DATAMATION 84®
JANUARY/4.00 U.S.A.

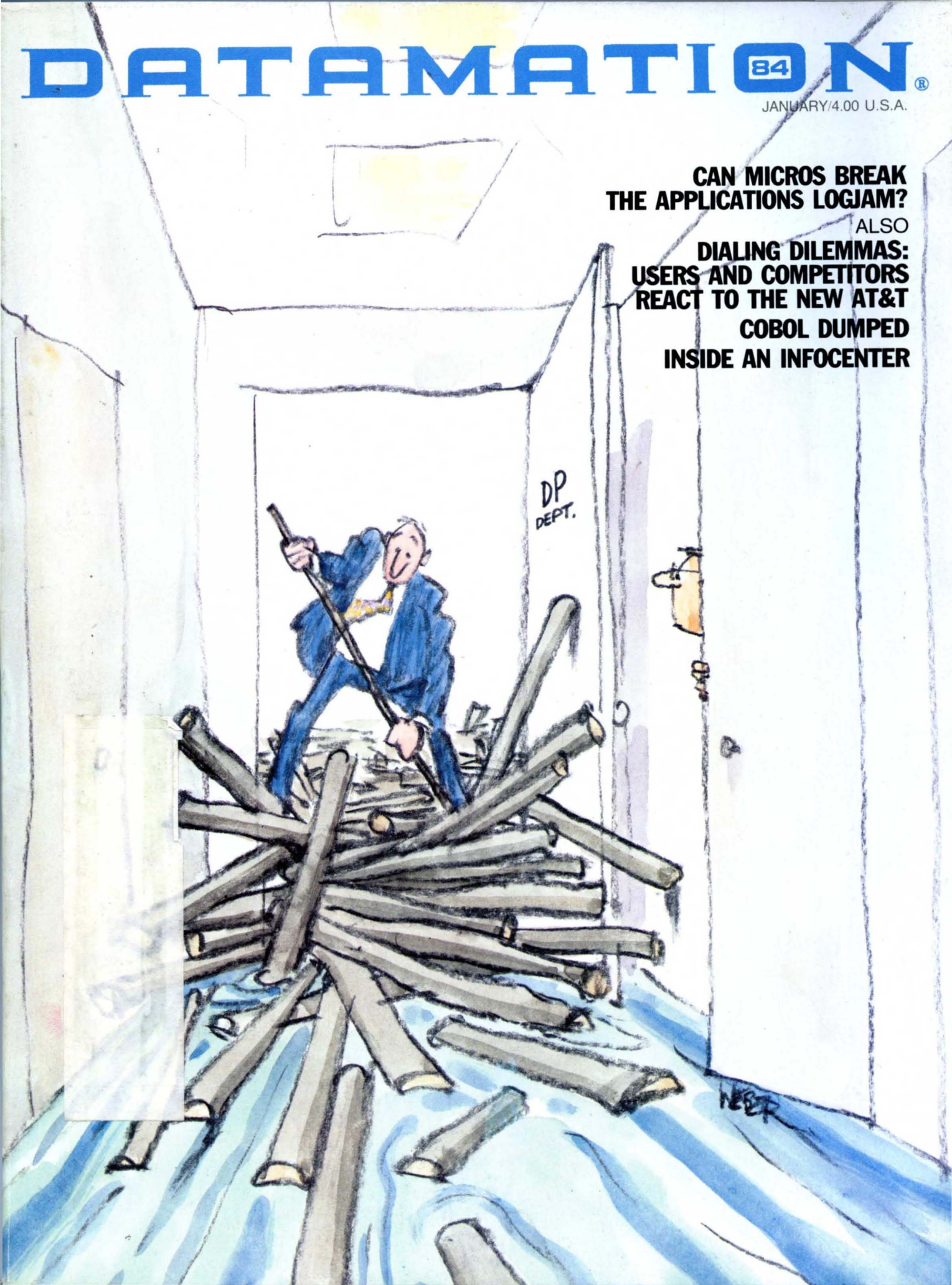
CAN MICROS BREAK THE APPLICATIONS LOGJAM?

ALSO

DIALING DILEMMAS: USERS AND COMPETITORS REACT TO THE NEW AT&T

COBOL DUMPED

INSIDE AN INFOCENTER



Model 6455 Cartridge Tape System

Loaded with Fe... tures —
Lo... h Benefits.

Kennedy products have always provided innova... features. And these features have always provi... benefits and convenience for the user. For ins... Model 6455 offers these features and benefit...

Feature: Start/Stop Operation

Benefit: Drive can emulate a ½" tape dri... the ability to perform selective f... file-restructuring, journaling an... updates.

The drive is effectively a ½" ta... smaller package.

Feature: Hard Read Error Spec...

Benefit: Best data reliability ... Gives the user ... back-up media...

Feature: On-board ...

Benefit: Drive ...

Cartridge Jam Protection

Protects the cartridge from damage if cartridge ...ams. This is accomplished by sensing a current surge and then disabling the motor, thus ...suring that the cartridge will not be damaged.

...gh Density Recording

...rage capacity of 23 MB on a single cartridge.

...tional industry standard ½" tape interface

...rates with existing tape couplers and software. ...drive operates as though it were a ½" ...drive without having to modify existing ... software.

... what we're driving at. Model 6455 ... and benefits for you. For the ... today.

...NEDY

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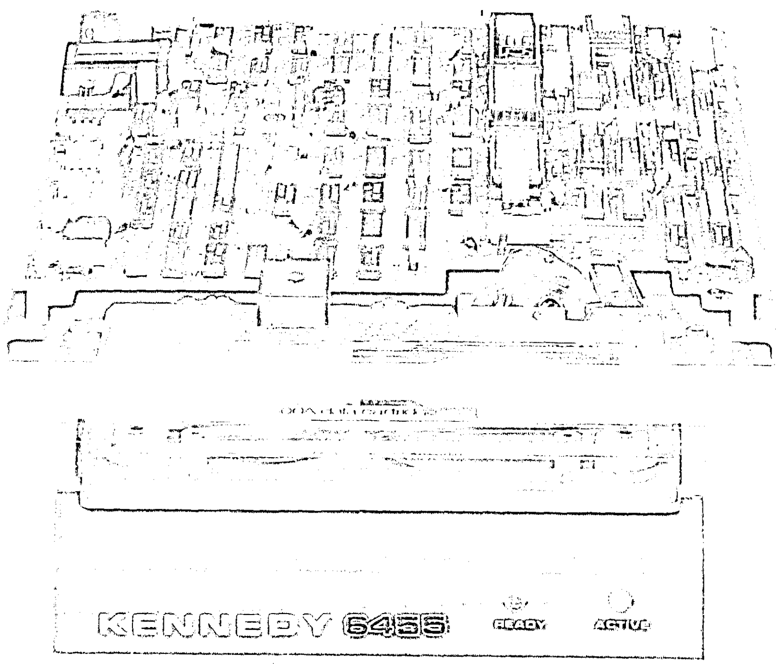


K... ...IT

Want to combine MICOM's money-saving data concentration with X.25's money-saving packet data communications?

Now you can. There's a new kind of data communications product which combines the best features of a MICOM Micro800/2 Data Concentrator with all of the functions of an X.25-compatible packet assembler/disassembler (PAD) to give you the best of both worlds. It's called the Micro800/X.25 Concentrator PAD, and here are some of its more prominent features:

Packetizing

of data from up to 16 "dumb" asynchronous terminals or from non-X.25 computers for transmission over public or private Packet Data Networks.

Local Switching

between any devices connected to the same PAD, and

Class Name Addressing

to allow users to be served by the first available member of a set of similar network resources.

Users may also force larger numbers of terminals into

Contention

for smaller numbers of expensive computer ports.

Most important, the Concentrator PAD makes the transition to X.25 easy. The menu-driven operation of its

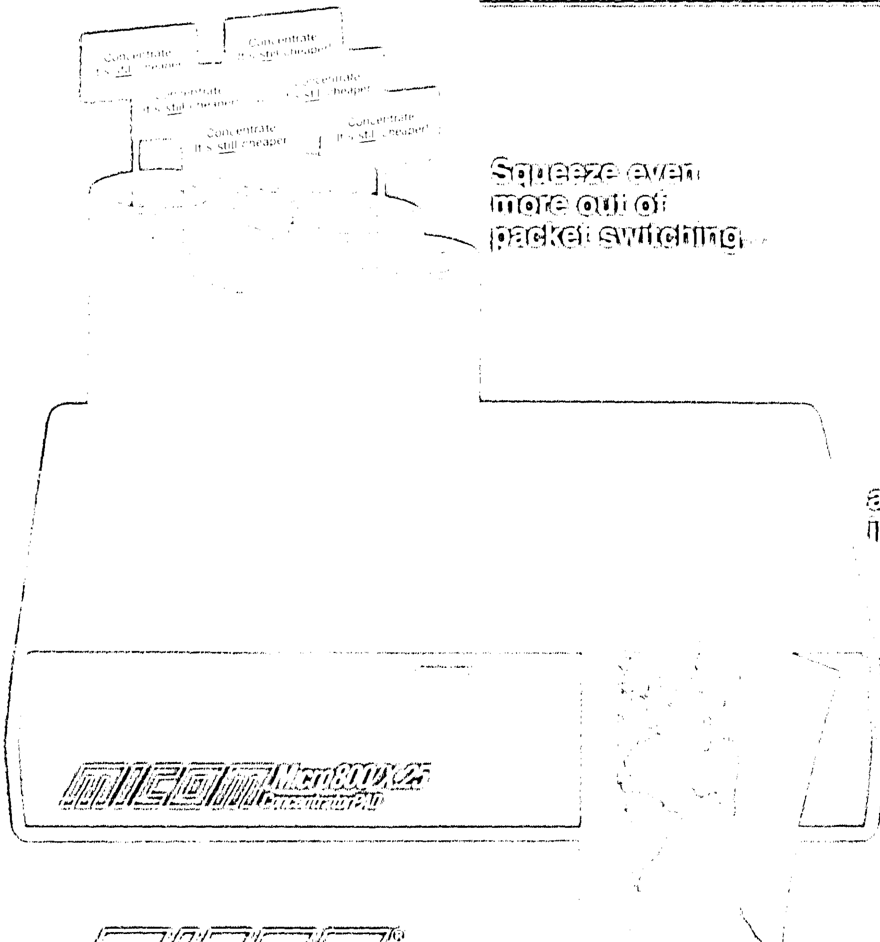
Command Facility

simplifies the setting of channel configurations and also makes it possible to set those parameters, to test channels, and to collect network statistics from a central site. Even its operating software can be updated through

Downline Loading

And it's inexpensive enough for applications supporting only a few terminals. Find out how easy X.25 can be.

Call or send today for a free 12-page brochure describing X.25 and MICOM's new Concentrator PAD.



Squeeze even more out of packet switching...

anywhere in the world!

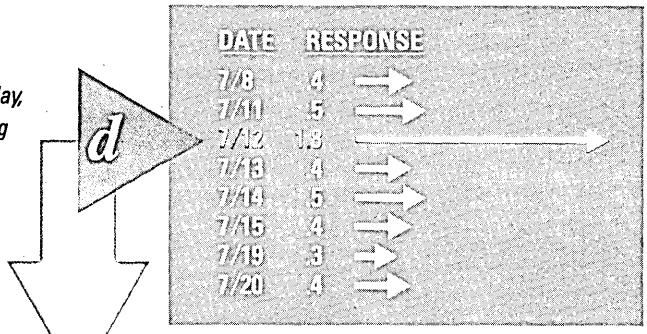
Candle Introduces EPILOG™/MVS

MVS PERFORMANCE IN 3 EASY STEPS

The EPILOG™/MVS Installation Performance Management System will allow you to easily analyze and manage your performance and capacity concerns.

Step 1

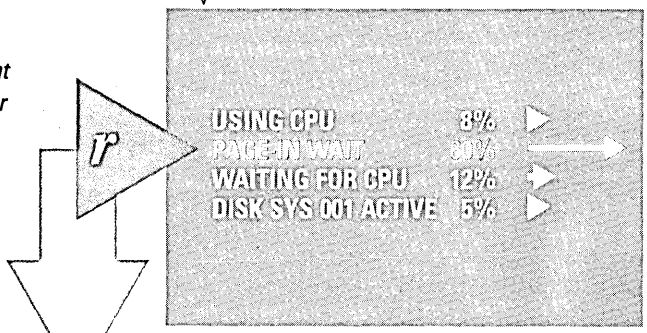
Discover your problems. Ask EPILOG/MVS to plot TSO response times or batch job run times (yesterday, last week, last month) on your CRT. After analyzing the workload for problems, simply place a "d" next to the problem time period and press enter. In this example, July 12 is the problem day.



Historical TSO plot for the month of July

Step 2

The result is a display of degradation reasons for that time period. Now you know the major causes of poor response. In this case, paging caused 60% of response time problems. But what is causing the degradation? Place an "r" on the problem line and press enter.

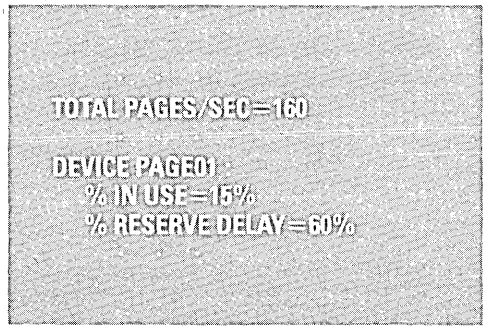


Detailed analysis of TSO response time problem for July 12.

Step 3

EPILOG/MVS will automatically bring you the information needed to help analyze degradation for that time of day. In this example, Step 3 shows an analysis of paging activity where a paging device has contention from another system.

Use EPILOG/MVS for monitoring: trends, capacity, TSO response time problems, batch job run times, effects of changing hardware, and effects of making tuning changes. It's as easy as 1-2-3.



Analysis for paging on July 12

☐ *Please send me more information on EPILOG/MVS.*
☐ *Please enter my free subscription to the Candle Computer Report.*

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CIRCLE 5 ON READER CARD

DATAMATION®

JANUARY 1984/$4.00 U.S.A.
VOLUME 30 NUMBER 1
This issue, 176,845 copies

FEATURES

NEWS IN PERSPECTIVE

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INTERNATIONAL 200-1

OEM SUPPLEMENT 201-1

COVER ILLUSTRATION BY BOB WEBER

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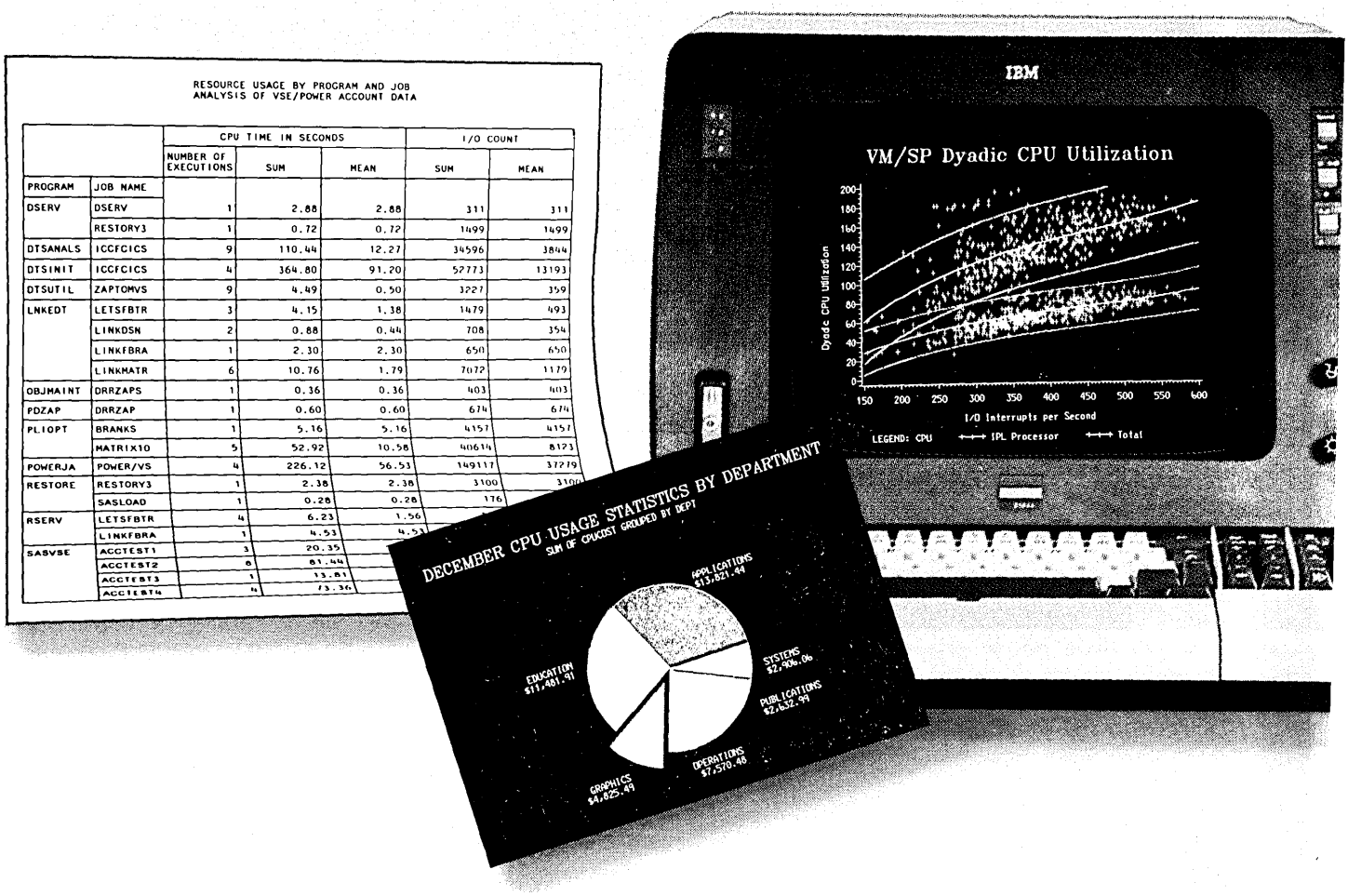
SAS...Performance Tools for Every IBM 370 Operating Environment.



		CPU TIME IN SECONDS			I/O COUNT	
		NUMBER OF EXECUTIONS	SUM	MEAN	SUM	MEAN
PROGRAM	JOB NAME					
DSERV	DSERV	1	2.88	2.88	311	311
	RESTORY3	1	0.72	0.72	1499	1499
DTSANALS	ICCFCICS	9	110.44	12.27	34596	3844
DTSINIT	ICCFCICS	4	364.80	91.20	52773	13193
DTSUTIL	ZAPTOMVS	9	4.49	0.50	3227	359
LNKEDT	LETSFBTR	3	4.15	1.38	1479	493
	LINKDSN	2	0.88	0.44	708	354
	LINKFBRA	1	2.30	2.30	650	650
	LINKMATR	6	10.76	1.79	7072	1179
OBJMAINT	DRRZAPS	1	0.36	0.36	403	403
PDZAP	DRRZAP	1	0.60	0.60	674	674
PLIOPT	BRANKS	1	5.16	5.16	4157	4157
	MATRIX10	5	52.92	10.58	40614	8123
POWERJA	POWER/VS	4	226.12	56.53	149117	37279
RESTORE	RESTORY3	1	2.38	2.38	3100	3100
	SASLOAD	1	0.28	0.28	176	
RSERV	LETSFBTR	4	6.23	1.56		
	LINKFBRA	1	4.53	4.53		
SASVSE	ACCTEST1	3	20.35			
	ACCTEST2	6	81.44			
	ACCTEST3	1	13.81			
	ACCTEST4	4	73.36			

SAS®—always a leading performance measurement tool for IBM OS users—now offers VM/CMS, DOS/VSE and SSX users the power and flexibility of the SAS System.

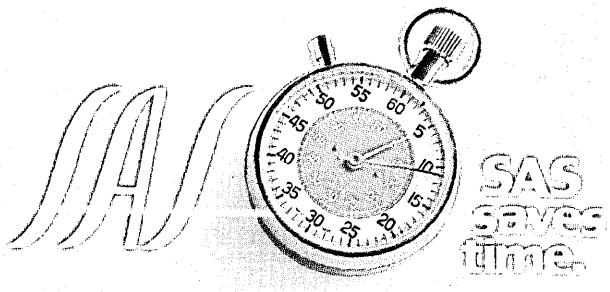
You get a twofold advantage with the SAS System. A library of ready-to-use procedures gives you the power to analyze performance statistics without formal training. SAS programs for reducing VM Monitor data and VSE Power accounting data are included with each installation tape. You can use these SAS programs to produce summary reports of key performance variables, user resources and system work loads. To print the reports, you can take advantage of the color charting, plotting and mapping capabilities in SAS/GRAPH® or use the line printer reporting facilities in SAS.

In addition to routine performance and accounting reports, the SAS System provides extensive data management and retrieval tools, combined with a sophisticated macro facility, to handle all your capacity planning needs. You can use SAS to analyze performance data from several operating environments, creating an integrated system.

Now you can enjoy the power and flexibility of the SAS System—under OS, VM/CMS, DOS/VSE and SSX.

Call or write today: SAS Institute Inc., SAS Circle, Box 8000, Cary, NC 27511-8000, USA. Telephone (919) 467-8000. Telex 810-2505.

The SAS System is available outside the USA from the Institute's subsidiaries in Heidelberg, West Germany; Weybridge, Surrey, UK; Wellington, New Zealand; and Sydney, Australia; and from licensed distributors in Tokyo, Japan; Milano, Italy; Herzliya, Israel; and Singapore.



Introducing COMPAQ PLUS, the first high-performance portable personal computer.

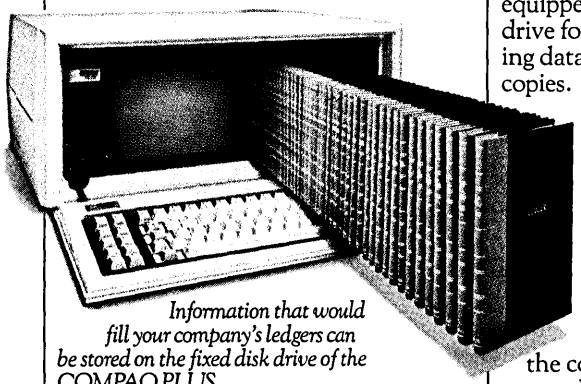
The makers of the COMPAQ™ Portable Computer, the industry standard, announce another breakthrough—the COMPAQ PLUS™ Portable Personal Computer. No other personal computer can handle so much information in so many places.

The new COMPAQ PLUS offers the power of an integrated ten-megabyte fixed disk drive in a portable. You get problem-solving power that no other personal computer can match.

Plus a bigger payload

How much is ten megabytes?

Enough to tackle jobs that can't be conveniently handled on most personal computers.



Information that would fill your company's ledgers can be stored on the fixed disk drive of the COMPAQ PLUS.

A mailing list of 100,000 names, addresses, cities, states, and Zip codes.

A full year of daily prices for every stock on the New York exchange.

Inventory records on a quarter million items.

The entire San Francisco phone book. And room left over for Peoria.

The fixed disk drive keeps all the information seconds away, ready to be searched, sorted, retrieved, analyzed or updated.

Plus better use of your time

The integrated fixed disk drive will store programs. That means your most used programs and data can be permanently kept in the COMPAQ PLUS, ready to call up and run.

With programs permanently stored, the COMPAQ PLUS becomes a well-informed traveling companion, a tool to help you apply your best thinking anytime, anywhere.

You could store a complete library of accounting programs on the disk—payables, receivables, general ledger, and payroll—*with* the company's books.

You could store an inventory control program with your inventory records and a list management program with your mailing list and a filing program with your personnel files.

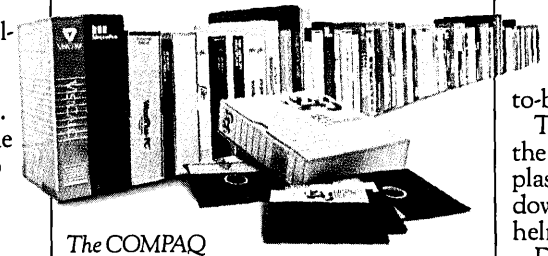
The COMPAQ PLUS is also equipped with a 360K byte diskette drive for entering new programs, copying data files, and making backup copies.

Plus more programs

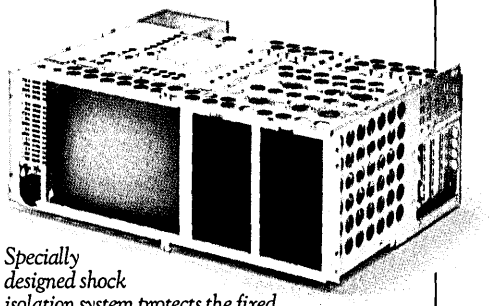
More programs means more versatility. And the COMPAQ PLUS is impressively versatile because it runs all the popular programs written for the IBM® Personal Computer XT, available in computer stores all over the country. And they run as is, with no modification whatsoever.

And the high-capacity portable multiplies the productivity of every program it runs. Your inventory and its control programs can go with you to the factory. Your books and your accounting programs can go with you to a board meeting. Your building specs and your project management programs can go with you to the construction site.

You're buying a computer to solve problems. Why not have more problem-solving programs to choose from?



The COMPAQ PLUS runs all the popular programs written for the IBM Personal Computer XT.



Specially designed shock isolation system protects the fixed disk from jolts.

Plus a traveler's toughness

Life can be tough on the road. A true portable has got to be tougher. The COMPAQ PLUS is.

Its integrated fixed disk drive is unique, designed specifically to travel. Rough roads and hard landings don't bother it because of a specially designed shock isolation system that protects the disk from jolts and vibration.

All the working components are surrounded by a uniquely cross-membered aluminum frame. This structure, common in race car design technology, strengthens it side-to-side, front-to-back, and top-to-bottom.

The outer case is made of LEXAN®, the same high-impact polycarbonate plastic used to make bulletproof windows and faceplates for space suit helmets.

Does a portable personal computer really have to be this tough? Take a good look at your briefcase and then decide.

Plus ease of use

The COMPAQ PLUS is big where it counts.

The display screen is big. Nine inches diagonally. Big enough to show a full 25-line-by-80-character page that's easy to read even if you're leaning back in your chair.

The keyboard is full-sized and typewriter-style for easy control.

With its built-in display, the COMPAQ PLUS makes a smooth, low profile on your desk, not an obstacle that you have to talk around.

Plus an easy way to get started

If you're buying your first personal computer and you're not sure how much capacity you need, your choice is easier now.

Start with the COMPAQ Portable with single or double 320K byte diskette drives. If you need more capacity later, upgrade to the COMPAQ PLUS. A conversion kit is available that turns the COMPAQ Portable into a COMPAQ PLUS, complete in every detail and capability.

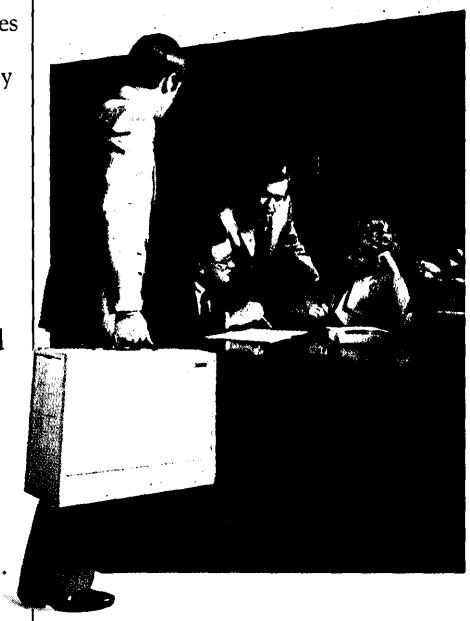
Plus a lot more

The COMPAQ PLUS also works with optional printers, plotters, and communications devices designed for IBM's personal computer family.

It has two IBM-compatible slots for adding optional expansion boards. With companion programs, they'll let you share information with a network of personal computers in your office, communicate with your headquarters computer files while you're away, or add memory capacity if your needs grow.

The COMPAQ Portable, the industry standard in portable personal computers. ▼

The problem-solving power of a high-performance desktop personal computer can now go where you need it.



It's got high-resolution graphics and text on the same screen. A detached keyboard. Programmable function keys. Expandable memory. Dozens of other features that simply make it do a better job of personal computing.

And when you see all that the COMPAQ PLUS has to offer, you'll be pleasantly surprised by the price. The fact is, it costs hundreds less than comparably equipped desktop personal computers.

See the first high-performance portable personal computer. The COMPAQ PLUS—performance, programs, productivity. Plus problem-solving power.

The new COMPAQ PLUS, the first high-performance portable personal computer. ▼

COMPAQ PLUS Specifications

Storage
- ☐ One integrated 10-megabyte fixed disk drive
- ☐ One 360K byte diskette drive.

Software
- ☐ Runs all the popular programs written for the IBM XT.

Memory
- ☐ 128K bytes RAM, expandable to 640K bytes

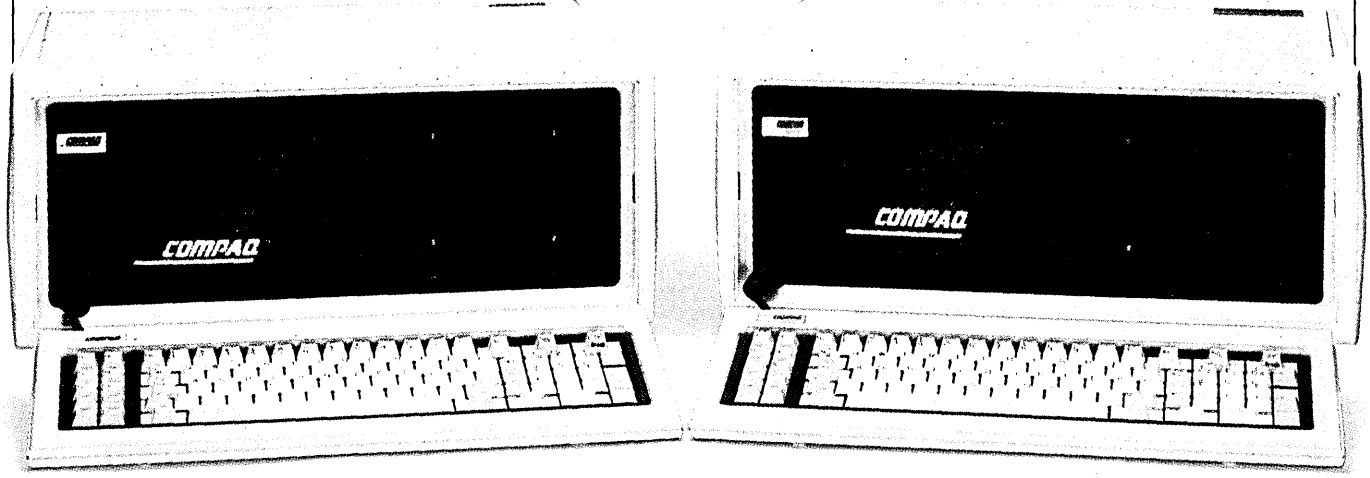
Display
- ☐ 9-inch diagonal monochrome screen
- ☐ 25 lines by 80 characters
- ☐ Upper- and lowercase high-resolution text characters
- ☐ High-resolution graphics

Interfaces
- ☐ Parallel printer interface
- ☐ RGB color monitor interface
- ☐ Composite video monitor interface
- ☐ RF modulator interface

Expansion board slots
- ☐ Two IBM-compatible slots

Physical specifications
- ☐ Totally self-contained and portable
- ☐ 20″W × 8½″H × 16″D

For the name of the Authorized Dealer nearest you, call 1-800-231-0900.



COMPAQ PLUS™

LOOKING BACK

BILL AND COUP

January 1964: A new section, "Washington Report," was introduced in this issue. Its purpose was to help readers keep tabs on government activities.

DATAMATION reported that President Johnson was putting the squeeze on military and space spending and that this would help push the "Brooks Bill" through the Senate. Nearly all the computer-using agencies strongly opposed the bill. The major gripe was that it delegated "sweeping authority" to the General Services Administration. GSA would be empowered to coordinate and control the purchase, lease, maintenance, use, and operation of dp equipment. Jack Brooks (D-Texas) author of the bill, claimed it could save the government $100 million a year—or about one eighth the anticipated government expenditures for dp equipment in fiscal '64.

The House Committee on Post Office and Civil Service also had a few gripes about the bill. Committee members felt it had been too hastily drawn up, proposed, and passed, and was too broad in scope. The committee also argued that any dp procurement agency should be located high on executive organization charts, rather than as a lower-echelon GSA department.

GOVERNMENT AID

On another level, congressmen were becoming more uncomfortable about making decisions on technical matters that involved hundreds of millions of dollars. The lack of counsel in resolving technical complexities prompted the Committee on Government Operations to schedule hearings to discuss appointment of an advisory board. A 12-person Science and Technology Council was proposed to advise both legislative and executive branches on these subjects.

QUE SERÁ, SERÁ

January 1974: DATAMATION interviewed 25 computer equipment vendors to elicit their expectations for the new year. While a recession was not imminent, many vendors felt that the winter's fuel crisis, if, indeed, it was real, could lead to severe economic problems.

Manufacturers of IBM-compatible peripherals expected to ship more tape drives and printers but fewer add-on memories and disk drives during 1974. Some vendors thought disk drive shipments would fall off as much as 10% to 15%, while users waited for details on IBM's advanced products, such as the Winchester file. Conversely, other vendors thought the market could rise 25% as 3330-like devices moved into production; this included dual-density offerings that could beat IBM products in price and performance.

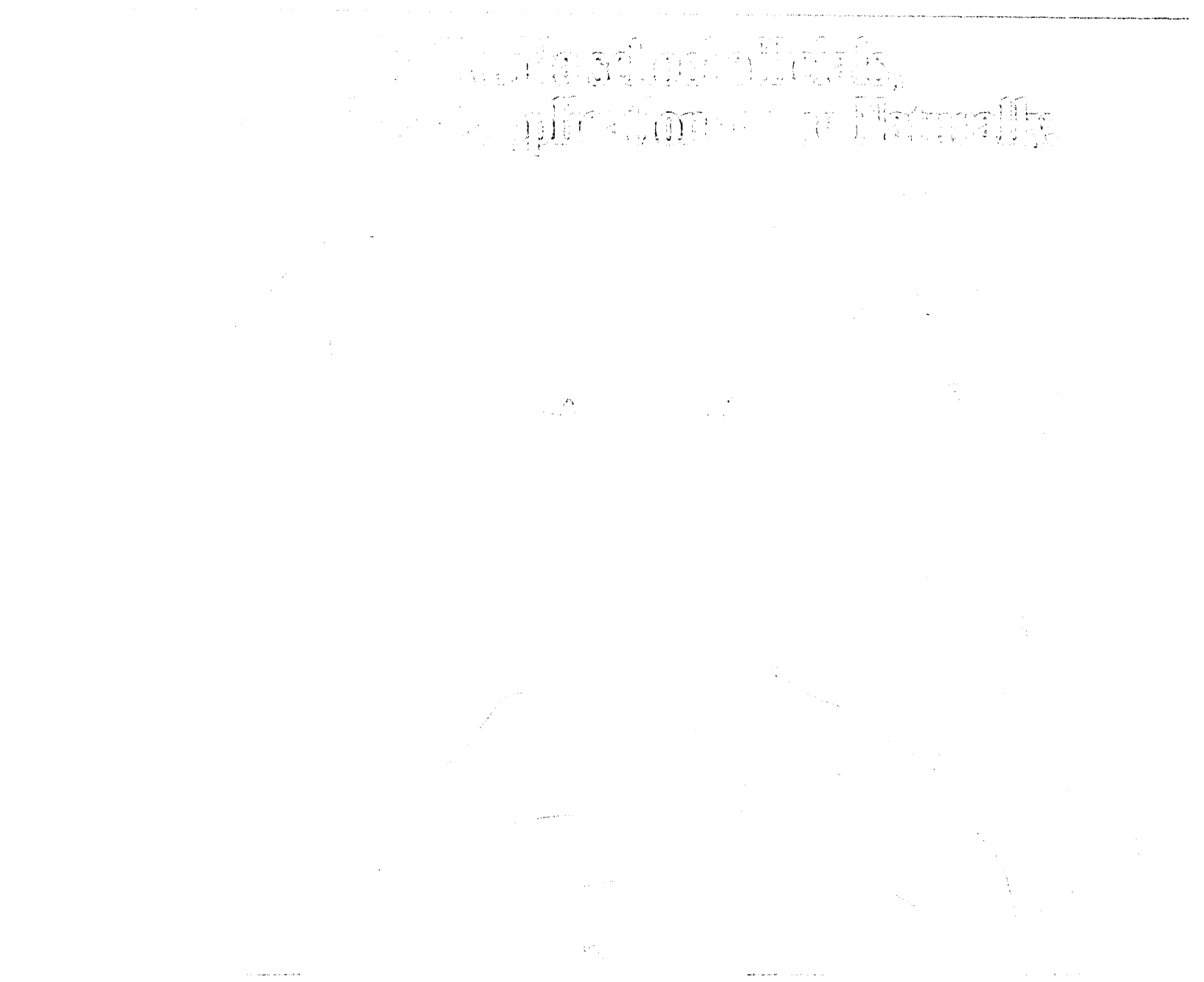
The softening of Judge Sherman A. Christensen's original Telex-IBM injunctions left many pcms feeling they were right back where they started from—frozen out of the money market. Their only hope was that the original injunctions would remain intact in appeals court and that a recession might push IBM users to grab the pcms' lower-priced offerings.

DEC said its minicomputer market growth was 45% in 1973, and corporate executives expected it to continue at the same rate in 1974. The growth rates for smaller companies in the same market were even higher. A study by International Data Corp. showed worldwide shipments of minicomputers reached $835 million in '73, and predicted they would soar to $2.5 billion by 1977.

Key-to-disk manufacturers remained confident that their market would grow 70%. The mainframers looked for a moderate growth in the number of units shipped. Their expected 4% rise was a conservative estimate after their anticipated 18% growth in '73 was shot down when IBM blitzed the market with its virtual machines.

The consensus was that '74 would be a year of oil shortages, paper shortages, and heavy inflation. Many dp departments would have to tighten their belts. Yet some economists felt even this had a bright side. They claimed inflationary pressures could conceivably increase the demand for automation equipment, since machine costs could be contained more easily than rising labor costs.

—Lauren D'Attilo



NATURAL Fourth-Generation Information Processing System

With nearly a quarter of a million students, Florida's Dade County School District could have been an administrative nightmare.

Instead, it's a perfect demonstration of how Software AG's NATURAL and ADABAS can make things easier for everyone from superintendents to first-graders.

NATURAL is Software AG's fourth-generation information processing system—the system with the largest installed base of its kind in the world. NATURAL is one of the most powerful programmer productivity tools around, typically 10 to 20 times more productive than COBOL.

And NATURAL is backed by ADABAS, Software AG's widely imitated but never-equalled data base management system—the system that's given more people a taste for relational architecture than any other DBMS.

With the help of NATURAL and ADABAS, Dade County officials now have a system that combines everything from electronic mail to centralized food purchasing for over 250 schools—while keeping track of each student's performance and needs.

So, whether you're managing a lunch program or just trying to digest a lot of information, you owe it to yourself to find out what NATURAL and ADABAS can do for you. We'll be glad to show you the rest of our menu.

Software AG of North America, Inc.
11800 Sunrise Valley Drive, Reston, Virginia 22091
(703) 860-5050

SOFTWARE AG

Powerful Software Solutions

CIRCLE 7 ON READER CARD

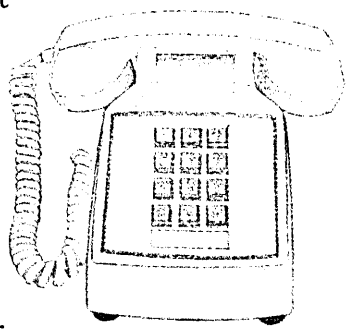
You'll be impressed with your Honeywell computer.

If you need service... even more impressed.

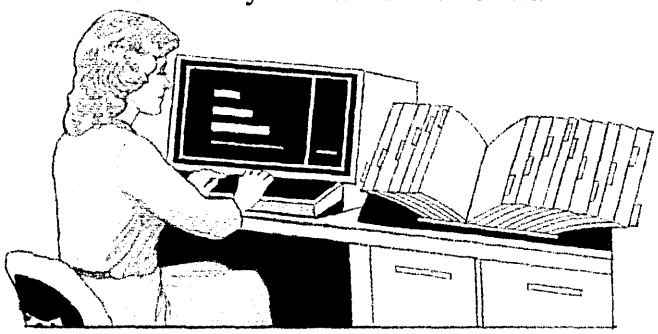
In evaluating a computer system, many users put service at the top of their list. So do we.

We start by making one individual responsible for your system's performance. He's highly trained and knows you and your operation first hand. And he's the focal point of a person-to-person approach that makes communication more effective and the entire program more responsive.

The Honeywell service program includes varied resources to assist your representative in meeting every eventuality. Like our National Response Center, operating 24 hours a day, seven days a week. Your one call here is all it takes to trigger action. All of the historic data on your system is at their fingertips, all resources at their disposal.

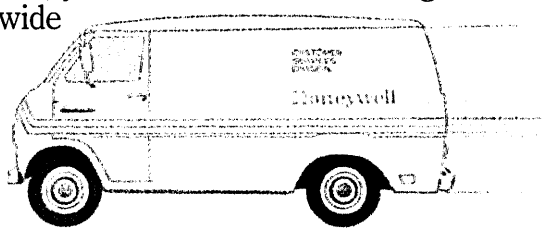


Among these are our Technical Assistance Centers. Staffed by hardware and software

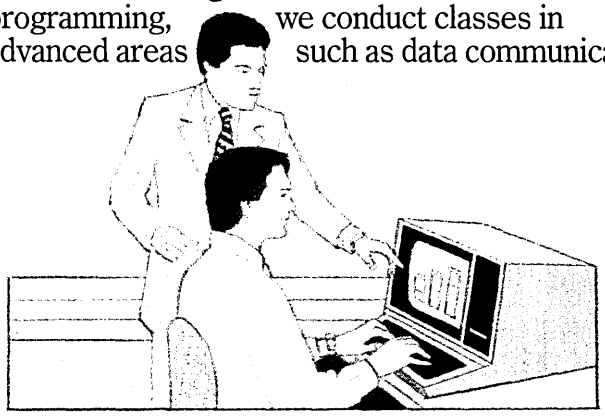


experts, each TAC is equipped with system documentation libraries and advanced capabilities to quickly diagnose your problem remotely.

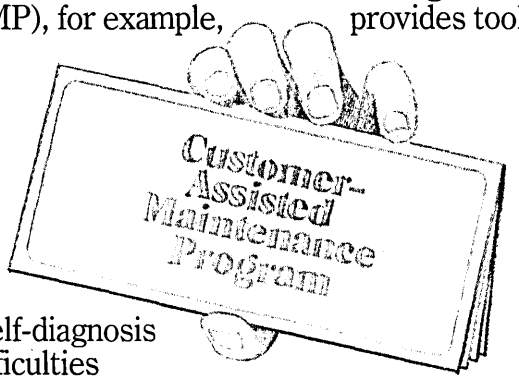
If spare parts are required, you'll get them. Fast. Our nationwide on-line inventory tracking system and network of stocking centers allow us to locate and ship any part. Quickly.



Still another element of our customer service is training. In addition to such basics as programming, we conduct classes in advanced areas such as data communications and database design. Using the latest computer-assisted learning techniques, these classes can be conducted at your facilities or ours.



There are no compromises in the quality of our service. But there are varying levels of service available that can be tailored to meet your system availability requirements. Our Customer-Assisted Maintenance Program (CAMP), for example, provides tools for self-diagnosis of difficulties and offers additional economies through parts replacement arrangements that include carry-in, mail-in, or call-in options for expedited delivery.



We call this comprehensive approach to system support TotalCare™ service. It represents all that we've learned in more than 25 years of serving the needs of customers all over the world.

For more information, call 800-328-5111, ext. 2702 (in Minnesota call collect 612-870-2142) or write Customer Services Division, Honeywell, MS 440, 200 Smith Street, Waltham, MA 02154.

Together, we can find the answers.

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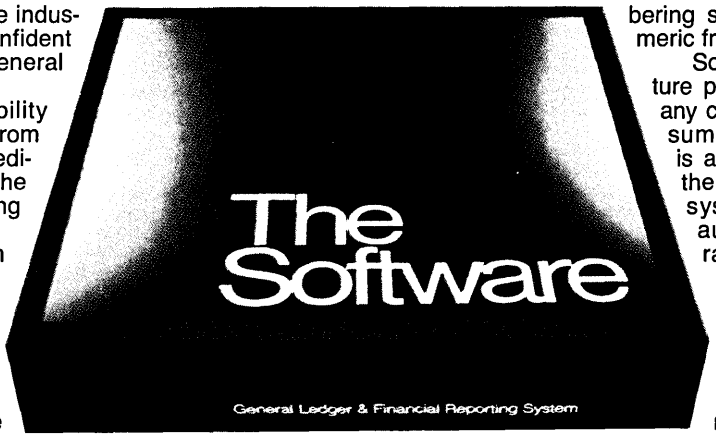
Comprehensive system security and audit controls are built into the system to ensure data integrity. You control who can enter, review and make changes to your financial information. Audit trails allow you to trace the source of transactions.



Our Variable Report Writer lets you design, maintain and control every report that comes out of your system. The automatic building of reporting structures allows you to rapidly address your company's reporting requirements. An extensive standard format library eliminates the need to design basic financial reports. You can also use a common format across reporting entities. No other general ledger provides as much easy-to-use reporting power and online access to information.

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Our package design accommodates your chart of accounts, not vice versa. You can design any account numbering system, up to a 24 alphanumeric free-format account number.

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CIRCLE 9 ON READER CARD

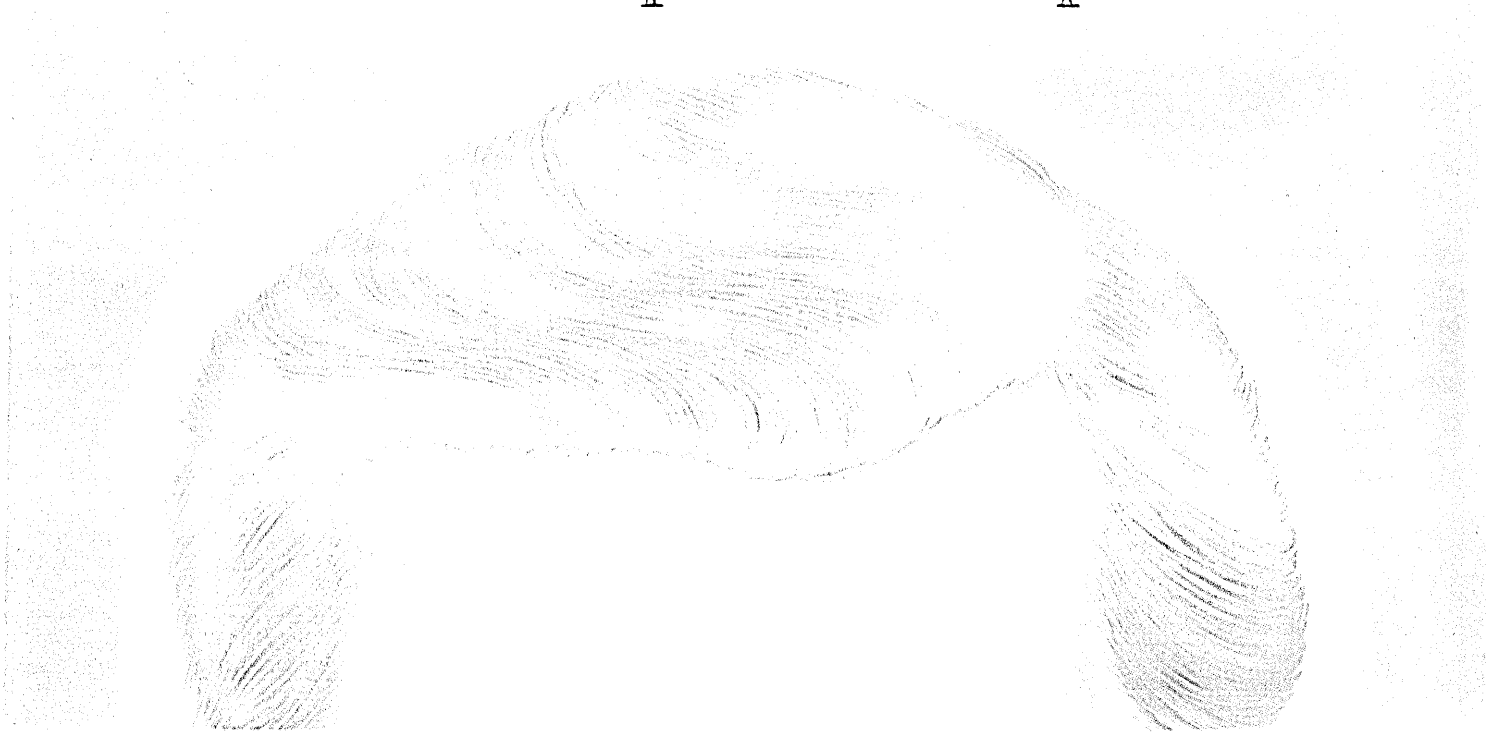
LOOK AHEAD

EUROPE TO EMBRACE SNA?	IBM may have a major victory on its hands if reports that several European telecommunications authorities will soon adopt IBM's System Network Architecture (SNA) for their public data networks are true. The most likely supporter of the IBM networking standard is British Telecom, followed by PTTs in Austria, West Germany, and Holland. Sources overseas say France will be the big holdout, however. The shift to SNA would follow years of standards efforts by the PTTs, which have been afraid of being dictated to by a single vendor. The general swing however, towards IBM compatibility -- seen in ICL's and Siemens' product lines, for example -- is thought to be the major reason for the expected switch.
4300 MEETS SYSTEM/38	A small team of systems designers is at work within the bowels of IBM trying to build a machine that would merge the largely incompatible 4300 and System/38 processor architectures. Headed by Alan Scherr, the principal development manager of MVS, TSO, and the 8100 minicomputer, Project X is focusing its attention on Intel's 286 microprocessor and the follow-on 386, according to knowledgeable sources. After a slow start, the System/38 is selling very well and has attracted an enthusiastic following inside and outside IBM.
IBM'S LAN IMMINENT	The most speculated upon product of the decade may be IBM's local area network, which is -- finally -- to be introduced next month, according to most analysts. Developed under the code name Alligator, the net is expected to be a token passing ring. Meanwhile, however, IBM is working on several other local networking products, including one designed specifically for personal computers and small business machines, which are slated for introduction this year. Coworker on one of the coming networks is Sytek Inc., the General Instrument-backed maker of broadband systems.
FENESTRATION OF THE P.C.	With windowing packages all the rage as vehicles for integrating personal computer software, it seem only natural that software developers would take a liking to IBM's 3270 P.C. The product's most striking attribute is the ability to display up to seven different windows at a time, each in a different color. The windowing is performed by special hardware, which independent software houses, including VisiCorp and Microsoft, are expected to take advantage of in upcoming products.

LOOK AHEAD

A BASIC CLEANING	The inventors of the BASIC programming language, John Kemeny and Tom Kurtz, are said to be joining forces with other Dartmouth College colleagues to form a company called True Basic. Their mission? To clean up what they think is the sorry state of the popular language. There are too many incompatible and poorly written versions on the market, the two entrepreneurs claim, adding that they are planning to develop a portable BASIC based on the ANSI standard. First target machine is the IBM P.C. What else?
AT&T WATCH	The phone company will soon introduce a pair of personal computing products. Expected are 16-bit and 32-bit machines that would run both MS/DOS and Unix. It's not clear if the machines will use Western Electric's Bellmac-32 chip or one from Intel or Motorola. Meanwhile, reports are circulating that AT&T and Wang Labs are cooking up some products in electronic publishing.
NEW PRINTERS	Dataproducts Corp. this month will unveil a pair of dot matrix printers developed by Integral Data Systems, Milford, N.H., which it acquired last March. One machine is a 180-cps, draft quality unit designed to sell for about $650 quantity one. The $1,500 model will run at 200 cps and print four colors. Both products offer 168 dots-per-inch resolution and are pixel-addressable for graphics applications.
MULTIMICRO DBMS MACHINE	Funded at $27 million, Teradata Corp., Los Angeles, is selling a relational database machine as a back end to IBM mainframes. Using multiple 8086 microprocessors -- as many as 1,000 the firm claims -- the machine runs parallel searches of disk files and merges the results using a proprietary packet sorting technique. An entry-level 2.5 MIPS system with 1.9 gigabytes will go for $480,000. Field testing has begun at Wells Fargo Bank. President of the company is Jack Shemer, formerly of GE, Scientific Data Systems, and Transaction Technology. Former Cincom marketing chief Walter Muir is vp of marketing.
RUMORS AND RAW RANDOM DATA	Look for Hewlett-Packard to unveil new models of its HP 150 personal computer. We hear a portable version is in the works, as well as a desktop model with a larger screen and additional functions. No word as to whether the much-touted touch screen will be kept on the portable....IBM has told financial analysts it will sell three times as many personal computers in 1984 as it did last year.

The first software that's truly compatible with the ultimate personal computer.



Every software ad you read seems to be talking about 'integrated software'. But it was 1-2-3™ from Lotus® that actually gave the phrase real meaning, because we combined spreadsheet, information management and graphic functions in one simple, powerful program.

A program that is faster and easier to use than any other software available today.

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THE DIFFEREN
EXPANDABI

The importance of expandability in a small business computer system cannot be blown out of proportion.

However, the facts can.

And the fact is that while much of today's hardware is expandable, the software isn't. Which means you could end up spending even more for new software than you did for hardware.

We stretch your budget, not the truth.

Alpha Micro won't make you change software as you grow.

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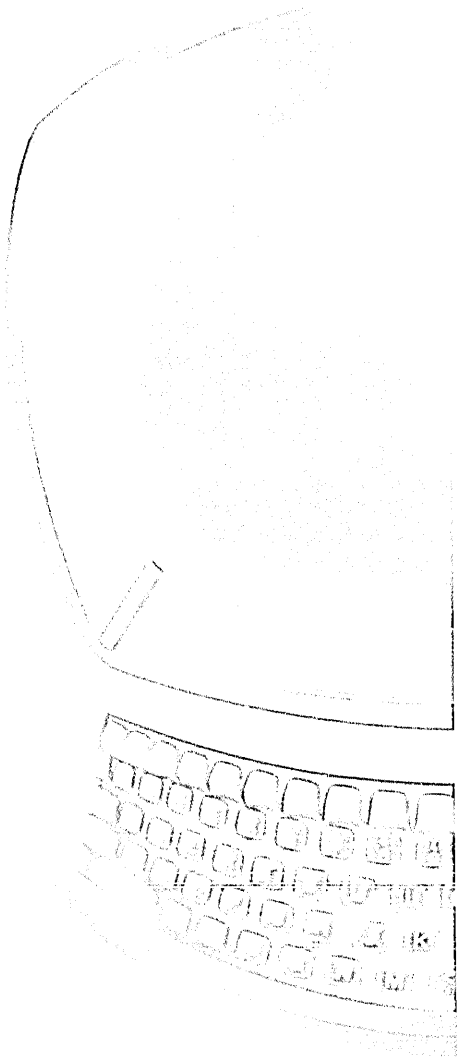

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We don't leave you flat when it comes to support, either. Our international network of dealers and factory trained specialists will give you all the service and support you'll ever need.

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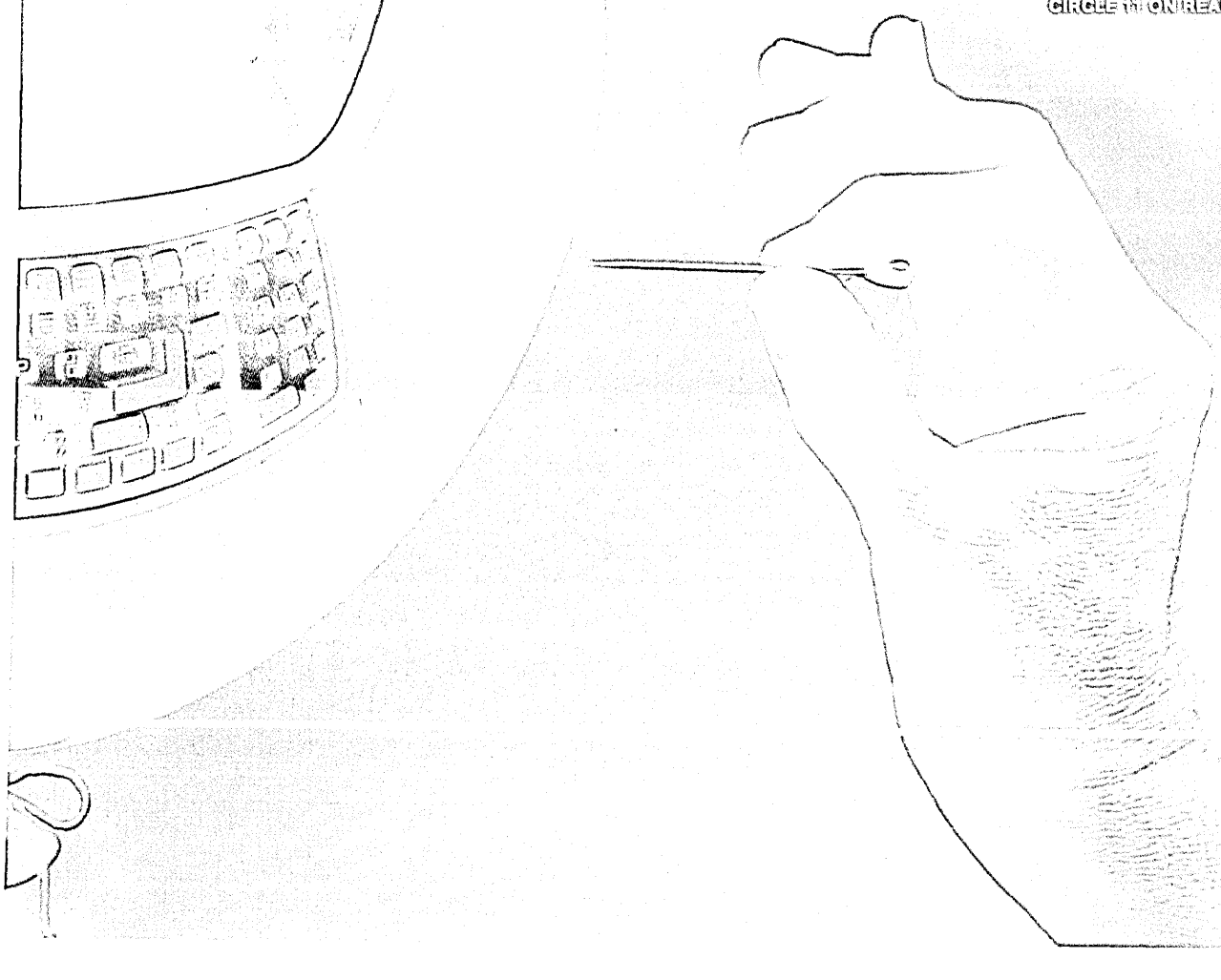


CALENDAR

JANUARY

6th Annual Pacific Telecommunications Conference.
Jan. 8-11, Honolulu, Hawaii, contact: Fred Smith, Pacific Telecommunications Council, 1110 University Ave., Suite 303, Honolulu, HI 96826, (808) 949-5752.

Southcon/84.
Jan. 17-19, Orlando, Fla., contact: Nancy Hogan, Electronic Conventions Inc., 8110 Airport Blvd., Los Angeles, CA 90045, (213) 772-2965.

Sixth Annual Advanced Semiconductor Equipment Exposition (ASEE '84).
Jan. 24-26, San Jose, Calif., contact: Joyce Estill, Cartlidge & Associates Inc., 4030 Moorpark Ave., Suite 205, San Jose, CA 95117, (408) 554-6644.

Communication Networks 1984.
Jan. 30-Feb. 2, Washington, D.C., contact: Louise Myerow, Registration Manager, CN '84, Box 880, Framingham, MA 01701, (617) 879-0700 or (800) 225-4698.

FEBRUARY

1984 Office Automation Conference (OAC '84).
Feb. 20-22, Los Angeles, Calif., contact: Ann-Marie Bartels, American Federation of Information Processing Societies (AFIPS), 1899 Preston White Dr., Reston, VA 22091, (703) 558-3613.

Information Technology and Office Automation Exhibition and Conference (INFO '84).
Feb. 21-24, London, England, contact: B.E.D. Exhibitions Ltd., 44 Wallington Square, Wallington, Surrey SM6 8RG England, (01) 647-1001, telex: 893069 BEDATA.

IMPRINTA 84 (International Congress and Exhibition for Communications and Techniques).
Feb. 22-28, Dusseldorf, West Germany, contact: Dusseldorf Trade Shows, 500 Fifth Ave., New York, NY 10110, (212) 840-7744.

MICAD '84.
Feb. 27-March 2, Paris, France, contact: World Computer Graphics Association Inc., 2033 M Street NW, Suite 399, Washington, DC 20036, (202) 775-9556.

The Hong Kong Personal Business Computer Show.
Feb. 29-March 3, Hong Kong, China, contact: Overseas Exhibition Services Ltd., 11 Manchester Square, London W1M 5AB, England.

MARCH

SaudiComputer 84.
March 18-22, Riyadh, Saudi Arabia, contact: Overseas Exhibition Services Ltd., 11 Manchester Square, London W1M 5AB, England, (01) 486-1951.

Federal Office Systems Expo (FOSE '84).
March 19-22, Washington, D.C., contact: Mary Beth Gouled, National Trade Productions Inc., 9418 Annapolis Rd., Lanham, MD 20706, (301) 459-8383 or (800) 638-8510.

International Symposium on the Performance of Computer Communication Systems.
March 21-23, Zurich, Switzerland, contact: Harry Rudin, IBM Research Laboratory, Saumerstrasse 4, CH-8803 Ruschlikon, Switzerland, (01) 724-2727.

The West Coast Computer Faire.
March 23-25, San Francisco, Calif., contact: David Sudkin, General Manager, Computer Faire Inc., 570 Price Ave., Redwood City, CA 94063, (415) 364-4294.

APRIL

Hannover Fair.
April 4-11, Hannover, West Germany, contact: Hannover Fairs Information Center, P.O. Box 338, Route 22 East, Whitehouse, NJ 08888, (201) 534-9044 or (800) 526-5978.

Intergraphics '84.
April 9-12, Tokyo, Japan, contact: World Computer Graphics Association Inc., 2033 M Street NW, Suite 399, Washington, DC 20036, (202) 775-9556.

The Sixth Annual International Conference on Computer Capacity Management (ICCCM).
April 9-12, Washington, D.C., contact: Institute for Software Engineering, 510 Oakmead Parkway, Sunnyvale, CA 94086, (408) 749-0133.

Videotex '84.
April 16-18, Chicago, Ill., contact: London Online Inc., Suite 3314, 1133 Avenue of the Americas, New York, NY 10036, (212) 398-1177.

AUTOFACT Japan Conference & Exhibition.
April 25-27, Kobe, Japan, contact: Public Relations Department, Society of Manufacturing Engineers, One SME Drive, P.O. Box 930, Dearborn, MI 48128, (313) 271-1500.

What to look for in a word processing printer.

And what to look out for.

First of all, look for a daisywheel printer. Daisywheels produce crisp, sharp characters that readers can't tell from the finest office typewriter.

They're the best choice for printing letters, proposals, contracts and other important documents that call for a professional look.

We make the DP-55 and DP-35 daisywheels, which print at 55 and 35 characters per second (CPS).

Rule of thumb: Faster is better.

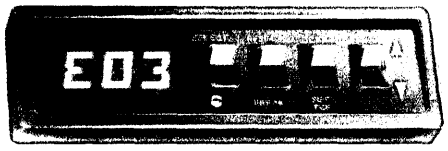
Our DP-55 will print a one-page letter in about a minute. A 12 CPS machine takes five.

You may be happy to wait five minutes for your letter. But remember, while the computer is tied up running the printer, it may not be available for other jobs.

Bad design can make a smart operator look dumb.

People with otherwise normal dexterity sometimes become all thumbs around a computer printer. The fault is usually the machine's.

Our DP-Series printers were designed with the operator in mind. A status display is standard on the DP-55. The printhead mechanism tilts a full 90° to make printwheel changes a snap.



Industry standard ribbons and plastic or metal printwheels are available from Dataproducts or local office supply stores. More than a hundred type styles are available, so you can match most any office typewriter.

A printer's no better than the technology behind it.

Some companies are pushing the limits of their technical knowhow and offer little more than souped up typewriters. Dataproducts has decades of experience in the design and manufacture of sophisticated, high-speed computer printers.

Our daisywheel printers are serious business machines, engineered to perform reliably for years and years. And to provide their users the greatest productivity at the lowest cost of ownership.

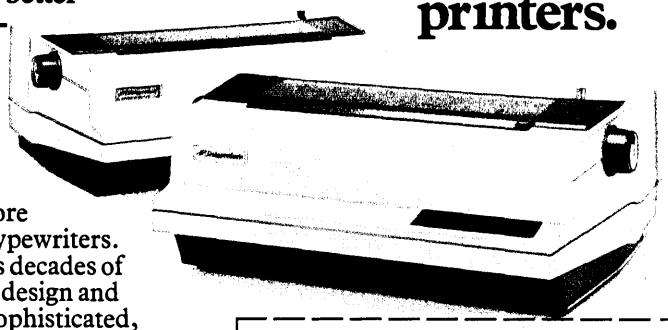
Depend on the world leader.

Virtually every major computer manufacturer buys printers from Dataproducts, then resells them with their name on them. For them, Dataproducts is synonymous with quality and reliability.

It's that reputation that made us the largest independent manufacturer of computer printers in the world.

To learn more about Dataproducts DP-55 and DP-35, or for the name of our distributor in your area, call (213) 887-3924. Or send the coupon below.

Look for Dataproducts printers.



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☐ Send details on Dataproducts' daisywheels.
☐ I'm shopping for printers now. Send a rep.

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Company _____

Type of business _____

No. of printers needed _____

Address _____

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Send information on: ☐ 120-200 LPM matrix printers ☐ 300-1100 LPM band printers ☐ 1500-2000 LPM high performance printers ☐ Dot matrix graphics and label printers ☐ Printer supplies

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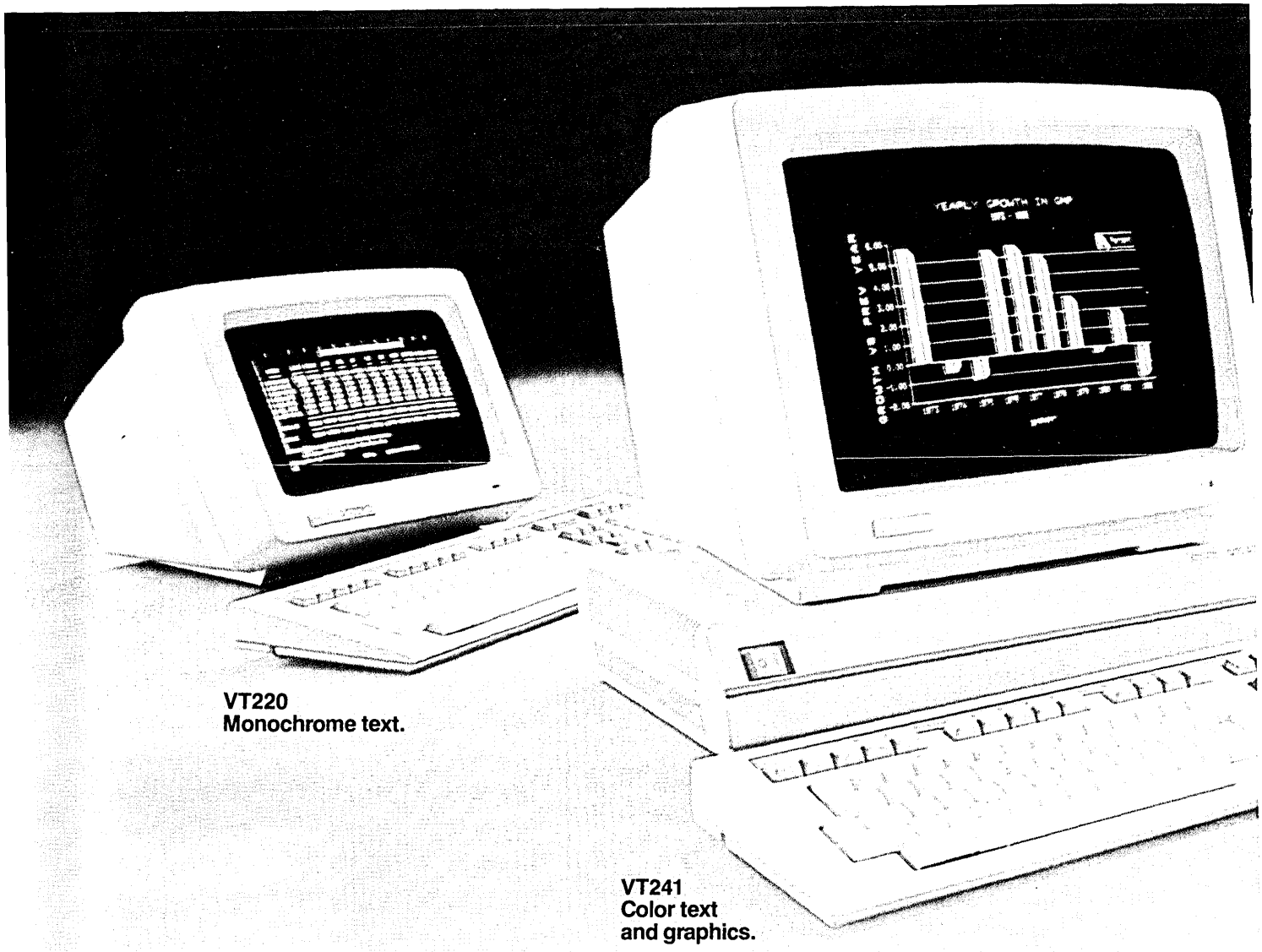
The Printer Company

Dataproducts

CIRCLE 12 ON READER CARD



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Monochrome text.

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Color text
and graphics.

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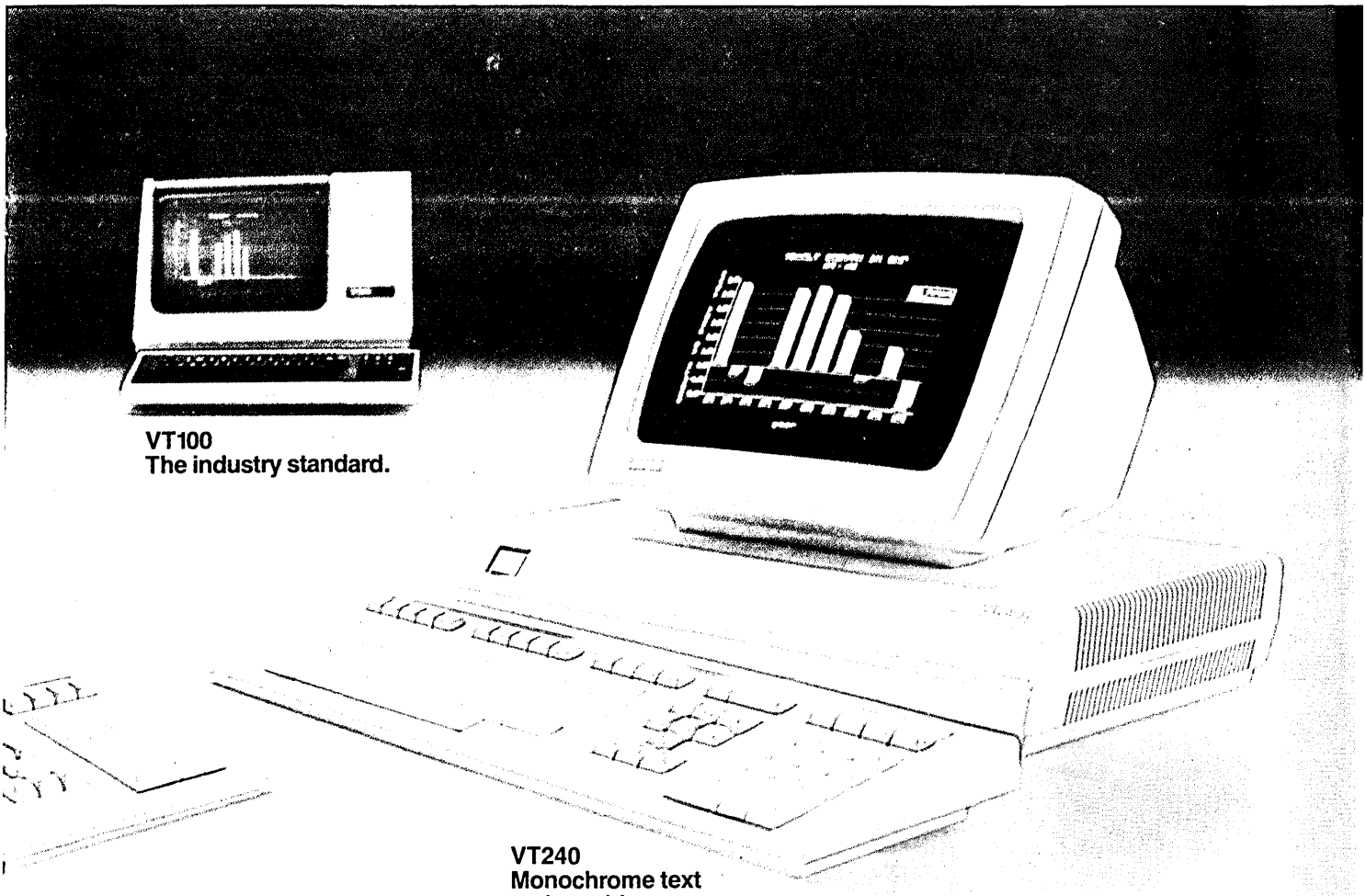
For years, Digital's VT100 terminal has been the CRT to choose if you want the most out of your computer. It has become the industry standard for reliability and ease of use. Not to mention the largest-selling ASCII terminal in the world.

Now Digital advances this standard with the VT200 family.

Three new terminals that embody everything Digital has learned about how to make people comfortable with computers. They offer non-glare screens that can be positioned for the best viewing angle. Keys that are so well arranged on our low-profile keyboard that you increase productivity and convenience. Fifteen programmable function keys eliminate keystrokes to speed up tasks. Plain-language setup commands to easily tailor the screen to each user. Plus, a built-in printer port for hardcopy convenience.



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The industry standard.

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and graphics.

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We've even included our most advanced video capabilities—like smooth scrolling and 132-column display—as standard features.

All packaged in our sleek new design that fits conveniently on your desk. And all supported by Digital's worldwide service organization.

But the best news is yet to come. Because despite all the advances, the VT200 family is very competitively priced.

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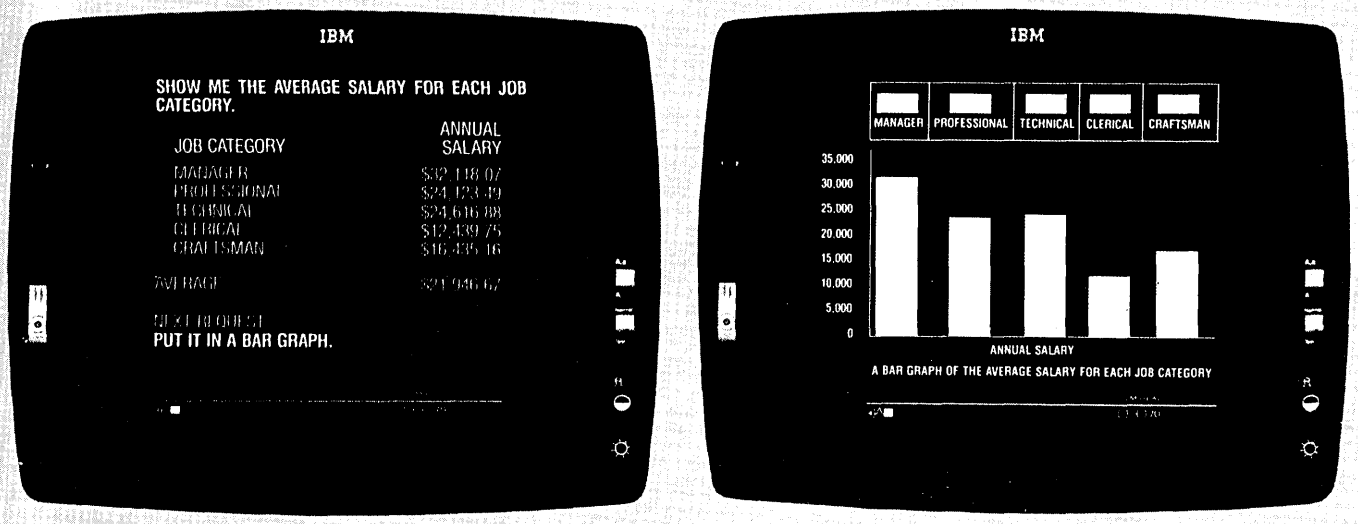

To use INTELLECT, the natural language query system, all you have to do is ask—in everyday conversational English—and you'll retrieve. Immediately, in either text or full-color graphics.

INTELLECT, the world's only successful *true* natural-language query system, is an ideal tool for your information center. INTELLECT's powerful information retrieval capabilities are so advanced that it understands questions and responds with answers as if you were talking to a knowledgeable colleague. Executives access data themselves—more easily than ever before—without learning *any* technical jargon or "computerese." It's so easy to use, it doesn't even have a training manual!

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INTELLECT is an important technological breakthrough. You can learn more about it by attending one of our nationwide seminars. Or put its amazing power at your fingertips in minutes with one of our demonstration tapes.

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CIRCLE 13 ON READER CARD

LETTERS

THOSE DARLING WOMEN

"In the end, though, what is most important to keep in mind about women and micros has little to do with culture, society, or the educational practices of public and private schools. Being a woman is not grounds for success or failure in any business, but, if you have brains, you can get to the top before anyone notices you're a woman" (October, "When Opportunity Knocks," p. 171).

I, for one, want everyone to notice that I am a woman—because I can be a model for other women and make it easier for the next woman to be accepted as a competent, intelligent person. Only by confronting stereotypes and prejudices will changes be made. I am surprised this article was written by a woman. I am surprised she could say that our culture, society, and education do not discriminate against women in technical learning. Computerland is a male bastion, because technical expertise is what our male-oriented culture values.

Perhaps Ms. Sojka is one of those who made it to the top before anyone noticed.

BECKY DARLING
Eugene, Oregon

Ms. Sojka Responds:
Both the male and female computer professionals I spoke with while researching the article unanimously agreed that this industry does not discriminate against either sex. While there are discrepancies in the way boys and girls learn and develop technical skills, this article concentrated on the professional woman.

The last line, about getting to the top, does not mean that women should hide their femininity, but rather that we all deserve recognition for our achievements—regardless of sex, not because of it.

A DIFFERING VERSION

Having worked in the business data processing department of the Space Division of North American Aviation (now part of Rockwell International) from 1962 to 1972 and having been one of the early IMS participants, I found it very interesting to read Bill Grafton's article, "IMS: Past, Present, Future" (September, p. 158), about the history of IMS. Unfortunately, because he joined the IMS development in midstream, he was unaware of or has forgotten some of the facts.

Those of us who were working with IMS, both on the software side and on the applications side during 1967, were given a copy of the paper that Dr. Brown presented in Rome in June 1967. Since one of my avocations is historical reading and study, I still have my copy of that paper. The authorship on the title page is "By Robert R. Brown and Peter Nordyke, Jr." The paper was presented at the International Federation *for* Information Processing Societies' 1967 Conference on Mechanized Information Storage, Retrieval, and Dissemination.

On p. 14 of the paper it says, "The first version of Data Language/I is now operational. The second version has been designed and is being implemented." I know this firsthand because I worked on the very first project to use IMS. We did not use the on-line capabilities because they were not yet available. But we did use the batch processing capabilities. The project was OCP. I no longer am sure what the initials stand for, but I think it was Operational Checkout Procedures. The supervisor was Gordon Wall. The manager was Hank Epstein. And the director was Dr. Brown. I was lent to this project by my supervisor, Dick Duffy, to write the applications soft-

CARTOON BY MARTY LOWE

ware using DL/I because I had worked on a number of projects with Pete Nordyke, who was jointly in charge of the IMS development effort. Management knew that whoever wrote the first IMS application routines would have to have a great deal of interface with Pete Nordyke and his staff.

I remember Pete being pleased that I had been chosen. Our goals were similar in this effort. I was working for the early success of our project. And Pete wanted his software to be used for the first time with a minimum of difficulty in order to encourage other projects to plan to use it. He felt that the more demand there was for what had already been done, the more management support there would be for his current effort. I remember Pete and his staff being cooperative and supportive of our effort. They recognized that our success would be their success. The project was completed successfully before Dr. Brown gave his speech in June 1967, after which time Grafton became involved with on-line IMS. At the same time, other projects were making plans to use batch IMS capabilities.

The first two applications to use on-line IMS capabilities were POLAR and ERS. ERS, the Engineering Release System, was supervised by Dick Duffy. It was a larger and more complex system than POLAR so we had a project engineer, Bob Whitaker, assigned to our project. When Dick Duffy resigned before the implementation of ERS, Bob Whitaker was made supervisor. The "key programmers" that Grafton mentioned were all the programmers assigned to POLAR. I do not remember Grafton having any connection or interface with the ERS project, so I can only assume that he did not know some of us and did not remember the names of the others.

The explanation for an obscure comment of Grafton's in the last paragraph of p. 163 about Caterpillar having an urgent need was that Caterpillar also wanted the capabilities of IMS as soon as they could get them so they contributed the services of several of their programmers who were working on the IMS software project in Downey, along with the IBM and North American Rockwell programmers. North American Rockwell was the name of our company at that time.

Dr. Brown's paper was not copyrighted. I would be pleased to send a copy of my copy to anyone else who is interested in early data processing history.

ROGER BENNETT
Data Processing Department
County of Los Angeles
Downey, California

Mr. Grafton responds:
Roger Bennett is a thorough, soft-spoken man who tends to complete his assignments on schedule and to write programs that work. This type of professionalism on the part of an applications programmer does not scar the memory of a harassed systems programming manager to the degree produced by the antics of more flamboyant colleagues. He most certainly was a key programmer on the project. My apologies to Roger and to any other IMS pioneers that I may have overlooked.

Dan Weller also telephoned to remind me about the OCP application. There were several systems that used an earlier, batch-only version of DL/I, but OCP was the first to use the IMS DB version. I believe I know why the developers of OCP have a clearer memory of that project than I: in addition to using the first release of IMS DL/I they wrote OCP in a beta test version of PL/I and ran it on a very early release of OS 360 MVT. I recall that the core dumps were somewhat challenging!

Bennett is incorrect in his assertion that the key programmers mentioned in the article "were all the programmers assigned to POLAR." I included programmers who were assigned to the first three IMS on-line applications.

On the matter of the IFIPS speech, I stand on my story of its background and of my contribution to it. I showed the article to Dr. R.R. Brown prior to publication and he concurred with my recollection.

I do wish that DATAMATION had chosen to print the list of sources that I submitted with my article. The IFIPS speech and several other published and unpublished references were included. Apparently this material was excised from the article because of space limitations.

PRESENT FUTURE

Congratulations on publishing the excellent article "Nanotrends: The Future of Present Systems" by Nicholas Zvegintzov (August, p. 106). Based on my own observations, I'd like to make the following comments.

About half of the dp resources currently devoted by most companies to maintaining present systems seem to be out of necessity, and not based on any economic analysis. Undocumented or poorly documented, unstructured spaghetti code programs naturally need more resources to maintain and modify.

I do take issue with your statement that "an hour of work on new systems is balanced by an hour of work on present systems; more of either one, and the value of the other diminishes." This is not true. More effort put in the front-end development, especially in analysis and design, and in using the right methodology, helps substantially to reduce future maintenance effort. This is the experience reported by several users of structured technologies.

"Add on, not replace" is indeed the trend in software. By developing, however, a semiautomated (full automation may not be advisable, even if it is feasible) method of replacement, this trend can and should be reversed. To take advantage of the new hardware/software technologies such as database management systems, microcomputers, and structured software development and modification techniques, replacements are essential. The logical output and input structures, extracted from present systems, are foundations on which the subsequent (data-structured) replacements can be built. In the long run, this would be cost-effective for many old systems. (Meanwhile, automated restructuring, if inexpensive, may provide an interim solution.)

I agree with Zvegintzov's conclusion. The bottom line of this trend is that you cannot easily sell a system or language as a replacement unless one of three conditions is satisfied: the new system is completely compatible (a PCM, for example), a conversion is mandatory, or the conversion is largely automatic.

Another important trend virtually ignored by Zvegintzov is replacing present systems with application software packages when appropriate. The motivation for such replacements seems to be the increasing costs and difficulties of modifying present systems.

Zvegintzov has spotted some likely future trends with present systems in this superb article. I hope it will generate further interest in this generally neglected but vital area.

GIRISH PARIKH
Independent Consultant
Shetal Enterprises
Chicago, Illinois

PARODY OF IMPROPER PROPORTIONS?

Twenty-five years ago I could understand everything in the *Journal of the Association for Computing Machinery*. As my brain hardened, I found less and less of it comprehensible, but I took comfort in the thought that I would always be able to understand everything in DATAMATION. Now I have failed even that test.

I have read and reread David A. Cohn's "The Amazing E. G. Ratigan" (October, Readers' Forum, p. 322), but I can't make head or tail of it. Does it make sense? Is it intended to? Does it refer obliquely and obscurely to some well-known situation? Is it a satire or a parody that has failed? Does it have any meaning? If so, what is the meaning? Please help.

ERIC A. WEISS
Springfield, Pennsylvania

For many there was neither rhyme nor reason, but a few found it fun. Take heart—you weren't the only one befuddled by this fiction. The Hertz Penske Truck Leasing company in St. Louis found the piece neither comprehensible nor amusing; the "fake"

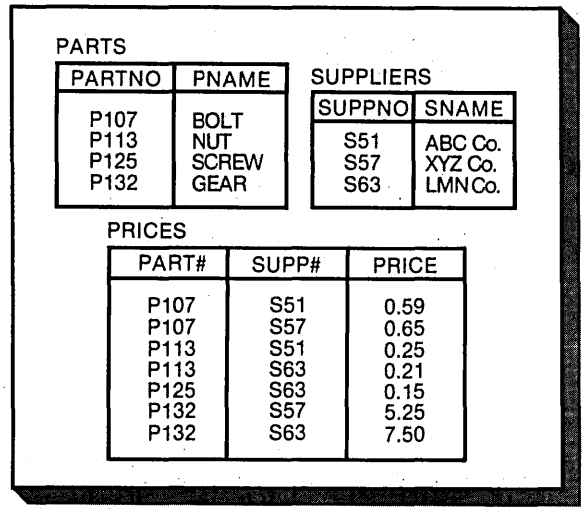
Relati
Data F

To: Dick
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
I'll start work, but I'd go with relational data base.
It's a software development that makes a big impact.
Dick



PARTS

PARTNO	PNAME
P107	BOLT
P113	NUT
P125	SCREW
P132	GEAR

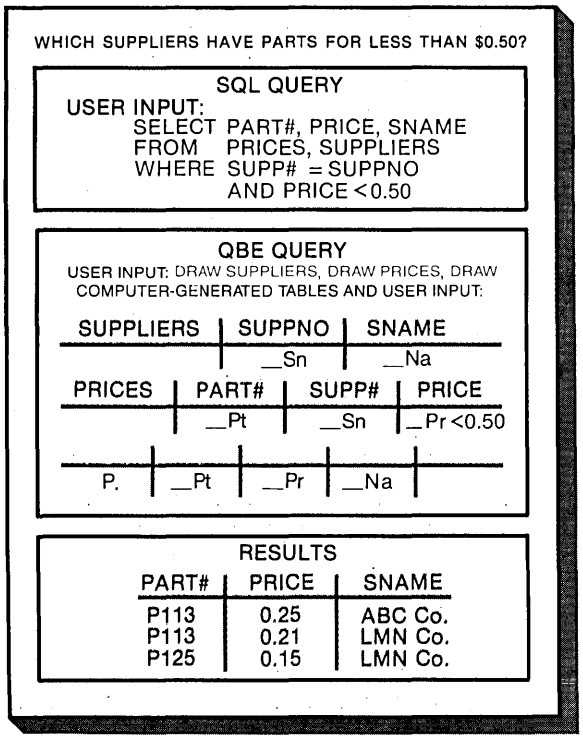
SUPPLIERS

SUPPNO	SNAME
S51	ABC Co.
S57	XYZ Co.
S63	LMN Co.

PRICES

PART#	SUPP#	PRICE
P107	S51	0.59
P107	S57	0.65
P113	S51	0.25
P113	S63	0.21
P125	S63	0.15
P132	S57	5.25
P132	S63	7.50

Figure 1. *Relational data base consisting of three tables.*



WHICH SUPPLIERS HAVE PARTS FOR LESS THAN $0.50?

SQL QUERY

```
USER INPUT:
      SELECT PART#, PRICE, SNAME
      FROM   PRICES, SUPPLIERS
      WHERE  SUPP# = SUPPNO
             AND PRICE < 0.50
```

QBE QUERY

USER INPUT: DRAW SUPPLIERS, DRAW PRICES, DRAW COMPUTER-GENERATED TABLES AND USER INPUT:

SUPPLIERS	SUPPNO	SNAME
	_Sn	_Na

PRICES	PART#	SUPP#	PRICE
	_Pt	_Sn	_Pr<0.50

P.	_Pt	_Pr	_Na

RESULTS

PART#	PRICE	SNAME
P113	0.25	ABC Co.
P113	0.21	LMN Co.
P125	0.15	LMN Co.

Figure 2. *An example of using IBM's very-high-level data base languages, SQL and QBE, to satisfy a request involving two tables from Figure 1. The SQL commands are expressed in a standardized block format; an example of the most common form for extracting data is:*

SELECT some data (column names)
FROM some file (table names)
WHERE certain conditions, if any, are to be met (rows)

QBE is initiated simply by typing the table name on the display screen, and the screen returns a skeleton table with column names in it. In this example, the user builds a new table in the blank skeleton by typing "example elements" (e.g., _Pt) under existing tables and in the blank skeleton. The example elements are formed by typing an underline followed by any mnemonic the user desires. Note that "P." simply means to present the results.

With business information growing at the rate of two file drawers per office worker per year, and with increasing amounts of it stored in electronic data bases, new techniques are required to allow easy, yet controlled, access by workers who lack computer expertise.

Starting in 1970, IBM researchers formulated, implemented, and tested prototype relational data base systems. This new approach in data base processing virtually eliminates the need for computer experience among users.

The relational model opened the way to more flexible, easy-to-use data base systems. The two relational data base management systems marketed by IBM for intermediate and large computer systems—Structured Query Language/Data System, introduced in 1981, and IBM DATABASE 2, introduced in 1983—allow users to update, retrieve, insert, delete, and otherwise manipulate data merely by specifying *what* they want to do, without having to tell the computer *how* to do it.

These relational systems are especially "friendly" because of the familiar, easy-to-interpret manner in which users see the data—as two-dimensional, rectangular tables ("relations"), with all information arranged in columns and rows.

IBM developed two very-high-level languages, Structured Query Language (SQL) and Query-By-Example (QBE), to access the relational data bases. Both are easy to learn, easy to apply, and immensely powerful. The innovative concept of QBE, which had a significant influence on display-screen interfaces, uses a two-dimensional programming approach. All queries are made directly onto a blank "skeleton" table appearing on a display screen. The user extracts data by a fill-in-the-blanks mode. SQL is a linear language that comes very close to "speaking English." It may be used both by ad hoc users at terminals and by programmers to embed SQL

statements in application programs.

The non-navigational nature of the relational data base model endows QBE and SQL with extreme flexibility. Since there are no predefined information pathways to negotiate, the user is free to make all manner of ad hoc queries—an essential feature for applications where information needs change rapidly.

One of the most important IBM innovations in relational data base technology was a compiler approach to execute SQL statements. Replacing an interpretive approach, this compilation technique reduces the overhead cost of implementing the SQL language by using a precompiler to generate a tailored data access routine before execution time. The access routine, because it is tailored to one specific program, and is reusable, runs much more efficiently than a generalized interpreter.

In addition, the compilation technique uses a very sophisticated optimizer, which chooses economical access paths to the data. The compiler approach allows data base query in a high-level, easy-to-use language, yet also provides efficient program execution.

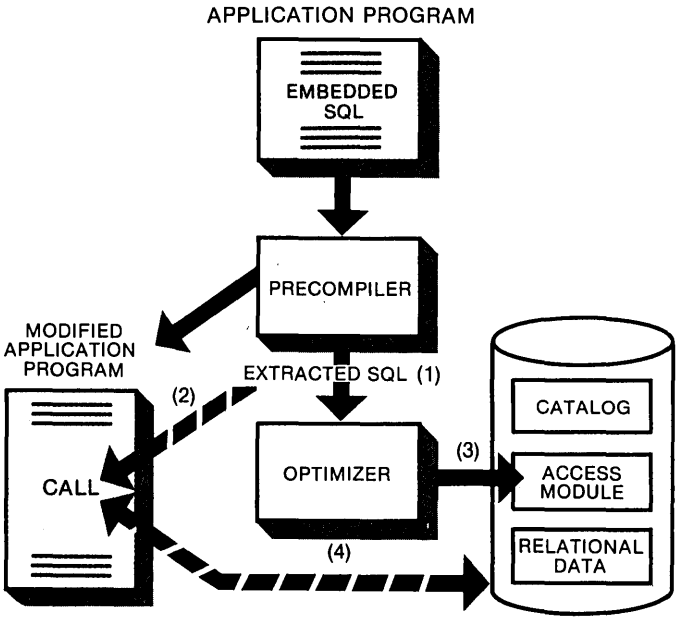


Figure 3. *The compiler approach is the key to IBM's efficient execution of SQL (very-high-level relational data base language) statements. This diagram illustrates the execution of application programs with embedded SQL statements. Programs are first processed by a precompiler, which extracts SQL statements from the application program (1). The precompiler also replaces the SQL statement in the host program with a CALL to the access routine (2). By very sophisticated analysis of available paths to the data, the optimizer chooses an economical path for the specific SQL statement, which is implemented as an access module (3). When the programs are executed, all the access modules for that program are loaded to provide targets for the modified CALLS (4).*

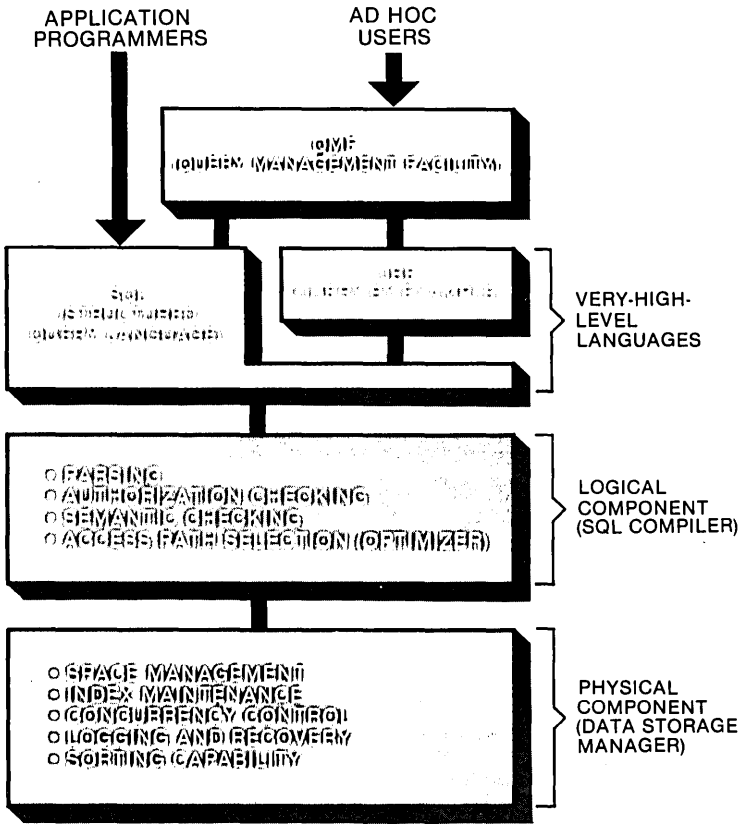


Figure 4. *This generalized architecture is the basis for IBM's relational data base products. It enables different types of users to access data easily, and yet is designed to handle complex programming tasks efficiently while providing the full function of a data base management system.*

Many scientists and programmers throughout IBM contributed to the development of relational data base technology, and researchers continue to explore future applications for the office environment and network users. These contributions are only part of IBM's continuing commitment to research, development, and engineering.

IBM®

For free additional information on relational data base, please write: IBM Corporation, Dept. 813G/3N35 Old Orchard Rd., Armonk, N.Y. 10504

phone number for Ratigan turned out to be theirs. Apparently the piece did "refer obliquely and obscurely to some well-known situation." —Ed.

SUPERCALIFICIALISTIC!

"The mainframe won't die! It will just fade away as the micro takes over. The process," says Martin Healey in "Junking the Mainframe" (August, p. 120), "will be complete within 10 years."

When did DATAMATION first predict that micros (or minis) would kill off mainframes? At least 10 years ago?

Why do you print such superficial sensationalistic garbage?

REGINALD SMITH
Grace Industrial Chemicals Inc.
Lausanne, Switzerland

ON NEUTRAL GROUND

I have just read your article "Librarians: The Untapped Resource" (September, Readers' Forum, p. 243).

I agree with your arguments nearly 100%. In particular, data processing will become a trade taught at two-year and vocational schools while the field of "information administration" (a wonderful term) will be the concern of higher education systems.

The reason I am so pleased with the term "information administration" is that it is neutral. It does not imply a takeover of either field by the other, but a *convergence* of librarianship/information services and programming/systems analysis. As the thrust of automation changes from number-crunching to information processing, it is natural to see a close alliance forming between the two fields.

Through a series of talks and lectures I have given over the past eight or nine months I have stressed to librarians the importance of recognizing our position in the information age and not to retreat from this expanded sphere of influence and use of our skills. Your article, and a recent EDUCOM Conference at Stanford, have reinforced my view. Let's keep preaching!

Best regards for your future work.

PAT MOLHOLT
President
Special Libraries Association
New York, New York

FED UP

It was interesting to note that the authors of your article on office automation at the Federal Reserve Bank of Atlanta (October, p. 247) relate the primary improvement in economists' productivity to output of printed material.

Assuming that the Fed of Atlanta is similar to the other 11 regional banks and the Board of Governors in Washington, D.C., we can conclude that within the Federal Reserve:

- there are 1,040 personnel in the research departments,
- these personnel utilize 832 terminals,
- maintain 26,000 statistical series,
- produce 1,300 pages of briefing booklets every six weeks for the Open Market Committee,
- sponsor 39 conferences every two years, with 11,700 top-level executives attending,
- produce 234 periodicals per year.

Alas, would it be too much to expect that, with a 920% increase in the economists' productivity, we could see at least a 1% improvement in the economy?

RICHARD S. WATT
Englewood, Colorado

IN DISTRESS

"Move It to a Micro" by Irene Nesbit (October, p. 188) distressed me deeply. Although the article did contain a number of cautionary phrases, I was left with the impression that "moving it to a micro" is essentially a straightforward task with a risk that on "the downside is minimal. . . ." In general, I felt the tone of the article was too glib.

I suggest that the "downside risk" of moving a business system to a micro is not minimal, but in fact can include complete disaster. While Ms. Nesbit's experience may be different, mine is that mainframe systems—even old outdated ones—contain certain safeguards that micro "systems" usually do not. Let me address Ms. Nesbit's article point by point.

". . . [take] an old system, written in COBOL, and [replace] it with a mix of packages and custom code—using BASIC." Replacing a COBOL system with a "mix" is surely no simple task. An application system of interrelated programs will have common data formats, a single form of operator-command syntax (one hopes), and run under JCL control. A mix of individual programs, possibly using different file formats and employing various syntaxes for user commands, may require some "shoe-horning." It may be difficult (if not impossible) to guarantee, say, that Program Five has the latest output of Program Four—output that first must be passed through File Format Conversion Program Two.

As to coding in BASIC, much has been written about its inherent deficiencies: lack of structure, slowness of execution, openness to tampering, and so forth. While BASIC may be fine in some limited instances, I believe that extreme caution should be used in undertaking *any* homegrown software development, lest the traditional problems associated with in-house programming be perpetuated.

". . . [The dp manager can] assert greater control over the ways micros are used in his organization." By removing applications that are (presumably) necessary to the operation of the business from the dp

"Hold it, Griffin . . . there's no place for that in today's economy."

