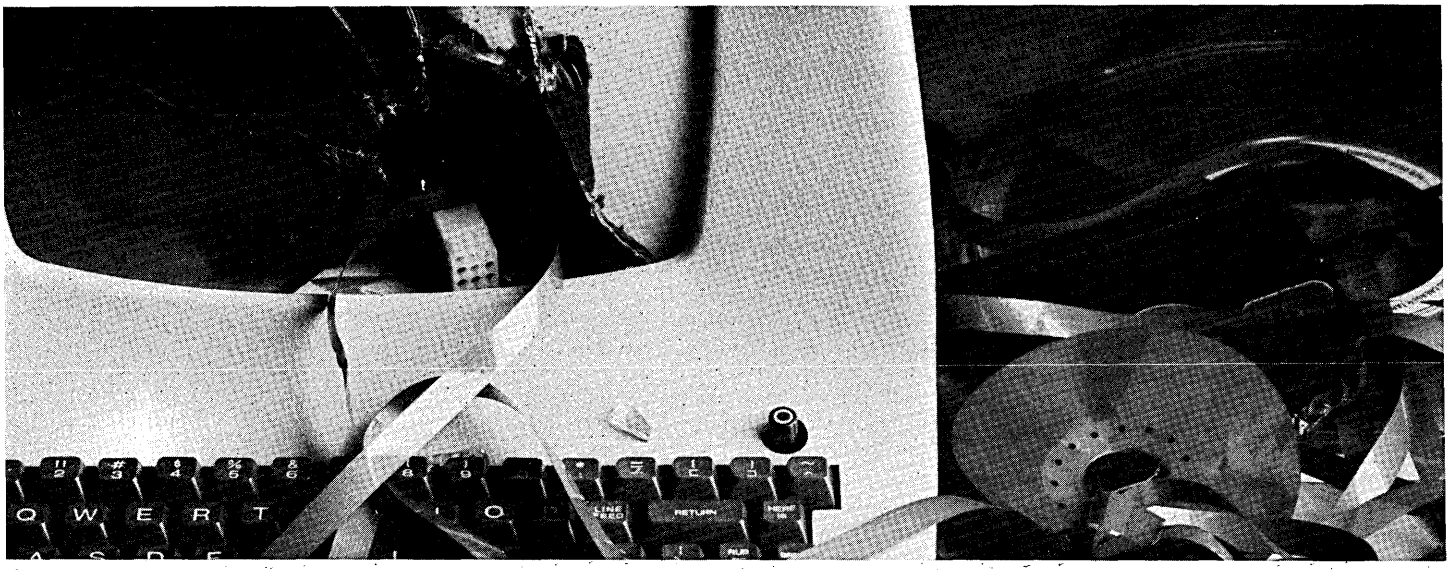
I talked with Gary Carlston, cofounder of Broderbund, about Broderbund's annual income. To be precise, Broderbund earns "a lot." When asked to be just a teensy bit more specific, he replied, "a bunch." Other estimates were "a great deal," "a load," "a hunk" (see Poppi letter, above), and "a heap." Gary did reveal, however, that a game called Choplifter!, which is currently Broderbund's best seller, has earned the company over $3 million so far.

Although Broderbund is not the largest video game publisher in the world, it is unique because both its entertainment software and its business software are popular. Choplifter! is number one on the game charts, and Bank Street Writer, Broderbund's word processor for the home, is number one on the business charts. Another hit product is the video game Lode Runner. Video games presently comprise about half of Broderbund's sales, the other half being business programs. In the future, games may comprise only 30% to 35% of its sales—not because Broderbund is deemphasizing games, but rather because the markets for business and educational programs are growing. ✲

Corey Kosak is currently on leave of absence from the University of California, Berkeley, and is employed by Broderbund Software Inc. as a freelance programmer. This is Corey's second appearance in DATAMATION—he participated in a round table discussion. "Growing Up Computing," that appeared in the June 1981 issue.

"A splendid choice, sir! It's the official floppy disk of the 1984 Olympics!"

CARTOON BY ELI STEIN



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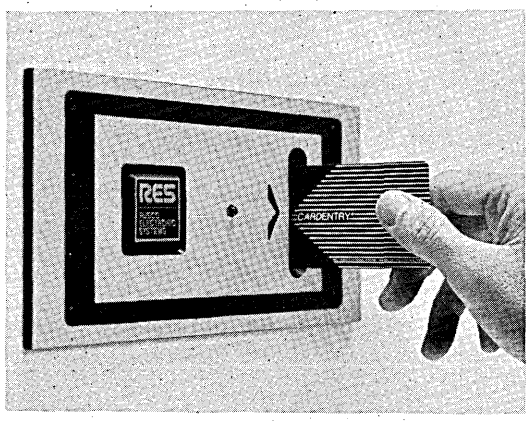

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THE SELLING OF SOFTWARE

by Efrem Sigel

When the 100,000 subscribers to *PC World* opened their November Software Review issue, they found an unusual insertion: a bound-in envelope containing a sample disk for Microsoft's just-released word processing program, Microsoft Word. Determined to crack one of the key micro software applications markets, the Bellevue, Wash., software house figured it might as well put the program itself into the hands of its prime audience: owners or would-be owners of the IBM PC. This kind of mass sampling had never been done before, and with good reason: not only were there production problems in binding the disk into the magazine, but the cost of disks and advertising space came to an estimated $350,000.

Yet Microsoft didn't stop there in its effort to launch a winner. Since October it's been running weekly five-column ads in the *Wall Street Journal* with the headline, "Stop Feeding Your Computer Junk Food." The ad, which shows a floppy diskette tucked into a bag of french fries, derides competing programs and immodestly contends that "From the first day you feed it Word, your pc will jump into high performance." On a national basis, the *Journal* ad costs Microsoft a cool $45,000 per throw. To make sure that nobody misses the message, Microsoft's ad agency, Keye/Donna/Pearlstein, also scheduled placements in *Byte, Infoworld,* and various business publications.

When all is said and resaid, the advertising and promotion launch of Microsoft Word won't be far from a million dollars, probably double what it cost to develop the program. This ratio of promotion to development budgets is becoming standard practice in the business software market these days.

Sorcim, San Jose, Calif., with about $10 million in annual sales, spent $1 million in just three months this fall to introduce SuperCalc3, the latest and most souped-up version of its spreadsheet and graphics program.

VisiCorp, also of San Jose, is locked in a battle with Microsoft and Quarterdeck Office Systems, Santa Monica, Calif., for leadership in the emerging windows software field. The company said it was budgeting several million dollars for the advertising/promotion of VisiOn. That is on top of the $10 million that VisiCorp already laid out to develop the program.

Lotus Development Corp., Cambridge, Mass., which started the present promotional war with its multimillion dollar launch of 1-2-3 early in 1983, has continued to spend heavily: its measured advertising just in computer and trade periodicals came to well over $2.5 million for the year. By contrast, Lotus's total development expenditures for 1-2-3 were under $1 million, based on figures from its prospectus.

Clearly, Silicon Valley has discov-

FIG. 1

CUMULATIVE SALES FOR BEST-SELLING BUSINESS SOFTWARE PROGRAMS THROUGH 1983

PROGRAM	PUBLISHER	CUMULATIVE SALES
WordStar	MicroPro	800,000
VisiCalc	Visicorp	700,000
SuperCalc	Sorcim	350,000
PFS:File	Software Pub. Corp.	250,000
dBASE II	Ashton-Tate	150,000
Total		2,250,000

Source: Communications Trends Inc

FIG. 2

BUSINESS/PROFESSIONAL SOFTWARE PURCHASES, 1981–84

	1981	1982	1983	1984P
		(in $ millions)		
Customer purchases	$140	$430	$936	$1,638
Publisher receipts	70	215	468	819

Source: "Business/Professional Microcomputer Software Market, 1984-86," Communications Trends Inc./Knowledge Industry Publications

The output of new titles far exceeds the abilities of retailers to stock, reviewers to review, and customers to buy.

ered—some would say fallen in love with—Madison Avenue. It's gotten so that every respectable software company needs two things: a multimillion-dollar injection of venture capital, and a multimillion-dollar ad campaign. The newly raised equity disappears so quickly into glossy magazine spreads that it surely won't be long before promoters put together a new kind of tax shelter, the limited partnership for software advertising, not software development.

Perhaps it already exists. Quarterdeck raised $5.8 million in venture capital in December for its DESQ, a windows package that competes with VisiOn, and promptly announced plans to put $3 million into marketing, of which $2 million will go for advertising. Ovation Technologies, Norwood, Calif., raised $5.5 million early this year for its highly touted integrated software package. Ovation plans an ad and promotion campaign in 1984 that will cost about $5 million, according to communications director Mark Minkin. One can only hope that when the ad directors, agencies, and media are through divvying up the spoils of these new offerings, there are a few pennies left. If so, they can be used to perfect the much-ballyhooed programs that were, in theory, the reason for these companies getting started in the first place.

It doesn't take great insight to observe that the microcomputer software industry is in the throes of a marketing revolution. The question is, will that revolution take the business to a new level, or will it wind up burying some of its most fervent proponents?

A MOST INGENIOUS PARADOX

A curious paradox is at work in the micro software field: on the one hand, the industry exhibits some of the trappings of a mass market; on the other, it continues to be a highly defined specialty business. The mass-market characteristics stem from the high unit sales being recorded by the best-selling programs. As of the end of 1983, five programs among them had sold more than 2.2 million copies, with the leader, MicroPro's WordStar, passing the 800,000 mark (see Fig. 1). In light of such sales, worth hundreds of millions of dollars, it is all too easy to lose sight of a fundamental fact: such programs are bought and used by a small minority of the adult population. While the audience is primarily business-oriented it is also composed of devoted personal computer users.

The reasons for the infatuation with marketing and advertising are understandable, which is not the same thing as saying they are valid. These reasons include the rapid growth in microcomputer sales and the attendant explosion in the number of available products; the peculiar economics of the software business, with its very high fixed costs and very low variable costs; and the sudden emergence of intermediaries (distributors and retailers) that exercise great influence over what is sold.

Microcomputer software sales have grown so rapidly that there has been a stampede of new companies—and new programs—into the market. Estimates from a recent study by Communications Trends, the Larchmont, N.Y., computer publishing industry analysts, shows that customer purchases of business/professional micro software totaled $936 million in 1983, up from barely $140 million in 1981. This year, purchases should reach $1.6 billion (Fig. 2). Publishers net only half of what customers spend, because of the high level of discounts to intermediaries.

As rapidly as the market has grown, the supply of products has grown even faster. No one can say what the output of new titles is, except that it far exceeds the ability of retailers to stock, reviewers to review, and customers to buy. Peek into the office of a software review editor at any computer magazine; you will barely see the floor for the stacks of new boxes, new manuals, and new disks that arrive daily. Talk to Softsel, largest of the independent software distributors, and you learn that it gets more than 300 new program submissions a month—and takes on only a few dozen new products. Visit a computer or software store and count the number of different programs on the shelves—it's the unusual retailer who can carry more than 200, and hardly anyone carries 2,000. Yet the count of programs that are commercially available already exceeds 35,000.

My guess is that the growth rate in title output is double the growth in industry sales, i.e., although software purchases are forecast to increase by 75% in 1984—which would be down from 1983's growth of 118%—the growth in number of programs will be more like 150%. Publishers have an ever more difficult time bringing titles to the attention of distributors, retailers, customers. Increasingly, the response is to turn up the marketing flame to try to buy that attention.

The drive to spend more affects the established publishers every bit as much as the newcomers. The last thing an established software company wants is to be knocked off its pedestal by an upstart, and since the new entrants can design programs that overcome the deficiencies of the leaders, there is all the more reason for the front-runners to erect marketing hurdles for would-be competitors.

As Fred Gibbons of Software Publishing Corp. (SPC), Mountain View, Calif., publisher of the best-selling PFS:File and related programs, puts it, the barriers to entering the software business are "marketing, marketing, and marketing." He explains that in six months, "anyone can reverse-engineer anyone else's product," whether the product is PFS:File or 1-2-3. The way to protect a position in the marketplace, says Gibbons, is to advertise and promote so heavily that the competitor cannot gain a foothold.

SOFTWARE BUSINESS ECONOMICS

How publishers deal with the oversupply of software titles leads naturally to the second reason for the emphasis on marketing: the peculiar economics of the microcomputer software business. SPC spends a whopping 40% on all marketing, 15% just on advertising and promotion. These percentages are high, but by no means atypical. Communications Trends has found that business software companies spend an average of 35% on marketing—far more than they devote to either product development (15%) or manufacturing and fulfillment (15%). Fig. 3 shows these ratios in chart form.

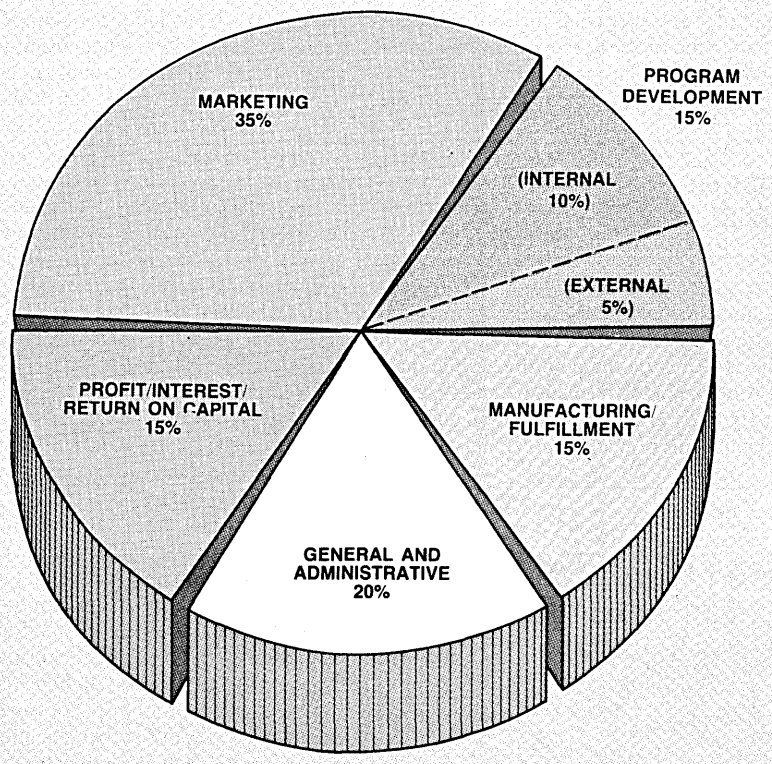
This pattern exists because business software publishing has very high fixed costs and relatively low variable costs. Once the first copy of a program is manufactured, the expense of producing additional copies is insignificant. Customers know that the manufacturing cost of a word processing or database program selling for $500 may be as little as $5 or $7. (This awareness is sometimes used to justify copying a program without compensating the producer.) What they don't know is that developing the program may have taken hundreds of thousands of dollars or years of unpaid toil by the programmer.

Nevertheless, the physical cost of making software is tiny compared to its price, which means that the gross margin on each copy sold is astonishingly high—95%, if one considers only manufacturing cost, 85% if one adds in royalties to outside authors and developers. Obviously the software publisher can afford to spend a bundle on making the sale, while retaining a very healthy portion of the proceeds.

And spend they do. Fig. 4 shows what four publicly owned micro software publishers spend on selling and administrative costs as a percentage of revenues—and what their pretax profit margins are. Lotus Development, which had such spectacular success with 1-2-3 last year, devoted more than 40% of its revenues to marketing and administrative costs, but earned an almost unbelievable 51.8% before taxes, in its first nine months of operation. BPI Systems, Austin, Texas, did almost as well, achieving a 46% pretax margin and keeping selling, general, and administrative costs to about 31%. (Its selling percentage has historically been

FIG. 1

HOW THE BUSINESS/PROFESSIONAL SOFTWARE SALES DOLLAR IS ALLOCATED



Source: Communications Trends Inc.

FIG. 4

SELLING AND ADMINISTRATIVE COSTS AND PRETAX PROFIT MARGINS FOR PUBLICLY OWNED MICRO-COMPUTER SOFTWARE COMPANIES

COMPANY	PERIOD	REVENUES (in $ thousands)	SELLING, GENERAL AND ADMINISTRATIVE COSTS	PRETAX MARGIN
Ashton-Tate	6 mos. ended 7/31/83	$18,016	38.0%	29.0%
BPI Systems	12 mos. ended 3/31/83	6,067	30.8%	45.6%
Innovative Software	12 mos. ended 6/30/83	1,685	39.0%	17.3%
Lotus Dvlpmnt	12 mos. ended 12/30/83	29,103	40.0+*	51.8%

*Estimate based on interim figures

Source: Compiled by Communications Trends Inc. from company financial reports

low because of an emphasis on oem sales to manufacturers. Now that BPI is beginning to stress sales under its own name, marketing expense is on the upswing.)

The third reason for the overwhelming emphasis on marketing by business software firms lies in the structure of the industry, specifically the key role played by a handful of distributors and by several thousand retailers.

