DATAMATION

85

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**VENDOR RELATIONS:**
THAT DELICATE BALANCE

ALSO

BETTING ON PARALLEL PROCESSING

4GLS PRAISED AND PANNED

THREE FACES OF IBM

A PERFECT FIT

• 16-user support • Full-function relational DBMS
• SNA, Ethernet, X.25 • Scientific languages

The new Perkin-Elmer 3203 fits a lot into a little package. Designed to fit the office, laboratory or factory environment, it fully supports up to 16 users — at the lowest cost per user in its class.

And the 3203 is a full member of our Series 3200 family of supermini-computers. So as your application grows, your computer can too, without sacrificing software or peripherals.

Mainframe-class software

Tailored for real-time applications, the 3203 runs not just a subset, but full versions of powerful Perkin-Elmer software. Like a complete relational database manager. Comprehensive networking. Even our high perform-ance scientific languages.

That's real supermini versatility now and for the future, at a price starting as low as $10,292.*

Featuring up to 4MB of memory, 170 MB fixed disk storage, a cartridge streaming tape, plus an SCSI bus for peripheral flexibility, this low-cost entry into Perkin-Elmer computing is easy to install, configure and use. All in all, a very fitting choice.

Fit us in:

1-800-631-2154.

Or contact the Perkin-Elmer Corporation, Two Crescent Place, Oceanport, NJ 07757, (201) 870-4712.

*OEM quantity 100; single unit price $16,600 (U.S. prices only)

PERKIN-ELMER

CIRCLE 1 ON READER CARD

Rumor has it you're moving up to T1.
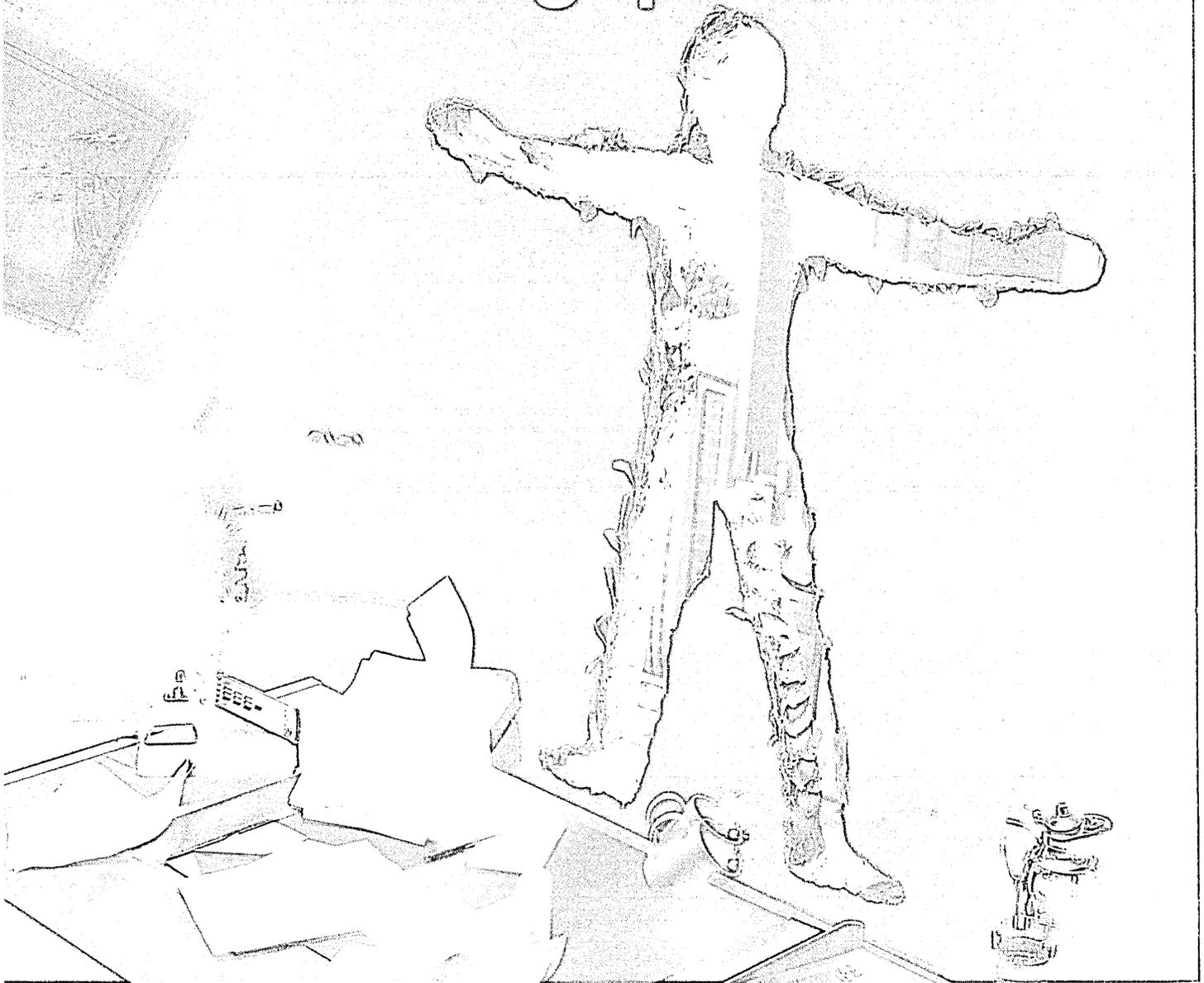
Come back.

T1 speed.

It doesn't have to be as scary a project as everyone thinks. Fact is, installing T1 can be a fairly simple chore.

We're Infotron. We design, build, and install communications networks. Reliable.

Compatible. Sophisticated T1 networks that support data and compressed digital voice.

Our newest system, InfoStream™, introduces an open architecture to T1 networking based on Infotron's long-established strengths in multiplexing

and switching.

We'll take care of you every step of the way. Before. During. And after the sale.

Calm down. Dust yourself off. Then call: 800-345-4636.

INFOTRON SYSTEMS

DATAMATION

COVER ILLUSTRATION BY DANIEL ADEL

Introducing seven different ASCII displays...
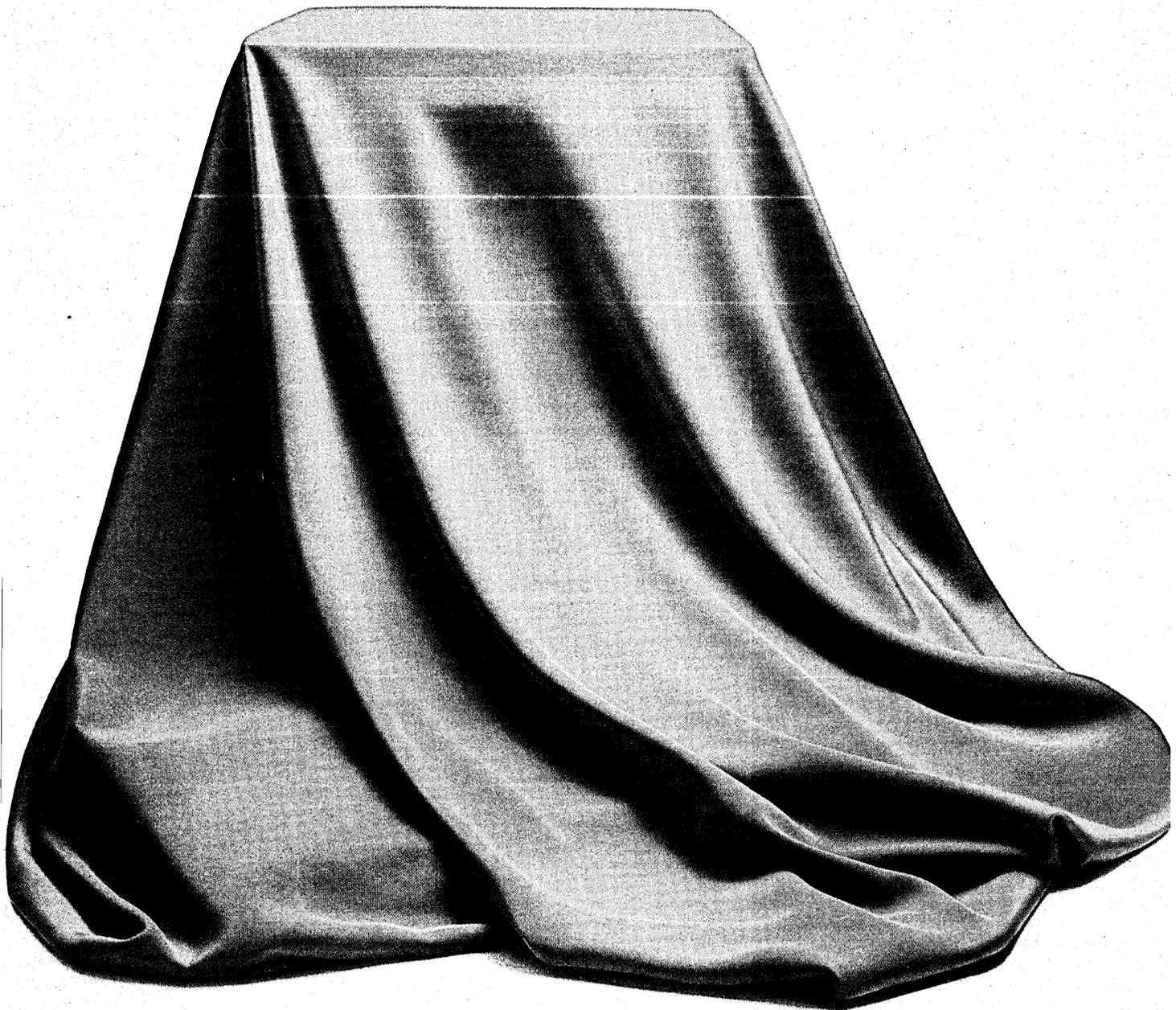
The new IBM 3161 ASCII Display Station is really seven different ASCII displays in one.

In addition to its own function-rich native mode, the new IBM 3161 can emulate:
- IBM 3101 Model 881
- ADDS Viewpoint*
- Hazeltine 1500*
- Lear Siegler ADM-3A*
- Lear Siegler ADM-5*
- TeleVideo 910*

Besides fitting nicely into existing systems, the IBM 3161 also offers impressive improvements in ergonomics.

Improved Ergonomics For Improved Productivity

Take the 102-key ASCII-style keyboard, for example. Its low profile, gentle contour and typewriter touch make for faster keying with fewer errors. The keyboard has programmable function and editing keys so it can be custom-tailored to meet your application needs.

Then, for comfortable viewing, there's the tilt and swivel of the 12″ display. And the sharp, clear 8 x 16 character matrix for easy reading. Plus cursor, character and field attributes (blink, reverse video, underscore, dual intensity, etc.). And scrolling. And partitioning. And lots more.

The IBM 3163 with Plug-in Cartridge

And, as if that weren't enough, we're also announcing

The sharp 8 x 16 character matrix helps make for easier reading and fewer operator errors.

a second new ASCII display station with even higher function—the IBM 3163.

Outwardly, these two new displays look alike. But the 3163, in addition to its built-in emulation of the IBM 3101 Model 881, also offers the ability to emulate the DEC VT 52 and VT 100* by means of a unique plug-in cartridge.

And while you'll like the power and flexibility of the 3161, for your high-function applications the 3163 goes even further. For example, a 7,680-character buffer and up to three windows enable you to view and modify portions of different host data bases. The 3163 lets you redefine and even recap the keys.

On both displays the setup is menu-guided and written in plain English, so it can be done easily and quickly. The point is, both are designed to improve your user productivity.

Very Attractive Prices

The price per terminal is $695 for the 3161 and $1,095 for the 3163. Quantity discounts are available. What's more,

IBM maintenance offerings start as low as $35 per year per terminal for customer carry-in repair.

Now there's a new family of ASCII displays with the quality, service and support IBM is famous for. Both displays are available through IBM Authorized Distributors and IBM marketing representatives.

FEATURES	3161	3163
Lines x Characters	25 x 80	25 x 80
Double-sized chars	No	Yes
Line drawing chars	24	24
Vertical scroll	Jump	Jump/Smooth
Definable function keys	24	24
Windowing	No	Yes
Partitioning	Horiz	Vert/Horiz

Call 1 800 IBM-2468, Ext. LE/82 for the name of an Authorized Distributor near you.

IBM®
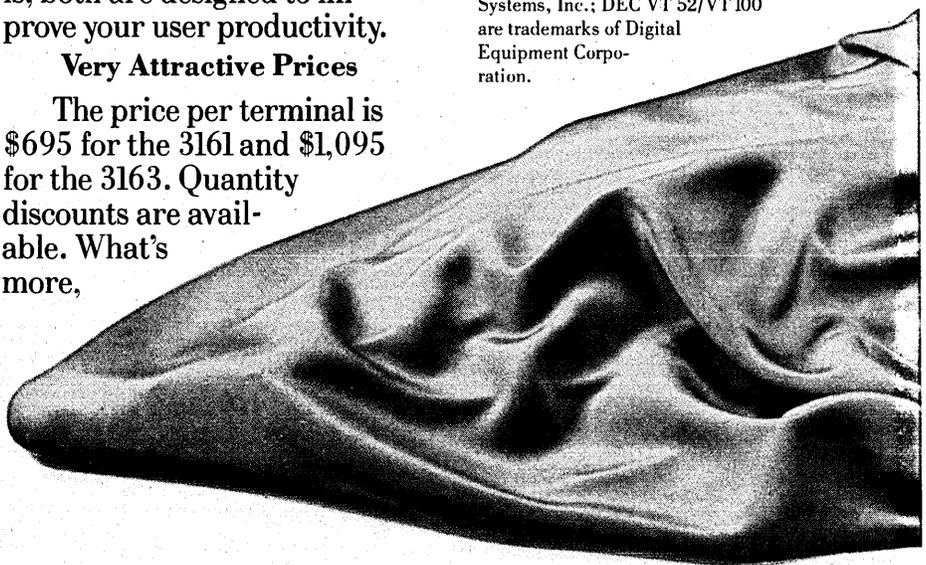
in one.

The IBM 3161 ASCII Display Station
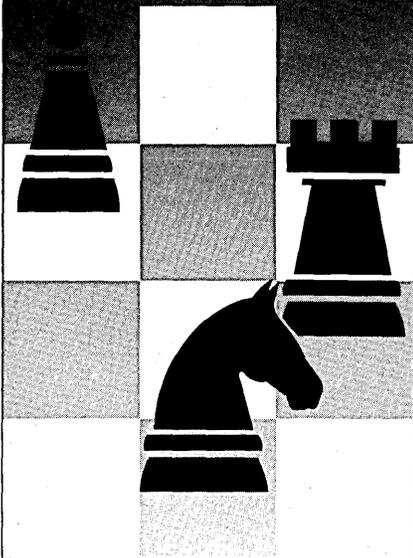
LOOKING BACK

KRANZLEY'S CRYSTAL BALL

July 1965: It was almost as if author Arthur S. Kranzley, managing director of Information Science Associates, Cherry Hill, N.J., could predict the days to come. In his article, *The Bank of the Future,* Kranzley showed tremendous foresight into the interdependent worlds of data processing and banking. His forecast stressed that commercial banks would become "one of the largest classes of information processing equipment users in this country," and that they would bring "modern information processing to more businesses and individuals in the next decade than any other single type of enterprise or segment of our economy." He expected that commercial banks would experience a continuing metamorphosis in automation because banking had, unlike any other segment of the business population, welcomed computers wholeheartedly since 1959. This metamorphosis had begun with the tenfold enhancement of computing power per dollar, the introduction of on-line remote terminals coupled with multiprocessing, and increasing levels of compatibility supplied by the dp industry.

From paying bills to planning investments, most bank customers needed and wanted more information and assistance from their banks. As Kranzley stated, "The friend in the bank must be more than a teller and supported by more than an alligator skin checkbook." So, to satisfy their customers and remain competitive, most commercial banks wanted on-line data transmission, inquiry and display consoles, teller terminals, remote terminals for users of their financial services, and new programming languages. In other words, every commercial bank wanted "to take full advantage of computers in the offering of new (and more efficient) services to its customers."

As the traditional roles of commercial banks changed due to data processing, how would customers benefit? Kranzley foresaw banks paying customers' bills by preauthorization. This pro-

cess, he envisioned, would be further enhanced by the use of the telephone or a pc hooked up to the bank. Checks would one day be souvenirs of the past, according to Kranzley. Customers' credit lines would be adjusted regularly and be available at all times. He also believed banks would play an instrumental role in the retail purchases of their customers. "More individuals and companies than ever before will realize the fruits of automation through the banking system's new services," prophesied Kranzley.

IBM EMPHASIZES COMMUNICATIONS

July 1975: Was IBM's System Communications Division (SCD) formed to ensure that satellite communications became part of IBM's "rightful share of the business"? As Phil Hirsch explained in his News in Perspective item, the Federal Communications Commission gave IBM a list of provisions it would have to meet before it could enter the satellite communications business, and one of the provisions was the formation of a separate subsidiary for the domestic satellite business. SCD would be responsible for the design, development, and manufacture of computer-based communications systems and terminals, thus abolishing the need for the System Development Division (SDD). So, SDD's noncommunications operations were dispersed to other divisions, and Bob O. Evans, former SDD president, became head honcho of SCD.

Ed Sussenguth, IBM's director of communications systems architecture, gave readers some indication of where this new division was headed. He predicted that the industry would see a growing specialization in terminal applications and wide use of distributed processing. Businesses would be using electronic mail excessively and secretaries would be composing letters on computerized, crt-equipped word processors. Naturally, the SCD would be in the mainstream of all this innovation, noted Sussenguth.

—Mary Ann Hariton

The first DBMS designed for online systems from the start, finishes first.

Compared to any other DBMS, CCA's MODEL 204 software is faster in a VM, OS, or DOS environment.

And, its productivity stays ahead of the pack even as you add more and more users. Incredibly, the MODEL 204 can support any size network from 30 to 30,000 terminals.

Like the cheetah's speed compared to other animals, the MODEL 204 was designed to be fast from the start. Because instead of being designed for batch, then retrofitted, this DBMS was specifically designed for online systems right from the start.

Impressive as its speed, is capacity. It can handle a few hundred records, or as many as 513 billion! With no limit on each record's size.

Because of its fourth generation tools, tough applications are easy to create, test, or change without affecting the database. And unlike any other DBMS, as your business data tracking requirements change, you can add or change new or existing fields without unloading, recompiling and reloading the database. A dramatic savings of time and manpower.

Very quickly, let us tell you more about MODEL 204's speed and superiority. Send the coupon for more information fast. Or, call 1-800-258-4100.

Software innovators creating better ways to manage business.

CIRCLE 4 ON READER CARD
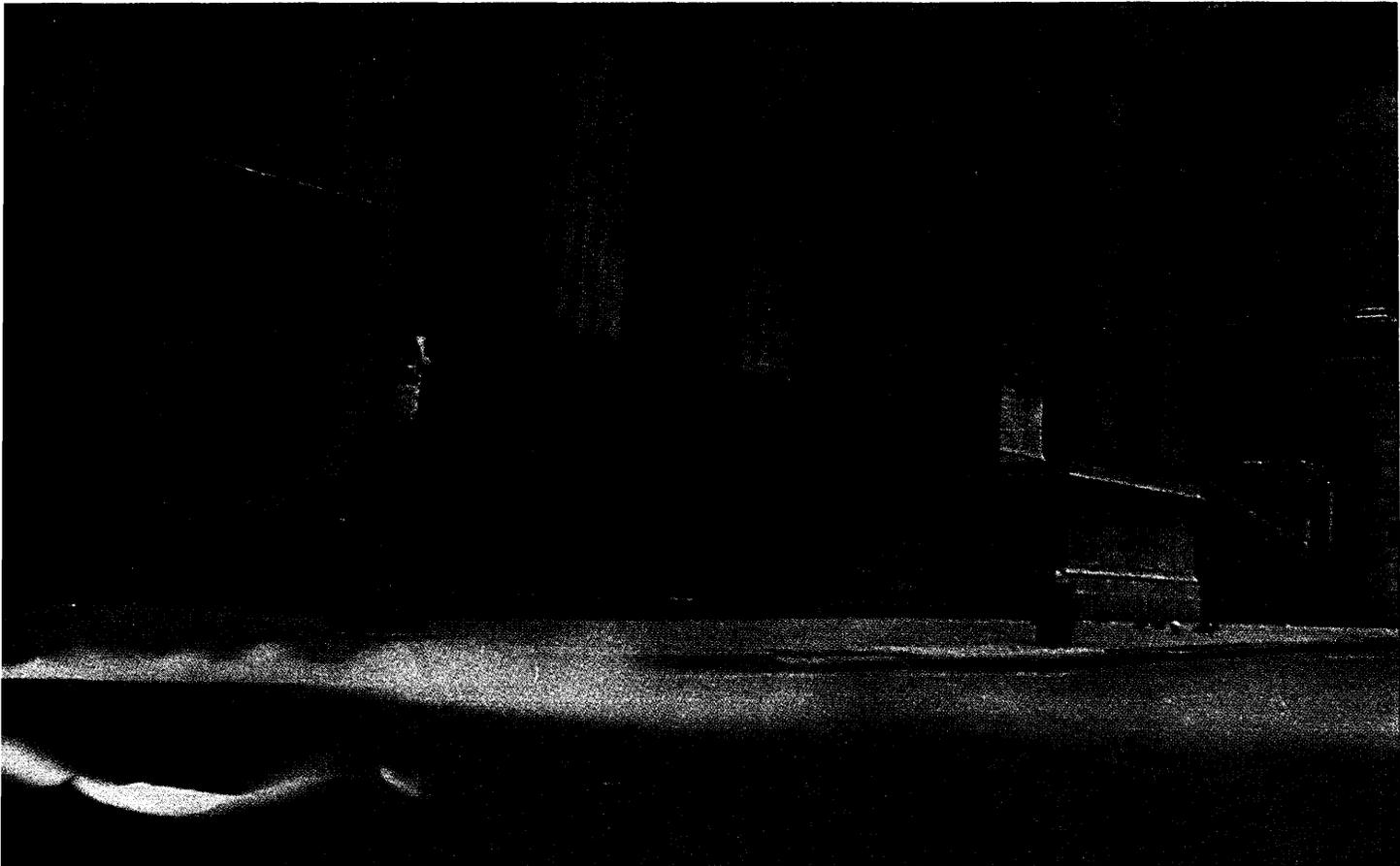
"WITH NETWORKING FROM DIGITAL, THE TRADING AT BANKERS TRUST WILL NEVER STOP."

Claus Grueneis
Vice President,
Bankers Trust Company

Wall Street has its eye on Bankers Trust.

Armed with a new network, rich in entrepreneurial spirit, the bank is pushing the frontier of what's new in financial services to the horizon. Bankers Trust is proposing to become the financial community's premier global merchant bank.

Claus Grueneis, vice president of the technology department, explains, "Our goal is to use the bank's resources more aggressively. To create more liquid assets and liabilities. In effect, to greatly increase that portion of the bank's portfolio that is available for sale."

Some would say Bankers Trust has its eye on Wall Street.

"DIGITAL IS BUILDING THIS NETWORK RIGHT."

At the cornerstone of global merchant banking is the ability to integrate the origination, risk management, and distribution of financial instruments worldwide. In real time.

Bankers Trust asked vendors to suggest a networking strategy that would match this business strategy.

"The development of a sophisticated system like this all at once," says Claus, "is venturesome. Digital offered us a modular approach that was most attractive."

Claus cites the family of compatible VAX™ hardware, its consistent VMS™ operating environment, and the sheer range and diversity of Digital's network offerings as critical factors.

"These are allowing us to build each product separately and be guaranteed they will all work together. It also means," Claus says, "we can address every opportunity regardless of its network location with a solution that fits just right. Digital's overall approach," he says, "has proven cost-effective every step of the way."

"TODAY, ASSET LIQUIDITY REQUIRES INFORMATION LIQUIDITY."

The networking system at Bankers Trust is called REMOS,™ the Resources Management On-line System.

It comprises applications software developed by Bankers Trust and a major VAX local area network in New York City that links the bank's trading floors around the world using Digital's DECnet™ networking software. The system makes the same information available to everyone at the same time.

REMOS is designed not only to display the bank's position in traditional treasury markets like foreign exchange, it is also opening up new

product opportunities.

"As our loan portfolio becomes more liquid, we will not only originate and maintain loans, but distribute them as well," says Claus. "Our ability to place these loans and other financial instruments internationally over REMOS is key to our growing competitiveness."

The idea is to keep everything in motion. To allow dealers to trade quicker and quicker. To be first to take advantage of the imperfections in any market.

Will the trading never stop?

"That's the idea," says Claus. "This networking system will support the growing trend toward 24-hour trading."

And REMOS will keep getting smarter.

As early as next year, Bank-

ers Trust will integrate expert system capabilities into the network.

"THE NETWORK IS AS FLEXIBLE AS THE FREE MARKET."

Claus says that the bank's new network is, "the most sophisticated attempt we've ever made to manage risk and capitalize on opportunities in world markets. We're not solving old problems," he says, "we're putting in place a technology that

will take advantage of market situations that aren't yet apparent. We can add or improve on product modules at will – the system is that flexible."

Bankers Trust and Digital are co-marketing REMOS. "Any institution with a keen sense of competitiveness, operating in

any money and securities market is a potential customer," says Claus.

Meanwhile, the nation's seventh largest bank is well on its way to becoming a preeminent merchant bank around the world.

BEST ENGINEERED MEANS ENGINEERED TO A PLAN.

Digital networking products, like all Digital hardware and software, are engineered to an overall plan. This means Digital systems work together easily and expand economically. Only Digital provides you with a single computing strategy direct from desktop to data center.

Digital will help design, install and maintain your network anywhere in the world. You, your users, your data communications management can all be Digital trained. Digital will give you round-the-clock support, with guaranteed service and warranteed product performance.

For more information about Digital's networks, call 1-800-DIGITAL, ext. 242. Return the coupon or write: Digital Equipment Corporation, ATTN: Media Response Manager, 200 Baker Ave., West Concord, Massachusetts 01742.

I'd like more information about Digital's networking capabilities:
☐ Please send a copy of your brochure, "Digital: Tomorrow's Networks Today."
☐ Please have your sales representative call.

Name

Title

Company

Address

City

State   Zip

Telephone   Ext.

Return to: Digital Equipment Corporation
Attn: Media Response Manager, 200
Baker Avenue, West Concord, MA 01742

THE BEST ENGINEERED COMPUTERS IN THE WORLD.

digital™

LOOK AHEAD

DON'T SLAM THE DOOR

AT&T apparently wants to pare its work force so badly that it is giving terminated employees an extra incentive to leave quietly. AT&T's "1985 Surplus Force Reduction Plan," designed to eliminate over 1,500 managers in six months, requires departing employees to sign a "separation and release" waiver, an AT&T first, in exchange for a 2% increase in severance pay. Employees surrender all legal rights under state and federal laws to sue AT&T for age, sex, or race discrimination.

PACIFIC BELL TO DUMP AT&T?

There's another good reason for those sour expressions at AT&T these days. Pacific Bell of San Francisco will begin tests next year of ITT Telecom's System-12, the Cadillac of PBXs. If the BOC likes the results, sources say, it will drop its costly leased 800 services from AT&T and start offering its own product to consumers and other interexchange carriers. S-12 will likewise allow Pacific Bell to get a leg up on AT&T and the other BOCs by offering an all-binary integrated services digital network over 60,000 miles of fiber-optic cable already laid statewide. If the tests are successful, they will vindicate ITT, which reportedly has spent $1 billion reconfiguring the switch from European to North American standards.

GUESS WHO MAY BUY JAPANESE?

With the trade deficit and technology race both serving as strong reasons to buy American megaFLOPS, it would seem as if Cray and ETA Systems might have an extra advantage in selling to U.S. customers--particularly when those customers are part of the U.S. government. Not so, say sources at two of Cray's biggest installations, Lawrence Livermore National Labs and NASA's Ames Research Center. Even as the Cray 2 begins shipments, these users say they may find faster machines in Japan--and if they do, they want to ignore political ramifications and buy the Japanese boxes.

IBM PREPARES WORKSTATION . . .

Watch for IBM to unveil a high-powered workstation later this year, based on the company's proprietary 801 RISC chip. Securities analysts were shown the so-called Quicksilver system at IBM's Yorktown Heights, N.Y., research labs in mid-June. IBM told them the machine wouldn't necessarily show up as a product, but sources at Carnegie-Mellon University in Pittsburgh indicate otherwise. There, company and CMU researchers have been building a software development environment based on Quicksilver, which when introduced will use Unix and other operating systems. CMU is targeting Quicksilver as a delivery vehicle for its in-house network-oriented operating system known as Accent. The 2MIPS unit, which has a large, mouse-driven display screen, may be marketed for CAD/CAM use.

LOOK AHEAD

. . . BUT WHAT OF PC2?

Meanwhile, IBM management is still deeply divided on the announcement date of its PC replacement, a small 80286-based ATjr device. One IBM insider now claims that early September is the likeliest introduction date, although many IBMers want the date pushed well into 1986 to protect older PC inventories. Some users have ceased all PC and XT purchases because of PC2 "preselling" and fears that new software applications being developed for IBM by third parties will run only in AT or PC2 mode. Many software companies are writing their new applications to run in the AT BIOS-protected mode to take advantage of latent 32-bit addressing and multitasking capabilities.

SHAKEUP AT SOHIO

The classic struggle between centralized and decentralized computing seems to be taking a new turn at Standard Oil of Ohio. Sources say the company is shifting away from a standard mainframe-based setup to a dp environment built on applications running locally on superminis and local area networks. Indeed, the Cleveland oil giant is said to be laying off some of its dp staff as it installs local area networks in its Louisiana and Ohio facilities. One insider says MIS professionals are now faced with the choice of mastering LANs and personal computers or looking for another line of work.

PRIME'S STAR OS:

Prime seems to be wowing its overseas customers with its Pick-like operating system, Information System. Spectacular successes with the software in Australia and Europe have helped Prime ride the recession that has hobbled other New England minicomputer companies. Many Prime remote sites are so heavily committed to communicating data that they don't have enough lines available for voice, and the new operating system allows these companies to download their message center software to a dedicated Prime minicomputer, according to one U.S. customer.

RUMORS AND RAW RANDOM DATA

Travelers Insurance Co. is about to buy 12,000 IBM PCs for its Norcross, Ga., offices to complement the 10,000 it bought last year for its Hartford, Conn., headquarters, but sources indicate that this time Travelers will buy directly from IBM. . . .An add-on vector processor for IBM's 3090 mainframes is apparently being shown to select customers. Can its introduction be far away?. . .Watch for HP next week to unveil a vector-driven color film recorder that makes slides with a resolution of 16,000 points per frame . . . .EMC, a Natick, Mass., supplier of memory upgrades for DEC, Prime, Wang, and Apollo systems, is about to hit the Hewlett-Packard market with a 1MB memory card for the HP 3000 models 39 through 48, at about half the cost of comparable HP cards.

INSIDE WITH THE

Is it possible for a computer to have a future built in?

As long as it's a computer from AT&T, like the AT&T PC 6300. For the inside story, read on.

SEE HOW IT GROWS.

When we say the computers with the future built in, we mean two things: AT&T offers you high-performance computers today, and a commitment to flexibility for future growth.

Let's take a look at the AT&T PC. Driven by the 8 megaHertz 8086 chip, it has a built-in socket for the addition of the powerful 8087-2 co-processor. The 8087 increases the speed of certain applications—up to 100 times faster on time-consuming mathematical programs and business projects. What's more, you can install the 8087 in a matter of minutes.

But what good is more power if you don't have more memory? Bearing that in mind, the AT&T PC can be upgraded from 128 or 256K RAM to 640K. So you can significantly increase the original memory for extra text, data and software applications with any combination of chips and expansion boards.

THE COMPUTERS WITH CONVENIENCE BUILT IN.

We can't emphasize enough just how easy it is to add enhancements to the AT&T PC.

Do you want more than the PC 6300's built-in color graphics and superior high-resolution display? Then take five minutes and install the display enhancement board which produces up to 16,000 on-screen color variations. All smooth enough for souped-up charts and graphs, and fast enough for animation.

Whether you want to add more power, speed or storage, you can do it in a snap. And that goes for any of the AT&T PC enhancements.

THE PC FOR THE LONG RUN.

By now, you know the AT&T PC is designed to take on tomorrow's high-performance technology.

But that's only half the "future built in" story. The other half begins with options and enhancements that ensure your future with integrated voice and data communications.

And who's more qualified to bring you that future of dependable communications than AT&T?

For today's needs, there's the AT&T Communications Manager. With this internal modem and two telephone lines, you can transmit data over one line while simultaneously talking on the other.

The Communications Manager also has concurrent context switching that lets you switch with a simple keystroke between the Communications Manager and your software application.

As time goes by, you can continue to look forward to the most advanced integrated voice and data technology on the market.

A STARLAN IS BORN.

AT&T also has the unique ability to put vast telecommunications expertise to work on computer networks. Thus was born STARLAN, a compact, high-

THE COMPUTERS FUTURE BUILT IN.

speed local area network designed to use ordinary telephone wires to connect computers, terminals, printers, workstations and other devices.

Consistent with AT&T's commitment to tomorrow, STARLAN has a future built in, too. It's compatible with AT&T's Information Systems Network. And it's even compatible with IBM's System Network Architecture and other wide area networks.
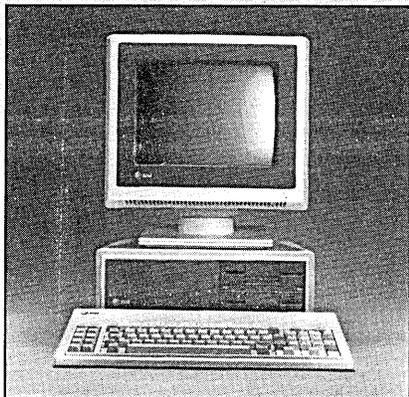
If you can plug in a telephone, you can install the AT&T STARLAN Network. Which can be expanded from 200 to 1200 physical connections.

MAKE THE RIGHT CHOICE.

As you can tell, when AT&T commits to something as important as a computer for your business, we stand behind it every step of the way.

From our nationwide service support and hotline assistance, to innovative systems that can grow as your business does, to new technology that adapts with your changing needs. Because when you invest in a computer, you want it to pay off for the long term. And if you buy an AT&T PC 6300, that's exactly what you can look forward to.

Which is why AT&T is the right choice now and years from now.

For more information, call your AT&T Information Systems Account Executive, visit an authorized AT&T dealer, or call 1 800 247-1212.

And get the inside scoop.

AT&T
The right choice.

CALENDAR

AUGUST

1985 International Computers in Engineering Conference and Exhibition.
Aug. 4-8, Boston. Contact Gemma Tansey, ASME, 345 E. 47th St., New York, NY 10017, (212) 705-7795.

COMTRED '85 (The National Computer Training and Education Conference & Exposition).
Aug. 7-9, Philadelphia. Contact NCEE, 1411 Walnut St., Suite 200, Philadelphia, PA 19102, (215) 972-8792.

The Fifth National Conference on Artificial Intelligence.
Aug. 11-15, Philadelphia. Contact Lorraine Cooper, AAAI, 445 Burgess, Menlo Park, CA 94025, (415) 328-3123.

IFIP/Sec '85 (Third International Conference and Exhibition on Computer Security).
Aug. 12-15, Dublin, Ireland. Contact Conference Secretariat, IFIP/Sec '85, 44 Northumberland Rd., Dublin 4, Ireland, tel. 688244, telex 31098.

AUSGRAPH 85 (International Computer Graphics Conference & Exhibition).
Aug. 12-16, Brisbane, Australia. Contact Conference Secretariat, AUSGRAPH 85, P.O. Box 29, Parkville, Victoria, Australia 3052, tel. (03) 387 9955, telex AA 33761.

Computer Graphics '85.
Aug. 13-15, Boston. Contact National Computer Graphics Association, P.O. Box 3412, McLean, VA 22103, (800) 225-NCGA.

INTECH '85 (Integrated Information Technology Conference and Exposition).
Aug. 26-29, San Francisco. Contact National Trade Productions Inc., 2111 Eisenhower Ave., Suite 400, Alexandria, VA 22314, (800) 638-8510.

Interconnect '85.
Aug. 27-29, San Mateo, Calif. Contact USTSA, 333 N. Michigan Ave., Suite 1618, Chicago, IL 60601, (312) 782-8597.

Ninth New Zealand Computer Conference & Exhibition.
Aug. 27-31, Auckland, New Zealand. Contact Conference Committee, C.M.S.P.O. Box 3839, Auckland, New Zealand, (09) 774-041, telex NZ2401.

SEPTEMBER

IPRC '85 (Second International Personal Robot Congress & Exposition).
Sept. 6-8, San Francisco. Contact National Personal Robot Association, P.O. Box 1366, Dearborn, MI 48121, (313) 271-7800.

COMPINT 85 (International Conference on Computer Aided Technologies).
Sept. 9-12, Montreal. Contact COMPINT 85, P.O. Box 577, Desjardins Postal Sta., Montreal, Quebec H5B 1B7.

Ninth Data Communications Symposium.
Sept. 9-13, Whistler Mountain, British Columbia. Contact B.W. Stuck, Technical Program Chairman, Ninth Data Communications Symposium, Viatel Corp., 344 Raritan Center Pkwy., Edison, NJ 08837, (201) 225-1188.

First Pan-Pacific Computer Conference.
Sept. 10-13, Melbourne, Australia. Contact PPCC-1, P.O. Box 212, Hampton, Victoria 3121, Australia, tel. (03) 429 6088, telex AA31494MTC85.

Eurographics '85.
Sept. 11-13, Nice, France. Contact INRIA, Public Relations Department, Domaine de Voluceau, BP 105, 78153 Le Chesnay cedex, France, tel. (3) 954 90 20, ext. 3600, telex 697 033 F.

Unix Expo.
Sept. 18-20, New York. Contact Robert P. Birkfeld or Don Berey, National Expositions Co. Inc., 14 W. 40th St., New York, NY 10018, tel. (212) 391-9111, telex 135401 DIMCOMM.

CAMP '85 (Computer Graphics—Applications for Management and Productivity).
Sept. 24-27, Berlin, West Germany. Contact Postfach 19 17 40, Messedamm 22, D-1000 Berlin 19, West Germany, tel. (030) 30 38-1, telex 1 82 908 AMKB D.

The Eighth Northeast Computer Faire.
Sept. 26-29, Boston. Contact David Small, Computer Faire Inc., 181 Wells Ave., Newton, MA 02159, (617) 965-8350.

OCTOBER

The Eighth National Computer Conference.
Oct. 1, Al Khobar, Saudi Arabia. Contact 8th National Computer Conference, ARAMCO, P.O. Box 1748, Dhahran 31311, Saudi Arabia, tel. 875-5935.

Info '85.
Oct. 14-17, New York. Contact CEG Client Services, 999 Summer Street, P.O. Box 3833, Stamford, CT 06905, (203) 964-8287.

Interface '85.
Oct. 17-18, Marietta, Ga. Contact Virginia Hein or Bob Wess, Department of English and History, Southern Technical Institute, Marietta, GA 30060.

WORLDCOM '85 (Fifth Multinational Conference on World Communications and Computers).
Oct. 22-26, San Francisco. Contact International Council for Planning, P.O. Box 17392, Washington, DC 20041, (703) 437-0027.

Systems 85 (The Ninth International Trade Fair and International User Congress).
Oct. 28-Nov. 1, Munich, West Germany. Contact Jerry Kallman, Kallman Associates, 5 Maple Court, Ridgewood, NJ 07450, (201) 652-7070.
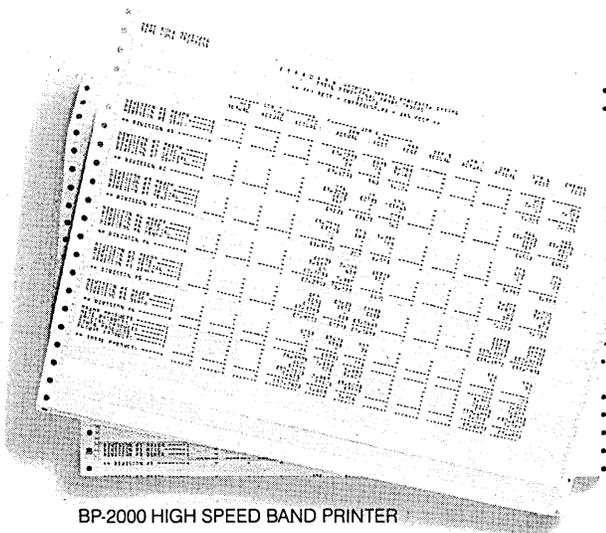
BP-2000 HIGH SPEED BAND PRINTER

M-100L
MATRIX PRINTER
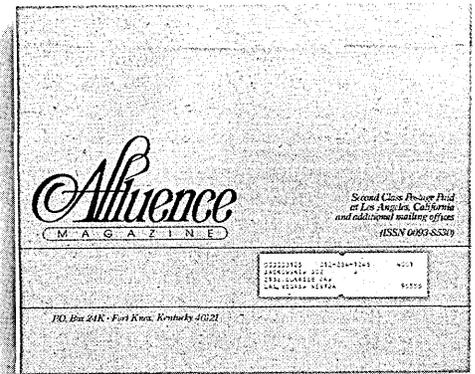
B-600 MEDIUM SPEED BAND PRINTER

8010 MATRIX PRINTER
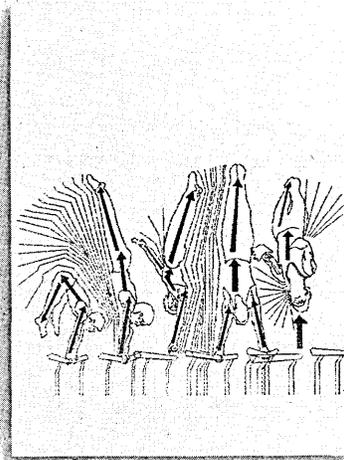
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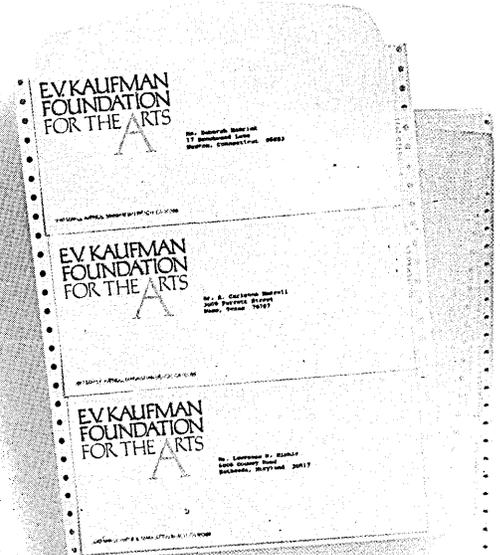
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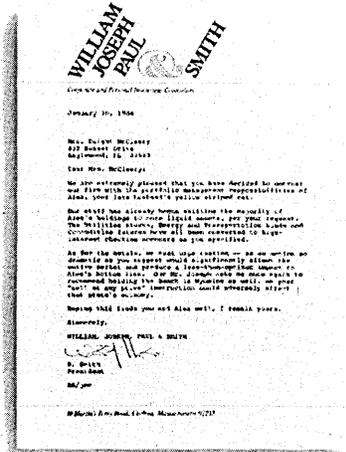
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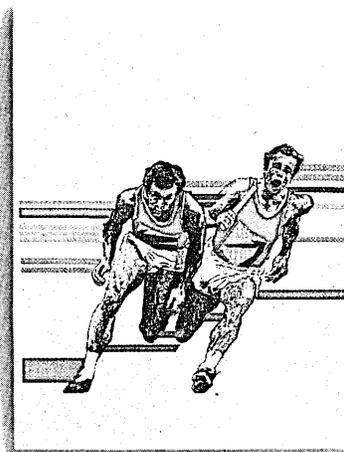
8050 MATRIX PRINTER
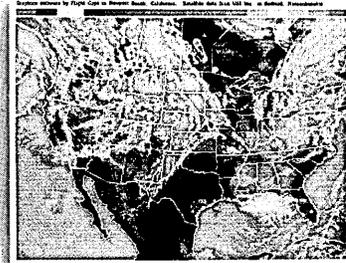
8070 MATRIX PRINTER
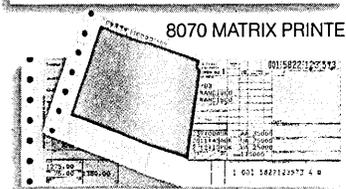
M-120 MATRIX PRINTER

...and so on.

THE BIG THREE IN BUSINESS SOFTWARE. BEFORE YOU BUY, SEE HOW THEY RUN.
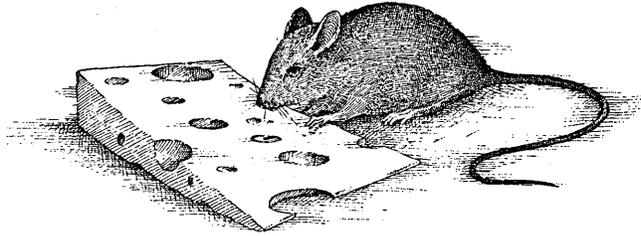
Run their general ledger. Their payroll/personnel. Their entire product line of financial and human resources software. Run the packages on your mainframe and link them to your PC's. Run them together and see if they work together.
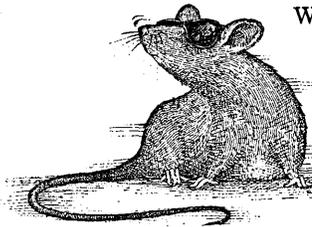
We believe you'll discover that two of the big three offer the mere appearance of integration, while one offers the real thing. Millennium. A true family of systems in which the whole works as smoothly as any part. In which every package has the same query mechanism, the same report writers, the same screen generation, the same on-line documentation, security and real-time capabilities. Giving you more efficiency than ever before from all your data processing resources.
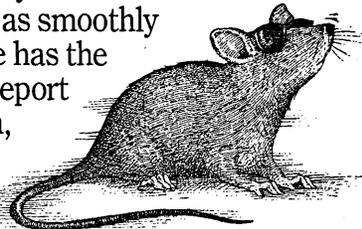
Of the big three in software, who's blind to integration and who's not? When you see how they run, you'll know the answer.

