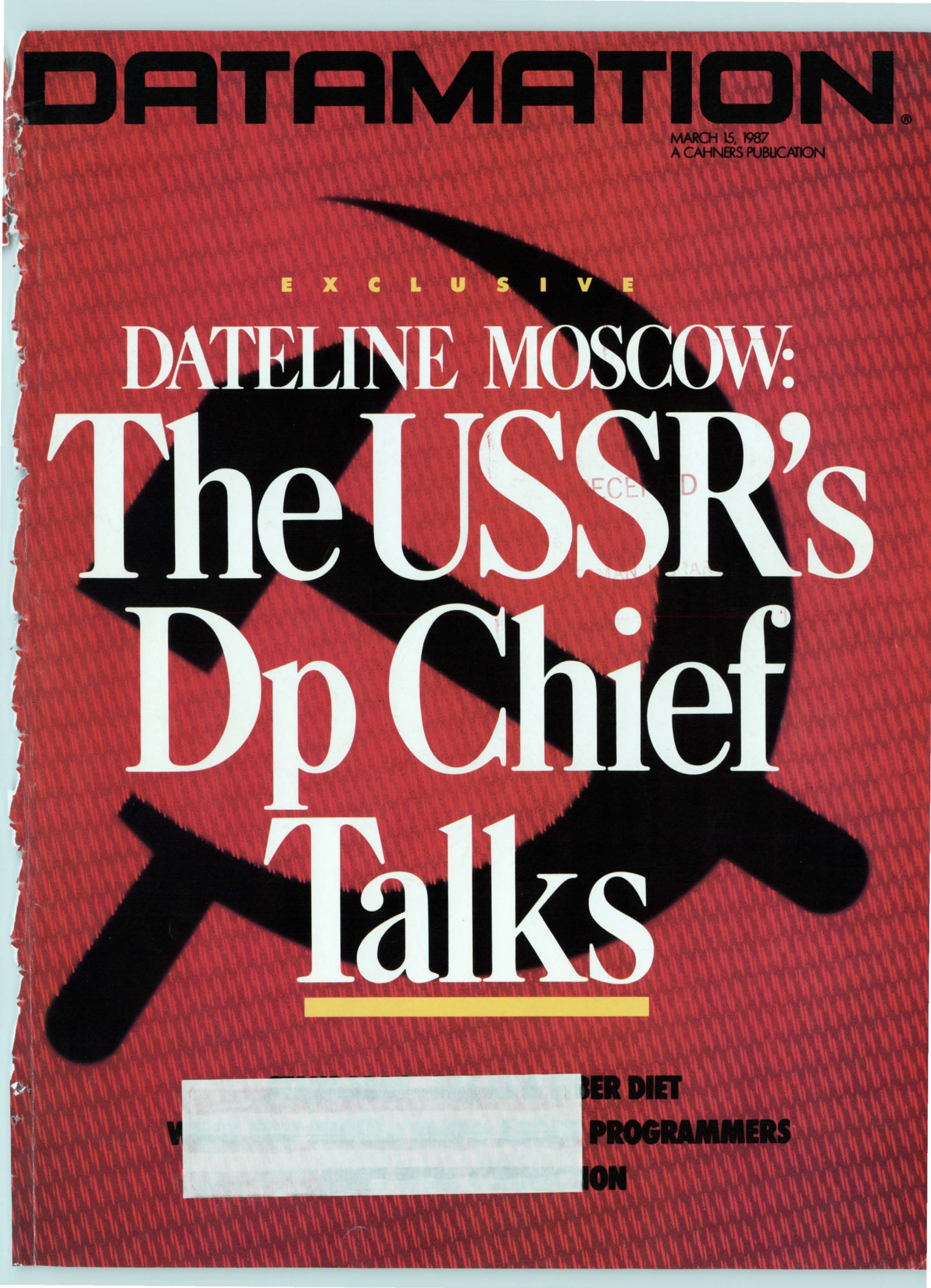
DATAMATION®
MARCH 15, 1987
A CAHNERS PUBLICATION



EXCLUSIVE

DATELINE MOSCOW: The USSR's Dp Chief Talks

[redacted]BER DIET

[redacted]PROGRAMMERS

[redacted]ION

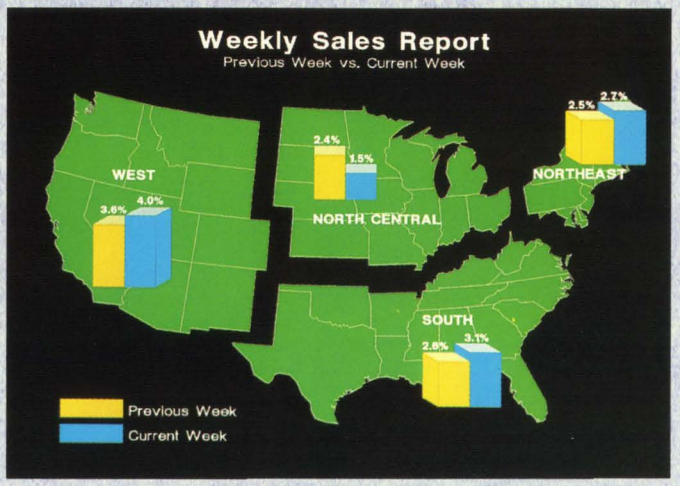
THE SAS® SYSTEM

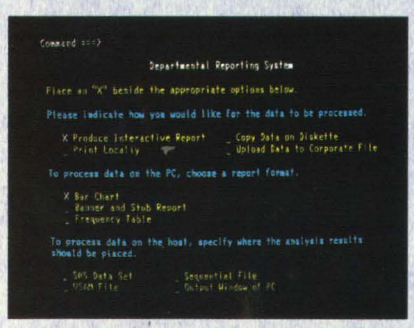
Your Fourth Generation Blueprint for Productivity

To build Information Center productivity, you need software that responds to your changing business needs. It's yours with the SAS System.

Built-in Applications. Handle today's requests (and stay ahead of tomorrow's) using integrated procedures for data management, statistical analysis, reports, quality control, custom graphs, spreadsheets, and more.

The SAS System lets you tailor front-ends for all your applications. Your entire company can run sophisticated reports and analyses, make management forecasts, track sales leads, and produce stacks of "personalized" letters...just by filling in the blanks. The menus make it simple and on-line help is always available.





Do-it-Yourself Tools. But don't confuse ease of use with lack of power. The SAS System gives you a powerful fourth generation programming language—complete with tools for computer performance, matrix programming, and applications development.

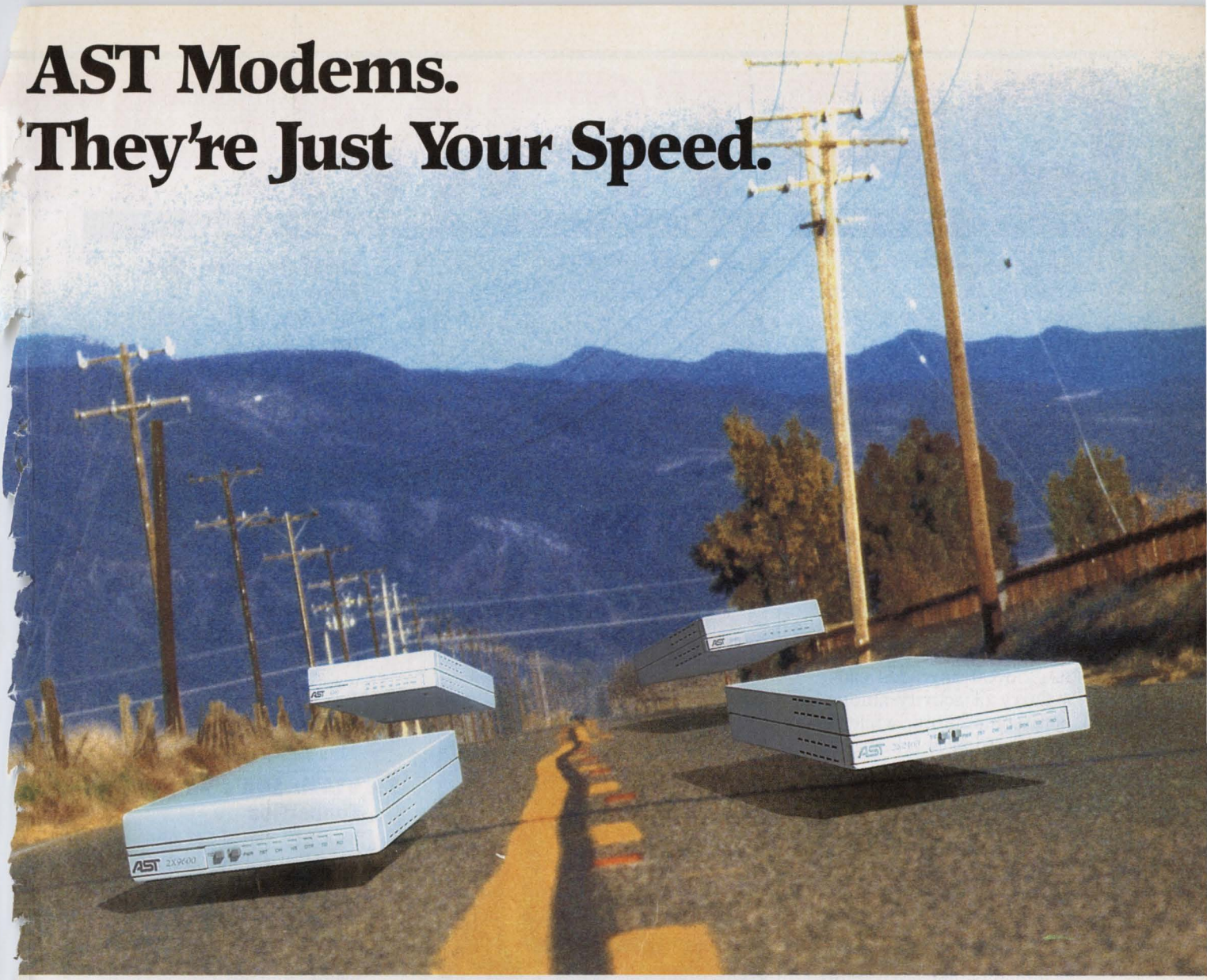
What's more, you can put the SAS System to work on your mainframe, minicomputer, or desktop PC. The language and syntax are the same. And the same high quality we bring to software goes into our training, documentation, and technical support.

See for yourself how the SAS System builds productivity. Just give us a call for a closer look at the blueprint.

The SAS System runs on IBM 370/30xx/43xx and compatible machines under OS, TSO, CMS, DOS/VSE, SSX, and ICCF; Digital Equipment Corp. VAX™ 8600 and 11/7xx series under VMS,™ and MicroVAX II™ under MicroVMS;™ Prime Computer, Inc. Prime 50 series under PRIMOS;® Data General Corp. ECLIPSE® MV series under AOS/VS; IBM AT/370 and XT/370 under VM/PC; and IBM PC AT and PC XT under PC DOS. Not all products are available for all operating systems.

SAS Institute Inc.
SAS Circle, Box 8000
Cary, NC 27511-8000
Phone (919) 467-8000
Telex 802505

AST Modems. They're Just Your Speed.



AST introduces a new family of standalone and internal PC modems designed for the way you work.

Whether you're shopping for a state-of-the-art, high-speed 19.2K bps modem with error correction; a low-cost 1200 bps, Hayes™ compatible modem loaded with features…or, anything in between…AST has just your speed.

AST's new modem family includes 1200, 2400, 4800 and 19,200 bps modems in both standalone (synchronous and asynchronous) and internal PC (asynchronous) models.

Fast and and Reliable.

The AST-2X9600™ standalone and AST-2X9600™ internal PC modems save thousands of dollars per year in telephone-line charges when used for intensive, high-volume file transfer applications. Fast, 19,200 bps speed is achieved using the industry standard MNP™ data compression. While data integrity is assured with MNP error correction.

For less intense applications, the AST-2X2400™ and AST-2X2400B™ provide data compression and error correction at speeds up to 4800 bps.

Low-Cost, Hayes-Compatible.

The AST-1200™ and AST-1200B™ provide reliable, 1200 bps dial-line communications for a variety of applications, including popular interactive and bulletin-board services.

Faster, yet price competitive with many 1200 bps modems, are AST's two 2400 bps modems—AST-2400™ and AST-2400B.™ They're the right solutions for a mix of interactive applications and low-volume file transfers.

Ask for AST modems by name. Visit your local, authorized AST dealer and compare AST modem prices and features. There's an AST modem just your speed.

Send today for AST's helpful Modem Selection Guide. It'll help you select the modem that's right for your particular application. For your free copy of this guide send the attached coupon to AST Research, Inc., 2121 Alton Ave., Irvine, CA 92714-4992, Attn. M C or call **(714) 863-1480**.

AST®
RESEARCH INC.

Yes! Send me information on AST Modems today!

Name_____

Title_____

Company_____

Address_____

City/State/Zip_____

Telephone_____

3/15/87

Send to: AST Research, Inc., 2121 Alton Ave., Irvine, CA 92714-4992, Attn: M C

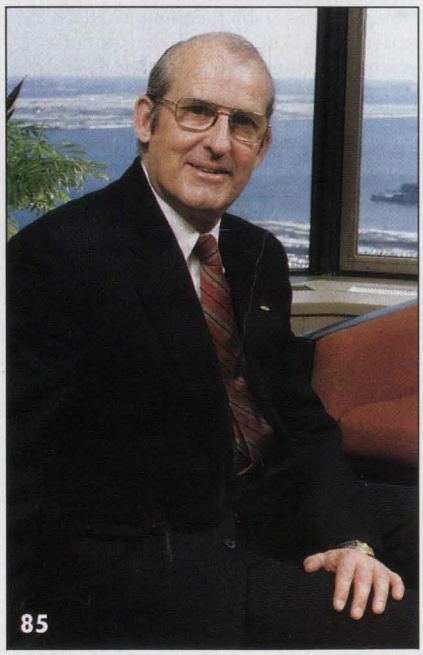
DATAMATION

NEWS

FEATURES

60


69


85

ION

DEPARTMENTS

OEM EDITION 56-1

Does not appear in all editions

Cover Photograph by
Peter Angelo Simon

OEM EDITION

MARCH 15, 1987
VOLUME 33
NUMBER 6
THIS ISSUE, 193,145 COPIES

Editorial

Time for a Second Move

It was almost two years ago when we first requested an interview on Soviet soil with the dp chief of the USSR. It was little more than two months ago that our interview was approved. When international editor Paul Tate arrived in Moscow on Jan. 19, it was during the Soviets' coldest winter of the century.

But his reception was warm. He left London hoping to get a reasonable answer to his toughest question: how do you introduce mass computerization into a closed society? He returned with an answer: the Soviet Union is not as closed as it once was. That's a start. What's more, he met with a man who seems more scientist than politician.

It's easier to oppose an ideology than it is to oppose a person.

The granting of our interview can only be seen as one more step in a series signaling the start of openness in Soviet society. Soviet leader Mikhail S. Gorbachev's latest moves toward a greater "democratization" are long overdue. For the once-censored "Doctor Zhivago" to be serialized by the Soviets next year somehow makes more sense than ABC's recent airing of the mini-series "Amerika."

We applaud the Soviets' respect for DATAMATION. Their government made it clear that it expected no less than fair and equitable treatment of its views on East-West trade in computers. Fair and equitable is our story, "Opening Moves" (p. 43).

But in the interest of fairness, we must now make a "second move" as a magazine. We must state our position on the eastward flow of technology. Our original question has grown: now we ask, can computers help open a closed society? Our answer is, yes; let's sell the Soviets personal computers. The use of pcs serves to accelerate an open society. They foster individual freedoms, not government control. We can help speed the democratization of the East without mortgaging the future of the West.

But trade beyond pcs is a subject for debate by those well versed in computers as well as national security. Computers, after all, are at the core of every government's defense strategy.

And Boris Nikolaevich Naumov, after all, is only part scientist. ■

REBECCA S. BARNA
EDITOR

DATAMATION

Editor-in-Chief George R. Davis
Editor Rebecca S. Barna
Senior Editor Linda Runyan
Managing Editor Parker Hodges
Assistant Managing Editor Florence Lazar
Senior Writers John W. Verity, Ralph Emmett Carlyle
News Editor David R. Brousell
International Editor Paul Tate
New Products Editor Theresa Barry
Copy Editor Eric Brand
Associate News Editor Karen Gullo
Assistant Features Editor Stephen G. Davis
Assistant Copy Editor Steven Korn
Assistant Editor Mary Kathleen Flynn
Editorial Assistant Karen J. Scher
Editorial Secretary Sheila D. Maddox
Bureau Managers
Boston Gary McWilliams
Dallas Robert J. Crutchfield
Los Angeles Edith D. Myers
San Francisco Jeff Moad, Susan Kerr
Tokyo Robert Poe
Washington Willie Schatz
Technology Editor, Europe Fred Lamond
Associate Editor, Europe Sarah Underwood
Editorial Assistant, Europe Lauren D'Attilo
Foreign Correspondents James Etheridge, Paris; Norman Kemp, Sydney
Oem Correspondent Tom McCusker

Art Director Kenneth Surabian
Assistant Art Director Cheryl Storti
Production Editor Susan M. Rasco
Art/Production Assistant Renée Nied

Contributing Editors Laton McCartney, Hesh Wiener
Advisory Board Lowell Amdahl, Philip H. Dorn, Joseph Ferreira, Bruce W. Hasenyager, David Hebditch, John Imlay, Irene Nesbit, Angeline Pantages, Robert L. Patrick, Malcolm Peltu, Russell Pipe, Carl Reynolds, F.G. Withington

Publisher James M. Morris
Operations Manager Donna O'Meara
Director of Marketing Laurie Schnepf
Production Manager Dollie Viebig
Circulation Vice President Joseph J. Zaccaria
Circulation Manager Mary Agnes Glenister

EDITORIAL OFFICES
Headquarters: 875 Third Ave., New York, NY 10022. Phone (212) 605-9400; telex 429073. **New England:** 199 Wells Ave., Newton, MA 02159, (617) 964-3730; **Washington, D.C.:** 4451 Albemarle St. NW, Washington, DC 20016, (202) 966-7100; **Central:** 9330 LBJ Freeway, Suite 1060, Dallas, TX 75243, (214) 644-3683; **Western:** 12233 West Olympic, Los Angeles, CA 90064, (213) 826-5818; 2680 Bayshore Frontage Rd., Suite 401, Mountain View, CA 94043, (415) 965-8222. **International:** 27 Paul St., London EC2A 4JU, England, 44-1-628-7030, telex 914911; 3-46-10 Sekimachi-Kita, Nerima-ku,Tokyo 177, Japan, 81-3-929-3239.

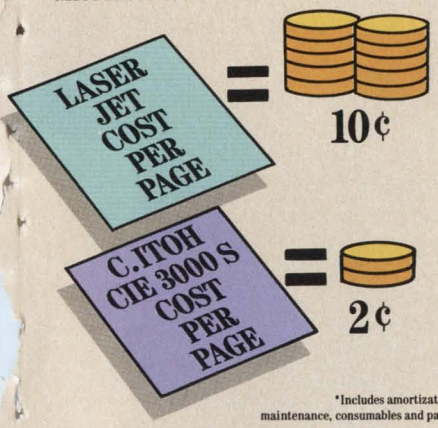
DATAMATION (ISSN 0011-6963) Magazine is issued twice monthly on the 1st and 15th of every month by The Cahners Publishing Company, A Division of Reed Publishing USA, 275 Washington St., Newton, MA 02158-1630. William M. Platt, President; Terrence M. McDermott, Executive Vice President; E.V. Burkholder, Group Vice President; Jerry D. Neth, Vice President/Publishing Operations; J.J. Walsh, Financial Vice President/Magazine Division; Thomas J. Dellamaria, Vice President/Production and Manufacturing. Editorial offices, advertising and subscription departments, 875 Third Ave., New York, NY 10022. Published at East Greenville, Pa. Annual subscription rates: U.S. and possessions: $55; Canada: $75; Japan, Australia, New Zealand: $145 air freight; Europe: $130 air freight, $235 air mail. All other countries: $130 surface, $235 air mail. Reduced rate for qualified U.S. students, public and school libraries: $40. Single copy: $3 in U.S. Sole agent for all subscriptions outside the U.S. and Canada is J.B. Tratsart, Ltd. 154 A Greenford Road, Harrow, Middlesex HA13QT, England, (01)422-8295 or 422-2456. No subscription agency is authorized by us to solicit or take orders for subscriptions. Second-class postage paid at New York, NY 10001 and at additional mailing office.

Printed by Brown Printing Co. POSTMASTER: send address changes to DATAMATION, 875 Third Ave., New York, NY 10022.

ABP ABC VBPA

FREEDOM OF EXPRESSION AT REVOLUTIONARY PRICES.

With the new CIE 3000 S Ion Deposition Printer, freedom of expression is yours at last. Now, it's easy to print electronic forms overlaid with your data, on-site. And at only 2 cents a page, it's affordable too.*



*Includes amortization, maintenance, consumables and paper.

Flexible electronic forms. On demand. Printing invoices or statements—even multiple form sets in different sequences—is a snap. The CIE 3000 S can store up to six pages of electronic forms and print faster and cheaper than other methods.

By creating and modifying electronic forms, you virtually eliminate the high cost of stocking and keeping inventory of preprinted forms.

Not to mention being able to update and instantly print documents as you need them. Now, one small change won't mean your entire stock of forms ends up in the trash.

And with our array of multiple fonts and point sizes, plus proportional spacing, your company's documents will look like they were typeset and printed at great expense. But cost a great deal less.

Our printer manages up to 32 fonts on one page, with practically no limitation on font size. You can choose from 8 standard fonts—and add 24 optional ones—for your electronic forms and correspondence.

Express yourself. We give you a lot of artistic license. Our graphic arts features include line drawing, shading, reverse type and bit-mapped graphics—all the tools you need to print attractive forms. Even add logos and signatures for a personalized appearance.

Non-stop technology from C.Itoh. Ion deposition printing is durable and dependable. A revolutionary four-step printing process with few moving parts. This means very low monthly maintenance costs. In fact, about half what it takes to keep a laser printer going.

At a fast 30 pages-per-minute, it can print 20,000, 50,000 or as many as 150,000 pages a month, to keep you operating virtually non-stop.

	HP LaserJet	C.Itoh CIE 3000 S	XEROX 9700
Print Speed	8 ppm	30 ppm	120 ppm
Monthly Recommended Volume	3,000 pages	150,000 pages	1,300,000 pages
Engine Life	100,000 pages	5,000,000 pages	78,000,000 pages
Purchase Price	$2,995	$16,995	$313,635
Cost Per Page	$.1040	$.0212	$.0207

The CIE 3000 S uses plain bond paper in letter and legal sizes and form lengths from 7 to 14 inches. What's more, the CIE 3000 S is fully compatible with IBM and DEC, as well as a variety of other host systems.

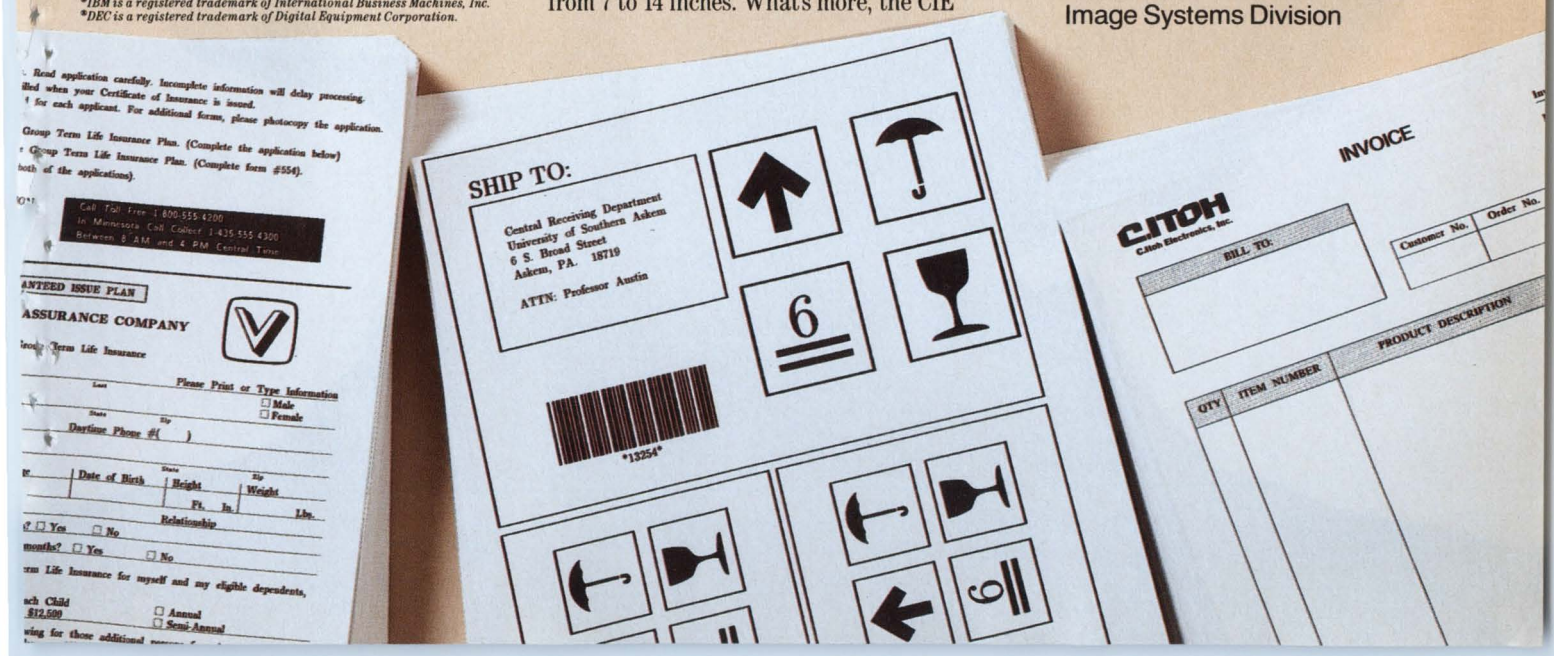
Of course, C.Itoh offers nationwide service, with several on-site service plans to choose from, as well as an end-user support staff.

So, go ahead. Express yourself. Call or write C.Itoh today at (213) 327-9100. Phone toll-free at 1-800-843-6143. In California, call 1-800-323-2024. TELEX: 652-451. TWX: 910-343-7446. 19300 So. Hamilton Ave., P.O. Box 9116, Torrance, CA 90508-9116.

CIRCLE 7 ON READER CARD

C.ITOH
Image Systems Division

*HP LaserJet is a trademark of Hewlett-Packard Inc.
*Xerox 9700 is a trademark of Xerox Corporation.
*IBM is a registered trademark of International Business Machines, Inc.
*DEC is a registered trademark of Digital Equipment Corporation.



In the new world of the IBM Token-Ring network it's nice to see an old familiar face.

The Token-Ring LAN is a reality. It shouldn't surprise you that IBM® was the company that developed it. It should be equally unsurprising that the technology that best allows the Token-Ring to communicate with the mainframe comes from DCA, the makers of IRMA.™

Introducing IRMALAN.™

IRMALAN is a new family of software and hardware products that can exploit the full power of PCs on the Token-Ring and other NETBIOS-compatible LANS: IRMALAN SNA Workstation™ is software that provides the PC with the 3270 functionality of IRMA; IRMALAN APA Graphics Workstation™ transforms a PC on a LAN into a mainframe graphics workstation. It can also store, print, plot and redisplay graphs right at the PC.

The IRMALAN family includes gateways that connect Token-Ring networks to both DFT controllers and SDLC communication lines.

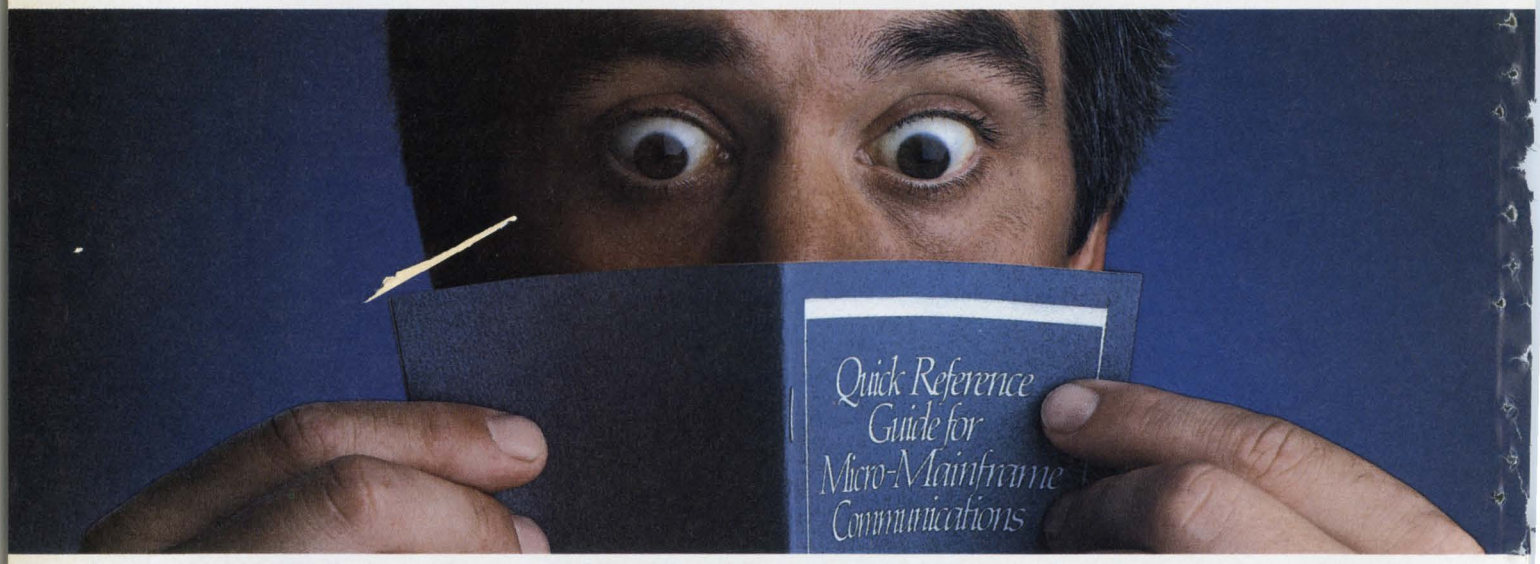
Best of all, IRMALAN can do all that with the ease and simplicity of IRMA. Which means your users can feel as comfortable working with IRMALAN now as they have been working with IRMA.

To find out more about DCA's IRMALAN, call us today at 1-800-241-IRMA, ext. 507.

dca®

CIRCLE 8 ON READER CARD

HERE'S HELP



Attachmate has answers to your questions about micro-mainframe communications. Hardware answers, software answers and now a guide packed full of answers to some important questions—questions worth asking *before* you make long-term decisions.

What should you know about IBM® standards, multiple sessions, windows, file transfer, API, and graphics?

You'll find the answers and solutions in Attachmate's *Quick Reference Guide for Micro-Mainframe Communications*—with a chart comparing IBM, IRMA®, and Attachmate. For a free copy, call toll free:

1-800-426-6283

Attachmate

Micro-Mainframe Technology: We put our heart in it!
Attachmate Corporation
3241 118th S.E., Bellevue, WA 98005
(206) 644-4010

CIRCLE 9 ON READER CARD

Look Ahead

AH, FINALLY SPECTRUM IN BETA

PALO ALTO -- The long wait may finally end this month for Hewlett-Packard Co. Insiders say the company this month will place first beta units of its RISC-based Spectrum 930 system into a handful of U.S. customer sites, a month earlier than HP had indicated last fall. Following right on the 930's heels into beta will be the higher-performance Series 950--provided that system passes its next major milestone: its first manufacturing run-through.