Just as the microcomputer software industry is only five or six years old (the industry can be dated from the release of VisiCalc in 1979), so the emergence of a computer/software retailing industry is also quite recent. Softsel, of Inglewood, Calif., the largest of the independent distributors, dates from only the end of 1980; Micro D, Fountain Valley, Calif., the second largest, was founded in late 1979. Among the computer and software store chains, Inacomp, Troy, Mich., was founded in 1976; ComputerCraft, Houston, Texas, in 1977; the Program Store, Vienna, Va., in 1979; Software City, Teaneck, N.J., in 1980.

As these companies have boosted their sales of software, and as the flood of new products has yet to crest, their market power compared to the software publishers has strengthened noticeably. To make retail sales the software publishers need retail shelf space; to get shelf space they must enlist the cooperation of the chains. As an example of the economic power of a couple of key accounts, in Lotus's first six months, 37% of its sales were to ComputerLand, another 28% were to Softsel. Indeed, Softsel had an exclusive on 1-2-3 until fall '83. As another example, in November '83 Ovation Technologies received the blessing of Tandy Corp., which adopted its integrated software for the new Tandy model 2000 computer. But in order to get its program into 1,100 Radio Shack outlets, Ovation had to agree that it wouldn't ship the IBM PC version of the software until the Tandy version was also ready.

By no means do the retailers and distributors hold all the cards. Microsoft has been reducing the number of distributors that carry its software from several dozen to about six. VisiCorp, MicroPro, Lotus, and other major software publishers have been beefing up their national sales forces to reach corporate customers directly, bypassing the retailer. In the case of Lotus, the dealer can earn a commission for assisting in such a sale, but the commission can only be applied against future purchases of Lotus software.

In general, however, it's only the very largest business software firms that enjoy such bargaining power. The small- to medium-sized publishers are forced to woo the distributors and the chains. To do so they must answer the blunt question posed to new

The allure of the software business is a combinaton of Hollywood and the early days of aviation.

companies by a key manager at Micro D, "What are your advertising plans?" It's not enough for the publisher to promise a budget of 10% of sales after the sales start rolling in; show us the color of your advertising money beforehand, say distributors, if you want any sales at all.

The need to work with manufacturers, distributors, and retailers is a continuing problem for software publishers. Yet it is also one of their greatest opportunities. Perhaps the most significant asset software companies enjoy is the assistance of many independent organizations in marketing their products: distributors, computer dealers, software retailers, mail order houses, bookstore chains like Walden and Dalton, and even mass merchants like Sears and Toys-R-Us. All these companies have a stake—and a growing one—in selling as much software as they possibly can.

Everyone has seen the Little Tramp in IBM's PC ads holding up a very high, somewhat shaky pile of software products. The message of this ad is clear: there is lots of software for the PC, and a computer that offers the best choice of software is the best computer.

Not only IBM, but Apple, Tandy, Texas Instruments, Hewlett-Packard, Epson, Kaypro, and Digital Equipment Corp., all trumpet software availability as a reason to buy hardware, and provide tens of millions of dollars of free advertising for software publishers. In the process, they reinforce industry participants' suspicions that what can really count is not the product itself, but the way that product is promoted.

EFFECTIVE MARKETING SUCCEEDS

Of course, effective marketing is required to succeed in the business software field. But the software executive at a multibillion dollar entertainment conglomerate, who told me in no uncertain terms that "it's a marketing-driven business," missed the point by a wide margin. A marketing-driven business is a mature industry like the detergent or auto industries, in which teams of market researchers are forever trying out new product names and new tv commercials on panels of "representative" consumers. It's far too early for software to be developed in this fashion.

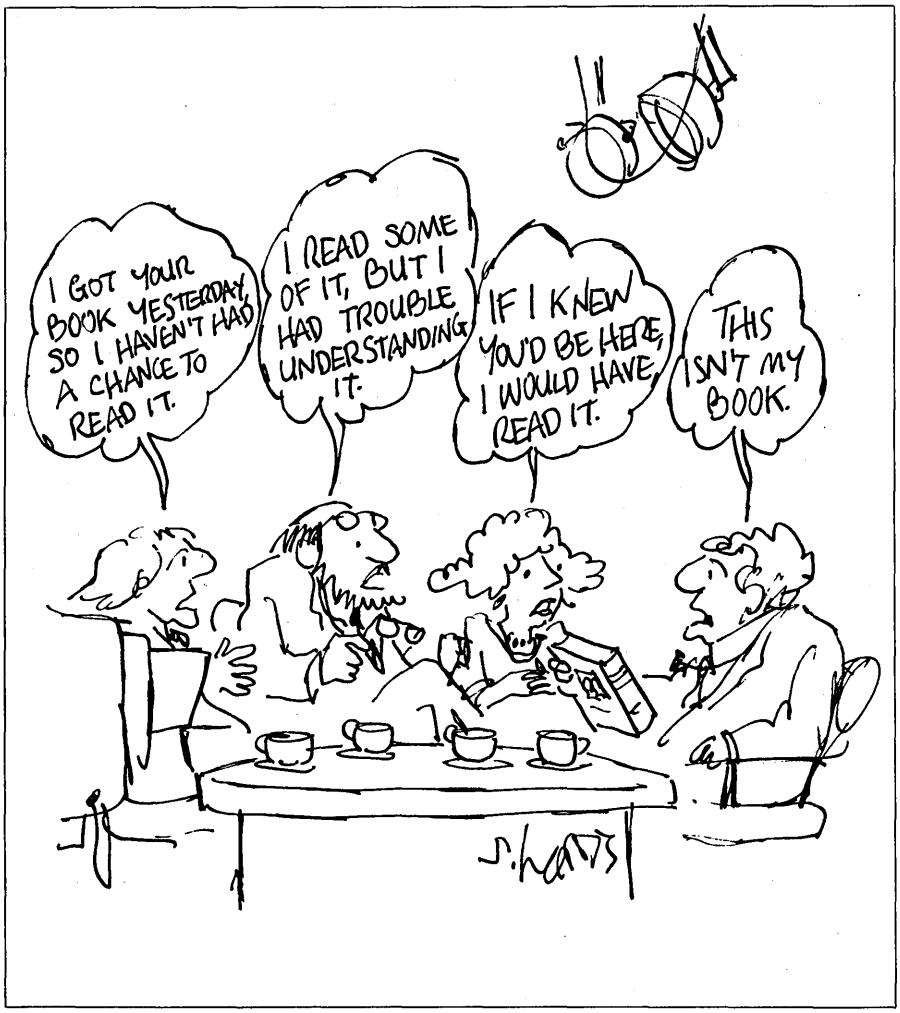
The allure of the software business is a combination of Hollywood and the early days of aviation. Important attributes are instinct, creativity, flair—and a good grasp of technology. New products come from the minds of developers, not from customer questionnaires or focus groups. Indeed, until significant new programs are actually produced, no one can envision whether they are feasible or how they will work.

Even for people accustomed to the fast-lane pace of the computer industry, time has a different meaning for software companies. A year in this field brings changes that in other industries would astound. If we look all the way back to the end of 1982, for example, we see a time in which no one was using 1-2-3; the popular business word processing program, Multimate, had yet to be introduced; Microsoft Windows was completely unknown; and pc-to-mainframe links from MSA, McCormack & Dodge, and others were an idea, not a reality.

On the surface, however, the notable changes can appear to involve the selling of software, the appointment of new ad agencies, the drawing up of multimillion dollar promotion budgets, the constant drumbeat of media hype, and the ardent courting of distributors, dealers, press, and customers.

In such an atmosphere, one can understand how some software entrepreneurs have come to believe that they exist to advertise and promote. The truth is otherwise: they are in business to create programs that do a better job for users than competing products. In their rush to raise venture capital and to pour it directly into advertising, software entrepreneurs can easily overlook this elementary function. Indeed, they are being abetted in their error by the investors that stumble over themselves to squander money in this brand-new field.

The current leaders in micro software, companies like Microsoft, MicroPro, Lotus, Digital Research, and Ashton-Tate, have quite a head start in the race to define and lead this new industry. One should never underestimate the perils of an early success, though. It has brought grief to lots of companies over the years, and there is, unfortunately, no evidence that things will be any different in microcomputer software. ❋



CARTOON BY SIDNEY HARRIS

Efrem Sigel is president of Communications Trends Inc., Larchmont, N.Y., publishers of *Computer Publishing and Advertising Report Newsletter* and *Computer Publishers and Publications Directory*.

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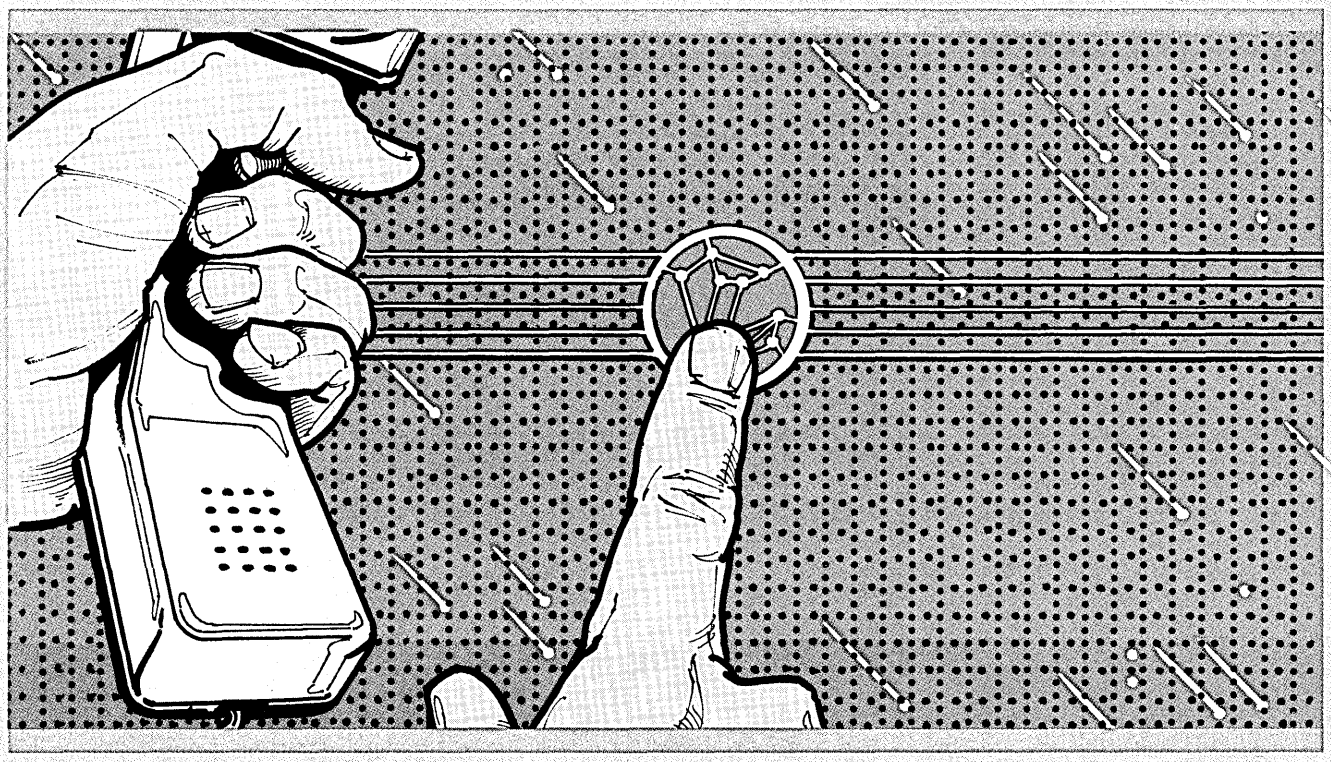

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With a little luck and some cooperation from users, you can plan your way to a painless conversion.

DATA CONVERSION WITHOUT TEARS

by John G. Seddon

Data conversion makes more than new files. It also creates opportunity for disaster. But handled wisely, data conversion can also improve overall system performance. It can reduce muddled thinking throughout your company, thinking muddled by scrambled data.

Unfortunately, conversion is often conjured up behind dp's closed doors. We say we don't want to baffle users with data definitions. They are happy to relinquish responsibility to us. Presto! So-called automatic data conversion becomes a gridlock of exception cases.

The answer lies with how you use the users.

If a new installation is to be a success, users must ultimately assume responsibility for their systems. That includes ownership of the data within these systems. If you can get users to cooperate during the data conversion stage of the installation project, your job will be simpler, your results better. It's time to bring data conversion out of the closet.

The project team can control the data conversion by limiting the scope of work for each phase of the installation. A generalized package usually provides more files and data fields than any one company can use. On the other hand, custom-programmed systems have custom-designed file structures. There may be less data conversion to do, but the same techniques apply.

Not all the fields in all the files will contain data in the first, second, or even third phase of the conversion. For example, the new customer record may include data fields to be used when customer statements are sent. If statements aren't scheduled during this phase, and aren't part of the old system, why create this information now? Chances are, if the data are generated in this phase, the users will ask that the statements be implemented too. Persuade users to wait until a later phase; by the time statements are implemented the old information will be out of date.

The first step in the project team's preparation is to put a boundary around the data conversion task. What information is needed to bring up this installation phase?

The next step is to match the new files and data fields with the old ones. This is easy at the file level; most of the fields in the new customer record will come from the old customer record, and so on. But how is each new field value to be generated?

In the simplest case, the new field takes a single value from all the records in the file. For example, if only active customers are converted to the new system, all the new customer records will have their status field set to "active." Another simple conversion is to translate values in the old field directly. For example, customer name, address, and credit limit won't change. Dollar values and text fields are usually translated directly, but fields that flag a record for different processing, like customer type, statement format, and aging class, do change. The project team should spell out the translation table to convert a retail customer, say, from type "27" in the old system to type "R" in the new. The translation becomes more complicated when a field accepting character values (i.e., up to 36 values in each field position) has to be translated to a numeric field (i.e., 10 values for each field position). The translation table becomes essential.

The new field value may depend on two or more fields in the old system. Or a 30-character field may have to be compressed into 24 characters, or split into two 20-character fields. Here, a translation table won't help; a conversion rule is needed.

Installation of a new application is often taken by the company as an opportunity to change the structures that classify its business. New general ledger software is a chance to go to a new chart of accounts. Bringing up an order entry system prompts the sales department to renumber its territories. Should the changes be made now?

No. Introducing new numbering systems like this will complicate the data conversion. It also makes it difficult to check that the conversion works. It's easy to compare apples in the old system with apples in the new one, but now you've introduced oranges.

Finally, and most important, people can only absorb so many changes at one time. Moving to a new software system already represents a tremendous change for the company. The benefits promised by the new classifications may be lost in the confusion they cause.

TRANSLATE THE DATA DIRECTLY

There is a safer way. First, translate the data as directly as possible. When the users have verified the conversion, then they can change their classification systems. They should use the functions provided by the package. They can redistribute general ledger amounts to a new chart of accounts through journal entries. They can reassign sales territory numbers by add-territory transactions and by changing sales rep assignments.

The project team defines how each new field's value is to be generated. Some translations will be unclear. Perhaps the team doesn't understand how the new field affects the way the record will be processed. The team should consult the new software to determine this.

There will be cases where the new data aren't available from the old system. They will have to be collected somehow. The company can conduct a survey, or the information may be available from the old transaction history.

Let's take the first method—a survey. Who is best suited to collect the data? Who is going to use them? The answers may be different. Data collection is often assigned to the group that gains from having the information. This may not be the best way to apply company resources. Take a purchasing system. The purchasing department enters purchase orders, including actual cost information. Purchasing also sends quarterly cost forecasts to cost accounting, based on information from the vendors. Cost accounting uses the forecasts to calculate standard costs and it tracks actual cost against standard. The final part of the jigsaw is the planning department, which uses the quarterly forecasts to model the company's future profit margins. The new system provides data fields for quarterly forecasts and standard costs. Who should key the information?