McCORMACK & DODGE

LETTERS

ATTITUDINIZING

The conclusion of the article "In Search of the Perfect Programmer" (March 15, p. 128) reinforces my theory that the main ingredient of a good programmer is not type but attitude.

The interviewer should spend the time necessary to determine the applicant's productive attitude. It is difficult to hire by type, but quite easy to hire by attitude. The result of hiring by attitude is generally a diverse group of interesting individuals, with at least one thing in common, the need to be productive.

How this group solves its problems is not as important as solving the problems in the scheduled time frame.

ARTHUR McBETH
Conston Inc.
Philadelphia, Pennsylvania

KID STUFF

It was with great pleasure that we read the article by Edith Holmes "DBMS for Kids" (April 15, p. 70). Your readers may be interested to know E. David & Associates had a 3 by 6 VISI-clone for children (called, appropriately enough, Kid Calc) available for TRS-80, Apple, and Commodore 64 computers three years ago.

CARL W. DAVID
E. David & Associates
Storrs, Connecticut

NOT OBSOLETE

While we would like to express our appreciation for your mention of our SideKick software product in "Oil and Water?" (April 15, p. 112), we request that you correct some statements in regard to our product.

First, SideKick was the first RAM resident desktop management package available (there were one or two other nonresident programs available before SideKick was introduced). Second, SideKick was introduced, copy protected, at $54.95. Today, SideKick is also available in a non-copy-protected version, for $84.95.

Third, and most important, SideKick is widely recognized as the best-selling desktop management program on the market today. More than 275,000 copies

of the product have been sold since its June 1984 introduction, and Softsel lists SideKick within the top four software products on its weekly "Hotlist."

In addition, we have enhanced SideKick over the past year, and will offer future versions of the product that are likely to enhance the way personal computer users work with desktop management software. SideKick is an evolving product, very much in demand today, and far from obsolete.

ROBIN TYGH
Director of Corporate Communications
Borland International
Scotts Valley, California

Steve Caswell replies:
Sorry for the misunderstanding. I used the word obsolete in comparing SideKick to some other packages that have reached the market with up to 13 more features, not to disparage its position in the market. In fact, the software market operates on name-brand recognition, which makes SideKick the leading package by a large margin. It's the reward for creating a new market category. It's good to hear that you're planning to expand the functionality, though. VisiCalc and WordStar both rested on their laurels and have lost their dominant market positions.

CORRECTIONS

An unfortunate statistical error in the DATAMATION 100 (June 1, p. 36) made it seem that the 1984 revenues of Racal Electronics PLC were down from the company's 1983 revenues: in fact, Racal's revenues were up. Measured in dollars, the revenues were up 14.8%, to $462.7 million from $403 million. In Racal's actual accounting currency, revenues were up 30% to £347 million from £266 million. These figures show that Racal's growth rate from 1983 to 1984 was the sixth highest of non-U.S. companies and that Racal should not have appeared in the "Stunted Growth" chart (p. 39). Racal would move from 51st place to 49th place in the overall rankings

Also, a transposed number in Siemens AG's 1983 revenues inflated this company's growth rate. Measured in dol-

lars, Siemen's 1984 revenues were off 1.1%, to $2.79 billion from 1983's $2.82 billion. In actual accounting currency, Siemen's revenues were up 10.6%, to DM7.95 billion from DM7.19 billion. Siemen's position as number 10 in the DATAMATION 100 ranking is unaffected.

Harris Corp. (p. 101) is still in the terminal business. According to W. Stephen Coleman, Harris's vice president of marketing, "Harris Corp. is committed to the information terminals business and offers leadership products in interactive terminals, remote batch terminals, and distributed data processing systems." Since the beginning of 1985, Harris's Information Terminals Group in Dallas has introduced new products including the Harris 9300 Work Group System and the Harris Challenger Information Display System.

Due to an error in our text processing system, the last paragraph from the Groupe Bull profile was inadvertently inserted into the writeup for Cap Gemini Sogeti (p. 162). Jacques Stern is the chairman of Groupe Bull, not Cap Gemini Sogeti as implied by the misplaced paragraph. The president director general of Cap Gemini Sogeti is Serge Kampf. Also, 27% of Cap Gemini Sogeti's revenues are generated in North America and 73% in Europe. Cap Gemini Sogeti's telephone number in France is (1) 723 61 85.

AT&T was inadvertently omitted from the chart of the leading U.S. dp companies (p. 54). It should have been in 12th place.

N.V. Philips's dp business in 1984 accounted for 6.5% of its total corporate earnings of $16.76 billion. Philips's position in the DATAMATION 100 remains the same.

We apologize for the errors.

In "Wishbook Wonders" (May 1, p. 24) Markline Co.'s 1983 sales figures were transposed: the correct figure is $23 million. Also, according to the company, it does not have a joint venture with Commercial Systems Inc. nor does Commercial Systems Inc. license or participate in the licensing of the Markline Mail Order Software.

The Missing Link: Even if you find it, you'll find it obsolete.
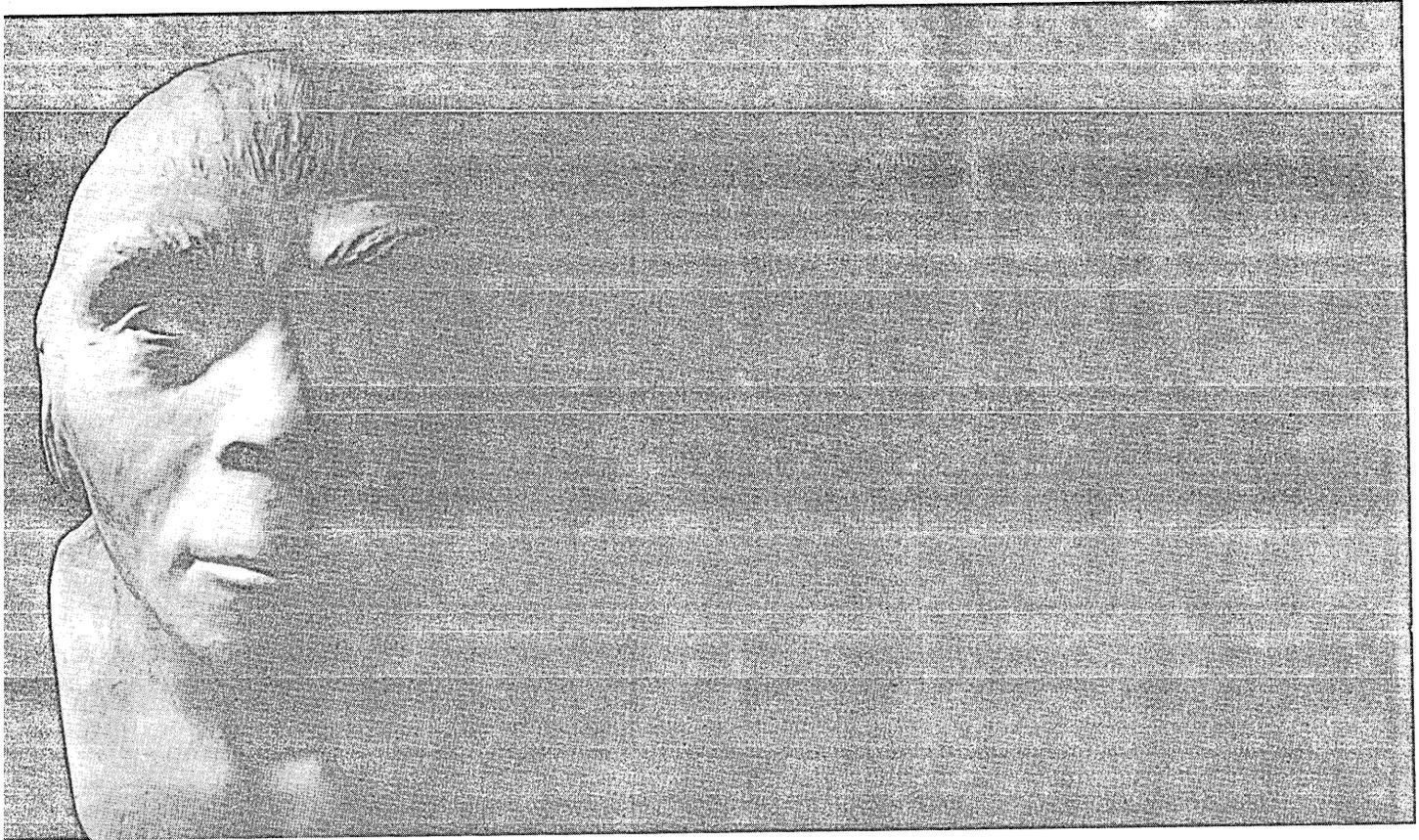
Which should come as no surprise to anyone in MIS who's tried to tie managers' PCs to the company's mainframe.

Because every "link" product on the market either causes more headaches for MIS than it's worth, or more work for executive end-users than they can deal with.

That's another reason thousands of PCs are now serving either as stand-alone work tools or as executive office decorations.

That's another reason Decision Support Systems simply aren't being used by decision-makers.

And...

THAT'S ANOTHER REASON WE CREATED COMMAND CENTER.™

To give you a set of 4th Generation software tools that help you build a truly functional Executive Information System quickly and economically. To take total advantage of all the data packed into corporate mainframes, and turn it into concise information that makes sense to executive end-users on PCs. Information that's integrated from both internal and external databases, in both text and graphic form. Information delivered on IBM® PCs driven by the mainframe, allowing different end-users to access their slice of a common database, all at the same time, all at the touch of a button.

COMMAND CENTER: THE FIRST TRULY SEAMLESS MICRO-MAINFRAME MARRIAGE.

Most emphatically, Command Center is not another "link" product that awkwardly attempts to communicate between database and decision-maker.

On the contrary, it's a single, on-line, distributed software system that resides seamlessly on both the corporate mainframe and any number of PCs, to give the user the best of both worlds: All the quick response, superior graphics, and highly interactive qualities associated with PCs, plus the database, system control, and number-crunching power of the mainframe.

All this with complete data integrity—since everything, from wire to wire, is back under MIS control.

How it works:

DataBridge:™ Brings data from widely varying systems together into one executive database. It integrates commercial databases, on-line public databases and, of course, your own in-house systems (including DSS models or 4GL DBMS).

EIS Database: A retrieval oriented relational database that handles both numbers and text, optimized for time-series data. It's smart enough to continually re-organize itself based on patterns of usage.

Smart Communications: Provides error-correcting communications with the user's PC in a protocol that produces rapid and accurate response. Also allows transfer of data from EIS database to 1-2-3™ readable PC files.

MENU SYSTEM

FOURTH GENERATION LANGUAGE

MAINFRAME SERVICES:	IBM PC SERVICES:
DataBridge	Graphics
EIS Database	PC Menus
Communications	User Interface

Command Center is designed for use with IBM®(VM/CMS), DEC® VAX ,"or PR1ME®, and any number of IBM PCs.
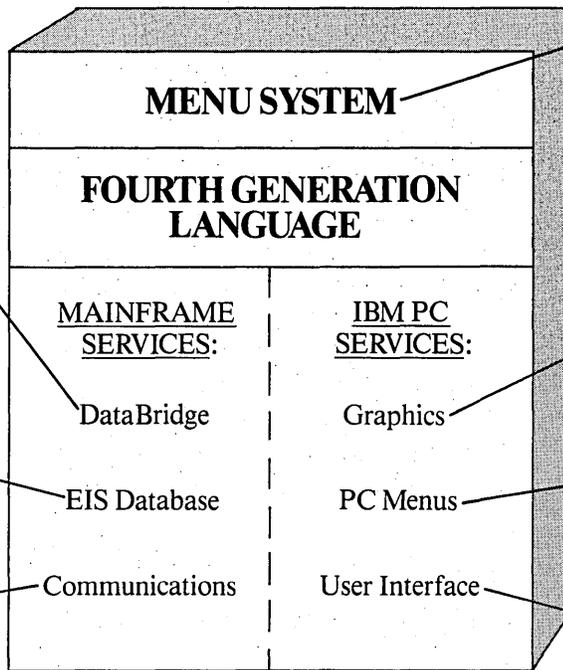
Menu System: Gives you mouse or touch-screen driven operation, controlled from the host. Provides the user with the ease of use of a PC with the database power of your mainframe.

Graphics: The PC graphics module creates bar, line, scatter, cross-sectional charts, and mixed text and graphics from data and commands sent from the mainframe.

Local Menu Storage: Menu screens can be stored on the PC so they don't have to be re-transmitted from the host.

User Interface: Non-keyboard pointing devices such as a mouse or touch are used for menu selection. Keyboard access is an option.

THE SYSTEM AT WORK:

Because Command Center is a single, 100% integrated micro-mainframe system, it gives MIS a way to serve a wide variety of purposes throughout the managerial structure of a company. For example:

One of the country's largest consumer products companies is using Command Center to build an executive system for presidents of its ten operating companies. Key items tracked include weekly sales, financial data, competitive information and industry news stories.

A major manufacturing company uses Command Center as an interface to the corporate data center to give non-technical senior managers financial information such as monthly closings, corporate consolidations and forecast updates.

A leading fast-food franchiser has developed an information system to give managers immediate access to historical operating results for 1200 franchise outlets, and to display growth rates, productivity, profitability and return on assets.

In short, Command Center is a tool that can dramatically disperse computer usage, while putting the management of information systems back in the hands of MIS.

And MIS back in the most productive ranks of management.

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For more information, please call us collect. We can elaborate by phone, send literature, or meet you for a personal demonstration.

In addition, we hold frequent Executive Information System seminars throughout the U.S. and Canada. For reservations, call Ruth Englar, Seminar Manager.

Aug. 22 ....Costa Mesa, CA	Oct. 17 ....Columbus, OH	
Sept. 4 ....Newton, MA	Oct. 22.........Hasbrouck	
Sept. 10.......Washington, D.C.	Heights, NJ	
Sept. 12........New York, NY	Nov. 5 ....Minneapolis, MN	
Sept. 19........Detroit, MI	Nov. 14........Dallas, TX	
Sept. 26........Denver, CO	Nov. 21.........Chicago, IL	
Oct. 1...........San Mateo, CA	Dec. 5 ....Toronto, ONT	
Oct. 10.........Montreal, QUE	Dec. 12........Los Angeles, CA	

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How do you switch and extend IBM channels?

You can't.

Unless you use the Data Switch Model 1200/1400.
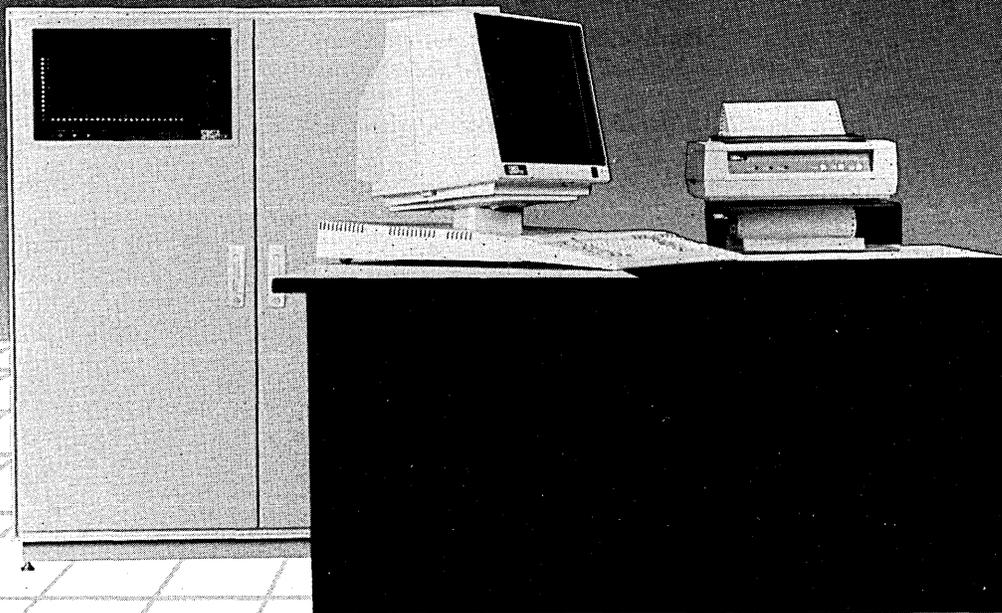
The ChannelMax Model 1400 incorporates Data Switch's proven switching technology and exclusive fiber-optic channel emulation and extension technology. This allows you to interconnect and extend IBM mainframes and control units for printers, terminals, and graphic workstations at distances up to 3.4 miles — without reducing throughput speeds.

The Model 1400 is an extension of our standard switch, the Model 1200. Both monitor channel activity of attached computers and control units and allow you to balance data traffic loads to optimize overall system performance. They safely test your peripheral subsystems, avoiding the risk of bringing down your on-line system. They even have a matrix that can be partitioned into logically independent systems for ease of operation.

And they can reconfigure your entire computer room, too, using reliable switching technology incorporated in over 1,000 installed Data Switch switching systems. The Model 1200 and 1400 control interconnections between multiple IBM (and compatible) computers and their peripherals, providing instant backup and increased equipment flexibility. They can be controlled from a local CRT terminal or from our Configuration Management System, which manages up to 36 Model 1200s/1400s located across the room or across the country.

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DATA SWITCH CORPORATION

HARDCOPY

GOODBYE MR. GOODWRENCH?
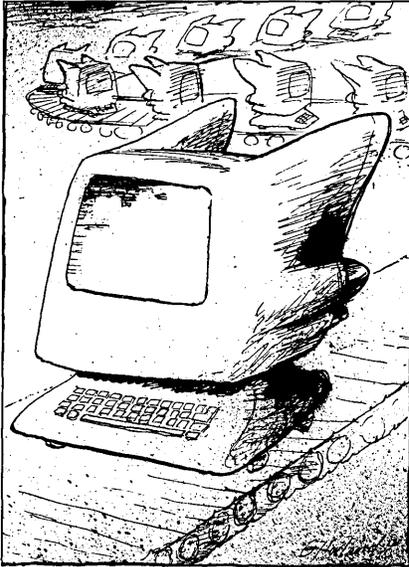
So, is what's good for General Motors still good for the country? At least it's beginning to look like what's good for GM might be wonderful for the computer industry. That piece of the cosmos could sure use some good news. How long ago was 1984? Centuries? Or was it eons?

This year has been one massive downer, and the body count is mounting: 1,600 workers out at Wang, which also reported for the latest quarter the second deficit in its history; dismissal of 1,300 employees and a dismal third quarter at Data General; 1,300 axed at National Semiconductor; four-day work weeks and 15% pay cuts for executives at Advanced Micro Devices; and Apple seemingly rotten to the core—another round of firings (1,200 this time), three plants shut down, and a loss for the just ended quarter. IBM is unable to make up its mind whether the year will show "solid growth" or less profit than its 1984 records or just be in the pits with the rest of the peasants. Spinster Sperry is still looking for a suitor. Even the retailers can't escape. There are suddenly 128 fewer people on Computerland's payroll.

Now into this mess strides GM. While it's bust time in Silicon Valley and along Route 128, it's boom time in Motor City. So what's GM doing here, anyway?

Because it wants to do for computers and electronics what it did for cars. If there were any doubts that GM plans to be a major player in the electronics game, its purchase of Hughes Aircraft should permanently put them to rest. Five billion dollars ain't hay, even for a company with pockets as deep as the Mindanao Trench. That's after GM spent $2.2 billion last fall to pick up EDS, another bastion of high-technology skills. And as chairman Roger Smith has made eminently clear, these new items won't be window dressing. They were bought to be used. Smith believes passionately that he has seen the future, and it is not what's presently in GM's factories or offices.

The key to unlocking that stodgy, outdated production process is information processing. GM has gotten off to a pretty decent start by imposing MAP (Manufacturing Automation Protocol) on a sometimes reluctant marketplace. Vendors could do a great deal worse than hitch their wagons to MAP's star. So could office automation devotees now that GM has put its economic clout behind TOP (Technology Office Protocol).

That same power automatically makes GM a major player in whatever game it's in. Now, with Hughes and EDS in the fold, GM is hitting cleanup in the data processing, communications, and electronics lineups. EDS's first quarter net income didn't rise 110% without a little help from GM.

Can GM do in computers and electronics what it did in autos? Why not? It certainly has the dollars. The company is clearly in this for the long term. And it's bought the engineering and communications skills it so sorely lacked. Hey, if you can't grow 'em, buy 'em. You can bet the ranch that EDS and Hughes will hardly take a deep breath putting up GM's worldwide internal network.

Once that's on-line, it isn't hard to picture GM selling that knowledge elsewhere. While the country is experiencing a severe shortage of engineers, GM has snapped up a hefty share for itself. One knowledgeable observer calls it "a preemptive strike that's going to put other companies in a catch-up mode."

After that, can GM's becoming a systems house be far behind? We're not talking boxes here. We do envision a systems house on the scale of a large computer company that's at the front end of a lot of hardware. Would you believe a prime contractor that takes on a major project, then spends millions giving part of that business to subcontractors?

GM is not about to stop making cars. It is about to make serious waves in the computer and electronics businesses. ◉

Introducing The Single Solution To Many Problems That Can Tie Up Your Personal Computer.

TRANSET 1000

Hayes

Transet 1000.™ The print buffer, communications buffer, port expander, printer sharer and I/O switcher. All in one.

Anyone with a personal computer and one or more peripherals has faced the all-too-familiar dilemma. You need your computer to do an important job. But you're forced to wait for the system to finish one job (printing, communicating, whatever) before you can go on to the next one. Or you need to stop what you're doing to switch cables when you want to use another peripheral.

Wait no more. Now Hayes introduces an innovative new device that lets you perform many jobs—at the same time—independent of your computer. Transet 1000. It works with a wide range of systems and configurations. And it allows you to continually expand your system as your needs grow.

Transet 1000 frees your computer from waiting on your printer or modem—so you and your computer can go on to another task. It even lets you print out documents in pre-set formats without having to go back into your computer. At the same time, Transet 1000 can operate unattended mailbox communications—24 hours a day—even if your computer is turned off.

Two computers can share one printer with Transet 1000. Or, you can use Transet 1000 to let two computers communicate with each other.
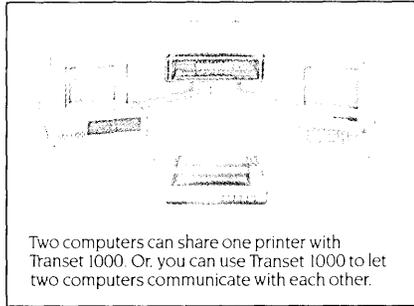
In addition, Transet 1000 is a port expander and software-controlled I/O switcher. Now files can be easily directed and redirected to different peripherals, without physically changing cable connections.

Even while printing, Transet 1000 acts as a communications buffer and 24-hour mailbox. And I/O switching lets you route information among peripherals, without switching cables.
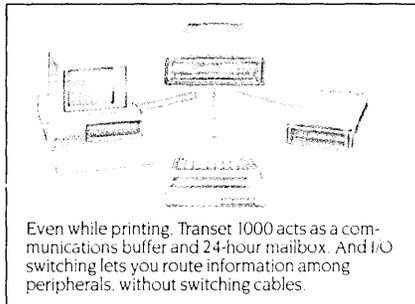
Transet 1000 contains a standalone microprocessor, and comes with 128K of memory. It operates with any RS-232 interface computer, and has optional accessory kits available for the IBM* PC and PC XT, Macintosh™and Apple* IIc. Kits contain the necessary host cable, a user guide and menu-driven software that lets you graphically set up or customize port parameters and printing formats. Cables available for IBM PC AT, other computers and peripherals.

Like all Hayes products, Transet 1000 combines sophisticated capabilities with easy operation. Just as Hayes set the standard in personal computer communications, now Hayes is taking the lead in computer task management.

Contact your authorized Hayes dealer to see how Transet 1000 can help you get a lot more productivity

Transet 1000 allows printing on both a dot matrix printer and letter quality printer, while freeing your computer for other tasks.
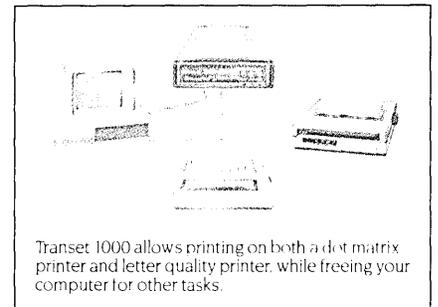
out of your computer system—without tying up your computer or you.

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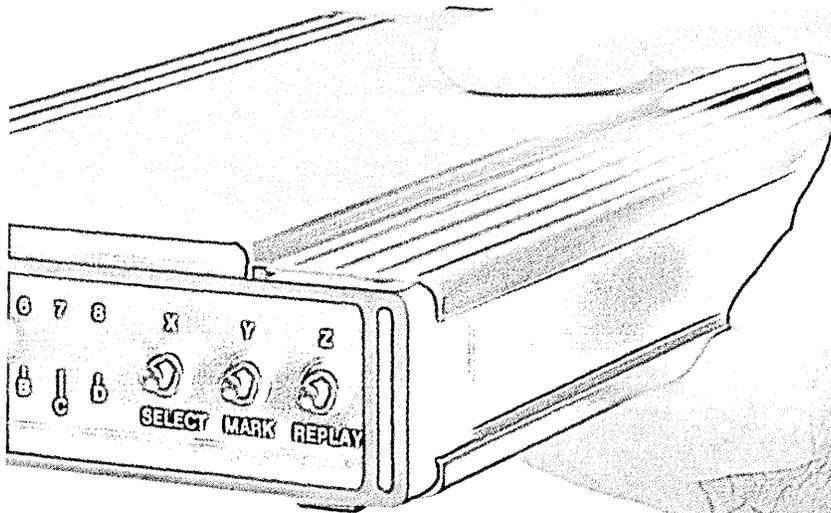
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PROCESSORS

BETTING THE COMPANY

Startups and traditional dp vendor Perkin-Elmer are betting that parallel processing is the wave of the future.
by R. Emmett Carlyle

"We're betting our company on this approach. This is the new order of processing and we intend to be first with the most." The new order is parallel processing—the darling of at least 50 well-funded schools and universities and a growing number of startups across the country that are arrayed under the FORTRAN banner. But the fighting words don't come from any impassioned researcher or entrepreneur; rather, they come from a senior vp at an old and established company whose new mission is to carry the new order into the commercial marketplace.

"Perkin-Elmer," says the head of its Data Systems Group, James K. Sims, without hesitation, "is perceived as a conservative, small-image company, but that will change as we promote parallel processing, because commercial users have to be educated and prepared for the benefits of the new technology."

Parallel processing—the concurrent execution of more than one program or subprogram, or the concurrent operation of more than one hardware computational element—though all the rage in universities where massively parallel architectures are emerging, is still in its infancy in commercial markets. But that could soon be different.

P-E's Sims reveals that the company is now beta testing a Unix V-based multiprocessor architecture for transaction processing that comes complete with IBM SNA support and full 3270 terminal emulation, and a back-end relational database. "The real breakthrough is that the architecture can handle from 100 to 1,000 terminals hammering away at the database at a very low cost per workstation—certainly well under the industry leading $5,000 to $6,000," Sims claims.

Sources add that P-E has targeted a list price of $3,000 per terminal (including the cost of the workstation) as its upper limit, and will discount at up to 38% in maximum volumes. Sims wouldn't be drawn out on pricing at this time, but did intimate that the Unix-based architecture

(upwards of nine tightly coupled processors around one main memory) will be announced shortly. Initially, the new architecture will be sold exclusively through systems integrators and vars, DATAMATION has learned.

Also mounting a commercial push at this time with a tightly coupled parallel design is the much-touted new startup, Encore Computer. Its Continuum bus architecture is currently scaled for a maximum of 10 dual processors delivering a total of 15MIPS.

If, as expected, the Wellesley, Mass., venture announces its new design this month, its general purpose mission will also include transaction processing and a number of other commercial niches such as timesharing, database management, and office automation.

The search for an inherent parallelism in commercial computer workloads has already resulted in one interesting and seemingly successful curiosity: Teradata's massively parallel back-end database machine, the DBC/1012 (see "Database Machines Take Off," May 15,

> **"True inherent parallelism lies not in the workload distribution, but in the applications program itself."**

p. 52), which the Inglewood, Calif., company contends could be the forerunner of a general purpose design. Currently the DBC/1012 links more than 1,000 micros, which can operate simultaneously in building a relational database and retrieving information from it.

Though there is evidence that the Teradata approach can increase a bank's transaction processing rate and decrease its overhead appreciably, experts feel that few other commercial applications lend themselves to parallel processing at this time because of a paucity of software.

"True inherent parallelism lies not in the workload distribution, but in the applications program itself. That's where the search should commence," says David Kuck, an innovative compiler designer and director of the new Center for Supercomputer Research and Development at the University of Illinois. Kuck is noted for his pioneering work on compilers that automatically vectorize and parallelize user programs. So far his work has focused exclusively on FORTRAN and resulted in a PL/1-based program known as Parafrase, which is now the subject of IBM funding at the university.

Kuck intimates that a push into commercial markets may be in the cards through a consulting spin-off, KAI Associates, which he founded six years ago with two partners, and which is consuming the balance of his time these days. His
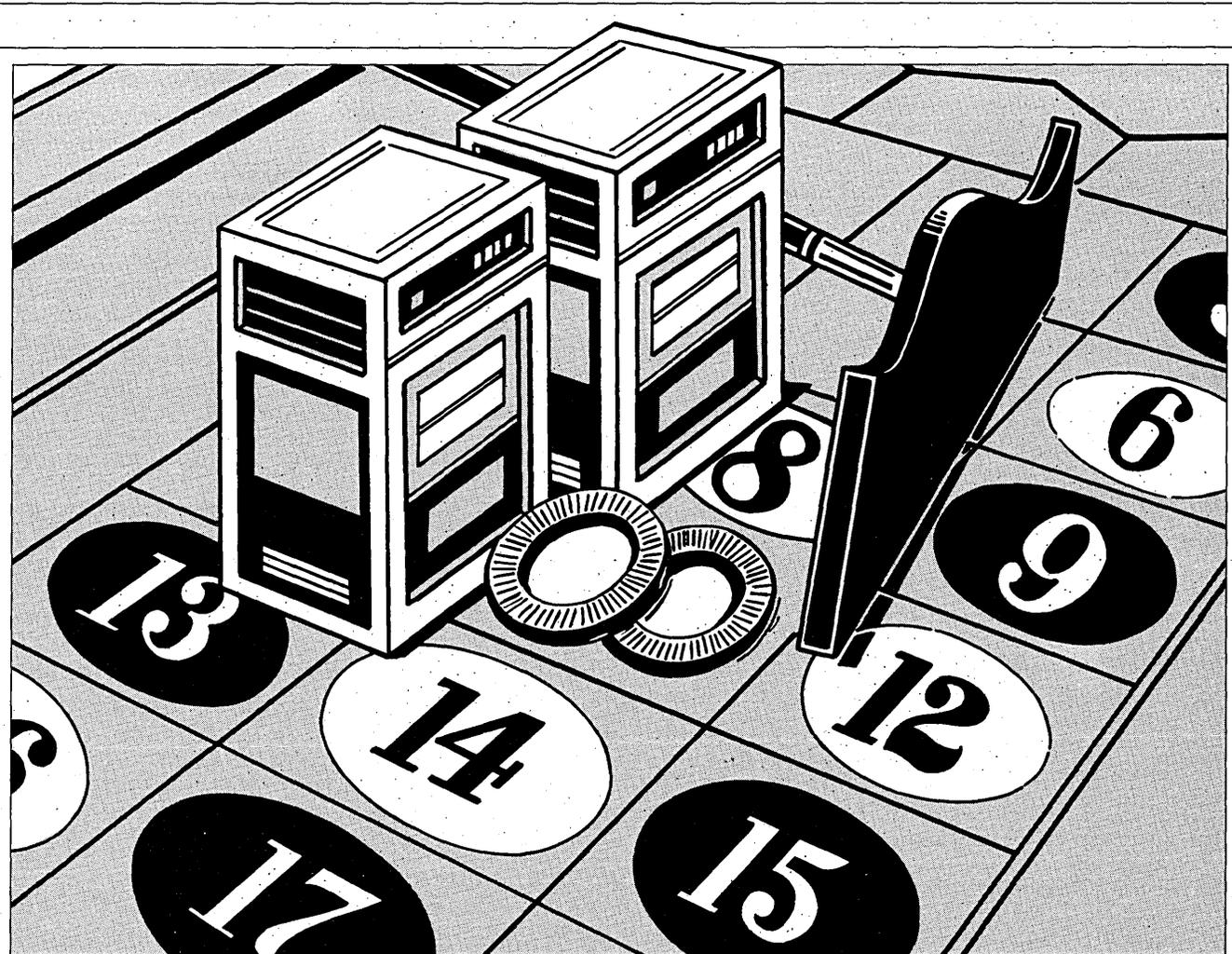
two partners wrote a high-level language known as Eye, which has been used to create a smaller and more portable version of Parafrase. The product known as KAP is the subject of numerous impending deals with existing and emerging supercomputer companies, and is part of the conceptual basis for a new parallel processing cluster from the Acton, Mass., startup, Alliant, which should be announced before the month is out. The company declined to discuss its new project.

"There is evidence that suggests KAP could be fruitfully employed with CO-BOL and with the AI language of choice, Lisp," Kuck adds tantalizingly, "but for the present, at least, we have our hands full with FORTRAN." P-E, Encore, and the new wave of startups with their confusing miasma of clustered, coupled, and networked processors have all shied away from embracing parallelism at the user program level. "It's too risky," says Encore chief designer Gordon Bell. "It's not yet a commercial, practical solution," adds Len Shar, vp for R&D at the San Jose-based Elxsi (now merging with Trilogy in a $70 million deal).

P-E's Sims agrees: "We believe that a whole new approach from the program-

mer could be required. Programs will have to be restructured or written in chunks. We're skeptical that any compiler, no matter how good, could handle this all automatically."

Sims did add that to be true to its mission of exploring all facets of parallel processing, P-E will eventually offer a so-called MIMD (multiple instructions-multiple data) architecture. "We've invested

Denelcor's problems prove that parallel processors are a high-risk gamble.

$300 million in software development to get us this far, and we won't back off—but the time isn't right."

With MIMD, a program is broken into subroutines compiled into several instruction streams, each resident on its own processor. "The problems of splitting programs and routing data can be overwhelming," says Elxsi's Shar. "The fear is that the current crop of relatively simple designs for multiprocessing and multiprogramming [whole jobs or programs run in dedicated fashion on each processor] that have spawned all the startup activity will degenerate into a spaghetti mess."

The staunchest and most vocal advocate of MIMD architecture, Denelcor, Aurora, Colo., is a living embodiment of the risks involved in breaking with the old order of sequential, single-stream programming. The company denies persistent rumors that it is flirting with bankruptcy, but admits that it is grappling with severe financial problems. "We can't complete our software development without a substantial infusion of new funding," admits Ron Ames, vice president of marketing.

Denelcor has so far received some $50 million from a variety of private and public sources. Ames estimates that the company needs $25 million more to "aggressively complete" its development of a new Unix-based operating system and parallel processing compilers. But Trilogy's misadventure, and a horde of pseudoparallel, multimicro architectures heading for a shakeout have soured the investment community's perception of our venture," he adds.

Ames says he is hoping that the general purpose computer vendors will buy Denelcor's technology and "take some risks." The company clearly hasn't ruled out any avenue of funding and reveals that it is currently involved in talks

with unnamed corporations about eventual merger or acquisition.

"The main thing is for us to complete our work and move the state of the art forward for everybody's benefit," Ames says.

Denelcor had been planning to offer the fastest scalar machines in the industry by utilizing its MIMD techniques. The first of a so-called HEP-II family stretching from 250MIPS (for $7 million) to 1 billion MIPS was expected to be announced this year, but that plan has now been revised. The company was recently benchmarking a 64-bit-word, 30MIPS computer for "under $1 million," but Ames couldn't say whether this machine would be the first to be introduced this year.

Some critics of Denelcor, though sympathetic and convinced that the company is doing useful work, claim that its problems do not stem just from late introduction of software. "They are betting their company on proving that the technique works. But unfortunately their hardware is old, slow, and too expensive," explains Kuck.

Denelcor officials concede that its HEP-I hardware is old. "After all, we started the project in 1976, and so to some extent must pay the price that all pioneers pay by being the first," says Ames. "But in the end, it's the application that counts, not what hosts it." He also adds that the company's HEP-II and upcoming HEP-III (new funds permitting) are much faster

Parallel processing, though all the rage in universities where massively parallel architectures are emerging, is still in its infancy in commercial markets. But that could soon be different.

engines. Overall, say sources in the Colorado area, the combination of new ideas and old technology has so far proved to be lethal.

Others heading down the same road, however, say they know of the potholes ahead. "We've said all along that there are risks as well as rewards in being first. It's a gamble.

"We want to be first with a viable commercial architecture and sometimes you have to give up something to get there," notes P-E's Sims, perhaps less than comfortably aware that P-E is steadily and inexorably shifting from its traditional base of real-time supermini buyers. "Forty percent of our group's $280 million revenue came from the commercial sector," he says.

Obviously, Sims thinks that, with its high stakes gamble, Perkin-Elmer is not betting more than it can afford to lose. ◉

SOFTWARE

CAN RAMIS II DELIVER?

It's showdown time in fourth generation languages. Martin Marietta has only six months to fix RAMIS II or face a bloodbath.
by Willie Schatz

Now is the summer of RAMIS II users' discontent. They're mad as hell and they're not going to take it anymore. They may soon start speaking another language.

"Mathematica management isn't worth a [what has been called in the *Congressional Record* a barnyard epithet]," says Jack DeWald, a California consultant who counts among his clients a major aircraft manufacturer and a major research organization. "They don't listen to us. They don't listen to anybody, ever.

"There are more bugs in the product today than ever. In 1981 they promised us concurrency for RAMIS II. Everybody waited. We're still waiting. Now they say they'll deliver it by Christmas. That might mean next June if it's in keeping with Mathematica's overall delivery schedule. You have to hit them over the head with baseball bats. Until you do that, they don't seem to give a [barnyard epithet] about the guys who are paying their bills."

Those guys—about 1,500 of them, according to Mathematica's estimate of its installed base—may soon stop payment on their checks. The Forum West users group voted 99 to 8 in March to withdraw all company marketing support, including client demonstrations and recommendations to buy RAMIS II, until Mathematica solves the concurrency problem.

Make that until Martin Marietta Data Systems' (MMDS) Information Technologies Division (ITD) fixes what the users think is broken. History buffs will recall that Jerry Cohen invented RAMIS I while at Mathematica. Cohen then cut out and formed Information Builders Inc. in New York, purveyors of Focus, RAMIS II's bitter fourth generation competition. Mathematica was acquired by Bethesda, Md.-based MMDS in 1983. The word "Mathematica" has been sent to Siberia in favor of ITD, but most users at the recent RAMIS II Roundtable still use the former name. After all, Stalinization doesn't happen overnight. And the current name may be causing an identity crisis.

"We're nervous because they've been bought by Martin Marietta," says Larry Hall, vice president of the financial information management department at Security Pacific National Bank in Los Angeles. His department has used RAMIS II for 10 years and has developed what Hall calls "some pretty sophisticated techniques." Among them is an on-line MIR-MVS-UCCFCS package management reporting system that supplies monthly hardcopy reports at all corporate levels above manager. Information in the system can also be extracted from UCCFCS and converted into a VM/CMS file to make it available to authorized users on VM/CMS.

Great stuff, right? So why is Hall running NOMAD, D&B's Computing Services' fourth generation language, simultaneously with RAMIS II as a test of their capabilities? "Because NOMAD has concurrency," Hall explains, referring to its capability to allow several people to enter and update data to the same database at the same time. "It's also better on data validation. And it has a financial package that does financial modeling." (It should be noted that DATAMATION, published by Technical Publishing Co., and D&B's Computing Services, Wilton, Conn., are both owned by Dun & Bradstreet.)

"I've also seen too many companies go downhill after they were acquired. Foresight is a perfect example. They were the leader in modeling until they were bought by United Technologies. Now they're way behind their competition. If I'm comfortable and confident that they [MMDS] have their act together and they start delivering on schedule, which they haven't done in two years, then I'll probably go back to being a RAMIS shop. But if I get the feeling that Martin Marietta took them over just to do government contracts, then sentimentality has nothing to do with it. It will just be a cold, hard business decision."

Those don't seem to be going RAMIS II's way these days. According to Focus Research, West Hartford, Conn. (no relation to Information Builder's Focus, by the way), RAMIS leads Focus by better than two to one at the 11,000 data centers it surveyed earlier this year. With 15% of all mainframe sites using some fourth generation language (as defined by the users), Focus led RAMIS 45.4% to 20.2%. NOMAD was used by 4.1%. Other languages, all more product development-oriented than those three, were IBM's SQL at 17.1%, Info Data's INQUIRE at 5.4%, and Applied Data Research's IDEAL at 7.7%.

Buying patterns show a similar distribution this year. Focus is on 35% of the lists, SQL on 25%, RAMIS on 18%, IDEAL on 12%, and NOMAD on 5%.

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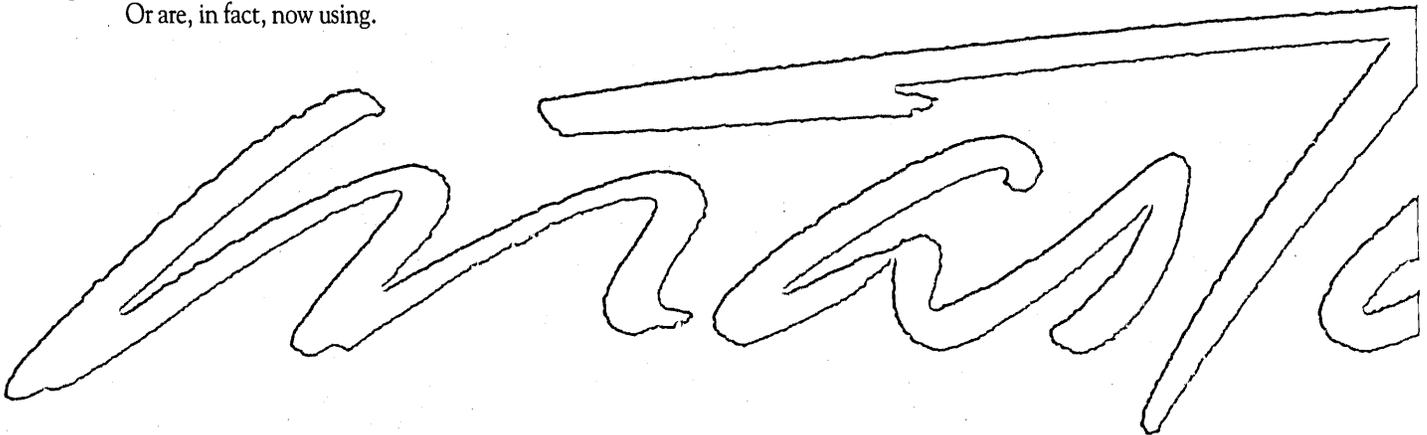
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So how did this happen? How did such a generation gap develop?

"RAMIS is perceived as not having kept up with Focus and NOMAD," contends Vern Scheidler, Focus's marketing support manager. "Seven or eight out of 10 buyers are going to Focus. With our recent release of the VAX version of Focus, we're the first of the fourth generation languages that has functionally equivalent products on mainframes, minis, and pcs."

"We beat RAMIS more easily than we beat Focus," says Andrew Abraham, vice president of marketing and development for D&B's Computing Services. "RAMIS isn't that good a product. We have a complete language for application building. They don't. They're long past their glory. They're not a significant player

In a recent survey, RAMIS II installations led Focus by better than two to one.

anymore. We owe them a lot, because they created the market. But they're not the ones I'm afraid of."

The only thing RAMIS has to fear may be itself.

"We got too cocky," admits Dick Cobb, vice president and general manager of the ITD. "We were doing so well that we thought we could do more than we could. We tried to do too many things too fast. And this is not an MMDS problem. This was happening while we were still Mathematica.

"We led the information world, sometimes kicking and screaming, into fourth generation language. And when fifth generation systems begin to replace fourth generation ones as the mainstream in the next decade, we're going to provide the best system there, too. We haven't met our release schedule in the last 18 months because we've had some real technical problems and we've had an ambitious timetable. But we're going to stay the leaders."

Delays in delivering on prior software promises aside, RAMIS users did see several new products a few weeks ago. PC/Reporter, a PC/DOS-based version of RAMIS II, was demonstrated. A Unix version of RAMIS II, Unix/Reporter, was also announced. The company also unveiled a COBOL-based applications development software product to be marketed under the name COBOL/XE.

MMDS also released a new system building executive component for its RAMIS DBMS. Designated SBX, the component is the successor to the RAMIS executive and is designed to meet performance needs of major production applications. Software hooks to RAMIS for pcs with IRMA boards are also available.

But even with the onslaught of product introductions, are the users going to stay around to see RAMIS "stay the leader"? After having hung on this long, many are thinking of folding their tents.