CARTOON BY LEO CULLUM

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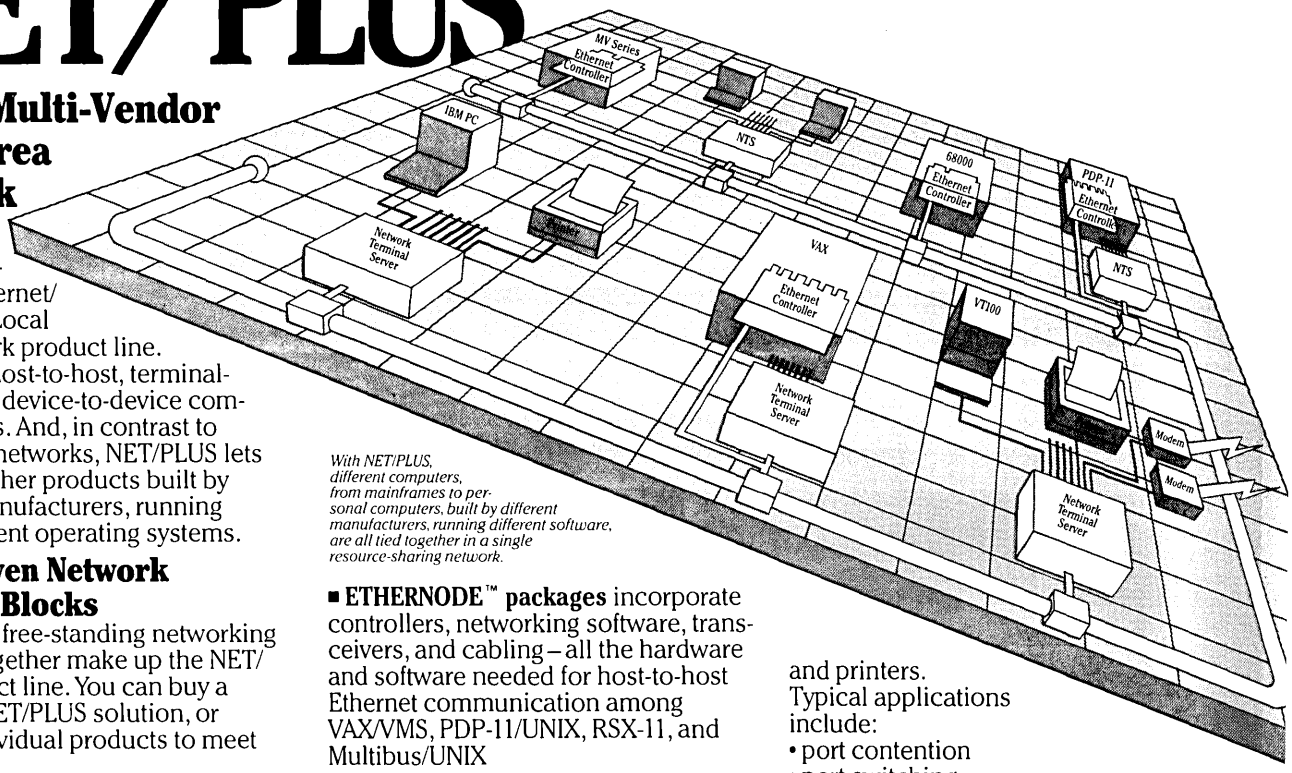
NET/PLUS™ is a comprehensive Ethernet/IEEE-802.3 Local Area Network product line. It provides host-to-host, terminal-to-host, and device-to-device communications. And, in contrast to proprietary networks, NET/PLUS lets you tie together products built by different manufacturers, running under different operating systems.



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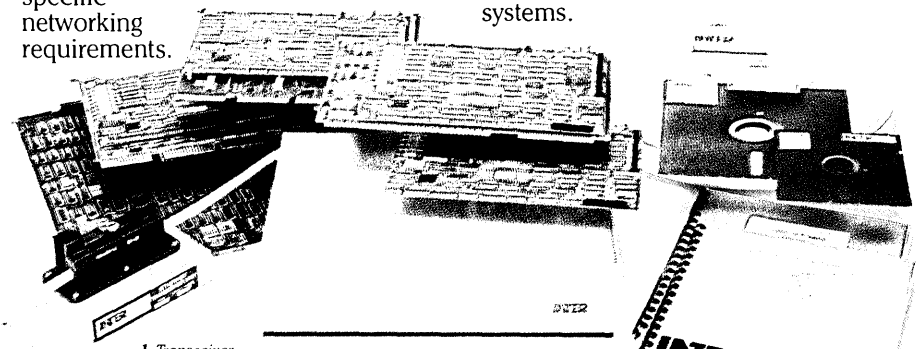

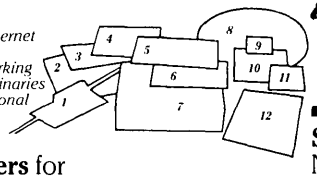

1. Transceiver
2. Data General Ethernet controller 3. UNIBUS Ethernet Controller
4. Q-bus Ethernet Controller 5. Multibus Ethernet Controller 6. Ethernet Protocol Module
7. Network Terminal Server (NTS) 8. Networking Software Sources 9. Networking Software Binaries
10. Ethernet Controller Diagnostics 11. Personal Computer Networking Software
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■ **Network Terminal Server (NTS),** the newest NET/PLUS product, provides virtual circuit interconnection between any two RS-232-C devices on the Ethernet. Available in four or eight ports, NTS electronically establishes, maintains, and disconnects virtual circuits between computer ports, terminals, personal computers, modems, and printers. Typical applications include:

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- resource sharing
- personal computer networking
- simplified RS-232-C wiring

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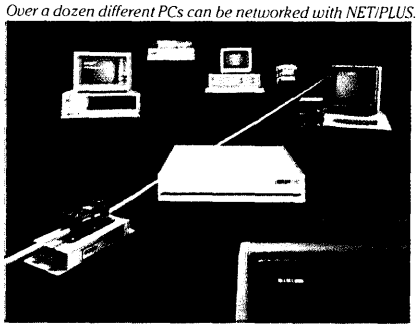

■ **Multi-Vendor Personal Computer Networking Software** is available for over a dozen widely-used personal computers (including IBM, Apple, and DEC), microcomputer software development systems, and popular minicomputers. Terminal Emulation and File Transfer allow PC users to log on to other computers and freely access and transfer files throughout the network.

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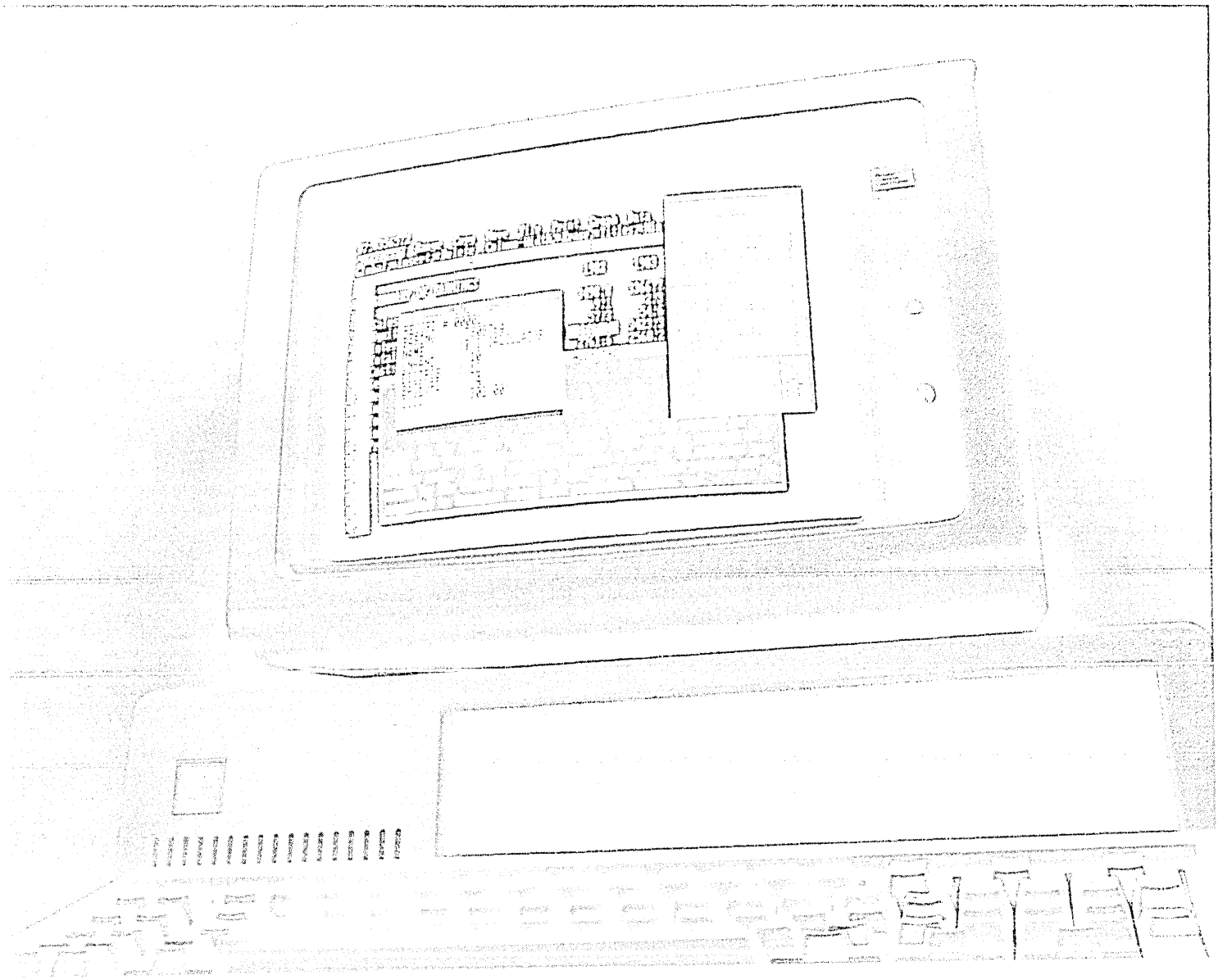

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department, the dp manager is hardly able to assert greater control over anything. This point seems to me to really be the crux of the matter, so I shall return to it later.

"The user maintains a neat collection of diskettes. . . ." There are many possibilities for disaster here. A program can be run with the wrong version of a file, a file can be destroyed, data can be inadvertently altered, and so on. Any system that does not automate the cataloging of new files, and the retrieval of old files required for program execution, must be suspect. A dp auditor might be more eloquent; for me, this laissez-faire attitude toward business data is unacceptable.

"It is easy to develop applications with nested menus and many user prompts." I have not found this to be so. Writing screen prompts that clearly convey their message to a user has usually required a number of iterations for me. I have to learn the user vocabulary, and anticipate not just one error, but the possible sequences of errors which can take a user way down some garden path. Ms. Nesbit may be better at this than I, but after years of designing and coding menu-driven systems, I still do not find it an easy task. Furthermore, as a user learns a system, the menus and overly wordy prompts can become a major source of annoyance. There should be some way of turning them off.

". . . the system and its accompanying procedures must be foolproof." Absolutely! The only problem is that the article does not indicate how this can be done, if at all. I do not think that giving a user a "collection of diskettes" will contribute to a foolproof system. Nor mixing "packages and custom code—using BASIC."

". . . the user is reminded to back up files . . . or the system automatically initiates the backup procedure." I would be comfortable with a system that automatically initiated backup procedures, guaranteed that they had completed successfully, determined when the backups were needed for recovery, and insured that backups were applied correctly when needed. Anything less could leave a user—and a company—out on a limb.

"The downside is minimal." I disagree. If the application is necessary to the running of a business, then it is a critical resource. I look to automation to protect me from errors; that's what input-edit runs are all about, or control totals, or error-correcting transmission codes. "Micro" (personal business) computers can be a powerful tool if properly used. But danger lies in the misapplication of the tools by the relatively naive.

I enthusiastically welcome personal business computers into the work place. I am delighted to see the benefits of data processing being made directly available to anyone who can cost-justify it. But I fear that disaster may lurk around the corner for the unsophisticated user. Putting some "what if" figures into a spreadsheet is not the same thing as running your accounts receivable.

GREGORY YOUNG
Oakland, California

SLIPPED NAUGHT

In our article "Breaking Into the U.S. Market" (Oct., p. 162), we reported that Donald Moore, director of the British-supported Export I.T. consultancy, estimated it cost $15,000 a person per year to set up shop in the States. The correct figure we figure is actually $150,000. Sorry, Mr. Moore, we needed one more naught. —Ed.

TO ERR IS HUMILIATING . . .

While scanning the Table of Contents of your October issue, I concluded that telecommunting (214) required greater artifical intelligence (92) than softward standards (259). Thank you S.J. Perlman for the stemulation.

RAY A. MANTLE
Milgrim Thomajan Jacobs & Lee
New York, New York

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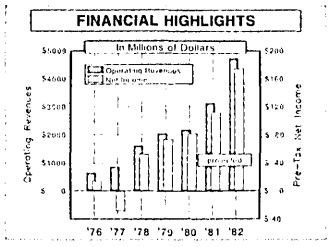

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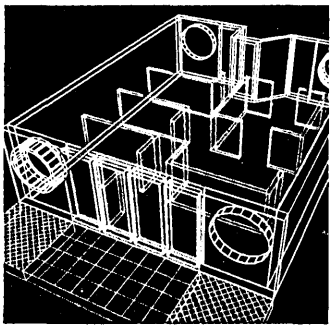

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Rebecca S. Barna, Editor

EDITORIAL

'TIS THE SEASON
1984 Is a Time of Transition (Introduction by Publisher James M. Morris)

DATAMATION enters its 27th year of publishing with high hopes and expectations for a great industry growth year. Both users and vendors alike face many exciting challenges and opportunities. In a growth period such as this, information becomes an indispensable tool. DATAMATION plans to respond to this information need by providing even more editorial breadth and depth in a new twice monthly format, beginning with the April 1 issue. Our intention is to provide you, the reader, with a larger selection of timely and topical editorial information which you will require to meet the ever-expanding needs of your job.

In line with our frequency change, we have made several editorial changes and realignments. Chief among these is the promotion of Rebecca Barna to editor of DATAMATION. Becky has been with the magazine for five years, moving from news editor to her post of the last two years as managing editor. Prior to that she spent a number of years in the industry, as well as at other publications. Becky brings to her new position a wealth of experience and knowledge of both the publication and the information processing industries. Please join me in welcoming her to this position, to this page, and to the challenges of a new and exciting 1984.

Over the course of the next few issues, you will no doubt note other changes and additions to the DATAMATION masthead. As the industry expands, indeed as DATAMATION expands, so must the editorial staff. The growth at DATAMATION is a reflection of the growth of information processing needs, of information processing applications. We look forward to this great growth year—for all of us.

New Year's resolutions are a dime a dozen. It's commitment that counts.

As DATAMATION embarks on a new twice monthly era, it is with the resolve to maintain the high editorial quality that has characterized our first 27 years. Our commitment is to provide even more editorial information, and on a more frequent basis.

The change comes not from a mere desire to be different. DATAMATION is driven by an industry—by the ever-expanding information needs of users, perpetrated by the never-ending technological advances of vendors. The expansion and pace of industry development in 1983 was staggering; the pace will only quicken in 1984. And so will DATAMATION's.

We represent what is known in the trade as a "horizontal" publication. Unlike the so-called "verticals" that cover a specific and narrowed segment of computing, DATAMATION follows everything from semiconductors to supercomputers, from micros to mainframes, from networking to artificial intelligence—all with an eye towards the integration of these products, technologies, and applications into the total information processing environment of corporations, educational institutions, and government entities.

As the industry's horizon broadens, so must the editorial menu we offer. It's seldom an item is dropped by popular demand. Our scope of coverage only widens from year to year.

And that's just what our readers demanded of us when they were approached about the prospects of a twice monthly format. In Focus Groups across the country, we sat around a table with top information processing professionals from all fields. Their mandate to us, in each city, was the same: don't drop anything; give us more, not less; and please, keep the same editorial depth of analysis that has become your stock-in-trade.

Our charter doesn't change; it merely expands. In 1984 our frequency will double—so will our ability to offer you, the reader, the fresh perspective and in-depth analysis on this fast-changing, high-growth marketplace.

It's more than a New Year's resolution. It's a commitment. ✱

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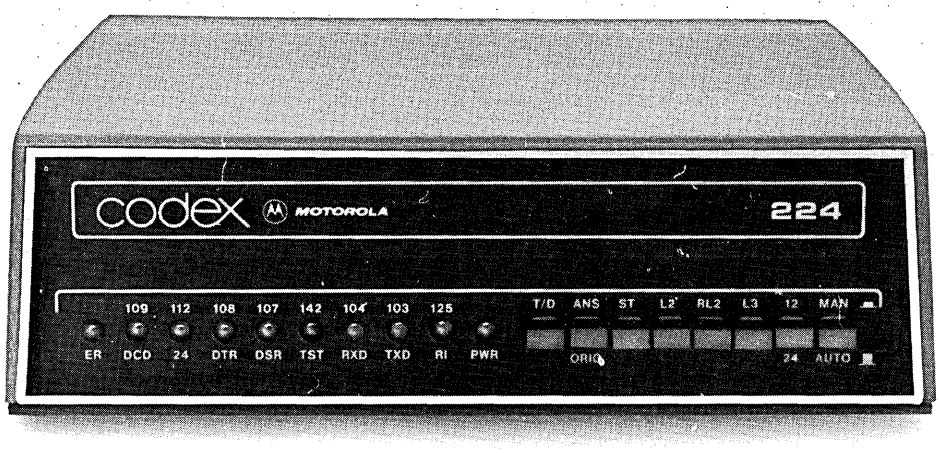

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IN FOCUS

KEEPING PACE

Cardiac pacemakers are the ultimate personal computers.

by Janet Raloff

They're among the world's smallest programmable computers. Built onto a chip roughly four tenths of an inch square, each packs a single 4- or 8-bit microprocessor, upwards of 15,000 transistors, and a memory that's best measured in nibbles, not bytes. But don't let size fool you, for this is no toy. The digital wizardry driving the latest generation of cardiac pacemakers times and controls the functions of sick and aging hearts.

Programmable pacers also represent the cutting edge of the $2.3 billion pacemaker industry in this country, one that since its inception has been extremely innovative, competitive, and profitable. Now the Big Three manufacturers—Medtronic, Cordis, and Intermedics—face unprecedented pressures as the federal government begins a campaign to throttle pacemaker fraud, abuse, and skyrocketing product costs for the 150,000 annual implantations. How the industry will weather this challenge is anyone's guess.

What seems certain, however, is that both profit and rate of innovation will be affected. And it has been suggested that at least for the near term, device programmability may determine whether the industry leaders maintain their robust health. Indeed, Medtronic, the largest pacemaker company with annual revenues exceeding $400 million, enjoys a 14% after-tax profit margin.

Pacemakers were initially developed to overcome heart block, a condition where the body's electrical signals, which trigger the heart to beat, fail to carry their message throughout the entire heart. A snag occurs at the electrical conduit between the heart's upper and lower chambers, the atria and ventricles. With intermittent heart block, perhaps only every second or third electrical signal gets through. With complete heart block, no signals pass. Sometimes the ventricles tire of waiting for a message that never comes and fire at some arbitrary and inappropriate time, resulting in a heart rate that will grow dangerously slow and perhaps irregular. Patients with complete heart block may develop cardiac arrest or erratic beating, both potentially fatal conditions.

Wilson Greatbatch was an electrical engineer detailed to Cornell University's animal behavior farm when he first learned about heart block in 1952. He recalls that physicians, "I knew I could fix it, but not with vacuum tubes and storage batteries." So when transistors became more widely available, he was ready. By 1958 he had teamed up with the physician William Chardack, and in May of that year they implanted in a dog one of Greatbatch's first fixed-rate pacers. It ran four hours.

The first artificial pacemakers for humans countered heart block by sending out an electrical pulse at a factory-set, fixed rate, usually about 70 times a minute. A wire lead to deliver the pulse was attached to the device, usually implanted in the shoulder, and threaded to the right ventricle of the heart via a vein. Known as fixed-rate pacers, those first devices acted just like a clock, sending out a timed pulse with a prescribed voltage and amplitude—whether the heart needed it or not.

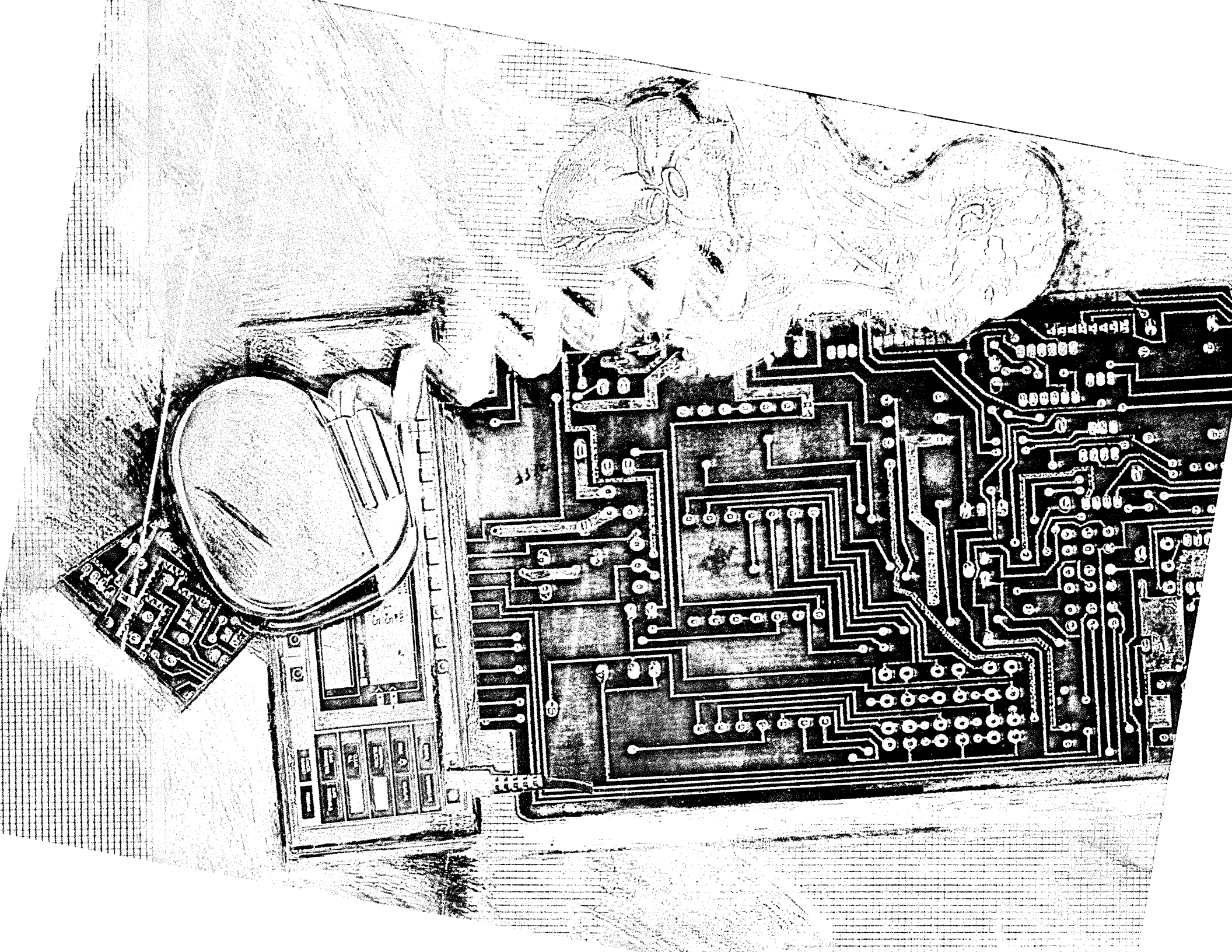
In October 1958, two Swedish researchers implanted the first totally embedded pacemaker in a human. And in 1959, using a Greatbatch device, Chardack repeated the feat in this country. Even though their circuitry was simple—two transistors and about seven other parts—at 7 ounces those early devices were heavy, about three to five times heavier than those on the market today. But patients didn't object. "We did 10 patients that year and then licensed the device to Medtronic," Greatbatch says. "It was a licensing arrangement that lasted 10 years. During that time [Medtronic] became number one in the industry." It has maintained that position ever since, with about 39% market share this year, compared to 17% for Cordis and 18% for Intermedics, forecasts Kenneth Abramowitz, hospital supply industry analyst for Sanford C. Bernstein & Co., New York.

The problem with fixed-rate pacers was that stimulation of the ventricle "could end up so inappropriately timed that you would lose cardiac output," notes Frank M. Fischer, president of the implantable products division of Cordis Corp., Miami. "There have been clinically documented cases of tachycardia [abnormally rapid heartbeat] caused by fixed-rate pacers," he notes. And since tachycardia can result in death, he says, "it is generally accepted that fixed-rate pacemakers are not a satisfactory medical treatment."

The first programmable pacer, introduced in 1972, had CMOS chips. Current models have an 8-bit micro, ROM, and RAM.

This complaint about fixed-rate pacing is something Cordis officials don't mind pointing out; Atricor, their initial entrant in the pacing field, was the first device marketed to prevent this form of asynchrony. Instead of having a single electrode, Atricor had two. As in other devices, the lead to the ventricle provided a fixed-

ILLUSTRATION BY JANE STERRETT



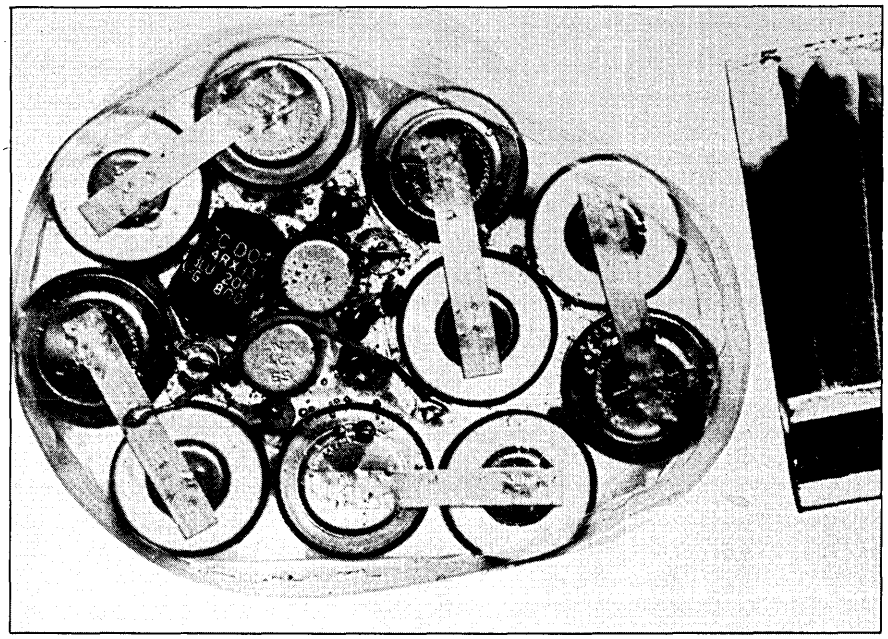
rate, stimulating pulse. But the sole function of the second lead, threaded into the right atrium, was to listen for atrial activity. Once its electrode picked up the signal, which triggers atrial contraction, the pacemaker began counting off an appropriate period—known as an AV delay—after which it would order its ventricular electrode to fire.

What's ironic, Fischer says, is that this device achieved in 1963 what has only recently become standard. "Today's rage is 'physiologic pacing,' and physiologic pacing is just an attempt to maintain that AV synchrony," Fischer explains. Nevertheless, Atricor never became very popular, because of the difficulties associated with the surgery and keeping the atrial lead in place.

The next major advance was American Optical's patent for "demand" pacers. Like the original fixed-rate devices, these had only a single lead threaded to the ventricle, but that lead served the dual function of sensor and stimulator. If a naturally occurring current signaled the pacemaker that the ventricle was contracting as it was supposed to, the pacemaker did nothing. But if the ventricle failed to contract, the pacer would fire "on demand" a stimulating impulse. Not only did this device no longer compete with those natural stimuli able to break through the heart block, but it also substantially reduced current drain on the battery. And with a projected lifetime of only 18 months to two years, anything done to prolong the battery life of those early devices would also prolong the period before a run-down unit had to be surgically replaced.

Wilson Greatbatch again stepped in, however, and changed the course of pacemaker history by introducing long-lived lithium batteries to the pacemaker industry. With a projected life in the neighborhood of 10 years, these batteries essentially ended the market for other types of pacemakers overnight. The reigning industry standard, until lithium took over, had been mercury zinc. Because it gave off a sodium hydroxide gas, early pacemakers using these batteries had to have permeable shells. Lithium put an end to that, and the industry quickly adopted the medically preferable hermetically sealed canisters.

Meanwhile, Cordis launched pacemakers into the computer age. In 1972, it introduced the first pacemaker that could be reprogrammed noninvasively, the Omni series. "This was revolutionary in its time," Fischer recalls. Initially marketed for about $1,250 each, these pacemakers "employed CMOS circuitry, hybrid circuits," and a number of other state-of-the-art digital techniques, he says. Physicians didn't care what made them run. What sold them was the ability to change the pacemakers' pulse rate (how many stimuli per minute) and output current—after implantation.



FIRST HUMAN PACER: Two transistors, several discrete devices, and 10 batteries in a package the size of a hockey puck.

The rest of the industry followed Cordis soon after. It was the advent of lithium batteries that encouraged this, Fischer now believes. With implants lasting longer, the advantage of being able to adapt—rather than exchange—a pacer to meet a patient's changing needs became obvious.

The newest generation of programmables offers such a wide range of sensing, pulsing, and data relay options that many physicians are actually embedding computers in the body. Prices range from $2,500 up to $7,000.

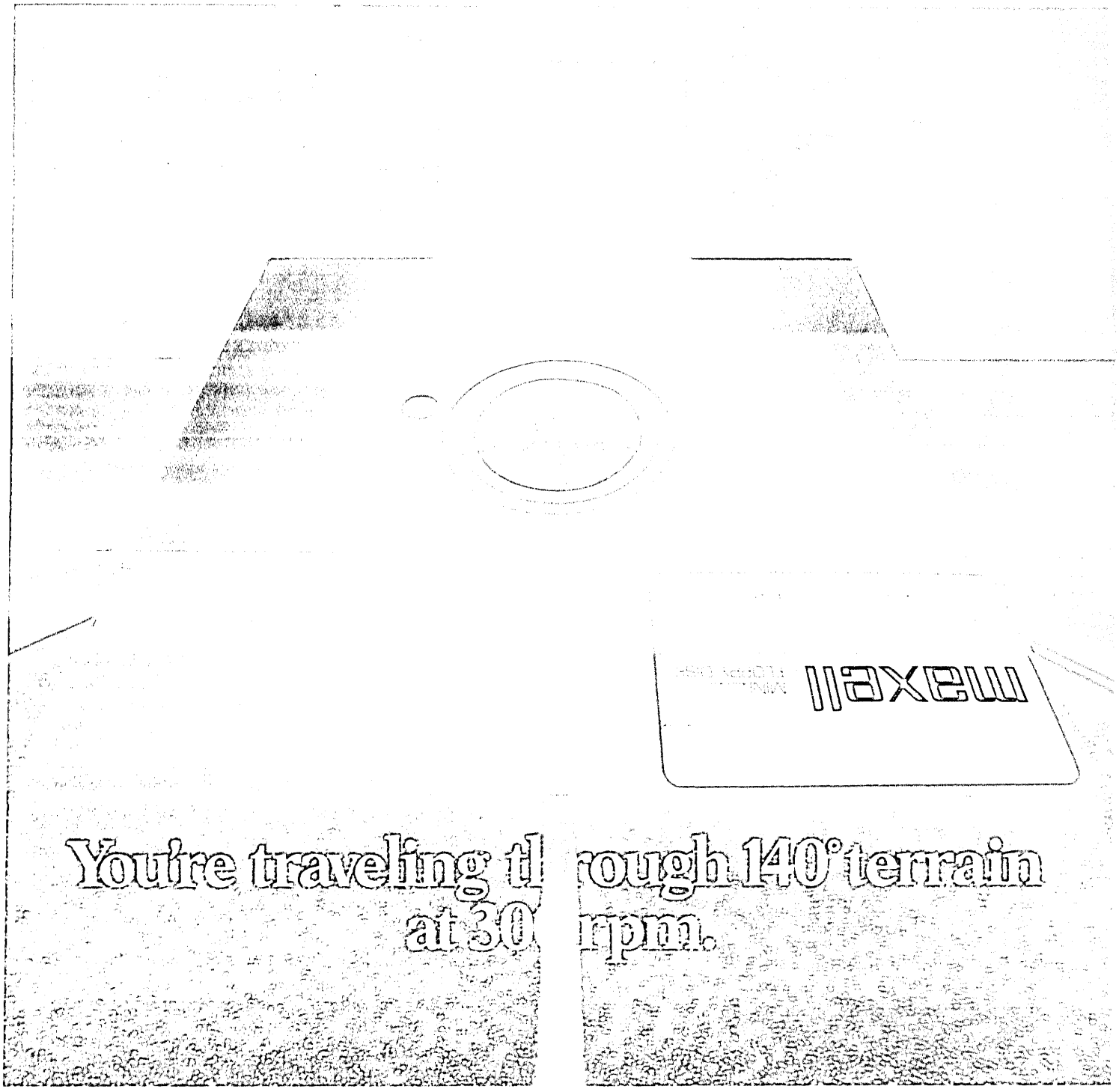
Programs enable the doctor to alter up to 30 different operating parameters, as well as view an ad for Medtronic.

For example, the new physiological pacemakers offer dual chamber sensing and fire-on-demand pulsing capabilities. They allow physicians to vary sensor-amplifier sensitivity, energy output per pulse, pulse width, pulse frequency, the delay between chamber pulses, and even pacemaker mode—whether it pulses every beat, pulses as needed, or doesn't pulse at all but just listens.

Some programmables offer rudimentary system diagnostics. For instance, most tell the physician via telemetry what it is they've been programmed to do—such as deliver a 5 V pulse, on demand, for a minimum heart rate of 70 beats per minute. Richard Calfee, vice president for engineering at Intermedics Inc., Freeport, Texas, notes that his company's Cosmos series pacer not only allows programming changes of 30 or more separate parameters, but it also has a measurement system built in that stores analog data on the lead system and battery voltage. Because these data can be telemetered out on command, a physician will be able to determine, for example, not only that a device was set to deliver 5 V, but also if it's really delivering 3.5 V.

In addition, some of the more sophisticated devices scheduled to enter the market this spring will store heart-performance data for telemetered retrieval. Jack St. Ores, product manager for Medtronic's Symbios series, notes that its pacemaker for treating tachycardia "will store in its memory whether there's been an episode of tachycardia since you've last seen the doctor." The Cosmos series will be able to store data on the percentage of times the pacemaker had to pace and on the number of types of unusual occurrences.

Not surprisingly, many of these latest generation pacers actually use microcomputer systems to handle their dazzling array of programmable control functions and data manipulations. "We put the first microprocessor in a pacemaker," boasts Frank Fischer of Cordis. In 1980 its Sequicor series initially used an RCA 1802. The 8-bit microprocessor was a "gap filler," explains the company's engineering manager, Vince Cutolo, "because we really don't need all of that computing power. But our custom [circuit design] program was taking longer than we anticipated." Eventually, the company phased in an in-house designed, 4-bit microprocessor, which Cutolo says is about as complex if not a tad more than the RCA product. The biggest advantage of the newer design is its lower current drain. The 8-bit device reduced the five- to seven-year battery life now expect-



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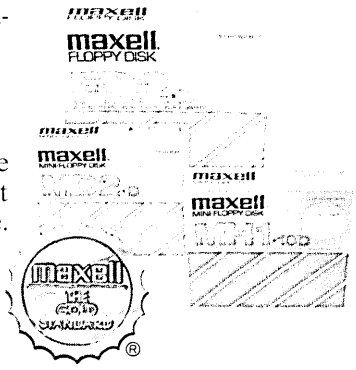

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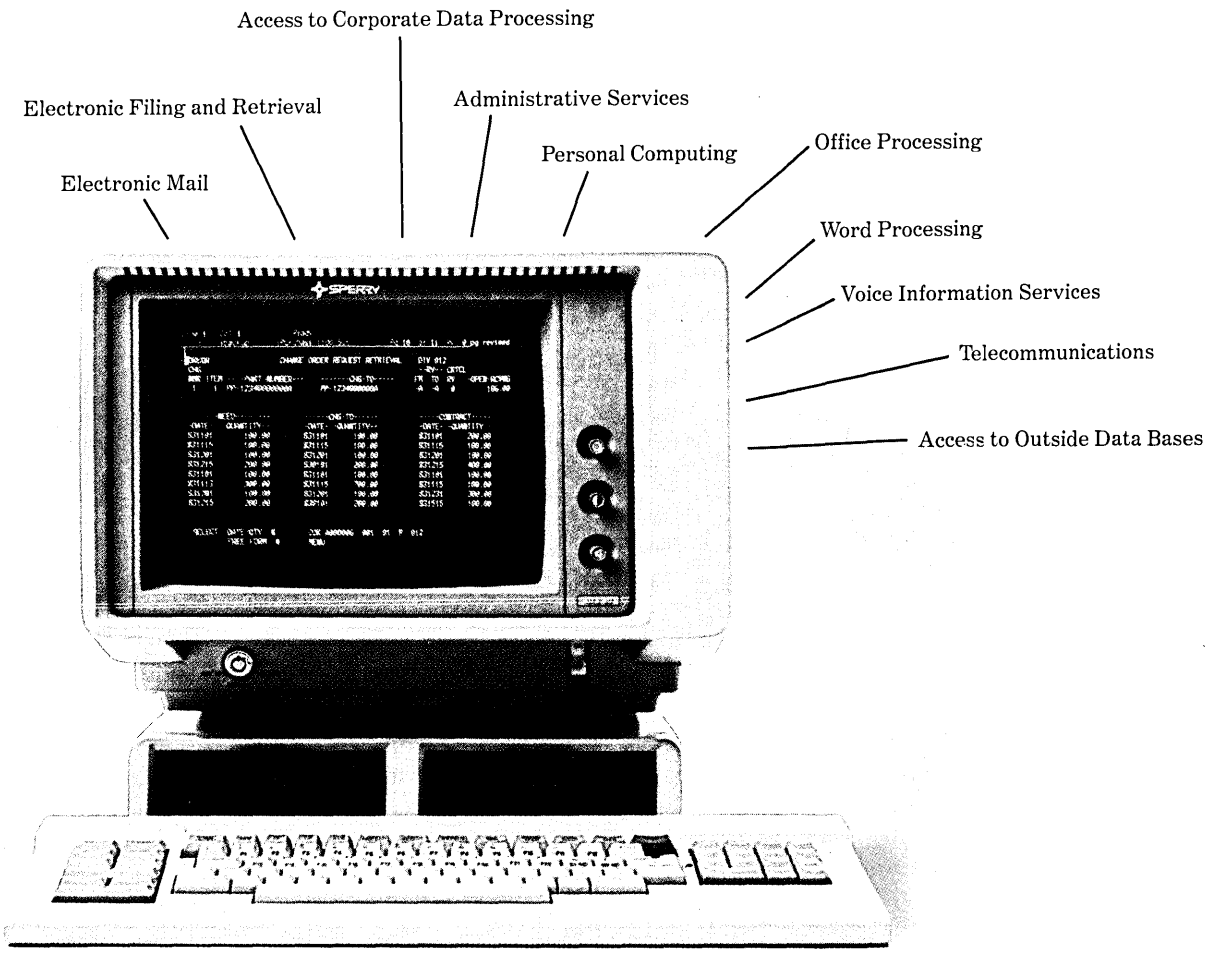

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ed of Sequicor to a mere two years.

Sequicor's memory is dedicated firmware. "We have two different memory banks," Cutolo explains. They include 1.25K (4 bits wide) of memory similar to what the industry calls a ROM, and what might be described as 32 bytes (or 32 4-bit words) of RAM equivalent. Input and output devices are 50-centimeter-long, surgical-grade, stainless-steel sensor/stimulator leads. The input signal has a frequency of between 40 hertz and 100 hertz (and a repetition rate of between 20 and 200 times per minute). Outputs are pulses (per minute) that a device is programmed to deliver.

The Cosmos series, with its greater degree of programmability and telemetry, is built around a custom, 8-bit microprocessor that was designed in-house at Intermedics and manufactured by the firm's ZyMOS Corp. semiconductor affiliate in Silicon Valley.

Not all firms have gone the microprocessor route, however. Medtronic decided against developing a software-based pacing system, relying instead on hardwired logic. "The real advantage of a microprocessor is [only related] when you have to do complex calculations internally"—calculations on the order of those for tachycardia detection and treatment—Medtronic's David Thompson explains. The company's circuit designers at its Minneapolis headquarters, and at the firm's MicroRel semiconductor-manufacturing facility in Phoenix, still haven't encountered engineering requirements they claim can't be adequately handled by custom, preprogrammed chips, he says. Moreover, he adds, there's a distinct advantage—measured as reductions in both cost and current drain—that comes from avoiding microprocessors in a pacer's design.

A physician implanted pacers into patients whose sole evidence of heart disease was chest pains.

Far more sophisticated are the computers that actually reprogram implanted pacemakers. In only a decade, they have evolved remarkably. Early models were desktop AC-powered units that revised either of two programmable functions. Today they are handheld battery-powered portables that query, display, and alter up to 40 different parameters. Known generically as "programmers," these are the devices that translate the physician's wishes into the pacemaker's commands. Of course, the manufacturers claim the units are user friendly.

The unit developed to program Medtronic's Symbios series pacers "has a high degree of internal diagnostics," explains product manager Jack St. Ores. "It will test itself, its battery, its soft keys, and its software cartridge, then report on any failures." It has a 160-character display. "If there are none, it will list the entire family of past, present, and future Medtronic pacemakers," he adds.

Each parameter that can be changed—such as pacing mode, the amount of pulse timing delay, or pulse width—will appear above a soft key. A physician merely presses the key corresponding to the parameter to be changed, and instantly the options available for substitution appear beside other keys. By selecting a key, he then begins a new prescription. Any or all parameters can be changed at a setting. When the prescription is complete, the programmer uses a magnetic (reed) switch to initiate the reprogramming, and then telemeters the changes down to the pacer via encoded radio frequency and magnetic signals (many other manufacturers communicate via magnetic signals only). This programmer uses four 8-bit off-the-shelf microprocessors, a 64K ROM, and 16K RAM.

For patient monitoring, physicians or clinical practices set up telephone communications centers. These centers query implanted pacemakers—via modem hookups—for information on how the heart, battery, and pacemaker are performing. Many even have the ability to simultaneously receive telephone-relayed data from skin sensors to print out an accompanying electrocardiogram (ECG) strip chart.

In fact, Symbios will be offering physicians a diagnostic-marker channel that will appear right below an ECG to help doctors interpret a patient's heart activities. This fall "we're going to go one step further and include timing patterns of the pacemaker interfacing with the heart—marking major milestones [in the heart's natural pumping cycle] on the ECG strip," says Medtronic's St. Ores. "That's probably Symbios's biggest advantage over existing products," he adds, because "it's very hard to interpret a normal ECG—where no pacemaker is involved. Throw in a pacemaker and possibly drugs, and the ECGs get *really* complicated. Without this kind of help the doctor almost has to have algorithms of the particular pacer implanted in his head."

There's little question the pacemaking industry's drive for technological achievement has resulted in enormous medical benefits for the hundreds of thousands of pacemaker wearers. But lately critics have begun to ask a stinging question: at what price? And the answer, government investigations now indicate, is that the price has been steep indeed.

Until this year, the pacemaker industry has been blessed with the rare luxury of never having to compete in the U.S. on the basis of product price. Users almost never pay for the product, Uncle Sam does. Not only does Medicare pay for between 80 and 90% of all pacemakers implanted in this country, it also covers most follow-up cardiac care. So the price of a particular pacemaker plays virtually no role in whether it gets prescribed.

"Let's face it," notes one disgruntled analyst with the Medicare program, "the history of the pacemaker industry has been 'If Medicare will pay for a Cadillac, the Chevette dealer goes out of business.' "

A study prepared by the U.S. Senate's Special Committee on Aging tends to confirm that. "Because of the lack of payment screens and the perverse incentives of Medicare's . . . payment mechanism, the most apparent competition present in the industry is to see who can produce the most expensive pacemaker," the study noted. In a 1982 report on that study, entitled "Fraud, Waste and Abuse in the Medicare Pacemaker Industry," the committee staff concluded that "use of pacemakers appears excessive, as do their cost to the program and profitability to the manufacturer, salesman, physician, and hospital." In the end, the committee estimated that half of the $2 billion Medicare spends each year for pacemaker implantation and follow-up may be unnecessary.

"We were afraid the industry would offer nothing but Rolls Royces."

Independently, the Health Care Financing Administration (HCFA), which administers the Medicare program, was coming to a similar conclusion. It found physicians who routinely implanted two pacemakers—one as a backup if the first failed. Then there was the case a year and a half ago where a physician put in a $10,000 pacemaker—the going industry average price was closer to $3,500—into a patient who had terminal cancer and wasn't expected to live three months. And just recently, several Medicare claims were denied because a physician implanted pacemakers into patients whose sole evidence of heart disease was that they complained of chest pains. The doctor hadn't even taken an electrocardiogram. Not all cardiac surgeons are guilty of such excesses, however.

A more insidious and pervasive problem, HCFA officials say, is the technology-driven spiral in pacer costs. The introduction of a new model line usually spells the death knell for the previous one, an official notes. He adds that it is no coincidence that the newer, deluxe model costs quite a bit more. The first Medtronic pacers cost $600, but prices have increased tenfold. "What we were afraid of was that the industry would begin offering nothing but Rolls Royces," says the government official. "Then HCFA would have to spend $10,000 to $12,000 for people who only needed a Model T because the Model T

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wasn't there anymore."

Things began to change. Last March HCFA issued rules establishing when it considered implantation of a pacemaker justified. Medicare reimbursement claims for conditions other than those specified may be denied. Likely to have an even greater impact are guidelines now under development to establish which medical conditions warrant implantation of the more sophisticated devices, such as physiologic pacers. Once in place, these guidelines could limit Medicare's financial obligation to pay for all those Rolls Royces. If a claim comes in for a Rolls when the guidelines suggest that only a Chevy is necessary, the hospital or patient could be forced to cover the cost difference.

Finally, there is Medicare's new prospective payment system (PPS) for all diagnostically related groups (DRGs). In layman's language, this new system restricts hospitals to a fixed Medicare reimbursement payment for particular diagnoses. And the hospital payment for pacemaker implants has been set at around $7,500, though actual payments will vary by region, type of hospital, and certain other factors. This system is being phased in nationally over a four-year period.

Any hospital that charges a patient covered by Medicare more than $7,500 for pacemaker implant surgery and the related hospitalization will have to eat the difference. "Since that rate is all the hospital is going to get, it's going to be in the hospital's best interest not to be implanting expensive pacers," notes Todd Richter, a health services analyst with Morgan Stanley Co., New York. But it's unlikely the market will dry up completely for the expensive pacers, he contends. "Now that the government has become a more prudent purchaser of health care, there will be a lot more attention paid to the relationship between cost and value by hospital administrators." One can expect to see hospitals teaming up for big purchases of one or two types of devices so that they can use their combined purchasing power to get the best price.

Medicare will pay $7,500 for a pacemaker implant. Hospitals that charge more will have to eat the difference.

What effect is this going to have on the industry and its lust for profitable innovation? According to E. Scott Thatcher, a veteran observer of this industry at the securities firm Dain Bosworth in Minneapolis, the industry is going to experience unprecedented cost pressures, and that's going to put the squeeze on R&D funds. "The rapid rate of infusion of new technology will slow," he says.

Thatcher also sees ways the industry might cut its losses under these new fiscal conditions. "Up until now, the pacemaker industry has never really reaped much benefit from the declining unit cost curve" characteristic of the electronics industry, "first, because they're not high-volume producers, but secondly because they're making a product obsolete very early in its life cycle." As a rule, he notes, the average pacemaker model has only been marketed for 18 to 36 months. What one can expect to see happening, he predicts, is a lengthening of pacemaker model cycles to reap a greater return on development costs.

Moreover, Thatcher forecasts, "integrated circuits going into the next generation pacemakers are going to be of the same family as those out there today. [Companies] won't start from scratch again" in their designs. Software innovation will likely play an increasingly important role, he adds, because upgrading a product's functionality with advanced software can be done more rapidly and at lower cost than redesigning the circuitry. Finally, Thatcher predicts such a stronger effort will be made to expand into new implant markets, such as heart valves and drug pumps, rather than merely upgrade pacemakers to better serve those who suffer heart block.

So, after years of being underwritten by Medicare's largesse, the pacemaker industry must soon join most of the nation's other industries. Cut-throat competition for profit on the basis of technology and value will replace the federal government's price protection. Medtronic, Cordis, and Intermedics, meet American Telephone & Telegraph—you all have a lot in common. ✱

Janet Raloff is the policy and technology editor at *Science News*, a weekly newsmagazine in Washington, D.C. She recently won the Science in Society award from the National Association of Science Writers.

"What a day."

CARTOON BY STEVE ATTOE

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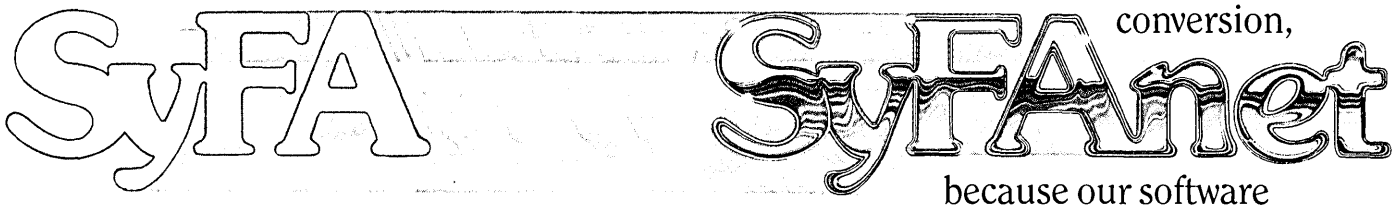

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NEWS IN PERSPECTIVE

GOVERNMENT

POLITICS AND POLICIES

Computer makers and Republicans are lining up against Democratic proposals for national "industrial policy."

by Willie Schatz

This is a multiple-choice test. Pick the best answer to the question, What is "industrial policy?"

It is: a) already a policy, b) an existing series of policies, c) not necessary as a policy, d) all of the above, e) any of the above.

If you answered a) through e), you're absolutely correct. Industrial policy is today's automated version of the weather. Everybody talks about it, but nobody seems able to do a damn thing about it.

Not that folks aren't trying. Even killing themselves, for that matter. The Subcommittee on Economic Stabilization of the House Committee on Banking, Finance, and Urban Affairs spent six months taking testimony from 125 expert witnesses on industrial policy. Their efforts begat a 73-page report, "Forging an Industrial Competitiveness Strategy," which proposes the creation of a Council on Industrial Competitiveness (CIC), a Bank for Industrial Competitiveness (BIC), and an Advanced Technology Foundation (ATF). Those ideas (H.R. 4360–61) have been placed in the legislative labyrinth by subcommittee chairman John LaFalce (D-N.Y.).

"We presently give industry a wide range of assistance including tax, trade, antitrust regulation, loans, and loan guarantees," LaFalce says. "But we have no means of requiring that in exchange for that assistance, the affected industry will take the tough steps to improve its international competitiveness. We can no longer afford to give aid without requiring that these industries modernize, invest in research and development, and become more efficient."

The total tab for the CIC, BIC, and ATF would be a cool $8.5 billion beginning in FY 1985. If you don't know where the money's going to come from, check your pockets.

Not wanting to be a policy or two behind—this being an election year and all that—the Republican Task Force on High Technology Initiatives essentially told the subcommittee that its product didn't come close to justifying its work. First we get our legislative act together, the Republicans implied. Then we'll see some real industrial policy.

"Although well-intentioned, the LaFalce proposal is doomed to failure," says Rep. Ed Zschau (R-Calif.), chairman of the task force and former Silicon Valley chief executive. "Replacing the marketplace with central economic planning is a bum idea. Everyone knows that. Nevertheless, the Democrats have staked out this approach to industrial policy as their political turf. I'm glad they have. It's territory that can't be defended.

"I can't think of any scheme less likely to make our industries more competitive than creating another bureaucracy—no matter how much money you give it. Rather than target industries with tax dollars, government should target the process of innovation by creating an environment in this country where new ideas and new technologies are likely to flourish."

Zschau and the other 135 task force members have promised a specific legislative agenda to accomplish just that.

They have thrown their weight behind the Work Opportunities and Renewed Competition Act (H.R. 3434). Zschau has also urged his colleagues to "target the innovation process," which would include a stronger commitment to basic research, more incentives for risk takers, and an adequate supply of trained technical people. Stay tuned for details.

The question now before the House is whether all this sound and fury is necessary. Many think the country already has an industrial policy. Or policies. Even the Republicans and authors of the Democratic manifesto admit that.

"Although well-intentioned, the LaFalce proposal is doomed to failure," says former Silicon Valley exec and Republican House member Ed Zschau.

"With our antitrust tax, trade, and an assortment of other laws and regulations, it's obvious that we do have an industrial policy," Zschau says. "We are claiming we need to maintain our technological leadership but sometimes these laws and regulations work at cross-purposes. They're so cumbersome that we can't accomplish what we set out to do. Our industrial policy is not rationalized. Our task force is looking for modifications of existing law so we can break down existing bottlenecks."

"At present, industrial policy is made through the tax code, trade relief, antitrust action, procurement policy, loans, loan guarantees, and loan insurance programs," the Economic Stabilization Subcommittee report notes. "There is nothing novel about 'industrial policies,' nor are they incompatible with a free market. We have them now; we always had them in our

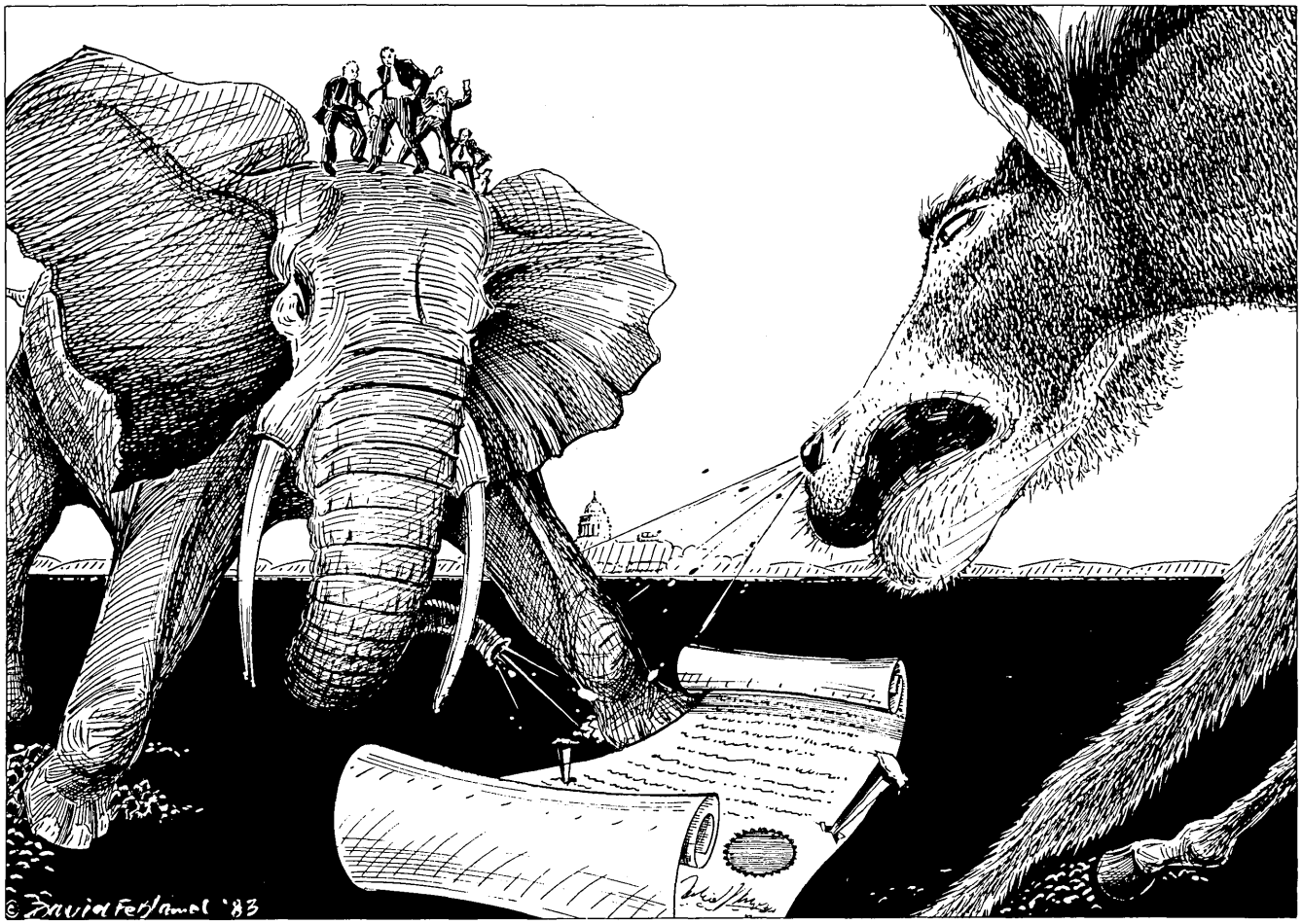

ILLUSTRATION BY DAVID FEBLAND

past; and we will undoubtedly have them in our future. The problem is that our current policies are inconsistent, uncoordinated, inadvertent, ineffective, and very expensive. We need to do better."

No, we don't, counter the Computer and Business Equipment Manufacturers Association (CBEMA) and the American Electronics Association (AEA). We like things just the way they are, thanks.

"We don't think any further initiative is needed," says CBEMA president Vico Henriques. "Our members haven't looked at the report yet, but a lot of them feel industrial policy per se is dead. It's not as hot as it was last summer. And it's not a thing that everybody's homing in on."

That must come as a surprise to the Republicans. They consumed 60 pages in the *Congressional Record* on the subject. Rep. Tom Petri (R-Wis.), who organized the extravaganza, said a national council partnership of government, business, and labor "sounds ironically and perilously close to the corporate state of Mussolini, the original model of fascism." Referring to his party's need to keep the trading doors wide open, Rep. Ben Gilman (R-N.Y.) called protectionism "the industrial policy of organized labor" and said it would result in "noncompetitiveness, high prices, and a low and sinking standard of living."

CBEMA has already zeroed in on the industrial policy target. Not surprisingly, it has government intervention dead in its sights.

"We're witnessing what could become public economic hysteria," Henriques claims. "That hysteria is coalescing around the demand for a centralized and coordinated U.S. industrial policy. The results of that hysteria threaten to undermine the foundations of the U.S. competitive economy."

There's going to have to be some heavy sandbagging before the public knocks CBEMA's members off their pins. The computer industry is one of the few bright spots in the cloudy U.S. balance of trade picture. While the 1983 trade deficit is expected to be $70 billion in the red, CBEMA's members should be $6.6 billion in the black.

It "sounds ironically and perilously close to the corporate state of Mussolini," says Tom Petri, Republican from Wisconsin.

No wonder, then, that CBEMA will toil tirelessly to defeat government-sponsored planning councils that would control wages, prices, investments, and the allocation of resources, as well as proposals for "national development banks," which the association believes would parcel out capital by poltically determined priorities.

"Nobody should be forced to pick winners and losers," Henriques says. "Nobody's smart enough to do that. Let the market continue to do it. A central bank would only hinder that process."

The feeling is mutual among AEA members. That group is also among the most fervent shakers of Adam Smith's invisible hand. The farther away the government stays, the better.

"There's been a deafening silence from our members on supporting this report," says Ken Hagerty, AEA vice president for government relations. "The report represents a very narrow and selective slice of the proposals and perspectives presented to the committee.

"How can you possibly determine whether something will be commercially successful [one of the criteria for obtaining money from the BIC]? Does the federal government have a role in subsidizing products because they have the feasibility of being sold? Is that a legitimate use of taxpayer dollars?"

To Hagerty and friends, industrial policy means working for a bill making permanent the R&D tax credit, which is sched-

uled to expire at the end of 1985. That bill would expand the ability of corporations to get credit for contributing to basic research at universities. In return, the administration would receive its cherished tightening of what is and is not legitimate R&D.

Even the ATF is not being welcomed with open arms. As proposed in H.R. 4361, the foundation would facilitate the movement of basic scientific concepts into the commercial products or processes and assist in the diffusion of new technology to industrial sectors to encourage the technological modernization of American industry. It would be to civilian applied research what the National Science Foundatin (NSF) is to basic research and the Defense Advanced Research Projects Agency (DARPA) is to military applied research. It would also establish a Federal Extension Institute, sort of a national referral service to spread the good research words of government and academia throughout industry. All this would cost $500 billion.

"The proposal isn't all terrible," Hagerty admits. "Some things may have merit. There's no question that we've got a significant challenge in technical education, and the ATF might help that. And the Federal Extension Service may have merit, although we've already got the National Technical Information Service [NTIS], which nobody ever uses.

"I think there's going to be a lot of smoke and heat, a little light, and very few, if any, public laws coming out of this," Hagerty says. ✱

ARTIFICIAL INTELLIGENCE

PROLOG VS. LISP

The two artificial intelligence programming languages are squaring off in what some say is a "religious" battle.

by John W. Verity

As the market for symbolic processing tools, used mainly in artificial intelligence and advanced systems programming applications takes off (Oct., p. 92), a minor but potentially decisive battle is brewing between the languages Lisp and Prolog.

"It is the great geopolitical battle right now," says Dr. S. Jerrold Kaplan, vice president of business planning at Teknowledge Inc., a Palo Alto, Calif., builder of expert systems and knowledge engineering tools.

Some would go further, claiming the Lisp-Prolog debate has taken on "religious" dimensions since it is being fought by two camps whose loyalties run fierce and are fueled by national pride. Lisp has been the AI language of choice in the United States for the past 25 years, having been nurtured to its present robust maturity in university and commercial research labs. Prolog, however, was invented in France and is the pride of European AI researchers, who have used it for about 13 years.

Now, however, the debate has heated considerably as a result of the wide pub-

The backing of Prolog by the Japanese has given the European language a big push in the U.S. industry.

licity given to Japan's fifth generation computer project, which aims to build large-scale knowledge processing systems by 1990. The Japanese, for reasons they defend zealously, have chosen Prolog as the main language for their well-funded efforts.

Knowing a good opportunity when they see it, several U.S. entrepreneurs (most of whom, interestingly, were born abroad) have set up shop to bring the gospel of Prolog to U.S. shores. Their hope is to exploit the fifth generation ballyhoo and establish Prolog as a respectable contender against Lisp. That job, however, will be made tougher, observers say, by the growing acceptance of a set of Lisp-related languages—Smalltalk and Flavors, to name two—which are described as "object-oriented."

Prolog's adherents claim theirs is a higher level language than Lisp and has built into it several powerful facilities that lend themselves to so-called knowledge processing. Chief among these facilities is a backtracking search mechanism which navigates through the lengthy arrays of "if-then" rules of which Prolog programs primarily consist. Furthermore, Prolog's roots in predicate logic—the kind familiar to freshman philosophy majors—give it a built-in relational database orientation, according to supporters.

"Programming in Prolog can be viewed as programming by assertion and query," says Kamran Parsaye, president of Prolog startup Silogic Inc., Los Angeles. "The Prolog programmer is not aware of the distinction between programming and querying—he stores information in the internal relational database of Prolog and retrieves it by powerful relational queries."

Promoters of Lisp, however, say Prolog's implicit search strategy is fine for some symbolic processing but can often lead a program down the proverbial garden path.

"Prolog can invoke some very expensive—in terms of computing resources—processes that are not obvious from the Prolog statements themselves," comments Dr. Fred Luconi of Applied Expert Systems. "Lisp is a more fundamental language and gives you better control over processes so the program won't waste time on useless searches."

Applied's chief scientist William Woods adds, "Searching algorithms can be combinatorially explosive, so you sometimes want to defeat the built-in strategy and impose your own because you know it will be more efficient in solving a particular problem."

But to do that in Prolog may mean inordinately inefficient run-time code, Woods says. "I'm still skeptical. It's not clear at all if Prolog will give enough control and the efficiency you need for nontrivial problems," he notes. "You're probably advised to write another interpreter and the question is, Is Prolog good for writing a non-Prolog interpreter? I suspect not, because you'll have to waste the efficiency of Prolog itself."

Or, as Edward A. Feigenbaum of Stanford University writes in *The Fifth Generation*, a strident call to arms to the

"Prolog has some nice ideas but it's not a real language," says John H. Clippinger of Brattle Research Corp.

U.S. computer industry coauthored with Pamela McCorduck, "The last thing a knowledge engineer wants to do is abdicate control to an 'automatic' theorem-proving process that conducts massive searches without step-by-step control exerted by knowledge in the knowledge base. Such uncontrolled searches can be extremely time-consuming."

John H. Clippinger, president of Brattle Research Corp., also of Cambridge, goes further. "Prolog has some nice ideas but it's not a real language. It's got some real limitations and people will have to reinvent a lot of Lisp. But that's not to say you can't commercialize it," he says.

Indeed. So far two companies in the U.S. have staked their success on selling Prolog, and reports are circulating that a Silicon Valley startup plans to build a Prolog machine.

Silogic Inc. of Los Angeles sells Prolog tools such as compilers and interpreters and plans to develop turnkey AI applications in Prolog. The company is privately financed but is considering seeking venture capital, says president Parsaye.

Meanwhile, Prologica Inc., Wyncote, Penn., sells various Prolog packages for micro- and minicomputers and is at work on expert systems and natural language processors for unidentified customers, according to Angelos T. Kolokouris, executive director and vice president. The

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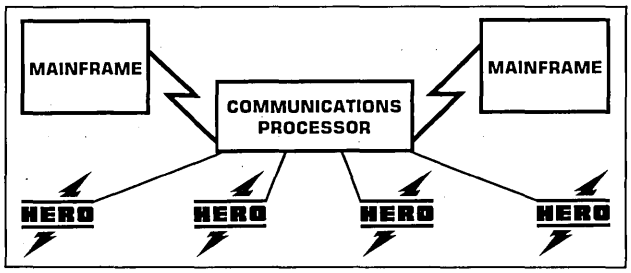

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company is backed by a parent whose annual revenues are "close to $100 million," says Kolokouris, but he declines to identify the company.

Another vendor of Prolog packages is Springer-Verlag, the West German publisher, which recently entered the software market with Prolog interpreters for 68000-based Unix machines and the IBM P.C.

Prologica's interpreters run on Z-80-based CP/M machines, Digital Equipment PDP-11s with RSX-11M/Plus, DEC VAX, and IBM mainframes running the VM/CMS operating system, according to Kolokouris.

Silogic's products include Prolog compilers for DECsystem-10, VAX, and 68000/Unix machines and interpreters for the Z-80, 8086 family, VAX, 68000, and Unix systems, according to a spokesman.

Some AI observers say Prolog may very well find use alongside Lisp as part of knowledge-based systems.

Silogic and Prologica both point to the Japanese endorsement of Prolog as the inspiration for their efforts. While the Japanese claim to be working on single-user Prolog machines in the 6-MIPS range, a U.S. company has yet to disclose product plans in the area.

Some observers of the AI scene suggest that Prolog may very well find use alongside Lisp as part of knowledge-based systems.

"There's no definite advantage of one language over another in the sense of having it all wrapped up," says Woods at Applied Expert Systems. "Ultimately logic programming will have an important role, but whether or not it will be done in Prolog we can't be sure."

Woods adds that the programming environments available for Lisp, which are all-important for the tools they offer for handling the massive complexes of recursive programs encountered in symbolic programming, are far richer than anything available in Prolog. "Lisp has a substantially larger history. We know what it can do. Prolog is still experimental. And besides, there's no assurance that Prolog's innovations are a good base for all problems."

Nevertheless, Woods foresees a place for Prolog. "I think what will fall out will be some sort of melding of the two languages," he states. Prolog is easily implemented in Lisp and can be added into current Lisp environments.

Meanwhile, the AI community, which has seen a wave of commercialization sweep its ranks as entrepreneurs cash in on years of academic research, is making increasing use of object-oriented languages. The two best known of these are Smalltalk, offered under license from Xerox Corp., and Flavors, sold by Symbolics Inc., Cambridge, Mass., which sells a single-user Lisp machine. Object-oriented languages make little distinction between data and program. Rather, entities within the program contain both code and data and converse between themselves by passing "messages." The languages lend themselves well to quick prototyping of complex systems, particularly those involving interactive graphics, according to users.

"These languages are not competitors to Lisp but are augmentations," says Woods. "They can be used to build skeletal structures to organize the program around an elaborate taxonomy. Their power comes from different levels of generalization. It makes it easy to build new structures because new things require only small modifications of things you already have built. Object-oriented languages are a helpful part of the Lisp programmer's tool kit."

Flavors derives its name from the concept of adding flavors to a soup. Once added, the flavor permeates the soup totally, affecting all parts of the mixture; similarly, new attributes added to a Flavors program affect all parts of the program, rather than being localized.

To some, the Lisp-Prolog debate is only so much noise, a distraction from the larger issues at hand. "A lot of energy is being dissipated. It's a mine vs. thine sort of thing," says Bob Abramson, marketing manager at Digital Equipment's Artificial Intelligence Technology Center in Hudson, Mass. "There's always a certain amount of passion and emotion among supporters of a particular computer language," he says, speaking for himself and not DEC.

But passion won't change people's minds, at least not in the short term. Says Kaplan at Teknowledge, "I don't see a tide sweeping the U.S. to change Lisp workers into Prolog workers." ✲

AN EYE ON AI

Three European mainframe companies are joining forces to do research in "knowledge processing."

by Paul Tate

Europe's three major mainframe companies—Siemens from Germany, Compagnie de Machines Bull from France, and ICL from the U.K.—are getting nervous.

Worried about their individual abilities to match the output of the computer research consortia of Japan and the United States, they have agreed to set up a joint research institute to coordinate their activities at a precompetitive level in the key area of knowledge processing. Knowledge processing, as opposed to traditional numeric data processing, deals with inference and reasoning and is a direct outgrowth of 20 years' research in artificial intelligence.

"This is the first research establishment of its kind in Europe," says Jacques Stern, chairman of the French Bull group and initiator of the joint venture.

It's only a modest step toward collaboration, however—maybe too modest. It will be sited in Bavaria, the southern state of West Germany, and concentrate on developing software and networking techniques for future knowledge-based systems. Around 50 researchers will be employed in the first two years, with staff coming from the three member companies and additional personnel recruited from outside.

Funds for the institute will be provided equally by the participants. The level of financing will be announced, when the agreement between the three companies is completed. But even optimistic estimates put the budget at only about $15 million, which doesn't go too far in the R&D world these days.

"Our institute has been set up by industrialists and will be run by industrialists," says Jacques Stern, chairman of the French Bull group.

Setting up a joint research center to spread the inhibitive costs of leading-edge R&D, however, is only part of the story. The three companies are also using the institute to ensure themselves against the increasing political influence over the direction of industry research in Europe—and they are doing so not as European companies, but as globally competitive mainframers first and foremost.

"These are the three mainframers where the need for this type of research is most urgent," confesses a Siemens spokesman. The "European trinity," as one observer calls them, has decided to stick together, and the institute will be closed to all outside firms. Europe's other major data processing companies, including Olivetti and Philips, were not invited to take part.

Perhaps more significant is that the institute will give the three companies a joint research resource that is separate from the politically motivated European R&D project Esprit (for European Strategic Program for R&D in Informational Technologies), in which all the major European data processing and electronic companies are taking part.

That, thinks Jacques Stern, is im-

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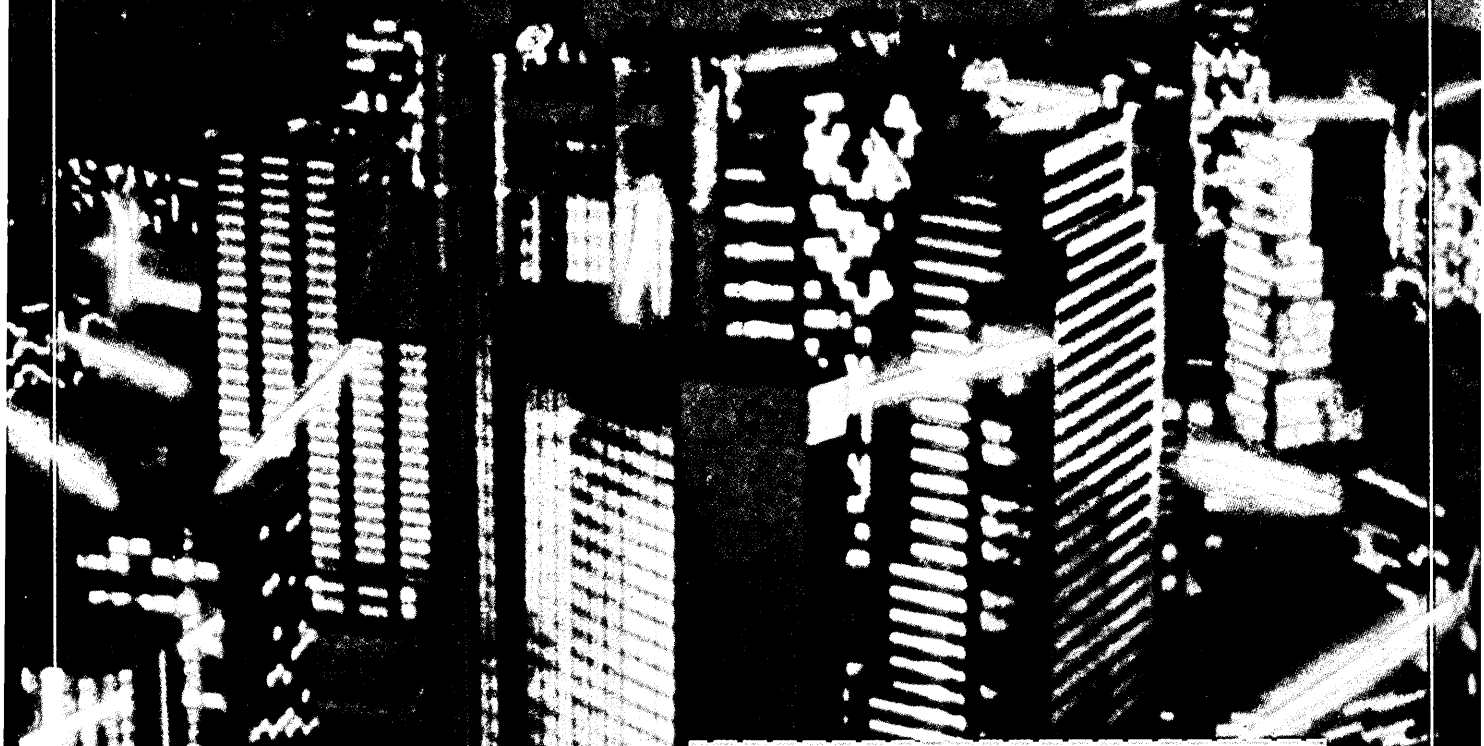

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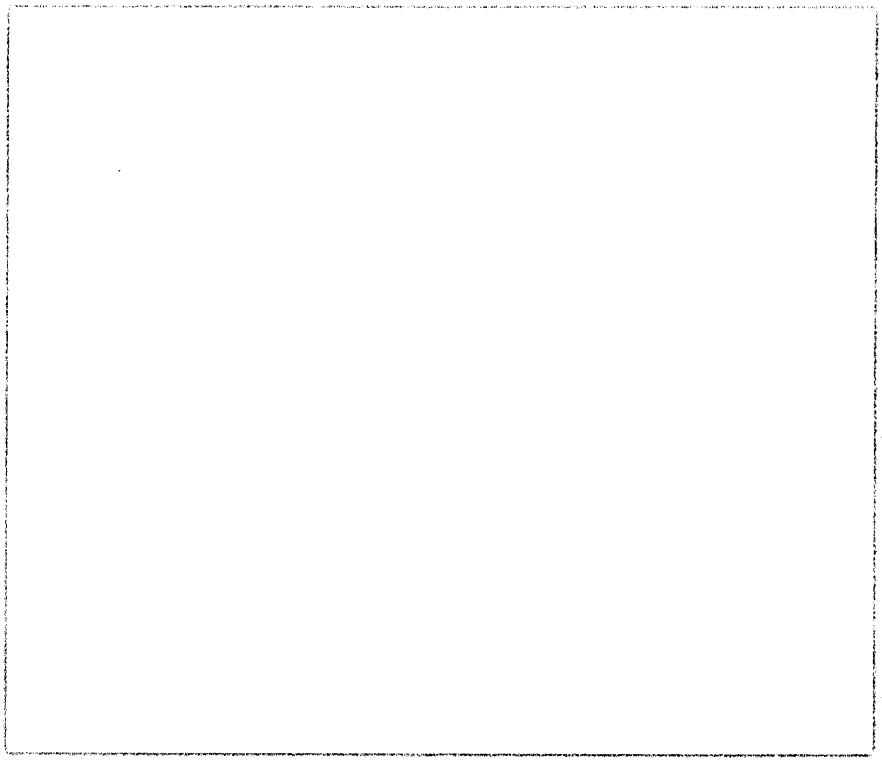

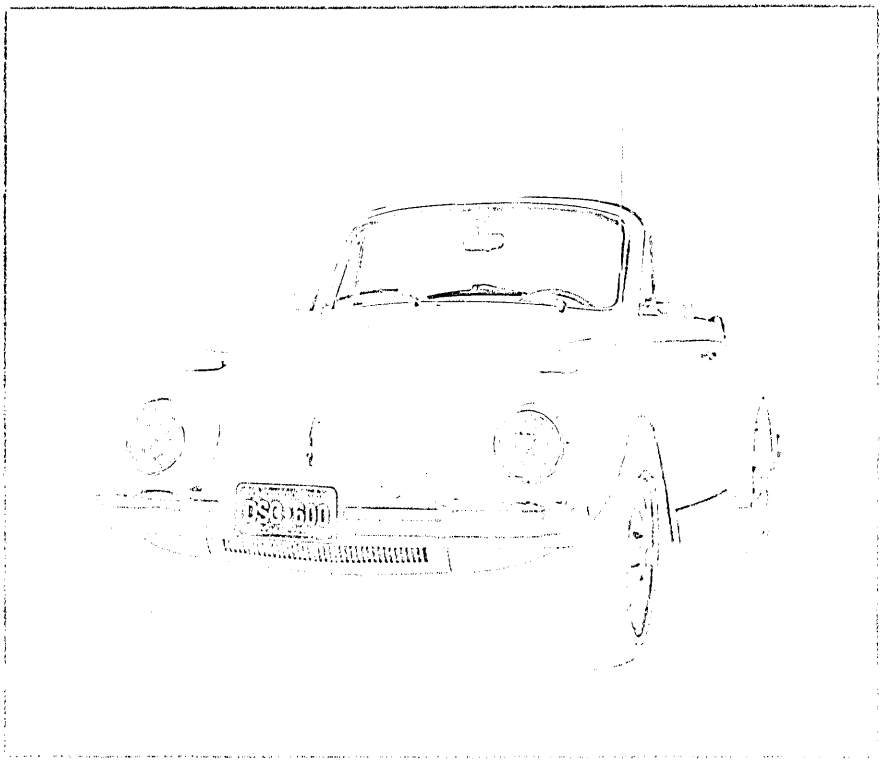

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portant. "Our institute has been set up by industrialists and will be run by industrialists," he stresses. "In Esprit, companies are cooperating on a contractual basis. The project is being run by EEC officials and each company's involvement is limited to the time it takes to fulfill the contract."

ICL, Siemens, and Bull are participating in the first phase of the EEC's proposed $1.3 billion Esprit scheme, and ICL is also taking an active role in the U.K.'s own artificial intelligence initiative, the AIT project (July, p. 67).

Stern insists, however, that the Bavarian institute will be different. "Its work could be complementary to what Esprit is doing, but there certainly won't be any duplication of effort. We cannot afford that."

European politicians do not object to the setting up of the private R&D center. Far from it. Many of the state-backed schemes are designed to encourage just such industrial collaboration on both national and European scales. The U.K.'s parliamentary under secretary for industry, John Butcher, referred to the institute as "significant and promising," addressing "an area of considerable importance to the information processing industry."

European industry is no stranger to collaborative ventures, but the precedent augurs ill for the future of the institute. Back in the early '70s, Siemens and CII-Honeywell Bull joined with Philips of the Netherlands and set up the Unidata company to develop a compatible range of data processing products, from mainframes to terminals, to be sold jointly by the three companies. That project lasted only two years, with little to show for itself.

Its collapse was symptomatic of the problems European companies have in working together. It was dogged by the pitfalls of management by committee, the complexities of each company's vested interests in national and corporate goals, and the generally debilitating undercurrents of mutual suspicion.

The Esprit project sidesteps many of these potential problems by coming under the control of the EEC, an apparently neutral pan-European body. But won't the new institute, as a solely industrial initiative, be prone to the Unidata syndrome?

Stern is adamant that it will not. "The previous venture with Philips and Siemens was quite the opposite," he contends. "There we set out to merge the whole of our activities, including product development and marketing, with a view to reducing the competition between us and establishing some kind of monopoly as a result. The research at the institute may belong equally to all three companies, but this time we will remain in competition with each other in the marketplace."

That is the formula the three companies hope will make the collaboration succeed this time. But there are still many details to be worked out before initial operations begin this year. Without sufficient backing, the right research people, and a shrewd but neutral director, the institute's chances of success will be slim. What's more, it will still be up to each of the participants to turn the institute's research into marketable products. ✲

MARKETING

IBM'S NEW NDD

The new division may form the vanguard of a new push by IBM into marketing through value-added resellers.

by R. Emmett Carlyle

In theory, it sounded like a good solution. With customers demanding mixed systems—one of these and a few of those—IBM needed a change from its self-competing DPD and GSD structure. The answer was to reorganize around the customer and let a consolidated sales force sell everything. Simple, right? Well, not quite.

"It's been a chaotic two years," says one former IBMer, speaking of IBM's monumental reorganization into National Accounts and National Marketing divisions. "IBM's salesmen are so confused that they don't know how to talk to their accounts. Big problems have also developed in the product development and support functions. The net result seems to be sinking morale."

The company won't discuss morale, but sources in and close to the company suggest the industry leader is not entirely satisfied with the way its new marketing organization is handling the swift changing tides of the marketplace. Apparently, a move is afoot to bring back some of the product-oriented marketing that was left behind two years ago as a way of addressing the office and small systems arenas.

"IBM's pendulum has been swinging for 30 years between an account focus and a product focus as it searches for the perfect way to organize computer marketing," comments Ted Withington, vice president and industry analyst at Arthur D. Little, Cambridge, Mass.

The oscillations have not been damped by the current split between National Accounts (NAD) and National Marketing (NMD) because, as Withington puts it, there are "three IBMs and no two of them

speak the same language." He is referring to the company's three major cpu lines: the 370, the former GSD System/34-38 line, and the up-and-coming Personal Computer family, which promises to become a major force in the overall corporation and the industry itself.

In addition to those three main lines, IBM maintains a mixed bag of unrelated office and distributed processing products that don't seem to fit in anywhere. Clearly, the IBM salesman has to be multilingual, so to speak, to have any chance at all.

For years the 5520, 5280, Series/1, 8100, Systems 34, 36, and 38, and the 4300 have been vying for the same markets and there is barely a hint of compatibility amongst them, observers explain. Several years ago, IBM tried to alleviate the problem by melding its developments into a Systems Product Division (SPD). Here, as before, engineering divisions in Endicott, N.Y.; Böblingen, West Germany; Rochester, Minn.; Kingston, N.Y.; and Raleigh, N.C. racked up hundreds of millions of dollars of duplicate development effort.

One major reason for the big 1981 reorganization was to draw SPD into the new Information Systems & Communications Group (IS&CG). The result, as observers explain, is that the 4300, as the strategic 370-compatible contender, has hogged most of the budget. Its biggest challenger for funds, the System/38, has noticeably stalled in comparison.

"IBM's pendulum has been swinging for 30 years between an account focus and a product focus," says Ted Withington.

"Meanwhile the demand from customers for new applications software and peripherals for all these incompatible products has grown by leaps and bounds," comments former IBMer Rick Martin, now president of Auragen Systems, Fort Lee, N.J. "Who's going to meet that demand? Most of these products haven't acquired the critical mass necessary to entice oems and value-added resellers because IBM has been sitting on them compared to the 4300."

IBM can't meet the demand for applications, Martin argues, "without a big jump in operating costs. That's the price it must pay for not having a compatible line."

It could be that following all that head scratching, IBM has found a way out of its dilemma, and the pendulum, as Withington quips, is beginning to move again. The first step to a solution comes in the form of a new division that begins operation this month. In part, the National Distribution Division (NDD) is a satellite of NMD; on breaking away it could take some of IBM's marketing woes with it. IBM describes NDD only as a consolidation exercise. "It combines our Systems Supplies Division and two business units, Distribution Channels and the Retail Marketing Group," a spokesman says. The former focuses on the oem and system house world, and the latter, formerly a part of NMD, is geared toward product centers and mass merchandisers.

As a first step, NDD will handle the Series/1 and Systems/36 and 38, IBM confirmed. But sources believe its mission will eventually be to draw together all the elements IBM can't cost-justify as part of its mainstream, and encourage the industry to develop applications and support for them. Thus the need for both oem and retail channels.

The hunt for oems seems already to have commenced in earnest. IBM is believed to have captured six in the last 90 days with help from discounts in the 25% to 35% range. But discounts may not be the only enticement. One source close to the System/38's development center at Rochester, Minn., reveals that IBM is planning to ship over 6,000 of the machines worldwide next year. The source puts the existing base at 9,000 systems worldwide. The System/36 seems to have equally impressive potential. It may sell 8,000 to 10,000 systems next year.

Supported by such a swelling user base, NDD (which is based at White Plains while looking for a new home) will mount an aggressive campaign next year. Insiders say that the new operation is seeking $1.5 billion in sales in its first year. For many IBMers, the true scale of NDD is telegraphed by its choice of president, Victor Goldberg. "He's one of the best people they have" enthused one former IBM executive. As former head of IBM's Communications Products Division, Goldberg is a "dynamo, well liked, and probably being eyed as a future ceo." Goldberg commands six divisional vps and his own legal counsel.

Other observers feel that NDD could eventually take charge of the P.C. family, which is now handled by Entry Systems Division and its umbrella, IS&CG, and subcontract not only new applications but field

38 TO GET BIG PUSH

One good question is just why, as sources say, IBM is expecting to launch 6,000 System/38s on an unsuspecting world this year.

"I could see 2,000 of them being explained by NDD's oem push," says Chris Herron, president of young Fusion Products, Mill Valley, Calif., "but I suspect that IBM has something else in mind."

That something else, according to Herron, could be a long-dreamed-of bridge between MVS and System/38 that will add a "mainstream" respectability to the innovative distributed database machine. "My instinct tells me that such a link will be announced this year."

It is known within IBM that Alan Scherr, the development manager of MVS, TSO, the small 370s, and numerous other machines, has been addressing this problem. One school of thought is that he is creating compatibility between the two at the command language or DL 1 level. Others talk of a bridge between the 4300 and the System/38, including Bob Fertig, president of Enterprise Information Systems, Conn., who thinks that a future System/38 will offer both processors under its hood.

While the speculation continues, Fusion has forged a bridge of its own. This time it's between the IBM P.C. and the 38. "At a recent Common meeting, half the audience said it already had P.C.s. The other half said it would have them by the end of this year. We intend to make sure they can use them properly!" Herron states.

Herron has been concerned by the perception in some quarters that IBM is "writing off" the 38, "despite new major releases of its operating system and new models." The reverse of this seems to be closer to the truth. IBM's Rochester, Minn., facility seemingly is busting at the seams despite 2.5 million square feet of space. Another plant has had to be constructed in Japan to help satisfy demand for the 38 in world markets, while the software development load has increased to such a level that 30% of it has now been transferred to a Toronto location.

As far as anyone can judge, the System/38 and its related model 36 are about to burst on the world with renewed vigor. Even the formerly potent comment, "Where is the desktop 38, then?" might soon have to be reconsidered.

"From what we can see the System/36 is the perfect low-end 38," says Herron of Fusion. "Our RPG 3 will run in native mode on the 36. And unlike the 38, the smaller machine can be manufactured cheaply to fit in with Opel's low-cost producer strategy."

Herron says he believes that the 36 has the highest density of any IBM machine on its one-card cpu. Other observers suggest IBM can manufacture the 36 cpu for as little as $5,000.

Together, the 36 and 38 provide a near-programmerless environment to end users, and should provide the perfect machine for IBM to mount its expected oem blitz.

So far most of the 38's success in the U.S. has come from the Chicago-Pittsburgh sector. It is believed that the likeliest new target for a push by NDD is on the West Coast. Value-added resellers such as Los Altos, Calif.–based Ask Computers, currently a $40 million a year manufacturing software company, could make the machine a big hit in certain vertical markets.

—R.E.C.

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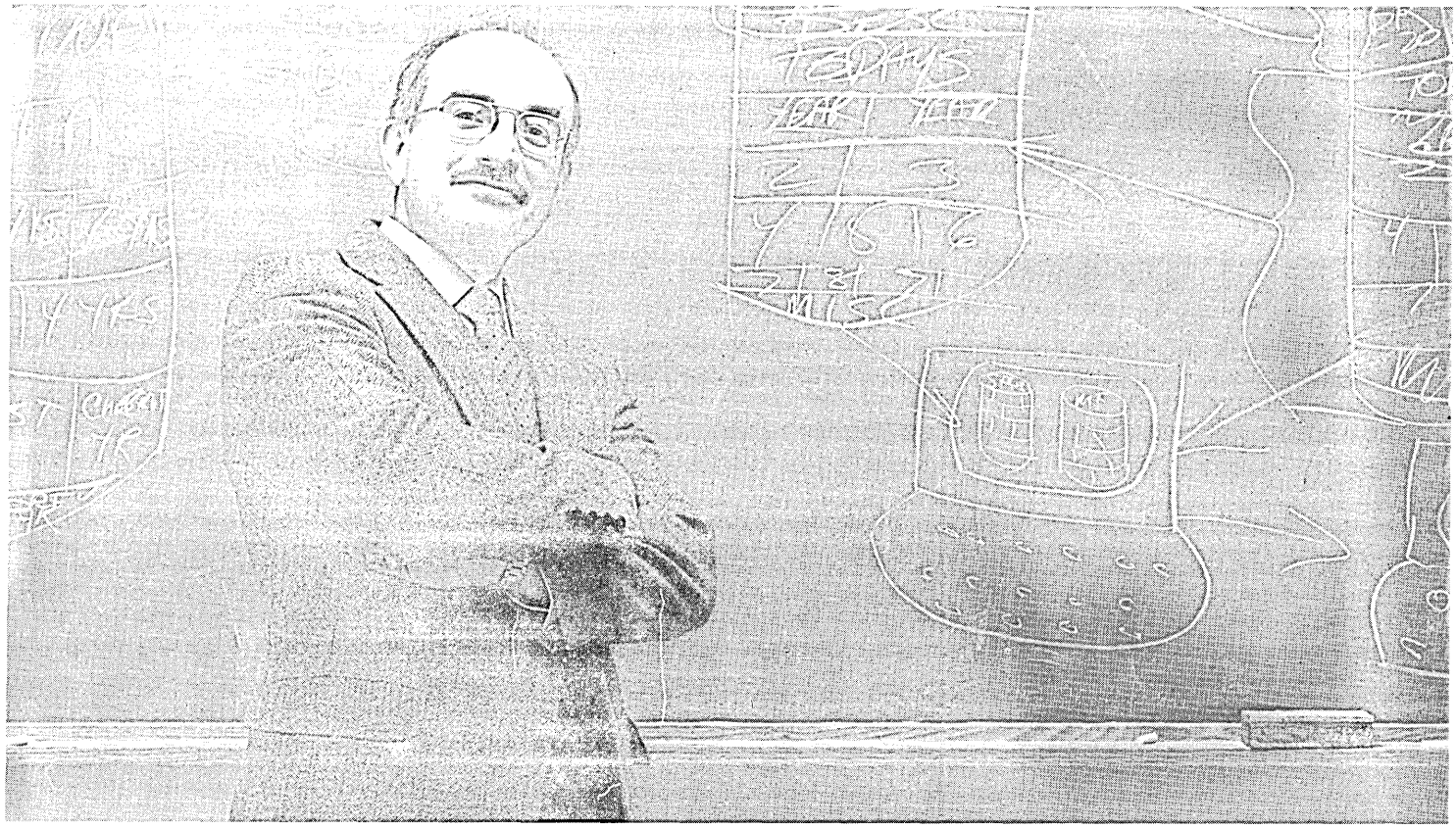

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service as well.

IBM stresses that both its NAD and NMD will continue to market the full product range to the end user, only now it will face its own equipment in the marketplace, increasingly supplied and supported by third parties. Whichever way you look at it, IBM will continue to compete with itself while NDD seems to offer a way to return to marketing by product groupings.

"Conceivably, IBM could form further splinter groups from NAD/NMD by product class. But the main contradiction lies between the Systems 36 and 38 and the 370 line," Withington explains.

As revealed in these columns, much of the middle ground of the IBM office product line will eventually be absorbed by the P.C. family. An upcoming P.C.2, for example, is expected to replace both the 5520 and the Displaywriter. This will probably help ease the pain in the marketing dimension as IBM continues to hunt for a solution to its incompatibilities.

"But you know, I've been watching that pendulum swing for a long time now," reflects Withington, "and I suspect that IBM will never find the perfect way to organize computer marketing." ✱

DEALING WITH DOD

The Defense Department has been leasing computers for years, but recent legislation will put a halt to it.

by Willie Schatz

It appeared to be just another case of the seemingly endless abuse of taxpayers' money within the Department of Defense (DOD). So DOD had blown a few hundred million dollars by leasing dp equipment when buying would have been far more economical and efficient. No big deal. It happens all the time, right?

Right. Except that this time the House Appropriations Subcommittee on DOD was trying to decide how much the agency should be allowed to spend for dp equipment in FY'85. DOD got its money, but not before its dp acquisition process had been examined up, down, and sideways, and found very wanting.

The House actually voted to pull the plug immediately on all leased systems within DOD and to reduce dp procurement funds by $680 million. Enter the Computer and Business Equipment Manufacturers Association (CBEMA). With visions of half its government market vanishing abruptly, the trade group circulated a letter bemoaning the "drastic changes" the House proposed and noting it was "highly concerned" over the prospect of the House philosophy becoming the law of the land. Someone must have been reading closely, because the House and Senate decided they ought to look before they leap.

As passed by Congress, the final bill reduces acquisition funds by $150 million and provides a $150 million fund to the Defense Industrial Fund to buy out existing leases. It also mandates that DOD get its dp act together pretty damn quickly. To wit: all acquisition of dp components will be purchased outright, unless another method of acquisition and financing can be justified that will produce a lower cost to the government; economic buyouts for equipment used but not owned by DOD will begin immediately, with a progress report due April 1; and no exceptions are to be made to competitive acquisition or outright purchase except where justified by the senior information resource management official. Lack of procurement funds or time sensitivity will not cut it.

"We didn't think the leasing option ought to be taken away just like that," CBEMA president Vico Henriques says. "It takes away a management tool for hedging against uncertainty and impedes management flexibility. It also slows down the market and cuts it by 50%. If somebody's going to have to wait for a purchase to be approved, they'll never do it."

CBEMA also claimed the House's decision could have had serious national security consequences and might have forced DOD to acquire obsolescent equipment.

"If you made your living off waste and fraud, you'd be upset, too," says Terry Miller, president of Government Sales Consultants Inc. (GSCI), a consulting firm in Annandale, Va. Miller might just be the best and most knowledgeable procurement man inside or outside government.

"The House tried to throw the baby out with the bath water," Miller says. "DOD is dumb and they manage poorly. But so do a lot of other federal agencies. The House shouldn't have acted so precipitously. They did uncover a number of abuses, and DOD deserved the beating it got."

"This whole thing started after one GAO [Government Accounting Office] report," Henriques claims. "Nobody's successfully proven that it's costing the taxpayers money. It's just rhetoric."

Not if you buy what the subcommittee's selling. DOD absorbed one of the more significant poundings since agencies first began walking up Capitol Hill. According to the subcommittee's survey and investigative staff, "DOD wastes hundreds of millions a year" in acquiring general purpose dp equipment. The hearing testimony is re-

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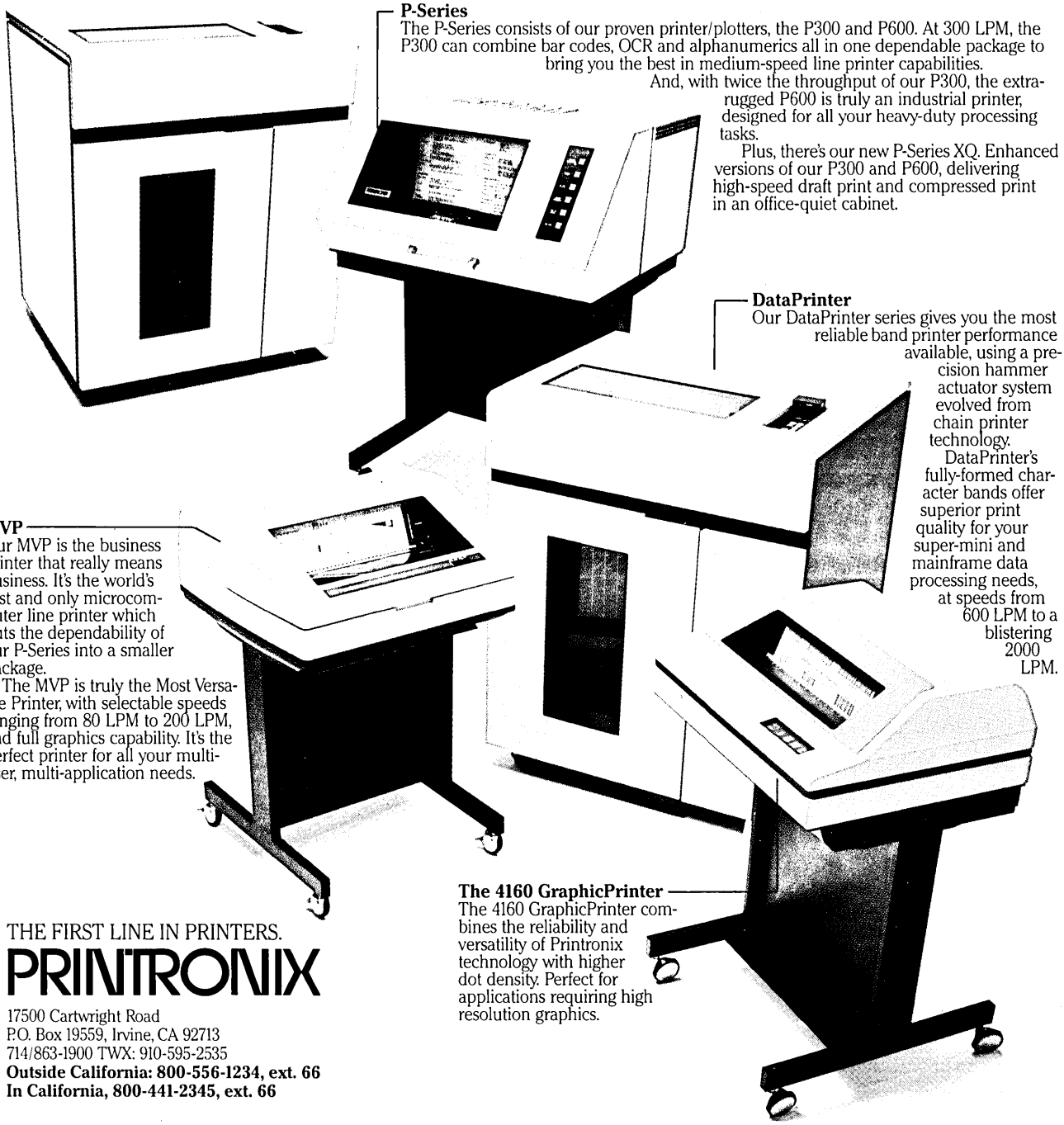

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plete with examples of $50,000 lost here and $12 million lost there. The staff estimates that DOD could have spent $225 million to $360 million less in FY'81 for dp if competition had been used on all procurements.

Nor was GAO particularly thrilled after examining DOD's books. In a report on DOD's approach to software proliferation, GAO reviewed 225 different components in DOD and found that 93% of the time the method of acquisition was not the most cost-effective and that 60% of the time any other method of acquisition would have been better than the one being used. It remains to be seen if the beat will go on with DOD's $5 billion FY'85 dp budget.

If one believes the subcommittee staff, when it comes to effectiveness, DOD can't be bothered. And when it comes to competition, DOD doesn't even know how to spell it, despite GSA regulations mandating that dp equipment over $50,000 be listed in the *Commerce Business Daily* to allow other vendors to compete.

"Our investigative staff found announcements were written in such a fashion as to actually discourage competition rather than promote it," subcommittee chairman Rep. Joseph Addabbo (D-N.Y.) told John Carabello, director of IRM systems in the office of the deputy assistant secretary of defense. "Why does a lack of competition appear to be ingrained in DOD when it comes to procuring adp equipment?"

Carabello, who told the subcommittee that 80% of DOD's inventory is owned, didn't contradict Addabbo's analysis. He attributed the problem to "mixed signals" for the past few years as to what the government's policy on competition is, fear of the competitive process leading to a tendency to use the far easier sole source acquisition method, and lack of training of DOD's contract officers.