Information should be entered into the computer system as close as possible to the point of origin. The data can be verified by the person who is nearest the information needed to resolve any questions. This system also reduces transcription errors and human communication errors. In the purchasing example, the quarterly forecasts come from the vendor; purchasing should enter this informa-

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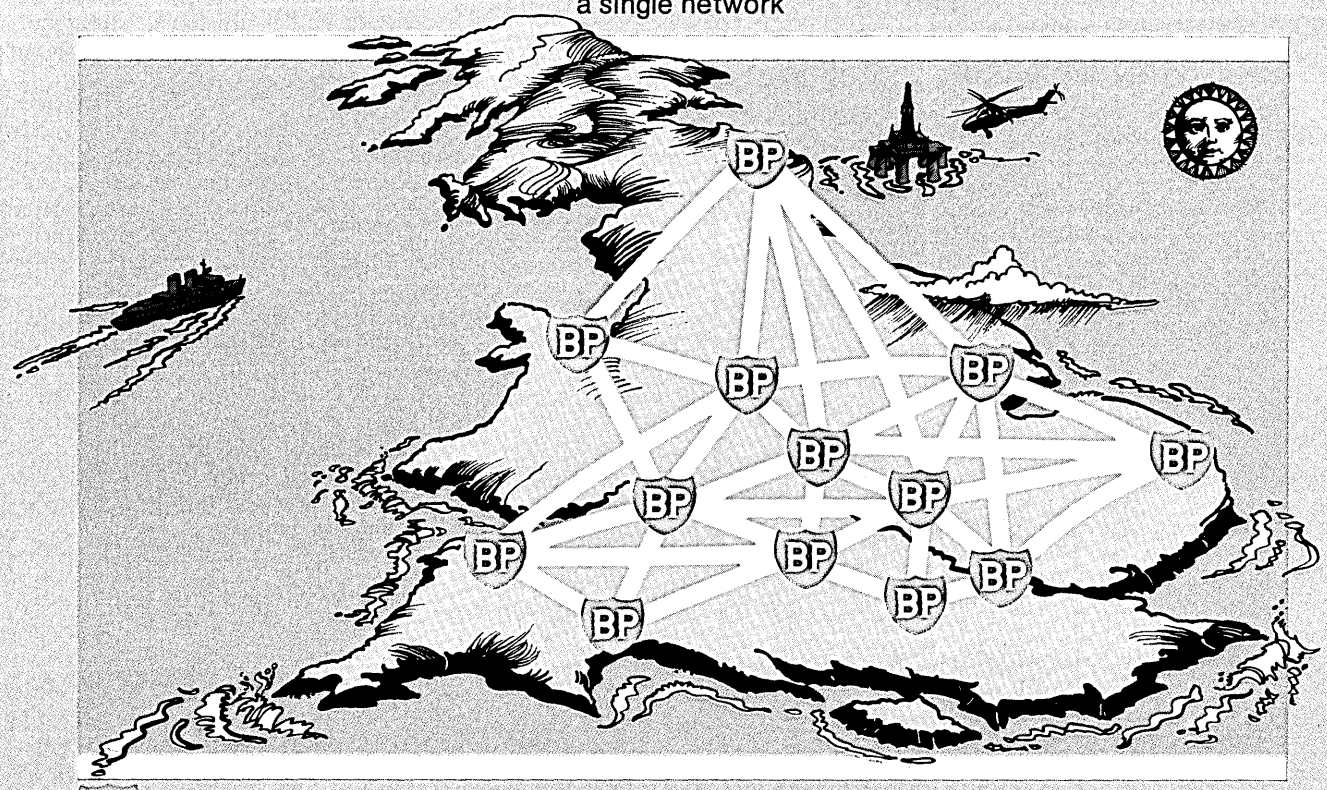

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It's tempting to take a conservative approach and convert everything.

tion into the new fields. Cost accounting calculates standard cost figures; it should be responsible for entering them.

An alternative way to generate data not directly available is to reprocess the old transactions. For example, the old accounts payable system might not keep a running total of disbursements by vendor. Reprocessing the year-to-date transactions is one way to calculate the disbursements totals. But reprocessing takes time. It's also a breeding ground for inaccurate information. The new calculations may be based on old archive tapes in bad physical condition. Besides, there's no guarantee things haven't changed during the lifetime of the old file structure. These changes may throw off your calculations. This year's order-value field may be last year's standard-cost field. Generating accurate data from the past history is difficult when the recording medium—the transaction archive—has changed.

So far, the project team has taken the new file structure and matched it against the old. Are there any data fields in the old system that have missed the conversion boat?

It's tempting to take a conservative approach and convert everything. After all, who knows when it might be needed? Simply because the old system kept the data around, however, is not reason enough to clutter the new system with them.

The project team has already taken part in the design of the new system. It knows what fields are being added to support the new functions required. So if a field from the old files has been missed in the conversion plan, it may mean that the field is not important. Or it may mean that the function the field served is important, but was overlooked in the design stage. Either way, converting everything just because it's there is superficial and dangerous.

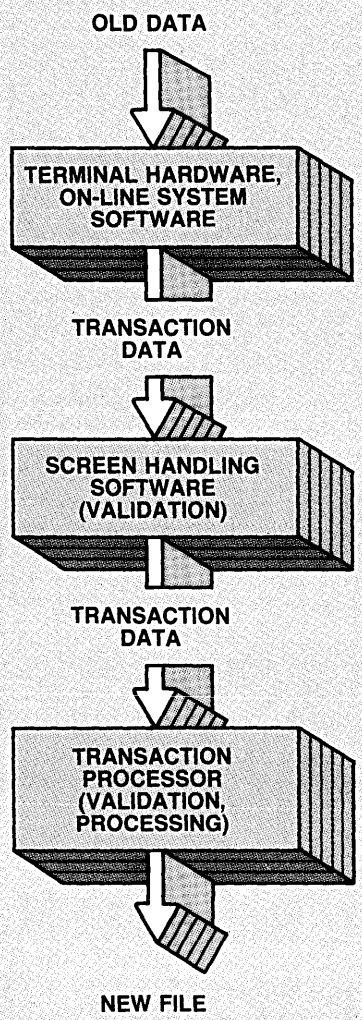
Sometimes the meaning of an old field is obscure. What the sales department refers to as "customer type" is what finance calls "aging class," and neither department may be able to define what the field means. Listing the file, sorted by the field in question, shows how the file defines the field.

When the meaning of an old field is vague, then the field values may be obsolete. Of 99 customer types on file, for example, only 10 may be active. The other 89 categories could have been inherited from previous sales administrations and long-forgotten projects. The 10 remaining types may be more useful as 30 new codes based on how the user classifies customers in business.

The team can wander into another danger area: cleaning up the old data. This takes considerable time and effort. Combining it with data conversion can also be distracting. After all, the objective is to get the new system working. The converted data should be at least as clean as the production data that will be processed against them. The project team can assure this by choosing an appropriate conversion method.

FIG. 1

ON-LINE TRANSACTION PROCESSING



There are many ways to move data into the new files. A description of some of them would be facilitated by a review of how the new system will handle the daily production work. Fig. 1 shows a file—for example, the customer file—being updated by a file maintenance transaction. The terminal hardware and on-line system software take the data entered by the operator and pass them to the screen handling software. The screen handler performs some elementary validation of the data. (Is the customer number numeric? Is the transaction code alphabetic?) Some screen handlers will check the value in a field against a table of possible values. (Is the transaction code A, C, or D?) The screen handler passes the transaction to the transaction processor. This program does more checking. If the aim of transaction is to add a customer, the program looks to see if the customer record is already on file. When the transaction processor has completely verified the transaction, it then updates the file.

Another method is shown in Fig. 2. A step has now been added; the transaction is passed to an intermediate file the operator can modify. When the operator is satisfied that the transaction data are correct, the transaction file is passed to the transaction processor. The program validates the information again and updates the file. This method allows the operator to review each transaction before the files are changed. Also, transactions are collected together in the transaction file. They can be printed out or written to an archive tape, providing the company with an audit trail. Transaction totals can also be calculated from the file.

Fig. 3 shows a one-step approach, typical of batch systems. The transaction processing program performs all the validation and updating. There is no interim file or preliminary validation.

TRANSLATE OLD DATA FIRST

The most often recommended data conversion method is to translate data from the old files into transactions to initialize the new files. The least recommended method is to write a program that loads data directly from the old files into the new ones. The file-to-file approach rarely checks the data as thoroughly as the transaction processor. Sure, the programmer can add validation code to the load program, but why reinvent the wheel? The package already does that. And direct, file-to-file conversion may skimp on the housekeeping tasks needed to maintain the new database. Just loading records into a file isn't going to update the indexes and record chains used to manage today's complex database structures.

There are other conversion techniques. Small files may be keyed in. Or data may be translated from the old files and passed to the screen handler or on-line system software. To do this, the software is directed to a file for its input instead of a terminal. There are as many alternatives as there are stages in the new system's processing flow. The wise project team uses as much of the

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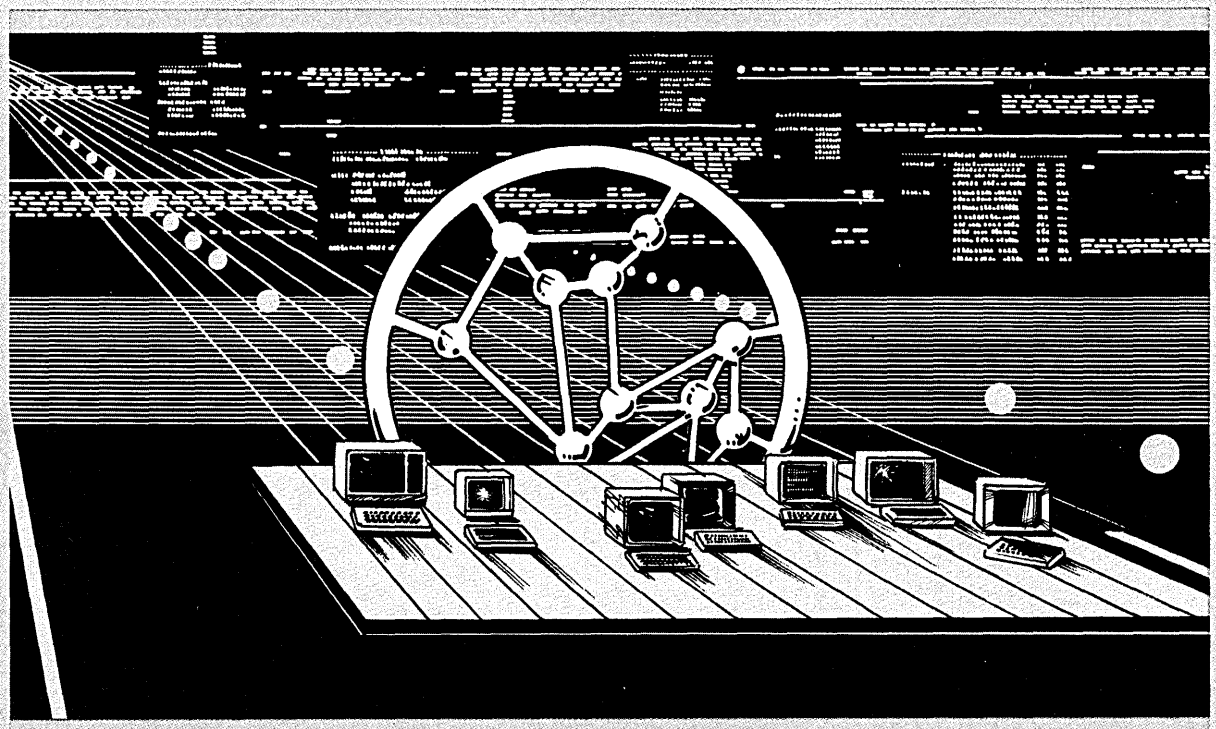

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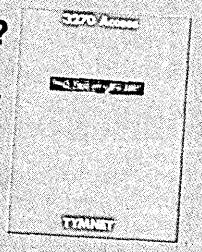

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CIRCLE 71 ON READER CARD

In an ideal world, all this would go smoothly. But people make mistakes.

already programmed software as possible.

If the team does use the new system's transaction processor, the sequence of file conversion will follow the production business cycle. For example, in converting purchase orders the transaction processor will validate the vendor numbers. This means the vendor file must already be loaded. The program to load the vendor records will check the vendor payment terms, so the payment terms file must be initialized. A data conversion plan is emerging.

The last stage in the plan must be to make certain the conversion worked. Transaction file listings and totals have already been mentioned. Standard reports will list data in the new files. These reports should be augmented with programs specially written for this verification stage, to match information from systems and report differences.

The verification procedure—which fields from which reports should balance—is written down by the project team. They will find they need more verification reports. Better to program these reports now than to have to wait for them after the data have been converted.

Planning should also include reestimating the file size requirements for the converted data. Decisions made earlier can alter these estimates dramatically.

TIME TO REVIEW THE PLAN

When the team has done its homework, it is ready to review its plan with the users. The objective is still to shift responsibility for the data, and for the data conversion, to them. But the users must be confident that the data conversion will be accurate and that they can control the data once they are on the new system. This objective is worth repeating at the beginning of the meeting. The team can then support this objective by presenting the alternative conversion methods, citing their own strengths and weaknesses and those of the methods being proposed. Verification procedures are then reviewed.

Describing conversion methods and verification procedures first allows the team to answer firmly any user doubts that are voiced later. The meeting goes on to the detailed plan, and the team must be prepared to discuss these matters:

- Unclear translations.
- New data to be collected.
- Fields that require old data to be reprocessed.

The project team should have an estimate of the work involved and the expected accuracy of the results.

- Cleaning up data. If the transaction processor method of conversion can't clean up the data to the user's satisfaction, the task should probably become the user's responsibility. For example, if bills of materials contain components no longer on file, the transaction processor will have problems loading the data. The users can check the bills for accuracy first.

In the final part of the meeting, the team should reiterate the plan and restate items changed or confirmed during the meeting. It should then publish a follow-up memo. The users go away feeling they can, and should, control the way the data are converted. If data in the new system are going to be their responsibility, dp should give them every chance to start off right.

The planning complete, it's time to do some work! The major dp effort will be developing the translation programs. The problem: how to pull data from the old files and generate records that look to the new software like valid transactions.

The project team and users have provided a definition of the field-by-field translations. The programmer will use translation

FIG. 2

ON-LINE TRANSACTION PROCESSING WITH TRANSACTION FILE

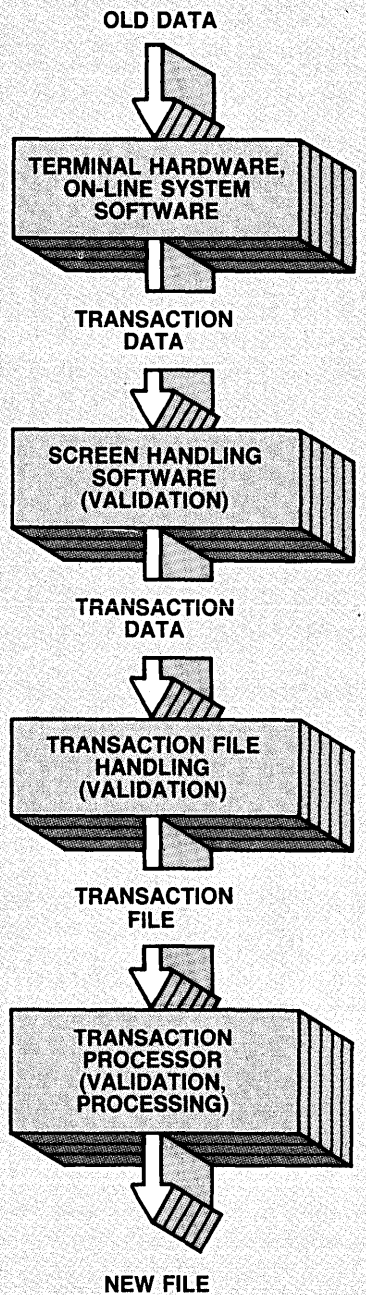
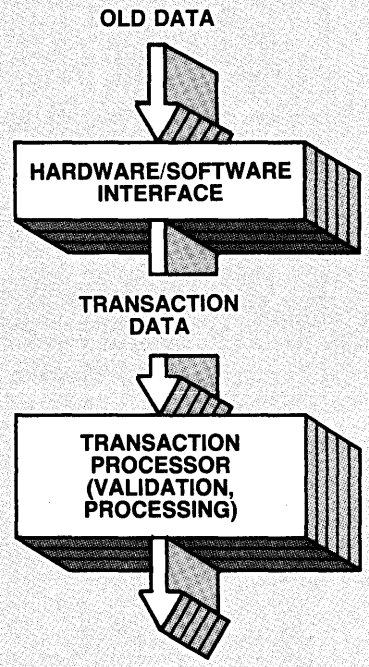


FIG. 3

ONE-STEP TRANSACTION PROCESSING



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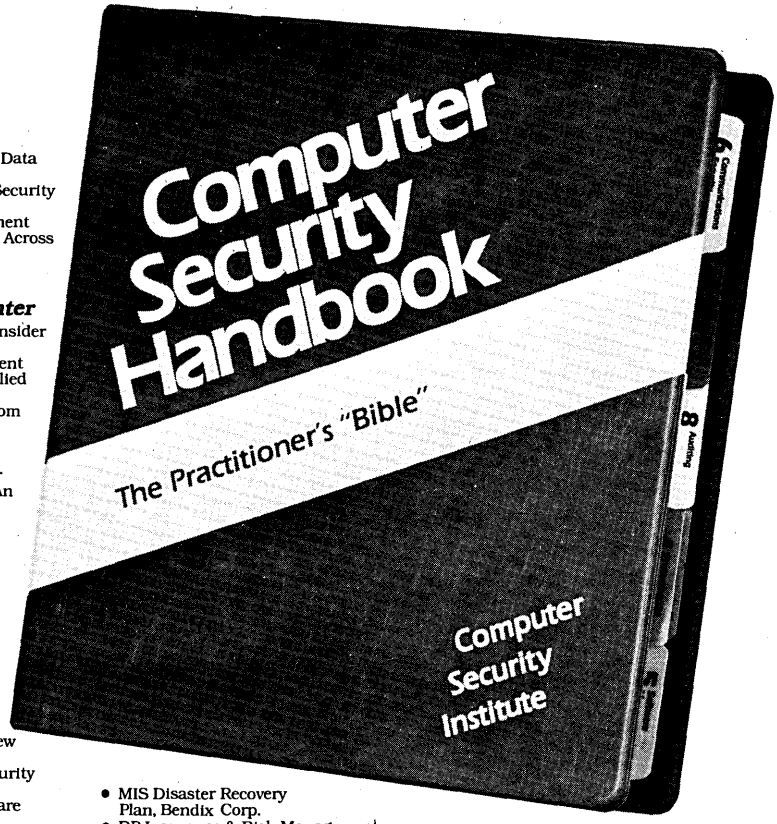

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It is crucial to give users accurate startup data, data they can believe in.

tables and algorithms to generate the new data values. Some translation tables will be large. For example, translating to a new chart of accounts requires a table with an entry for each new account number. No algorithm or blanket rule will suffice. In these cases, the translation table itself becomes difficult to maintain. The programmer should set up a separate translation file and file maintenance program. This saves time when the translation changes.