"If I could change without endangering my information center, I'd look again," says Pat Engstrom, dp project officer in the information support center at Pittsburgh National Bank and president of the Pittsburgh Users Group. "I've already held off deciding whether to buy RAMIS for the banks we've acquired. I've also held off spending money on enhancements. I don't feel stable with what I have. If they looked at us as allies, they could have the best marketing around. But I get the feeling they look at us as adversaries."

"You can say the most emotional things and it hits them like the wind," says Rosalie Galazka, president of the Forum East users group and director of EPI Software Consultants, Essex, Conn. "They do nothing about it. It's blue sky all the time."

It wasn't at the round table. There was a severe thunderstorm watch as users lambasted the quality of communication with ITD and the failure to resolve problems with RAMIS. They also presented the ITD with proposals for an on-line bulletin board and distribution of quarterly maintenance release tapes. After initial resistance, ITD agreed.

"There was definitely a concerted effort to make sure we died at that voting meeting," Engstrom says. "But we obviously didn't. It meant a lot to me that they listened. Maybe the users weren't strong enough before this. But we were organized this time. We came at them with definite needs and they responded. And those things weren't planned by the company. This may be an indication that they plan to do more.

"Of course, we should never have had to go to through what we went through. I don't anticipate ever getting to that level of frustration again."

But Engstrom and friends didn't expect that the first time, either. Now ITD has much more rope with which to hang itself. Even for stalwarts like Security Pacific's Hall and consultant DeWald, who freely admit that they owe their careers to RAMIS, time is of the essence.

"After 10 years, I've got a lot invested in RAMIS," Hall says. "But our industry is very competitive, and I've got to go with the most productive tools. The burden is on them to prove they can deliver products on time. They're already two years late with concurrency. I can't wait much past the end of the year. RAMIS is a great tool, and I'm kind of rooting for it against NOMAD in our test. But victory goes to the best product."

"They're getting away from what made them great," says John Rosen, a longtime user and president of consulting firm Database Connections, Los Angeles. "They're trying to be all things to all people. That's going to get them in trouble. Even IBM can't do that. They need to turn it around in no more than six months."

"It's not the product, it's the people," DeWald says. "The product is superb. I've based my whole career on it. But that's my problem. I've stuck my neck out promoting the product. My personal credibility is on the line."

ITD's corporate credibility may have already crossed it.

"We've had a good history of credibility," Cobb says. "But if we don't deliver now, we'll have a problem. I think we've got a six-month window.

"But we're in good shape. I'm optimistic. We're leading in many areas and trailing in a few. Nobody's working in the fifth generation like we are. We're going to have to screw up badly not to be leaders there. With leadership and vision, I don't see how we can fail. We've only screwed up with RAMIS a little bit. I think our users are willing to give us one more chance."

Then the window shuts. Permanently.   ◉

NETWORKS

THE FUTURE IS NOW

All digital telecom networks are starting to move up the road from fantasy to reality.

by Charles L. Howe

History has a way of vindicating the notions of some who are scoffed at or persecuted for their ideas. Consider Galileo Galilei, Gregor Mendel, and Albert Einstein. Others have fared less well, as those who track the builders of perpetual motion machines can attest. What, then, are dp and MIS types to make of the Integrated Services Digital Network, which promises instant single-line connectivity of everything? Some have dimissed ISDN as a boondoggle that will have five generations of standards-setters pettifogging well into their dotage before product is ever shipped.

Such jaundice may be misplaced. Now some hungry vendors are eyeing the 22 Bell operating companies for what

may be a multibillion-dollar plum that could drop even before the second millenium arrives 15 years hence. There may soon be paying customers out there.

For those not au courant in data communications, ISDN means an end-to-end digital service over telephone lines that were designed, when many were keeping cool with Coolidge, to support analog traffic for no more than five minutes per call. While much telephone line traffic is still analog, heavy data users must lease special lines for fast digital usage, and even an analog shop must purchase one line apiece for facsimile, communicating terminals and computers, and similar low-end data devices.

Although current ISDN plans call for a mix of voice and data over twisted pair wiring, in time the BOCs pushing ISDN want even voice digitized in the handset of a telephone, so that everything leaving or entering a shop is binary and all of it traveling over the same cable. In the end, everything will travel over fiber-optic cable. ISDN promises lower costs through the ultimate black box tactic—everything will go through the magic box, reducing the costs of interfacing hardware and the duplicate lines now used for voice and data. The question of when has been hovering over the concept for the past five years, but there is, to resurrect a discredited phrase, a light at the end of the tunnel.

A new force that may soon bring ISDN to fruition has emerged in the United States, and it is called Bell Communications Research Inc. Funded entirely by

Hamburger king McDonald's is putting in two 64Kbps and one 16Kbps digital channels.

the BOCs, Bellcore was created at divestiture. One of its functions is to act as a scaled-down Bell Labs and come up with moneymaking schemes for the operating companies while AT&T goes its own merry way in similar efforts for long distance digital/data communications that could link up with statewide BOC ISDN networks.

Of late, the Livingston, N.J.-headquartered Bellcore has been holding seminars and inviting vendors to participate in ISDN-type standards-setting efforts in a move to keep apace with similar activities in Europe and Japan (see "The Integrated Services Digital Network," by William Stallings, Dec. 1, 1984, p. 68). Current plans call for a series of "islands" of ISDN pipelines throughout the United States. The earliest of these trials will probably get under way late next year in Oak Brook, Ill., where Illinois Bell will install a small network gratis for McDonald's Corp., the $10 billion corporation that

KOS OF MCDONALD'S: "We move 50% of our 1,200-person staff here every year, and the cost of moving around terminals and other gear is quite high."

sells jillions of hamburgers in more than 10,000 locations. And Illinois Bell is considering other ISDN users.

McDonald's is getting the network simply because it requested proposals for telephone systems from 12 vendors and Illinois Bell offered the most elegant solution, according to Bonnie Kos, the hamburger king's vice president of facilities and systems. "We haven't seen product yet, but service is expected by September of 1986," says Kos, adding that plans call for a top-of-the-line No. 5 ESS central office switch to be installed across the street from her offices.

The network will support some 300 voice and data lines between two buildings and will utilize what Bellcore calls the 2B plus D scheme. Here, the network supports two 64Kbps B (for bearer) digital channels and one 16Kbps D (for delta) channel. The D channel supports applications that include telemetry functions.

"The ISDN solution is a very flexible one for us," claims Kos. "We move 50% of our 1,200-person staff here every year, and the cost of moving around terminals and other gear is quite high." With the ISDN solution of one RJ-11 jack containing a plethora of voice and data outlets, the company could come out a theoretical winner in reducing telecommunications costs, according to Kos. She continues: "If you have Centrex, as we do, ISDN is a logical step up," adding that the network may well run on fiber optics rather than the now planned twisted pair wiring.

Representatives of data communications manufacturers seem enthusiastic about ISDN, but offer a note of caution about just when vendors and users may dine upon what currently seems like digi-

tal pie in the sky.

"You can't have a real live ISDN right now because the hardware just isn't available and the CCITT is only just beginning to set specifications," says Dave Lieberman, engineering section manager of Rolm's Office Systems Division in Santa Clara. CCITT is the Consultative Committee for International Telegraph and Telephone, one of the international groups setting ISDN standards.

Chips for applications like coder/decoder devices that will digitize voice to ISDN specs in the handset are also scarce, adds Lieberman. "We're still one or two years away on chips," he says, adding that attempting to set costs or market values on an ISDN and the gear it will produce is at this point "largely a matter of educated guesses." On the other hand, says Lieberman, whose firm makes the CBX digital switch, anyone in the PBX business who isn't staying on top of ISDN "won't be in business in several years."

A source at Intel Corp. differs with Lieberman's assessment of the ISDN chip matter. "We've been fiddling with an ISDN programmable chip set for five or six years," says the source. "No matter where we land when standards are finally set, we believe that we have our bases covered."

The Santa Clara-based firm is building its own prototypical version of an ISDN, the source explains, using a 32Kbps Western Electric variant scheme that doubles the usage bandwidth. Intel has installed Rolm CBX digital switches in its Oregon shop and AT&T-IS System 85 switches in California and Arizona locations.

Stephen J. Langdon, an Amdahl Corp. senior network architect who sits on the International Standards Organization's Open Systems Interconnection sub-

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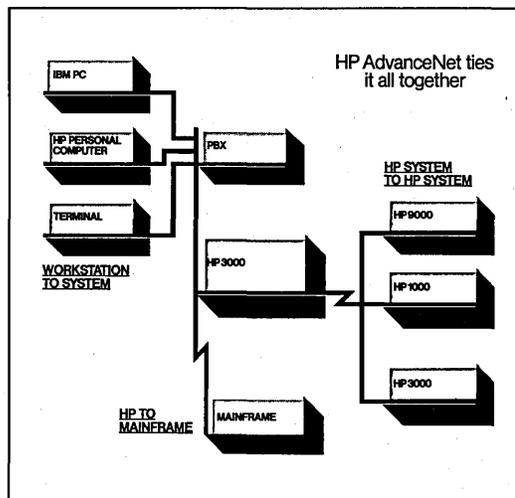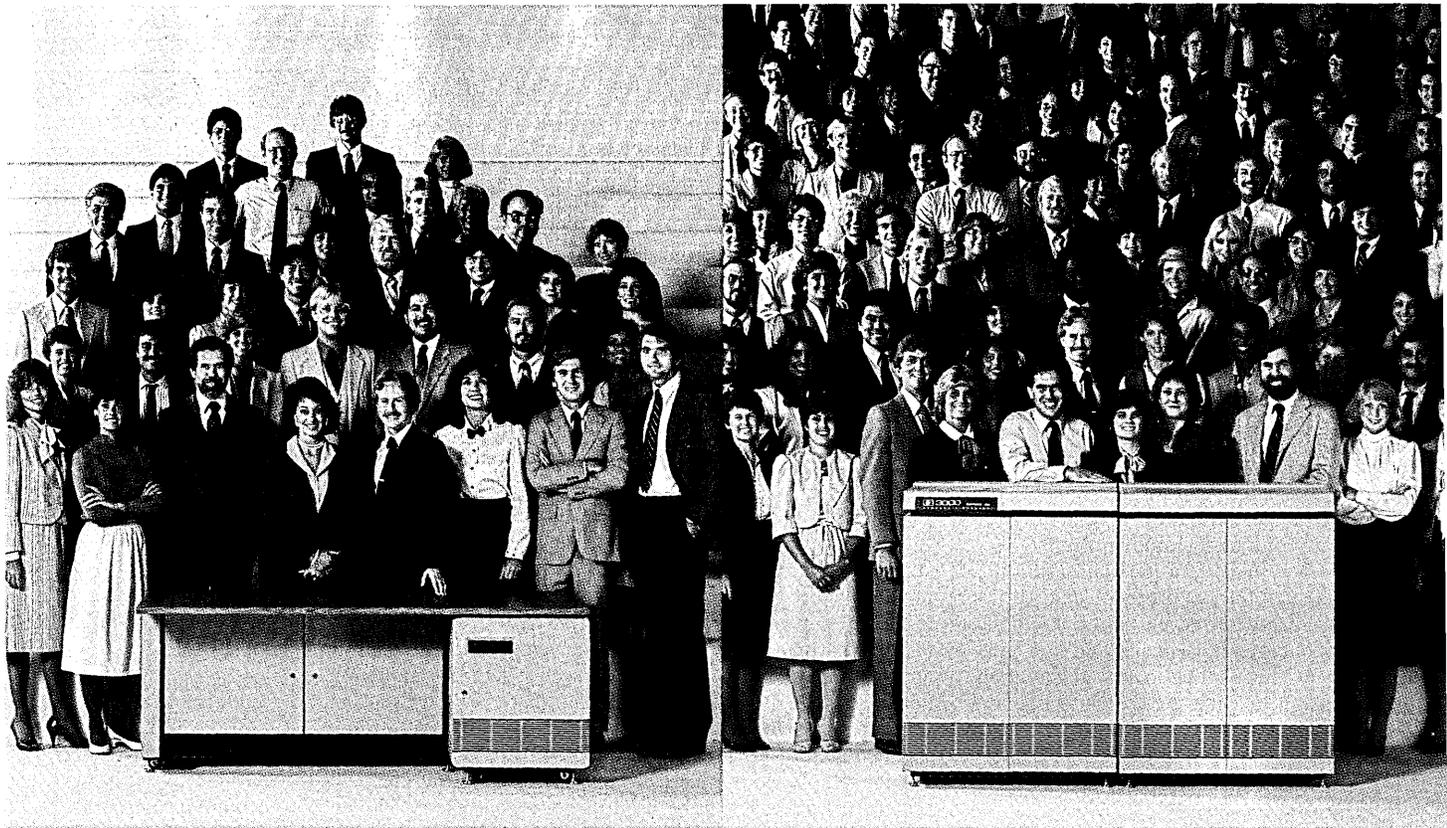
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committee dealing with ISDN matters, is cautiously enthusiastic about an all-digital pipeline that will offer everything from pictures to burglar alarm telemetry over a single phone line. Like many who make their livings from analyzing data communications standards, however, Langdon has problems with some interim solutions that Bellcore has cobbled up, and does not expect to see them resolved soon. "The vendors paying the most attention right now to ISDN are data communications manufacturers," he says, adding that "computer vendors aren't paying one helluva lot of attention to standards-setting activities at the moment."

Nor will they until around 1988, when CCITT and ISO protocols may at last be massaged into stone. Until then, say many observers, Bellcore and the BOCs may go their own distinct ISDN way, hoping to reach some kind of international

Pacific Telephone will use Apple Computer for a test of an ISDN.

communications accord when the rest of the world does.

One of the BOCs heavily gearing up for an ISDN prototypical run is Pacific Telephone in California. In years to come, ISDNs will likely use fiber-optic cable as the principal means of transmission. PacTel bought half of Western Electric's entire fiber-optic production run in 1983, and now has some 100,000 kilometers of this cabling strung in California for all-digital communications. Sixteen of its central offices have Northern Telecom SL-10 digital switches for packet switching applications.

Don't think that PacTel is blindly following the latest technological chimera. Being enamored solely of the technological aspects of ISDN is not going to get it into the marketplace, warns a Pacific Bell vice president. "It's about time for us to move away from letting ISDN be an issue of technocracy and time to move toward a more business-case development of ISDN," says Al Boschutle. The drive to create this market, he says, will revolve around customers controlling their own networks, transmission predictability, and cost-efficient pricing.

Pacific Bell plans a test soon involving Apple Computer Corp., wherein that firm's micros may be used in home ISDN-like applications that include videotex, electric meter reading, home banking, and similar applications. This is of course a low-end market and hardly likely to generate the kind of data communications dollars that Fortune 1,000 users spend. None of these home applications, it should be added, has had much success so far using conventional transmission technologies.

That said, the lure of ISDN has prompted virtually every major data communications company extant to appoint

> **"The vendors paying the most attention to ISDN are datacom manufacturers. Computer vendors aren't paying one helluva lot of attention to standards-setting activities at the moment."**

an agent to sit on ISDN standards-setting subcommittees. While no one is predicting that modem makers and data concentrator vendors will soon go the way of the barrel stave and hoopskirt industries, pressure being generated by the BOCs and Bellcore has sparked enough interest to begin a serious canvass of potential users. Vendors who want to get in on or about the moment of creation are advised that Bellcore has started putting out a monthly newsletter containing standards and technical announcements. Priced at $35 annually, the document may be obtained from Bellcore at its Information Operations Center, 60 New England Ave., Piscataway, NJ 08854. ◉
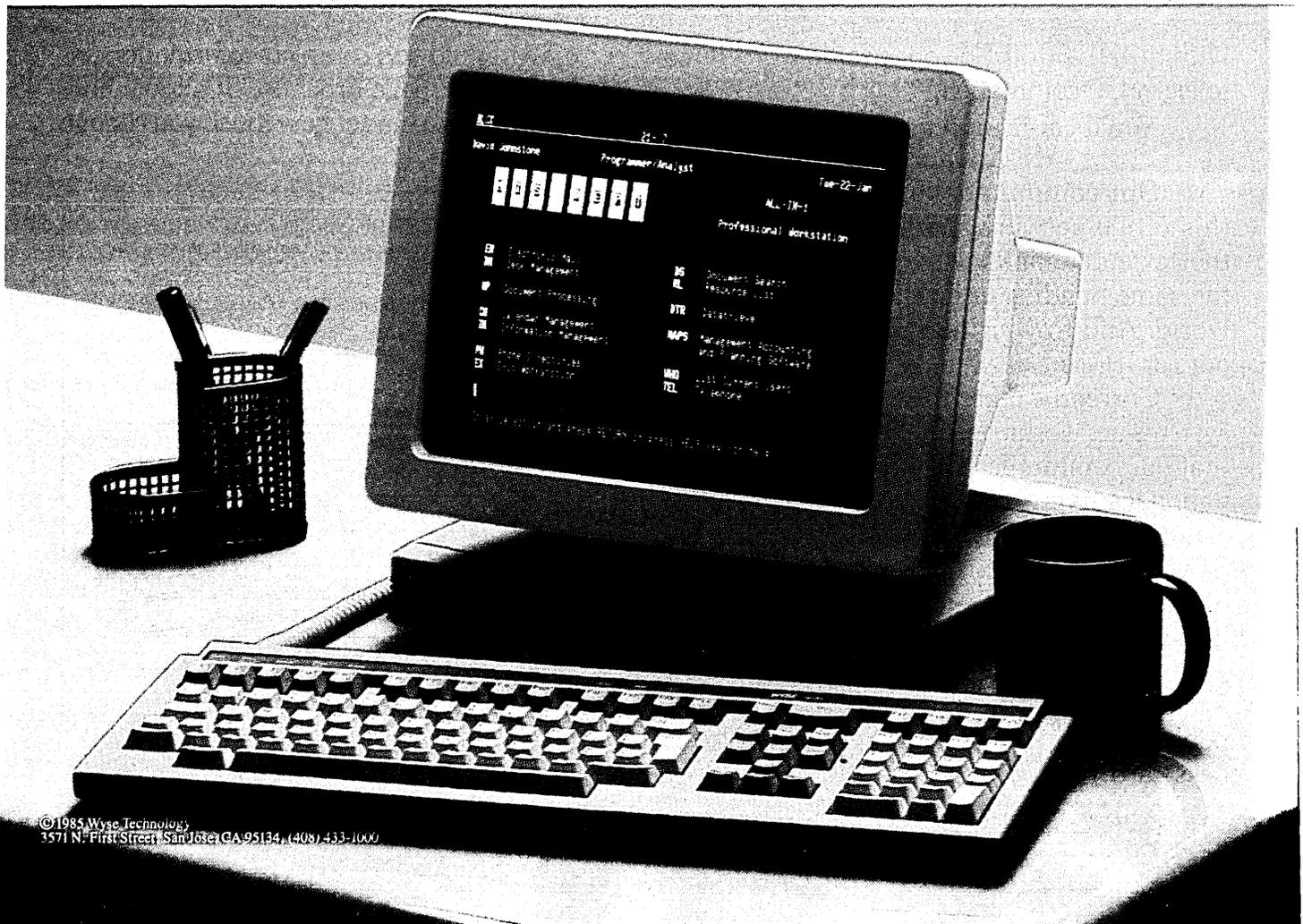
VERTICAL MARKETS

"WEIRD-WARE" THRIVES

Swine management and astrology micro software are but two examples of products developed in the twilight zone of the industry.

by Irene Fuerst

Garages are some of the most important structures in computing history. In May, the town of Palo Alto decided to make an official shrine of the garage where Hewlett-Packard Inc., a local electronics giant, was started some 40 years ago. For the most part, microcomputers were born in garages—most notable is the one in Cupertino, where "the two Steves," Jobs and Wozniak, brought a particularly ripe idea to fruition. Once Apples and other pcs got into the hands of inventive sorts, a whole other garage industry evolved—de-veloping and selling microcomputer software, or hacking for fun and profit.

While it seems unlikely that another blockbusting VisiCalc or Lotus 1-2-3 will emerge anytime soon, the garage software industry remains robust, even in these times of industry slack. The mantra many micro software gurus chant these days is vertical industry software. The narrower the vertical industry the better, and if it isn't being done in a garage exactly, it's pretty close.

Market analyst Pamela Park of Dallas-based Future Computing says there are about 50 to 75 software publishers making more than $2 million in revenues annually. Below that, Park estimates, there are about 1,500 to 2,000 smaller publishers, and perhaps two to three times as many developers. "I would hate to have to count those," she admits.

The market niches being aimed at by small software publishers include virtually every profession and trade: agriculture, accounting, medicine, law, horticulture, trucking, psychology, and so on. Developers have created programs for astrologists, car dealers, numerologists, pet breeders, wine makers, landscapers, cooks, Amway distributors, genealogists, sports handicappers, morticians, dieters, cops, gas station owners, exterminators, interior decorators, occultists, and shoppers, among others. It seems that everybody with a pc and a hobby is writing software.

Some products go beyond the traditional limits of software—they've entered the ether of the fringe, the twilight zone of the computer industry. Some might call them weirdware. These vertical packages are often straightforward, stick-in-the-mud accounting or database software adapted for unusual occupations—undertakers have to keep their accounts straight, too. For swine management, there is said to be a package, perhaps apocryphal, titled HogStar.

Typical of this breed of way-out software vendors is five-year-old AGS Software of Orleans, Mass., soon to be renamed Astrolabe Software, which specializes in astrological programs.

"The computer is essentially the bulldozer of astrology."

According to marketing vp Patricia White, the company develops and publishes several levels of astrological software, ranging from home-use programs to those that perform "rather exotic kinds of calculations" for professional astrologers. The company also distributes a com-

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DEC VT-220 compatibility, Wyse-style.

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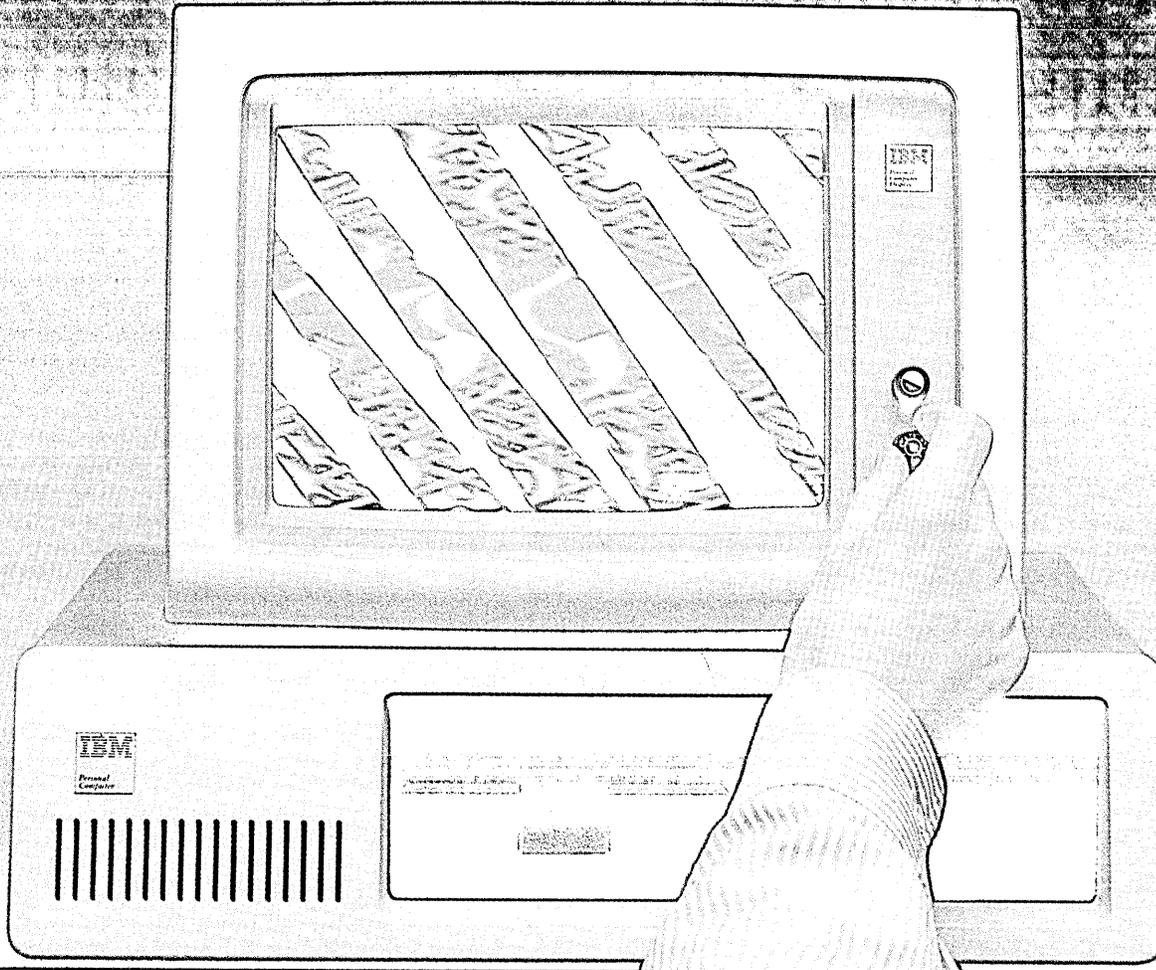
In a relatively short time, the local area network (LAN) market has attracted a host of suppliers. Each has a LAN system to sell. And each is fighting for a proverbial piece of the LAN pie.

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The company is Novell. The company's solution is NetWare.
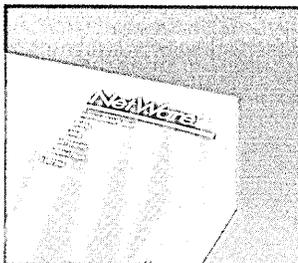
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How good is NetWare? In recent benchmark tests conducted by Novell as well as Belmont Laboratories, NetWare significantly improved the performance of every LAN system tested.* In fact, NetWare currently runs on 24 different LAN hardware systems, outperforming the original software for every one.

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*LAN Benchmark Report, May, 1985, Novell, Inc. and "Software,Not Hardware Key to LAN Performance," PC Week 1/15/85.

NOVELL

puterized version of the ancient Chinese fortune-telling sticks of Huang's *I Ching*.

White says the company saw $500,000 in gross sales last year and projects $750,000 for 1985. AGS employs 15 people, including four full-time in-house programmers and three contract programmers.

White says AGS's biggest problems stem from the nature of its customers. "When Mercury goes retrograde we have a short slump in sales," she says, explaining that in astrological lore "things like the mail go astray" during these periods. "We can't figure out if it's actually because Mercury is retrograde or because astrologers *think* they'll have these difficulties," she muses.

President Robert Hand is a prominent astrologer known more for his books than for software. He was one of the first astrologers to use microcomputers, in 1977. "My father used computers to forecast the stock market back in the middle '60s," he says. "The only things available were these big mothers with tubes that probably didn't have more power than a [Tandy] Model 100."

According to Hand, computers take much of the drudgery out of astrology, a highly mathematical practice. "The computer is essentially the bulldozer of astrology," he says, leaving the astrologer

"Many fine packages are going begging because their publishers can't get people to know about them."

more time to concentrate on the interpretation of charts.

Even when Mercury is where it's supposed to be, occupational hazards abound in the weirdware market. Take Data Consulting Associates, for instance. Based in Occidental, Calif., the firm specializes in software for professional vintners. "When you sell some of these things, [the customers] start you drinking," says cofounder Gary Carmignani, explaining that the wine makers are always anxious to have visiting salespeople sample the latest cuvée. "They get you inebriated. I had to build up [the tolerance of] one of my partners" to help him hold his liquor.

Carmignani's background is in chemistry and for a time he worked for the Bodega Bay Marine Laboratory, located where Alfred Hitchcock filmed *The Birds* and close to California's wine country. When he decided to move to Occidental, he discovered "the only way to make a living in Sonoma County was to start your own business."

So he and a friend in the computer business put together a package that helps wine makers do their job. The software

helps keep track of the formulas for each vintage and stores detailed records that are critical to avoiding losses from improperly mixed wines. The software also allows for the preparation of reports for the government and performs traditional accounting functions.

Currently, Data Consulting sells two systems, one for the IBM PC and another for the IBM S/36 and S/38. In 1985, the company expects to see $300,000 to $400,000 in revenues, much of it from custom programming. The business has three partners and four contract programmers.

Data Consulting counts some of California's largest and most prominent wineries among its customers, including Heublein, Beringer, and Joseph Phelps. The company has also sold one of its program to the Cook's winery in Auckland, New Zealand. "We're now at a point where we're looking at Europe," says Carmignani. "We've been approached by people from all over the world."

Notably absent from its roster is the biggest winery of all, Gallo. Carmignani says Gallo has used a computer system hooked up to a mass spectrometer for many years. The system, which supposedly monitors the chemistry of Gallo's many brews, helps Gallo outcompete other volume wine makers, according to Carmignani. "They are real secretive. Nobody knows what it is," he says, referring to the Gallo system. "Apparently, they wrote the system themselves, or had it written for them."

Not all developers, publishers, or would-be publishers have cut themselves as sparkling a niche as Data Consulting's wine marker, but its not for lack of ideas. Donell Cox, a minicomputer capacity planner with San Francisco's Pacific Bell telephone company, thinks what the world needs is his animal breeding software. After a stint in the Navy and freelancing as a game software developer, he was led by his wife's hobby of animal breeding to start his own business writing software for others like her.

But, like many before him, he's finding that developing software is the easy part—marketing it takes money. Over the past six to eight months, he tried advertising his product but that yielded little response. Now he's reassessing the situation.

No one knows how many Donell Coxes the world holds. "At some point they [small software publishers] get too small to count," says analyst William Coggshall of Software Access International, Mountain View, Calif. "Below the top 25 no one has more than one half of 1% of the market."

The total number of published micro software programs certainly exceeds

10,000 and may be as great as 50,000 when all versions are counted. Future Computing's Pamela Park estimates 10,000 apiece for the Apple II and the IBM PC. Many of these are simply machine-specific versions of the same program.

"Below the 50 biggest products there's relatively small demand," says Coggshall. Although many are useless, he says, "many fine packages are going begging because their publishers can't get people to know about them."

So what's in the horoscope for these thousands of tiny software houses whose unsung products come and go, listing and printing of Michaelangelo? It seems unlikely that Mitch Kapor at Lotus Development, or one of his big competitors, will branch out into small vertical markets on his own, or even buy up one or more of the niche players until the entire microcomputer market picks up again. And nobody gazing at the stars

The best guess is that today's successful niche vendors can count on a continued but modest existence.

these days can say when that will happen.

The best guess is that today's successful niche vendors can count on a continued but modest existence. "Vertical market software, by its very nature, is going to stay little and diffused," says Mary Ellen Dick, an analyst with Software Access. Usually expensive, this software experiences long and slow sales. It's developed by insiders in specific industries.

"For example, pet cemetery software is sold by people who understand pet cemeteries, have worked in pet cemeteries, or have worked very closely with one person to build the software to fit their needs and then sold to other pet cemetery people," she says. "Big companies, like Lotus, don't have the resources to divert in that many directions. Nor do they have the cachet of approval that somebody coming out of the industry has."

But it doesn't stop the the big guns from eyeing what they think are opportunities. Winery software maker Carmignani admits to having been approached by "a large software company" interested in purchasing his business. "We really aren't interested in selling," he explains, because business is now "at the place where we worked to get it to. It's the heyday so we might as well stick around."

While Carmignani's company plans on expanding geographically, star-charter AGS sees its opportunity in other ways. "Last year and the year before we thought the market would be saturated

pretty soon," says astrology software maker White. "But we found it wasn't at all. It depends on how you reach the people. We keep uncovering new markets."

The total number of published micro software programs may be as great as 50,000.

With more astrologers buying computers, a new trend in astrology has been created.

And what happens when all the astrologers have all the computers they want? "They'll still want bigger and better programs," White says, adding that there will always be new areas for AGS to branch into. Graphology? Phrenology? He's not saying.

"We have several horoscopes for the company based on different things and we follow them quite religiously. We don't always plan on it because sometimes we're too busy to sit down and look at them, but we do consult them," says White. "We haven't looked more than two years ahead." ◉

YANKEE BASHING TIME

Is the U.S. controlling exports for commercial, not security, reasons?

by Willie Schatz

It seemed like another routine assignment. The Organization for Economic Cooperation and Development (OECD) told Stuart Macdonald, a member of the economics department at the University of Queensland in Australia, to report on the latest developments in export controls.

After researching the subject for four months, Macdonald found he didn't quite like what was going on. When he wrote about his discoveries in March, the OECD didn't quite fancy what Macdonald had to say. So "The Sisyphus Syndrome: Implications of U.S. Controls on High Technology Exports" met an early official demise and was sent wherever unused OECD reports go to die.

The report is still very much alive in British government circles, however. Although copies of it have been guarded with their possessors' lives, one managed to make its way to the desk of Norman Tebbits, secretary of Great Britain's Department of Trade and Industry. That event alone is enough to start anew the conflict over U.S. export controls, which was supposedly softened by the Department of Commerce's recent release of its new software regulations. But the situation now is made incendiary by European allegations and corresponding U.S. denials of American government pressure to send "The Sisyphus Syndrome" permanently down the proverbial hill.

Anger in Britain and elsewhere is growing over what European officials perceive to be some sinister reasons behind U.S. reluctance to permit the export of advanced high-technology equipment. The report reinforces a feeling that the controls help the U.S. industry maintain its supremacy and do not deter the Eastern Bloc from obtaining the equipment that it wants. The fact that the Americans deny knowledge of the report and of what others say is a concerted effort to squelch its contents does not bode well for future relations.

"The Americans did definitely lobby on this," a member of the U.K. delegation to the OECD says. "There were

a lot of discussions here and there. The lobbying started before we even got our copies of the report. Very rarely does that happen."

"There were a lot of free lunches going on in Paris that week," adds a member of the Dutch delegation. "The Americans' basic thrust was that the report was written in a slapdash manner, didn't take account of American sources, and wasn't academic enough.

"I was disappointed with the U.S. reaction, but not surprised. Most of the sources quoted were American. What more did they want? Maybe they meant American government sources," the Dutch delegation member says.

If so, they probably meant ones who would talk. Adopting their best Mission Impossible attitude, U.S. officials denied all. "There was zero U.S. government pressure," John Marcum, director of the OECD's science, industry, and technology division, says from OECD headquarters in Paris. "There wasn't a single message or phone call. There was no effort by the U.S. to oppose this."

Explains a member of the U.S. science department delegation at the OECD, "The allegation that the U.S. tried to have it suppressed is a complete canard. Nobody in the U.S. government had even heard of it until it appeared in the U.K. press. We've never seen a copy. Seventy-five percent of these reports never see the

A new report concludes that the U.S. export controls do not harm the Soviet Union.

light of day. We didn't even discuss it. But we did send a report about it to Commerce and [the] State [Department].

Then that report must have landed in another cosmos, because the feds Stateside claim ignorance, which in this case may not be bliss. "This is the first I've heard of it," says the Commerce Department's Tim Hauser, named by the U.S. government's OECD science department official as the probable recipient. "Just by asking me means you know more than I do."

Asked if he had seen the report, Vincent Comras of the State Department's European Affairs Desk said he hadn't and requested that it be sent to him.

But to hear OECD tell it, no one was supposed to see "The Sisyphus Syndrome" anyway.

"This is not an OECD report. It was never intended to be one," Marcum contends. "It was intended as an internal paper. It wasn't a finished report. It was a draft contribution to the whole issue of export controls," he says.

"This is a political document that

doesn't give a balanced, objective presentation of the facts. It's highly polemical and the staff member to whom it was submitted decided it wasn't suitable for further use," the OECD division director says.

"I think polemical's a bit strong," Macdonald counters from his home in Brisbane. "It's definitely a rousing document. But I didn't mean it to be wishy-washy. I guess OECD isn't used to reports like this. They're used to mealy-mouthed ones. This is something you can get your teeth into."

There's certainly enough in "The Sisyphus Syndrome" to cause some severe root canal pain, especially on the U.S. side of the Atlantic. Macdonald concludes that the only country U.S. export controls help is the one they are designed to harm.

"Only the simplest soul could truly believe that current U.S. controls on the export of high technology can ever achieve their stated objective," Macdonald's report says. "For the Americans, high technology has progressed beyond
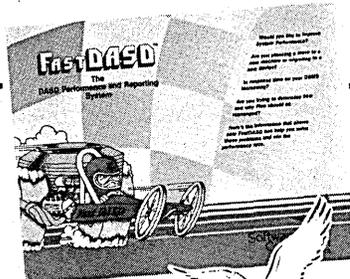
something that is used in weapons—it has become a weapon itself. Almost all high technology has military applications. Absolutely all of it is imagined to be precious to U.S. national security."

The report goes on to say that the U.S. and Europe will suffer from the disruption in information flow, and says that the "other side" will gain in the long run. "That region most likely to improve its

"Under the guise of foreign policy, the U.S. is seeking to protect its position in technology."

lot is the region which has had experience and has proved most resourceful in procuring and handling copious amounts of high-technology information flowing through informal channels. The Soviet bloc promises to be the main beneficiary from U.S. controls on the export of high technology."

Strong stuff, for sure. Apparently too potent for the OECD, which doesn't make a habit of taking political stands on anything. A direct descendant of the Marshall Plan, the 24-nation group is structured somewhat like the United Nations, although with every country an industrialized one, the rapport is better in Paris than in New York.

The furor over export controls is a threat to the tranquility, though. Unhappiness over U.S. export controls is more intense than ever, and violations are on the increase. "Nobody in Europe follows the rules. They can't afford to," says an executive for a Scandinavian computer company. "We'd die if we followed them. We make the necessary statement that a machine we're shipping doesn't exceed the required degree of technology. But we know it does. So we lie. We make up a false form. The government knows it. Besides I'm helping my country's economy. I can buy a machine on the street in Taiwan that has much more power than anything I can ship there."

Businesspeople aren't the only folks on-line with "The Sisyphus Syndrome." Despite the report's unofficial status, its attack on U.S. policy is endorsed by most European politicians. "The report shows what many of us believe about the way the export controls benefit the U.S. and Russia," says Conservative party Parliament member Spencer Batiste. "The obvious solution is that the U.S. recognize that invading the sovereignty of its partners is not conducive to good relations with its allies. It's a continual running sore that's going to aggravate relations with Europe."

That's not all, folks. The European Parliament a few weeks ago was scheduled to adopt a draft resolution on export

controls after a Belgian company was denied an export license for equipment admitted by all parties to be of no strategic importance. The resolution notes the Parliament's concern "at the growing nationalism surrounding technology, whereby the U.S. hopes to achieve economic and technical supremacy" and that "in the absence of a concerted approach, the European Community's technical dependence will lead to ever greater political dependence and make it vulnerable to blackmail."

A European Parliament draft memorandum is even stronger in its denunciation of U.S. export control policy. "U.S. restrictions on the transfer of technology have a much greater effect in the community than they have in the U.S. It is increasingly apparent that, under the cover of secrecy and in the guise of foreign policy, the USA is seeking to protect its dominant position vis-à-vis the community in advanced technological sectors," the memorandum says.

The memorandum calls for establishing a consultative body for the U.S. and the European Community, which would include representatives of governments and industry.

But if that comes to pass, they won't be able to use "The Sisyphus Syndrome" as more than an unofficial reference document. It has been buried, and author Macdonald can't publish the report or even show it to anyone. "I didn't expect any controversy," Macdonald says. "But there are an awful lot of strong feelings on the subject [of export controls]. It's really beyond the pale as far as European industry is concerned. Putting clamps on information because of security reasons is going to be terribly damag-

"Export controls on high technology have the ability to transform more mundane matters into issues of national security."

ing to any information-intensive industry, which high technology is," he says.

The lack of air time doesn't detract from the potency of Macdonald's points in Europe. Despite the careful crafting by Congress of a new Export Administration Act, designed to outline once and for all under what circumstances what goods can go to what country, the issue is hardly resolved. And even Macdonald doesn't quite believe that 100% of the fault lies with the U.S.—just 99.9%.

"Export controls on high technology have the ability to transform more mundane matters into issues of national security," he says. "That is why even those controls introduced for blatant reasons of foreign policy have been justified in terms of national security that would

not be acceptable on other grounds. The American academic community has tolerated a degree of government interference in its scholarly activities that would otherwise have been unacceptable. American high-technology industry has also acceded to intervention in its affairs.

"Only the allies of the United States object to making sacrifices for the sake of American national security, only they are so parochial and venal that they would put their own sovereignty and economic well-being before the national security of the United States and—by extension—their own national security," Macdonald says.

Even if they get published, these are hardly the last words on the subject.◉

Foreign correspondents John Lamb and David Hebditch contributed to this story.

BENCHMARKS

TI TURMOIL: Before Texas Instruments' new president and ceo, Jerry R. Junkins, can address the myriad of problems now facing the company—including a weak personal computer business, the worst semiconductor slump in history, and a downturn in the company's Defense Department programs—he must quickly restore company morale, which has hit rock bottom, say industry watchers. A string of vice presidents and other management personnel have made hasty exits from the Dallas-based company in recent months. "The first order of business is to up morale," says Mike Krasko, veteran electronics industry analyst at L.F. Rothschild. "He has to create stability and instill confidence in his people, and then assess who can execute and who can't." The appointment of Junkins after the abrupt resignation of Fred Bucy is viewed by many in the industry as an opportunity for TI to reverse three years of setbacks. Already, TI chairman Mark Shepherd Jr. has turned control of the finance, strategic planning, and external affairs staffs over to Junkins, giving him more power to run the company than his predecessor had. Bucy, who is said to have been forced to leave his position, has been blamed for much of TI's recent troubles, and is known in industry circles for his tough personal style. In contrast, Junkins is said to be well regarded among his colleagues and stands a better chance of stopping the exodus of top management and scientists. "The two men have very different styles," says Krasko. "Junkins will delegate responsibility and seeks participation from all levels of management. Bucy preferred to go one-on-one most of the time." Junkins, formerly the executive vice president of data systems, government electronics, and industrial con-

trols, isn't likely to make any startling changes in company strategy in the near future, but analysts expect him to overhaul the company's computer business, a source of headaches for the company in recent years. In 1983, TI lost nearly $600 million after it abandoned its home computer. In addition, stiff competition and lack of IBM PC compatibility forced TI to withdraw its Professional Computer from the retail market.

SLICING UP APPLE: Restructuring is the order of the day at Apple Computer, where officials have for months blamed declining profits and slow sales on a weak personal computer market while the company picture has gone from bleary to downright bleak. The company's new directives eliminate its two product divisions and establish an operations group to oversee the manufacturing and distribution of the Apple II and Macintosh lines and a marketing and sales group for both lines. Insiders say the reorganization will help alleviate rivalry between the product divisions. Apple cofounder Steven Jobs will no longer oversee daily operations; the restructuring gives more power to the two group vice presidents. Exactly what Jobs will be doing at the company is somewhat vague—Apple says he will assume a "more global role" in new product development and company strategy. Meanwhile, Apple dealers no longer have to compete with the company's direct sales force. Apple dissolved its national accounts sales team, which was largely unsuccessful at selling to corporations, and says it will rely almost fully on dealers for sales to large companies. It remains to be seen if the measures will lift the company out of its slump. Company revenues and earnings continue to slide; the numbers are worse than Wall Street expected. Apple may just break even in the third quarter, or possibly lose money for the first time in its history. The introduction of a file-server which would allow Apple machines to share data with IBM computers, a crucial link in Apple's office system, has been delayed several months. Key employees have left the company, plants have been closed, and more than 1,600 Apple employees have been laid off. The progress of the Macintosh has been excruciatingly slow, and to make matters worse, sales of Apple IIs, the company's mainstay line, are down about 50% so far this year.

PIRATES: Chapter one in ADAPSO's crusade to bring software pirates to task ended with an out-of-court settlement of the highly publicized suit against American Brands Co. The company acknowledged that employees of its Wilson Jones

Co. unit had made unauthorized copies of Wordstar and three other programs from Micropro. A cash settlement for an undisclosed amount was paid to ADAPSO and Micropro—both jointly filed suit earlier this year. The suit asked for damages of $225,000 and the return of any profits earned as a result of the alleged copying. ADAPSO was reportedly seeking a settlement because of financial constraints. Top management at Wilson Jones was not aware of the copying, according to ADAPSO. The company has agreed to take steps that will ensure against illegal copying in the future. ADAPSO has hinted darkly that the settlement by no means closes the book on its efforts to rid the world of software pirates. More suits are likely to follow, say ADAPSO officials.

NEW LIFE AT COMSERV: With a new ceo, a thinned-out work force, and a couple of newly signed million-dollar contracts, Comserv Corp. is putting its troubled past behind it and taking what it says are the last of its lumps for previous bad behavior. The Eagan, Minn.-based maker of manufacturing software gained attention over the last two years not for its products, but for its practice of capitalizing software construction costs, a suspect accounting method unpopular with the financial community. The company turned over a new leaf early this year when, amid a storm of protest from small software firms over the practice, it voluntarily dropped capitalization in favor of the more acceptable method of expensing product development. The action resulted in a charge of $12.8 million on 1984 earnings, bringing the year's loss to a total of $22.6 million. The company also ran into trouble last year with the Securities and Exchange Commission for booking revenues earlier than it should have. Correcting that indiscretion resulted in a pretax loss, not counting the accounting charge, of $9.7 million. Revenues were down for the first quarter of 1985, at $4.5 million from $5.5 million in 1984, but Comserv reduced its operating loss 42%, reporting $2 million, down from $3.4 million last year. Comserv's new chief executive, Tania Amochaev, says the company will be profitable in the second quarter. If she's right, it will be the first time in three years. "We've put ourselves under fiscal control," says Amochaev. "Our stategy is not a going-out-of-business strategy, but a research and development strategy. We spun off our service bureau, cut our administrative costs, and reduced our work force from 415 to 260. But we are devoting 20% of revenues to research and development." In other moves to reduce expenses, Comserv sold off its international subsidiary business, began leasing space in its headquarters building to out-

side tenants, and merged its sales and marketing departments. A new management team was brought in, headed by Amochaev, 35. Amochaev, who was born in Yugoslavia and emigrated to the United States as a child, joined Comserv last November. Starting out as a programmer at Control Data Corp., she moved up to vice president of scientific information services for CDC's international operations, where she considered marketing Comserv's software overseas in a joint venture. Instead, she became president of Comserv, replacing Richard Daly, who resigned amid the accounting mess, and Control Data acquired distribution rights for Comserv products overseas. The moves are showing signs of success: Comserv's sales increased 28% last year, to $25 million. Amochaev boasts that the company sold 100 new installations of its AMAPS system, of which 60 are new customers. The company moved into niche markets with a new product focused at government contractors, developed minicomputer-based products, and introduced an information reporting system with a micro-to-mainframe link for pcs. More recently, Comserv closed two multimillion dollar contracts—with Control Data for $3 million and with Kodak for $5 million.