GIVING THE NOD TO TOLERANT

SEOUL, SOUTH KOREA -- The Korean government looks set to select superminicomputers from Tolerant Systems Inc., San Jose, for its $176 million National Administration Information System (NAIS). In the first stage of the project, which runs until 1989 and is designed to improve the country's computer technology, 100 superminis will be manufactured in South Korea under license. A further 10,000 workstations for NAIS will be procured locally. The second phase of the project calls for the development of a Korean sourced and manufactured supermini by the early 1990s. This system will be based on Tolerant technology.

THIRD LAYOFF AT SYTEK

MOUNTAIN VIEW, CALIF. -- Sytek Inc. has laid off 46 workers, its third such action in 15 months. The move, which leaves the communications company with approximately 450 employees, occurred "because we didn't make all our revenue projections," a spokesman says.

NEW ROADS FOR THE MAC

PITTSBURGH -- Now that Apple has introduced versions of its Macintosh personal computer with expansion slots, the inclusion of the Mac into standard networks such as Ethernet and token ring is a step closer. Publicly, Apple announced plans to ship an Ethernet card that supports the TCP/IP protocol as part of its Unix option for the Macintosh II; behind the scenes, Apple is helping to finance development of a Macintosh-to-token-ring connection at Carnegie-Mellon University. The university has already developed hardware and software that tie a Macintosh on the Appletalk network to token ring via Ethernet. Current work is focused on incorporating a token ring card directly into the Macintosh. Completion of that effort is probably a year away, after which Apple hopes a third-party house will market the product.

STRIKE UP THE BAND

WESTWOOD, MASS. -- Cullinet Software Inc. hopes to drum up interest March 31 in two recently acquired products for DEC VAX and IBM mainframe markets through a series of video conferences. The product parade in-

cludes a preview of the DEC VAX database to be available in September, IDMS/D, and formal release of two PC-based products: IDMS Architect for designing IDMS/R mainframe databases, and Implementation Workbench, a tool for working with Cullinet's mainframe-based manufacturing software.

THE RACE FOR ERASABLES

TOKYO -- The race to introduce erasable, rewritable optical disks is on. Sumitomo Chemical and Sumiomo Metal Mining will begin joint production of optical magnetic disks at one of the metal company's factories by the end of this year. Initial production targets are for 100,000 disks per year, increasing to 1 million at full capacity. Competition will come from Idemitsu Petrochemical Co., which moved aggressively into the electronic materials field last year. It is skipping the memory-only optical disk market to go to production of semifinished rewritable disks.

MSA EYES THE VAX

ATLANTA -- Success is certainly contagious. Just about everyone, it seems, wants to get in on the joyride Digital Equipment Corp. is having these days. So it comes as little surprise to learn that Management Science America Inc., which made its name selling applications for the IBM mainframe, has turned its considerable attention to the VAX market, particularly in the manufacturing realm. You'll recall MSA stuck its big toe in the market last year when it acquired Information Associates, Rochester, N.Y., which develops Digital-based and IBM-based software for colleges and universities. But now high-ups tell us that MSA has a plan for its new manufacturing software company (formed following the acquisition of Comserv Corp., Minneapolis, earlier this year) to offer products in this area. Stay tuned for details on exactly what and when.

NOT SO SWIFT AFTER ALL

LA HULPE, BELGIUM -- Introduction of the SWIFT II banking network has been delayed until the second quarter of 1988--two years behind schedule and well over the initial $70 million budget. A date for the cutover to the new network will be fixed by a Society for Worldwide Interbank Financial Telecommunication (SWIFT) board meeting in June. Until then, the 1,361 banks that use the network to exchange 900,000 messages a day will be dependent on the existing SWIFT I net. Problems dogging development of SWIFT II include extending the on-line message recovery facility from two weeks to four months. The introduction of SWIFT II--which will not only have a higher capacity but

ARBITER VENTS PEER-TO-PEER PRESSURE

The Micro/ Mainframe Cooperative Processing Software Solution.

The pressure is mounting to integrate hundreds of increasingly more powerful PCs into existing networks. Networks with teleprocessing subsystems originally designed to support terminals.

Application backlogs have created pressure to provide advanced program communications between intelligent processors using current and next-generation languages and data bases.

There's pressure between peer groups in organizations to use their own mainframe- or PC-based tools.

And there's even pressure on companies to make strategic connectivity decisions given the myriad temporary link fixes on the market and the promises of future deliverables from a single vendor.

The answer to peer-to-peer pressure is peer-to-peer communications. The answer is Arbiter.™

Arbiter is a VTAM-based cooperative processing subsystem which was designed to integrate mainframes and microcomputers as peers. As a VTAM subsystem, Arbiter is capable of supporting hundreds of PCs simultaneously with higher data transfer rates and lower system overhead than CICS- and TSO-based approaches Fully SNA-compatible, Arbiter not only improves the performance of existing networks with LU 2 devices, but, by design, is compatible and performs optimally with LU 6.2.

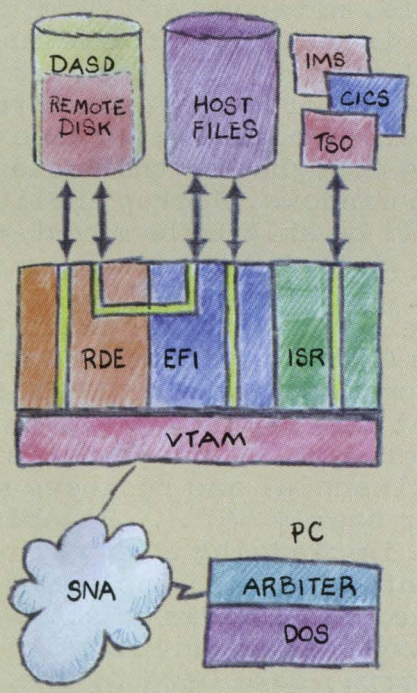
Arbiter's advanced file transfer facilities include application program interfaces (APIs) to existing COBOL, PL/I, Pascal and Assembler applications, and a general-purpose External File Interface utility. In addition, Arbiter delivers total end-to-end communications between 4GL and data base extraction packages (eg, SAS®) and PC tools like Lotus 1-2-3® and dBASE II® and III.®

Data transfers may be interactive or batch, in both directions, directly or through remote disks using familiar PC DOS commands. Arbiter's dynamic management of VSAM data sets and a more efficient VTAM-based transport vehicle result in a superior implementation of the virtual disk concept.

Arbiter addresses major security considerations by complete integration with RACF, CA-TOP SECRET™ and ACF2®. Arbiter also generates SMF records to provide information for accounting, auditing, and network and CPU performance measurement. Arbiter allows control of the micro/mainframe environment based on an organization's policy rather than technical product limitations.

Since its introduction, Arbiter has been installed in blue chip Fortune 500 corporations, large government agencies and major service organizations. The results have been impressive. Better than 50% CPU overhead savings vs. CICS-based links and file transfers up to 10 times the speed of CICS- and TSO-based products.

So, to find out why Arbiter is without peer, call Tangram Systems Corporation today at **(919) 481-4444.** Ask about putting Arbiter to work immediately with a trial evaluation.



Arbiter's cooperative processing architecture: The Remote Disk Environment (RDE) provides a seamless interface to remote disks on the host. The External File Interface (EFI) transfers data to and from files on the host. The Interactive Session Relay (ISR) connects a PC to another mainframe subsystem simultaneously.

TANGRAM SYSTEMS CORPORATION

Tangram Systems Corporation
118 MacKenan Drive, Suite 100
P.O. Box 5069
Cary, NC 27511-1999
(919) 481-4444

Arbiter is a registered trademark of Tangram Systems Corporation. Other names identified by ® or ™ are registered trademarks and/or tradenames of their respective manufacturers.

CIRCLE 10 ON READER CARD

Look Ahead

	also support new applications--has already been pushed back once because of late delivery of networking software from Burroughs.
HOW GREEN WAS AMDAHL'S VALLEY	SUNNYVALE, CALIF. -- One of Silicon Valley's early success stories, Amdahl Corp., plans to look for greener pastures when next it comes time to expand its manufacturing operations. Although Amdahl doesn't expect to need more space for at least another two years, when expansion is required it will be outside the valley. Amdahl headquarters will stay where they are. No decision has been made on where the manufacturing expansion will take place. In deciding to expand outside the valley, Amdahl is emulating its majority shareholder Fujitsu Ltd., which two years ago set up a disk manufacturing operation in Oregon.
WINDOWS ON MAINFRAMES	LOS ANGELES -- Pop-up windows, popular on micros, will be available to mainframe users with a software product under development at Trax Softworks Inc. Called Saint (for spreadpad, appointment calendar, index card file, notepad, and terminal print utility), the package is scheduled for release in the fourth quarter and will operate with the firm's ESS electronic spreadsheet product for mainframes and/or its mainframe word processing package EdWord, or by itself. It is being designed so that data will be interchangeable between windows. Backup applications screens and windows will be able to be moved, changed in size, overlapped, or highlighted with a single keystroke.
RUMORS AND RAW RANDOM DATA	With the acquisition of ISSCO (Integrated Software Systems Corp.) by Computer Associates, Garden City, N.Y., complete and with ISSCO now part of CA's enlarged Applications Product Division, development of interfaces between ISSCO's graphics packages and the parent firm's financial and business software are either finished or nearly so. . . . Bluebird Systems, Carlsbad, Calif., is readying a bevy of new products for early April introduction, including a package that makes it possible for 49 users to share a single IBM AT, and something the company is calling SuperBoard/386. . . . Unify Corp., Lake Oswego, Ore., is planning to go public within the next year, following in the footsteps of Oracle Corp. and Informix Software Corp., leaving Relational Technology Inc., Alameda, Calif., as the only one of the Big Four RDBMS rivals in private hands. Unify, which claims 50% of all Unix RDBMS licenses sold worldwide, says that a listing will raise its profile rather than extra working capital.

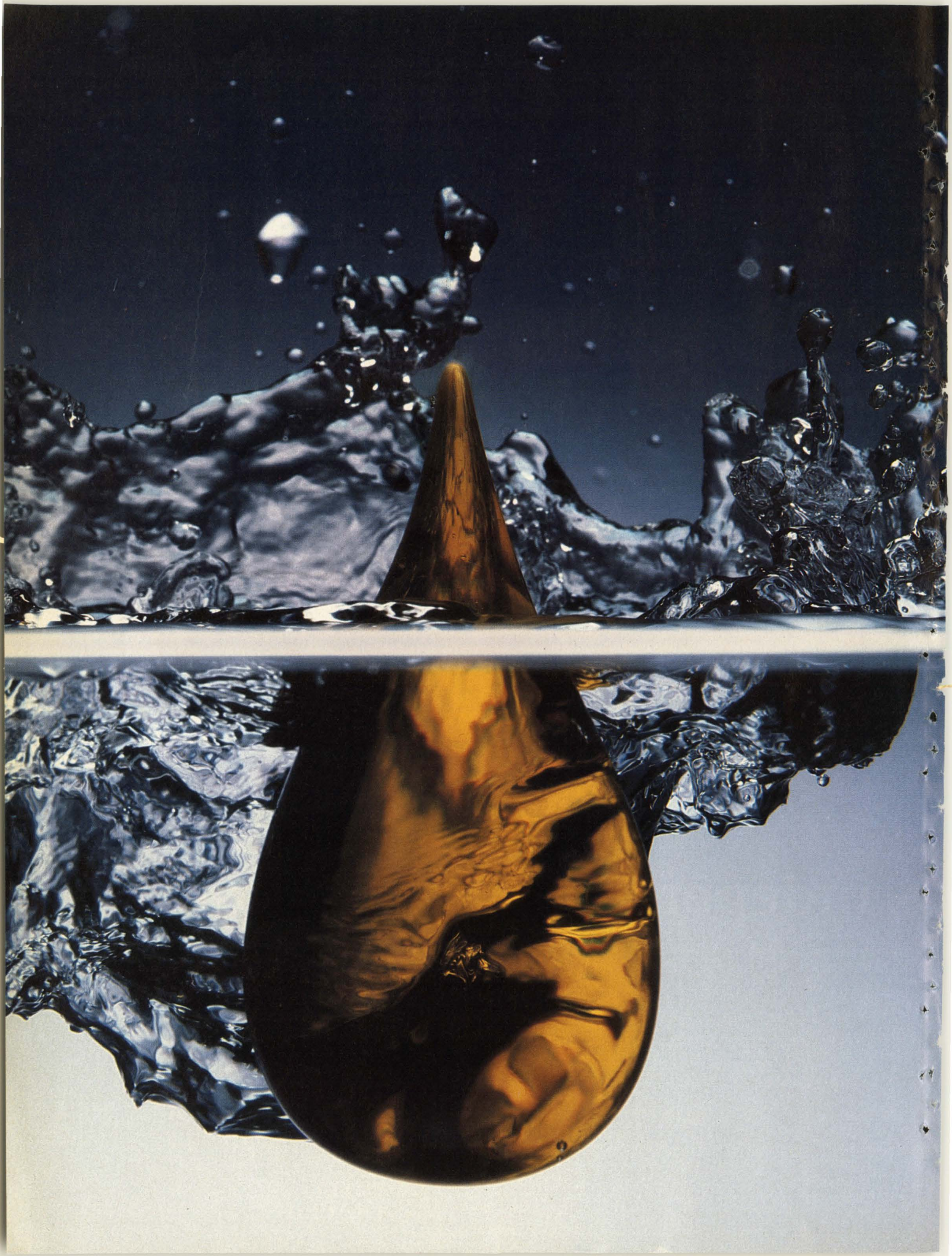
A new light in the independent service industry.

We may all carry tool cases, but Intelogic Trace has more to offer than just repair. Armed with over 15 years of service experience, our support teams troubleshoot multi-vendor systems and networks from over 250 locations across the nation. Objectively and effectively. See the difference in independent maintenance. See the light with Intelogic Trace.

Call 1-800-531-7186 for an evaluation of your service needs.

INTELOGIC TRACE, INC.

CIRCLE 11 ON READER CARD



WITHOUT DATA GENERAL INTEGRATING YOUR SYSTEMS IS LIKE MIXING OIL AND WATER.

FOR FULLY INTEGRATED BUSINESS AUTOMATION, TALK TO DATA GENERAL.

To maintain a competitive edge, a business needs to integrate all its resources. Ultimately blending people, departments, data and computer systems together.

Data General's Business Automation Systems integrate all these vital elements. Which gives your company one, accessible information flow.

Our industry-leading CEO® software gives you the most integrated business automation essentials. With spreadsheets. Graphics. Decision support. Tools that help you make faster, better informed business decisions.

Then we take you further. By letting you integrate your existing applications.

Our communications story is second to none. We give you the most complete IBM compatibility. We also adhere to industry standards like Ethernet® and X.25.

Our business automation solutions integrate all levels of your company. From PC's to mainframes. From the next room to the next continent.

Our MV/Family systems lead the industry in price/performance. And give you a low cost of ownership, along with service, training and support.

Today, over 165,000 CEO users have discovered true integrated business automation. To create the best possible blend for your business systems, talk to Data General. Call 1-800-DATAGEN (Canada call 1-800-268-5454.) Or write: Data General, 4400 Computer Drive, MS C-228, Westboro, MA 01580.

Data General
a Generation ahead.

CIRCLE 12 ON READER CARD

Here's A Graphic Demonstration Of PCOX Technology.

Whatever you want in micro-to-mainframe graphics, wherever you want it. That's what you get with PCOX Technology.

Starting with a better view. Our 3279 S3G graphics give your PC the clearest, brightest and most accurate host graphics on the market. Our 3179 APA graphics come standard with 16 colors.

Both come with the power to run GDDM, SAS/Graph,® DISSPLA™ and TELAGRAF.™ Plus screen saves, printer and plotter support, and high speed file transfer. All standard.

But that's just the beginning.

PCOX Technology gives you the same graphics capability everywhere in your network. Whether your PCs are clustered around a controller, ganged up in a LAN or isolated miles away in branch offices. And if you have an IRMA™ board, it'll run there too.

PCOX graphics products also give you a uniform API and a software migration path to other micro-to-mainframe capabilities, including windowing, multiple host sessions, and more.

In fact, you can run just about any PCOX 3270 software—graphics or otherwise—in any combination, on any PCOX connection.

So you get true freedom of choice.

For micro-to-mainframe graphics, that's a first. For PCOX Technology, it's business as usual.

It's also the reason why more companies are standardizing on PCOX Technology for *all* their micro-to-mainframe needs.

Take a closer look at PCOX Technology, and the full line of PCOX micro-to-mainframe graphics products.

Then draw your own solutions.

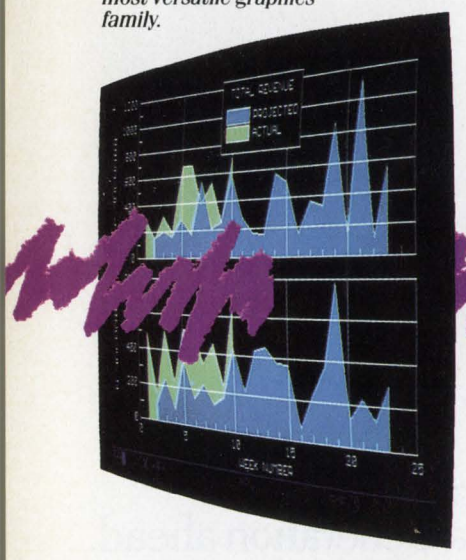
800-225-PCOX
In California, 415-969-1999

CXI

CXI, Inc., 1157 San Antonio Road, Mountain View, CA 94043. Telex: 821945.

CIRCLE 13 ON READER CARD

Micro-to-mainframe's most versatile graphics family.



Clearer, brighter, more accurate S3G graphics.

APA Graphics for coax and remote environments.

Mainframe graphics for coax and remote LAN gateways.

Plus a software path to other micro-to-mainframe functions.

PRICING

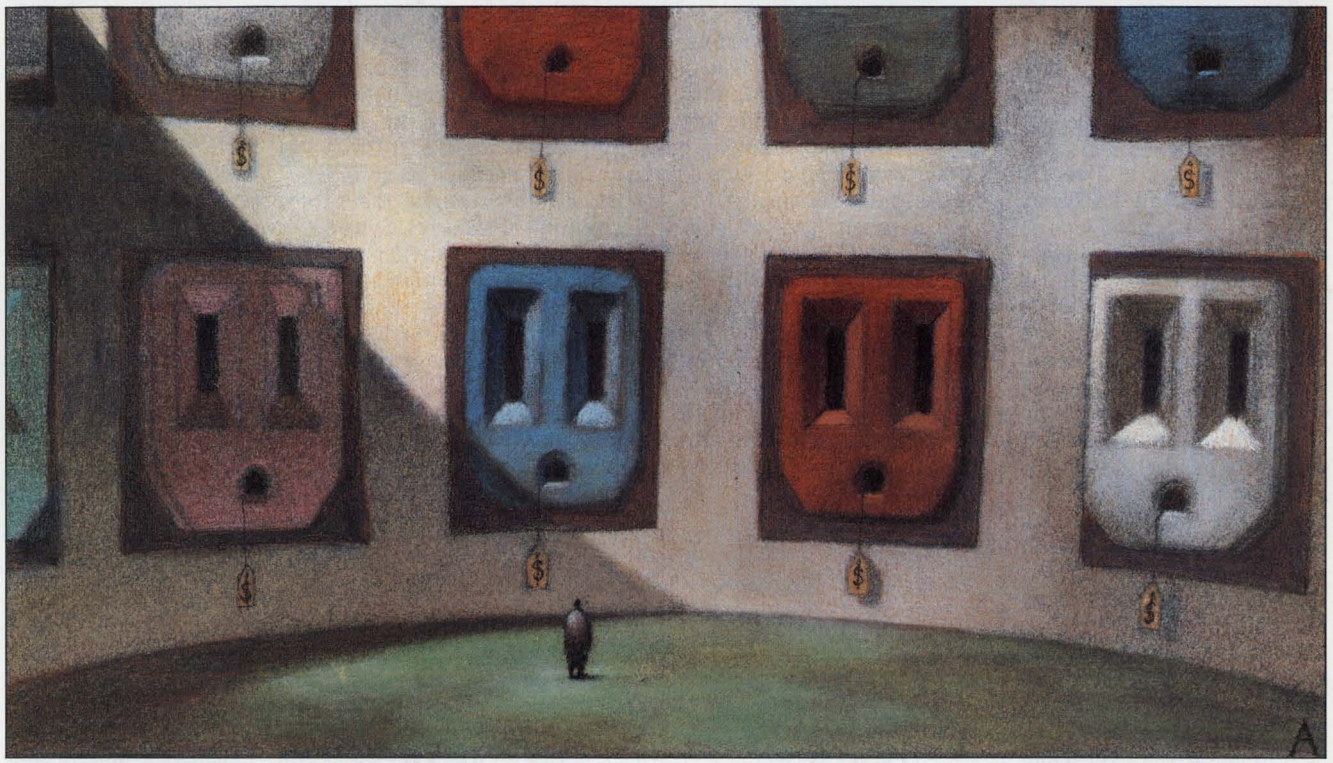


Illustration by Dan Adel

Battling Out Of A Pricing Corner

Digital hopes its new pricing scheme for software on networks will calm confused users.

BY GARY McWILLIAMS

Early this month, Digital Equipment Corp. dramatically embarked on one of the most critical undertakings in its recent history: setting a new software pricing policy to replace one grown complicated and largely unsuited to the networked environment.

It's an effort that portends major changes in the way Digital users will pay for their software. It's also an important milestone for Digital, which has lately begun to describe itself as a software company. That it is the first major computer maker to contend with network-based pricing is due largely to its success with networking. Others are soon to follow.

"We recognize the fact advanced cluster technology changes the way you think about licensing software," says Digital's Jeffrey C. Kalb, vice president for low-end systems and technologies. Work on the new pricing schedule, which Digital in October said would be implemented over the next 20 months, was accelerated, according to observers close to the company. The price changes will broaden the narrow gulf between MicroVAX and large VAX fees, and enable software to be moved legally among machines of similar sizes. In addition, observers expect steps to be taken to establish software as a network service. Other changes include a one-year warranty on all hardware and discounts based on annual dollar purchases.

The impetus for the change is clear. Digital is rapidly moving away from timesharing systems to a distributed processing orientation. VAXclusters and the company's Local Area VAXcluster (LAVC) software for MicroVAX computers enable software to be moved easily among processors of different sizes and software prices.

In addition, expansions to the company's line of software-compatible VAX computers now enable applications to run on systems packages from $10,000 to $4.8 million.

Clair W. Goldsmith, president of the U.S. Digital Equipment Computer User Society (DECUS) and executive director of information technology at the University of Texas Health Science Center, San Antonio, says another reason for the change is that the company "is trying to address the issue" created by the ease with which software can be moved among large and small VAX computers. Another reason is that Digital "boxed itself into a corner" by introducing networkwide resource sharing without first committing to a new software pricing plan, says Leslie Maltz, director of computing and communications resources at the Stevens Institute of Technology, Hoboken, N.J.

Trying to Regain Control

"The problem existed the minute they invented VAXclusters. When Local Area VAXclusters brought the MicroVAX into the whole thing, [the pricing problem] touched another whole class of people because of the number of MicroVAXs [installed]," says Maltz. "What they are trying to do is to gain control again."

While agreeing that the issue Digital hopes to address the most in its repricing is the

potential for software piracy on VAXclusters, Goldsmith downplays the extent of such illegal software swapping.

Many users are already upset at the implied challenge to their honesty in a recent decision to ban software transfers with used equipment, says Goldsmith. In first proposing the ban, Digital said the move was "aimed at tightening compliance and discouraging unauthorized movement and usage of software."

A DECUS questionnaire, mailed to 50,000 members, asked if the transfer ban would aid compliance with current licensing policies. It drew an angry response, says Goldsmith. "The overwhelming majority [of 9,500 returns] said they didn't see how it would." Many of those who replied felt the question was an accusation, he says.

Regardless of the company's intent in its transfer ban, the change already has had an impact. Some users are delaying new purchases and calling for existing software licenses to be "grandfathered" under prior transfer rules. Infotron Systems Inc., Cherry Hill, N.J., put off plans to replace five older VAX 11/700 series computers with new VAX 8000 series computers as a result of the ban, says Pat Maroney, director of MIS, communications, and engineering. The upgrades were proposed in order to lower maintenance and service costs, but now Infotron Systems may forego the larger computers altogether.

"Our plan was to go to fewer, larger machines," says Maroney. "Now, we're not planning any major machine purchases this year. It's a factor of the lower resale value of the machines. We're forced to keep them," he says. A Digital spokesman says the rules would be "fine-tuned," but declined prior to actual implementation to say what the changes would be.

To the issue of what users would like to see in a revamped policy, Goldsmith says pricing should take into account "the use of software rather than which machine or processor it's running on. My view is when you buy software it should be available on all machines in the cluster."

Even though VAXclusters can be configured for fault tolerant operation, "If the processor on which software resides fails, even though there are others able to do the job, the whole system is down as far as that user is concerned," reasons Goldsmith. "Trying to solve that problem is something the industry is attempting to deal with. People don't want [a software license] to be limited to a particular machine."

GOLDSMITH DOWNPLAYS THE EXTENT OF ILLEGAL SOFTWARE SWAPPING.

In fact, Digital already has taken the first steps toward disassociating a license from a particular computer with its Local Area VAXclusters. In an LAVC, a VAX or MicroVAX acts as a software librarian, dispensing copies of the operating system to other members on the network. Only a total up to the licensed number of users can have the software at any one time, says Marty Gruhn, vice president at the Sierra Group, a Tempe, Ariz., market research firm.

She says a reason for the repricing, and one likely to be felt most by users, is that software is seen within Digital and elsewhere as the largest future revenue opportunity for vendors. Declining hardware prices are forcing all hardware manufacturers to focus more attention on software and the revenue they derive from it, she says. Software expenditures are beginning to outstrip hardware and will shortly represent the largest portion of the MIS budget, she adds. "There is a cultural shift underlying the attention [to software]," Gruhn says. "DEC is more and more positioning itself to be a software supplier. The repricing has to say a lot about how DEC perceives its future."

The company's present license policy is rooted in its past. It uses a series of price tiers, devised when the VAX line consisted of three machines within a comparatively narrow performance range. That tiering, in which license fees are based on processor size, has become harder to establish with nine new VAX models and three workstations now in its processor line, say users.

"We're so confused with what we have that we have to bring [Digital] in to tell us what we've got. It's not as simple as ordering from a book anymore," says Dennis G. Martineau, vice president of the computer systems group at Project Software & Development Inc., Cambridge, Mass. The variations of software licenses now possible have made the present policy too complex, he says.

Changes to individual prices and new tiers created by a much broader product line also create confusion for users desiring to upgrade their systems. "It's getting complicated handling existing licenses," says Infotron's Maroney. "For instance, do we pay the differential between what we already paid or the existing cost of a license? We bought one of the first packages of All-in-1; it was $25,000 and now is $10,000. What would we pay?"

Not a Precise Measure

While the existing price structure also is intended to differentiate between machines of different performance ranges, it isn't a precise measure of usage or performance, and that represents an issue with some users. Stevens Institute's Maltz says separate prices for MicroVAX II and VAXstation software "is bizarre" considering that both are based on the same processor. "Just because one's called a workstation and one's a MicroVAX, it's still the same software and same application."

Whatever method the company has chosen on which to base its pricing, it had better be flexible, argues Bill Hancock, a networking consultant and vice president of engineering at Essential Resources Inc., New York. A complete pricing review will have to encompass network-based servers and distributed applications that haven't even appeared. "How do you charge for applications that have pieces running here and there? If a MicroVAX is the server and a [VAX] 8800 is the client, do you charge more for one and less for another?" asks Hancock.

These are questions with no easy answers.

"It's going to be interesting," notes Martineau. "The hardware engineering people have come up with this neat architecture and now the software people have to figure out how to protect it." Infotron's Maroney adds, "The clear message we hear is there is a need for some consistency in Digital's software pricing policies. The ability of the industry to deal with issues in terms of licensing is probably the major issue for this year." ■

Dennis Strigl, president of Applied Data Research Inc.

Business As Usual?

A year after its acquisition by Ameritech, ADR still faces some old, as well as new, challenges.

BY KAREN GULLO

What happens when a multi-billion dollar company like Ameritech acquires a leading mainframe software firm like Applied Data Research Inc.?

Only good things, to hear ADR officials and users tell it. ADR contends that it's been business as usual since it was acquired about a year ago for $215 million by the Chicago-based parent of five Midwestern Bell operating companies. Company executives emphasize the advantages of being under the umbrella of a deep-pocket partner, saying that the pressures of quarterly performance have been lifted and that significant investments in R&D during a troubled period in the industry are now possible. However, management reshuffling, continued operating losses, a slow market, and the impending presence of IBM's DB2 has cast a shadow over a seemingly bright picture.

Business was a bit unusual last fall when ADR's president Martin A. Goetz stepped aside by his own choice and was replaced by an Ameritech man, Dennis Strigl, formerly president of Ameritech Mobile Communications. Goetz has the titles of senior vp and chief technology officer. ADR's chairman and ceo, John Bennett, retained his titles.

Some observers see the new appointment as Ameritech's desire to graft its culture onto ADR. "It's Ameritech's way of streamlining management," says Bob Brandt, systems manager for the systems development group at Mays Department Stores, Piscataway, N.J., and president of Cadre, ADR's user group. "They want to bring ADR management into the style of Ameritech." Brandt says he doesn't anticipate more bureaucracy at ADR, but more focus on the product line's direction. "Strigl's there as a management-administrative type of figure. His appointment brings Marty Goetz out of an administrative position and back into a position where he's setting the direction of the product line. During the time Goetz spent as president, he was always more of an R&D type of individual."

Meanwhile, ADR's new president says that except for changes in the method of financial reporting to the parent company, ADR has not felt "the heavy hand of Ameritech. We don't get help from the parent company unless we ask for it. That should be a comfort to our customers. What we have gotten from Ameritech is the ability to invest significant amounts of revenue in R&D at a time of difficulty in the industry. If we were measured on quarter-to-quarter results," says Strigl, "we might not have been able to invest as heavily in R&D as we did in 1986. Our relationship with Ameritech allows us to invest even more than we would. We plan to spend 20% of revenues on R&D in 1987." The company spent 19% of revenues on R&D in 1986.

This philosophy is not lost on customers. "ADR has been a little strapped for cash, especially for R&D," says Bruce Clauter, manager of systems software at Borden Inc., Columbus, Ohio, and president emeritus of Cadre. "Now they have Ameritech behind them and can afford to invest more."

Effects of the Market

The company, like some of its competitors in the database management software arena, has felt the effects of price-cutting and a sluggish market. In the nine months ending Sept. 30, 1985 (the last time ADR reported financial information before acquisition), the company suffered a net loss of $2.3 million on revenue of $103.7 million. The company's financial status is now melded into the parent firm's results (Ameritech's 1986 earnings were $1.14 billion on revenues of $9.36 billion), but continued operating losses seem apparent. "I wouldn't be surprised if they were close to the bone or losing money," says Brandt.

Strigl says he can't give specific results for 1986, and wouldn't comment on losses. He did say the company increased its revenues from last year. "If you attempt to normalize 1986 revenues with 1985, and by normalize I mean that in '86 we introduced a new lease program, we accounted for our maintenance revenues in a different way, and we booked our revenues on delivery rather than onorder. . . . If we were to eliminate all that and do what I call normalize, you would see an increase in '86 revenues of about 6%."