Dp's other responsibilities include tasks already mentioned: writing and testing load programs; listing files for users who are collecting data, cleaning up data, or entering the smaller files; writing verification programs; scheduling reprocessing to generate new data; monitoring file space requirements; estimating and scheduling machine time. The users' tasks include collecting new data, entering data, cleaning up data, and checking that the conversion is correct.

In an ideal world, all this would go smoothly. But people make mistakes in programming, in thinking, and in communicating with other people. Typical errors are not understanding what a data field means, making tape-read errors, handling errors badly—the conversion program may detect a bad record but not be able to recover from it—using file sizes that are too small, forgetting housekeeping tasks necessary to maintain the new file structure, making too many changes in the data at the same time, and letting production work slip into the system during conversion.

If the verification reports are out of balance, don't panic. There may be a very simple explanation. And there are good ways and bad ways of fixing problems. In a general ledger installation, for example, the conversion may move items posted to two old account numbers into a single, new account number. If this translation turns out to be incorrect, a journal entry can be used to reclassify the difference. The accounts will then balance. This won't transfer the detailed activity to the new account, however. Since the reclassification remains on file, it will remind users of the less than perfect data that dp gave them to start with. If there are many of these corrections, the users will be more confused and less confident that the conversion worked.

If design changes or corrections are necessary, the project team should try to fix the problem in the old system and then reconvert. It takes more machine time, but it boosts the users' trust in the new system.

And that's what it's all about. The team's goal is to hand the new system over to the users. It is crucial to give users accurate startup data, data they can believe in. This becomes the foundation of their work. By taking data conversion out to the users, dp stands a better chance of giving them what they want. ✱

John G. Seddon is senior consultant with Peat, Marwick, Mitchell & Co. Systems Development Group in Los Angeles. He has worked for Control Data Corp., Canada, and IBM, U.K. He has managed three application conversions in the past 18 months and has gone through three hardware system conversions in his 15 years in dp. This article will appear in his *Package Installation Handbook*, to be published by Prentice-Hall in the spring of 1985.

HARDWARE

OFF-LINE

With all the lawsuits, countersuits, out-of-court settlements, and injunctions with which the computer industry has been clogging court calendars, it seems as if more new products are resulting from legal action than from the more traditional R&D route. The more amicable settlements, as these things go, are the out-of-court agreements in which neither party admits any wrongdoing but one party pays the other lots of money and promises never to do anything naughty again. And of course that party also forks over any materials that seem somewhat suspicious in nature, even though there was no admitted wrongdoing. The more hostile cases these days have resulted in product bans, fines, and stiff rulings from authorities such as the International Trade Commission or some federal court. Here is a scorecard of some of the more significant recent cases:

Printronix and CIE Terminals reached an out-of-court settlement in a dispute over the CI300 and CI600 terminals, which Printronix argued violated its patents. CIE agreed to stop importing the terminals from its Japanese supplier, although it did not concede the patent issue. CIE did say, though, that it will introduce new terminals this fall to replace the disputed line. They're called, at least for now, the Settlement Series.

The International Trade Commission ruled that nearly two dozen Asian manufacturers had infringed on copyrights and patents held by Apple Computer by importing pcs using a nearly exact duplicate of Apple's ROM-based Apple IIe operating system. None of the clones may be sold in the U.S., the panel ruled. Left open was the issue of whether the machines could be sold here if the disputed ROM were removed.

A U.S. Court of Appeals judge ordered Franklin Computer to pay $2.5 million in damages to Apple for copyright infringement, also relating to the Apple IIe operating system ROM. It's no surprise that Franklin, based in Cherry Hill, N.J., claimed no wrongdoing.

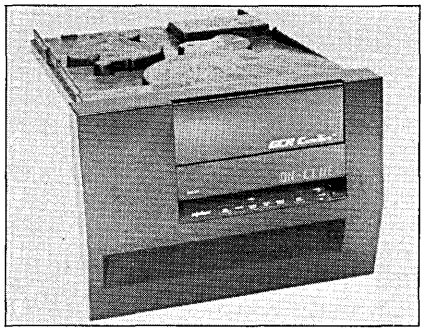
Similarly, two companies felt the wrath of IBM. Both Corona Data Systems and Eagle Computer were barred by federal judges from using the basic I/O system they had incorporated into their IBM PC-compatible units because, well, it was too compatible. Both companies agreed to replace the BIOS, destroy any material relating to the old BIOS, and stop shipping units with the old BIOS.

Whether any of these firms actually did anything illegal is not even the issue; more interesting is whether they can survive without the ROMs and BIOSs on which they built their systems. All three of the American companies affected said that they would have no problem replacing the components without affecting revenues or profitability too much, but that remains to be seen. And if they can't, does that mean that IBM and Apple are free to build monopolies by crushing competitors under the copyright and patent laws?

An early criticism of the IBM 3270 PC was its inability to perform graphics applications. That's been blunted recently by IBM's announcement of two cards for the PC to allow both PC-compatible graphics and host-compatible graphics. The $800 Programmed Symbols Adapter Card essentially gives the PC GDDM compatibility when running as a 3279 connected to a host. The $550 PC Adapter Card allows the 3270 PC to display bit-mapped graphics of any PC graphics application that adheres to the IBM PC/DOS BIOS, the company said.

TAPE DRIVE

The CacheTape M990 tape drive is designed to meet the storage requirements of 32b computer systems, and is targeted for the higher level secondary storage market.



It employs the standard Cipher ½-inch tape interface for hardware integration and for system software compatibility.

The unit features a cache size of 128KB and a maximum transfer rate of 450KBps. At 450KBps, the transfer rate for the M990 offers approximately three times the throughput that 100ips streamers provide, according to the manufacturer.

The tape drive is 14 inches high. It has a front-loading and threading design. The unit also has a front panel word display for operators and service maintenance messages. The unit provides up to 180MB of data storage in a single reel of tape.

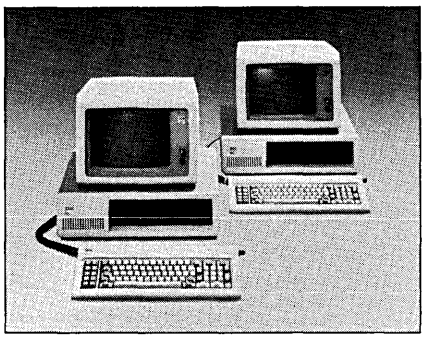
The vendor says with the increasing storage capacity of the Winchester disk drives, there is a need for a high-density 6250bpi tape drive. The M990 costs between $6,000 and $7,000. CIPHER DATA PRODUCTS INC., San Diego, Calif.

FOR DATA CIRCLE 300 ON READER CARD

PC NETWORK

The Plan 2000 lets users network IBM personal computers, XTs, and PC compatibles to access shared databases, hard disks, and printers. In this system, the PC that acts as a file server is not dedicated to network functions, so the user can run applications while network functions are processed.

The entire network can be upgraded



for increased capacity, function, and performance by plugging in additional vendor products. The individual network interface cards for each PC, software providing network-wide resource sharing, and cabling form a Plan 2000 System. The software allows for printer and disk sharing and offers exclusive access to personal work volumes, read-only access to program libraries or information owned by other users; locks to implement multi-user applications; and passwords to protect private information.

The system allows clusters of PCs—typically two to four per disk server—to be linked. It utilizes token passing protocol that has a data rate of 2.5Mbps. Up to 225 stations can be connected to the same network, with a maximum distance of 22,000 feet between PCs. Starter kits including two network interface cards, network software, and cabling bundled with one or more application programs cost $2,000. NESTAR SYSTEMS INC., Palo Alto, Calif.
FOR DATA CIRCLE 301 ON READER CARD

PROFESSIONAL WORKSTATIONS

These workstations operate in Ethernet and PBX environments. One of the models, for use in remote locations, can transfer information through a PBX to an Ethernet network. The standalone model can be field upgraded to a network version or a remote workstation.

Both workstations are based on the Xerox 8010 Star system. They incorporate interfaces such as the mouse, symbolic icons, multiple display windows, and a bit-mapped display. The remote workstation uses regular phone lines and can be routed through a PBX to an Ethernet network. Once linked to the network, it fully shares all regular network resources such as electronic mail and electronic files. It communicates through an RS232C connection, using either leased or dial-up lines.

The workstations have two print options, a conventional character, and a network laser printer that can be accessed via the system's floppy disk. All text and graphics displayed on the standalone Star workstation can be stored on the system's floppy disk, and the disk can be transferred to a Star network model.

Computer aided instruction is available with the equipment. The standalone Star 8010 costs $9,000. The remote Star 8010 is priced at $10,000. XEROX CORP., Palo Alto, Calif.
FOR DATA CIRCLE 303 ON READER CARD

ACCELERATOR

The 580 Accelerator gives users of Amdahl's 5840 and 5850 mainframe computer systems access to the power of a larger processor during periods of increased demand.

A benefit of this device, according to the vendor, is it can handle large workloads without maintaining idle computer capacity. Depending on the installed processor and desired performance level, users can select one of three options.

Option one enables a 5840 to be accelerated to a 5850 level, with a performance increase from 25% to 30%. Option two lets a 5850 be accelerated to the 5860 level with a performance increase between 30% and 35%. Option three accelerates a 5840 to the 5860 level with an approximate performance increase of from 60% to 70%.

In each case, acceleration occurs when the console operator issues a single command. A second command returns the cpu to its original performance level. The 580/Accelerator, factory-installed, costs $2,500. Field-installed, the unit lists for $3,000. Operating charges are $200 per hour for option one, $275 per hour for option two, and $475 per hour for option three. AMDAHL CORP., Sunnyvale, Calif.
FOR DATA CIRCLE 304 ON READER CARD

INTELLIGENT WORKSTATION

The WS-4004 intelligent workstation can display both 80 and 132 columns. When displaying an 80-column format, the entire 14-inch screen is utilized, providing large type. The 132-column format, desirable for accounting, spreadsheet, and other financial applications, displays characters in 9 × 13 pixel resolution. The P31 phosophor monitor produces 26 lines in either format.

The unit has a tilting/swiveling monitor, detachable keyboard, and programmable function keys. The workstation has a 4MHz, Z80A microprocessor with

64KB RAM. The computer runs the TurboDOS network operating system, which supports CP/M and MP/M applications software with no modifications and allows a network to operate 30% faster than a single computer using CP/M, according to the vendor.

For I/O support, the WS-4004 is equipped with two RS232 serial ports, one parallel printer port, one parallel hard disk interface, and an RS422 network interface. When used in network configuration, it functions as a fully interactive, intelligent workstation providing access to all network resources. The WS-4004 costs $2,000. ALSPA COMPUTER INC., Campbell, Calif.
FOR DATA CIRCLE 305 ON READER CARD

MATRIX PRINTER

The 4512 is a wide-column matrix printer that can be matched to vertical application packages. The unit prints draft copy at 140 cps with medium resolution, and can employ a double pass method in order to obtain near letter quality printing. A second pass slows the mechanism down to 25 cps and produces characters in a matrix of 18 × 17 dots. Working in single pass mode at 140 cps, the unit prints in a matrix of 9 × 9 dots for continuous large volume printing.

HARDWARE SPOTLIGHT

ESPIONAGE-PROOF PC

This personal computer is designed to process sensitive information in privacy for business, military, and intelligence applications. The vendor says the Grid 1107 resists sophisticated forms of espionage in which radio signals emitted from unshielded computers are detected and decoded to intercept private information.

The magnesium-encased computer has been tested to meet Department of Defense "Tempest" security requirements.

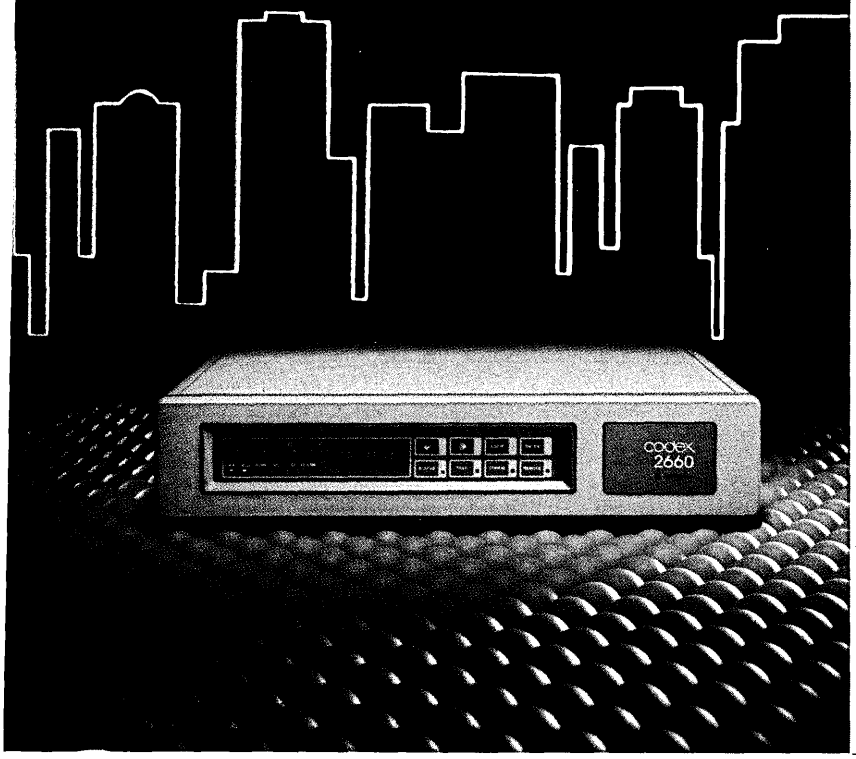
The 1107 has 512KB of RAM and 384KB of bubble memory. It runs on Intel 8086 and 8087 microprocessors. The computer weighs 13½ pounds and fits into half a standard-size briefcase. The unit also houses a full-size flat panel screen.

The 1107's operating system is MS/DOS and runs IBM PC software as well as Grid's own integrated management software. The vendor also offers a variety of compilers and software development tools.

The vendor provides users with a choice of peripherals including a portable floppy disk, a Winchester disk drive, printers, plotters, and a Grid server networking system that offers peripheral and file sharing and communicates with other systems. The Grid 1107 costs $12,500. GRID SYSTEMS CORP., Mountain View, Calif.
FOR DATA CIRCLE 302 ON READER CARD

EVERYONE WILL BE MAKING HIGH SPEED MODEMS LIKE THIS.

IN THREE OR FOUR YEARS.



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A design that ensures data reliability with Trellis Code Modulation (TCM)—a significant advancement over uncoded modulation techniques in common use today.

In multipoint applications, the Codex 2640 can even handle mixed 9600, 7200 and 4800 bps inbound rates. So each drop can operate independently at maximum speed and efficiency.

Of course, with the Codex 2600 Series, network control is standard. So you can monitor line and modem performance from the front panel or from a central Codex DNCS system. Plus there's an optional downline-loading feature that lets you conveniently modify or enhance the functionality of remote, unattended modems.