MORE LAYOFFS: Another wave of layoffs has hit the industry of late. AT&T says it is cutting 1,650 jobs at AT&T-Information Systems, initially in the telephone and computer equipment marketing and repair operations. About 1,000 jobs in the eastern division of the group that markets to small business will go. The company will also reduce the number of repair centers to 14 from 17. The staff at the Information Systems group headquarters in Morristown, N.J., will also be reduced. AT&T says it will attempt to reassign employees to other positions. Control Data Corp. will lay off several thousand workers at 28 sites for the first two weeks of July in addition to closing a computer disk-drive plant in Minneapolis with 450 employees. The closing and layoffs involve Magnetic Peripherals Inc., a joint venture managed by CDC. In another not-too-surprising announcement, Wang Laboratories says it will lay off 1,600 employees and take an unspecified write-off for obsolete inventory. A loss for the fourth quarter, ending this month, is expected, though the company claims it will show a profit for the year. The company has been slow to deliver new products and users have complained that its office automation systems did not have useful connections to IBM mainframes, thereby cutting off their OA systems from the company's databases (see "Dark Days at Wang," April 1, p. 32).

WORLD WATCH

TOKYO – Following the debut of the Crayettes in the American arena, Fujitsu is reportedly waiting in the wings to introduce a vector processing superminicomputer that it will unveil as early as next autumn. Also watch for Fujitsu to offer supercomputing muscle as an add-on option for its mainframe wares.

LA GAUDE, FRANCE – Big Blue's famous French facility, which has brainstormed much of IBM's telecom technology, is now toiling away on the PBX front. Working with researchers at Rolm and at IBM's Reseach Triangle Park, N.C., labs, the La Gaude center is putting the final touches on a switch for the European markets. The IBM/Rolm PBX, which is expected to be announced along with an associated local area network in October, must now win the approval of the various European PTTs–a process that could take another year.

PARIS – Things are a bit shaky at Apple France now that it's lost its head honcho to the company's Cupertino home office. Right after Jean Louis Gasse exited Europe for Silicon Valley, the French subsidiary dramatically dropped its growth forecast to 50% from 100%. Maybe the operation was a one-man show after all, or maybe the micro market is just turning sour.

TOKYO – NEC and Geisco are about to seal a deal for joint development of telecom and applications software sorely needed in Japan. The resulting network will be aimed at the local micro market that is dominated by NEC, which currently has an installed base of over 1.7 million pcs. Japan's prince of the pc will also distribute the Yankee company's remote computer services in the land of the rising sun.

SYDNEY – Software smugglers beware. Lotus Development Corp. and Ashton-Tate have teamed up with local software distributor Imagineering to form the Anti-Software Piracy Association. Pooling their resources to come up with a fighting fund of $100,000, the companies have vowed to track down and prosecute Southeast Asian software pirates from Hong Kong to Singapore.

OSLO – Rumor has it that Tandberg's German parent Siemens is unhappy with company president Ralph Høybakk, who's had his head in the clouds too long. Having successfully scaled Mount Everest in February, Høybakk returned home to face an uphill battle with Siemens, which may replace him with one of its own corporate climbers.

STOCKHOLM – Forget the whiz kids, watch out for the clever computer-age clerks. In 48 computer crime lawsuits brought in Sweden between 1981 and 1983, most of the culprits were clerks who had altered input data. Half of the data delinquents had been on the job over 11 years and 44% were women.

LONDON – Sporting Sperry is kicking around the idea of using club membership cards and an automatic turnstile to combat violence at U.K. soccer matches. Prime minister Margaret Thatcher likes the scheme, but skeptics warn that card-carrying thugs are still thugs.

HOW TO DECIDE ON A COMPANY-WIDE GRAPHICS SYSTEM.

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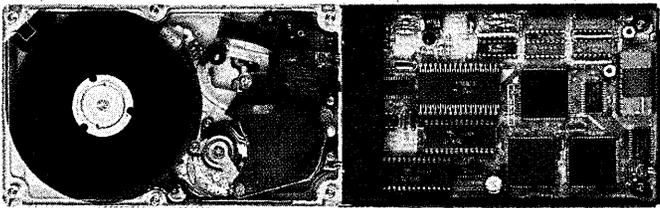
A 10 megabyte hard disk drive on a card that makes a PC* function exactly like an XT. In fact, the only difference is that Hardcard has a faster access time than the XT's built-in drive.

It's also faster to install than any other add-on drive. Because everything is compressed onto a single card that quickly plugs into any expansion slot inside the PC. Which means you can rescue hundreds, even thousands of PCs in a day.

And with Hardcard's special installation software, your users can load the operating system and be ready to install their programs in minutes. Which saves your technical staff a lot of support time.

Hardcard also saves all that money you've invested in software. Because it runs all the most popular programs exactly like an XT would. With no extra fuss or modification. And its built-in file directory lets users arrange their files anyway they'd like. So they can boot up any application at the touch of a key.

As for reliability, there's simply less to go wrong. Because Hardcard has fewer parts than other drives. And absolutely no cable connections. Which makes it twice as reliable as the XT's built-in drive.

And Hardcard is the only add-on drive that lets your users keep both their floppies up and running.

But perhaps the most reassuring thing about this revolutionary

PCs.

concept is that it is based on totally non-revolutionary technology: the Winchester hard disk.

In fact, Hardcard was created by some of the same people who pioneered the 8"and 5¹/₄"Winchester drives. And their company has a long history of producing reliable drives for some of the biggest computer manufacturers in the industry.

Because of Hardcard's superior reliability, we can offer you a warranty that goes well beyond the usual 90 days. We give you a full year. Should anything go wrong within the year, take it to your nearby authorized service location, and you'll

get a replacement Hardcard. Immediately. Which means little to no down time.

And the price? Affordable enough to turn all your PCs into XTs.

Hardcard will be available during October at your local computer dealer. In the meantime, write for more information: Plus Development Corp., 1778 McCarthy Boulevard, Milpitas, CA 95035.
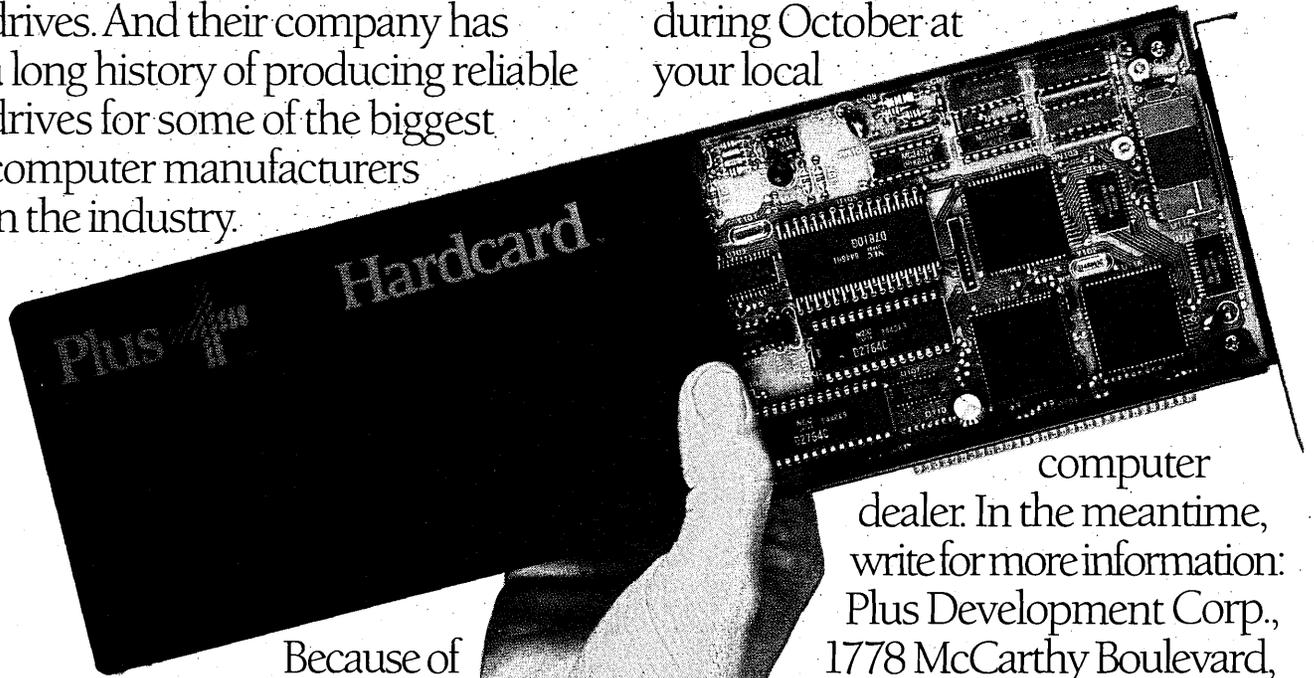
And do your part to save these friendly, intelligent little machines.

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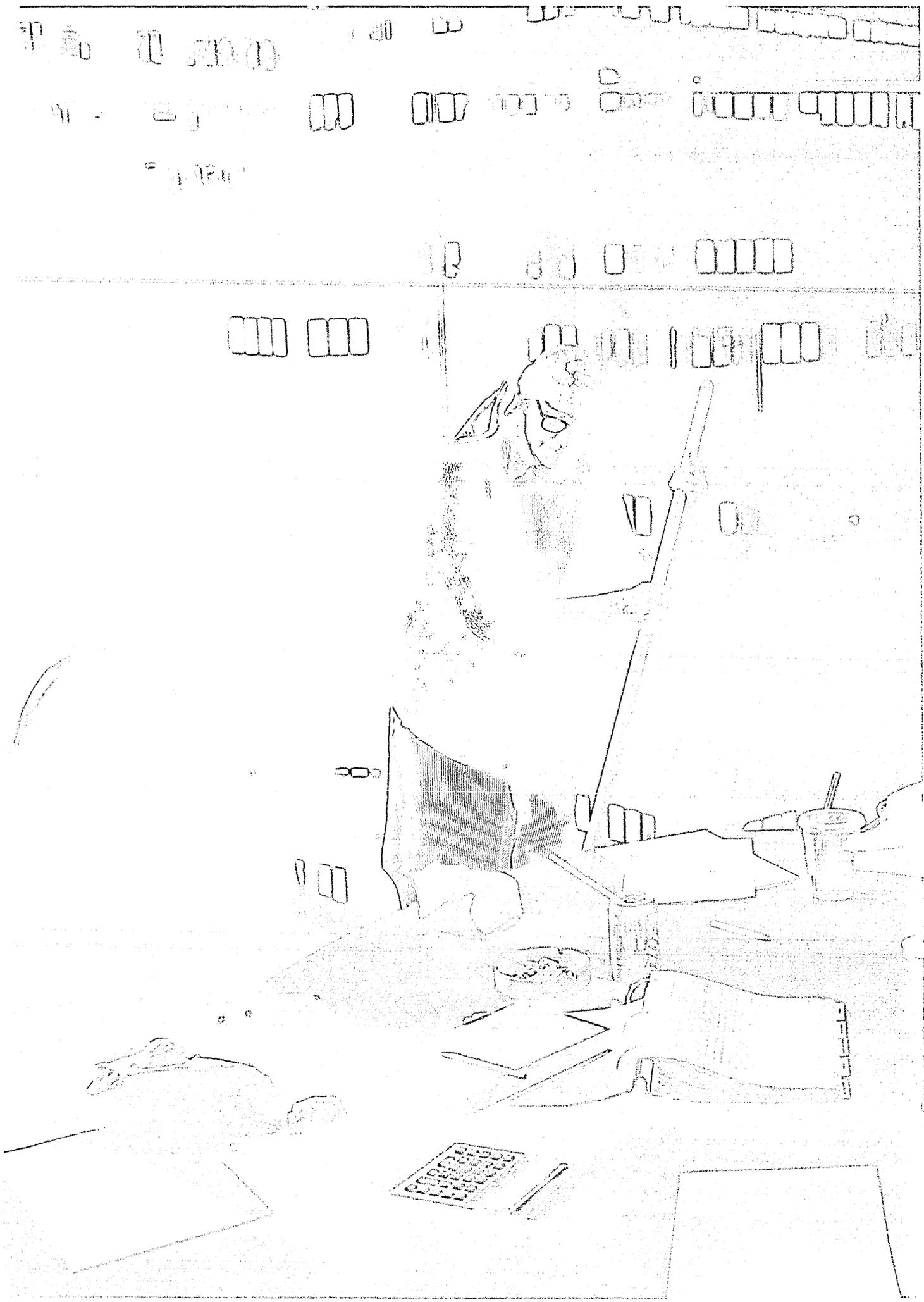
Seven pointers on how to cut the best possible deal.

NEGOTIATING SOFTWARE CONTRACTS

by Charles Edison Harris

As the cost and importance of software continues to escalate, more and more users are recognizing the value of pursuing aggressive contract negotiations. This user activism is a healthy development, but it won't accomplish much unless users know which issues are important and what strategies are effective at the negotiating table.

The essential issues in a software contract vary from deal to deal, depending upon such factors as the source and nature of the software involved. The most basic factors include
• whether the software is packaged, custom, or a combination of the two;
• whether the software is an operating system or an applications program;
• whether the software is proven or new; and
• whether the vendor is financially sound and experienced.

Despite these differences, some key points should be considered in virtually any software agreement. Fig. 1 provides an abbreviated checklist of the more important issues.

This article focuses on seven key steps that can help you smoothly manage the legal and financial aspects of your next software acquisition. The first three steps relate to project management and negotiating strategy. The remaining steps cover substantive contract issues. Taken together, these seven steps will go far toward helping you avoid the most frequent causes of failure in software transactions (Fig. 2).

The examples used throughout this article are based on the agony and the ecstasy of actual software negotiations. In order to protect the confidentiality of the transactions (and the concessions), the descriptions of the companies and the software have been scrambled and disguised.

The best software contract should be like the Holiday Inn room advertised a few years back: no surprises.

Start early. Contrary to popular opinion, computer contract negotiations do not begin when your lawyers sit down to hammer out the written agreement. In a software acquisition, the negotiation process is essentially the same as the acquisition process. The negotiations begin the moment the vendor salesperson walks through your door. Once you openly commit your company to a transaction with Vendor X, you lose nearly all of your negotiating leverage with that vendor. Without this leverage, any efforts to gain meaningful contractual concessions will generally be doomed to failure.

Consider the large regional hospital that spent two years evaluating alternative approaches to its data processing needs. After issuing its RFP, the hospital narrowed its software choices to three vendors. Six months later, it selected its favorite, and obtained board approval to proceed with the transaction at an approved budgetary level. Pleased with this commitment, the director of the hospital's data processing department proudly informed the vendor sales team that board approval had been obtained, and that contract negotiations could begin.

Not too surprisingly, the hospital found that the vendor was unwilling to grant any financial concessions. In addition, although the vendor listened politely to the hospital's requests for changes to the contract, the deal was ultimately documented on the vendor's standard form agreement, with a few minor alterations relegated to a separate addendum.

The hospital's negotiating problem was very simple. Having lost its negotiating leverage by prematurely announcing its commitment to the vendor, the hospital was engaging in the far-too-popular sport of computer contract begging—which should never be confused with the much more productive game of computer contract negotiations.

Moral: negotiations require leverage. If you want to negotiate a software contract, you have to start early enough to build and use negotiating leverage.

MAXIMUM GAIN FROM CONTROL

Maintain control. Even if you begin early enough to be effective, you have to maintain control over the negotiation process to gain maximum concessions from the vendor. Control is important for two reasons. First, control creates and enhances negotiating leverage. Second, by imposing discipline on your own bargaining efforts, you reduce a vendor's ability to use your sense of urgency against you.

The best method of maintaining

FIG. 1
A SHORT SOFTWARE CONTRACT CHECKLIST

- [ ] Detailed specifications:
    Function
    Performance
    Documentation
- [ ] Source code availability
- [ ] Delivery and installation deadlines
- [ ] Acceptance testing:
    By module
    By system
- [ ] Terms and conditions of license:
    Specific grant of license
    Perpetual or limited term
    Permissible use
    Nonexclusive license
- [ ] Ownership of software:
    Basic package
    Modifications
- [ ] Payment terms:
    Amount
    Timing
    Additional location fees
- [ ] Warranties:
    Function
    Performance
    Documentation standards
- [ ] Proprietary rights warranty indemnity
- [ ] Manuals and publications
- [ ] Vendor assistance in customization
- [ ] Protection of proprietary rights and information:
    Vendor
    User
- [ ] Risk of Loss:
    Work in progress
    Completed software
- [ ] Assignment and sublicense rights
- [ ] Right to move
- [ ] Right to permit others to use
- [ ] Default and remedies (user and vendor)
- [ ] Act of God provision (user and vendor)

control is to follow an organized, professional approach to the procurement process. Key steps include forming an interdisciplinary negotiating team, using a good RFP, maintaining multivendor competition (or at least the appearance of competition), using agendas and other techniques to ensure that the negotiations proceed on your terms, and refusing to negotiate with vendor representatives who do not have final negotiating authority.

Control may well have made the difference in a large software acquisition by a multinational banking concern. Faced with a particularly important transaction, the bank created a strong negotiating team that included a member of senior management, the head of MIS, the chief financial officer, a representative of the legal department, and an outside specialist in computer contract negotiations. The bank used a combination of strategies to maximize control. These included holding all negotiations at the bank's site, according to its agendas; using the bank's draft contract rather than the vendor's preprinted form; and refusing to discuss contract specifics before achieving agreement on business concepts important to the bank.

The key test of control came early during the conceptual discussions. The bank had previously indicated it would bring its full negotiating team to all formal meetings, and that it expected the vendor to do likewise. In particular, the bank had emphasized that it would not engage in any negotiations unless the participants included the vendor official who would sign the final contract.

Despite these warnings from the bank, the vendor showed up at the first critical negotiating session without its attorney and without anyone having authority to sign the agreement. The vendor's negotiating team essentially consisted of several levels of marketing personnel, plus a technical advisor.

Faced with this situation, the bank responded by refusing to discuss any substantive issues at the meeting. Although the vendor marketing representatives claimed they had misunderstood, the bank stood fast and terminated the session. One week later, the parties tried again. This time, the vendor was represented by a senior vice president, its attorney, and its regional marketing manager. The bank controlled the agenda and the discussions, and went on to achieve valuable concessions from the vendor.

Moral: the party who controls the negotiations has a distinct advantage at the bargaining table. If you don't control the negotiations, the vendor will.

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To reject software on your terms, you must use a realistic acceptance test.

Identify misunderstandings. The most important reason for engaging in software contract negotiations is to identify problems and misunderstandings. Unfortunately, users and vendors both tend to view the contract negotiating process as a method of documenting whatever business and legal concessions may be agreed upon at the bargaining table. The irony of this traditional approach is that you can't negotiate or document a problem if you don't know it exists.

The best software contract should be like the Holiday Inn room that was advertised a few years back: no surprises. To achieve this goal, you have to use the negotiating process to probe every potential uncertainty, whether it springs up on your side or the vendor's side of the table.

DANGERS USUALLY HIDDEN The most dangerous misunderstandings are often buried beneath more obvious issues. In one near disaster, an insurance company was negotiating for the development of an applications package to process a new insurance industry product. Because the product itself was still being designed, the parties appropriately devoted substantial effort to designing and documenting the software specifications. These specs included interfaces with the user's existing software and several off-site service bureaus. Both the user and the vendor had signed off on the interface specifications, and the user's attorney had incorporated them into the initial draft of the software development contract.

Two weeks later, the user's attorney happened to overhear a discussion concerning the off-site hardware and software involved in one of the interfaces, and certain changes being planned by her client. When she asked her client whether these items would affect the interface specs that were being included in the contract, she was assured that they would not. Keeping a note of the issue, she raised the question again at the next formal negotiating session with the vendor. The response from both sides was the same: no effect. The vendor's technical representative jotted the question down, however. A week later, just before the contract was being finalized, a new answer came back: the proposed off-site changes would require substantial revisions in the interface specifications—revisions so serious that the user doubted its implementation deadlines could be met. Fortunately for all concerned, the error was caught in time, the specifications and deadlines were revised, and the contract was signed.

Moral: what you don't know *can*

hurt you. If you want a software contract that avoids surprises, you must use the negotiating process to identify and solve potential misunderstandings.

Document specifications. The single greatest cause of disputes in software transactions is the failure to include adequate specifications in the contract. Although the lack of written specifications is more likely to create disaster in custom development projects than in packaged software transactions, some form of written specifications should be included in every software contract. The reason is very basic: the specifications provide the measurement standards for the most important provisions in the agreement.

Unfortunately, adequate specifications for the software are not always available at the time the contract is signed. This problem often occurs in transactions involving the development of custom software or the conversion, upgrade, or enhancement of existing programs. In one recent situation, a telecommunications company was contracting for a custom software system related to its satellite transmission of billing data. Intent on locking up the business as soon as possible, the vendor proposed its standard agreement, which included a few functional specs and provided that the final specifications would be mutually agreed upon at a later date. Like many similar agreements used in the software industry, the contract required substantial user down payments (before the specs were completed) and failed to say what would happen if the parties could not reach agreement on the final specifications.

Although the users rejected this approach, they recognized that they faced several key problems:
• They needed to get the implementation process moving as soon as possible;
• The specs could not be developed without the vendor's assistance;
• The vendor could not afford to develop the specs without advance payments from the user.

PROPOSED SEPARATE AGREEMENT To solve these problems while still protecting its own interests, the user proposed a separate consulting agreement that would allow the vendor to develop the specs at a fixed fee before the software development agreement was signed. Although this approach is frequently employed by knowledgeable users, the vendor rejected the idea, claiming that it needed a higher level of user commitment or it would not undertake the engagement.

As a fallback position, the user agreed to enter into a staged software de-

velopment agreement. Under this approach, which was eventually accepted by the vendor, the specs would be developed by the vendor at a fixed fee as stage one of the contract. If the user accepted the specs, the agreement would remain in effect and the vendor would begin coding the programs. If the user rejected the specs, the contract could be terminated at no additional cost. As things turned out, the user's ability to terminate the contract was highly beneficial in encouraging the vendor to produce final specifications that were responsive to the user's needs.

Moral: specifications are the only things that describe what you're getting. If you don't take time to document adequate specifications, don't be surprised when you pay for something you didn't expect to get.

Stress acceptance testing. The acceptance provision may well be the most important user provision in any data processing acquisition agreement. Software contracts are no exception.

For an acceptance test to have optimum value, it must be carefully tailored to your needs and equipment, as well as to the function and purpose of the software being acquired. Where proven packaged software is involved, the acceptance test can be short and simple. On the other hand, where custom software is involved or where one vendor is furnishing software for a new or existing computer system provided by another supplier, the acceptance test must be quite detailed. At a minimum, the test must be sophisticated enough to identify the source of any system failure (for example, hardware, operating software, or specific applications software). Among the acceptance items often overlooked by users are detailed requirements concerning run times, response times, storage requirements for the program itself, and the ability of the software to handle the user's peak demand periods as well as its normal operations.

Acceptance testing can be at its most difficult when integrated software is to be delivered in multiple stages over a period of months or years. Faced with this situation in a four-year project involving a mixture of packaged and customized software, a university medical center used a combination of separate and sequential acceptance testing.

The vendor initially proposed that each module be tested as it was delivered. If the module passed the acceptance test, it would be finally accepted and the monthly license fees for the module would begin. The user recognized that this approach would prevent him from subsequently rejecting accepted modules, even if related modules that were delivered later failed to

work, or brought the entire system down.

Seeking the high ground, the user initially demanded the right to reject all previously tested modules if any other modules failed to pass acceptance tests at any time during the four-year implementation period. Confronted with the possibility that the user could reject four years of work by refusing to accept the final module, the vendor balked. Seeking a compromise, the user's attorney asked his client to identify the modules and subsystems that were functionally interrelated. Based upon this categorization, the user determined which modules it would be willing to accept even if other modules failed to work.

The attorney then used this assessment to prepare an elaborate acceptance test employing test groups and acceptance groups. Modules in a test group would be tested together upon delivery. If the test group passed, it would be tentatively accepted and provisional license payments would begin. Subsequent test groups in the same acceptance group would also be tested as delivered, both separately (as a single test group) and sequentially (together with all previously delivered test groups).

If all test groups in an acceptance group passed acceptance, those test groups would be permanently accepted, and the user would no longer have the right to a rebate of the provisional license payments for those groups. Conversely, if any test group in the acceptance group failed its separate or sequential acceptance test, the

medical center would have the option to reject any or all test groups in the applicable test group (whether tentatively accepted or not) and receive a full rebate of all provisional license fees paid for the rejected groups. The compromise worked because it provided pragmatic protection for the user while avoiding undue exposure for the vendor.

Moral: if it doesn't work, you certainly don't want to pay for it. To reject software on your terms, you must use a realistic acceptance test.

WARRANTY MUST BE INCLUDED *Provide for ongoing performance.* Despite their importance, specifications and acceptance tests provide little help if the agreement fails to include warranty and maintenance provisions that provide for ongoing software performance. Regardless of whether the vendor obligations are documented in a warranty or a maintenance provision, the key to success is to clearly describe the standards the vendor must meet. As suggested earlier, the basic performance standard should be based on the detailed specifications that form the heart of the agreement. Although general statements that the software will perform in accordance with published specifications can be helpful, the best warranty and maintenance provisions include separate performance levels for such critical items as run times, response times, and uptimes/downtimes.

Where user requirements differ for certain modules or subsystems, the performance levels should be varied accordingly.

Warranty and maintenance negotiations frequently break down over the required level and speed of the vendor's response to a problem. Vendors naturally prefer to avoid any specific obligation to respond by a given time or with a particular level of support. Users justifiably want to receive assurance the vendor will devote maximum resources to critical problems.

Presented with this issue in its acquisition of an inventory control system, a pharmaceutical company made headway by categorizing various potential problems and designing a required response level for each category. By accepting the fact that the vendor was unwilling to devote all of its resources to correcting a nonessential bug that could be fixed in the next semiannual release, the user showed some reasonableness and gained negotiating leverage.

The user was then able to convince the vendor to respond very quickly to certain critical defects. (For purposes of this approach, the contract defined these critical defects as those that created a risk of physical or personal injury or which precluded the software from being used in the company's pharmaceutical business.) The agreement provided that the vendor would meet stated benchmarks in performing its warranty and maintenance obligations. Among other things, these benchmarks required the vendor to acknowledge and tentatively diagnose critical defects within stated response times, develop a patch for the problem within a further deadline, and correct the defect in an additional period.

Because both the vendor and the user admitted that the vendor could conceivably be unable to fix a critical defect within the targeted deadline, the agreement also provided that the vendor would not be deemed in default of his obligations, even if a deadline were missed, as long as he committed given levels of personnel to correcting the problem on a full-time basis (in some cases 24 hours a day).

Moral: acceptance tests are no guarantee against subsequent bugs. To assure performance after acceptance, you need warranty and maintenance provisions that tailor the vendor's response obligations to your particular needs.

FOCUS ON FIXING TOTAL DUE *Tie down payment.* Software payment terms can offer particular risks. As with many other provisions, the risks are generally greater where the agreement covers the development or conversion of custom software or the li-

cense of a less established package from a
smaller firm.

Regardless of the type of transac-
tion, price negotiations should focus on fix-
ing (and reducing) the total amount due
and tying payments to deliverables. Even in
software development contracts, you
should seek a total maximum price. At a
minimum, you should avoid open-ended
language requiring your firm to pay "any
other charges incurred" under the agree-
ment. Where hourly rates must be used for
personnel or computer time, you should
employ formulas and standards to limit the
types and amounts of charges that can be
made.

If the vendor insists upon additional
charges for use of the software on an addi-
tional machine or at an additional location,
the wording must be carefully reviewed to
ensure that an unexpected windfall will not
be created for the vendor. Increased use of
local area networks and multiple-site data
processing facilities has made many "one
location" and "single machine" provisions
dangerously obsolete.

Determining a reasonable payment
schedule can be difficult. Ideally, you
should seek to delay any payments until af-
ter the acceptance date. Unfortunately,
many smaller vendors do not have the cash
flow to undertake a large development
project without receiving an initial down
payment and reasonable progress pay-
ments. The important factors in these situa-
tions is to assess the relative financial
standing of the vendor and maximize the
relative security of the amounts advanced.

In negotiating a software develop-
ment contract with a young but talented
vendor, a data processing service bureau
solved this dilemma by making weekly pay-
ments tied to specific deliverables. Al-
though somewhat of an administrative
nightmare, the weekly payments substan-
tially reduced the user's exposure while
providing essential cash flow to the emerg-
ing vendor. Because the payments were
linked to required deliverables, the weekly
schedule also enhanced project administra-
tion and provided a substantial incentive
for timely performance.

Moral: if you fail to tie down price,
you give a blank check to the vendor. If you
pay too much too soon, you make an unse-
cured loan. To leave the banking to others,
you must tie down price and payment. ◉

Charles Edison Harris is coauthor of
Computer Contract Negotiations and *Ma-
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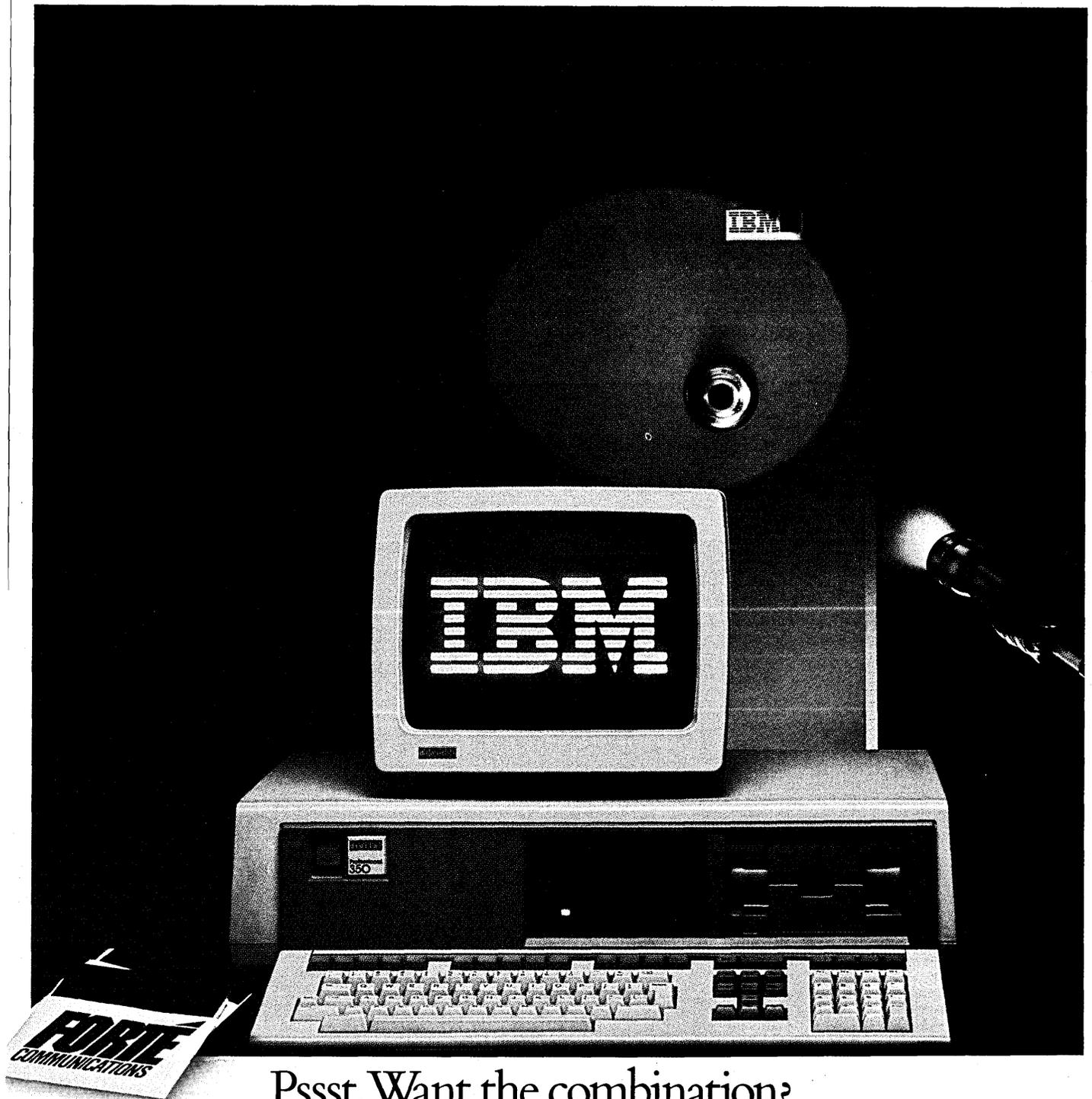
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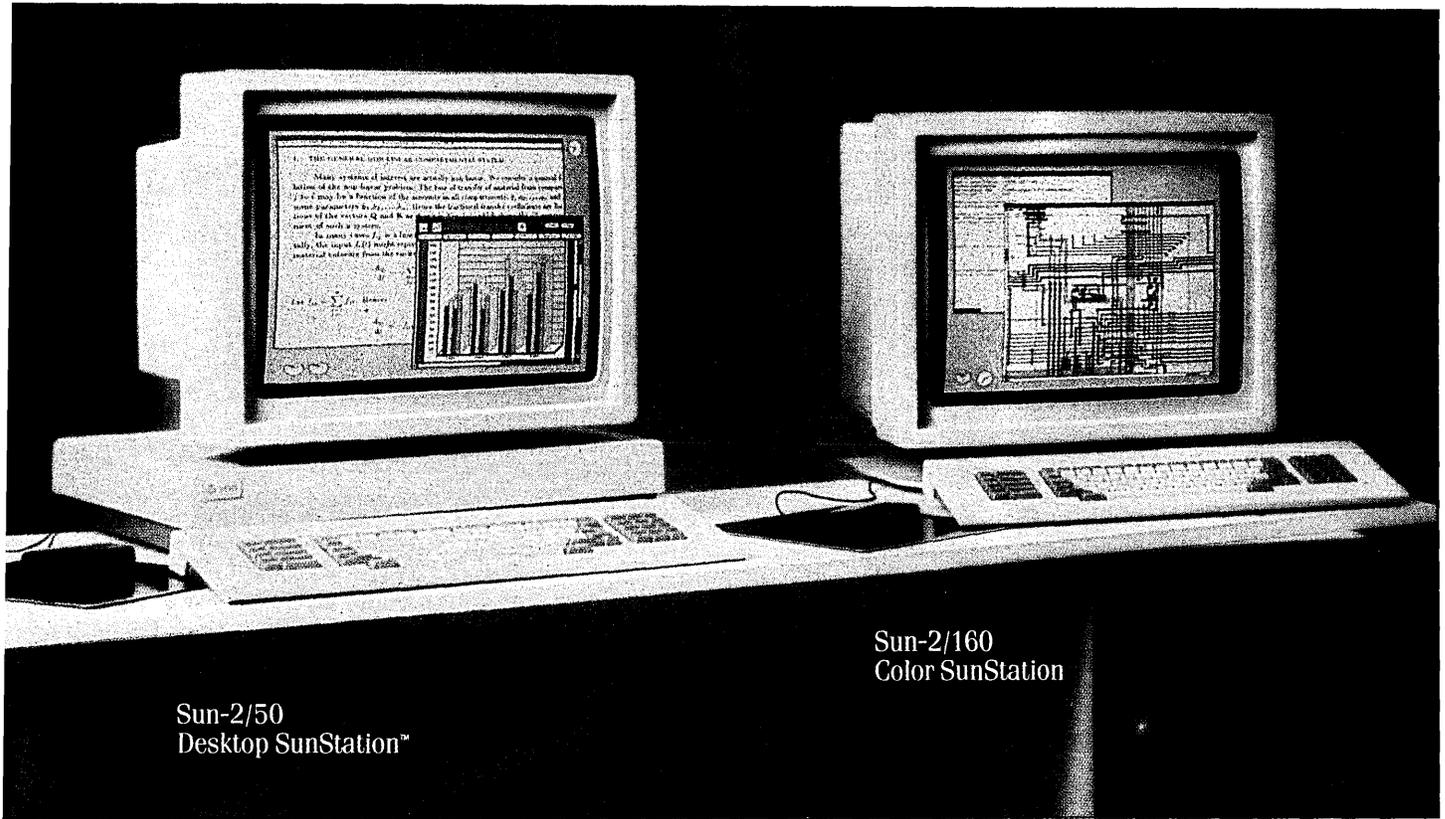
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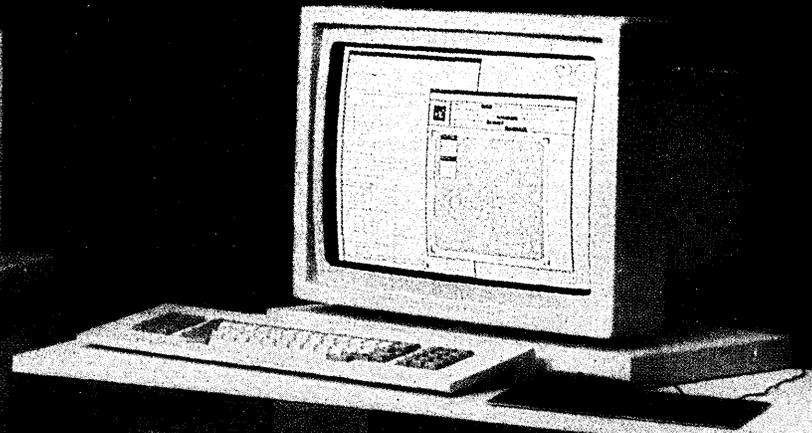
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MANAGING A MULTIVENDOR SHOP

by David D. Truax

In the mid-1970s, did you need more capacity than IBM had to offer in a single uniprocessor? In the late 1970s, did you have a problem getting enough DASD from IBM? More recently, have you become frustrated with the extremely long lead times for IBM front-end processors, terminal control units, and tape drive controllers? If your strategy as a data processing manager was to run your shop with only IBM hardware, these were all real issues for you to deal with. IBM essentially put Amdahl on the map in the mid-1970s when the Amdahl 470/V6 provided a far more cost-effective and available alternative than any processor solution IBM had to offer. Storage Technology Corp. manufactured and sold very competitive tape drives and controllers, but the shortage of IBM 3350s in the late 1970s made the Colorado-based company a billion-dollar enterprise.

Please don't think IBM is the only manufacturer that experiences delivery problems. The same Amdahl that beat IBM to the punch with the 470/V6 also came out one year late with its latest uniprocessor (the 5860), not to mention performance and reliability problems that lasted for almost one more year. And hasn't IBM had a devastating effect on PCM DASD vendors in the past two years with its ability to manufacture and deliver the very reliable 3380?

If you're drawing the conclusion that these problems occur only in the IBM and pcm arenas, let's recall Digital Equipment Corp.'s recent journey with its Venus processor, the DEC 8600. Depending on your point of view, the 8600 could be considered 18 to 36 months late. While DEC is delivering a more powerful processor than was promised in late 1982, the fact remains that DEC users, needing more power than the 11/780 and the subsequent 11/785 could supply, had to wait until April of this year to satisfy their needs.

This isn't really meant to be a history lesson. In opening these old (and some not-so-old) wounds, I hope to illustrate that as a dp manager your requirements are growing greater every year. Industry estimates state that cpu requirements increase between 40% and 60% annually while DASD grows 50% per year. You are being judged on how well you can accommodate the growth. If your strategy dictates using a single vendor (even if it's the industry giant), occasionally your needs won't be met.

The following will suggest that a data processing manager must consciously elect a strategic direction regarding equipment selection. Specifically, I will argue that any computing organization can and will benefit from the advantages that result when you establish a multivendor equipment philosophy and policy. Generally speaking, a more cost-effective, competitive environment will be created—one that demands the complete involvement of both data processing and vendor personnel.

First, however, let me state that in the development of a multivendor approach, manufacturer selection is not easy; it is obviously far more complex than the predefined solutions you may have become accustomed to implementing. Also, the subsequent management issues are far more difficult; when problems arise, no longer can the accusing finger be pointed at one (guilty) party. But these are not overwhelming difficulties. If anything, they provide incentives. They allow the data processing organization to become far more involved in its own facility, its operation, and its management. So with these challenges in mind, let's begin.

DO YOUR HOMEWORK FIRST

Recognizing that a thorough set of selection guidelines must be applied and evaluated is the first step. And clearly, the most important aspect of any acquisition is the analysis of your requirements. You must be sure of precisely what you need before making any moves toward acquiring anything. Unless every specific technical issue is addressed, you stand a chance of buying the wrong device. Be sure to include and understand any operating system modifications that may be required and the impact (if any) on application programs. Although this appears to be obvious, the need to do your homework and create a comprehensive requirements statement cannot be overemphasized.

Once the requirements definition is developed, measure your needs against the available solutions independently. If you ask a vendor whether a given set of criteria
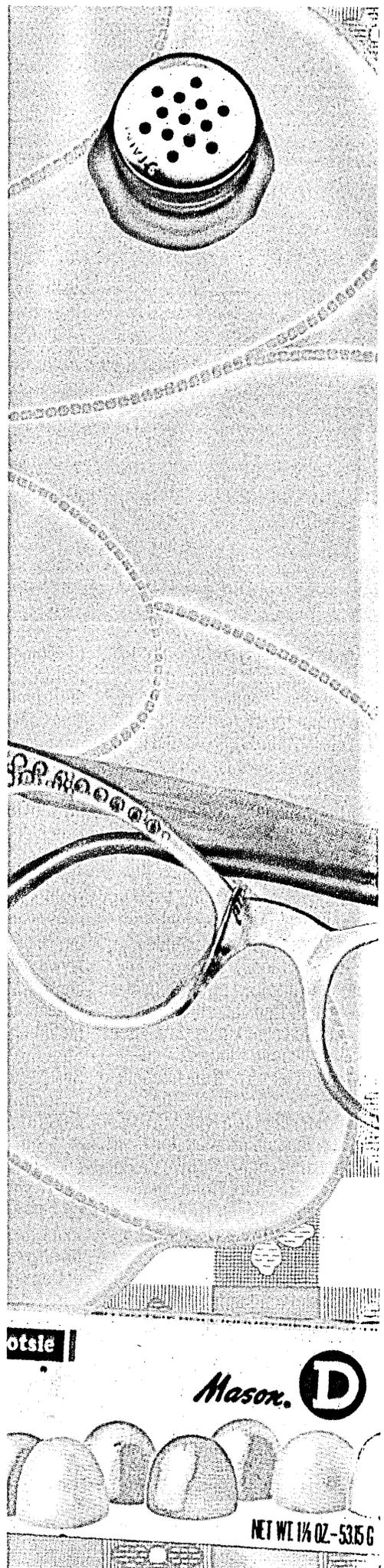
VENDOR'S PROGRESS IN:

	1	2	3	4
WORK HABITS				
1. WORKS WELL WITH OTHER VENDORS	C	C	B	
2. MAKES GOOD USE OF TIME AND MATERIALS	B	B	A-	
3. COMPLETES WORK ON TIME	B	C	B	
4. FOLLOWS INSTRUCTIONS WELL	C	B	B+	
5. NEATNESS	C	D	C	
TECHNOLOGY				
1 UP-TO-DATE	A	B+	B+	
2. COST-EFFECTIVE	B+	B	B+	
3. RELIABLE	B	C	B	
4. SPEEDY	A	A-	A	
ATTITUDE				
1. RESPONDS WELL TO CRITICISM	C	D	B	
2. TRIES HARD	B	B	A	
AVAILABILITY				
1. SHORT LEAD TIME	F	C	B	
2. PROMPT DELIVERY	D	B	B+	
FINANCIAL HEALTH				
1. REVENUES	C	B	A	
2. CASH FLOW	C	B	A-	
3. PROFITS	C	B+	B+	
4. STAYING POWER	B	B-	B+	
ATTENDANCE				
1. PRESENT WHEN NEEDED	C	C	B	
2. PUNCTUAL	B	B	B+	
3. AVAILABLE FOR MEETINGS	D	C	A	

CUSTOMER'S COMMENTS

Technosis Inc. has made good progress. The presence of the other vendors seems to make him try harder.

Cost-effectiveness is important, but reliability and performance are crucial.

can be accommodated, very few will respond negatively. Use existing measures of performance available from any of the reputable industry services (e.g., power ratings, protocol potential). Where you have questions that can't be answered through industry services, contact those firms that you know have had appropriate experiences. By all means, ask the vendor for referrals, and contact these referrals to determine the adequacy of any given solution.

Since you have developed your requirement specifications and have started drawing data together to create some conclusions for the purpose of determining what vendors and devices can satisfy your needs, what should you be quantifying? To me, the most important aspect of any data processing operation is its reliability. All the advanced functions in the world are useless unless your systems are running. Check with your contacts or go to R+, from Uccel, Dallas (see "Hard Facts on Hardware Reliability?" Oct. 1, 1984, p. 82), for the comparisons you need.