Bill Clifford, executive vice president, says ADR had a better than anticipated fourth quarter 1986. Customers were encouraged not to spend all of their dp budgets in 1986, "so we anticipated that the last quarter of the year would be slow," he says. One third of the company's sales, however, came in the last quarter. The majority of those were sales of Datacom/DB, ADR's relational database, he says. "During a period of belt-tightening, we didn't think the fourth quarter would be as strong. A very positive sign in a tight economy."

"GOETZ WAS ALWAYS MORE OF AN R&D TYPE."

While a 6% revenue increase is better than nothing, it's less than ADR had in previous years. In 1985, for example, revenues increased 17%, to $150 million from $128.2 in 1984. That, however, hasn't stopped the company from maintaining an aggressive en-

Photograph by Tom Sobolik

hancement schedule for its product line or buying strategic technologies over the last few months. ADR announced release 1.4 of Ideal, its fourth generation application development system, which, according to company benchmarks, provides a 25% increase in system throughput performance.

In addition, the company announced new releases of several other products.

In February, ADR acquired an SQL-based relational database management system from Software Systems Technology (SST), College Park, Md. The microcomputer-based product, XDB, will give future releases of Datacom/DB SQL capability in mainframe, LAN, and PC environments.

Commitment to SQL

Other highlights at the company in the last six months point up ADR's commitment to support SQL, part of a larger strategy to both live with and compete with IBM's formidable DB2. In September, ADR announced a strategic alliance with Teradata Corp., Los Angeles, to integrate ADR's software tools, using SQL, with Teradata's DBC/1012 Data Base Computer system. This way, ADR customers can use Datacom to run transaction processing applications on an IBM mainframe and ad hoc queries against very large databases on an DBC/1012 simultaneously.

Also in September, the company announced Ideal-Escort, a fourth generation applications development system for LANs. It permits data sharing between IBM PCs, LANs and Datacom/db mainframe databases under the control of ADR's Datadictionary.

"ADR recognizes that the emergence of SQL . . . is of concern to our users," says Clifford. "People are looking at it not so much for its syntactical elegance or ease of use, but as a focal point of applications portability. In light of this, ADR is supporting SQL in a couple of ways."

First, says Clifford, Ideal users will be able to generate an applications program using either fourth generation constructs or by imbedding SQL statments. This feature will be available on a future release of Ideal, to come in approximately 12 months, according to Clifford. Second, for Datacom/DB users, the company is supporting SQL as an optional data manipulation language. This feature won't be available for another 12 to 18 months.

While ADR, like other independent software companies, is taking steps to stay in sync with IBM and DB2, Dennis Strigl says the company's effort to support SQL doesn't mean it can't win market share with Datacom/DB. "If you look at results from early last year, you would see that we struggled against DB2," says Strigl. "However . . . we feel very confident of our ability to compete against DB2. It [DB2] has been out, and people have had a chance to evaluate it and often times benchmark it against Datacom/DB. Where they've done that, I think we've done extremely well."

New Contract With 3M Corp.

ADR recently landed a large contract with 3M Corp. for Datacom/DB. 3M is migrating from DOS to MVS and was using Cincom's Total. ADR beat out several of its toughest competitors in the DBMS arena for the contract, which is worth up to $7 million. The real beauty of the deal, says ADR, is that the conversion to Datacom/DB will be totally transparent to users, i.e., no rewriting of applications will be necessary.

Users laud the company's aggressive enhancement schedule for Ideal (the last release, announced in June, was the third major release in 17 months), but say that they wish ADR would be as aggressive with Datacom. The product's latest release, 7.5, became available this month, but users say they are waiting for the next release, 8.0, which will contain some "fairly monumental changes," according to Bob Brandt. "The only area that [ADR] has been slow in is in a new release of Datacom. Company executives have alluded to it at the last few Cadre meetings, but we don't know when they will introduce it."

"ADR HAS BEEN A LITTLE STRAPPED FOR CASH."

Joseph Farrelly, vice president of research and development, says the company has not set a release date for the enhancement, but says the new release would appear sometime within 12 to 18 months. He revealed to DATAMATION three new features that 8.0 will embrace. First, the product will allow users to generate in real time the definition of a new database, a boon for users who want to generate their own private databases by downloading a subset from the mainframe database. Second, the product will feature a join capability for combining data from different tables. Last, 8.0 will utilize "referential integrity," which means that users can define and change business rules in the data dictionary instead of in the applications program itself.

Brandt, who is familiar with the enhancements, says they will do much to bolster the status of Datacom/DB. "With them, ADR can really go head to head with DB2."

Meanwhile, there was talk a year ago about joint product development between Ameritech and ADR and/or development of a proprietary product for use at Ameritech, which touched a chord with users who feared the giant telecommunications company might alter the direction in which the company had been going for over 25 years. On the subject of the convergence of telecommunications and software technology, Strigl says there are possibilities for the future, "but it's not clear how that convergence will take place. For our purposes now, ADR is not engaged in the development of a proprietary product for Ameritech." The two companies are interested, however, in throwing a little business each other's way, points out Clifford.

For now, the company has its hands full with keeping up enhancements, fending off DB2, keeping its prices competitive with IBM, and generally keeping its head above water. With Ameritech looking over its shoulder, those tasks may be easier, but who knows how long the Ameritech umbrella will stay up.

Others view the company's future differently. "ADR is in transition," says Bob Brandt. "There's always a concern when you're dealing with a company that's losing money. If they were on their own, it would be a serious concern, but with Ameritech backing them, it's not a major concern.

"ADR experienced a lot of growth a few years ago when Ideal was introduced," continues Brandt. "Then IBM came along with DB2 and things changed. It's going to take some dollars before ADR begins to bounce back." ■

INGRES SEMINAR

Is the data you need distributed across multiple computers?

With INGRES, you get a truly distributed database. INGRES works across multiple operating environments from mainframes to minis to PCs.

And with INGRES you can build applications and share data that span multiple computers just as easily as if all the data were located on one machine.

Users don't have to worry about where the data is located, how to get it or what type of hardware and operating system are used. Your entire company uses one powerful DBMS with consistent reliable results.

Do you need greater productivity in developing applications?

Only INGRES gives you a comprehensive application development environment. With a 4GL that includes SQL, a Visual-Forms-Editor and interfaces to traditional programming languages. This will increase your organization's productivity by leaps and bounds.

Your end-user will find INGRES easy to use too. Whether they want to create forms, queries, reports or graphs. And using INGRES/PC LINK, end-users can download host INGRES data for use with products like Lotus 1-2-3 and dBASE.

Is performance important in your SQL applications?

The heart of INGRES is a high-performance SQL relational database management system.

INGRES is uncommonly fast. INGRES provides special support for transaction processing and complex queries. And INGRES is compatible with DB2.

If you answered "YES" to any of these questions, register for a FREE INGRES Seminar by calling (800) 4-INGRES.

AL	Huntsville	Jan 15
AZ	Phoenix	May 27
	Tucson	May 14
CA	Irvine	Mar 3
	Los Angeles	Jan 29
		Apr 22
	Sacramento	Jan 13
		May 13
	San Diego	Mar 10
	San Francisco	Jun 18
		Jun 24
	San Jose	Feb 18
		Apr 29
CO	Denver	May 14
CT	Hartford	Apr 7
	New Haven	Feb 25
	Stamford	Jan 6
FL	Melbourne	Mar 24
	Tampa	Jan 6
GA	Atlanta	Jan 20
IL	Chicago	Feb 12
IN	Indianapolis	Feb 24
LA	New Orleans	Jun 10
MA	Boston	Feb 11
	Burlington	Jan 14
		May 28
	Cambridge	Apr 22
	Newton	Mar 26
MI	Detroit	Mar 17
MN	Minneapolis	Feb 5
MO	Kansas City	Mar 4
	St. Louis	Feb 18
NC	Charlotte	Mar 10
	Research Triangle Pk	Feb 3
NE	Omaha	Jan 22
NJ	Iselin	Mar 4
	Princeton	Jan 27
NY	Albany	Feb 18
	Rochester	Jan 28
OR	Portland	Apr 28
PA	Pittsburgh	Mar 19
RI	Providence	Mar 11
SC	Columbia	May 26
TN	Memphis	Apr 14
TX	Austin	Apr 8
	Dallas	Mar 12
	Houston	Mar 26
UT	Salt Lake City	Feb 10
WA	Bellevue	Jan 27
	Seattle	May 6
WI	Milwaukee	Jan 8
	Canadian Seminars:	
BC	Vancouver	Feb 12
ON	Edmonton	Mar 19
	London	Mar 18
	Ottawa	Jan 14
	Toronto	Feb 4
		May 6
NS	Halifax	Mar 5
QB	Montreal	Feb 19
	Quebec	Mar 24

(800) 4-INGRES

Canadian Seminars,
(415) 748-3444.

INGRES

Relational Technology
1080 Marina Village Parkway
Alameda, California 94501

1986 and 1987 Digital Review Target Award Winner

CIRCLE 14 ON READER CARD

MAINFRAMES

IBM Moves to Take The High Ground

IBM's 3090 upgrades may spur a response from Amdahl and NAS, but users are reacting mildly.

BY JEFF MOAD

In the never-ending fight between IBM and its Japanese-backed pcm competitors, IBM's latest round of 3090 performance and configuration upgrades is more like a competitive counterpunch than a knockout blow.

The announcements—4% to 18% performance improvements in IBM's current 3090 models, plus new three-processor and six-processor 3090 configurations—revived the company's recently challenged claim to high-end performance leadership and shored up a competitive weakness faced by its 3090 Model 200 dyadic system. But by the time IBM starts shipping the faster E-Series versions of its current 3090 lineup in May and the new three-way and six-way systems in the third quarter, it may have already lost much of the competitive ground it regained with these announcements.

Among other things, IBM had hoped to head off the loss of its high-end mainframe performance leadership to Mountain View, Calif.-based National Advanced Systems, which was scheduled to start shipping an 80MIPS, four-processor version of its Hitachi-built AS/XL-compatible processor line in the third quarter of this year. IBM's 3090-400, which has been shipping for seven months, is rated at about 47MIPS. If left unchallenged, the four-way AS/XL 100 would have given NAS a legitimate claim to having the largest IBM-compatible mainframe. While such a claim might be of limited practical value, many observers believe IBM was unwilling to surrender the performance high ground, particularly at a time when Amdahl and NAS were beginning to make some market share headway.

According to figures compiled by San Jose-based Dataquest Inc., while IBM increased its mainframe market share leadership in worldwide revenue by 4.6 percentage points through the first three quarters of 1986, IBM gained no ground in the fourth quarter after Amdahl and NAS started shipping their largest systems. "IBM hasn't been in the driver's seat in mainframes since the third quarter," says Dataquest's Kimball Brown.

At the time IBM made its announcement, its plan to ship the 77MIPS 3090-600E in the third quarter would have put the company ahead of Amdahl's 75MIPS 5890-600, which doesn't ship until the fourth quarter, and on an even footing with NAS, which had planned a third quarter ship for its AS/XL 90 and AS/XL 100.

Reshuffling the Deck

But both NAS and Amdahl have reshuffled the deck slightly since then. Amdahl in mid-February added faster memory components to the 5890 line, claiming a 4% overall performance boost and virtual parity with the 3090-600E. At the same time, NAS was reportedly planning to accelerate initial shipment of the AS/XL 90 and AS/XL 100 to the second quarter of this year and to boost maximum main memory on both the AS/XL 90 and AS/XL 100 to 2GB, compared with 256MB on the 3090-600E.

Both Amdahl and NAS were also expected to respond to IBM price/performance improvements, either with list price reductions or negotiated, off-list price breaks on a customer-by-customer basis. Meanwhile, both Amdahl and NAS are promising either to come close to or match IBM's six-processor performance with four-processor configurations of their own. So, while neither Amdahl nor NAS will commit to plans to ship six-way systems of their own, they are likely to sell users on the latent growth potential in their product lines.

"IBM may still have us slightly on the high end, and for a handful of very large dp users that may mean something," says Dennis Stein, Amdahl's manager for processor product marketing. "But, overall, we were pleased with the IBM announcement. We didn't see a lot of new function there. The goal seemed to be to do it the same way but with a little more power." While some IBM seers expected the company's announcement to include channel support for faster data transfer rates, IBM saved that feature for another day.

Another of IBM's apparent goals was to plug a competitive hole in its product line where Amdahl had been enjoying success with its 41MIPS 5890-300 dual processor system. Prior to the IBM announcement, the 5890-300 offered a 34% performance advantage over IBM's dyadic 3090-200 at about the same price. The claimed performance advantage was even greater in IMS environments. Of the 5890 systems it shipped in 1986—estimated to total 55—Amdahl claims a "large majority" were 5890-300s. Best of all for Amdahl, the company was able to sell the increased performance of the 5890-300 for a price on a par with the IBM 3090-200, contributing to high 1986 profit margins.

IBM's new 3090-300E is seen as "quite obviously their fighting machine," according to Amdahl's Stein. Priced at about the same level as the 3090-200E, however, the 5890-300E still offers a discount of about 27% compared with the 3090-300E.

Few Changing Buying Plans

While IBM and its pcm competitors attempt to outmaneuver each other, customer reaction to the announcement, even among some users anxious for increased single-image mainframe processing power, has

Tale of the Tape

Mainframe	MIPS Rating	Price ($ mil.)
IBM		
3090-600E	77	11.5
3090-400E	56	8.4
3090-300E	44	6.2
3090-200E	32	4.6
3090-180E	17.6	2.7
3090-150E	10.2	1.7
AMDAHL		
5890-600E	77	8.6
5890-400E	60	7.3
5890-300E	43	4.6
5890-200E	35	3.9
5890-190E	19	2.6
NATIONAL ADVANCED SYSTEMS		
AS/XL 100	80	12.7
AS/XL 90	65	10.1
AS/XL 80	45	7.2
AS/XL 70	33	5.3
AS/XL 60	25	4.4
AS/XL 50	18	3.1

(MIPS, or million of instructions per second, are from Gartner Group reports and represent relative performance, which varies according to application. Prices are for minimum usable configurations and are from Annex Research Inc.)

Photo: NASA

OUR SOFTWARE IS PREFERRED BY AN ELITE CIRCLE.

This world has many companies whose products are marketed across borders. But only one whose software crosses borders – in two important respects.

First, our technology.

Several years ago, McCormack & Dodge pioneered a technique of integration which allowed users to move effortlessly from one application to the next while pursuing a path of inquiry. In effect, this development erased the borders between packages and created a single informational environment for corporate decision-making.

Second – and even more important than our celebrated borderless technology – is the McCormack & Dodge approach to multinational service and support. Truly borderless in the classic geographic sense.

We have professionals in over 40 countries. We offer systems and documentation in multiple languages. We design our systems to accommodate the myriad laws and business practices found throughout the world. And to run in several different hardware environments.

In the world of McCormack & Dodge, knowledge has no borders.

McCormack & Dodge

a company of
The Dun & Bradstreet Corporation

Financial, human resource, manufacturing and application development software for mainframe and minicomputer environments. Call 1-800-343-0325.

CIRCLE 15 ON READER CARD

XEROX

"Xerox has a range of Electronic Printing Systems that produce 10 originals per minute to 120 per minute. And they thought I was prolific."

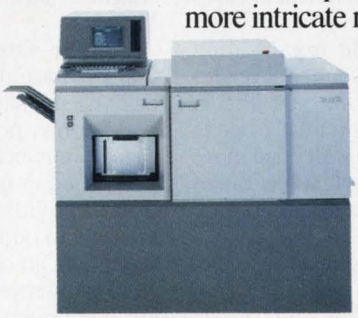
Leonardo da Vinci

Whether you're pounding out a few pages or putting out pages by the pound, Team Xerox has the solution to your printing problems. To Xerox that's more than just producing reliable printers. It's more than just service. It's a belief that finding the solution to your problems isn't good enough unless it's the exact, right solution.

As a result, Xerox has developed more than just one of the broadest ranges of electronic printing systems—it's one of the most unique. For instance, Xerox 4045 Laser CPs are desktop printers that are also copiers. The two new models have expanded memory capabilities—the Model 20 for IBM 3270 data processing systems, and the Model 50 for desktop publishing and other applications where full-page graphics are needed.

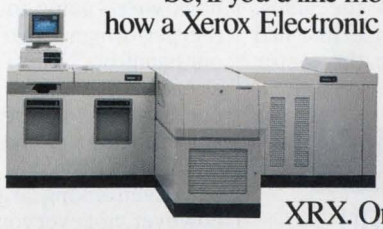
Work groups and small corporate departments have special problems when it comes to electronic printing. Problems the Xerox 2700 and 3700 can solve. Both laser printers are designed for remote printing. The 2700 can produce 12 originals per minute. And the 3700 can produce up to 24 pages per minute on paper sizes up to 11″ x 17″.

Xerox has electronic printing systems for more intricate needs. The 4060 computer printing system can turn out 60 pages per minute. Its ion-deposition print engine is extremely reliable and an economical way to produce documents with a lot of text. The Xerox 4050 is a laser printer that creates laser-sharp text and graphics at 50 pages per minute.



The Xerox 8700 and 9700 set the standard for high-volume electronic printing. And now, the new 8790 and 9790 take that standard to a new level. These high-volume electronic printing systems give corporate data centers and service bureaus imaging tools that are unsurpassed by anything else on the market. The 9790 can produce up to 120 pages a minute. And can handle both text and graphics, which is critical for so many high-speed applications.

So, if you'd like more input on how a Xerox Electronic Printing System can improve your output, call Team Xerox at 1-800-TEAM-XRX. Or send in the coupon below. Because when it comes to solving your problems, we'll help you find the solution.



TeamXerox

Xerox brings out the genius in you.

Xerox Corporation, P.O. Box 24, Rochester, NY 14692.

☐ Please have a sales representative contact me.

☐ Please send information on Xerox Electronic Printing Systems.

NAME (Please Print)

COMPANY TITLE

ADDRESS

CITY STATE ZIP

PHONE

Or, if you can't wait, call

1-800-TEAM-XRX, ext. 187B

(1-800-832-6979, ext. 187B).

187B 071-3/15-87

CIRCLE 16 ON READER CARD

been lukewarm. Few of the users contacted recently by DATAMATION say they are changing buying plans as a result of the IBM moves.

"It's just a relatively insignificant price/performance boost that doesn't add anything new in terms of functionality," says Dean Allen, director of information services at Lockheed Corp., which is in the market for more processing power but won't be buying the new, enhanced 3090s soon. Allen, after evaluating the 3090 announcement, recommended that the Burbank, Calif.-based company go ahead with plans to buy two 3081K mainframes on the used computer market.

The used 3081Ks offered Lockheed a big price/performance savings and no significant functional limitations compared to the 3090s, Allen says. Even if IBM had gone ahead with the faster data transfer rate feature, "I doubt that it would have made any difference."

"IBM STILL HAS NOT EXPLOITED ALL OF MVS/XA'S TALENTS."

There was some new functionality in the IBM announcement. VM/SP HPO was improved, and VM/XA was upgraded to support the new processors, more CMS applications, and intersystem facilities. That was too little, say many users who contend that overhead and memory limitation problems still trouble VM/XA, and that much still needs to be done in other areas. "IBM still has a long way to go to exploit all the talents of MVS/XA," says Tom Blodgett, MIS vice president at Southeast Bank in Miami.

Of course, some very large users always on the lookout for more MIPS in a box were pleased with the IBM upgrade and not particularly troubled by the company's move to restrict the new price/performance improvements to customers willing to upgrade between models. According to Joseph T. Brophy, senior vice president at the Travelers Insurance Companies, "We are planning to move into that [high-end] performance range, so we were delighted about the announcement. Over the next few years, with the addition of image processing and expert systems to what we're doing now, we're going to need all the performance we can get our hands on." The Travelers already is planning to upgrade one system to a 3090-400E and probably will take a 3090-600E, says Brophy.

Even among large users, however, not everyone is prepared to drop everything and stand in line for a 3090-600E. United Airlines also falls in the category of being able to use all the processing power it can get, but, according to MIS vice president Donald Karmazin, the company will hold off ordering the newest, biggest box until it can be assured that the latest release of the TPF airline control program will take advantage of the new multiprocessor architecture. According to Karmazin, United has been holding off on buying a 3090-400 for the same reason. Until the latest release of TPF for four-processor and six-processor systems is ready, he says, "this announcement causes no fundamental change in our buying plans. I see it really as an attempt by IBM to bring its price/performance more in line with its competition." ■

REGIONS

A Few Rays of Light South of the Border

GATT membership and a World Bank loan may help push lagging high technology in Mexico.

BY SUSAN KERR

It's not often that gaggles of giggling grammar school children, European ambassadors, and digitized pictures of Christie Brinkley in a see-through bathing suit can be seen within a few feet of each other. But that opportunity presented itself at the recent MexCom computer and communications trade show held in Mexico City.

Beyond the fun and the pomp, though, MexCom '87 heralded the start of what could be the most important year to date for high technology in Mexico. For while the technological discrepancy between Mexico and its northern neighbor is overwhelming, this year the Latin country is taking the first steps to narrow that gap. Among them are sweeping changes in trade restrictions as well as the allocation of billions of pesos to modernize the country's telephone and data communications networks.

Mexico traditionally has had a closed, protectionist economy, but this is changing. The government decided in late 1986 to join the international trade organization GATT, the General Agreement on Tariffs and Trade. This move potentially opens the door for a wider and more state-of-the-art selection of computers and electronic products.

Affording new technology has always been a problem in Mexico. The country has faced economic hardship since the oil glut in 1981 and is struggling under the weight of poverty and illiteracy. Computerization in a country with plenty of excess labor clearly has not been a number one priority; MexCom show organizers say the Mexican market for computers and peripherals could reach only $559 million this year.

But there are signs of hope across the board. Mexico hopes to finalize this month a $12 billion loan, jointly supplied by the World Bank and commercial lending institutions. According to a U.S. embassy official, the Mexican government has not received such money in any magnitude in almost two years.

While most of the incoming funds will be spent on housing and projects such as building roads, a chunk—some say upwards of $5 billion—will be allocated to expand telephone service in the country.

That's particularly heartening to satellite equipment suppliers. Last year, in preparation for televising the World Cup soccer games, which it hosted, the Mexican government purchased two Hughes satellites dubbed Morelos.

"The satellites are up there but are only being partially used," says Patricia Farias Barlow, president of Fapezal Comunicación, Mexico City, a cosponsor of MexCom. Providing telephone services to outlying areas via satellite is an obvious way to go. Barlow says that the satellite equipment the Mexican government will be in the market to buy includes transmitters and receivers.

★EXTRA★

FIND CARGO LOST AT SEA!

ITT rushes aid to fleet

A California shipping agent, who used to worry about keeping in touch with a worldwide fleet of container ships by telex, called his operation "shipshape" today.

Bill Lowe, a manager for Los Angeles-based Merit Steamship Agency, Inc., added that ITT Worldcom experts had made it "much, much easier" to transmit cargo schedules.

Merit, a nationwide shipping agency, is one of the few agencies to represent a number of steamship companies in worldwide cargo transport, Mr. Lowe explained.

"We dispatch over 40,000 telex messages a month," he said. "So we really needed a first-rate communications network to keep our customers on top of their imports and exports."

ITT Worldcom solved all the sticky problems that Merit faced with its last international carrier, Mr. Lowe pointed out. "And they even cut some of our costs—by 50%!"

Service...and Savings.

Among Merit's major clients is Japan Line, which each year moves thousands of containerized shipments, inland and overseas.

BACK IN TOUCH—Shipping agent Bill Lowe after rescue.

ITT Worldcom created a super-efficient network between Merit's 14 U.S. locations and Japan Line's Tokyo headquarters.

This network includes customized communications software, plus ITT's sophisticated Worldbridge℠ family of networking, office automation and electronic messaging services.

Let the ITT Lifesavers go to work for you. Call 1-800-922-0184. Or mail our coupon.

ITT WORLDCOM. WE COULD BE YOUR LIFESAVER.℠

Name _____ Title _____

Company _____

Address _____ City _____

State _____ Zip _____

ITT World Communications
Dept. CR/A, 100 Plaza Drive
Secaucus, N.J., 07096

COMMUNICATIONS SERVICES VIA ITT

CIRCLE 17 ON READER CARD

CURIOSITY: Crowds gather at Apple Computer's booth to see the Macintosh computer at the recent MexCom show in Mexico City.

An interesting outgrowth of Morelos is that with so much excess capacity, more is being made available for data transmission. The Mexican government reportedly is beginning to make pricing concessions to facilitate this type of usage. Additionally, Barlow says that a push is under way to sell Morelos space segments to companies in the southern U.S.

Taking Advantage of Morelos

One supplier taking advantage of Morelos is Lehmex, Mexico City, which represents such American companies as Vitalink Communications Corp., Mountain View, Calif., and Republic Telcom Systems, Boulder, Colo.

Lehmex was the first private company to buy space on Morelos, says company executive Carlos Leiva Amour. "Right now, the problem for companies is that it takes a long time to get a private line," he comments. These companies are looking at satellites as an alternative. For example, Lehmex just signed up the Instituto Tecnologico de Estodios Superiores de Monterrey, a private university, which will place the hub at its main computer site near Mexico City and remote terminals at 25 other locations throughout the country.

"The government launched the satellite to offer better service," Amour says. "The rates to use it have come down considerably—one third of what it cost a year ago. You still need a license, but the government is making it easier to get permissions."

Making it easier to do business in Mexico is a top priority of its government. A Mexican embassy official based in Washington, D.C., says that Mexico is drastically changing its import requirements, both in terms of allowing a larger number of goods to enter and by assessing lower duties.

Under the new way of doing business, Mexico is in the process of abandoning its tough import permit requirements on all except approximately 900 of 7,000 items. Computers are no longer on the list. Under the previous arrangement, some felt that import permits were hard to come by.

Another change is in the manner import duties are assessed. Mexico used to charge duties up to 100% of the value of the imported good. Now, the top rate is in the 45% range. Additionally, Mexico has abandoned its practice of allowing customs officials to assign the worth of the product in question. By the end of 1988, the country will move to the GATT system, whereby there is one commonly agreed-upon international value for products.

These moves are attractive to outsiders, says Milton Ganley, who, as president of Do Mas Corp., Washington, D.C., represents such American companies as Nynex Corp. in dealings with Mexican and Latin American distributors.

"Europe is saturated" in terms of buying potential, Ganley says. "The last three to four years, studies show Central America and the Caribbean are tops" in potential.

But a long road lies ahead of Mexico. Last year, the official inflation rate was 105%. Although authorities are trying to reduce it to below 80% in 1987, first indications are not encouraging.

The economy is the number one worry for Mexican businessmen. Although the economic incentives give hope, the U.S. embassy official claims that, until the peso strengthens, it is doubtful that there will be an onslaught of outside computer vendors on the country. Instead, the official says, those companies already established in Mexico will battle it out among themselves. Major U.S. companies already in Mexico are IBM, Unisys, Hewlett-Packard, NCR, and Apple.

Software Still Lacking

Another U.S. official, Rafael Fermoselle, director of the U.S. Trade Center in Mexico City, points out that there is a demand currently not met by existing suppliers. Many basic systems hardware needs can and have been fulfilled, but peripherals and software for all types of systems are still relatively scarce in the market. "I don't see that many people pushing software," he says.

That desire to get beyond the basic computer box is becoming obvious to some. Local area networking vendor Novell Inc., Orem, Utah, is beginning to make a big push in Mexico, says Miguel de Lascurain, commercial director of Dinamia, a large Mexican distributor and parent company of Novellco de Mexico.

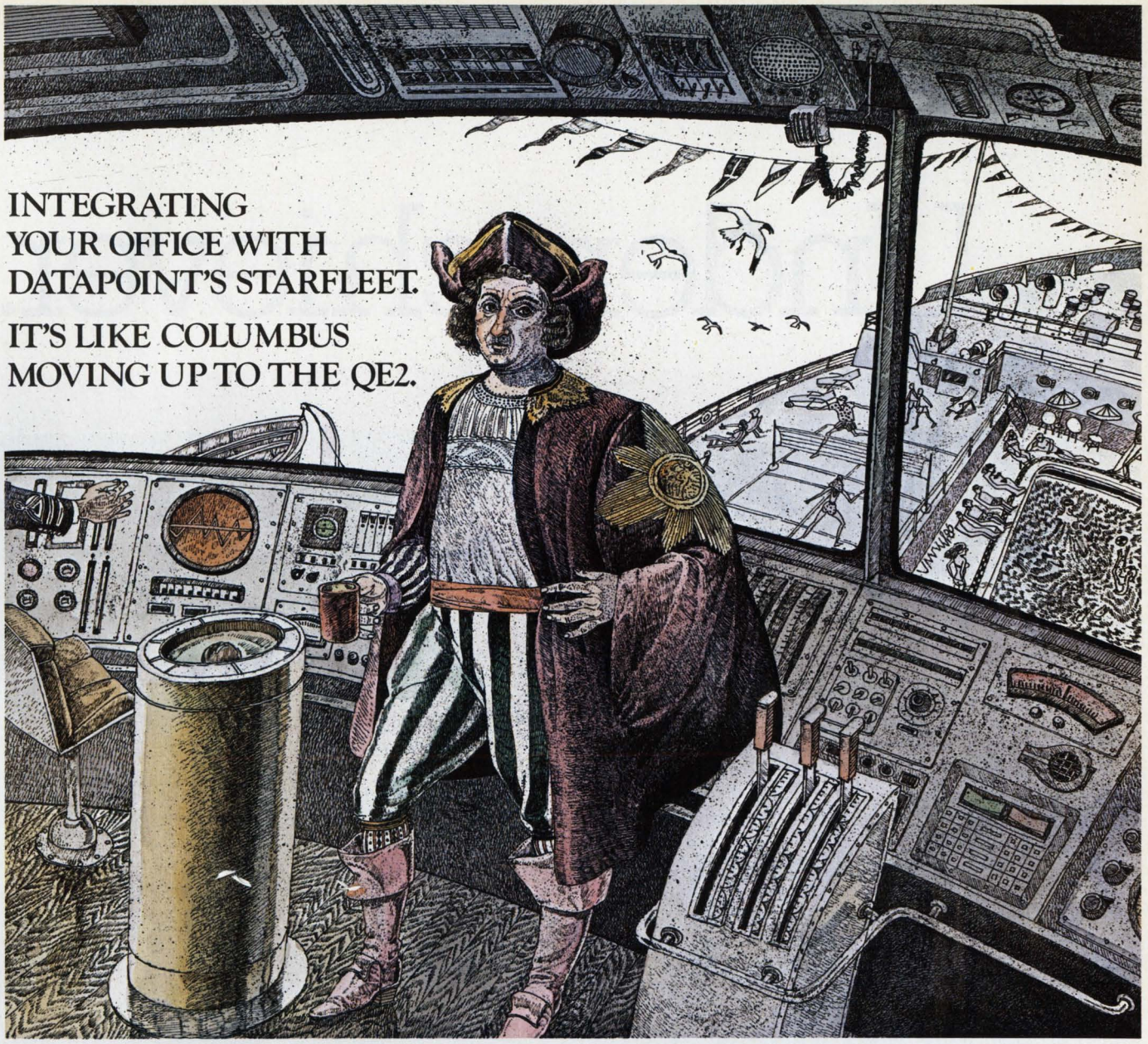
"We're still waiting for the year of the LAN here too," de Lascurain laughs. "We're getting our feet wet. The LAN market in Mexico has grown very slowly. . . it's part of the maturing process of the industry. Mexico lags the U.S. by approximately two years. [For LANs], the hardware has been ready but the software hasn't."