"He's not kidding about that," says Miller, who claims that he recently talked to a new dp contracting officer who said she'd been buying for DOD for the last eight years. When Miller asked what she'd been purchasing, the answer was "coal."

"The real problem is that GSA doesn't enforce its own rules," Miller claims. "It refuses to put people like Comdisco and CMI, who are in the used IBM business, on the GSA schedule. Even though these guys compete with IBM and their prices are consistently lower, they can't get on the schedule."

"If somebody's going to have to wait for a purchase to be approved, they'll never do it," says CBEMA's chief.

Therefore, they can't do business with the government. Therefore, IBM racks up $300 million per year in GSA schedule business. Meanwhile, Federal Computer Corp., Federal Data Corp., and Centennial, which make their living from leasing, do a total of $900,000 in annual business with GSA.

To get on the schedule, a company has to show "commerciality" and agree to a price reduction clause. "Commerciality" means doing business in the private sector, which the three aforementioned leasing companies don't do. The price reduction clause guarantees GSA that the contractor will sell to it at the lowest end-user commercial price. According to Miller, Comdisco and CMI have refused to agree to such a clause, but have sworn on a stack of cpus that their prices will always be at least 5% below IBM's.

"So what you've got is the FBI, for example, going to the IBM schedule and purchasing a 4341 for X dollars," Miller says. "Meanwhile, the other companies are selling it for 10% to 15% less. But they can't get on the schedule because GSA won't enforce its rules and the other companies aren't promoting themselves enough.

"The big companies don't care. Why should they? In FY'82, IBM got $104 million in rental income. Honeywell got $16.6 million and Xerox got $8.8 million. They can make more on rentals than on purchases, so why should they push for GSA to enforce the rules? IBM, Burroughs, Univac, and Honeywell have cleaned up on government ignorance."

Well, maybe the government's getting smarter. Or at least less dumb. With more stringent oversight—at least on paper—over DOD's dp acquisition methods required by the final defense appropriations bill (P.L. No. 98-212), perhaps the waste, fraud, and abuse will be reduced by an order of magnitude. Maybe the taxpayers will only get beat for millions rather than hundreds of millions.

DOD, naturally, says it has most of the situation well under control. Those few aspects of its dp acquisition policies not complying with Congress's desire will do so shortly pursuant to the agency's "goals and initiatives" action plan for IRM.

Not everyone's buying that.

"It sounds really good, but I doubt much is going to happen," Miller says. "I'm sure DOD will produce a flurry of activity for a while. They'll certainly submit that action report due April 1 on their buyout program. But after about six months, they'll stop going through the motions.

"Then it will be business as usual."

We all know how that's conducted.

TELECOMMUNICATIONS

OF LIONS AND LAMBS

The telephone interconnect industry is preparing to tackle the postdivestiture world, along with AT&T and GTE.

by Willie Schatz

There they were, all in one place. AT&T Information Systems. GTE Automatic Electric. And the more than 100 interconnect manufacturers exhibiting their wares at the recent North American Telecommunications Association (NATA) Convention.

Talk about the lion lying down with the lamb. Until two months ago AT&T and NATA wouldn't give each other the time of day—unless it was what hour to be in court.

Always aware that those who cannot remember the past are condemned to repeat it, NATA allowed AT&T and GTE entry into its club only as associate general members. The two once and future foes cannot serve on the association's board or participate in formulating policy. They also were required to sign a consent agreement waiving the right to object to lawsuits filed against either carrier or its affiliates by NATA or one of its general members. A tough bargain, but one that surely passes muster as peace in our time.

"I guess you can say we've arrived when AT&T and GTE petition NATA for membership," NATA founder Tom Carter told the opening day luncheon crowd.

Indeed. NATA's come a long way, baby. Founded in 1970 on a wing and a prayer by Carter and several other businessmen to try to take advantage of the FCC's Carterfone ruling, which allowed users to connect their own telephone equipment to Bell's national network, the organization now represents 550 manufacturers and suppliers in the interconnect (terminal equipment) industry who account for $2.6 billion in annual sales. Okay, it's not AT&T, but it's a fair piece of change.

And now, in the brave new postdivestiture world, there's going to be more change than ever. Huge markets once closed to all but Western Electric—the Bell Operating Companies (BOCs)—are now wide open to all comers. We're talking megabucks here. Theoretically, there's something for everyone. Realistically, only the strong may survive.

"Once again, regulators are shutting their eyes to the cost of anticompetitive behavior to general ratepayers," NATA president Edwin Spievack charged in his opening remarks. "Once again, we persist in fighting the cross-subsidization of regulated services aimed at the competitive market. And in one of this country's more brilliant financial strokes, the Bell Systems' investment in used communications equipment was written down from $9.5 billion to $2.8 billion. The meaning for the competitive market is that a price war will avail no one.

"Because of these and other developments, because of destructive price competition throughout the year, there is much speculation about the survival of this industry. The speculation feeds panic and our industry is itself asking the question," Spievack said.

So far there is no answer. There probably won't be one for a while. Most members of the industry, uncertain about what AT&T Information Systems and the BOCs are going to do, prefer to wait and see what happens. Not that anybody knows. It's just less risky letting the other guy go first.

"The issues that are foremost in our minds today are the imminent divestiture of the Bell System and deregulation," said John Hinkle, president of the Fisk Division of Centel Business Systems. Centel is the nation's fourth largest independent phone company.

"Many of us are concerned about the effect of these decisions on our business," Hinkle continued. "There's a lot of the FUD—fear, uncertainty, and doubt—factor going around out there. The anxiety and concerns are justified. But when have we not faced serious concerns?"

Never. Well, hardly ever. Until deregulation officially came into the world at 12:01 a.m. on Jan. 1, NATA members would wake screaming in the night with visions of new phone company predatory tactics dancing in their heads. Now those same members toss and turn over the same possibility,

Most members of the industry say they will wait and see what happens in the marketplace after AT&T breaks up.

but for a different reason. They're afraid that with the BOCs and AT&T unleashed, their present customers will desert en masse to enlist with the phone company.

"We expect the BOCs to be very competitive in the residential and business markets," says Ted Westfall, president of Comdial, a major independent manufacturer. "It's going to be much more competitive for all of us because the BOCs are back in it this year after sitting out last year. But it's also a major opportunity for everyone in our industry. Nobody in this business ever had an opportunity—or an obligation—like this before."

So far Comdial and friends seem to be doing just fine, thanks. As of early last month, it was no contest among Western Electric and the independents as to whom the seven regional BOC holding companies preferred. Freed from the yoke of AT&T's mandate that buying anything other than Western Electric equipment was un-American, the holding companies are making good on the NATA convention's theme of "We'll Give You the Business."

Several billion BOC dollars are still at large, but the early returns are in. They show the independents with a significant lead. The big winners in the equipment that the BOCs will resell to customers—residential, phones, small business systems, and private branch exchanges—are: TIE/Technicom, NEC America, Northern Telecom, ITT, American Telecom, and Comdial. Western Electric? Can't find it even with a scorecard.

"We doubled our capacity in less than a year and built a whole lot of new manufacturing equipment," Westfall said. "But we were doing all this in the dark. We had no idea if it would be worth it, because we didn't know what the BOCs would do."

It was worth it, in spades. What Bell Atlantic and Pacific Telesis did was give

Comdial a $60 million contract. This won't be the last time, either.

"I think Western Electric will have a small share of the BOC market from now on," Westfall says.

Hoping to pick up the major share of the pieces is ITT. The company may be better known for its politics than its telecommunications equipment, but let the record reflect that it is the second largest phone company in the world. It wants very much to be No. 1.

"We know we're not as visible in the U.S. as in Europe," admits Dick Lindemuth, president of ITT's Business and Consumer Communications Division. "We realize we have to educate American residential and business customers about our product."

"I think Western Electric will have a small share of the BOC market from now on," one NATA member says.

The word has already leaked. ITT has signed contracts to supply phones to Pacific Telesis, Southwestern Bell (for all that company's single-line subset business this year), and Southern New England Telephone.

"A lot of markets are open to us that weren't before," Lindemuth said. "We used to get absolutely nothing from the BOCs. Now they represent potential large-volume purchasers. There are only a few companies besides us—GTE, Comdial, Western Electric—that can consider bidding on the BOC market. I think the BOCs will buy from all so they can maintain good relationships with them and are not sole-sourced.

"We want to be as big in the U.S. market as we can. Any company, particularly one with our resources, has to be in a leadership role. Otherwise why get in? If you're not in there for big market shares, you're just playing."

Unless you're not ITT. In that case, this ain't no party, this ain't no disco, this ain't no fooling around. This is life and death.

"Our industry is going to go through unprecedented growth in the next few years," said John Cosgrove, president of Executone-Tate Communications and a member of the NATA board of directors. "We've got tremendous exposure from the media play given to deregulation. The market is expanding tremendously.

"But some companies—maybe a lot—will go out of business because they'll be relying only on price. The breakup is going to force the issue of support. If a company doesn't move price down and value up, it deserves whatever happens to it. That will be bad. The specialists will increase, though. There will be a lot more niches, but if you don't find one, you'll be blown away by someone who does."

One of those cozy cubbyholes just might be data. Everybody's talking data, but no one seems to be doing much about it. The BOCs have been slow to recognize the potential in that slice of the pie, preferring to run as far as they can with voice before they crawl with data. So for all the talk on the NATA floor about the fourth generation PBX, data revenues are still in the first generation. For those who can create a positive generation gap, there's bucks in them thar data lines.

"Our customers are pushing us toward data equipment and supplies," said Bill Obermayer, executive vice president of North Supply, one of the industry's biggest wholesalers. "It's becoming clearer that data is the way you better go."

"The computer manufacturers are not positioned to dominate the local area network (LAN) market through data," contends Mike Doran, president of Teltone Corp., a supplier of integrated voice and data LANs and telecom products.

"We regard the divestiture as a real benefit, not a threat," Doran said. "We can finally sell to the BOCs in an unconstrained manner. They're going to have to get into data, and they're going to have to look outside Western Electric. If a company can bring its customers the capability for an integrated voice-data switch for under 400 lines, there's a significant share of the market for it. But you have to wonder if the computer companies are going to get into that. And how effective will AT&T be?"

Good question. Could the fancy booth on the NATA convention floor be the start of something big? "We just came here to talk," said Ed Gray, a staff manager for AT&T Information Systems. "We're getting a lot of attention and interest just from the fact that we're here."

"Our industry is going to go through unprecedented growth in the next few years," says John Cosgrove, president of Executone-Tate Communications.

"Sure they came here to talk," a NATA man said. "They came here to do business just like everyone else. But I can't see any of our guys doing business with them." Ah, but can the AT&T guys see themselves doing business with the independents? If not, numerous NATA members may find themselves on the endangered species list.

"I believe you will survive—handsomely and profitably," Spievack told his charges. "It will take the new entrants in the competitive market some years before they can replicate your skills. In the interim, your growth can be steady and reliable if you keep educating customers that the cheapest buy is the worst buy."

"There will be a shakeout, but not out of proportion to what it's been before," Hinkle said. "There will be more bodies falling, but there will be more bodies in the game. It certainly won't be on the level we've seen in the industry.

"If we read this right, we'll have access to new profit streams and wider access to old ones. One thing's for sure. The future can't possibly be as difficult as the past," he added.

For sure. No one ever thought AT&T would join NATA. Next thing you know they'll kiss and make up. ✲

SNA TO SNA

IBM is moving aggressively in the networking arena, giving users new capabilities to ward off AT&T.

by John W. Verity

In a move designed to help it compete more effectively with AT&T's public data network, IBM has enhanced its System Network Architecture scheme to enable different SNA networks to exchange traffic.

New software and upgraded 3725 communications controllers will give IBM users the ability to interconnect different SNA networks that previously had to remain separate. One key application of the new facilities, according to IBM and industry observers, will be the direct connection of a manufacturer's SNA network to customers' networks. Ostensibly, the customer could order and receive goods faster than through standard mail or telex channels.

Other applications for the new SNA interconnection facilities include the joining of networks in conglomerate companies where a parent corporation would like to have a direct tie into a subsidiary's data processing network; situations where one large SNA net is to be broken into smaller, self-contained nets; and the merging of different nets within a corporation.

Previously, IBM notes, independent SNA nets could not be interconnected without being combined and configured in a new network. This method had severe limitations, however, due to the ceiling on the number of network addresses available under SNA and its companion virtual telecommunications access method (VTAM) software.

Industry sources say demand for the interconnection facility came from several large SNA users, including General Motors, whose various divisions needed to tie their disparate networks together. In such cases

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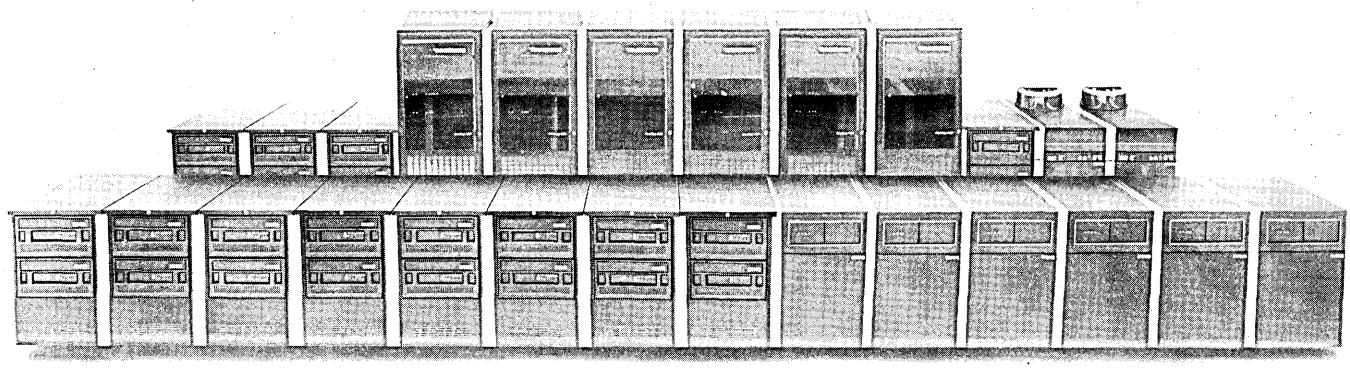

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where a company's divisions have built their own independent networks, address spaces can overlap, but the new IBM products enable a transparent translation of addresses that requires little if any reconfiguration of the networks themselves.

The interconnection takes place through a 3725 or 3705 front-end communications controller, a device that operates as a node in SNA and routes traffic around and to 370-type mainframes.

"IBM has been promising this capability for two years," says David Passmore, staff consultant with Network Strategies Inc. Burke, Va. He adds that the Defense Department has also pushed IBM to come out with the new capability so that various regional DOD networks could be attached together through a long-haul common transport network.

The interconnection does not require that different SNA nets have common operating characteristics, says IBM. Support for interconnection is offered under the MVS and MVS-XA operating systems and requires such software as ACF/VTAM Rel. 2.2; ACF/NCP Rel. 3; ACF/SSP Rel. 2.2; NCCF Rel. 2 and Network Logical Data Manager Rel. 2, the company says.

One open question in the late November product introduction was that of security. No mention of security measures was made in the IBM literature and IBM did not respond to inquiries by press time. Observers said it was surprising that IBM did not emphasize the security of its network facilities, particularly when it was suggesting that different companies link their networks together. Moreover, the lack of security data stood out in the light of recent publicity given to unauthorized access into private networks by schoolchildren.

Generally, however, the announcement was taken as notice of IBM's increased interest in networking, an interest that has piqued a great deal of curiosity from observers who scrutinized the firm's recent display of a so-called "experimental" token passing ring local network at a Geneva trade show. The industry has long awaited IBM's entry into the local network arena ever since 1980 when Xerox, Intel, and DEC joined forces to bring Ethernet to market.

Previously, independent SNA nets could not be connected without being combined and configured in a new network.

"The question remains, will the IBM local network be a separate SNA network or will it be merely a multipoint line node in a larger SNA net?" asked Passmore.

One observer took the SNA interconnection announcement as more evidence of an alleged general strategy by IBM to confuse the user so much in the telecommunications area that he will have to take cues from IBM.

"It's a deliberate fostering of complexity to gain control of the network," states Kenneth Bosomworth, chief executive of International Resource Development, a Norwalk, Conn., market research firm. "The user of SNA is confronted with an increasingly complex set of options in designing large-scale networks. It will be mind-boggling in two years."

Bosomworth says IBM is trying to distract the user away from the network by having him concentrate on workstations and the mainframe. "It's making life so difficult for the user that he must let IBM do the work for him. IBM wants very much to get back in the driver's seat."

Bosomworth thinks the company got bumped from that seat by plug-compatible terminal suppliers, minicomputer vendors, and others who have eaten a large chunk away from IBM's 3270 terminal base. "SNA is very high on IBM's priority list, particularly in large corporations where P.C.s are being attached into mainframes," he adds. ✱

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TECHNOLOGY

BRITISH FISH FOR CHIPS

A new kind of microprocessor with on-board inter-chip communications has made its debut in the U.K.

by John Lamb

Nascent British chip company Inmos is planning to take on the U.S. semiconductor establishment with an innovative processor called the "transputer," which Inmos claims is designed specifically as a building block for future parallel processors.

The first transputer device, the T242, is a 32-bit microprocessor with 4K bytes of memory and communications interfaces on-board. A number of the devices can be linked together, each running parts of a single program simultaneously.

Inmos managing director Iann Barron, designer of the chip, regards the device as "unique" in the industry. "The transputer offers capabilities that no other microprocessor has," he claims.

But does the small, state-backed U.K. company, which is headquartered in Colorado, stand a chance of gaining market share against U.S. and Japanese giants that are even now fighting fiercely over the booming microprocessor market? Inmos, which has already cost the British taxpayers $150 million in state investment, faces tough competition from semiconductor and computer firms. Intel, Motorola, National Semiconductor, Bell Labs, Nippon Telephone and Telegraph, Digital Equipment, and Hewlett-Packard are among those with an eye on the 32-bit microprocessor market.

"One of the strengths our competitors have," says Barron, "is the investments they have already made in their architectures, but their weakness is that they are reluctant to move away from those architectures."

In the face of such competition, the timing of the transputer launch is crucial. Barron plans to introduce the device for volume shipment in 1985, in the midst of what is expected to be a rash of 32-bit chip introductions. Already, Intel, Nat Semi, and Bell Labs have unveiled 32-bit chips, though volume shipments are still ahead.

Peter Newman, the director of the Electronic Components division of consultants Mackintosh International, says he thinks this could be a problem. "For a company the size of Inmos," he says, "it is important to be very early with the product. The established firms have the manpower to get into a market after everyone else, while Inmos does not."

Yet, Newman believes Inmos has a fighting chance. "There is a precedent in Mostek for a relatively small firm making a big impact by having a better design," he adds. Some of Mostek's former management, including Dick Petritz and Paul Schroeder, were in fact involved in setting up Inmos several years ago. Mostek gained success in the late '70s as a maker of semiconductor memories.

Certainly, the technical specifications seem impressive. While current versions of the transputer, which is under development at Inmos's Colorado Springs plant, have a throughput of 5 million instructions per second (MIPS), Inmos intends to double this to 10 MIPS before the prototypes are ready by the end of this year.

Built with a 2-micron CMOS process, the device comprises a processor, memory, and communications interfaces, and is only a quarter of an inch square, considerably smaller than rival chip combinations.

Processor speeds have been increased by using a reduced instruction set consisting of under 70 instructions, and by eliminating the register file. "The technique is feasible because the on-chip memory is as fast as a specialized register file," explains Barron.

Apart from the 4K bytes of on-board RAM, the transputer can address up to 4 gigabytes of additional memory, although Inmos has decided against equipping the transputer to handle virtual memory. In most applications the on-chip memory would be used as a temporary store for data arriving from main memory.

Each transputer has four links that enable it to hook up to other transputers working on the same task, a design the company thinks makes the device ideal for applications involving signal processing—voice recognition, image analysis, and telecommunications switching. It could also find use in data processing applications where fast database searches are required.

A new language, called Occam, has been developed to program the transputer.

Inmos has developed its own software language to run on the transputer: Occam. Named after William of Occam's "razor" principle of the economy of hypotheses, Occam has been designed for concurrent processing. Using classic structured programming techniques, it enables the programmer to define the relationships between different processes and mirrors what is happening in the hardware.

Inmos has already begun selling Occam compilers and development systems to generate interest among engineers and software houses, interest that will be vital to the success of the chip when it is launched.

In the future, the transputer will also support more conventional high-level languages including C, Pascal, FORTRAN, and Ada, according to Barron. "Our policy is open. You program in the language of your choice," he says.

In addition to the 32-bit T242, Inmos plans to launch a 16-bit variant and two other processors for controlling disks and graphics. Each of the controllers will be programmable and compatible with the other even when they employ different word lengths and perform at different speeds. All transputer devices will be easier to program than conventional processors, says Inmos, because of the way in which the memory and peripheral interfaces have been separated on the chip.

By the time it is launched, the transputer will have cost only about $7.5 million to develop, compared to the $100 million that Hewlett-Packard has spent on the 32-bit processor for its 9000 system. But the British government has been reluctant to plow more money into the company, which is only now moving into profit—through sales of memory chips—after five years.

Inmos has yet to secure private investment, although that was the stated goal of the U.K. government at its inception. There is now some debate as to whether privatization is still part of the government strategy, since the U.K. Department of Trade and Industry has decided to partially fund an $875 million national research and development scheme in advanced information technology. That program is known as Alvey. Certainly there is already interest in the transputer from U.K. industry and academia, including from Clive Sinclair and the artificial intelligence unit of London's Imperial College. ✱

SPEAKING IN TONGUES

Computers can't translate yet but they can provide a lot of help.

by Edith Myers

Non-English speaking countries are becoming more aggressive in their demands that they receive communications in their own languages. This bodes well for translators, except that they are in short supply.

Computers into the breach? Not quite, but work is being done in many parts of the world to harness computers to increase the productivity of human translators.

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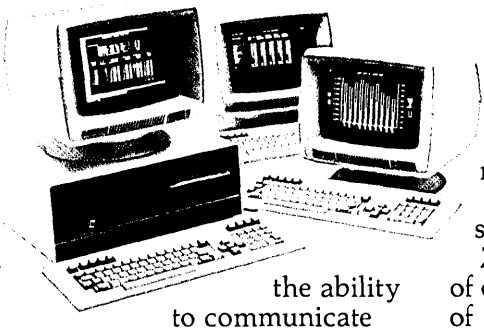

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NEWS IN PERSPECTIVE

Nevil M. Garrett of Weidner Communications Corp., Northbrook, Ill., a company that does this, says informal studies estimate that from $10 billion to $20 billion a year is spent on translation worldwide. The Japanese Electronics Industries Assn. conducted a survey on translation in 1982 that showed that more than $2.5 billion was spent on business and industry translations in Japan alone. "This figure was just a part of the country's translation industry since it did not include government and banking," Garrett says.

Garrett's company was formed in 1977 based on technology that came out of Eyring Research Institute of Provo, Utah, a Brigham Young University spin-off. Initially, company headquarters were in La Jolla, Calif., with research and development in Provo. R&D is still in Provo, but headquarters were moved to Northbrook about two years ago.

Weidner's earliest computer assisted translation software was written for the Digital Equipment PDP-11 and helped translate Spanish to English.

"We're a DEC oem," said Garrett. "Our translation software runs on the PDP-11/44 and the 11/70, and now on the VAX-750 and 780. We'll sell the software both with and without the hardware."

Today, the company offers two-way translation between English and Spanish, French, and German, and one-way translation systems from English to Arabic, English to Portuguese, and Japanese to English. Coming soon is English to Italian. The fourth quarter this year should see the introduction of versions for English to Japanese, English to Korean, Korean to English, Japanese to Korean, and Korean to Japanese. In the first quarter of 1985, Garrett said, Weidner expects to offer a version for translating from French to Arabic.

The newest development for Weidner was its introduction late last year of translation systems on a microcomputer. The company is an IBM value-added dealer and offers translation systems on both the IBM XT and ICL's DRS 20. Garrett said the software will operate on any microcomputer based on an Intel 8086 or 8088 chip with at least 640 kilobytes of main memory and a 10-megabyte Winchester disk. He sees a "big market" for the micro-based systems in small companies. The software for a single PC system sells for $11,000.

Multilingual Canada and Europe continued to push studies on machine translation after the U.S. largely dropped the ball.

Mini-based systems, Garrett said, can support up to 16 simultaneous users at $16,000 for the first terminal and $12,000 for each additional terminal.

Weidner also operates a translation service bureau in Northbrook and is planning additional bureaus for Washington, D.C., New York, Boston, Los Angeles, San Francisco, London, and Geneva sometime this year. "We'll probably make a lot of use of telecommunications so we can spread the work around, take advantage of valleys and peaks."

Garrett likes to describe his systems as multilingual word processing devices. The computer's memory stores a two-language dictionary and a table of synonyms and grammar. When one language is typed in on a keyboard, a word-by-word literal translation is displayed on a crt. A translator, acting as an editor, examines this preliminary version of the text and makes changes where necessary, using the keyboard.

Through the synonym dictionary, the system provides a choice of words when the word being translated could have more than one meaning in the target language. The translator can select the appropriate word and insert it instantly. Garrett said the systems improve the productivity of a translator by a factor of from 4 to 8, depending

on the skill of the operator and the type of text being translated.

When an operator is satisfied with what he or she sees on the screen it can be printed, stored, or routed to other systems.

The notion of translating machines in the U.S. dates back to the 1930s, but it was just that: a notion. In 1949, four years after development of the computer, the University of Washington began a study on a machine translation from Russian to English, spurred by the demand for translation of a large volume of Soviet scientific and technological data.

Japanese efforts are being renewed on a large scale, observers say.

Other American universities and companies followed this lead and, in the late 1950s, IBM and the University of Washington demonstrated a jointly developed prototype translation system. In 1964, a Russian-English translation system developed at Georgetown University was put into practical use at the European Atomic Energy Community, and the University of Washington's Mark II Russian-English system went into Air Force facilities.

These were primitive machines and, in 1966, the Automatic Language Processing Advisory Committee of the U.S. decided machine translation was not practical in terms of speed, accuracy, and cost, slowing down U.S. research and development on such systems.

Multilingual Canada and Europe continued to push studies on machine translation. France's Grenoble University began a project in 1961 and Canada's Montreal University launched one in 1966.

In Japan, Kyushu University and Electrotechnical Laboratory began work on machine translation projects in the late '50s but abandoned them when efforts to develop a practical system didn't pay off.

Currently, Japanese efforts are being renewed on a large scale. The country's Science and Technology Agency has embarked on a project to translate scientific and technological data from English to Japanese and vice versa. MITI (Ministry of International Trade & Industry) and other government organizations and several electronics companies are working on a multilingual machine translator as part of the fifth generation computer project.

Also pushing machine translation in Japan are Fujitsu, Hitachi, Toshiba, NEC, IBM Japan, Bravis International, Kyoto and Kyushu universities, Electrotechnical Laboratory, and Nippon Telegraph and Telephone Public Corp.

A Kyoto University–developed system has been operating at the Agency of Industrial Science and Technology's laboratories at Tsukuba Science City since 1981.

In 1982, Fujitsu put its ATLAS/1 system into practical use in-house for translating scientific and technological data from English to Japanese. In June 1983, Bravis International began marketing a system developed in cooperation with Weidner for two-way English-Japanese translation.

Fujitsu is hard at work on a system it calls ATLAS/U which currently is capable of translating limited material such as computer manuals from Japanese to English and will be further refined into a multilingual translation system.

After the sentences for translation are entered in the computer via a keyboard on ATLAS/U, the system must recognize the words making up the individual sentences, a particularly complicated process when the source language is Japanese, since words in Japanese sentences are not separated except by commas and periods. Word recognition is handled by access to two dictionaries in

Fujitsu expects to commercialize ATLAS/U "in several years."

auxiliary memory units: a Japanese word dictionary and another that defines the adjunctive relationships between words.

Next the system interprets the grammatical structure of the sentence and then checks for meaning by access to a "world model" dictionary that defines word-sense meanings and helps in selection of a word that has many possible interpretations.

Fujitsu's ATLAS/U system consists of a FACOM 18011 computer, auxiliary storage for the dictionaries, and input/output terminals. The word dictionary currently has some 80,000 Japanese words and 40,000 English words. The world model contains some 10,000 items. Fujitsu expects to commercialize ATLAS/U "in several years," a spokesman says.

Garrett of Weidner says his firm undertakes some of its special language version developments at the instigation of, and with the cooperation of, outside companies. "A Japanese company is funding the development of our Japanese-Korean version. It will keep marketing rights in its area and we'll have them everywhere else."

Weidner doesn't undertake to develop everything it's asked to do. Garrett said a most unusual request came from a branch of the Canadian government. "They wanted us to develop a system to translate from English to Eskimo. While we have the technical skills to develop this language direction, the market, to say the least, would be limited." *

ACQUISITIONS

SHOPPING SPREE AT CROWNTEK

Computer Corp. of America is just the beginning, says the Canadian company.

by John W. Verity

These days it seems as if everyone and his brother are getting into the data processing business, even Canadian nursing home operators. Specifically, Toronto's Extendicare Ltd., recently renamed Crownx Inc., has begun an ambitious drive to form a broad-based collection of technology companies.

The $156 million-a-year Crownx, which owns 92% of Crown Life Insurance Co. of Canada, scored big in November with a letter of intent to purchase Boston-based Computer Corp. of America (CCA), the vendors of the Model 204 database software package, for $40 million in cash and notes. Soon after, the Canadian company disclosed it had bought a 35% interest in Waterloo Microsystems Inc., whose operating system for the IBM Personal Computer is to form the basis of a micro-to-mainframe office automation system.

Parent Crownx is not wholly unfamiliar with data processing, having made its service bureau subsidiary Datacrown Inc. of Toronto an $88 million operation, but it has now embarked on a plan to get into computers in a big way. So far it has a portfolio of nine technology companies, not including CCA. According to company officials, several more "significant investments" are to be disclosed in coming months.

"We are actively looking at additional software companies in the United States," says Duncan MacLachlan, who as president of Crownx's technology holding company, Crowntek, oversees the big push. He declines to elaborate, but suggests that Crowntek is out to gain complete or partial holdings in a wide range of microcomputer-oriented companies whose prod-

ucts and services help penetrate North American and international markets.

As for CCA, MacLachlan repeats the often heard reasoning behind the acquisition of well-established, private software companies: "We thought we could bring CCA marketing and financial muscle to push the software products they develop. We want to have a long-term strength in software."

CCA itself, well known for its technical capabilities, is a $20 million private company, tightly controlled by a small group of investors. Claiming it is bound by SEC regulations, the company declines to discuss why it sold out to a foreign company and did not, as competitors Cullinet and Software ag have done, go to the public securities market for further funding. Founder and president Dr. Thomas Marill, the company's largest stockholder, did not respond to phone calls.

What is known is that the Crowntek deal, which Marill has endorsed in principle and will recommend to other shareholders, involves cash and five-year debentures convertible to common stock. No changes are planned in CCA's management or location.

"We are actively looking at additional software companies in the United States," says president and ceo Duncan MacLachlan.

If the deal goes through, Crowntek will have for itself a pair of well-respected software products, Model 204 and Comet, an electronic mail system; a customer base of some 400 clients; and 10 branch offices in the U.S. Company officials say Model 204 has been installed in 250 IBM or IBM-compatible machines, including those of 10 timesharing services companies. The product is known for its ability to handle particularly large databases.

"CCA has done outstanding work. It is a high-quality company," comments MacLachlan, referring to the firm's close work with the Department of Defense and other government agencies and its pioneering database research activities.

CCA recently entered the Unix market with Emacs, a text editor for Digital Equipment VAX computers. Additionally, Model 204 has been upgraded with a P.C. front-end that offloads certain validation and communications functions from the host and makes it easier for users to move data between Model 204 and such P.C. packages as Lotus 1-2-3.

Shipments for the PC/204, as the new product is called, are to begin this quarter, according to James M. Rothnie, executive vice president. The P.C. code is priced at $750 a copy with a minimum order of 10 copies required.

Meanwhile, Crowntek's investment in Waterloo Microsystems, an offshoot of Waterloo University, Waterloo, Ontario, will give the holding company access to Waterloo Port, an operating system claimed to outperform the IBM P.C.'s standard PC/DOS software. Port, as the new OS is nicknamed, supports multiple windows, a mouse, concurrent execution of several tasks, and local networking.

The operating system is also being marketed for real-time applications such as process control.

Port includes a programming language—also called Port, according to the owners—that is similar to C and Pascal but that has been designed for real-time operation and portability to new machines. The system's file structure enables up to 4.2 billion bytes of outboard disk files to be addressed, according to Kenneth Gingrich, president of Waterloo Microsystems.

Crowntek's Productivity Network is to connect up to 40 P.C.s and mainframes in a local network that can share files and programs, taking advantage of Port's facilities. Non-IBM machines will eventually be supported, according to Crowntek. The product is slated for first delivery in July 1984, being offered initially to customers of Datacrown, Crowntek's service bureau. Royalties from each sale will be paid to Waterloo University, an institution whose computer science department has developed many commercialized software products including the Watfor language and several systems packages for the IBM Series/1 minicomputer. Indeed, the university claims that in terms of dollar value it has licensed more software than any university in the world.

Rounding out Crowntek's holdings are Crowntek Networks Inc., which will develop and market the P.C. network; Kaptron Inc., a Palo Alto, Calif., developer of fiber optic interfaces; a Customer Information Services group, which, comprised of four companies, supplies computer output microfilm and direct marketing services; Dynamic Sciences Ltd., St. Laurent, Quebec, which consults in rail transportation; Crowntek Technology Distributors Inc., which has been set up to acquire and sell products from third parties; and Polaris Technology Corp., Toronto, which develops industry-specific software applications. Polaris is the Canadian distributor for CCA.

Crowntek is hoping to build a strong portfolio in third-party products, which will augment its own products.

Crowntek also has an investment division, which identifies investment opportunities, and an advisory board headed by Dr. Roger Gaudry, former chairman of Canada's Science Council. Crowntek's total revenues are about $120 million.

MAINFRAMES

ELXSI SYSTEM DEBUTS

A Silicon Valley startup is marketing a modular mainframe that grows from 4 to 10 MIPS.

by Edward K. Yasaki

Historically, mainframe vendors have sought to provide their customers with an upgrade capability, whether it involved a physical swap of one box for another or the installation of new boards at the user site. New startup companies, however, are showing up in the marketplace with modularly expandable systems that are said to require no recompilation of users' programs, whether there's one processor or eight. They are stressing the benefits of this expandibility in such applications as CAD/CAM and transaction processing.

The latest such system, from Elxsi of San Jose, Calif., is based on a 64-bit, virtual memory machine that runs at 4 MIPS, placing its throughput significantly above that of the Digital Equipment VAX. In a closely coupled multiprocessor configuration, the bus-oriented system can accommodate up to 10 processors, placing it above the biggest IBM mainframe currently available.

"We see this machine positioned between the largest of the minicomputers and the very largest machines like the [Control Data Cyber] 205 and the Cray, because we cover a lot of that range in between," says Mel Arendt, marketing vp of Elxsi.

The air-cooled System 6400 is byte-addressable, making it adaptable for both commercial and scientific applications. Unlike classic word machines, an instruction or data field can start on any byte boundary. The virtual memory machine, with an address space of four gigabytes, has translation look-aside buffers that do the physical-to-virtual address translations in hardware. It does a 64-bit integer add in 100 nsec and a 64-bit floating point add in 150 nsec. Prices range from $600,000 to $4 million.

What ties the system together is the so-called Gigabus, a bus that is 64 bits wide and runs at 320 MBps. Attached to that bus are processors, memory subsystem, I/O processor, and a dedicated service processor. Main memory is expandable to 192MB, making it the largest memory currently available. The hardware is supplied with a proprietary message-based operating sys-

tem, a version of the Ingres relational dbms, and five languages—Pascal, FORTRAN, COBOL, BASIC, and C.

The company takes its name from two words—Elxsi actually means "electronics times silicon." At the time the company was formed in January 1979, the story goes, the eight or nine cofounders knew they were going to make a computer and the VAX was the initial target, perhaps on one chip. But the self-funded group had yet to determine the exact final product. "In the first three months after we got started," says president Joseph D. Rizzi, earlier a founder of semiconductor maker Intersil, "whatever anyone's view was of what we were going to do, there was a definite change." The one constant, says Rizzi, was that "all the changes we made were in the direction of making the machine bigger."

The group included a member of the design team for the HP 3000 at Hewlett-Packard, as well as people from semiconductor companies who were tempted to build a bigger microprocessor. "What came out of that three- or four-month positioning phase was something very different from anything any of the individuals actually thought they were going to do," says Rizzi. The original concept was a computer in the 1 MIPS range with a 100MBps bus and the FORTRAN language. Nothing else. Instead, they achieved about four times the processor speed, a bus three times faster, and a five-language capability.

After the first six weeks, the system architecture emerged, calling for a multiprocessor with a bus architecture. At that point, the speed of the processor was a mere detail, in the sense that it had nothing to do with system architecture. Paramount was the decision of which semiconductor technology to harness. In the first half of 1979, MOS was the first choice, with the faster ECL—as used by Amdahl Corp. and Trilogy Corp.—barely in the running. "In a very short period of time, ECL went from something I wouldn't bet on to something I would bet on," says Rizzi. By the end of the summer of '79, Motorola was finally able to show Elxsi samples of the high-speed gate array technology.

"I'm convinced that the best decision we made was to do this thing in ECL," says Rizzi. It made possible a 4 MIPS processor, instead of the 1 MIPS or 1.5 MIPS machine that could have been built in CMOS.

Chip technology aside, however, the System 6400 offers the industry yet another instruction set, and some would question that. "I'm a little leary of this whole concept of a multi-user computer nowadays for sharing computer power," says Los Altos, Calif., consultant Omri Serlin. The trend, he says, is towards single-user desktop computing. The System 6400 is a "throwback to the '60's" and the timesharing environments of that decade, just the thing microprocessor technology today enables the user to get away from.

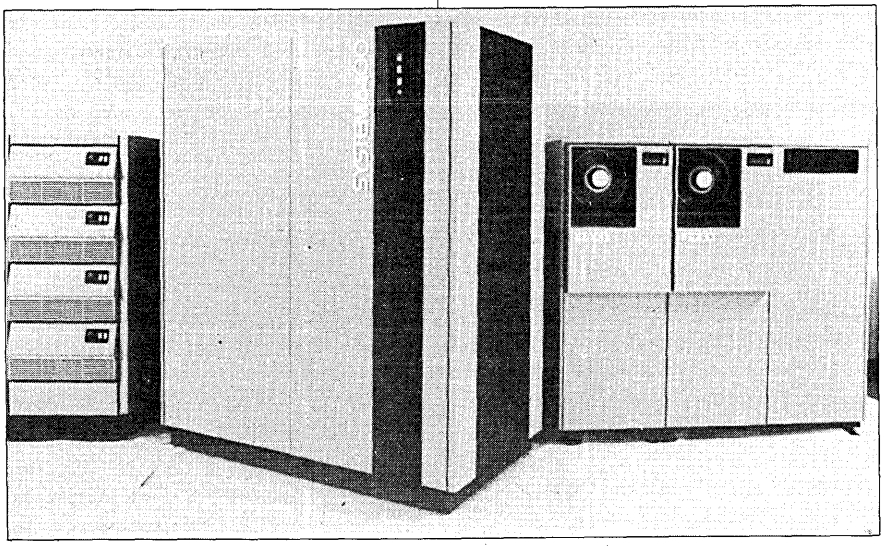
Moreover, Serlin criticizes the machine's not being fully fault-tolerant. Despite a message-based operating system that the consultant describes as "absolutely great" and "the next technology of operating systems," Elxsi, he says, has not exploited the inherent fault-tolerancy of the software. "I think that's very disappointing," Serlin adds, "and I think they will find that that limits their market. In today's technology, there's no justification for a central timeshared system unless it provides significant fault-tolerant features."

Indeed, in a multiprocessor configuration, the system is intended to service a number of users, rather than to solve one large problem that has been partitioned to run simultaneously in several parallel processors. An early user is Digicon Geophysical, a Houston, Texas, seismic dp systems house that has a one-processor system. Elxsi's Mel Arendt figures an average system will have one cpu, though several might have four.

When asked what the company could do to follow such a powerful initial product, Elxsi's Rizzi says, "There are a lot of hooks and handles designed into the system that just leave themselves wide open for enhancements." In addition, advances in the semiconductor technology would allow them to increase throughput by a minimum of three times.

Interestingly, Elxsi received some of its first funding from Tata, an Indian conglomerate which now controls Tata-Elxsi, a Southeast Asian marketing operation. Elxsi in the U.S. has marketing rights to the machine in the U.S., Europe, and Japan while Tata-Elxsi, based in Singapore and 25% owned by the Singapore government, will handle the rest of the world. The company may begin manufacturing the machine early next year, say industry sources.

Tata is joint owner of Tata-Burroughs, said to be the largest software company in India. ❋



MODULAR: Elxsi's bus-oriented mainframe enables users to build the machine's capacity as their needs grow.

NETWORKING

P-SYSTEM NETWORK SOFTWARE

A new family of local area networking software is described as an "open" system.

SofTech Microsystems, the San Diego, Calif., firm that took UCSD (University of California, San Diego) Pascal into the commercial world and created from it the p-System for software portability, this month moved the p-System into local area networking.

The company has introduced a family of local area networking software products it calls Liaison. "Liaison has been designed as an open system," said C.A. Irvine, vice president and director of engineering. "It is a family of networking products, and it has been designed and documented to permit 'servers' to be constructed by third parties. A 'server' in Liaison is simply a program that provides, as a service to its clients, the control and management of a shared network resource."

Clients essentially broadcast a request for their server, he explained. "The request identifies the server or servers. The servers are listening for such requests, and when one is received a dialog between client and server is initiated."

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Closed networking offerings, Irvine said, may not provide the information network services that an organization requires. "They employ a variety of topologies such as star or ring configurations. What is needed is an open network software system that can be used with any network hardware."

Liaison is a member of the p-System family and shares the portability qualities of the p-System. When the p-System is established on a computer system, it duplicates all the conventions of the p-System on any other computer so that applications programs written using the p-System can be moved from one machine to another without modification.

The p-System uses a hypothetical computer concept commonly called a pseudomachine, or p-machine. This is an idealized computer that executes a machine-independent pseudo-code, or p-code. When an application program is written in any p-System language (Pascal, FORTRAN, BASIC, and COBOL), the system compiles the program into p-code, appropriate for the p-machine, rather than into the machine code for the actual hardware in use. A p-machine emulator, a program in the native code of the hardware, is provided for each real machine on which the p-System runs. When the application program is run, the p-machine emulator executes the p-code. P-System adaptations are available for most popular personal computers. All that is needed to use Liaison with a specific networking hardware medium, Irvine said, is to develop the network I/O adaptation. He said SofTech Microsystems will soon provide a collection of adaptation software, and he expects others to provide additional adaptation software.

System software in the Liaison family includes a disk server, a p-System program that manages disk storage on behalf of client nodes in a network; a print server, a p-System program that manages one or more printers in behalf of client nodes; a tool kit, a collection of software components and documentation that support the development of networking applications; and a media adaptation kit, which provides the system software components and documentation required for the adaptation of Liaison to new hardware network media.

Five application products were announced with the Liaison family. They are database/query, electronic mail, word processing, executive calendar, and spreadsheet (similar to VisiCalc).

"The combination of the p-System and Liaison," said Irvine, "provides a means for the development, maintenance, and distribution of one collection of personal computer programs that can be used by all personal computer users connected to a LAN." ✱

USER EDUCATION

TRAINING FOR INFO CENTERS

A company called Crwth Computer Coursewares sells just that—on mainframes instead of micros.

by Edith Myers

Marsha Seidman would like to be able to see six months into the future.

Early last month, excited by IBM's 3270 P.C. and XT/370 announcements, she wished, "Oooh, if I could only get out there six months and see what's happening."

Seidman is president of Crwth (pronounced to rhyme with truth) Computer Coursewares, Santa Monica, Calif., a com-

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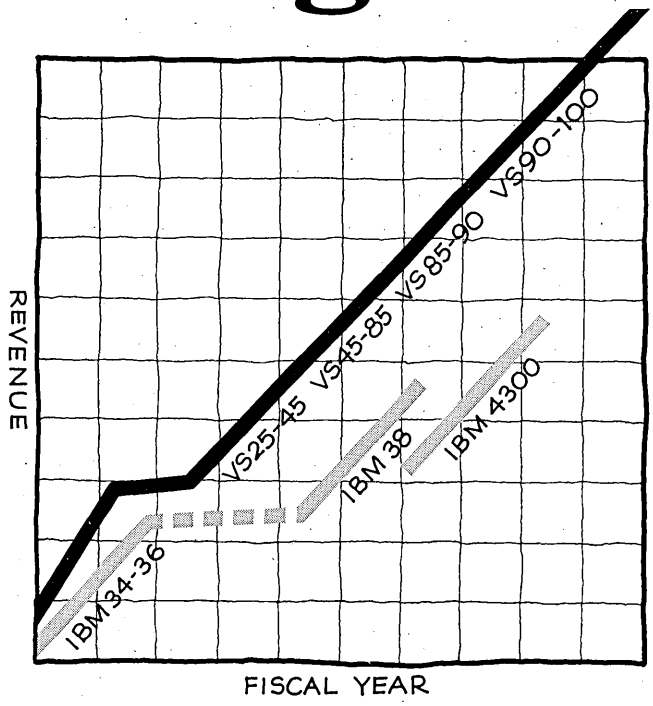

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WANG

The Office Automation Computer People.

pany that provides computer-based training (CBT) courseware for corporate information centers using IBM System/370 and compatible systems.

She and Crwth cofounder Gary D. Brown had been thinking about somehow putting training on micros, and they see the IBM announcements as opening up "all sorts of possibilities" for their type of training products.

"We won't do training products for VisiCalc or Lotus 1-2-3 or things like that," says Brown. Crwth's line of interactive training courses is aimed at enabling managers and executive users of information centers to use nonprocedural fourth generation languages to "do their thing and not what data processing thinks they should do."

Like many others who have heard talk of micro-to-mainframe links for some time, Seidman was skeptical until the IBM announcements. "Now I know it's really going to happen." What will Crwth do about it? "One thing I'm considering is, for a slightly higher licensing fee, permitting users to download our courses to micros." Nothing is certain yet, which is why she'd like to propel herself six months into the future.

Seidman is chairperson of the CBT User Group of the Trainers Association of Southern California (CBTSC), which in late October sponsored a CBT Vendor Showcase in Los Angeles that attracted some dozen vendors and 100 visitors. Most vendors' courses were micro-based. Seidman said the only other company that has announced CBT courseware like Crwth's is Deltak.

Representing both CBTSC and Crwth, Seidman does a lot of traveling, talking to information center user groups

Users embrace the interactive courseware like a bowl of jelly beans.

around the country. "Now," she says after the IBM announcements, "I'm finding that a lot of things I said just a month ago are obsolete."

She's a strong believer in the information center concept. "It acts as a mediator between the executives and the data processing department. Executives or end users know what information reports and decision support they need. The dp support group knows how these can be obtained. The two groups work together to maximize productivity. The goal is to train and support the end users until they are computer self-sufficient."

She notes that most information center managers she has met have not come out of data processing, though she's met a few who have. "First and foremost, an information center manager should be a sales type."

She admits Crwth had to sell itself hard in the early days of its three-year existence. "It took an awful lot of missionary work in the beginning."

Seidman spent 10 years with IBM as a systems engineer and course developer before she established a small consulting company that developed custom CBT courseware in the late '70s. In 1980 she met Brown, a technical author and Rand Corp. executive.

"Our daughters were friends," states Seidman. "I'd known him for some time socially before I found out we were both in the same business." Convinced that "the demand for high quality CBT merited expansion," the two formed Crwth in 1980 and began working out of Seidman's dining room. Brown is the principal author of all of Crwth's courses.

It wasn't an easy job, he says. "Computer language designers and end users have very different styles. Writers of data processing tools seem to have learned their technique from reading Russian novels. Every subject is referred to by several different names, totally confusing the reader. End users prefer the *Reader's Digest* approach: 'Just tell me what I need to know to get my job done' sums up their position."

In his course development, Brown adds, he exercises "the Ali Baba option. Ali Baba could stand in front of the cave door forever, but unless he remembered the magic words, he was going nowhere. It's the same with computing, except that there are thousands of doors and thousands of magic words that open them. If you explain the magic words to people they may remember them, but if they use them a few times and see the doors swing open, they have a much better chance of remembering them."

The key to computer-based training, he explains, is "to teach the material in much the same way as a person standing over a student's shoulder at the keyboard might do, presenting the 'magic words' in many short examples."

Brown notes that he once had a professor who maintained that the unique feature about the human species was not the oversized brain—"dolphins have a larger brain"—but rather the opposing thumbs. "The large brain developed to take advantage of our opposing thumbs." He thinks this has a lot to do with learning. "We have probably all had something explained to us. We nod our heads, understanding perfectly, but when we go to do it, we can't remember where to begin. But if we get our hands involved, as we do in a CBT course, suddenly our minds remember. In fact, our hands often remember better than our minds. Many people can open combination locks, but they can't remember what their combination is if they have to write it down."

The information center of Inland Steel in Illinois has implemented Crwth CBT courses. Before this implementation, says instructor Linda Frigo, training was accomplished via a week of stand-up lectures. "Besides the tremendous burden placed on our limited staff, the chance to get out of the office attracted a lot of curiosity seekers who had no commitment to learning and who disrupted the learning process of serious students." Now Inland spreads the education process over a month. Students are allocated 10 days to complete Crwth's introductory courses, working no more than two hours per day on the training program at their own terminal. Upon completion of the courses, students gather for a four-hour

"There's a lot of insecurity in dp departments. They were thrown by the micro explosion."

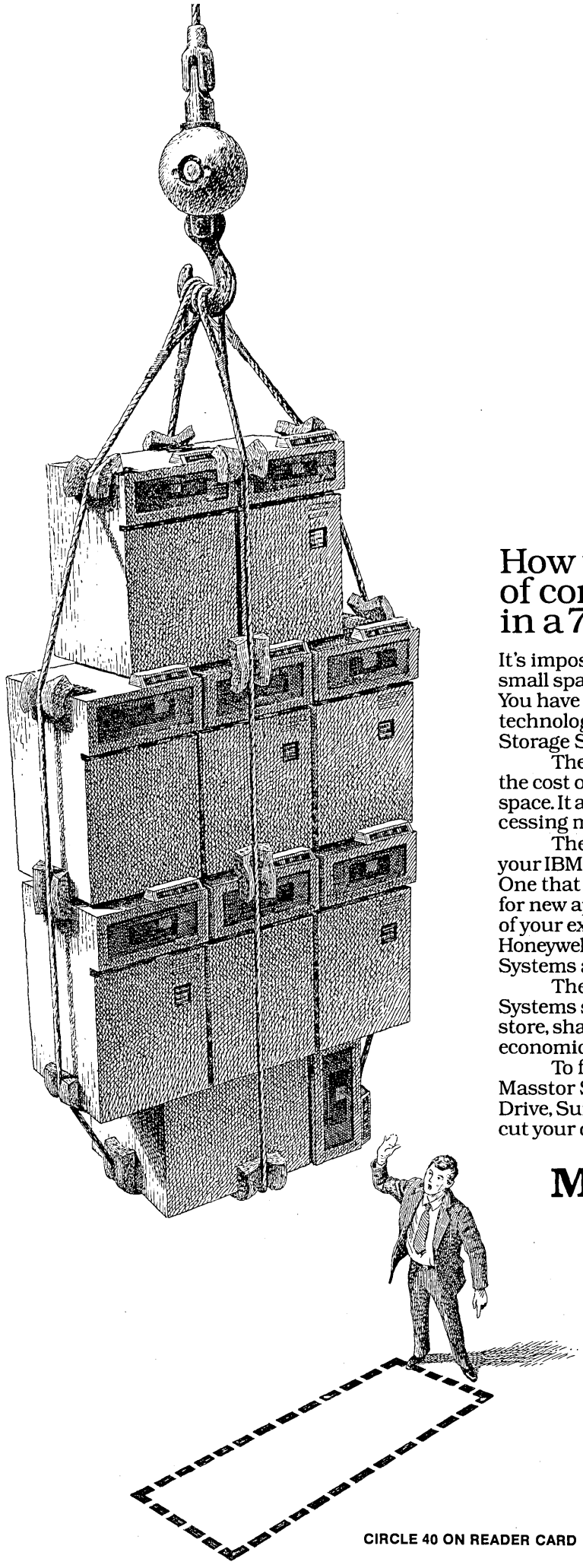
review seminar at the information center to learn the specifics of Inland Steel's environment and to meet the center personnel. End users are then given the option to train in a fourth generation language.

"With the computer-based training," explains Frigo, "students realize that they have to make a commitment to learn. Previously, after a week of stand-up lectures, people would walk out of a lecture and never know how to begin. Now people are working comfortably with the keyboard and terminal by the time they come in for the review session."

At the information center for the Commonwealth of Massachusetts, Judith Kingsley, assistant manager of user services, uses Crwth courses to train users in 54 state agencies. "There's been a great deal of emphasis on manual work in government agencies, especially for smaller applications whose size did not justify adequate attention from dp. Over the years, these manual systems have grown and it's now unfeasible to handle them without a computer system. With the current backlog, dp still can't tackle this," says Kingsley. "The only answer is to give the end user some control over his dp destiny."

Kingley notes that users are responding to the interactive courseware with "wild enthusiasm. Users embrace these courses like bowls of jelly beans. My only problem is to slow down the rush."

Both Seidman and Brown concede there is still a lot of missionary work to be done, particularly with dp departments. "There's a lot of insecurity there," says Brown. "They [traditional dpers] were thrown by the micro explosion. There they were, guarding their own little secrets, their own jargon, and all of a sudden people were talking about VisiCalc and other things they'd never heard of. They feel threatened." ❋



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NEWS IN PERSPECTIVE

BENCHMARKS

SPERRY GOES PC: Declaring it has been infused with a "new culture," Sperry Corp. has entered the personal computer market with an IBM-compatible machine built by its technology partner, Mitsubishi of Japan. The Blue Bell, Pa., mainframer disputed charges that it is too late to the burgeoning PC market to gain a strong position, claiming its machine outperforms IBM's P.C. in several areas and will be priced at 10% less in all quantities. The main difference between the two machines is that Sperry's has a higher clock rate on the 8088 microprocessor and higher resolution color graphics. Sperry said its marketing will focus on its size and stability, which it hopes will appeal to corporations that are wary of the looming shake-out in personal computers. As for market share, the company hopes to capture 3% to 5% of the total personal computer arena in "the next several months," according to James B. Aldrich, vice president of product strategy and marketing support for the Computer Systems group. Aldrich, the heir apparent for the top job at Sperry's computer operations, said the new product is "bit-level-compatible" with IBM's hardware and represents the first of a family of products.

OFFER TO BUY: McDonnell Douglas Corp. reached an agreement in principle to buy Tymshare Inc., the Cupertino time-sharing and data communications company, for $378 million in cash. The agreement follows many months of speculation as to who would acquire Tymshare. Although Tymshare was a pioneer in time-sharing and public data networking, its growth rate has slipped and its profits have plunged in the past 2 years. Among the companies cited by observers as having made passes at Tymshare are Wang Laboratories, MCI, United Telecommunications, Sperry Corp., and Chase Manhattan Bank. Apparently, McDonnell Douglas, through its McAuto computing services subsidiary, is most interested in Tymnet, Tymshare's public datanet that competes with Telenet, Uninet and AT&T's Information Service. Tymnet is seen as a well-designed network using up-to-date technology. However, Wall Street analysts were critical of the aircraft company's approach to Tymshare, claiming that the acquisition price was too high for the assets to be acquired. McDonnell Douglas also owns Microdata Corp., a maker of small business computers. It is thought McAuto would like to expand its offerings beyond the medical and manufacturing markets it currently sells to.

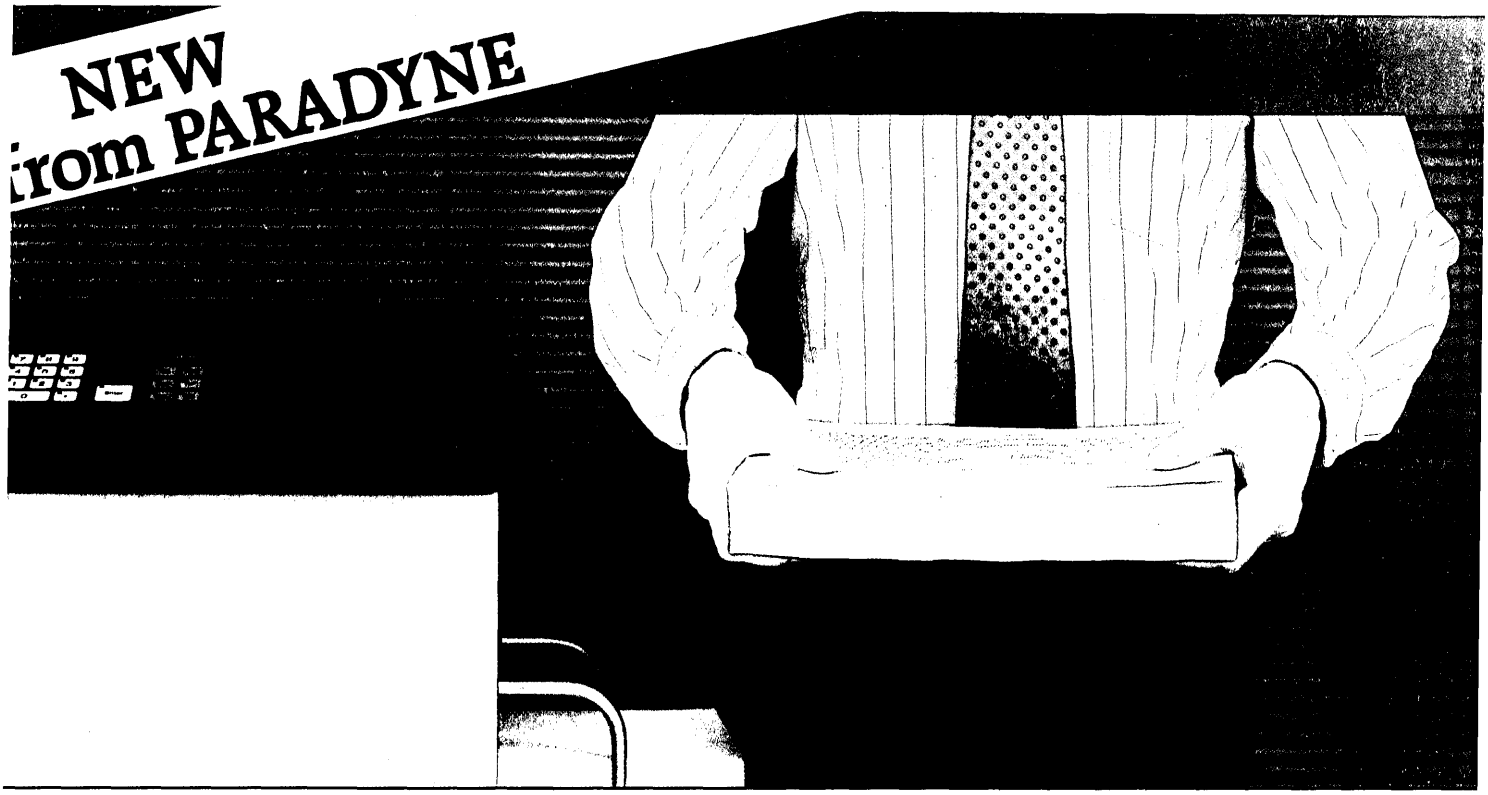
PRESSES CASE: Having settled its trade secrets theft suit with Hitachi, IBM has gone ahead with a tough racketeering suit against National Advanced Systems, which IBM alleges was in on the Hitachi dealings and knew full well it was procuring illegally obtained, confidential documents. National denies the charges and says it will defend itself successfully if the suit reaches court, which it is expected to do because the two companies have not been able to come up with a private settlement as IBM did with Hitachi. As a result of the suit, National faces the possibility of having to pay as much as $7.5 billion in damages to IBM. Also named in the suit were several individuals including Jonathan Fram, a former IBM engineer who is accused of taking with him confidential information when he left IBM to work for The Gartner Group Inc., a Greenwich, Conn.-based market research house. Subsequent to leaving Gartner, Fram offered the confidential information for sale to National, IBM says in its suit. Fram was most recently known to be working at Paine Webber, the Wall Street stock brokerage firm, as a computer industry analyst. In a related matter, Gartner Group settled quickly a suit brought against it by IBM, agreeing not to disclose IBM trade secrets and to help IBM ferret out those people who may have had access to such information. Gartner denied any wrongdoing, but industry observers and competitors said the market research company's reputation would be damaged by the negative publicity surrounding the situation.

WANG AND CHIPS: Wang Laboratories Inc., Lowell, Mass., has agreed in principle to buy a 15% stake in VLSI Technology Inc. for about $34 million in cash. The deal would give Wang its first ownership of a chip manufacturing company, a key relationship for the future, when integrated circuits will be more important than ever in the production of computers and workstations. VLSI is a so-called silicon foundry based in San Jose, Calif., which has supplied parts to Wang for the past six months, according to a spokesman. Wang said it has an option to purchase another 15% of VLSI but said it has no intentions of gaining control of the San Jose company. The buy-in, if completed by early 1984 as expected, would give Wang priority access to custom chips, software technology, and foundry capacity. VLSI is expected to make its software conform to Wang's design specifications so that Wang's in-house circuit designers can bring custom circuits to market quickly.

SUPERCOMPUTER WORRIES: The concern over the United States losing its lead in the supercomputing arena has reached a House committee that began hearings on the matter in November. The Science and Technology Committee is focusing on research areas that require large-scale computations and on the federal government's response to the supercomputing needs of the country's scientists and engineers. Democrat and committee chairman Don Fuqua of Florida noted that the "extraordinary cost" of supercomputers threatens U.S. research and said that the U.S. might benefit from a government-coordinated R&D effort similar to one under way in Japan. The ranking Republican member of the committee, Larry Winn of Kansas, said the nation must maintain a careful balance between federal and private sector participation in supercomputing research. Competing with Cray Research, Denelcor, and Control Data, three leading U.S. makers of supercomputers, are Hitachi and NEC, which have garnered publicity recently from their government-backed efforts to bring high-speed machines to market.

SUIT–COUNTERSUIT: A fight has broken out between Network Systems Corp., Minneapolis, and Masstor Systems Corp., Sunnyvale, Calif., over alleged patent infringements and trade secrets theft. Both companies sell high-speed networking systems that connect cpu channels for data sharing and intercommunications. Network Systems has charged that Masstor stole trade secrets, breached contracts, and infringed on patents Network owns for its Hyperchannel product. Masstor has countered with a suit charging that Network Systems' suit is merely a nuisance action whose purpose is that of "damaging Masstor's reputation and business." Masstor has demanded $5 million in general damages and $10 million in punitive damages. Masstor's Massnet product was still in final testing and was not yet shipped so there was no "legitimate basis" for Network Systems' allegations, stated the Masstor countersuit. Masstor stated it would continue development and begin marketing Massnet despite the legal squabble.

NEW ROLM PBX: In its first major product introduction since selling an 18% stake to IBM, Rolm unveiled a distributed architecture private branch exchange (PBX) designed to handle up to 10,000 lines of voice and data. The CBX-2 replaces the company's 1975-vintage product line and represents a product that IBM will probably endorse as its choice for data processing customers. The nonblocking unit, which uses time-division multiplexing on a 295 million bps bus, will be priced between $700 and $1,000 a line, which does not represent a significant reduction from the company's current product line. Rolm, a leader in the PBX field with some 13,000 installed systems, said the new hardware can be used to upgrade the previous products and can use previously introduced circuit cards in many cases. Although IBM vice chairman Paul Rizzo was present at the product introduction, Rolm said it alone will market the PBX for now. ✲



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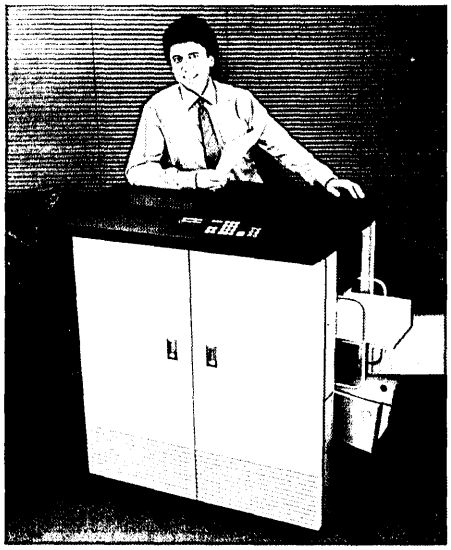

Uses Standard 8½" x 11" copy paper.

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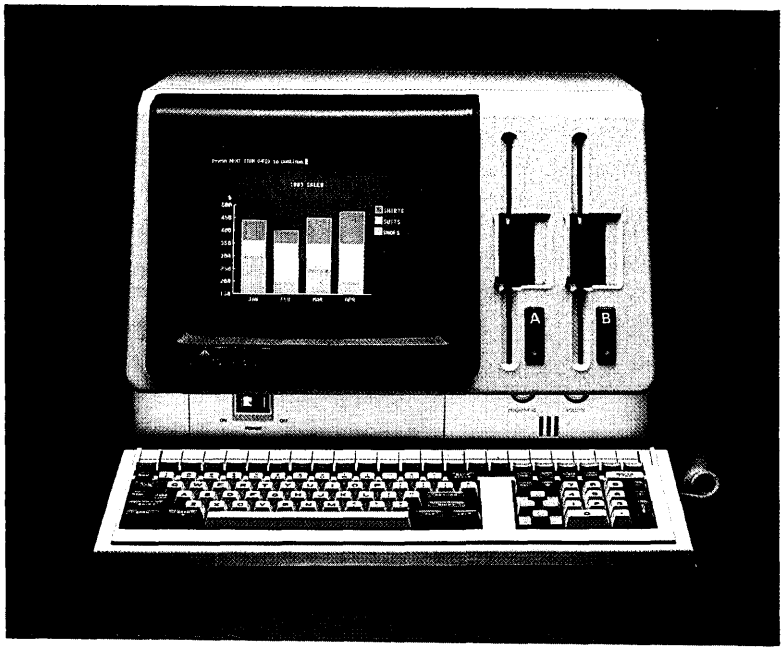
CIRCLE 41 ON READER CARD

CAN YOU FIND THE IBM* 3278 HIDDEN IN THIS PICTURE?



It's right there.

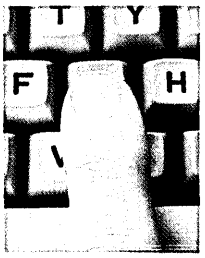
Inside the Advanced Personal Computer from NEC Information Systems.

In fact, the Advanced Personal Computer is the best personal computer for direct connect 3278 emulation, with 3274 and 3276 controllers.

Get the advantages of personal computing plus direct connect 3278 emulation.

With the APC, your people will be more productive than ever before.

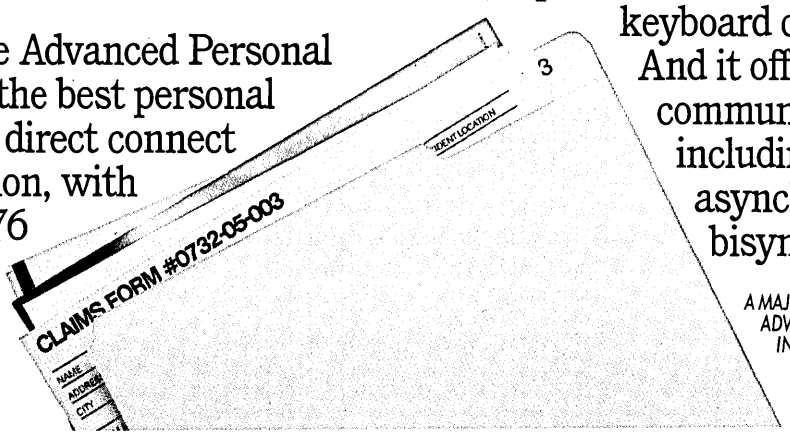
They can easily perform all their existing 3278 applications. Then, with a single keystroke, switch to a full function personal computer, quickly and easily.



WITH A SINGLE KEY-STROKE, YOU CAN SWITCH FROM 3278 EMULATION TO A FULL FUNCTION PERSONAL COMPUTER.

And the APC is fully compatible with all 15 different 3278 keyboard configurations.

And it offers a full range of communications protocols, including SNA/SDLC, asynchronous and bisynchronous.



A MAJOR INSURANCE COMPANY IS USING THE ADVANCED PERSONAL COMPUTER TO GREATLY INCREASE WORKER PRODUCTIVITY.

Own for less than you pay in rent.

With all this functionality, you'd probably expect to pay a small fortune for the APC. Surprise! The APC can be purchased for less than 1 year's rental charges on a 3278.

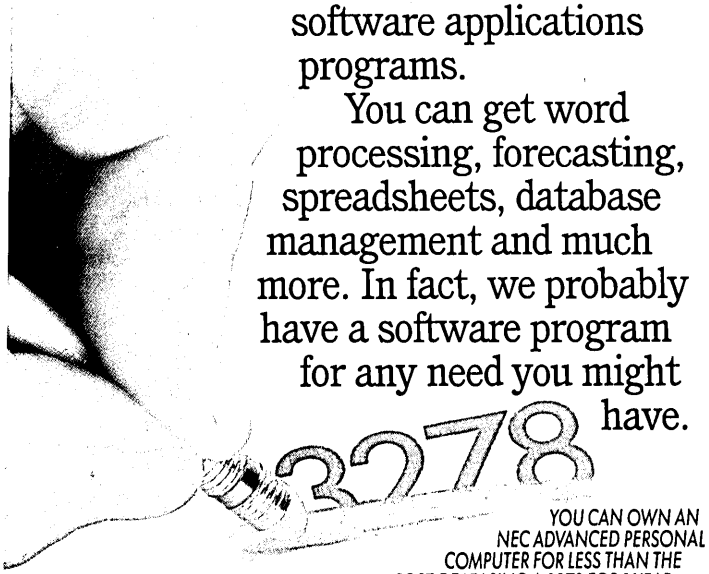
Which means you can offer your people a lot more functionality and *still* pay less.

WITH THE ADVANCED PERSONAL COMPUTER, DESKS ARE LESS CLUTTERED AND PEOPLE ARE MORE PRODUCTIVE.

Software, software, and more software.

With the APC, you can choose from hundreds of different software applications programs.

You can get word processing, forecasting, spreadsheets, database management and much more. In fact, we probably have a software program for any need you might have.



YOU CAN OWN AN NEC ADVANCED PERSONAL COMPUTER FOR LESS THAN THE COST OF LEASING A 3278 FOR 1 YEAR.

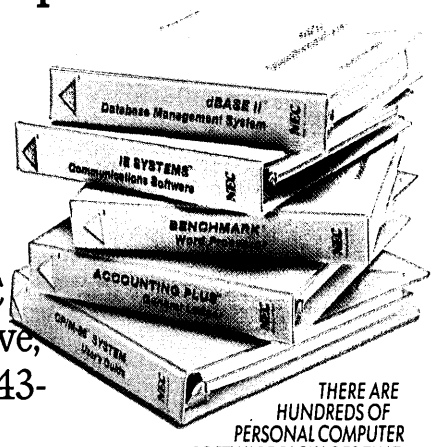
The APC also offers you the best color graphics in the industry, and a wide range of graphics software. The most storage capacity of any computer in its class. And the kind of reliability that NEC is famous for.

All for less than you're paying now.

*IBM is a registered trademark of International Business Machines Corp.

Find out more about NEC's Advanced Personal Computer.

For more information about the APC, or for the location of your nearest NEC representative, call 1-800-343-4419.



THERE ARE HUNDREDS OF PERSONAL COMPUTER SOFTWARE PACKAGES THAT RUN ON NEC'S ADVANCED PERSONAL COMPUTER.

And find out why so many 3278 users are saying "NEC and me".

NEC

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CIRCLE 42 ON READER CARD

The typical dp department has a three-year backlog of development and maintenance work. Will small computers change that?

THE MICRO VS. THE APPLICATIONS LOGJAM

by Gary D. Brown and Donald H. Sefton

At the turn of the century, visionaries looked to the automobile to solve city traffic problems. The streets were clogged with horse-drawn traffic because horses were so slow in getting from one place to another. They also required space for stables—which had the unfortunate effect of dividing real estate into upwind and downwind categories—and various support services, which generated still more traffic.

Although the automobile did solve each of these problems, we sometimes long for the old days when the pollution was on the ground where you could step over it, rather than in the air where you must breathe it. What the visionaries didn't foresee was that the automobile would create a new demand for travel.

Is the microcomputer the automobile of the 1980s, creating new demands for data processing services, or will the micro reduce the huge backlog of tasks found in most companies? Will it cause other problems? Or will it have no impact?

The figure most often quoted for the backlog of data processing tasks is about three years, although some companies report backlogs of up to seven years. And of course, this is only the formal backlog—the backlog that has resulted in specific requests made to the dp department. The hidden backlog, consisting of tasks that have not been submitted, may be even larger, as some people may feel it is not worth the effort to submit a request for something that is not essential.

The formal backlog comprises the following:

- Requests for changes and enhancements to existing systems; in short, maintenance. This accounts for roughly 50% of a typical dp department's workload.
- Requests for new applications and systems that interface to the current systems.
- Requests for new applications and systems that stand alone.

The backlog is real, if our experience is any indication. Granted, obsolete requests are not always removed from the list. Sometimes, too, data processing encourages requests to justify more budget, and occasionally disgruntled users flood dp with requests to try to make the department look bad, but most requests are legitimate. In companies where the backlog has been set to zero by decree, it resumes its former size in a few months.

The hidden backlog is more difficult to characterize. It typically consists of noncritical items that are required by single persons or small groups. Department and division requests have enough backing to land on the formal backlog. The hidden backlog can be thought of as containing tasks that are important, but only to a few people.

Both backlogs exist because more computing tasks are required than there are people to execute them. The availability of hardware plays only a minor role. This means that if the micro is to break the logjam, it can do so in only two ways: by increasing the productivity of the people who can make computers work, or by enlarging the number of such people.

The backlog consists of more than just programming tasks. There's also work to be done in planning, analysis, design, evaluation, selection, training, documentation, implementation, maintenance, and conversion. There would still be a backlog even if no programming were needed. For example, consider replacing any of the big five business systems (personnel/payroll, accounts payable, accounts receivable, general ledger, or fixed assets) with a package system. Almost all the programming is already done, but in most shops the project will take from six months to a year.

The backlog is a large block of the wall that separates data processing from the end users. To dp, the backlog is evidence that the department is overcommitted, understaffed, and subject to insatiable demands. To end users, the backlog gives clear proof that data processing continues to take a larger bite of the corporate budget without being able to deliver on its promises.

In a sense, data processing has sole responsibility for reducing the formal backlog. End users are not made a part of the solution. The dead letter bin of the formal backlog provides a convenient scapegoat for them: "What did you do about the accounts payable problem?" "I put in a dp request. What more can I do?" Note that it costs virtually nothing to add a request to the backlog. Users pay for services rendered, not services ordered. Consequently, aging the backlog is one method used to determine priority. This approach is based on the theory that the truly urgent items will rise to the top of the list.

WHAT THE MICRO CAN DO

Now let's turn to the micro and see how it will affect this backlog. Before we can do this, we need to examine what a micro does well and what it does poorly. The advantages of a micro are its low cost, its fast, consistent response, its availability and portability, its freedom from the establishment, and some of its software.

The basic micro costs little more than a terminal on a large computer, and in fact, more and more micros are being used as terminals. They offer an abundance of computing power, which is cheap to increase. On a large, heavily loaded computer running TSO, the incremental hardware cost to provide adequate response for five additional users might be $500,000. To give the same five users even better response with five micros would cost less than $25,000, with a letter-quality printer thrown in for each.

Another advantage of the micro is its relatively fixed costs. You can start a job running on Monday, and if it doesn't complete until Friday, all you pay is the electric bill. Computer time is a scarce resource on a large computer. The more you use, the more it costs. Mistakes cost less on a micro, which takes much of the tension out of using a computer. Perhaps as important, only one user is affected. If a user starts a runaway job on a shared resource, everyone suffers.

The micro gives more consistent response, and often faster response, than a large computer that is concurrently used by many people. Micros, and especially portables, are also more available than large computers. Three shifts of operators are required to make a large mainframe available, and

ILLUSTRATION BY BOB WEBER


DP
DEPT.

No one will know that you are using your micro to keep track of your bowling scores.

preventive maintenance and file backups limit access. The micro is available wherever there is an electrical outlet—and battery-powered machines are coming onto the market.

You don't have to ask anyone's permission to use a micro. If you don't use it for a month, you don't have to crawl back to a data processing administrator and explain why your password should be reinstated. You aren't nagged about cleaning out your disk files, and no one will know that you are using your machine to keep track of your bowling scores. A large part of the appeal of the micro is this opportunity to bypass the dp department, to possess a truly personal computer.

Much of the currently available micro software is excellent. The CP/M, MS/DOS, and p-Systems are all easier to use than TSO or MVS on a large mainframe. On a micro, there is nothing approaching the difficulty of job control language. Spreadsheet analysis has become an established application area in its own right. The word processing systems, small database systems, mail merge systems, and interactive languages like BASIC and Pascal on the micro are usually superior to those found on large computers.

WHAT MICROS CAN'T DO

Micros were designed for interactive computing, large computers for batch processing. The tape drives, the fast selector I/O channels, and all the buffering built into the operating systems on large computers were designed for quickly moving large amounts of sequential data. In random processing, which is common in interactive computing, all that buffering and all those fast channels go to waste.

By contrast, the micro excels at interactive computing but is poor at moving large amounts of data. In terms of raw computing power, a typical micro supplies more than is needed for most applications. A micro is great for doing a million calculations. But if you need to sort a thousand records, the micro dies. Consequently, the micro is poor for transaction-driven systems, which form the backbone of most business applications.

Another weakness of the micro is the flip side of one of its strengths: you're the operator. If files are to be backed up, you must do it. This is one of those things that everyone says should be done, but which, in practice, often slips by. The micro is also poor for printing large amounts of data. You must be the one to watch the printer for paper jams, and you will have to listen to its incessant clatter.

Micros are not yet adept at accessing files on a large mainframe computer. Communication packages are available, but it takes real patience to upload or download a file of any size using a 1200-baud modem. (A 300-baud modem is four times worse.) Users must allow about half a day to upload or download a diskette full of data using a 1200-baud modem, assuming that things go fairly well. This severely limits the use of a micro.

And finally, micros are difficult to control. The thought of 250 different brands of micros and their attendant software strikes fear into all dp managers' hearts. They visualize long lines of users forming outside their offices, holding Osbornes and demanding, "Well, what are you going to do about this?" It appears, however, that the micro market will coalesce around the IBM P.C.-compatible market, just as the large mainframe market has coalesced around the System/360 and 370, so that compatibility will not be the nightmare it threatened to be a few years ago.

Micros cause security problems. In a way, micros are potentially more secure than are large computers. A diskette locked in a safe is more secure than any existing software protection on a large computer. But because of the control problem, there is no way to assure that everyone who should put his diskette in a safe will do so. The end result is that the micro is less secure than a large computer is. Of course, the worst security problem with a micro is that the machine itself may be stolen!

As with most technology, the reaction to the micro moves in four distinct waves: fear, ecstasy, disillusionment, and cold reality. Fear develops because the micro is an unknown. "Everyone else seems to be using them, but I don't understand what they do or how I can use them. I'm a little afraid. If I don't get a micro at home, my kids will never have a chance in college."

The second stage is when you learn to use the micro, and the elation with your conquest gives you evangelical zeal. You use the micro to balance your checkbook, you put all your home recipes on it, and you badger your school board to teach computing. (The micro has replaced the encyclopedia as the key to success every family must provide for its children.) As an industry, we are now in the ecstasy stage.

Eventually the thrill wears off. You never seem to have your computer along when you write a check, and you find it's easier to balance your checkbook using a calculator. The Thanksgiving turkey is incinerated because your teenage daughter in her first pair of high heels steps on the diskette containing the recipe. (Counter space was always an insurmountable problem in keeping recipes on the micro anyway.) Your son is failing four subjects because he spends every waking moment playing an elaborate space wars game on the micro.

Finally you come to realize that the micro is just another tool. It does many things well, but its uses for you are limited: word processing, spreadsheet analysis, perhaps a small database or two. It may also serve as a terminal for a large mainframe computer. You would be disappointed with it were it not for one thing. It has become indispensable.

The micro also has bad side effects. It turns each person into a combination computer operator, data entry clerk, and programmer. As one chief financial officer said, "I hired this person as a $75,000-a-year financial analyst, and the micro turned her into a $25,000-a-year BASIC programmer." Computers create demand, and programming is seductive. It sucks people in and consumes all their time. Computers also lead to what has been termed "analysis paralysis." The means become the ends as you forget what you wanted to get out of the computer and become wrapped up in the process of getting it out.

Data processing programmers will do little program development for the large mainframe on the micro. They may be able to do compilations by downloading an entire region, but printing the compilation listing will take forever. Then there is the difficulty of accessing data on the large computer with the micro. Programs cannot be debugged without access to data. You may be able to upload and download data and programs, but at best this is a pain.

MICRO AS PORTABLE TERMINAL

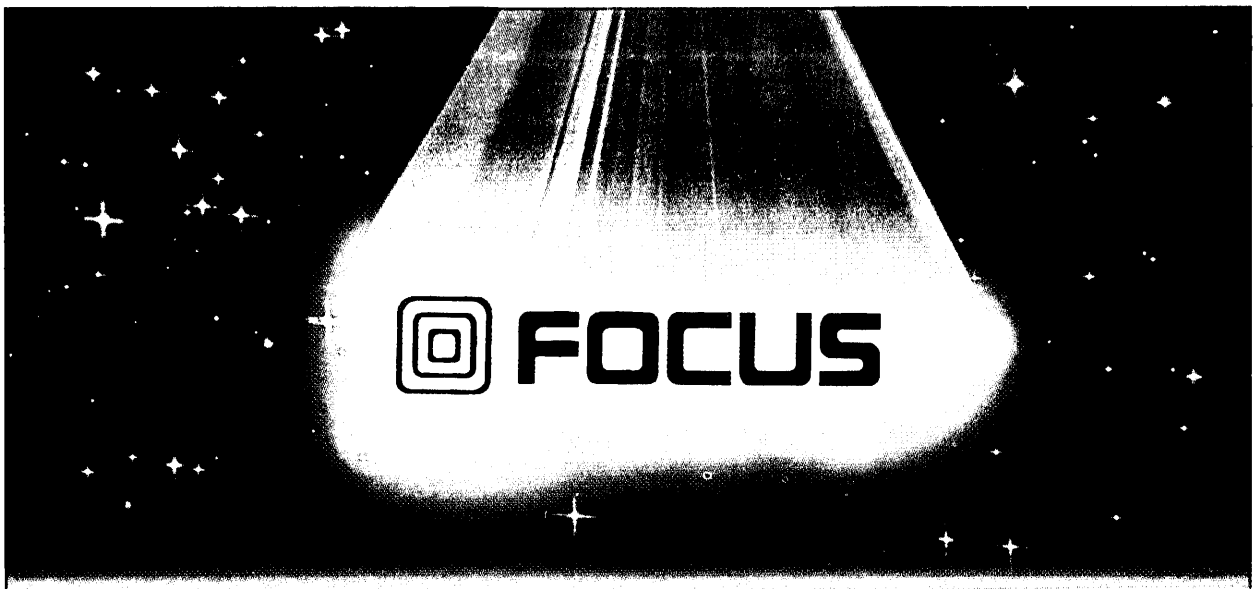
The biggest appeal of the micro to data processing is its potential as a portable terminal. As one programmer said, "It'll be great. I can take my micro home and then when I get a midnight call, I can dial up and fix the JCL problem rather than making the 41-mile drive into work." Of course, this will also appeal to management—it extends the workday.

Dp will also use the micro for word processing, spreadsheet analysis, and small databases, as will all departments within a company. In a sense, the dp shop will become just another end user.

Today, most microcomputers are in the hands of end users. To determine whether the micro will have an impact on the application backlog, we need to examine which of the things that the micro can do well can be done by end users. With the successes of fourth generation languages such as SAS, FOCUS, and RAMIS II, and of packages such as VisiCalc, 1-2-3, IFPS, and d-BASE II, end users have proved that they can do computing. The question is whether they can do it without becoming programmers.

The key factor an end user brings to computing is a knowledge of the application. Where knowing the application is more im-

ONE LANGUAGE. ONE SOLUTION.



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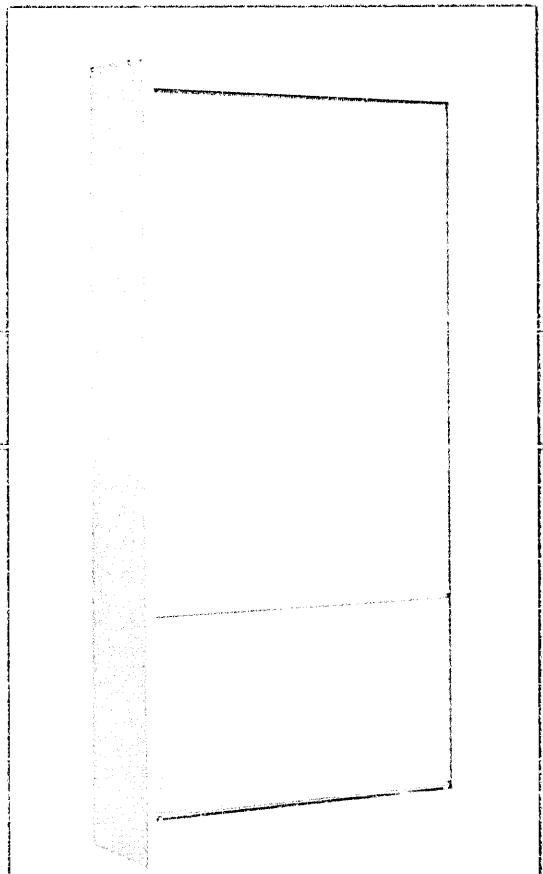
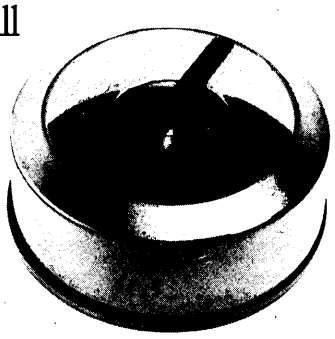
CIRCLE 43 ON READER CARD

There's nothing special about this file.

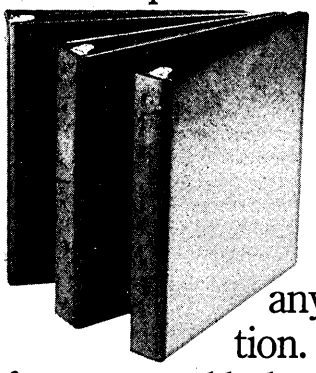


"The Anything File."

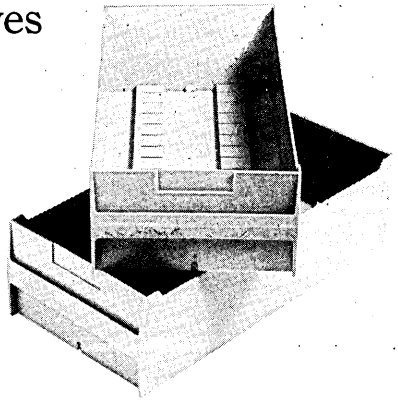
Why invest in a special file for card trays? And another for disk cartridges? And still another one for Mag tapes?



If your company is like most, the practical answer for you is Supreme's "Anything File"... Conserv-a-media.™ An ingeniously designed 36" cabinet for multi-media storage and retrieval, Conserv-a-media comes in heights of 59", 72" and 85" with adjustable interior components for total versatility.

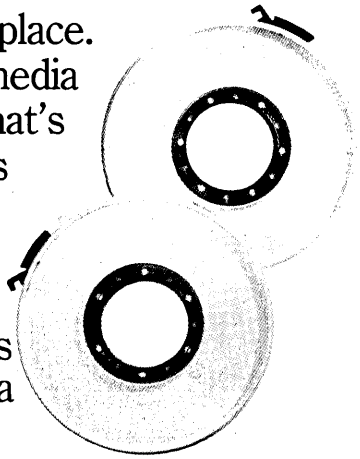


In these handsome, quality-constructed, easy-access units, you can have your choice of almost any storage configuration. With hanger bars for tape-seal belts. With wire racks for disk cartridges. With roll-out shelves for disk packs or card trays. With roll-out shelves and rail dividers for cassettes and microforms. With stationary shelves for binders and manuals. With hanger bars for center hook filing of EDP printouts. With hanging frames for drop filing of all legal/letter size material.



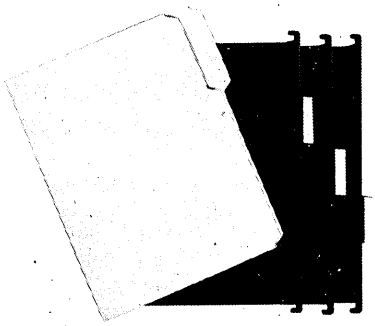
With pullout work surface shelves. And more.

It's the inventiveness you expect from the people who invented lateral filing in the first place.



Conserv-a-media by Supreme. What's special about it is that it's the best non-special file you can buy.

For full details and the name of a dealer near you, contact Advertising Dept, DA-184, Supreme Equipment & Systems Corp. 170 53rd St., B'klyn, NY 11232. 212-492-7777.



Supreme Equipment & Systems Corporation

Innovation is what makes Supreme supreme.

CIRCLE 44 ON READER CARD

Prototype systems may replace a lot of what is now called analysis.

portant than a familiarity with technical design and programming problems, end users generally do a better job than programmers. Users have the greatest success with applications like word processing, spreadsheet analysis, and report generation.

But when the need is for a procedural language, of for large volumes of data to be processed, programmers generally do a better job. There is a line that divides end-user computing from professional programming. End users can cross the line, but only by becoming programmers. Conversely, programmers who cross the line become end users. Any task with one of the following characteristics is a bad candidate for end-user computing:

- Large size. Technical expertise is needed to handle sizable volumes of data or large numbers of program statements.
- Complexity (especially lots of Boolean logic).
- A need for efficiency.
- Conversions.
- Interfaces.

None of the fundamental laws of data processing are suspended just because end users do computing. They have the same problems with compatibility, conversion, interfaces, documentation, and maintenance as do programmers. But some things are different when end users program.

First, they almost always use a higher-level language. In applications that lend themselves to high-level tools, such as word processing, spreadsheet analysis, and small database systems, end users are far more productive than their COBOL-programming counterparts, often achieving in an hour what it would take a COBOL programmer a year to perform. Unfortunately, not all applications are served by such excellent programming tools. VisiCalc was a breakthrough for spreadsheet analysis, but there's no guarantee that its success will be repeated in other areas.

Naturally, end users know their applications better than a programmer can. Given the right tool, they can program an application in less time than it takes to explain it to a programmer, eliminating the chance for miscommunication. This also means that end users do best where the application does not cross department boundaries.

But end users don't write generalized applications as well as data processing does. End users worry about their own problems. The dp department is trained to solve the problems of others, and has learned from experience to generalize whenever possible. An application written by end users for their own department will usually have to be entirely rewritten to be suitable for other departments.

Dp has worked many years to develop formal ways of building systems, such as structured, top-down methods. To a certain extent, micros will undermine these structures because they offer yet another way to avoid systems planning, and they allow users to address symptoms and not problems. On the other hand, they may let systems grow organically. Prototype systems may replace a lot of what is now called analysis.

In applications where examining the output leads to further analysis, the end user is far superior to the professional programmer. This synergism, wherein the computer acts as a catalyst in solving problems, cries out for end user involvement.

End users are far more tolerant of their own systems than they are of systems built by the dp department. All those "It's only a little change" requests often vanish. A system requiring the maintenance of 10 diskettes with backup would be intolerable if supplied by dp, but is entirely acceptable if done by end users.

Applications done by end users are not inherently more user friendly than those done by data processing. Often they are less so. End users almost always do a poorer job of documenting than do programmers, because end users program for themselves, while documentation is done for others.

End users are best as consumers of data, whereas the dp department is best as a supplier of data. Much of the applications backlog is a result of requests for information, for information presented in a different form, or for different combinations of information. The ultimate output of a computer is usually a report, and reports are often a catalyst to a request for a different report. Given the right tools, end users can do most of the programming for this.

ASSAULT ON THE BACKLOG

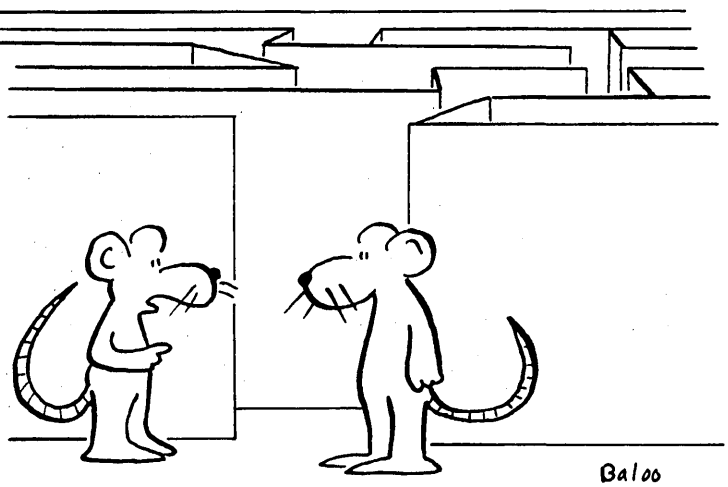
If only professional programmers were to use the micro, even the hidden backlog wouldn't be reduced except for a small gain resulting from the fact that micros are easier to program than large computers. Remember, the micro is just another piece of hardware, and the backlog is caused not by a scarcity of hardware, but by a scarcity of people to design, program, and implement software.

The formal backlog, which is the exclusive responsibility of dp, is composed of maintenance of current systems, new systems that interface with current systems, and new systems that more or less stand alone. Maintenance items, which make up roughly 50% of the backlog, are not suitable for the micro because they usually require the modification of existing programs. Only in the adding of new reports (less than 20% of the maintenance) could the micro have potential use, but there it is severely limited by its inability to access the large files on the mainframe.

The micro is also of limited use in developing new systems to interface with current systems, because of the problems in interfacing the micro to the large computer. That leaves the standalone items as the main candidates for the micro. Of these, it can be effectively used only for smaller applications. The average application size on a large mainframe is*:

55 programs
23,000 source statements
6 master files
13 megabytes in the database
26 predefined user reports

*Lientz, B.P., Swanson, E.B., *Software Maintenance Management*, Addison-Wesley Publishing Company, Reading, Mass., 1980.



"Left, right, left, left, right, left, right, right, right, and you can't miss it."

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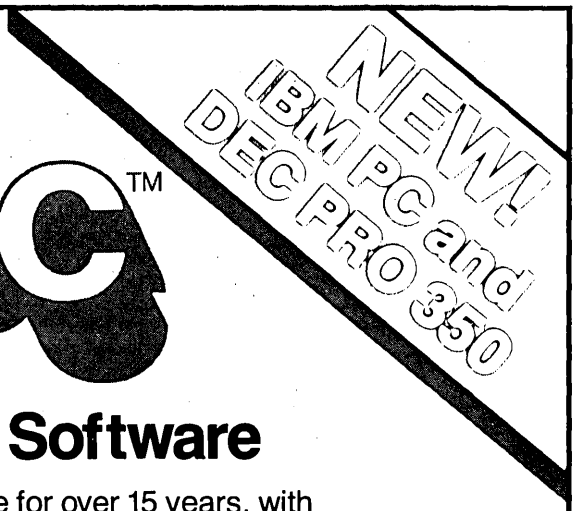

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CIRCLE 45 ON READER CARD

For micros to be truly useful to a company, they must be tied to the large mainframe.

A micro could handle an application this size—just as one could pull a house trailer with a motorcycle. It wouldn't make much sense. The inescapable conclusion is that the micro will reduce the formal backlog very little.

Which brings us to the hidden backlog. Obviously, the dp staff won't use the micro to work on the hidden backlog because they don't know what jobs need to be done. Consequently, it is not the micro itself that offers the hope of breaking this logjam. The hope lies in the phenomenon of end-user computing.

It is difficult to determine what percentage of the hidden backlog is composed of maintenance, of new systems that interface with current systems, and of standalone systems. Our experience is that it consists mostly of standalone systems—smaller applications that serve a few people. For such applications, the micro is a natural. Thus, while it can reduce the formal backlog little, it has the potential to have a significant impact on the hidden backlog. Now, let's see if this potential can be realized, and what it brings in its wake.

The typical end user begins by writing a standalone application, such as keeping sales records on a spreadsheet tool. He receives a computer-generated report from the dp department every couple of weeks and then enters this data into a spreadsheet. Quickly tiring of this, the user turns it over to a secretary who tires of it even faster and asks the obvious question: "Why am I reading numbers off a computer-generated report and typing them into another computer?"

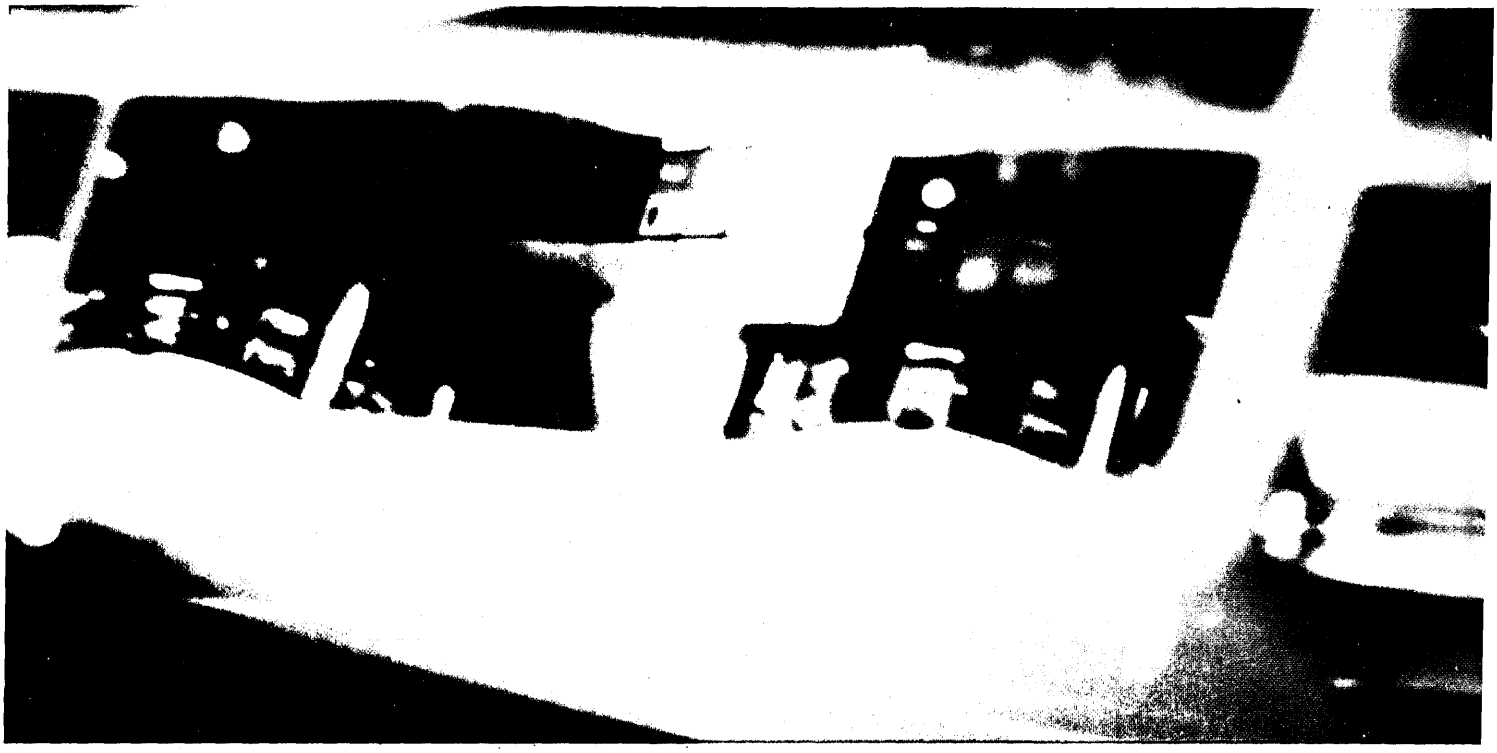
Almost all company data are maintained on the large mainframe, and there will be an overwhelming need to interface the micro to the mainframe. Even if the micro and mainframe are made by the same manufacturer, this is not an easy job. It is a job that will be the responsibility of data processing. In other words, it is a high-priority task that must be added to the formal backlog.