Another issue that is closely related to reliability is performance. If you can't determine by asking current users if a solution has, for example, enough MIPS or bandwidth, be prepared to measure these yourself with your own benchmarks or representative segments of your workload.

Following your assessments of reliability and performance, other physical factors should be addressed. Your computing facility environment (temperature, humidity, cleanliness, and power) is a consideration. Also, attempt to develop some conclusions regarding the man-machine relationship. This ergonomic issue is particularly important when acquiring output devices or terminals, for instance.

Last but not least, what kind of field support can you expect? Is maintenance provided by the manufacturer or a third party? Be sure to address response times for calls, parts availability, and on-site coverage. Create a maintenance environment that you are comfortable with managing, not one that the vendor is willing to provide for you. Notice that we haven't discussed cost yet. Cost-effectiveness is very important, but for most data processing installations, reliability and performance are (or should be) crucial. Regardless, compare such things as the cost per MIPS or cost per gigabyte to ascertain which solution is the most economic.

Once everything is put side by side, you will probably observe several manufacturers with adequate solutions. The last issue then becomes availability of the selected solution. This is truly a question that you should have been asking all along.

But now, at the end of your analysis, is the equipment available within the time frame that you need it? In short, keep track of availability throughout, with one final reading at the end, primarily because lead times have been known to change.

Having created the justification for acquiring a device, ask your financial organization to check on the financial well-being of each vendor you select. You may have to do this yourself, but in any event, make sure it is done! Acquiring the most reliable, cost-effective device available from a company just about to file Chapter 11 is probably not the best way to go. Be sure of the company you choose.

DIFFERENT VENDOR IS NOT A SIN You have now figured out what manufacturer and device you want to buy. But wait, it's not the same manufacturer of all your other equipment! Not to worry; regardless of what the incumbent tells you, this is neither a mortal sin nor a fatal mistake. This can be the right choice and it can be implemented most successfully, but the multivendor environment has to be managed properly to be successful. Before explaining how to do this, let me provide you with the history of the Hughes Aircraft Co. Corporate Computing Center. This background will illustrate my perspective.

The corporate facility was established in 1971 with only IBM equipment (i.e., two 370/165s, 3330s, and 3420s). If you refer to my opening comments, you will see that IBM had few, if any, reasonable cpu alternatives to satisfy Hughes's expanding needs in 1974 and 1975. At that time, Gene Amdahl had started Amdahl Corp. and had begun selling and installing Amdahl 470/V6 systems very successfully.

Hughes people evaluated the available solutions, selected the 470/V6, and installed it in 1976. But this was just the first wave. A short five years later, the facility that was once exclusively IBM's now had Amdahl cpus, Storage Technology DASDs and tape devices, COMTEN front-end communication processors, and IBM I/O devices (card readers, card punches, laser printers, and impact printers). Furthermore, Harris remote job entry (1600s) devices were distributed in a multitude of user locations and Hewlett-Packard 3000 processors were being used as front-end transaction machines and data-entry devices. The rest of Hughes (each noncorporate operating group) relied primarily on IBM for manufacturing and Digital Equipment Corporation for engineering.

Today, the corporate facility uses both Amdahl and IBM cpus, IBM and Stor-

age Technology DASDs, Storage Technology tape devices, and IBM and COMTEN front-end communication processors. The I/O and remote processing are accomplished with essentially the same manufacturers, but the composition has changed.

Have we encountered problems? We have, but we've been in the proper position to deal with those problems. It is also important to note that each acquisition decision was made upon a complete analysis of our requirements, matching this to the vendor solutions available and selecting the solution that appeared to cost-effectively satisfy our needs most reliably. We put a great deal of effort into understanding the problems and applying the most appropriate solution. These decisions do, of course, take our architectural strategies into account, eliminating some vendors immediately (such as those not compatible with our present environment and direction).

ASPECTS OF MANAGING So what is involved in managing this multivendor environment? It is essential that the data processing manager be aware of exactly what performance levels each of the components in his or her shop is achieving. Measuring performance must then be related to predefined performance objectives or goals. These may include but are not limited to cpu uptime, cpu reliability, TSO response time, DASD use, and batch turnaround time. This information must be in the hands of the individuals responsible for making sure equipment runs reliably.

It is strongly recommended that a single group within your data processing organization be identified as the one responsible for insuring reliability. This single focal point will be very effective in dealing with several vendors (or a single vendor for that matter) and the many departments in your data processing organization.

In addition to monitoring performance, these individuals must monitor the manufacturer's support organization. Don't hesitate to make value judgments on the technical merits of the customer engineers. If one is good, say so; if one is not, constructively provide examples of deficiencies. Build a rapport with the support function people by creating a highly communicative atmosphere. Try to make the encounters dialogs, not diatribes. Be open with the manufacturer's field support management about your problems (real and perceived) and your goals.

Customer engineers are clearly extensions of your own organization, so be insistent. Insist on seeing the same people

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Take as much interest in customer engineers as you would in your own employees.

from week to week (be sure you're not part of a manufacturer's customer engineer education or rotator program) and demand experience, or at least representative senior-level talent among the junior engineers. Take as much interest in these people as you would in your own.

Also related to customer service: if you know some specialist-level individuals—those who normally hang around headquarters—you're somewhat ahead of the game. Situations (infrequently) arise that go beyond local talent. If you wait for your vendor to bring the regional specialist in, the problem may continue longer than necessary. Diplomatically begin with your suggestions of additional help, then when enough time has elapsed, demand more advanced expertise.

Parts can be a potentially divisive issue. How often does your vendor have to send to the opposite coast for them? Does your vendor's customer engineering team get a bonus for keeping its parts inventory at infinitesimal levels? Yes, this has to be a concern of yours, too. Obviously, whether the vendor has the right parts on hand in sufficient numbers will affect your MTBF (mean time between failures) and MTTR (mean time to repair).

All these performance data and the outstanding performance issues should be addressed formally at least once a week, no matter the size of your shop. At the Hughes Corporate Computing Center we have a weekly meeting with all our vendors and operations management present. We don't expect a lot of problem resolution at the meeting, but it is effective in
• identifying problems,
• assigning problem responsibility,
• reviewing (tracking) outstanding problems,
• identifying repetitive conditions,
• establishing a cooperative atmosphere for everyone and building vendor-to-vendor working relationships, and
• recording the proceedings for reference (minutes are taken).

One additional meeting is held with each individual vendor (also weekly) to review any sensitive, embarrassing, or potentially explosive issues. These, too, are very helpful as some field managers are less hesitant in a one-on-one situation as compared with the well-attended weekly meeting.

One last piece of advice regarding the management of vendors: the more you have in writing, the better off you are. If possible, include performance objectives in any vendor contract. At minimum, specify the hours of costumer engineer coverage and response times. But add more (i.e., MTBF, MTTR, etc.) if you can.

There are conditions that may preclude employing multivendor approaches. The predominant examples follow.

1. Equipment types and manufacturers may be specified contractually.

2. Performance levels that limit the number of vendors that can be considered may be required (or, again, contractually defined).

3. Aggressive service levels, such as MTBF or MTTR levels, may be required from the manufacturer, but the manufacturer may not be willing to commit to these service levels.

4. The initial investment in a certain vendor's technology may severely limit a data processing manager's future selections. For instance, your needs in the future may include X.25 compatibility, but some of your current manufacturers may have no intention of supporting X.25.

5. Your company may have defined a specific direction for data processing, eliminating any potential for establishing a multivendor facility.

ENTIRELY FEASIBLE APPROACH In most cases though, the multivendor approach is entirely feasible. What have we gained at Hughes Aircraft and what can you expect to gain by managing a multivendor shop? We run an extremely reliable facility. Industry comparisons, which we track religiously, always put us above average—way above average—for cpu, tape, and DASD. Conceivably, you can expect the same results. With a multivendor approach, you are selecting the most reliable, cost-effective, and compatible devices, so it stands to reason that your numbers will improve.

Moreover, you have told your incumbent vendor(s) and any other manufacturer or vendor that you're going to be very selective. A competitive mood will therefore be created. This competition can only benefit you and your company. Not only will each vendor know that he was selected because of a good track record (and high expectations), but that his performance is going to be monitored and subsequent acquisitions will be predicated on past experience. Simply stated, it is understood by all parties that if the vendor does well, the business relationship can continue. This competitive feeling normally permeates marketing and sales, as well as the field support organization. Everyone becomes motivated. Those who do not respond to this competitive incentive are probably not going to provide a quality product or service anyway.

Another principle advantage of using a multivendor approach relates to avail-

ability. If IBM doesn't deliver, a pcm most likely can or vice versa. Even though some data processing managers have recently become reluctant to select an available and viable IBM alternative (owing to the problems of Storage Technology, Trilogy's demise, and Control Data's withdrawal from the 3380 marketplace, for example), the alternatives are definitely there for street-smart professionals and can be most advantageous when managed appropriately.

The next major benefit of having a multivendor shop is cost. Today, even IBM provides users with discounts (absolutely unheard of in the past). By using your new multivendor philosophy, you have increased your bargaining power. Clearly, you are more likely to get a better deal when vendors are competing against one another.

At this point, I would like to suggest that a multivendor philosophy should not translate into an unlimited number of vendors. Realistically, it probably means three, four, or five, depending on the size and complexity of the facility. The reason for putting a cap on the number is vendor management. The more vendors you have, the more dificult it becomes to properly manage them. Common sense dictates that having four or five DASD vendors will create more problems than the benefits realized from an excessive multivendor storage strategy.

Regardless of your specific configuration, architecture, locale, or situation, a multivendor approach to equipment acquisition can be extremely beneficial. The keys to success are developing and executing a comprehensive set of vendor selection criteria and properly managing the multivendor environment once it is established. And remember, managing this multivendor shop is not going to be easy; it's definitely not for the timid data processing manager. This difficult challenge takes a great deal of time, both in preparation and in ongoing effort. But the rewards are significant. Certainly, substantial cost savings will result. More important (to you and your users), the competitive mood a multivendor shop inspires can improve your level of reliability—the single most important criterion of a successful data processing facility. ◉

David D. Truax has been employed by Hughes Aircraft Co., Fullerton, Calif., since 1968. An associate director in the Corporate Communications and Data Processing Division, he has been responsible for corporate data processing services since 1982. These duties include computer operations, technical suport, and user services.
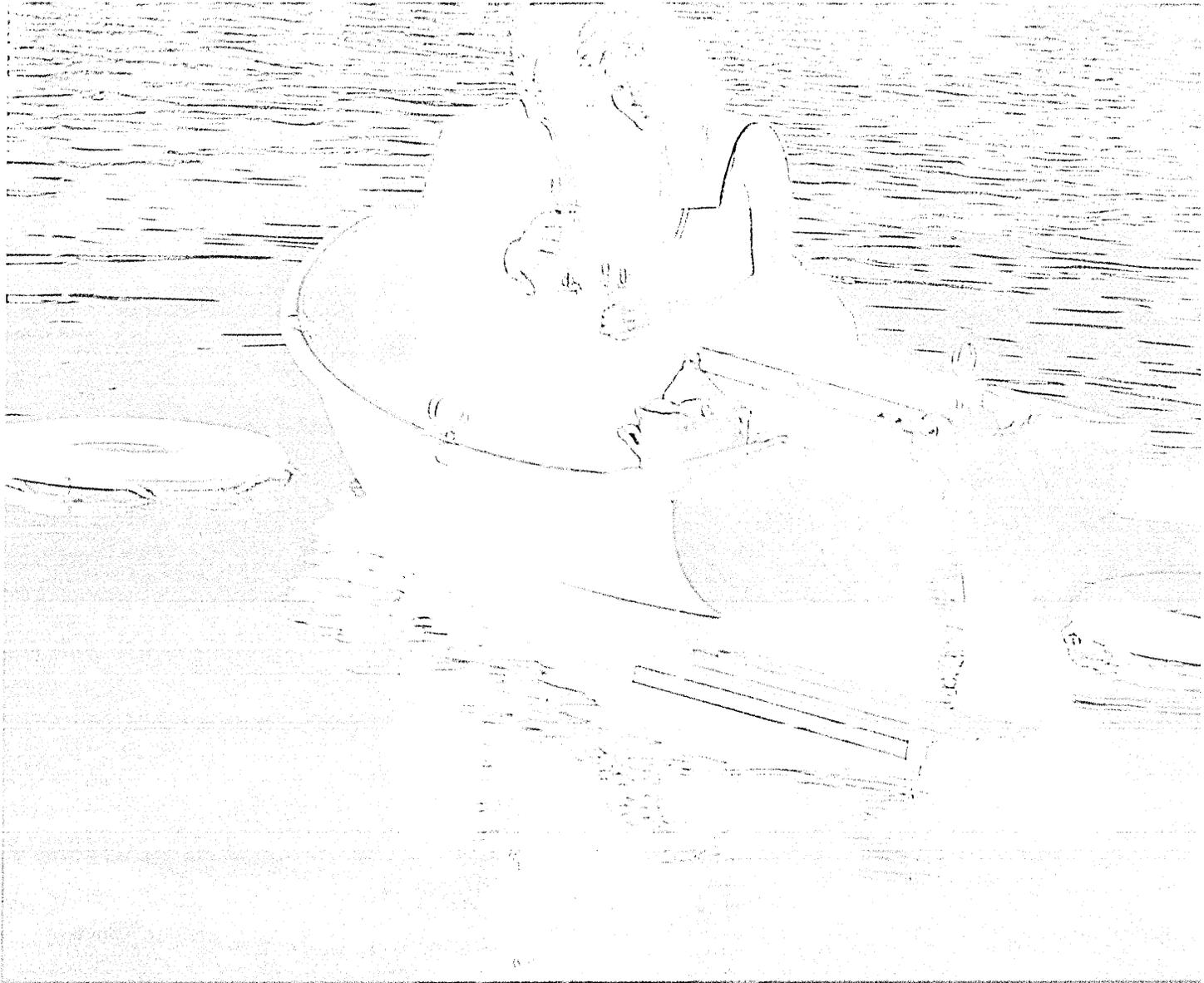
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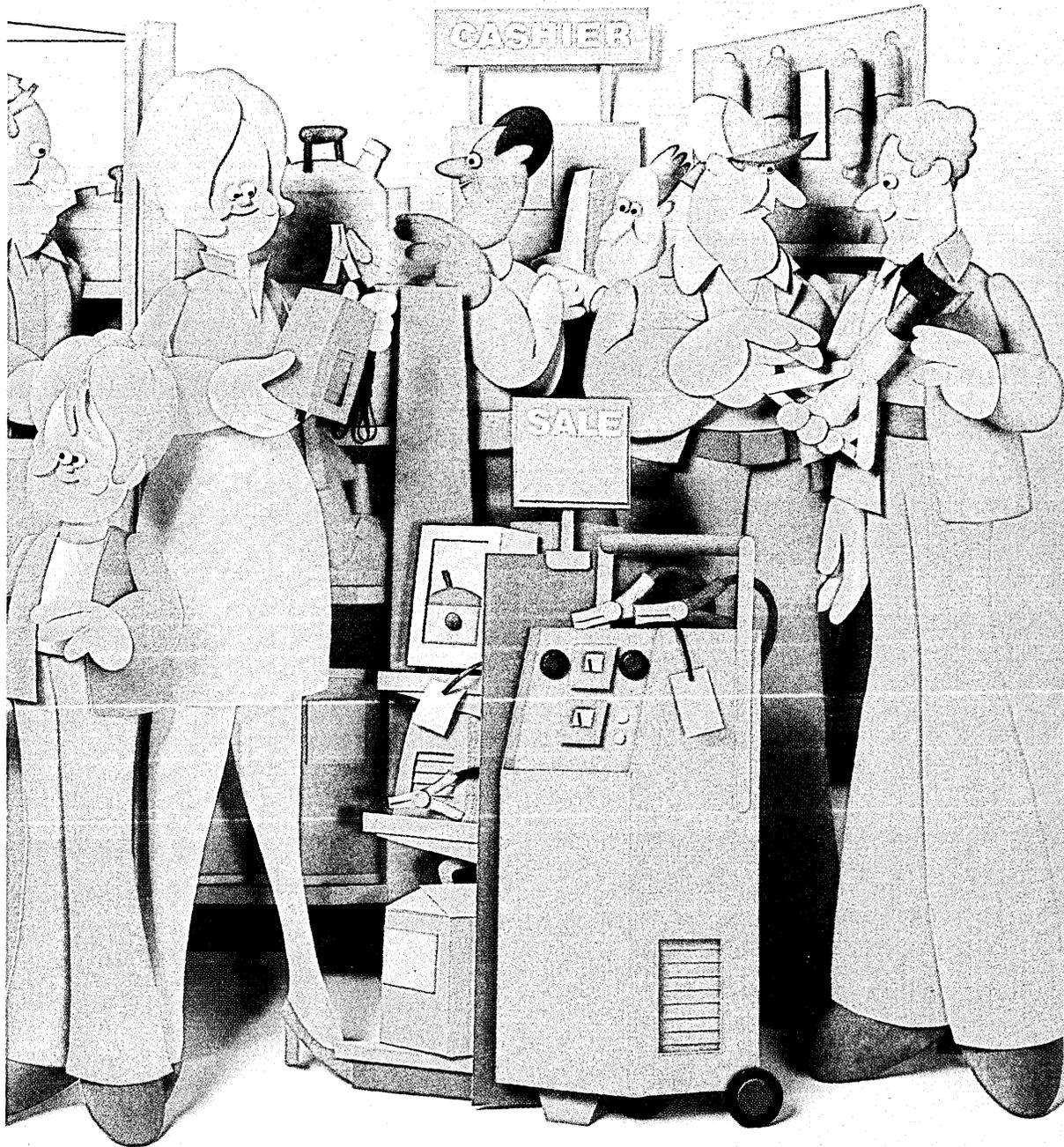
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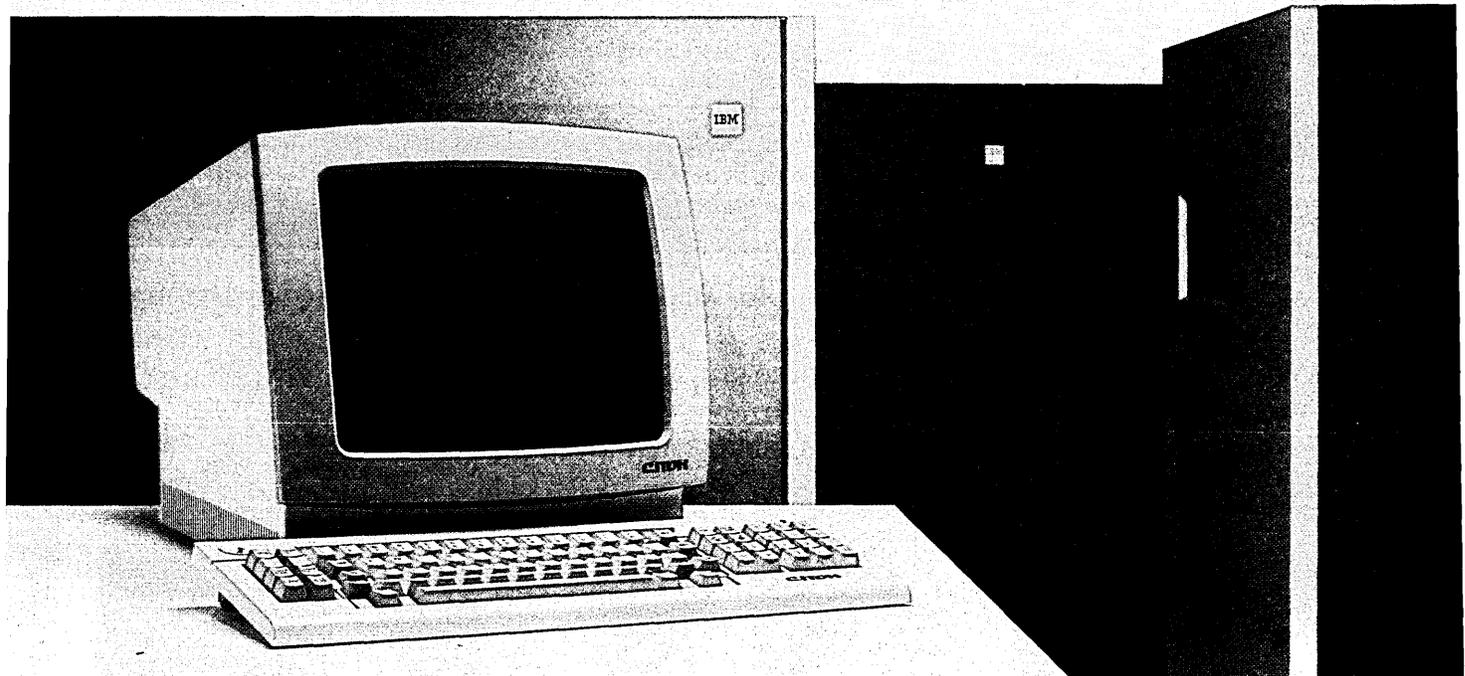
EUROPE'S USERS TALK BACK

by John Lamb

A few years ago, a user was so frustrated by problems with his IBM computer system that he vented his spleen on Big Blue by booking space on a roadside billboard. With a large picture of a lemon and some strongly worded text, the outraged dper told the world what he thought of his supplier.

Whether or not the user got what he was looking for is not known, but such outspoken displays of negative feedback by computer users are rare indeed. With chummy user groups, well-stroked key accounts, and locked-in customers, the data processing business tends to show little sign of dissent among the ranks.

In fact, the way computer user groups are organized seems designed to stifle dissent. Often funded by manufacturers, run by technical experts, and joined mainly by those who can afford to swap shop talk instead of work, user groups often act more like gentlemen's clubs than pressure groups.

These bands of managers and technologists, linked by a common supplier, or more rarely by a common industry or organization, are unique to the data processing business. They sport their delegate badges in such numbers because in the late '50s and '60s suppliers and their customers were really partners in a great experiment.

New machines, new software, and new applications were on offer. Those brave enough to try them needed the mutual support and the ready channels to suppliers that user associations offered. The interests of the computer specialist very often lay with the company that supplied him rather than with the organization he had badgered into shelling out for a newfangled computer.

Stocking up one's intellectual armory is still one of the main reasons for getting involved in a user group. Dissertations from vendor experts and conversations with other users help to ease the daily round. Some manufacturers—although not

IBM, which is still bound by law to keep its own counsel—also give those who attend meetings an insight into their thinking on new products.

But in the age of personal computing, the great experiment is over. Customers expect companies to deliver on their tv advertisements. Is this consumer phase of computing reflected in dpers' attitudes?

In Europe there is some evidence that it is, that users are prepared to press their vendors a little harder, be it over lemons or the latest price hikes. Take the SHARE European Association (SEAS), which represents IBM users who possess a 4300 machine or larger. The organization's gripe list runs to over eight major issues covering pricing, licensing, support, and new technology.

SEAS has a database, available to other IBM groups, of some 380 "requirements" that it has submitted to IBM, over 100 of them during the past year. Of the 380, 124 have either had a positive response from IBM or have actually been acted on by the company. IBM has rejected 29 of the requirements.

"In negotiations with IBM top management in Europe, several cases have been presented to IBM. Responses and actions, sometimes immediate, are the results of this important channel for influencing the largest manufacturer in Europe and worldwide," notes SEAS' latest annual report with some satisfaction.

SOME SUCCESS WITH IBM Although SEAS president Dr. Burkhard Mertens admits it is not always easy to measure by how much his 440-strong band of users has budged IBM, it has recorded some successes. One campaign dear to the heart of many non-English speaking members that has borne fruit is SEAS' effort to get IBM to offer an expanded character set throughout its products that includes the special characters like accents and umlauts found in European languages.

Without those characters, it is ex-

tremely difficult for many SEAS members to produce literate text in their mother tongues. "The growth during recent years of end-user programming, word processing, and PCs . . . has forced the national character problem out into the open," says SEAS. IBM has set up a national language center in Toronto to explore the notion of providing codes for characters not found in English, but progress has been slow.

IBM maintains that to accommodate all the characters might involve upping the size of character codes from one to two bytes, which would make it impossible to incorporate them into existing software. An alternative would be to begin by changing existing English codes as a prelude to introducing code tables covering all languages. SEAS calls for what it terms a national language architecture at no extra cost to those who use it.

SEAS has also appealed to IBM to go easy with its recent policy of supplying software in object code only in order to protect users' software investments. The Netherlands-based organization has also called for a supercomputer from IBM for its scientific users and criticized IBM's software support centers. At its recent annual meeting in Veldhoven, the Netherlands, SEAS also debated the question of whether or not it should push an IBM line with standards-setting bodies in Europe—from which IBM is excluded—while at the same time pressing IBM to take more notice of international standards.

"Users are certainly more vocal in Europe," says Neville Boothroyd, secretary of the British IBM Computer Users Association (IBM CUA). "I've been to annual meetings in America of 3,000 or 4,000 and you certainly don't get people standing up and saying IBM is doing a bum job or that maintenance doesn't work."

Boothroyd has been on both sides of the fence. Thirty years with IBM, he was responsible for IBM U.K.'s user relations before defecting to the other side. "Part of the reason why Europeans feel differently from the Americans is the announcement time

A major demand from non-English speaking users is for a character set that can handle various languages on IBM machines.

lag. The Europeans are paying effectively the same if not higher prices for their systems but they are not getting them quickly enough."

The CUA has certainly not been slow to pick up on what it sees as IBM's shortcomings. Prime among these is IBM's software pricing policy. The CUA argues that while IBM price rises may be reasonable when looked at as an overall average, the company tends to keep price hikes to a minimum in areas where it faces competition (particularly in systems software) while loading those in which it has a clear field.

But it's not just software pricing that gets the European users going. Price increases earlier this year at the lower end of IBM's hardware lineup, covering the IBM PC, System 36, and System 38, ruffled cost-conscious users in the U.K. With rises of up to 9%, well above local inflation rates, users tackled local IBM management head on.

PRICES A FREQUENT PROBLEM

IBM prices within European markets are a perennial problem. Until two years ago, says Chris Bunyan, managing director of Xephon, a London-based research firm specializing in IBM, European users were paying 10% to 15% more than their U.S. counterparts for the same goods, despite the fact that much of what they bought from the company was made in Europe.

Since then, however, IBM has held prices, bringing them more in line with prevailing U.S. rates. Bunyan even reports a gray trade in machines that are bought in Europe and shipped across the Atlantic to undersell their American equivalents.

This gray trading also goes on within Europe from time to time. Sometimes exchange rates or local price freezes open up opportunities for middlemen to ship systems across national boundaries and sell them at a discount. It is something that IBM does its best to stamp out.

Such financial niceties do not impress the CUA, however. Chairman Roger Dale claims that when IBM upped its software prices in 1984 it argued it would offset the increases by discounting hardware. That has not happened, he claims.

Another burr that has been under the CUA's saddle for some years is politely known as customer communications. It is more than just a matter of public relations. A joint working party has spent some time trying to make IBM's monthly invoices more understandable to the average dp manager or accountant. Boothroyd says it is often difficult to work out how much has been charged for which piece of gear and to assess whether price increases have been correctly applied.

Although IBM users predominate in Europe they are not necessarily the most outspoken group. A survey carried out 18 months ago by Xephon revealed that those with IBM systems were surprisingly reluc-

tant to question what their supplier had to offer. Xephon discovered that IBM users were less likely to put their requirements out to competitive tender and less likely to get discounts or to negotiate variations from their supplier's standard terms than were users of other vendors' systems.

"IBM gets a much easier ride than other manufacturers," comments Bunyan of Xephon.

That is certainly borne out by the public rows that some manufacturers have been subjected to. Both British Olivetti, the U.K. subsidiary of the Italian firm now hitched to AT&T's star, and Burroughs have been subjected to vigorous campaigns and threats of legal action over alleged failures in their smaller systems.

Users of Olivetti's S6000 minicomputer, for instance, attacked the company last year for late deliveries and failure to provide a proper upgrade for the machine. At one time Olivetti faced more than $1 million in damage claims but managed to calm users. It blamed the press for whipping up a storm over the issue.

Of course, such huffing and puffing by European users could be given more edge if they acted in concert. As far as IBMers are concerned, the international platforms of SEAS and GUIDE give a direct line to IBM Europe in Paris, but with a combined membership of only 2,000 (the U.K.'s CUA has 1,100 members) the organizations cannot speak for everyone.

"User organizations have to mature," says Simon Bensasson, a delegate to the Conference on European Computer Users Associations (CECUA). "Any user organization contains only a portion of those to whom it is relevant. And of those only a few are prepared to take action because of the recommendations of their association."

Bensasson is far from convinced that European users show much in the way of militancy. "If European users are aggressive, I hate to think what's going on in America," he remarks.

CECUA, which represents national user organizations from the 10 Common Market countries, seems an ideal mouthpiece for European dpers. With EEC officials sitting in on its four monthly meetings, it has a hot line to policy issues. But here Bensasson admits that the user's voice has been effectively gagged in European discussions.

European manufacturers, Bensasson maintains, have tended to see CECUA as their opponent. "Three years ago we suggested a project to them that would prepare a kite line between the upper and lower levels of the Open Systems Interconnection (OSI) standards. We proposed options to

SCIENCE/SCOPE

The first full-scale development Amraam missile was fired successfully at the White Sands Missile Range in New Mexico. The missile was launched from a U.S. Air Force F-16 at 40,000 feet at a speed of Mach 1.2. It flew a preprogrammed course designed to evaluate the missile's control system and separation from the launch aircraft. It did not have a seeker but instead was programmed through its autopilot to fly a prescribed route. The advanced medium-range air-to-air missile is in full-scale development at Hughes Aircraft Company for the U.S. Air Force and Navy.

A new technique may expand the use of lasers in commercial and military applications. The approach, called optical phase conjugation, is considered a major advance in optics because it offers a solution to distortion problems that have limited the use of lasers. When a laser beam passes through a turbulent atmosphere or a severely strained optical component, the beam is distorted and the information it carries is degraded. The Hughes technique, however, forces the laser to retrace its path through the distorting medium so the beam emerges free of distortion. The method eliminates the need for complex electro-optical and mechanical components to correct the distortions.

A new process called vacuum brazing will soon help manufacture advanced radar components for U.S. fighter aircraft. Vacuum brazing forms extremely strong joints between lightweight metals, allowing engineers to design parts that previously could not be manufactured. The process involves treating parts with a special brazing alloy and a small amount of magnesium. The parts are placed inside the vacuum furnace, which normally operates at a pressure of one millionth of an atmosphere, and heated to temperatures of 1100°F. Because vacuum brazing requires no flux, it is far more economical than conventional flux dip brazing, in which components are dipped into molten salts. The process also eliminates corrosion caused by trapped or residual flux. Hughes engineers are investigating how vacuum brazing might be used to fabricate heat dissipators and other radar parts.

Acting as a kind of design and manufacturing prompter, a new artificial intelligence network increases productivity by automatically generating instructions for assembling complex electro-optical devices. The Hughes Integrated Classification System (HICLASS™) analyzes product design information to determine the best assembly techniques. It then selects the most efficient manufacturing processes available. Operators, on demand, are able to call up appropriate graphical and text instructions in color as they interact step by step with the system. As a result, workmanship improves substantially and products are made better.

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"If European users are aggressive, I hate to think what's going on in America," says Simon Bensasson.

avoid incompatibilities and offered to produce a guide for users. The manufacturers did not take it up."

As Bensasson points out, users are more interested in standards at the top end of OSI and beyond: standards for applications such as electronic mail and accessing databases, rather than for basic networking functions like network control.

So far, manufacturers and government officials have been the most active in standards-making. A dozen European manufacturers are collaborating on those options for OSI (without CECUA), while at the government level EEC standards policy is dominated by the Senior Officials Group on Information Technology Standardisation composed of bureaucrats from European industry ministries.

GIVING VENDORS A LEG UP Standards in Europe are seen as an instrument of industrial policy, a means of giving vendors a leg up, says Bensasson, rather than as a way of helping computer users. "There is little input from users although the value obtained

from the proper use of information technology through standards might well far exceed the value of profits from the IT industry."

Users that do have somewhat more clout than the average multinational company are the European governments themselves. Their procurement policies can exert far-reaching influence. None has gone so far as to insist on standards although many make the appropriate rumblings. The trouble is they have as much old gear as anyone and tend to see their jobs as encouraging local firms as much as boosting the ideals of open connection.

"The usual problem is that no single user organization has the time to spend on standardization, so the hope really lies with governments and their procurement policies," says Bensasson. "The trouble is that Common Market members always bend their procurement policies to favor national champions."

The collective approach is not to the taste of all users, especially the large shops. "We can apply pressure ourselves because we are big enough," says one bureau man-

ager. "We can ring up a vice president and get some action."

While manufacturers certainly cannot ignore the united voices of user groups, even in Europe they are not all singing the same song. There is evidence that users are becoming disenchanted with the returns they get from their data processing investments. Two recent reports, one on the worldwide banking scene and another on computer-integrated manufacturing in the United Kingdom, conclude that users are not getting the profits they expect from automation.

The banking report, called "Impact of Technology on Banking" and produced by public accountants Touche Ross, New York, says that bank executives see no lasting competitive advantage and no cost reductions from dp. Engineering firms investing in new technology, according to a report from Ingersoll Engineers, Warwickshire, are being pushed into investments by vendors rather than making up their own minds.

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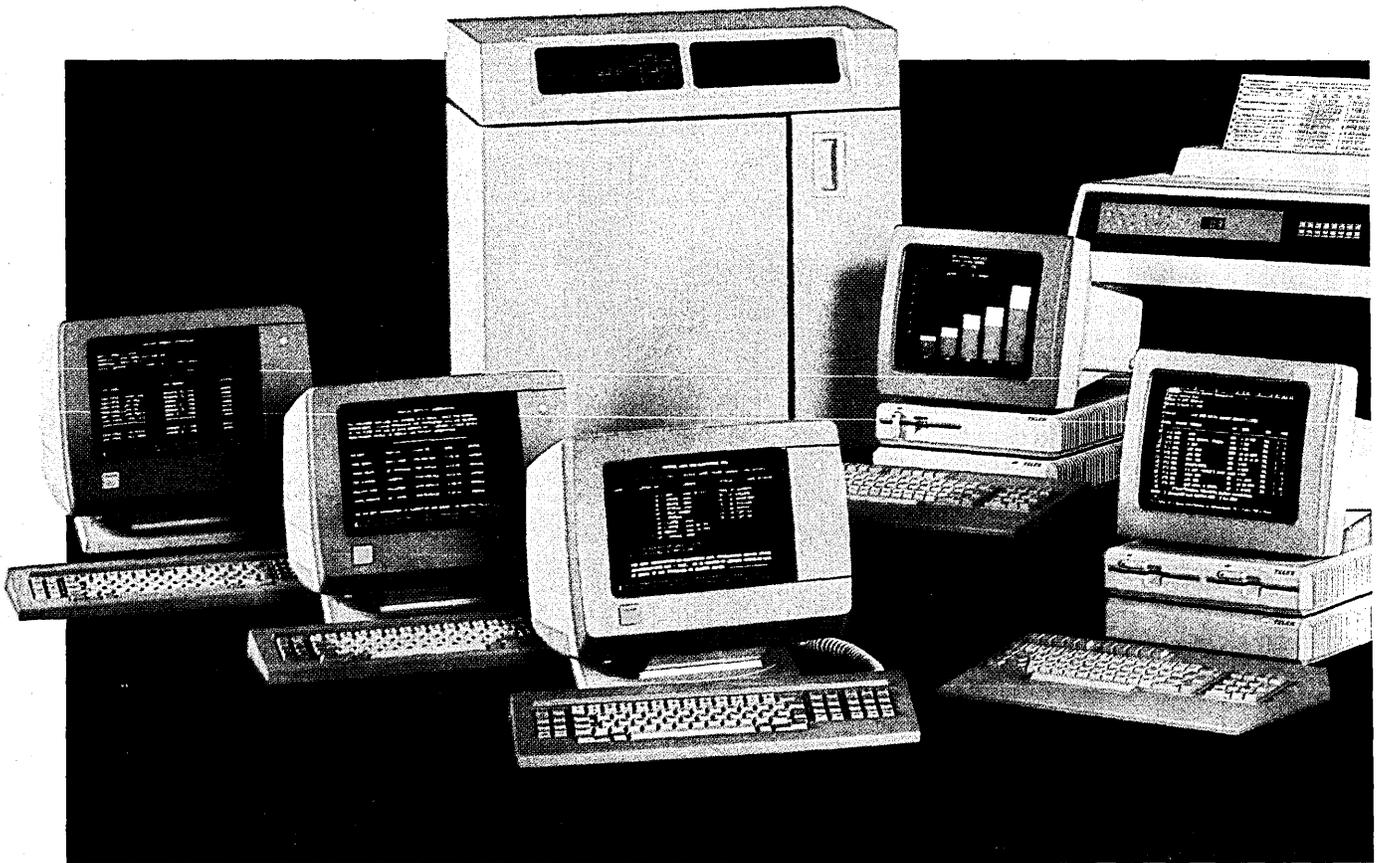
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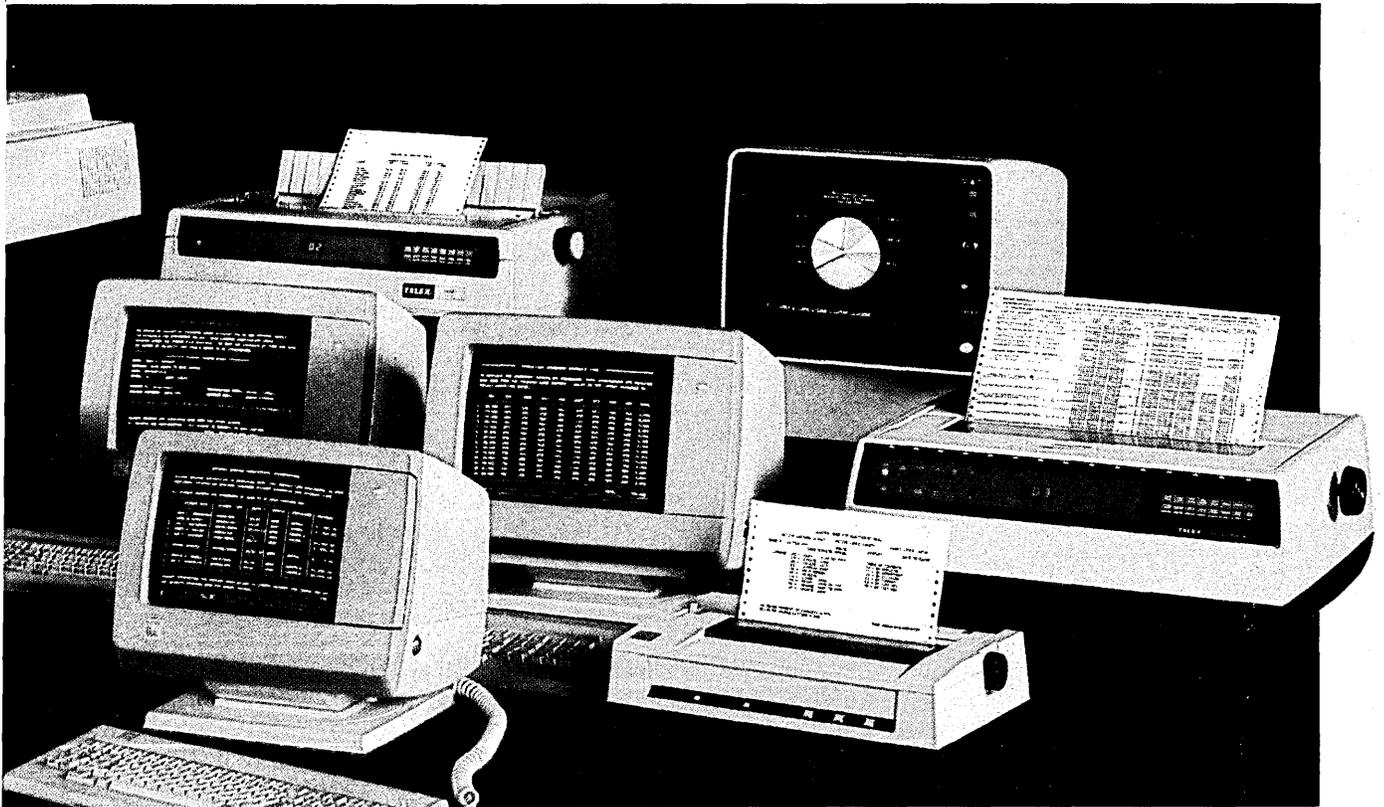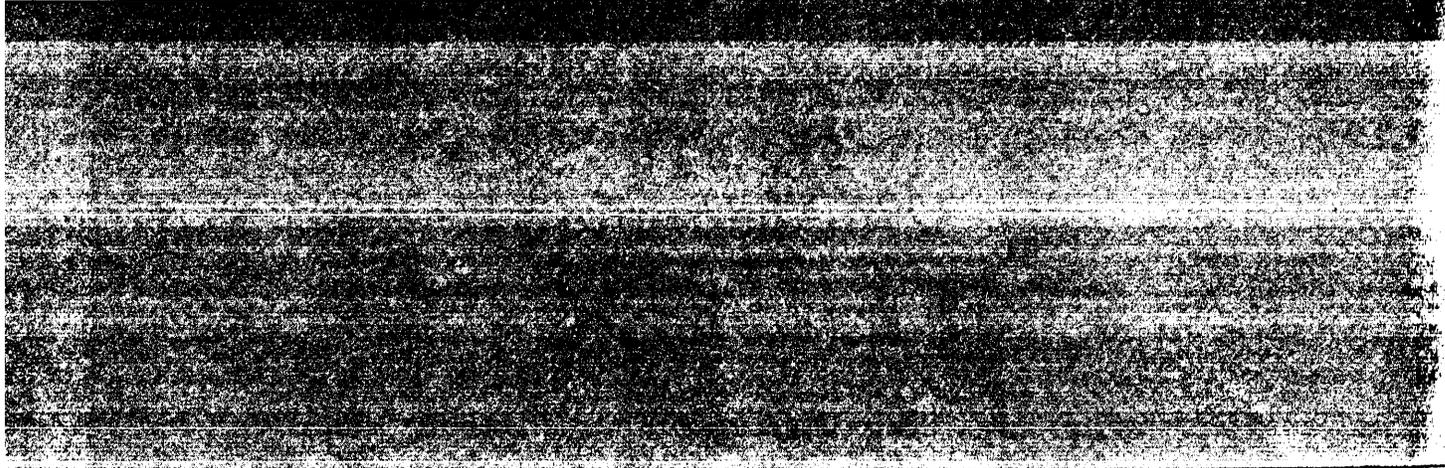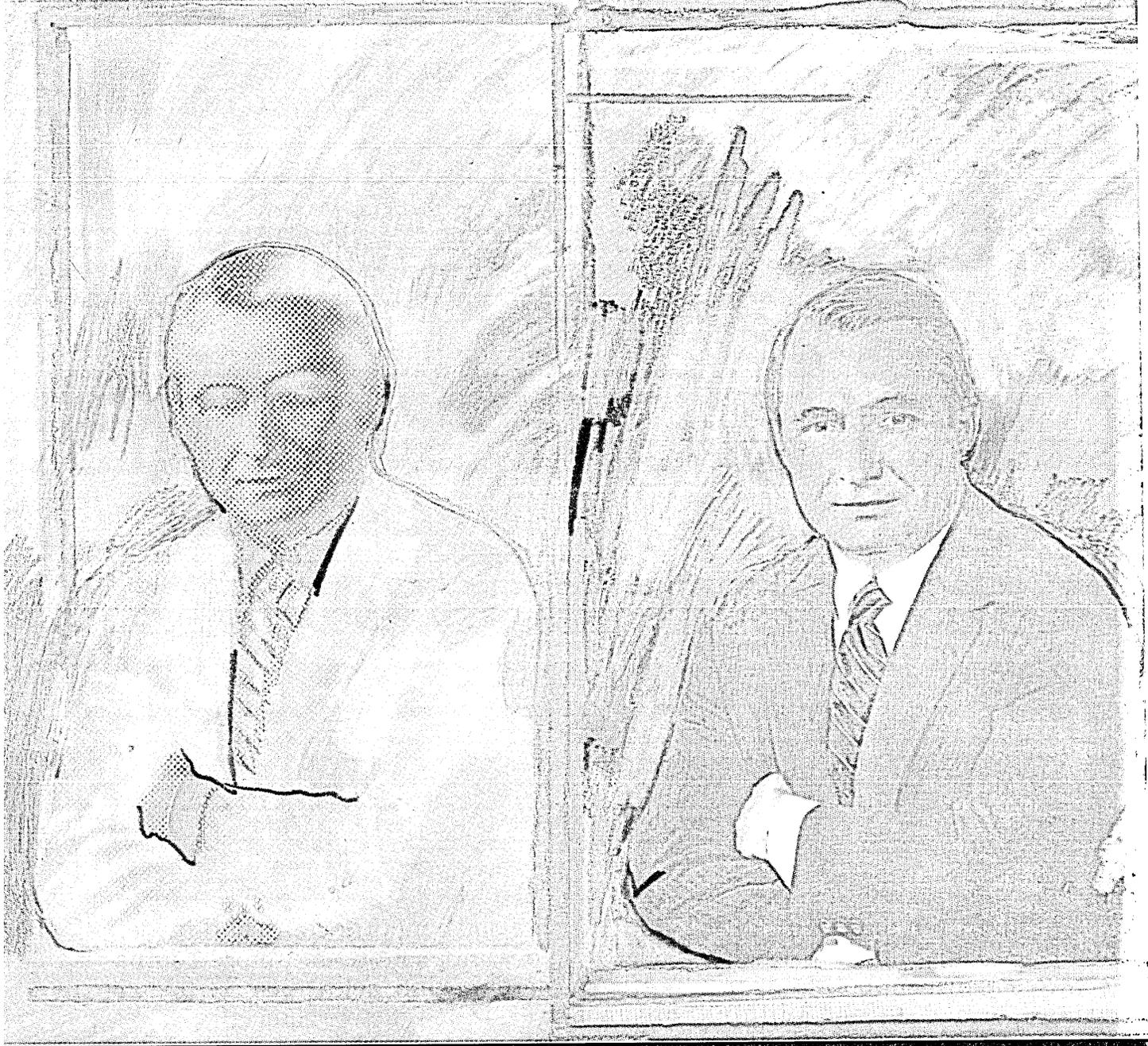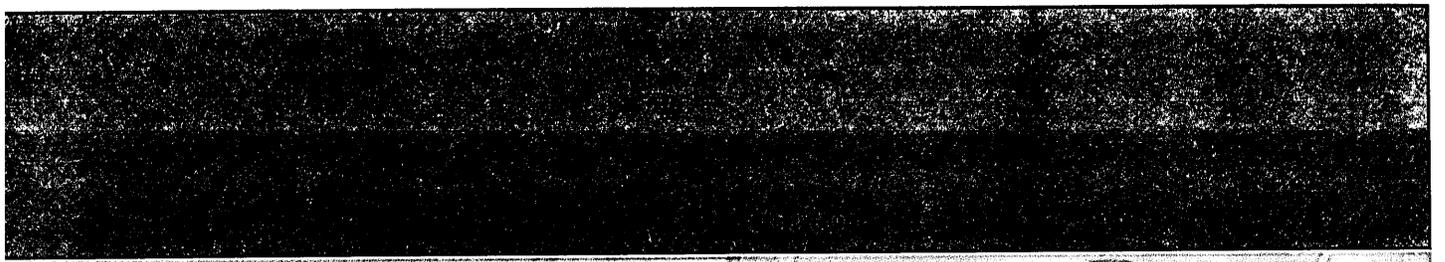
The industry leader now has three distinct ways of marketing its products.