The lag time was evident at the MexCom show. On the microcomputer front, few 32-bit 80386-based machines were demonstrated. AT&T Infosistemas' booth featured the Unix PC, a system that AT&T has had little success with in the U.S. and in fact last August essentially stopped ordering from supplier Convergent Technologies Inc., San Jose.

IN MEXICO, THE GOVERNMENT IS THE BEST CUSTOMER.

Because many of the 50,000-plus show attendees were students, the emphasis by vendors was on demonstrating high technology to people who have had little contact with it. Apple was a big hit with mobs straining to get a look at the Macintosh's graphics. At NCR's exhibit, children played computer

Photograph by Bob Schalkwuk/Black Star



INTEGRATING YOUR OFFICE WITH DATAPOINT'S STARFLEET.

IT'S LIKE COLUMBUS MOVING UP TO THE QE2.

When it comes to large scale departmental computing, many vendors simply don't know the devil from the deep blue sea.

In fact, managers everywhere are exploring the course set for their departmental systems and finding themselves adrift in uncharted waters.

Unless they have discovered Datapoint systems. For almost 10 years, Datapoint has been delivering real local area networking instead of token promises.

Now, Datapoint introduces the next generation—the first extended architecture network based on the advanced STARFLEET technology. Allowing you to sail boldly toward the ultimate destination: maximum integration with minimum obsolescence.

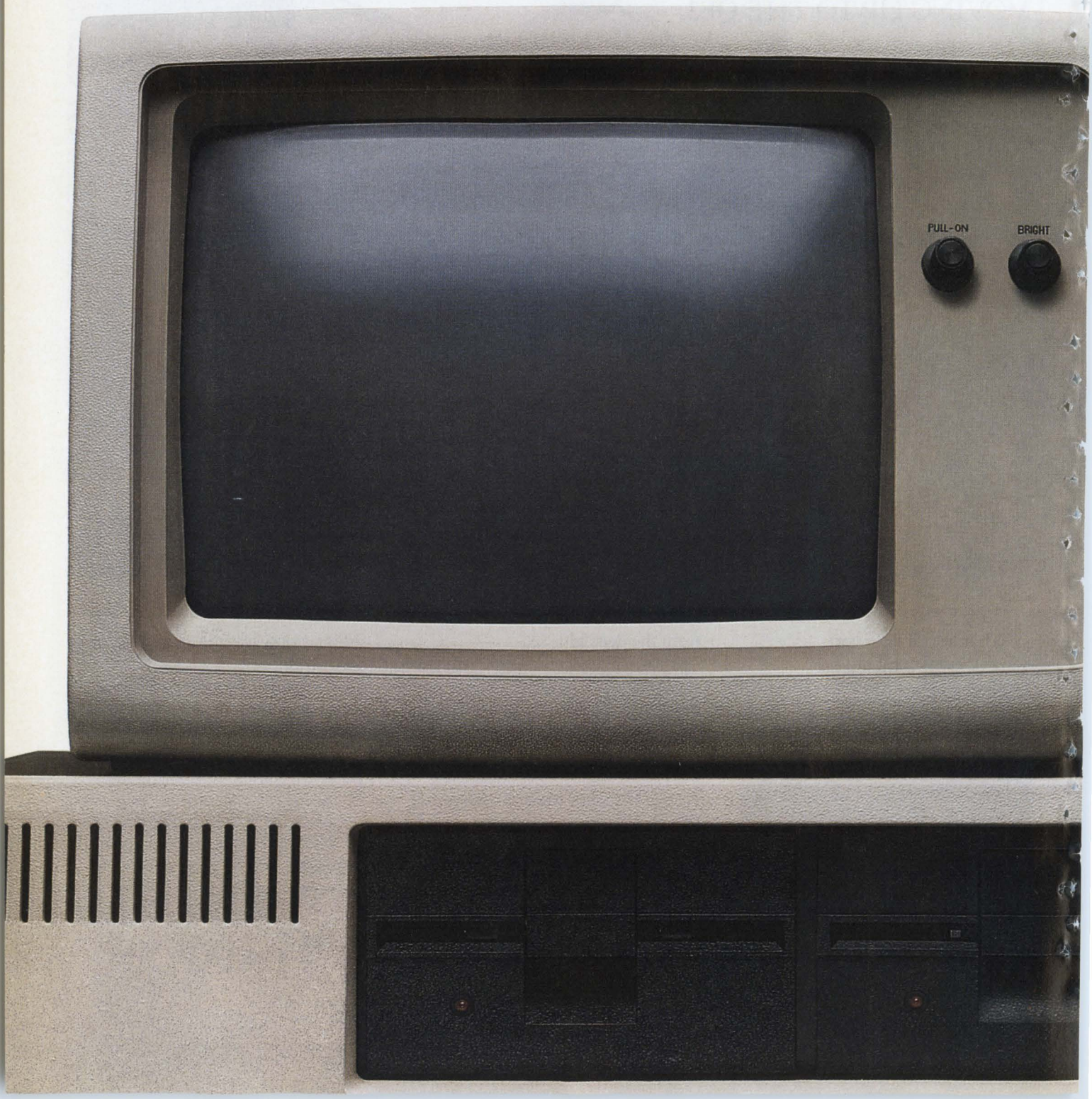
The result? Productivity gains today and investment protection for tomorrow.

Let us help you chart a course for your business computing future. Write today for a copy of *Datapoint Departmental Systems: The Best of all Worlds:* Datapoint Corporation, MS/K-39, 9725 Datapoint Drive, San Antonio, Texas 78284.

DATAPOINT

CIRCLE 18 ON READER CARD

Underachiever.



we never stop asking "What if..."

Using a PC merely as a stand-alone is rather like using a race car to fetch the groceries. A severe case of under-utilization.

But it's a widespread problem. And, since PCs are here to stay, a serious one. So we at Hewlett-Packard did some hard thinking—which resulted in the Personal Productivity Center (PPC). The PPC is an office information system based on the HP 3000 family of computers. It's designed to help you realize the full potential of your PCs, including IBM.

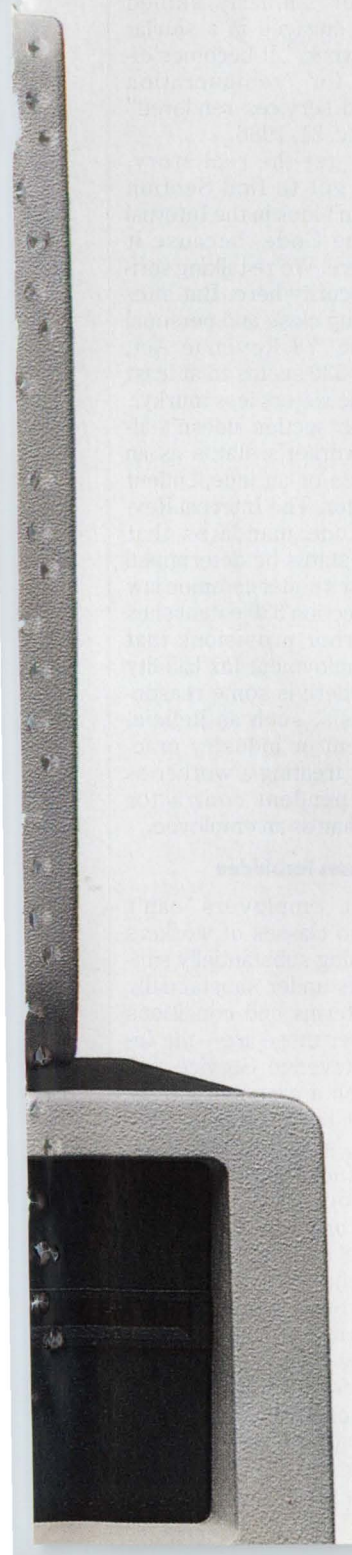
One way the PPC does this is with HP Information Access. It gives your PC users a consistent, relational-like interface to data anywhere in the network. Without special programming. It can save data in a variety of formats, such as 1-2-3® from Lotus® and R:Base™ 5000, right on the PC. This means that its data can be manipulated and analyzed off-line. So your users are less prone to ask you for special reports. Leaving you free to satisfy your users' more important needs.

With HP Advancemail, your PC users can send messages and files to any user on the network, as well as process mail off-line. Which means not only added convenience for your PC users, but less drain on the host system.

All of these capabilities are given to your IBM PC users as well. And every PC user can also send any DCA-compatible file throughout the network, the file automatically being converted to the format which the recipient can read and edit. Your PCs are linked to each other as well as to central data bases—yet they also provide users with their own local processing power and familiar user interface.

The Personal Productivity Center, as you can see, is quite a remarkable achievement. Made more so because it can be integrated with IBM PROFS and DISOSS mainframe office systems. It lets your PC users share printers, discs and tape back-up devices. And it comes from the company with an unsurpassed record of service and support; the company that never stops asking "What if..." about how best to help you fully utilize your PCs.

For more information, call 1 800 367-4772, Dept. 275M.



1-2-3® from Lotus® is a U.S. registered trademark of Lotus Development Corporation.
R:Base™ 5000 is a U.S. trademark of Microrim,® Inc.

HEWLETT PACKARD
Business Computing Systems

 IS02703

CIRCLE 19 ON READER CARD

games on the Tower system.

"This is a good opportunity to let people know about technology and what it can do," says Hector A. Aguirre, manager of NCR's financial distribution division in Mexico City.

NCR hopes to sell roughly $35 million to $40 million worth of product in Mexico this year as compared with $30 million in 1986.

While it sounds like positive news for vendors, ironically the altered trade laws and even MexCom itself could signal a changing of the guard in electronics suppliers. Fermoselle of the U.S. Trade Center says American computer companies currently supply 85% to 90% of the market in Mexico. Until MexCom's initial appearance three years ago, his outfit put on the only computer-related trade show in Mexico. The U.S. Trade Center-sponsored show allows only American companies, whereas MexCom is open to all nationalities. Non-U.S. companies such as Plessey took advantage of that fact.

Asked his opinion of MexCom, Fermoselle says, "If you have 90% of the market and the only trade show, and along comes a forum for all companies and countries . . . ." He doesn't finish his thoughts. Why cheer competition, he seems to imply. Mexico is a vital trading partner of the U.S.—the third largest market after Japan and Canada for American goods, he notes.

Joining GATT "is a sign to the international community that we'll pull our act together," says the Mexican embassy official. "It'll create a positive image to play by international rules and they [other nations] used to complain we didn't do that. . . . So now we'll have to follow the rules of the international community and we'll have both rights and obligations." ■

TAXATION

Putting Their Heads on the Tax Block

The new tax law has threatened independent contractors, but they are planning to fight back.

BY WILLIE SCHATZ

This isn't exactly what Sen. Daniel Patrick Moynihan had planned.

When the Democrat from New York introduced last June what eventually became Section 1706 of the Tax Reform Act of 1986, he told his colleagues that "my purpose is to propose a noncontroversial and narrow amendment." He came close, but didn't get the cigar.

The proposal, which directly affects independent contractors such as programmers and systems analysts, by making it more difficult for them to qualify for write-offs they previously enjoyed, did stay out of harm's way long enough to slip unobtrusively into the new tax law just before the 99th Congress called it quits. But that was the end of its peace and quiet. Now, with the 100th Congress having just opened for business, all hell's breaking loose.

With the law barely on the books long enough for the ink to dry, there's already a movement to either delay its implementation or totally wipe it out. Rep. Judd Gregg (R-N.H.) would put 1706 on hold until Dec. 31, 1988, via H.R. 792. Senators Alfonse D'Amato (R-N.Y.) and Christopher Dodd (D-Conn.) would kiss section 1706 good-bye through S. 491.

You wouldn't think one of the shorter and more intelligible sections of the Internal Revenue Code could cause such trouble. Section 1706 amends Section 530 of the Revenue Act of 1978 by adding a new subsection (d) saying, "This section [530] shall not apply in the case of an individual who, pursuant to an arrangement between the taxpayer and another person, provides services for such other person as an engineer, designer, drafter, computer programmer, systems analyst or other similarly skilled worker engaged in a similar line of work." It becomes effective for "remuneration paid and services rendered" after Dec. 31, 1986.

To get the real story, you've got to find Section 530. Don't look in the Internal Revenue Code, because it isn't there. We're talking serious obscurity here. But after getting up close and personal with the '78 Revenue Act, Section 530 seems to at least make the waters less murky.

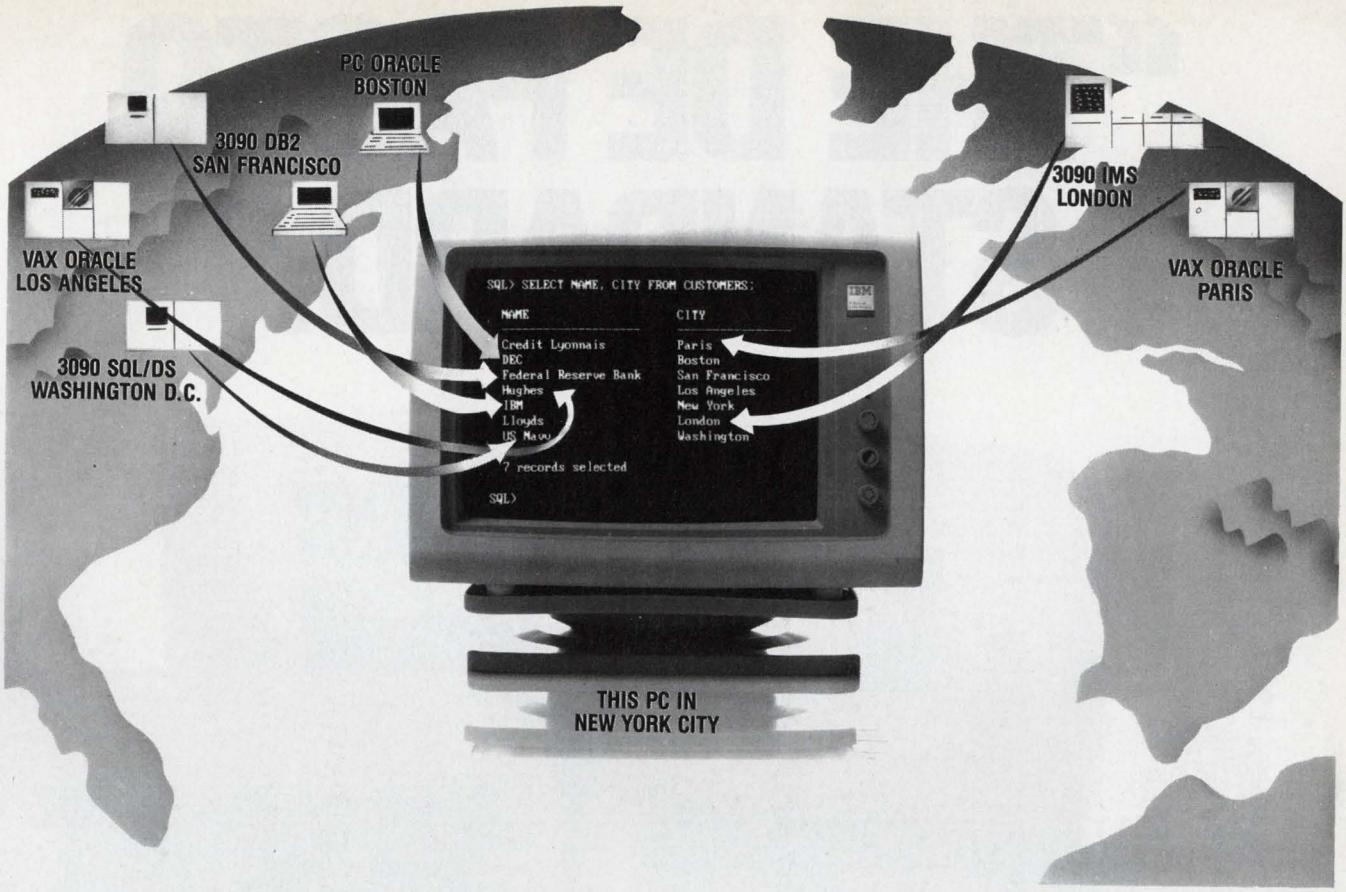
The section doesn't affect a worker's status as an employee or an independent contractor. The Internal Revenue Code mandates that worker status be determined in all cases under common law rules. Section 530 establishes safe harbor provisions that limit employment tax liability where there is some reasonable basis, such as judicial precedent or industry practice, for treating a worker as an independent contractor rather than as an employee.

Two Classes Forbidden

But employers can't have two classes of workers performing substantially similar tasks under substantially similar terms and conditions (whatever those are—the Internal Revenue Service will decide on a case-by-case basis) and treat some as employees, with all the tax liabilities (unemployment compensation, FICA, etc.) that entails, and others as independent contractors. That consistency requirement has been around since Section 530 was enacted and is not affected by 1706.

According to Ron Palenski and Mary Jane Saunders, ADAPSO's general coun-

Illustration by Scott MacNeill



Oracle Announces SQL*Star: The First Distributed Relational DBMS

In 1979, Oracle Corporation *delivered* the very first relational DBMS. Oracle also *delivered* the very first implementation of SQL. Today, Oracle is proud to announce that we have *delivered* the very first distributed relational DBMS. It's called SQL*Star,™ and it's an open-system...the very first.

SQL*Star enables organizations to integrate different computers, different operating systems, different networks—even different brands of DBMSs—into a single unified computing and information resource.

SQL*Star allows users to access data stored in different databases—including our own ORACLE and IBM's DB2 and SQL/DS—located on multiple dissimilar systems as easily as if all the information were stored in the same database on a single computer.

SQL*Star is a location-independent, hardware-independent, network-independent, DBMS-independent open system.

Location independence means users don't need to know where their data is located. Whether it's on one computer or on dozens. On one desktop, in one building or around the world.

Hardware independence means users don't need to know on what kind of hardware or under which operating systems their data resides. On mainframes, minis or micros. Under MVS, VM/CMS, VAX VMS, PC-DOS, UNIX or many others.

Network independence means users don't need to know what networks are used to transmit their data. DECNET, SNA APPC, coax connections, Ethernet-TCP/IP, async or others.

DBMS independence means users don't even need to know what DBMS is providing the data: ORACLE, IBM's DB2 or SQL/DS. And in 1987, even VSAM, IMS and other non-SQL DBMSs.

SQL*Star is an **open system,** so you needn't be limited by the network and DBMS interfaces provided by Oracle. Our SQL*Star Toolkits allow *you* to develop your own custom interfaces to networks or DBMSs. And our national consulting organization is ready to assist you with those specialized interfaces.

Best of all, you don't have to wait for SQL*Star to become a reality. It's here. Mainframes, minis, micros. On VAX/VMS, VM/CMS, MVS, PC-DOS, UNIX. DECNET, SNA, coax, async. ORACLE, DB2, SQL/DS. Which is why you should call today, to enroll in the next free ORACLE seminar in your area.

Call 1-800-345-DBMS. Today.

ORACLE®

Compatibility • Portability • Connectability

20 Davis Drive, Belmont, CA 94002

"THE DE FACTO STANDARD."

The broadest range of systems for total graphics solutions: It's the compelling reason why so many of the world's foremost corporations select Tektronix. Tek established the standard for graphics tools compatibility. For the development of graphics software. And for the easy migration to more powerful, more productive graphics processing systems.

Today, Tek graphics are recognized worldwide as the de facto standard. From high-performance 3D to low-cost desktop graphics to precision color output systems. In fact, more leading graphics application software packages are designed for Tek products than any other equipment in the world.

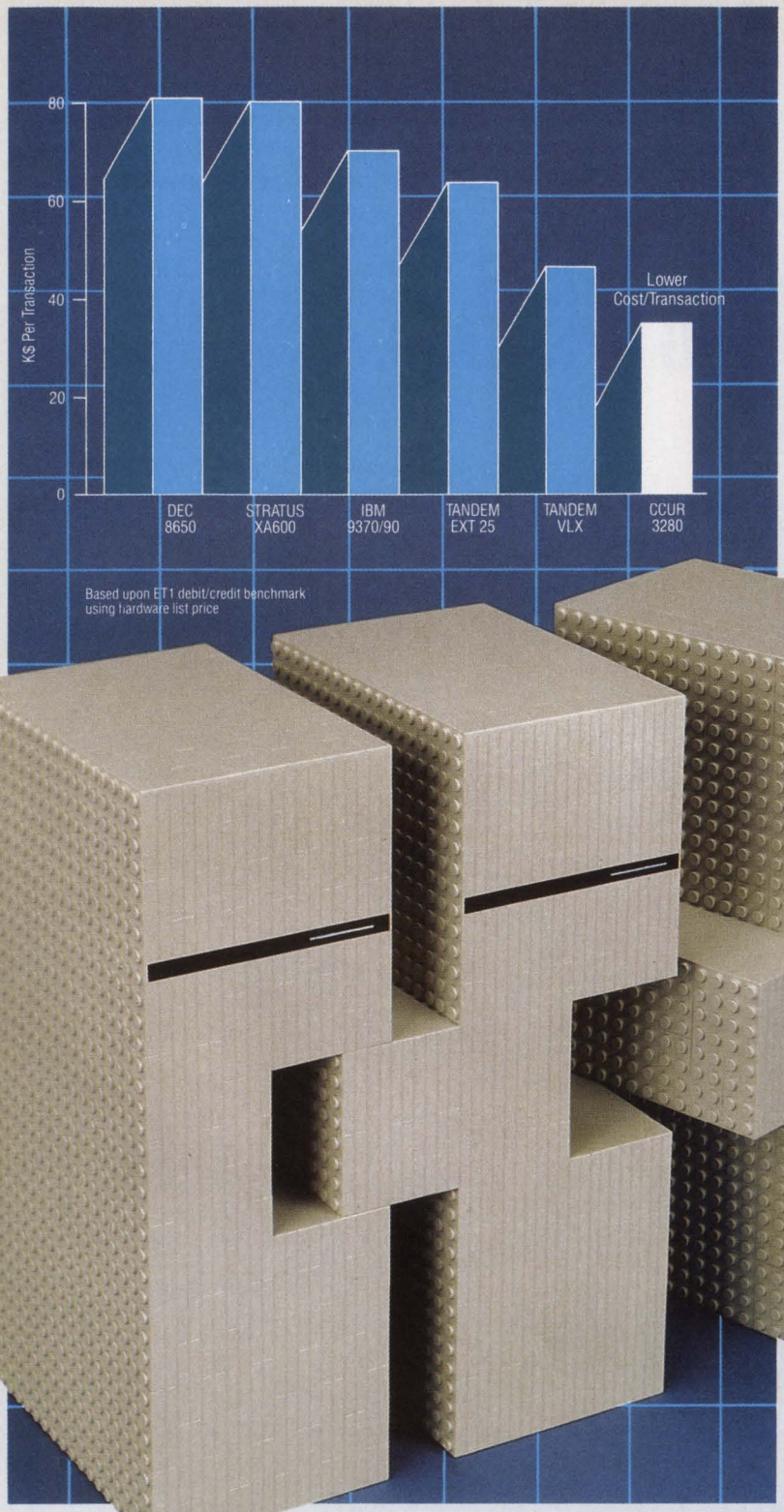
TEK GRAPHICS PROCESSING SYSTEMS.

Plus, the Tektronix graphics standard means that a cost-efficient migration path is always ahead of you, protecting your hardware, software and training investments.

To learn more about why the de facto standard should be your standard, contact your representative about Tek Graphics Processing Systems. Or call 1-800-547-1512. In Oregon, 235-7202.

Tektronix®
COMMITTED TO EXCELLENCE

CIRCLE 21 ON READER CARD



Plug-In Parallel Processing

HOW TO BUILD A LOW COST, HIGH PERFORMANCE TRANSACTION PROCESSOR

The Model 3280 from Concurrent Computer Corporation is the best place to start. It has the power to handle up to 30 complex transactions per second.

In applications such as ATM, POS and lottery systems, rates of up to 200 transactions per second have been achieved.

Low Cost

From all the benchmarks we have run, including the industry standard ETI debit/credit benchmark and a variety of application relevant tests, the 3280 yields the lowest cost per transaction of any on line system available today.

Expandable

With our family of compatible systems, you won't run out of power when your applications grow.

We offer a high degree of IBM (SNA) and ISO connectivity as well as a full set of communications networking facilities. So, you don't have to sacrifice functionality to get cost/performance.

Call

1-800-631-2154

or write us at

Concurrent Computer Corporation
2 Crescent Place
Oceanport, NJ 07757

Concurrent Computer Corporation

CIRCLE 22 ON READER CARD

As Anger Grows Among Consultants

As bills percolate in Congress that would either put a moratorium on Section 1706 or repeal it, independent computer consultants, the brokers they work with, and the clients they serve are doing some percolating of their own.

Some of them are, in fact, steaming. "It [1706] is hassle, grief, and baloney," sums up David B. Hicks, president of David B. Hicks Associates Inc., a Lafayette, Calif.-based broker of consultants' services and president of the National Association of Computer Consultants and Brokers.

Jeff Jacobs, who has run his own computer consulting firm, Consart Systems Inc., Los Angeles, since 1973, says 1706 has "taken two groups of people, consultants and brokers, who for years have worked together with common interests, and turned those interests 180 degrees around and placed them in opposition. It's made for a great deal of bitterness."

"A lot of clients are ruling out use of [independent] consultants and who's to know what the real reason is," says Guy Scharf, legislative chairman for the Independent Computer Consultants Association (ICCA) and an independent consultant operating out of Mountain View, Calif.

Mary Rich, a consultant operating as PFS Inc., El Segundo, Calif., thinks she knows. "My personal opinion is that it doesn't affect me. I'm an independent, but this isn't necessarily what my clients think and it's difficult to find work."

The section refers to three-party agreements but consultants who negotiate independently with clients are being affected. "They're brushed by the same broad brush," says Larry Smith, a Los Angeles attorney.

Allegations are flying that brokers are attempting to force consultants, even those who are incorporated or who can otherwise demonstrate independent status, to become their employees. Hicks is not one of these. "My clients are well educated," he says, "but others are not so lucky."

Many consultants sometimes work through brokers and other times negotiate independently. The work taken through brokers is usually for clients who insist on working with the brokers to cut down the number of negotiations necessary.

Mark Leuzinger is one such consultant. In mid-1986, he took on a project at California Institute of Technology's Jet Propulsion Laboratories (JPL), Pasadena, which deals with brokers who handle security clearance; Leuzinger was told to pick one from a list of three. He chose Amtec Systems Inc., Los Angeles, a subsidiary of Computer Task Group. When 1706 was adopted late last year, Leuzinger recalls, Amtec began putting pressure on the independents (he says Amtec had 44 people working at JPL, less than half of whom were independents) to become employees. Without authorization, he contends, Amtec began treating the independents as employees, including issuing them payroll checks. Leuzinger has returned the checks only to have them re-sent to him. He hasn't cashed them. "It's check Ping-Pong," he says.

In February, Leuzinger and five other consultants who had been working through Amtec at JPL filed suit in Los Angeles County Superior Court against the broker, charging breach of contract. At press time, Amtec had yet to reply. "We will answer the action as prescribed by the law," commented Nino Posella, executive vice president of Amtec, in late February. "It could take years to resolve."

Leuzinger, in the meantime, continues to work on the JPL contract and he has found a broker that honors his independent status in White Star Data Systems, Tarzana, Calif.

Most independent consultants, and those brokers who prefer to continue working with them, tend to see the National Technical Services Association, a group they characterize as "a lot of big job shops," behind clients' unease. "They're sending letters to clients warning them of potential dollar losses through collection of back payroll taxes, morale problems with permanent employees, and mandated fringe benefits," says Jacobs.

Tom Miskinis, System Professionals Corp., Sherman Oaks, Calif., a broker who is allowing independents to remain so if they can prove that status with such things as incorporation or business licenses, doesn't think a moratorium or a repeal of 1706 will change the situation. "The intent of the IRS is evident. They are going after the underground economy however they define it, and we all have to reevalulate our relationships."

BY EDITH D. MYERS

sel and associate general counsel, 1706 revokes the safe harbor provisions in three-party (i.e., worker/broker/client) situations and permits the IRS to issue regulations regarding the employment tax status of certain technical personnel, including computer programmers and systems analysts.

So what's the problem? Only everything, argue ADAPSO, the IEEE, the Independent Computer Contractors Association (ICCA), the Technology Consultants National Association (TECNA).

The IRS did its best to help. The agency tried to put it all to rest with a release stating that Section 1706 does not "automatically convert certain technical service specialists from independent contractors to employees for income and employment tax purposes. The specialists are to be classified as independent contractors or employees under generally applicable common law standards."

"1706 stinks," says Harb Hayre, chairman of the IEEE's United States Activities Board career activities council and a professor of engineering at the University of Houston. "It's going to put small independent contractors out of business. They can't afford to become employees."

The United States Activities Board's position statement has a few more words on the subject: "The dislocation that Section 1706 will create will have a chilling effect on innovation and productivity throughout the nation's research and development community. . . . Section 1706 must be immediately repealed or amended so that it will apply fairly and equitably to all occupations."

ADAPSO's Objections

No way, counters ADAPSO. We can work it out. Let's just leave it alone.

"The purpose of the tax bill was to clean up the loopholes, and that's exactly what 1706 does," says Jack Courtney, a member of ADAPSO's professional services section and president of Computer Task Group, Buffalo. "We're not interested in creating problems for bona fide inde-

not interested in creating problems for bona fide independent contractors. It's the people holding themselves out as independent contractors but who don't now qualify and never have qualified as one under the 20 tests of common law that are a problem."

Ah yes, the 20 questions. If we're talking common law, we're talking a long time on the books, folks. Like centuries. For purposes of the Federal Insurance Contributions Act (FICA), the Federal Unemployment Tax Act (FUTA), and income tax withholding, an individual is an employee if he satisfies the common law test. That means the worker is an employee if the person for whom he works has the right to specify not only the work product but also the time, place, and manner in which the work is to be performed. All the employer has to have is the right to assert such control.

INDEPENDENT CONTRACTORS CAN'T AFFORD TO BECOME EMPLOYEES.

Now the fun starts. Lobbyists from all the interested parties have been swarming over Capitol Hill. One congressman tried to make it easy on himself by having a simultaneous meeting with ADAPSO and ICCA supporters.

There wasn't much chance of lighting a peace pipe. The various parties can't even agree on numbers. The Congressional Joint Tax Committee says Section 1706 will raise $12 million annually for the government for the next five years. ADAPSO contends it's more like $1 billion to $1.6 billion per year.

So now it's down to winning the hearts and minds of the House and Senate.

"There's strong support for the status quo [keeping 1706] in the House," Rep. Robert Matsui (D-Calif.), a member of the omnipotent Ways and Means Committee, told last month's ADAPSO Capitol Caucus. "We will have a technical corrections bill in April for the Tax Reform Act. But that will apply to nonprofit entities and municipalities.

"I don't think there will be any substantive amendments on 1706. But it's quite possible there will be some offered when the bill gets to the Senate floor. A two-year moratorium is the best the opponents can get."

To counter those arguments, Matsui advised ADAPSO to argue that changing the bill so soon after it became law would be patently unfair and would impose a significant financial burden on companies that have changed their procedures to comply with 1706.

That's not the only economic hit companies may take. As ADAPSO's Palenski warns, "Elimination of the safe haven provisions of the 1978 Revenue Act suggests that computer software and services companies and their clients review their relationships with outside contractors. Specific reference to programmers and systems analysts in the 1986 Tax Reform Act may presage increased IRS enforcement, and failure to comply with the common law rules could be costly."

"I think ADAPSO's position is absolutely correct," Matsui told the caucus. "But you're going to have to make sure the members are educated. And you'll have to maintain surveillance."