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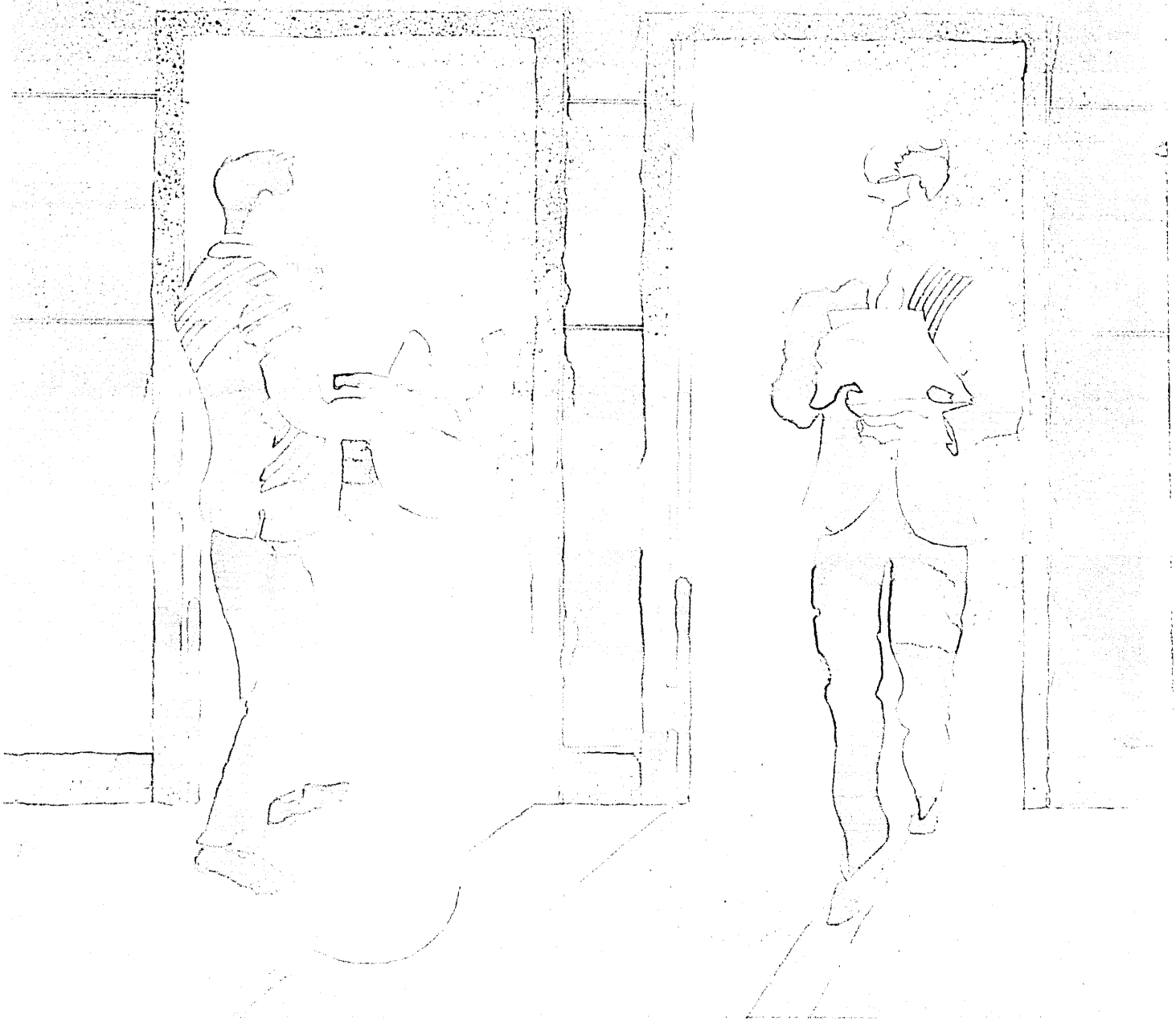
DayFlo announces a major revision of the fundamental law of computing



Garbage in, garbage out.

Since computers were invented, the conventional wisdom has held that input that doesn't conform to the computer's highly structured needs will result in unintelligible output.

Which meant that you had to learn to think like a computer in order to use one.

Trouble is, the world isn't organized to suit computers. Data is never collected in the way you want to retrieve it. That's why traditional, rigidly structured databases often wind up hindering your work more than they help.

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DayFlo's concept is as simple as it is revolutionary. You no longer have to think for the computer. Instead, it can help you think better for yourself. Which leads, inevitably, to a brand-new version of computing's fundamental law.

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The unit has the ability to print characters twice the normal height and width, as well as print in italic or boldface. This multifont printing feature also generates microsubscript and superscript characters that are suited for scientific reports. Block and pin graphics can also be printed.

The printer has an optional emulation feature that makes it compatible with the IBM and Epson computer systems. The unit has a Centronics type and serial V.24/RS232C interface.

The unit is available in national language versions. Printing speeds for 10, 12, or 17 characters per inch or proportional spacing can be selected. Column length ranges from 80 to 132 columns wide. The 4512 costs $2,000. FACIT INC., Nashua, N.H.

FOR DATA CIRCLE 306 ON READER CARD

FRONT END

The 2400B intelligent computer front-end processor is a user-configurable tool for data acquisition and control and product testing. The unit interfaces with any mainframe, personal, or instrument computers at distances up to 4,000 feet, or from remote locations through modem and phone lines. This allows it to operate on-site in the process environment, taking and scaling measurements and executing local decisions and control while the host computer concentrates on data storage, detailed analysis, and report formatting and generation.

A 16-bit, on-board cpu provides the standalone capability through a stored application program of up to 28KB of RAM which may be downloaded from the host or stored permanently in EPROM. This intelligence enables the 2400B to monitor analog and digital inputs such as voltage, ohms, thermocouples, RTD's strain, frequency, time intervals, totalizing, BCD or binary, and contact closure. Options are available for up to 1,000 analog inputs and 1,024 digital inputs and outputs, and 128 analog outputs.

The unit is user-programmable and features English-like language. Communication with host computer is selectable as either RS422, RS232C, IEEE-488, or mA current loop. The 2400B costs $4,400. System prices range from $5,400 to $10,000. JOHN FLUKE MFG. CO., Everett, Wash.

FOR DATA CIRCLE 309 ON READER CARD

DESKTOP COMPUTER

The 9002 is a compact model of the System 9000 desktop computer. It is not a personal computer; it is designed for engineering, scientific, and business professionals.

The vendor says the 9002 has the processing power of a minicomputer and the size of a microcomputer. The unit stands 7 inches high and is 18 inches wide by 16 inches deep. An optional Xenix operating system is available that permits up to four individuals to use the system simultaneously and allows users to take advantage of many commercially available Unix and Xenix application programs.

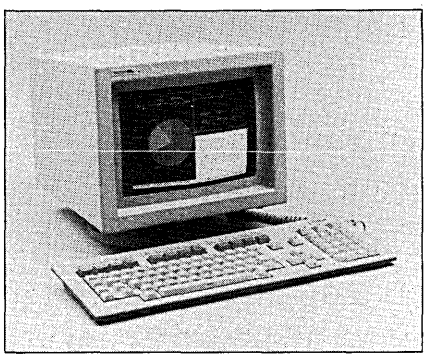
Based on the Motorola 68000 microprocessor, it can internally process 32 bits of information at a time, and can handle up to four 10MB hard disk drives. The unit has a 12-inch raster scan with 768 by 480 pixel bit-mapped screen; displays 30 rows of 80-character lines; sports a green on black display; and has 10 user-definable keys beneath the display screen and optional built-in diskette drive. The 9002 costs $6,500 for the system unit, display, keyboard, and standard operating system. The complete system with Xenix starts at $16,000, including required 10MB hard disk, additional memory, and memory management card installed. IBM CORP., Town of Rye, N.Y.

FOR DATA CIRCLE 307 ON READER CARD

WORKSTATION

The 750 Professional Workstation allows executives, managers, and professionals to display and edit text, electronic spreadsheets, and business graphics in multiple windows. The information can be previewed and then printed in a single integrated document.

The workstation is run with a Z80 microprocessor. It has a monochrome bit map display and uses floppy and hard disk



storage with a main memory of 512KB to MB. The unit has dual architecture that will run both 8- and 16-bit applications software. The unit will support MS/DOS, and provides asynchronous and bisynchronous communication and 3270 emulation.

The unit has three serial ports and an 8400 series attachment. When connected to the model 8400 series controller, the workstation can send and receive messages via transparent electronic mail, and use time management to set up and maintain schedules and meetings. Users can do cross-reference searches and have access to the Unix operating system facilities and general relational database management.

The 750 has a detached keyboard, swivel/tilt display, and integrated disk drives along with built-in self diagnostics. The 750 Professional Workstation with a 10MB fixed disk, 600KB diskette, and 512KB RAM storage costs $7,750. EXXON OFFICE SYSTEM CO., Stamford, Conn.

FOR DATA CIRCLE 310 ON READER CARD

GCR TAPE SUBSYSTEM

The model 9250 GCR tape subsystem offers full-sized system performance by utilizing LSI gate array and microprocessor technology. The unit's formatter is on two circuit cards and is integrated directly into the tape drive package.

The subsystem is a 50ips start-stop, autoload/autothread, vacuum column tape drive with embedded GCR formatter. The standard densities are 6250 and 1600bpi, with an 800bpi option. The tape drive's motor is a direct-drive pneumatic system that is brushless and insensitive to changes in voltage, altitude, and line frequency.

According to the vendor, more data can be stored in less space because the data density of a GCR tape is 6250bpi. The peak throughput rate at 6250bpi is 312½KBps.

The system's diagnostic functions are controlled by microprocessors to monitor and make any adjustments to keep the unit performing within specification. An operator control panel feature provides the operator or service technician with visual information to localize problems at the circuit card or subassembly level. The 9250 Shamrock, available in June, will cost $7,400 for large oem quantities. TELEX COMPUTER PRODUCTS INC., Tulsa, Okla.

FOR DATA CIRCLE 308 ON READER CARD

COMPACT LINE PRINTER

The MVP 150B dot matrix line printer is designed for use as a shared resource printer for workstation clusters or as a system printer for microcomputer-based local area networks. The compact, office-quiet unit is suited for large print jobs in the small business environment. The printer is plug compatible with the IBM Personal Computer and other microcomputers.

The unit prints letter-quality correspondence at 80 lmp and draft reports at speeds up to 200 lpm. The printer accepts forms from 3 inches wide to 16 inches wide. Under software control of the microcomputer, it can expand or condense printed lines. A normal 132-column dp report can be printed on 8½ by 11-inch paper.

The unit can compress, shadow, or print boldface in word processing or forms generation applications. With the block graphics character set, users can generate custom business forms from a variety of horizontal, vertical, and diagonal lines, and from corners and other graphics characters designed for forms generation work. It plots 100 by 100 dots per inch. The MVP 150B costs $3,750. PRINTRONIX INC., Irvine, Calif.

FOR DATA CIRCLE 311 ON READER CARD

—Robert J. Crutchfield

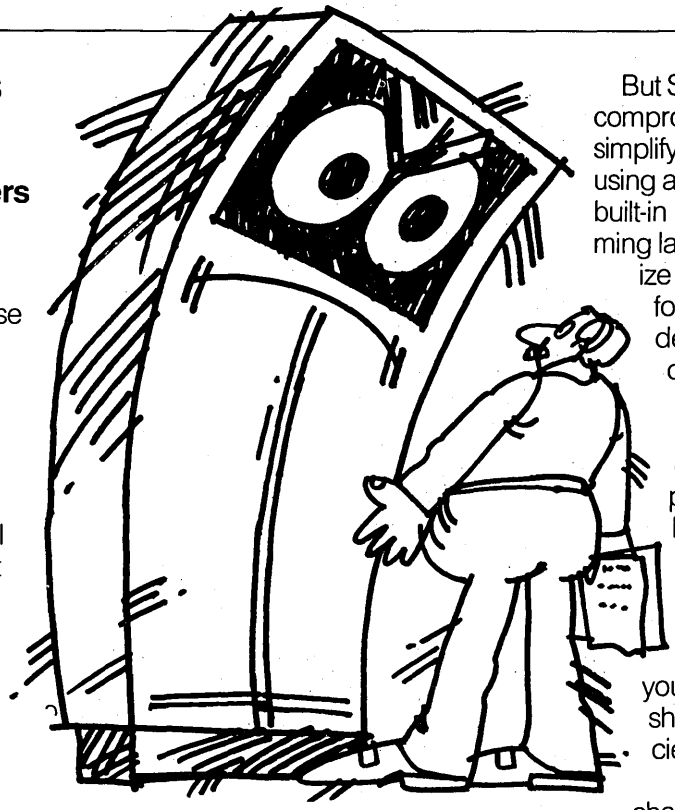
Who Really Manages Your VAX Data?

Introducing the DBMS that Users can Use, Programmers can Program, and Managers can Manage.

Most data base users are merely bystanders. Because most data base management systems are so complex that only a few people can squeeze out results.

Now System 1032™ puts the power of the VAX on your side. You get relational data management, without the burden of relational calculus or SQL.

Anyone can use it with less than an hour of training. If you get stuck in the middle of a command, just touch a key. System 1032 prompts for essential information, list choices, or offers a capsule description of any feature.



But System 1032 doesn't compromise on the features that simplify your applications. Design using any host language or our built-in block-structured programming language. You can customize data bases and output formats to satisfy your most demanding users. Yet you can modify any data structures at any time.

Try it out on your own computer. A 60-day trial period costs just $85. See how easily System 1032 manages your own data, on your own system. Test our responsive hot-line support services. Watch your programmer productivity shoot up, and system efficiency accelerate.

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Security in VM

A Different Paradigm

Last night someone accessed the personnel database. Was this for a legitimate business need, or is your VM system wide open? Your computer holds the design plans for the company's hottest new product to be introduced next month. Who has seen, or even copied those plans?

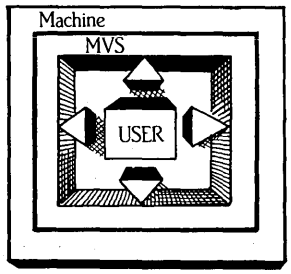
You need security for your system, and for the applications and data it supports. Meeting these security needs requires an entirely different approach in a VM environment than in any other environment.

THE SECURITY ENVIRONMENT

When most people think of security for an IBM mainframe, they have as a mental starting point one of IBM's batch operating systems. Given that DOS has been around since the 60's and MVS since the mid 70's, this is understandable.

So most people have a mindset that links a security system to an *operating system*, rather than a *machine*.

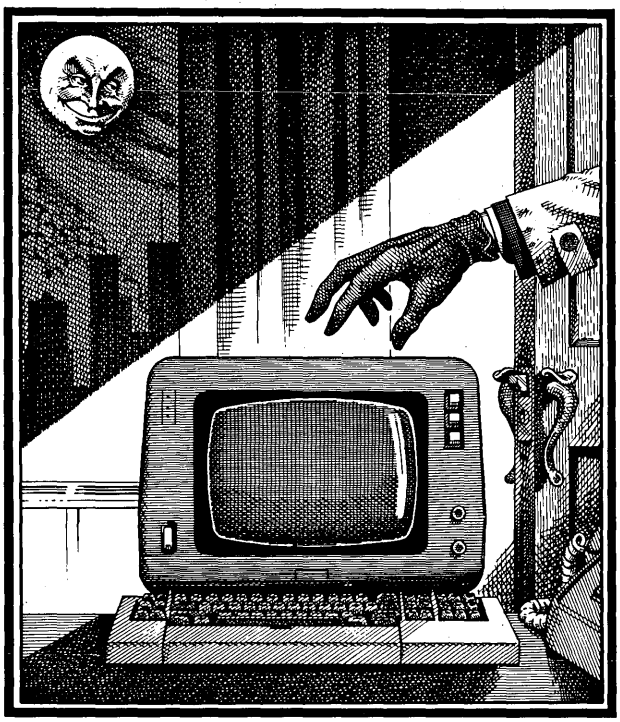
Traditionally, the operating system controls the user:



In fact, in MVS, it controls the user at a *logical* level. It ordinarily allows access only to datasets and other logical entities.

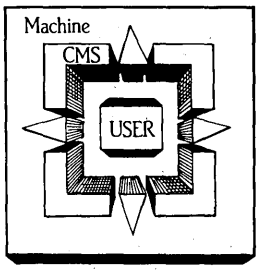
THE VM ENVIRONMENT

Under VM, multiple virtual machines can be run on one real machine. Inside these 'machines', various sets of instructions, or operating systems, can be run. For example, one virtual machine might run CMS, another DOS or MVS. A unique feature of VM is that each virtual machine (or user) is separated by hardware from other virtual machines on the same CPU. Each virtual machine functions independently of the others, making sharing of resources between machines difficult at best.



THE COMPARISON

In contrast to other IBM mainframe environments, such as MVS, the VM control program (CP) allows *physical* access to equipment. Thus, a user can access any logical piece of a physical entity in his virtual machine:



What this means for security is that a user in VM can *bypass* a logical system such as CMS and do physical access in his virtual machine. For example, a user in MVS cannot execute a privileged instruction, such as starting I/O to a device. He must ask MVS to do it. In VM, a user can do it easily.

THE MISCONCEPTION

The main liturgy of the security goes something like this: We must:

1) Define ownership of all resources (tape, disk, machine access, etc.),
2) Specify rules to access those resources (hence the buzzwords "resource access control"), and
3) Manage and monitor this effort.