THREE FACES OF IBM

by Brian Jeffery

It is a truism that IBM is no longer a monolith, but nowhere is this more the case than with IBM's marketing operations. IBM currently has two direct marketing divisions with close to 20,000 sales personnel and a combined total of over 200 branches. Of these, the National Accounts Division (NAD) handles the company's 2,000-plus largest national accounts, while the National Marketing Division (NMD) works the small-to-medium business market with a sales force assigned by ZIP code.

Also in the field is the National Distribution Division (NDD). This a conglomerate that runs 16 third-party distribution programs with close to 6,000 U.S. distributors; the company's 81 U.S. Product Centers; and IBM Direct, a New Jersey-based IBM operation that put out upwards of 20 million pieces of direct mail in 1984. To these three divisions, one can also add a further 300 or so sales personnel in marketing operations for independent business units and other specialist IBM organizations.

This awesome array of marketing power is crucial to IBM's drive for revenue growth. The company is targeting 15% annual average revenue growth thru 1994, but with exchange rates and other economic factors hampering international business, IBM's U.S. marketing operations are going to have to manage better than 15% if the targets are to be met. The problem for IBM is that the performance of its various marketing operations is uneven.

National Accounts Division, which handles the company's largest and most lucrative accounts, has con-

The IBM PC has brought a strange variety of newcomers into the heart of the IBM market.

sistently exceeded quota; record shipments of the 308X mainframe line over 1983 and 1984 have helped a great deal. Third-party distribution has also been going great guns, increasing from less than $600 million in 1981 to over $4 billion in 1984 in the U.S. alone. The growth has come mainly from PC retailers, oems, and a new push for IBM midrange systems thru the value-added remarketer (var) program.

On the downside, the National Marketing Division (NMD) has been under quota. IBM has found that its small and medium business footsloggers have cost too much and sold too little. A general softness in the midrange market bracket, erosion of conventional small business systems by micros, and the overhead of keeping well-paid salespeople out on the street for relatively small orders have made NMD one of the black spots in the IBM financial picture. The division has also suffered from Armonk's decision to turn the popular System/36 over to the var program, where more than 400 U.S. distributors have been competing with the division since the system was introduced in 1983. During 1984, more than 40% of U.S. System/36 sales went through the var program. This year the figure is likely to clear 50%.

Still, even the National Marketing Division has performed well when compared with IBM Product Centers, the company-owned retail outlets selling PCs, low-end systems such as the S/23 Datamaster and Displaywriter, and office products. Regarded inside IBM as one of the worst business blunders in the company's history, the Product Center program has failed to turn a profit since its introduction in 1980. Excessive overheads, poor marketing, and mismanagement led IBM to call a halt to the program in April 1984 after 81 out of a planned total of 400 Product Centers had been completed. Again, third-party distributors helped undercut the company's own operations. The local Computerland store and its counterparts proved more adept at selling PCs than the average Product Center.

MARKETING ACTIVITY POLARIZED The result of this widely varied performance? IBM's marketing activities have begun to polarize between the large account marketing of the National Accounts Division and the complex of third-party distribution channels operated by the National Distribution Division. In 1983 these two divisions combined accounted for around $19.3 billion in revenues.

By 1988, they are likely to account for close to $40 billion, and if IBM revenues

from maintenance services and government special contract business are factored out, they are likely to increase from just over 80% to just over 90% of IBM sales over this period. In the meantime, IBM appears to be disengaging from the small-business direct sales and direct-retail businesses as fast as the capital investments and 6,000 or so salespeople involved in these areas allow.

Even in IBM's large account business, things are changing. The blue pinstripes are still there, and the dynamics of selling million-dollar mainframes haven't changed much over the years, but IBMers now come bearing term leases from IBM Credit Corp. (IBM salespeople now receive commissions for such placements). For just about everything except mainframes they will offer volume purchase agreements (VPAs), which give a volume discount for most products if customers buy rather than rent or lease. IBMers are more choosy about the size of orders they will handle, too. Orders for office products and supplies will be taken only for volume buys. Otherwise, it is IBM policy to refer customers to Product Centers for typewriters, copiers, and the like, and to the IBM Direct unit for supplies.

Probably the biggest change in the large account business, though, is that the IBM PC has brought a strange variety of newcomers into the heart of the IBM market. More than 80% of IBM's PC sales go through third parties, and even in the large account market retailers like Computerland and Businessland have consistently undercut IBM direct sales staff. Over protests from the National Accounts Division, IBM has also progressively expanded the role of its PC retail dealers. The retailers will soon be selling the System/36; before long, their sales forces will be offering to equip whole departments with IBM products—in competition with IBM's own direct salespeople.

IBM does not seem to have figured out how to deal with this situation, and is pursuing diametrically opposed courses of action (not exactly new for IBM perhaps, but still a little disconcerting). On one hand, the company is preparing a new direct sales push for PCs. On the other, it has been expanding the role of retail dealers. Where once the retailers carried only the IBM hardware, they are now offered things like the PC Network and assorted software products for tying PCs to hosts and System/36s. Many of the larger IBM retail dealers will likely move toward selling broader, IBM-based solutions for PC use. One way this may shake out is for IBM to start concluding cooperative marketing deals with its larger retail distributors, but the situation is likely to remain confused

for a long time to come.

Though third-party distributors may not be too popular with the IBM direct sales forces, there is at least one place in IBM where they are greeted with open arms. That is the National Distribution Division. Third parties are what NDD is all about, and it deals with over 6,000 of them—more than 2,000 PC retail dealers, a further 2,000 typewriter dealers, over 1,000 value-added remarketers, more than 600 value-added dealers (vads), 250 dealer-associated vars, 20 industrial vars, 15 industrial distributors, and 20 special and miscellaneous distributors. NDD staff will happily give you anything from a 4381 mainframe to an ASCII terminal or typewriter to resell. PC resellers even qualify for a special discount if they care to send one of their own trucks down to Boca Raton to pick the stuff up. (T.J. Watson must be turning in his grave.)

The rise of third-party distribution for IBM has been one of the more striking developments in the company's recent history, and it has developed into a veritable love affair for IBM corporate management. Growth rates have been little short of spectacular, with PC distribution through retailers and value-added dealers (i.e., systems houses) bringing in the largest contribution, but with the var program also doing well. IBM has cheerfully allowed third-party channels to compete with its own sales forces.

VARS ARE BURYING THE NMD PC retailers and vads have undercut everyone, and vars are in the process of burying the National Marketing Division. Much of this is due to the way in which IBM handled the System/36. Introduced in 1983, the system was essentially a more powerful, almost 100% compatible version of the popular six-year-old System/34. Somewhere along the line, IBM noticed that there were over 500 third-party firms selling software for the System/34, notably for vertical market applications. In 1983 the company began a mass exercise in turning these into vars, and also began pushing the System/36 at anyone who was in the minicomputer oem business. The result was that vars rapidly took business away from IBM's own people.

It got worse, too. At a time when IBM was launching a direct sales push in the CAD/CAM market, the National Distribution Division was peddling 4300-series mainframes at some of IBM's biggest CAD/CAM competitors, firms like Computervision, Matra Datavision, Calma, and a group of smaller, more specialized outfits. On occasion, complaints would even be heard from IBM Branch Typewriter Mar-

WHAT'S WHAT IN IBM MARKETING

National Accounts Division

Based in White Plains, N.Y., IBM's National Accounts Division (NAD) is responsible for marketing the entire IBM product line to the company's 2,000-plus largest U.S. accounts. Organized into 14 regions with 160 branches, NAD has over 1,500 field sales personnel assigned by account and by product specialization. Marketing is divided into two main areas, Data Systems (mainframes, software, and storage) and General and Office Systems (the rest). Vertical market functions also cover engineering and scientific customers, CAD/CAM, finance and securities, retail, insurance, and transportation. NAD also handles IBM federal government business (except for specialized contracts, which go through Federal Systems Division).

National Marketing Division

Based in Atlanta (the old headquarters of General Systems Division), IBM's National Marketing Division (NMD) handles secondary large accounts, typically those with older IBM mainframes and small and medium business accounts. NMD is organized into 16 regions and 170 branches. The majority of its 5,000 sales staff cover the small and medium business market with territories assigned by ZIP code. NMD organization is less clear-cut than that of NAD, with a matrix structure that includes large account, small and medium business marketing, and vertical marketing functions. While NMD in theory carries the full IBM product line, the bulk of its business is in midrange systems.

National Distribution Division

Based in Montvale, N.J., IBM's National Distribution Division (NDD) consists of four groups:
- Distribution Channels, based in Rye Brook, N.Y., handles the majority of IBM third-party distribution programs. These include the value-added remarketer (var), value-ddded dealer (vad), dealer-associated var, and oem sales programs and office products dealers.
- PC Dealer Operations, which was transferred from Entry Systems Division in January 1985. This Boca Raton, Fla.-based unit handles IBM's 2,000-plus network of PC retail dealers and its various PC retail programs.
- Retail Marketing, based in Atlanta, handles IBM's 81 U.S. Product Centers. In addition to storefront sales, Product Centers also field a dedicated direct sales force for PCs.
- Systems Supplies, based in Princeton,

N.J., handles IBM's supplies business. Reporting to Systems Supplies is the Franklin Lakes, N.J.-based IBM Direct unit, which handles mailing and shipping of a wide range of IBM products from advertising response, referrals from other IBM units, and its own direct mail marketing. During 1984, IBM Direct managed about 20 million direct mail pieces, including two major catalogs of IBM products.

Other IBM Units

Other IBM units with marketing responsibilities include Industrial Systems (direct marketing for factory automation systems and third-party distribution of some IBM industrial products), General Products (oem marketing of host disk and tape storage systems), Information Services (direct marketing of on-line and custom programming services), IBM Instruments (direct marketing of analytical instrumentation and systems), Biomedical Systems (direct marketing of IBM medical equipment), Telecommunications Carrier Products (oem marketing of telecom products and systems), and Science Research Associates (educational software sales). This group combined accounts for more than 300 U.S. field sales personnel.

Personal Computer Retail Dealers

IBM's retail dealers accounted for over 65% of the company's 1984 U.S. sales of personal computer products and systems. They consist mainly of storefront operations, with the larger retail chains also fielding Fortune 500 direct sales forces. The basic IBM Authorized Dealer program covers the PC, PC XT, PC AT, Portable PC, and the full range of IBM software, peripherals, and supplies. The Advanced Dealer program, introduced in August 1984, also covers the PC Network, 3270 PC, and the Scientific and Engineering Series of PC products. A separate program covers marketing of software through the IBM Software Showcase.

Value-Added Remarketers

Vars resell a variety of IBM systems, including 4300-series mainframes, the System/36, System/38, System/23 Datamaster, Displaywriter, 9000 series Unix supermicro, 7361 Fastdraft system, 6670 laser printer, and a variety of specialized Series/1-based systems. Minimum orders range from five units per year for the Series/1 to 20 for the S/23 Datamaster, with discounts varying by product. The var program accounted for slightly over $1 billion in IBM 1984 U.S. sales.

Value-Added Dealers

Vads resell the PC line, including the PC, PC XT, PC AT, Portable PC, XT/370, 3270 PC (on a limited basis only), and IBM software, peripherals, and supplies. The vad program accounted for around $720 million in IBM 1984 U.S. sales, but is increasing fast. IBM recruitment of vads was particularly heavy during fourth quarter 1984, bringing the total to more than 600.

Dealer-Associated Vars

Dealer-associated vars are smaller firms that may buy PCs from retail dealers to resell for particular markets and applications, subject to IBM approval. This program is dead in the water because of IBM's liberality in giving out value added dealer authorizations and because of the PC gray market.

Industrial Vars

Industrial vars resell the IBM 7500 series of robots. There are over 20 of them, but their sales performance has been disappointing.

Industrial Distributors

IBM industrial distributors include 11 firms carrying the 3101 ASCII terminal and four carrying the 5531, a ruggedized factory version of the PC XT introduced in April 1984.

Complementary Marketing Organizations

CMOs are firms with which IBM conducts cooperative marketing activities, including joint sales presentations and product installations. The National Accounts Division uses a number of CMOs covering such areas as array processors, decision support software, on-line services, and CAD/CAM, but the majority of IBM CMO tie-ups involve National Marketing Division arrangements with vertical market software specialists.

Marketing Assistance Program

The MAP program allows National Marketing Division branches and Product Centers to sign up local software and services organizations to act as commissioned sales agents for IBM products and systems. Product Centers are permitted to sign up five per outlet and NMD branches can sign six. The program covers the PC line, S/23 Datamaster, Displaywriter, Series/1, 4300 series, and Systems/36 and 38. Commissions are typically in the 5% to 10% range.

—B.J.

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CIRCLE 46 ON READER CARD

keting Centers that the company's typewriter dealers were hurting their business.

The gripes are going to get louder. To date, IBM's various third-party distribution programs have been pretty much compartmentalized. Vars mainly handled midrange systems, retailers and vads handled PCs under separate programs. Other third-party distributors also typically handle only one or two product lines. It looks as if this is going to change. IBM is likely to react to market trends, and these include a convergence among different types of distributors. Vars are also becoming vads, retailers are going into the vad business and vice versa, and both groups want the System/36. Even typewriter dealers are coming into the picture. IBM began qualifying the larger ones as PC retailers early in 1984.

The way things are going, IBM seems to be moving toward a class of "generic" distributors reselling a broader range of IBM products—"mini-IBMs," as it were, and potentially bad news for all IBM direct sales forces.

If IBM's corporate management is upset about this situation, it isn't showing it. Third-party distribution has generated revenue growth and has also been good news for IBM's profitability picture. The trade-off of per-unit sale price against overhead is a very attractive one, particularly when compared with the financial performance of the National Marketing Division's field salespeople and the Product Center storefront operation. As long ago as 1982, IBM defined a $25,000 sale price as the efficient minimum for direct sales. Anything below that price should preferably go third party.

PRICE LEVEL GOING UP

More recently, the price level appears to be going up. Even the System/36, with a $20,000 entry level and a high end above $100,000, is showing better performance through third-party channels, and the efficient minimum looks as if it will clear $50,000 this year.

To set the seal on the process, IBM has also begun a program to train its oem resellers in IBM sales methods and techniques. This activity, run by the National Distribution Division out of Atlanta, does not enforce the wearing of blue pinstripes. It does, however, provide useful inputs for IBM resellers in identifying prospects, targeting markets, and closing sales. IBM even operates an on-line database of reseller offerings that is available to IBM direct sales personnel.

Faced with competition from third parties, IBM's direct sales operations have responded with their own third-party pro-

FIG. 1

IBM U.S. REVENUES BY DISTRIBUTION CHANNEL, 1983 TO 1988
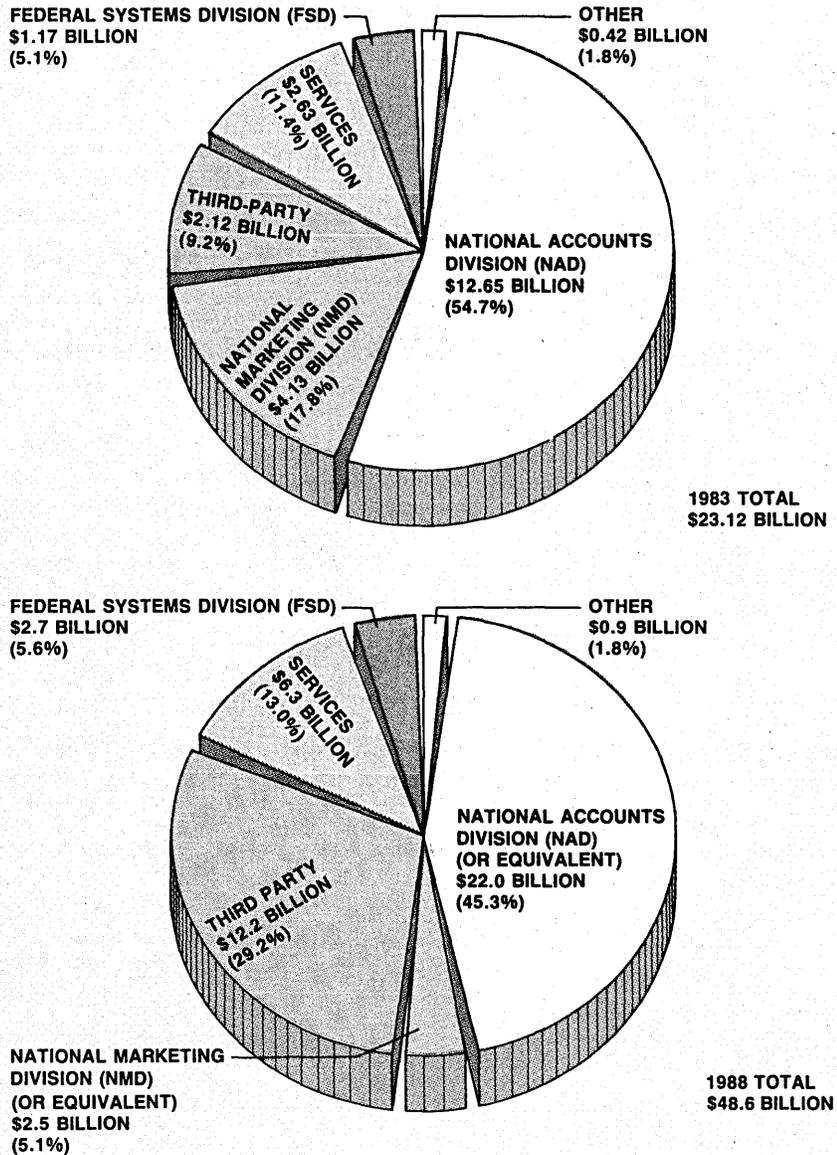
Notes: Excludes Rolm, Satellite Business Systems, and subsequent acquisitions.
Source: International Technology Group

Third-party distribution is rapidly emerging as IBM's fastest-growing distribution channel. More than 20 IBM product lines are now available to third parties, from the Personal Typewriter ($595) to the 4381 mainframe (up to $1 million). Virtually all of IBM's new midrange and microcomputer products are likely to follow as they are introduced. For IBM, the attraction is partly a matter of sales growth. The company's third-party sales in the U.S. more than doubled during 1984, reaching more than $4.3 billion by year-end. PC sales through retail dealers and vads led the pack, but third-party sales increased through all channels, and resellers accounted for most of the growth in IBM's otherwise flat midrange systems business.

By 1988, IBM marketing will probably be polarized between large account systems sales and third-party distribution, with these two accounting for close to three quarters of the company's U.S. sales overall and over 90% of sales once maintenance services and government systems business are factored out.

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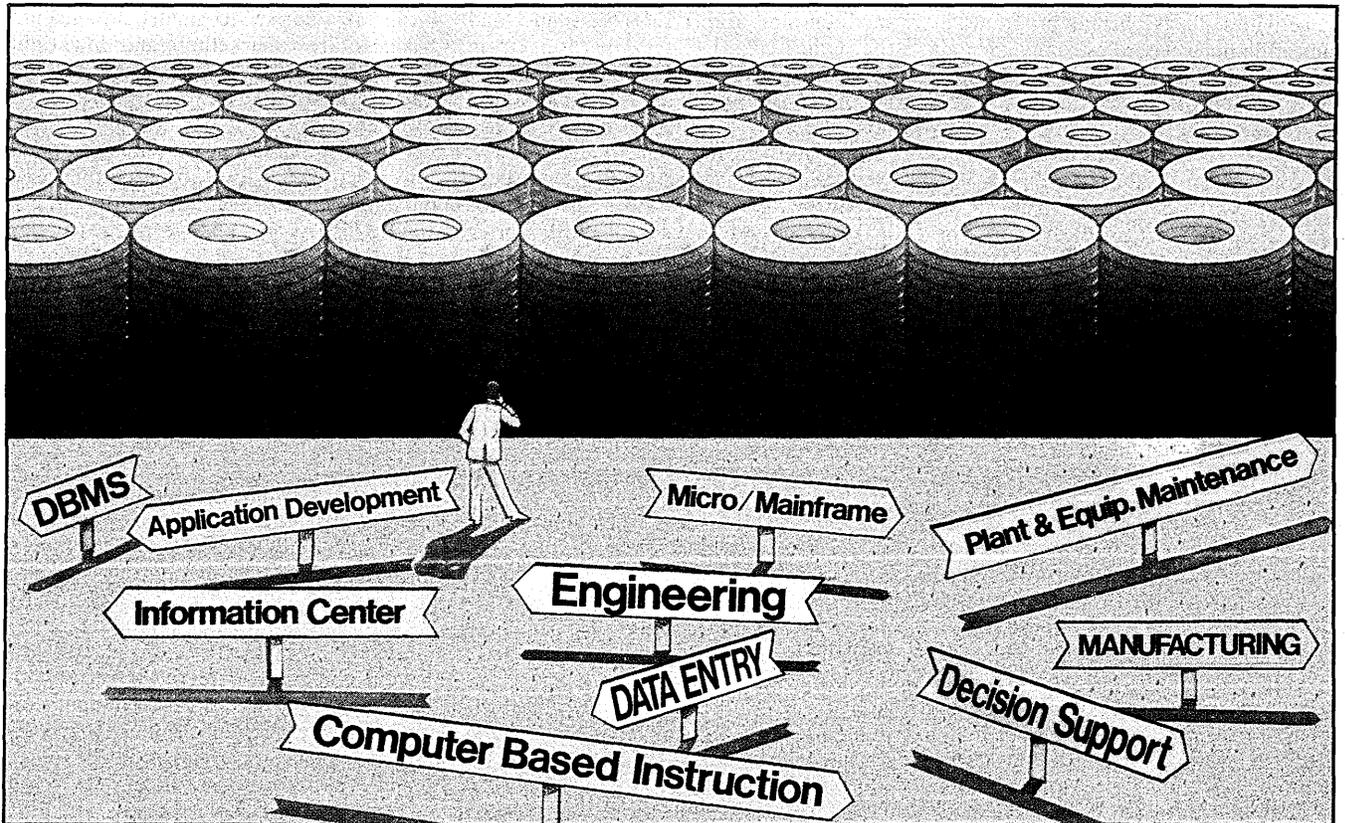
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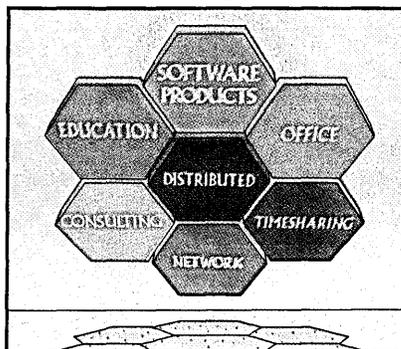
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grams, under which the company's direct sales forces engage in cooperative marketing activities. IBM's current programs include affiliations classed as complementary marketing organizations (CMOs) and concluded under the Marketing Assistance Program (MAP). The use of CMOs dates back to 1982, and both National Accounts Division and National Marketing Division use them. NAD's partners to date include Floating Point Systems, Beaverton, Ore. (array processors), Comshare, Ann Arbor, Mich. (the System W host decision support system), and Mead Data Central, Miamisburg, Ohio (the LEXIS and NEXIS database services, supported on IBM PCs and the 3101 ASCII terminal).

Also notable in this group is CAD-COR, a CAD/CAM consulting firm that IBM is bringing in to support its marketing of 4300 series-based CAD/CAM turnkey systems. It forms an interesting counterpoint to the National Distribution Division's liberality in selling 4300s to IBM CAD/CAM competitors. The bulk of CMO use, however, has been by NMD, where to date more than 60 vertical market software houses have been signed up to support the division's vertical market sales specialists. The majority have been S/36 and S/38 software houses, and NMD sales personnel are increasingly conducting joint sales presentations and (if successful) installations with their CMOs, rather than trying to sell IBM machines and software only.

MAP is a lower-level program operating locally and handled through NMD small-business direct sales personnel and the dedicated sales staff operating from Product Centers. Local firms act effectively as sales agents for these, receiving a commission for IBM sales to prospects that they identify to the IBM organization involved.

Success of the CMO firms has been patchy, with NMD's vertical-market CMOs making the best showing. The Marketing Assistance Program has been even more variable, with wide differences between individual branches and Product Centers. This area, moreover, has been notable as an extreme case of IBM "contention management," with S/36 software houses being pursued by NDD as vars and by NMD as CMOs, plus PC software firms pursued by NDD as vads and NMD branches and also by Product Centers (occasionally in competition with each other) as MAP affiliates.

If that sounds confusing, it is. The basic problem for the direct sales operations is that they are often reduced to signing up second-rank firms as CMOs and MAP affiliates. Many of the better candidates prefer to resell IBM machines themselves as vars or vads. The programs have done little to improve the competitiveness of NMD and Product Centers in particular against IBM's third-party distributors.

The bottom line for IBM's marketing operations varies considerably from unit to unit, with performance ranging from excellent (NDD's third-party distribution program), through good (NAD's systems business), poor (NMD small and medium business direct marketing), and downright awful (IBM Product Centers).

At the moment, the company seems to be trying to reconcile backing the winners with the revenue and market share losses that would result from cutting back on NMD and the Product Center operations. In the long term, it is clearly IBM policy that its marketing should polarize between large-account direct sales and third-party channels, but it is going to be a long and hard road before IBM reaches this point. Probably the process won't be complete until the 1990s. In the meantime, NMD and Product Centers are likely to be progressively scaled back, and their sales forces will just have to live with the competition from retailers, vars, vads, and others.

This polarization looks good for IBM's profitability, at least. The company's business in host mainframes, software, and storage ($23.8 billion or 51.5% of 1984 U.S. revenues) provides the highest margins companywide, while third-party distribution combines attractive growth with relatively low overhead. As the more inefficient NMD and Product Center channels decline in importance, IBM is likely to see major improvements in cost of sales.

Less clear is whether this situation is going to mean the kind of revenue growth that IBM is targeting. The whole third-party complex is likely to slow over the next few years as PC market growth starts to dip and as IBM's recruitment of midrange systems resellers flattens. NMD and Product Centers are likely to come in below the 15% annual growth target, and large account systems business will at best keep its historical growth rate. This is not going to add up to a 15% growth rate across the board.

The cracks are clearly showing. In 1984, IBM managed revenue growth of only just over 15% during the first three quarters, and in the fourth quarter it dipped to 12.4%, bringing the annual growth figure to 14.2%. The company has already said it's unlikely to post solid growth in revenue for 1985. If those ambitious sales targets are to be met in the longer term, the third parties and all of the direct sales forces are going to have to sell pretty hard. ◉

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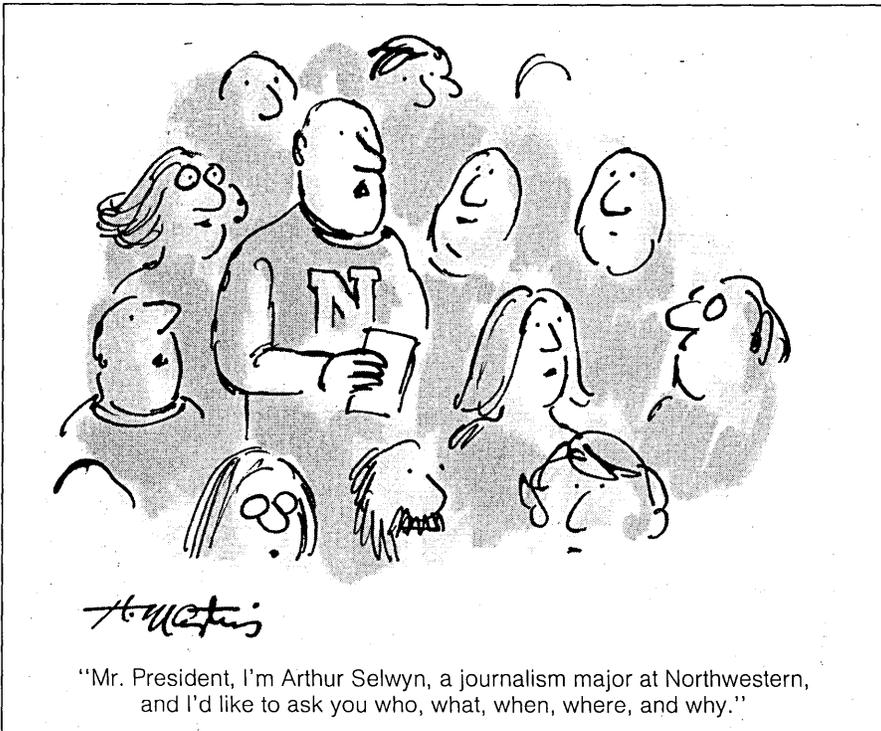
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One of the developers of RAMIS II, the first fourth generation language, talks about his favorite way to program.

IN PRAISE OF 4GLS

by Richard H. Cobb

The goal of any language is to communicate, that is, to give and receive information. In the case of computer languages, the goal is communication between people and computers. Traditionally, people have been taught to talk to computers in the language of the computer. Today, however, we are beginning to teach computers to communicate with us in our own language. This did not happen overnight—it evolved through five distinct stages of computer language development: machine, assembler, high-level, nonprocedural, and knowledge-based. Each of these stages has left its mark, helping to spur a dramatic increase in the use of computers.

Early communication between people and computers was based on machine language, the language of the computer hardware itself. Since the computer only understood a well-constructed pattern of zeros and ones, virtually all the effort of programming a computer rested with the user rather than with the computer. In addition, programmers had to deal directly with the physical limitations of hardware instructions and memory size.

Although this early programming was tedious and labor intensive, low programmer productivity was not a serious concern. It was generally thought that only a small number of expensive computers would exist, working on the most difficult problems, with only technical specialists to

communicate with them. This first generation of computer languages is still used by computer builders. But, for the most part, the days of coding in binary are gone.

In the late 1950s, assembler, the second generation of languages, began to emerge. Assemblers were programs that allowed symbols and mnemonics to represent the hardware language of bit patterns. By transferring some of the work of communicating to the computer, assemblers improved communications and extended the use of computing to many more people. They are still used by programmers building some systems software that requires the highest efficiency and direct interaction with computer hardware.

Not long after assemblers were developed, high-level languages began to evolve. During the ensuing years, such well-known procedural languages as COBOL, FORTRAN, BASIC, PL/I, and Pascal emerged. Although they appeared to more nearly approximate the language of humans, they used symbols extensively. These third generation languages are still widely used and have been supplemented with system tools like report writers, database management systems (DBMSs), and application products such as general ledger and material requirements planning systems. Application products like these are written in third generation languages by software vendors, not by in-house programmers. This arrangement has led to significant productivity increases for society, since every company is not reinventing the wheel.

Third generation languages spurred the great increase in information processing that characterized the last 20 years. During that time, the number of mainframes in use increased from hundreds to tens of thousands. Their impact on our society has been enormous. For example, most people agree that many companies could not operate if their computers suddenly just stopped. Expenditures on computing have increased by about 15% per year despite continued dramatic achievements in hardware price/performance, and computer specialists are constantly in short supply.

When third generation languages first appeared, individual application pro-
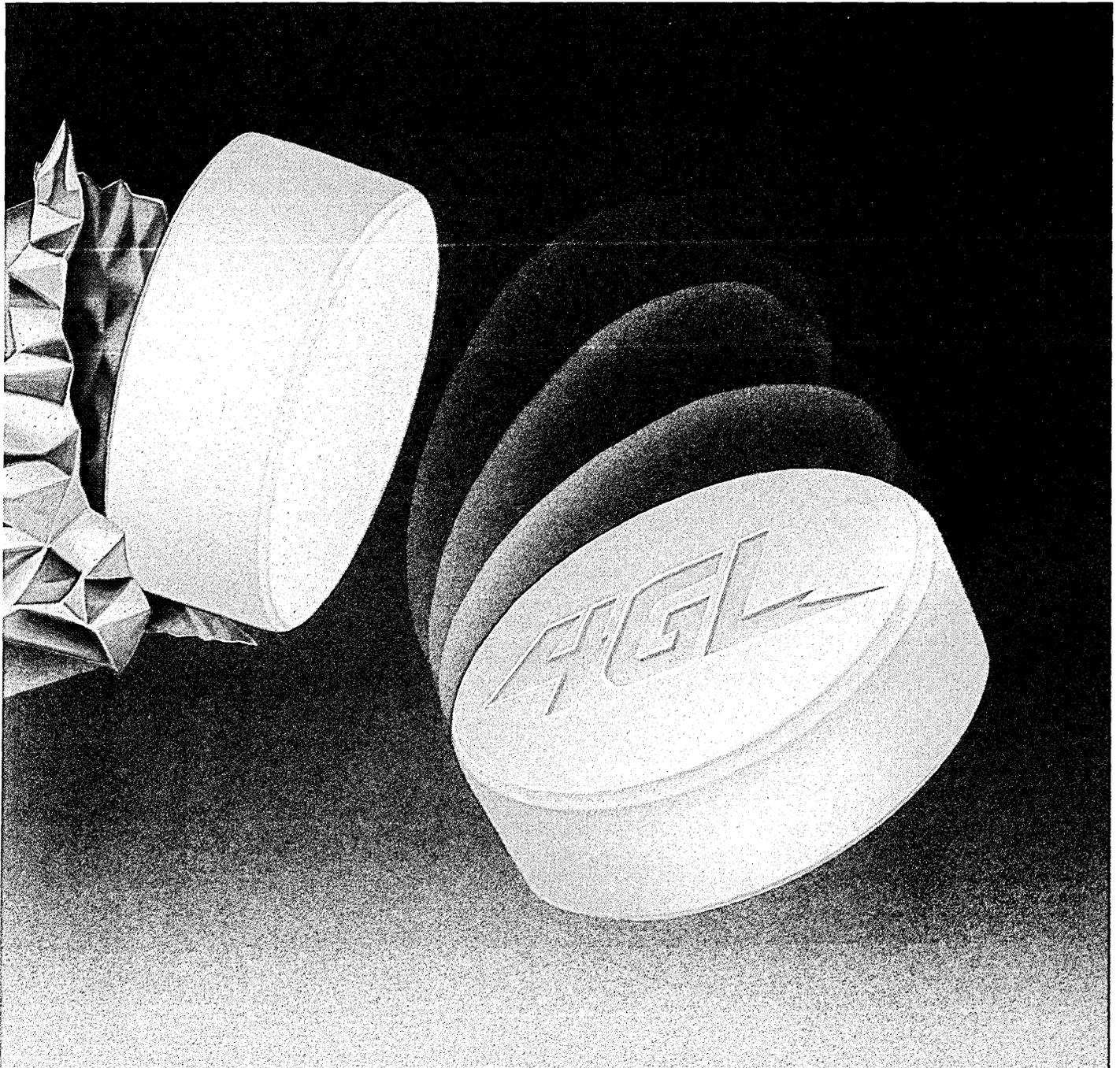
The concept behind 4GLs is to transfer the entire concern about program flow from the computer specialist to the computer software.

grams were responsible for establishing, understanding, and using data structures that needed to be accessed. When a change occurred in data structure, the application was very often severely affected. The concept of a DBMS promised a solution to this problem since its data-independent access method gave applications immunity to changes in data structure. This made it easy to develop new applications and reduce environmental maintenance.

Early DBMSs were not without weaknesses, however. Originally, their purpose was to provide insulation between data and programs. Because most early DBMSs were navigational systems with rigidly predefined relationships, applications programmers needed to know a great deal about the structure of the data, bringing the coding of such systems beyond the reach of all but the specialist. As a result, much of the intended objective was sacrificed. Examples of this type of DBMSs include IMS and IDMS.

To eliminate these weaknesses, structure-independent or relational databases were conceived. With a structure-independent database, relationships are defined dynamically—users are not concerned with structure. Moreover, structure-independent databases have become a prerequisite for the successful implementation of nonprocedural or fourth generation languages.

FEW DBMSS PROVIDE ACCESS Only a few systems provide such structure-independent access to data. Some of the more prominent ones are DB2 (IBM), NOMAD2 (Dun & Bradstreet), RAMIS II (Mathematica), and Oracle (Oracle). Although DBMSs are not computer languages, they have played an important role in the evolutionary process of languages. In fact, without structure-independent DBMSs, fourth generation languages would never have come into existence.

The first three generations of computer languages are closely tied to the architecture of computer hardware. They are derivatives of the work of the late mathematician, John von Neumann (of the Institute for Advanced Study, Princeton, N.J.), whose concept of the stored program computer is still embodied in systems that use a program counter. This counter controls program flow by indicating the next instruction to be processed.

With von Neumann-based languages, the programmer has two main responsibilities: to define what is to be done and to control the flow of the program. Based on these responsibilities and the fact

that these languages are driven by the characteristics of the machines they run on, von Neumann-based languages are labeled procedural languages.

Fourth generation or nonprocedural languages altered this approach to programming as well as the role of the program counter. The fundamental concept behind a nonprocedural language is to transfer the entire concern about program flow from the computer specialist to the computer software. Nonprocedural languages instruct the computer by specifying the desired result, rather than specifying actions needed to achieve that result.

These 4GLs evolved when it was observed that management of program control could be specified in an algorithmic manner. In this way, the computer software could control the program's flow while permitting the programmer to merely specify the work to be done.

For example, assume that a report is

desired showing the total units sold for each product, by customer, in each month and year, with a subtotal for each customer. In addition, each new customer must start on a new page. A 4GL request would look something like this:

```
TABLE FILE SALES SUM UNITS
BY YEAR BY MONTH BY CUSTOMER BY
PRODUCT
ON CUSTOMER SUBTOTAL PAGE BREAK
END
```

The logic flow of the same request, using a procedural language like COBOL, would be represented by a flowchart with 58 active procedural blocks and would require 500 to 1,000 lines of coding.

Differences between procedural and nonprocedural languages become clearer when a closer examination of flowcharts is made. In fact, flowcharts were what von Neumann used to define the basis of a

FIG. 1

THIRD GENERATION ECONOMICS
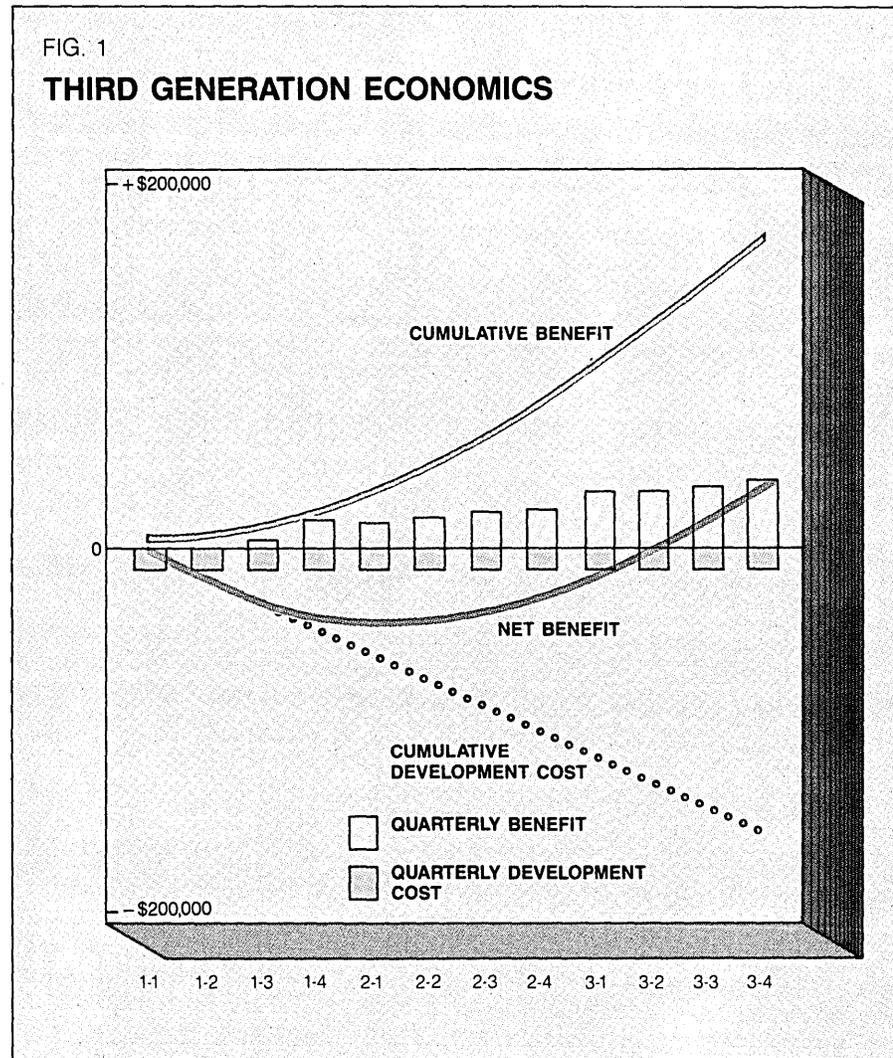
FIG. 2
FOURTH GENERATION ECONOMICS
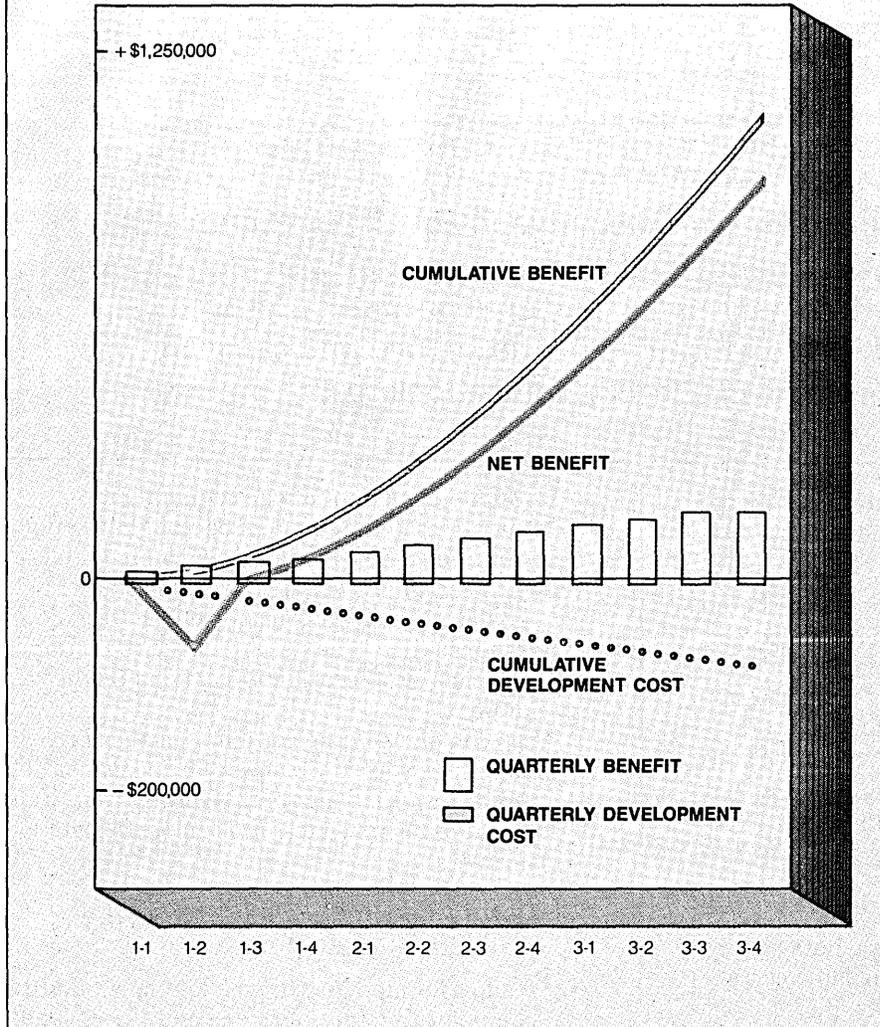
stored computer program. They clearly indicate the reasoning behind all work associated with von Neumann languages.