BENCHMARKS

Best Bid

Sun Microsystems Inc., of Mountain View, Calif., has agreed to pay $20 million in stock to acquire Centram Systems West Inc. of Berkeley, Calif. Sun overcame an earlier offer for Centram from 3Com Corp. of Mountain View. Centram markets Tops, software that ties Apple and IBM personal computers to Unix-based microcomputers. Centram has shipped about 21,000 copies of the software to date. 3Com had proposed only one week earlier to take over Centram for an undisclosed price. Failure of the 3Com-Centram deal followed the collapse last year of 3Com's plans to merge with Convergent Technologies Inc. of San Jose.

Out Shopping

Cullinet Software Inc. plans to acquire warehouse and expert systems software developer Distribution Management Systems Inc. (DMS) in an agreement valued at about $18 million. The acquisition, for 1.69 million shares of Cullinet stock, continues a series of recent buy-outs of software developers in the Digital Equipment Corp. market. The DEC marketing thrust had led Cullinet to acquire for a combined $12.4 million in cash database developer Esvel Inc., manufacturing software developer Computer Strategies Inc., and database tools developer Applied Development Corp. The latest agreement requires SEC approval that could delay the takeover by up to three months, says a Cullinet spokesman. DMS, whose software runs on IBM and DEC computers, maintains a customer base of such international companies as Nestlé. Under the agreement, DMS would operate as a wholly owned subsidiary of Cullinet, with chairman John Landry and president Robert Weiler maintaining their posts, the spokesman says. Both men joined DMS from McCormack & Dodge.

Joint Venture

General Motors' Electronic Data Systems, Dallas, has formed a joint venture with Korea's Lucky-Goldstar Group to provide systems integration and data processing services to Lucky-Goldstar and other Korean companies. The venture, called Systems Technology Management, will be headed by Y.T. Kim, formerly an executive vice president with Lucky-Goldstar. Jerry Thorson, formerly EDS's manager of international business development, has been named executive vice president. The new venture will handle all of the data processing and communications within Lucky-Goldstar's 20 affiliated companies. The move follows EDS's recent formation of a joint venture with Olivetti to market systems integration services to European firms.

Pioneer Acquired

One of the industry's original microcomputer companies, Cromemco Inc. of Mountain View, Calif., has been sold to diversified management conglomerate Dynatech Corp. of Burlington, Mass., for an undisclosed price. Dynatech, which bought Cromemco along with four other small, private companies on Dec. 31, says Cromemco cofounders Harry Garland and Roger Melen will remain with the company. The company will be part of Dynatech's video communications and test and measurement instruments group. Founded in 1974, Cromemco had seen limited success selling into academic and technical markets. More recently, the company had focused on video graphics and communications. Cromemco had 1986 sales of about $15 million and was not profitable last year. ■

Sooner or later...

everyone leaves the nest.

Discover the benefits of TRW's quality maintenance and repair services for your IBM systems. Mainframes. Minis. Micros. And compatible peripherals. You'll find true security with TRW's expert and remarkably cost-effective service programs.

TRW's nationwide network of service professionals, thoroughly trained in maintaining IBM systems, are dedicated to keeping your equipment in prime operating condition. Whether it's preventive maintenance or emergency repair of an occasional malfunction, we'll keep downtime low so that your productivity remains high. With guaranteed fast response. 24 hours a day if necessary.

There's an economical, comprehensive TRW Service Program that's just right for your equipment and your requirements. Call 1-800-257-7464 today for all the facts. Take wing with TRW and discover the advantages of independence.

TRW

Third Party Maintenance From A Company Called TRW

CIRCLE 23 ON READER CARD

CLIP AND SEND! Data - 3/87

It's about time I leave the nest, also. Please send me more information.

Name _____

Company _____

Address _____

City _____

State _____ Zip _____

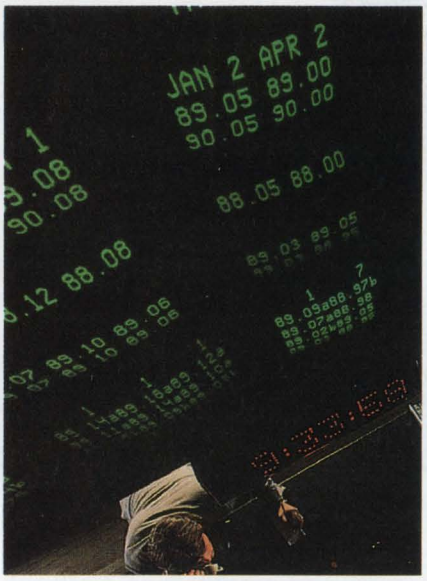
Phone _____

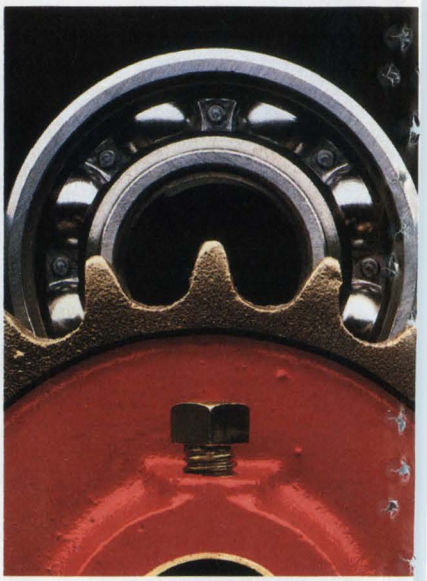
TRW Customer Service Division
Dept. 845, 15 Law Drive
Fairfield, NJ 07006

ACCESS T
TECHNOLOG

IT'S EASY TO USE.

IT'S EASY TO





DATABASE

Cullinet's new database products support all applications – small and large, simple and complex – to improve productivity and guarantee data integrity.

- High-transaction processing is enhanced with comprehensive MIS and end-user development tools.
- Delivers database products for connectibility across mainframe, departmental and personal computer architectures.
- Features an integrated data dictionary that ties together multiple data sources and supports SQL.
- Completely automatic backup and recovery requiring absolutely no human intervention. Recovers and re-establishes all transactions as well as data integrity.

NEW IDMS/ARCHITECT

Now Cullinet offers the only family of computer-aided software engineering tools that integrate both database and applications design.

- Dramatically improves design quality, shortens development time and automates documentation – all with reduced MIS manpower resources.
- Integrates database, fourth-generation development tools and applications.
- Mouse-driven, graphics-based intuitive interface delivers the ultimate simplicity in applications and database design.

APPLICATIONS

Integrated business applications now in use by over 2500 customers form the core of your successful information strategy.

- The Cullinet Manufacturing System lets you plan, control and react to real-world changes in the manufacturing cycle, worldwide. And now for government contractors, the system offers project management, bid tracking and funds management in compliance with DOD reporting standards.
- The Cullinet Financial System delivers on-line financial control to maintain current information accurately, efficiently and securely.
- The Cullinet Human Resources System gives you a complete personnel management and payroll processing capability.
- New financial and manufacturing functionality extend Cullinet's application solutions.

HE NEW Y OF IDMS/87.

IMPLEMENT.

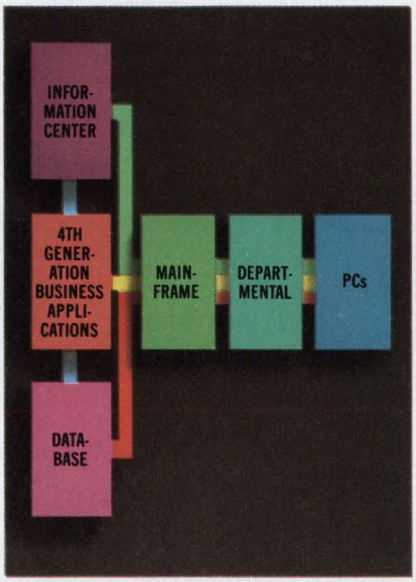
NEW IMPLEMENTATION WORKBENCH

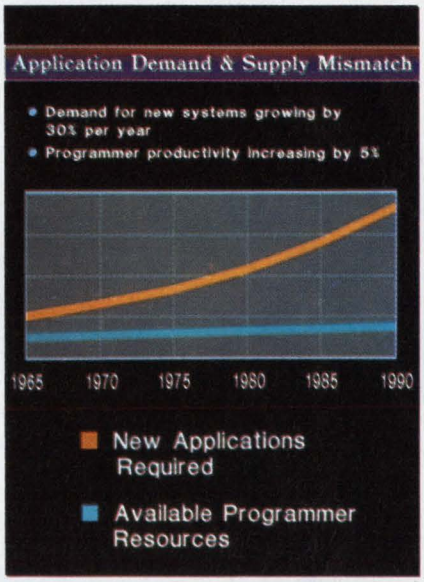
ullinet's new "expert" implementaon tool dramatically reduces applicaons installation time and assures roject success.

his top-down, PC-based implemention aid and project management ol provides training, customized, n-line documentation and data conrsions for Cullinet applications.

ts Cullinet manufacturing applicaons to the way you do business. What if..." implementation modelg and planning can be simulated.

IT'S EASY TO JUSTIFY.





NEW 3X3 ARCHITECTURE

Cullinet's comprehensive circumference strategy spans mainframe, departmental and personal computers for unmatched system integration.

- Database products, fourth-generation business applications and information center tools are engineered to work together providing total corporate computing solutions.
- SQL provides a point of compatibility across a three-tiered platform.
- Distributes uniform database products, applications and decision support throughout your organization's personal, departmental and mainframe computers.
- Integrates and provides connectibility between the DEC VAX – the world's leading departmental computer – and your IBM mainframe.

NEW BUSINESS CASE

Cullinet has done extensive research and quantified the variables, making it easier for you to implement your information system strategy.

- Cullinet's business-planning models spotlight specific benefits of an information system design.
- These models help evaluate the costs associated with the "buy vs. build" decision.
- An informative white paper detailing the economics of information systems strategy is available to help you examine the ROI of your information system.

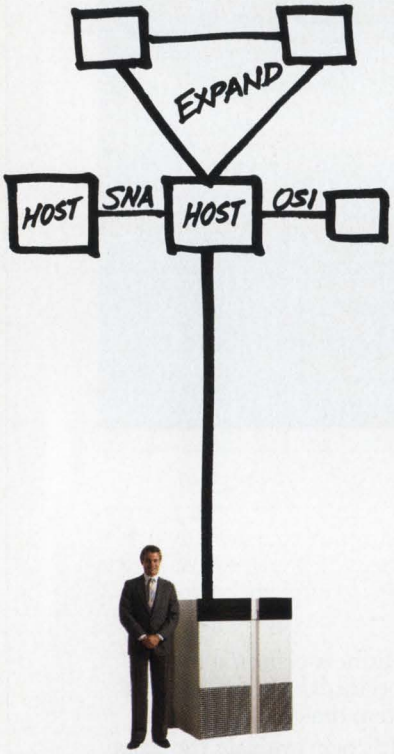
Cullinet

An Information Technology Integrator
For The 80s, 90s And Beyond.

EXPERIENCE IDMS/87 ON MARCH 31ST IN ONE OF THESE CITIES NEAR YOU:
lanta, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Hartford, Houston, Kansas ity (Missouri), Los Angeles, Minneapolis, Montreal, New Brunswick (New Jersey), New York City, Ottawa, Philadelphia, Portland (Oregon), San Francisco, Seattle, St. Louis, Tampa, Toronto, Tulsa, Washington, D.C.

NonStop EXT.™

Tandem technology extends transaction processing to a compact, low-cost system.



LOCAL AUTONOMY. CORPORATE UNITY.

The EXT is the low-cost system that lets you distribute your processing to the local level. More work gets done and you save communications costs. And because the EXT knows its way through all the major protocols (SNA, X.25 and O.S.I.) it can connect to and integrate with your network.

A COMPUTER ROOM ON WHEELS.

Everything is contained in one cabinet that needs no special air-conditioned environment. Just wheel it in and plug it in. Unpacking and set-up require only about an hour.

YOU GROW, EXT GROWS.

To add power, just add processors. You can grow from four to over 22 ET-1 transactions per second. You can upgrade memory from four to 64 megabytes. Grow at each location or grow to new locations, with software that's compatible throughout your Tandem network.

EVERYTHING'S EASIER.

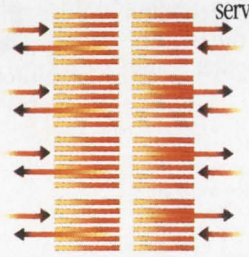
All major components are field-replaceable, so servicing them is fast and foolproof. Our high-performance, relational database simplifies use. And powerful programmer tools speed up application development.

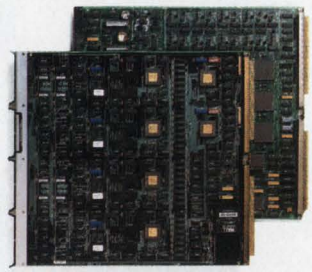
NO MORE TAPE REELS.

A tape cartridge snaps in and out and stores 90 megabytes, replacing two full reels of tape. There's room to add another tape drive if you need it.

THE DATA EXPRESSWAY.

Multiple high-density disk drives allow parallel data access. This speeds up data flow and shortens response time. Each drive can be individually maintained and replaced without interrupting service.





COMPACT COMMUNICATION CONTROLLERS.

They're all on a single board. Advanced, high-density circuitry saves space and increases reliability. Communications lines can be configured individually and can function simultaneously.

NO-FAULT INSURANCE.

Tandem's unique, parallel architecture keeps you up and running without the waste of idle backup components. Instead, multiple components share the workload. If one fails, the others pick up the slack.

EXTEND US A CALL.

Tandem systems are at work for Fortune 500 Companies in banking, telecommunications, manufacturing, retailing and energy, as well as several branches of the U.S. Govt.

To find out what we can do for you, call 800-482-6336 or write: Tandem Computers Incorporated, 19191 Vallco Parkway, Loc. 4-31, Cupertino, CA 95014.

TANDEMCOMPUTERS

CIRCLE 25 ON READER CARD

SPECIAL REPORT

Opening Moves

The Soviet Union says it wants a dp détente. In an exclusive DATAMATION interview, Gorbachev's man in charge of mass computerization, B.N. Naumov, proposes joint ventures with the West. The reaction in Washington is mixed and cautious.

BY PAUL TATE AND DAVID HEBDITCH

Boris Nikolaevich Naumov, the distinguished director of the Soviet Union's Institute of Informatics Problems, sits in his Moscow office and pounds his fist emphatically on his desk.

"We are ready to cooperate with the West in science, in fundamental research, in applications, in production, and in the future generations of computers. We want to organize joint ventures in many different fields, and as soon as possible. It depends on you, not on us. We are ready. Are you?"

Naumov pauses to let his heavily accented words sink in. He picked up much of his English during his time as a visiting professor on process control systems at MIT in the late '50s. A few years later he began the design and development of the USSR's strategic minicomputer line, the SM series. Now his status as an academician at the Soviet Academy of Sciences, as the head of an institute in the front line of the Soviet Union's mass computerization scheme, and as a leading figure in the Eastern Bloc's 11-nation research program into future generation systems makes him one of the grand masters of Soviet computing (see "The Man Behind the Message").

His call for East-West cooperation, during an exclusive interview with DATAMATION in Moscow, reflects the new, highly publicized Gorbachev policy of openness, or *glasnost*.

"From my point of view," he continues, "we must progress in many different ways with this cooperation. We must feel it is profitable both from your side and our side. When I say profitable, I'm not just talking about money, but about it being a very useful thing for the progress of technology."

Naumov is not naive. He realizes that access to a massive and eager new market is very tempting to the West's business community. He also realizes that such an offer is highly contentious, since many in the U.S. believe that any increase in U.S.-Soviet dp trade will strengthen the USSR's military resources.

Naumov feels this view is misguided. "Maybe, if a company has a secret, then it must save it, and if a technology is used in rockets or something like that, then it is impossible to share it, but for other things, no problem. Take the pc. What is strategic about a personal computer?"

That is no longer just a Soviet view of the U.S. high-tech export controls with the Eastern Bloc. A recent report from the U.S. National Academy of Sciences says the consequence of stringent export controls for U.S. companies is lost business of around $9 billion a year, and the U.S. government is preparing to lower some barriers to East-West trade (see "The Word from Washington").

Some forms of East-West cooperation may indeed benefit both sides. Most observers put the Soviets about five years behind the West in hardware. They are just moving into volume production on 16-bit pcs, 32-bit superminis, and multiprocessor mainframes running under operating systems similar to IBM's VS/VM. The software gap is narrower, particularly in operating systems and process and production control applications. Soviet scientists have been responsible for a number of important developments, from linear programming to some of the language compiler theories now being used in Japan's Fifth Generation Project (see "The Soviet Leading Edge").

Where the Soviets have excelled is in the fields of computing science, application algorithms, and theory. What the Soviet Union lacks is an industry that can back up those theories with volume production—a point that Naumov readily admits.

Not Enough Computers

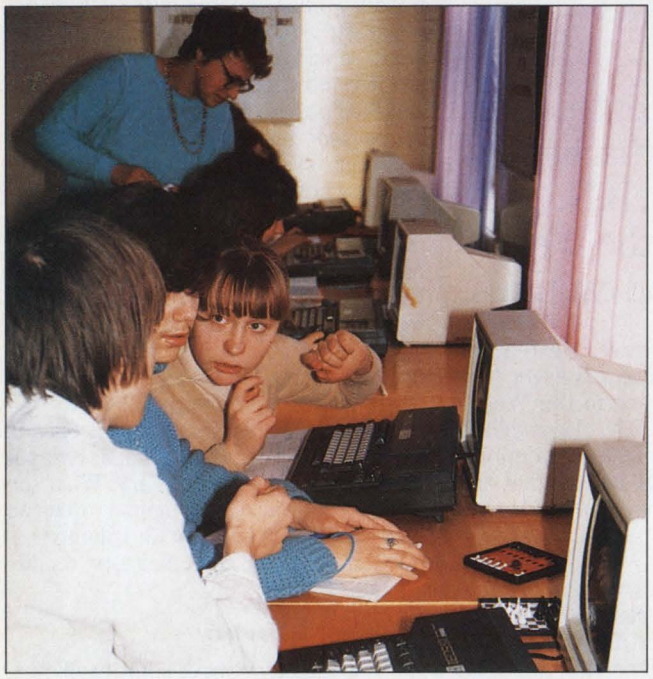
"Certainly we have some problems, and these aren't simple ones," he says. "The biggest problem is that we do not have enough computers. It's not the design of the computer that is the main obstacle, but organizing the production. It's a problem of developing a modern industry in computers which can provide what the users want.

"For each area we are ready to have serious discussions with your companies and your people. That is why we are asking you if you are willing to cooperate with us at this time. We are prepared to join with you. If you are not prepared to join us, then excuse us please, but good-

Boris Nikolaevich Naumov, director of the USSR's Institute of Informatics Problems.

Photographs by David Hebditch

SPECIAL REPORT



Naumov wants to develop very small, very cheap computers for children.

bye. We will survive without you.

"If in future we work by ourselves, like NEC does in Japan where its computers aren't compatible with anything, then it will produce very bad conditions for your businessmen. It will be impossible to sell to us. Those products will not be compatible with our computers.

"So, I propose that we organize an international institute for the standardization of future generation computer systems—to work together at a fundamental level. When we have got those standards, you will go back to your countries and build systems using your technology and we will go back to our country and build with our technology."

Naumov also proposes ventures for linking medical databases via satellites and pcs, for developing cheap and simple educational software and hardware, and for designing and developing integrated manufacturing systems.

Naumov isn't prepared to agree to just any type of venture, though."I have had some proposals when companies want to organize joint ventures for producing old products. We must buy modern products, not old ones. These must have compatible software with our own, like Unix or something else we want to use, and have high-level interfaces for instrumentation. I have had a few cases when Americans have sold us very bad things—like an IBM XT [clone] (not from IBM; IBM always sold us very good products). These are very bad computers and they still don't work. Now we are not so stupid and in future we will not buy these.

"But we have bought computers from the Japanese and these are very good. We bought 4,000 Yamaha computers with a simple network for schools. They are very reliable and they are very cheap. I like the Japanese. They are very accurate in their technology and their business relations. But they have problems. When IBM wants to sell us IBM XTs for example, it is easy. But when we wanted to buy from the Japanese they had 10 times more trouble getting approval."

The widespread economic and social reforms rapidly being introduced in the Soviet Union by First Secretary Mikhail Gorbachev depend heavily on the mass use of computing technology to make them work (see "Gorbachev's Gambit"). The Soviet Union needs products fast. The USSR's current Five-Year Plan calls for 1.1 million microcomputers to be installed by 1990 and for production of all computers to be increased by 140% over the same period.

"We made many serious decisions at the 27th Congress," explains Naumov, referring to the Communist Party's meeting in Moscow in February 1986, "especially about how we must improve in the fields of informatics and computers and so on. It is one of the main directions that we must follow in our country.

"Maybe for us it was more important to apply computers as process control computers at first. At that time we did not use computers in office automation so much. Now we are using them for text editing, for spreadsheet calculations, for local information retrieval, and so on."

This "electronization and computerization of the national economy," as Naumov describes it, is being supported by a three-pronged policy: the creation of a stronger, independent Soviet dp industry; extending technical cooperation with other Eastern Bloc countries; and seeking stronger commercial and scientific links with the West.

"In many countries people are mistaken," he observes. "You think that it is only possible for our country to buy computers from the U.S. or from other Western countries. But you must understand that our country is a great country, like your country, and the first problem we must solve for our country is to improve our own industry. It's impossible, in any case, only to buy. We must have our own industry. This is the first way we are going ahead and we are doing so very actively. We have agreements with other socialist countries that have been given the highest priority."

Joint Projects Involved

Those Eastern Bloc accords involve joint projects among 11 socialist countries covering the production of the current ranges of mainframes, minis, and pcs. There are also links between the Academies of Science of these countries involving extensive and ambitious programs of joint research into future technologies such as AI software and computer architectures. These fall under the Eastern Bloc's Comprehensive Program of Scientific and Technological Progress to the Year 2000.

But for all the grand plans, Naumov concedes that some aspects of the Soviet technology industry are still weak: "We are only at the first phase of this development," he explains. With so much political attention being paid to the use of computers, however, he is confident that the existing industrial infrastructure can be quickly improved. As Naumov puts it, "It may take us a long time to harness the horse, but when we have, then we like to ride very fast. Look at our achievements in nuclear power—not Chernobyl!—and space technology."

Certainly, the Soviet computing in-

dustry has become increasingly independent. For example, Naumov revealed that he is now completing the design of a combined television and 16-bit computer, costing, he says, the same as a regular color tv, and destined for mass production later this year. Naumov explains, with one of his easy smiles, "Because Mr. Reagan restricted our relations in the field of computers, we have improved faster than we thought before. We're grateful to him."

Naumov continues in a more serious vein. "Many times, I hear people in the West say that we just copied DEC or IBM or so on. It's not true. It's impossible for us to have direct copies like that. IBM and our computers are quite different. Now we are going our own way."

Naumov's point here is significant. While Soviet component technology may be competent, it does not match the sophistication of that in the U.S. or Japan. To copy a U.S. machine, chip for chip or board for board, would be impossible. The Soviet DEC-like SM Series of minicomputers and the Soviet IBM 360-like ES mainframes have more in common with plug-compatible systems than direct copies (see "Soviet Systems").

Yet Naumov admits that in the past these two major U.S. companies did provide a direction for Soviet hardware development. "Certainly, there was a time when we were working with the standards set by DEC and IBM, but we were prepared to pay for that," he says.

Naumov's reference is specifically to East-West discussions on licensing U.S. technology. "If you want just the technology then you must pay for it," he repeats, "and we wanted to pay DEC, for example, to use their standard. We had discussions with senior people and at that time it would have cost us between $5 million and $7 million to use the DEC standard in our circumstances. And our officials agreed. But after that, along came the bureaucrats and . . . ." He shrugs eloquently.

The result of that failure of the two superpowers to cut a licensing deal was that the Soviet Union became more active in developing its own range of DEC-like systems, the SM Series. There are some DEC systems that have entered the country via the so-called gray trade, which bypassed the export restrictions (see "Techno-Bandits," Sept. 15, 1984, p. 116). Nevertheless, most of the estimated 60,000 SM minis now installed, of which 40% are employed in process control tasks, were designed and built in the Soviet Union and other Eastern Bloc countries. That was Naumov's job until 1983.

Even More Strategic Role

Now his role as the head of the Institute of Informatics Problems (IPIAN) is even more strategic for the development of the Soviet dp industry. IPIAN employs around 900 computer specialists working in its Moscow headquarters and three other offices across the country. It is a part of the Soviet Academy of Sciences, which is represented on the newly formed State Committee for Computers and Informatics, the main policy-making body for computer use in the Soviet Union.

IPIAN has a wide brief. It is a research and consultancy group, assessing user needs and translating them into recommendations for new products and systems. Naumov explains, "Our institute is quite different from other institutes because we do fundamental research and we are working on current problems. Our main direction is to work in the different fields of computing for mass applications, from personal computers to megaminis."

That covers three main areas: short-term product development in both hardware and software, free dp consultancy to the whole of the Soviet industrial and scientific community, and long-term research into new technologies.

Within those three areas are a number of other specific responsibilities. "It's impossible for our institute just to take only one problem," Naumov explains. "The main task is to understand what is necessary to develop effective applications—to feel, to understand the real problems, especially for our country, a socialist country. . . . The level of production today is also under our control. We must give advice—good advice—on how to improve it. We must also give technical advice on which foreign computers to buy."

Much of Naumov's current work is focused on personal computers. "In terms of the importance and the num-

The Man Behind the Message

Beneath academician Boris Nikolaevich Naumov's avuncular style is a sharp, decisive mind that steps nimbly from discussions on operating systems to foreign trade issues to the standards jungle to Marxist-Leninist politics and back again.

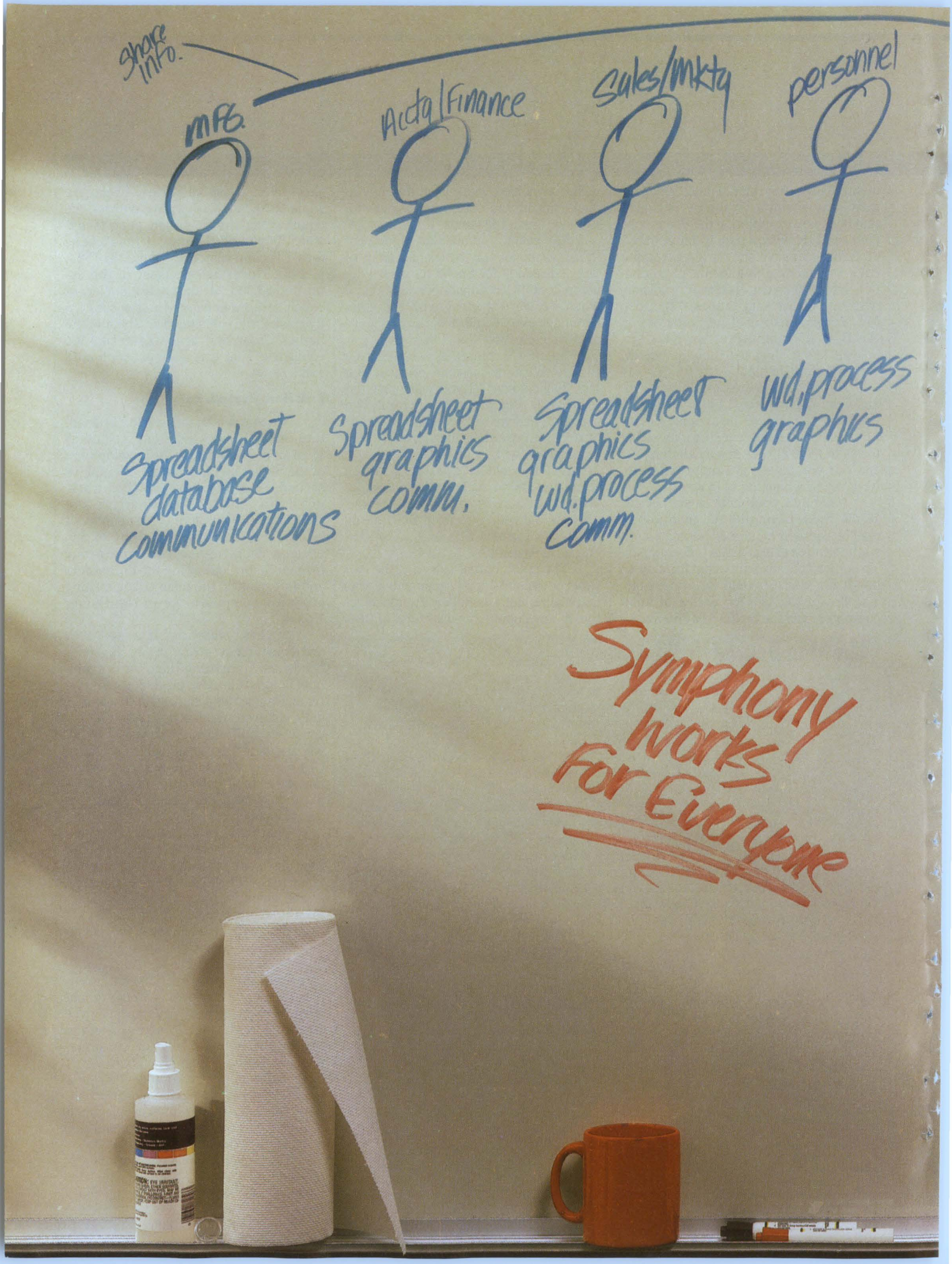
Born in Moscow in 1927, Naumov graduated from the Moscow Energy Institute in 1950, became a Doctor of Technical Science in 1966, and made full professor two years later. In due course he received the ultimate accolade: membership in the Soviet Academy of Science and subsequent election—in 1984—to the rank of academician. In the intervening years, Naumov published more than 100 scientific papers and won a number of awards, including the State Prize of the Ukrainian Republic. In 1955, he became scientific secretary at the Institute of Administrative Problems, working mostly on process control systems. In 1958, Naumov spent some time as a visiting professor at MIT.