The micro will have a significant effect on items on the hidden backlog, and will become an important part of a company's computing resource. Such use, however, will add two large tasks to dp's list of things to do: the interface to the large mainframe and the request for more data. The micro, in attacking the hidden backlog, will make the formal backlog even worse. The micro will be like Los Angeles freeways whose very efficiency encourages commuting and generates more traffic than they were designed to handle.

For micros to be truly useful to a company, they must be tied to the large mainframe. This problem is just beginning to be addressed. Right now micros are useful but limited, and they'll stay that way until we're better able to connect them with central computing resources. ❋

Gary Brown is vice president of Crwth Computer Courseware, Los Angeles, Calif. He is the author of five books: *Beyond COBOL: Survival in Data Processing; System/370: Job Control Language; System 360: Job Control Language; Advanced ANSI COBOL with Structured Programming;* and *Surviving with Financial Applications for the Computer.*

Don Sefton is an independent consultant in Los Angeles and coauthor of *Surviving with Financial Applications for the Computer.* He has worked for Software Support Services, the Rand Corp., and United California Bank.



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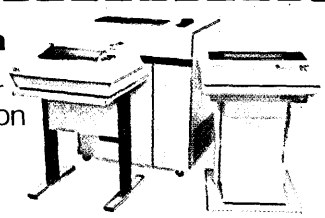

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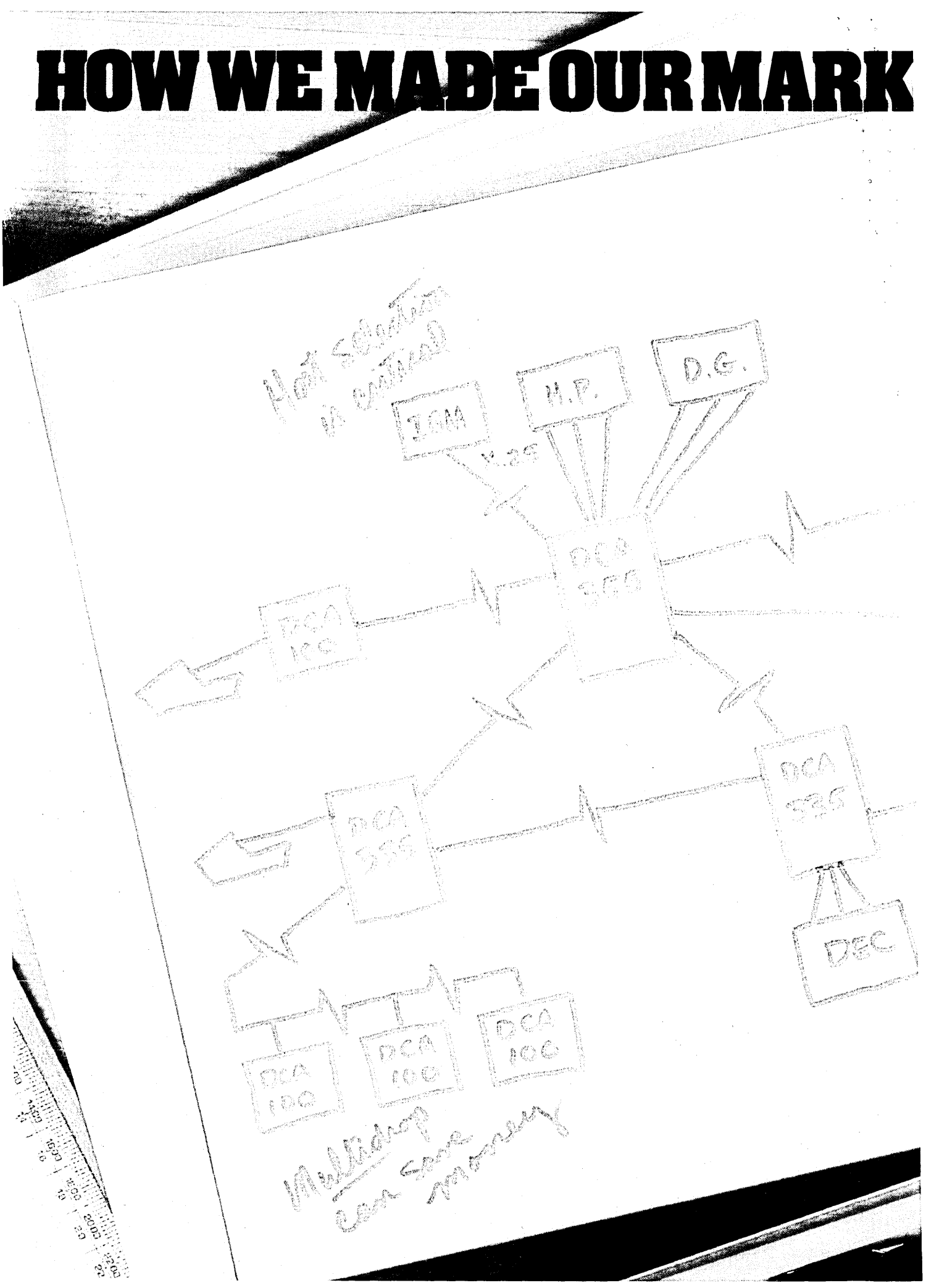

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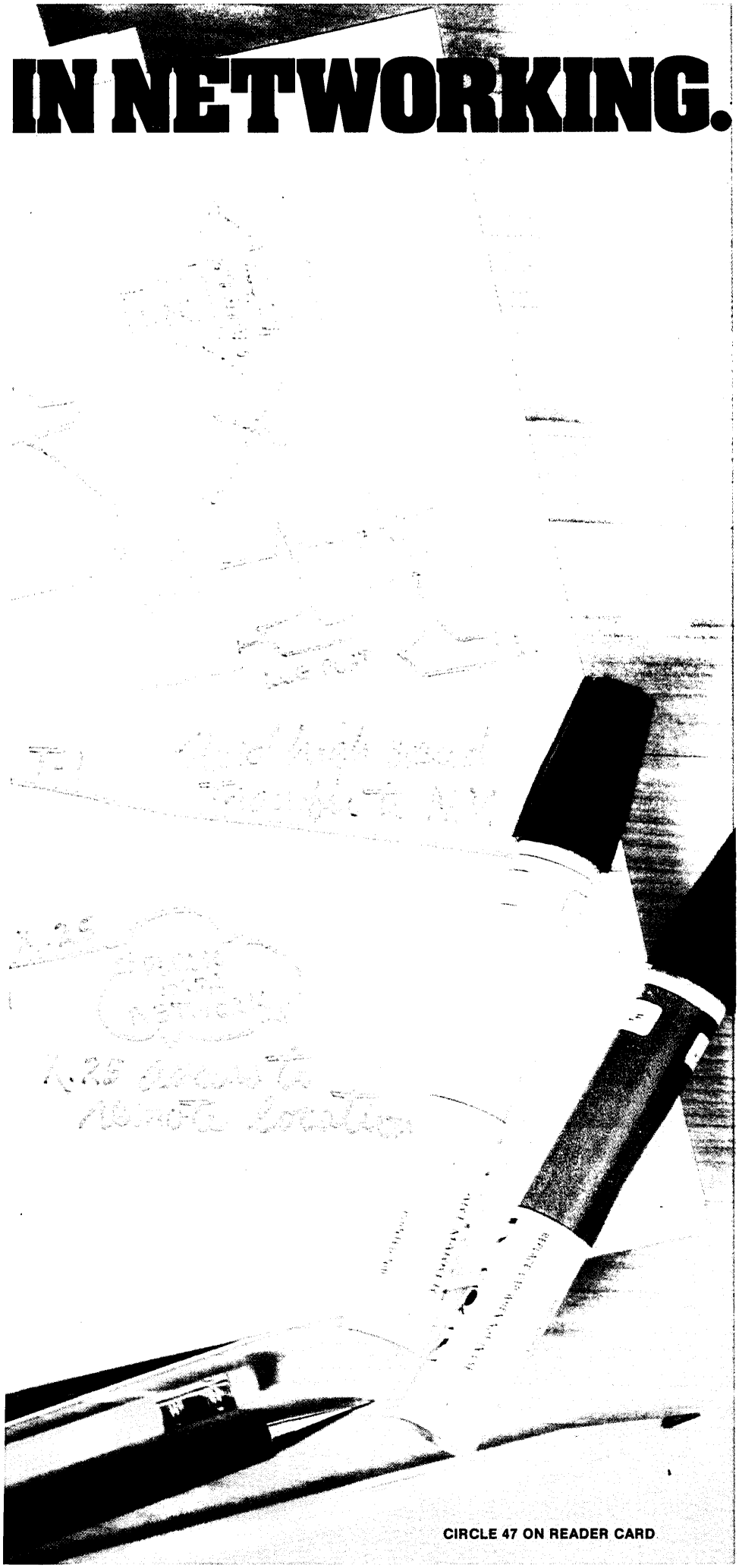

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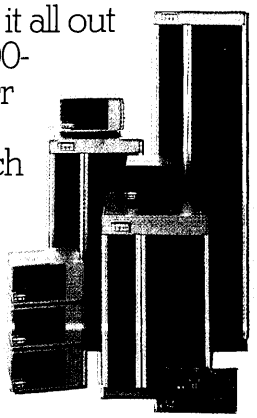

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Morgan Stanley makes money the newfangled way: with systems developed in very high level languages.

COBOL DUMPED

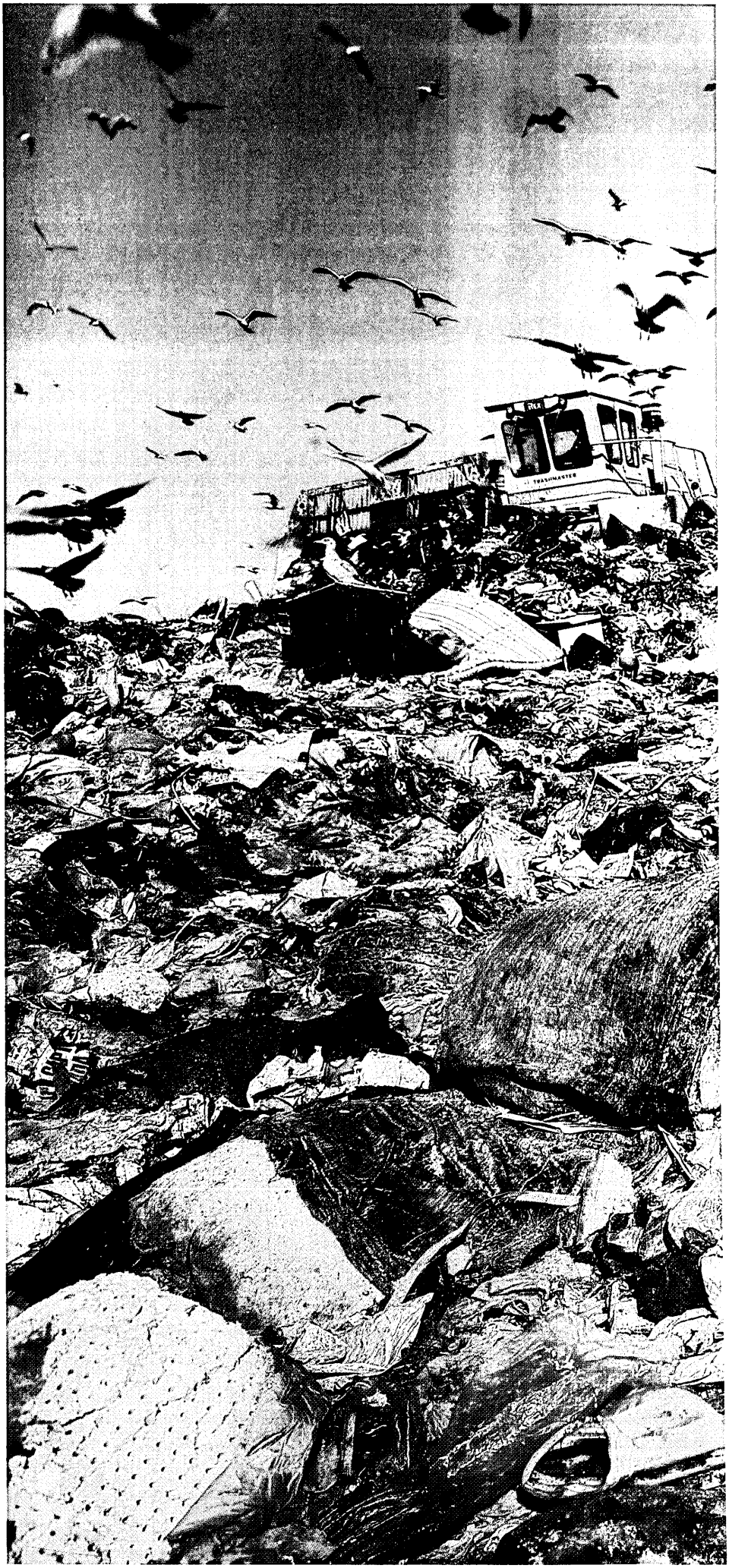
by Scott G. Abbey

Application development is a major problem for many firms, especially those that rely upon information systems for growth and profitability. Many MIS departments have application backlogs of two or three years. Even more significant may be the hidden backlog of applications that users haven't yet asked for or have decided to do without because of the time, expense, and delays in getting work out of MIS. Morgan Stanley, a New York–based investment bank, has attacked this problem with a combination of remedies, including fourth generation languages, an intensive management training program, and MIS policies that encourage productivity.

The main reason that our MIS department has been able to move aggressively in these areas is its relationship with the firm's management, which strongly supports and encourages our efforts. In turn, MIS reports to a user committee that sets application development priorities and budgets.

Morgan Stanley was formed in 1935 when four members of J.P. Morgan & Co. resigned to form an investment banking company, an activity the Glass-Siegel Act had made illegal for commercial banks. The firm concentrated its efforts on underwriting the largest issues in both the public and private sectors, and remained for many years a small organization, growing only to 18 partners and $18 million in revenue by 1971. During the late '60s and early '70s, the firm began a 10-year period of high growth. New businesses were developed internally and by acquisition: real estate development and management, asset management, stock trading, stock borrow and loan, etc. The firm currently has 62 partners, 2,300 employees, $125 million in equity capital, and 1983 revenues in excess of $300 million. It remains a leader in the underwriting field, is a major factor in many mergers and acquisitions, and accounts for a significant percentage of the dollar volume traded on the New York Stock Exchange (though representing a very small portion of the number of transactions).

Morgan Stanley installed small busi-



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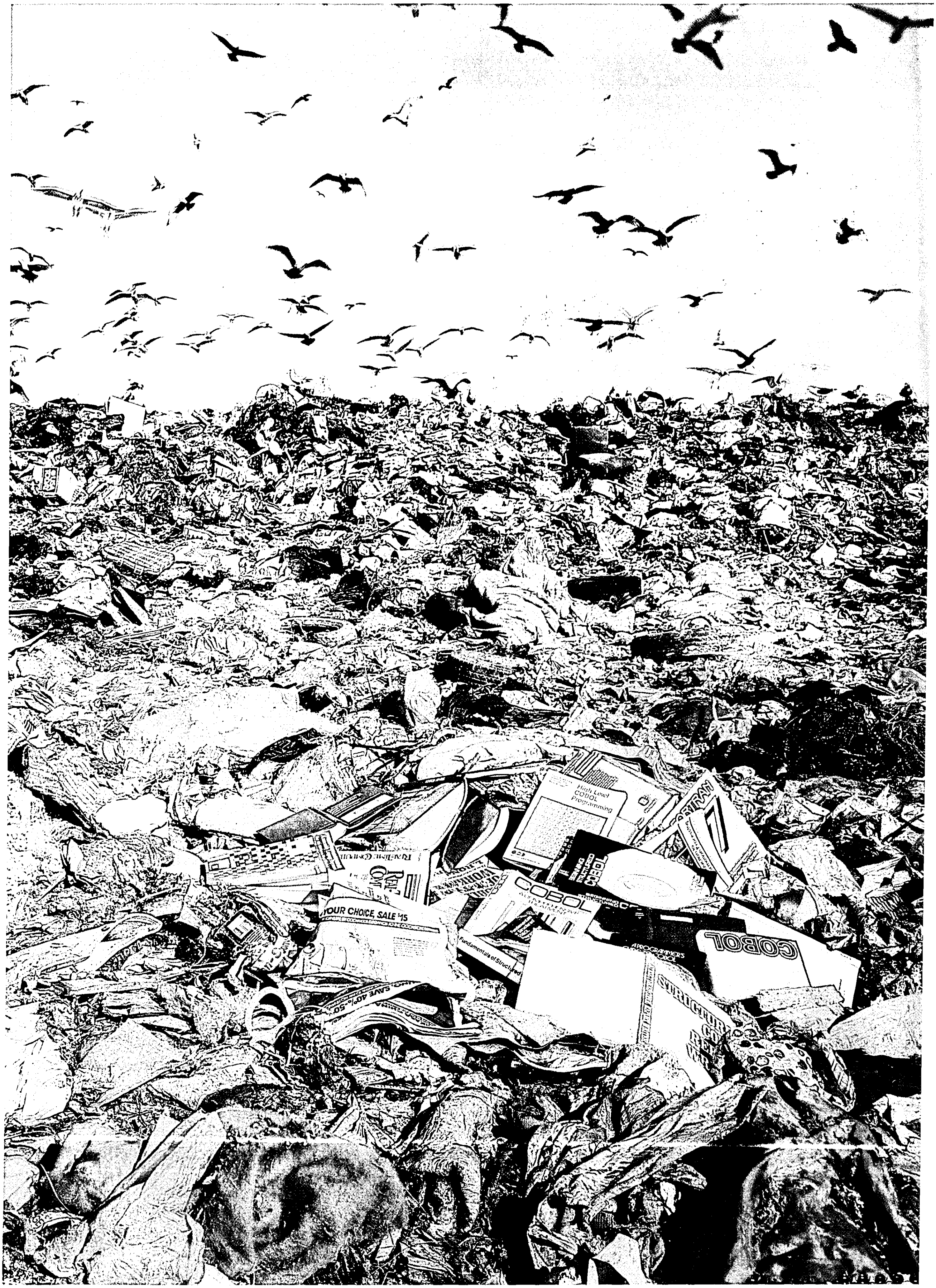
High Level COBOL Programming
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Many installations encounter significant resistance among their technical staff when VHLLs are put to use.

ness computers in the early 1970s in order to perform the bookkeeping associated with running a business as well as the accounting required of all stock brokers. Starting with a System/3, the firm grew into a 370/138 by 1976. The data processing activity, however, remained purely back office bookkeeping with no strategic impact on the firm, either in its daily operations or planning activities.

In the late 1970s, Morgan Stanley's management realized that MIS had to become an integral part of its business. Investment banking is an information-intensive activity, and the industry was becoming increasingly competitive. New management was brought into MIS and given a mandate to implement the firm's strategy of "leveraging people with technology." A number of initiatives were begun, including:

- Significant upgrades of the hardware plant (see Fig. 1);
- Design and implementation of a management training program that would ultimately eliminate all professional hires and serve as the source of MIS management;
- Stabilization of the existing processing systems, which were patched so they could survive the next several years;
- Implementation of a new on-line processing system to replace the bookkeeping systems and provide appropriate management information for the firm;
- Use of very high level languages for all systems development and procurement of adequate hardware for development and operation of applications (see Fig. 2).

FIG. 1

MIS RESOURCES

	1/1/80	1/1/81	1/1/82	1/1/83	(Est.) 1/1/84
Systems development head count	46	60	85	81	82
MIPS	1.6	3.0	19.8	34	51
DASD Mbytes	10,400	11,280	40,010	96,030	119,208

FIG. 2

HARDWARE RESOURCES PER SYSTEMS DEVELOPMENT STAFF MEMBER

	1/1/80	1/1/81	1/1/82	1/1/83	(Est.) 1/1/84
Systems development head count	46	60	85	81	82
MIPS dedicated to SD	.4	1.0	3.6	8.2	11
MIPS per staff member	0.009	0.017	0.042	0.101	0.134

FIG. 3

PRODUCTIVITY COMPARISON

Language	COBOL	Natural
Organization	IBM	Morgan Stanley
Staff level	Senior Programmers	Trainees (2 yrs. exp.)
Raw lines per month	600-800	1,250
COBOL-equivalent Lines Per month (Natural = 2 × COBOL)	600-800	2,500

NOT AN OVERNIGHT DECISION

The decision to do all systems development in very high level languages (VHLL) was not an easy one, and wasn't made overnight. Experimentation started in the late 1970s when APL was used in a number of analytic applications. The company was fairly successful in making data available to the end users via a number of tools, including APL-DI (the APL data interface product from IBM) as well as tools built at Morgan Stanley.

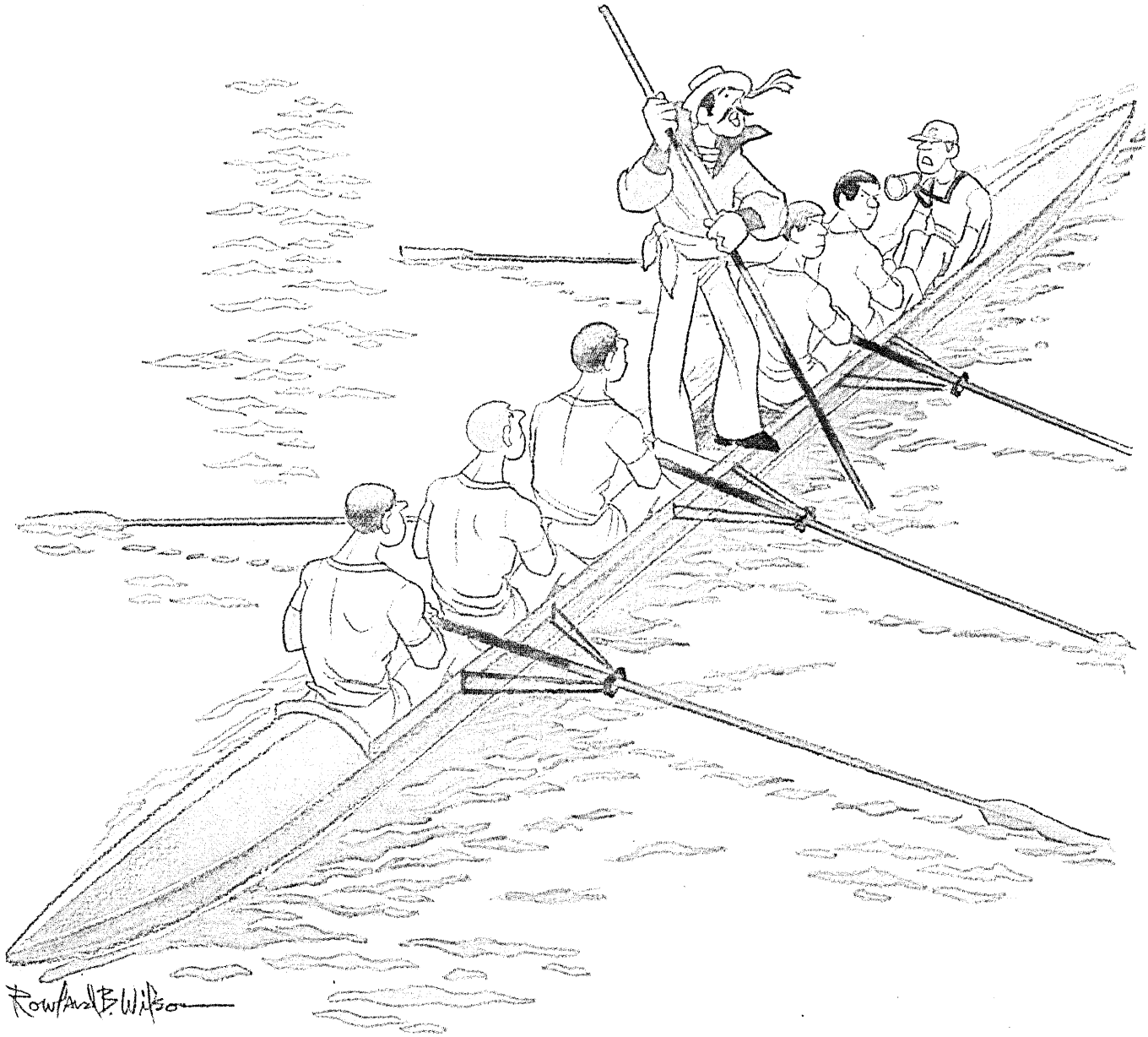
It was obvious, however, that APL was not the appropriate vehicle for building transaction processing systems or large, on-line databases. ADABAS had been installed in 1978 to support the first on-line applications, which were basically keypunch machine replacements. There were not any true database applications running. The cost and complexity of developing these applications in assembler (which was the standard for on-line systems) were too great, as was the cost of running the applications on the limited hardware available.

In an effort to improve our productivity in building these on-line applications, Natural was installed on a trial basis in 1980. There was the usual programmer resistance, and for the usual reasons: efficiency, flexibility, "I can do it just as well in assembler." The pilot applications nevertheless proved highly successful. In early 1981, an order entry system was implemented at a very low cost, using virtually no formal specifications.

Following the success of the pilots, other applications were begun using Natural, and before long MIS management decided to use Natural for all database and transaction processing systems—both on-line and batch. The decision raised two main difficulties: potential resistance from the programming staff, and insufficient hardware performance and capacity.

Note that APL continued to be used; in fact, its use grew tremendously during the same period and continues to grow today. Its applications are in sophisticated financial and analytic models, while the Natural/ADABAS systems are oriented toward transaction processing. MIS also will buy packages or services where appropriate. For example, we use a commercially available general ledger package, and our payroll is run by a bank. There is essentially no COBOL, assembler, or PL/1 development done at Morgan Stanley. All applications are developed using either Natural/ADABAS or APL.

Many installations encounter significant resistance among their technical staff when VHLLs are put to use. Despite their role as agents of change for the rest of the organization, technical people often turn out to be very conservative in their approach to their own work. The usual recommendations for overcoming this resistance include a small yet highly visible pilot system, proper education of the staff, and high-level management support. Morgan Stanley did all of these but



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Technical people often turn out to be very conservative in their approach to their own work.

added two significant factors to the mix.

First, the management training program began to recruit liberal arts graduates directly out of college. These people typically have no prior computer training or experience, and therefore no preconceived notions of how systems should be built or which languages should be used. The training they receive teaches them Natural and exposes them to the development techniques we have evolved at Morgan Stanley. They don't know any other way to develop systems, and are frankly amazed at the speed at which they begin to develop applications using Natural or APL. In fact, we have found that they often tend to write better programs, and sooner, than a more experienced person who attempts to write COBOL-type programs using APL or Natural. The latter just doesn't work.

The second factor is an outgrowth of the management training program. An up-or-out policy exists for all systems development staff. People are rated on a quarterly basis, and the lowest ranked are constantly culled as the trainees move in to take their places. This policy, combined with a strong management directive making APL or Natural the standard languages unless an exemption was granted, brought the staff around and forced obstructionists to leave.

These techniques are probably not appropriate for many organizations. But, the insistent management directive can be applied in most places, along with the usual training and pilot project approaches. Removing the decision from staffers and forcing them to justify alternatives makes them more likely to use the available VHLLs. In addition, frequent evaluations of productivity (i.e., how quickly people get their projects done and whether they are on schedule and budget), encourage them to use the most productive tools at their disposal.

OBSTACLES TO USE OF VHLLS

One of the obstacles that vendors of very high level languages have had to overcome is the perception that their products don't make efficient use of machine resources. The situation is comparable to that which existed when languages such as COBOL and FORTRAN were first introduced. At that time, the old guard insisted that programming should be done in assembler, because it was more efficient and the compilers for the new languages could not generate code to keep up with handcrafted assembler programs. COBOL and FORTRAN eventually won out, since the benefit to the user of getting the application developed more quickly in COBOL far outweighs the extra cost associated with running it. In addition, most of today's applications are heavy users of system services (I/O, paging, etc.). The cost of using these services is the same for using a COBOL program as it is for an Assembler program.

A similar argument holds true when one compares a very high level language such as Natural or APL with COBOL. It is our experience that most database application programs spend upwards of 80% of their time using the services of the database itself. Even if you could cut the remaining 20% in half by coding in COBOL rather than Natural, the savings would be relatively small. Furthermore, the additional cost incurred in testing and debugging a COBOL program probably outweighs the cost of executing the Natural program.

Another objection commonly made against VHLLs is the fact that, once introduced into a shop, they cause computer use to grow at a rapid rate. This is because the systems development group can try out applications much more quickly. If your hardware planning had assumed production of four applications per year, and instead you have to deal with eight, then you will indeed find yourself short of hardware. But this is a problem caused by success, not failure. What MIS has to do is anticipate the type of hardware it will need to provide the firm with a higher level of computer support.

Several years ago, Morgan Stanley was concerned about whether Natural was less efficient than COBOL for batch jobs. To test this, we selected typical Natural and COBOL programs. The Natural program was to be recoded in COBOL and the COBOL program was to be coded in Natural. The run times of the four versions of the two programs would then be compared. The COBOL program was recoded in Natural, and the run times turned out to be identical. The Natural program never got recoded in COBOL because it was too difficult; everybody lost interest very rapidly.

MEASURING WORK IN MODULES

We have made some rudimentary efforts to measure the productivity of our systems development unit, which produces the majority of our transaction processing systems. The major measured unit of work is the module—a single Natural program that typically corresponds to a single on-line screen. Of course, some modules maintain more than one screen, some screens require more than one module to process the data, and some modules are batch programs and therefore have no screens at all. But we have found that the work necessary to produce a module is fairly constant. In 1982, the average was created in approximately four person-days.

This is a fully loaded cost: administration, systems analysis and design, coding, unit testing, system testing, and implementation are all included. The average Natural program in this environment contains 250 lines of code, thus yielding approximately 1,250 lines of code per person-month, or about 62 lines a day. Using the conservative estimate that one line of Natural is equivalent to two lines of COBOL, we wind up with 124 lines a day or 2,500 lines a month.

The traditional number of 10 to 20 lines of debugged code per day has been quoted since the early 1970s. We exceed this by a factor of 10 to 20. Two years ago, in a sales presentation, IBM reported that senior programmers in its Federal Systems Division were producing 600 to 800 lines per month. The figure did not include administration and preliminary analysis. Our management trainees, with an average of two years' experience, exceed this by a factor of 3 to 4. These figures are summarized in Fig. 3.

Despite these impressive numbers, we are still not satisfied with the productivity of our staff. Morgan Stanley is committed to improving the productivity of its entire pro-

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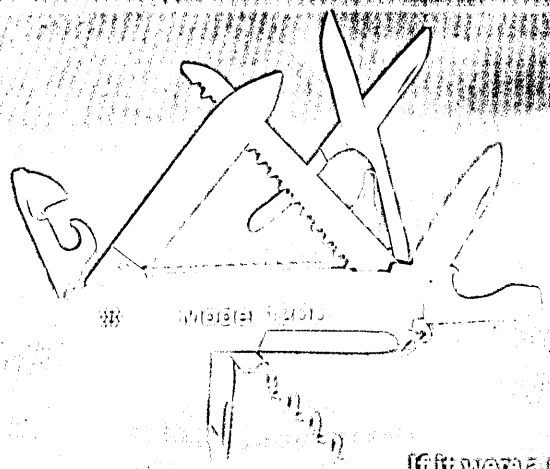

If it were a pocket knife it would look like this.

The COBOL program got recoded in Natural, and the run times were identical.

fessional staff. MIS is attempting to lead the way by building better tools for both the business units and the systems development staff. Some of the more interesting things we have done (and will continue to do) to improve systems development include:

• The creation of tools that enhance the capabilities of the data dictionary for database and system documentation and management. We don't understand how anyone can run a major systems development organization without a powerful data dictionary.

• Development of tools that generate programs. In most cases, these tools will of course be written in either APL or Natural. We have a number of tools aimed at end users, systems development staff, or both that use the data dictionary and high-level user specification of processing needs. They do so either through menus or a very concise language designed for the purpose, and they generate real live Natural programs.

We can generate programs that produce sophisticated reports with complex selection logic and database updates, including full validation of fields based on data dictionary rules.

• Formalization of our current systems development methodology, which runs contrary to the structured design/structured programming approach. We do not do detailed specification documents for application systems. We have found these to be costly to produce and only marginally useful in the actual development of the system. Instead, we foster an extremely close relationship between the systems development staff and the business unit people and develop the programs according to verbal agreements between the groups. Since the person who works with the user is typically the same person who actually develops the code, there's no need for him to write down on paper what is in his head and then translate that into a program. Instead, he can develop the program and demonstrate it to the user. This approach is feasible because a VHLL such as Natural or APL makes it cheap to write and modify programs.

The program generator and data dictionary tools we are developing will enhance this technique. We have had applications where programmers used preliminary versions of these tools to produce programs for on-line inquiry and update at the rate of four programs per day.

Morgan Stanley is firmly committed to developing applications with the highest level languages available. In the future, we expect MIS to become primarily a data administration and operations organization. The use of APL, Natural, and other tools we plan to develop and acquire will make it possible for end users to develop 90% of their applications, at a lower cost to the firm than if MIS had to do it. For us, the information center is not a small component of MIS but the essence of what MIS should become. We are part way there, and plan to go the rest of the way. ✱

Scott G. Abbey is vice president of data administration at Morgan Stanley, responsible for operational support of the data center, database and design support for new applications, and improvement of programmer productivity. Prior to joining Morgan Stanley in 1981, he was director of computing for the Rockland Research Institute. He has a PhD in computer science from the State University of New York at Stony Brook.

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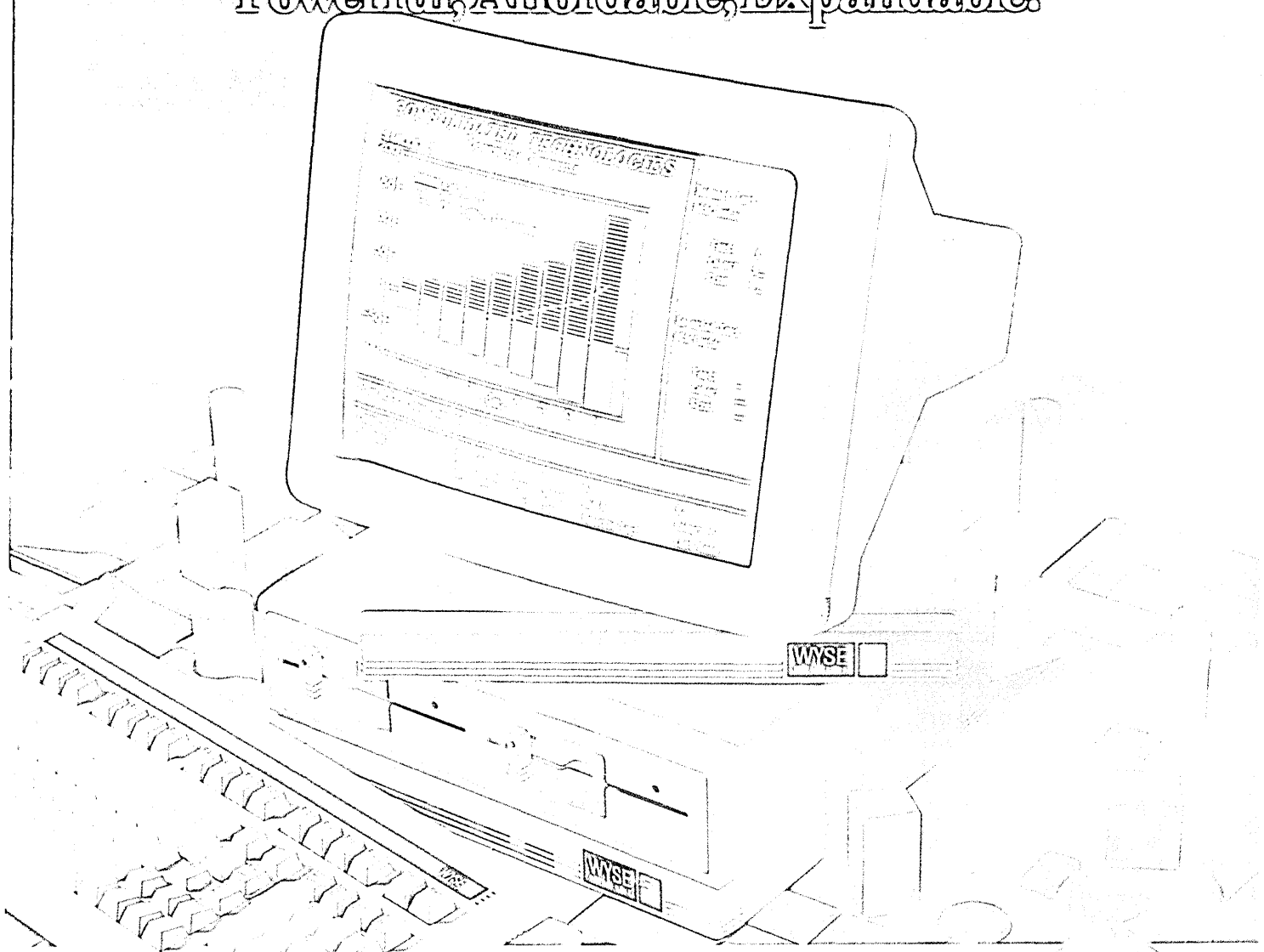

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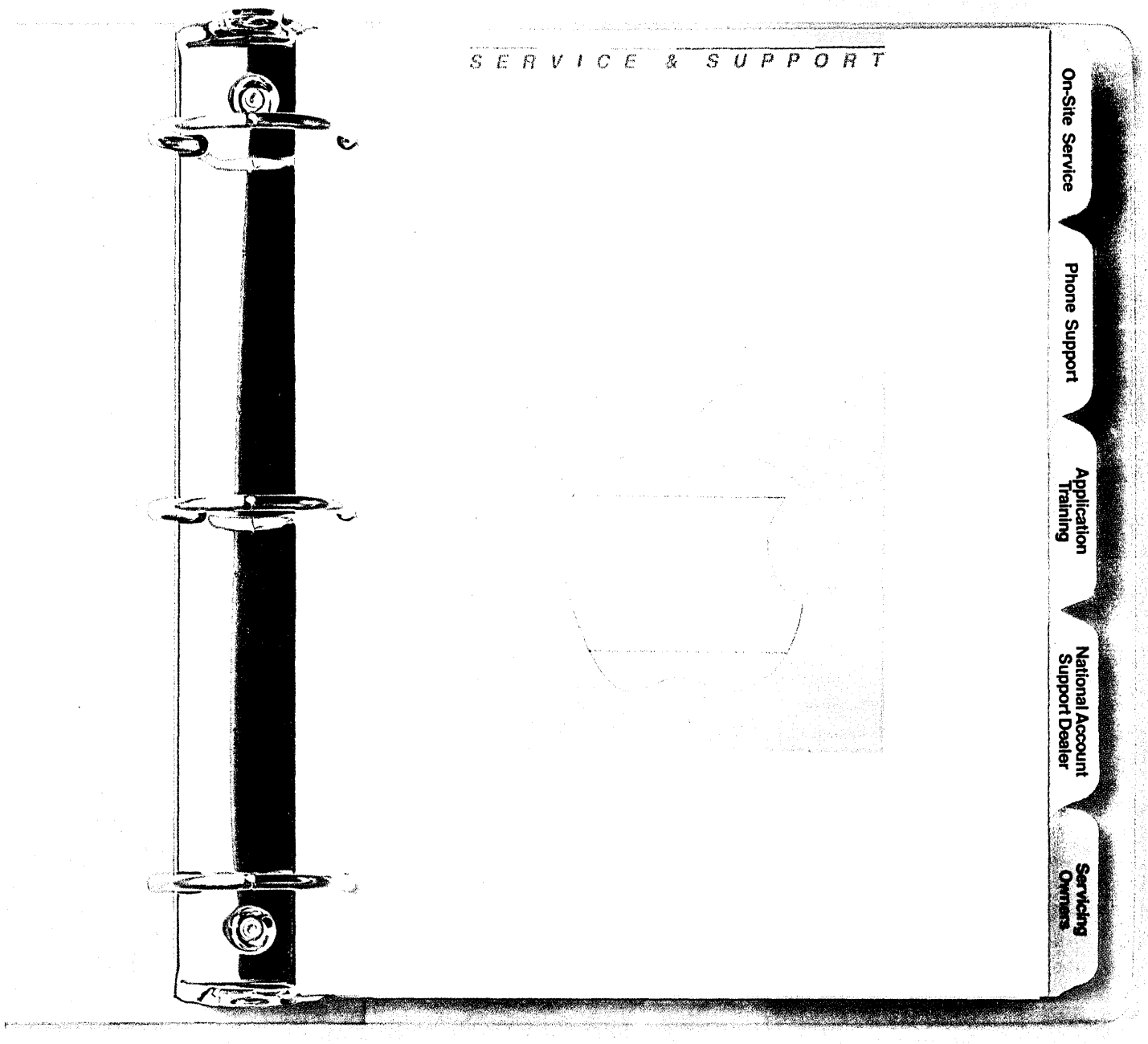

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How telecom managers are learning to cope with the AT&T divestiture.

DIALING DILEMMAS

A DATAMATION staff report

Jan. 1, 1984, will go down in the history of telephony as D day, the official divestiture day for mammoth American Telephone & Telegraph Co. This month, the monopolistic Ma Bell era ends, giving way to the age of competition, and users everywhere must learn to cope.

While many users were positive about the long-term benefits of breakup, some of AT&T's corporate customers regard the breakup as bad news. They fear the worst as they watch line and service costs rapidly increase, especially at the local level. "I don't see the overall costs to the consumer coming down, and that, I believe, was the intent of the action in the first place," contends Bob Best, vice president, corporate data systems department, Toyota Motor Sales USA. "I don't believe there's any great advantage [in a breakup] for industry."

Several users estimate overall costs to increase 15% to 30% each year. The largest increase, an estimated 70%, is expected for calls within the local access transport arrangement (intraLATA), which is a geographic area within which the local operating company is king. Long distance carriers are permitted to carry traffic between LATAs, or

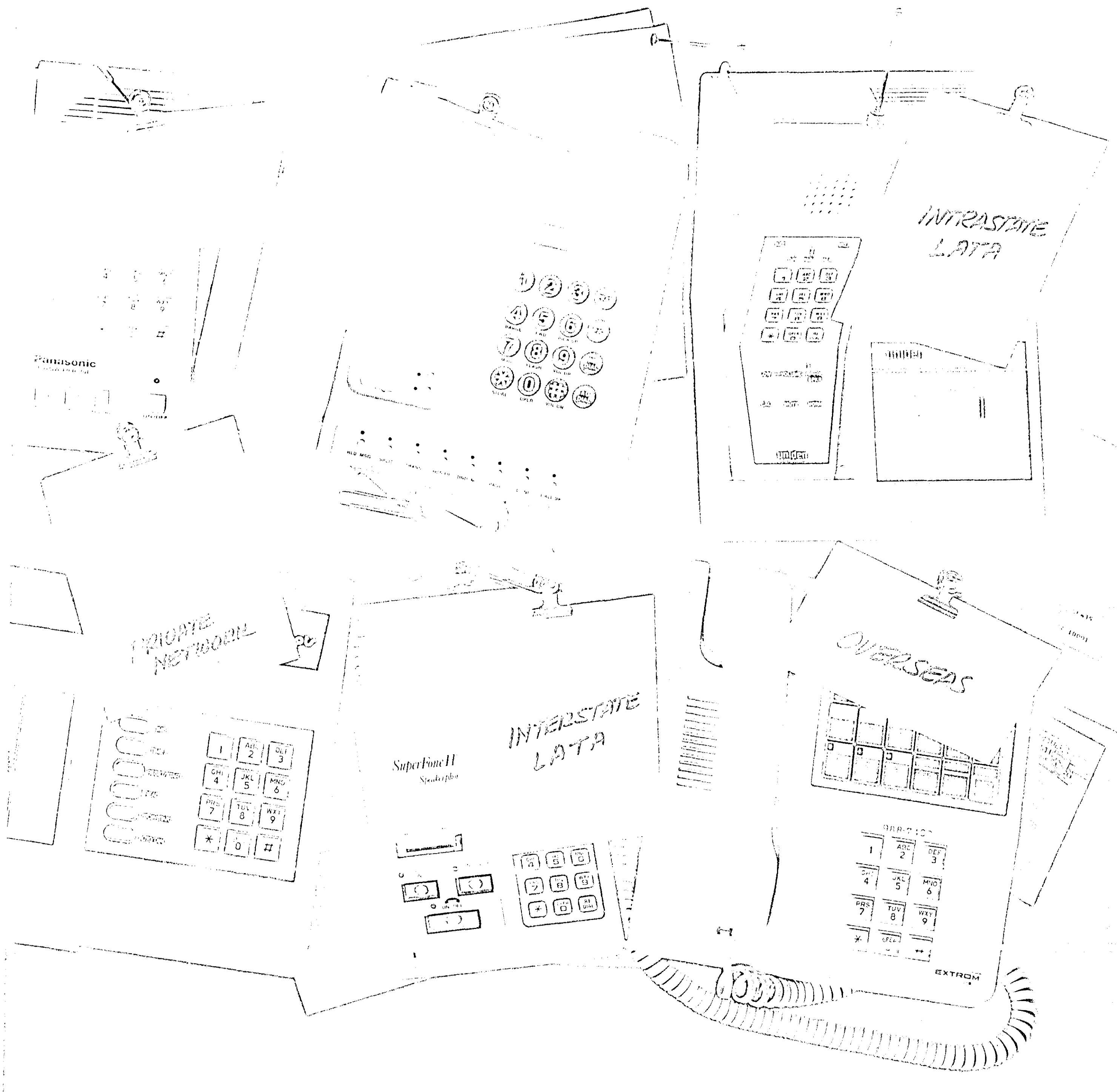
intraLATA. Within the geographic boundaries of one area code there will be at least one, and often two, LATAs; there are 160 LATAs resulting from divestiture.

Meanwhile, costs for long-distance lines and wider bandwidth circuits are expected to decrease. Digital dataphone service (DDS) charges, for instance, are expected to decrease by 35% to 40% when the new tariffs are approved in April. Analog circuits are heading up, though. Bills for peculiar but common long-distance circuits that look like local calls, known as foreign exchange lines, are also heading through the ceiling, so companies everywhere are dumping this service as quickly as possible.

Tymnet is replacing its foreign exchange lines with a new product called the Microengine, a tabletop version of Tymnet's packet-switching node. It was developed specifically with that purpose in mind, says Alan Zucchino, vice president, network support and operations.

Faced with a baffling array of answers instead of a simple "Call AT&T," telecommunications cost containment is now a much more complex project than simply sending out a memo warning against personal calls to Timbuktu. "With selected procurement, good network management, and planning, I hope to see a very small increase in total cost," says John Dewey, manager of carrier relations, GTE Telenet. Other telecom users less well equipped to measure service and hardware against costs will not be able to adequately manage telecommunications.

Dewey expects a big increase in the number of bills received each month. "Currently, we receive 1,200 bills a month from telephone companies that include everything we deal with," estimates Dewey. "After divestiture, the fact is one of those phone lines could turn into three separate bills—one from the local telephone company at each end of the line as well as another for the long-haul



Looking for a long lost lover: some companies want the local telco to act as their comm consultant.

portion. That is a potential problem for us if the Bell operating companies do not reference the original circuit. We hope to know which bill goes with which circuit."

In practice, Telenet's Dewey does not anticipate being flooded with 3,600 bills since Telenet will use AT&T as its agent for long-haul service. Dewey acknowledges, however, that "AT&T has not agreed to be agent in total."

The AT&T-as-agent approach, currently a popular option for many companies, is bound to run into trouble, predict several users. Competitive pressures building between AT&T and its former subsidiaries, the local telephone companies, may make one-stop telecommunications management a thing of the past.

"There seems to be some real antagonism developing between the Bell operating companies and AT&T," observes Zucchino of Tymnet. "I think the BOCs feel like the poor sisters who've been cast out, and there's probably some truth to that." He's heard AT&T information systems people, those in charge of customer equipment sales, make derogatory comments about people at AT&T communications, the Long Lines operators, and vice versa. "There's no question but that the organization is in great turmoil. It is not the monolith it once was, and as of Jan. 1, it is even less of a monolith."

EVERYONE IS CONFUSED

Art Landman, assistant vice president, computer and communications services of Pacific Southwest Airlines (PSA), San Diego, says everyone is confused. "People don't know what they are supposed to do. There's an inability on the part of the reps of the local companies and AT&T to give information. They are as much up in the air as we are." Almost everyone, he points out, is having a hard time keeping up with all the tariff changes.

Telenet's Dewey contends that the confusion is more localized. AT&T Information Systems (ATTIS) appears to have the worst case of confusion. "We've dealt with four account executives in the last year," Dewey notes. The groups associated with AT&T Long Lines seem to be better organized. They appear to be operating in "post divestiture mode," he reports, and claim to know little about the operating companies.

He depicts the local operating companies as "well informed," "aggressive," and "ready to deal with their customers directly." He singles out Pacific Telephone and Telegraph, San Francisco, as being well along the market savvy learning curve, but notes that of the seven regional holding companies, PTT has always been more independent. Pacific Telesis, as it is now called, is one of only two operating companies to inherit its own region, and is accustomed to working as a regional team. The other regional holding companies are comprised of several operating companies thrown together and still learning how to work under one head, says Dewey.

Another MIS executive, who is responsible for communications and computer technology for a large New York insurance company, says that in her experience AT&T and the liberated telcos are willing to work together. The local telcos are not "pressing to eliminate AT&T as middleman. They don't seem paranoid," she flatly states. "But things will get more complicated and chaotic this year."

In contrast, other MIS managers believe the telcos are not yet ready to deal directly with their customers. "Rather than deal with the telephone companies directly, we continue to go through AT&T for all our [leased line] needs," says a voice comm specialist with a large New England bank who is a former Bell System employee. "This hasn't helped us yet. We still can't get due dates on leased lines. It looks like you can't rely on AT&T's clout with the phone companies anymore." She is not ready to write off AT&T, though, calling it "premature" to talk of dealing directly with the phone companies because their new managements are not fully settled in.

NOW IT'S PLEASE DO IT

Tymnet is also taking steps to work with the local telcos because it can't rely on Ma Bell anymore. "AT&T's national account team just won't have the kind of clout it has had in the past," explains Zucchino. "Before, AT&T was able to tell the operating company, 'Do it.' Now it's, 'Would you please do it.' "

Tymnet secures a lot of circuitry from AT&T Long Lines, remarked Zucchino, "but there is also an awful lot of the short-haul stuff and dial-up ports, which of course are the domain of the BOCs. Dealing with local companies, lining up the dial ports and short-haul lines, that's where AT&T's account team provided a lot of help," says Zucchino.

Also thinking ahead is John Edloff, manager of communications, ConAgra Inc., Omaha, Neb., with a scheme that resembles a search for a long lost lover. "We want to coordinate with US West," he says. US West, based in Denver, is one of seven regional holding companies that manages the former Bell operating companies that reside within regional boundaries. "We want to sign a letter of agency with all seven holding companies making US West our agent. Then US West could fight the battles with the other six companies," says Edloff, whose goal is to deal with only one vendor. Just like the good old days. The service would be offered by US West for a fee, of course. Watch for other regional telephone companies to evaluate similar agent services.

Not everyone is looking for a girl just like Ma Bell. Many companies are like caged creatures set free, racing around, sniffing all the vendors and their wares, looking for the best fit for their needs. Few want to go back to captive status under Ma Bell.

One industry source, a telecom manager with a large Midwest company who has been in the business for 12 years, was particularly outspoken on the issue of Ma Bell's level of service. "They had taken the posture of a monopoly, although some employees tried to work their way out of that," he says. "But generally, it was so ingrained for them to think 'We're the best. You have to come to us,' that it's made their priorities different."

As a result, Bell dropped the ball in two places, he suggests. One was the technology ball, which fell with a thud when the company failed to debut the first good digital PBX, despite possession of the fabled Bell Labs.

The grounder through the legs was the service ball. Getting a line repaired has been a particularly aggravating experience for the Midwest telecom manager, especially since the mid '70s. "We had to keep calling for repairs on the same circuits," he cries. "They weren't being fixed. It costs a company money to have a guy sitting around, waiting for the telco guy to show up and repair the line."

Since the breakup, service and repair have worsened, according to some users. "There has been a lot of finger-pointing on the repair side, leading to delays," recalls the telecom specialist with a New England Bank. "I'll often get four different people, each saying it's not his domain. It's getting harder to find the right person responsible for repairing a circuit."

The local loop was the source of problems for many users. Switching from one long distance vendor to another, as from Bell to MCI, for instance, doesn't help—it's still the same local loop and the same operating company servicing that line. What does help is building a network that bypasses the local loop.

Bypassing the local Bell company is not a threat but a current reality for the local telcos. It's driven by user desire to be in control of service and costs. One Wall Street prediction is that 40% of the telco traffic is going to migrate from Bell. The telcos confirm that migration is growing, often in the form of microwave systems or shared satellite links. Cable companies are also considered a prime participant in the bypass

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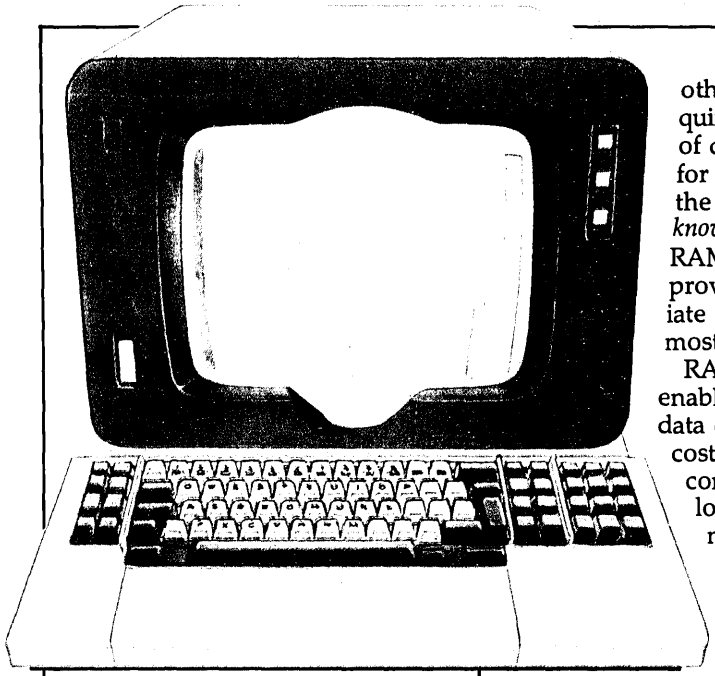

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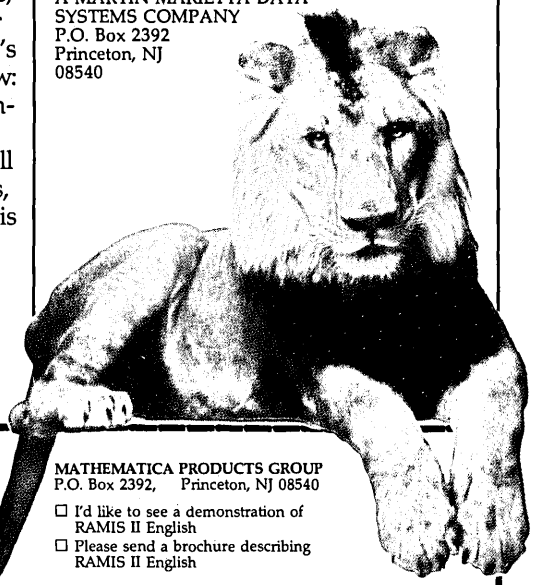

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CIRCLE 51 ON READER CARD

Four good reasons to bypass the local company: quality, control, backup, and costs.

business (December, "Avoiding Local Loops," p. 50).

Old hands Tymnet and Telenet are also investigating bypass technologies, mainly as a refuge from rising costs. They claim to have suffered little damage from the multivendor, finger-pointing confusion. They both monitor their networks with sophisticated network control centers, capable of pinpointing a malfunction down to the modem. For those building or operating multivendor networks, the message from Tymnet and Telenet is clear: invest in competent network monitoring equipment.

There are four good reasons for going bypass, advises the Midwest telecom manager. Consistent, high-quality service is important, but he emphasizes control as critical. "If one of the circuits does go down you can fix it in an hour or, if it is not urgent, wait until tomorrow," he notes. "But it's a business decision, not a supplier's decision. The third reason is to be able to plan for backup and have the ability to build in extra slots. "When I need to grow I can grow overnight," he explains. "Fourth is that you can save a heck of a lot of money, and that's assuming there are no rate increases."

For example, in September 1980, the Midwestern telco manager installed a $150,000, 24-channel, dual tower microwave system with 16 voice channels, 2 data, and 6 reserve. "My real payback came in about two and a half years," he estimates.

There is a price to pay, though. Managing a network is not a trivial task. Communications managers must become asset managers. They must do cost analysis, planning, and, adds the Midwest bypass veteran, "they will have to learn how to be public relations men for their function and how to be salesmen for [bypass] projects."

Installing a bypass loop means that the organization has taken on the responsibility of owning and operating its own telephone network. "You take over the responsibilities that Bell had—or that somebody had—to keep the network running smoothly," emphasizes the Midwest telco manager. "The good news is that you are rid of those guys and all their screw-ups. The bad news is there's no place to point the finger but at yourself."

KEY TO BYPASS SUCCESS

Staffing is key to a successful bypass project. Without the talent to plan, implement, and manage a network, it is unwise to continue the project. "You become a little telco, and that's a lot harder for a company in the bottom half of the Fortune 500 than it is for one in the top half," says the Midwest telco manager, whose company is in the top half.

Don't look to a bypass loop to bypass the access charges due to be passed sometime in April. While most users are resigned to the reality of paying surcharges, many are on edge about the size of the surcharges and who will set them (see "Survival of the Swiftest," p. 129). A worst-case scenario for those operating a bypass system would include a surcharge higher than the cost of the tie-line it replaces. That would effectively stifle the migration threat, but raise serious questions about the government's professed dedication to open competition.

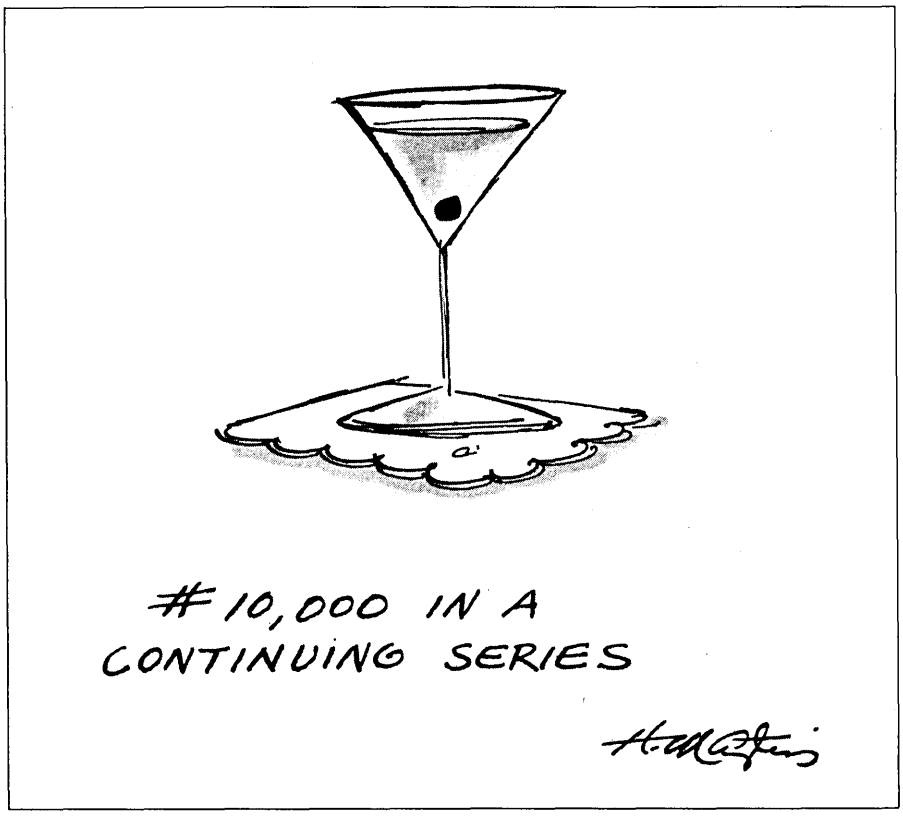
Was the breakup a good thing? Not for some companies, for whom it seems to loom as a dark cloud of problems. "It would be much better if it hadn't happened," says PSA's Landman. "I'm all for competition, but this is the worst decision ever made in the antitrust world. From the user's standpoint, it will be much more difficult to deal with numerous companies, each one fighting with the other, competing with the other. We know we're in for increased costs, increased problems with reliability, and increased difficulty in getting the service we want. Oh, we'll get service, but coordinating it and implementing it will be a big problem."

For others, AT&T's monolithic presence was the dark cloud. They claim AT&T had gotten too powerful and that legislation was the only relief. The problem, as the Midwestern telco manager recalls it, was that Bell thought it had the market cornered. Ma Bell was motherhood and apple pie. As absolute power corrupts absolutely, Bell started to use its size and power in anticompetitive ways. "It used a lot of shabby techniques in the 70s," contends the Midwestern telco manager. "It exercised influence on boards of directors to prevent people from going with interconnects. The philosophy was 'Get the communications manager in trouble and that'll solve that.' The government had to legislate AT&T out of being a monopoly because the marketplace couldn't handle it. They had gotten too powerful."

THE SUN THROUGH CLOUDS

Now, with the breakup, it's as if the sun had broken through the clouds. "I've been waiting for it for years," remarks Carl Reynolds, vice president, communications and data processing, Hughes Aircraft Co., Los Angeles. "We are already seeing a more responsive Bell System than we've ever seen before. It'll be a lot of work; it's a big change. Things will be disjointed. But in the long run things are going to be a lot better."

Among the benefits to come out of the breakup are the immediate influx of new technology and, over the long term, price competition and better cost controls now that the telcos are required to price their services according to their true costs. That's why tele-



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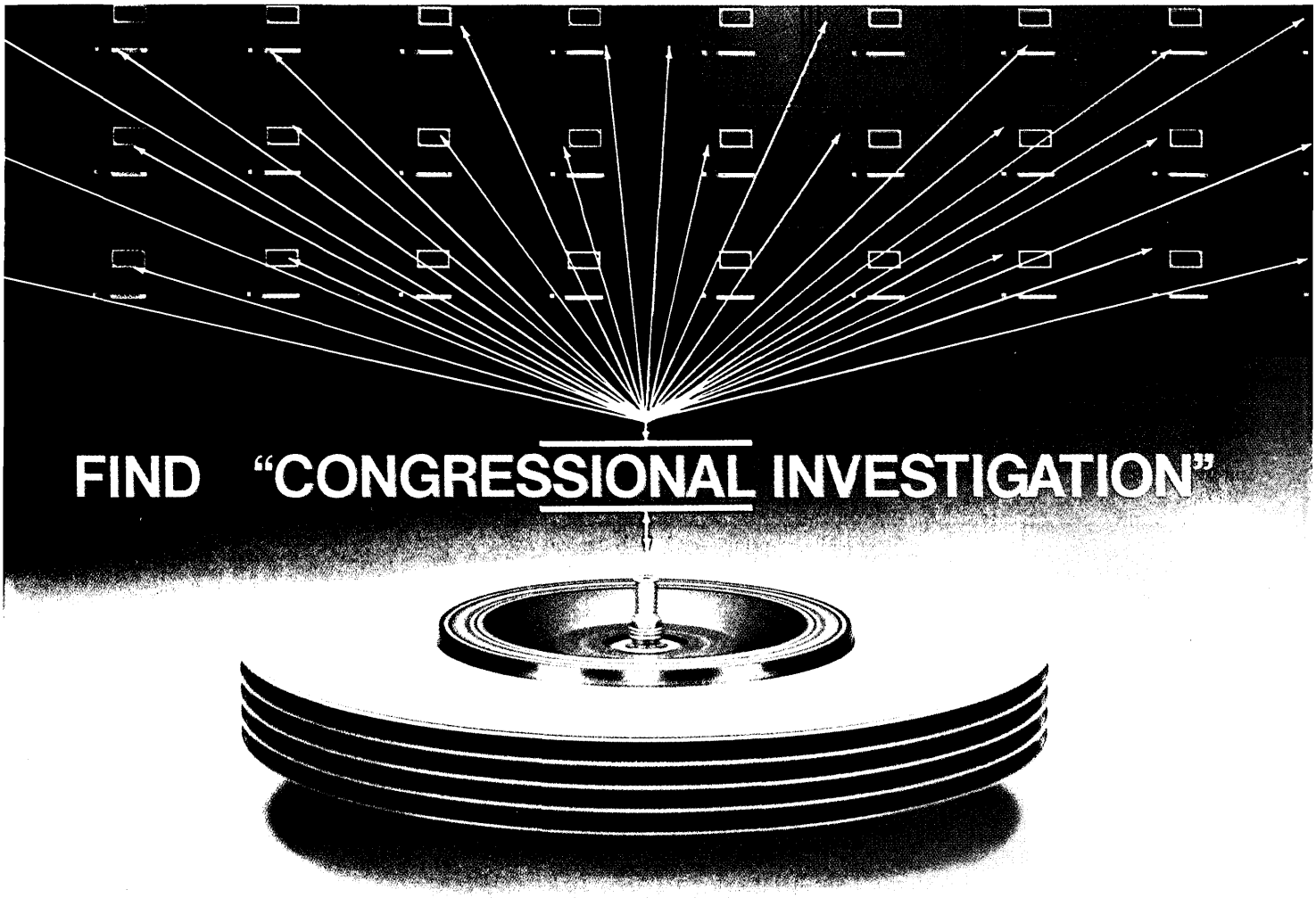

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CIRCLE 52 ON READER CARD

If things get too bad, we may see the return of the party line.

communications management takes on a new meaning and numerous new responsibilities.

Companies everywhere are acutely aware of their need to beef up the knowledge level of their staffs. The magnitude of the task has mushroomed: strategy decisions and buying decisions must be made, and network traffic statistics collected and analyzed. People skilled in network design, management, and monitoring are already in short supply, which opens yet another avenue of opportunity for consulting, educational, and training services.

"I'm very excited about all this," says ConAgra's Edloff. "In the short term we will lose our single point of contact, but the tradeoff is very, very beneficial to companies that accept divestiture in a positive way."

Adds the New England telecom specialist, "We will increasingly be doing our own repairs and orienting ourselves to operate as a telephone company." She sees the breakup as providing a "great opportunity for us [in the telecom business] because of the need to staff up. We become more valuable to our companies, more of a focus." A new empire, courtesy of the government.

One speculation is that all this telecommunications self-awareness will eventually lead to a majority of large companies choosing to operate in-house telephone companies. The telcos will be left serving small- to medium-sized companies that can't afford to run their own show, along with the residential market. A Northwestern Bell source agreed with this view.

The outlook for the Aunt Nellies of the world, however, looks bad. What may have been a $6 basic phone bill 20 years ago, is now $20 and headed higher. The soaring cost is not outrageous, compared to other costs: 20 years ago their winter gas bills may have been $20, and they're now $140. But residential telephone service, subsidized by business for years, will be expected to carry its own share of the system costs, and that has a lot of people upset with deregulation.

If things get too bad, we may see the return of the party line, but under a new hi-tech name—maybe "shared resource plan"?

"I think when all is said and done, in the long run [the breakup] is probably a good thing for the country," contends Zucchino. "I believe that competition tends to advance technology faster and control costs better." Though he acknowledges the gloomy reception the breakup has received from some quarters, he is optimistic. "I think for companies like Tymnet, it'll turn out in the long term to have offered a lot of possibilities for us. We may or may not be smart enough to take advantage of them. I hope we will be smart enough." ✲

This DATAMATION staff report was researched by field editors R. Emmett Carlyle, Jan Johnson, Edith Myers, Willie Schatz, and Ed Yasaki, and was written by Johnson.

Left to right: Phillip, Charles, William, Edward, and Andrew.

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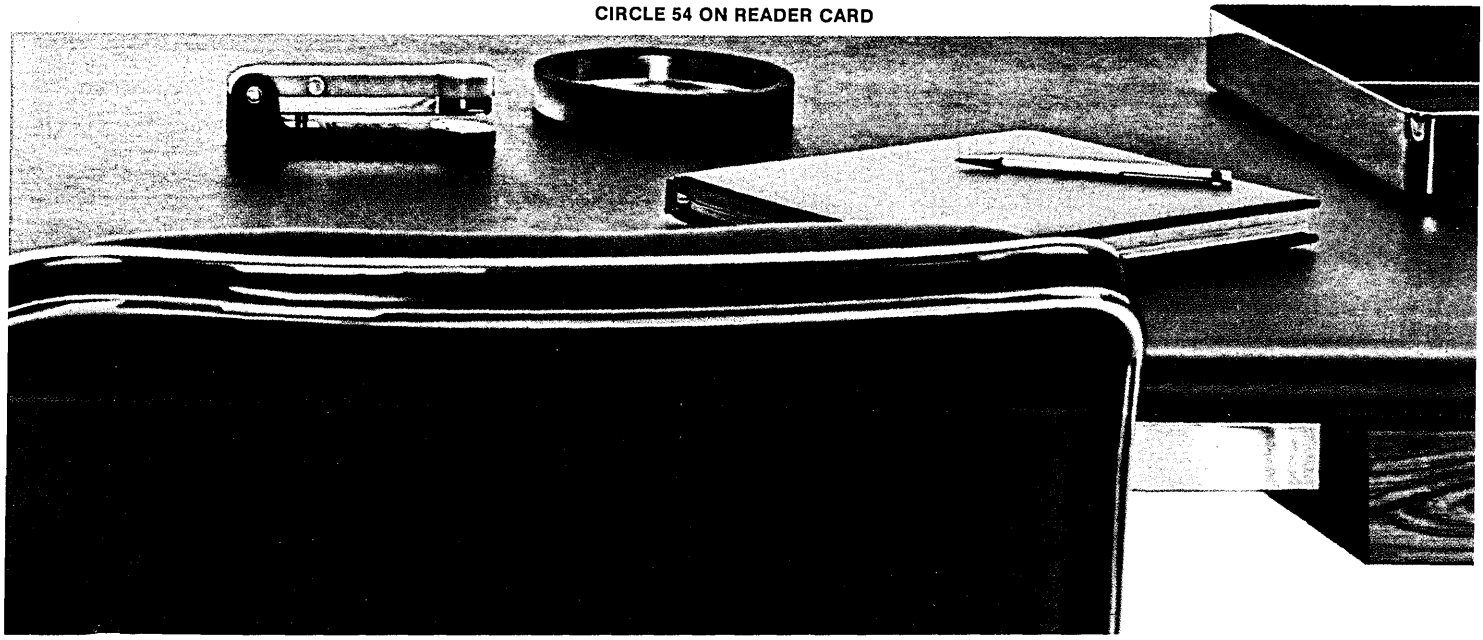

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CIRCLE 55 ON READER CARD

Deregulation is here, and specialized common carriers that don't react quickly may find themselves too tangled to compete.

SURVIVAL OF THE SWIFTEST

by Willie Schatz

TO: All non-AT&T common carriers
FROM: Concerned citizens
SUBJECT: Your future
CONSENSUS: If you want to be around to see it, change your ways. Not later. Now. Being strictly a long-haul voice carrier may not cut it in this brave new communications world.

"If Congress doesn't go completely insane and pass laws limiting competition, AT&T will put the specialized common carriers [SCCs] out of business instantaneously," says Howard Frank, president of Contel Information Systems, a Great Neck, N.Y., consulting firm. "If I were MCI, Sprint, or any of the others, I'd recognize that that's the potential scenario. Being a basic carrier of long-haul communications will be a very severe risk. They'll have to go outside their traditional businesses."

"It would be a bad mistake for the specialized common carriers to think of themselves as only that," warns Walter Hinchman, president of Walter Hinchman Associates, a Bethesda, Md., consulting company. Hinchman knows whereof he speaks. As chief of the FCC's Common Carrier Bureau from 1974 to 1978, Hinchman perused all the filings from the SCCs that wanted freedom to compete with Ma Bell.

Now that liberation day is here, the SCCs will have to come up with a new set of competitive strategies. "In the new environment an SCC will win by being flexible," explains Hinchman. "Being a successful SCC meant being faster on your feet than AT&T. With AT&T deregulated, an SCC now has to worry about another SCC being faster on its feet than it is.

"The way to win now is by offering the best way to solve a customer's communications needs. No matter what it takes, the SCCs should be ready to do it," declares Hinchman.

Most of the telecommunications analysts for the Wall Street brokerage firms have a distinctly different view of the future. "Over the long term, AT&T will lose share of the long distance marketplace," contends

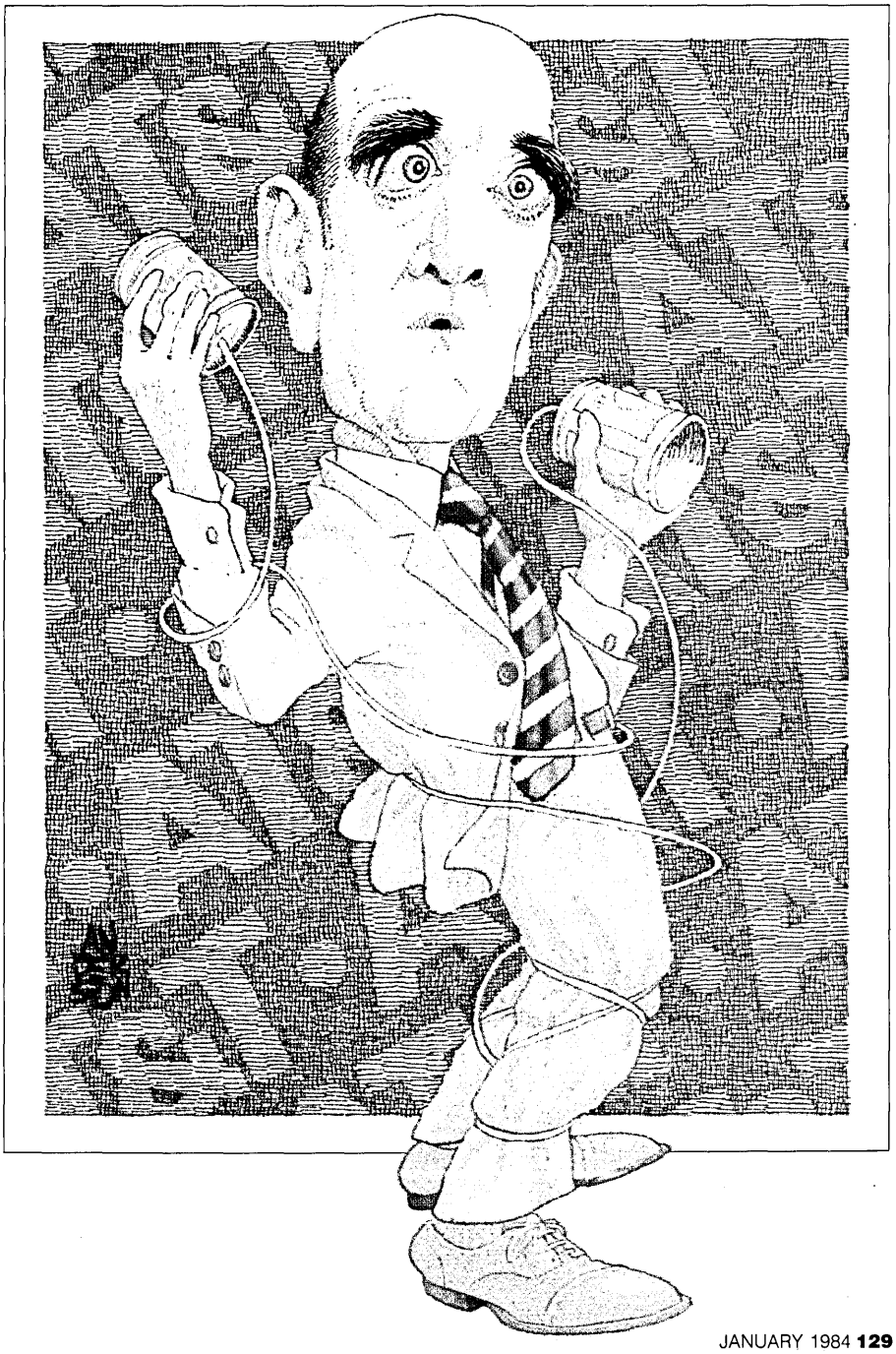

ILLUSTRATION BY RICHARD ANDERSON

"The SCCs have spent too much time on engineering and not enough on business planning."

Steven Chrust, an analyst at Sanford Bernstein & Co., New York, considered the most knowledgeable AT&T watcher in the financial community. "By the early 1990s, AT&T's share of the long distance market will have shrunk by 30 to 40 percentage points."

Confusion over the future of the nation's $35 billion long distance telephone bill is not confined to AT&T's customers. AT&T's competitors in the long distance, timesharing, and other telecommunications businesses are also scratching their heads over the impact of divestiture. MCI, Sprint, and a host of other companies all insist they will survive the unleashing of AT&T, but Chrust and others on Wall Street predict that only the companies with their own transmission facilities will be around in 10 years. Diversification into other telecommunications businesses, such as cellular radio telephones, will be a necessity.

Are you getting the message, you SCCs? Then step right up and branch out. Enhance! Be fruitful and diversify!

Before rushing off to the R&D lab, however, the SCCs had better take a careful look at the new environment they'll be operating in. Unfortunately, no one knows the exact layout of that new environment and that makes planning for the future difficult. So what's an SCC to do—conceive a game plan when it doesn't know the rules?

Yes, as a matter of fact, because if it was a jungle out there before, it's going to be an impenetrable rain forest now. And only the strong will survive.

"We've examined all the possibilities and we've got some alternatives laid out," says Tom O'Rourke, president of Tymshare, Cupertino, Calif. "But we don't know which way to go. We're just going to have to wait and see what comes out of the bill."

That bill is H.R. 4102, the Universal Telephone Service Preservation Act of 1983, sponsored by Reps. John Dingell (D-Mich.) and Tim Wirth (D-Col.). The bill purportedly deals consumers a better hand than if they were forced to play with the FCC's deck. Those cards contain a monthly access charge of $2 for residential users and $6 for business customers. The amount would increase $1 per year until 1986. Business users, on the other hand, will clearly be getting a bad deal if the bill becomes law. Rates for multiple line businesses will soar into the stratosphere. Thus, businesses would be picking up the tab for residential users.

"Businesses are very angry about the prospect of H.R. 4102 becoming law," asserts Hinchman. "They're going to pay more for long distance as a result of this bill, which clearly maintains the current hidden subsidies. I think it's bad for any user. Someone else is playing with your money."

A WARNING TO CONGRESS

Business has a few things to say about the recent goings-on in Congress.

"The entire focus of this legislative debate [over H.R. 4102 and S. 1660] has been AT&T against the poor little consumer," complains Dave Sherman, associate general counsel of General Electric Information Services Company (GEISCO). "The impact on business has been totally ignored. The focus is too narrow. It's much more than a telecommunications issue. It's a national industrial policy issue. Office automation will slow down because of the high cost of communications. We'll lose our worldwide leadership in innovation.

"Both these bills are unnecessary. The FCC access charge decision [which would increase residential bills by $2 a month and business bills $6 a month starting April 3] is sound and should be given a chance to operate. The legislation won't shift charges away from the consumer. Business will pass through the costs with higher prices for goods and services."

Guess who's going to be on the receiving end of that pass? Not AT&T. Not the Congress or the FCC.

"This legislation [H.R. 4102] is antibusiness and antitechnology," charges George Shea, vice president of National Data Corp. "Having to pay a penalty for using bypass is like putting a tax on technology. That's going to stifle innovation.

"There's no way that this bill protects the consumer. We're looking at significantly increased long distance rates. Business will simply pass on those costs to the consumer."

National Data's got it scoped out already. As the nation's largest independent credit card verifier, it plans to charge more to its client banks. Banks will then up the ante to merchants for using their credit services. Merchants will maintain their profit margin by having you pay more when you walk out the door.

You'll never know what hit you. The company will see the increase in communications costs, but you won't. And those extra bucks can cover a multitude of sins.

"With AT&T's plans so unclear, it's going to make communications planning very difficult," Shea says. "I'm sure we'll have to reconfigure our network because of the changes in the rate base."

"If long distance rates continue to be high, we'll have to look toward distributed processing," Sherman says. "I would think every business in the country is thinking about it."

Every company around is also eyeing 1984. Nov. 6, to be exact. Election Day. That's when the business community will remember who listened and who didn't.

"We've got to relieve the pressure on legislators who are running scared because of a $2 increase in their constituents' phone bills," Sherman says. "They don't understand what the increase will do to us and what we'll have to do to consumers."

"This is partisan legislation in an election year," Shea says. "Business needs to galvanize. We've got to get across the point that this [S. 1660, scheduled for a vote later this month] is not a consumer protection bill and it's also bad for business. People are pushing this legislation who won't be around to see it in action."

Message received. If the lawmakers ignored business before, they apparently do so at their peril now.

—W.S.

SUBSIDY TO RURAL TELCOS

For the record, H.R. 4102 repeals the access charge and establishes a $1.25 billion universal service fund to subsidize high-cost (rural) phone companies and "lifeline" local rates for poor and elderly customers. Despite strenuous opposition from AT&T and irrelevant objections by the Justice Department, support for the bill was so overwhelming the House didn't even bother with a roll call. A voice vote proved that most legislators were not listening to AT&T.

While the FCC wants to play AT&T's game, the Commerce and Justice departments want some changes made in what the commission will approve as charges for AT&T's competitors to hook up their lines with the local phone company's.

"The parts of the decision increasing the access charges assessed to AT&T's long distance service competitors are a matter of serious concern," Commerce Secretary Malcolm Baldrige wrote to FCC chairman Mark Fowler. "The decision would substantially increase competitors' costs. It would do this before they are afforded the benefits of equal interconnection required under the AT&T antitrust settlement.

"AT&T's long distance service competitors have petitioned the commission urging a reduction in their charges until fully equal interconnection is achieved. We have carefully reviewed these petitions and believe that they advance a sound case for further revising the commission's decision."

The FCC reconsidered its Jan. 1, 1984 access charge implementation date and

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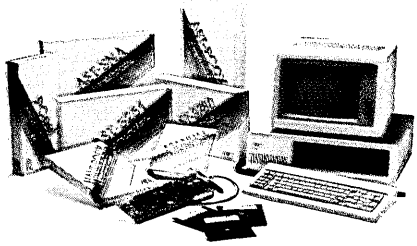

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MCI wants "to change people's perceptions of us from a long distance phone company to a one-stop communications company."

moved it back to April 3. There's also the little matter of the Senate having a thing or two to say on the subject. Its bill, S. 1660, which would delay imposition of the access charges for two years, requires the FCC to rethink the whole matter. The bill was approved by the Commerce Committee last fall but won't hit the floor until late this month or early February.

Where does this leave the SCCs? Getting a busy signal.

"We'd be delighted with either the House legislation or the FCC following Baldrige's advice," says Herb Jasper, executive vice president of the American Council for Competitive Telecommunications (ACCT). The group's membership, which includes MCI, ITT, GTE Sprint, and SBS, tells you all you need to know about what it thinks of the access charges. ACCT's support of H.R. 4102 marked the first time in the group's eight-year history that it backed any legislation.

"We didn't want to get on the legislative bandwagon," comments Jasper. "We'd much rather work through the FCC. But Fowler's still being stupid. He believes in unregulation, not deregulation, and let the chips fall where they may.

"If the bill passes or the FCC reconsiders, we'll grow as fast as our little legs can carry us. But it's gloom and doom under the other scenario. If the current access charges prevail, we're in bad trouble. A number of resale carriers will go under 12 months after that becomes effective. It will be very slow growth, if any, for the others trying to catch MCI and Sprint. The resale carriers' only salvation is either to get the bill passed or persuade the FCC it made a serious mistake."

NOT A MISTAKE AT ALL

Many people, however, don't think the FCC made a mistake at all, much less a serious one. A moment of empathy for the commission, if you please. It was in the ultimate no-win situation. No matter how it ruled, either AT&T or its rivals would have been miffed. Yet it seems to have kept its losses to a minimum and mitigated its damages quite nicely. One could even argue that it almost knew what it was doing.

"The FCC ruled fairly," according to Tymshare's O'Rourke. "Sure, the private lines will go up $25 a shot. We've got 10,000 to 15,000 private lines on our network nodes. It's a shot we'll have to take; but we can live with it, even though it will increase our costs by $50,000. But if Congress has its way, the rate increase will be aimed right at the business community. That's even more unfair.

"The FCC did its best," he says. "No matter what it did, it was going to be painful." Absolutely. With divestiture, those long distance subsidies to the Bell operating companies (BOCs) were history. Those payments, and those alone, were the only reason the price of local service never reflected its true cost. You got a lot more than you paid for. Now the FCC wants you to pay for exactly what you get. Congress—or at least the House—still wants the BOCs and AT&T to come out on the short end.

If they do, everybody else does, too. AT&T has already sworn upon a stack of Yellow Pages that if H.R. 4102 becomes the law of the land it won't go through with its promised $1.75 billion reduction in long distance rates this year. AT&T also insists that the House legislation would force it to continue its subsidy to the BOCs, despite their court-decreed disconnection.

"H.R. 4102 is very anticompetitive," contends Contel's Frank. "AT&T and Long Lines will have to maintain their high interstate toll rates. AT&T will have to continue subsidizing the local telcos. The FCC order is a reasonable approach. Sure it puts pressure on the MCIs and Sprints. But that's what competition is all about."

Or has been all about. MCI, Sprint, and friends have suffered the slings and arrows of AT&T's anticompetitive conduct for quite some time. Yet they're still alive and kicking. True, AT&T does have 96% of the long distance market, leaving 2½% for MCI and the leftovers for everybody else. MCI goes to the bank more than the others, but no one's pinching pennies.

But that was in the other world. In the new one, with AT&T footloose and fancy-free, the SCCs must become chameleons. Change or die.

"After divestiture, the value-added packet switch carriers won't survive providing their traditional service," claims consultant Dick Deale of Richard Deale and Associates in Burke, Va. "If they want to make it, they're going to have to add valuable application services to what they offer. And they'll have to capitalize on their installed base.

"They should get into network services, like protocol emulation and conversion between diverse computers trying to interconnect. They should be able to interconnect dumb terminals to an SNA network. They should look at gateway functions to twix and telex service. That's the way to thwart competition."

Granted. But can the SCCs cope? They've been making a pretty good living allowing people to talk to each other for a lot less than AT&T charges. Under the FCC rules, though, it's goodbye big discounts. No more of those luscious 40% to 50% reductions in your long distance bills. Try 5% or 10%. And don't even think about the SCCs having a technological advantage over AT&T. They've just been cheaper, not better.

"A lot of SCCs are thinking about how to fight off divestiture at the expense of planning future services," observes Deale. "They're too concerned about making their traditional services better. There's too much time spent on engineering and not enough on business planning."

"One organization that does that kind of planning is AT&T," Hinchman says. "I'm not convinced that the other carriers have their act together to do that kind of thinking. There's been a short-term reaction from them. Maybe they're so busy worrying about tomorrow that they can't think six months ahead. One exception to that, though, seems to be MCI."

Indeed, MCI has seen the future, and it's no longer content to be "your long distance phone company." For about one million people, MCI is indeed their long distance phone company. In its fiscal year ending last March, MCI's revenues exceeded $1 billion, and its net income was over $170 million. Most of the revenues and profits were from residential telephone calls, its new bailiwick after more than a decade of dealing strictly with business customers.

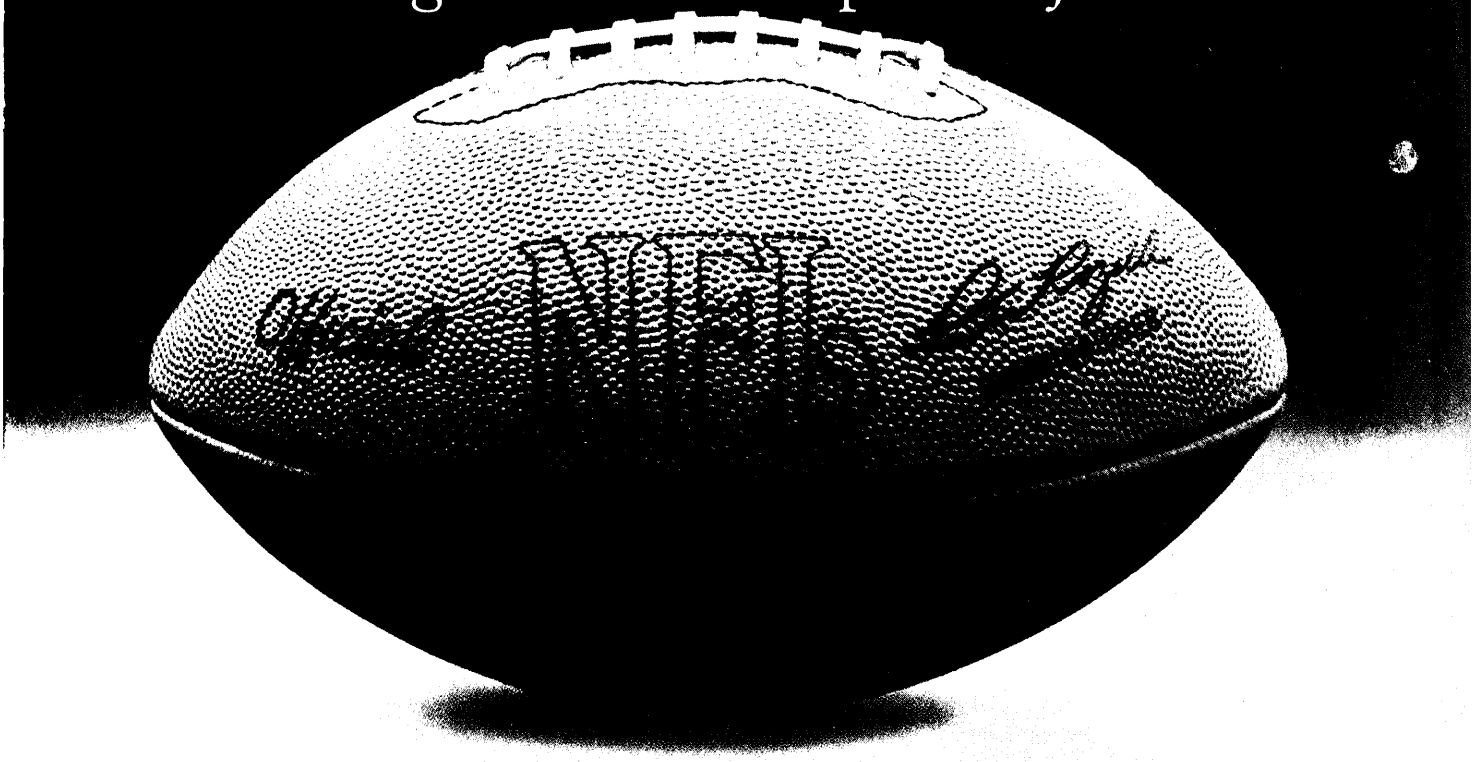
"We want to change people's perception of us from a long distance phone company to a one-stop communications company," explains Gary Tobin, MCI's director of public communications. "We're there right now, but the perception isn't there."

That may not matter as long as the equipment is there—as it is for MCI Mail, a data service that Tobin claims will pull in $1 billion in revenues over the next three years. This year, MCI's data service will generate $25 million to $50 million in revenues, estimates analyst Chrust. "Five years out, it could possibly be $500 million to $1 billion a year." Overall estimates of the data communications market, including facsimile, telex, and microcomputer transmissions, run to $8 billion this year and are expected to double by the end of the decade. AT&T is expected to keep the lion's share of the business, but MCI and the other packet-switched networks will have a nice piece of business, in Chrust's opinion.

MCI also owns MCI Air Signal and MCI International, and is currently committed to an expansion program that will run about $1.5 billion. The company is also exploring three bypass technologies—cablephone, digital termination systems (DTS), and cellular radio telephones.

"We're the only company experimenting with alternative technologies," Tobin contends. (GTE Sprint, which could be taking similar actions, has not, because Telenet, also part of the GTE empire, offers TeleMail.) "We want to transmit communications no matter what it is or where it is,"

It took over 100 years for America to do for the football what Zilog did for the computer in just three.



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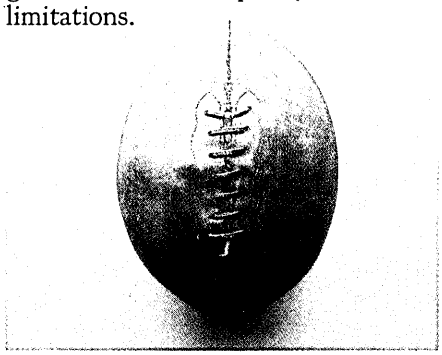

In 1874, Harvard played Montreal with a slimmer, watermelon-shaped ball good for running but not for passing. Like the personal computer, that ball was alright for individual effort, but didn't do much for teamwork.

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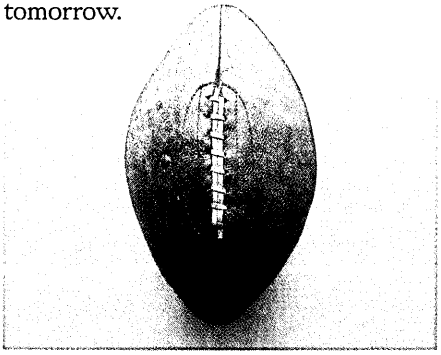

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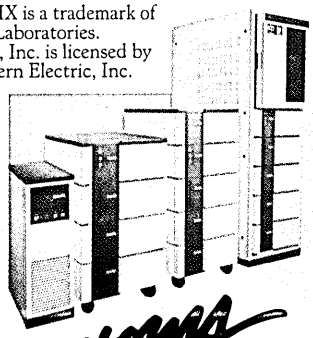

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"The SCCs haven't been beating AT&T on technology, just on price."

Tobin continues. "We don't care if it's local or international. We won't only be in the fixed-line business. We're not abandoning the basic voice business, but we're going to be out there in every way possible that fits our style. That's a high-growth, capital-intensive—not people-intensive—company. We're not locked into anything."

Make that almost anything. If the FCC access charge order goes into effect as written, MCI becomes saddled with a monumental increase in its access fees. If it is, so are its customers.

The company currently doles out $234 per access line per month. With 70,000 lines out there, that's almost $17 million a month. Under the FCC's plan, costs would soar to $357 per month and the company's profit margins would shrink from 20% to 6%, which is not good for a capital-intensive industry. Or for the company's stock, which took a beating before rallying slightly after the passage of H.R. 4102.

A WAY AROUND THE FEES

"Actually, there is a way to get around the access fees," declares Tobin. "We can go to bypass." MCI, along with other carriers, is considering using alternative methods such as private microwave and cablephone techniques to set up its own systems that would enable it to avoid the local phone company's network. But getting those systems up and running takes time. You don't throw up microwave towers in a weekend. And they're not cheap, either.

MCI isn't the only one thinking about the bypass option. Tymshare has already obtained FCC approval for its DTS technology. The company installed three DTS facilities last year and expects to have another three completed this year.

MCI seems nevertheless to have put the most muscle into its planning. Explains Tobin: "We're preparing ourselves for a world in which the access charges are way out of line with what other technologies are offering. We are as ready as you can prepare yourself to be. Of course, we thought we were prepared for the FCC order. But never in our wildest dreams did we expect that. I've never seen an order that anticompetitive."

Well, competitiveness is in the eye of the dialer. This game may yet—and probably will—be played by the FCC's rules. If it is, check out the obituary column under SCC. Look for MCI and its colleagues to sprint en masse toward bypass. Watch for satellite traffic to resemble rush hour at Times Square. And keep your eyes peeled for consolidations upon mergers upon acquisitions.

"Five years from now there won't be nearly as many value-added carriers as there are now," consultant Deale predicts. "The competition's going to be there. It's just going to be different. Large companies are making entries from quarters not normally associated with communications. It's going to look like the Book of Genesis, with all the begettings and begattings.

"I think there are a lot of new players out there. It's like a poker game. Large, well-capitalized players have bought chips. Now they're waiting to take the next seat at the table. And only God has more money."

Maybe. AT&T has the ultimate deep pocket. No one's found the bottom yet. If no one did when it was regulated, no one will when it's deregulated.

"If AT&T is allowed to compete, there's no reason to have any other long distance carrier," declares Contel's Frank. "The SCCs haven't been beating AT&T on technology, just on price. With real competition, they'll be at a competitive disadvantage.

"As the cost of local access becomes more and more of the cost of communications, the cost of long-haul carriage becomes less and less relevant. The MCIs and Sprints don't have a substantial role in that. AT&T is already there. The SCCs don't look that good in true cost-based pricing."

Other experts on Wall Street have another opinion. They don't believe AT&T will entangle itself in a price war with SCCs. Furthermore, they claim MCI, Sprint, and ITT may have lower operating costs since their networks aren't gold-plated like Ma Bell's. Wall Street, after listening to private briefings from AT&T chairman Charlie Brown and other senior executives, expects the company to avoid a price war because it wants to maintain a decent profit level. In the past, its long distance service did not earn the kind of profits permitted by the FCC under the old rules—its rate of return was several percentage points below the 12.75% okayed by the government. "In our view, the primary goal of AT&T is not to protect market share but to earn its rate of return," observes William S. McKeever of Dean Witter Reynolds.

WEIGHING THE BYPASS OPTION

No matter how aggressive or passive AT&T may become toward its pint-sized competitors in the long distance market, no company is comfortable with its fate in the hands of others, so many of the SCCs and the companies with private networks are looking at bypass alternatives. The SCCs and the private nets may be able to earn a decent return on their investment based on the philosophy of "If we can't go through AT&T, let's go around it."

Then there's enhanced services, wherein true salvation may lie. The nimble SCCs have always been quicker than ponderous AT&T. They can still be if they broaden their base beyond telephony. Moves toward data processing or computer-based services, however, are sure to be copied by AT&T. But by the time the giant catches up, the little guys may have established a decent lead.

The SCCs would nevertheless still love to snuggle under Congress's protective blanket.

"That's going to be an absolute nightmare," Hinchman warns. "You can't legislate with these simplistic notions and a blunderbuss approach like the House took. There's no single formula for universal service. The people who need the subsidy won't get it and those who don't need it will.

"There's no desire or capability on the Hill to get in and analyze. All they're doing is trading one set of words for another. It's frightening to think what might happen. It's just pure politics now."

That may not be what the SCCs want, but it may be what they need. Economically, the smaller companies, and certainly the resellers, don't stand a chance against a fully armed AT&T. Even equal interconnection—which, ACCT's Jasper says, "no one believes will happen" by the divestiture-mandated date of 1986—won't do the job. By the time any SCC sounds as good as AT&T, the SCC cemetery will be lying room only.

"If it's allowed to compete, will AT&T be able to go into a competitive posture where it will be allowed to wipe out all the others?" Frank asks. "That's a political question, not an economic one. It certainly can do it. Whether it will be allowed to is another question.

"My guess is that AT&T won't be able to take the political heat of wild and true competition. It will be very tough on pricing. And all but the major SCCs will disappear. AT&T will put the remaining ones on shaky ground and limit their growth. It will let them hang on, though."

Sentiment in the nation's financial district is of a decidedly different nature. Wall Street analysts insist that the MCIs of the world will do just fine, that AT&T will spend most of its time dealing with the incursions into the hardware business by Mitel, Rolm, and Northern Telecom, and use the profits from long distance as a cash cow to fund its other ventures. The loss of marketshare is not a big deal, contend the seers, because the rosy-cheeked economy is adding more toll charge volume than MCI, Sprint, and ITT are taking away.