MANY GAINS TO BE MADE In the preceding example, only 10 boxes, or 17% of the flowchart, deal with solving the problem. The remainder is concerned with controlling program flow. This is typical of von Neumann languages and indicates why there are so many productivity gains to be made when all effort associated with managing program flow is transferred to the computer, a task it is well equipped to handle. Additionally, because the programmer tends to better understand and concentrate on the desired results, the other 80% or 90% of the program dealing with the program flow would be more likely to contain errors. By eliminating most of this programming, nonprocedural languages tend to improve application reliability by an even larger margin than their program size reduction would suggest.

The nonprocedural approach opened the doors for continuous evolutionary development of the new generation of computer languages. It took about seven years—from 1967 to 1974—to really perfect fourth generation ideas.

4GLs are beneficial because
• they are results oriented;
• they improve productivity by at least 5 to 1, and by as much as 300 to 1 for some activities;
• a large percentage of staff can deal directly with computers without going through intermediaries, since fourth generation languages are designed for both computer specialists and end users;
• they are the ideal tool for the information centers being established by corporations today; and
• they are ideal as applications generators.

Although they have much to offer, acceptance of 4GLs has not been easy for the computer industry. In 1977, few people believed that 4GLs would ever be able to replace third generation languages, like CO-

BOL, by the 1980s. Eight years later, however, as more people have gained experience with 4GLs, many believe the replacement is well on its way.

The large increase in productivity that accompanies the use of fourth generation languages raises interesting economic considerations for potential purchasers of high-level software. For example, compare the use of a fourth generation language, such as RAMIS II, with the typical third generation approach, using COBOL plus a traditional DBMS.

Examine the effect on a single programmer, making the following conservative assumptions:
• The cost of a programmer is $25 per hour.
• A typical application development project takes one programmer eight months to complete.
• The payback period for each project is 12 months.
• Each application has a useful life of two and a half years.

For eight months, the programmer costs money without delivering any benefit until the first application is implemented and starts paying back. The programmer then starts on a second application. At the end of the first year, the programmer has completed one project, which results in four months of savings. The net cost to the company is thus $40,000 at the end of the first year.

After three years, the programmer has completed four projects and has given the company a net benefit of about $24,000, with the break-even point occurring in the tenth quarter. The cumulative results are shown in Fig. 1.

Compare this with a fourth generation language user, assuming a conservative 5-to-1 productivity factor. (A more realistic factor may be over 10 to 1, as reported in a recent—third quarter 1984—product survey by Martin Marietta of 800 users of the RAMIS II 4GL and DBMS.)

With this increased productivity, one person completes seven projects and starts on the eighth in the first year. Thirty-nine project months are saved, giving the company a net benefit of slightly more than $61,000 the first year, with the break-even point occurring in the third quarter. Savings continue to accrue for more than three years, resulting in 40 times more savings (see Fig. 2).

This three-year comparison is illustrated below.

	4GL	3GL
projects completed	22	4
break-even quarter	3	11
total savings	$938,308	$23,889

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

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

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

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

Q. What makes a superior modem?

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

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

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

A. Let's face it, modems are not the most expensive part of your telecommunications network. Chances are, line charges are. If you

design a modem that can send data more reliably, then that modem can begin to affect your line charges. Every time a modem has a "hit," or an unsuccessful transmission of data, the data must be retransmitted, slowing down response time. The net effect is a reduction in the amount of information carried by the network.

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

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

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

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

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

A. Take your most troublesome line and put IBM modems on it. We believe you'll see an
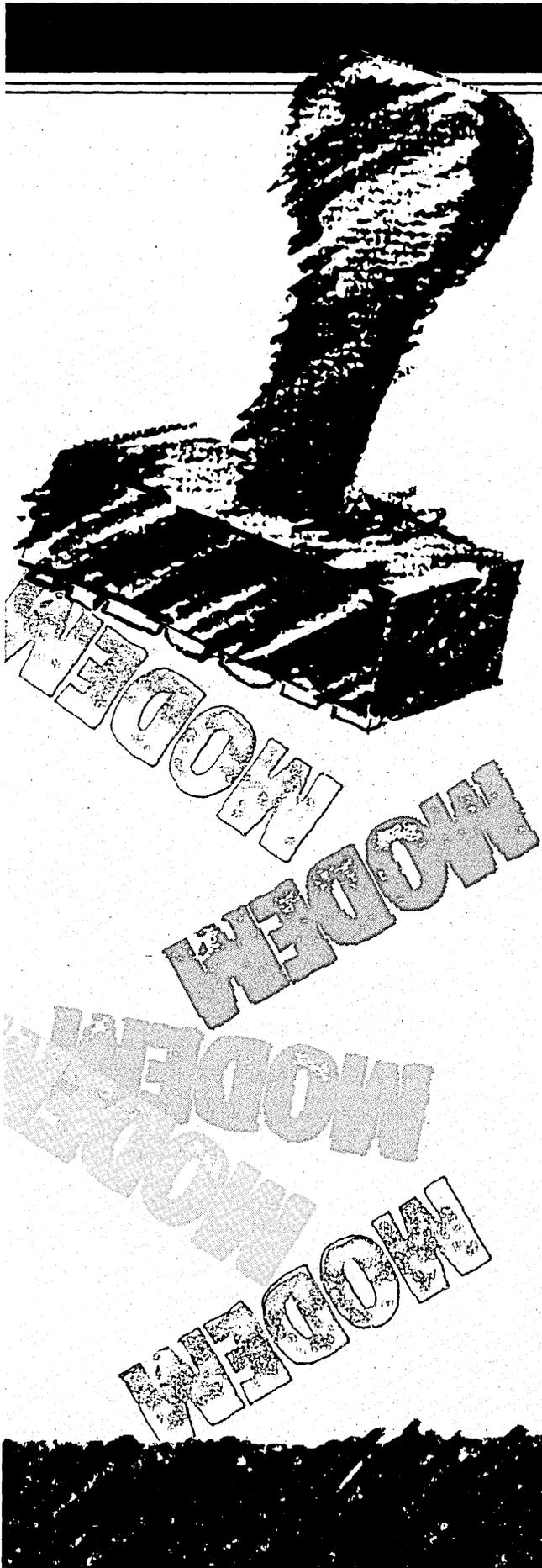
impressive improvement. Which leads us to another benefit of superior modems—you'll spend less time troubleshooting your network simply because line conditions that once were considered problems aren't really problems any more.

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

The New IBM Modems

	IBM 3833	IBM 3834
Transmission Speed (bps)	2400 (full speed) 1200 (half speed)	4800 (full speed) 2400 (half speed)
Compatibility	3833, 3863-1,* 3868-1	3834, 3864-1,* 3868-2
LED Diagnostic Indicators	standard	standard
Communication Facilities	4-wire, point-to-point or multipoint	

Both modems operate over nonswitched telephone lines that can be leased (common carrier or PTT) or private.
*Must be in native mode. For full diagnostic capability, must be equipped with the Extended Diagnostic feature.

What's more, we've also recently lowered the prices of the IBM 3863, 3864, 3865 and 3868 Modems by as much as 29 percent. And there are also volume discounts available. If you're looking for modems that offer reliability, can improve end user productivity and are competitively priced, talk to your IBM marketing representative.

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

A complete fourth generation system consists of a number of individual elements. In addition to containing fourth generation or nonprocedural languages, a fourth generation system must have other features that make it easy for the user to communicate with the computer, such as
• nonprocedural language for report preparation,
• nonprocedural language for data maintenance,
• screen definition and management facility,
• business graphics,
• spreadsheet analysis,
• fourth generation database manager,
• relational language,
• applications manager,
• extended data access,
• database information system,
• an environment for applications development,
• an environment for information consumers, and
• a micro-to-mainframe environment.

There are two ways to acquire these facilities. One is to obtain each component separately and build bridges between the components. Although a feasible solution, it is difficult to implement since the separate components available are not designed to fit together.

The second solution is to acquire all the functions from one vendor in a single, integrated system containing components that are designed and implemented specifically to work together (Fig. 3). Currently, there are four vendors working toward offering such systems—Mathematica, Princeton, N.J.; Cullinet, Westwood, Mass.; ADR, East Syracuse, N.Y.; and CINCOM, Cincinnati.

One area in which fourth generation systems are often perceived to be lacking is processing efficiency. It seems natural that the dramatic gains in productivity provided by 4GLs should be balanced by significant increases in resource consumption. And, although the performance of fourth generation languages have been found wanting in many instances, it is important to recognize that there is no reason, in principle, why the typical fourth generation language program must be less efficient than its third generation counterpart. In fact, there are good reasons why fourth generation software should be more efficient.

The primary reason for this contention is that a fourth generation system "understands" the programs it processes to a much larger extent than does a third generation compiler. It knows, for instance, that it is producing a report and can try to optimize this process. All .a COBOL compiler

FIG. 3
AN INTEGRATED FOURTH GENERATION SYSTEM

knows is that it has a large number of statements to process.

The fact is, developers of fourth generation software have concentrated most of their efforts on adding capabilities rather than improving performance. A few vendors, however, are now dramatically increasing their performance-related efforts. Through better software engineering, fourth generation compilers, advanced data structures, and other techniques, fourth generation languages will one day outperform their third generation predecessors. In fact, in many of today's situations, 4GLs outperform even very well written third generation implementations.

Although fourth generation systems are relatively new, current technological developments have moved computer languages into the fifth generation of knowledge-based systems.

At the heart of these systems is the software's ability to make largely correct inferences using an available base of knowledge. This technology, based on research in artificial intelligence, is having a profound impact on our communication with computers and will allow computers to converse with people in their own language. Currently the only knowledge-based system on the market is Mathematica's RAMIS II English. Its knowledge base contains four dictionaries:
• File dictionary—contains information about data in the database files.
• General dictionary—over 4,000 root words and phrases of the English language.
• Dynamic dictionary—accumulates vocabulary as the system is used.

• Application- and user-specific dictionary—incorporates specialized vocabulary.

This type of knowledge-based system permits the user to frame requests in his own jargon or special business terms, putting the power of computing and vast information resources in the hands of information consumers. With such systems, it appears the goal of providing human fluency to computers will be reached within the next 10 years. What will come after that is limited only by our vision of the future.

Fourth generation nonprocedural languages are here to stay. They will soon replace procedural languages as the choice for implementing the vast majority of applications, even applications developed for resale. But even as fourth generation languages are now reaching their potential, the advent of natural language processing and other work in the area of model-driven systems foreshadows their decline. The one thing we can be sure of in information processing is constant change—as one technology is perfected, it is adjusted with an even more powerful technology that one day may replace it. Only organizations that adapt to this rapid pace of advancing technology will survive. ◉

Since 1984, Richard Cobb has been vice president and general manager of the Information Technology Division of Martin Marietta Data Systems, Greenbelt, Md. From 1975 to 1984, Cobb was president of Mathematica Products Group Inc. and senior vp of Mathematica Inc. He was instrumental in developing RAMIS II, the first nonprocedural language. ◉

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THE DOWNSIDE OF 4GLS

by F.J. Grant

Given that the cost of software development has not decreased significantly over the past 20 years and that backlogs for new applications development have never been higher, one could argue that the time is right for something different. Are 4GLs (fourth generation languages) that something?

I have used several fourth generation software products and found them to be useful in some environments. Frankly, given the pressures of my job, I frequently use any tool I can to get results as quickly as possible. In general, these products have been well developed and well documented. But, 4GLs do have a downside. Like icebergs, the real dangers are not always readily obvious.

I have a great deal of respect for fourth generation software developers; they are pioneers pushing the state of the art forward. It is the state of the art that frustrates me. And it is the state of the art that I herewith criticize.

Speaking in generalities, 4GLs are a new class of programming languages. Much like third generation languages such as COBOL, 4GLs are designed to help get information from computers. The only difference is that the number of programmed instructions required to get information is typically less when 4GLs are used. Most 4GLs are interactive and nonprocedural, but some are more interactive and/or more nonprocedural than others. A number of fourth generation products are also capable of performing generalized database upkeep functions, though this is not a requirement per se. No industrywide, generally accepted standard exists to which 4GLs must conform.

Fourth generation programming languages are still-evolving software products. That which is evolving cannot be fully defined. That which cannot be fully defined is commonly associated with the information center.

Fourth generation languages are not a solution to the intellectual and infrastructural problems of traditional MIS implementations. These problems include
• the lack of standardized, generally accepted data management techniques and procedures;
• the lack of well-defined, well-documented, and well-integrated databases supporting business operations;
• the lack of integrated communications networks in multihost environments; and
• a critical shortage of appropriately trained dp generalists who have a "service" orientation and know the true businesses in which their companies are engaged.

In short, 4GLs are ostensibly more "not something" than they are "something." Yet, they do indeed exist and must be taken seriously.

CONSIDER DP GROUPS LACKING Despite the use of structured analysis, design, and programming tools to aid systems development efforts, dp organizations are usually perceived as inadequate at forecasting costs, projecting schedules, producing reliable end products, and achieving economically justifiable productivity rates. These embarrassing facts account for most of the interest in 4GLs.

Most 4GL proponents are quick to assert that their products are capable of permitting substantial productivity increases over second and third generation programming languages. But, the definition of productivity is itself as elusive as the exact definition of fourth generation languages. In my view, productivity is certainly more than a measure of lines of code generated per unit of time. For example, if a 4GL product saves 50% of the time needed to code an informational inquiry but requires 50% to 150% more cpu and disk resources, is this an increase in productivity?

Certainly, no one is against increased productivity. But the questions are whose productivity and at what expense? To answer these questions, one must be aware of the resources required to implement 4GL programming solutions on a case-by-case basis.

What can be said in general? Given a typical 4GL product, the more complex the query, the bigger the file in the database, and the more 4GL users, the more cpu and disk resources required and the longer the response time.

If the 4GL product is easy to use, and admittedly some are, a large number of users could be attracted. The number of simultaneous 4GL users usually proves to have the greatest impact on the system resources consumed. Contention for limited cpu and disk resources—and who hasn't had this problem, especially in companies where new development work is taking place—suggests that the ability to use some 4GL products may depend upon where companies have already put their money.

In any event, someone will have to study the impact of the 4GL product on the existing production environment and organize a comprehensive data dictionary. That person will also have to explain to users why some data do not exist in the database, why some values were "hard-coded" into existing programs that may be a number of years old, and why the data they want to access are distributed over multiple hosts (i.e., not immediately accessible through the environment on which the 4GL is resident).

Existing file organizations—will they be efficient for query processing, especially if such processing uses intermediate files of fixed-block sizes? Your guess is as good as mine. Depending on the organization of the file(s), the entire file(s) must be read again and again and again. Sound like an efficient use of resources to you?

What priority should such processes be given? Is all of this information needed on a real-time basis? How large a machine does one need just to get a foot in the door of greater productivity? These are some of the questions on my mind.

Some would have us believe that the time and expense involved in applications development is principally a function of the programming language used to implement systems. Such a view is, to say the least, naive and unsubstantiated by historical evi-

We tend to ignore some types of development mistakes for the sake of meeting immediate deadlines.

dence. History is clear; we tend to ignore and even institutionalize some types of developmental mistakes for the sake of obtaining immediate results or meeting immediate deadlines without much thought about tomorrow. Unfortunately, tomorrow always comes.

The failure to produce software rapidly and cost-effectively is principally a failure to recognize that immediate results are better accomplished through standardized data management techniques. Even within individual companies, standardized data management and, therefore, software development methods are not generally practiced. This is currently a fundamental deficiency.

Data processing is all about data. It should not be all about programming. Unfortunately, current dp organizational structures favor this latter approach. We have placed too much emphasis on how to get the job done (programming) rather than on what the job really is (data resource management).

In embracing the various and latest approaches to systems development, we (dp managers) often overlook the fact that data, and not programming per se, give our organizations their reasons for existence. While there has been some progress in terms of better and more efficient programming techniques, much progress remains to be made in understanding and managing corporate data resources. In short, we should be better organizing our data and our data should be better organizing us.

REDUNDANT PEOPLE, GROUPS

If your organization is like most others, it has at least one Department of Redundancy Department. Depending upon your point of view, this department may be made up of users, programmers, or a combination of both. And this is not just data redundancy. It is a redundancy of information processing as well as other efforts.

Redundancy can take many forms. Most commonly, it is two or more people or organizations doing similar work for similar purposes and producing (it is hoped) similar (redundant) results.

The Department of Redundancy Department exists because a great many people are doing a great many similar things with identical but separate data. If the use of data were controlled, these people and things would be known. As it stands now, data seemingly belong to everyone but they are controlled by no one.

In most traditional organizations, dp development, maintenance, and control organizations are, by and large, caught un-

derneath the business proper. It is difficult to develop, maintain, and control systems from the bottom up. This has direct implications on how 4GLs will probably affect company resources.

Informational costs are usually a function of two factors: the organizational level at which information is required and the span of control of the organization.

The higher one goes within the organization, the farther removed one is from direct contact with computer-based informational resources. The cost of information is also accordingly higher.

The span of a traditional organization is often the single most important indicator of redundancy. Redundancy occurs as the span increases because most organizational departments have common informational requirements. But because there is little communication across levels, there is no mechanism to provide this information—except from the top. Consequently, each department must develop its own operational informational system, and this has a direct impact on the operational costs of developing and maintaining computer-based informational resources. Rather than being integrated, data structures are fragmented to serve the fragmented yet common needs of the various functional departments.

Any organization can be stratified into user classes; each user class often has

its own peculiar needs. At the highest levels of a traditional organization, information is usually required on a one-time, immediate basis. Yet, as a user class, top management is the least likely to use 4GLs. Instead, a request for information will be generated downward through the organization. Since dp resources are already besieged with requests for new applications and modifications, there will be a delay in producing the information, or the request may be ignored altogether.

Both eventualities lead to possible confrontations, a reshuffling of priorities, or the answer that it is impossible to service the request at this time. In many cases, the affected parties have been conditioned over time and the user organization will simply produce the information manually or through its own standalone capability.

It is precisely these circumstances that made user programming a politically expedient way out for dp management. Unfortunately, user programmers often have an incomplete knowledge of exactly what data are available to draw upon, where and how they are stored, or exactly what is required to satisfy the management people who originated the request.

In general, the information sent back up the chain of command is not complete, does not meet the requirement, or results in another request for information to be broken out in a different way.

FIG. 1

A DATA-CENTERED ORGANIZATION

4 GLs bring management closer to the information it needs only if information resources are integrated.

Under these circumstances, it is unlikely that 4GLs, in and of themselves, can increase the speed or quality of information transferred to higher operational levels. What will perhaps increase—for a time—is the speed of each iteration in producing information. But it is highly probable that all bottom-end user departments will want the same 4GL capabilities, no user organizations will be talking among themselves, and there will be increasing competition for physical and data resources.

A WORST CASE SCENARIO

If this internal competition is allowed to intensify, the organization gradually begins to erode. In the worst case scenario, user-programming organizations eventually replace their dp organizational counterparts, but the dp function of control is not replaced. The current wisdom of the information center is to prevent this scenario from occurring. Unfortunately, this is occasionally as far as the concept goes. The fallacy of the information center is that it assumes that the data an organization relies upon are managed in such a way that an independent observer can understand user requirements well enough to draw upon a company's complete resource base as if it were an integrated whole. While the information center does serve to cap the user environment, in the long run its resources will also be outstripped by user demands for services.

Consider the case of multihost environments. Most large corporations have more than one host computer, not to mention tens to hundreds of minis or pcs. Who knows the extent and depth of the data on these machines? As a consultant, I have seen several instances where virtually identical applications were being developed by similar groups on computers that sat side by side.

With respect to 4GLs, the danger here, of course, is that users or even programmers will be endlessly reinventing the wheel—albeit quicker than they were before—because there is virtually no control over corporate data resources.

Another problem with 4GLs and multihost environments concerns the fact that those two (or more) computers sitting side by side may not be talking to each other. In fact, they may not even be made by the same vendor.

I am continually amazed that given such an environment, users somehow find out what is on that other computer and invariably want to access its data. But these 4GL user-programmers don't want to put you to any trouble—they intend to do the work themselves. Unfortunately, the reports they wish to generate involve summaries of certain data items by EMPLOYEE-NUMBER. EMPLOYEE-NUMBER is stored in signed-binary, ASCII form on one machine and (for whatever reason) as a concatenation of SSAN-PLUS-EMPLOYEE-NUMBER, in EBCDIC on the other. Try explaining this to a freshly minted 4GL user.

The point is, multihost environments can impose special problems for 4GL users. In fact, they pose problems no matter what the language if the data environments between hosts are not concurrently managed. Sophisticated integrations between mainframes, micros, and minis without such management may only amplify the problems in this area.

Fourth generation languages have been touted as offering the potential for tremendous productivity increases. With their current organizational structures, however, it is unlikely that most companies' potential can be realized. Fourth generation languages may enable an individual programmer to be more productive, but they will not necessarily allow a large and complex organization to be productive in relation to its scale of operations. In other words, well-managed and well-integrated databases are fundamental to system development efforts. Without data resource management, information centers, user programming, 4GLs, and a number of other causes célèbres will be self-absorbing.

A COMMON SERVICE UMBRELLA

In my view, the provision of decision support systems, executive information support systems, and other concepts associated with the information center are all contained under a common dp service umbrella. The key to relating all of these services—with or without 4GLs—is information resource management (IRM). Whatever became of this concept?

If IRM is dead, then a postmortem will certainly reveal that it was not for a lack of problems the concept could have solved. Its epitaph should read: "A friend who was not well understood."

If IRM is to have a second coming,
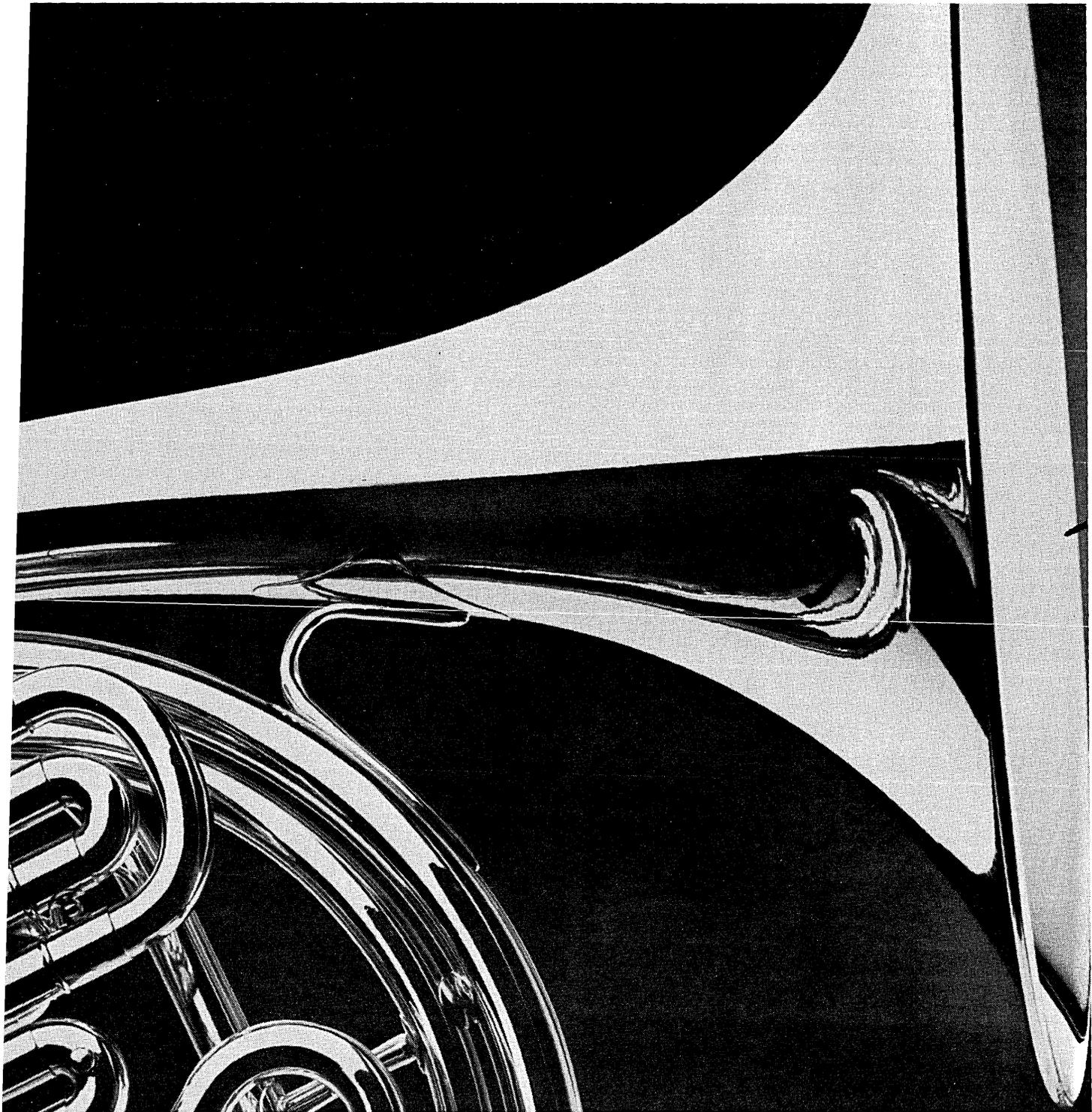
Now, Symphony sounds better than

The software that does more, now does more for everyone.

Current users will find Symphony,™ release 1.1 provides the basic functions of spreadsheet, word processing, database, graphics and communications, in a far more powerful package. New users will find Symphony far easier to learn. And you'll find it more valuable because it offers additional options for customization and applications development on personal computers.

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We've enhanced Symphony's functionality with a Macro Library Manager, so users can now access an unlimited variety of turnkey applications from any file. These applications can also be larger, because Symphony now manages memory more efficiently and can address up to 4 megabytes of additional memory. And Symphony now supports the 8087/80287 microprocessor chips, so users can now process their work up to 60 times faster.

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two things must happen: it must be supported by and be a part of top management, and its concepts must be incorporated into the MIS organization. The occurrence of these two events largely depends on where information processing organizations care to be five years from now.

In short, a dp organization should not be approaching the implementation of a 4GL as if it were just another programming language or software product. 4GLs are a forewarning that fundamental reorganizations are desperately needed—reorganizations that can translate the true informational needs of a business into workable service systems. Service systems do not consist of computers alone.

As technologies become usable, they require fewer and fewer technical types and more and more generalists. Recognition of this fact provides a basis for dp reorganization. Application development/maintenance teams should report to the respective managements of operational departments, as well as through a dp chain of command. Since they are members of the company at large in addition to being dpers, their roles become as much managerial as technical. They gain an increased exposure to the businesses their companies

are in and what informational services are really required by the various operational areas. This is the essence of IRM.

While no organizational form is perfect, some are better and more intuitively satisfying than others. One that I favor is the matrix approach. A matrix organization is one that can be "data centered," i.e., it recognizes that information systems must be integrated so they respond to the true needs of the economic enterprise.

As shown in Fig. 1, a data-centered organization permits the various levels to be as close to information resources as their requirements dictate. The reason for this is that the organization is three-dimensional. As such, the costs associated with automation are a matter of choice, and the dp organization is not pressured by impossible demands for information to run the business. Dp development, maintenance, and control departments are involved in and aware of the business requirements because they functionally reside on an equivalent plane.

How many shops double-check the layout of file definitions with end-user groups prior to going into production? This organization will. A data-centered organization consists of a centralized core of DBA

(database administration) functions such that all work is data dependent. Such an organization is able to make sense out of the ways different parts of the business view data, not to mention controlling how data are (physically) stored and what they should (logically) be related to.

Formal sign-offs on policies, procedures, and specifications are no longer dp requirements; they are business requirements that reinforce short-range and long-range planning exercises. Such requirements are a direct result of initiatives put in motion and monitored by a director-level, information resources management planning committee.

Even though 50% or more of the U.S. work force performs tasks that are information processing related, most of America's workers have no terminal-based computer access whatsoever. Unfortunately, many members of the work force that do have access have formulated the impression that their companies' dp systems generally cannot provide the information they want in the format they want on a one-time, immediate basis. Fourth generation languages alone will not solve this problem.

Data processing resources are limited, budgets are limited, time is limited, and qualified personnel are limited. Deriving the most benefit from available resources is dp's fundamental managerial challenge. Before buying yet one more product, perhaps we should first question why these limitations have become so manifest.

In examining fourth or even nth generation languages, businesses must be willing to realistically assess the true ability of any technology to solve infrastructural problems. Fourth generation languages will very likely require fourth generation organizations. History is clear; we have tended to ignore and even institutionalize some types of mistakes for the sake of obtaining immediate results. Immediate results are what 4GLs are all about.

We will have fully entered the information age when corporations place as high a value on data as they do on hardware and other fixed assets.

Will 4GLs be for everybody? Part of the evolution of the industry will be to determine the real niche into which they fall. Those organizations that have good systems development track records will probably find that 4GLs offer substantial returns. Less successful dp shops . . . well, that's how consultants make their livings.   ◉

F.J. Grant is an independent consultant based in Marietta, Ga. He has extensive experience developing software both domestically and internationally.

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For end users, our system makes it easy to design reports. For your data processing staff, its fourth gener-

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HARDWARE

OFF-LINE

IBM's long coattails seem to keep the add-on hardware market growing and thriving, according to a report by Frost & Sullivan Inc., a research firm with offices in New York and London. The continued popularity of the IBM PC, PC XT, and PC AT -- as well as of compatibles -- has created a surging market for add-on devices with the market expanding through 1988, the report says. Compatible devices such as disk drives, printers, and modems are faring the best of the peripherals. By 1988, more than 1.3 million modems will be shipped, the report predicts; the modem market will top $615 million in 1988, compared with 1984's $246 million market.

A major reason for the popularity of compatible add-on devices, the report suggests, is the expanded capability they offer the microcomputer end user. In addition to printers and on-line storage devices, there is a growing market for memory boards, controllers, solid state disk drives, plotters, and a variety of displays. The report reveals that the IBM PC hardware market will increase to $35 billion by 1988, up from $10 billion this year. And users are expected to spend a "considerable" amount of money on add-on products.

The study concludes that the market for add-on equipment represents one of the most viable areas of growth in the pc marketplace. And why not? Peripherals range in price from a few hundred dollars to more than a thousand dollars. The report points out that "for the retailer, the hardware market can normally provide a much

higher profit margin than can be obtained through personal computer sales." Typical margin for this equipment is 40% and higher, making add-ons a profitable business, at least for companies like Quadram and Hayes.

To illustrate the volume of microcomputer sales, look no farther than the federal government. The General Services Administration reports that Uncle Sam's purchase of computers costing under $10,000 increased rapidly in fiscal 1984. Government agencies bought 37,277 units last year compared to approximately 8,000 acquired in fiscal 1983. The agencies reported that expenditures for microcomputers increased proportionately from about $34 million in 1983 to $137 million in 1984.

According to Frank J. Carr, GSA assistant administrator for information resources management, the statistics are indicative of the rapid adoption of this technology to achieve greater efficiency in the government workplace. He cautions that the computer purchases reported in this survey are probably understated, due to decentralized acquisition and management of microcomputers by departments.

The Department of Defense, not surprisingly, reported the largest purchases of small computers, acquiring 17,419 units in 1984 compared to 1,624 in 1983. Next was NASA, buying 4,029 computers, followed by the Environmental Protection Agency, with the purchase of 1,910 units. Other agencies reported acquisitions ranging from one to 1,729 microcomputers.

COLOR TERMINAL

The Model 2130 color display is compatible with IBM's 3179 display and has seven-color capability. The unit includes a 14-inch monitor, 122 keys, and logic module. It provides high-resolution characters with a flicker-free image on a Mod 2 screen size (24 lines by 80 columns). In the on-line mode, the display will support host applications requiring up to seven colors, including red, blue, green, white, pink, turquoise, and yellow. It can also use extended highlighting information from the host, which adds blinking, reverse video, or underscoring to displayed data. In the local command mode, users may select two- or four-color support. The Model 2130 sells for $2,060 with keyboard. LEE DATA CORP., Minneapolis.
FOR DATA CIRCLE 301 ON READER CARD

COAX PROTOCOL CONVERTER

The Series II+ 3287/Coax Protocol Converter allows local attachment of non-IBM output devices to IBM 3270 cluster controllers. The product emulates the functionality of a 3287 Model 1 or Model 2 printer allowing the ASCII printer to appear to the host as a 3287. Emulation of the 3287's front-panel controls provides familiarity for current 3287 users. The product supports RS232C, Dataproducts, Centronics, as well as the vendor's graphics controllers. The unit accepts SNA LU1 (SCS), SNA LU3 (DSC), or BSC data streams depending on the application and local controller. The Series II+ 3287/Coax Protocol Converter sells for $2,000. KMW SYSTEMS CORP., Austin, Texas.
FOR DATA CIRCLE 302 ON READER CARD

PUBLISHING SYSTEM

The Concept 100 is a personal publishing system designed as a complete document processing system for the IBM PC or PC AT user. It consists of a graphics subsystem on a plug-in circuit board, a mouse, and a software package. The system contains an 80186 microprocessor that executes graphics primitives, drives the IBM 5151 monochrome display, provides a mouse

port, and performs raster image processing for printers interfaced through its serial or parallel ports. The software package includes a Wang-like word processor, professional drawing editor, and a charting program integrated in a way that allows users to insert graphics into the formatted text on the screen. According to the vendor, images are printed out exactly as they appear on the screen.

The product is compatible with the IBM PC Graphics Development Toolkit, which is based on the ANSI GKS standard. The circuit board boosts the PC's screen resolution to 720 by 352 pixels and also increases display speed. The graphics editor is mouse- or cursor-driven with windows and menus enabling the user to create lines, boxes, circles, and polygons, then copy, move, rotate, or scale the graphics, and pan and zoom through the worksheet. A virtual device interface allows rasterization and printing to the full resolution of the output device. File translators for Wang files are included; translators for the IBM Displaywriter are planned. The system is compatible with existing spreadsheet, database, and other business-oriented software. Options to the system include Tektronix 4014 emulation and an equation editor that manipulates a set of mathematical symbols to be integrated into text. The Concept 100 system without the PC XT or PC AT costs $2,200. QMS INC. (formerly Quality Micro Systems), Mobile, Ala.
FOR DATA CIRCLE 303 ON READER CARD

LAP-SIZED
The Portable Plus is a durable, full-performance personal computer designed for mobile professionals like middle and upper managers and sales professionals. This enhanced version of the vendor's original portable computer runs pc software applications and communicates with desktop personal computers, including the HP Touchscreen, the IBM PC, and compatibles.

The lightweight, notebook-sized portable features plug-in ROM-based software and a full-sized liquid crystal display screen. The 25-line by 80-character LCD flip-up screen displays the same
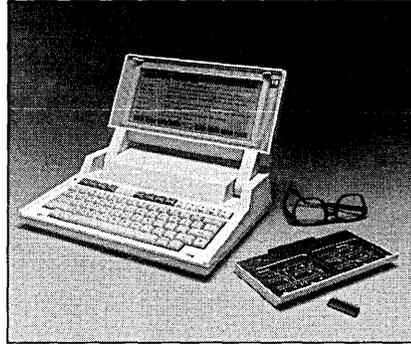
amount of information as desktop personal computers. Features include an electronic disk (E-disk) and ROM software in snap-in cartridges. According to the vendor, the E-disk, a RAM circuit powered by the system's batteries, eliminates the need for a disk drive and speeds up the computer's operation. ROM/RAM drawers permit memory expansion and the use of customized or off-the-shelf plug-in ROM software cartridges.

This configurable system allows users to choose individualized capabilities and options, and to switch from one task to another. The lap-sized computer is powered with a rechargeable battery. It can also function as a standalone computer or as a portable intelligent terminal. The Portable Plus sells for $2,400. HEWLETT-PACKARD, Palo Alto.
FOR DATA CIRCLE 304 ON READER CARD

AT-CLASS MICRO
The TeleVideo AT is intended for "power users" looking for greater performance in software processing speed, memory and storage capacity, and disk I/O operation. This product is designed with the 8MHz Intel 80286 microprocessor. Besides being compatible with the IBM PC AT, this product is fully functional with the PC XT and PC AT add-on expansion boards.

It is packaged to accommodate the needs of vars. The product consists of a system module, a keyboard, and a text and graphics monochrome monitor. Two configurations are available. Model I is the entry-level system with 256KB of RAM, a 1.2MB floppy disk drive, RS232C serial port, parallel printer port, clock/calendar with battery backup, and eight I/O bus expansion slots. Model II also includes 512KB RAM and a formatted 20MB Winchester disk drive in addition to the features of Model I.

The monitor features a 14-inch nonglare screen with full tilt and swivel, and has a footprint of less than a square foot. A single graphics controller supports both alphanumeric text and graphics. The keyboard features 84 keys and a main typing section. It runs under MS/DOS 3.1 and GW/BASIC is included. Other options include a 20MB tape backup, a 360KB floppy drive, 80287 coproces-

sor, and the Personal Mini network interface boards. Prices for the Model I start at $3,400 and $4,800 for the Model II. TELEVIDEO SYSTEMS INC., San Jose.
FOR DATA CIRCLE 305 ON READER CARD

DISPLAY STATION
The HostStation 100 is an interactive display station that combines the advantages of mainframe computing with the display features of a standalone workstation. This is the first product in a line of interactive display stations and workstations for applications like CAD/CAM/CAE, publishing, software engineering, artificial intelligence, computer science research, and engineering and scientific problem solving.

The product is part of the vendor's Continuum group of interrelated products. The Continuum provides a framework for integrating a wide variety of computers, software, and methods of access from Encore to other manufacturers.

HARDWARE SPOTLIGHT

DATA COMMUNICATIONS
The Multiple Data Set II (MDS) is designed for creating and managing high-density data communication facilities and networks in large-scale communications systems. The MDS system also gathers information on performance and usage, allows reconfiguration to meet traffic
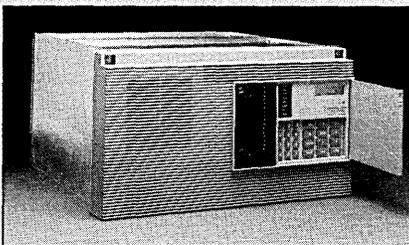
needs, and improves equipment utilization.

A set of configuration options allows users to control, change, and monitor the system, either locally or from a remote location. The MDS II chassis is mountable in a standard 19-inch rack and accommodates up to 32 modems. The system controller performs complete central site supervision and monitoring functions for a network of up to 16 individual chassis. The product has a front-loading, rack-mountable chassis assembly. The front panel contains status indicators, EIA lights, an LCD, and a keypad. Pricing for the MDS II line starts at $3,200. RACAL-VADIC, Milpitas, Calif.
FOR DATA CIRCLE 300 ON READER CARD

HARDWARE

Designed for use with existing supermini-computers, mainframes, and supercomputers, the product can access data in up to three computers simultaneously. The display screen can be used as a whole or be partitioned into two or three independent windows, each of which can access a different computer or different processes of the same computer.

Each HostWindow can emulate the VT100 or the Tektronix 4010 and 4014 graphics terminals. The product also supports Encore's Ally software development system for commercial applications. In working with text, the unit can display eight times the information of a typical personal computer screen. The workstation displays two full, legal-sized pages of text simultaneously. Dual pages can be presented side by side or top to bottom. For spreadsheet work, HostWindow displays 176 columns by 86 rows at a time.

The monitor provides flicker-free display of high-resolution, noninterlaced graphics for applications such as CAD/CAM. It can perform vector and curve drawing as well as area frills. In addition, it produces graphs, charts, and other visual aids. It can plug directly into DEC VAX minicomputers. Prices start at $3,500. ENCORE COMPUTER CORP., Wellesley, Mass.
FOR DATA CIRCLE 306 ON READER CARD

3270/PC WITH GRAPHICS

The IRMAX Graphics device is a hardware and software package that enables an IRMA-equipped IBM PC, PC XT, PC AT, or compatible micro to function as an IBM 3270 PC with graphics. This device is the first member of a new line of products based on the distributed function terminal (DFT) technology.

IRMAX Graphics is totally compatible with IBM's host-based Graphical Data Display Management System (GDDM) and operates in a SNA teleprocessing environment. The product also allows a PC to function as an IBM 3278 S3G or IBM 3278 S2G monochrome terminal, or an IBM 3279 S3G or IBM 3279 S2G color terminal. Any of the vendor's IRMA micro-to-mainframe interfaces can be converted to work with IRMAX Graphics.

In addition to using IRMA, the PC must be equipped with at least 320KB of memory and a graphics adapter. Display hardware supported with the color displays include IBM's enhanced color graphics adapter and TECMAR's Graphics Master card. Display hardware supported with the monochrome displays include IBM's standard color graphics adapter. IRMAX Graphics sells for $1,200. DIGITAL COMMUNICATIONS ASSOCIATES INC., Norcross, Ga.
FOR DATA CIRCLE 307 ON READER CARD

TAPE BACKUP

Programmed much like a videotape recorder, the Sysgen Smart Image and Smart QIC-FILE can be set a week in advance to perform backup routines for files on IBM or compatible pcs. A menu-driven utility program allows the user to preselect files to be backed up any day of the week up to twice daily. Files specified may include subdirectories or only files which have changed since the last backup.

If the computer is in use when the system has been instructed to back up, it will sound a beep to remind the user. The user can either instruct the subsystem to back up the data or to ignore the remainder, in which case the product will perform the backup once the user exits the operating system.

On-line help screens guide the user through the initial programming process to select the times and files to back up. Users may also back up manually in a conventional file-by-file mode, archiving files under a number of different parameters (including by file, groups of files, date, time, and whether previously damaged) and in a fast mirror-image mode, in which the entire disk is backed up at once.

Utility programs verify that the proper files were backed up. They also create directories of tapes—as well as of files—that were archived, so the user can immediately locate files archived earlier. The same file name may be backed up in different tape sets, thus giving users a record of changes made over time in a given file.

Users may enter commands in either a menu- or command-driven mode, and may create comment lines for each group of files being backed up. Special batch files may be created to control the automatic backup process, thus giving us-

ers the ability to add or change the automatic backup parameters. Both the Smart Image and Smart QIC-FILE can restore data to a different hard disk than was originally backed up. Their "verification on the fly" error-correction method checks transferred data and immediately rewrites it, if necessary, during the recording process. The Smart Image, a cassette-based subsystem, has a suggested retail price of $1,000. The Smart QIC-FILE, which uses the QIC format cartridge,
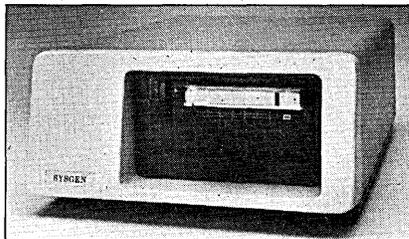
is priced at $1,400 for an internal model and $1,500 for the external version. SYSGEN INC., Fremont, Calif.
FOR DATA CIRCLE 308 ON READER CARD

DEDICATED OA SYSTEM

The Sensory Office System integrates voice, data, and communications to enhance productivity and communications between all levels of an office work group, including executives, managers, professionals, and support staff.

The system consists of the Sensory 5000 controller and up to 32 Sensory

2000 workstations. Multiple controllers may be linked to create larger networks. The system offers standard and proprietary features including VoiceNotes, which enables users to embed voice comments or corrections anywhere in a document; voice messaging; telephone management; electronic mail; document filing; dictation; and a word processor with powerful text editing functions. Options include the MultiPlan spreadsheet, support for the IBM 2780/3780 communications protocol, a document processing package, and printers.

According to the vendor, this dedicated system differs from other dedicated systems because it is not tied to one task like word processing. This system has been designed to address the needs of the entire office with a focus on voice and data communications, and ease of use for nontechnical, managerial, and professional workers. It has what the vendor calls a "seamless environment," allowing a user to create a document, then incorporate a spreadsheet, add VoiceNotes, send the document via electronic mail, and file it automatically, without having to leave one application or enter another.