This is what you get with a package from IBM such as RACF on MVS.

One might conveniently think that the low level commands from such an MVS security implementation could be 'moved' to VM, but this is a dangerous misconception.

Any security facility implemented in an operating system within VM, such as CMS, whose usage can be bypassed, is just smoke—not realistic at all. Think of a security system that modifies every possible CMS command to control logical access to files. Sounds good, but any programmer can write a program *outside* CMS to beat it, or copy an unaltered version of a command from one of 10,000 plus other VM systems.

The virtual machine is the only level at which a VM system can be secured.

THE SOLUTION

First, what does VM itself offer for security? The VM directory defines users (virtual machines) and maps virtual to physical resources for those users. It contains a password for each user to access the system, and an optional password for access to each user's disk by others. In fact, VM is relatively secure when users need not share. The simple reality though, is that programs and data must be shared among users.

To be effective, a security package must work within the constraints of, and address the vulnerabilities of VM. It must be implemented at the control program level of VM—where it cannot be bypassed in CMS. It must be built within the VM directory scheme, so that it becomes an integral part of the VM system, and it must not require modifications to any part of VM or CMS.

The issue of security in the VM environment cannot be approached in the same way as for batch operating systems. It requires a vendor who understands the intricacies of VM to develop a security package to meet the needs of the VM community. It requires a vendor with the creativity to implement a system that addresses the unique features of VM.

VM Software Inc. is the undisputed leader among vendors of system software for the VM environment. Our newest product, VMSECURE, was designed by our experienced staff of VM professionals. VMSECURE is a resource access control, directory management, and disk space management system designed specifically to address the security needs of VM users.

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SOFTWARE AND SERVICES

UPDATES

IBM has finally discovered that it has two microcomputer lines, and the discovery bodes well for end users and oems. Unlike the PC line, the CS 9000 series uses the MC68000 cpu, making it much more appropriate for many types of vertical applications. IBM recently announced a second version of the unit, which comes out of the IBM Instruments subsidiary in Connecticut, and decided to market the series via its mainstream channels. More important from a software point of view, however, is IBM's decision to support Xenix, which will make it easier for Unix-oriented minicomputer oems to port their vertical packages to the IBM line. Of course, no two Unixes are exactly alike -- it is not, in fact, an easily portable OS -- and Xenix differs from all Unix systems in some key areas. Still, it is easier to move from a minicomputer-based Unix to Xenix than to MS/DOS or the CP/M family.

Unix has its limitations, however, such as its inability in its current form to support windows, multi-user systems, or DBMSs. These have caused IBM to look for a second major operating system to support on the 9000. High on its list, we hear, is S1 from Multi Solutions Inc. in Lawrenceville, N.J. The package is written in the SL language, which consists of a dozen statements and is something of a high-level assembler. It runs at virtually the same speed as machine language, the vendor says.

S1 consists of a 2KB core with a linker, and a variety of independent modules that provide networking, multi-user capability, utilities, a variety of file access methods, locks and semaphores, electronic mail, and so on. It can read and write files from many other operating systems as well. Essentially, S1 is constructed so that any capability can be added or subtracted from the whole, giving the customer only what is desired. The package, incidentally, can run on virtually any microprocessor or cpu board within months of its release simply by writing a new SL compiler. Prices vary but are generally around $1,000.

S1 may have a yes listed in every box of a typical feature comparison chart, but that's not the only way to choose software. Neither is using any of several software ratings services that have cropped up recently. One such service is provided by Software Digest Inc. in Wynnewood, Pa. It lists many of the most popular packages for a given micro -- say, word processing for the IBM Personal Computer -- and assigns numerical ratings to each based on criteria such as user friendliness, versatility, error handling, and value for the money, among others. The numerical ratings for each criterion are based on esoteric formulas derived from the experiences of 10 reviewers. The ratings are then weighted and combined, using some other esoteric formulas to produce an overall rating for each product listed. Now, that may be fine if your needs are identical to the weights used in the formulas, but that probably will not happen too often.

Instead, it seems more tha these services are rating something that by its nature cannot be rated numerically -- much like books or paintings. (Is the "Mona Lisa" a 9.5 and "The Last Supper" a 7.9?) Court decisions upholding the use of the copyright law in software litigation reinforce the notion that software is more artistic than numeric. So while these software ratings services may have feature checklists that are somewhat comprehensive and objective, relying on them for anything more than that could be risky. Caveat emptor.

QUERY SYSTEM

This free-format, fully on-line CICS query system uses a simple English syntax. ExecuTrieve is designed to be learned and used by executives with minimal computer skills. Users do not have to know computer language or deal with strict procedures to ask a question when using the system, the vendor says.

The system also lets executives generate their own questions and get answers to everyday business questions. Users can develop reports and graphics. ExecuTrieve operates on existing files and applications under CICS in OS and DOS environments without system changes, modifications, or reformatting. Users access the mainframe through the use of groups of data fields matched for various user groups.

With the system, data processing management retains control of its use in several ways. First, the dp manager defines the data fields to various user groups in the organization. In addition, a nine-tier system of security levels further restricts access. Also, record count limitations can be imposed to prevent overuse of the system. ExecuTrieve costs $15,000 for DOS and $24,000 for OS. ON-LINE SOFTWARE INTERNATIONAL, Fort Lee, N.J.

FOR DATA CIRCLE 326 ON READER CARD

TELECOMMUNICATIONS

This telecommunications package performs emulation and file transfer functions via a serial communications port on the IBM Personal Computer. In addition, it incorporates a keyboard redefinition facility through which any key on the keyboard can be redefined, and a language in which users can write scripts that automate transactions with computer systems accessed over the telephone.

The package, called Tel, has two modes of operation: terminal mode and command mode. In terminal mode, any of three types of terminals can be emulated, including a VT-52. The package sends and receives in both text and binary. The program supports two file transfer protocols, text and Christensen. It incorporates error

checking, and can be used to carry out a complete preprogrammed dialog with a remote system.

A number of scripts are included with the package. DJNQ, for example, can be used to automatically dial up the Dow Jones News Retrieval service. Such a script can be programmed to wait until a specific time when rates are low. Tel is compatible with PC/DOS and costs $90. INFORMATION PRODUCTS, CO., Boston, Mass.

FOR DATA CIRCLE 327 ON READER CARD

SECURITY SYSTEM

The Rabbit-4 security system for RSTS/E users prevents theft and destruction of computer data by preventing accessing of confidential data by unauthorized personnel, monitoring those attempts, and monitoring commands and operations at all terminal keyboards. The package incorporates modules for File Intrusion Prevention (FIP) and System Intrusion Prevention (SIP).

FIP keeps unauthorized personnel out of classified or confidential data files and programs by locking up the secret files and keeping the system from running until the break-in attempt is cleared. The system's manager is alerted at the time of the occurrence, and the violation is recorded for analysis. The FIP log indicates data, time, job, program, project, programmer, and keyboards for access and violation.

SIP is a run-time system and keyboard monitor that restricts user activity on a system at specific times and from specific terminals. System commands are secured with SIP's local calendar-check function, which keeps track of the time and day the system is used. A built-in menu is designed for application-oriented users, and passwords are used. The security system costs $2,500. RAXCO INC. Rockville, Md.

FOR DATA CIRCLE 328 ON READER CARD

C COMPILER

This C compiler permits C program development in the IBM mainframe environment. It also allows systems houses and DEC VAX users to move existing C and Unix applications to the IBM 370 architecture through recompiling and relinking. This package also includes a Pascal-to-C translator.

The C/370 compiler is a full implementation of the standard C language. It runs on all IBM 370, 43XX, 30XX, and plug-compatible mainframe systems under a range of IBM operating systems, including MVS, VS1, SVS, MVT, and MFT. In addition, C/370 operates with VM/CMS through OS simulation and MVS/TSO to provide an interactive program development environment.

A system interface library allows terminal access to sequential or direct access datasets using QSAM, BDAM, and BPAM. The library is provided in source code, allowing users to tailor the C/370 execution environment to take advantage of local enhancements to the operating system. The C/370 compiler is priced at $5,000, including user documentation, source code for the system interface library, and binary code for the remainder of the compiler. One year of maintenance is also included. WHITESMITHS LTD., Concord, Mass.

FOR DATA CIRCLE 329 ON READER CARD

DEFENSE DATABASE

This database is designed for governments, research and development centers, defense-related industries, and others who need to track the defense markets and technology on a global basis. The database, Defense Markets and Technology (DM&T), will be accessible through Dialog and Data-Star.

It will provide information reported in international defense publications and defense agency reports. The vendor says over 40 defense journals will be completely abstracted cover to cover, and another 60 publications will be selectively abstracted. All major defense contracts awarded by the U.S. Department of Defense are included in the database, complete with contract number, award date, type, and dollar amount.

Some 1,500 trade journals, newspapers, government reports, press releases, and annual reports will be scanned for inclusion in the database. Initially, the database will contain 40,000 records. The vendor plans to add 2,000 additional records to the database each month. The coding system will include new retrieval codes, including indications of source type (news items, press releases), language of original article, photo inclusion in original article, specific trade names and government agencies. The connect rate is $150 per hour. PREDICASTS INC., Cleveland, Ohio.

FOR DATA CIRCLE 330 ON READER CARD

PROGRAMMING TOOL

The DCL-Edit programming tool enables DEC users to edit DCL commands without retyping command lines. Compatible with the VMS, RSTS, and RSX operating systems, DCL-Edit automatically tracks the user's last 22 commands. The utility logs these commands upon request, allowing high-level edits to be entered, and submits the revised commands to DCL.

This software enables the programmer to assign command strings to a single control character and duplicate the strings elsewhere in the program with one keystroke each. DCL-Edit also allows the execution of commands with complete flexibility, using cursor selection. The programmer can save any command for later use by writing it to a disk command file.

The software requires 15KB of RAM and can be run in a shared, multi-user environment. The utility has a spooling capability for the command log file and storage of DCL commands after log-off. Other features include full VT-100 keypad functionality and on-line help. DCL-Edit costs $750. SYNTACOM CORP., Costa Mesa, Calif.

FOR DATA CIRCLE 331 ON READER CARD

DATA INTERCHANGE SERVICE

This value-added data communications service allows direct computer-to-computer transmission of business documents between different organizations with dissimilar computers and document formats. EDI (Electronic Data Interchange) Net service integrates use of the vendor's public packet data communications network with a collection of processing capabilities to identify, process, and deliver documents electronically. Electronic Data Interchange delivers a formatted message that can be directly processed by the recipient's computer, thereby eliminating data entry. Although any data can be sent via EDI-Net, the vendor says attention so far has been given mainly to purchase orders, invoices, and physical distribution documents.

For an organization capable of generating a standard message, EDI-Net provides a store-and-forward service for message distribution. The service is capable of handling any standard message, including the Uniform Commercial Standard (UCS)

SOFTWARE SPOTLIGHT

MAINFRAME LINK

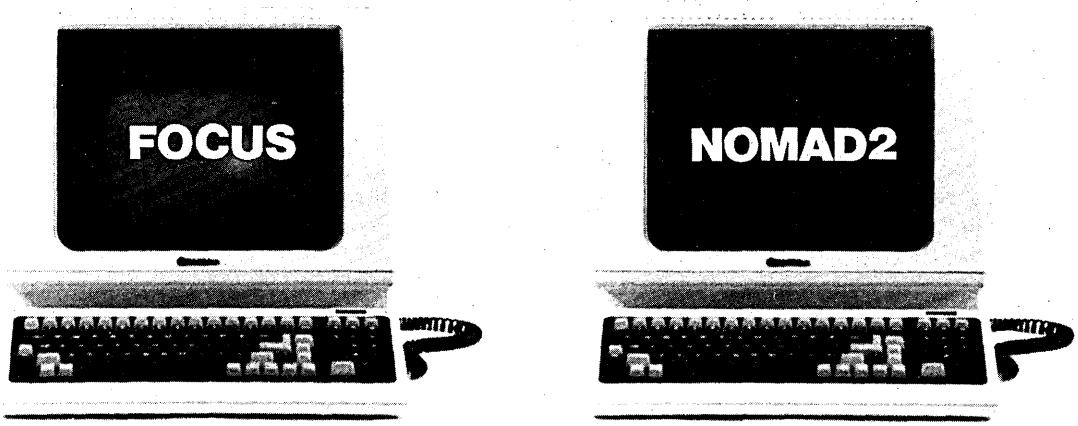
This package is an integrated, interactive upload/download communication link between the IBM 370 architecture and IBM Personal Computers. PC Contact allows users to extract corporate data off the mainframe host using Mantis, an application development language. The information can then be downloaded to a PC diskette. The software also allows users to upload data from the PC back to the mainframe host.

Mantis is a prerequisite for PC Contact. Although Mantis runs on the mainframe, PC Contact makes it appear to be running on the PC, emulating an IBM 3270-type terminal. PC Contact provides directory-controlled, nonredundant access to corporate information from the mainframe. The software can be linked to the micro and mainframe by an asynchronous communications link, coaxial cable adapter to a 3274-type control unit, or by SNA/SDLC.

PC Contact has one set of access strategies to access any file structure, and doesn't need any other system activity. The upload/download capability is an ongoing process, providing complete system integration. PC Contact costs $60,000 for the mainframe purchase, $1,000 per PC purchase price, and $1,000 installation fee. CINCOM SYSTEMS, Cincinnati, Ohio.

FOR DATA CIRCLE 325 ON READER CARD

Considering FOCUS?
NOMAD2
Should Be In The Picture!



If you're presently evaluating FOCUS, take a look at NOMAD2 and you'll be surprised at the outcome of that comparison.

Whether your comparison is made based on specific features, the scope of the product, or the sheer power it puts into your Information Center or your development activities, NOMAD2 wins hands down.

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Relational? Yes! English Commands? Yes! Interactive? Yes! Procedural? Yes! Modeling? Yes! Statistical Analysis? Yes! Multi-layers of Security? Yes! Graphics? Yes! Runs on VM? Yes! Runs on MVS/TSO? Yes!

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CIRCLE 76 ON READER CARD

SOFTWARE & SERVICES

and ANSI X.12.

The EDI-Net services provide for several delivery options. The store-and-retrieve option permits a user to dial the host to send and receive from disk storage; alternately, the host can dial a customer's computer directly to initiate data exchange. TYMSHARE INC., Cupertino, Calif.

FOR DATA CIRCLE 332 ON READER CARD

NETWORK PLANNER

Net/Link is a network planner and analyzer for users of the Net/Alert network performance monitoring and management system. Net/Link enables users of Net/Alert and an IBM Personal Computer equipped with the 1-2-3 software to extract and transfer network information gathered by Net/Alert in order to conduct customized analyses of network services and operations.

The system provides users with detailed information about the status, performance, utilization, and availability of network services. It also provides a means to manipulate Net/Alert statistics for specialized studies. Users can develop individualized reports and generate custom-tailored charts and graphs.

Users can sort and chart network performance data by line or groups of lines for specific statistics, including response time and its components (internal time, network in and out time, polling latency), transactions and character counts, errors, and failures such as time-outs and no-polls. Users can also set scaling increments and select colors to create line, bar, stacked bar, x-y axis, and pie graphs. Net/Link costs $10,000. AVANT-GARDE COMPUTING INC., Cherry Hill, N.J.

FOR DATA CIRCLE 333 ON READER CARD

COMMUNICATIONS

This communications software package connects more than 60 minicomputers, microcomputers, and mainframes to IBM mainframe systems (MVS/TSO or VM/CMS). The vendor says that any system that uses Blast (Blocked Asynchronous Transmission) software can communicate with every other system with Blast.

Blast uses an SDLC-like full-duplex sliding window CRC protocol for reliability over noisy phone lines, packet switched networks, local area networks, or satellite-linked phone calls. Binary or text files are transmitted as 18-bit-wide data. The system operates over standard dial-up phone lines with any asynchronous modes, at any modem speed, or over direct connections at speeds up to 19.2Kbps.

Data transfer, if interrupted, continues from the point of line loss. Blast uses a selective retransmission ARQ, providing greater throughput on noisy lines or satellite links to reduce connect time, the vendor says. The system has a full duplex operation that supports file transmission and reception at both ends simultaneously.

Operation with 17-bit half-duplex IBM mainframe systems requires the addition of a hardware line adapter to the 8-bit full-duplex protocol at each communications port. Prices range from $500 to $1,300. COMMUNICATIONS RESEARCH GROUP INC., Baton Rough, La.

FOR DATA CIRCLE 335 ON READER CARD

INVENTORY COUNT

This inventory count system is designed for Macpac users. The system is built on the vendor's basic physical inventory system, Eztag, to interface to the Macpac inventory system. An initiator program will extract the data from Macpac to support the system.

Inventory tags will be printed for each part item-location-quantity code combination, showing the part description and unit of measure. The system will also process secondary location details to scan for nonzero entries. An on-line tag update program allows multiple users concurrent access to enter actual tag counts, to void tags, or to enter handwritten tags.