It must be some small consolation to telecommunications managers to know that the experts are as confused about the outlook as they are. As one analyst conceded after an hour of explaining his financial scenario for AT&T, "It will take us six months to sort it all out and know what is really going on." ✱

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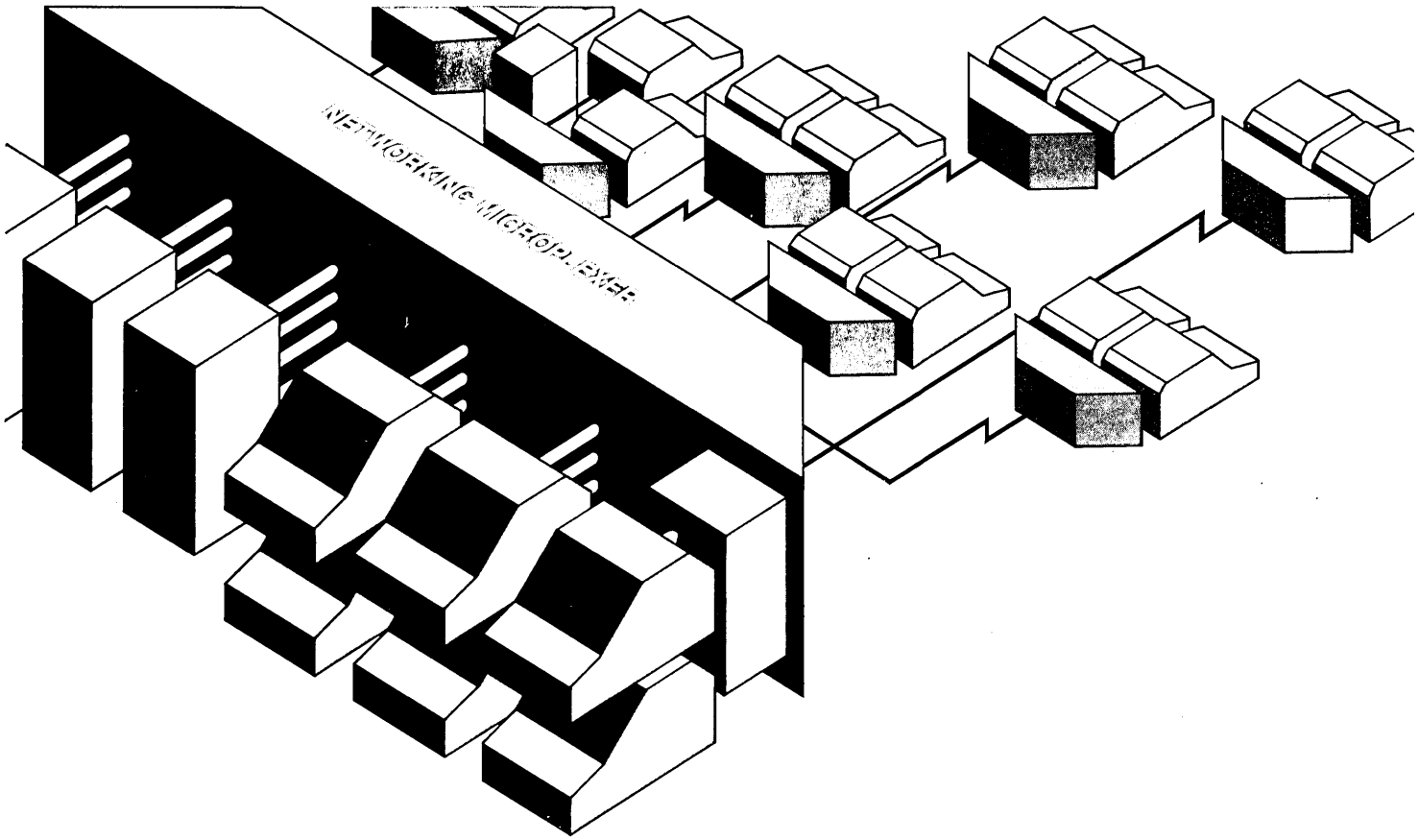

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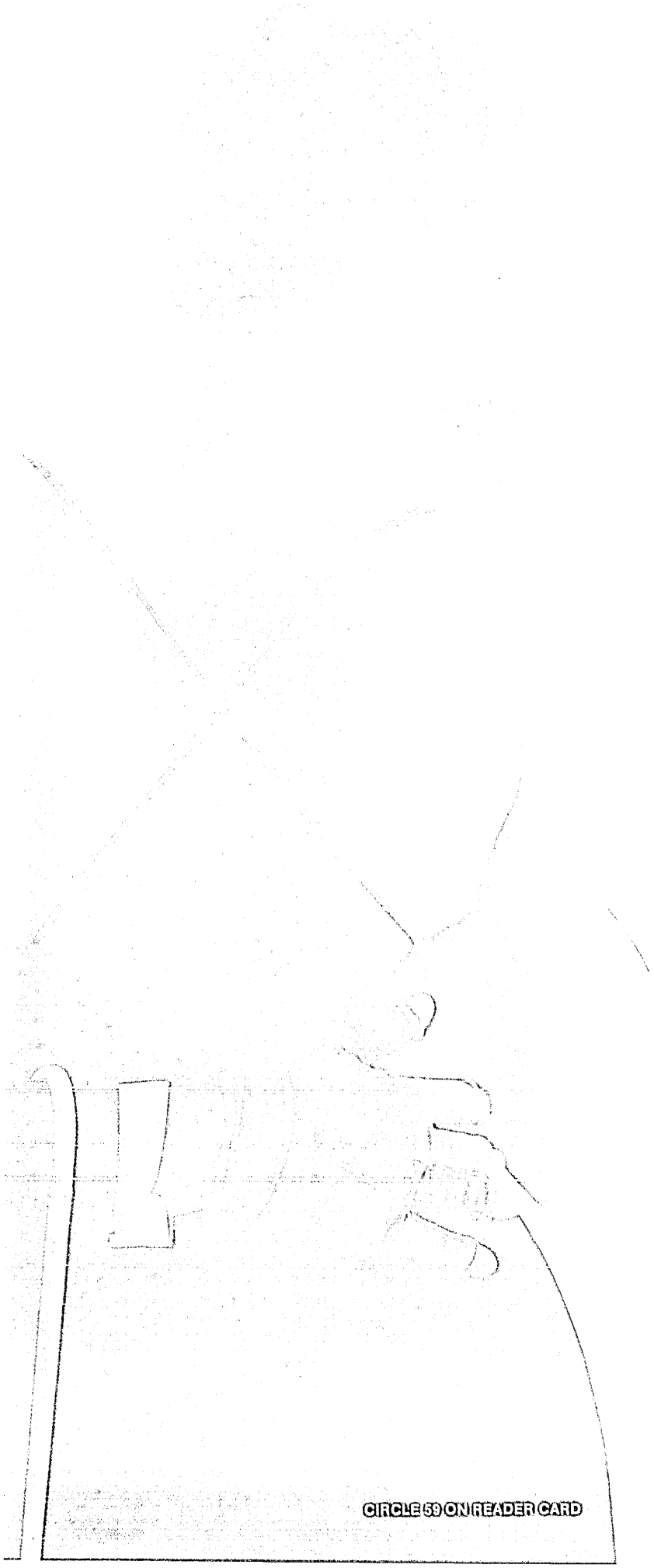

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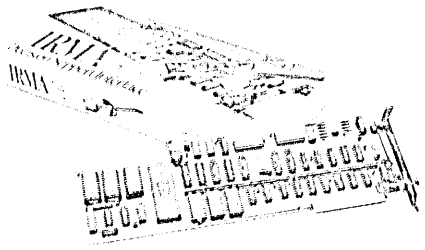

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THE INFOCENTER EXPERIENCE

by Richard T. Johnson

Like most large companies, Exxon Corp. is familiar with the phenomenon of end-user computing and the concept of the information center. Sixteen information centers have been established throughout Exxon over the last two years, with other locations, not served by an actual center, providing informal end-user computing support. Several more centers are planned in the near future.

One of Exxon's first information centers was the Client Support Center in the New York corporate headquarters. Although that center is now quite successful, many problems and issues had to be resolved during its first two years.

A division within Exxon's Communications and Computer Science Department (CCS), the Exxon Corporate Headquarters Client Support Center (CSC) is a rather conventional information center. It provides consulting, training, and technical assistance in the application of end-user computing tools. Its client base includes some 1,200 professionals, managers, and support personnel located in midtown Manhattan, and its staff consists of a secretary and four computer professionals, who complement each other in their breadth of computing and business skills.

The CSC team was formed in November 1981, and the center opened its doors for business in March 1982. The name information center could not be used because the corporate headquarters already had a library information center, which performed document and database searches. Moreover, the term client support center indicated more clearly the services to be provided. A computing information center is not only a source of company information but also a source of support for clients seeking information from many places with the aid of computing tools.

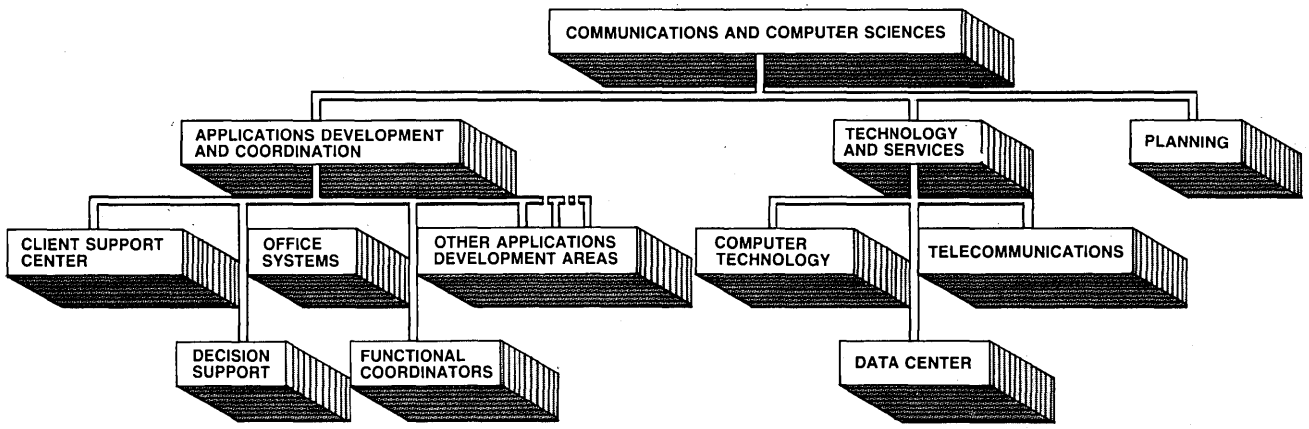
While the CSC is the front line for end-user computing, other groups in the communications and computer sciences department play key support roles. The CSC is part of a larger group responsible for conventional computer applications development. Also within that larger group are a decision-support tools development team and an office systems development team. Both provide advice and develop tools for use by the CSC. Another part of the department, the computer technology division, provides primary technology surveillance and evaluation of new hardware and software tools.

All three groups offer their services to other computing departments throughout the corporation as well.

A fourth group, the data center, also plays a key role. It provides computing resources and plans for the adequate delivery of those resources. Because of lengthy ordering cycles and the high cost of computer hardware, proper planning is crucial. The CCS department organization as it relates to end-user computing is shown in Fig. 1.

FIG. 1

EXXON'S CCS DEPT.—AN ORGANIZATIONAL BREAKDOWN



CHARTS BY CYNTHIA STODDARD

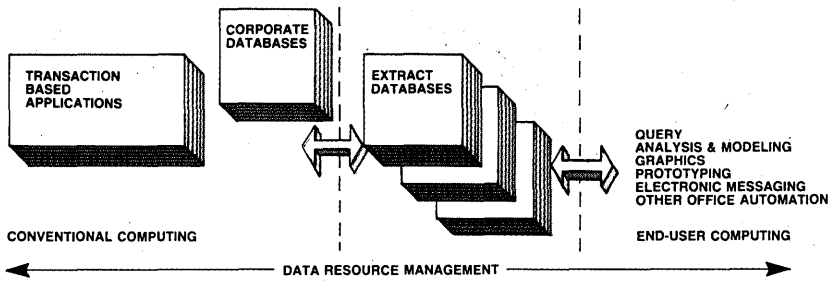
The CSC's singular goal is to support end-user computing.

DRM IS CENTRAL LINK

One more group will become the final component of this partnership in 1984. Exxon, like many other corporations, is struggling with data administration and control, or data resource management (DRM). The definition and role of a separate DRM function within the computing organization is just beginning to emerge. Without the DRM function, however, the CSC would have difficulty evolving, because data (information) access, with its associated control, is viewed as one of the most important elements in the future of end-user computing. To facilitate data access, Exxon is creating extract databases as links between traditional computing applications and clients. DRM helps tie all of this together (Fig. 2).

FIG. 2

DRM LINKS TRADITIONAL APPLICATIONS AND END USERS



The CSC's singular goal is to support end-user computing. This means that the CSC is customer-oriented and attempts to accommodate its services to its customers' business environment. Except for training, all services are offered on call during normal working hours. And even training is provided as soon as a class can be formed rather than on a fixed schedule.

The CSC provides consultation, training, and technical assistance to all levels of the headquarters staff. Consulting includes discussions to determine if an application is suitable for end-user computing, and, if so, how best to do it. Sufficient training is provided to make the client comfortable with a tool or procedure without transforming him into a technical expert. The term "technical assistance" encompasses a broad range of on-call services aimed at keeping the client functioning and productive in his computer work.

Each member of the CSC team, including the leader, or coordinator, supports one or more tools and provides backup in others. The secretary also gets involved by teaching word processing and answering technical questions about several of the tools.

CSC services include management overviews; consulting on applications, justification, tool selection, security, and control; equipment ordering (paid for by the client); equipment setup; training; technical assistance; and limited equipment trouble-shooting and maintenance. The CSC also provides advice to employees on the purchase of microcomputers for home use.

Because of its size and purpose, the CSC does not write applications for its clients; that would not facilitate "end-user" computing. And, while CSC services are available on call, there is a four-hour limit on consultation or technical assistance per application. This ensures that no single user monopolizes the center.

When clients come to the CSC for advice on a new application, a team member discusses the problem with them and evaluates how best to handle their needs. For straightforward applications, the CSC member simply recommends an approach or a tool. For more complex problems, a second CSC member is usually called in to help. If the application is complex enough to require contracting for conventional development by systems professionals, the client is directed to the appropriate people in other parts of the CCS organization.

To help ensure consistency and accuracy in consultations, the CSC team meets once a week to compare notes on significant recommendations. This meeting also enhances the team's education while preventing any one member from overselling the tool that he or she normally supports.

Training is geared to clients' schedules. Courses are also designed to give a working knowledge of tools without turning clients into technical experts. Each course maximizes hands-on student exercises and minimizes lecture sessions, and no course is longer than one day. Each class is limited to four people, and for clients with seniority, classes are available on a one-on-one basis. There are no published class schedules—a class is taught when two or more clients have requested it and an instructor is free. Waiting time to take a class is typically less than two weeks.

STANDARD COURSE CONTENT

The CSC standardizes course content instead of tailoring it for each class. This ensures that all key points are covered. It also allows a second member of the team to take over the class at any time. On several occasions, instructors have been called out of class because of a client crisis they are best qualified to handle. A second instructor who can step in makes such exigencies manageable.

Like everything else, technical assistance is on call for clients. The CSC does not offer a true hot line, but CSC staff members will respond to a telephone call for help as soon as possible. Additionally, clients are encouraged to come to the center at any time. Although the four-hour rule applies to technical assistance as well as to consulting, the CSC has found that most requests can be handled in less than 10 minutes.

From the beginning, the CSC has supported a mixture of mainframe and microcomputer tools. The microcomputer is viewed as both inevitable and valuable. It is also viewed as a workstation, and not a standalone box. The standard workstation for professionals or managers consists of a microcomputer with 512K bytes of memory, color monitor, 3278 interface, and modem. Clients are taught to use the microcomputer alone for small problems and as a terminal connected to the mainframe for larger ones.

Software has been selected to provide similar functions on both the mainframe and microcomputer. Generically, these functions are analysis and modeling, database query and report writing, graphics, and communications.

As part of its service, the CSC offers demonstrations of the software and hardware it recommends to clients. Until now, however, the CSC has not offered to loan equipment on a trial or pilot basis to new clients. But after evaluating this posture, the CSC decided to begin a limited loan service in 1984. The center does provide a small courtesy terminal room where clients may try the various tools.

The CSC does not have the authority to dictate which tools to use. To provide thorough support, however, the CSC must limit its tool set to a manageable size. Therefore, the CSC has a simple policy: if clients use the tools recommended by the CSC, the door is

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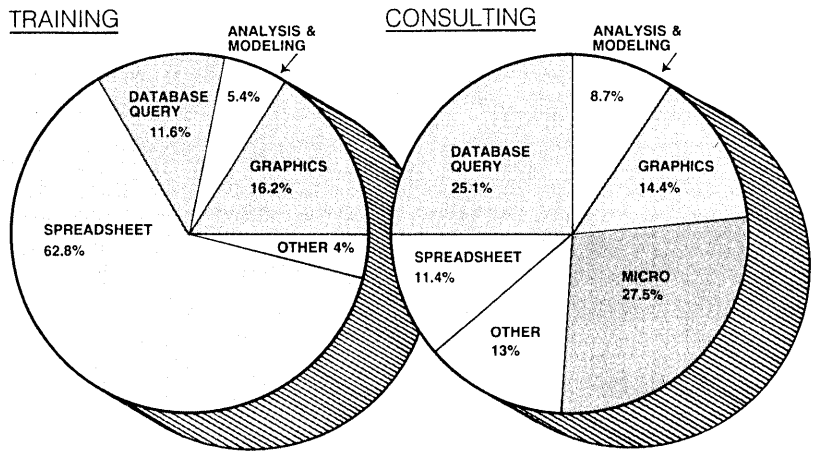
The CSC offers demonstrations of the software and hardware it recommends to clients.

always open, and the CSC will provide complete and comprehensive service. If clients use brand X of their own choosing, the CSC will provide only minimum service and then only after meeting the needs of its regular clients. This policy, applicable to both hardware and software, has been quite successful.

During the first two years, the CSC concentrated on bringing analysis and modeling, limited query, report writing, and graphics to the client population. Software was readily available for these functions, and applications that justified the investment in equipment and training were easy to identify. Of these tools, the microcomputer spreadsheet proved the most popular, based on the number of clients trained. Mainframe database query and report writing required the most technical assistance. But microcomputer consultation, which encompassed such services as providing an overview of what a microcomputer is to helping fill out purchase orders and even to installing equipment, was the most time-consuming. A breakdown of CSC activity is shown in Fig. 3.

FIG. 3

BREAKDOWN OF CSC ACTIVITY



CSC TO EXPAND SERVICES

During 1984, the CSC plans to expand its service by concentrating on executive tools, networking, professional office automation, and improved query facilities. The CSC will also offer seminars on the security and controls issues of end-user computing. To develop these seminars, the CSC will enlist the aid of controllers and audit in addition to various elements of the communications and computer sciences department.

In 1984, the CSC will also study the impact that end-user computing is having on several client departments. The studies will address staffing levels, required skills, job impact, and job turnover. The CSC will investigate the effects of departments working together to share information through using end-user computing tools. Such sharing occurs more frequently on an informal basis, without the knowledge of the CCS or CSC.

Exxon policy normally stipulates total cost recovery for services that one group offers to another. But because the value of an information center was unknown when the CSC was established, it was handled as a general interest corporate expense for the first two years. Clients were told from the beginning, however, that they would have to share the cost of operation in 1984 and pay all costs in 1985.

As of November, the CSC had not yet formulated a final cost recovery procedure. The obvious difficulty is that the mechanism to account for and recover CSC costs could compromise the customer-oriented operating style. Also, the accounting mechanism could become more expensive to administer than the expenses it recovers, since much of the work for clients is done in brief, informal sessions. For 1984, a combination of a surcharge on computer mainframe rates and an administrative surcharge has been proposed, but this setup could easily change for 1985.

Hourly billing for standard services is not being contemplated. Under such a system, a client might pay for training and the initial request for technical assistance. After startup, however, the clients would probably try to cut costs by doing all work on their own and possibly attempt applications that are not suited for end-user computing or that duplicate what others have already done. Either eventuality could be costly to the corporation. Moreover, the only way a client support center can guide end-user computing effectively is when a user feels free to talk to center personnel at any time and trusts their recommendations. Hourly billing defeats that purpose.

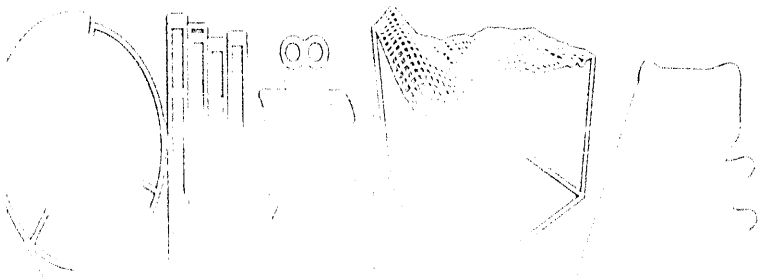
The people who comprise a client support center must be top performers who have excellent interpersonal and communications skills. Because of the fast-paced nature of the job, they must also be self-starters and good organizers who can juggle many tasks at once. To act as consultants, they should have experience both in the computing tools that they support and in general business practices. Moreover, team members should complement each other in skills and knowledge of business techniques. For example, the original CSC team consisted of an expert in database management systems and query, a second expert in database applications, a person skilled in financial analysis and modeling, and the coordinator, who specialized in distributed processing and microcomputers. All four people also had extensive business consulting experience.

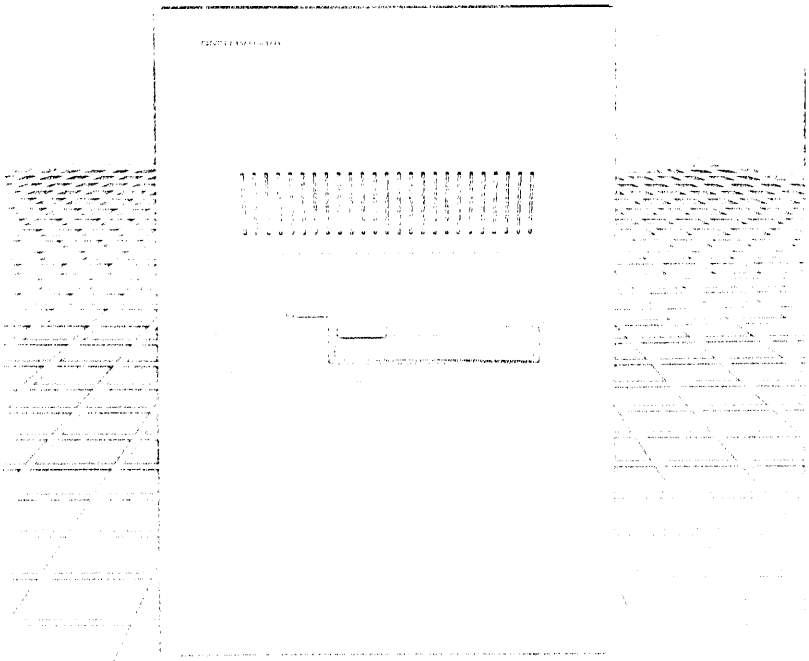
FREQUENT STAFF TURNOVER

Needless to say, qualified candidates for the CSC team are scarce. Because of their excellent qualifications and the diverse experience gained from being part of the CSC team, these people are highly marketable to other organizations. Consequently, the CSC has seen extensive staff turnover. Four people from the team have moved on to other assignments in less than two years. Consider the impact of a 75% or 100% turnover in a high performance team and how to manage for it.

Since careful planning and preparation is needed to staff a center, the CCS has begun identifying candidates six months to a year ahead of their planned move and placing them in interim positions to refine their skills; still, the personnel shortage persists.

One of the biggest problems facing the CSC when it first began operation was the fact that other computing professionals lacked an understanding of its role and impact upon the computing organization. Suddenly a new "upstart" unit was competing with the traditional computer application developers and, even worse, was fast becoming the initial point of contact within the computing department for a majority of clients. Recommendations were being made to clients without any regard for conventional development work being done by the rest of the organization. No one in the department had foreseen the possibility of conflict.





It is beneficial for the CSC to work in partnership with noncomputer-oriented groups.

This situation was particularly troublesome to the staff members known as functional coordinators, senior people who have insight into a business function such as controllers or refining. They work in a planning mode with the management of those functions and are well respected by them. Their role is to ensure that computing stays responsive to business needs. CSC's rise and potentially competing role to keep the CCS department customer-oriented caught them by surprise. Obviously, this created tension.

Once the problem was identified, the CSC devised three ways to help ease the friction. The first was to educate the computing department about end-user computing. The goal was to assure functional coordinators and line managers that the CSC dealt only with computing tasks that could be accomplished without professional systems analysis and programming. In fact, it was pointed out, the CSC would be a help to the traditional organization by identifying additional users in need of computing services.

Secondly, the CSC coordinator scheduled regular meetings with computing managers and functional coordinators to keep everyone up to date, including the CSC coordinator.

ALL CSC ACTIVITY RECORDED

Finally, the CSC established guidelines for how and when it or the rest of the computing applications development organization dealt with clients. Creating a log of CSC contacts with clients, which included a brief description of the meeting and any actions taken, was central to improving communication between the CSC and other departments. CSC members were free to handle clients' problems directly if the solution was clearly suitable for end-user computing. All contacts, however, were to be logged, and the appropriate applications development staff was to be notified immediately if a problem could best be solved by them. The log was distributed monthly to the applications development group and to other interested parties so they could follow up on any CSC activities deemed appropriate.

The CSC provides support to clients in ordering, installing, and maintaining microcomputer products. After helping to justify an application, the CSC recommends a specific hardware and software configuration and then helps the user complete a purchase order, which is signed by the client department manager, processed through normal company channels, and sent to one of several local dealers. The dealers assemble the equipment prior to delivery and later provide maintenance for all components in the configuration. When the equipment is delivered, the CSC installs it and configures the software as needed. The CSC installation service helps the client and also keeps the CSC in contact by tracking what equipment and software are in place.

The CSC has chosen not to take out maintenance contracts on microcomputer equipment but rather to keep one microcomputer for use as a maintenance spare. That unit is loaned to users while their equipment is being repaired on a time and materials basis. Additionally, the CSC keeps several spare parts (a diskette drive and memory chips) and diagnostic programs on diskette. CSC advisors do all installations; clients reimburse the center only for the part. In this way, maintenance costs average less than 1% of the equipment price, rather than the 12% or more that most maintenance contracts run. Like the installation service, this maintenance service helps the clients and keeps them in touch with the CSC.

The combination of mainframe and microcomputer graphics represents about 20% of the CSC's business. Both analysis and presentation graphics are supported. Output varies from simple screen displays to overhead transparencies generated by a pen plotter. Used either to produce a trend line on a screen or to make a final change to a transparency minutes before a presentation, graphics tools are quite popular.

But graphics are also easy to misuse. There are numerous instances where senior-level end users spent a half hour or more in front of a crt to get one graph just right or tried to use a two-pen plotter to create several transparencies at one sitting. These situations are a waste of time and manpower because an administrative services graphics group exists to create such charts. The CSC is now searching for more user-friendly graphics tools while instructing clients on using the current ones more effectively.

The CSC is certainly not the only division in the corporation that provides support services relating to an individual's work assignment. It is beneficial for the CSC to work in partnership with noncomputer-oriented groups to improve the services provided by both. One example of this is in accessing outside database services.

BROADER PROGRAM OFFERED

The Corporate Headquarters Library Information Center mentioned earlier provides searches of over 200 external information services and databases. The CSC had been teaching end users how to access some of those same services with the microcomputer and a modem. The information center and the CSC have now combined their efforts to offer a much broader program. The information center provides consultation and training in selecting and using equipment, while the CSC offers technical instruction on using this equipment to access the various services.

End-user computing uncovers many new approaches to meeting a myriad of business needs. It also creates many unexpected problems and challenges—and the CSC must be prepared to deal with them. The following examples show why.

The CSC was supporting a widely used micro spreadsheet and had planned to migrate corporate users to an advanced version in 1984. Consequently, it paid only passing attention to the introduction of Lotus 1-2-3. A senior manager from one of the user departments saw a demonstration of 1-2-3 in a New York department store. The store even provided him with a copy of the demonstration diskette, which he brought back to the office and distributed to other departments. The CSC found out about this when he and another department manager demanded that future spreadsheet training be done on 1-2-3, and not on the current product, thus creating a flurry of activity that ultimately led to the realization that 1-2-3 was better at meeting the CSC clients' needs. In the past, the CSC had handled the promotional efforts of traditional vendors, but it never expected a problem from a department store.

A different problem occurred when Exxon's medical department decided to place a microcomputer in the laboratory where EKGs are given. A senior executive was receiving an EKG as part of his annual physical when someone turned on the microcomputer. Interference between the two machines caused the EKG to indicate a heart problem. After a momentary fright, the doctor realized what had happened, and the micro was removed from the laboratory immediately.

End-user computing is likely to become the dominant means of delivering computer resources in the near future. It has already affected the way that companies conduct business and organize computing and user departments. Client support centers or information centers have already proven their worth in helping to make this new technology widely accepted. But because the technology and the procedures for employing end-user computing are so new, many unexpected challenges will confront those who implement it. Sharing experiences is an excellent way to expand our understanding of the technology and to increase its effectiveness. ✱

Richard Johnson, a senior advisor in the Communications and Computer Sciences Department of Exxon Corp., New York, is coordinator of the Corporate Headquarters Information Center and was responsible for its implementation.

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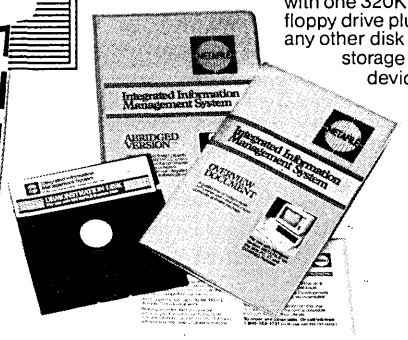

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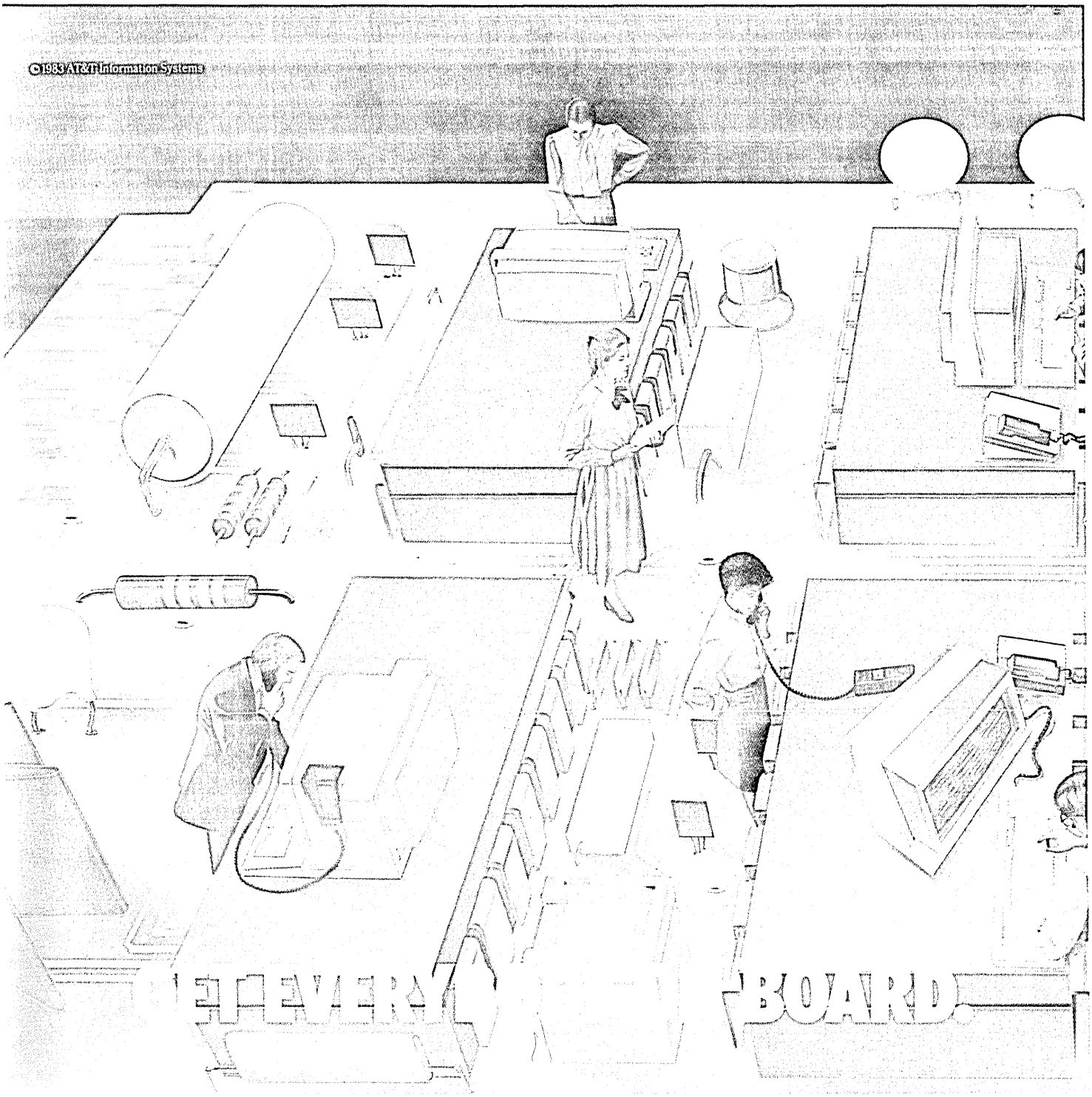

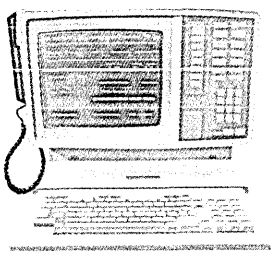

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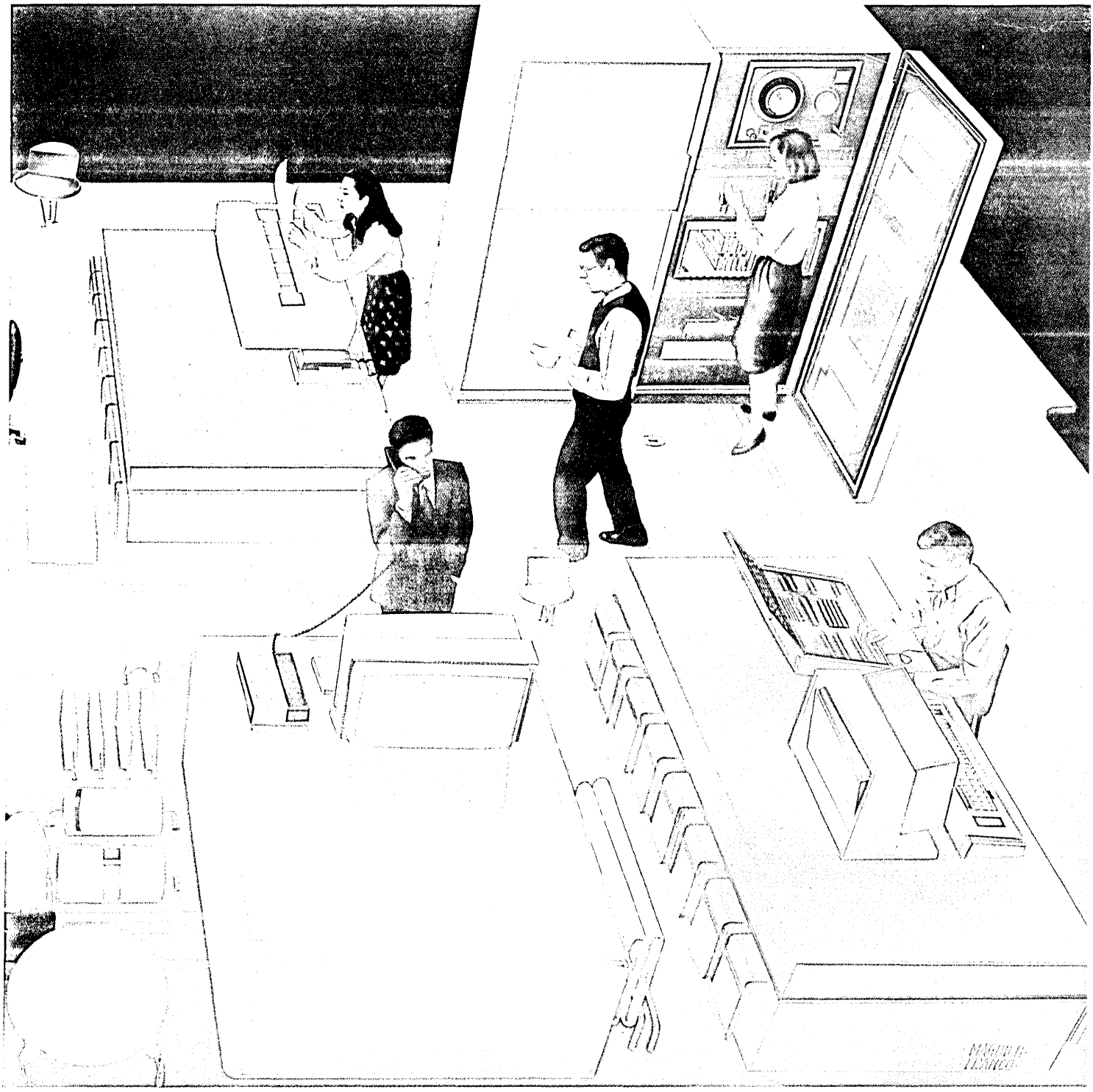

retrieves and evaluates contents quickly and easily with electronic files—while reducing the possibility of losing documents. An electronic "Mailbox" allows you to quickly determine which documents to read first by giving you an overview of "Mailbox" contents. EDC reduces storing and filing costs with an electronic "Archives" that allows for either short- or long-term storage, and the "Wastebasket" which enables you to permanently delete items after a determined period of time. There's even an electronic "Calendar" that checks personal schedules and arranges mutually convenient meetings.

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EDC was developed by systems designers from Bell Labs who now work for AT&T Information Systems Laboratories. AT&T Western Electric produces EDC, and AT&T Information Systems will maintain it with comprehensive, conscientious service from the largest service organization in the industry. To find out more, call toll-free 1-800-247-1212, Ext. 879M.

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CIRCLE 63 ON READER CARD

Touch-sensitive terminals may be very sexy in the office, but whether they actually stimulate people to use computers is open to doubt.

TOUCH SCREENS: BIG DEAL OR NO DEAL?

by Michael Tyler

Chemical Bank's foreign exchange trading room is in a small corner on the sixth floor of the bank's lower Manhattan office building. In that room, some 30 traders virtually live on the telephone, buying and selling the currencies of the world. Each trader has about half a dozen crt terminals stacked in front of him, looking dangerously unstable and about to come crashing down on the mountain of paper that covers the remainder of the desk area. The terminals provide the latest foreign currency rates, stock market figures, business news, and other pertinent information.

The exchange moves quickly. When the right price for a certain currency is within reach, the trader must pounce with the speed of a leopard or wind up losing money. When he has the price he wants, he needs to telephone the broker he feels is in the best position to find a willing trade partner, negotiate the terms of the deal—amount, price, method of payment, etc.—and then record that information for posting on the exchange's ticker.

Yet for all the speed of the exchange, and all the computer terminals teetering atop the traders' desks, the Chemical Bank foreign exchange department is often overwhelmed by the slow, manual method by which deals are entered into the bank's computers and posted on the exchange, says Anthony P.R. Herriott, senior operations officer of the bank's treasury division. When a trader completes a deal, Herriott says, he is required to fill out a form listing the particulars of the deal and place it on a conveyor belt to another section of the room. There, data entry clerks receive the trade forms and key them into a 10-year-old Arbat system, which is connected to a PDP-11/70 across the street. The deal will be posted on the exchange after the PDP receives this information.

The process takes about 15 minutes from the time the trader completes the deal until the time he can see it posted on the ticker. That system worked well enough in 1973, when the exchange handled some 100 trades a day, Herriott says. The trader had enough time to fill out the form and place it securely on the conveyor, so that few trades were lost for very long. Now, says bank vice president John M. Wigzell, the same traders handle 1,000 trades a day, and often deal so quickly that they cannot write down all their trades on separate slips of paper. The result is that they keep a running list on a scratch pad, which intermediaries must then rewrite and stick on the conveyor; with a little luck, the paper reaches the other end and the data entry clerks key it correctly into the system. "We need a better system just to stay in the game," Herriott says.

A few miles uptown, Merrill Lynch and Co.'s Advanced Technology Development Department is developing new ways for the financial services firm's branch offices to improve the quality of information that reaches clients. The group is looking at videodisks, portable computers, teletext, touch-screen technologies, and just about anything else that may give the company a strategic advantage, says systems analyst David Rossien. Right now Rossien is examining several ways to provide clients with direct access to Merrill Lynch's databases in a controlled manner, so that they cannot make unauthorized entries or typographical errors.

Enter a small startup from Woburn, Mass., called Interactive Images Inc. Its first product—and its only product for the foreseeable future, according to president and founder Leonard I. Hafetz—is a hardware/software combination called Easel that might best be described as a user's front end to a computer terminal. It comes in several versions, each of which ultimately boils down to a color monitor with a touch-sensitive screen and a lot of software.

Both Chemical Bank and Merrill Lynch have acquired beta test Easels and are developing dedicated applications for the product. For each firm, the key factor in choosing Easel was the touch-sensitive screen. Indeed, more and more users are turning to touch-sensitive crts as "ergonomic" user interfaces. Says T.S. Springer, a senior associate with the Springer Associates consulting firm in St. Charles, Ill., "Manufacturers are realizing that computer devices are moving out of the clerical areas and into the managerial and executive areas, where keyboarding is not recognized as a high-status activity. The result is that manufacturers and users are turning to alternative methods of interacting with the computer." Fortunately, he says, the types of computer interactions often found on these levels lend themselves well to such alternatives. On the other hand, clerical functions such as word processing and data entry rely more on the keyboard.

The advent of touch-sensitive screens as alternatives to the keyboard has been heralded for several years, but only in the past few months have users and manufacturers begun to take them seriously. Easel was introduced last June, and the Hewlett-Packard HP 150—the first personal computer with a touch-sensitive screen—premiered in October. The sudden movement to touch-sensitive screens has raised the expectations of vendors such as Carroll Touch Technology, a Champaign, Ill., maker of touch screens. The day after the HP 150 was announced, Carroll Touch ceo Arthur B. Carroll told the *New York Times*, "I had a companywide celebration. I struggled for 10 years to get a stamp of approval on touch technology and they just did it."

SCREENS' PAST A STRUGGLE

What Hewlett-Packard's announcement holds for the future of touch screens is arguable, but the past has indeed been a struggle. In the decade since touch screens first made their appearance in commercial products, business has grown slowly to a current industry volume of $10 million annually, Carroll says. Bart Goodmandson, the marketing manager at Sierracin Transflex, another touch panel vendor, tags the market at closer to $30 million; either way, the industry is microscopic.

Yet even for such a small industry, there is no shortage of vendors or technologies. About a dozen vendors currently provide touch systems based on any of four different touch technologies. The HP 150 uses an optical system, in which a user's finger interrupts crossing beams of infrared light. The beams are generated by LEDs just in front of the screen on two sides, and detected by pho-

PHOTOGRAPH BY ROBERTO BROSAN


A little lower, please

About a dozen vendors provide touch-sensitive systems based on any of four technologies.

tosensors on the other two sides. The intersection of a vertical and a horizontal beam is a touch point.

A similar technology uses acoustic surface waves. Acoustic signals travel along a curved glass overlay that conforms to the shape of the crt. When the user touches the screen, his finger interrupts the echo pattern and a controller interprets the interruption to indicate which point on the screen was touched. TSD Display Products of Bohemia, N.Y., manufactures this type of device.

The third technology might best be called a capacitive sensing system, such as is found on AT&T Information Systems' touch-sensitive terminal. These products use a thin, transparent material that is fused onto predetermined areas of the crt face. When a user touches one of the areas, the capacitive value of that particular section changes, indicating that a touch has been made. The AT&T terminal has some 30 such areas.

The fourth technology, which is used on the Easel and Sierracin Transflex products, can be called a resistance membrane approach. A set of parallel electrodes is etched onto a sheet of Mylar; then, two of these sheets are stretched across the crt at right angles to each other, creating a grid of electrodes. When a finger presses on the outer of the two Mylar sheets, the sheets touch and short-circuit a pair of electrodes.

While all four technologies are designed for the same function, significant differences exist. The resolution—how many distinct areas the user can touch—differs dramatically for each approach. The smallest touch-sensitive area on the AT&T capacitive sensing terminal, for example, is about half an inch wide by an inch deep. Infrared systems are limited by the size of LEDs and photodetectors; the HP 150 uses a grid of 40 beams across by 27 down, which divides the 12-inch monitor into touchable areas about a quarter of an inch square. Acoustical methods provide similar resolutions. Resistive membrane touch panels, however, offer significantly higher resolutions, to the point where they can replace digitizing tablets. Easel's touchable resolution is 960 by 720 pixels, and a resistive membrane touch panel made by Elographics, in Oak Ridge, Tenn., can obtain a touchable resolution of 4,000 by 4,000—16 million distinct touchable areas, compared to 30 on the AT&T terminal.

Other differences exist as well. Optical, acoustic, and resistive membrane techniques can accept a finger, a pen, or any other device; capacitive sensing systems require a human finger with a known electrical charge. And with resistive membrane and capacitive sensing systems, the user must actually touch the screen with something, while for the other technologies merely pointing from a very close distance is fine.

After evaluating the technologies available, both Merrill Lynch and Chemical Bank chose the Easel system, which adds an authoring system, a programming language, and other software to a resistive membrane approach. A software feature that attracted both companies to Easel is a utility that allows programmers to disable areas of the screen at any time, much as a software program might disable keys on the keyboard. Both firms are using a cpu and monitor supplied by Interactive Images Inc., Easel's maker, although versions are currently available for the IBM Personal Computer and for mainframes running software from Applied Data Research in Princeton, N.J.

INVESTOR INQUIRY SYSTEM

Merrill Lynch is working on a client inquiry system through which clients will be able to walk into a branch office and find out how their investments are doing and what other avenues of investment might do. The Easel terminal would be tied into a Quotron or some other stock service, and would provide each client with the price of any stock or investment in which the client has an interest. Nonclients could query the prices of a couple of stocks to whet their appetites, but no more. "One of the things that Merrill Lynch sells to its customers is information and the access to information," Rossien says. "We don't want to give it away."

The firm's application takes advantage of Easel's selective touch sensitivity by restricting the kinds of input available to the customer; since there is no keyboard, the customer must follow the screen's directions and cannot tamper with the system or obtain unauthorized information.

The Merrill Lynch application is experimental. "We have one Easel, and it's on an approval basis," Rossien says. "If it doesn't work to our satisfaction, we'll return it to Interactive Images." If the product is approved by Rossien's group, it will be installed in a single branch in New York for a six-month tryout. If it is successful there, it will be offered to other branches, without obligation to accept any technology coming out of Merrill Lynch's advanced technology development labs.

Chemical Bank, on the other hand, is fully committed to converting its foreign exchange trading to Easel; it has attempted other ways of automating the process and consistently been dissatisfied, says Herriott.

"We tried electronic pens, tablets, voice input, you name it. But the tablets demand too much precision on the part of the trader, and the voice input products we tried couldn't separate the speaker from all the noise in the room."

His colleague Wigzell adds, "We were convinced that the only way to automate was to have the trader key in each trade. But the unfriendliness and structure of the keyboard is a big problem. We tried to use conventional means, but we need a breakout technology."

The bank is in the process of implementing a two-phase strategy that it feels will accomplish the breakout. The plan employs Easel workstations programmed in the bank's London office. Each workstation's screen is divided roughly in half vertically. Large touch-sensitive boxes at the top of the screen invite the user to declare the current transaction a "buy" or a "sell"; at the bottom, similar boxes let the users deal, service, cancel, log out, or lock out their screens. The right half of the screen lists key information about the current transaction, including buyer bank, seller bank, currency, exchange rate (in dollars and the foreign currency), broker, bank customer, exchange location, and method of payment.

When the trader touches the screen in one of these areas, a list of potentially valid entries or a numeric keypad appears on the left half, inviting the user to choose the information needed on the right. For instance, when the user hits the "broker" cell on the right, a list of brokers appears on the left; the trader then hits the name of the broker to be involved in the current trade, and that information is entered into the system. For exchange rates and other numerical data, the user hits the proper cell on the right and then types in the numeric data on the keypad that appears on the left. In this way, an entire transaction can be completed directly on the workstation. (A QWERTY layout can be called up on the left for entry of nonstandard or rare names—an infrequently traded currency, for example.)

In the first phase of Chemical's plan, the Easel workstations will replace only the Arbat data entry system, while the rest of the trading system remains in effect, Wigzell says. Traders will still create blizzards of paper, which will then be rewritten by intermediaries onto proper forms and sent along the conveyor to the data entry area. There, data entry clerks will enter the data on the Easel system. The primary gains in this phase of the operation are accuracy in listing trades and independence from other bank areas sharing the Arbat system, Herriott says.

In the second, more ambitious stage of the plan, the Easels will be installed on the traders' desks alongside the various other crts. The trader can then talk on the phone with a broker or customer and simultaneously enter the transaction information directly into the system. Once a trade is complete, Easel

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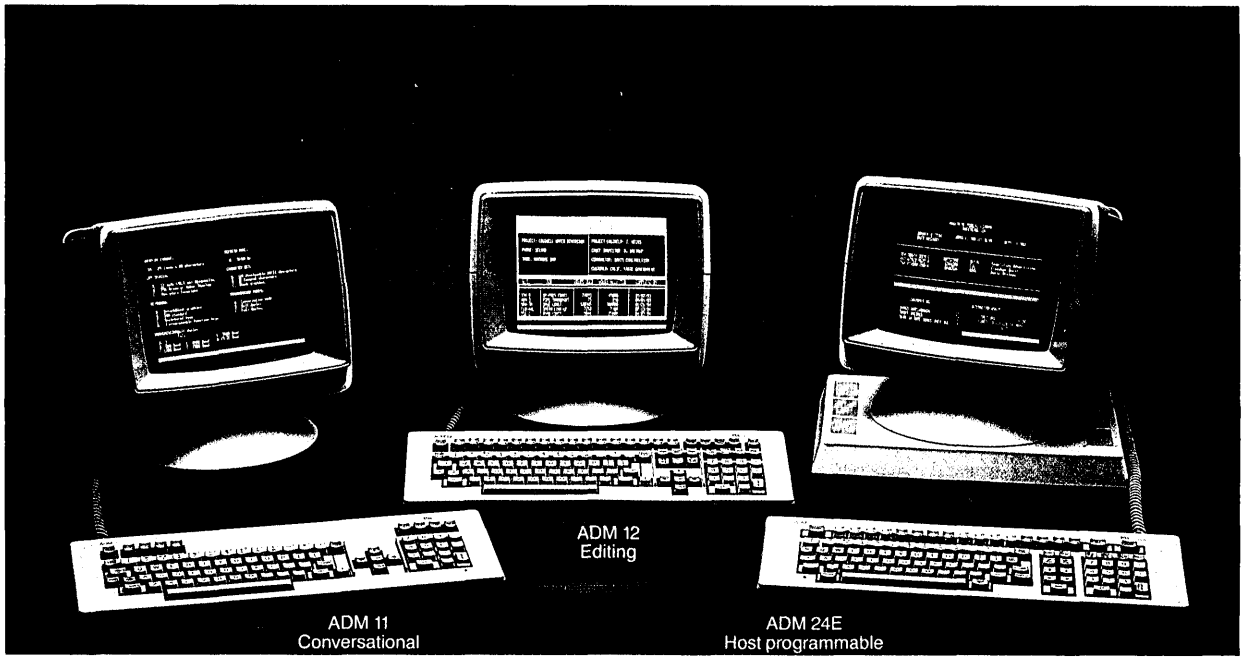

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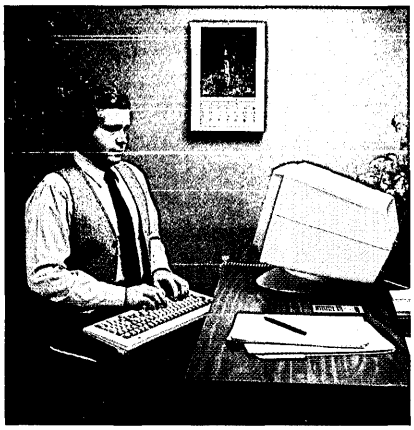

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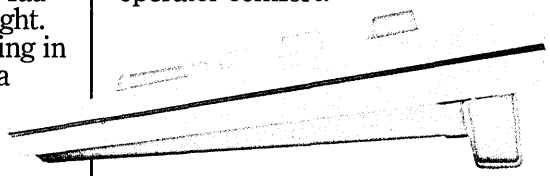

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	ADM 11	ADM 12	ADM 24E
Programmable Function Keys	4 (Shiftable to 8)	16 (Shiftable to 32)	16 (Shiftable to 32)
Non-Volatile Function Keys	Optional	Standard	Standard
Function Key Legends on 25th Line	From Host	From Host	Standard Non-Volatile
No. of Pages of Display Memory	1	2	2 or 4
Display Memory Configurations (Plus 25th message/status line)	24 lines by 80 characters	(2) 24x80 or (1) 48x80 or (1) 24x158	User-Definable up to 96x80
Scrolling	Standard Scrolling	Smooth, Jump or Horizontal Scrolling Split Screen	Smooth or Jump Scroll Split Screen
Transmission Mode	Conversation Mode	Conversation or Block Mode	Conversation or Block Mode
Editing	Limited	Full Editing & Protected Fields	Full Editing & Protected Fields
Visual Attributes: Reduced Intensity, Blink Blank and Reverse Video. Underline also on ADM 12 and ADM 24E	3 Embedded 1 Non-Embedded	5 Embedded or Non-Embedded, plus Full Screen Reverse Video	6 Embedded or Non-Embedded, plus Full Screen Reverse Video and Highlight
OEM Flexibility	Modifiable Set-Up Characteristics	Modifiable Set-Up Characteristics & Personality	Modifiable Set-Up Characteristics. Add to Program in ROM or Down-Line Load in RAM (56K ROM or RAM. Plus up to 22K Display Available) Room for add'l Logic Boards.

line print, transparent print, and display and print. There are four programmable function keys (shiftable to eight). And two levels of setup mode to reduce errors while still giving the operator maximum flexibility.

For a High Touch terminal with editing and more, choose the ADM 12. It features five non-embedded attributes. Embedded mode can also be selected for existing applications. And 16 programmable non-volatile function keys (shiftable to 32). The display memory can be configured as two 24 x 80 character pages, or one 48 x 80 page, or one 24 x 158 page. The terminal runs in either conversational or block mode.

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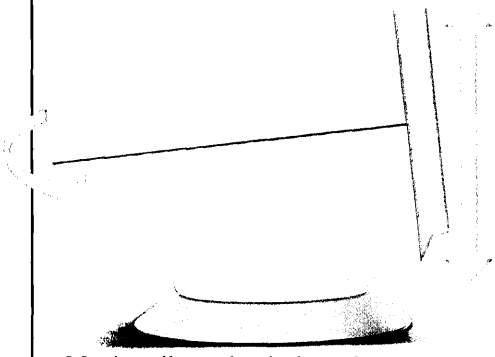

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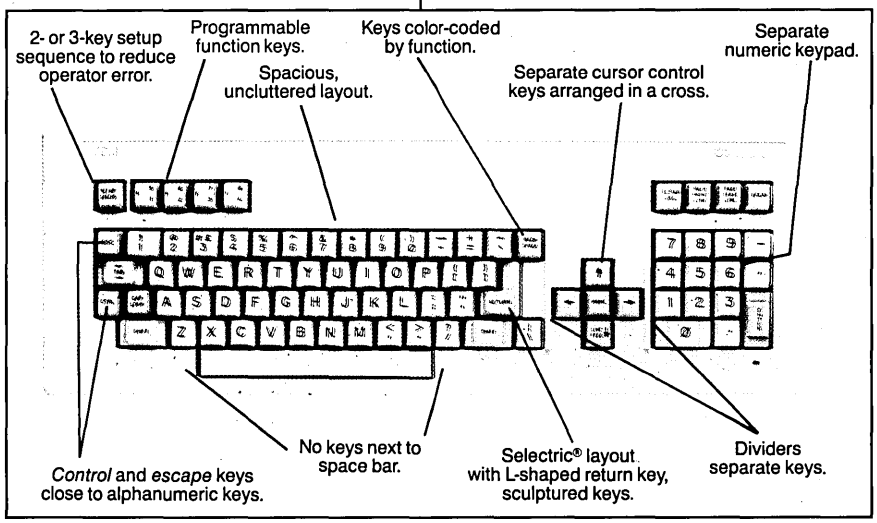

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can send it to the PDP-11 and out to the ticker. No more scratch paper, intermediaries, conveyor belts, data entry, or 15-minute lag between the transaction and its posting.

INSTANT FEEDBACK ON TICKER

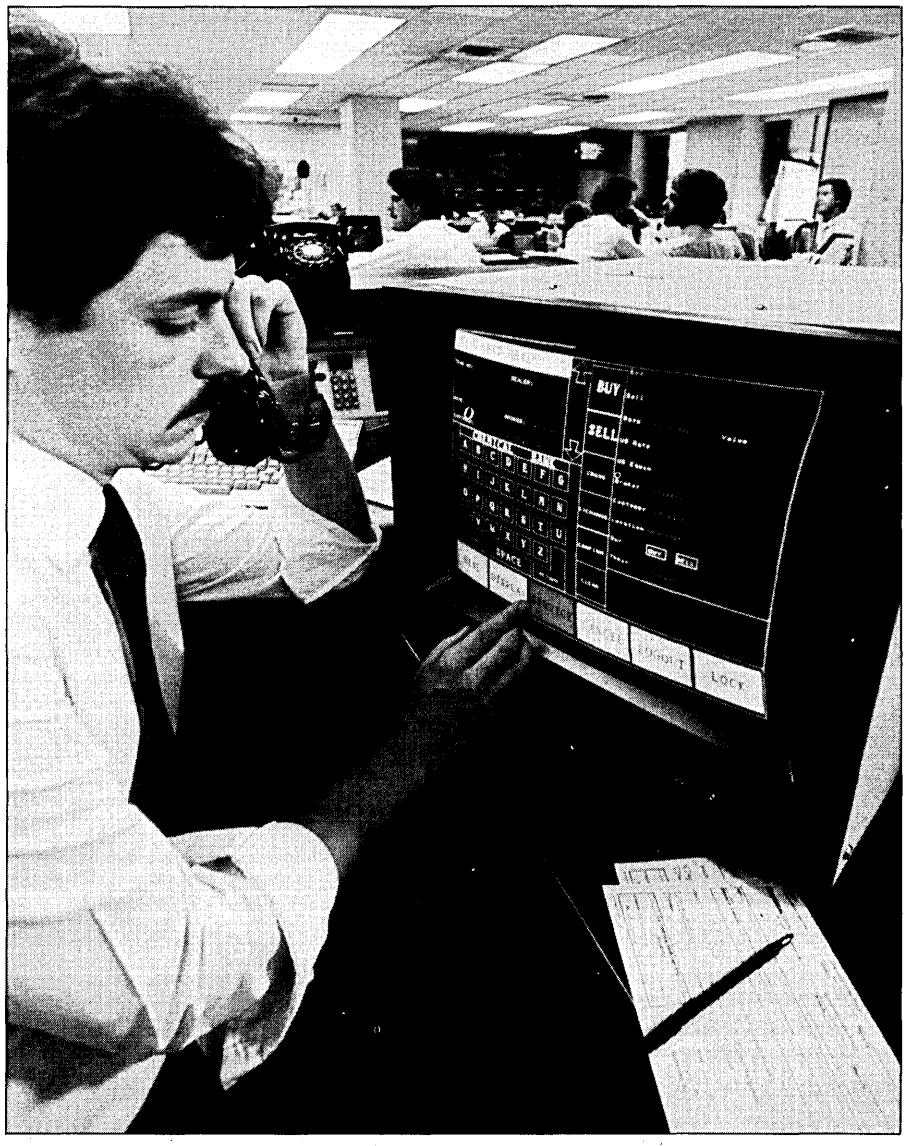
Reducing the number of transactions lost on the floor beneath the conveyor belt and providing virtually instant feedback on the exchange ticker are two advantages that appeal to traders, according to S. Waite Rawls, the bank senior vice president in charge of the New York trading operation. The system also provides other advantages to bank management, he says, some of which the traders may also appreciate.

Easel workstations used in the trading room, for example, will include cells that indicate what the trader's customer and trading limitations are, and how close he is to those limits. The trader can then incorporate this information, previously unavailable online, when making decisions about deals. "The faster and the better our traders can analyze the information at their disposal, the more money the bank can make," Rawls says. "Automation now is not a way of saving money but a weapon for profit."

Easel is also a way of managing the traders, which may not sit well with these independent-minded, free-spirited people. Managers can keep track of how individual traders are performing, Herriott says, and use the selective touch-sensitive facility to lock traders off their terminals if they are doing poorly. "We can finally establish some management control," he says. "We can police the traders and cut our losses." The same central control facility will enable trainees to begin trading in a controlled environment where their inexperience cannot cost the bank too much money; when the average amount of each transaction is $3 million, even a few minor errors can cost the bank a bundle.

Other users have begun integrating touch-sensitive screens into less traditional fields than banking and finance. Walt Disney's Epcot Center, several Manhattan office buildings, and many business hotels throughout the country use them as informational directories. People walk in off the street and ask the computer where a particular restaurant, exhibit, or office is. These information requests are particularly amenable to menu operation, and therefore to touch screens. For example, the crt could ask the user to touch a box labeled "restaurants," "night clubs," "theaters," or "sports," and then present a screen with more information on the chosen area.

Because of their usefulness to computer neophytes who are merely looking for information or following a menu, says Richard Peterson of Input, a market research firm



One of Chemical Bank's traders interacting with computer via touch screen.

in Saddle Brook, N.J., "the MIS reaction has been very favorable. A touch screen is a very effective vehicle to get people into a computer system."

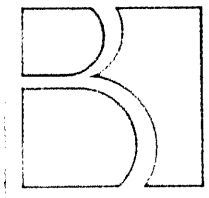
Touch screens are also catching on in applications where the user simply does not have the time to hunt for keys, even if he is computer literate and uses computers all the time. Chemical Bank's traders, with their crts heaped precipitously atop their desks, certainly are computer literate, but they do not have the time to use a keyboard accurately. The American Stock Exchange in New York uses a similar system, in which a specialist can execute a trade by touching the order as it comes up on the screen. The user then touches the price and broker information, and the trade is completed.

Applications requiring rugged equipment that is amenable to menu-driven software are also prime targets for touch screens. Goodmandson of Sierracin Transflex reports a system his company developed with Litton and Westinghouse for the military. Generals operating command posts behind the front lines in a battle situation can deploy troops, tanks, and other forces using a touch-sensitive screen. Hafetz of Interactive Images notes that touch panels work well in industrial process control applications. In both of these applications, the potential for dirt and grime to pollute a keyboard is reduced since touch panels can be more hardy.

DRAWBACKS OF TOUCH PANELS

Yet touch panels are not without their drawbacks, and these may prove fatal to the fledgling industry. Parallax—in which the actual touch-sensitive area does not align exactly with the crt's image of where it should be—affects all touch-sensitive systems, but it is more of a factor in acoustic and infrared systems because the sensitive areas of those technologies are farther away from the crt face on which the image is seen. Unless the user sits directly in front of the screen at eye level, the area he thinks he has touched may not be the area he did in fact touch.

Capacitive sensing and resistive membrane touch panels are in effect part of the crt face, not separate from them, so the



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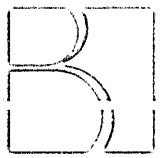

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"People will always touch the screen. You have to ask what the cost of random interactions with the screen will be."

parallax effect is reduced; yet even with these technologies the thickness of the crt's face causes some parallax. Moreover, critics charge that resistive membranes have been known to slide slightly from their original location, also causing parallax.

The reliability of the various technologies has also been questioned. Acoustical systems are extremely sensitive and can be thrown off by dirt or small scratches in the surface of the crt screen. With optical systems, a pack of cigarettes falling from the top of the terminal can break the light beams as easily as an intentional touch, producing the same result as smashing a book against several keys on a keyboard. Capacitive sensing systems are inflexible; because the touch areas are fixed in size and location by the manufacturer, it is more difficult to modify software for touch input. In addition, critics claim that these systems do not hold up well in environments marked by temperature and humidity fluctuations. Finally, resistive membrane touch panels, because of the properties of Mylar, block out light from the crt, reducing the visibility and clarity of the screen itself. The resistive membrane overlays are also more delicate than the crt's glass face or other touch panel technologies, and can be damaged easily by careless users.

And users are careless, more so than they may realize. T.S. Springer of Springer Associates recalls that when IBM brought out an antireflection coating for its crts a few years ago, people touched the screen and got the residue on their fingers. The end result was not less glare but rainbows on every screen. "People will always touch the screen, whether it is touch sensitive or not," he says. "They point out information to a colleague, or point to the screen to compare specific items to a printout, or whatever. Manufacturers have to be aware of this and ask what the cost of random interactions with the screen will be."

Another potential drawback is that human interaction with touch panel crts is even more direct than it is with keyboard-based crts. While this may not bother managers who have been using terminals and personal computers happily for several years, it may scare away the very neophytes that touch terminals are supposed to attract. Says Paul Nesdore, an analyst with Datapro in Delran, N.J., "If a user isn't going to like a keyboard, he's not going to like actually having to touch the screen. You know, think about the radiation and the fear of injury and all that." (No such complaints have yet been registered, according to Janice Blood, a spokesperson for 9 to 5, the National Association of Working Women.)

Yet another negative factor is price. Touch panels, not including the crt, cost up to $1,000 each; no significant price differences exist among the four technologies. Joe Kelly, another Datapro analyst, says, "Terminals are too cheap and too laden with other features to support touch panels."

Many terminal makers agree, and have shied away from adding touch panels to their products. Burt Hochfeld, vice president of Raytheon Data Systems, says, "They're just too expensive. If we could buy a touch screen and make money on it, we would be doing it. The applications are there, but right now it's too expensive."

But perhaps the most important drawback to touch-sensitive terminals, at least in terms of gaining widespread acceptance, is the inherent restriction the technology places on which applications can be run. Says Rossien of Merrill Lynch, "Some applications make more sense than others, and some make less sense. One of the things we're doing is seeing whether applications we would want to use will make sense." Consequently, he adds, his company is moving cautiously on Easel and may eventually drop it entirely.

Says Kelly of Datapro, "Touch panels are only for very specialized applications. They have to be menu-driven, and they are slow. The currently available applications are as a result quite simplistic compared to what's available for a keyboard."

Springer adds, "You have to display meaningful information on the screen so that people can respond to it. It becomes difficult to replace the keyboard in applications like word processing, but it can be very good in replacing the special function keys."

WORK WELL WITH MICROS

On some personal computer applications, touch screens can work well. Several microcomputer applications software vendors have already announced versions of their products that can take advantage of the touch screen on the HP 150. Peterson of Input notes, "You need to have the keyboard. You can use the two together very well. The touch screen with a keyboard can make a micro very easy to use, and yet very versatile."

In comparison, the touch screen's success in mainframe-based systems is more uncertain. Richard Telesca, a consultant with Aetna Life and Casualty in Hartford, Conn., says that his company experimented with Easel but dropped the product. "We weren't satisfied with the interface to the software we already have. It's too difficult to fit a touch screen to interface our existing CMS software; you need a system designed to work with touch to begin with."

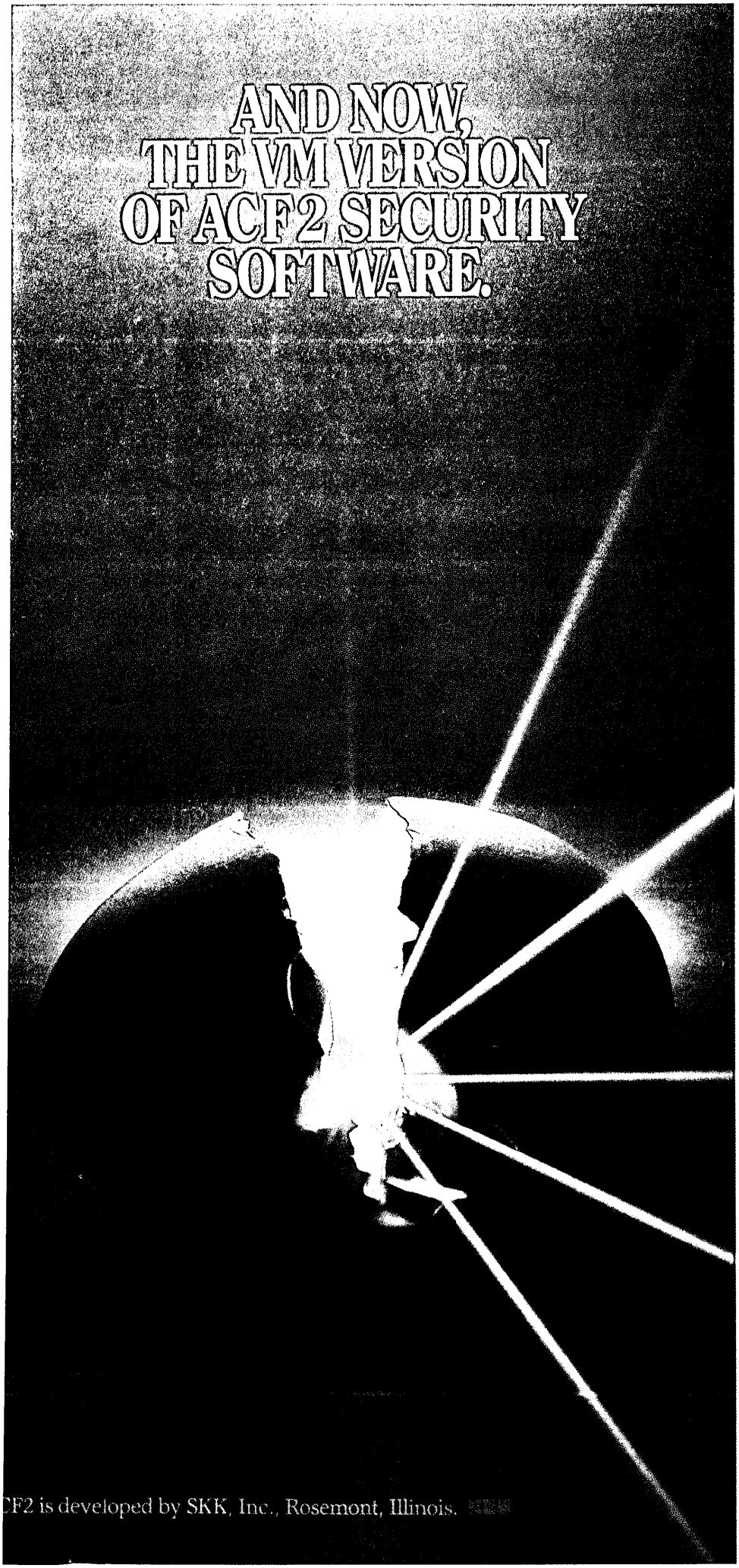
Rossien of Merrill Lynch complains that touch screens present additional problems for programmers accustomed to working on traditional mainframe applications. "You really need intelligent software design. Easel, or other touch-sensitive products, demands a different mentality in programming. You have to know everything the user can possibly want to do at any time and be prepared to handle it in some way. When you lock out everything but the prescribed menu items and there is no keyboard to write a command, the user cannot get the system to do anything but what's presented. If he has a legitimate need for something else then you've failed in your software design."

The combination of these drawbacks and outside influences may doom the touch-sensitive terminal, analysts fear. Kelly says, "The touch screen's main advantage is for users who are unfamiliar with a keyboard and unwilling to become more familiar. But with microcomputers all over the place and at all levels of a corporation, people are more comfortable on the keyboard. That eliminates the main competitive advantage of the touch screen. They've been around a while, and they will continue to be around, but I don't think there's much interest in them."

His colleague Nesdore is even more pessimistic: "I just don't think the concept can make it today."

Springer notes that touch screens, even in applications designed for computer neophytes or computerphobes, may be eclipsed by other technologies. "Touch screens, I think, are only a stopping point in the evolution to voice input. Touch is currently a more sophisticated and well-developed technology than voice input, but voice input is more versatile and promising. When voice input comes around, touch screens will no longer be needed."

Even touch technology's greatest proponents admit that the future is not as bright as it once seemed. Chemical Bank, in plunging forward with Easel, clearly is optimistic about its effectiveness in automating the bank's foreign exchange area, and eventually, all similar transaction-oriented areas. Even still, vice president Rawls says, Chemical does not see Easel as an effective long-term strategy. "We'll be rolling it in over the next year and a half, but I wouldn't put even a five-year life span on it. I think it will be obsolete by then." The system can handle upwards of 2,000 to 3,000 trades per day—triple the current rate—but Rawls says that amount may not be sufficient and that the Easel system may not be able to deliver more because of touch technology's inherent slowness. "We may be on the leading edge for a few minutes, but not for long unless we keep going to new technology. Touch screens aren't going to be the newest technology for long, and we have to prepare for what comes next." ✻



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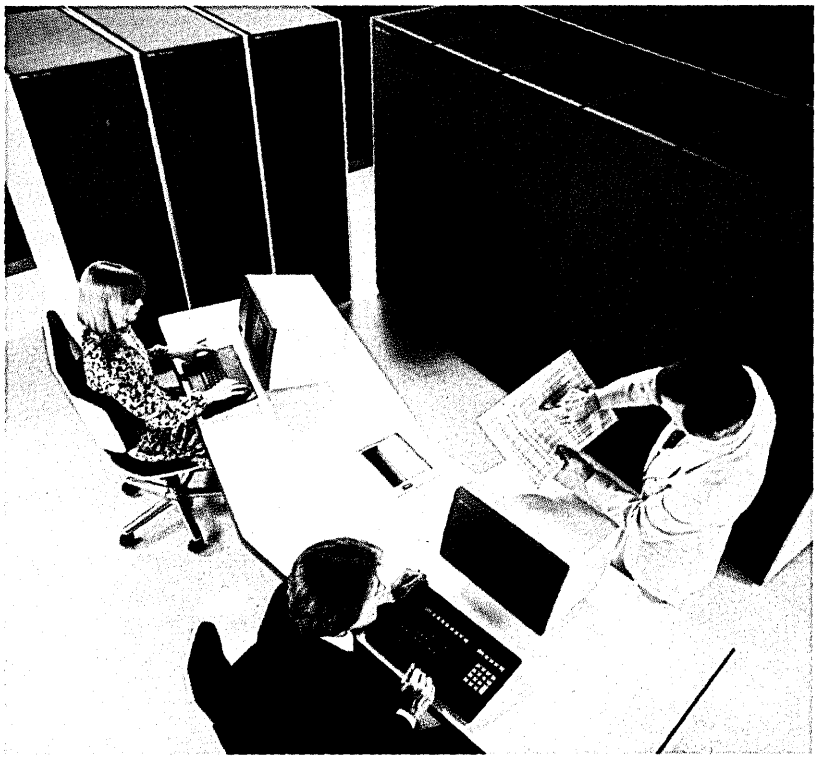

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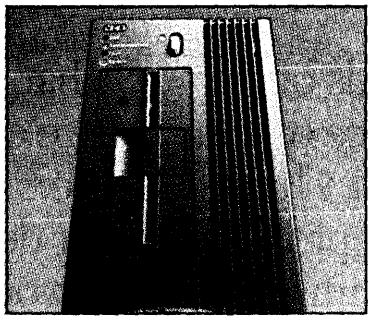

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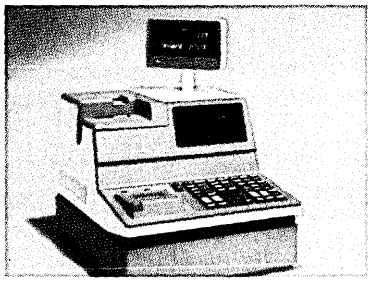
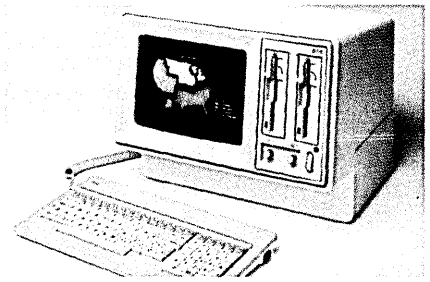


Bubble memory technology provides resident mass memory in the terminal for automatic price look-up for supermarkets and other retail stores.



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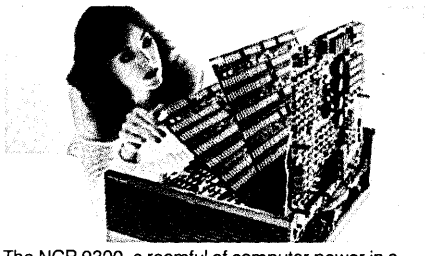

The NCR 9300, a roomful of computer power in a 50-pound box, was a big breakthrough in 1983. Add this 32-bit VLSI mainframe for a complete system price of less than $46,000!

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Lots of companies develop strategic plans; relatively few of them are put into practice.

DECISION-ORIENTED INFORMATION

by Victor E. Millar

More than 90% of the Fortune 1,000 companies claim to be doing some type of strategic planning. Although business leaders hold this methodology in high regard, their experience with strategy execution—mobilizing an organization to change—has left them somewhat dissatisfied. Strategic planning's unblemished reputation will not survive the 1980s unless more enterprises develop an effective program for strategy execution. One vital component will be a "change agent" that can motivate an organization to move in whatever strategic direction the ceo chooses.

We are at the threshold of an information explosion that is fueled by electronic technologies. Two years ago, I set out to determine the international business community's plan for this period of enormous promise. I met with ceos and senior executives in 58 cities around the world—from Melbourne to Moscow and from Oslo to Johannesburg—to learn what the most innovative people planned for the future.

Many ceos feel that they will not be direct participants in the information age because their roles are so unpredictable and subjective. Underlying their dim view is a negative and even mistrustful perception of information processing, an area that has grown so rapidly in the last two decades that, in terms of personnel, it usually outnumbers corporate planners 50 to 1.

Despite this growth, many ceos and senior managers have little understanding of information processing, and some even distrust those associated with it. Information processing personnel usually report to a level below that of the planners and therefore have limited direct access to top management.

Most ceos and senior executives view the computer as a tool for operations personnel, but computers carry a bad image in most companies because they are associated with unpredictable results, cost overruns, and masses of information proliferated throughout organizations.

There are two underlying reasons for information processing's negative image. First, the clash between two very different cultures has created much dissonance. Executives are interested in results, not techniques. They are worried about how to reduce costs, increase revenues, improve customer service, and gain better information. Computer professionals, on the other hand, are craftsmen—in the finest eighteenth-century use of the term—who understand and value high-technology tools and techniques.

Secondly, most of the information received by the ceo and his senior executives is by-product information: it was originally generated for individuals in lower-level positions in the organization. Senior management has received information based on someone asking the wrong question, "What else can we do with the information that we have already collected?" instead of "What information do you need at the top to manage this company?"

On the positive side, in most companies, senior management views the computer as a successful technological innovation unparalleled by any other modern development. But because information processing has not served its needs, top management often feels the computer has failed to achieve its potential in supplying the information needed for making decisions.

Despite this prevalent attitude, I have a very different hypothesis about the kind of relationship this group will have with the computer. After seeing what pioneers around the world are currently doing, I believe the ceo and his management team will actively participate in the information age.

I say this not because of the microcomputer, decision support systems, computer education, or less expensive hardware, but because of the ceo's experience with strategic planning, which will catapult his organization ahead. And, owing to this process, the computer will finally begin to meet the need for executive-directed information.

CEO'S PRIMARY ROLE

Other employees in an organization often do not understand the ceo's work. Yet, everyone considers "planning" the ceo's primary role. In fact, most ceos consider strategic planning their single largest concern and their greatest personal responsibility. That planning responsibility is divided into strategy development and strategy execution. While development has been successfully accomplished in many organizations, execution has not.

Effective strategy development and execution requires two kinds of strategic information. The first kind, commonly known, monitors external change and is used in strategy development. The second, which monitors internal change and is used in strategy execution, has not been used effectively.

To solve the problems of strategy execution, the ceo must use strategic information in a new role, a role that will help overcome the basic orientation differences between business and computer professionals, and move the computer from the clerical floor to the executive suites. Before this move can occur, however, organizations will have to fully understand the value of strategic information.

The right kind of strategic information can serve as the instrument of change the ceo needs to move his organization in the strategic direction he has chosen. It can be used to describe the expectations of corporate leadership and their concept of ideal performance, and also measure progress toward specific goals. In this role, information becomes the means to encourage change in highly motivated people. If people know that a certain measure will be used to judge their performance, they'll strive to do well according to that measure.

Most successful members of corporate management are strongly motivated to excel when prompted by the expectations of corporate leadership. They will change to meet those expectations, if the expectations are clear. Effective leadership, therefore, demands that the ceo's goals are clearly understood by everyone in the organization.

Management must define the target point on the horizon, as well as the organization's concept of ideal performance in meeting that target, to implement a successful strategic plan. Part of the strategic planning process should include defining this concept in terms of strategic success factors (Fig. 1).

Strategic success factors are not new to business. Arthur Anderson & Co. developed responsibility reporting, a forerunner of

DECISION-ORIENTED INFORMATION IN PRACTICE

The following case study is based on a composite of a European and an American textile company that have implemented Information for Motivation.

Grayson Manufacturing Company, a textile firm with annual sales of about $500 million, is a pioneer in the use of information. The seven-step process by which Information for Motivation was implemented at this company clearly illustrates how effective use of the right information can maximize the value of strategic planning (Fig. 1).

Grayson manufactures towels, bath mats, drapes, and tablecloths. It also sells cloth at intermediate stages in the production process. Production is handled at three cloth mills, a yarn mill, a dye house, and a finishing plant.

The first step in implementing Information for Motivation was for Grayson management to identify the environmental, enterprise, industry, and company-unique success factors (Fig. 2). Environmental restrictions have a major influence on the textile industry. Foreign competition is critical because Grayson was strongly affected by Chinese imports into California. The company's margins are very low, so inflation represents a substantial factor. In addition, government regulations are important because dust created during the production of textiles concerns both OSHA and the EPA.

The success factors that Grayson and its competitors must consider include selecting market niches, providing competitive products within that niche, periodically purging their product line, and maintaining modern, labor-efficient facilities.

Grayson's enterprise success factors apply to almost every organization: high labor productivity, minimum working capital, high-quality customer service, a motivated management team, and a return exceeding its cost of capital.

Selecting Grayson's company-unique success factors required the largest part of management's attention.

The second step in implementing Information for Motivation was a review of the company's strategic plan. To avoid competition from foreign imports, Grayson chose to focus on being the low-cost producer in the market niches selected. But because Grayson values employee satisfaction as much as profitability, the company's mission was twofold: first, to be the dominant supplier of textile products to the most profitable segments of the domestic textile market, and second, to provide a high-quality work life for their employees.

As a result, its objectives were to compete in profitable markets, be a low-cost producer, and offer a high-quality work life.

Fig. 3 illustrates how the first two objectives were broken down into the goals and strategies necessary to accomplish the company's mission. The goals are specific and the target dates are identified.

The third step was to select the strategic success factors. The project team's knowledge of the organization, coupled with a review of annual reports, press reports, and job descriptions, helped it understand what was strategically valuable to the firm. A series of interviews beginning with the ceo and proceeding down the organizational chart also helped determine the strategic success factors. Key performance indicators and individuals were discussed.

In a second set of interviews conducted from the bottom up, participants discussed the decisions and plans made to better understand the strategic success factors and operating success factors formulated for each organizational level. In this way, those factors constant throughout the organization were identified.

The more decentralized the company, the fewer strategic success factors apply to all units at all levels. In companies under centralized management, more strategic success factors are similar among different business units and executives.

FIG. 1

IMPLEMENTING INFORMATION FOR MOTIVATION

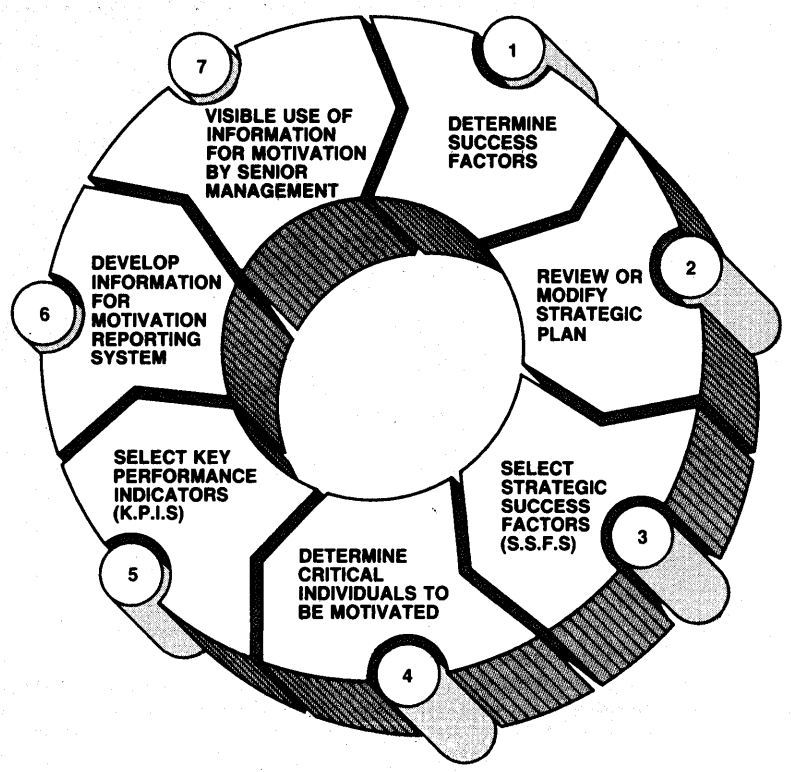


FIG. 2

UNIQUE SUCCESS FACTORS

ENVIRONMENTAL

Foreign competition
Inflation
Government restrictions

INDUSTRY

Quality products
Low-cost production
Modern production facilities

COMPANY-UNIQUE

New products
Stable work force
Market segment dominance
Low material cost
Effective market intelligence
Low-cost funds
Design for low-cost manufacturing

ENTERPRISE

High labor productivity
Minimum working capital
High-quality customer service
Motivated management team
Return above the cost of capital

FIG. 3

BREAKDOWN OF OBJECTIVES

MISSION	OBJECTIVES	GOALS	STRATEGIES	STRATEGIC SUCCESS FACTORS
• To be the dominant textile products supplier to the most profitable domestic market segments and to provide a high-quality employee work life	• Compete in profitable market segments	• Identify and enter five new market segments with high-profit potential by 1986 • Increase market share 15% in high-profit market segments where we are not the dominant supplier by 1987	• Upgrade market research function to identify high-profit potential market segments • Develop a product line that fits the requirements and needs of the high-potential market segments	• Effective market intelligence • New products
			• Expand product distribution network	• Market segment dominance
			• Product differentiation	
	• Be the low-cost producer in our market segments	• Reduce total manufacturing costs by 10% per unit by 1986 and achieve 15% ROI • Achieve 3% return above the cost of capital by 1986	• Review and upgrade all labor standards • Negotiate lower prices for raw materials and tighten control over yields	• High labor productivity • Low material cost

FIG. 4

KEY PERFORMANCE INDICATORS

STRATEGIC SUCCESS FACTOR: LOW MATERIAL COST KEY PERFORMANCE INDICATORS	CRITICAL INDIVIDUALS INFORMATION RECIPIENTS	ADDITIONAL INFORMATION RECIPIENTS
Material costs vs. long-term target Grayson percent material costs vs. industry	Vice president—research & development	Ceo, vp R & D, vp purchasing
Material price as percent of standard price Change in material price as percent of CPI	Vice president—purchasing, fabric group	Ceo, vp purchasing, vp R & D

The strategic success factors important to Grayson included effective market intelligence, development of appropriate new products, dominance in chosen market segment, high labor productivity, and low material cost.

The next step was identifying the individuals to be motivated to achieve these factors. A network of people from various levels of the organization was identified for each strategic success factor. At that time, many executives in the hierarchy were not part of the network of critical individuals because they were not vital to achieving that particular strategic success factor.

The fifth step was to determine and communicate the key performance indicators, which had to be action-oriented, capable of monitoring performance, and acceptable to management. In contrast to the ceos who single-handedly selected the strategic success factors, many people participated in determining and monitoring key performance indicators. The performance of these key people was not measured because Information for Motivation reporting is exercised with restraint.

At a textile company in France, for example, the president wanted all executives (regardless of their degree of interest or involvement in a strategic success factor) to assist in selection of key performance indicators, even though some of these executives would not be measured by the indicators.

Grayson's development of the key performance indicator and the individuals critical to one strategic success factor—reduced material cost—is illustrated in Fig. 4. Purchasing is an important function in this organization because buying a few high-volume commodities at the right price is critical to Grayson's bottom line. The synthetic materials purchased represent 70% of Grayson's product cost.

The sixth step involved development of the Information for Motivation Reporting System. Information needs were determined by the key performance indicators, and where appropriate, modern techniques such as decision support systems were used. The availability of necessary strategic and operating information was addressed, and, when it was unavailable from existing source systems, the need for more systems was indicated.

The final step was conspicuous use of the Information for Motivation system, which determined the entire endeavor's success. The plan called for disseminating the information in group meetings, monthly newsletters, individual conversations, and by other means of communication.

While information summaries from the transaction systems are distributed to lower-level managers, the top executives benefit by receiving strategic information based on strategic success factors and key performance indicators.

—V.M.

this approach, in the 1950s. Hundreds of companies used this concept to motivate all management levels to focus on containable costs in each area of responsibility.

That containable cost was identified as the strategic success factor in each level in the management structure and was then carefully monitored.

In the 1960s, D. Ronald Daniel, now managing director of McKinsey & Company, expanded the concept of success factors. Instead of relating them to responsibility reporting, he tied them to executive compensation. John F. Rockart of the MIT Sloan School Center for Information Systems Research carried this concept still further in the '70s by creating a methodology in which executives developed their own critical success factors. He focused on data that were not always collected, but that contributed to the success of the particular management level involved.

Today, in most companies, we find only a small number of factors—from 10 to 12—that dramatically effect an organization's success. Because these factors can measure successful performance in relation to the horizon point, they constitute the strategic information on which to base strategy execution. To execute strategy successfully, management must continually pay close attention to these factors and also carefully define them for its employees, because the concept of strategic success factors can be elusive. Terms like "growth" and "profitability" are not enough. If misrepresented, these strategic success factors can lead employees down a path that diverges from management's original purposes.

For example, one bank adopted fees generated by each division as a strategic success factor. Shortly thereafter it found offices aimed for high-volume customers rather than good credit risks. As a result, the net fees declined considerably. Other companies that focused only on fees or sales have caused their personnel to poach on each other's territory or to ask customers to sign orders with the understanding that the merchandise would never be delivered.

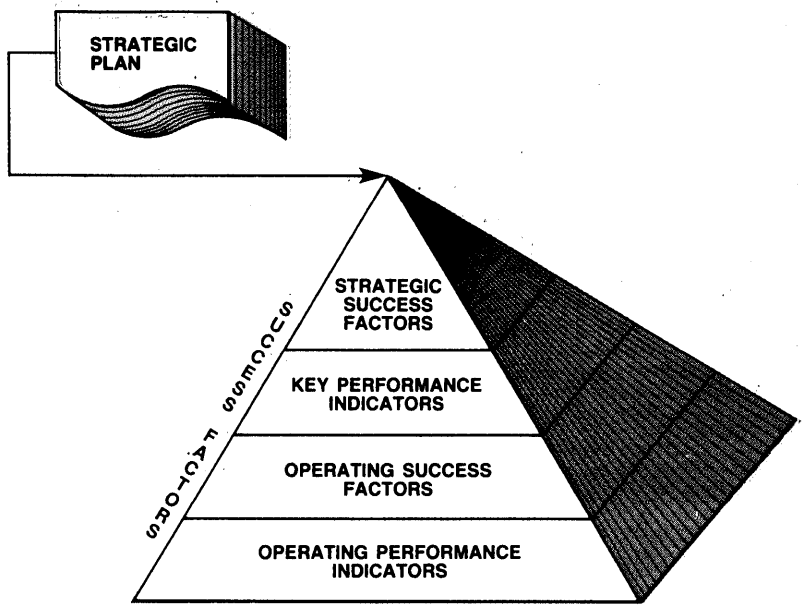
DEFINE TERMS CLEARLY

These examples illustrate that the wrong strategic success factor can be counterproductive. But by clearly defining terms like growth, profitability, market share, and morale, the strategic success factors can help an organization reach its new goals.

After corporate management has selected and defined the strategic success factors, it should develop a formal information plan that articulates the success factors at every level in the enterprise's information systems, from the top down. The information plan should familiarize users and information processing professionals with the range of internal and external business information available to them.

FIG. 1

INFORMATION STRUCTURE



In most organizations, no one person is responsible for information. A chief information officer (cio) should be appointed to oversee the merger of strategic planning and information processing.

This position entails teaching management personnel to use strategic information, supporting the selection of the business strategies, identifying the strategic success factors, and building them into the information systems. While the cio role is clear, the best candidate for the position is not so easily determined.

The chief financial officer is a possibility. Until the '70s, the cfo in most companies was the cio, because the answers to many business questions were found in the organization's accounting systems. This scenario changed, however, when large amounts of operating information were no longer within the cfo's purview.

The chief MIS officer is another candidate for the cio slot. This person is potentially ideal except for the existing dichotomy between information processing personnel and other areas of the enterprise.

A third candidate is the head of corporate planning, because planners are inherently information conscious. They already enjoy the advantage of working closely with the ceo. But the main drawback to this candidate is that most of the planners I know want to plan change instead of manage it.

Regardless of who is appointed cio, he cannot serve as a surrogate ceo—only the ceo can provide the authority and leadership necessary to meet the firm's information needs. The ceo must motivate the magagement team to accept his goals as their own. Toward that end, he must conspicuously measure progress toward the horizon. This last step, the conspicuous consumption of information, is the "engine" that mobilizes the organization to move in a desired direction.

The ceo must be involved. Only he can define an organization's direction. Only he has the authority and leadership to change the organization's concept of ideal performance, introduce strategic success factors and induce the organization to accept them as their own, and motivate the organization to change through his conspicuous consumption of strategic information.

I believe, therefore, that the most successful companies of the future will bridge the gap between information processing and corporate planning, because the computer will be an essential tool in executive management's quest for strategic information and in its selection of strategic success factors.

A few companies are pioneers in this unique use of information (see box p. 160). The competitive edge gained by such companies will encourage others to adopt these concepts. The merger of strategic planning and information processing in the 1990s will finally create the environment in which strategic planning's full potential can be realized.

Victor E. Millar is a managing partner-practice, of Arthur Anderson & Co., Chicago. He is responsible for the planning, definition, and integration of the firm's three practice divisions: accounting and audit, management information consulting, and tax.

CHARTS BY PAUL GOODFRIEND

CIRCLE 70 ON READER CARD

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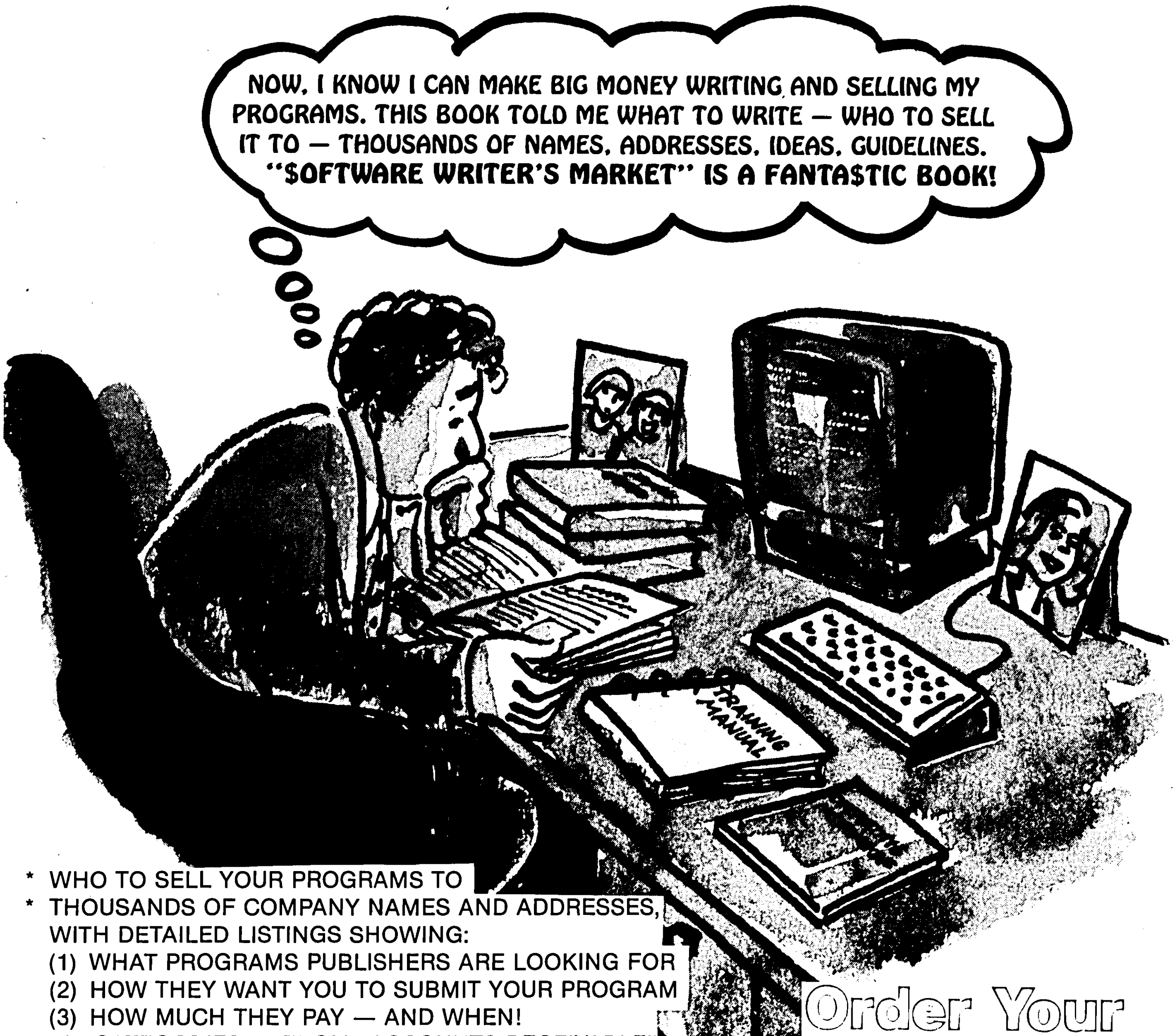

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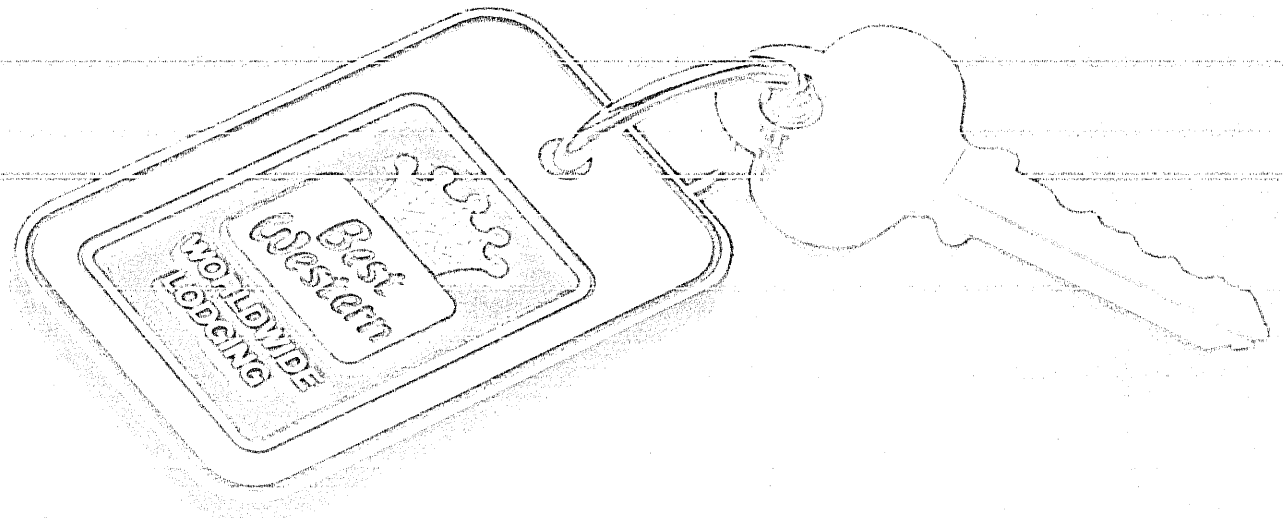
Vice President
Data Services
Best Western International



TIS

"TIS™ is truly a remarkable software system. With TIS operating at both the Strategic and Tactical levels of our organization, we now have a sophisticated software system capable of evolving as the needs of the company evolve. As far as I'm concerned, TIS is giving Best Western International the kind of next generation technology we need."

—Keith Barlow

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TIS was brought up quickly. It was first used in a Strategic capacity to implement corporate payroll and personnel applications. Now, TIS is being used in both Strategic and Tactical operations throughout Best Western International to develop applications for financial, marketing, supply and other functions. And, because the TIS Intelligent Query language provides easy access to corporate information, end-users are discovering that they can meet their own information needs without the aid of trained programmers.

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Modern Technology For Modern Needs

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- A relational view of data which gives programmers and end-users complete data structure independence.
- A powerful 4th Generation procedural language to serve requirements of both programmers and end-users.
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- An Intelligent Query language to provide instant information to end-users for virtually all ad hoc needs.
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800-543-3010

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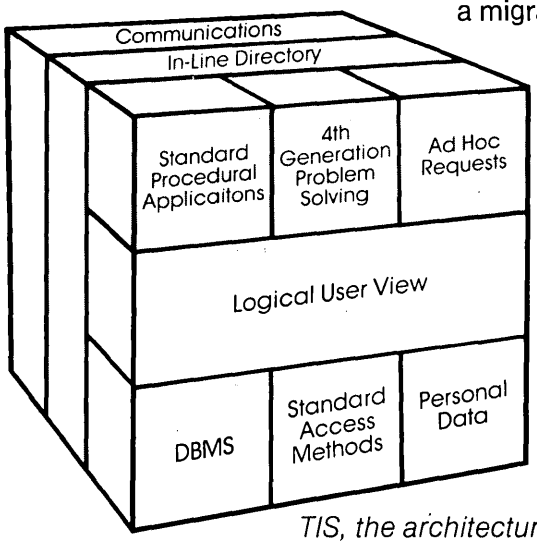

TIS, the architecture of the next generation of integrated data base technology.