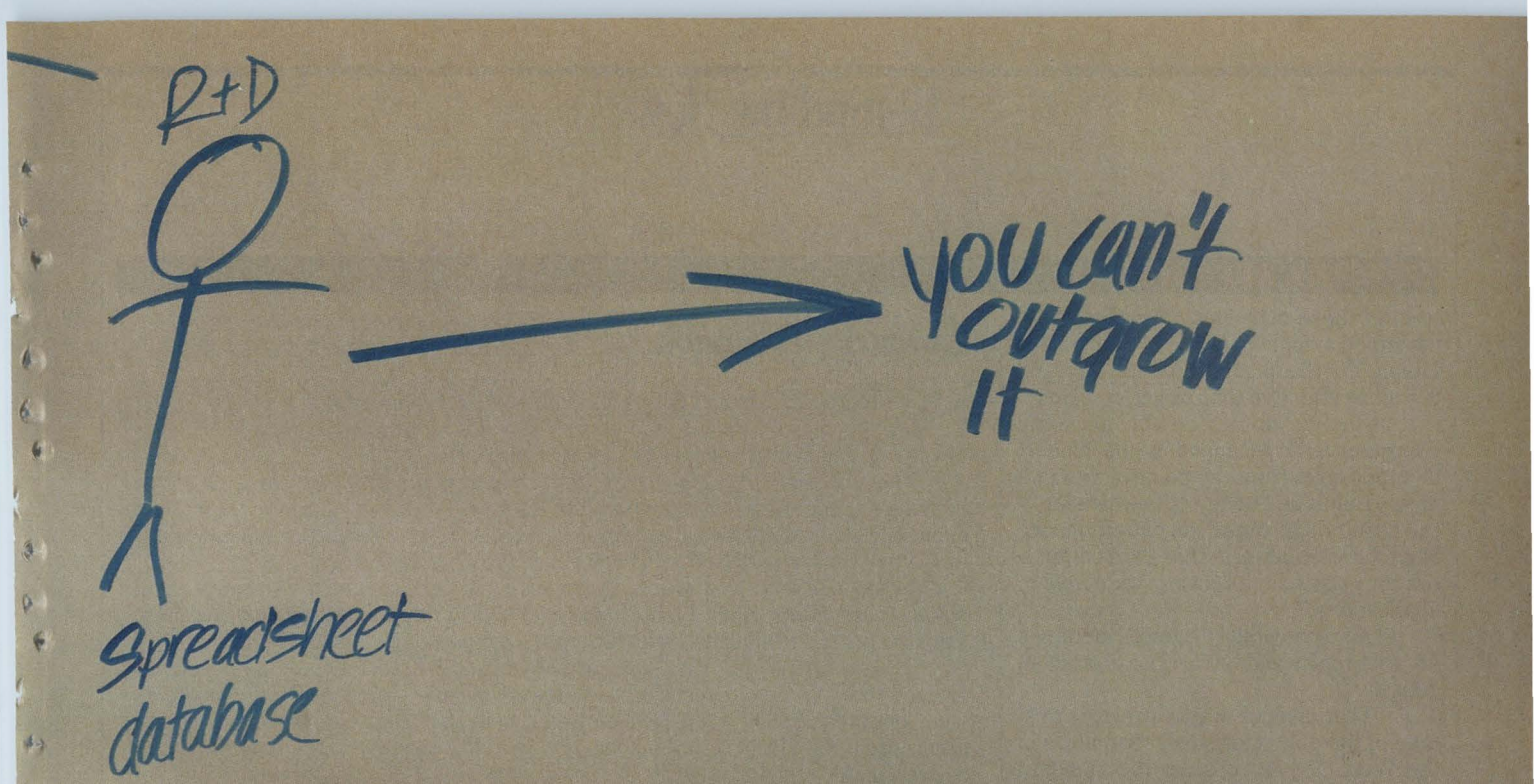
In 1967, he became director of the Institute of Electronic Control Equipment, essentially an R&D department of the Ministry of Instrumentation, Automation, and Control Systems (MINPRIBOR), a major computer manufacturer. There, he took charge of the M series of process control computers.

From 1974, Naumov was chief designer of the DEC PDP-compatible SM range of general purpose minicomputers. His other areas of interest have included the architecture and programming of multimicro systems, networked computers, processors for compiling high-level languages, and publishing systems. The year 1983 saw his appointment as director of the newly formed Institute of Informatics Problems (IPIAN) in the Soviet Academy of Sciences.

Naumov is also involved in a variety of high-level Eastern Bloc bodies concerned with the conception of future generations of computer systems.

Last year, Naumov became director general of the Intersectorial Scientific and Technological Complex (ISTC) for Personal Computers. Conceived to break down the traditional barriers between R&D and manufacturing, this group is seen as the white queen in Gorbachev's gambit of using computers in the modernization of the cumbersome Soviet economy.


share info.
Mfg.
Acctg/Finance
Sales/Mktg
personnel
Spreadsheet database communications
Spreadsheet graphics comm.
Spreadsheet graphics wd.process comm.
wd.process graphics
Symphony works for Everyone



Symphony® is the one software product no business and no business person can afford to be without.

Based on the 1-2-3® spreadsheet technology, Symphony pulls together five key functions in one program. Functions that help a marketing manager work smarter. Give a financial analyst a clearer picture. Run an entire company more effectively.

An all-in-one investment, Symphony increases in value over time. It offers continuous growth through Lotus® Add-in products like Spelling Checker, Text Outliner, Symphony Link™ and through more than 250 specialized applications designed by independent software developers.

What's more, Lotus backs Symphony with a free telephone hotline and Lotus PROMPT,™ a new comprehensive user support program.

One product to train on. One company to support you. One investment that grows over time. For all these reasons, you should consider standardizing on Symphony to meet the personal computing needs of your corporation.

Lotus Symphony

A complete general-purpose software tool built around the world's leading spreadsheet technology.

SPECIAL REPORT

bers of these machines," he says, "it is certainly a high priority in the Soviet Union. It's the cheapest technology, and it's more effective than larger systems.

"But we don't see the personal computer as an independent machine. It is impossible, from my point of view, to divide [minis and micros]. The division is the result of an American definition. We like to say simply that these are computers for mass use, for a very wide field of applications."

This is obviously one of Naumov's favorite topics and he carries on enthusiastically.

"That division was a strategic mistake of the policy for small computers in the West. If you consider the standard pc—I must be polite to IBM, because I like this company very much—but it is not possible to connect many things around the pc. Many of the interfaces are only there in principle. When you want to [share] it in bigger configurations for applications packages like a spreadsheet—Lotus 1-2-3 and so on—you can't.

"And it's also necessary to have a real-time operating system for pcs. But you don't have that. Only MS/DOS.

"But DEC always had systems designed to be used in big configurations with different types of operating systems, and now you are looking back to

"WHAT IS STRATEGIC ABOUT A PERSONAL COMPUTER?"

the DEC approach. They are rising in the field of technology because they are cheap and you can use their systems for any type of application. That was a strategic mistake of many American companies. At first they had some real success with pcs, but they did not think about the future in different fields of applications. That is my personal opinion."

Naumov's philosophy of strong integration and standardized multiuser small systems lies behind much of the development work at IPIAN. Naumov reveals that the institute is "working on

Gorbachev's Gambit

If First Secretary Mikhail Gorbachev gets his way, the economy of the Soviet Union will undergo a radical change, and the widespread use of computer technology is regarded as one of the key factors in his plan.

The scale of the problem is awe-inspiring: an economy producing more than 24 million kinds of products (one fifth of the world total by value) for 280 million consumers. Although the national income has been expanding since World War II, the rate of that growth has been declining in the past 15 years.

In the new spirit of *glasnost* (openness), one of the country's leading economists, academician Abel Aganbegian, writes that "these negative trends stem from mistakes and shortcomings in economic management."

The problems are many, but the one getting the most attention is overcentralized control. The preoccupation of Moscow planners with production volumes (the "quota mentality") and the centralized fixing of things like product lines and prices are seen as root causes of the problem. Consequently, the manufacturing sector cannot respond directly to consumer needs. The result: mismatches between supply and demand in the areas of product type, quantity, quality, and price.

"It is no longer possible to manage effectively—from the center only—an economic complex that comprises scores of thousands of enterprises," Aganbegian says.

The immediate action that has been taken is to increase the autonomy of the individual enterprises by enabling them to raise bank loans, implement local cost accounting procedures, reinvest profits in their own firms instead of sending them to Moscow for redistribution, have more direct links with the marketplace, allow larger organizations to trade directly with foreign companies for the first time, and set their own prices.

Aganbegian says that the objective is a "rational combination of centralization and decentralization." Ministerial bodies will concentrate more on matters affecting the national economy and thus ". . . will be freed from their petty tutelage over enterprises . . . and from settling matters which can well be managed by the enterprises' work collectives." The result of this greater freedom will be concerns that are "profitable, self-sufficient, and eventually self-financing."

Since 1986, all enterprises have been given this new autonomy and claims are already being made for improved productivity and profits.

The Soviet government sees information technology as the springboard for the modernization process. Traditionally, computer support for Soviet organizations has come down from the dp department of the controlling ministry in the form of "packaged solutions" to specific problems or the provision of bureau services. These systems are unlikely to take account of the new planning and control responsibilities of the local management teams. The traditional strength of Soviet computing has been in process and production control systems; what is now needed is software for the new accounting systems, market research, budgetary control, and office automation.

The enterprises will thus be looking for quick, cheap, and effective solutions—pcs, easy-to-use applications, and some training. Anything too complex involving minis or mainframes will take too long.

The Institute of Informatics Problems and the Intersectoral Scientific and Technological Complex for Personal Computers are responsible for ensuring that this demand is met. The target set by the current Five-Year Plan is 1.1 million micros plus open-ended applications packages to go out to the schools and enterprises by 1990. Production of all types of computers is to be increased by 140%.

Such rapid and radical improvements in the efficiency of any economy can be achieved only with the support of the managers and workers most affected. They will want to know what's in it for them.

Perhaps the answer to that lies in Mikhail Gorbachev's speech to a key meeting of the Communist Party's Central Committee in January: "We need democracy like air. If we . . . make no serious steps to broaden democracy, to advance it, and to draw the country's working people extensively into the process of national reconstruction, our policy will be choked off, and our plans peter out."

LAN REPORT 5

A Hard Look at LAN Choices.

Novell's LAN Report Package makes choices easier.

The flexibility of local area networks allows users to assemble LANs using network components that best suit the needs of the installation. But choosing those components can be a confusing process.

Novell, Inc., has published two reports designed to make the process easier: the *LAN Operating System Report 1986* and the *LAN Evaluation Report 1986.*

These reports help users evaluate network components and make informed decisions when choosing the components that meet their needs. Hardware and software issues are separately evaluated in the two reports, and extensive performance benchmarks are included.

Software Choices.

Choosing a network operating system, or LAN software, is the most critical aspect of designing a network. Simply, the better the operating system, the better the network. The *LAN Operating System Report* contains an in-depth analysis of LAN software, beginning with an examination of LAN software standards such as MS-DOS 3.1 and NETBIOS, and the file server environment. Issues like internetworking, system reliability, security and performance are addressed as well.

The *LAN Operating System Report* also evaluates Novell Advanced NetWare, the IBM PC Network Program and 3Com 3+. The report shows users how the design and implementation of these products translates into real performance.

Hardware Options.

The *LAN Evaluation Report 1986* focuses on evaluating network hardware. It examines hardware issues that affect LAN performance, including an analysis and benchmarking of major LAN products.

"Hardware and software issues are separately evaluated in the two reports..."

A key element of the study is the NetWare Evaluation System. The system provides a mechanism for matching site needs to specific hardware. Whether a new network is being planned or an existing site is being upgraded, the study is useful in the performance evaluation of any network.

System planning starts with the network interface card (NIC) and cabling. NICs analyzed in the study are:

- AT&T StarLAN
- Corvus Omninet
- Davong MultiLink
- Gateway G-Net
- IBM PC Network
- IBM Token Ring
- Interactive Systems Vista LAN/PC
- Nestar PLAN 2000
- Novell S-Net
- Proteon ProNET
- Standard Microsystems ARCNET
- 3Com EtherLink
- 3Com EtherLink+

The report analyzes each NIC according to its access scheme, raw bit rate, on-board processor and NIC-to-host transfer method.

Another important component of the LAN is the network server. In examining network servers, the *LAN Evaluation Report* looks at several performance indicators. Processor type is the most obvious feature to differentiate servers. However, other factors important in determining server performance are also evaluated, including processor clock cycle speed, wait states, server memory cycle speed, memory channel and transfer bus channel. And the report examines the effect of disk channel speed on network performance.

In addition to providing a careful examination of LAN hardware, the *LAN Evaluation Report* features an evaluation formula. Using the formula, a LAN's estimated future site activity is measured and matched to the appropriate LAN hardware.

To Get the Reports.

The *LAN Operating System Report 1986* and the *LAN Evaluation Report 1986* are available free of charge from Novell. To obtain a copy of the Novell Report Package, call or write Novell Corporate Communications, 122 East 1700 South, Provo, Utah 84601, (801) 379-5900.

NOVELL

CIRCLE 27 ON READER CARD

SPECIAL REPORT

new architectures for personal computers, pcs with local networks, different interfaces to link scientific, medical, and factory floor instruments to pcs, powerful server systems, and shared memory for mainframes and small computers."

Naumov is also working with other development groups in his capacity as the head of the Intersectoral Scientific and Technological Complex (ISTC) for Personal Computers. This is one of the organizational innovations that was introduced by Gorbachev in December 1985. It is designed to overcome the rigid structure of Soviet ministries that are responsible for specific vertical sectors of industry or society. By creating a cross-sector organization that will pull together all the country's specialists in one field, Gorbachev hopes to shortcut

"WE WILL SURVIVE WITHOUT YOU."

the decision-making process, help put theories into practice much faster, and pool valuable resources.

The ISTC's designers work on prototypes and then place manufacturing contracts with the ministries that offer the best deals on cost and quality. This Western-style competitive bidding for contracts is a new development for the Soviet system.

"It is a very interesting new forum," says Naumov. "We are the leading organization, and around us we have all the groups that are working in the field of personal computers. We are responsible for all technical matters for personal computers on many levels. We are preparing the programs, we are designing the operating software, and we are forecasting the number of pcs we will need."

Those forecasts suggest that after the first installation phase of 1.1 million pcs by 1990, the number of micros will triple over the following five years. This may not seem like much when compared with Western markets, but Naumov suggests that such direct comparisons are invalid.

Soviet Systems

Most experts agree that the Soviet Union is now three to five years behind the West in its dp technology. The same experts believe that this gap is closing.

Over many years, the Soviet Union has allocated substantial resources to the development of supercomputers. The most established installed machine in this class is the workhorse BESM-6, the design of which dates back to the 1950s. At less than 7MIPS, the BESM is not astoundingly fast, but is good enough to support the Soviet space program. The flagship supercomputer is the Elbrus. It is considerably more sophisticated than the BESM, with multiprocessor configurations combining as many as 10 cpus, and is rated at well over 100MIPS.

In the 1960s, the Soviet Union decided that it could not afford to diversify its resources in the development and production of mainframe systems. Soviet technologists were impressed with the design and quality of the System/360s they had bought from IBM. They were equally impressed with Big Blue's increasing domination of the Western market and decided that compatibility would yield benefits in international trade in both hardware and software.

Eastern Bloc versions of the IBM 360—and subsequently the 370—have never been copies. The technology gap in LSI chip manufacture dictated that Soviet versions be reengineered equivalents compatible at the instruction set and I/O bus levels. This is the same approach adopted by Western pcmers.

Soviet mainframes are often described in the West as the Ryad series. The Soviets themselves designate them as ES models, from the Russian for "unified system." The larger ES models are made in the Soviet Union, but the nine or so smaller models are manufactured in Hungary, Czechoslovakia, Poland, Bulgaria, and East Germany. The power of the bigger computers ranges up from the old IBM 370/168 and includes multiprocessor configurations. The fastest of the medium range are said to be equivalent to the IBM 370/148 models.

A similar strategy of compatibility with a key Western product has also been taken—in this case with a 16-bit Digital Equipment Corp. PDP-11. These were designated SM after the Russian for "minicomputer system." The popular SM1420 (known as the SM5 in export markets) runs at 1MIPS with up to 4MB of main memory, ranking it in performance alongside DEC's PDP-11/23.

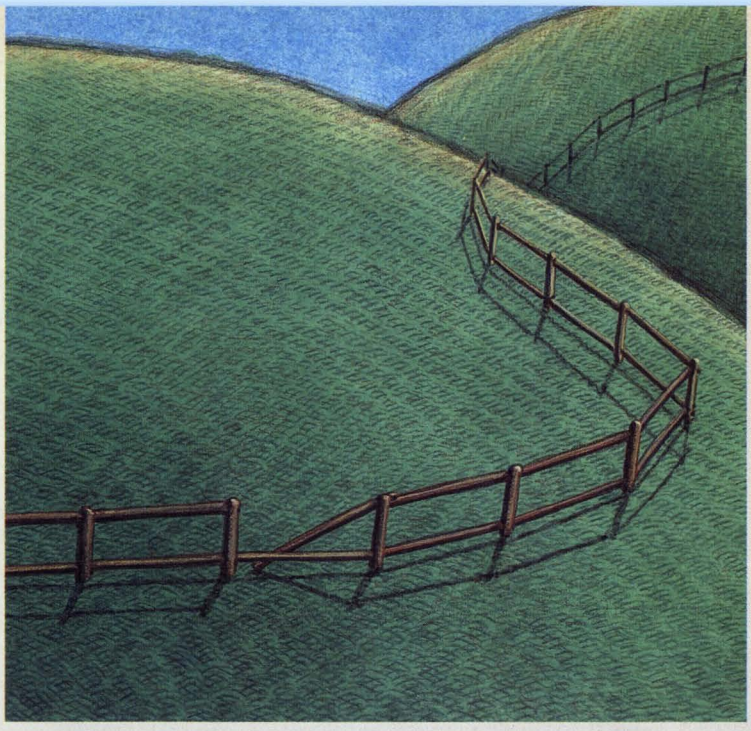
The Eastern Bloc is also gearing itself up for the manufacture of what it calls megaminis. These 32-bit processors (called E82 or SM52) are thought to be compatible with the DEC VAX but engineered with lower-density chips. Bulgaria, Czechoslovakia, and the Soviet Union are all participating in the development of these machines, and limited production of models in the DEC VAX 11/750 and 11/780 range is now under way.

The relative success of the SM range clearly influenced the Soviet Union's decision to base its first volume microcomputer on a chip set implementation of the PDP-11 instruction set (analagous to the LSI-11 range). The advantage of this approach lay not only in the familiarity of the technology, but also in the fact that a real-time operating system was available. This was important for a country that puts such emphasis on process control and instrumentation systems.

This class of product is available as the SM1300 and SM1800 ranges as well as 12 models of the Elektronika-60. Commitment to the LSI-11 instruction set will continue in the tv-based micro developed by the Institute of Informatics Problems and the Intersectorial Scientific and Technological Complex for Personal Computers, but it is understood that some compatibility has been sacrificed.

The Agat micro, similar to an Apple IIe, was short-lived, with the ISTC for Personal Computers recently killing the project to release production capacity for more modern products.

The gap between the low-priced tv/micro and the expensive Elektronika-60 is likely to be filled with an IBM PC look-alike. Limited manufacture of various models using a chip equivalent of the Intel 8086 has already begun in Leningrad, Moscow, and Minsk. It is thought that the existing production capacity will be sufficient for only about 20% of the target of 1.1 million personal computers set by the current Five-Year Plan to 1990. This capacity will be increased, but the Soviet Union will import PC clones to make up any shortfall.



AGS knows... building a better system is not just a matter of mending fences.

A successful information processing system must be constructed on a solid foundation. This foundation consists of a strategic design, state-of-the-art tools and technical aptitude; all of these comprise a system that is maintainable.

To achieve a quality system, many of the world's largest corporations and government agencies have called upon AGS consultants to design, implement and maintain their information processing systems.

Among our 1,800 professionals you'll find technical expertise in such areas as UNIX*, C, DB2, ADABAS, CICS, IMS, IDMS and SQL as well as extensive experience in networking, telecommunications, and computer manufacturing applications. In addition to their technical abilities, our consultants work well within existing management structures.

To find out how you can stop mending fences, send for our brochure, "In systems development... ". Write AGS Information Services, Inc., 1139 Spruce Drive, Mountainside, New Jersey 07092.

33 offices throughout the United States and Europe. Also serving the Federal Government marketplace.

*UNIX is a trademark of AT&T Bell Laboratories.

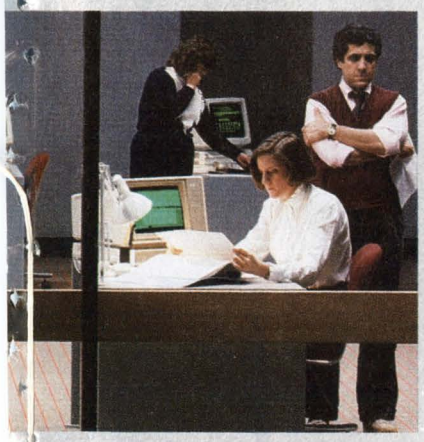
CIRCLE 28 ON READER CARD

AGS

Digital has it now.

The one thing departments do with consistency is change. Therefore, the most challenging problem in departmental computing is how to meet needs you can't always predict.

Digital understands. Our solution is a single architecture that is so flexible, it can satisfy your department's computing performance demands from the desktop to the data center. Our VAX™ systems all use the same huge range of applications, the same files, the same friendly commands. Throughout the department, VAX systems, storage devices and applications can be cost-effectively added or reallocated without disrupting users. Systems can even



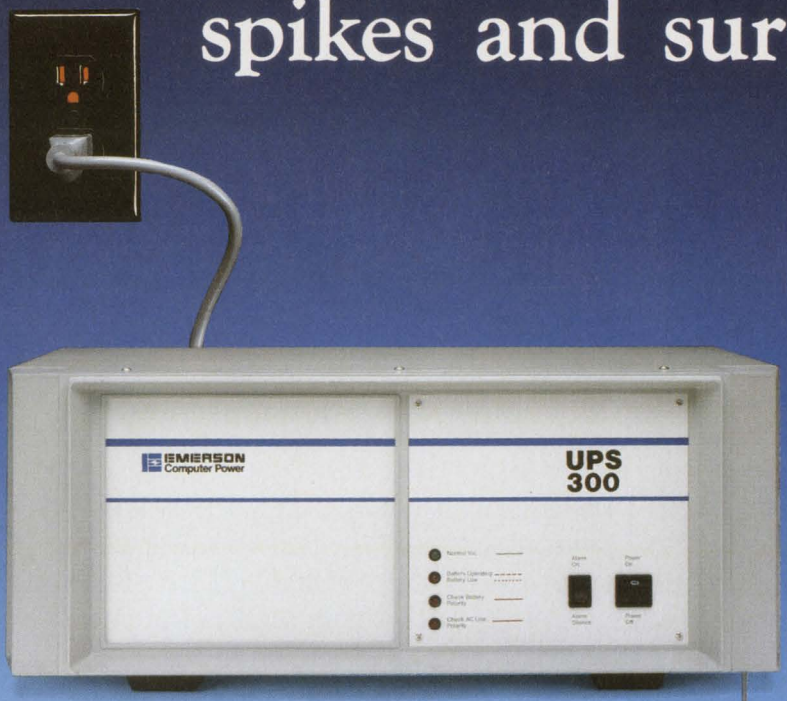
One Architecture. A consistent approach to computing for all your department's changing needs.

be clustered for greater power, capacity and redundancy. Transparent communications built on the same architecture let you tie our computers to each other and to multi-vendor environments. And because of our superior networking technology, you can also connect peer-to-peer in both local and wide area networks.

Best of all, with one architecture you're always in control–no matter how things change. Call your local Digital sales office. Or write: Digital Equipment Corporation, 200 Baker Ave., West Concord, MA 01742.

digital™

Emerson's UPS* protects your investment from blackouts, brownouts, spikes and surges



200 to 1500 Watt models available

Twenty Years of Power Protection Experience

Today, as the world's largest manufacturer and supplier of Power Protection Equipment up to 4,000KVA, Emerson has brought its experience and expertise to the microcomputer user. **Emerson's AP1000 Series UPS** has been designed, sized, and engineered to provide your **microcomputer** system with full sine wave power protection at the most affordable price.

PC's - AT's* - XT's*
Microcomputers

***Uninterruptible Power System**

Call today for more information and a free brochure...
"How to Size Your UPS"
1-800-BackUPS
Ext. 28

EMERSON Computer Power

Emerson Electric Co., Industrial Controls Div.
3300 S. Standard St. (P.O. Box 1679)
Santa Ana, California 92702 USA
(714) 545-5581 Telex 67-8460

"The Computer Power Specialists"

* "AT" and "XT" are product models manufactured by International Business Machines Corporation.

CIRCLE 30 ON READER CARD

SPECIAL REPORT

"You see, this first million might be quite enough for our needs until 1990. In our planned system we know what sort of computers and how many of them we need for each industry. We will probably need only a few general purpose pc software packages, too—maybe 10 or 15 covering accounting, forecasting, text editing, graphics, data management, and so on. It is not like other countries where there is a market to sell to."

Strengthening Educational System

A top priority for the Soviet Union during the early stages of this micro revolution is the strengthening of its educational system. Naumov estimates that "a little less than half of our microcomputers are for education at the moment. Like in Lenin's time when education was the first problem, now educating people to use computers is our first problem."

There are already a number of computer schools in the country. Among the systems installed are simple networks of National Panasonic and Yamaha micros from Japan, conforming to the MSX standard for systems software and hardware. The first Moscow center serves 1,500 students aged 15 and 16 who each attend for one day a week over a period of two years. They learn some aspects of computer science and BASIC programming, and get some hands-on experience.

Naumov wants to take computing to much younger Soviet children. "We will develop very small, very cheap computers for children, maybe before they are of school age. The trouble is that I don't like many of the computer games in your countries. Mostly it's piff poff, piff poff. Sometimes I like to piff poff too, but in principle we must improve these games. They should be designed to improve the intellect, to improve knowledge in special fields and decision-making."

Naumov maintains that policy of easy-to-use but effective software when developing packages for other application areas. "You see, software must be simple. Then it must be effective. After that you can put the software into an organization very quickly. The software that is around now—like Lotus and Supercalc and so on—it is good, but it is only the very first stage."

He would like to combine the abilities of Western software companies with the work on "application algorithms" now being done in the Soviet Union. This brings Naumov back to the problems of setting up such cooperative ventures.

"I have said to many people from the West, to IBM, to many companies, 'Let us sign.' But they cannot. They must ask somebody."

Naumov holds a document, typed in Russian, above his head. "This is a copy of the Helsinki Accord, and I can show you what was agreed by the American president. It talks about cooperation in the computer field, telecommunications, and information technology. Look, it's

Plaque translates: "Academy of Sciences of the USSR, Institute of Informatics Problems."

The Soviet Leading Edge

In the town of Bourne End in Buckinghamshire, England, is a small computer company called M.S. Associates Ltd. that specializes in Unix and computer language translation systems. In January, the company launched a major new product, a database system for Unix that runs up to five times faster than the standard C-ISAM package. Called C-Index, it's based on a theoretical tree structure contained in a scientific paper called, "An Algorithm for the Organization of Information," published in 1962 by two of Russia's leading mathematicians, G.M. Adelson-Velsky and E.M. Ladis. "The Russians are excellent at that kind of mathematical theory," comments Robert Manning, the M.S. Associates software engineer who uncovered the Russian paper.

While it is a commonly held view that the USSR lags behind the West in computers and information technology, it would be unwise for the West to take too much comfort from such a sweeping assumption. The major area of deficiency is in the technology of production. In other areas, Soviet achievements are significant.

Soviet scientists and technicians can certainly design computers and build plenty of working prototypes. Indeed, their problem in the past has been that they designed too many prototypes that never reached volume production. But there were certainly innovations. The design group led by B.I. Rameyev implemented an open-ended I/O bus, the precursor of Digital Equipment Corp.'s Multibus and IBM's Block Multiplexor, as early as the 1950s. The Mir computer, developed by V.M. Glushkov at the same time, anticipated ROM-based language processors by featuring a "microcoded" compiler.

While the West is beginning to standardize on 1Mb components, the Soviet Union is catching up in LSI technology and is now using 256Kb memory chips.

The USSR's real strength has always been in fundamental research and the theory of computing. In spite of the fact that the study of cybernetics was considered politically unsound in the Soviet Union until after the death of Stalin, it was Soviet scientists who established the principles of linear programming—an essential computer-based technique for optimizing complex manufacturing processes in oil refineries and chemical plants throughout the world.

This is one example of the Soviet expertise in developing algorithms that can be adapted for specific applications. Other examples include algorithms covering medical systems, process control, and instrumentation. Also, Soviet work on language compiler theory underpinned much of the research in Hungary that resulted in a compiler for the AI language Prolog, and was subsequently bought by the Japanese for their Fifth Generation Project.

Prof. Martin Healey, head of microprocessor systems research at University College, Cardiff, Wales, is an expert on computer architectures. "The Soviet Union always seems to be before its time on theoretical matters," he contends. "Their research is very mathematical and often very impractical—the technology is not always there to test the theory. In recent years, they have been publishing many papers on computer architectures, particularly for parallel processing. Once they are able to make the building-block chips for such systems, the theory will suddenly become relevant and practical. Such a coincidence of events might cause them to leap ahead in this area."

SPECIAL REPORT

Washington's Reaction

"Working with the Soviets is a long, frustrating experience," says Tom Christiansen, manager of international trade relations for Hewlett-Packard and a member of the subcommittee on export administration of the President's Export Council. "The Soviets want turnkey operations. U.S. firms will be unwilling to do the handholding that would require. A lot of firms would find other things they could devote equal time and energy to and be a lot more successful with."

Prospects don't look terrific right now for Boris Nikolaevich Naumov's proposed joint ventures. But maybe later, because, after years of crying in the wilderness, industry's voice is coming through loud and clear in Washington. The controls on export controls are about to become less controlled.

It started with a report by the National Academy of Sciences (NAS). A prestigious panel of former government and intelligence officials and current industry and academic luminaries issued a devastating report on the current state of U.S. export controls. Among its kinder comments were that "the recent performance of the U.S. government [on national security export controls] has not been satisfactory because it has tended to focus on tightening controls while giving little attention to their effectiveness and costs. The executive branch has failed to implement the existing provisions of law in a coherent and effective manner, which has in turn created uncertainty, confusion, and criticism at home and abroad.

"In the absence of appropriate corrective measures, these continuing problems will exact ever-higher tolls—on both Western economic vitality and innovative capacity and on the military security of the United States and its allies."

But it was the $9.3 billion and 188,000 jobs that export controls cost in 1985 that gave the computer and electronics industry the momentum that has led to the current race to see which piece of government can do the most the fastest.

"The terms of the debate have changed completely," says Jim LeMunyon, senior manager of government relations for the American Electronics Association. "It's not whether the export controls are going to change, but by how much."

"I'd like to think the report was the key," says Christiansen, also a member of the NAS panel. "But there are a lot of other factors. Competitiveness is now a bipartisan issue. There are a lot of trade bills circulating. And there's a new broom in the National Security Council. They're reexamining export controls too.

"When we started investigating this 18 months ago, nobody knew where this would go. We figured we were probably writing for the next administration. But it became clear the pendulum had swung way too much the other way."

Now it's swinging back. The Commerce Department has proposed that licensing requirements be dropped for "low-level" exports. That would probably include products widely available elsewhere. The department would also loosen or eliminate reexport of products from one Coordinating Committee on Export Controls (Cocom) country to another. At present, if a U.S. manufacturer ships a high-tech item to another Cocom country, U.S. permission must be given before the product can be resold outside the country. Industry members have consistently said this extraterritoriality provision hurts their international reputations and costs them sales.

President Reagan has commissioned a Cabinet review of export procedures and wants a report by mid-March.

"Much of our poor international performance is a self-inflicted wound," says Rep. Bill Frenzel (R-Minn.). "It's worse than the NAS said. The greatest problem is the chilling effect on potential small exporters who have said the hell with it."

"I'm not surprised the atmosphere has changed this fast," LeMunyon says. "When the facts are known, the right things can get done very quickly. It's not a matter of relaxing national security. Industry still wants to make sure a Cray doesn't slip through the cracks. But this beast has gotten way out of hand. Congress can do some good things this year."

BY WILLIE SCHATZ

page number 46 in Russian. And it was signed by the president of the United States. It means zero. I don't believe the signature of the president of the United States—not in my field."

Of course, the Helsinki Accords, signed by President Ford and Leonid Brezhnev in 1975, cover many areas, notably human rights. While no country is above reproach, as pointed out by Helsinki Watch, the private monitoring group, the differences are "significant" between the Western countries and the Soviet Union and its satellites, which have committed the most egregious violations of the agreement.