The system provides two exception reports to aid users in resolving differences between perpetual and physical counts. The cutoff program will freeze the perpetual inventory counts for reconciliation purposes while allowing Macpac to continue its regular inventory function. The system is written in COBOL II and will be installed with both source and object code for $2,400. ABACUS DATA SYSTEMS, Chicago, Ill.

FOR DATA CIRCLE 334 ON READER CARD

INTEGRATION

The Propel integrated software package is for business professionals in large corporations. It has multiple applications, with a set of consistent commands for each application.

Propel will initially operate on Digital Equipment Corp.'s Professional 350 microcomputer. Eventually, a Unix version will operate on the IBM XT/370. In addition to the word processing, electronic mail, graphics, and spreadsheet software, Propel also has voice capabilities. A voice message may be left on the terminal. Callers who reach an unattended Pro 350 can retrieve a voice message by entering a special code; they can then leave messages. A voice message can be attached to a report, alerting the reader to what important information should be read.

Currently, Propel requires the base configuration of the Pro 350, which includes the F11 microprocessor with standard floating point processor, 512K RAM, a 10Mb, 5¼-inch disk, and the P/OS operating system. DEC's Telephone Management System (TMS) with diskette is required for voice communications applications. Propel costs $1,200 with phone applications, and

DON'T PAY MORE FOR A PRINTER THAT DELIVERS LESS.

COMPARISON CHART

	Printing speed (cps)	Avg. hours before repair*	User-changeable multiple interfaces	Mfr's suggested retail price
)iablo 630 API	40	4,000	YES	$2340
IEC 7700 Series	55	2,000	NO	$2595
Qume SPRINT 11/55 PLUS	55	5,500	YES	$1990

A simple comparison tells the whole story. Qume's new SPRINT 11/55 PLUS™ daisywheel printer is tops in performance, with a steady speed of 55 characters per second. Print quality that's second to none. And the industry's best reliability rating—equal to almost three years of all-day, five-day-a-week business use without a single repair.
That's nearly a year longer than its closest rival.

And the SPRINT 11/55 PLUS is a perfect fit for most popular business computers, via our inexpensive plug-in interface modules.

That means you won't have to change printers when you upgrade your current system.

It's this kind of value that has made Qume one of the largest manufacturers of letter-quality printers in the world.

So don't pay more for less. Choose Qume's SPRINT 11/55 PLUS—the best printer you can buy. *And* the best buy in printers. For more information, contact the Qume distributor nearest you. Or write Qume Corporation, 2350 Qume Drive, San Jose, CA 95131.

Qume's SPRINT 11/55 PLUS™ outperforms NEC and Diablo† for a lot less money.**

Qume printers. Your best investment in productivity.

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*Mean Time Before Failure at 25% duty (manufacturer's published data)
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SOFTWARE & SERVICES

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FOR DATA CIRCLE 337 ON READER CARD

DIRECTORY

The New York Metropolitan Directory of Computer Installations lists 16,000 computer users in New York, New Jersey, and Connecticut. Each computer installation listing includes a comprehensive profile of the hardware installed, packaged software installed (such as operating systems, languages, and database systems), consultants used, future plans, applications, dp executives' names, titles, and phone numbers. An index allows users to access information by 120 cross-references according to hardware, software, and industry.

The full directory costs $295. Various geographic subsets of the directory are available, ranging in price from $165 for all of New York State and $105 for New York City to $85 for Connecticut.

The vendor has similar directories for the remaining five New England states and for five mid-Atlantic states. The New England directory lists 10,000 computer users, and also costs $295. Directories for each state are available, ranging from $145 for Massachusetts to $55 for Maine. The mid-Atlantic directory has 16,000 listings of users in Delaware, Pennsylvania, Maryland, West Virginia, Virginia, and Washington, D.C. It also costs $295, with state directories priced from $55 to $155. COMPUTER MANAGEMENT RESEARCH INC., New York, N.Y.
FOR DATA CIRCLE 338 ON READER CARD

TELEX INTERFACE

The CEO Document Exchange II allows users to telex any document without having to leave the integrated office automation environment, thus allowing them to send messages anywhere in the world from the workstation.

The unit complies with selected industry standards and is compatible with national and international telex networks. The system automatically dates messages and informs users of successful or unsuccessful transmission of messages. It is also compatible with future telex systems enhancements. It can use any editor running under Advanced Operating System (AOS) and Advanced Operating System with Virtual Storage (AOS/VS).

Hardware requirements are a telex interface device and an asynchronous I/O multiplexor port. AOS or AOS/VS is also needed. Other document exchanges offered are Document Exchange I, which lets CEO users transfer documents with Wang word processing equipment. The interfaces range in price from $500 to $5,000. DATA GENERAL CORP., Westboro, Mass.
FOR DATA CIRCLE 339 ON READER CARD

—Robert J. Crutchfield

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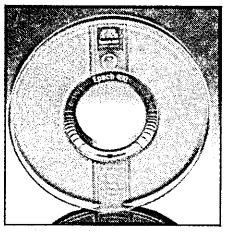

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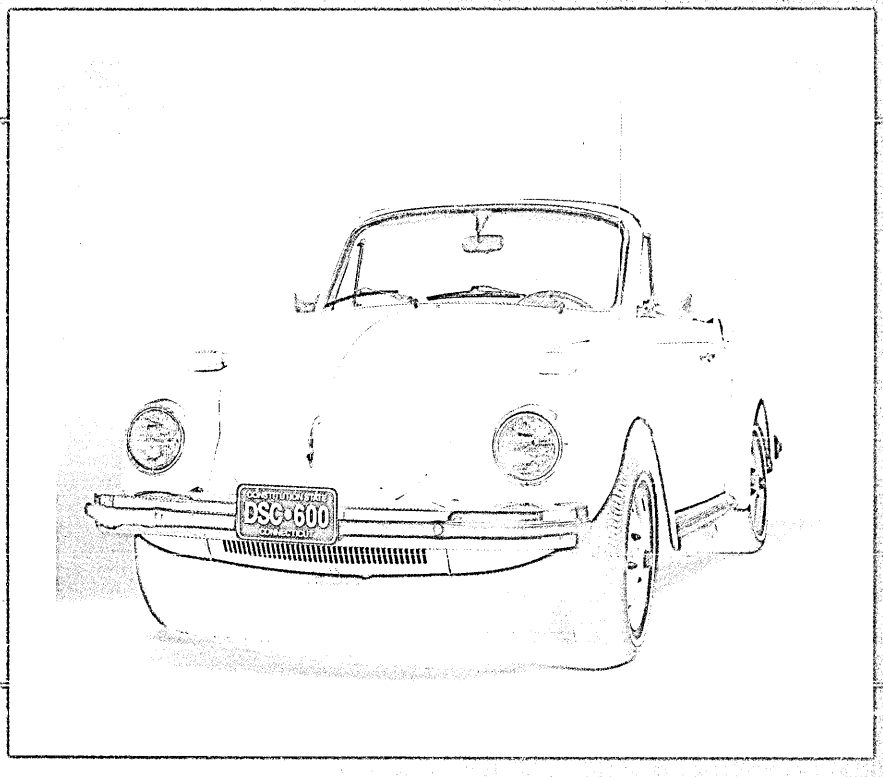

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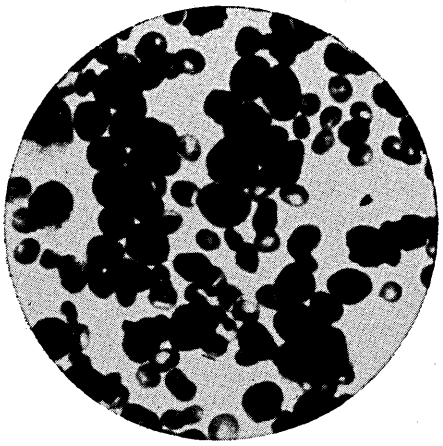

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In 1963, IBM had the same problem. The company's enormous growth dictated that 17,000 new jobs be filled over the course of about 12 months. The company examined its hiring practices and found that a job applicant might be turned down at one location, yet be qualified for a position at another site. Dale H. Learn, IBM's corporate manager of recruitment was assigned to help develop a large-scale computer program that would match job applicants with the various job opportunities available throughout the company. Information on applicants was then sent to IBM headquarters and stored in a computer. Any of IBM's 300 hiring locations could access the data through a teleprocessing network.

The system was quite successful and IBM believed there was a commercial market for this process. After concluding a major feasibility study of the project, IBM found that the need did exist, customers were ready to buy, and Big Blue could make money. Unfortunately, the company decided the project would divert energies from its primary business of selling computers and dp services, so it decided against the venture.

In 1965, Dale Learn and four other employees left IBM to form Information Science Inc. (InSci) to develop and market human resources systems. One of the company's first projects was the Personnel Information Communication System, or PICSystem. In three months, PICSystem had built a résumé database of 30,000 engineers, computer programmers, and general management personnel. In 1968, InSci's board of directors decided to shelve the program because too few employers used computers in their personnel operations.

Such is not the case today. With the proliferation of computers in every aspect of business as well as in homes, technology has caught up with the application. Learn

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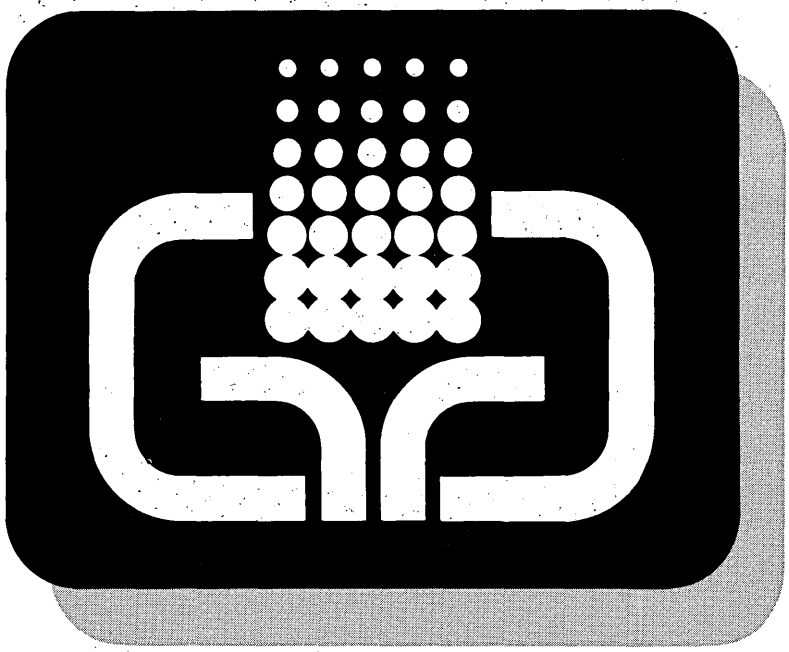

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CIRCLE 79 ON READER CARD

claims that over 2,000 corporate and institutional personnel departments now use computers on a day-to-day basis.

General Database Technology Inc. (GDTI), West Palm Beach, Fla., was formed in 1979 when Learn and two other InSci cofounders, William E. Berry and Philip L. Morgan, left the company to work in the field of national information database services. They developed a software product called General Database System, which manages and maintains large information databases. The system permits users with terminals to search a database and match and communicate needed information on a nationwide basis.

The GDTI has also updated the PIC-system. This project, called CareerSystem, uses the General Database software as well. The company hopes to have about 175,000 individual résumés by the end of this year, and more than 500,000 by the end of 1985. The system can handle 937,000 résumés per computer node (it now has just one) but can be expanded to 256 nodes, to hold almost 240 million résumés.

Here's how it works. The CareerSystem database contains individual career profiles that include career objective, work experience, education background, current and preferred salary level, geographic preferences, and other information. Companies lease the CareerSystem terminal for a monthly charge of $150, or on a yearly basis for $250 a month with a 30-day cancellation option. There is a $2-a-minute connect charge and a $20 fee for mailing and handling information sent to the client. A prospective employer hooks up and types in the specific criteria for an opening, which is processed by CareerSystem's computer and matched against all the profiles in the database. Qualified candidates are identified and displayed on the user's terminal.

Learn figures the average employer spends from eight to 10 weeks and $6,000 to find a middle-level professional, technical, or managerial person. Using the CareerSystem, he claims, qualified candidates can be identified in 30 minutes, at a cost of about $400.

Individuals can use the system to keep an eye on the job market; there are safeguards to prevent them from being matched with their current employers or affiliated companies. Candidates receive a "job opportunity package" when matched for a job, and have the option of following up on the lead. Through the end of February, applicants were invited to have their résumés entered into the system free of charge. At the time of this writing, the company was considering an annual subscription fee.

GDTI hopes to have more than 400 employers and employment services on the system by the end of 1985. They are targeting the service to "the 32 million individuals in professional, managerial, and technical jobs." The company also feels that in the future, such databases will be used to help high school seniors pick the right colleges, and to help employers recruit college graduates.

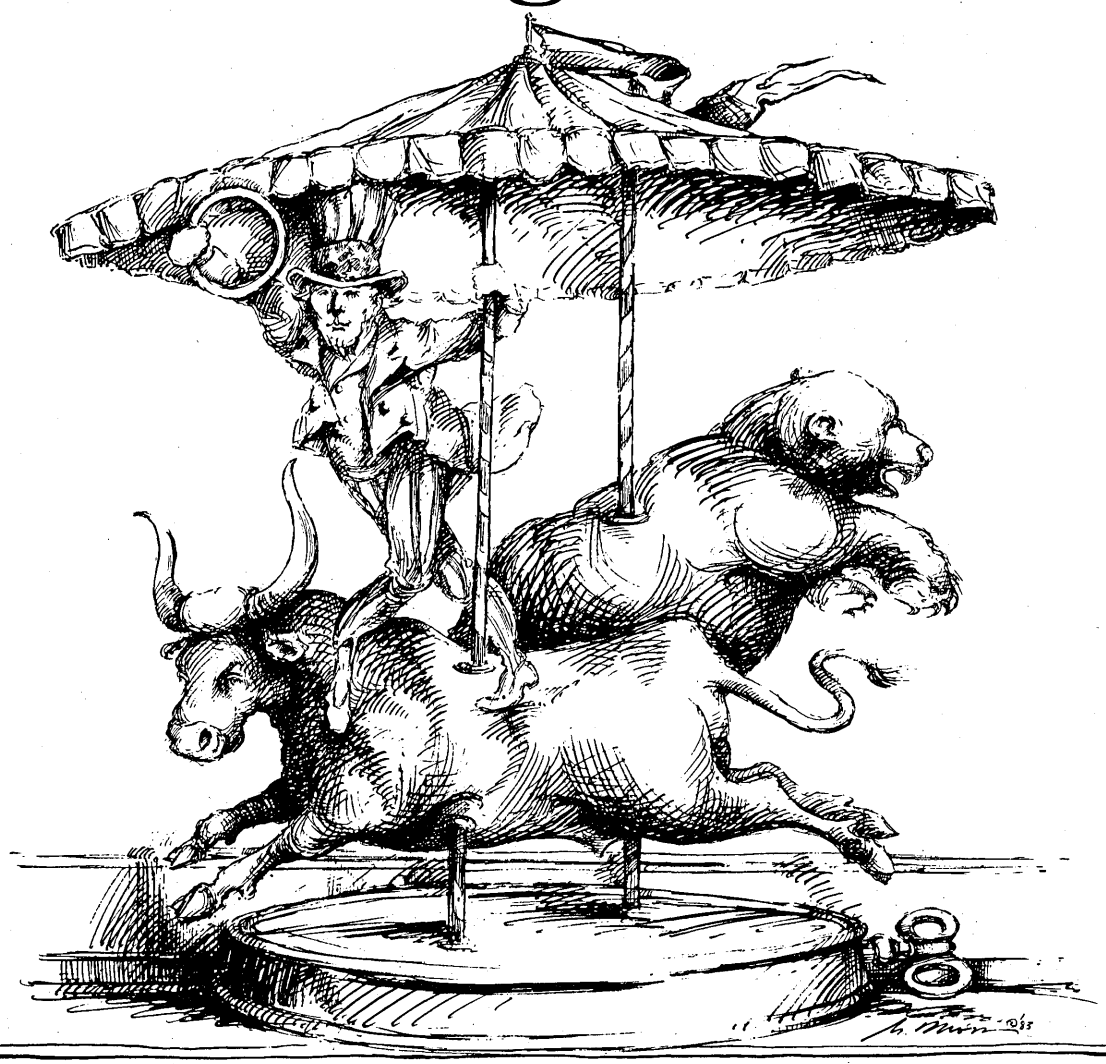
For more information about CareerSystem, write William E. Berry, vice president/corporate services, CareerSystem, General Database Technology Inc., 1675 Palm Beach Lakes Blvd., West Palm Beach, FL 33401, or call (305) 689-3337.