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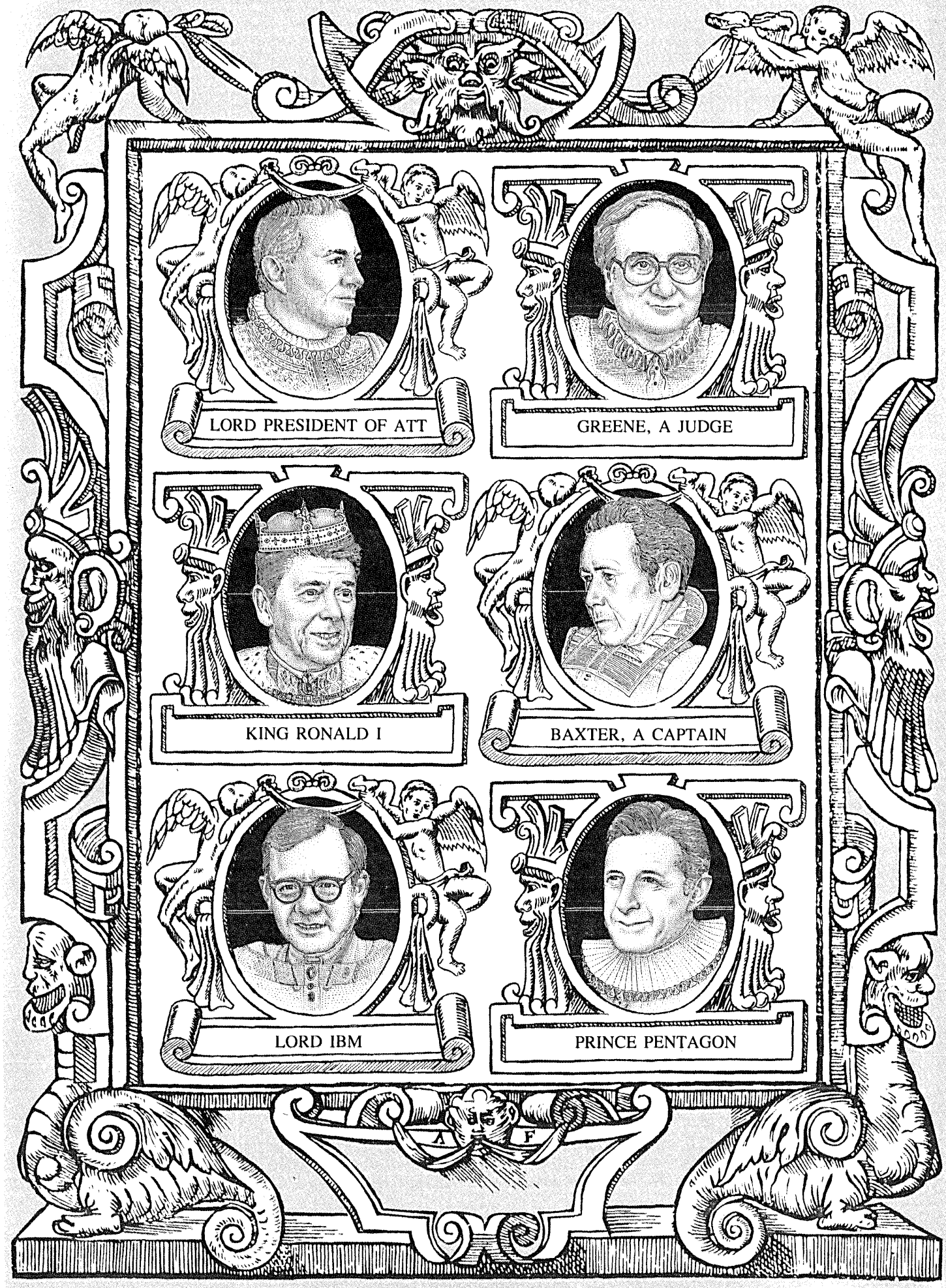
CIRCLE 71 ON READER CARD



BORDERS BY DAV BARBER AND PORTRAITS BY BARBARA KELLY

COMPUTER II, PART I

A Tragedy in Three Acts, in which is recounted the Sorrowful Demise of the Empire of Lord ATT.

by Francis Bacon

The Players

King Ronald I	Meese, a Chamberlain	Baxter, a Captain
The Duke of Commerce	Lord IBM	The Barons of ATT
The Duke of Justice	Lord President of ATT	Lord Planning, a servant of ATT
Prince Pentagon	Greene, a Judge	Clown

Attorneys, California PBX builders, engineers, lobbyists, messengers, network news teams, personal assistants, press secretaries, process servers, researchers, salesmen, technical witnesses, technicians

Act One, Scene One

The Tower of ATT. Enter President, Executive. Sound of bells offstage.

President:
Ho, what speak these bells?

Executive:
'Tis a rider come, my lord
That saith that 'ere the six o'clock news
Did like unto his daily round full large
Upon all channels come, yea like a portent
It is noised abroad. Reagan is elected.

President:
Oh bounteous day! Praise be to God
That this dread curse at last is lifted.
Say, hath he his cabinet named?

Executive:
Not yet, my lord, but many say
That have in full measure his speeches scrutinized
That he a man of boundless grace
Pro-business henceforth shall be renowned,
And resting not upon the praise of his triumph
Posthaste shall loose the shackles laid

By that dread race, the Democrats, upon the land
That thwarted the pursuit of this our business.

President:
What of our case? Did he speak thereon?

Executive:
Not yet, my lord. He hath sent messengers
And bade them neither rest nor wait
Until his advisers be all summoned
Unto fair Pacific Palisades, there weightily
To ponder upon affairs of state.
But yet intelligence hath come
That our dread foe, the Antitrust
Is borne hence from his dwelling place
In the charge of a trusted captain chained
And doth await his merited judgment.

President:
Oh happy day! Speech doth fail me
So long have we awaited this. Say, dost recall
The long, sad years of our anguishment
When we did argue like abased dogs
Before the throne of o'ermighty Antitrust?
And he, scorning our humble pleas
Did sniff and scorn, like to some popinjay
That knoweth not the press of business.
Now he be chained, and he shall find
That we in triumph shall repay
Fourfold his o'erweening arrogance.
Hold, enough! There shall be time enough
To revel in the downfall of our foe.
But now the iron is hot. Go bid my vice presidents
To summon my attorneys. The spoil waits!
And bid them sharpen up their wits, and
Pull their dusted texts from filing cabinets.
Now is the hour come! Send messengers
To seek the best and smartest they may find
Who laugh at judges, fearing naught.
Go, seek them out! Ready their briefs
And let all men be well supplied
With ample stock of precedents.

Executive:
So shall it be, my lord.

President:
And summon forth my barons who
Full loyally have this our torment borne
A brave array, some twenty-two
From all the corners of this our fair realm.

Executive:
So shall it be, my lord.

Act One, Scene Two

The Royal Court. Enter King, advisers, cabinet members, press secretaries.

King:
Heigh ho, 'tis noon. And I the papers scannèd have.
Let us begin. Ho, chamberlain, what is the
Business that we this day must turn our majesty upon?

Chamberlain:
Sire, my lord of Commerce seeks thine ear
To bring the might of thine deliberation
Upon certain pressing matters of policy.

King:
Let him speak.

Commerce:
My lord, I had scarce come upon my desk
When pressing delegations did descend
Crying that thou shouldst judgment pass
On that dread felon, Antitrust
And showing their fell wounds did cry
That thou shouldst succor them.

King:
What manner of men were these?

Commerce:
Sire, my lords of ATT and IBM.

King:
What? Come these fractious twain once more?
A pox on them, that have so marred our rest
With clamor from their sundry quarrels.
I shall not see them, bid . . .

[Alarums. Enter messenger.]

Messenger:
My lord the King! My lord the King!

Chamberlain:
Fie on thee, man! Dost thou not see?
His majesty in grave deliberation sits!

King:
Hold. Come forth, good fellow, tell thy tale.
And thou, proud lords, be not too quick
To raise the issue of thy rank.
This messenger a subject is of mine
Perchance he hath a mortgage, suffereth
From the weary years of thriftless Congresses
And liketh not the indigent.

Messenger:
It is so, my lord.

King:
'Tis good. This man shall named be
An undersecretary. And now
What is thy message?

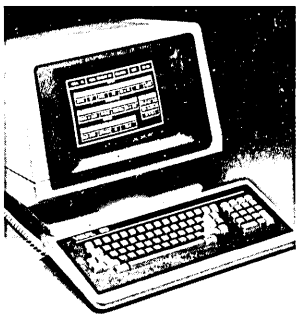
Messenger:
My lord of IBM hath sent me, sire
Posthaste across the land, nor sleep nor rest
Have eased me of the burden of my news.
O sorrowful day, that e'er I should have seen
The fairest flower of our industry
So cruelly humbled, and by treachery!

King:
What sayst thou, man? Art jet-lagged?
What is thy bruit?

Messenger:
The Japanese, sire, have by cruel stratagem
Once more upon our groaning soil laid their yoke.
This very morn did I observe a mighty host
Made by our foes bully his noisy way
Into a dp room that once was ours
With many laughs and jeers at we thy subjects.
'Tis stolen from us, sire! My lord of IBM
Swears even now that he shall ride against them
Summoning his lawyers from the corners of the land.
He begs thine help against the foe.

King:
Oh cruel day! Now do these Japanese begin
To raise the wind of this mine anger.
They shall behold that we, though of the stuff
As befits our station, of magnanimity
Hath not yet forgotten how to wield our clout.
For these are they, these many years
That hath feloniously the GATT betrayed

When critics rate you tops, what do you do for an encore?



*"VISUAL 50 is in a class by itself for visual quality; the character set is unusually clear and sharp."**

*"The VISUAL 50 is the most promising new terminal to come out so far, especially in light of its price."**

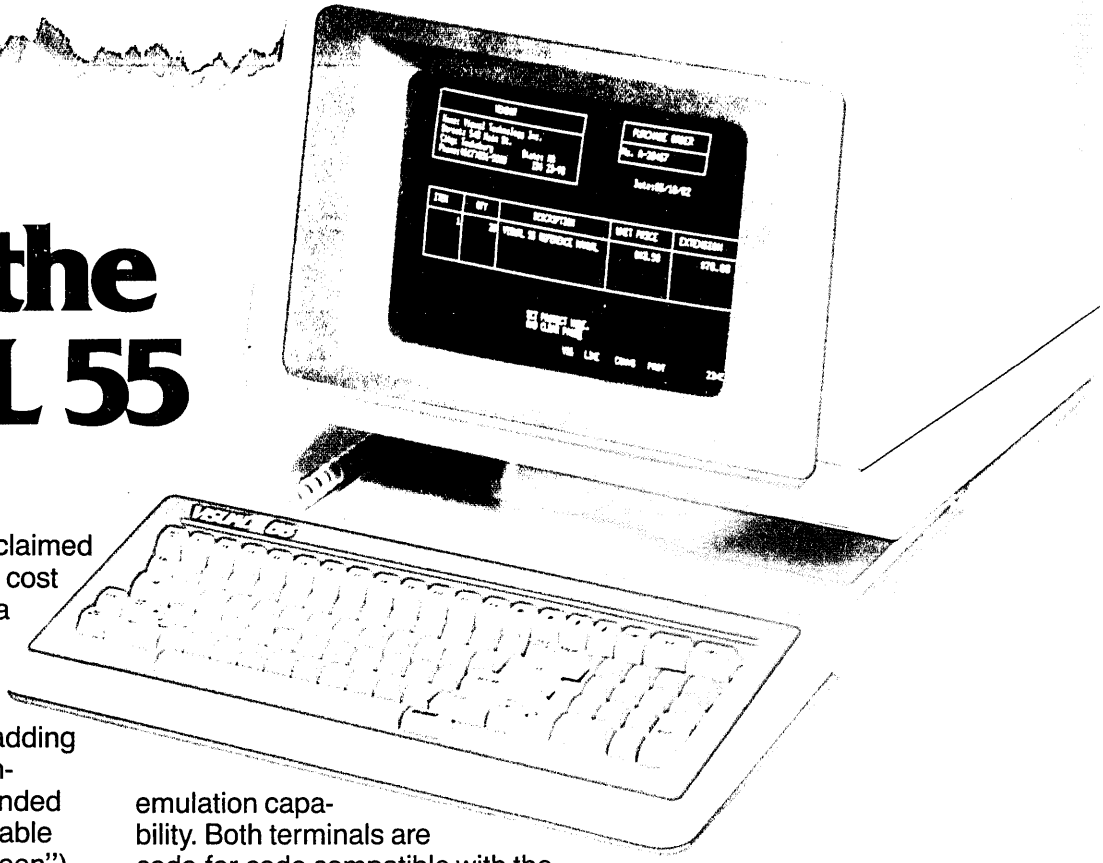
*"We consider this terminal to be one of today's best products in price/performance, its incorporation of ergonomically designed features and its broad range of functionality."***

Feature Comparison Chart*

Feature	ADDS 60	**VISUAL 50**	TeleVideo® 925	Zenith 19	Wyse 100
Style	4	**4**	4	3	5
Overall Quality	2	**5**	3	4	3
Keyboard	3	**5**	2	4	2
Rollover/false keying	5	**5**	3	4	4
Video Quality	1	**5**	4	4	3
No. of attributes	5	**5**	5	2	5
Attribute method	2	**5**	2	4	2
Suitability for micros	2	**5**	3	5	3
	24	**39**	26	30	27
List Price	$895	**695**	995	895	995

*MICROSYSTEMS—March 1983
**THE ERGONOMICS NEWSLETTER—August 1982

Meet the VISUAL 55



The VISUAL 50, widely acclaimed as the best performing low cost terminal in the industry, is a tough act to follow. But the new VISUAL 55 extends its predecessor's performance even further by adding 12 user-programmable non-volatile function keys, extended editing features and selectable scrolling regions ("split screen").

Both the VISUAL 50 and VISUAL 55 offer features you expect only from the high priced units. For example, the enclosure is ergonomically designed and can be easily swiveled and tilted for maximum operator comfort. A detached keyboard, smooth scroll, large 7 x 9 dot matrix characters and non-glare screen are only a few of the many human engineering features.

Another distinctive feature of the VISUAL 50 and VISUAL 55 is their emulation capability. Both terminals are code-for-code compatible with the Hazeltine Espirit,™ ADDS Viewpoint,® Lear Siegler ADM3A and DEC VT52.® In addition, the VISUAL 55 offers emulations of the Hazeltine 1500/1510 and VISUAL 200/210. Menu-driven set-up modes in non-volatile memory allow easy selection of terminal parameters.

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CIRCLE 72 ON READER CARD

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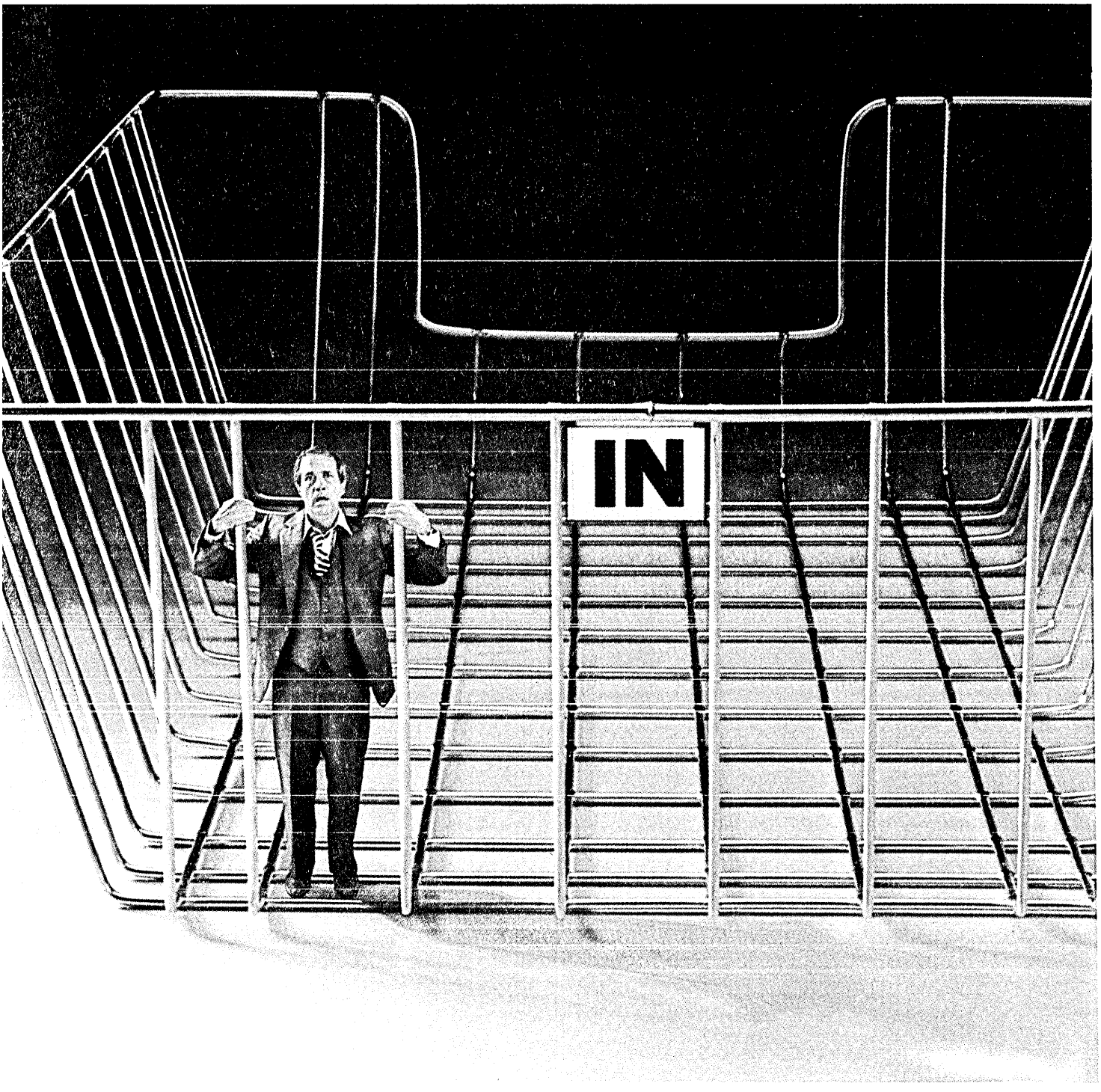

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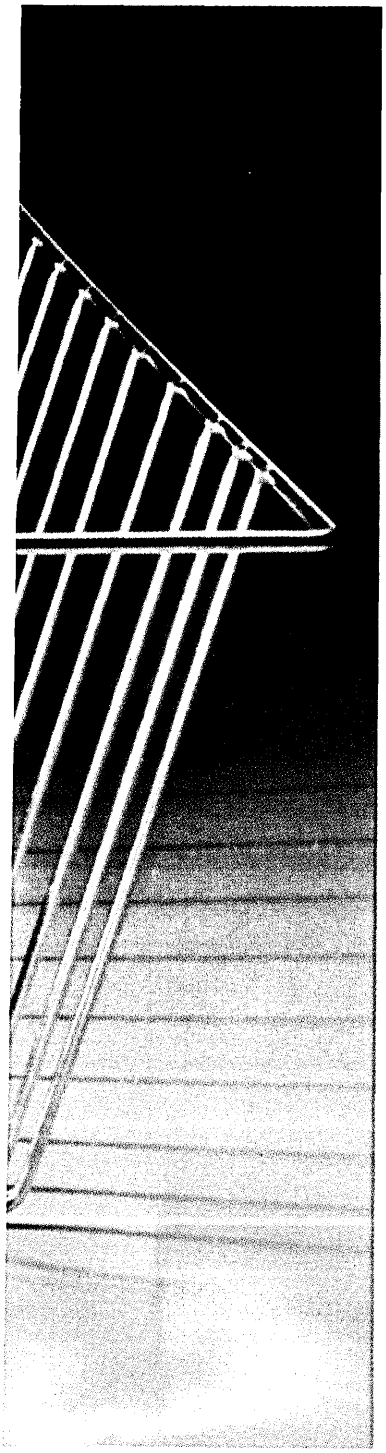
Of course, CEO includes easy-to-use word processing. And all this is integrated with data processing for total decision support.

CEO even has an exclusive button that lets you handle typical interruptions, and returns automatically to where you left off.



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Data General
a Generation ahead

CIRCLE 143 ON READER CARD

That all men else do hold in sacred awe.
Ho, chamberlain, go summon to me
Justice, and the captains of my agencies.
The die is cast, and they shall rue this day.

Commerce:
My lord, what wouldst thou have
In this affair of Antitrust?

King:
What? Pratest thou?
Have we not enemies enough
That we fair lords so grievously must shackle?
Doth Antitrust yet live? Off with his head!
Go find thee now a trusted captain
To execute my purpose and my writ.
Then prate no more upon such matters.
Come, away!

All:
My lord, it shall be done.

[Exeunt]

Act One, Scene Three

The Tower of ATT. Enter President, Vice President of Planning, barons, executives, attorneys, engineers.

President:
So, lords, I do entreat of you,
Cooperate with this our new-found friend
That wisely in the garments sits
Once worn by Antitrust our foe.
What know we of this captain?

Attorney:
Baxter, my lord, a bounteous man
The King's own choice. 'Tis bruited wide
That he dread government from off our backs shall get.

President:
'Tis good. Do he but say the word
And we to terminals shall rush
Until our DTEs and PABXs
Like unto a swollen torrent
That doth in Spring rise in the mountains
Sweep all before them.

Baron:
Speakst thou of Interconnects?

President:
Yea, verily. For we shall chase them
With leasing terms from site to bounteous site
Until like weeping maids their treasurers
Shall stretch their arms out, crying pity.
But then fell monopoly, like to a Hydra
Her hair made of their disconnected wires
Shall but laugh at them, denying pity.

Baron:
My lord, what of computer firms?

President:
We shall convert their protocols.

Baron:
My lord, full in her grace thou stand—
Minerva sits upon thy brow.

Act Two, Scene One

The fort of Antitrust. Enter Justice, Captain, attorneys.

Justice:
Say you so, Captain? Dost thou not think
That we might let these fair lords be
That they may their own profit seek?
It seems the King hath spoke of this.

Captain:
My lord, they must divest!

Justice:
Aye, aye, so sayest thou. And yet my lord of Pentagon
Was but a moment past come here
And he did huff and stalk about
Like to a mighty general
Denied a shiny bomber or the like.
And he did shout and much protest
Declaring grounds of national security.

Captain:
He sayest so, and yet I fear
The will of Congress speaks against it.

Justice:
I must reflect. Come hither at morn.

Captain:
My lord, there is another figure that doth come
Like to a spectre unto this our feast.

Justice:
How so?

Captain:
A judge, my lord, that here circuited be
Must first his brows upon the matter bend.

Justice:
'Tis no matter. What? Fear of judges wouldst thou bring
Into this seat of our dread jurisdiction?
Nay, fear thou not. Such men appointed are
By mayors and small bosses and the like.
My lord of Labor will arrange . . .

Captain:
I earnest do entreat thee, sire . . .

Justice:
Enough! I must get hence!
His majesty hath summoned me
Unto his Western stronghold to repair
There to discourse upon draft evaders.
Boy, go bring my helicopter!

[Exeunt all but Captain]

Captain:
And yet methinks before this year is run
And spring doth bring fresh congressmen
This judge shall by thee cursed be.

[Enter Clown]

Clown:
What, my lord, so ill of favor?
What hath become thee? Hath some Democrat
Regulated thee with some new legislation?
Perchance thy pollution controllèd be?

Captain:
Enough, thou prater, get thee hence.
A fool may yet o'erstay his privilege.

Clown:
A privilege, thou sayest? Is not thine
The privilege and majesty of law?
Fie upon thee! Needst thou say,
"Enough, thou prater, get thee hence,"
When thou an order may emit

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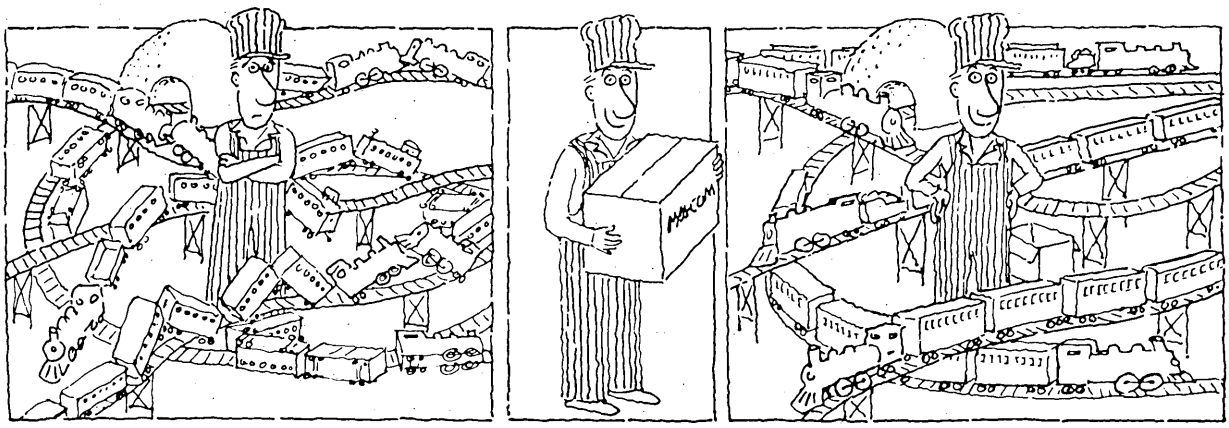

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THE NETWORK YOU CAN CONTROL

M/A-COM

CIRCLE 73 ON READER CARD

To have me deemed a nuisance or the like
And regulated by an agency?

Captain:
Good fool, thou hast refreshed my thoughts.
'Tis true that I o'ermuch have dwelled
On thorny matters of divestiture.
I now resolved am to press
For safeguards to the public good.

Clown:
What says the King? Shall he not sigh
And knit his brows and rise
Portentedly, and loud proclaim,
"Methinks this smacks of regulation!
Ho, guards, off with his head!"

Captain:
Ho! Off with thy head more like.

Clown:
Nay, nay, for I protected am.
My lord the King did not but yesternight
Lean to me thus, confidingly did say,
"What thinkst thou, fool, of the environment?"
And I did smilingly my cause advance
And talked of whales, how they feloniously
Did millions of kind plankton devour
That ne'er did aught but photosynthesize.
And I did speak of acid rain, and cited long
The wondrous health of the umbrella industry.
My lord of Detroit then did rise and pound his fist
With many noisome oaths, and did declare
That he since suckling times
Full deep of carbon monoxide drunkèd had
And ne'er did drive but with his seat belt off
And healthy were despite these things.

Captain:
What said his Majesty thereon?

Clown:
He hath a proclamation made
And named me Secretary of the Interior.

Captain:
Thou jesteth.

Clown:
I jesteth not, and must away
Pressing matters of state attend.
Boy, go bring my 747!

[Exeunt]

Act Two, Scene Two

A court in Washingtone.
Enter Judge, Captain, attorneys.

Captain:
And yet say I again, three summers now
Hath this dire suit our department becalmed
Till lawyers wearily do sit and prate
Demanding when this business ended be.
My lord, canst thou not expedite?

Judge:
Forsooth, I have thee tenfold importuned
To cease the chase of this thy quarry
And let them peacefully divest. I shall impose
Such safeguards as shall please posterity.

Captain:
What saith my lord of Pentagon
And the princely lads of FCC?

Judge:
They do collude.

[Alarums. Enter President of ATT, executives, attorneys.]

Judge:
How darest thou come in warlike mien
Into this sacred place the court
Surrounded by thy grisly attorneys.

1st Attorney:
Sue him, lord!

2nd Attorney:
Aye, find a precedent and litigate!

President:
Enough! Though 'tis well said.
Ho, judge, my attorneys restive grow
And say thou dost our case delay.
And I not sleeping have descried
That our dread foe, Lord IBM,
Hath smiling from thy chambers come
And boasts in taverns how he hath
A charter from thee borne that doth allow
That he may connect what'er he will
While we like knavish curs do fawn
Upon they pleasure for the simplest plug.
How say you, lord, for I have heard men say
A pox upon thee for a Democrat.

Judge:
Ne'er so, my lord, my duties lie
Upon the towers and battlements
Of this fair edifice the law.
This is my duty, lord, and thou
With arrogance thy station do o'erween.
Thou'll capitalize thee as I say
And thine accounts to me shall bring
There shall the matter end.
But touching on Lord IBM—
This matter were not in my grasp.
Lord Baxter might thy plaint receive.

President:
Aye, what on't, thou litigating cur
That unto Lord IBM's beck do run?

Captain:
Callst me cur, thou phone peddler, thou?
'Twere plain to any honest man
That no liability established were.

President:
His majesty shall hear of this.

Attorney:
Nay, nay my lord, it sits not right.
Thinkst thou of yesteryear.
When good King Richard troubled were
With many scandalous accounts
Of trafficking with corporations.

Captain:
Aye, wouldst thou change thy letters, man?
Would ATT be ITT, and wouldst thou bring
More strife unto our goodly king?

President:
Then pox upon thee, too! I'll hold
Thou art some bleeding heart
A liberal! Nay, worse, a Democrat
That will upon our company impose
All manner of concerns to curb our zeal.

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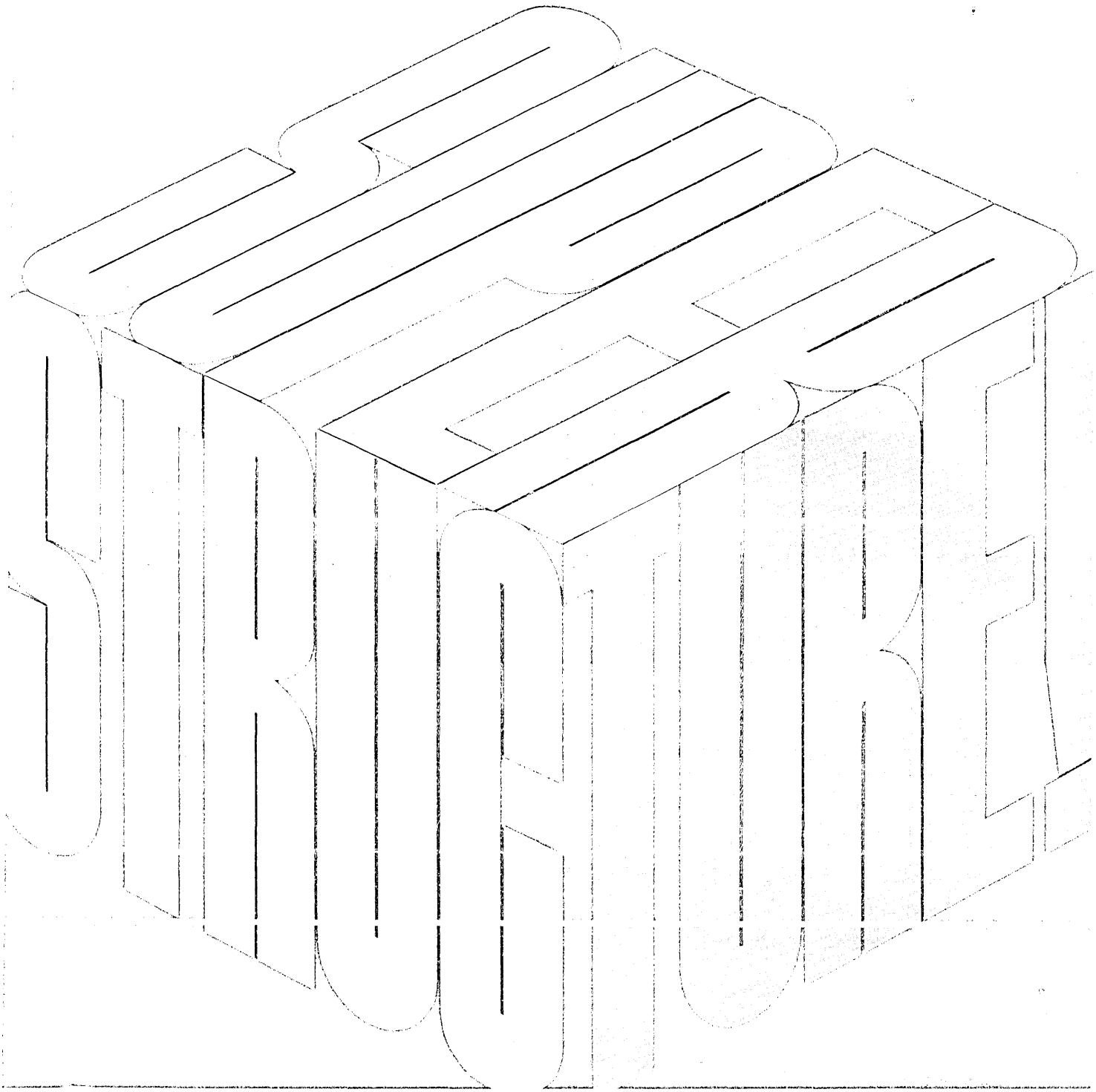


Judge:
O cursed day, that I should hear
Such slander in thy prattle. Get thee hence,
And take thy teeming brood of LLDs.

Act Three, Scene One

The Judge's residence in Washingtone. Enter Judge and attorney.

Judge:
'Tis true, I do right fear
My lords of Justice and the FCC
With many tangled stratagems their will shall have.

Attorney:
How so, my lord? 'Twere disingenious!

Judge:
Aye, but should I for a second but relax
Then they shall straight collude.
And when the arms of Morpheus doth embrace
The sleeping folk of this my office
When the owl hoots, we shall have decrees.

Attorney:
Thinkst thou that they their brows
Upon this fell design do bend?

Judge:
I fear it.

[Alarums. Enter messenger.]

Messenger:
My lord! My lord!

Judge:
What ho, good messenger?

Messenger:
I have straight these two days rode, my lord
From distant lands, fair California
Where the goodly sun upon palm trees sends his breath
And folk in hot tubs gaily do frolic.

Judge:
Fie on thee, man! Dost thou a message bring
From the California Tourist Board?

Messenger:
Nay, nay, my lord, I have come straight
From the Commissioner of Public Utilities.

Judge:
Ha?

Messenger:
My lord, they do migrate! E'en as I left
Did many groaning petitioners come
Unto our doors, and weeping did their story there unfold.
My lord of ATT hath a decree proclaimed
That they must dreaded rate hikes pay
And telecommunications managers, receiving of their bills
Do rend their clothes and cry out to the skies
That they shall bankrupt be.

Judge:
'Tis dread intelligence.

Messenger:
Aye, and worse my lord. For as men do weep
And pray the bounteous heavens for deliverance
Then doth the minions of my lord of ATT
Smiling into their offices stride
And jesting at their peril, do proclaim,
"Ho, so thy phone bills do thee tax?
Then rentest thou a wondrous PBX
That many lines shall handle, till thou shalt
Marvel at its skill and artifice
And sing the praises of our bounteous lord
Of ATT, who doth thee deliver."

Judge:
O cruel strategem! And what of Centrex?

Messenger:
Centrex is dead, my lord.

Judge:
Unhappy day! That e'er the goodly sun
Did shine upon so fell a sight!
Great heavens, I am amazed
That the very twisted pairs do not unite
And writhe away, hiding their faces
From such a bloody spectacle,
And telephones do not themselves tear free
And run from their new masters, crying havoc!

Messenger:
Alack, my lord, it is not so.

Judge:
Aye, I knoweth it. We must not rest
Upon the receiving of this intelligence!
Ho, attorney, ring the bells
And summon up my lawyers from their rest
And scour the taverns, bring them hence
E'en those that do the singles bars frequent.
And bid them arm, and bring their briefs
So we each loophole mightily may scrutinize
To block the breaches with their filings.
Bid them make haste, and straight repair
Unto this my bower, here to prepare
An expedition 'gainst these fell men.

Attorney:
My lord, it shall be done.

Act Three, Scene Two

A plain in Massachusetts. Enter President of ATT, barons, attorneys, marketing executives, salesmen, technicians.

President:
Now is the winter of our disconnect
Made glorious summer by this sun of migration.
And all the competitors that troubled this our house
Are gone, squeezed out by our financing terms.

[Enter baron]

Ho, good baron, goes the day well?

Baron:
Right well, my lord, the users do migrate
And salesmen and distributors
That once did clap their hands at our discomfiture
Do wring them now, and bear their switches
Like lepers unto closed doors, and beat their breasts.
The day is ours!

President:
'Tis good. What of the alarm companies
And the prattling band of telephone answerers?

Baron:
My lord, we have their names and clients listed
And pricked them with our pens, as though
We did them thereby unto Hades sentence.
E'en now thy servants do prepare
A just and awful retribution.

What three letters represent the most powerful on-line computer in business today?

T

The most powerful on-line

Time was, the answer to the previous page was as easy as ABC.

But that was yesterday.

Today, the world of business computing is being introduced to a system featuring over two-and-a-half times the performance and twice the price/performance of its nearest competitor.

A versatile system. Able to compile the information of the largest corporations into a single relational data base. Instantaneously updated and fully available across the entire system.

An expandable and compatible system. Allowing the simple addition of future programs and equipment, without sacrificing past investments.

And most importantly, a system that won't let you down. Because its fault-tolerant design won't let itself down. Even if a major component fails.

This system isn't from IBM.

It's from Tandem.

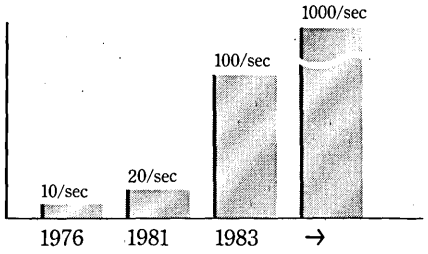
Introducing the NonStop TXP™ system.

TXP: 32-bit transaction processing.

The TXP system processes high volume loads faster and more economically than any other system. Executing over 100 transactions per second now and thousands of transactions in the near future.

It's built around multiple parallel 32-bit processors. Each addressing 16 MB of physical memory and over a gigabyte of virtual memory.

To help memory keep pace with that kind of processing, TXP pulls 64 bits on each memory access.



Our success can be summed up in a second.
Transactions per second. Numbers unsurpassed in the industry. On-line systems that fit your needs today. And tomorrow. With more processing power on the way.

The TXP system also features parallel data paths. Manipulating 32 bits of information in a single cycle, two 16-bit operations in the same cycle.

And TXP incorporates extensive pipelining, to process multiple instructions simultaneously. Each processor overlaps instructions in three levels: Fetching one, while preprocessing a second, while executing a third.

While helping TXP deliver full 32-bit power, for less.

Cache memory pays off in faster response times.

Cache memory is a high-speed data storage area between the processor and main memory. It lets the processor store more frequently used information closer. So it can get to it faster.

And our tests have shown that the TXP cache memory has a 98% "hit rate." Which means the requested data is virtually always nearby for fast access.

The result? Larger volumes of work can be processed in shorter amounts of time. Helping TXP to be even more productive.

Making cache memory pay big dividends.

A system you'll expand, not disband.

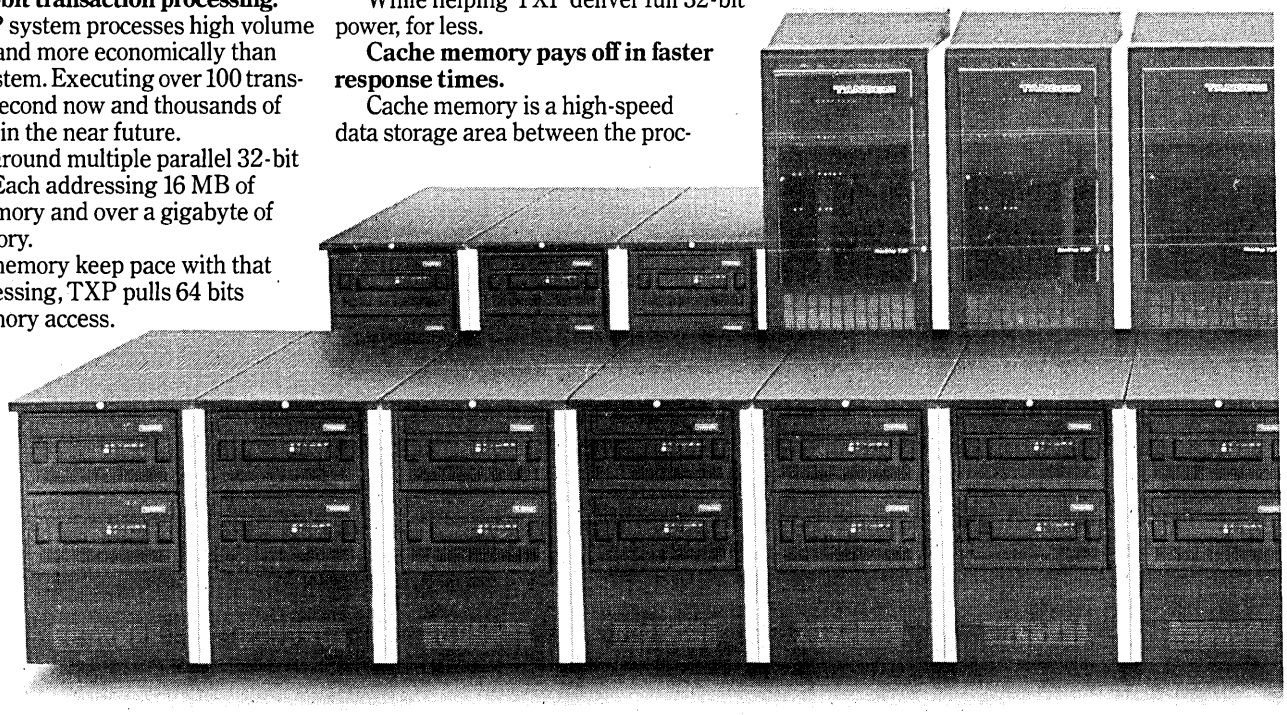
Most computer systems have very limited expandability. So if a company outgrows its computer's capacity, it usually means starting again from scratch.

Selecting and buying a larger and more expensive system.

Then reprogramming.

Then re-training.

Plus all the chaotic disruption and



XP

:omputer in business today.

massive loss of revenue that's unavoidable during the switch-over.

Not so with the TXP system.

It can expand from two to 16 processors. Increasing its power by a factor of eight.

That's more power than any of the largest mainframes.

And the additional processors can be installed while TXP is running at full speed. No downtime. No reprogramming.

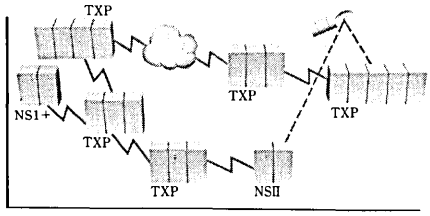
Still not enough power? Up to 14 TXP systems can be joined together by high-speed fiber optics. Linking the systems together as one computer with 224 processors.

But that still isn't the full potential of the TXP.

TXP systems at up to 255 sites can be joined in a worldwide network. Generating the power of over 4,000 processors.

And that gives TXP the most powerful on-line computer capacity in business.

Expandability our competition wishes they could disband.



The most powerful computer network in business today. *Users access a single unified global data base from any of thousands of terminals anywhere in the system.*

NonStop™ system compatibility from the people who started it all.

TXP can process more information and support more programs, users and devices than any other computer designed for on-line transaction processing.

Devices you most likely already have.

Even devices made by IBM.

But what if your company isn't quite ready for the TXP system's awesome power?

We suggest the Tandem NonStop II™ system. The second most powerful on-line computer in business today. The cost effective solution for medium to large corporations.

What if your company is somewhere between a NonStop II and a TXP?

No problem. They can be combined. They can share the same data and programs. In fact, NonStop II and TXP processors can coexist in the same cabinets.

And what if your company needs even a smaller computer?

We make a smaller computer.

The Tandem NonStop 1+ system. Perfect for those low-volume sites where less processing power is needed.

Tandem literally wrote the book on NonStop™ transaction processing. That's because we introduced the first NonStop system.

Over eight years ago.

And for over eight straight years, despite attempts by others, we've continued to lead the industry.

Learn all about TXP, ASAP.

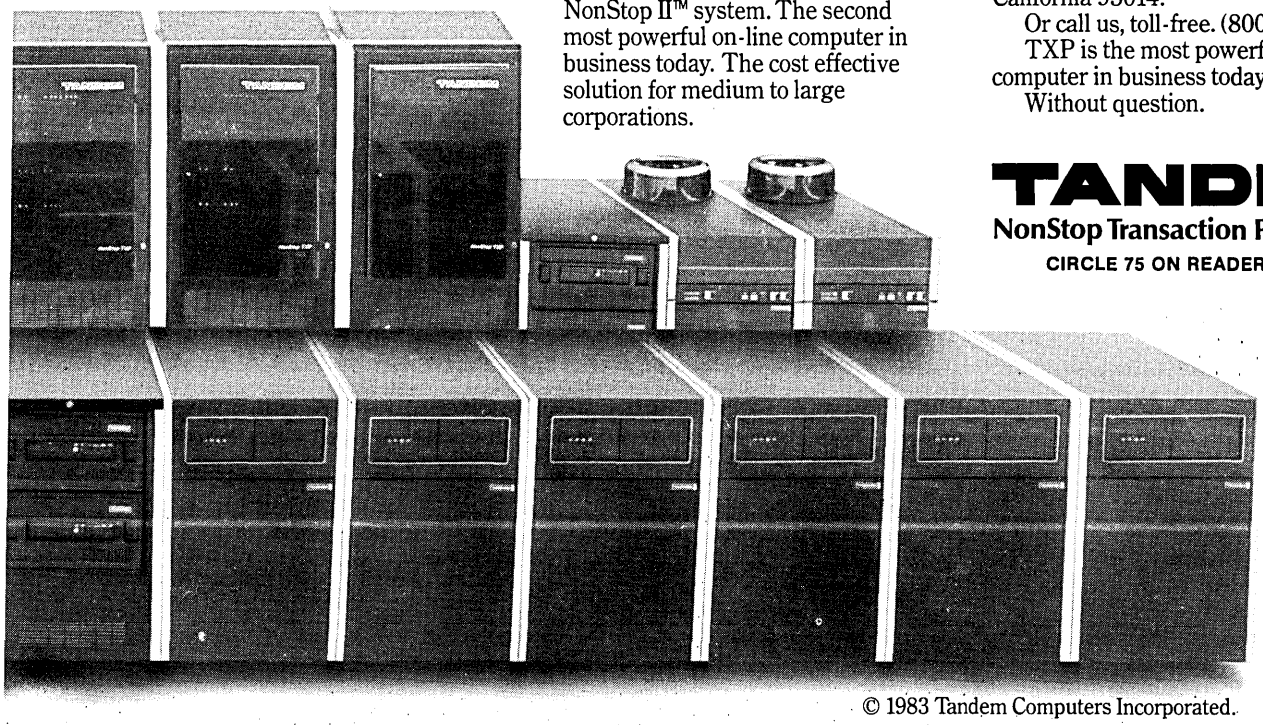
For complete literature, contact your local Tandem Sales Office.

Or write Tandem Computers Incorporated, 19333 Vallco Parkway, Cupertino, California 95014.

Or call us, toll-free. (800) 482-6336.

TXP is the most powerful on-line computer in business today.

Without question.



TANDEM

NonStop Transaction Processing

CIRCLE 75 ON READER CARD

President:
O happy day! Too long have we their dominion
Upon the wires of our empire foreborne.
Fie on them! Let each severally
Their wires unto residences string.
Let them now face the niggarding
Of councils and utilities commissions.
A pox on them, I say!

[Alarums, excursions]

But hold! Who comes here now?

[Enter Judge, attorneys, process servers, technical witnesses, research staffs, clerks]

What, thou? Now dost thou dare
With this thy paper-shuffling legion come
Dispute with us? Thou dost o'erreach thyself
Thou gowned vulture! Get thee hence!

Judge:
Not so, my lord. Full many years hast thou dominion borne
Upon the wires and conduits of this land.
But now the hour is come! Dost thou not hear
The groans of thy oppressed competitors?
Thinkst thou that thy o'erweening arrogance
May ever bend thy users to thy will?
It is not so! I bid thee stand!

President:
Thou biddest me? Litigious cur
That ne'er did manage aught but thy car payments.
Dost thou bid me, that many hours doth work
To manage this our mighty enterprise
The fairest flower of the whole world's corporations?
Attorneys!

Judge:
Briefs, speak for me!

[They litigate. Exeunt.]

[Enter baron, attorney]

Attorney:
Now yield thee! Thou art overborne.

Baron:
Never will I my signature
To thine accursed documents append.

Attorney:
We have discovered a precedent
And proven that thou dost the trade constrain.
Thou art out-precedented! Yield!

Baron:
I'll fight thee in the Supreme Court.

[They litigate. Exeunt.]

Act Three, Scene Three

Another part of the battlefield. Enter Lord IBM, Californians.

Lord IBM:
'Tis meet that we this day our instrument should sign
That will us mighty dominion give
E'en as these fools do litigate each other.
Will thou build me a PBX?

Californians:
We will, my lord!

Lord IBM:
'Tis good. We are right pleased. Henceforth shall we
With thine prized help both voice and data switch
Till no bit shall upon a wire
Not through our switches gladly bustle
Unto the farthest corners of the land
Through satellites and X.25.
Away, the booty waits!

[Exeunt. Enter President, barons.]

Baron:
My lord, the day is lost.

President:
It is not so, forsooth.

Baron:
Thy captains beg thee loudly now to yield.
Our stock of appeals is exhausted gone
And foes do gather round the marketplace.
Great corporations, which ne'er before in this our empire came,
Do mutter and market with many pronouncements.

President:
How so?

[Enter marketing executive]

Ho, what bruit bring thou?

Executive:
Alack, my lord, dread news!
My lord of IBM hath made a pact
With wild Californians that fear thee not.
And they shall mightily travail
To build a PBX to smite thee with.

President:
Treachery!
Hath we not shoulder unto shoulder fought
Against the petty judgments of our foe,
Fell Antitrust, these many years?

Executive:
My lord, there is more news.

President:
O cruel fates! I see upon thy brow
Some new misfortune that shall bring
E'en crueller commotion to our house
And strife upon our marketing.

Executive:
My lord of IBM hath also brought
A protocol convertor to the marketplace
That doth e'en now insurance men dumbfound.
And they do jest and gaily do proclaim
That this be mightier than thy net.

President:
Ah! Ah!

Baron:
O woeful sight! He doth grow pale
And tremble. Now I fear that bilious humour
Doth invade his sorrowful countenance.

[Enter marketing executive]

Executive:
My lord! My lord!

Baron:
Hush, dost not see our lord is sickly lain?
He hath been overdoing it.

President:
Nay, nay, good baron. Let him speak.

More and more, personal computers in large organizations are dramatically improving productivity. But there's also a problem involved with this improvement. People are using many different, often incompatible microcomputers, yet they still need to share information, programs, and peripherals.

It's as if everyone had an automobile, but no highways leading to their destination. No traffic signs to follow. No rules of the road. The result? Mass confusion.

Until now, that is. Until Liaison from SofTech Microsystems.

Based on the p-System,™ the Universal Operating System,™ Liaison is a family of network software products that lets you establish a workable, efficient personal computer network. It allows personal computers and users to co-operate and work together so that your organization is altogether more effective. Liaison includes systems software products, such as an operating system, print servers and disk servers as well as development tools. And, a collection of network applications, including a database management package, electronic mail, and more.

Liaison lets you unite many different personal computers in an effective network. 8 and 16-bit machines from virtually all personal computer manufacturers (including IBM,® TI,® Corvus,® and Apple®) can all share programs, all work together, all co-operate.

So if you're tired of your different personal computers driving you to the brink of insanity, give us a call at SofTech Microsystems.

We'll show you how Liaison can get you back on the road to recovery.

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Introducing Liaison.™ Software that allows personal computers to co-operate.

CIRCLE 76 ON READER CARD

Already doth the fiend Consent
Beckon to me from his dread kingdom.
Parting his grisly lips to smile
To enter and forever there to dwell
A curse upon me, uncompetitive.
I am burned up in the dread fire
Of mine own litigation.
Let the knell ring out on this my empire.

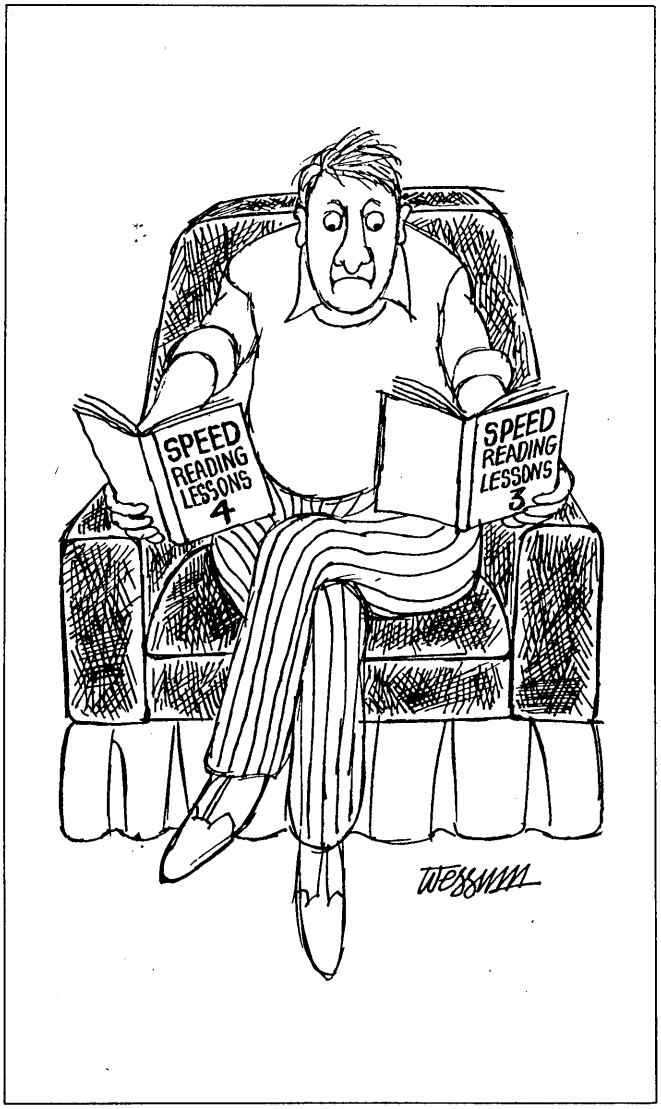
Executive:
My lord of Pentagon hath straight sent word . . .

President
Ha! Doth he come?

Executive:
Alack, my lord, he hath sent word
That he a mighty host doth face
That hath invaded his dominions.
Dread Japanese, that even as I speak do fall
Upon the cowering folk of Cupertino.
He hath his lobbyists straight summoned
And mighty programs issued from his Treasury
Until this foe be vanquished, he doth fear
That he no clout for thee can spare.

President:
Et tu, Pentagon? Then fall, ATT.

[Expires]



CARTOON BY JAN VAN WESSUM

Act Three, Scene Four

Another part of the battlefield. Enter salesmen, technicians bearing President of ATT. *Enter, from the other side, Judge, attorneys, witnesses, process servers, researchers, clerks, news teams, journalists.*

Judge:
Hold, who goes yonder?

[Approaches]

Alas, unhappy sight! O woeful day!
How were he slain?

Technician:
A heart attack, my lord. For many morns
Hath his physician oftimes warned him
That he were overdoing it.

Judge:
Alas, poor Bell, art come to this?
That thou by humble technicians be borne
Their gnarled hands used to a different trade
Of plugging and unplugging thy installed base.
What, so alone? Where are thy barons now
That once did hang upon thy every word
And connected whate'er thou willed
Proclaiming it an honor to install
Thy Dimensions and suchlike stuff?
Where be thy memos now, that once did shake
The very world, till mighty states and cities did submit
To be tariffed as thou willed?
'Tis come to this, a piece of earth
No larger than a low-end Horizon.
Now art thou like unto the clay
Thy engineers did oftimes excavate
Installing conduits to some office block.
Immortal ATT, dead and turned to mould
Might stop a hole to meet the OSHA code.

Attorney:
He weeps, his soul is overborne.

Judge:
He were a man of mighty soul
That much great service to our land hath done
Till haughty pride did his good qualities
Like to a Whitsun flood tide overbear.
What of his barons?

Technician:
Fled, my lord, to their baronies.

Judge:
Go, seek them out, e'en as they hide
Armed with many strategies from us,
Proclaiming that they never did conspire
Constraint of trade, and crying to all men
That they did ne'er but seek the common good
Providing services to customers.
Let them be regulated. Bring them hence
That I their balance sheets may long descry
And severally injunctions serve them.

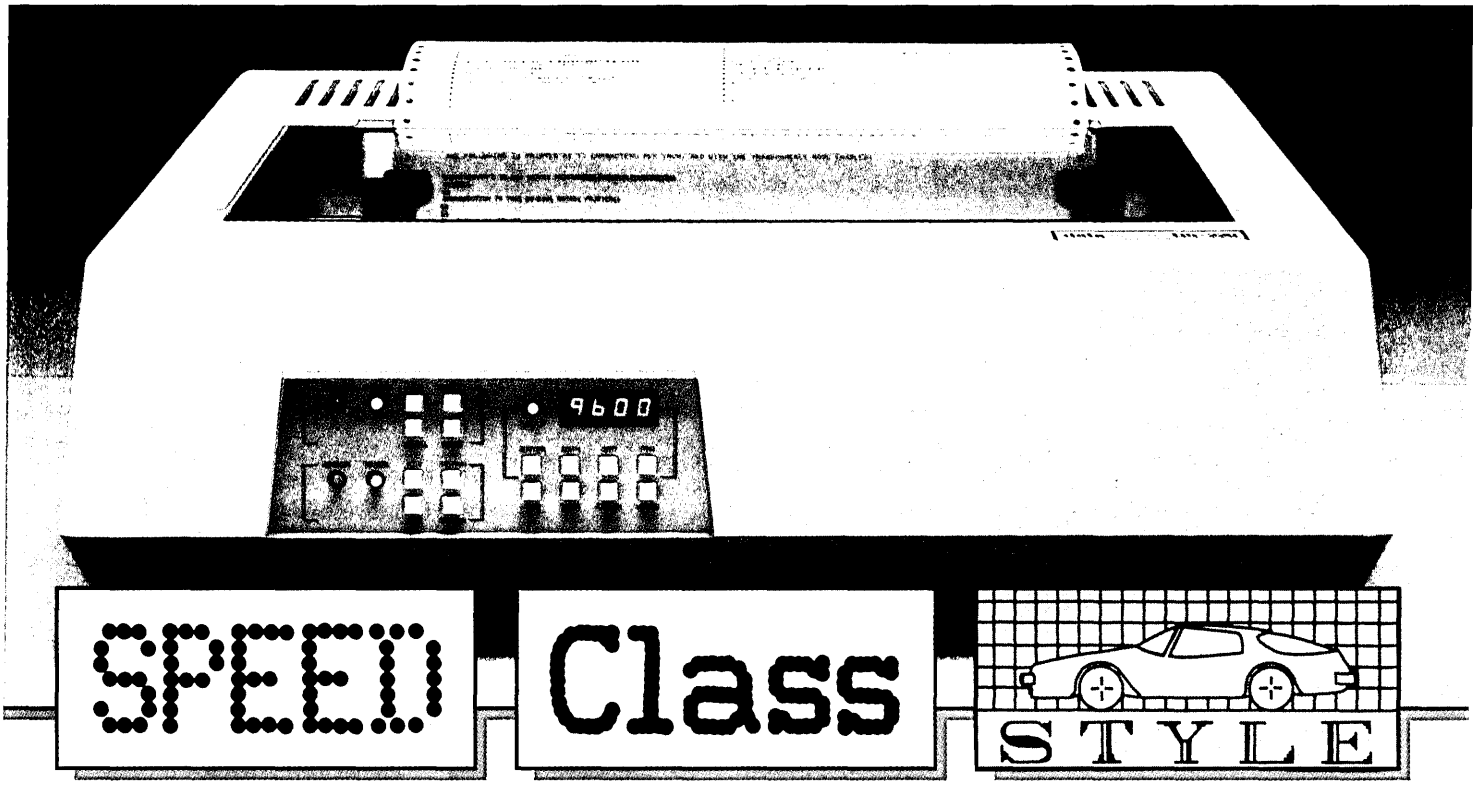
[Exit attorneys, process servers]

Judge:
And thou, technicians, bear him hence
That once a mighty empire ruled.
And let it be proclaimed in the land
That no o'ermighty subject may preclude
What Congress hath established for the common good.
Go, bid the cameramen shoot.

[Exeunt] ✲

HIGH PERFORMANCE

NOW AVAILABLE IN A THREE-SPEED



INTRODUCING THE NEW DS 220 MULTI-MODE MATRIX PRINTER

First there was the Datasouth DS180. The original high-performance printer. The printer that raised the standards of on-the-job performance to new heights. A tough act to follow.

And now, following in the same tradition, is the new Datasouth DS220. State-of-the-art performance, taken to higher levels. In a new 3-speed multimode form. Ready to run data, near letter quality and graphics output—in a single printer.

At data speed, the Datasouth DS220 leaves competitors in the dust. By using high speed tabbing to zip over blank spaces and true logic seeking to print the next available character, the Datasouth DS220 charges through printed copy at speeds rivaling more expensive line printers.

At 40 CPS NLQ speed, the Datasouth DS220 creates near letter quality output with the kind of class that might make you wonder if it was produced by a daisy wheel printer. With its fine tuned 18 x 48 dot matrix, multiple fonts are produced with the precise clarity required for word processing applications.

And for graphics, the Datasouth DS220 adds high performance style to popular microcomputer applications programs through high resolution dot addressable output. Sharp new details emerge from business charts and graphs, and engineering drawings.

And those are just its printing capabilities. Its fully instrumented dashboard allows push button programming of up to fifty features for forms control, communications and print style selection.

Best of all, the Datasouth DS220 costs much less than you might expect for a high performance three speed. Go to your nearest showroom and run a Datasouth DS220 through the gears. See how little it costs to own three high performance printers in one high performance package.

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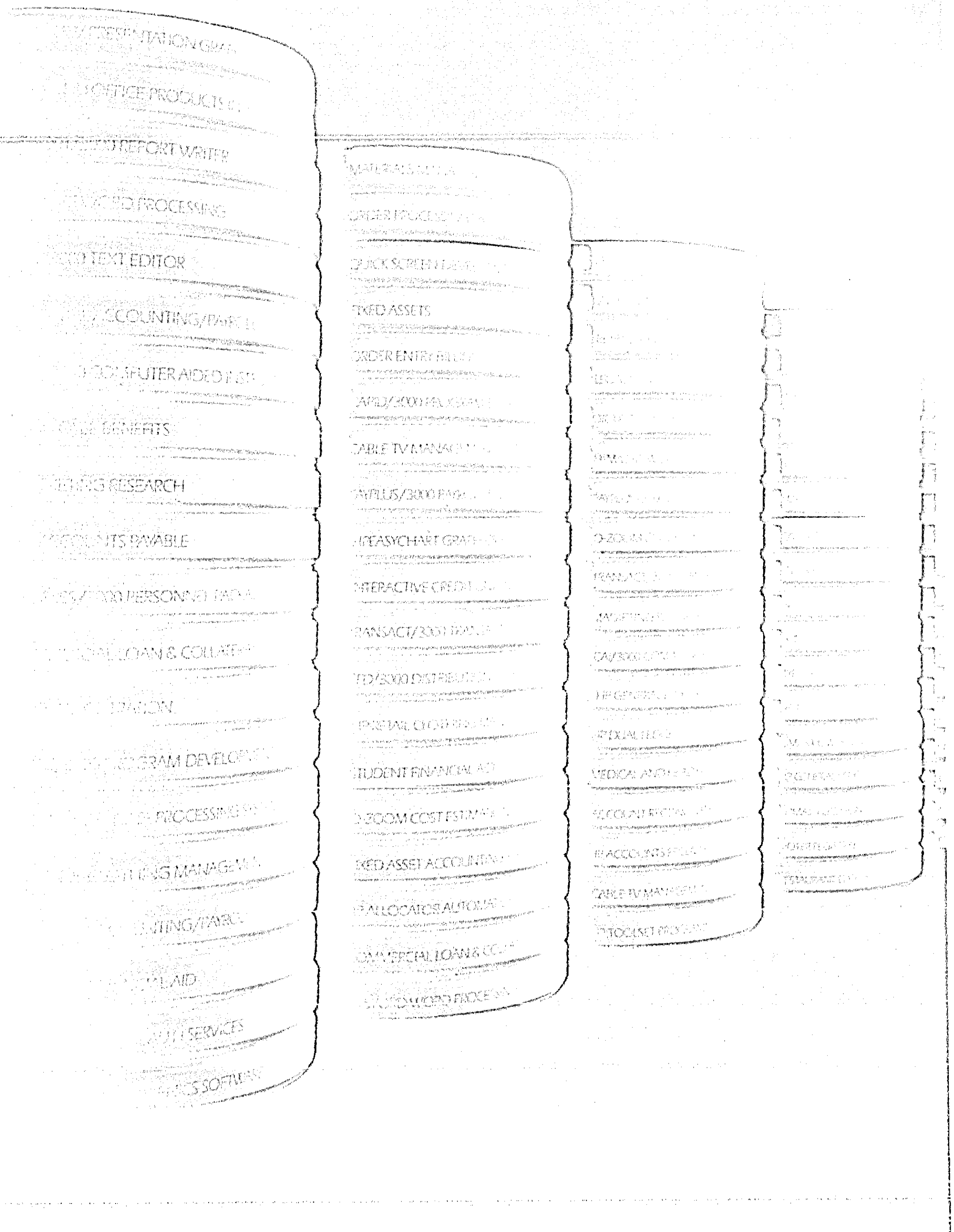


[illegible] to use an HP 3000.

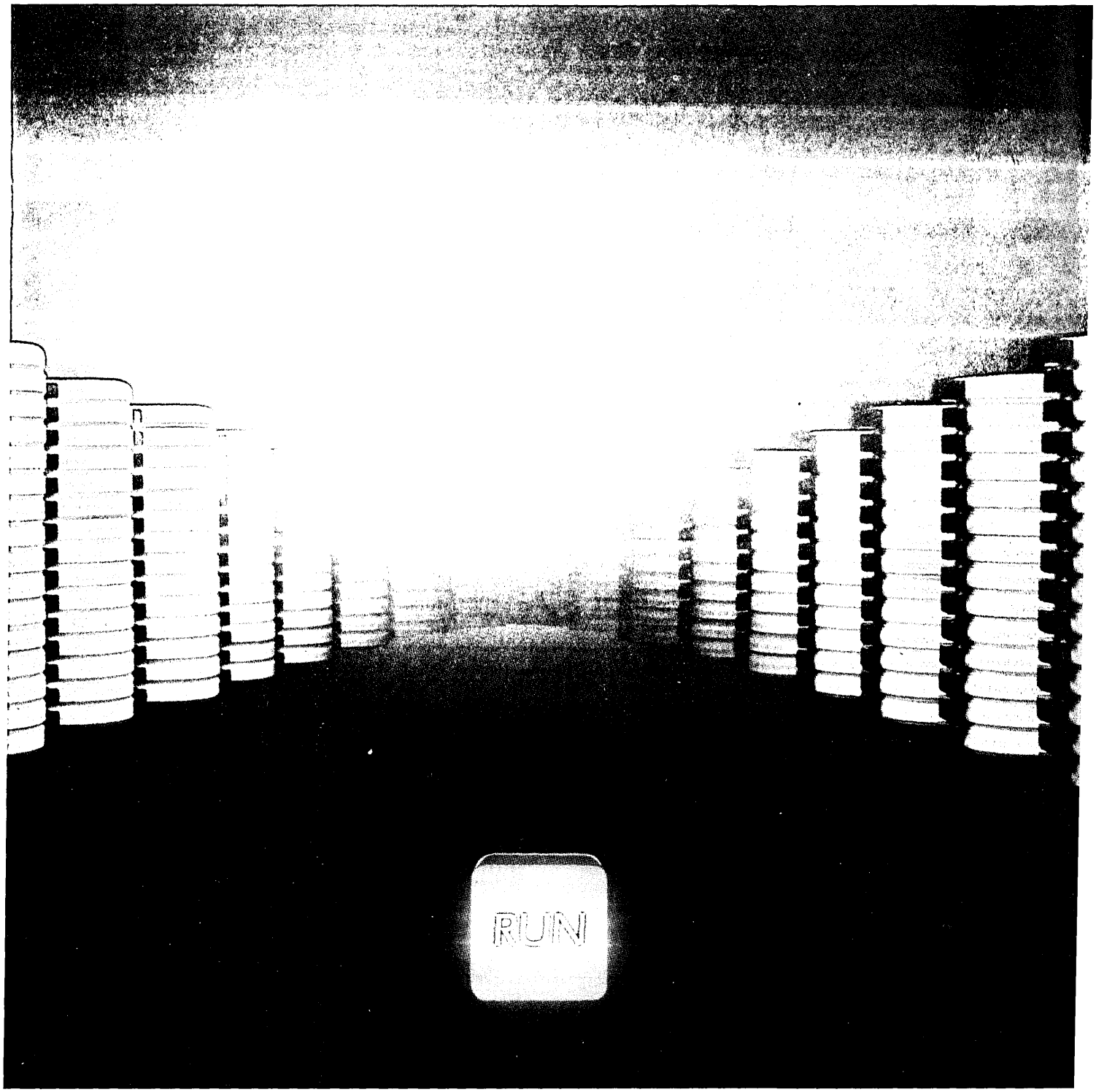
The point of buying a computer is to speed things up. So why let programming slow you down?

With the HP 3000 family of business systems, you can usually be up and running as soon as you plug them in. Because our computers come with a vast range of ready-to-use software [illegible] applications spectrum from accounts [illegible]

We wrote many of these [illegible] programs ourselves. Last year alone [illegible] with more than 250 million [illegible] software. Others come from a variety of software [illegible] working closely with us.

So the chances are pretty good that your own programming effort can be trimmed substantially. When you do need to write your own programs, the HP 3000 will help you do it much faster. With our special set of programming tools, customers have cut 500 lines of code down to 100. At about $50 a line, that really adds up.

Here is another way you save. With complete compatibility across the entire range of HP 3000s, you don't have to spend a dime converting software from one system to run on another. That's a big help when you're picking the right computer for a branch office or a



Press here.

regional center. Or any size office in between.

When you write a program for our inexpensive Series 39, you can also use it on our Series 68 distributed mainframe which handles up to 400 users. Or on our mid-range Series 42 and 48 computers.

Here's some more help in making your selection. The HP 3000 costs up to 40% less than comparable systems. So you save on the hardware as well as the software.

If you'd like to see how useful an HP 3000 can be, call your nearest HP sales office listed in the white pages. Ask a Business Computer Specialist for a demonstration. Or write for more information to Tom Rappath, Hewlett-Packard, Dept. 04184, 19447 Pruneridge Avenue, Cupertino, CA 95014. In Europe, write to Henk van Lammeren, Hewlett-Packard Nederland B.V., Dept. 04184, P.O. Box 529, 1180 AM, Amstelveen, The Netherlands.

HEWLETT PACKARD

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CIRCLE 78 ON READER CARD

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...

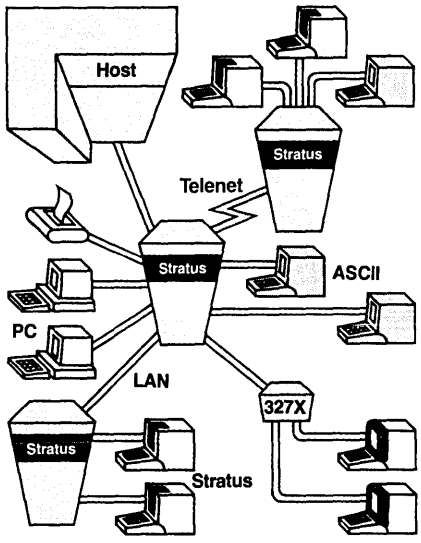
You need a solution right now and it has to be comprehensive and easy to understand. And if they're going to depend on it, it should be fault tolerant. What you need is the Stratus Office Solution (SOS).

SOS is Comprehensive Software, Easily Comprehended.

Stratus is the company that first made its mark with its hardware-based fault tolerant super-mini. Now it's offering a turn-key software package 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.

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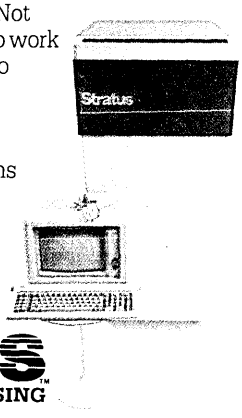

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Now that the world relies on computers it needs a computer it can rely on.

Why database often disappoints, and how to make it live up to its promises.

DATA ADMINISTRATION: IT'S CRUCIAL

by Arvind D. Shah

While most dp managers have read about the phenomenal productivity gains and data integration benefits that database technology offers, relatively few have experienced such successes. The fact is that, in many organizations, database methods have yet to match the expectations that management has held for them. The integration of data has remained largely unaccomplished, despite the impressive technological maturity that database management system (DBMS) software packages have attained in recent years. Even the staunchest database advocates have begun to wonder what went wrong.

A short answer is: all kinds of things, managerial, technical, and political. The good news is that there now exists a sufficient body of experience for one to enumerate them, and suggest some remedies. Eight major problems typically arise in database projects:

Uncommitted management. Crucial to database success is an effectively phased plan both for incorporating data entities into databases and for implementing application systems. In addition to systems planning, the development of data integration strategies calls for data resource planning. Few companies have initiated this planning function. In its absence (or even in its presence, if it lacks real management support), priorities for candidate system projects tend to be assigned to the end users who shout the loudest. Other symptoms of uncommitted management include lack of funding for database training, failure to properly develop database standards and procedures, and inattention to defining user requirements. Of course, saying "get management support" is easier than actually getting it. Later on we will see how data administration provides solutions to this problem.

Insufficient end-user involvement. Selling the database approach to end users is typically no problem, but obtaining their participation in the system development cycle is a different matter altogether. The database approach requires that users supply about 40% to 50% of the total system development effort—from the planning phase all the way through system implementation, testing, and delivery. This compares with only about 10% to 20% in development projects for conventional file systems. Unfortunately, even when you do get a good level of participation, the people assigned may not be available full-time or may lack the proper analytical skills. You may also find that no funds are available for training these people, and such training is essential if their contributions are to be worthwhile.

Lack of requirements definition. More often than not, a database project is behind schedule even before the project team is staffed. Under such pressure, the project team often takes end-user requirements from existing systems, without any additional interviews or analysis. This in itself is bad enough, but often the old systems copied previous systems, and may even have been designed to run off cards on the IBM 1401. With requirements "definition" of this sort, how could anyone reasonably expect the database system to perform adequately?

Antiquated end-user procedures. Most of the time, the end user's external procedures and ways of doing business must be modified if database technology is to be exploited to its fullest. Antiquated procedures negate database advantages. It's not unlike jetting between two distant cities and finding you must travel from the airport to your true destination by horse cart.

Lack of development discipline. Normally sober-minded data processing professionals are apt to become entranced by DBMS technology and ignore the all-important areas of planning and standards. As a result, the dp department may exercise inadequate discipline over its database projects. Use of any sophisticated tool must be accompanied by rigorous standards and procedures. Would you fly a jumbo jet with safety standards and maintenance procedures set for a Piper Cub? Some dp shops have designed and operated database systems with procedures created for conventional file systems.

Resistance to sharing data. When managers decide to go database, they simultaneously and unknowingly commit organizational users to share corporate data resources. Those who have worked on conventional file systems where two end users have had to share a report know how hard it is to get agreement on something even as simple as that. With database methods, you're talking about sharing whole databases, not just among several end users, but between entire, often semiautonomous, corporate departments. You meet a lot of resistance trying to coordinate such sharing.

Lack of data standards. Standardization is a necessary prerequisite for effective data resource sharing. The majority of end users you talk with will agree that the idea of standardizing data is a good one. Often, it is something they have wanted for a long time. But when the moment of truth comes, and you actually start changing their data definitions and reports, they'll often tell you that making the necessary changes will put the project too far behind schedule, and that so much work is involved that the project loses its cost-effectiveness for them. Suddenly, they see standards as much less attractive. What they really want is for their own conventions to be adopted by everybody else.

Inappropriate DBMS tool. All DBMS packages are not alike. Some users, who skip the step of rigorous DBMS package evaluation and selection study, find the package they acquire to be inadequate, or too cumbersome or too costly. As a result, a significant number of DBMS users, including some very large corporations, either scrap the database project or change the DBMS package in midstream.

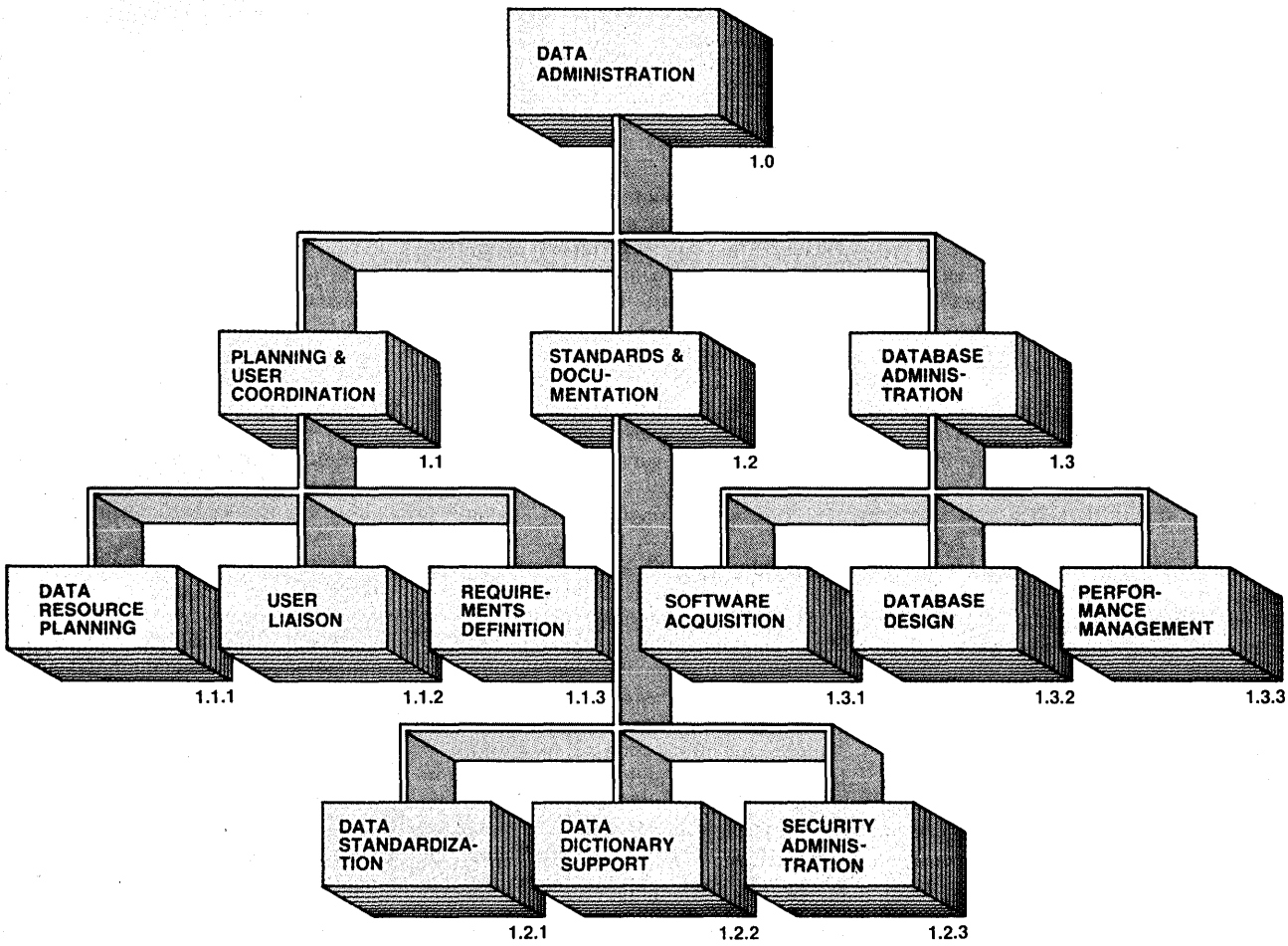
SEARCH FOR SOLUTIONS

The problems just enumerated can be grouped in three categories: management, end user, and technical. Data processing departments, with adequate training, can normally resolve the technical problems. When it comes to the end user and management issues, however, dp shops are at a disadvantage. In order to rectify this situation, organizations that use DBMS must create a new function called data administration (DA). The object of the data administration function is to manage data as a corpo-

What end users want is for their own conventions to be adopted by everyone else.

FIG. 1

THE DATA ADMINISTRATION FUNCTION



rate resource, much as a corporate controller manages the "money" resource. This new function should be organized so that it is possible to address important end-user and management issues. The new group provides the focal point for all the interfacing and communication between users and the dp department required during the planning and development stages of database system projects.

The data administration group should act as liaison between corporate management, end users, and the dp department. Its mandate is to translate business plans into data resource plans, particularly by using business modeling and data modeling techniques. In the process, it evaluates users' needs, weighs them against long-term data resource development objectives, solicits the assessment of dp experts, and then assigns individual priorities. The outcome of this activity is a data resource development plan.

Significantly, the efforts of the DA group relieve system development teams of the ungratifying task of arbitrating disagreements between end-user offices and departments—a de facto dp responsibility in the past. As a result, the system plans that are developed tend to have better user commitment, as well as the solid appreciation of management.

Since data administration is closely associated with end users—as much if not more than with the dp department—who is better placed to handle issues of information ownership and data standardization? Resolving these issues requires an understanding of business processes as well as an ability to deal with organizational politics.

Defining requirements for database systems means bringing end users and dp analysts together and providing them with direction in their analyses. Database systems usually deal with multiple disciplines and users, and are therefore found to be complex even when structured analysis techniques or other analytical methods are used. The DA staff, with its overall awareness of corporate business processes and data resource requirements, is likely to do a much better job of providing leadership here than anyone from the end-user or dp staffs. Its business experience and substantial expertise is also likely to give it greater leverage in standardizing business procedures—always a thorny problem for dp on its own.

The existence of the DA function also ensures that certain types of crucial tasks that are almost always ignored in database development are addressed. Among these tasks are changing end-user procedures, redirecting

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The data administration function should provide the forum where involved end users come together to discuss their problems.

the channels of information flow outside the database system, and modifying associated manual information handling tasks. On its own, dp typically fails in these tasks because it lacks time, interest, and authority.

SECURITY, PRIVACY CRITICAL

Finally, the issues of data security and privacy are as critical outside the database system as they are inside. Although the technical database administration (DBA) function has made strides in attending to these issues inside database systems, on the outside these issues have remained virtually untouched. Naturally, effective company policies and procedures for data security and privacy must include all stages of data handling and all types of data. The DA is ideally situated to attend to those outside areas.

A hierarchical decomposition of a typical data administration function is shown in Fig. 1. Brief descriptions of each subfunction follow.

1.1 User coordination. One of the objectives of this function is to represent end users (especially multiple end users with common information needs) when it comes to negotiating systems requirements and information ownership with system development teams. This function also involves arbitrating among end users. The data administration function should provide the forum where involved end users come together and discuss their problems, procedures, and systems requirements so that their requests can be implemented in a uniform fashion. This function assures that necessary training is provided to end users as well as management.

1.1.1 Data resource planning. Since the objective of using the database approach is to achieve data integration, any major systems development effort should span three to five years. These database systems are not only complex in terms of their components and interrelationships with other systems, but also have to continually meet the changing needs of the end users. This means the system development plan should be compatible with a corporate business plan. The data administration function develops long-term functional requirements, which are translated into business information models. The business information model in turn is used in the development of corporate data models and conceptual systems models. Based on the overall pictures produced by different models, the DA staff generates a system development plan in conjunction with key end users and the dp department.

1.1.2 User liaison. Most of the time, the incumbent procedures reflect the limitations of the conventional file systems. These external procedures must be modified if database technology is to be exploited to its fullest. It is necessary that end-user business policies and procedures be examined in light of changed business requirements and the new technology, and modified wherever necessary. This process will produce some conflicts, and the user liaison function has to make sure that they are resolved and that viable procedures are developed to support the users' business objectives and goals.

1.1.3 Requirements definition. The database design and the associated system design reflect the quality of end users' functional requirements as defined by systems analysts. The requirements definition methodology appropriate for database systems is drastically different from those used for traditional systems. Database design calls for the definition of the end-user data views in very specific and quantitative fashion during the early stages of the design phase.

DA STAFF DIRECTS ANALYSIS

Defining requirements for database systems means bringing end users and dp analysts together and providing them with direction for their analysis. Database systems usually deal with multiple disciplines and, as noted, are extraordinarily complex. The data administration staff, having gained an awareness of corporate business processes and data resource requirements through its modeling activity, can provide effective leadership for such efforts.

1.2 Standards and documentation. The objective here is to develop policies, procedures, standards, and controls that are necessary for the development, maintenance, and operation of database systems. This function is also responsible for the communication of standards and procedures to corporate and dp users. The data dictionary is an automated tool that facilitates documentation and, to some extent, monitoring of the standards. Management of the data dictionary function naturally falls within the responsibility of the DA staff.

1.2.1 Data standardization. The data administration staff works with end users and the data processing team to define each data element—its size, format, usage, and other pertinent information. All this information is properly documented in the data dictionary so that it is available to all the projects and end users. As crucial as this function is, it is also sticky and difficult to implement because of corporate organizational barriers. Therefore, the data administration group must have authority to enforce standards. Wherever appropriate, this function could be extended to standardization of common reports, forms, and other sources of information.

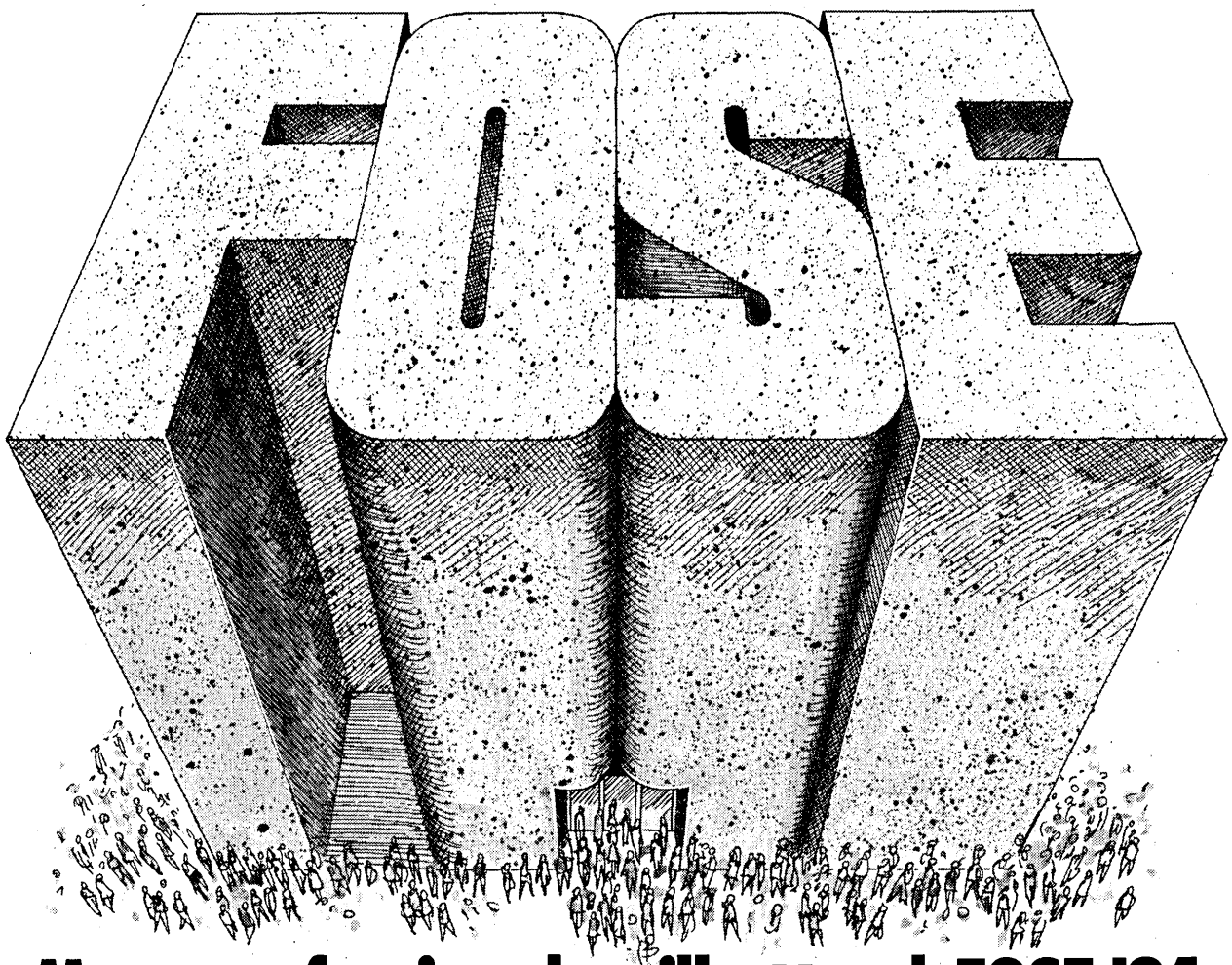
1.2.2 Data dictionary support. The data dictionary is a productivity tool not only for data administration but also for all data processing. The dictionary stores all the information about data elements, records, databases, programs, reports, transactions, organization, business functions, end-user views, and other project details. It is therefore necessary that an appropriate data dictionary package be available, and that appropriate procedures be in place to make the dictionary useful to system developers, and to maintenance and database administration staff. If an automated dictionary is not available, a manual one should be developed. A key to successful data dictionary implementation is a training program that motivates data dictionary users.

1.2.3 Security administration. Central storage of the entire corporate data resource necessitates some precautions. The DA staff has to work with management and end users to set security and privacy standards for all the data elements, records, and files. Working with database administration, DA designs passwords and other controls. Some data elements require more restricted access than others. In order to maintain the controls on such data, and continually monitor their use, information ownership is established for each critical element. Once an information owner is established, that group is responsible to see that the data element is properly defined, and that its integrity and privacy are maintained in the database.

1.3 Database administration. It is the database design that provides the foundation for the integration of the corporate data resource residing in the computer. Database administration is charged with designing an overall database structure that's stable in the long term but at the same time meets the requirements of component systems. In the absence of such a centralized database design function, each system would go on its way and data integration across application systems would be impossible.

1.3.3 Performance management. Since several end users share a common data resource, and they all have to go through one DBMS to access their data, performance becomes a common issue. The fact that most database systems have increased on-line usage further complicates the performance issue. Because no one application has total control over system performance, the responsibility falls to database administration. This group works with the systems programming and operations staff in setting standards, procedures, and performances monitoring mechanisms.

DBA is also responsible for conducting reviews of development projects to assure that database systems being designed do conform to corporate standards. The DBA staff may sometimes simulate the performance of a database system during the design stages in



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The key to successful data dictionary implementation is a training program that motivates users.

order to assure that end users' response time expectations will be satisfied.

WHERE DOES DA FIT IN?

If the DA function has all these responsibilities, where does it fit within the organizational structure of the company? The nature of DA responsibilities dictates that it should be placed in such a way that it provides a forum through which end users can express their frustrations, in addition to desires and needs. End users must feel that the DA is responsive to them, and in fact is their corporate representative on matters relating to information. The office of the DA, in effect, will provide a more or less democratic means for end users to resolve their conflicts. The DA function should be independent of the other dp functions.

In some companies where management and end users are enlightened on the subject of data resource management, they have experimented by placing the DA function outside the dp department. Although they were successful, there is no conclusive evidence that this is the best arrangement.

Naturally, the DA function should be placed high enough in the organizational hierarchy so that it has sufficient authority to issue policies, enforce standards, and resolve conflicts. Even in cases where the DA function is organizationally outside the dp department, it must still work closely with it.

One way to appreciate the significance and utility of data administration is by analogy. Success in the aviation industry today obviously depends as much on regulatory bodies such as the Civil Aeronautics Board, as on technology itself. Such bodies provide an organizational framework within which all parties can come together and search for agreeable solutions.

The DA is precisely the same type of body for all matters related to information within the corporation. The DA function provides an organizational framework withing which database technology can be successfully employed for the benefit of its users. Among other things, the DA will embody humanization of a technology that has hitherto frustrated end users because it offered high promise but yielded less than expected performance.

But the DA is more than just a regulatory body. It also bears important responsibilities for data resource planning and database promotion. Any technology, once mature, requires that more attention be devoted to education and enlightenment of the marketplace than to its own further technological exploration. Equally important is learning about the marketplace, speaking its language, and understanding its environment. That is just the situation the database industry is in today. We must learn how to use the technology that already exists and to productively plan its exploitation for our businesses. If this is not done, the significant data resource management innovation that is about to emerge in the dp industry will be of little or no value to its users. ❖

Arvind D. Shah is a principal with Performance Development Corporation, Princeton, N.J., in charge of eastern regional operations. He has been involved over the past several years in virtually every phase of information resources management, and has extensive experience with the major commercially available DBMS packages. Prior to joining PDC seven years ago, he worked for Dow Chemical, General Electric, Exxon, and Corning Glass.

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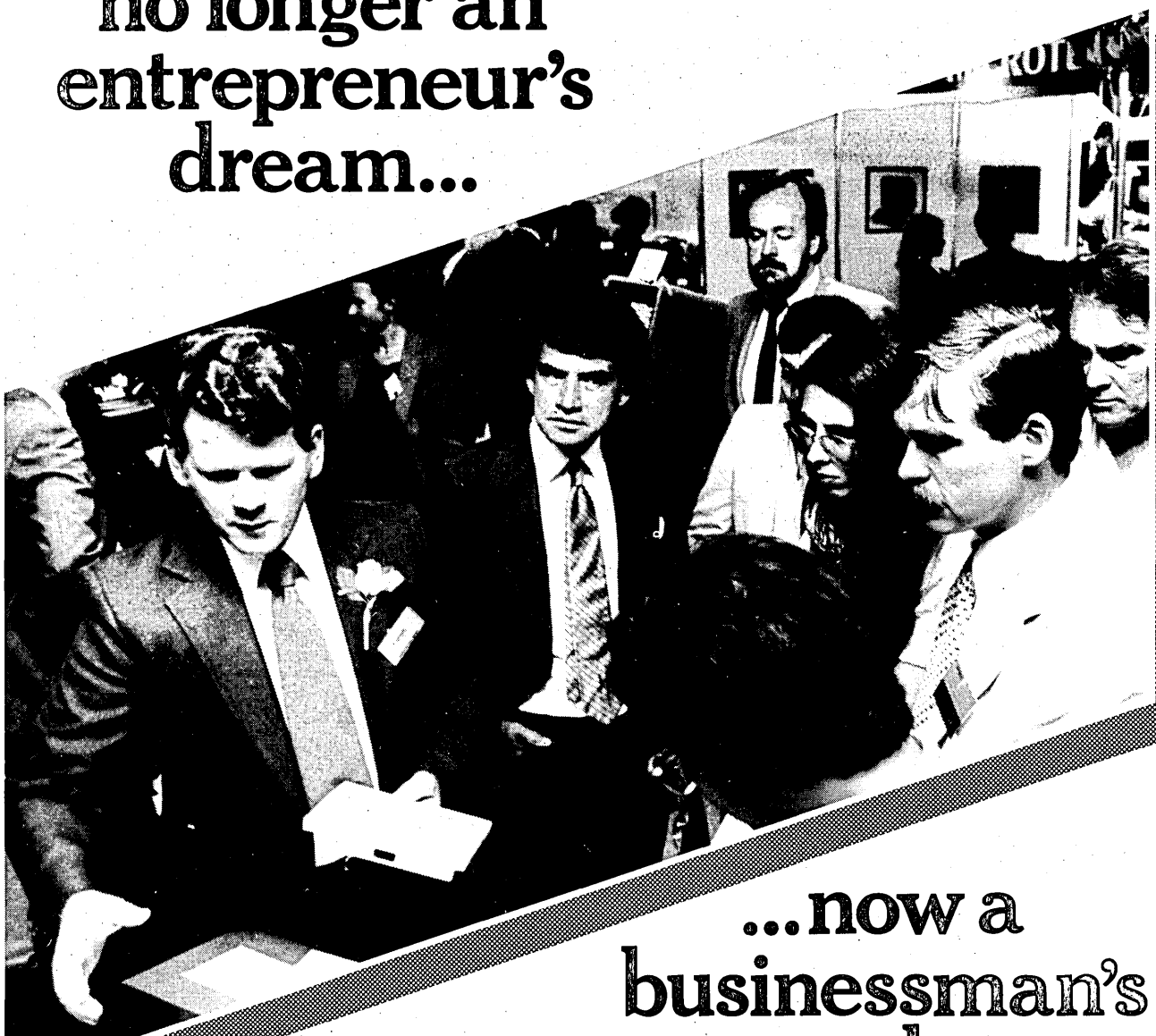

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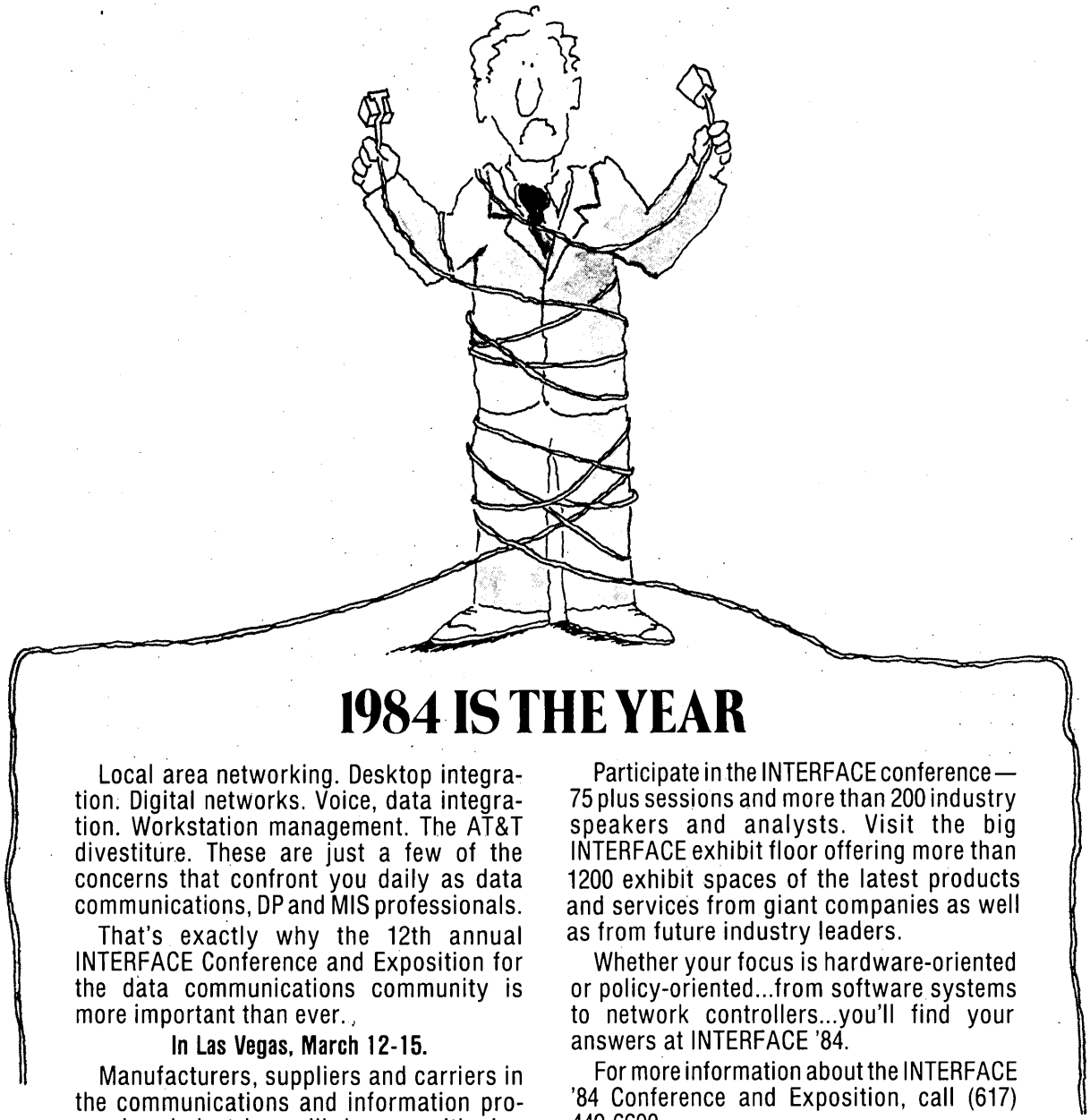

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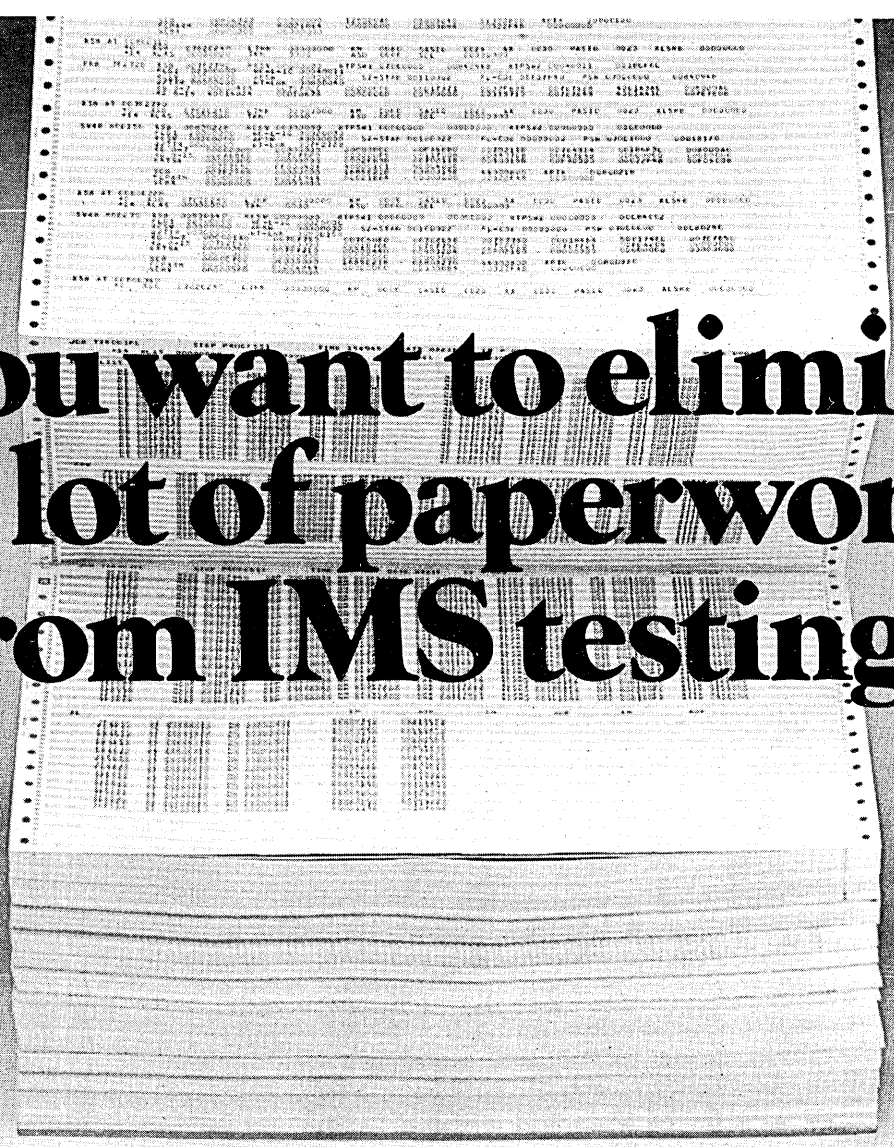

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CIRCLE 83 ON READER CARD

A data administrator's chief problems are people, software, organization, and people.