The technology clauses are vague, referring to "possibilities for improving cooperation," but Naumov takes them very seriously. He stresses the difference between such accords and commercial deals. "When I have had relations with different private companies, when they signed something, they always gave me 100% or sold me what they promised. You see, in my field the president's signature means zero. The agreement was not fulfilled." Naumov believes part of the trouble is that "the responsibility to give the okay or not for technology trade lies not with the heads of the computer companies but with bureaucrats who don't know the difference between a bit and a byte."

In his view, these people stand in the way of genuine scientific and commercial cooperation—and of the natural links that govern the way societies interact, whatever their political persuasion. That is particularly bad for the scientific community, which has always had something of an international ethic, one that has most of the time managed to overcome political boundaries.

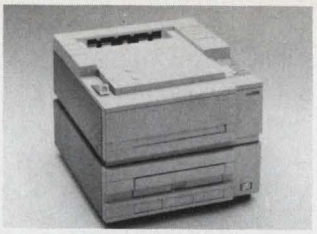
"There is in the world a culture," he concludes. "It belongs to you, to me, to everybody. Computing is becoming a part of that.

"And, you see, if we are friends, if we are discussing something even with opposite points of view, then maybe we too can find a new brilliant idea." ■

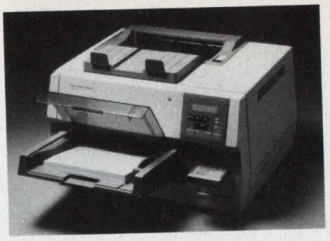
David Hebditch is a freelance writer based in Leeds, England. He is a DATAMATION *advisor and was coauthor with Linda Melvern and Nick Anning of* Techno-Bandits *(Houghton-Mifflin, Boston, 1984), a book on covert East-West technology trade.*

Also contributing to this article were Nick Anning, a freelance journalist based in London, and Heikki Auvinen, managing director of East-West trade consultancy Asumer Oy in Helsinki, Finland.

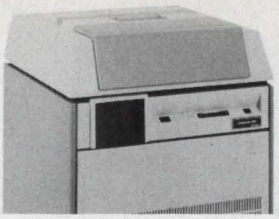
QMS-PS 800



ITT Qume ScripTEN



Texas Instruments OmniLaser 2108



Linotype Linotronic 300

QMS-PS 2400

The biggest names in desktop publishing all speak the same language.

These best selling laser printers all use POSTSCRIPT®, the page description language from Adobe Systems.

Only POSTSCRIPT can combine text, line art, even digitized photographs on the same page. That's one reason more manufacturers use POSTSCRIPT in their laser printers and typesetters than any other language.

With POSTSCRIPT you also have the option of printing from a PC, Macintosh or mini/mainframe computer. So, you select the best laser printer for your company's desktop publishing needs, without making a once-and-for-all commitment to a single vendor.

But the freedom of choice doesn't end there. Hundreds of software programs, for an assortment of operating systems, support POSTSCRIPT printers.

Plus, POSTSCRIPT is the only device independent page description language. That means a document can be designed at your office then printed professionally at a higher resolution.

So, take your pick of laser printers. Just make sure it speaks POSTSCRIPT, the language of electronic and desktop publishing.

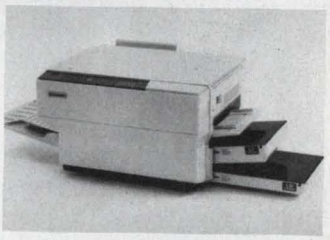
For the name of the manufacturer's sales representative in your area, call 415-852-0271.

ADOBE SYSTEMS INCORPORATED

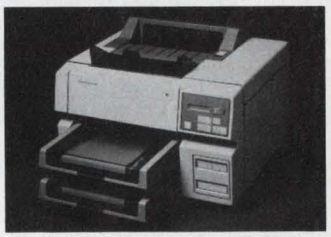
POSTSCRIPT from Adobe. The magic behind desktop publishing.

NBI Model 908

Apple LaserWriter/LaserWriter Plus

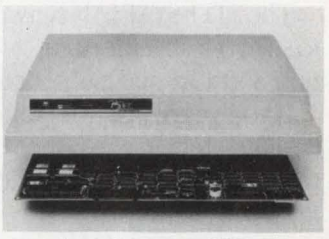


Dataproducts LZR-2665



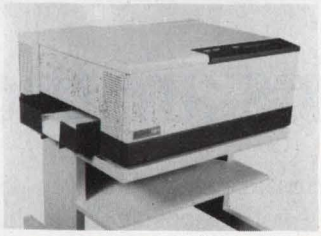
Texas Instruments OmniLaser 2115

Agfa-Gevært P400PS

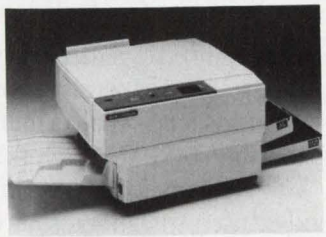


Laser Connection PS Jet

NEC SilentWriter LC-890



Diconix Dijit 1/PS



Apollo Domain/Laser 26

How many possibilities are there

For customized solutions to networking problems, AT&T comes through.

The AT&T STARLAN Network is so flexible, you can tailor it to suit your specific needs, to get your people sharing information, software and high-priced peripherals.

If you've got just two PCs and one printer, or more PCs and peripherals than you care to count, you can easily link all of them together with the STARLAN Network using standard telephone wiring.

AT&T's STARLAN Network is so compatible it works with PCs and software made by different manufacturers. Even MS*-DOS and AT&T's UNIX® System V workstations are able to share information and resources, giving users easy access to one another's files.

As many as ten computers can be linked together in a basic Daisy Chain configuration. And there's no expensive central equipment to buy, so your start-up costs are kept to a minimum.

When you're ready to expand, the STARLAN Network's modular design makes it simple. With Network Extension Units, you can add on over one hundred users spread across an entire department or small business. Even your departmental

*Trademark of Microsoft Corporation

with AT&T's STARLAN Network?

STARLAN Networks can be linked by connecting them to AT&T's powerful Information Systems Network, giving you a fully integrated system with PCs, mainframes and terminals.

The STARLAN Network also offers AT&T service and support, including installation, documentation, maintenance, training and hotline assistance.

From equipment to networking, from computers to communications, AT&T comes through. To find out how to take your first step toward a flexible networking solution, contact your AT&T Account Executive, your authorized AT&T supplier, or call 1 800 247-1212.

AT&T
The right choice.


Kilobytes
LAN BRAN
Fiber Fortified
FAST!
Kilobytes
LAN BRAN
WITH EVERY INSTALLATION OF OPTICAL FIBER YOU'LL GET:
● HIGHER DATA RATES—UP TO 1300 NANOMETERS AND 100 MBPS!
● ELECTROMAGNETIC ISOLATION!
● LESS SIGNAL DISTORTION THAN ANY LEADING COPPER BRAND!
● NO MORE SNAP, CRACKLE AND POP!

3-D illustration by Kathy Jeffers; Photograph by Steve Cooper; Fiber Optics courtesy of General Fiber Optics Inc.

Much debate about which LAN to choose has focused on the transmission medium and the topology: baseband vs. broadband coaxial cable, shielded twisted pair vs. unshielded twisted pair, and bus vs. ring. Missing from the debate until recently has been any discussion of optical fiber, which has become increasingly attractive in the LAN arena as costs plummet.

Standards: The New Fiber Diet

BY WILLIAM STALLINGS

Choosing a backbone LAN can be as confusing a task as deciding on a diet plan. There always seems to be a new one on the market, promising better results than the old ones. But now there really is a new kind of system, based on the Fiber Distributed Data Interface (FDDI) standard that, like a high-fiber diet for people, will keep a backbone LAN running smoothly.

Although optical fiber has already become the darling of the long-distance world, cost and technical hurdles have kept fiber out of the LAN arena until recently. This is changing largely because of FDDI, which the American National Standards Institute (ANSI) expects to finalize by year's end. Even though FDDI is not part of the well-known IEEE 802 family of standards, it is likely to have at least as much impact on the market as those older standards. Customers can expect to see some FDDI products by the end of this year—perhaps even earlier—and a large variety of vendors providing products in 1988.

Local area networks on the high-speed FDDI are ideal backbone LANS for premises distribution systems, such as a large network inside a building or a network of equipment and slower-speed LANs throughout a cluster of buildings. FDDI is the only high-speed backbone LAN standard now in progress.

As the use of distributed processing applications and personal computers increases, network planners must develop flexible strategies for local networking. Optical fiber systems offer that flexibility. Using a single LAN is not a practical solution in most cases, because premises data communications requires a networking and communications service capable of

Standards: The New Fiber Diet

spanning distances to interconnect equipment in a single building or a cluster of buildings. A more attractive alternative is for the network planner to use lower-cost, lower-capacity LANs within buildings or departments and to link these units with a backbone LAN—a high-capacity (and therefore higher-cost) LAN.

High LAN capacity can be achieved in two ways—by using multiple channels at relatively low data rates, or by using one channel at a relatively high data rate.

The multiple channel method can be used with a broadband bus LAN. A notable drawback to this approach is that bridges must be provided between channels, and their architecture must be designed carefully to avoid high rates of interchannel traffic and bottlenecks at the bridges. A number of analytic and simulation studies reveal that none of the available medium access control protocols for the broadband bus achieves high efficiency at high data rates. (The one area in which broadband is superior to optical fiber is video. A broadband LAN can easily carry multiple channels of video as well as multiple channels of data. A fiber LAN like FDDI can carry one or two channels of digitized video at most, and in doing so, leaves little room for data.)

The alternative is to use a single-channel LAN with a high data rate, in the neighborhood of 100Mbps. This approach, however, requires a topology other than bus.

To realize the single channel's full potential requires an efficient medium access control protocol that allocates LAN capacity in an orderly fashion. The high data rates and long distances encountered in typical backbone LAN applications, however, make efficiency hard to achieve.

The allocation task requires that information be exchanged among the participating devices—an exchange that consumes time and capacity. The larger

Facts on FDDI

The FDDI standard contains two specifications, one for the physical layer and one for medium access control. The physical layer details the characteristics of the optical fiber transmission medium. These characteristics are primarily determined by the choice of signaling rate and fiber dimensions.

The specified data rate is 100Mbps using an encoding scheme called 4B/5B. The actual signaling rate is 125MHz. Given today's technology, these are reasonable values. Although it is possible to achieve much higher data rates on the point-to-point links used in a ring (250Mbps to 500Mbps), higher rates would result in significantly increased costs and smaller ring capacity in terms of number of repeaters.

The wavelength specified for data transmission is 1,300 nanometers. Virtually all fiber transmitters operate at 850, 1,300, or 1,550 nanometers. The cost and performance of the system increases as the wavelength increases. For local data communication, much of the traffic today uses 850-nanometer light sources. However, at distances of about a kilometer and data rates of about 100Mbps, this wavelength loses steam. On the other hand, the 1,550-nanometer source requires an expensive laser and probably represents overkill for the LAN application. Accordingly, the FDDI committee chose the 1,300-nanometer specification, which allows the use of less expensive LED sources and can support the data rate and distances required for a high-speed ring LAN. (Although the nature of the clocking for this scheme limits the frame size to a maximum of 4,500 octets, there seems to be no particular user disadvantage to this limitation.)

The dimensions of optical fiber cable are specified in terms of the diameter of the core of the fiber and the outer diameter of the cladding layer—a glass or plastic coating that surrounds the core and guides light signals along it. The combinations that are allowed in the FDDI standard are 62.5/125, 85/125, 50/125, and 100/140 microns. The latter two are not officially part of the standard but are listed as "alternatives." Smaller diameters offer higher potential bandwidths but also higher connector loss. The 50/125 fiber is used primarily by the military and is not likely to be as widely available as the other sizes. The 62.5/125 has been in production for some time and has become popular for local applications, such as in AT&T's Premises Distribution System. Component costs for this type of fiber are dropping the most. The 85/125 fiber is preferred by the FDDI committee because it is most easily tailored to specific applications. This product is relatively new. Finally, the 100/140 fiber seems to have been added primarily because it is used in IBM's cabling system and a number of customers have already installed this cable. It is unfortunate that the standard could not specify a single fiber type, since this might have resulted in lower costs and would have made it easier for the customer to start small and expand later.

Based on these characteristics, the maximum distance between adjacent repeaters is two kilometers. The FDDI specifications were developed on the basis of up to 1,000 physical connections and a total fiber path length of 200 kilometers.

The FDDI standard explicitly addresses the need for reliability and includes three reliability-enhancing techniques: a bad or power-off station is bypassed by an automatic optical bypass switch; wiring concentrators can be used in a star wiring strategy, facilitating fault isolation and correction; and two rings can be used to interconnect the stations so that a failure of any station or repeater results in the automatic reconfiguration of the network to maintain connectivity.

The token-passing protocol used in FDDI is based on the IEEE 802.5 standard for a 4Mbps twisted pair ring. When no station is transmitting, a small control packet—the token—circulates around the ring. When a station has data to send, it must wait until it sees the token. It then removes the token from the ring and transmits a packet of data. The packet will circulate around the ring and return to the transmitting station, which absorbs it. Once the station has finished transmitting, it places the token back on the ring. In the FDDI standard, the station places the token back on the ring as soon as it has completed transmission.

The FDDI standard also specifies a means for capacity allocation. Two types of traffic are accommodated—synchronous and asynchronous. Synchronous traffic is guaranteed a certain fraction of the 100Mbps capacity. Any unused capacity is available for asynchronous traffic, which may be subdivided into up to eight levels of priority. Capacity allocation is controlled by a technique known as timed token rotation. In essence, each station keeps track of how long it has been since it last saw the token. When it next sees the token, it can send synchronous traffic and any asynchronous traffic for which time remains available. This scheme provides good support for a variety of interactive and bulk file transfer applications.

The Silent 700™ Data Terminal Series from Texas Instruments.

Next time you take off, take the DEC connection.

Talk about convenience for the DEC user. TI's TravelMate™ 1200 is display, printer and communications all rolled into one lightweight, go-anywhere package that emulates a VT-100™ video terminal. With it, you can access DEC computers from just about any remote location as long as there's a phone handy.* Perfect for on-the-go DEC communications.

The TravelMate 1200 VT-100 emulation cartridge also includes auto access features such as stored phone numbers and log-on sequences. This actually makes your TravelMate-to-DEC communications easier than using a phone. And the VT-100 emulation cartridge can be programmed to fit individual applications within your DEC operating environment.

The TravelMate 1200 with VT-100 emulation capability also carries an impeccable pedigree — a 15-year heritage of reliable, rugged design and dependable operation. After all, it's a

member of the Silent 700 Series of Portable Data Terminals family from Texas Instruments. It's definitely a terminal you can trust.

So next time you have to take off, take the DEC connection.

For more information on the Silent 700 Series, TravelMate and VT-100 emulation, call toll-free **1-800-527-3500.**

TEXAS INSTRUMENTS

Silent 700 and TravelMate are trademarks of Texas Instruments Incorporated.
VT-100 is a trademark of Digital Equipment Corporation.
*In locations where a phone jack is not accessible, the optional acoustic coupler may be required.

Standards: The New Fiber Diet

the network, the longer it takes for control information to propagate to the LAN's various devices. The higher the data rate, the more costly this time is in terms of the number of bits of data that could have been transmitted.

A carefully designed version of the token-passing protocol can achieve high efficiency on the ring. Thus, the requirement for high data rate and long distances dictates the use of a ring topology. Using a ring LAN for the backbone implies an additional technical requirement. In a ring LAN, a data signal is repeated a number of times as it circulates. At each repeater, the receiver must be synchronized with the incoming signal by recovering clock information from the signal. Due to distortions in the signal, there is a clock recovery error, known as timing jitter, which is cumulative around the ring. Thus, the number of repeaters, and hence the size of the ring, is limited by jitter. The longer the average distance between repeaters and the higher the data rate, the greater the effects of timing jitter. These effects are minimized by the use of optical fiber, which introduces less signal distortion than copper media.

The continuing improvements in performance and falling prices, combined with its inherent advantages, make optical fiber well suited for local networks. In the context of a LAN for premises distribution, optical fiber offers three important features: electromagnetic isolation, small size, and low cost.

Isolated Electromagnetically

Optical fiber systems are isolated electromagnetically from the environment. Because they do not radiate energy, they are not vulnerable to interference, crosstalk, the effects of lightning or electromagnetic pulse, or eavesdropping.

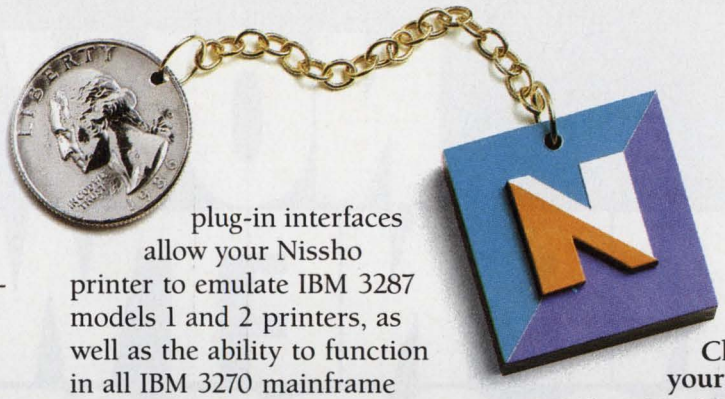
Another reason to choose optical fiber is that it's considerably smaller and lighter than coaxial cable or bundled twisted pair cable. In addition, with proper packaging, it can be made quite rugged for outdoor use.

The third advantage is that the cost of optical fiber components is dropping. Optical fiber, which is becoming competitive with broadband coax, is expected to be increasingly less expensive than broadband over the next few years.

As the FDDI specification moves toward standardization, interest in fiber LAN products is growing on the part of both vendors and customers. It is safe for network planners to assume that FDDI products will soon be widely available and prices will be competitive with other alternatives for backbone local nets. ■

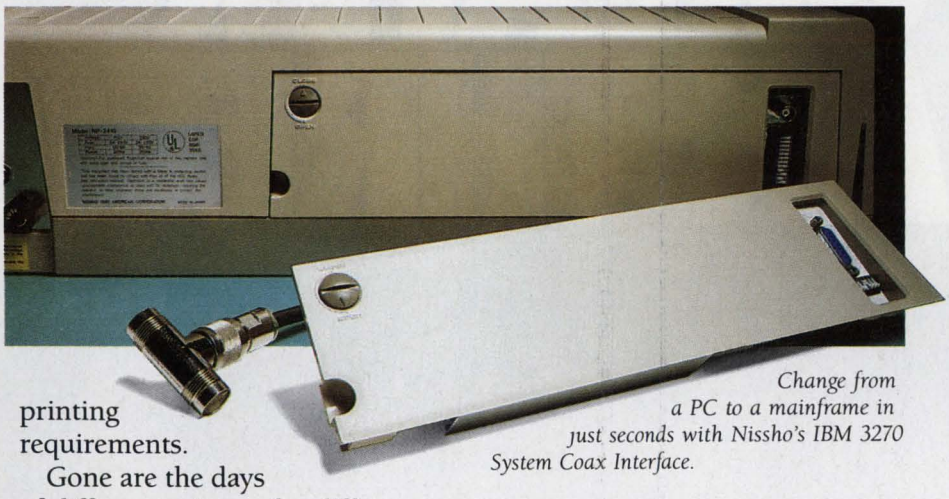
A frequent contributor to DATAMATION, William Stallings is president of Comp/Comm Consulting, Great Falls, Va.

The key to cost effective System 3270 printing.



Just think, if you had a Nissho NP-2410 or NP-910 printer, all you'd need to change your interface from a PC to an IBM 3270 System Coax…is a quarter.

We've incorporated modular interfaces into every Nissho printer, providing you with flexible solutions for all your IBM systems printing requirements.



Change from a PC to a mainframe in just seconds with Nissho's IBM 3270 System Coax Interface.

Gone are the days of different printers for different applications. Now, you only need one printer…Nissho.

Quick change artist.
Simply by inserting a quarter into the back panel slot, you change your interface from a mainframe to a micro computer in just seconds. And that makes your Nissho printer more versatile, too.

Our interchangeable, modular plug-in interfaces allow your Nissho printer to emulate IBM 3287 models 1 and 2 printers, as well as the ability to function in all IBM 3270 mainframe environments.

Both the NP-2410 24-wire and NP-910 9-wire printer give you functions like compressed printing, high speed printing, advanced paper handling, demand document capabilities, 100% duty cycle, and hex transparency mode for graphics capabilities.

Also available, is the IBM Systems/3X Twinax Interface, as well as Centronics™ Parallel, Centronics Parallel with 48K buffer, RS-232-C Serial, and RS-232-C Serial with 48K buffer.

Choose your weapon.
Nissho's NP-2410 produces letter-quality dot matrix sharper than you've ever seen before…fast too, at 180 cps. And it puts out 540 cps at 18 characters per inch in draft mode. Compare that to your current printer.

If your needs call for a dot matrix "power printer," our NP-910 is the answer. It's the ideal printer for numbers-intensive printing, with an impressive 350 cps.

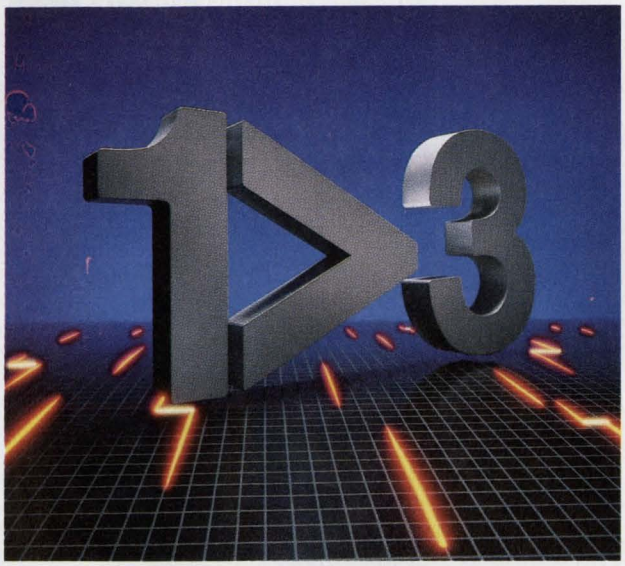
So no matter what you're looking for in an office printer, check out the Nissho NP-2410 and NP-910. The only printers that let you change your interface for a quarter.

NISSHO Information Systems
10855 Business Center Drive, Suite 100
Cypress, California 90630
(800) 952-1919
(800) 443-9998 In California
(714) 952-8700 California Headquarters
(617) 337-1270 Eastern Regional Office

NISSHO
Information Systems

NOW ONE NETWORK IS GREATER THAN THREE.

You count on a satellite network for some data transmissions. A microwave to link different offices. And leased lines for still other applications. Sure they work. But now, one Telenet® network can combine the best of each technology to deliver tighter cost control and better management for virtually all your applications and locations. Couple this with Telenet's advanced protocol conversion and unique switching capabilities and you can integrate dissimilar hardware systems and handle your asynchronous and synchronous applications on one backbone network, a Telenet network.



We'll design, build, and manage a private network for you, link you with our public network, or set up a combination. We'll coordinate sub-contractors and blend your existing systems into one network. One that'll grow as fast as you do. And through our management facilities you can gather network statistics, monitor activity, troubleshoot and diagnose problems. Network control. Network efficiency. And built-in network security.

Telenet has developed and installed more than 70 dedicated networks. We operate the world's largest public data network supporting over 1000 virtual private networks. We've proved time and again one network can be greater than three. For more information, have your computer call ours today.

TO REACH TELENET VIA TELEMAIL®:

- With a PC or terminal supporting asynchronous communications, using your modem, dial 1-800-424-9494.
- Wait for connection, then press carriage return (CR) twice.
- At TERMINAL = press CR.
- At @ type MAIL press CR.
- At USER NAME? type ONE.NETWORK press CR.
- At PASSWORD? type TELEMAIL press CR.

Or call us at 1-800-TELENET. Or send us your name and address via Telex: 248419.

Telenet
A US Sprint Company

SENDING DATA TO WORK FOR YOU.℠

CIRCLE 36 ON READER CARD

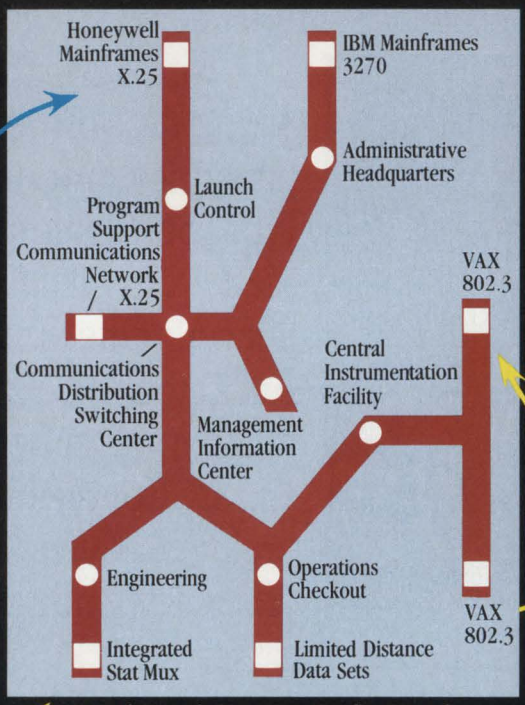
The Common Sense Data Network

The solution to most real-world data communications needs is a hybrid network. One that complements the performance features of a LAN and the efficiency of a WAN.

It's simple common sense and it's called DevelNet.

In its most basic form, DevelNet is a data switch—but with a significant difference. DevelNet is the most sophisticated data switch available today.

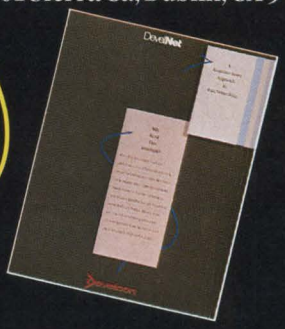
DevelNet features unlimited growth, tremendous data gathering capabilities, and gateways to complement your existing 802.3, X.25 and T1 networks. DevelNet's performance is proven daily at NASA's Kennedy Space Center.

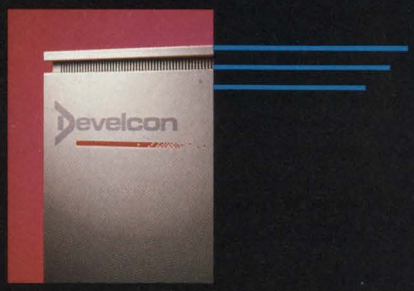


N.A.S.A's Kennedy Space Center DevelNet Network

If you're in the market for a high performance, cost effective data network, you can't afford not to consider DevelNet.

Call us toll free:
In US: 800-423-9210
In CA: 800-345-9097
In Canada: 800-268-3349
Or write to receive your DevelNet literature "A Common Sense Approach to Data Networking."
6701 Sierra Ct., Dublin, CA 94568





DevelNet
The Common Sense Network

See Us At Booth #1680
INTERFACE '87
15th ANNUAL CONFERENCE & EXPOSITION
FOR COMMUNICATIONS & INFORMATION NETWORKS
Co-Sponsored by
BusinessWeek and Data Communications
March 30-April 2 1987 Las Vegas Convention Center
Las Vegas Nevada

Develcon
The Northern Light in Data Communications

CIRCLE 37 ON READER CARD

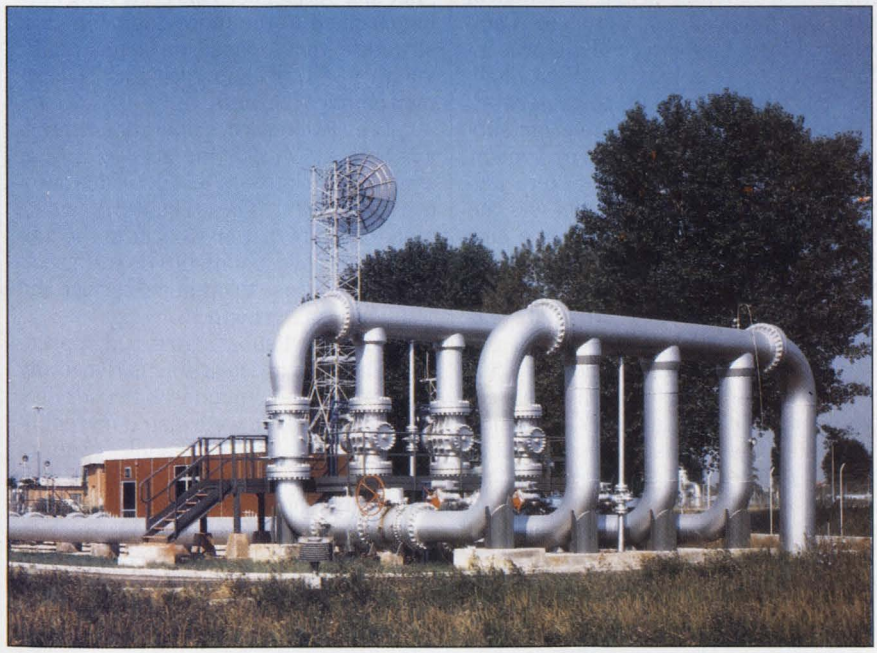
The story of how Ente Nazionale Idrocarburi (ENI), Italy's huge national energy conglomerate, went from a point-to-point to a packet switching network is told by the telecom chief, who was involved with the massive data communications project from start to finish in 1985. The story starts seven years ago, when ENI's SNAM subsidiary began examining alternatives for a shared, switched network. ENI went with X.25 to set up its Internet network, which serves 5,000 users in 400 locations all over Italy.

A Net Gain for Packet Switching

BY GIACOMO V. REPETTO

Whatever happened to packet switching? Well, the 20-year-old data communications technology that went to Europe and thrived is once again up and running data in America. Hewlett-Packard recently announced that its new corporate networking strategy would be based on packet switching. And experts are predicting that the tried-and-true technology will get another big push as more and more voice nets become packetized.

What the Americans are discovering has been well known in Europe for years—packet switching is efficient and cost-effective. One European company that realized a net gain from packet switching is Ente Nazionale Idrocarburi (ENI), Italy's giant energy conglomerate. With over 60 subsidiaries spread throughout the country, ENI has substantial data communications needs. To meet those needs, the $24 billion state energy conglomerate began building back in September 1984 a packet-switching network to serve 5,000 users in 400 locations. What ENI ended up with is Internet, one of Europe's largest private networks, supporting some 20,000 megabytes of traffic a day.



ENI, Italy's national energy corporation, uses cable and microwave links in its packet switching network to monitor its oil and gas pipeline operations.

Internet, which became operational in 1985, was Italy's first—and one of its largest—corporate X.25 networks. The net is run by Societá Nazionale Metanodotti (SNAM), the ENI subsidiary responsible for the company's oil/gas pipeline transportation operation and for corporate telecommunications. In the early '80s, SNAM recognized that considerable economies could be achieved if all corporate datacom traffic could be carried by a single, high-capacity shared network.

Prior to 1984, datacom at ENI was basically point to point on numerous radial networks, with the host computers located in several cities. For each subsidiary's network, the "spokes" reached out to hundreds of terminals scattered all over Italy. A large proportion of these point-to-point connections overlapped with each other and with the links from other subsidiary companies within ENI.

Installing and maintaining this type of duplicative setup was inefficient, particularly since a parallel backup link was needed for almost every line. To guarantee the continuous service we required, any traditional system then available would have to duplicate each physical link. But we soon realized the duplicate

paths provided by an alternative network technology could load share, doubling the normal traffic-handling capacity.

We also recognized that some form of switched network that could be shared by all the subsidiary companies was needed to eliminate the excessive duplication of links. In 1980, when we began considering possible network architectures, the decision on which type of switched network to use was less obvious than it is today. There was considerable controversy then over whether circuit or packet switching was the better approach. While circuit-switched technology was already well established at the time, packet switching was relatively new to the corporate environment, but its potential benefits in terms of bandwidth efficiency, flexibility, and data management were very appealing to us.