The system runs under the vendor's proprietary operating system and has dedicated keys to perform all common functions. The vendor says the single-key emphasis makes the system operation simple, straightforward, and easy for users to learn. The Sensory Office System is priced from $5,000 to $8,000 per user. SENSORY INC., Santa Clara.
FOR DATA CIRCLE 309 ON READER CARD
—Robert J. Crutchfield

"Promises promises, com
Somebody's got to start
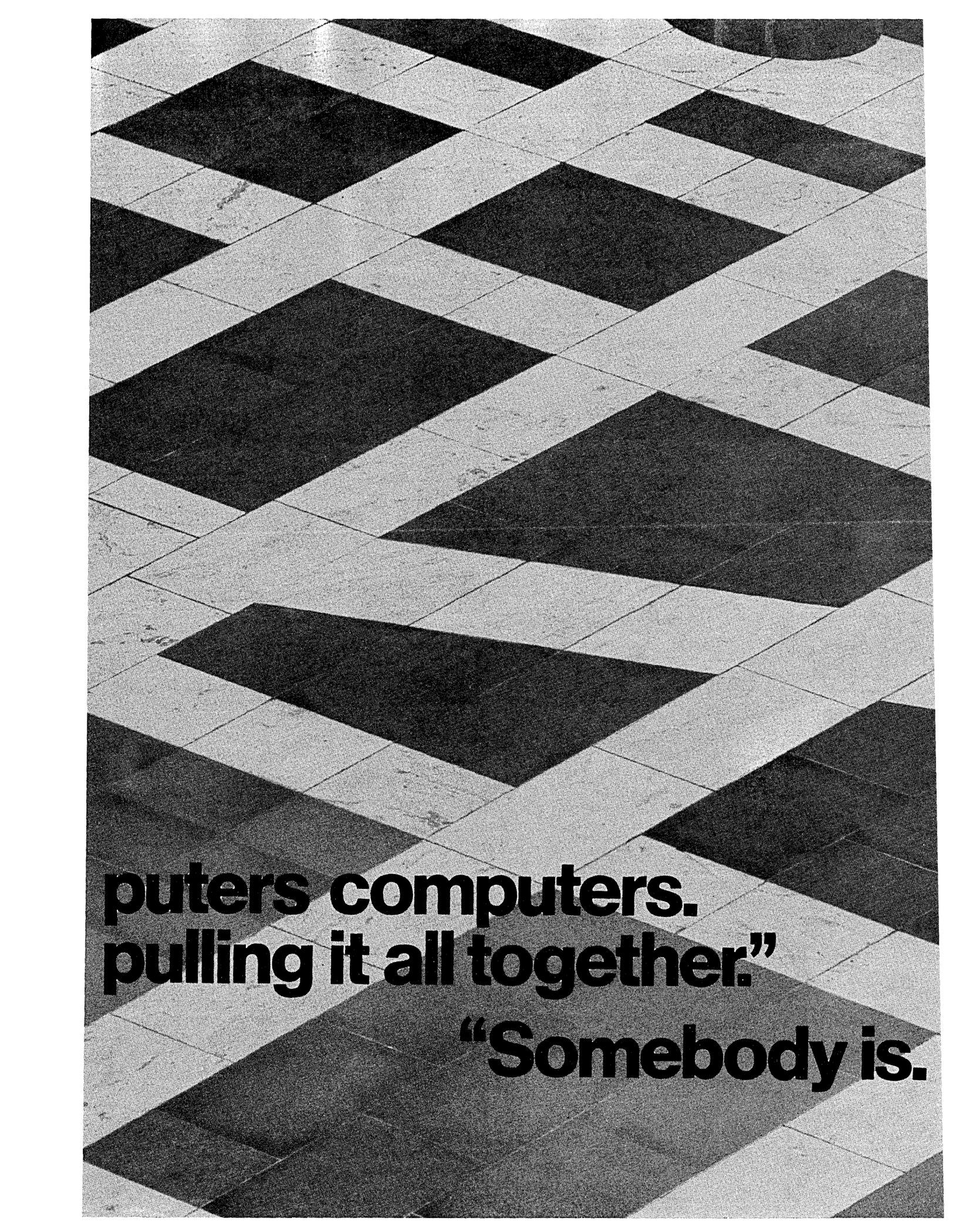
puters computers.
pulling it all together."
"Somebody is.

With more than 70 and enhancements, complete solutions

A few weeks ago, AT&T made a major computer announcement. Major in every way.

Certainly in the depth and breadth of the offering —which includes computers, peripherals, software, networking options, communications products and much more.

Major in terms of AT&T's growth as a force in the computer industry. Consider the new, enhanced and existing products. You'll find our line of integrated communications-based computers runs the gamut from PCs to superminis.

What's more, they can be connected easily to each other and to your mainframes. They're readily expandable, too, bringing a new level of productivity to your business.

Most importantly, the announcement reinforces in a major way AT&T's commitment to computers. Tangible proof that our products are what we say:

AT&T PC 6300

AT&T UNIX PC

The Computers With The Future Built In. Our computer line now includes the following:

Computers: To serve an entire office, our recently enhanced line of AT&T 3B Computers puts the flexibility and power of the UNIX™ Operating System to work for you.

There are five models. Our new 3B2/400 can accommodate up to 46 different peripherals (terminals, printers, modems, etc.). The new 3B15 up to 128.

AT&T

new computer products AT&T is now fully equipped to offer to your computer needs.

The 3B2/300 and 3B5 have both been enhanced with many features for better performance. The former can accommodate up to 18 different peripherals; the latter up to 128. The 3B20 has room for up to 256 peripherals.

The AT&T PC 6300 is for the single user in need of a superior MS-DOS* business computer. It can also run the Xenix* operating system. For single or multi-user situations, the AT&T UNIX PC offers a unique combination of power, ease of use and advanced communications capabilities.

Communications: AT&T has always led the way in telecommunications. That leadership continues in computers. Our computers and communications products link together, allowing voice and data integration and shared information from PC to mainframe.

We now offer a complete line of low to high-end data communications products and service giving you complete control over the management of your data network.

Those with a major investment in mainframe computers can rest easy. Now you can enjoy complete end-to-end connectivity. We now support popular SNA and BSC protocols, which means our computers and systems can communicate and work with your mainframes. Your investment is protected.

Peripherals: We offer a full line of high-performance, highly reliable synchronous and asynchronous terminals and printers. They're highly compatible, too, with our own and other computers.

Software: Choose from a large and growing list of applications software based on **UNIX** System V. Some handle general business, such as word processing, financial spreadsheets, and business graphics. And some tackle specific needs of spe-
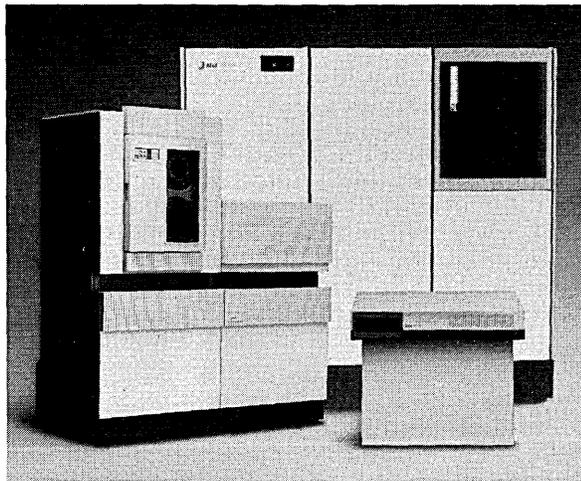
THE COMPUTERS WITH THE FUTURE BUILT IN

cific industries, including, accounting, automotive and retailing.

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For a more detailed look at what AT&T Computer products can do for you, just turn the page.

See how AT&T Computer products can make your system work as a system.

AT&T 4410 Terminal
AT&T 3B2/400
Computer

It's easy to get started putting AT&T to work for your business—in small easy steps or a complete system. These communications-based computer products are designed to work with each other, and with your existing system. Start with the newly enhanced **3B2/300** or the new **3B2/400** to develop a distributed departmental system. Both are true 32-bit computers that run **UNIX System V.** The **3B2/400** offers full hardware floating point performance, streaming tape backup, and up to 4 MB of main memory. Supporting up to 10 or 25 users respectively, the **3B2/300** and **3B2/400** offer plenty of room for tape and disk storage growth.

For even higher storage capacity and performance, build your system around the enhanced **3B5** or the new **3B15** minicomputers.

The **3B15** is equipped with a high-performance **WE™ 32100** microprocessor with main memory up to 16 MB. It supports up to 60 users on a number of configurations. Other features include demand paging memory management with file and record locking and standard floating point performance.

To over 500 tested software packages already listed in the **AT&T Computer Software Guide**, we're adding more applications programs, such as UltraCalc** and CrystalWriter™*** For systems developers, high level languages for **3B Computers** such as UX-Basic† and Micro Focus Level II Cobol†† open the world to thousands of additional software applications running in the **UNIX System V** environment. And AT&T can address unique business needs with software solutions specifically for vertical markets such as accounting, real estate, and automotive industries. IBM††† mainframe VM users now have **UNIX System V** develop-

ment capabilities through our **System V-VM** software.

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Dataphone I Modems

DATAPHONE II is a family of digital and analog modems, multiplexers, and diagnostic control devices for multilevel network management and control. To the family we just added the **DATAPHONE II Model 2600 Digital Data Service Unit**, an integrated DSU and Channel Service Unit in one compact, easy-to-install and operate unit. Plus, it is fully compatible with the **DATAPHONE II** equipment you're using now.

AT&T 4410 Terminal
AT&T Model 4000
MODEM

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Of course, one advertisement can't begin to do justice to the full line of AT&T Computer products. There's much more to talk about. **For more details, contact your AT&T Information Systems Account Executive, authorized AT&T Representative, or call 1 800 247-1212.**

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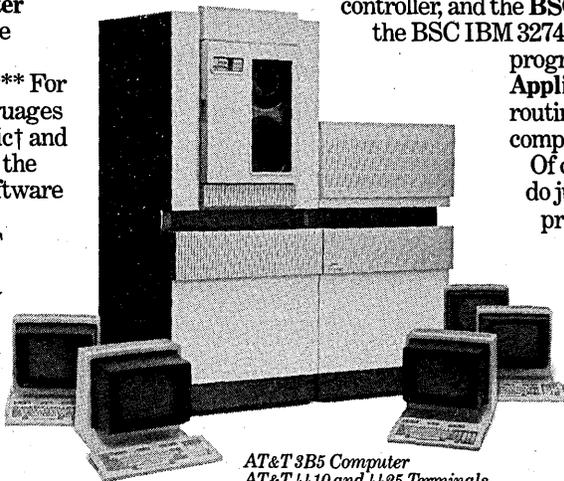
AT&T 3B5 Computer
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SOFTWARE AND SERVICES

UPDATES

Apple's Macintosh may finally be shedding its image as a warm, fuzzy little machine and replacing it with a gray flannel suit. Boosting its memory to 512KB has opened the Mac to serious business applications. On the heels of the Lotus Jazz premiere were the debuts of three competitors: Excel from Microsoft, Bellevue, Wash; Crunch from Paladin Software, San Jose; and Mindsight from Execucom, Dallas.

Jazz is an integrated package with a worksheet, word processing, graphics, a database, and communications. Excel and Crunch--how aptly named!--are both being positioned as spreadsheets for "power" users. With Apple's Switcher option, Excel spreadsheets and graphics can be integrated with Microsoft's Word. While Excel won't be available until September, Crunch will be on the shelves earlier this summer.

Unlike the other products, Mindsight is more of a decision support tool than a spreadsheet. It is designed for managers to do "what if" scenarios, goal seeking, modeling, and decision support. All of these packages are in the $600 price range and take full advantage of Mac's user interface.

Apple is undoubtedly pleased with the quality and diversity of business software available for the Mac. When the Lotus product was introduced, Apple's president, John Sculley, said Jazz was the preeminent product that would sell Macs. And when Excel was introduced, Apple chairman Steve Jobs gave the Microsoft product a similar endorsement. Confused? Jobs says he would like to see heated competition between Jazz and Excel.

With Jobs and Sculley endorsing a pair of software products, it doesn't leave much room for other vendors trying to crack the Fat Mac business market. Does this mean Apple is abandoning the Fortune 5 million for the Fortune 500? Probably not yet. But with communications links to IBM mainframes, AppleTalk, and networking software from companies like Lutzky-Baird Associates of Los Angeles, Mac is going to have to don a tie, like it or not.

In an industry of short memories and shorter product cycles, it's easy to forget the much anticipated battle that was supposed to rage between Lotus and Ashton-Tate last summer upon the initial shipments of their integrated software packages, Symphony and Framework. Symphony was on time and scored modest success; Framework came in late and fizzled. Nearly a year later, the two products are still on the shelves, but neither is selling as well as its vendor had projected. A big drawback at introduction time was the lack of mainframe software integration, and now both companies have cut deals with mainframe software suppliers to integrate the micro products with mainframe databases. Lotus is linking Symphony to Cullinet's IDMS, while Ashton-Tate of Culver City, Calif., has signed a letter of intent with Software AG to conduct joint development and marketing activities with the commitment to link the Reston, Va., firm's Natural/Connection with dBASE III and Framework.

MIS MANAGEMENT

The Request Tracking System (MRTS) is a software package designed to aid MIS managers in controlling their application maintenance backlog. It provides a record of each program change from the date of receipt in MIS to the first production date.

It tracks such information as assigned staff, effort and costs expended, and the systems and individual programs that were modified. Product benefits include historical data for determining the accuracy of estimates, information on the efficiency of individual programmers, and analysis to determine the need to rewrite specific programs or portions of systems.

Designed for the IBM Personal Computer and compatibles, MRTS includes data entry screens, on-line help, and on-line file inquiry, as well as a complete user manual and a variety of hardcopy reports. The menu-driven system provides security via log-on IDs and passwords. Both color and monochrome monitors are supported along with user-defined choice of screen colors. MRTS costs $700. A demonstration disk is available for $20. VSP INC., Park Ridge, N.J.

FOR DATA CIRCLE 326 ON READER CARD

SECURES AND AUTHENTICATES

MailSafe is a data security program for general electronic mail applications using IBM PCs and compatibles. It uses what the vendor calls the Mail Digest Signature Blocks (MDSB) and signed key server certificates techniques in an information security and authentication program that can be used in existing electronic mail networks.

Features include the ability to create and verify electronic "digital signatures," to verify the source of a received message, to assure the integrity and authenticity of received data, and to electronically "seal" sensitive data for transmission. An MDSB can be transmitted and stored with an ordinary message or an encrypted one in most E-Mail sys-

SOFTWARE AND SERVICES

tems. This function can then automatically authenticate both the entire message content and its origin for a user.

The product can also be used to assure the integrity and authentication of data in either stored or transmitted form. It also offers a function whereby a message itself can be scrambled so that it can only be unscrambled by the party whose RSA Public Key was used for the scrambling function. The RSA Public Key is part of the RSA Public Key Cryptosystem, a kind of cryptographic envelope that can only be opened by the specified person using his RSA Private Key. The vendor has purchased an exclusive license for this patent from MIT. MailSafe costs $350 and volume discounts are available. RSA SECURITY INC., Sunnyvale, Calif.

FOR DATA CIRCLE 327 ON READER CARD

PRESENTATION GRAPHICS

Impressionist is a high-resolution presentation-quality graphics software system for pcs. It provides corporate decision support with business graphics for visually analyzing and interpreting business situations, formally presenting information, and communicating ideas.

The product works with other business software. The software can produce a variety of charts, diagrams, maps, text images, and free-form graphics.

It includes a graphics editor, and can be used with digitizers to create free-form images and modify existing images. The menu-driven package can be used to produce slides, hardcopy plots, and transparencies, using a wide array of graphics output devices.

The software can be used as a standalone package and with other software including Lotus 1-2-3, Symphony, and Multiplan. It interfaces directly to IFPS/Personal, the vendor's business planning and analysis software. Impressionist runs on the IBM PC, PC XT, PC AT, and compatibles. The single-copy price is $1,000. EXECUCOM SYSTEM CORP., a Continental Telecom Inc. (Contel) company, Austin, Texas.

FOR DATA CIRCLE 328 ON READER CARD

ENHANCED MRP

MAX is a closed-loop, real-time manufacturing planning resource (MRP) system that controls shop floor activities. The enhanced version 3.1 allows manufacturers to post scrap and splits against orders. Scrap is tracked at each operation, and planned vs. actual scrap is displayed in each bill of materials. In addition, orders can be split between parent parts to support requirements of repetitive manufacturers.

The enhancements also give manufacturers the option of rescheduling operational start dates based upon either a work center's standard queue time or the order's projected setup and run times. Additionally, work center backlog data can be requested in a time-phased display to help manage capacity and identify bottlenecks in the shops. This version also lets users write customized help screens.

The interface module, which can can transfer data to other software packages and can link the product to other computer systems, now makes all information in the product's database available for use in calculating, making massive changes, and creating customized reports.

Optional modules have also been made available for the MRP system, including a performance module that provides performance summaries and gives management overviews of the operation. The module analyzes and summarizes quantities and costs of surplus, inventory, purchase orders, and all inventory transactions. It analyzes shop order shortages and the timeliness of vendor deliveries and work order completions.

The vendor also added a costing module that determines the costs of components, labor, and stock. It pinpoints planned, actual, and variance costs of components issued to each material order and of labor hours spent on each order. In addition to running on the IBM PC XT and PC AT, the new release of MAX also runs on the IBM 5531 Industrial Computer, an industrialized version of the IBM PC XT. The performance module costs $2,000 and the costing module sells for $3,000. MICRO-MRP INC., Foster City, Calif.

FOR DATA CIRCLE 329 ON READER CARD
—Robert J. Crutchfield

SOFTWARE SPOTLIGHT

DATA CENTER MANAGEMENT

CA-Unicenter is a software-based business solution for the management of corporate data centers using IBM and IBM plug-compatible mainframes under MVS. The system is designed to unify control in the dp shop and solve problems faced by data center management.

The system consists of three components. The first component is data center management software that addresses operational and programmer productivity needs. The second component is CA-Uniservice, a micro computer and mainframe-based client service, support, and training system. The third component is CA-Activator, an interactive, on-line system that automates and simplifies product installation and maintenance.

The data center management software includes integrated operational and programmer productivity software for MVS operating systems. Operations management facilities include job scheduling, documentation management, performance measurement, on-line and batch job accounting, capacity planning, tape and disk management, and sorting. The software features common screen formats, report formats, function keys, and installation procedures for each facility.

CA-Uniservice is a training system and includes an IBM PC XT serving as the nucleus for a communication system between the user and the vendor's 24-hour, on-line customer service support system. Users also have access to the vendor's database where they can report problems, request supports, place orders, and browse through product support files. Tutorials are available on-line as well as on diskette. An on-line mainframe help facility is accessible from anywhere within the system.

CA-Activator is an on-line, interactive, menu-driven system that simplifies installation of CA-Unicenter. Running under the control of TSO/ISPF, this product acts as the front-end processor to the Systems Modification Program (SMP) supplied by IBM. It allows for the interruption of the installation process at any time and permits installation to continue later without losing a step. It monitors all installation activity, defines SMP and library data sets, automatically allocates disk space, generates required JCL, and also submits the complete job to SMP for execution.

CA-Unicenter consists of 13 modules to monitor MVS, CA-Activator, a fully configured IBM PC XT with graphics and communications, data center management software, a printer, modem, and cabinet. A perpetual license is available for $180,000 and a three-year lease is available for $144,000. COMPUTER ASSOCIATES, Jericho, N.Y.

FOR DATA CIRCLE 325 ON READER CARD

They all say they reach the Fortune 500.

Here's what the Fortune 500 say:

1. Exxon
2. General Motors
3. Mobil
4. Ford Motor
5. International Business Machines
6. Texaco
7. E.I. du Pont de Nemours
8. Standard Oil (Indiana)
9. Standard Oil of California
10. General Electric
11. Gulf Oil
12. Atlantic Richfield
13. Shell Oil
14. Occidental Petroleum
15. U.S. Steel
16. Phillips Petroleum
17. Sun
18. United Technologies
19. Tenneco
20. ITT
21. Chrysler
22. Procter & Gamble
23. R.J. Reynolds Industries
24. Getty Oil
25. Standard Oil (Ohio)
26. AT&T Technologies
27. Boeing
28. Dow Chemical
29. Allied
30. Eastman Kodak
31. Unocal
32. Goodyear Tire & Rubber
33. Dart & Kraft
34. Westinghouse Electric
35. Philip Morris
36. Beatrice Foods
37. Union Carbide
38. Xerox
39. Amerada Hess
40. Union Pacific
41. General Foods
42. McDonnell Douglas
43. Rockwell International
44. PepsiCo
45. Ashland Oil
46. General Dynamics
47. Minnesota Mining & Manufacturing
48. Coca-Cola
49. Consolidated Foods
50. Lockheed
51. Georgia-Pacific
52. Monsanto
53. W.R. Grace
54. Signal Companies
55. Anheuser-Busch
56. Nabisco Brands
57. Johnson & Johnson
58. Coastal
59. Raytheon
60. Honeywell
61. Charter
62. General Mills

63. TRW
64. Caterpillar Tractor
65. Aluminum Co. of America
66. Sperry
67. Gulf & Western Industries
68. Continental Group
69. Bethlehem Steel
70. Weyerhaeuser
71. Ralston Purina
72. Colgate-Palmolive
73. American Home Products
74. Litton Industries
75. Hewlett-Packard
76. Control Data
77. Texas Instruments
78. LTV
79. American Brands
80. International Paper
81. Motorola
82. Burroughs
83. Archer-Daniels-Midland
84. Digital Equipment
85. Borden
86. Champion International
87. Armco
88. Esmark
89. Diamond Shamrock
90. CPC International
91. Time Inc.
92. Deere
93. Bristol-Myers
94. Martin Marietta
95. Firestone Tire & Rubber
96. IC Industries
97. North American Philips
98. Agway
99. Pfizer
100. H.J. Heinz
101. NCR
102. Pillsbury
103. PPG Industries
104. International Harvester
105. American Motors
106. Borg-Warner
107. American Cyanamid
108. Kerr-McGee
109. United Brands
110. FMC
111. Emerson Electric
112. Dresser Industries
113. Boise Cascade
114. Warner Communications
115. Owens-Illinois
116. Carnation
117. American Can
118. Reynolds Metals
119. Campbell Soup
120. Kimberly-Clark
121. Land O'Lakes
122. Celanese

123. Northrop
124. Merck
125. B.F. Goodrich
126. SmithKline Beckman
127. Inland Steel
128. Warner-Lambert
129. Combustion Engineering
130. Eli Lilly
131. Avon Products
132. National Intergroup
133. Burlington Industries
134. Textron
135. Teledyne
136. Norton Simon
137. Abbott Laboratories
138. Eaton
139. Dana
140. Kaiser Aluminum & Chemical
141. St. Regis
142. Owens-Corning Fiberglas
143. Levi Strauss
144. Crown Zellerbach
145. Republic Steel
146. Quaker Oats
147. Whirlpool
148. Hercules
149. Mead
150. Interco
151. Penn Central
152. Swift Independent
153. Tosco
154. Times Mirror
155. Singer
156. Scott Paper
157. Murphy Oil
158. Kellogg
159. Revlon
160. Allegheny International
161. Kidde
162. ConAgra
163. Pennzoil
164. AMAX
165. Ingersoll-Rand
166. National Distillers & Chemical
167. Grumman
168. General Tire & Rubber
169. Gillette
170. American Standard
171. Wilson Foods
172. Williams Companies
173. Fruehauf
174. Engelhard
175. McGraw-Edison
176. American Petrofina
177. Mapco
178. White Consolidated Industries
179. Avco
180. Uniroyal
181. Jim Walter
182. Upjohn
183. Northwest Industries
184. Sherwin-Williams

185. Olin
186. J.P. Stevens
187. Ogden
188. Sterling Drug
189. Rohm & Haas
190. Cooper Industries
191. Baxter Travenol Laboratories
192. Baker International
193. SCM
194. Schering-Plough
195. Squibb
196. Superior Oil
197. Ethyl
198. Gould
199. Manville
200. Central Soya
201. Harris
202. Hershey Foods
203. Gannett
204. Union Camp
205. Emhart
206. Chesebrough-Pond's
207. A.E. Staley Manufacturing
208. Crown Central Petroleum
209. James River Corp. of Virginia
210. National Can
211. Pitney Bowes
212. Air Products & Chemicals
213. American Hoechst
214. Hammermill Paper
215. U.S. Gypsum
216. Cummins Engine
217. Corning Glass Works
218. Tribune
219. Colt Industries
220. General Signal
221. Koppers
222. Great Northern Nekoosa
223. Lever Brothers
224. Cabot
225. Pacific Resources
226. R.R. Donnelley & Sons
227. Wang Laboratories
228. AMP
229. Asarco
230. Alumax
231. Morton Thiokol
232. Westvaco
233. Joseph E. Seagram & Sons
234. Knight-Ridder Newspapers
235. Marmon Group
236. Lear Siegler
237. International Minerals & Chemical
238. Gold Kist
239. NL Industries
240. Armstrong World Industries
241. Geo. A. Hormel

242. PACCAR
243. Farmers' Union Central Exchange
244. Anderson Clayton
245. Witco Chemical
246. Zenith Radio
247. Mid-America Dairymen
248. Mattel
249. Stauffer Chemical
250. Monfort of Colorado
251. Johnson Controls
252. Mobay Chemical
253. Allis-Chalmers
254. Crown Cork & Seal
255. McGraw-Hill
256. Polaroid
257. Louisiana Land & Exploration
258. Blue Bell
259. Mack Trucks
260. Brunswick
261. National Semiconductor
262. West Point-Pepperell
263. Tektronix
264. Amstar
265. Black & Decker Manufacturing
266. Libbey-Owens-Ford
267. Hughes Tool
268. G. Heileman Brewing
269. Square D
270. National Gypsum
271. Norton
272. Intel
273. Becton Dickinson
274. International Multifoods
275. Federal Co.
276. Richardson-Vicks
277. Miles Laboratories
278. Adolph Coors
279. Louisiana-Pacific
280. VF
281. New York Times
282. BOC
283. U.S. Industries
284. Trane
285. BASF Wyandotte
286. Masco
287. Willamette Industries
288. CertainTeed
289. Parker Hannifin
290. Cyclops
291. Perkin-Elmer
292. Dover
293. Thomas J. Lipton
294. Crane
295. NVF
296. G.D. Searle
297. Chromalloy American
298. Stanley Works
299. Apple Computer
300. Phelps Dodge
301. Pennwalt
302. General Instrument

✓ 303. AMF
✓ 304. Hartmarx
305. Mitchell Energy & Development
✓ 306. Tyler
✓ 307. Cameron Iron Works
✓ 308. Ex-Cell-O
✓ 309. Hanson Industries
✓ 310. Timken
✓ 311. National Service Industries
✓ 312. General Cinema
✓ 313. Lone Star Industries
✓ 314. Clorox
✓ 315. Ball
✓ 316. Sundstrand
✓ 317. Potlatch
✓ 318. EG&G
✓ 319. Quaker State Oil Refining
✓ 320. Springs Industries
✓ 321. Fairchild Industries
✓ 322. Storage Technology
✓ 323. Washington Post
324. Lafarge
✓ 325. Cluett Peabody
✓ 326. Dow Jones
✓ 327. Clark Equipment
✓ 328. CF Industries
✓ 329. Fleetwood Enterprises
✓ 330. A.O. Smith
✓ 331. Harsco
✓ 332. Interlake
✓ 333. Dean Foods
✓ 334. Tecumseh Products
✓ 335. Data General
✓ 336. Brockway
✓ 337. CBI Industries
✓ 338. E-Systems
✓ 339. Vulcan Materials
✓ 340. Household Manufacturing
✓ 341. Avery International
✓ 342. Rexnord
✓ 343. Lubrizol
✓ 344. Outboard Marine
✓ 345. Todd Shipyards
✓ 346. Freeport-McMoRan
✓ 347. Fort Howard Paper
✓ 348. National Cooperative Refinery Assoc.
✓ 349. Anchor Hocking
✓ 350. Amdahl
✓ 351. Hoover Universal
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✓ 353. Kane-Miller
✓ 354. Champion Spark Plug
✓ 355. Dow Corning
✓ 356. Capital Cities Communications
357. Inspiration Resources
✓ 358. Varian Associates
✓ 359. National Starch & Chemical
✓ 360. Midland-Ross
✓ 361. Magic Chef
✓ 362. Reichhold Chemicals

✓ 363. Federal-Mogul
✓ 364. Sun Chemical
✓ 365. McCormick
✓ 366. Scovill
✓ 367. Fuqua Industries
✓ 368. NI Industries
✓ 369. American Greetings
✓ 370. Newmont Mining
✓ 371. Dayco
✓ 372. Gerber Products
✓ 373. Bemis
✓ 374. GAF
✓ 375. Smith International
✓ 376. Pabst Brewing
✓ 377. Frederick & Herrud
✓ 378. Collins & Aikman
✓ 379. Bell & Howell
✓ 380. Southwest Forest Industries
✓ 381. Insilco
✓ 382. Badische
✓ 383. Sonoco Products
✓ 384. Economics Laboratory
✓ 385. Big Three Industries
✓ 386. Figgie International Holdings
✓ 387. Hoover
✓ 388. Interstate Bakeries
✓ 389. Nalco Chemical
✓ 390. Joy Manufacturing
✓ 391. Stone Container
✓ 392. Harcourt Brace Jovanovich
✓ 393. Mohasco
✓ 394. Genesco
✓ 395. M/A-Com
✓ 396. Kaiser Steel
✓ 397. Scott & Fetzer
✓ 398. Idle Wild Foods
✓ 399. Dennison Manufacturing
✓ 400. Deluxe Check Printers
✓ 401. Ferro
✓ 402. MEI
✓ 403. Briggs & Stratton
✓ 404. Sybron
✓ 405. Sheller-Globe
✓ 406. Brown-Forman Distillers
✓ 407. Tyson Foods
✓ 408. Arvin Industries
✓ 409. Maytag
✓ 410. Coleco Industries
✓ 411. Armstrong Rubber
✓ 412. M. Lowenstein
✓ 413. Raychem
✓ 414. Wm. Wrigley Jr.
✓ 415. Sanders Associates
✓ 416. ACF Industries
✓ 417. Gulfstream Aerospace
✓ 418. Handy & Harman
✓ 419. Tyco Laboratories
✓ 420. Consolidated Papers
✓ 421. Kellwood
422. Smithfield Foods
✓ 423. Federal Paper Board

✓ 424. Bausch & Lomb
✓ 425. Rohr Industries
✓ 426. Nashua
✓ 427. AM International
✓ 428. Echlin
✓ 429. A.H. Robins
✓ 430. Michigan Milk Producers Association
✓ 431. Dexter
✓ 432. Dr Pepper
✓ 433. Cincinnati Milacron
✓ 434. Bucyrus-Erie
✓ 435. Fieldcrest Mills
✓ 436. H.H. Robertson
✓ 437. Westmoreland Coal
✓ 438. Bangor Punta
✓ 439. Nucor
✓ 440. Datapoint
✓ 441. Shaklee
✓ 442. Foxboro
✓ 443. Eagle-Picher Industries
✓ 444. Stokely-Van Camp
✓ 445. Cessna Aircraft
446. Flowers Industries
✓ 447. Sun-Diamond Growers of California
✓ 448. Universal Foods
✓ 449. Georgia Kraft
✓ 450. Oxford Industries
✓ 451. Prime Computer
✓ 452. Revere Copper & Brass
✓ 453. Media General
✓ 454. ROLM
✓ 455. Illinois Tool Works
✓ 456. Warnaco
✓ 457. Easco
✓ 458. Amsted Industries
✓ 459. Royal Crown Companies
✓ 460. American Bakeries
✓ 461. Savannah Foods & Industries
462. Roper
✓ 463. Coachmen Industries
✓ 464. United Merchants & Manufacturers
✓ 465. Trinity Industries
✓ 466. Rorer Group
✓ 467. Palm Beach
✓ 468. Guardian Industries
✓ 469. Ceco
✓ 470. International Flavors & Fragrances
✓ 471. Liquid Air
✓ 472. Cooper Tire & Rubber
✓ 473. Phillips-Van Heusen
✓ 474. Snap-on Tools
✓ 475. Worthington Industries
✓ 476. Cooper Labs
✓ 477. Prentice-Hall
✓ 478. Ametek
✓ 479. Meredith
480. Wisconsin Dairies Cooperative

✓ 481. Peabody International
✓ 482. Dorsey
✓ 483. Diebold
484. Holly
✓ 485. Harte-Hanks Communications
✓ 486. Bairnco
✓ 487. Rubbermaid
✓ 488. Hillenbrand Industries
✓ 489. Macmillan

✓ 490. Harvey Hubbell
✓ 491. Pittway
✓ 492. Oak Industries
493. H.B. Fuller
✓ 494. Sealed Power
✓ 495. Tracor
✓ 496. Moore McCormack Resources
✓ 497. Hyster
✓ 498. Riegel Textile
✓ 499. Masonite
✓ 500. Tandem Computers

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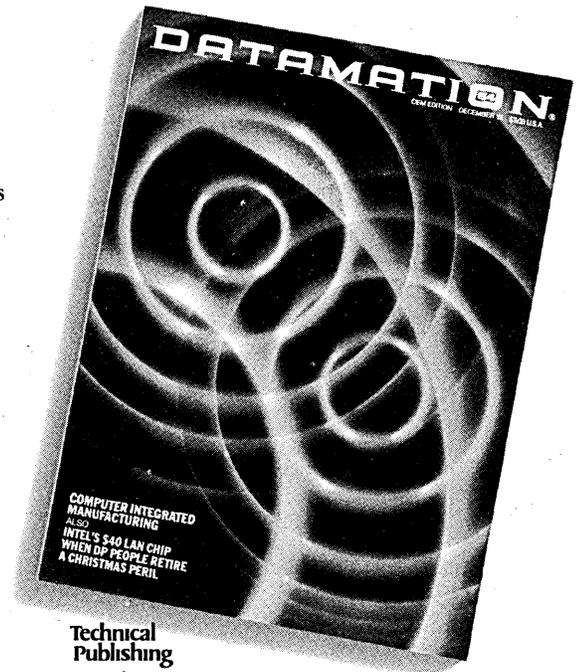
Technical
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ON THE JOB

AI'S WHERE IT'S AT

Business is booming and jobs are plentiful in the artificial intelligence arena. The current explosion in artificial intelligence is creating a demand not only for experts in this emerging field, but also for a variety of non-AI specialists, according to Halbrecht Associates, an executive employment agency. Competent people are especially needed by companies that are developing AI software products. Software engineering management, knowledge engineering, AI training, marketing, market support, technical writing, and government liaison are only some of the new job opportunities opening up in the AI field, notes Daryl Furno, a senior associate with the Stamford, Conn.-based company.

"Our firm has scarcely been able to keep up with the demand for top-rated AI experts themselves. . . and now, on top of that, there's a building demand for a broadening range of managerial and technical talent that has virtually exploded," comments Furno. She attributes this growth to the new generation of computers that has made applications of AI commercially possible.

Currently, almost 200 firms are working on AI, especially in the expert systems area, and on software to be used in geology, medicine, and finance. Now, says Furno, all of these companies want AI experts on their staff. Naturally, that means they need to hire support staffs and people in AI-related areas as well. "Most of the software and research companies in AI are startups, and they're still fleshing out their staffs," explains Furno. But people with AI-related experience are pretty hard to find because the industry itself is so young.

Though the opportunity to jump on the bandwagon and "make it" in the AI area is great, Furno cautions, "However enormous the potential, the market for AI products has yet to be tested. Most of the companies rushing headlong into the business are clearly not going to make it in the long run."

So, if you're contemplating a job in AI, Furno recommends you ask yourself a few questions first: does the company include top-notch senior people with some track record in the company's speciality? Is there a mix of business-oriented managers who know how to finance a venture and bring a product to market? Finally, does the company maintain an advisory board consisting of AI experts? Thank your lucky stars if you find a company that meets all the above criteria because, as Furno states, they are few and far between.

NOT EXACTLY "ON THE JOB"

Is your company's payroll getting out of hand? Perhaps your company is continuing to pay people they shouldn't. Unemployment compensation may be costing your firm big bucks. According to Automatic Data Processing Inc. (ADP), headquartered in Roseland, N.J., one out of every four people cashing unemployment checks shouldn't be. ADP's Unemployment Compensation Management Service, however, is now available to help companies prevent unwarranted claims and reduce their overall unemployment tax rate.

The unemployment tax is a controllable tax and ADP, which produces payrolls for over 125,000 companies, claims its service will help curb your company's costs. This tax is controllable because it is based on a company's experience; in other words, the more people the company is paying unemployment benefits to, the higher its unemployment tax. So, as part of its service, ADP will handle all claims, attend all unemployment hearings, monitor all benefit charges against an account, apply for relief from charges, review procedures, and suggest changes to prevent unwarranted claims. ADP will also provide management reports analyzing unemployment costs and trends within specific departments and other categories.

ADP has published an eight-page brochure highlighting its Unemployment Compensation Management Service. For a free copy of the brochure, or more information on how the service works, contact Automatic Data Processing Inc., Corporate Headquarters, MS #245, One ADP Blvd., Roseland, NJ 07068, or call 1-800-CALL-ADP .

THE HITCHHIKING ENGINEER

Do you know many engineers who have hitchhiked around the country, exploring differing ways of life, discovering fascinating people? According to Dr. L.S. Fletcher, newly elected president of the American Society of Mechanical Engineers (ASME), before beginning their first jobs, newly graduated engineers should investigate the nontechnical world around them. Speaking at the ASME annual meeting in Cincinnati, Fletcher encouraged engineers to pay more attention to the human dimension of engineering. "The increasingly complex world requires engineers who understand not only technology, but its impact on the world and the world's effect on technology," he said.

"All too often our BS graduates in engineering graduate one day and accept a position with industry the next day. Our PhD graduates sometimes commence teaching before they complete their degrees. There appears to be little if any exposure to our country or the world before embarking upon employment," explained Fletcher. An inquiring engineer wasn't Fletcher's only concern; he also stressed ethics and the importance of environmental awareness. "As a profession, we need to be concerned with ethics. We don't operate in a vacuum. We need to know how our actions affect others; we need to know how they affect the world. We need to know whether our engineering actions are good or bad for the environment."

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READERS' FORUM

GUILLOTINE REDUNDANCY

Did you hear about the computer operator, the programmer, and the database administrator who were to be guillotined? The operator was dragged to the block first. The executioner pulled the triplever but the heavy blade didn't fall. "A miracle!" the crowd shouted. So they set the operator free. Then the programmer was strapped into place. Again they yanked the trigger and the machine jammed. "Another miracle!" the crowd screamed frantically. So they released the programmer.

Finally the DBA was in position. The hooded headsman pulled the lanyard. The blade fell a fraction of an inch and jammed again. The crowd drew its collective breath to cry a third miracle when the database administrator shouted, "Wait, stop! I see the problem. There's a piece of wire snagged in the track! Pull it out and it'll work fine!"

About a year ago, after my lecture on the do's and don'ts of database administration, an attendee posed the following question: "We have four customer files: one for order entry, one for the credit department, and one each for shipping and accounts receivable. How many DBAs should we have?" I thought she was joking. So, going along with the gag, I chuckled, "None of course, since you don't have an integrated database!"

Nobody laughed.

You see, eliminating or avoiding redundant data is a primary goal of database administrators. Our job is to ensure that each entity (a customer, say) is on file only once, and that the data stored there are shared among all applications. Have you ever really thought about why? Consider two reasons for avoiding redundant data: they lead to inconsistency and they imply redundant data updaters.

According to the second law of thermodynamics, redundant data lead to inconsistency because that's simply the way nature works. Leaving out the math, the first law of thermodynamics says "You can't win." The second is "You can't even break even." Disorder, in other words, tends to increase. Real systems are imperfect and whatever mechanisms we use to keep two files in step will sometimes fail. The causes of specific failures (system crash, program bug, misunderstood procedure, etc.) are as countless as they are irrelevant. They happen and some are just not preventable. Inconsistencies gradually creep in (at a rate proportional to file volatility). Once entrenched, they are hard to detect, harder to eradicate.

I recall a firm that bought a highly touted canned general ledger application. One of its selling points was that although it enabled one to keep an "official" chart of accounts, it also al-lowed each cost center to tailor account names individually. Account 534 could be labeled "moving and living expenses" in one department's budget and "travel expenses" in another's. Within two years, it became impossible to produce meaningful companywide ledger statements. Each account number had dozens of descriptions. To one unit, account 534 meant salaries, to another it meant telephone charges, and a third used it for magazine subscriptions. The cost of straightening out the situation was staggering, and last I heard they were still at it.

The second reason to avoid redundant data—redundant data updaters—is more insidious. Redundancy means that two or more people must needlessly do the same job. Our challenge is that not everyone sees double effort as necessarily bad.

A firm with a chain of 480 restaurants had a scheme whereby unit managers reported sales volume to headquarters at the end of each day. Actually, they reported three ways. First, each manager telephoned sales figures to headquarters, where a battery of clerks wearing headsets filled out data entry forms. The manager also wrote up a form with the same data in a different format and mailed it to headquarters, where it was keyed as well. Then the manager filled out a third form (third layout) with the same data and held it for pickup by the district manager, who mailed it in after reviewing it.

At headquarters, separate groups of data entry clerks keyed the same data into three different applications. A fourth set of programs matched the other three to see that they all agreed.

"All you're picking up, by matching the three inputs," I told the user, "are the very transcription errors caused by the triple entry. If you eliminate two of the inputs it would ease the unit managers workload and reduce errors."

"I see," he replied, "but I prefer to do it this way."

"No, no!" I insisted. "Let me explain. If you get rid of two of the inputs, your job would also be easier. You wouldn't have to assign a group to resolve inconsistencies and we could eliminate dozens of programs in data processing."

"I heard you the first time," he informed me. "Please close the door on your way out."

"Wait a minute!" I pleaded desperately. "You don't understand! You could eliminate two out of three data entry groups, the reconciliation group, all their supervisors and overhead, and I could reassign two programmers. Look here," I exclaimed, "We could cut your department's budget in half and transfer elsewhere two thirds of the people who report to you!"

Pausing for breath, I absorbed the implication of what I'd just blurted out. "Oh," I squeaked, edging toward the exit.

"I understand perfectly," he hissed. "You're the one who doesn't. Goodbye." The door latch snapped shut like the click of a just-released guillotine blade.

—Frank Sweet
Jacksonville, Florida

READERS' FORUM

THE NETWORK COMES TO LIFE

The phones are ringing. Our computer's down
Since six a.m. In Little Rock it's eight
O'clock; out there a dozen clerks can't wait
For their reports. Chicago adds Jim Brown,
And so it goes along from town to town,
As quick as sunrise and as sure as fate,
Until at last dawn hits the Golden Gate
And San Francisco gives us one more clown
To swell the din. It only goes to prove
That progress has a price for us to pay.
Though former bounds and limits we transcend,
The future beckons at the next remove
Until we learn a lesson, as today
Two hundred people on one chip depend!

—Thomas A. Goldman
Bethesda, Maryland

CONFESSIONS OF A SWAP PROGRAMMER

I work as a systems programmer on a large IBM computer system. Whenever I try to explain to people just what I do for a living, they usually say, "Oh, you're a computer expert!"

Now, I'm not comfortable as an "expert." I know an "ex" is a has-been and a "spurt" is a drip under pressure. But people don't seem to mind and have no qualms about asking me what kind of computer to buy for their children or themselves.

To answer them I pull an old systems programmer trick out of my hat. I answer with another question: "What exactly do you want to use it for?" It turns out that most people have no idea what they want one for, but thanks to television advertising they have a vague notion that they will miss out on something important if they don't get one.

I do my best to convince them they don't need a computer. If they can talk me into changing my mind, then I know they know what they want to use it for and probably should get one. Then we can move our conversation on to the real hard stuff, like software. ("Yeah, I've heard of that. Like Macintosh?")

But for most people a computer is a solution without a problem (SWAP), and for some, it can be a costly mistake.

I've been seeing program listings ("Free!") in the popular trade magazines lately that remind me of SWAPs. But I muffle my snorts of snobbish disgust at these simplistic programs when I remember, not so long ago, all things computerish were gibberish to me; when my first assembly language program came back from the printer, it had more syntax errors than program lines.

I admit that there probably are a few people who see a sparkling ray of sunshine in these simple programs. But never would I stoop so low myself.

About a week ago, I noticed that I'd accumulated some 60 or 70 disks for my Apple IIe system, and I was having trouble finding and remembering what was on all of them. I figured I could write a handy BASIC program that would maintain a file of disk contents, so that when I wanted to show off ("Just what

exactly does that thing do, anyway?") I could reach for the appropriate demonstration disk with unerring accuracy.

Planning began in earnest. There would be an Applesoft program to read and write the file, with a separate section to input, change, and print labels. Oh yes, I can keep the label information for each disk in the file on disk—sort of poetic justice.

Of course, I'll need to keep a complete list in the file of all the files on each disk. That means there can be a machine language program to read the DOS 3.3 catalogs directly and communicate the file names back to the Applesoft program, one at a time. I can use some routines from "Beneath Apple DOS" to read the catalog.

And what about ProDOS? Golly, it begins to boggle the mind. I can use a program I saw in "Nibble" a few months ago to read the ProDOS catalog. Then my program can work under both ProDOS and DOS 3.3.

Hey, this is beginning to sound like fun! And it shouldn't take me more than a couple of weeks of programming time.

You more astute readers might be beginning to see past the rosy glow of system design to the harsh light of the real world. It didn't sink in, at first.

But being essentially lazy, I started thinking of easier ways to get this same job done. ("What exactly do you want to use it for?") Besides, I didn't have the two weeks in which to do the programming.

The first thing to go was the machine language catalog reader—although it sounded like fun. Why don't I just do a CATALOG to my printer for each disk? I could get a notebook from the store for 89 cents, and keep each disk's CATALOG on a separate page. I'd have lots of room for random notes on the side of each page.

Then I could print off the labels from my disk file and stick one on top of each page of my notebook. But wait, why don't I just use the label program I already have for that and . . . but wait again, why don't I just handwrite title information on each page? It would take me less time than the programming.

At this point in my musings I stopped. I looked over my three pages of notes, flowcharts, file layouts, and sample DIM statements. I felt my face reddening: I had a SWAP!

There was no reason in the world for me to spend two weeks coding my program, when instead I could take my dollar down to the store and spend it plus an hour or so writing down all this information.

I don't have to worry abut ProDOS or DOS 3.3 either: if the disk boots, the correct DOS will already be there. If I can't do a CATALOG, then my machine language program probably wouldn't work either.

Oh sure, I could stick a disk into my drive and let my program read it and update its own records. But it's a lot simpler and cheaper just to leave the computer out of it. If I had hundreds or thousands of disks, something like my program would make more sense. So would a secretary.

But without a program, when I search for "just the right disk" to impress my cousin the used car salesman, I can whip out my notebook and fan the pages. He doesn't have a computer, so he could never read my disk file anyway.

Come to think of it, this could be a great way to spread the gospel of computers to nonbelievers. When "normal" humans want to browse in my library, they can hold my "card catalog" in their hands, and flip the pages, without getting peanut butter or automobile grease on my disks.

Say, that's not a bad idea. Maybe I could borrow my wife's recipe box and use real cards to record this information. Then I could put all this into my card file database program, and . . . oops, I think this is where I came in!

—Joseph Larson
Stevens Point, Wisconsin

Get Ahead of the Gang