WANTED: EXPERIENCED KAMIKAZE PILOTS

by Frank Sweet

Increasing numbers of dp executives are steering their shops into a database environment. Some will come to regret it. The problem is that many lack sound reasons for getting into it in the first place. Vendors seem to promise everything imaginable. That's their job, after all. The dp manager must stick to pragmatic goals. That's his.

Database promises the ability to share files among applications while avoiding retrofit each time something changes. But if you don't want to be disappointed, you should realistically understand what's involved. Consider that:

- The problem is using old data in new applications.
- Traditional methods offer two solutions, both wrong.
- The pitfalls are people, software, people, organization, and people.

Imagine that you have a customer master file, belonging to accounts receivable. Each record holds a customer's name, address, and how much he owes your firm.

One day, your vp of sales walks through the receivables' office and sees a listing of the file on someone's desk. He likes it, and he calls you up to ask you to furnish him a weekly copy.

"No problem," you reply, confident you can do it.

"But I don't really need to know how much he owes us," he adds. "Leave that part off."

"Well, I guess we can handle that," you answer.

"I need phone number, though, so add that in," he concludes.

What can you say? Knowing that 1) the field "telephone number" isn't in the record and 2) the filler was used up years ago, you have but two ways of providing this new "Sales Reporting" application with its file: you can add the field to the receivables file, making each record longer, or you can create a new, independent customer file for sales. Neither of these traditional solutions would be correct.

If you add the field to the current file, making its records longer, you must first identify, recode, and recompile every program you ever wrote that reads the file. The fact that your receivables users have no interest in telephone numbers is irrelevant. Since the record is to be made longer, you either retrofit the old programs or they'll croak—abending with wrong-length-record errors or worse. So you retrofit.

How long will it take? Well, work it out. Recompiling 50 programs could take a day. But first, you have to recode them to add a 10-byte filler to the customer record. That could take a week, and even before that you have to find out which 50 programs (out of the 1,500 you have in production) read the customer record. That could take a year; come on, we all know what your documentation's like.

The bottom line? When the vp says, "Oh yes, add phone number," your reply goes something like, "Yessir. But it'll take a year and cost $50,000."

NEW FILE LEADS TO CONFUSION

Alternatively, creating a new, independent file for sales will lead to inconsistencies. With sales maintaining one file and receivables the other, it wouldn't be 12 months before there were discrepancies. Customers would be added to one file, but not the other. New customers might receive two different ID numbers, one from each department. The same number could identify different customers on the different files, and there'd be no assuring that the names and addresses were in fact the same.

There are three reasons why the problem raised by the vp's request isn't trivial:

It isn't an epochal event. The need to use old data in a new application isn't unusual. The question arises dozens of times a year. You'll face it, in one form or another, each time you develop a new system. And your goal, when you come down to it, is just that: to provide systems. Hence, the buildup of repeated consequences of this decision reflects your shop's style. In other words, when facing the eternal question, "Do you want it right or do you want it Friday?" some shops tend to do it right (retrofit), while others go for speed (duplicate files). Neither works over the long pull.

The consequences can be serious. In 1977, I had the unpleasant task of explaining to a client's top managers why they had two fanfold reports in front of them. Both computed P&L. Both were from the same dp shop. Yet one showed the firm had made $18 million the prior year, while the other said it had lost $20 million. Think about it, now. Here's an otherwise sensible company with $40 million worth of uncertainty as to whether or not they'd made money. At root, the problem was traceable to two different standard cost files, belonging to two different accounting departments. Did I explain it to their satisfaction? Of course not; could you have?

Constant retrofitting can cause your shop to grind to a halt. In the example above, the work of adding a mere 10-byte phone number is so costly that you'd have to be mad to go through with it. The result? As more and more applications are added to your shop, the retrofit time and cost increase. If you have only 15 programs in place, finding and recompiling the ones that read the customer file is easy. With 150 it becomes hard,

No matter how fast your people are, or how complete your documentation, sooner or later your new documentation will stop.

at 1,500 it's economically impossible, and at 15,000 it's inconceivable. No matter how fast your people are or how complete your documentation, you'll sooner or later reach the point where new development stops. The irony is that efficiency is punished. Disorganized, poorly documented shops can take 10 years to reach the point where no new systems can be developed. I've seen efficient outfits whip through the dp life cycle so fast that they grind to a halt in five years or less.

It does no good to imagine that, if you'd designed the file to include phone number from the outset, you wouldn't have the problem. That's just wishful thinking. If you'd taken the time to include every field any application could ever want to know about a customer, you'd still be at it. The technical term for this is paralysis by analysis.

By now, most people have at least a passing familiarity with the technology that offers an alternative to retrofitting each application as new systems arise, or accepting redundant standalone files. I'm speaking, of course, of database management systems, which appear to enable file sharing without paralyzing application growth.

Without a DBMS, the user's program reads records on its own. When the program issues the READ command, it finds the target record, extracts it from the disk, and puts it into its I/O area. With a DBMS, the user program's I/O is intercepted. The DBMS finds and extracts the target record from the disk, then tailors the record into the format that particular program expects. Finally, it passes the result to the program.

The tailoring is the important part. Without it, the user's program reads the actual record. If you've recently stretched that record by adding a 10-byte phone number to an 80-byte record, the program will be fed 90 bytes of record, like it or not. Hence, it must be prepared for it. It must be recoded and recompiled or it dies.

The DBMS compares the real record layout (90 bytes with phone number) with the view the program expects (the old 80-byte version). It then chops out the 10-byte phone number, glues the pieces of record back together, and hands it to the program. The program need not be aware the real file was changed at all. It need not be recoded or recompiled.

FREEDOM TO EVOLVE FILES

The difference is profound. At a stroke, you have the freedom to evolve your master files, keeping up with changes in your business. But how much freedom do you really have? Are there limits to the changes you can inflict on a file without affecting the programs that read it?

You can certainly add new fields. This is the most common change, after all. Any DBMS that doesn't chop out newly added fields before passing the record to an old program doesn't deserve the name. Removing old fields, however—if any program out there needs them—is a problem. How would the DBMS know what to put in? And changing their order, format (packed, unpacked), or their length depends on the DBMS. Some do, some don't.

The ANSI terms, by the way, are as follows: Schema view is the real record layout as it sits on disk (the 90-byte record with phone). Subschema view is the individual program's view (the old, 80-byte version). Obviously, a given record can have many subschema views, but only one schema view.

Now that we've considered some of the implications of database, the pitfalls become a bit more evident. They're the things that jeopardize either your ability to share files or to avoid retrofit. Consider these four:

Users may not agree to share files. This is, by far, the most common cause of database failure. Think back to the example. You have a DBMS, so you add telephone number to receivables' customer file and give the sales vp what he wants. The next thing you know, the financial vp devours your liver for breakfast. Whatever gave you the idea he'd agree to let sales look at his data? I've found companies all over the spectrum of interdepartmental trust. At one end are the places where line managers trust one another so much, they'll go out of their way to help. At the other end are departments so implacably hostile that sabotage is not unheard of. If your firm fits the latter description, forget database.

Software may be inadequate. Actually, this is less common today than it was 10 years ago. For many years, one of the largest-selling DBMS packages on the market did not remove newly added fields from a record before passing it to an old program. If you added a field, making the record longer, you had to track down and recompile every program you ever wrote that read the record. Yet, many folks bought it.

Another thought: since your files can be shared among many applications, and applications do blow away now and then, the software must detect the fact and immediately put everything back the way it was—on the fly, without intervention. Not all products do this, even today. Finally, since the files are shared, they must be concurrently accessible to your TP monitor and to batch jobs. But let's not belabor it. I agree completely with Tom de Marco (*Structured Analysis and Systems Specification*, Yourdon Press, 1978). When it comes to selecting software, we dpers aren't consulted. The decision is always made via trial by combat between those two factions in every company: the "only IBM can save us" group and the "IBM over my dead body" team.

PARALYSIS BY ANALYSIS

S&P can be habituated to paralysis by analysis. There are shops where the eternal question (right, or Friday?) is taken much too seriously. They become aware of the possibility of file sharing, and react to it by vowing to do such a thorough job on their next file design that they'll include every field that any user could ever want. Squirrels collect such ideas and store them for the winter, I've heard. I recall one large manufacturing firm that spent over $150 million on application design alone before upper management came to its senses and slew the beast. The blame was laid at the database's doorstep. Rightly so; if systems and programming had never been told that files were shareable, they'd never have tried to do the ultimate design. Again, if this description fits your shop, you'd best avoid database.

The dp organization itself might not withstand the impact. Finally, if you have a DB, you'll need a DBA (or a DA, but that's another story). His job has two parts: 1) fretting over the accuracy, security, and timeliness of the shared data, and 2) wrestling with those two vps to get them to share the file. The problem is that everything the DBA does will require him to step on someone else's turf: security/backup procedures overlap with dp operations, data naming standards encroach on systems and programming, and DBMS software maintenance trespasses in tech support's area. Can your organization withstand the impact?

The database approach to handling master files is worth considering. It lets you build new systems on existing master files, while avoiding retrofit. But it can be jeopardized by any of four common problems. One of these is technical. The other three are political. Now, look again at the two aspects of the DBA's job description. The first is highly technical, the second, completely political. Now you know why headhunters claim finding a good DA/DBA is as easy as finding an experienced kamikaze pilot. ❋

Frank Sweet is corporate manager of data administration for The Charter Company, a Fortune 100 firm in Jacksonville, Fla. He has worked with IMS/DLI, TOTAL, and IDMS since 1970 as IBMer, Booz Allen & Hamilton consultant, and free-lancer. Today he works mainly with IDMS and is former president of the national IDMS User Association.

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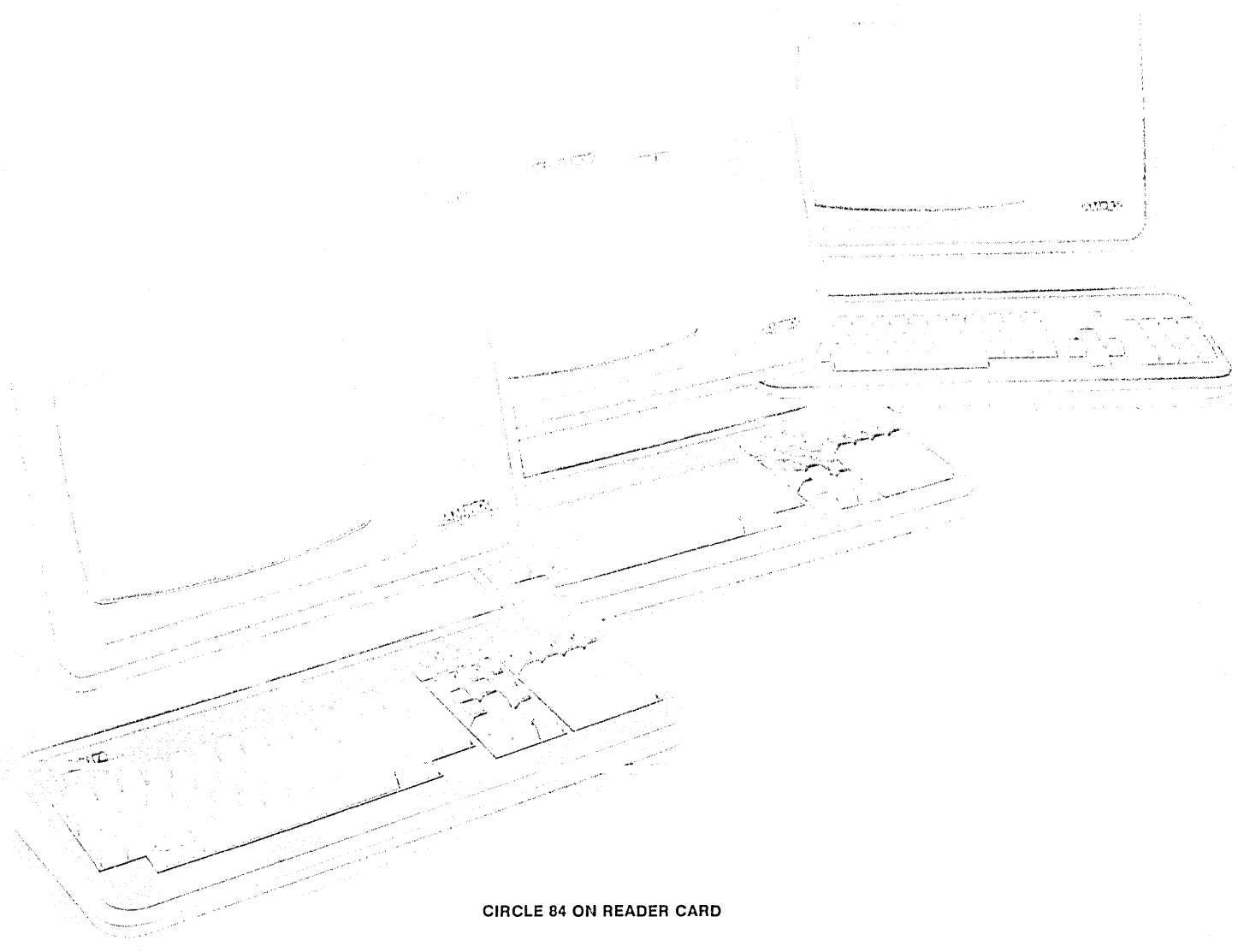

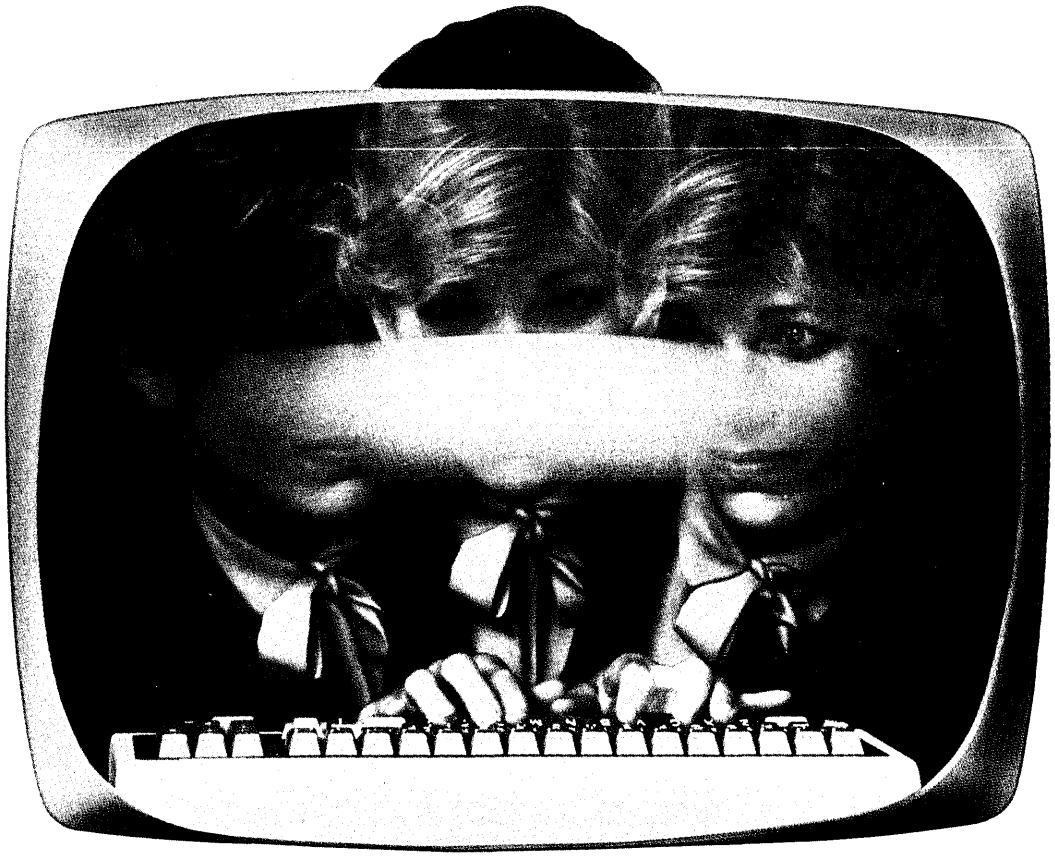

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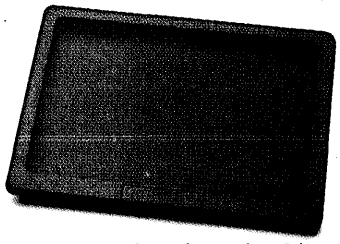

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CIRCLE 85 ON READER CARD

PEOPLE

FROM ESSEX TO IRVINE

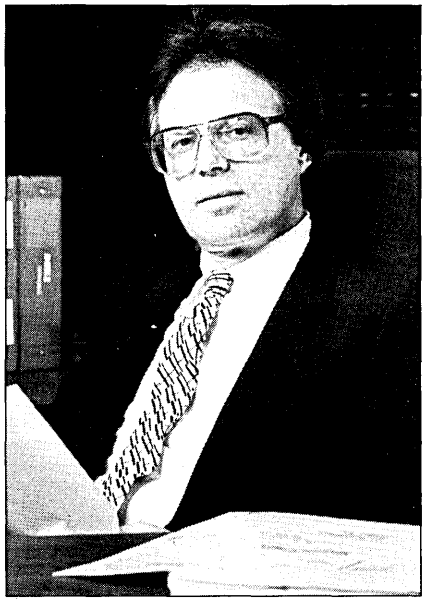
Frank Thomas Connors traveled a circuitous route from his native Hornchurch, Essex, England to Irvine, Calif., where he is president and chief executive officer of Doelz Networks Inc.

Along the way, he patched up companies, sometimes successfully and sometimes not, and learned not to be an engineer, which is what he had set out to be at St. Bedes College and Victoria University, both in Manchester, England.

The fast-talking, 49-year-old Richard Burton look-alike enjoys talking about his diverse career. "It was out of the frying pan into the fire," he says of one job change.

Fresh out of college and still an engineer, he joined Hawker Siddley Aircraft in Manchester in 1957 and helped design in-flight recorders and landing simulators for the Hawker Harrier jump jet and the Concorde.

He got into computers in 1961 when he joined English Electric Computers Ltd. as chief engineer, communications and special engineering. English Electric was combined with 11 other British firms in 1968 to form International Computers Ltd. (ICL). Connors worked on design of ICL's complete range of computer equipment from 1968 to 1972. Then, until 1976, he ran all development for ICL outside the mainframe area. He assisted in the setting up of Computer Peripherals Inc., a joint venture of ICL Control Data Corp. and NCR, and for two years was ICL's representative on the CPI planning board.



FRANK T. CONNORS: "Engineers tend to do things just because they're fascinating."

"I spent a lot of time in the U.S. during those years," he recalls. When, in 1976, ICL began looking at Singer Business Machines as a potential acquisition, Connors was assigned to do the acquisition study. ICL decided in April to acquire Singer Business Machines' international operation. The U.S. operation was foundering so "we said, we'll run it for you for six months. I came over to run it for six months. They paid $1 million for six months of my services."

Connors consolidated Singer activities from California and New Mexico to Utica, N.Y., and this became International Computers Ltd., USA, and Connors became its president. He remained in that job until 1979, increasing the operation's revenues from $30 million to $120 million.

During that time he met Leonard McKenzie, who had been with TRW, which had acquired the service and support activities of Singer Business Machines. McKenzie left TRW to join Northern Telecom about the time that company acquired Data 100 and Sycor. He tried to persuade Connors to join Northern Telecom to integrate the acquisitions.

"I thought about it a long time," Connors adds. "I'd been with ICL for 15 years but what with Geoff [Cross, former president of ICL, who stepped down in 1977] leaving, it wasn't the same company anymore."

He joined Northern Telecom and moved to Minneapolis. That was the frying pan to fire move. "By the time I got there, upper management in both companies had all disappeared. The two companies were too dissimilar in style. Sycor was Sam Irwin's company. Data 100 was a country club. At Sycor the feeling was 'the latest technology is not enough for us.' And you bring that attitude into the regulated mentality of a telephone company?"

Connors believed at the time that Northern Telecom was well positioned for "the office of the future. What do you need in an office—a table, chair, paper, pencil, and a telephone. That was Northern's strength, but they bought two companies

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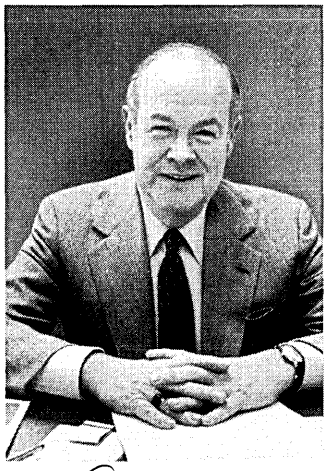

Best regards,

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PEOPLE

that were over the hill and underestimated what was needed to integrate them. After 18 months of that, I'd had enough."

He was at loose ends. "I'd been with two big companies. I decided to try a small one. He approached some New York venture capitalists he knew, and it was off to Buffalo to try to revive Nanodata Computer Corp., an ailing developer of high-performance simulators.

"After a year, I concluded that Nanodata was not fixable." He went back to his venture capital friends in search of greener pastures. Citicorp Venture Capital, one of the principal investors in Nanodata, had been approached by Doelz for capital and told Connors about the firm.

"I didn't come to California to look at Doelz. I came to look at three other things. Actually I was going to San Diego when I decided I'd love to find out what these guys are up to, so I stopped by. After that I rearranged my whole day and canceled a trip to Cleveland. I decided they really did have something here, that they were looking at networks a different way than anyone else. That's not what they said though. I had to dig to get it."

Doelz's founder and chairman, Melvin Doelz, left Collins Radio with a group of others in the late '60s to form Marshall Communications, which was sold to Control Data Corp. In 1978, the group from Marshall backed out of CDC to form Doelz Networks as a consulting firm, primarily consulting to CDC to solve the networking problems of Plato. The company was primarily funded by CDC as well.

In 1982 Doelz decided to develop and market products for interfacing computers to communications networks and to manage their operation in networks. The company was recapitalized with funding from a consortium of venture capitalists of which Citicorp Venture Capital was a part. Citicorp's participation was contingent upon Connors coming in as president and ceo. He started with the company as a consultant in September 1982 and became president last December.

He's excited about Doelz. "They look at networking as a single subject. Network management is not added afterward. It's an essential part of a network. Their networking transcends broadband or baseband or protocols. Sure you can fly from here [Irvine] to L.A., but it makes no sense. Different ways suit different circumstances. It's a bit transport problem. We can handle any kind of network with the same set of building blocks."

Connors feels a part of his value to Doelz lies in his having learned not to be an engineer. "Engineers tend to do things just because they're fascinating."

—Edith Myers

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CIRCLE 86 ON READER CARD

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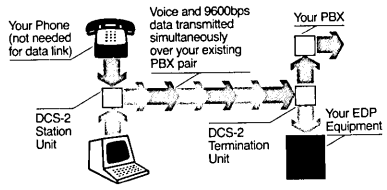

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CIRCLE 87 ON READER CARD

HARDWARE

OFF-LINE

Mohawk Data Sciences' splashy introduction of the Hero 16-bit intelligent workstation has struck some observers as being rather myopic, much in the way its Personal Computing 21 debut last May was. That product gave current MDS users all the capabilities of the already obsolete CP/M operating system with none of the advantages of standalone computing; despite the product's name, it runs on the host Series/21 processor. Now, the Hero -- the first production version of Convergent Technologies' touted N-Gen -- gives MDS users the choice of running MS/DOS software as a standalone PC or emulating a Series/21 terminal. The Parsippany, N.J., firm is promoting this capability as proof its products can emulate 3274 controllers with PCs attached, without requiring the user to discard existing hardware. That's true insofar as MDS systems go, and one would expect Hero to catch on within MDS's installed Series/21 base. But if the company really wants to use Hero as a wedge into other installations, it faces a major obstacle: no non-MDS equipment will operate in a Series/21 environment. Users who have bought hundreds -- or thousands -- of IBM P.C. products will not toss them out the window and replace them with Heros when other vendors can integrate the same P.C.s into their own networks.

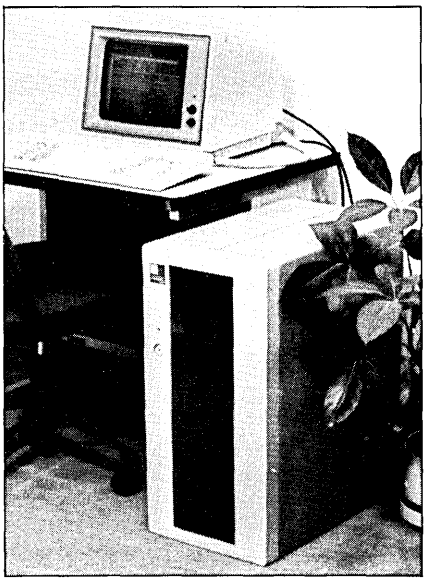
Hero bucks the current wisdom in other ways that are bound to alienate current P.C. owners. The product runs MS/DOS under the control of the H/OS (nee CTOS) operating system, but it is not IBM compatible. As more and more PC makers -- Kaypro, TeleVideo Systems, and Vector Graphic are but the most recent examples -- convert their products to IBM compatibility, big users have more places to turn. MDS's current strategy may wind up locking Series/21 out of new installations rather than opening the door into them.

Kaypro, meanwhile, has had stunning success following the opposite strategy. Its Uniform and Kaylink software products are designed to let the portable computers emulate a wide range of other micros, and its new Plus 88 expansion cards allow the II and 4 models to run CP/M-80 and IBM PC/DOS programs without modifications. As a result, the Solana Beach, Calif., company is selling more micros today than any vendor except IBM and Apple, according to many industry estimates.

Kaypro's success has more than countered Osborne's failure in the portable computer field, at least in terms of how many vendors are tossing their hats into the ring. While the surge of startups could be expected of any new market, the entry of more established vendors represents a stabilizing influence. Early birds like TeleVideo, Epson, Tandy, and Convergent Technologies have been joined of late by Panasonic, Xerox, and even IBM. All have followed Kaypro's example of providing portability and compatibility. Panasonic's PC/DOS Senior Partner comes with 128KB of RAM, a 9-inch crt, a thermal printer, a disk drive, and software, all for $2,500. The machine competes with other 30-pound transportables like the Kaypros. The Xerox 1810, by comparison, is a lap-sized unit like the Sharp PC-5000 or the Gavilan 1. The CP/M machine has 64KB of RAM, a 3 x 80 LCD screen, a tape recorder, a speakerphone with autodial, and other communications capabilities, for $2,200. IBM's portable, of course, is the PCjr. While not promoted as such, users can pack it into its case and cart it around. It happens to be lighter than most "portable" computers.

MULTI-USER PC

The Dimension is a multiprocessor, multiuser system that can support up to 12 workstations, each running a different IBM P.C. XT business application. The heart of the system is a single board computer based on the 80186 microprocessor and controlling a 13-slot IBM bus. Each user has a dedicated 8088-based workstation processor board that connects to the IBM bus.



The Dimension's operating system is compatible with PC/DOS 2.0 and has built-in electronic mail capability for up to 12 users. It provides each user with the equivalent of an IBM P.C. XT with networking and shared access to fixed disks, printers, and communications devices. The cluster of 12 workstations is connected through the IBM bus to provide networking at bus speeds. Among the options for the system are communications links to mainframe computers; one option allows the Dimension to emulate a 3274 cluster controller.

Standard equipment on the product includes one 360KB floppy disk drive, a 15MB or 30MB fixed disk drive, and add-in spaces for a second fixed disk and an integrated tape backup system. The main processor board comes with 256KB of RAM,

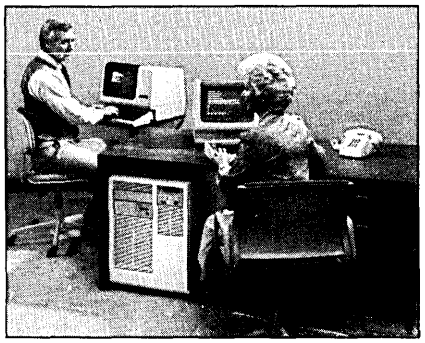
which can be expanded to half a megabyte. This RAM is used primarily as cache memory to provide high-speed interaction between the users and the hard disk. Each workstation board includes 128KB of RAM, which is also expandable to 512KB. Workstations can also come with a local RS232 interface to connect a local printer or a mouse.

A Dimension with a 15MB hard disk and two workstations costs $7,000; the same system with a 30MB disk drive costs $8,000. Additional workstations cost $1,500 each. The operating system is included in that price. NORTH STAR COMPUTERS INC., San Leandro, Calif.

FOR DATA CIRCLE 301 ON READER CARD

VAX-IN-A-BOX

The MicroVAX I computer system implements a subset of this vendor's VAX architecture and retains many elements of the family, including full virtual memory man-



agement with address capability of 4GB, 16 32-bit general registers, 32 hardware and software interrupt priority levels, and all native mode instructions for byte, word, longword, quadword, and single and double precision floating point data types. Certain instructions, hardware-assisted in other VAX systems, are implemented in the MicroVAX I in software; these include decimal mathematics, some string instructions, and the D and H floating point data types.

The MicroVAX cpu resides on two quad-height modules that occupy adjacent slots on the Q22 backplane. One module contains the 32-bit data path, microsequencer, and control store. The second is a memory management and cache module, which provides logic for interfacing the Q-bus to the internal 32-bit VAX architecture. The system uses standard Q-bus memory modules and performs all memory data transfers in block mode. The system runs the MicroVMS operating system, a subset of VMS. Prices begin at $10,000 for a diskless, rack-mountable unit with 512KB of memory for dedicated, memory-resident applications. With an 800KB 5¼-inch floppy disk drive and a 10MB 5¼-inch Winchester disk drive in a floor standing unit, the price is $13,880.

The vendor also announced the VAX-11/725 supermini, its smallest Unibus VAX system. It contains a VAX-11/730 cpu with a 52MB Winchester drive in a cabinet designed for office locations. Prices range from $25,000 to $37,000. DIGITAL EQUIPMENT CORP., Maynard, Mass.

FOR DATA CIRCLE 302 ON READER CARD

HARDWARE SPOTLIGHT

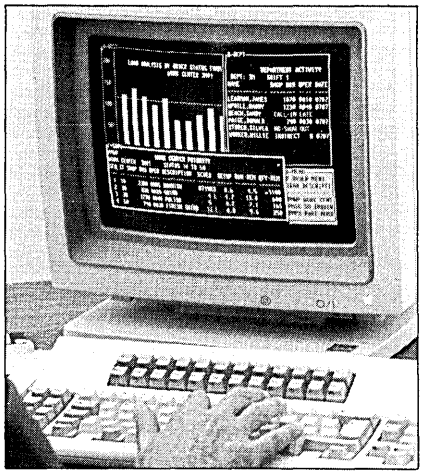
DESKTOP 370

The Personal Computer XT/370 allows users to run VM/CMS application programs on a desktop machine. The unit operates under the VM/PC (virtual machine personal computer) operating system and provides CMS functions with VM/SP compatibility. The XT/370 can be used in a standard P.C. XT standalone mode, as a System/370 VM/CMS workstation, or as a 3277 display terminal connected to a host computer. Users can switch between two preset modes of operation.

The XT/370 can be operated as a single System/370 workstation with up to 4MB of virtual memory. Users can transfer programs and information from a host processor to XT/370 workstations, where they can create and edit files, compile and execute programs, and generate reports. Data can also be uploaded to the host. The workstation can serve as a distributed system for people who need the 370 software library and the response time of a single-user machine.

The XT/370 consists of a P.C. XT with 256KB of RAM, a display unit, a floppy disk drive with 360KB capacity, a 10MB or 20MB Winchester drive, and three circuit cards for System/370 compatibility. The first card, which has three key chips, gives the XT/370 the ability to work with a host mainframe and execute host-compatible programs. Two of the chips—a standard MC68000 and a customized MC68000—execute the most common System/370 fixed point data and control functions. The third, a customized 8087, executes floating point instructions.

The second card provides an additional half megabyte of core. It has up to 4MB of virtual memory in the VM/PC mode, and expands the memory available in the



standalone mode to 640KB. The third card provides the XT/370 with a coaxial attachment that enables the processor to act as a 3277 model terminal. A P.C. XT/370 with a 10MB Winchester disk drive costs $9,000, and with a 20MB drive costs $11,690.

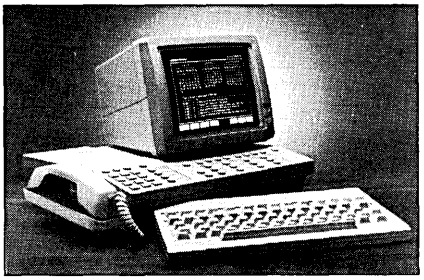
The vendor also introduced the 3270 Personal Computer, a hybrid between a 3270 terminal and the P.C. XT that allows users to display information in seven different windows simultaneously. Four can be from interactive programs in host mainframes, one from a standalone personal computing session, and two from "notepad" sessions in which the user can write messages, maintain a calendar, or transfer data among other windows. The operating system is not completely compatible with PC/DOS 2.0. Prices range from $4,290 to $8,200, depending on monitor and on terminal emulation. The operating system costs $300, and a file transfer program costs $600. IBM CORP., Town of Rye, N.Y.

FOR DATA CIRCLE 300 ON READER CARD

VOICE/DATA TERMINAL

The ES.1 integrates an executive feature telephone, a data terminal with a 9-inch crt, an internal 300 baud full-duplex modem, a detachable keyboard, and business support software in a desktop package. The unit is capable of simultaneous voice/data communications using two telephone lines, allowing the user to access databases while speaking on the telephone. It has a telephone directory, with single keystroke dialing capable of incorporating numbers for long distance services, individual authorization codes, and database log-on procedures. It also supports automatic redialing of any of the last 15 numbers dialed. Users can maintain a personal calendar/reminder file, and generate and send electronic messages and memos. The data terminal displays 25 lines of 80 columns; each character has a 7 × 9 matrix in a 9 × 12 cell.

The typewriter keyboard includes ten function keys. A separate control panel—like a dashboard—has a standard touch-tone telephone keypad, with 13 programmable executive telephone function keys and eight soft keys for menu selection. The unit comes standard with two modular



"GET IBM 3270, 3780 AND HASP COMMUNICATIONS—ADDING A ONE-BOARD PROCESSOR TO MY PC?"

"YOU CAN WITH PERSYST."

The Persyst DCP/88. The only compatible front end communications processor that can support a range of IBM communications.

It's a Persyst exclusive.

The DCP/88 distributed communications processor. A one-board computer that can be configured by software to handle communications between a PC and another computer system.

In fact, the DCP/88 enables the IBM or TI PC to support a range of sophisticated IBM communications—all with just one processor.

So it gives corporate users unprecedented, low-cost flexibility to incorporate the PC into virtually any environment.

Convert any PC into an IBM 3270 terminal. An IBM 2780/3780 RJE workstation. Or a HASP/RJE workstation—instantly.

Just combine the DCP/88 with Persyst software—and you can connect your PC to any compatible host mainframe or minicomputer.

PC/3270 enables your PC to emulate an IBM 3274 Cluster control unit and 3278 terminal, supporting up to four additional devices. Including a printer and three other PCs functioning as 3278 terminals.

PC/3780 converts your PC into a 2780/3780 remote job entry terminal that can send and receive batch files to and from the host.

And with PC/HASP, your PC instantly becomes a full-function HASP/RJE workstation that can support up to seven input and seven output multi-leaved job streams concurrently.

Capability to support your communications needs now. And in the future.

Because the DCP/88 supports bisync, SDLC, HDLC and async protocols, it is the only communications processor you'll ever have to buy.

Use it to connect your PC to an expanding network of IBM communications. Configure your system to meet virtually any communications need—without adding another piece of hardware. Or expense.

All of which makes the DCP/88 as practical as it is powerful.

The Persyst Coax/3278. Still another way to expand your IBM communications.

Here's another fast way to incorporate the PC into existing SNA or bisync data processing installations.

The Coax/3278. A single-slot expansion board that converts your PC into an IBM 3278 display terminal. And with its high-speed coaxial port, you can connect the PC directly to IBM 3274 or 3276 cluster controllers.

Sophisticated communications products for the corporate user. Insist on Persyst.

Persyst communications products are designed to make corporate information systems more powerful. And more efficient.

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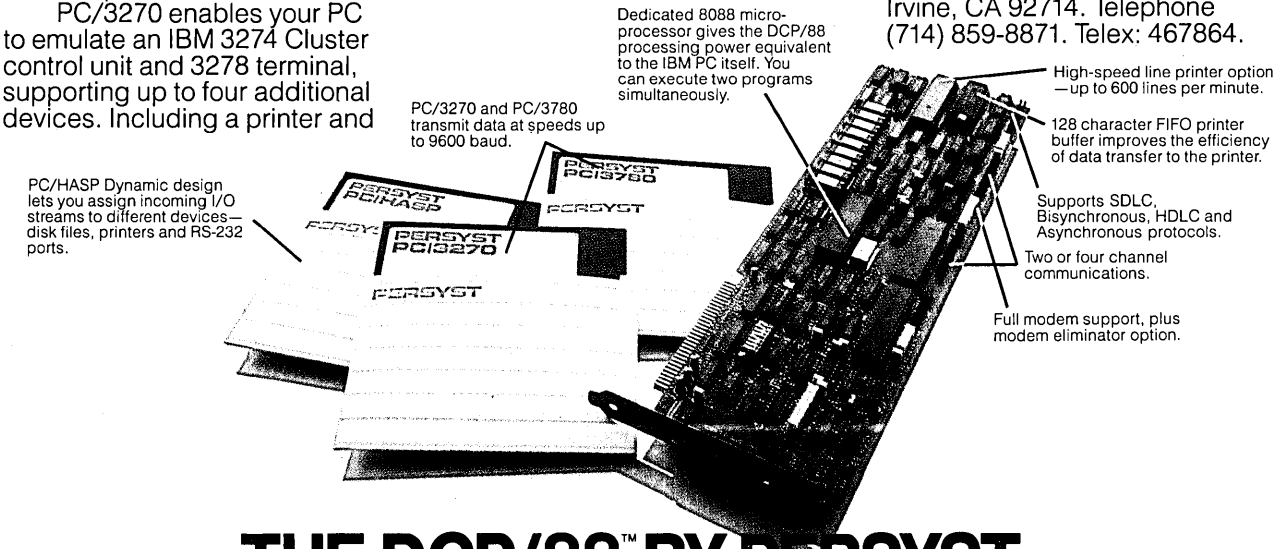
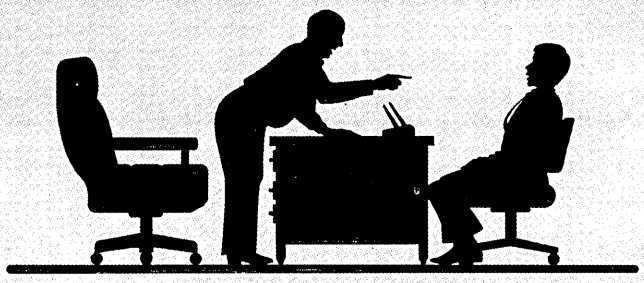
Persyst Products, Personal Systems Technology, Inc., 15801 Rockfield Blvd., Suite A, Irvine, CA 92714. Telephone (714) 859-8871. Telex: 467864.

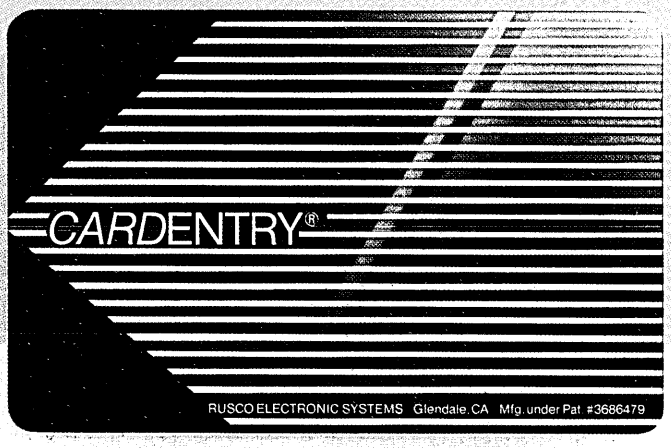


THE DCP/88™ BY PERSYST.

CIRCLE 88 ON READER CARD



"Do you realize, Rutherford, if Ripley gets his hands on those reports he could run off to Rio!"



How to keep an eye on the company files, guard the computer room, patrol the halls and watch the back door, all at the same time.

To be in 14 places at once, you need a system. The Cardentry® system from RES, the leader in access control.

It all starts with a card. A durable, wallet-size plastic card. With its coded information inside, invisible, and protected.

Insert the card into a Cardentry reader, and the code is instantly transmitted to the controller. If the person's authorized, the door opens. If not, the door stays shut. In either case, his name, location and time of day are recorded.

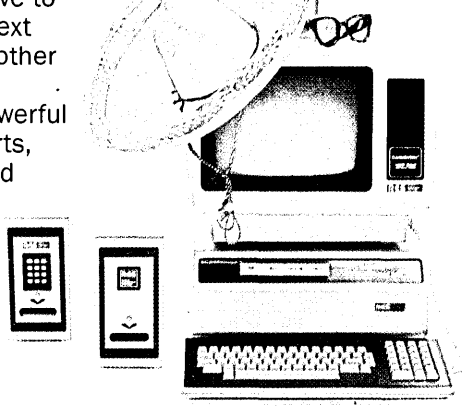
Aha, you say, what if I lose power or communications from the card reader to the controller? You're still in control. Because, like the controller, the card reader has a mind (and memory) of its own. It still lets the right people in, and keeps the wrong people out. That kind of security only comes with the Cardentry system.

Well, you say, what if I expand my operations, outgrow the system and have to junk it? Can't happen. Each Cardentry system integrates, on site, with the next system up. So you can upgrade, anytime, easily. (That's something else no other company offers.)

What's more, with a Cardentry host processor, the system becomes a powerful and flexible data processor. One that gives you detailed management reports, all in plain English, the moment you need them. All while your controllers and card readers are controlling who goes in what door, when.

If you can't be everywhere at one time, get the system that can. The Cardentry system, from RES.

Because if Ripley never reads those reports and runs off to Rio, Reynolds might.



RES, Headquarters, 1840 Victory Blvd., Glendale, Ca. 91201. Offices in principal cities worldwide. Call toll free: 1 (800) 528-6050 x691; Arizona: 1 (800) 352-0458 x691; Phoenix: (602) 954-4600 x691; Alaska and Hawaii: 1 (800) 528-0470 x691.

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CIRCLE 89 ON READER CARD

telephone jacks (RJ11).

The unit is based on a Z80 cpu with 32KB of ROM containing the operating system and 8KB of CMOS RAM backed up by batteries. In addition to the telephone handset, the unit has a full-duplex speakerphone, a day/date clock, and a parallel printer port. The unit costs $850 in single quantities. ZAISAN INC., Houston, Texas.

FOR DATA CIRCLE 303 ON READER CARD

FLOPPY TRANSLATOR

The TM-500 universal diskette reader/writer is a media translation system that accepts source computer data from floppy disks of any size or density and many formats. The unit transfers the data to an internal buffer memory, where overhead formatting data are stripped away. Data are then reformatted in memory and written back out to other floppies of different sizes or densities, allowing input to otherwise incompatible computer systems.

In addition to disks, the TM-500 also unifies data formats for I/O ports and magnetic tape. Thus, disk-resident data and text may be collected from many sources, unified in format, and then input into a large mainframe via tape and I/O ports.

The product is intended for use by banks, insurance companies, and government offices, which can collect data directly from branch offices, regardless of the kind of word processors and personal computers used in the field. The product also benefits phototypesetters and computer service bureaus that must accept input from a wide variety of customers on a random mix of floppy diskettes, the vendor says.

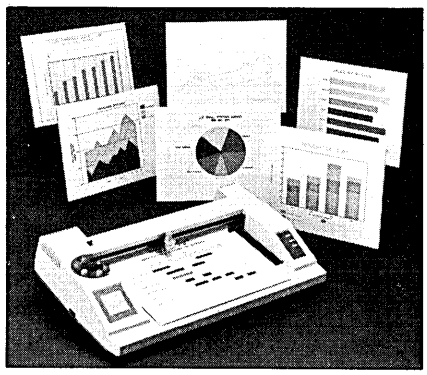
In reverse, the TM-500 allows central mainframes to generate data for a variety of unrelated microcomputers and point-of-sale terminals. A standard xon/xoff feature allows the unit to accept real-time data communications input; IBM's BSC protocol is offered as a $1,600 option. The TM-500 costs $15,800. APPLIED DATA COMMUNICATIONS, Tustin, Calif.

FOR DATA CIRCLE 307 ON READER CARD

PLOTTER

The six-pen Sweet-P model 600 Six Shooter has a plotting speed of 14 inches per second, both RS232 and parallel interfaces on each unit, mainframe "eavesdropping," 19 English and foreign language character sets, and 2KB of buffer memory storage. It offers a resolution of 0.001 inch.

The unit, like its Sweet-P 100 predecessor, operates with the Sweet-P Graphics Language and can be used with many Apple, IBM, or CP/M-compatible computers in both single and multi-user configurations. All graphics software programs that now support Sweet-P 100 can be used to operate the 600. In serial port operation, the plotter can be used as a shared resource in a multi-user environment. Sweet-P 600 can be placed between the microcomputer and the printer or between the terminal and the printer, operating in an eavesdrop mode and performing tasks only when specifically ordered to do so by the user at his micro.



The plotter can use both 8½ × 11 and 11 × 17-inch paper, as well as European equivalent sizes. Six pens are housed in the plotter's rotating carousel, which automatically changes and caps pens during operations. Users have a choice of pens in 12 colors for writing on paper or acetate. The unit can also use rapidograph-type drafting pens used in CAD applications.

The unit has 2KB of buffer memory, which expands to 8KB, allowing the user to instruct the plotter to perform tasks by itself while the user dedicates the micro to other work. The Six Shooter costs $1,100, including pens, paper, and operator manual. ENTER COMPUTER, San Diego, Calif.

FOR DATA CIRCLE 304 ON READER CARD

SNA GATEWAY

PENgates represents a set of communications products that allows this vendor's Series 3200 family of superminicomputers to interface to SNA networks and other IBM-compatible systems. Included in the product set are SNA/3270, which enables interactive terminals, printers, or application programs on a Series 3200 to emulate the capabilities of IBM 3270 series terminals; BSC/3270, which provides identical facilities as SNA/3270 but over bisynchronous lines; SNA/RJE, which provides emulation of a remote job entry station; HASP, which emulates a HASP remote job entry station over bisync lines; and 2780/3780 for remote job entry emulation.

The SNA/3270 emulator provides support for logical unit types 1, 2, and 3, making the 3200 system look like a 3270 cluster controller. It furnishes both an application program (virtual terminal) interface and hardware emulation of 3270 terminals and 3280 printers. In the virtual terminal mode, application programs running on the Series 3200 can interact with the IBM host as if they were run from 3270s.

The emulator handles all the details of the interface. In the hardware emulation mode, the vendor's editing terminals can be used like physical 3270 series terminals connected with the host.

The SNA/RJE makes the 3200 system appear to an SNA/SDLC network as a logical unit type 1 3276 RJE workstation. It provides both a program interface and the emulation of the hardware, including the workstation's operator's controls.

PENgates/BSC supports 2780/3780 and HASP RJE for batch processing and 3270 for interactive crt/printer work. Local computing power, host offloading capability, and networking features of the Series 3200 can be integrated into a BSC network. PERKIN-ELMER CORP., Oceanport, N.J.

FOR DATA CIRCLE 305 ON READER CARD

DISK SUBSYSTEM

The 3695 high-performance disk subsystem is compatible with IBM's 3375. The direct access storage device is designed specifically for use in the 4300 cpu marketplace. The unit includes the 3695 disk storage module, the 3697 disk storage and primary controller module, and the 3698 disk storage and alternate controller module. The subsystem is based on the 3690 introduced in 1982 and marketed outside the U.S.

The disk storage module contains one head disk assembly with a horizontal axis spindle. It provides 819.7MB of data storage, accessed by two independently addressable actuators. Each actuator can access half of the data storage space. The horizontal axis of the HDA allows a single motor to be used to drive both the spindle and the air-flow system, generating less heat and consuming less power than other arrangements.

The 3697 primary control unit contains all the interface, power sequencing, and control circuits necessary to attach the subsystem to a 3888 storage control unit or to an IBM 3880 controller. The 3697 also contains an HDA that provides storage space equal to that of the 3695. The 3698 alternate control unit is a mirror image of the 3697, providing an alternate path to stored data. The units offer a data transfer rate of 1.86MB per second and an average access time of 19msecs.

Users can configure a 3697 and 3698 in a short string with an optional dual path feature to permit maximum access to stored data. The 3695 modules can also be attached to, and run alongside, 3375 subsystem strings. List prices for the 3695 are $28,770 for purchase and $808 per month for lease; the 3697 is tagged at $38,040 for purchase and $1,003 per month for lease; and the 3698 costs $36,290 to buy or $958 per month to lease. MEMOREX CORP., Santa Clara, Calif.

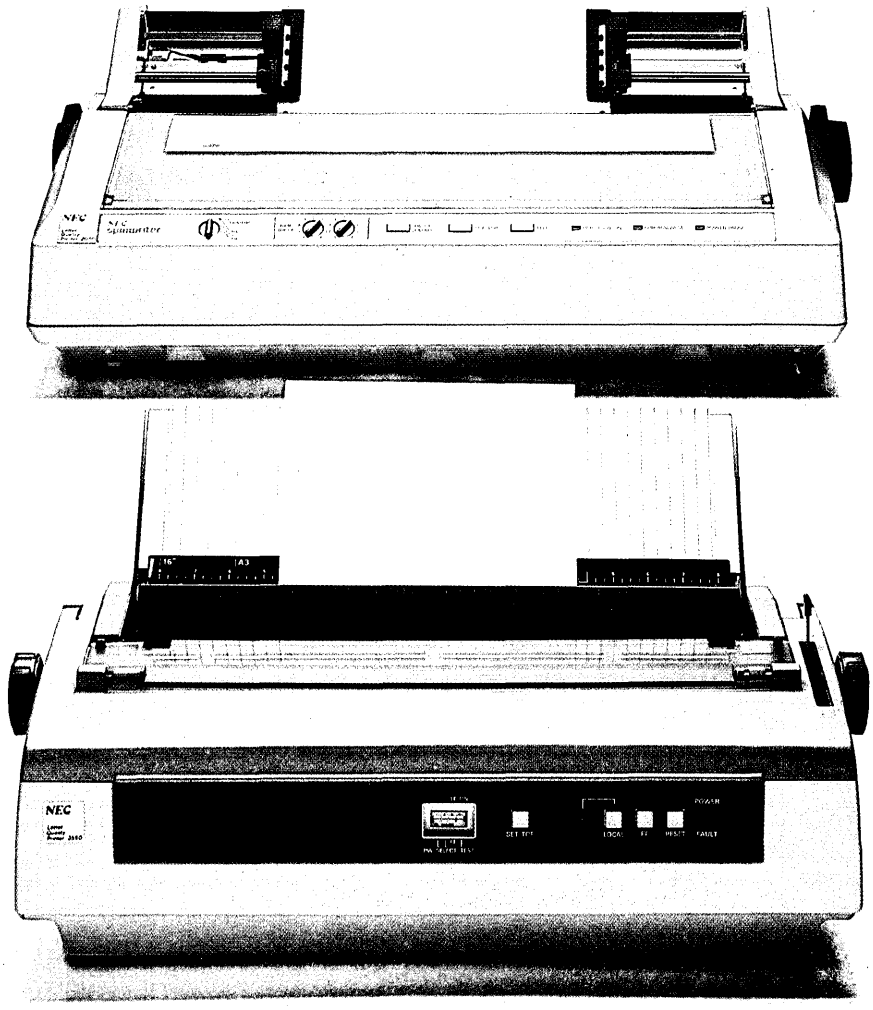
FOR DATA CIRCLE 306 ON READER CARD

PORTABLE PRINTER

The TTX 1280 Portaprint is an 80- or 132-column, 3½-pound, battery-powered thermal matrix printer. In battery mode, the

SPINWRITER INTR

Now you have a choice of fully compatible Spinwriters for your IBM PC and XT.



NEC MODELS OFFER SPEEDS OF 200 AND 350 WORDS PER MINUTE.

First, a few words about the original, the Spinwriter 3550.

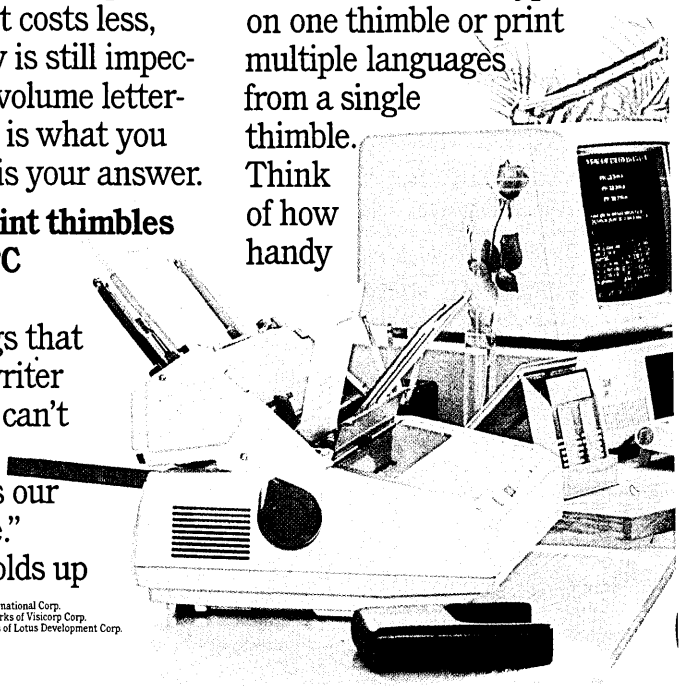
It was the first and only totally compatible letter-quality printer for the IBM PC. It plugs directly into the IBM PC and works with every piece of IBM PC software, as well as all popular third-party application packages, such as WORDSTAR,™ WORDPLUS,™ VOLKSWRITER,™ VISIWORD,™ MULTIMATE,™ BPS GRAPHICS,™ LOTUS™ 1-2-3,™ and VISICALC.™

It even looks like it was made for the IBM. Now, as good as the Spinwriter 3550 is, we recognize that a single printer can't take care of every business or professional office need. So we've added another IBM PC compatible Spinwriter: The 2050.

The new 2050 has a printing speed of 200 words per minute. And while it costs less, the print quality is still impeccable. So if low-volume letter-quality printing is what you need, the 2050 is your answer.

60 different print thimbles let your IBM PC look its best.

One of the things that gives our Spinwriter capabilities you can't even get on other printers is our unique "thimble." Each thimble holds up to 128 characters. You can even have two different type faces on one thimble or print multiple languages from a single thimble. Think of how handy



ODUCES A SPINOFF.

that would be if your business is international.

On the other hand if you have special printing needs, you can opt for a full alphabet plus numbers, sub- and superscripting and scientific and arithmetic symbols.

Incidentally, for all their versatility, our inexpensive

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SPINWRITER OFFERS OVER 60 DIFFERENT TYPE FACES.

thimbles last for over 30 million impressions.

So it won't end up costing you a fortune to look like a million.

No matter what form your business takes, Spinwriter can handle it.

A Spinwriter can actually help you put your communications in better shape. It can use any of our nine interchangeable forms handling options. And they can all be easily installed and changed by the operator.

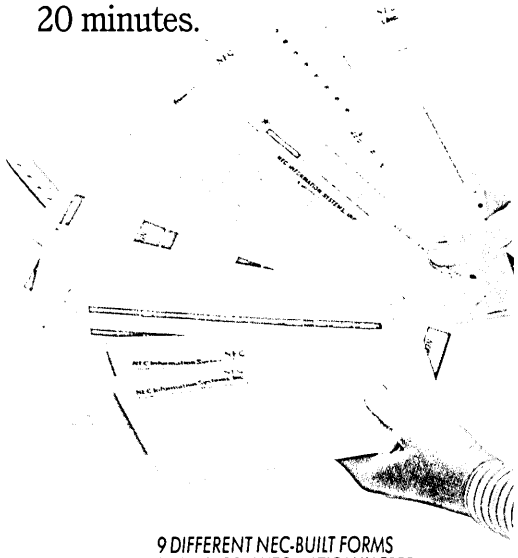
Want to dash off a few hundred original letters to your customers? Our sheet-feeder is just the ticket. It will print on your letterhead and second sheet or envelope.

Standard features include continuous forms handlers that take paper up to 16 inches wide, variable size forms, and multi-part forms.

Spinwriters have a hard-earned reputation for reliability.

Spinwriters hold the industry record for mean-time-between-failure. Over 3,000 hours. Which, in terms of average personal computer usage, adds up to more than two trouble-free years.

One reason for Spinwriters' staying power is the fact that we manufacture every major component. It also helps explain why NEC Information Systems is the number one supplier of letter-quality printers to PC users in America. Of course, someday you may need a little service. If you do, it's nearby. We have a large group of NEC-trained professionals all around the country. It's also quick. Because of our modular design, normal repairs take less than 20 minutes.



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You'll find Spinwriters at participating ComputerLand stores, Sears Business Systems Centers, IBM Product Centers nationwide, Entré Computer Centers and authorized NEC Spinwriter distributors. Or call 800-343-4418 for more information. And find out why more and more IBM PC users are saying, "NEC and me."

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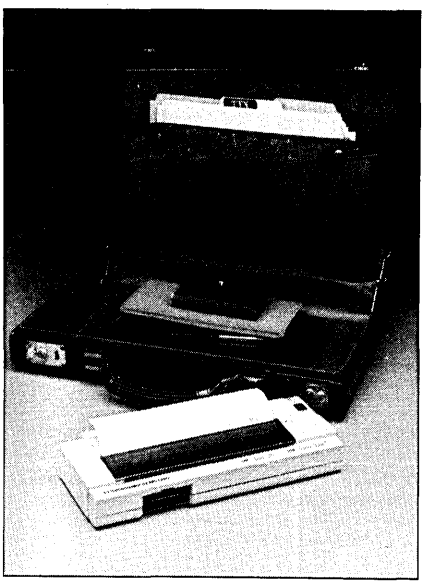
CIRCLE 91 ON READER CARD



bidirectional printer can produce 40 characters per second; powered conventionally through any AC outlet, the Portaprint can print 80 cps.

Portaprint's 5 × 7 matrix printhead can produce a variety of character sizes and densities, as well as specialized letter, line, and dot-by-dot placements. For example, Portaprint graphics printing can produce charts and graphs with 72 dots per inch resolution. Condensed printing, which enables users to fit 132 columns on standard 8½-inch width paper, is also provided. The unit is capable of bold or shadow printing and oversized printing to a variety of heights and widths.

The TTX 1280 Portaprint uses four rechargeable or replaceable 6-volt batteries that provide between 4,000 and 5,000 lines of print on a single charge. It is compatible with the HP-IL, RS232, and Centronics parallel interfaces. Volume shipments of Portaprint units, which cost $200 in single quantities, are slated to begin in the second quarter. TELETEX COMMUNICATION CORP., Foster City, Calif.

FOR DATA CIRCLE 308 ON READER CARD

TEST AND MEASUREMENT

The Midas 7000 workstation combines a logic analysis system with the tools offered by the company's Idea 1000 computer aided engineering system. The product supports the digital hardware design cycle from schematic entry to verification and test of the final product.

The logic analysis system provides up to 80 channels of state acquisition at speeds up to 10MHz and 16 channels of timing acquisition at speeds up to 100MHz. The workstation's 32-bit cpu performs postacquisition data processing.

The Midas 7000's architecture will accommodate digital test instrumentation in addition to state and timing analysis. All instrumentation setups, data acquisitions, and data transfers to the workstation's main memory are controlled through the same user interface that operates the other design tools in the Idea 1000 system.

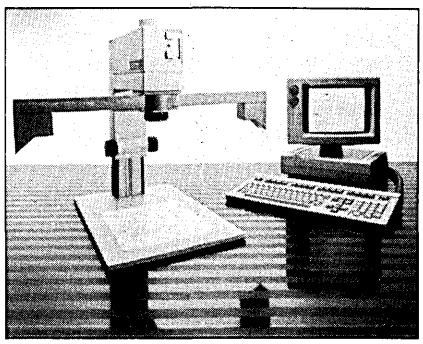
A series of data acquisition and clock probes connect the unit to the hardware under test. Once real-time data acquisition is complete, the results can be automatically transferred to the workstation's main memory for postacquisition processing or storage on any disk drive throughout the network.

Postacquisition processing can take advantage of the vendor's system commands, command macro files, or user-written programs. By invoking system commands, the user can automatically compare previously simulated data files with actual logic analyzer files, and have all discrepancies output to the crt, disk, or printer. The unit costs $14,900. MENTOR GRAPHICS CORP., Portland, Ore.

FOR DATA CIRCLE 316 ON READER CARD

IMAGE COMPUTER

Based on this vendor's Professional microcomputer, the Professional Image Computer (PIC) includes a desktop camera-like scanner to digitize images from a sheet of paper, a high-resolution monitor capable of displaying the image, and a desktop thermal printer to print the image. PIC image processing software permits users to scan, digitize, create, display, alter, merge with text, store, retrieve, and transmit images. The PIC can handle image information that includes pictures, handwritten notes, margin notations on correspondence, drawings, and typed text. With the PIC, users can process images, words, and data, and transmit that information locally or remotely within



this vendor's family of office products.

The PIC is fully integrated with the VS/IIS, VS/Alliance, OIS, and Alliance product lines, as well as with the Professional Computer. When combined with any of the larger systems, the PIC workstation can handle multiple forms of information using the Office file management software package. It allows the user to index, file, and retrieve any integrated information or single information type across a network of systems.

The PIC is composed of a Professional Computer with a 512KB memory expansion card and an image monitor and controller. The image scanner digitizes at 200 dots per inch (1,728 × 2,200 pixels across the screen), providing resolution equivalent to that of Group III facsimile systems. The scanner includes its own lighting system. The system can manipulate images only as visual items; it cannot interpret text or numbers and process their contents. The basic imaging system costs $15,000 plus microcomputer. WANG LABORATORIES INC., Lowell, Mass.

FOR DATA CIRCLE 309 ON READER CARD

TIMING ANALYZER

The model 220 interactive timing analyzer (ITA) is designed to pinpoint faults in hardware during design of microprocessor- and microcomputer-based systems. Together with the model 2100 interactive state analyzer, it provides an instrument set that covers the scope of performance requirements during hardware and software integration.

The vendor's instrument architecture is designed to take advantage of the control and processing capabilities of personal computers. Under the control of the IBM Personal Computer, the 2200 provides data acquisition, analysis, and control capabilities. It has 16 input channels with a maximum 100MHz sample rate that uses transitional timing mode.

The data capture is complemented by the 1-megohm, 5-picofarad probes, and 5-nanosecond glitch detection capability. The software accompanying the 2200 establishes a menu-driven user interface for simplified operation of the instrument's setups and controls. Timing waveforms can be displayed on the IBM P.C.'s bit-mapped display monitor, and waveform manipulation is performed on the P.C. keyboard. In addition, the combination of the ITA and the computer permits postacquisition analysis of the required data.

Nine trigger modes are provided, including triggering setup time violations and hold-time violations, recognizing and triggering on either the beginning or the end of a pattern, and triggering based on pattern or pulse duration at 10nsecs resolution. The 2200 is implemented on two plug-in cards that attach to slots inside the vendor's uAnalyst 2000 frame. The two-card set, with probes, costs $3,000. NORTHWEST INSTRUMENT SYSTEMS, Beaverton, Ore.

FOR DATA CIRCLE 312 ON READER CARD

FAULT TOLERANT

The NonStop TXP 32-bit multiple processor computer system provides users with twice the performance of the NonStop II system with which it is compatible. The TXP uses a mix of 64, 32, and dual 16-bit features in a transaction processing environment. With its 32-bit native addressing mode, each cpu can address 1GB of virtual memory per processor. The architecture also supports physical addressing of 16MB of core per proces-

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[illegible] the most of the new FCC direct connect ruling with unique cost-saving [illegible] from GDC. You can lease our GSU-500A for half [illegible] or purchase with payback in 12 months. GDC offers more features than anyone else, *and* the big plus of network management.

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CIRCLE 92 ON READER CARD

general datacomm

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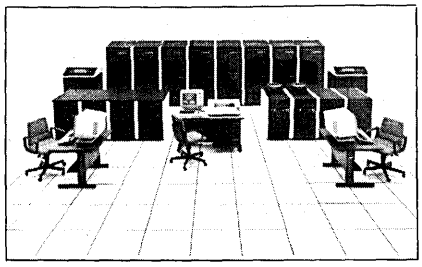
Danbury, CT 06810
(203) 797-0711

sor. In addition, each cpu accesses 64 bits at a time from main memory, and manipulates 32 bits simultaneously via dual data paths and dual arithmetic logic units.

Each processor in the TXP system has a 64KB cache memory to reduce the average memory access time and cut the number of times the cpu must access main memory. High-speed 16K static RAMs, combined with programmable array logic and streamlined data paths, also enhance performance by reducing the cpu cycle time to 83.3nsecs.



The TXP is expandable from a single system of two to 16 processors to a local complex of up to 224 processors connected via fiber optic links. It can be expanded further to a worldwide system of 4,080 processors without reprogramming applications. The systems are fault tolerant and provide networking, a relational database manager distributed across the system, satellite and fiber optic communication links, and gateways to other networks, including SNA and X.25.

U.S. pricing for the TXP is $328,550, which includes two cpus, each with 2MB of core, two 128MB disk drives and controllers, a 45ips tape drive, four I/O power supplies, an operation and service processor, and software. TANDEM COMPUTERS INC., Cupertino, Calif.

FOR DATA CIRCLE 311 ON READER CARD

TERMINAL

The Freedom 200 video display terminal has a nonglare, 12-inch diagonal screen with full tilt and swivel. It offers eight foreign character sets, a DIN standard low profile keyboard, 7 × 9 character cells in a 9 × 12 matrix, a 24 × 80 display with a user-accessible 25th status line, and 106 keys clustered in several functional groups.

A range of user-programmable features includes a soft setup mode and 10 programmable function keys. Nonvolatile memory allows the user to store these functions after the power is turned off. Other features include nonembedded character attributes for both visual display and data entry, double-high/double-wide characters, programmable handshaking protocol, 86 extended graphics characters, a bidirectional buffered auxiliary port with expandable buffers, programmable answer-back, smooth scrolling, programmable screen time out, split-screen capability with definable scrolling regions, one page of display memory in native mode with a second page optional, and two pages of display memory in emulation mode with additional pages optional.

The unit has an accessible rear panel in the base of the pedestal to allow for replacement or addition of boards without dismantling the product. The Freedom 200 emulates both the TeleVideo 950 and the Lear Siegler ADM-31 and is compatible with the vendor's previous Freedom 100. (The 200 is not available as a field upgrade to the 100.) Single unit price for the 200 is $745; the tag is $75 apiece less in quantities of 25 or more. LIBERTY ELECTRONICS, San Francisco, Calif.

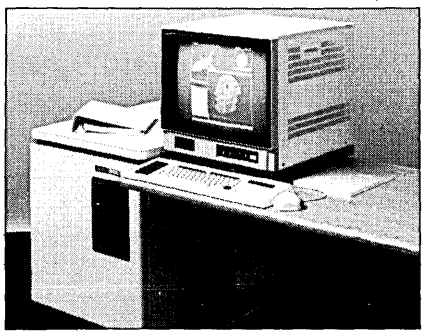
FOR DATA CIRCLE 313 ON READER CARD

GRAPHICS PROCESSORS

The DN460 and DN660 computational nodes offer about twice the performance of this vendor's current DN420 and DN600 systems. They are designed for computation-intensive applications programs such as structural analysis, printed circuit layout, integrated circuit simulation, and solids modeling.

The units include an integrated hardware floating point processor to handle single and double precision calculations, a three-stage bit slice pipelined processor with separate data and instruction caches, 32-bit memory data transfers, and virtual address space expanded up to 256MB per process.

The workstations are housed in cabinets with a 10-slot chassis, a power supply, peripheral expansion capabilities to



accommodate integrated disk drives, and an optional 5-slot Multibus card cage. Both nodes are available with color or monochrome displays and a low profile keyboard. A mouse or touchpad cursor locating device is optional.

The DN460 monochrome display provides a 1,024 × 800 pixel resolution, bit mapped raster scan graphics with a dedicated 128KB core, and three RS232 ports. The color DN660 display has a 1,024 × 1,024 resolution with up to 2MB of core and the three serial ports. A multimode printer, communications cards, and other devices can be attached through the Multibus cage. A standard local network interface allows nodes to run on the same network as other workstations made by the vendor. The DN460 costs $40,000, and the DN660 costs $60,000. APOLLO COMPUTER INC., Chelmsford, Mass.

FOR DATA CIRCLE 314 ON READER CARD

DISKETTE DUPLICATOR

This desktop diskette duplicator is specifically aimed at businesses that have embraced personal computers as a productivity tool. Called the Series Two diskette duplicator, the system can produce fully verified copies on blank diskettes at the rate of 120 per hour. The rate is about 10 times the speed possible by manual duplication on a personal computer, the vendor says, and consumes no PC cpu resources. It is tagged at $12,700.

The self-contained unit includes three disk drives, one for the source disk and two for duplicating. The source disk remains in place until the desired number of copies are produced on the two copy drives. Signal lights chart the process from source to completed copies. The unit can copy floppy disks in many popular formats, including IBM, Apple, Commodore, TRS-80, and DEC Rainbow. It will be available next month. FORMASTER CORP., San Jose, Calif.

FOR DATA CIRCLE 315 ON READER CARD

DATABASE MACHINE

The Textarcana Data Base Engine (TBDE) is designed to serve very large databases using high-speed disk systems. It will search indexed files, structured files, or full text. The search and query resolution logic is performed by the hardware, so that the product is not slowed by the complexity of the logical query or the report generation. It is designed to run at disk transfer speeds and has been tested in excess of 3.5 million characters per second, the vendor says.

The product is designed to resolve multiple complex queries in a single pass. Logical powers include searching up to 128 characters in a single word or any combination of words, strings, or characters. More than one machine can be coupled together to allow any number of strings or words. Moreover, a single TDBE unit can search four sets of four strings per set. Each set may be called for within a single word, sentence, paragraph, document, title, or chapter, using partial Boolean logic.

The product searches structured files, compressed code, ASCII, and EBCDIC, is not limited to English or any other language. By setting switches it may select all 256 symbols and characters, or it may be programmed to accept search words in ASCII and ignore case.

The TDBE is currently controlled by an IBM Personal Computer, although other comparable micros can be used. TEXTARCANA INC., Boulder, Colo.

FOR DATA CIRCLE 310 ON READER CARD

—Michael Tyler

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CIRCLE 94 ON READER CARD

SOFTWARE AND SERVICES

UPDATES

Last year it seemed as if you couldn't turn your head without seeing yet another vendor unveil a new microcomputer. That frenetic pace has thankfully slowed somewhat, but in its place has come the next wave: the "micro to mainframe link." But as with the micros of a year ago, not all micro-mainframe links are the same -- nor is there even agreement on what exactly constitutes such a link. Even when hardware considerations are put aside -- such as how a mainframe can be physically connected to a micro -- the functional differences in software for micro-mainframe links are vast. The simplest such links are packages that let a PC -- usually the IBM Personal Computer -- emulate a dumb terminal of some sort. The PC77/78 and PC72/73 packages from Cambridge Computer, Mt. Carmel, Conn., are a case in point, emulating four Honeywell terminals. The P.C. still retains its original capabilities when the package is not in use, of course. Similarly, the ATE-Plus program from Path Management Systems, Appleton, Wis., allows the NCR Decision Mate V micro to emulate any NCR I-series mainframe terminal, and no more. Somewhat more powerful are packages like the Intext II from Interactive Systems Corp. in Santa Monica, Calif., which allows the IBM P.C. to emulate intelligent Unix terminals.

Still more sophisticated are packages that provide some sort of file transfer capability between the micro and the host. Cambridge Computer offers one such package as an adjunct to its PC77/78 and PC72/73 products. The MasterLink, from Performance Software in Midlothian, Va., provides a file transfer capability for IBM P.C.s linked to Sperry or IBM mainframes. These products will sign onto the host as a terminal, select data from the host database, and then convert them into a form suitable for processing by the micro. MasterLink, for example, takes host data and turns them into a 1-2-3 or VisiCalc file. And Micropulse, from ESI in Tallahassee, Fla., allows a user to extract data from a Burroughs mainframe, store them in the Burroughs ET 2000 micro, and then summarize and reformat them for use by software packages supported by the ET 2000's MS/DOS operating system. When the user is finished, these products then upload the data and convert them back to their original form.

Yet another tack taken recently is the production of micro versions of successful mainframe software packages. Micro Focus of Palo Alto, Calif., for example, has converted its Level II COBOL product for use on the IBM 3270 P.C. On the applications side, MCBA of Montrose, Calif., is now offering 16 of its minicomputer products for use on the Altos 586 and Zilog Systems 8000 supermicros. Finally, Computer Solutions of Burlington, Mass., has converted its FM/3000 line of products for the Hewlett-Packard 3000 minicomputer so that they will run on the HP 150 personal computer. Products such as these often promise a micro-mainframe link, but caveat emptor: what they deliver more often are micro and mainframe versions of the same software that provides user interfaces that are nearly identical but cannot talk to each other without outside intervention. MCBA's micro products, for example, don't interface to their mini equivalents, because the firm believes that different users will be interested in each and won't need to talk to each other. By contrast, the PC versions of the Model 204 and Oracle DBMS products interface more completely with their mainframe brothers.

INTEGRATION

Jack2 is capable of performing multiple application tasks simultaneously without using windows or separate screens. Users can create documents with active spreadsheets or graphs without needing to switch disks, screens, or modes. Moreover, if a spreadsheet item is updated, any related data in either a graph or a word processing document will also be updated automatically. Users can print exactly what appears on the screen at any time.

Jack2, a successor to the Incredible Jack introduced a year ago, employs icon-driven commands in a hierarchical system. To create a database, for example, a user points with the cursor to one of the disk icons on the screen. A series of up to 50 "envelopes," or rectangles, representing files on the disk, then appear on the screen. The user points to an envelope, and its contents are displayed. The system displays the first record of up to 2,300 in the file. The user can then design the database format to be used, identifying visually the locations where data are to appear and how large the fields should be.

The word processing capability can handle multiple columns of text on the same page, with a maximum page width of 25½ inches. The crt acts as a scrollable window to wide pages. A scratch pad ability allows users to handle confidential or scratch work on the screen and then delete it when the document is printed on hardcopy. The spreadsheet capability uses names to title rows and columns, rather than cell numbers, and can format data in the cells automatically. Spreadsheets can accommodate up to 1,000 rows and columns; fields within a spreadsheet can be masked to accept only certain kinds of data. The $500 package also includes charting, graphing, and sorting capabilities. BUSINESS SOLUTIONS INC., Kings Park, N.Y.

FOR DATA CIRCLE 326 ON READER CARD

VSAM TOOL

VSAMAID/XP is designed to eliminate many inefficiencies of VSAM and to automate the

tuning of VSAM files. The product collects its own statistical file information, which is placed in a history file and then analyzed. The system makes recommendations that can be implemented by using a VSAM backup and restore utility. The product uses direct access to historical performance data for each file to create projections; several mathematical algorithms enable multiple variables to be considered simultaneously. VSAMAID/XP also provides a simple modeling facility to help determine optimum virtual storage allocation.

A dataset recommendations processor analyzes historical data and produces the recommendations for redefining each VSAM file. Specific goals for each recommendation are the reduction of DASD space and I/O operations. A device capacity processor provides a current and cumulative look at historical data to help users find the best control interval size to conserve DASD space. An option allows device capacity calculations to be performed as they would appear on a different operating system, a capability geared at installations currently running DOX/VSE but converting to MVS or those currently running MVS but supporting remote locations using DOS/VSE.

A history files trends processor provides a method of monitoring VSAM file trends. Long- and short-term trends can be identified and analyzed to help the user clarify the recommendations made by VSAMAID/XP. The price for OS/VS users is $5,040 for a permanent license, or $126 per month for a three-year lease; the price for DOS/VSE users is $3,080 for a permanent license, or $77 per month for a three-year lease. GOAL SYSTEMS INTERNATIONAL INC., Columbus, Ohio.

FOR DATA CIRCLE 327 ON READER CARD.

MULTIPLE MAPICS

The Multiple MAPICS Environment System (MUMES) is a utility package designed to convert an IBM System/38 single-user MAPICS environment to a multi-user environment. MUMES creates a multiple-thread MAPICS environment, which allows up to 35 different database entries with differing modifications or specifications to be maintained and run concurrently from one cpu. It also allows a single-thread MAPICS environment to keep System/38 workstation users on-line while running test, education, or demonstration systems.

Installation of entities or applications and security maintenance are menu-driven in MUMES. The user is guided through both processes by the system itself, without needing written or memorized commands and guidelines. The system has a MUMES program message queue displayed at the bottom of the user's screen that will discourage most human error, the vendor says. Moreover, the system creates independent job queues for each entity installed in MUMES. (In MAPICS, only one job queue exists for several entities' processing needs.)

The MUMES package allows MAPICS users to work in an interactive mode with any installed MAPICS applications, including this vendor's purchasing, production, and warehouse packages. MARCAM DATA SYSTEMS CORP., Needham, Mass.

FOR DATA CIRCLE 328 ON READER CARD

ACCOUNTING

The Professional Accountant Software System (PASS) consists of three packages designed for professional accountants. The PASS Volume One Write-Up System consists of a general ledger with a report generator. The volume also includes after-the-fact payroll reporting with data maintained for each quarter, an electronic spreadsheet for financial analysis, and an asset management system. The system can maintain a three-year history of record for each client as well as calculate budget and comparative reports.

The PASS Volume Two Time and Charges System provides billing and reporting procedures. The program can calculate up to ten billing rates for various employees and offers a high-volume transaction entry program. Other features include work scheduling and time analysis.

The third program is the TAX II 1040 Tax Preparation and Planning System. It enables users to calculate and print several types of client tax returns. Several federal schedules and forms for tax calculation are available with the program, as well as fixed asset subsystems and automatic sales tax deduction options. State income tax modules and yearly renewal and updates are also available.

PASS can be expanded from a one-user micro to a multi-user system without user retraining. The vendor provides a direct support plan, including customer training, periodic software updates, manuals, and a toll-free telephone line. PASS Volumes One and Two cost $2,000 each, and TAX II costs $900 for the federal version and $500 for state modules. PLENARY SYSTEMS INC., Dallas, Texas.

FOR DATA CIRCLE 329 ON READER CARD

BUSINESS ANALYSIS

This business analysis and system development product family includes a set of technologies and software that covers the information system development cycle from business requirements analysis through program generation and maintenance. The product family is a collection of business analysis and program design tools whose basic premise is that the user's business needs to be analyzed more thoroughly even before a system is developed than during system development. The products, which run on IBM mainframes, were developed at Exxon Corp.

The programs, called Explore-It, Explain-It, and Expand-It, use models, including hierarchies, flow diagrams, and

SOFTWARE SPOTLIGHT

PC DBMS

PC/204 is a four-product software link between IBM Personal Computers and IBM mainframes. Based on the vendor's Model 204 database management system architecture, PC/204 is designed to give users transparent access to the mainframe database without connecting through a network and interacting with the mainframe operating system.

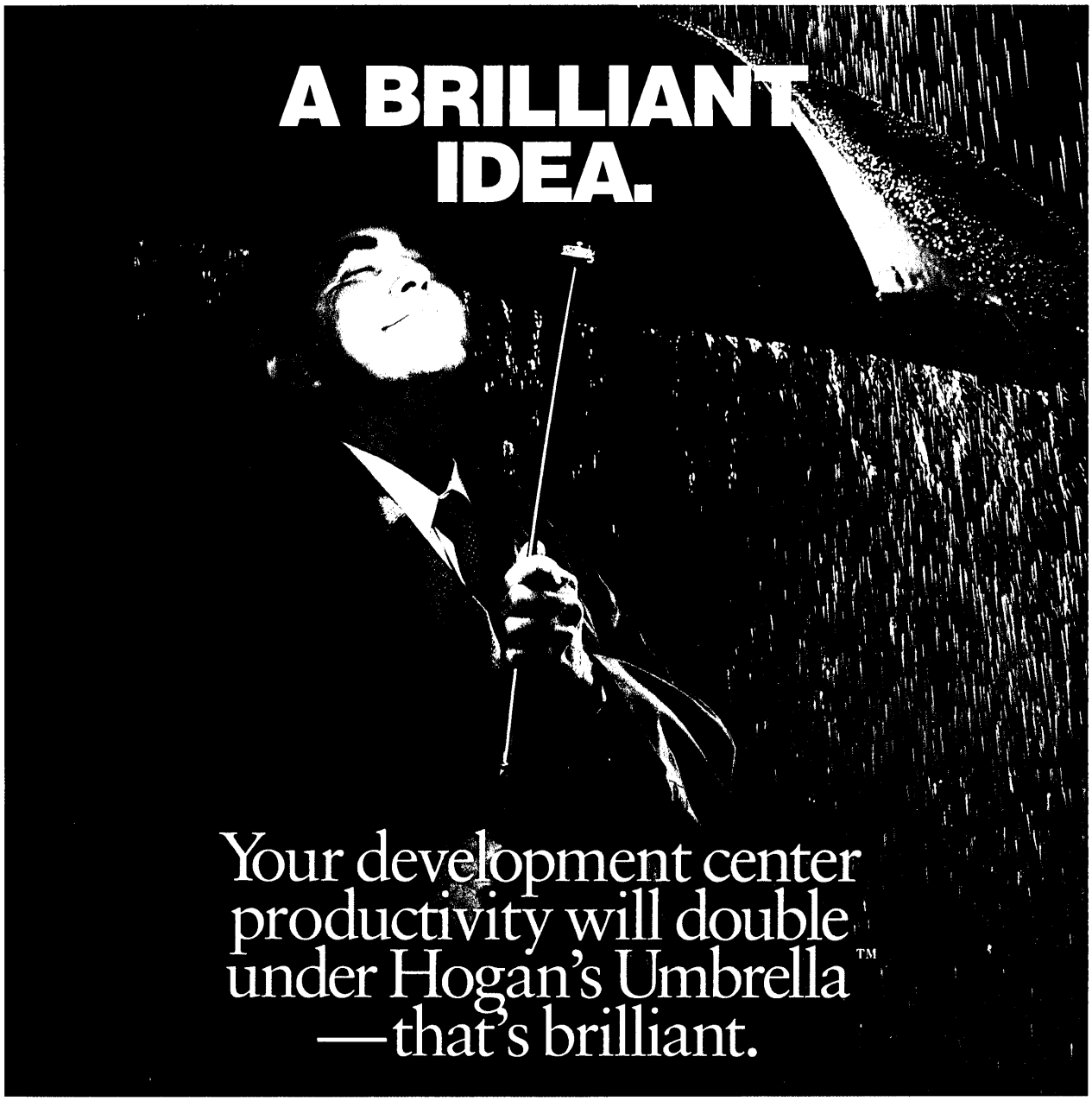
The first element of PC/204 is the communicator, which employs asynchronous block-mode communication between the P.C. and the mainframe using the CRC-16 protocol. The protocol performs automatic error detection and retransmission of damaged data blocks. The communicator presents the user with a menu of both P.C. and mainframe programs. If a P.C. program is selected, control passes directly to that program; if a mainframe program is selected, the communicator automatically connects with the mainframe database, logs the user in, and connects with the desired application.

The retriever element enables end users to scan mainframe data stored in Model 204 data files, select and extract desired information, and manipulate it on the Personal Computer. The retriever is designed to extract data specifically for spreadsheet applications; its double window screen layout allows users to select data on a menu in the top portion of the screen, while the retriever automatically builds a sample spreadsheet in the bottom portion. This is facilitated by a database administrator tool called a semantic network that both defines the relations between database objects and guides the user through the creation of the spreadsheet.

The distributor element permits applications written in Model 204 User Language to be executed partly on the mainframe and partly on the P.C., reducing overall demand on the mainframe and the communications load between the two systems.

The fourth element of the PC/204 package is the Lotus Development Corp. 1-2-3 software package, which comes as a $500 option. The mainframe portion of PC/204 costs $10,000. The package, consisting of the communicator, the retriever, and the distributor, costs $750 per Personal Computer; a minimum of 10 Personal Computer packages is required. COMPUTER CORP. OF AMERICA, Cambridge Mass.

FOR DATA CIRCLE 325 ON READER CARD



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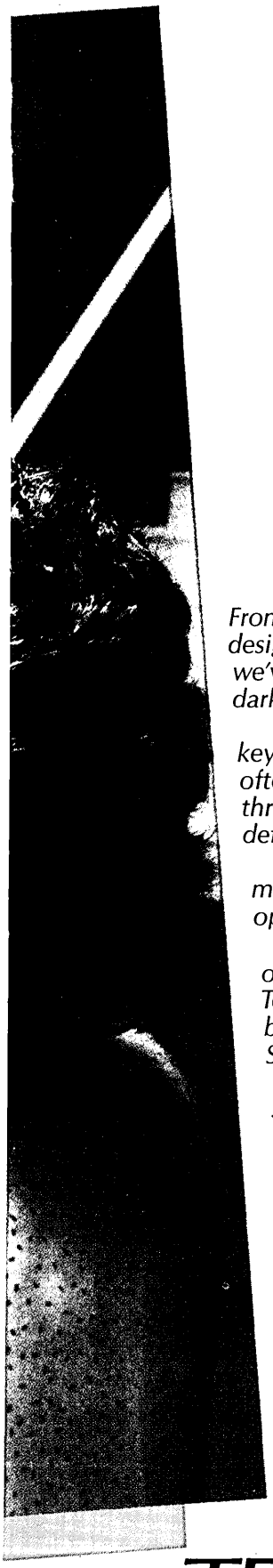

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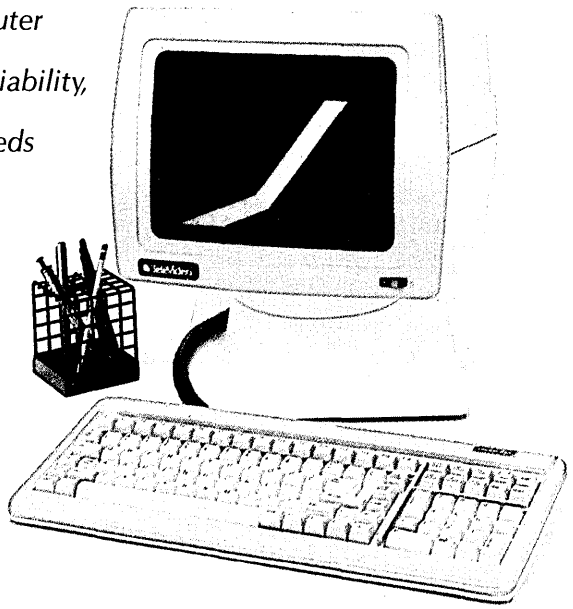

TELEVIDEO® TERMINALS

TeleVideo Systems, Inc.

CIRCLE 96 ON READER CARD

matrices, to define, document, and analyze an organization's data and functional requirements and to form an information base for both business and computer application solutions. The menu-driven product instructs the business analyst how to interview business management and operating personnel, how to organize information diagrammatically, and how to analyze the results. It uses consistent terminology and notation, and verifies each step of the analysis process with walk-through checkpoints.

All functions developed during a project are maintained on a private user database, which includes models developed during a specific project and supplementary information. The software allows the analyst to edit the diagrams graphically while analyzing existing models for improper information flows and bottlenecks, and for geographical business distribution. The programs also assist in analyzing the models for inconsistencies and invalid situations. The three packages come as a set for $120,000. Leasing arrangements are available as well. Each package includes training classes for up to 20 students. TECHNOLOGY INFORMATION PRODUCTS CORP., Burlington, Mass.

FOR DATA CIRCLE 330 ON READER CARD

COMPONENT DATABASE

The Tech-Doc engineering database provides design engineers with a source for a range of components and materials specification data. Tech-Doc contains information on 400,000 industrial products and is updated every 60 days. The system is built around the Micro-Index, a computer-based indexing program that allows access to the location of data stored in the database. The other component of the database is a microfiche library of source materials that includes product specifications, data sheets, applications notes, supplier catalogs, price lists, and handbook data.

The Micro-Index enables the engineer to access information in Tech-Doc either by supplier name or by product type. The information contained in Tech-Doc files is divided into 18 functional categories: electronic components, electrical components, computer, communications equipment, instruments/controls, motors/engines/turbines, compressors/blowers/fans, mechanical components, fasteners, fluid system components, metallic materials, nonmetallic materials, plastics/resins/elastomers/rubbers, adhesives/sealants, lubricants, surface treatments, chemicals, and services.

Subscribers to the Tech-Doc service can order the entire set of 18 files or can tailor the subscription to their specific needs. The Micro-Index to these files is supplied on either floppy or hard disks for use with several microcomputer operating systems. Some larger systems can also be used. The source library provided in microfiche is taken directly from supplier data without omissions or editing. INACOM INTERNATIONAL, Denver, Colo.

FOR DATA CIRCLE 331 ON READER CARD

AUTHORING SYSTEM

The Educator is a microcomputer authoring system that enables users to create training programs for micros using the target systems. That is, a programmer can use an Altos micro to create training programs for the same Altos machine. Other micros supported include Apple, Compaq, Convergent Technologies, Honeywell, Vector Graphic, and Wang; the product runs under the Xenix, MS/DOS, AppleDOS, or CP/M-86 operating systems using BASIC, Pascal, or C. The product allows users to develop packages that provide for the simulation of such activities as writing a letter, filling out a form, completing an invoice, or creating a file. The Educator allows for error tracking and feedback for incorrect responses. It provides a record of who has attempted training, the number of questions completed, and the percentage of correct answers. The number of attempts for questions can also be specified.

The Educator can access video tapes and enable them to be integrated into computer-based learning presentations. Full video editing capabilities are provided, along with video path branching. The Educator can also link to application and special purpose software that trainees will learn. The package allows a training program to use windowing. The authoring system can define the location and number of windows on a screen, with the number limited by the number of rows and columns on the screen. They can be presented to the trainee after any specific keystroke (e.g., the return key), or they can be displayed after a specified time delay. Windows can also be erased from the screen after a specified amount of time.

Within a window, the Educator allows the user to create box and line graphics, charts, special characters, and visuals using straight rectangular or square shapes. It also allows for the creation of text and graphics in colors supported by the hardware system. Angle, circle, and ellipse graphics can be created, and foreground and background colors may be specified. SPECTRUM TRAINING CORP., Salem, Mass.

FOR DATA CIRCLE 332 ON READER CARD

CONTROL LANGUAGE

The Orbix Control Language is an HP 3000 version of the IBM System/34 Operation Control Language (OCL) that is designed to simplify the task of converting IBM System/34 software to an HP format. Orbix's primary function is to permit software already written for the System/34 to run on the HP 3000 without modification or recompilation. It also provides the HP user with the full IBM OCL instruction set, in order to facilitate the transition between systems.

All of the OCL statements needed to set up and run a job are incorporated in a procedure that is interpreted and executed on the HP 3000. Orbix procedures can be structured as menu-driven applications, with all prompts, error messages, tests, and conditional branches written directly into the procedure. This ability is designed to make the operating control language steps transparent to the user, and can be used to link a series of applications together for presentation in the form of a menu.

The product is optimized for running repetitive kinds of jobs where a minimum user interface is desired, the vendor says. It is written in SPL and stored in HP Editor files. Orbix procedures are executed as MPE operating system commands by the HP 3000. A one-time license costs $4,500. DATAMASTER COMPUTER SERVICE, Eureka, Calif.

FOR DATA CIRCLE 333 ON READER CARD

PERSONAL MANAGEMENT

The Manager Program Collection combines time, project, and "card file" records management software for the IBM Personal Computer. The product includes the Task Manager, the Records Manager, and the Time Manager segments.

The Task Manager is an intelligent journal and calendar that identifies significant dates, categorizes activities, and organizes and tracks expenses. Tasks, schedules, and appointments are organized into 26 user-definable categories; five priority levels help rank each activity's importance. Key words, categories, or priority levels can be specified to help narrow searches for specific historical or future events. Incomplete activities from past days can be posted on the current day.

Project Manager organizes projects and available resources. It calculates critical path; prepares PERT, GANTT, schedule, task, or time charts; analyzes resource allocations; and determines slack time and alternative model approaches. Extended detail on each project is also available, with up to 62 subdivisions.