ON COURSE

A September article in *Management World* indicated that by the year 2000, 80% of the work force will be employed in information-related work. The article also said that the proportion of workers in the 16 to 24 age group is decreasing, while those in the 25 to 54 age range are increasing. For a copy of the article, send a 37¢-stamped, self-addressed envelope to "Charting Labor," Administrative Management Society, 2360 Maryland Rd., Willow Grove, PA 19090.

—Lauren D'Attilo

About Bulls & Bears & Savings Bonds.



According to people in the stock market, bulls are good and bears are bad. But if you're buying U.S. Savings Bonds through the Payroll Savings Plan, you don't have to worry about missing a ride on the bull or being devoured by the Wall Street bear.

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SECOND ANNUAL

Software User Survey Forecasts Prosperity and Problems for Major Vendors

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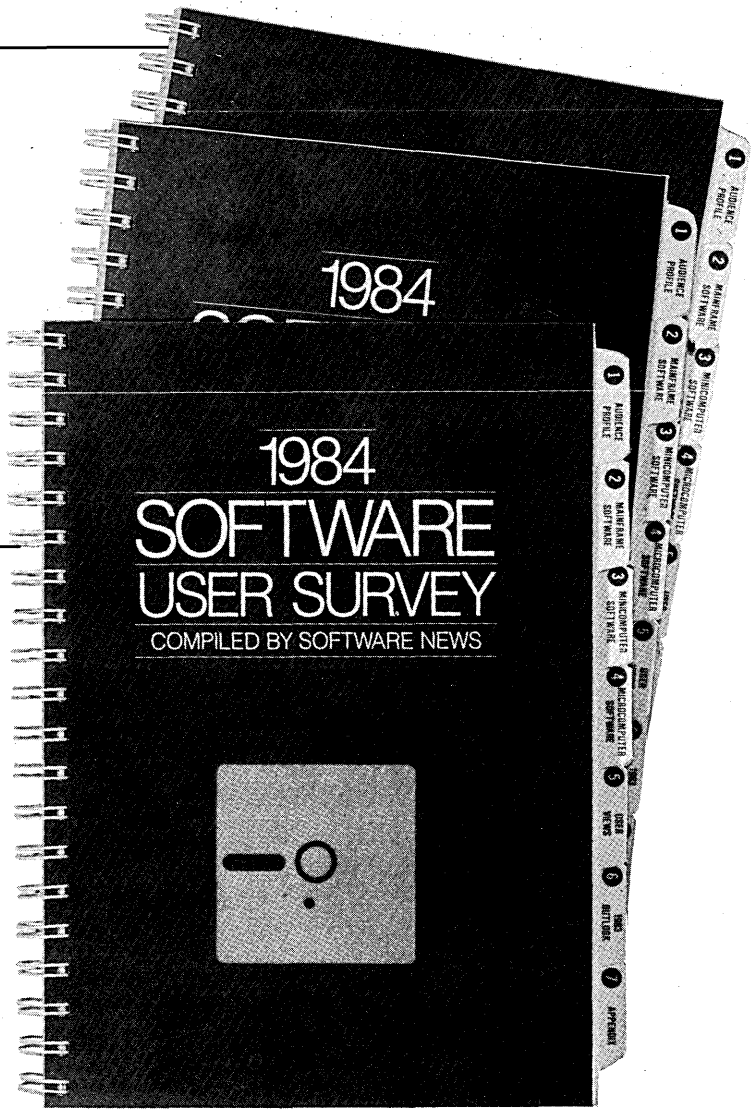

The results are now in from the second annual Software User Survey conducted by Software News. Over 2000 major national accounts participated.

Virtually every sector of the U.S. economy was polled...banks, insurance firms, manufacturers, distributors, medical and legal groups, educational institutions, systems

iouses, process industries, tc. The respondents iden- ified the software ackages they are now ising and what they plan o buy in 1984. The main- rames, minis and micro- omputers currently in use nd those planned for pur- hase in 1984 are also dentified.

The 200-page report of he survey results ranks he leading software endors by their relative narket shares. The xpected increases in 1984 oftware expenditures are nalyzed separately for nainframes, minis and nicros. Twenty-seven pecific categories of pplications and systems oftware were studied to dentify the fastest growing egments. Examine the Table of Contents for more details.

Partial Table of Contents

1. **1983 competitive market shares of independent software vendors (analyzed by application/function)**
   a. Mainframe software vendors
   b. Minicomputer software vendors
   c. Microcomputer software vendors
2. **Software vendors' projected 1984 market shares (analyzed by application/function)**
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7. **How users rank the various selection criteria when choosing a software vendor.**
8. **An assessment of lagging programmer productivity and what users cite as the most viable solutions for easing the backlog of applications awaiting development.**

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READERS' FORUM

HIT THE SLOPES

The basic Optimum Ride Quantity (ORQ) model calculates the number of ski-lift rides as a function of the Cost of Ski-lift Ticket (COST) and the monetized Estimated Natural Unit Fatigue Factor (ENUFF). The relationship between COST and ENUFF is too often overlooked. By selecting a suitable ENUFF value and applying the ORQ model, skiers can determine the optimum number of rides for their skiing day.

The model is developed as follows:

1. The Cost of Single Ski-run (COSS) is calculated by dividing COST by the nth run, then adding its quotient to the product of ENUFF multiplied by the nth run:

$$\text{COSS} = \frac{\text{COST}}{\text{n}} + \text{ENUFF.n}$$

where: COST = pro-rata cost of one adult ski-lift ticket on the day in question.

ENUFF = monetized cost of personal factors of which fatigue induced by the total skiing scene is the principal one. In the model, this is incremented arithmetically per run, since fatigue does not reset to its original value after each run.

n = numerical value of each run.

2. The ORQ equation is derived by differentiating the COSS equation to minimize COSS. Differentiating and setting the result equal to zero, to get the slope of COSS at its minimum point, gives:

$$\frac{\text{dn}}{\text{dx}} = \text{ENUFF} - \frac{\text{COST}}{\text{n}^2} = 0$$

$$\text{n}^2 = \frac{\text{COST}}{\text{ENUFF}}$$

$$\text{n} = \frac{\text{COST}}{\sqrt{\text{ENUFF}}}$$

Either (or both) COST and ENUFF may now be set to any actual or arbitrary value to begin calculating the optimum number of runs for the day. This should be done before starting the day, around 11:00, or while waiting for the ski patrol to rope you down from your chair. Although COST is normally a given, the following may give a better understanding of ENUFF, and of COST as an optional variable.

1. COST is usually the price of a one-day ticket. The rate per day discount on two- and three-day tickets does not significantly

FIG. 1

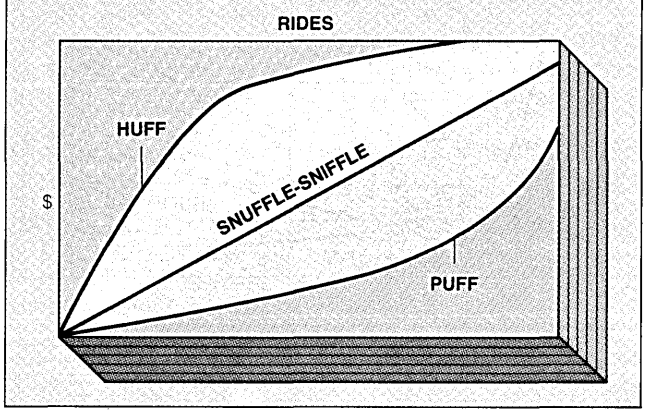
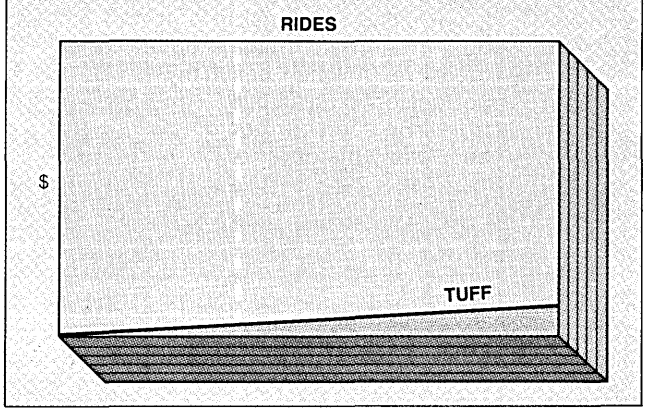


FIG. 2



CHARTS BY NINA WALLACE

READERS' FORUM

alter the ORQ except at very low ENUFF values. Skiers capable of sustaining such values over consecutive days may wish to investigate ski-week packages. Using them will put the ORQ comfortably within the 12–14 ride-per-day range, especially if inclement weather requires assigning temporarily higher than average ENUFF values.

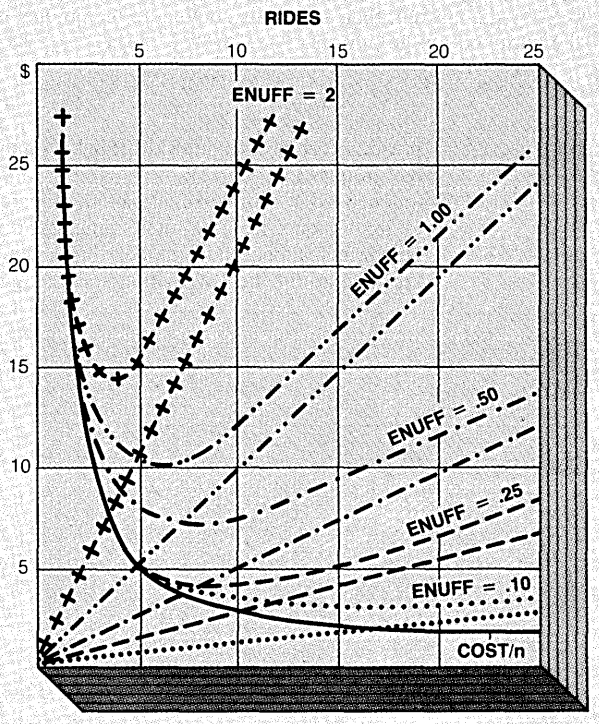
2. The slope of the ENUFF line has been normalized from the two basic fatigue curves experienced by the bulk of recreational skiers (Fig. 1). The upper curve is weighted by Cost of Opportunity Lost (COOL) factors and is typical of blasé, late-morning riser types who (under peer pressure to hit the slopes on time) are losing the opportunity to stay in bed, brunch leisurely, and browse in the ski shops. This results in a steep incremental increase in fatigue during the early runs of the day, which then slopes off after lunch. The resulting curve is the Hyperbolic Unit Fatigue Factor (HUFF) line.

The lower curve is weighted by Cost of Reward Deferred (CORD) factors and is typical of early-morning riser types capable of chopping a cord of wood before a quick and hearty breakfast. This results in a shallow incremental rise during the early runs, which can even be extended by prudent and moderate lunchtime habits. The slope of the curve steepens sharply, however, in the late-day runs as the skier not only begins to experience fatigue, but also begins to look forward to his deferred reward. The resulting curve is known as the partial Parabolic Unit Fatigue Factor (PUFF) line, whose focus is on the deferred reward. Note that the curve for the next day can be considerably modified depending upon whether the deferred reward takes the form of a beneficial preprandial snooze or excessive consumption of spiritous beverages (booze).

When subjected to multiple, stepwise least-squares regression analysis techniques, the HUFF-PUFF lines result in the Statistically Normalized Unit Fatigue Factor Linear Extension (SNUFFLE)—also called the Statistically Normalized Incremental Fatigue Factor Linear Extension (SNIFFLE) line—with a determination coef-

FIG. 3

ORQ GRAPH



ORQ Curves at COST = $25 and at Representative ENUFF Values

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READERS' FORUM

FIG. 4

ORQ TABLE

COST	ENUFF				
	$.10	0.25	0.50	1.00	2.00
$25	16	10	7	5	4
24	15	10	7	5	3
23	15	10	7	5	3
22	15	9	7	5	3
21	14	9	6	5	3
20	14	9	6	4	3
19	14	9	6	4	3
18	13	8	6	4	3
17	13	8	6	4	3
16	13	8	6	4	3
15	12	8	5	4	3
14	12	7	5	4	3
12	11	7	5	3	2
11	10	7	5	3	2
10	10	6	4	3	2

ficient of .81. The SNUFFLE-SNIFFLE line is not to be confused with the ordinary lift line, which is a horizontal Multiple-merge of Linearly Extended Skiers (MOLES) line, even though the two exhibit some external characteristics in common. The SNUFFLE-SNIFFLE line has been validated via statistical variables sampling techniques to yield a computed precision interval of ± 5% at a 95% confidence level.

3. The vitalistic Teleological Unit Fatigue Factor (TUFF) line, depicted below, is not considered when deriving the SNUFFLE-SNIFFLE line. The TUFF line (Fig. 2) is a statistical anomaly occurring very rarely, and then only in People Made of Steel. For example, the maximum number of practicably attainable runs during normal lift operating hours, in respect to linear lift speed, lift-line wait time, deteriorating trail conditions, *and* going home for lunch, is 23. This was conclusively demonstrated by A Person Made of Steel under adverse weather and trail conditions, with minimum lift-line wait time, in 1976. Setting n = 23 as the ORQ in the model gives an ENUFF value of five cents, which is clearly out of the question for the typical skier.

Since ENUFF is an arbitrary value, it must be selected by each individual skier. The recreational skier should think in terms of establishing a median ENUFF value based on constants such as age, skill, physical condition, the mountain, etc. Ranging above and below that median will be ad hoc values based on crowd, weather and trail conditions, the night before, and whether the skier is skiing with or without a spouse.

The application of the model for a given lift-ticket price of $25, and at representative ENUFF values, is illustrated in the Optimum Ride Quantity (ORQ) Graph (Fig. 3). The ORQs for a range of COST/ENUFF values are given in the ORQ Table (Fig. 4).

Readers are encouraged to experiment with the ORQ model to establish their own optimum ENUFF values, and to learn to trust the ORQs that result from their model applications. Orthopedic surgeons at major ski slopes who have reviewed this material are hopeful that its widespread use will significantly reduce the consequences of the last-run syndrome.

—A. J. Crawford
New York, New York

If you'd like to share your opinions, gripes, or experiences with other readers, send them to the Forum Editor, DATAMATION, 875 Third Ave., New York, NY 10022. We welcome essays, poems, humor, or short stories.

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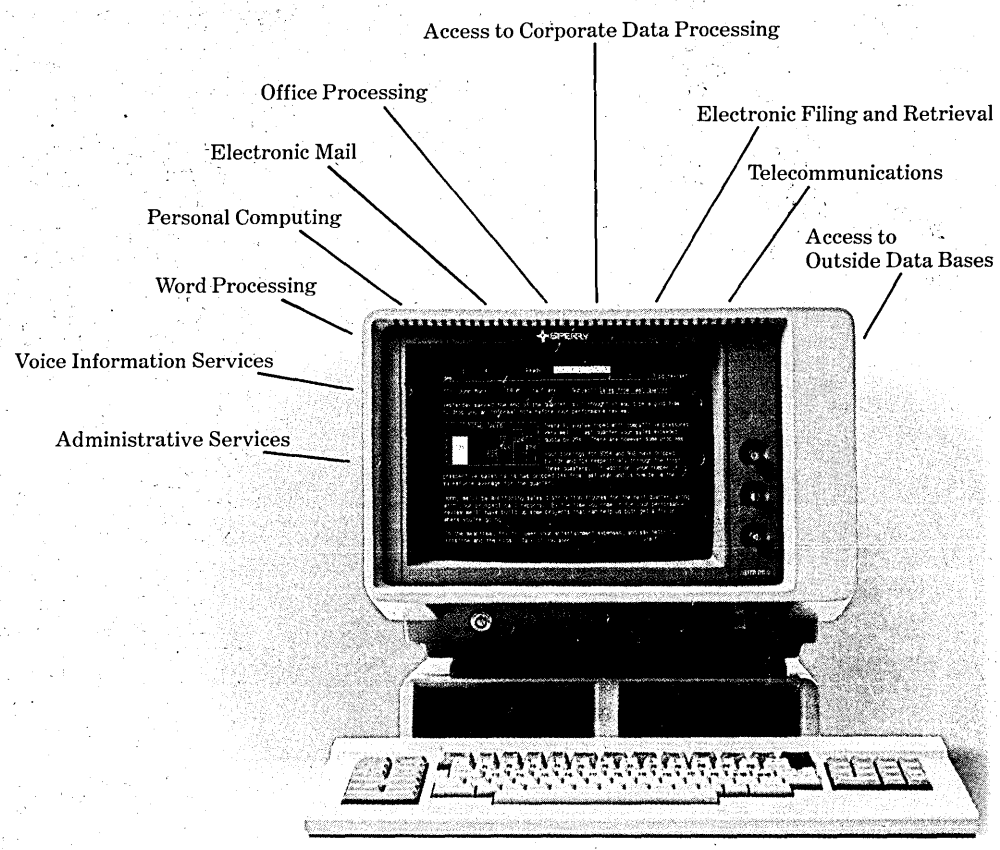

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