The Records Manager is a "card file" database. It can be used to maintain

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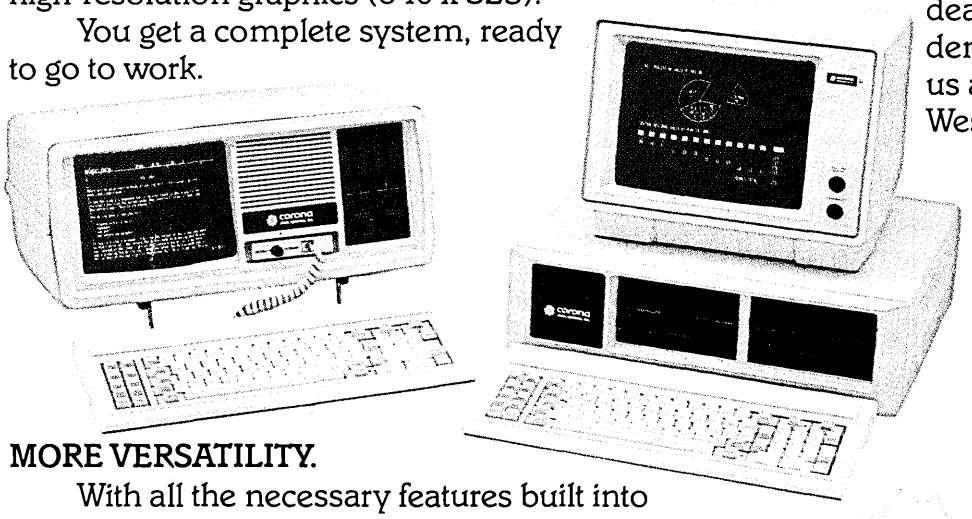

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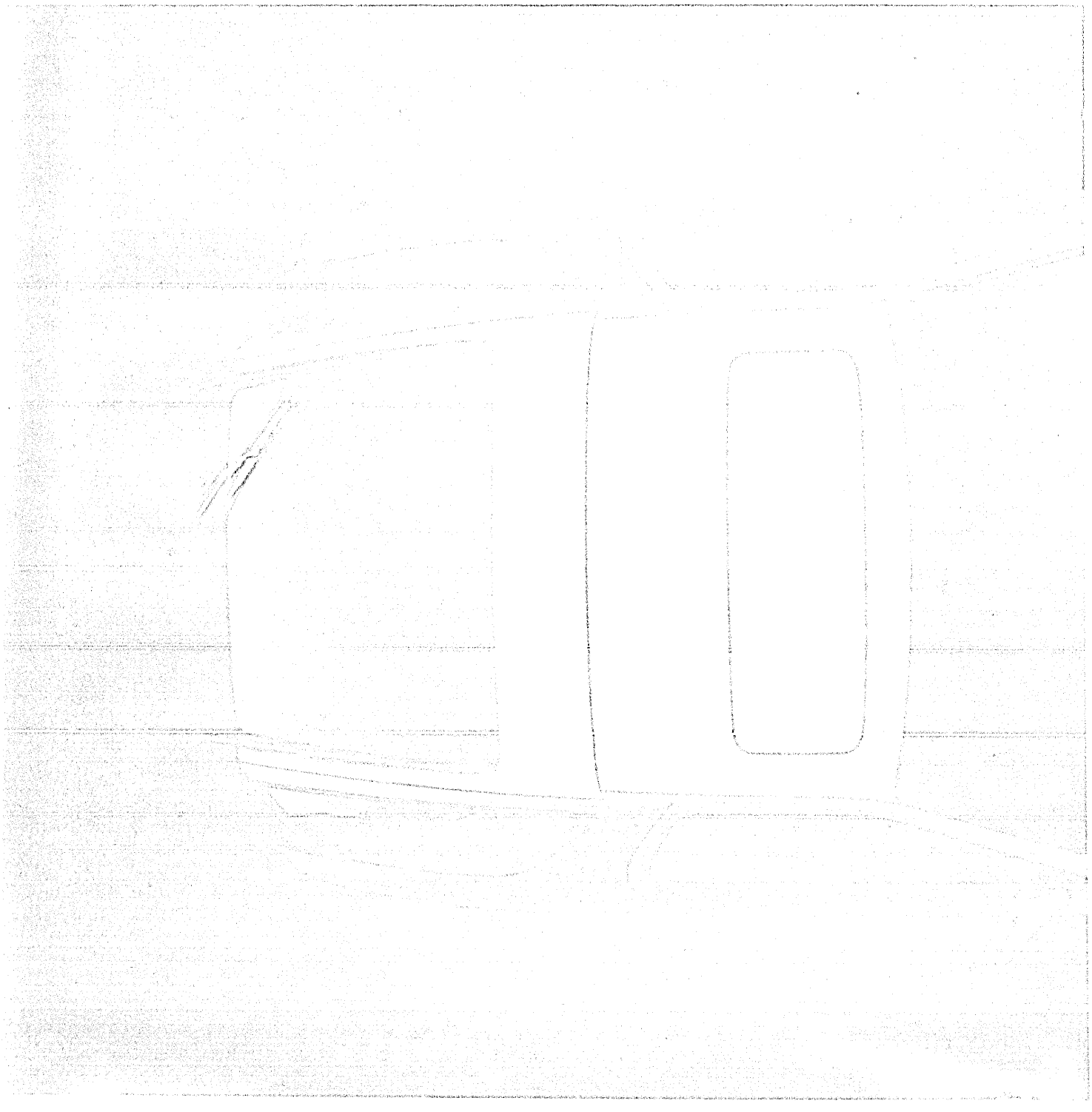
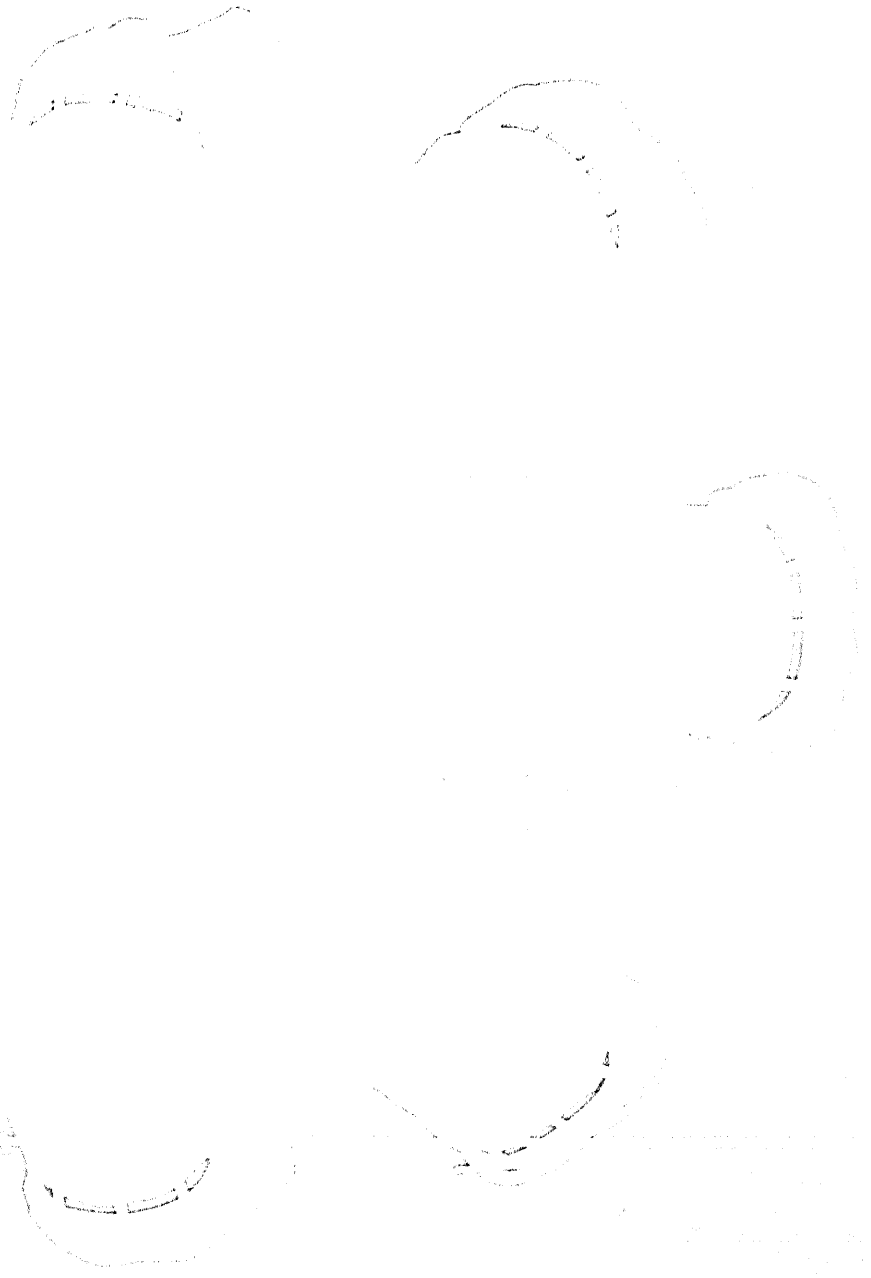
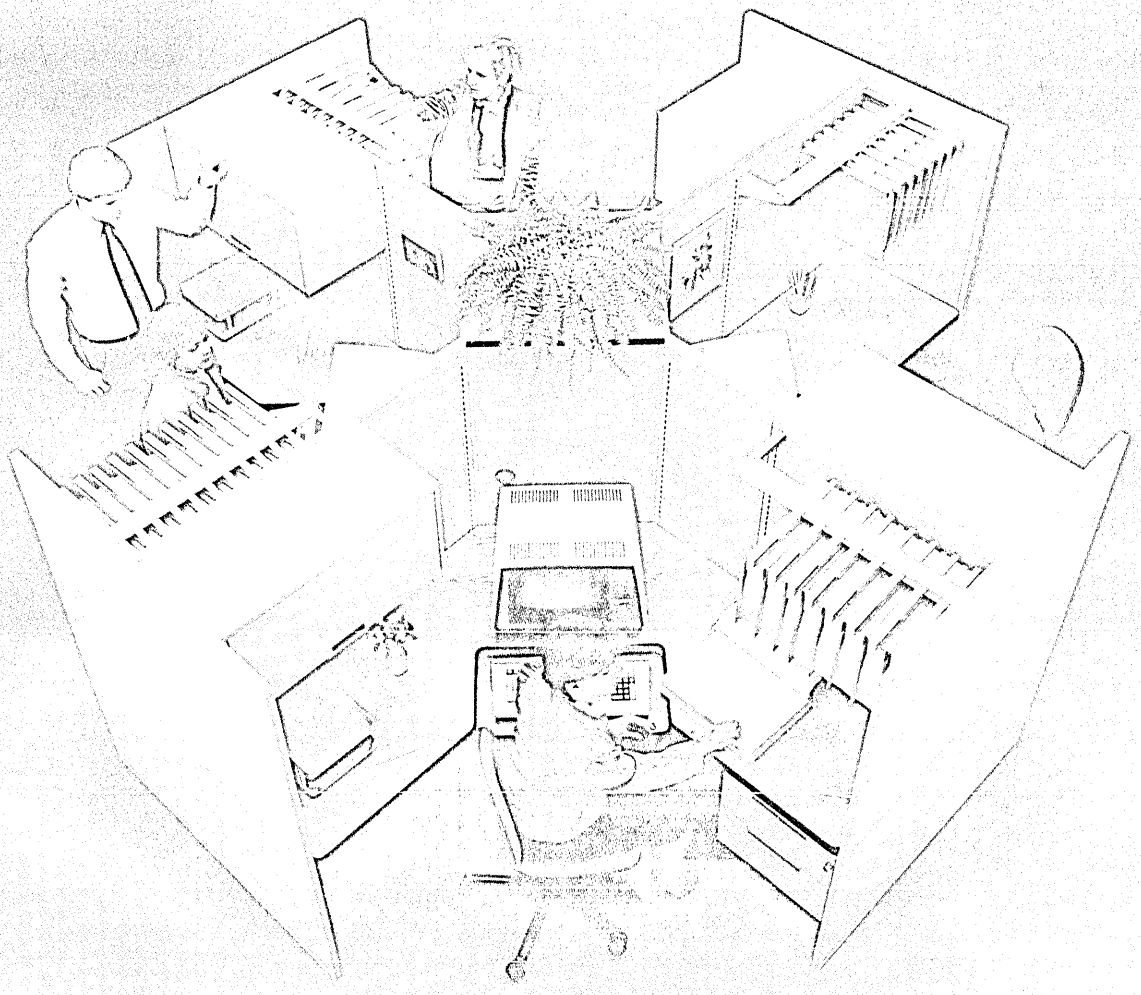




INTRODUCING TAB Humanetics™ Group

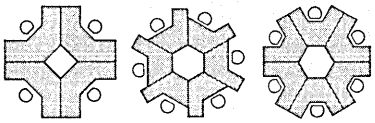
CLUSTERED WORKCENTERS



The ergonomic approach to maximizing electronic office space

This simple, space saving concept arranges panels and work-surfaces around a core, creating a central housing for all power cords and communications cables. Wires are kept organized and out of the way, yet readily accessible.

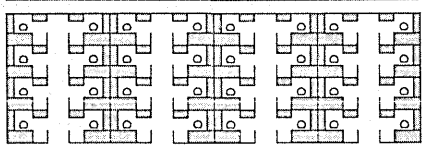
Typical four and six-station clusters.



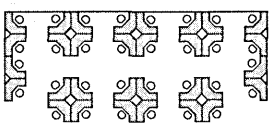
Select from a variety of Workcenters The modular design of TAB Clustered Workcenters allows easy set-up with a minimum of office disruption. They can be installed in groups of two, three, four or six stations. And you can select panel heights of 48, 62 or 68 inches.

Worker comfort is enhanced in many ways You have a choice of 30 fabric colors that make the panels both decorative and sound-absorbing. TAB's optional personalized airflow system keeps operators surrounded with fresh air while eliminating equipment heat. Both task and ambient lighting are also available to meet your needs.

The TAB Humanetics Approach Workers never have a closed-in, elbow-to-elbow feeling. Traffic patterns are more direct and office space opens up to create a pleasant environment. Compared to stand-alone workstations, TAB Humanetic Workcenters provide both cost savings and greater flexibility.



Old fashioned arrangement of 32 workstations (above) compared to same number in TAB Clustered Workcenters (below).



For more information, look in the Yellow Pages under "Data Processing Supplies" or write us at 1400 Page Mill Road, Palo Alto, CA 94304. In Canada, 550 McNicoll Ave., Willowdale, Ontario M2H 2E1.

TECHNOLOGY AND BUSINESS

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CIRCLE 99 ON READER CARD

client, associate, or personnel records, and can be modified to maintain inventory or other information. Data are organized in four levels against 26 categories, each with sorting and selection criteria individually defined. One level can track planned and actual start and end dates, status, and outcome. Another level can be used for related information, such as salary reviews, positions, classes, and grades.

Each program can share information with the others. Minimum system requirements are the IBM P.C., 192KB of RAM, and two disk drives. The product costs $500. DATAMENSION CORP., Northbrook, Ill.

FOR DATA CIRCLE 334 on READER CARD

TRADEMARK DATABASE

Trademarkscan, Thomson & Thomson's database of 600,000 registered and pending U.S. trademarks, is available on-line through this service. The database tracks active trademark registrations of the U.S. Patent and Trademark Office for all trademarks and pending applications. It is updated fortnightly. Users are able to make a trademark search themselves rather than have to request one from Thomson & Thomson or another search firm and then wait for a written report.

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The product is geared toward product managers who are considering names for new products and toward new businesses that are unfamiliar with the market. The Trademarkscan service requires no subscription fee or minimum usage; charges are based on connect time and the information retrieved. DIALOG INFORMATION SERVICES INC., Palo Alto, Calif.

FOR DATA CIRCLE 335 ON READER CARD

REPORT WRITER

The Concentric Information Processor (CIP) is a database/information management and report writing program for the IBM Personal Computer that employs visual techniques to allow users to interact with data. The CIP is designed to eliminate command languages, key combinations, parameters, switches, and user-defined screen positions.

For example, the product lets a user call up a record format, and then eliminate each field he does not want while moving the remaining fields around on the screen into any configuration. The program comes with a step-by-step tutorial, and context-sensitive help screens can be called to explain how to complete tasks.

The CIP implements a visual approach throughout the system. Objects are identified using a pointing technique that highlights the area of interest. Fields are interactively moved around the screen in a similar manner. When creating a file, the user can see the number of characters assigned to each field. When the field length looks appropriate for the data, the user then selects any of eight attributes to assign to that field. For instance, the user may want to make the field "unique" and so specify that the data in that field cannot be duplicated in another record. Calculated fields are also defined using pointing and selection. Both numerical and data calculations can be performed. Averages, counts, and totals may be included, along with five-line headers and footers. Field names can be split and moved independently of their data representations to format the report in column, multiline, or stock formats. The product costs $400. CONCENTRIC DATA SYSTEMS INC., Westboro, Mass.

FOR DATA CIRCLE 336 ON READER CARD

FINANCIAL DATABASE

The Executive Information Service is a financial database offering information for personal and corporate portfolio management, long-range planning, and merger/acquisition strategies. A ticker retrieval feature allows users to access information on 9,000 security issues, including current high, low, closing, volume, and net change. Background information such as synopses on 3,000 companies, pricing history, dividend history, pricing statistics, detailed issue examination, annual and quarterly financials, and estimates and projections on 1,700 companies, is provided.

The database also provides descriptive and financial data on some 3,000 companies, including earnings per share, quality rating, new product development and recent contracts, company product and long-term outlook, product/service breakdown, net income, and sales figures. The market performance of some 40,000 stocks, bonds, mutual funds, and government issues is tracked over 10 years of daily trading.

Market reports provide information on the market trends, including 20 most active stocks, 20 largest gains, 20 largest percent gains, price up last three to five days, new six-month high, low above yesterday's high, volume twice average, 20 largest dollar volume gains and losses, price down past three to five days, new six-month low, and 20 largest volume losses.

An issue examination feature provides Standard & Poor's and Moody's ratings, share outstanding, beta factor, latest bid, pricing and dividend activity, bond coupon rate, yield, maturity data, and open interest. Other information available on the database includes multiple price quotes, portfolio summaries, major market and industry indices, the National Business Wire, money market services, and the Associated Press Wire. Daytime connection rates for the service are $12 per hour for 2,300 baud modems and $15 per hour for 1,200 baud modems. COMPUSERVE, Columbus, Ohio.

FOR DATA CIRCLE 337 ON READER CARD

FINANCE TEMPLATES

Bottomline-V is a financial decision support system composed of several spreadsheet templates. The product works in conjunction with the 1-2-3, Multiplan, SuperCalc, and VisiCalc spreadsheet programs.

The user begins developing a decision support system by completing a 12-month budget. This is followed by entering sales forecasts, cost of goods sold, operating expenses, average collection period, days of inventory carried, debt funding, equity funding, capital expenditures, and research and development budgets. The product then simulates the calculation of simultaneous equations through an iterative technique that performs 9,000 calculations in about five minutes. Five-year pro forma income statements, balance sheets, sources and uses of working capital, and a complete financial ratio analysis are available once the calculations are completed. They may be printed or stored for further use.

The system may also be used to monitor results of operations on a periodic basis, comparing actual to budget and evaluating results compared to various financial ratios. It will provide data on investment utilization, company value, profitability, cash flow, budget requirements, and other strategy planning functions as well. The product costs $300. STRATEGIC SOFTWARE SYSTEMS, INC., Newport Beach, Calif.

FOR DATA CIRCLE 338 ON READER CARD

ADMINISTRATIVE TOOLS

Domain Professional Support Services (DPSS) is a user-oriented package of integrated administrative tools designed to solve mundane information processing problems that crop up while users are engaged in scientific or engineering computing on the vendor's hardware. The package consists of a document editor, an electronic mail facility, a document storage and retrieval program, a spreadsheet, and a personal calendar for schedule management.

The programs all use a mouse for cursor positioning. Each program is accessed by pointing the mouse at an icon, which opens up a window for the tool. Each window is arranged so that status information is at the top, menu selections are on the

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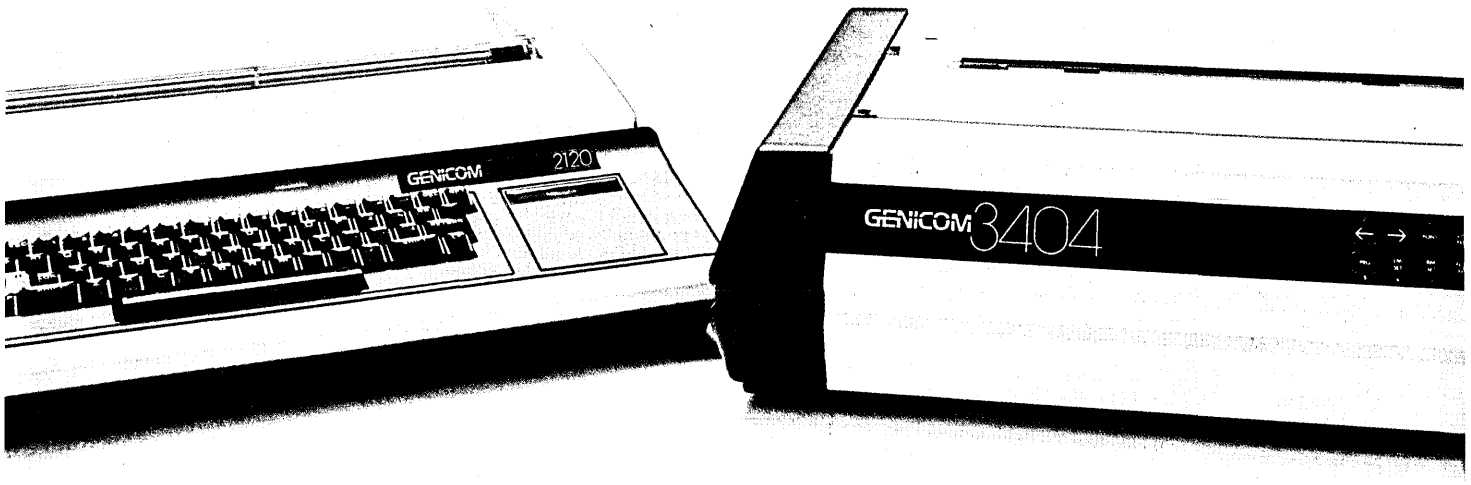

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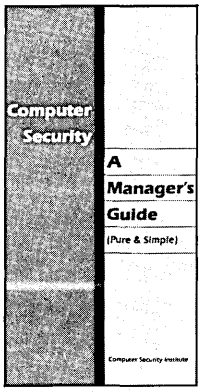

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right directly below a help icon, and the working area is in the middle. The five applications can be accessed concurrently through the vendor's multi-windowing capability.

The document editor incorporates most traditional word processing functions. It allows users to take graphics from one window and paste them into a document in another window, as well as copy spreadsheets into documents. The electronic mail facility sends, receives, and forwards messages in the form of memos, loner documents, and programs and data. The facility includes a directory of names and addresses for mailing lists. Each user has a private mail-in box, which is part of the electronic filing capability. The electronic file cabinet provides for document storage and retrieval, and is organized by drawers, folders, and individual documents. Users can crossrefrence documents in several drawers of folders without creating redundant copies.

The spreadsheet provides most common spreadsheet capabilities with a 78-column by 2,048-row format. In addition to the algebraic functions, the spreadsheet can calculate geometric functions such as logs, sines, cosines, tangents, arcsines, arccosines, and arctangents. The calendar capability provides an overview of any day's schedule, an expanded view of any event, and a monthly overview. The five packages together cost $500, or $4,000 for up to 100 users, and run on the vendor's graphics computational nodes. APOLLO COMPUTER INC., Chelmsford, Mass.

FOR DATA CIRCLE 339 ON READER CARD

REPORT TRACKING

The Report Processing and Tracking (RPT) component of the UCC-7 automated production control system is designed to provide the facilities necessary for a data center to control and manage batch production output information.

On-line facilities provide both inquiry and update capabilities to report distribution data. An optional banner page helps reduce delays in report handling by showing the recipient's name, location, and any special distribution instructions, the vendor says. The product allows users to respond to changes in a real-time environment since the centralized database is on-line. A report archival function is intended to eliminate the need to rerun a job to recreate a lost report. The product does not print exception reports unless they are specifically requested. If a report is lost or if exception reports need to be added, RPT's select/search option allows users to retrieve all or portions of reports from an archive.

An on-line report status feature gives users current information on the status of reports without having to know the name of the creating job. Data provided by the program also show what decisions are necessary to handle exceptional or unusual situations. Other features of the product include formatted screens for inquiry and update, on-line graphic summaries, and security provisions. The UCC-7/RPT subsystem costs $9,500 and is licensed only in conjunction with the full UCC-7 automated production control system. UNIVERSITY COMPUTING CO., Dallas, Texas.

FOR DATA CIRCLE 340 ON READER CARD

PC/MAINFRAME LINK

The Information Gateway is a three-tiered link between IBM Personal Computers and mainframes that provides mainframe data storage for the P.C., translates P.C. files into mainframe files readable by the vendor's Alter word processor, and allows the P.C. to operate as an intelligent Alter terminal.

The first tier allows files and documents prepared on the P.C. to be stored on the mainframe. Using the Alter mainframe software, the user can essentially convert the mainframe into an electronic filing cabinet for P.C. documents. The archival segment of Alter has been split off from the teleprocessing segment in order to accommodate this storage on the mainframe. This tier also allows the P.C. to act as a 3278 terminal.

The second tier is an Alter interface that can be used to translate P.C. files into Alter's file and document format. Files created using third part P.C. software can be sent to the mainframe for translation into Alter's text databases, which in turn feed directly into applications such as legislative research, bill processing, and type composition.

The third tier of the Information Gateway is the P.C. Alter workstation. This option allows the P.C. to function as an intelligent Alter terminal for a direct interface to text processing and other specialized applications.

The first tier of the Information Gateway costs $20,000 for the host software and $250 per P.C. The second tier costs $2,500 per software module, and the third tier costs $250 per P.C. The first two levels will be available in the second quarter, and the third will be available in the third quarter. DATA RETRIEVAL CORP., Milwaukee, Wis.

FOR DATA CIRCLE 341 ON READER CARD

DEVELOPMENT UTILITIES

This series of high-performance development utilities is aimed at the professional and the personal program developer. The Ticom Tools series is designed to offer a variety of utilities in several areas, but the only volume currently available is limited to Input/Output Utilities. The volume runs on most MS/DOS-based microcomputers, although the product is language- and machine-independent. It provides the software writer with capabilities typically requiring assembly language programming and knowledge of the internals of MS/DOS, the vendor says.

The I/O Utilities volume encompasses some 50 utilities and is organized into several modules. The system operations module contains routines that monitor and control the operation of disks, keyboard, display, serial peripherals, and parallel printers. The screen control module has routines for defining control codes and for controlling keyboard and display operations.

The screen operations module has routines to perform screen and cursor manipulation operations. The directory information module includes routines to modify or examine parameters relating to disk access and disk directory information. The File I/O module provides data file handling utilities for sequential and random files. Finally, the file allocation table allows file attribute manipulation such as inserting clusters and reorganizing the disk.

The Tools can be called from C, BASIC, FORTRAN, and Assembly languages on 8086- or 8088-based microcomputers running MS/DOS version 2.0 or later. Subsequent volumes are slated to contain applications modules relating more to standardized user interfaces and self-contained applications, the vendor says. TICOM SYSTEMS, Marina del Rey, Calif.

FOR DATA CIRCLE 342 ON READER CARD

RECORDS ACCESS

Superzap is a program that will allow a user to access any database file to which he is authorized by the standard IBM System/38 security system. Once a file has been designated and opened (either in arrival sequence or by keys), the user may position the file to any record or may scroll through the file. When a record has been located, the user may either delete the record or modify and rewrite it. The program does not allow records to be added. Record deletion is permanent since there is no "undelete" possible.

During keyed access of a record, the key along the access path in use may be modified. In this case, Superzap cannot then access that record unless the user manually changes the key area to correspond to the new key value. The program can accommodate all records less than 10,000 bytes long; the maximum key length, with all fields concatenated, is 99 bytes. (A file may have more, but only the first 99 will be used for positioning the file cursor.)

Data and key fields are displayed in both EBCDIC and hexadecimal form. No mapping or decoding of numeric fields is provided by the package. The product comes with a user manual and several illustrated examples. It costs $750. VENTURA COMPUTER SYSTEMS, Santa Susana, Calif.

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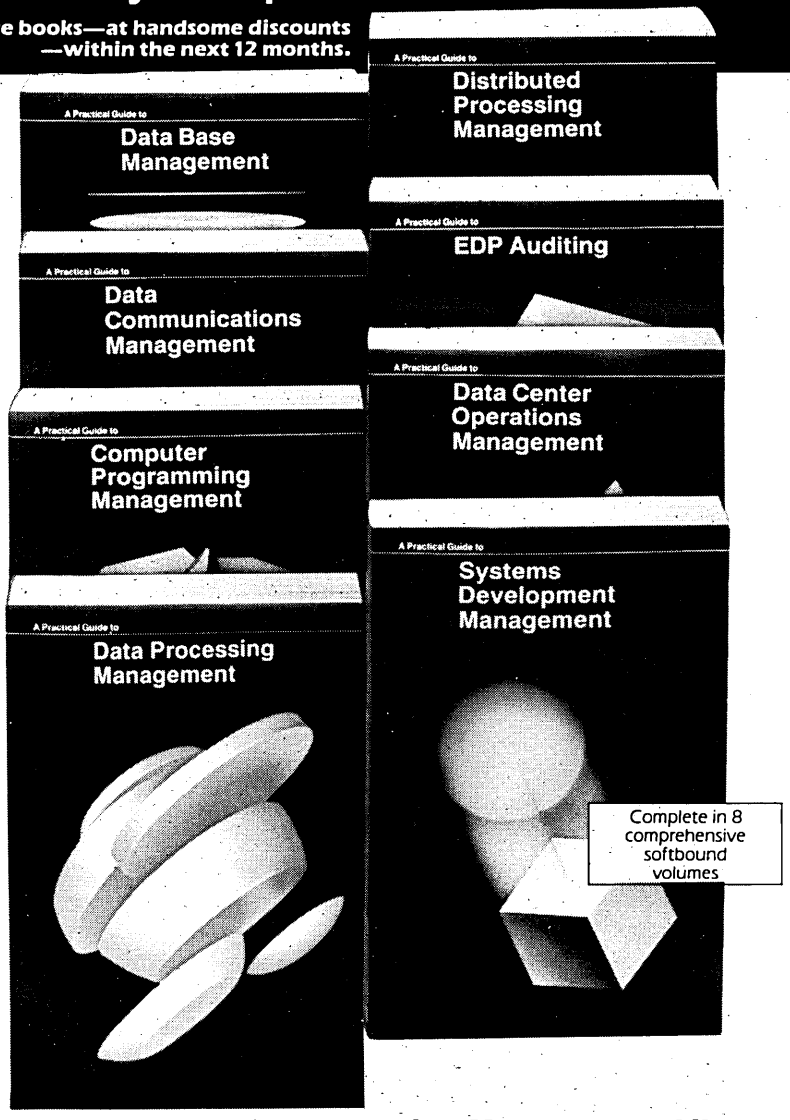

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BOOKS

FORWARD AND BACKWARD

We all know The Future plays a leading role in the selling of computers. It is the big carrot dangled in front of balky customers, enticing them to automate everything from bedrooms to battlefields.

The Future also sells books. Perhaps no one has made so much of and so much from The Future as Alvin Toffler, a professed social theorist whose main talent appears to lie in coining such lurid terms as "electronic cottage," "future shock," and "eco-spasm." Unfortunately, his latest book, *Previews and Premises*, offers little in the way of even memorable phrasing, not to mention serious thinking. The book is a poorly organized, rushed-to-print rehash of his *The Third Wave*, published a few years back.

It purports to be a series of interviews Toffler gave to the left-leaning Boston publisher South End Press, in which the unidentified interviewers ostensibly try to pin Toffler down on some of his more provocative predictions about the future of politics, the work place, and society itself. The text, however, reveals that Toffler is apparently talking to himself, answering weakly posed questions with his tired catch phrases and evading even the simplest challenges to explain himself. If, indeed, South End initiated these interviews then why didn't it publish them? Instead, Toffler (and William Morrow and Co., N.Y.) managed to copyright and publish a book that could easily have been titled *Advertisements for Myself*, although its stature hardly compares to that of a previous book of similar title.

No doubt Toffler fans, many of them corporate speechwriters, will plunk down their $12.95 for the book, hoping to hear the latest about The Future. They will be treated to such gems of wisdom as: "For me, the fuel of the information revolution is a combustive mixture of diversity and accelerated change. Put them together and you produce an information explosion."

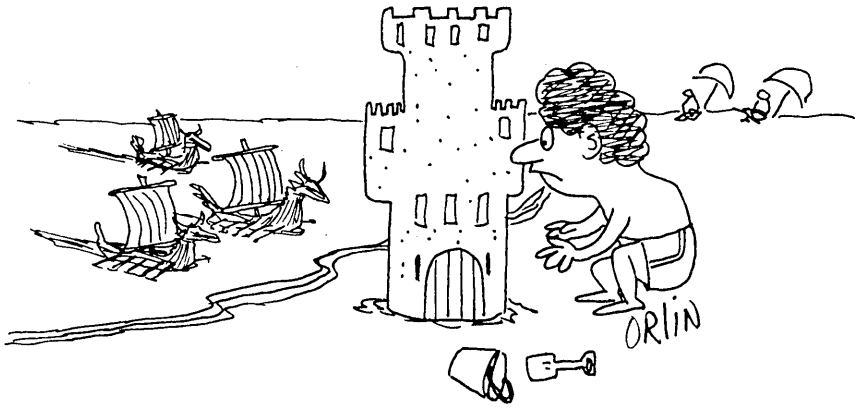
If Toffler mentions change once, he mentions it a thousand times. If it isn't alluded to in the vague terms of his Third Wave metaphor, it's reiterated in such words as rupture, restructuring, shift, revolt, eruption, crisis, and upheaval. In fact, he celebrates massive, unending social change, seemingly for its own sake. Unlike utopians of the past, who generally offered visions of some future stability, Toffler looks forward to an acceleration of change, a constant restructuring of people's lives. His world is a frantic pursuit of The Future.

And, apparently, while the industrial nations of the world take advantage of Toffler's "clean" information technology—the "cognitariat" dutifully mining their "info-sphere"—the poorer nations will be stuck with polluting smokestack industries. Toffler's simplistic analysis, much of it apologetic for the disruption and shock caused by constant upheaval, is weighted heavily in favor of a small portion of the globe's burgeoning population.

Finally, the book's index is practically worthless, listing nonexistent references for many topics—for instance, p. 48 makes no mention of "pollution." It makes one wonder how seriously Toffler wants to be taken.

Meanwhile, as future shockers continue searching for the very tip of the point of the leading edge, it is refreshing to observe computing's quiet but growing interest in its own rich past. Leading the more serious historical journeys during the past four years has been AFIPS' *Annals of the History of Computing*, a splendid quarterly whose every issue offers a gold mine of information. With a nostalgia rarely seen among technologists, the journal presents firsthand accounts of technical developments, interviews with pioneers, key documents from industry and academia, and a wealth of scholarly research. *Annals* has also become a prime forum for several lively debates about who invented what, and when.

Paul Ceruzzi, a contributor to the journal who teaches history at Clemson University in Clemson, S.C., has written



CARTOON BY RICHARD ORLIN

Reckoners, a "prehistory" of the digital computer. By that he means the period between 1935 and 1945 when researchers on both sides of the Atlantic constructed crude machines from relays and vacuum tubes.

Ceruzzi's well-crafted work closely examines four projects of that era: work by Konrad Zuse, a German who, because of World War II, worked in isolation from his British and American counterparts; the Harvard Mark I project, headed by Howard Aiken and aided by IBM; a series of relay machines built by Bell Labs under the direction of George Stibitz; and ENIAC, Eckert and Mauchly's famous vacuum tube machine, which is generally regarded as the world's first true electronic computer.

While the stories of these machines have been told before, Ceruzzi brings to them a deep understanding of the technology and, best of all, the skills of a good writer. He explains the development of these different computers in the context of the mathematical problems their designers were pursuing, providing math-oriented readers an extra measure of appreciation. If there is one thing wrong with this 181-page book, it's the $29.95 price tag. Let's hope the publisher, Greenwood Press (Westport, Conn.), brings it out in paperback before too long.

The same company also brought out, for a stiff $35, *An Annotated Bibliography on the History of Data Processing*, compiled by James W. Cortada. This 215-page volume will no doubt appeal to budding computing historians because of its 1,500 titles, which include biographies, memoirs, and key technical papers. A quick perusal, however, raises two quibbles: neither Joseph Weizenbaum's *Computer Power and Human Reason* nor Abbe Mowshowitz's *The Conquest of Will: Information Processing in Human Affairs* is cited. While they aren't strictly history books, they are much more so than many of the titles listed in the bibliography.

Finally, history buffs with an economic bent will welcome Praeger Publishers' (New York) *IBM and the U.S. Data Processing Industry*. This 532-page tome, written by Franklin M. Fisher, James W. McKie, and Richard B. Mancke, is a distillation of the 104,000 pages of evidence, depositions, and testimony collected during the government's aborted 13-year antitrust case against IBM. If there was ever any doubt about IBM's central role in the industry, this $37.95 book will dispel it.

The authors, economists who spent much time with their material while employed as expert witnesses for IBM's defense, have synthesized what they term "an economic history," which ranges in time from the early 1950s to 1980. Machine by machine, merger by merger, product by product, they plot IBM's every move in the marketplace and the reactions of its competitors. Virtually every paragraph contains a reference to the trial transcript.

This is no popularization of the computer business; instead, it is a detailed tool that gives the motivated researcher easy access to the antitrust case transcript. The authors claim to have aimed for as much objectivity as possible in their selection of materials, striving to tell a factual story rather than argue economic or policy issues. To this untrained eye, they have succeeded.

—John W. Verity

THE PSYCHOLOGY OF HUMAN–COMPUTER INTERACTION by Stuart K. Card, Thomas P. Moran, and Allen Newell

System designers and computer scientists seem to be turning from intuition to controlled experimentation in just one generation. This rapid transformation is propelled by competitive market forces and increasingly demanding customers. Still, the creation of a science base for human-computer interaction can only occur if computerists and psychologists are willing to cross disciplinary boundaries.

System designers and computer scientists are beginning to accept the great diversity among users, and to collect performance data before, during, and after the implementation of interactive systems. Error frequencies provide clues to user problems with syntactic complexity, inconsistent command strategies, insufficient training, and inadequate documentation. Utilization rates for commands or menus offer necessary data for machine optimization and interface redesign.

Similarly, psychologists have a golden opportunity to apply their skills to complex human problem-solving tasks. In addition to forming a more elaborate theory of human cognition, they can contribute to refinement of a vital technology. Psychologists, system designers, and computer scientists are helping to create a science of human–computer interaction.

Stuart Card and Thomas Moran studied with Allen Newell at Carnegie-Mellon University, and then went west to Xerox-PARC (Palo Alto Research Center), where they formed the Applied Information-Processing Psychology Project. With Newell as a consultant, the AIP project conducted "basic research within a context of application." Their work and this book begin with an attempt to extract a knowledge base relevant to interactive system design from cognitive and perceptual psychology.

Vital information about keying rates, cursor movement, learning, perception, and forgetting are concisely presented. For example, did you know that, on the average, people can recognize digits (33 milliseconds), colors (38), or letters (40) faster than geometrical shapes (50) or nonsense syllables (73)?

With this foundation in place, the authors take readers through detailed presentations of their research program. Their experiments concentrated on text editing, but were broad enough to include computer-aided VLSI circuit design and comparative studies of a mouse, a joystick, and cursor motion keys.

These diverse studies are integrated under the GOMS model—goals, operators, methods, and selection rules—of the user's cognitive structure. A GOMS analysis starts with high-level goals, such as EDIT-MANUSCRIPT, which are broken down into elementary operators or tasks and then organized into procedures or methods to accomplish a goal. The selection rules describe how specific methods of accomplishing goals were chosen.

The authors then offer the more narrowly focused keystroke-level model (KLM), which predicts the amount of time expert users will need for error-free task performance. The KLM works by adding up the system's response time and the time required for human actions such as moving a cursor, keying a command, and various "mental" operations.

After a full exposition of these ideas and experimental evidence, the authors cite 10 principles for applying psychology to design. Although the GOMS analysis and the KLM can help in some design situations, they do have their weaknesses (see "Details of Command-Language Keystrokes" by R. B. Allen and M. W. Scerbo in the *ACM Transactions on Office Information Systems*, Vol. 1, No. 2, April 1983 for a fuller critique).

The KLM applies the reductionist method to its limit, dismissing vital factors that, I believe, influence user performance. Since Card, Moran, and Newell concentrated on the task performance speed of experts and eliminated the error data (335 out of 1,280 tasks in one central study), they reduced the importance of their results. This makes it difficult to understand the problems people have in learning, using, and retaining in memory the interaction commands. If experts never made mistakes, we might accept the KLM's limits, but even in the studies reported in this book, experts made mistakes in 30% of the tasks.

Further, the fact that a user's think time and error rates are functions of the system response time is not considered by the KLM; nor are preferences for alternative comand names, errors induced by complex command syntax, unusual sequencing of subtasks, comprehensibility of screen displays or menu structures, effectiveness of error messages, help facilities, or documentation.

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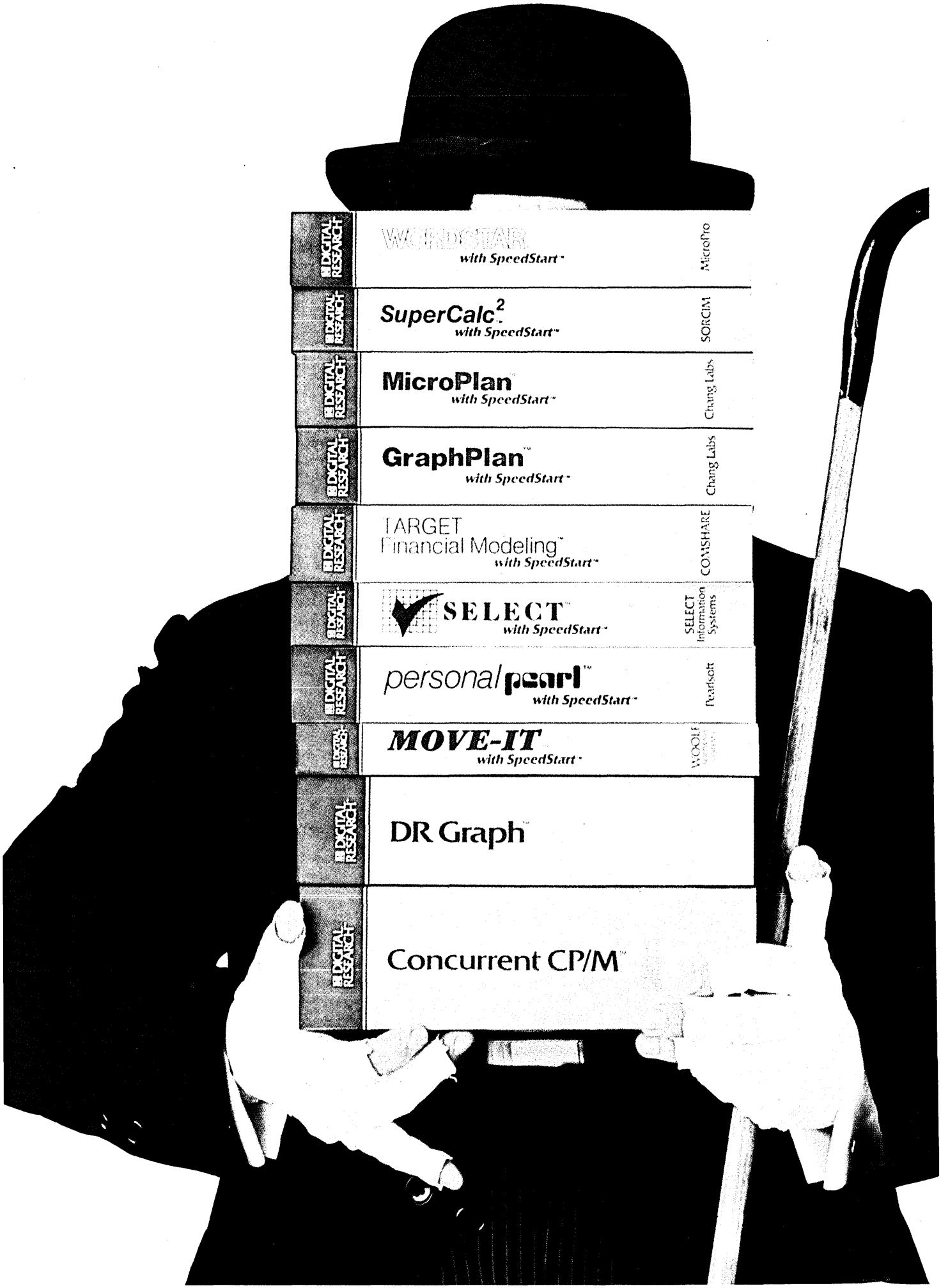
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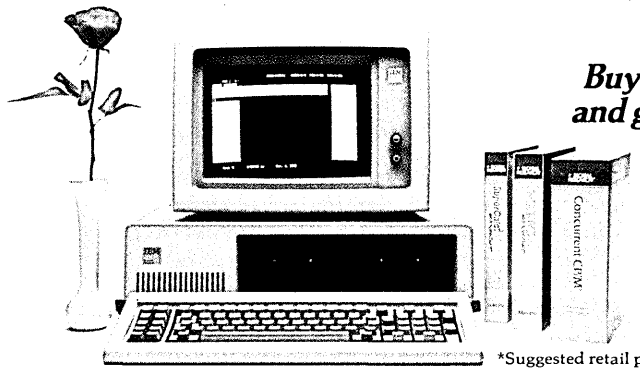

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At particular points in the book, I felt that the authors were trying too hard to promote their models, instead of providing insight to human users or guidance for designers. A designer who rigidly adhered to the KLM would have to construct the shortest possible command strings, thereby ignoring comprehensibility or memorability.

While I was pleased to see yet another book devoted to the user interface, I was disappointed with the attitude expressed toward users. The authors begin (p. 4) with: "The human–computer interface is easy to find in a gross way—just follow a data path outward from the computer's central processor until you stumble across a human being." Stumble? There is little concern for the user community and even less recognition of its diversity, except in terms of different keying speeds. Differences in computing background, mathematical skills, gender, culture, cognitive styles, personality, motivation, etc. apparently do not merit discussion in this evaluation of human performance.

This book offers a tremendous amount of information and detail. Like many pioneering efforts, it is excessively complex. For example, I found it difficult to recall the meaning of some mathematical symbols, including T_M, T_m, τ_m (tau), and t_M. Occasionally sentences were overloaded with multiple concepts and numerous prepositional phrases.

It was refreshing to see this book place such strong emphasis on controlled psychologically-oriented experimentation. In addition, I was glad to learn that XEROX PARC researchers and one of the leading figures in artificial intelligence, Allen Newell, have moved toward research paradigms that require testable hypotheses, a priori designation of independent and dependent variables, adequate controls for biasing, objective measures of success, and replicability.

On the negative side, I found too much emphasis placed on speed measures. The authors have not yet provided an adequate theory of human-computer interaction that is useful to designers. But they do offer a detailed description of serious research efforts, which should motivate computer scientists and psychologists. I look forward to the refinements of their theory or competitive theories, a torrent of experiments, and lively discussions of how to apply the fruits of this new science. LEA Publishers, Hillsdale, N.J. (1983, 469 pp., $39.95).

—Ben Shneiderman

REPORTS & REFERENCES

SOFT TALK

Technique Learning, Dobbs Ferry, N.Y., has announced the publication of *USMI: Market Directory*. The directory claims to provide current and comprehensive profiles of software publishers, and is geared to computer stores, book and electronics retailers, office equipment dealers, distributors, suppliers, and consultants to the microcomputer business. The publisher feels it will be useful for libraries and end users as well. The directory supplies data on over 500 current publishers, ranging from large software firms to small entrepreneurs. The company plans to update and expand the directory six times a year. The guide is available for $195 a year, including the six updates.

For more information, contact David Cohen, Box P, Technique Learning Corp., 40 Cedar St., Dobbs Ferry, NY 10522, (914) 693-8100.

DBMS

Small Systems World is offering in-depth reviews of major DBMS products for minis and micros in their "Guide to Database Management Systems." The packages reviewed include Oracle, MDBS, Ingres, OID/1, Prompt, Database-Plus, ADABAS-M, Relate/300, Informix, and the IDM database machine. Also included is an overview of current trends in DBMSs for minis and micros, entitled "DBMS Comes to Small Computers." For more information on how to purchase the $20 guide, contact Gordon Levy (DBMS), Hunter Marketing Services, 950 Lee St., Des Plaines, IL 60016, (312) 296-0770.

PC REFERENCE

The Book Company, a division of Arrays Inc., has introduced a new series of personal computer encyclopedias, detailing all facets of hardware, peripherals, software documentation, and usage for nine different PCs. The company claims that "no other guide covers applications, operations, languages, disk-operating systems, add-on equipment, and software in a concise, encyclopedia format." The series includes some software reviews and sells for $19.95. For more information, contact Product Information, Arrays Inc., 11223 S. Hindry Ave., Los Angeles, CA 90045, (213) 410-9466.

CBEMA DATA BOOK

The Computer and Business Equipment Manufacturers Association (CBEMA) has compiled 22 years of computer and business equipment product demand data in one publication. The book contains data collected from various surveys, industries, and government sources. Entitled "The Computer and Business Equipment Industry Market Book," it claims to provide key information for investing, trading, and production to industry analysts, product managers, corporate planners, strategists, and researchers who want current and accurate market demand trends and analyses. The book costs $350 and can be ordered by writing or calling Data Book, CBEMA, 311 First St. NW, Suite 500, Washington, DC 20001, (202) 737-8888.

MANAGEMENT BASICS

The American Management Associations has announced its second edition of the *AMA Management Handbook*. The AMA claims that new techniques for better management are often widely touted, enjoy brief popularity, and then fade away as everyone goes back to the basics. AMA contends that the book's 14 sections cover all business management specialties and every management discipline from general management and finance to packaging and public relations. There are over 200 contributors to this volume; most of them are from AMA's councils of experts. The 1,600-page book costs $69.95 and can be ordered from the American Management Associations, 135 West 50th St., New York, NY 10020, (212) 586-8100.

ROBOT SHOW

A history of the art and technology of robotics will be explored in a show presented by the American Craft Museum II, from Jan. 13–May 25 in New York City. The exhibit plan contains approximately 200 objects and major illustrations chronicling the development and social and historical impact of robots. "The Robot Exhibit will feature working robots, toys, robot sculpture, prints, photographs, slides, books, and video tapes lent by public and private collectors." Robert Malone, author of *The Robot Book*, developed the idea for the show and is guest curator of it. For more information, contact Susan Harkavy, Publicity Office, American Craft Museum II at International Paper Plaza, 44 W. 53 St., New York, NY 10019, (212) 397-0632.

MAINTAINING INDEPENDENTS

Computer/Electronic Service News is publishing *Guide to Independent Service*, a directory of companies offering third-party, on-site maintenance and depot repair to oems and end users. Independent service companies will be listed by geographic locations. General corporate information will also be included, as well as a listing of the hardware and software maintained by each company and the services that each offers. The directory will cover such specifics as information on each company's service contracts, minimum rates and charges, average response time, and geographic areas serviced.

The guide will feature articles on third-party service for oems. For end users, the guide will explain how independent services function, what their advantages are over maintenance offered by manufacturers or distributors, and which guidelines for evaluating independent service companies should be used. The guide is priced at

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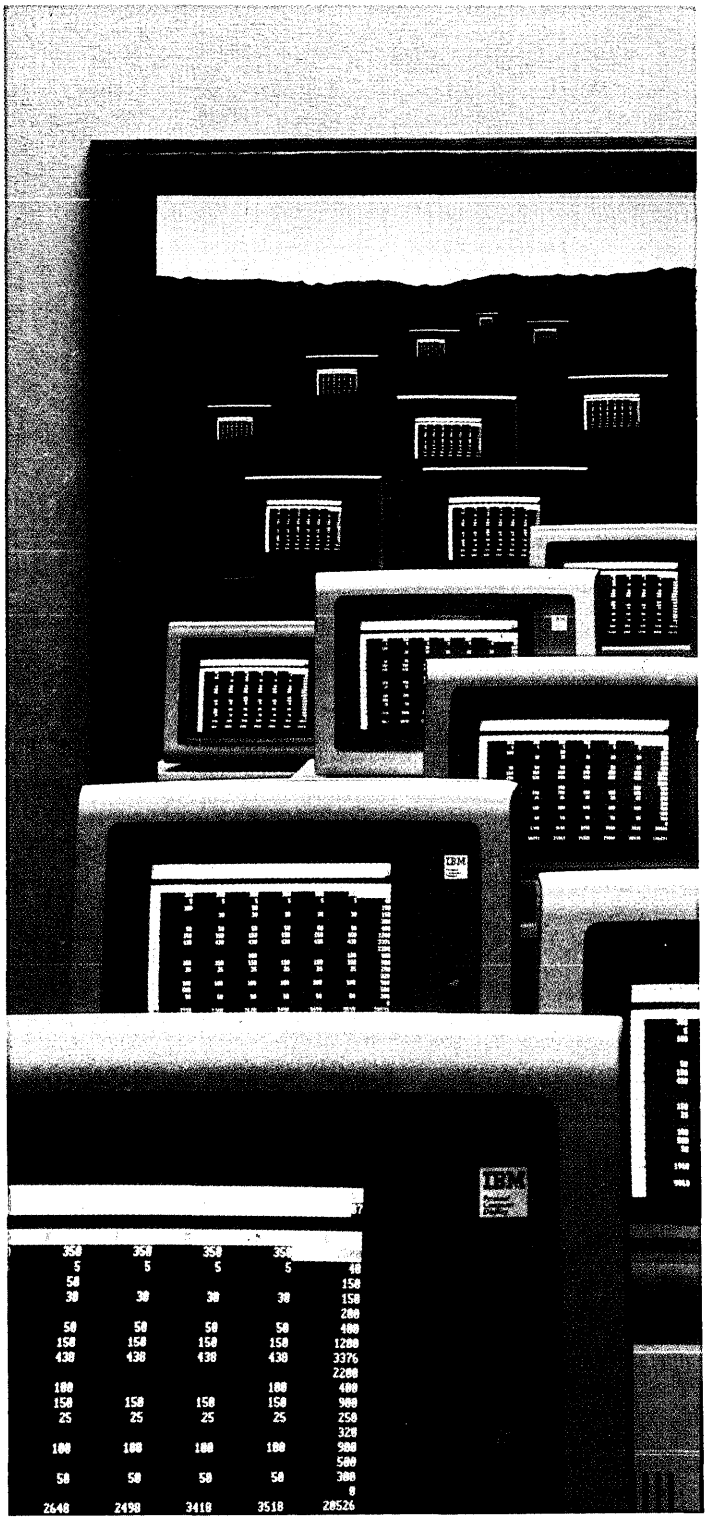

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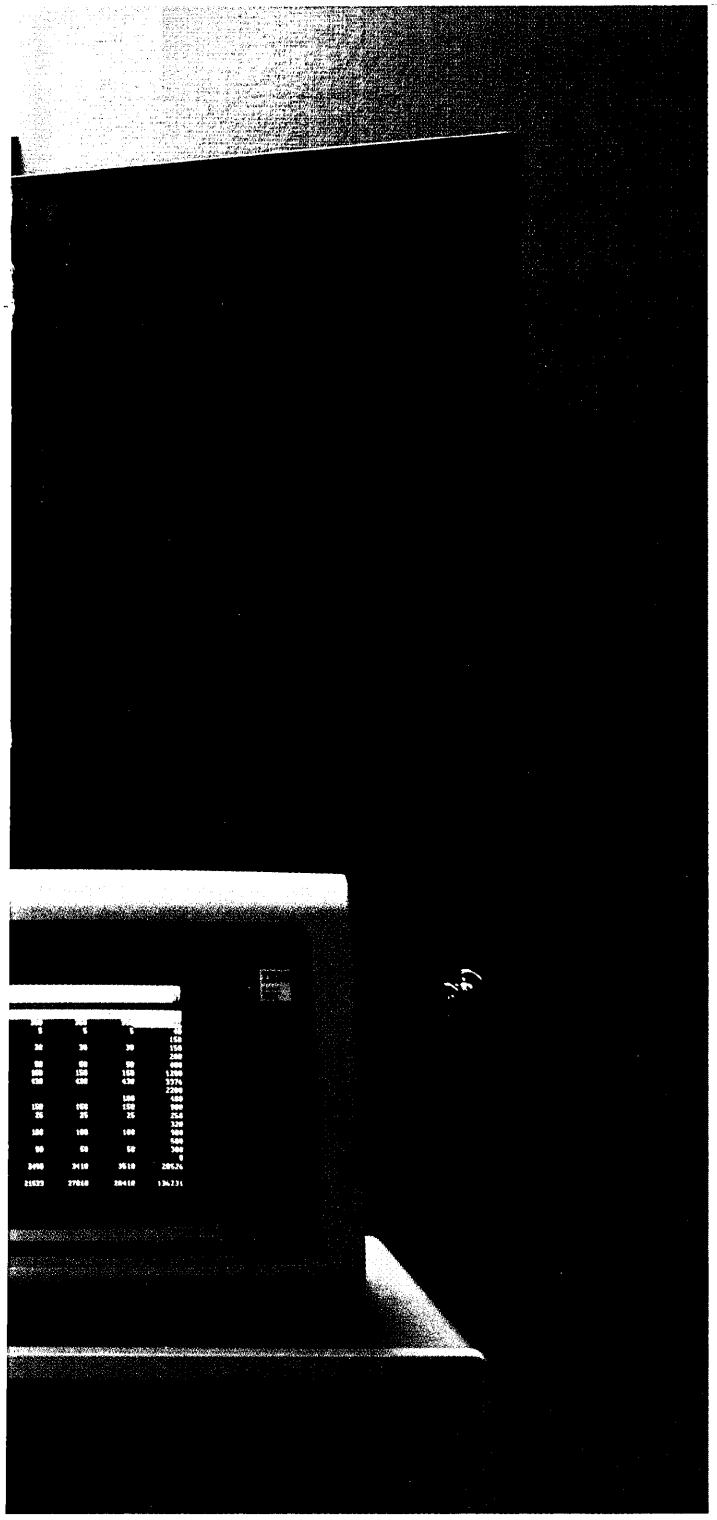

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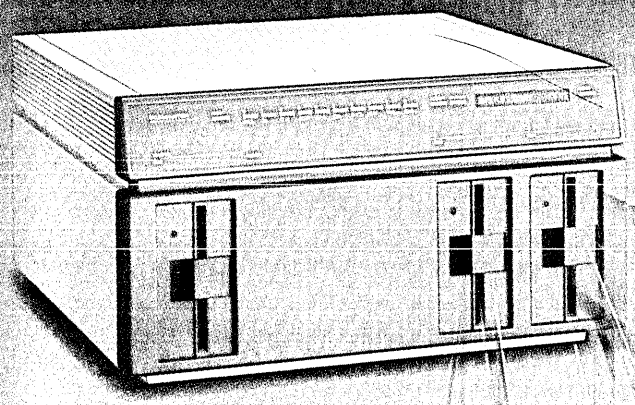

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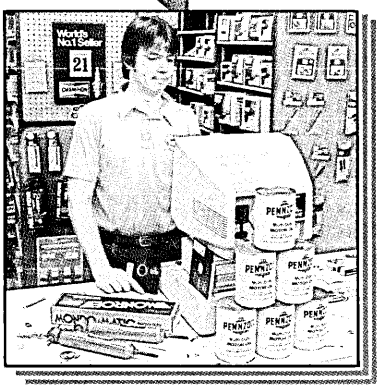

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HP TESTAMENT

Hewlett-Packard has published a 350-page book consisting of 23 articles from the company's technical periodical, the *Hewlett-Packard Journal*. The book, which covers 33 years of engineering at the firm, recounts HP's principal product developments and provides insights into the atmosphere that motivated HP inventors. Entitled *Inventions of Opportunity: Matching Technology with Market Needs*, the hardcover book is priced at $27.50. For more information, refer to HP part number 92233B, and contact Computer Supplies Operation, Hewlett-Packard Company, P.O. Box 60008, Sunnyvale, CA 94088, (800) 538-8787 or collect from California (408) 738-4133.

A STAR IS BORN

Sybex has published a book, entitled *Practical WordStar Uses*, on the capabilities of the WordStar program. Written by Julie Ann Arca, the book contains examples of many common word processing problems, their solutions, and detailed instructions on how to create word processing documents and forms. She also provides guidelines for developing any number of new WordStar applications. Sybex says the book is useful for those just starting to use WordStar as well as for expert word processors who want to improve their knowledge of the program. The book costs $13.95, plus $2 for postage and handling. For more information, contact Sybex, 2344 Sixth St., Berkeley, CA 94710, (415) 848-8233.

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ELECTRONIC COMPUTER PRINTING

George Washington University, Washington, D.C., is offering a course on the current and emerging technologies for converting electronically stored information into printed hard-copy products. The course will emphasize digitally addressable electronic computer printing, vendor technology, decision making in the marketplace, and practical management for successfully operating an electronic computer printing environment. Among other activities, the seminar will feature hands-on, on-line access to a large, technical database and a field trip to view an advanced elecronic printing system in operation. It will be held Jan. 23–25, and costs $695. For more information, contact Continuing Engineering Education, George Washington University, Washington, DC 20052, (202) 676-6106 or (800) 424-9773.

JAPAN'S SOFTWARE MARKET

Technology Analysis Group is offering a seminar on how to market packaged software in the multibillion dollar Japanese software market. According to Patrick F. Sullivan, president of the Technology Analysis Group Inc., "Japanese software houses lag far behind the United States in producing software, [and] companies are eager to purchase high-quality foreign software."

The seminar, "Software Business Opportunities in Japan," will present topics such as marketing software packages, software licensing, protection of software from competitors, methods of distribution, tax planning considerations, profiles of the competition, and sales techniques. It will be held Jan. 26 and 27 in Monterey, Calif. and costs $895. For more information, contact Patsy Vyner Hawks, Technology Analysis Group Inc., 1424 16th St. NW, Suite 101, Washington, DC 20036, (202) 483-6642.

MICRO TYPESETTING

The Rochester Institute of Technology will offer a four-day seminar on microcomputers and typesetting. The course will present information on typography, typesetting, and equipment interfacing. It is designed for micro users, office information specialists, self-publishers, authors, and graphic reproduction managers. Topics covered will include basic typography concepts; system components and planning; the vendor marketplace; the word processing-typesetter connection; micro applications; photographic material handling; exposure and processing; and copy preparation. The seminar will be held Feb. 22–25 in Rochester, N.Y., for a fee of $630. For more information, contact Brenda Reimherr, T&E Center Seminar Coordinator, Rochester Institute of Technology, One Lomb Memorial Dr., P.O. Box 9887, Rochester, NY 14623, (716) 475-2757.

FINANCE AND ACCOUNTING

If you want a greater understanding of business finance and the ability to use a personal computer to analyze financial data to aid your decision making, New York University has a seminar designed for you. "Fundamentals of Finance and Accounting, Using a Microcomputer" is a three-day course de-

"Is it yak butter yet?"

CARTOON BY SIDNEY HARRIS

signed to blend these two areas of knowledge. The dates and locations of the seminar are: Jan. 30–Feb. 1, Washington, D.C.; Feb. 22–24, New York City; and Feb. 27–29, Chicago. For more information on the $695 seminar, contact the Registrar, New York University Seminar Center, 575 Madison Ave., New York NY 10022, (212) 748-5094.

TOOLS FOR DSS

A two-day conference will be held on "Software Tools for Distributed Support Systems," Feb. 27–28, at the Westin Hotel in Boston, Mass. The conference will address the management issues behind evaluation and selection of software tools for development of distributed decision support systems. Each day, a panel discussion will include users, consultants, and keynote speakers. Twelve leading software vendors will provide concurrent in-depth demonstrations and discussions of their products, while they brief the audience on key features. For more information, contact Dr. Warren G. Briggs, Chairman, The Software Tools Conference, Suffolk University, School of Management, Beacon Hill, Boston, MA 02114, (617) 723-4700.

MINI AND MICRO DDP

Integrated Computer Systems is offering a four-day course on "Distributed Processing, Mini- and Microcomputer Implementations." The course is designed to provide an introduction to distributed processing hardware and software, and practical techniques for design and implementation of multiple micro- and minicomputer systems. Topics include design requirements of distributed systems; attendees will learn to partition system tasks and hardware, implement data links and protocols, and integrate and test multiple compute systems. The course costs $895, and will be held Jan. 31–Feb. 3, Palo Alto, Calif.; March 20–23, Washington, D.C.; and March 27–30, Boston, Mass. For more information, contact Ruth Dordick, Integrated Computer Systems, 6305 Arizona Pl., P.O. Box 45405, Los Angeles, CA 90045, (213) 417-8888.

NETWORK CONTROL SYSTEMS

George Washington University is also presenting another course; this one is on "Digital Communications and Computer Network Systems," Feb. 13–16, in San Diego, Calif. The school of Continuing Engineering Education offers this class to engineering managers, engineers, and scientists who seek a practical understanding of network control systems. The course covers essential theory, techniques, and applications of the principal elements of network control systems without the use of advanced mathematics. The price of the course is $795. For more information, contact George Harrison, George Washington University, Continuing Engineering Education, School of Engineering and Applied Science, Washington, DC 20052, (202) 676-8522 or (800) 424-9773.

TELECOM FOR EXECS

Worcester Polytechnic Institute is holding one-day briefings for the information management executive on "The Revolution in Telecommunications Technologies." The programs are designed to keep attendees up to date on the latest products and technologies in communications, who the top firms are, and what kind of services they offer. The dates and places of the sessions are March 15, New York City; and March 16, Boston, Mass. The price is $690. For more information, contact Kathy Shaw, Office of Continuing Education, Worcester Polytechnic Institute, Worcester, MA 01609, (617) 793-5517.

VENDOR LITERATURE

PLEASE DON'T EAT THE DAISY

Daisytek is offering its latest product catalog to its dealers and end users throughout the country. The 32-page booklet features updates on several new type fonts, wheel modifications, and ordering information for its stock of daisy printwheels, ribbons, and magnetic media. DAISYTEK INC., Dallas, Texas.

FOR DATA CIRCLE 350 ON READER CARD

TELEX TO DATABASE

A new brochure on Infotex, a service that enables telex terminals anywhere in the world to communicate interactively with virtually any public or private database in the U.S., is offered by ITT WORLD COMMUNICATIONS INC., Secaucus, N.J.

FOR DATA CIRCLE 351 ON READER CARD

M.Y.O.B.

The features and benefits of Wang Laboratories' system house partnership program are presented in a new brochure from the company. Entitled "You Mind Our Business and We'll Mind Yours," the eight-page brochure details some of the facts ISOs should consider before signing on with a manufacturer. WANG LABORATORIES INC., Lowell, Mass.

FOR DATA CIRCLE 352 ON READER CARD

DO POINT

A catalog from Point 4 Data Corp. contains an updated pricing structure for all hardware and software, including a 25% price reduction on the Lotus Cache Memory. POINT 4 DATA CORP., Irvine, Calif.

FOR DATA CIRCLE 353 ON READER CARD

DEC WHODUNNIT

DEC has published a 40-page data communications casebook that uses a fun approach (with cases, clues, and solutions) to solving datacom problems. The company's line of modems, acoustic couplers, and intelligent communication processors is described in the closing section of "The Evidence." DIGITAL EQUIPMENT CORP., Merrimack, N.H.

FOR DATA CIRCLE 354 ON READER CARD

POWER FULL

Oneac offers an eight-page brochure that discusses the changing power requirements of today's computer systems. It also illustrates what the computer owner should do to protect his or her system from power problems. ONEAC CORP., Bannockburn, Ill.

FOR DATA CIRCLE 355 ON READER CARD

VIA? BECAUSE . . .

A new six-page, full-color brochure detailing the VIA Series 100 family of interactive graphics systems is now available from VIA SYSTEMS INC., North Billerica, Mass.

X-COMMUNICATE

A 12-page capabilities brochure describing the full range of applications, functions, and components of the X-Net local and wide area data communications network can be obtained from CR COMPUTER SYSTEMS, Orange, Calif.

FOR DATA CIRCLE 356 ON READER CARD

DIAL-UP SYSTEMS

Ledex Inc. has published a pamphlet describing its dial-up control and status reporting systems. The dial-up system continually monitors the status of up to 12 inputs at up to 75 remote sites. LEDEX INC., Vandalia, Ohio.

FOR DATA CIRCLE 357 ON READER CARD

NETWORK

A four-color, 12-page brochure, entitled "Data Flow," describes how data passes through the network. The guide also details the hardware and software components of the satellite network and the services it provides as a value-added carrier. RCA CYLIX COMMUNICATIONS NETWORK INC., Memphis, Tenn.

FOR DATA CIRCLE 358 ON READER CARD

BURROUGHS' BOSS

Burroughs Corp. is offering a new service that will allow customers to order catalog items by telephone, and in many cases they'll get delivery 24 hours later. BOSS (Burroughs On-line Supplies Service) has a toll-free number that customers can call 12 hours a day, five days a week. Customers will be able to order computer products and office supplies, including ribbons, printwheels, computer disks, paper, and many other products for the office and computer room. BURROUGHS CORP., Detroit, Mich.

FOR DATA CIRCLE 359 ON READER CARD

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ON THE JOB

HOPE FOR THE TERMINALLY ILL?

Video display terminals have been accused of causing health problems that range from neck aches, fatigue, and impaired vision to miscarriages and birth defects (News in Perspective, July). The furor over whether the dangers are physical or psychological continues.

The Computer and Business Equipment Manufacturers Association (CBEMA) says it's a behavioral problem and that job dissatisfaction and fear of terminals, rather than radiation output, are at the root of it.

Other groups, like 9 to 5, the National Association of Working Women, are not so sure that vdts are physically safe, and are pressing for further research.

One thing, however, is certain: physical problems are not the only manifestations of "terminal fatigue." Where there is stress and fatigue, there's bound to be high error rates and low productivity. The National Institute for Occupational Safety and Health (NIOSH) has studied the problem, and one of its surveys revealed that clerical workers at vdts showed higher stress levels than air traffic controllers.

How can we ease the plight of vdt users? Manufacturers are studying the impact of constant vdt use on the health and productivity of workers and are making constant ergonomic improvements with each product introduced. This is fine if you're willing to go out and buy every new model that appears on the market, but who can afford such a benevolent policy? And, if you've got people left over working on the older models, you still have to help reduce their stress and strain. Complaints abound of keyboards and screens that can't be adjusted, and of flickering images that cause distraction.

Less than three years ago, Marilyn Joyce, owner and president of the Joyce Institute, Seattle, Wash., realized vdt users had some serious problems. While teaching the institute's Dataspan vdt skills course at Boeing Aerospace, Joyce piloted the techniques her company now uses to minimize error rates, headaches, and other illnesses associated with constant vdt use.

During the 10-hour Dataspan ergonomics skills course, trainees learn visual and auditory techniques to improve their skills at the terminals. They also learn the Datahealth techniques developed by Joyce to ease man/machine interface problems.

Joyce recommends a 30-second to three-minute break in which to practice these techniques. One is to place your palms over your closed eyes, then try to blink your eyes a few times while thinking of something pleasant; one of the institute's instructors tells students to think of black velvet. This palm-to-eye method effectively allows no light to enter the eyes and relaxes eye muscles as well as the rest of the body.

Six months after taking the course, one group of users found that their error rate had reduced by as much as 50%, and their speed had increased by up to 70%. About 85% of the participants reported increases in health and comfort.

So far, 4,500 trainees have found the method successful. Elva Slagle, training and educational program manager for the Environmental Protection Agency, looked into the Dataspan program after hearing complaints of double vision, headaches, and color vision problems from EPA terminal users. Slagle thought Dataspan might help alleviate some of the physical problems as well as increase productivity. EPA ran a pilot course with a follow-up three months later.

The results of the course got around by word of mouth and EPA ran 12 more presentations of the course within the year. "We found that the course not only improved health and safety," said Slagle, "but supervisors were delighted with the improvements in productivity and accuracy."

So if you see employees slumped at their terminals, their faces in their hands, don't despair. Perhaps it's in your best interests.

—Lauren D'Attilo

ADVERTISERS' INDEX

The Marketplace...JOB MARKETPLACE

ADVERTISERS' INDEX

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CIRCLE 500 ON READER CARD

Faculty Positions in Media Technology

The Massachusetts Institute of Technology has created a new interdisciplinary laboratory to address the invention and creative use of new media. As part of this Media Laboratory's teaching responsibilities, six faculty positions are open in the Department of Architecture. Candidates qualified for any one or more of these openings are invited to submit resumes and any additional information by February 15, 1984:

Professor Nicholas Negroponte
Director, Media Laboratory
Room NE43-205
Massachusetts Institute of Technology
545 Technology Square
Cambridge, Massachusetts 02139

The positions are in the discipline areas of:

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5. epistemology and learning
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3. thesis supervision

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Applicants must possess a PhD or equivalent, and must have demonstrated ability and interest in research. Teaching experience at the University level is desirable. The positions respectively require professional experience in:

1. television engineering, digital video, telecommunication
2. computer animation, image processing, artificial intelligence
3. human/machine interface, experimental psychology
4. electronic imaging, display technology, 3-D
5. developmental psychology, social science, computation
6. digital audio, real-time signal processing, spatial sound, speech processing, performance technology

Each position can be at either the Assistant or Associate Professor level; salary competitive and to be negotiated. The opening is specifically for the academic year starting September 1984. An earlier starting date is possible.

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CIRCLE 509 ON READER CARD

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READERS' FORUM

DID YOU HAVE A MICRO CHRISTMAS?

On the first day of Christmas my user gave to me
Sixty-four KB of memory.

On the second day of Christmas my user gave to me
Two beta tests,
And 64KB of memory.

On the third day of Christmas my user gave to me
Three disk packs,
Two beta tests,
And 64KB of memory.

On the fourth day of Christmas my user gave to me
Four crts,
Three disk packs,
Two beta tests,
And 64KB of memory.

On the fifth day of Christmas my user gave to me
Five protocols,
Four crts,
Three disk packs,
Two beta tests,
and 64KB of memory.

On the sixth day of Christmas my user gave to me
Six cursors cursing,
Five protocols,
Four crts,
Three disk packs,
Two beta tests,
And 64KB of memory.

On the seventh day of Christmas my user gave to me
Seven sheets a-spreading,
Six cursors cursing,
Five protocols,
Four crts,
Three disk packs,
Two beta tests,
And 64KB of memory.

On the eighth day of Christmas my user gave to me
Eight numbers crunching,
Seven sheets a-spreading,
Six cursors cursing,
Five protocols,
Four crts,
Three disk packs,
Two beta tests,
And 64KB of memory.

On the ninth day of Christmas my user gave to me
Nine points a-floating,
Eight numbers crunching,
Seven sheets a-spreading,
Six cursors cursing,
Five protocols,
Four crts,
Three disk packs,
Two beta tests,
And 64KB of memory.

On the tenth day of Christmas my user gave to me
Ten RAMs a-charging,
Nine points a-floating,
Eight numbers crunching,
Seven sheets a-spreading,
Six cursors cursing,
Five protocols,
Four crts,
Three disk packs,
Two beta tests,
And 64KB of memory.

On the eleventh day of Christmas my user gave to me
Eleven systems crashing,
Ten RAMs a-charging,
Nine points a-floating,
Eight numbers crunching,
Seven sheets a-spreading,
Six cursors cursing,
Five protocols,
Four crts,
Three disk packs,
Two beta tests,
And 64KB of memory.

On the twelfth day of Christmas my user gave to me
One endless loop.
On the first day of Christmas . . .

—Eric Brand
Brooklyn, New York

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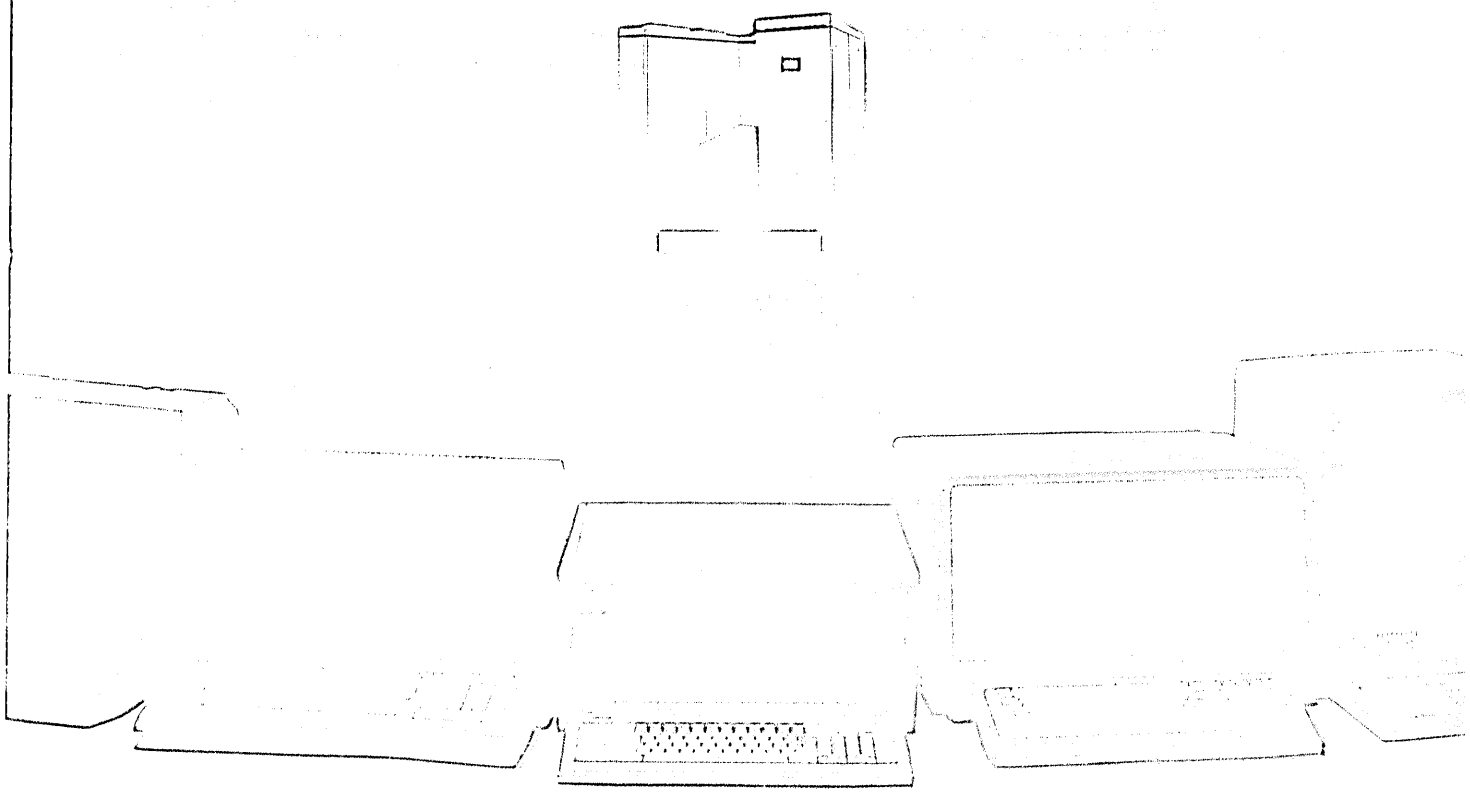

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CIRCLE 112 ON READER CARD

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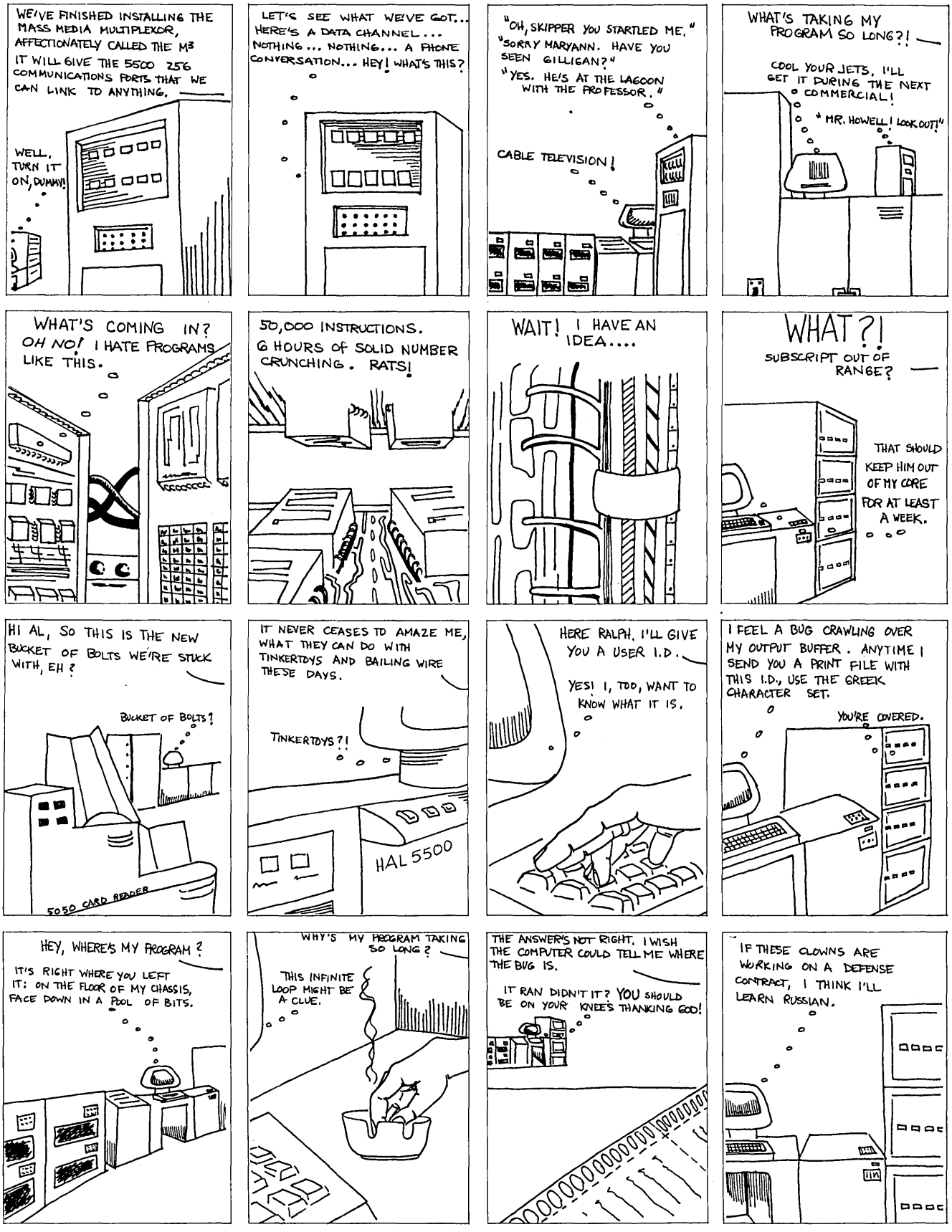
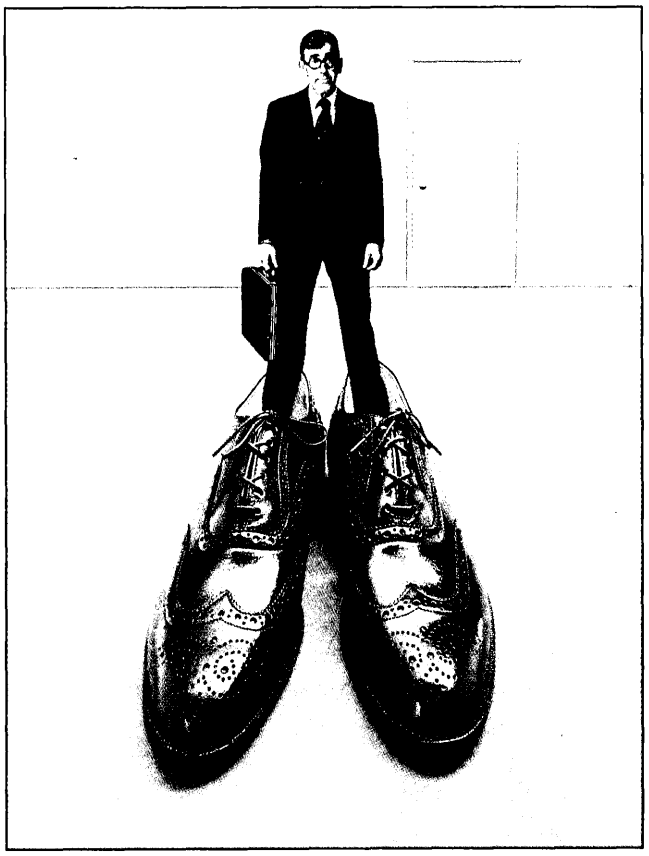


THERE'S ONLY ONE UFO.



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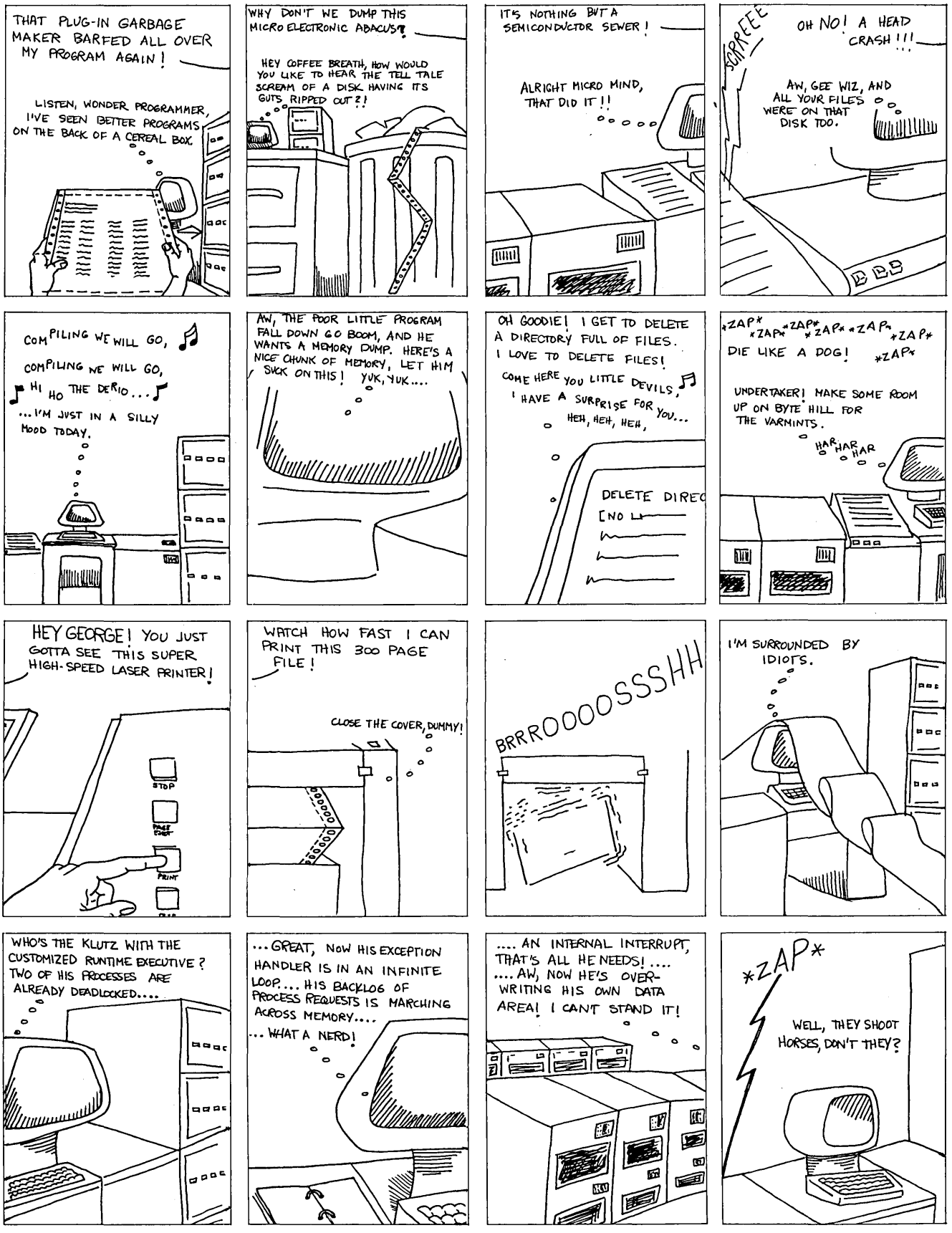
THAT PLUG-IN GARBAGE MAKER BARFED ALL OVER MY PROGRAM AGAIN!
LISTEN, WONDER PROGRAMMER, I'VE SEEN BETTER PROGRAMS ON THE BACK OF A CEREAL BOX.
WHY DON'T WE DUMP THIS MICRO ELECTRONIC ABACUS?
HEY COFFEE BREATH, HOW WOULD YOU LIKE TO HEAR THE TELL TALE SCREAM OF A DISK HAVING ITS GUTS RIPPED OUT?!
IT'S NOTHING BUT A SEMICONDUCTOR SEWER!
ALRIGHT MICRO MIND, THAT DID IT!!
SCREEE
OH NO! A HEAD CRASH!!!
AW, GEE WIZ, AND ALL YOUR FILES WERE ON THAT DISK TOO.
COMPILING WE WILL GO, COMPILING WE WILL GO, HI HO THE DERIO...
...I'M JUST IN A SILLY MOOD TODAY.
AW, THE POOR LITTLE PROGRAM FALL DOWN GO BOOM, AND HE WANTS A MEMORY DUMP. HERE'S A NICE CHUNK OF MEMORY, LET HIM SUCK ON THIS! YUK, YUK....
OH GOODIE! I GET TO DELETE A DIRECTORY FULL OF FILES. I LOVE TO DELETE FILES!
COME HERE YOU LITTLE DEVILS, I HAVE A SURPRISE FOR YOU... HEH, HEH, HEH,
DELETE DIREC
[NO
ZAP *ZAP* *ZAP* *ZAP* *ZAP* *ZAP*
DIE LIKE A DOG! *ZAP*
UNDERTAKER! MAKE SOME ROOM UP ON BYTE HILL FOR THE VARMINTS.
HAR HAR HAR
HEY GEORGE! YOU JUST GOTTA SEE THIS SUPER HIGH-SPEED LASER PRINTER!
STOP
PAGE EJECT
PRINT
WATCH HOW FAST I CAN PRINT THIS 300 PAGE FILE!
CLOSE THE COVER, DUMMY!
BRRROOOOSSSHH
I'M SURROUNDED BY IDIOTS.
WHO'S THE KLUTZ WITH THE CUSTOMIZED RUNTIME EXECUTIVE? TWO OF HIS PROCESSES ARE ALREADY DEADLOCKED....
...GREAT, NOW HIS EXCEPTION HANDLER IS IN AN INFINITE LOOP.... HIS BACKLOG OF PROCESS REQUESTS IS MARCHING ACROSS MEMORY.... ...WHAT A NERD!
.... AN INTERNAL INTERRUPT, THAT'S ALL HE NEEDS!.... .... AW, NOW HE'S OVER-WRITING HIS OWN DATA AREA! I CAN'T STAND IT!
ZAP
WELL, THEY SHOOT HORSES, DON'T THEY?

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PROJECTS IN FISHBOWLS

Is it sufficient to give a work group a job to do and the resources—money, machines, and people—to do it with, and then step away until completion? Is it desirable to have someone from outside the work group monitor work methods, review intermediate results, suggest ideas, criticize, and perhaps impose directives?

"Give us the chance to fail!" is a common call when managers, users, or others insist upon outside audit, quality assurance, productivity improvement, design review, or any form of intrusion.

As a systems person with years of project level experience, I can easily side with project autonomy. But as a productivity improvement consultant and user ombudsman, I can just as easily support the other side. There are good points to both arguments. Where this autonomy has been a serious issue, I advocate that systems people share their intermediate results and discuss their work process, primarily for two reasons: first, the issue is usually raised where users and managers have viewed past performance as poor; and secondly, it is those who lack confidence in their work who both resist outside involvement and need it most. Why would an effective group resist outside review?

When performance is negative, resistance to scrutiny and involvement from outside the work group is useless. Resistance will prove that original perceptions are well founded, thus intensifying efforts to improve things—whether improvement is warranted or not.

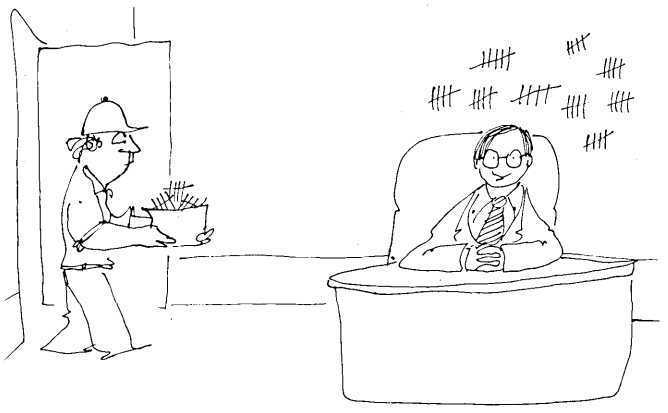
Nonresistance permits performance questions to be aired. In a healthy environment, this means that all sides will be heard and an objective analysis can be made. If substantial issues exist, they can be identified and resolved.

When lack of confidence in one's work causes resistance to outside involvement, there is every reason to cut through the resistance. The issue is one that hurts the organization as well as the individuals in the work group. Improvement cannot occur, because outside input is cut off, and any fresh, new ideas are limited to those that arise in a small group.

We are dealing with three issues: methodology, competence, and territoriality. Without tactful intervention, an undesirable situation may be perpetuated. Let's take a closer look at these issues.

Methodology refers to the unified set of techniques used to provide systems solutions. We have been working toward a more methodological approach to systems development for years—and with some success. The process involves recognizing shortcomings in existing methods and fine tuning, combining, or creating techniques as needed.

Resistance to methodology comes from two groups: technical people who are unwilling to hear about or adopt new techniques, and managers who refuse to allow the time and effort required to learn and implement new techniques.



CARTOON BY RICHARD CLINE

I have found that technical level resistance is easily remedied because of the technical person's inherent desire to do a good job. Take an experimental attitude that begins with the hypothesis that a new technique can improve product quality. When management support is given in the form of time and money, this attitude rarely fails if the new techniques are sound and can be adapted to a specific environment.

Management's refusal to adequately support productivity/quality improvement is far more difficult to overcome. It requires coming to grips with some very sensitive issues that include tight time frames within which to deliver systems products; fear of becoming technically outmoded; fear of loss of staff and career "dead-ending"; and miscomprehension of the need for productivity and quality improvement.

No simple solutions exist. Each environment calls for a different approach, such as direct confrontation, changing compensation and motivation programs, or reorganization.

The competency issue is also sensitive. Questions of competence and insecurity often result in creation of smoke screens to hide these problems from the rest of the organization.

This issue also pertains to the different levels of technical skills required to perform systems development work in a complex and changing environment. Systems design is an example. The ability to create an elegant systems design that considers new technology, user friendliness, fast development, and other criteria (all seemingly mutually exclusive) is rare. Fortunately, this ability does not have to be exercised too often on most projects, but when required, it sets the foundation for the rest of the project.

The competency issue arises when a project group "closes itself down" to outside designers or experts. The attitude is that whatever the project group does is good enough and outside involvement is unnecessary. This attitude, however, overlooks the fact that the project goal is a high-quality product—not an exercise in do-it-yourself systems development.

The real problem here is one of organizational values and self-evaluation. The competency issue vanishes with the recognition that in group activities it doesn't matter who does what—only that it gets done effectively. Continuous exposure to new ideas and objective evaluation as part of an ongoing quality assurance function will help to eliminate the problem.

Territoriality is a key issue in the question of autonomy. Territoriality refers to our tendency to define an area as "belonging to us" and then protecting that area from encroachment by others. In the context of systems development, territoriality means protecting one's perceived job functions and responsibility. In its positive form, territoriality ensures that redundant effort is not performed. But in its negative form, it can inhibit cooperation and promote the worst qualities of bureaucracy.

These issues must be addressed if we are to open the work process to a reasonable level of outside involvement and surveillance. Necessary control processes in any work environment, quality assurance and the project control function require involvement and surveillance. Quality assurance necessitates independent scrutiny of job performance and intermediate results. Project control requires monitoring work completion against a plan.

Resistance to effective involvement from outsiders is a sign of an unhealthy work group—one that thinks (consciously or unconsciously) it has something to hide. If there is something to hide, then an even greater need for scrutiny exists. If there is nothing to hide, why not open the process and be proud of the result?

Product and work process improvement and better working conditions can become ongoing activities only with recognition of the need for three primary elements in the work process: quality assurance, project control, and performance.

—George Pitagorsky
New York City

READERS' FORUM

ABACUS DATA PROCESSING

There is little doubt that the basis of today's dp began in China approximately 450 years ago. In 1523, in the Chinese city of Peking, the modern "five-two" bead abacus was born, although records indicate a premature announcement was made by a large manufacturer of old style abaci as early as 1520. The new abacus consisted of a rack of beads strung in a 5-2 row pattern. It quickly became a calculating miracle, replacing the 4-2 bead and the 5-1 bead abacus. After considerable training, professional abacus operators could perform calculations somewhere between the speed of the electric calculator and the IBM 1401 computer.

This article will explain, for the first time, the pronounced similarities between older abacus calculations and edp operations of today. To do so, it is necessary to define some early Chinese words that either have been carried forward to modern times or were accidentally reinvented since 1951.

The following definitions have been translated from various provincial Chinese dialects in use around 1500 A.D.:

A.D.P.—abacus data processing.

Abaci—plural of abacus.

Abacore—the size of the abacus in beads, generally in multiples of seven to the maximum quantity of 105 (15 rows of seven beads each, generally referred to as a hexabead machine).

Abacusystem—the generally accepted procedures used in abacus processing.

A.R.G. II—early abacus programming system, Abacus Report Generator II. To obtain financial reports for taxation purposes, young Chinese were trained to copy abacus intermediate and final results onto small uniform sheets of rice paper.

R.O.S.—right-hand operating system, most commonly used by beginners.

L.O.S.—left-hand operating system. Designed for left-handers, who generally operated in a dual-processing mode, mirroring the *R.O.S.* operator.

T.O.S.—two-hand operating system, a higher-speed system developed for abadextrous operators. Some operators became so proficient in *T.O.S.* that they could perform two different calculate operations simultaneously, generally adding and subtracting with the left-hand system and multiplying and dividing with the right-hand system.

D.A.P.—dual abaci processor. Two abacus operators handling the same problem and periodically comparing cumulative results.

Abacus 3—a relatively simple, low-cost abacus, usually constructed of soft wood and cheap beads, used for instructional purposes and small-number users.

Abacadata—input to A.D.P. systems.

Abascores—final or control totals of financial data.

Young men were brought into centralized abacus operations to learn general concepts. After learning progressively more difficult operations, many were trained in abacusystems concepts and moved into systems work. Trained operators were generally rated in accuracy and speed, measured in milliclicks (from the sound of the beads striking each other).

Mathematical programming developed as a simple three-address language; one from column A, one from column B, and bead storage. This system became known as BAL, or basic abacus logic.

The term flip-flop originated at this time as an abacus memory clearance device. The instructor would tell the novice programmers and operators to clear the abacus of all previous calculations by shouting "flip-flop!" At this signal, the student would grip the

programmer's

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abacus by one end, extend the arm forward, and with a quick, clockwise flip of the wrist, throw all the abacus beads back to the zero or home position.

About 1540, the description "rod memory" was first used. Until then, the abacus beads were strung on taut, rawhide thongs that wore through after several thousand calculations. In 1540, a copper wire rod was substituted for the leather thongs and these new abaci were known as "rod memory" machines. Also at this time, abacore increased and some chief operators could handle up to 40 rows of beads (the Bead-280).

In 1550, the first software was developed and used. When several operators in one room were running high-speed calculations, the milliclicking noise became almost unbearable. A young inventor, Lyte Ning, manufactured little disk-shaped washers, which he placed between the beads, thus reducing the noise and the bead-bounce problems at the same time. All experienced operators immediately field-updated their abaci with the new soft wear (we occasionally see it spelled this way today!).

To speed up the transfer of information from the abacaroom to the users, the first C.R.T. was designed. When the operator reached a final or meaningful total, he would press the abacus into a shallow pan of soft clay or wax, thus preserving the results. This instant impression was given to the C.R.T., or character relay team, a staff of runners who would race the results from A.D.P. to the chief operating officer of the organization, village, or province. (Note: many commonly used expressions come from this operation, such as "feat of clay," "waxed and waned"—waned being the Chinese expression for fast running—"beadswax," etc.)

Some other terms developed in the 1500s were:

NCR—new Chinese reproducer.
CDC—Chinese digital counter.
RCA—rebuilt Chinese abacus.
CRAM—Chinese random abacus memory.
IBM—independent bead manipulators (the first free-lance service bureau abacus operators).

Few improvements were made to abacus data processing during the late sixteenth century. Abacus auditing was developed, however, when certain powerful users, generally the warlords, began to question abacus integrity and security. Questions on processing backups were used to ascertain protection against abacus loss by fire, flood, or other acts of Buddha. Contracts were developed to cover the use of backup abaci.

Chinese operators were quite superstitious; when consistently wrong answers were produced, these operators blamed some unknown "hex." If errors continued, the operator lost face and was labeled "hexadismal." He would then visit a local shrine to pray for help from a "hexorcist" or "devil-driver" to rid him of his problem.

The last written records located by the research team show that about 1580, the general method of abacus operation changed so that no one operator maintained the entire mathematical process, but the various processing steps were divided among several people. These operators would pass intermediate results to other operators. The operations controller became known as the abacadatabase manager.

The Chinese withdrew from world commerce at this time and no new developments in abacus use were discovered. The researchers are convinced, however, that many edp processes and terms in common use today are based on the Chinese abacus operations of the Middle Ages.

—Harry L. Brown
Hattiesburg, Mississippi

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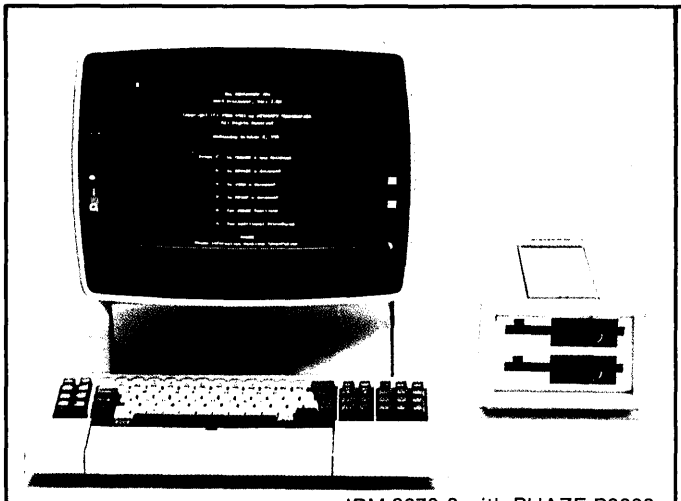

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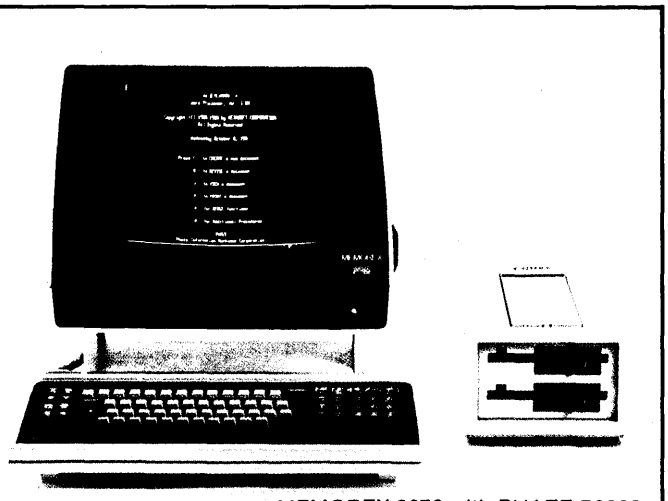

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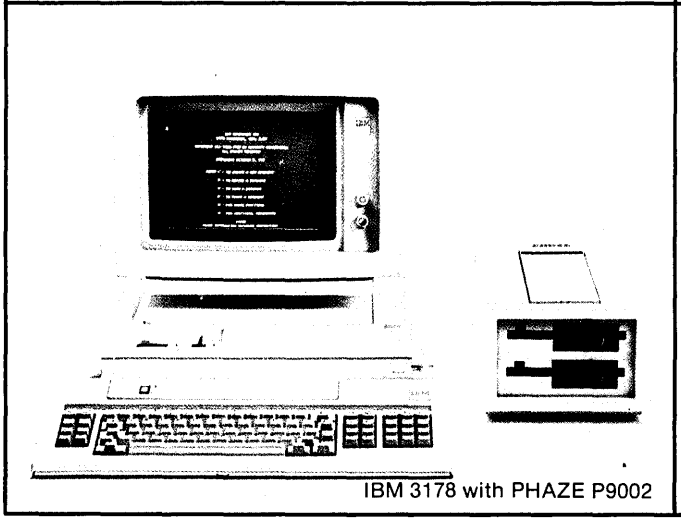

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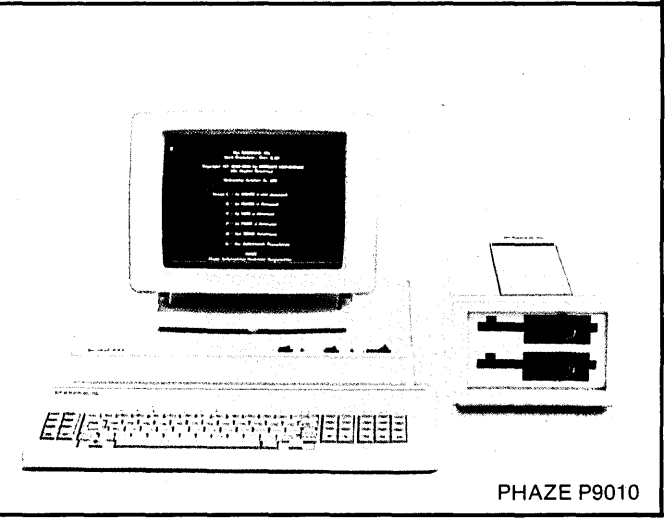

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Another example of the amazing value the 5420 represents, is that it lets you change from an 80 to 132 column mode to put more data—including accounting spreadsheets—on display.

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