Fortunately, by 1982 packet switching products had caught up with the concept. At about the same time, X.25 was being ratified as a standard. But despite all this, there were few installed networks for us to inspect—in fact, none at all in the European private sector. We realized, of course, that someone had to be first and at SNAM we were convinced that this technology would form the basis of the next decade's data communications.

Encouraging a pioneering spirit in other ENI subsidiaries was one of our jobs. That task was made a little bit tougher because people were suspicious of the concept of sharing lines. Once a program that established the security of the system was completed, however, this natural resistance was overcome.

Transparency Important Factor

The transparency of X.25 is an important factor to a corporate network designer. The fact that X.25 networks are truly open, allowing equipment from many dp vendors to be hooked together, makes it possible for a company to avoid being overly dependent on a single supplier. Such dependence was impractical anyway for a full-blown international operation like ENI.

X.25 is also open in terms of the protocols that it can handle, allowing bisync, SDLC, and async traffic. ENI operates some 80 host computers from a number of suppliers, so it was necessary to be able to connect all of them. X.25 also had advantages over other networking systems in the area of network management. With X.25, you can separate the communications function from the actual applications processing. Connections of terminals and other remote systems are managed by the network, simplifying host software configuration and allowing changes to be made much more easily.

Another X.25 network feature that appealed to us was flexibility—both in the way it can readily be reconfigured for new users and in the way it can automatically maintain calls and connections by rerouting around faulty lines. Furthermore, X.25 offers an infrastructure that can quickly be adapted to accommodate future developments. Staying in step with future trends in office automation is vital in a corporation as large as ENI.

All these advantages made us confident in our decision to commit to X.25 in 1982. But since we had no experience with the X.25 network manufacturers,

INTERNET WILL SOON BE EXTENDED TO ENI'S OVERSEAS SUBSIDIARIES.

we began an exhaustive study of suppliers, which resulted in the selection of BBN Communications Corp. of Cambridge, Mass. Our choice of BBN was influenced by several factors. First of all, the fact that BBN was already a network equipment supplier to the telecom subsidiary of Olivetti, ENI's main dp vendor, was important. There were also technical considerations. In 1983 BBN was the only supplier that could offer us a dual link between every packet assembler-/disassembler (PAD) and the nodes—a reliability feature that we felt was essential.

The resulting Internet network currently has 24 packet switching nodes, 104 PADs, and two network operation centers. While each subsidiary tends to operate independent databases, the fact that any terminal can now be used to access many host computers belonging to that subsidiary offers many operating advantages. Critical applications, for example, can use duplicate hosts, which ensures that there is always an alternate source of information. In addition, other systems can benefit from the fact that distributed processing is spread over a number of hosts in different locations. Internet users will soon be hooked up to outside services such as databases and value-added networks. This will be achieved by connecting our network to the public X.25 network run by the Italian telecommunications authority (PTT). International ties will then become possible, extending our network to our overseas subsidiaries.

Duplicated by Separate Paths

For increased reliability, Internet is duplicated by two totally separate communications paths. One conventional path uses PTT facilities, while the other is owned and managed by SNAM. This arrangement is possible because of the nature of ENI's business: we own oil and gas pipelines that run throughout Italy. These pipelines use associated microwave links for remote operation and to connect plants for safe process control.

Our larger oil and gas pipelines require several line valves, which means we need a substantial volume of cabling for monitoring all these valves. For the smaller pipelines that do not require such regular valve control, we use microwave links that have proved to be more flexible and economic overall. The microwave links run right alongside the pipelines, so the bandwidth can be extended to handle corporate data traffic.

User charges for the network have been based on the old point-to-point, "per link" principle. This is currently being changed to the more equitable tariff structure that's based on actual traffic volume—a tariff approach that is common among X.25 nets.

The two network operation centers are both in Milan. One acts as a "hot standby" backup site that provides automatic cutover. These centers, which monitor faults that may occur in the network, also collect statistics on traffic patterns that we use to optimize service and plan for future growth.

Many ENI subsidiaries run applications that are particularly sensitive to any interruption in communications service. This is the reason we insisted on redundant systems. BBN's technology offers comparable reliability by automatically rerouting a line if it becomes faulty. Integral error checking is also inherent to X.25. The contents of each received data packet are checked for errors. If an error is detected, then a repeat transmission of the packet is requested from the transmitting node. This error detect/resend process, which is transparent to the dp equipment and application, combined

Let General Instrument Guide You Through The Maze Of Local Area Networking

Choosing the right technologies and vendors for your Local Area Network can be like trying to find the right path through a hedgerow maze in an old English garden. Should it be broadband, baseband, fiberoptics or twisted pair?...Our experience says your best choice is broadband...and with General Instrument you get the convenience and value offered by the leader in broadband LAN distribution products for over 35 years.

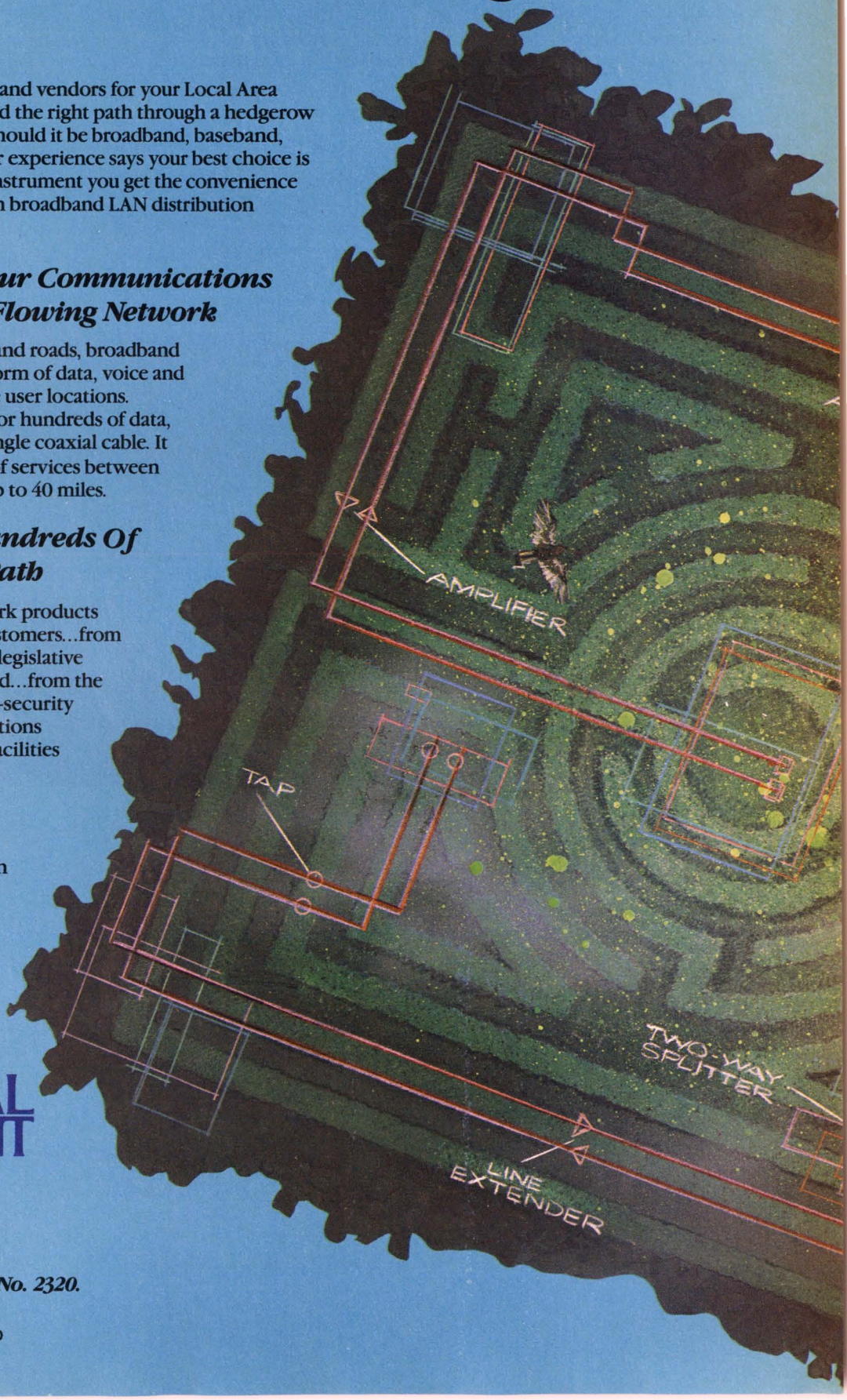
Broadband Turns Your Communications Maze Into A Smooth Flowing Network

Much like a system of highways and roads, broadband delivers two-way traffic, in the form of data, voice and video signals to and from remote user locations. A broadband network provides for hundreds of data, voice and video channels on a single coaxial cable. It readily supports a wide variety of services between multiple points over distances up to 40 miles.

We've Already Put Hundreds Of Users On The Right Path

You'll find our broadband network products working for a wide variety of customers...from America's largest auto makers to legislative centers in Washington and abroad...from the nation's leading hospitals to high-security government and military installations ...from space flight monitoring facilities to major Ivy League and State Universities.

For a detailed explanation of how General Instrument can turn your communications maze into a smooth flowing network, write for our broadband LAN brochure today. It's bound to put you on the right path!



GENERAL INSTRUMENT

Jerrold Division - LAN
2200 Byberry Road
Hatboro, PA 19040
(215) 674-4800

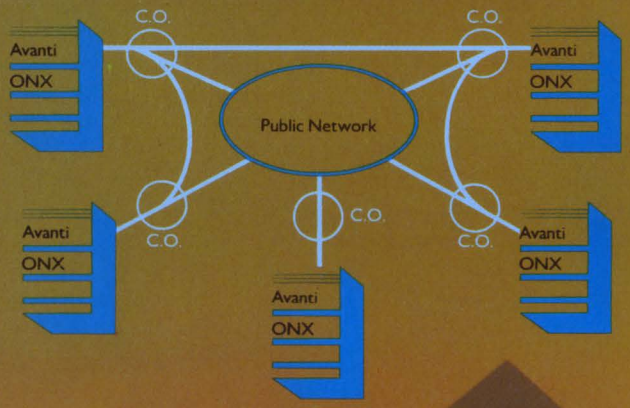
See us at Interface '87 Booth No. 2320.

CIRCLE 38 ON READER CARD

ENTER THE FUTURE OF

OPEN NETWORK EXCHANGE FROM AVANTI.

The future of T-1 networking will bring advanced, intelligent private networks and cost-saving public carrier services together in perfect harmony. The future is here: Open Network Exchange from Avanti.



Open Network Exchange is a powerful multi-nodal T-1 processor. By removing barriers caused by proprietary protocols, Open Network Exchange makes it possible for private network nodes to allocate voice and data over the best combination of public and private services. The result? You maintain full network control over your facilities and achieve a degree of reliability never before possible.

Avanti is the only T-1 networking company to meet the principles of Open Network Architecture, which will become the national regulatory policy. Avanti's Open Network Exchange removes the barriers to T-1 networking and opens the door to the future.

T-1 NETWORKING.

The power behind the ONX.

Open Network Exchange gives you the power to handle over 100 nodes with a throughput capacity of over 7300 channels per node. Its fully distributed adaptive routing allows automated least-cost circuit routing.

And Avanti is the only T-1 networking company to use three-dimensional switching arrays for unrestricted channel routing within the framework of the sub-rate standard. This is essential for true management of any ISDN-based network.

Voice quality plus bandwidth efficiency.

Avanti opens the door to quality voice networking with standard PCM, ADPCM, and sub-band encoding techniques. Open Network Exchange also has full flexibility to handle analog and digital PBXs. The options are there—and so is the cost savings.

The door is open.

Open Network Exchange has thrown open the door to the future of T-1 networking—a future based on harmonious, effortless sharing of T-1 resources.

With Open Network Exchange, you build a network that's powerful, compatible, and cost-effective. The first true ONA network. Enter with us.

For a good look at the future of T-1 networking, call Avanti today: 1-800-535-3550. Avanti Communications Corporation, Aquidneck Industrial Park, Newport, RI 02840.

AVANTI

We make T-1 work.

CIRCLE 39 ON READER CARD

A Net Gain for Packet Switching

with the automatic rerouting feature, helps to ensure high integrity of the network from end to end.

Network reliability is particularly important to SNAM's national gas distribution organization. The operation deals in such high revenues that even a one-day delay in billing would represent a notable loss. The information for this billing is gathered from over 100 terminals spread all over Italy. This terminal input is passed on to the host computer in Milan for processing and then the billing information is returned for local printout.

The strategy of redundant host and network facilities is also vital for another ENI subsidiary that's concerned with coordinating the national distribution of gas tankers. It is imperative for tax reasons that the flow of gas be carefully and constantly monitored and that the appropriate documents be printed out locally before a truck leaves the fuel depot. Clearly, this has to be a real-time operation. Integral to this operation are the 100 or so fuel depots that are equipped with over 600 terminals handling thousands of transactions each day. Internet and our redundant host computers guarantee that this on-line application is always available on a minute-by-minute basis. X.25 is also being used to help optimize resources of the oil refineries and chemical plants in the ENI group that have their own communications systems for process control. X.25 is currently being evaluated for use in two safety procedures—controlling the flow of gas and oil in the pipelines and operating the remote-controlled line valves and compressor stations.

NETWORK RELIABILITY IS IMPORTANT TO ENI.

Now that our network has been fully operational for more than a year, it is appropriate to reflect on the results. Our initial aims were to exploit the latest communications technology to improve the quality of service that ENI subsidiaries received and to offer that service more economically. This has been achieved. We made a good choice of product and we obtained a close liaison with the supplier, which was essential in the early stages of network installation.

Our original projections for substantially increased traffic have also proved to be correct—indeed, slightly conservative. The only thing we would caution other prospective X.25 users about is to avoid an overly hasty implementation of the network. Initial user confidence in a new technology is not improved by fixing teething problems on-line. A prudent approach is to install and debug a pilot environment for each application before turning the real network over to users for on-line work. ■

Giacomo V. Repetto is director of telecommunications services at the SNAM subsidiary of Ente Nazionale Idrocarburi, Italy's national energy company.

Your Key to Simplified Network Access

NETWORK ACCESS, a product from Duquesne Systems, allows users to gain access to their applications easily from a common entry point. Access can be as simple as pressing a program function key. NETWORK ACCESS also allows you to manage security for the entire ACF/VTAM network in a single place, reducing administrative effort. The flexibility of the security interface permits you to utilize standard security packages or an in-house routine. In addition, since all system users have NETWORK ACCESS in common, they may send messages to each other or receive status information from system administrators.

Let NETWORK ACCESS be your key to simplified application access. Call us today at (800) 323-2600 to arrange for a FREE 30-day trial.

DUQUESNE SYSTEMS

Duquesne Systems Inc. • Two Allegheny Center • Pittsburgh, PA 15212 • (412) 323-2600

CIRCLE 41 ON READER CARD

The latest UPS syste in two

So head crashes, disappearing data and board failures have finally gotten to you.

All fingers point directly to a plague of dirty power bugs-incoming spikes, sags, surges, transients and glitches.

You're convinced that an uninterruptible power supply (UPS) system is the only solution.

Look before you leap. Now there are two UPS technologies to choose from: Solid State and Rotary State.

Both provide the same fail-safe insurance. Each has an equally fanatic following.

EPE solid state UPS is anything but static.

In fact, this all-electronic UPS technology is growing so fast that we've formed a new subsidiary, Ultimate Power Systems,™ to efficiently handle the business.

Annual world-wide UPS system sales from Ultimate Power and our joint venture partner, Merlin Gerin, now total over $100 million. Our installed base over the past 16 years now exceeds 10,000 systems. That's over 600,000 KVA of installed UPS power.

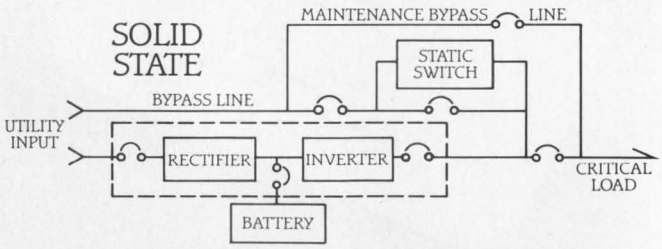
Why UPS solid state UPS?

Breadth and stability are two reasons. We're big, efficient and on the move.

State-of-the-art electronics is another. Ultimate Power uses the latest pulse-width modulation (PWM) voltage regulation techniques for 10 times faster response to critical load changes. With innovative designs requiring fewer parts, system reliability exceeds 100,000 hours.

Installation and maintenance is easy, too. In fact, the average system installs in only about four hours compared to two-to-three *days* for some competitive units.

EPE systems range in size from three

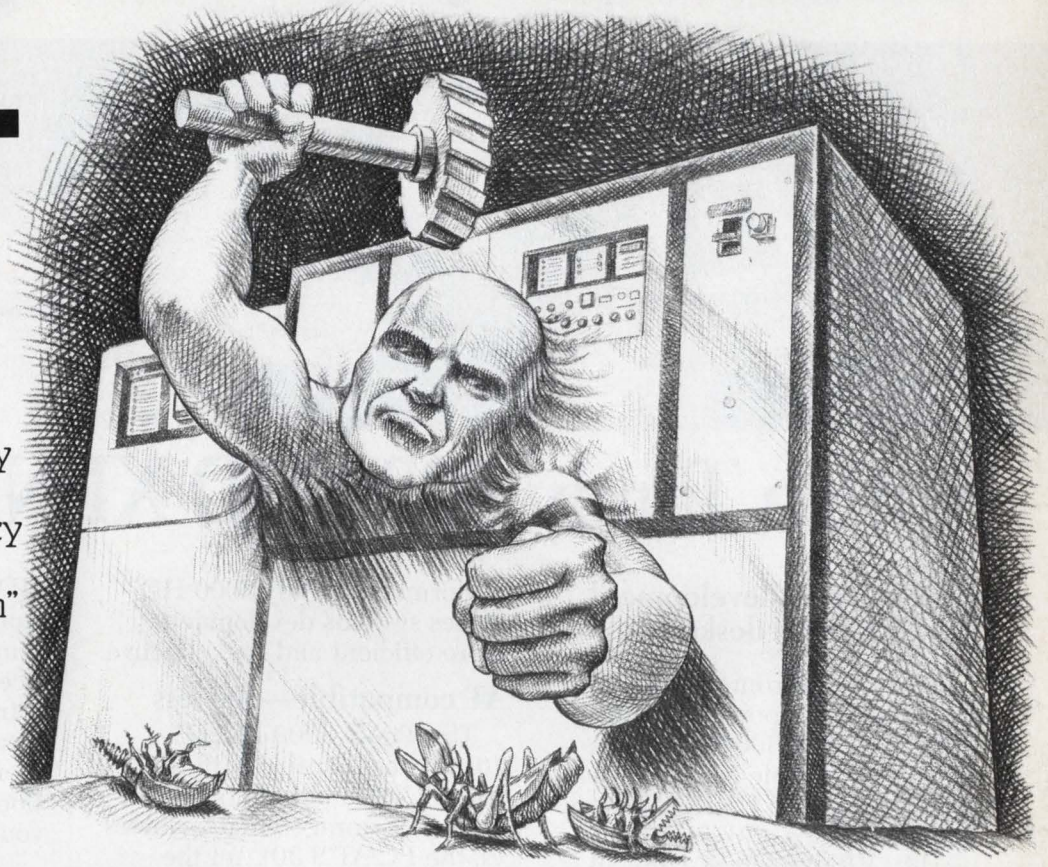


to 600 KVA. Six or more modules can be paralleled to increase ratings to 3600 KVA and beyond, building in fail-safe redundancy.

We've caused a revolution in rotary.

EPE motor-generator sets are not the big, rumbling cellar dwellers of old. They're small, as reliable as static systems, cheap to maintain, quiet and run cool enough to blend right into your computer room.

ms are now available states.



Full UPS protection comes from Powerbloc UPS, a unique off-line inverter/battery module.

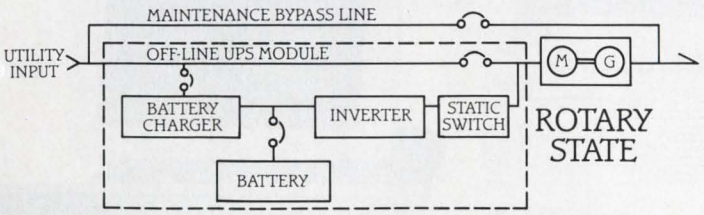
At the first sign of a power drop, Powerbloc UPS swings from standby mode–no noise, no load, no heat–to full emergency back-up protection.

Generator "ridethrough" inertia provides clean power for up to two seconds–far more time than Powerbloc UPS needs to start providing power.

Powerbloc is the only UPS system you can grow into.

Simply start with a Powerbloc power conditioner now and add a Powerbloc UPS later when you're sure you need it and can afford it.

Or if you already have a power conditioner, simply add a UPS unit to it. Suddenly you'll have complete UPS protection at a



fraction of the cost of a whole new system.

Ask *that* of any other UPS supplier.

One-UPS-manship.

Regardless of which UPS state you prefer, only EPE offers both.

Only EPE has a broad product line from switchgear to loadbanks to transformers to power centers to line conditioners to our Environmental Monitoring Systems (EMS).

And only EPE can provide the kind of objectivity you need for such a critical UPS decision. Write, call or send in this coupon today.

I'm interested.

Send me: ☐ EPE power protection guidebook ☐ Information on your seminars near me. ☐ A sales person.
Info on: ☐ UPS systems ☐ Power conditioners ☐ Computer Power Centers ☐ Isolation transformers ☐ EMS systems ☐ Custom switchgear and loadbanks.

Name_____ Title_____

Affiliation_____ Phone_____

Address_____

City_____ State_____ Zip_____

I have_____ computers.
(no., size, brand)

epe

Because knowledge is power.

DM-3

Emergency Power Engineering, Inc.
1660 Scenic Ave., Costa Mesa, CA 92626 Phone: (714) 557-1636

CIRCLE 42 ON READER CARD

Streamline your DP operations

with a Tandy® 3000 HD XENIX® system.

Real systems-development power from a desktop

Break away from your mainframe with the powerful Tandy 3000 HD. The 3000 HD supports the versatile XENIX System V (based on UNIX® System V, the standard of the UNIX world). XENIX offers extras like a "C-shell" programming environment, a menu-driven help system and support for Tandy and other peripherals. The high-performance Tandy 3000 HD makes systems development more efficient and cost effective.

AT compatible—for less

The Tandy 3000 HD (25-4011) is compatible with the IBM PC/AT® and offers greater hard disk storage (40 megabytes vs. the PC/AT'S 30). Yet the 3000 HD is priced at only $4299 (vs. $5295 for the PC/AT*).

Based on the 16-bit Intel 80286 microprocessor, the 3000 HD operates at 8 megahertz. And since it's a multiuser system, people throughout your office can simultaneously access it from inexpensive data terminals—for program development, as well as user applications. The Tandy 3000 HD is your key to office automation.

Come in today

Stop by your local Radio Shack Computer Center today . . . we're ready to talk business.

Available at over 1200 Radio Shack Computer Centers and at participating Radio Shack stores and dealers.

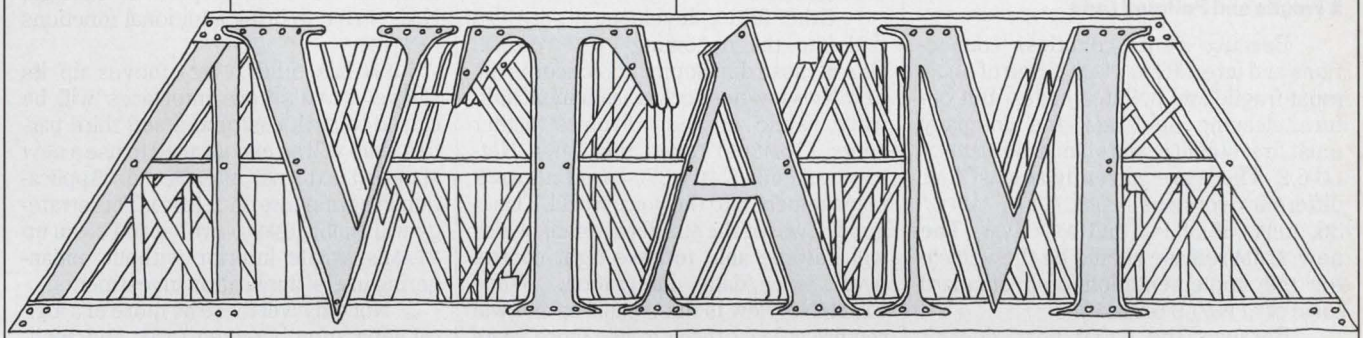
TANDY COMPUTERS: In Business . . . for Business™

Radio Shack®
COMPUTER CENTERS
A DIVISION OF TANDY CORPORATION

*Based on IBM price list as of April 2, 1986. Tandy 3000 HD price applies at Radio Shack Computer Centers and participating stores and dealers. Monitor, data terminals and XENIX sold separately. XENIX/Reg. TM Microsoft Corp. UNIX/Reg. TM AT&T. IBM PC/AT/Reg. TM International Business Machines Corp.

CIRCLE 43 ON READER CARD

To meet the challenges posed by the new world of peer communications, IBM is fine-tuning VTAM, adding support this year for LU 6.2, SNA's modern data transfer software. In its new form, VTAM will be logically as well as physically separated from application programs. Customers such as Boeing have already created dedicated VTAM machines. More of those machines are on the horizon and so are more MIPS—an appetite IBM relishes since it must find fresh markets for its number crunchers. The crucial market is communications and the crucial ingredient in that market is SNA's VTAM, the springboard for distributed DBMS networks.



SNA's Vital Connection

BY DALE KUTNICK AND RALPH EMMETT CARLYLE

SNA has come a long way from the days when competitors jokingly referred to it as "Still No Architecture." With over 24,000 networks installed worldwide, SNA is clearly a de facto networking standard.

With that evolution has come expansion. No longer is the networking software just a tool for mainframe communications—a rich man's toy. Today, even medium-sized users can take advantage of SNA's management and control facilities without putting an undue strain on their MIS budgets. Older networks geared to the master-slave relations of host mainframes and dumb terminals are giving way to more democratic arrangements. Systems that communicate using SNA's modern data transfer software, LU 6.2, are considered peers, whether they're mainframes, minis, or micros.

In an era of rapid technological change, hierarchies create bottlenecks that prevent the free flow of information through a company. Fed up with these bottlenecks, IBM's customers demanded, and got, the peer communications capability that is enabling them to structure more responsive organizations. SNA networks can now be built from the top down, as before, or from the bottom up, which wasn't possible before.

Mainframe-controlled SNA networks will continue to exist primarily for real-time, large DBMS applications such as transaction processing. Most new SNA networks, however, will have fundamentally different roles. They will be relying heavily on peer communications to support departmental and office computing. This new networking concept has led many observers to refer to LU 6.2 (also known as Advanced Program to Program Communications or APPC) as the future of SNA. That future, however, won't happen very quickly. Slow to take off, LU 6.2 has been implemented in relatively few IBM products, especially in the 370 realm, where only the Customer Information Control System (CICS) supports it.

In fact, IBM chose CICS as the 370's initial LU 6.2 interface because it supports the broadest range of end-user subsystems, particularly DISOSS office automation. Moreover, as IBM's primary transaction processing subsystem, CICS offers the most convenient 370 vehicle for handling external device and subsystem requests.

But there is a better approach, one that the Gartner Group, a Stamford, Conn., research and consulting firm, believes IBM has adopted as part of its long-term strategy. That approach is to put LU 6.2 into VTAM, IBM's host access method. The lowest common denominator among 370 communications subsystems, VTAM interfaces to all of IBM's oth-

Illustration by Susan Hunt Yule

VTAM: SNA's Vital Connection

er software facilities. IBM has taken this VTAM route because it eliminates the requirement for separate LU 6.2 interfaces for each subsystem. The Gartner Group believes this new VTAM release will be announced this year, probably in the second half, with first shipments beginning in 1988.

A Fragile and Polluted Code

Because of its countless connections and interfaces, VTAM is one of IBM's most fragile and polluted codes. But before cleaning up VTAM, the company must first stabilize and standardize APPC/LU 6.2. There are currently at least four different versions—APPC/CICS, APPC/36, APPC/36,38,PC, and APPC/VM. The new VTAM release should be the vehicle for the implementation of a standard form of APPC/LU 6.2 in 1988.

Because the VTAM/host doesn't "recognize" APPC/LU 6.2, the host mainframe can't be brought into peer sessions with IBM's midrange systems and workstations. Such synergy is vital to the success of IBM's new 937X family of departmental 370s. It's also crucial if IBM is to support its claim that it now has a single architecture that stretches from the data center to the desktop. Furthermore, that claim must be based in fact if IBM is to compete with the VAX offerings from archrival Digital Equipment Corp. Until VTAM supports LU 6.2, the VM-based 937X will go on operating in its own environment, despite the fact that it has hardware compatibility with SNA host machines.

When VTAM/LU 6.2 appears, SNA network management operating in a peer-to-peer environment will finally be possible. Host SNA software will know when communications sessions are occurring between adjacent intelligent nodes in peer groups. For the first time, IBM's customers will be able to select between host or distributed network management.

Other future developments are also tied into the upcoming VTAM release. One of those developments concerns the new Netview network management software, while another involves higher speed (16MBps) token ring LANs. Netview extends SNA's 370-based network management into the voice world. This is good news for the MIS department, which will now be able to have tight control over voice/data integration. While VTAM/Netview is not a panacea and will require at least three to five more years of evolution, it will certainly expand IBM's traditional mainframe power base.

SNA support for higher-speed LANS should begin to emerge with the new VTAM release sometime in 1988. It's around this time that IBM will offer high-speed fiber-optic connections for 370 cpu channels. This VTAM and LU 6.2 support, however, will require extensive memory utilization. So IBM cannot actively encourage VTAM/LU 6.2 on its token ring LAN until its new PCs—which some say may break the 640KB memory barrier and support 16MB addressing—are shipped later this year.

To meet the challenges in this new world of peer communications, IBM has resorted to a coverup. What it's actually been doing is burying much of SNA's operational complexity in its past VTAM releases. Indeed, VTAM has become so insulated that it is almost a network operating system in its own right. User application interfaces are focused primarily at subsystems such as Netview, DSX, BDT, and XRF. This separation trend will continue as IBM's developers at Raleigh, N.C., strive to bring additional functions to VTAM.

IBM has other VTAM moves up its sleeve. VTAM's core interfaces will be closed to both customers and third parties, who will be encouraged to use a new standard external interface or Application Program Interface (API). This strategy will enable IBM to evolve and clean up VTAM's fragile interior without endangering users' application investments.

Not only will there be more of a logical separation between VTAM and application programs, but there'll also be a physical one as well. Customers such as Boeing and even IBM's own Information Network bureau have already created dedicated VTAM machines. This move to dedicated VTAM machines is expected to accelerate.

No matter what form the future VTAM comes in, one thing is certain: it will be a huge consumer of host MIPS. Some large users estimate that in order to support a large SNA terminal network, IBM's communications-oriented software, which includes VTAM, Netview, and parts of CICS and IMS/DC, eats up 15% to 20% of a 309X's hardware resources.

Those figures should hardly frighten IBM, which, facing a slowdown in its traditional dp operations, must find new markets for its MIPs. In fact, the computer giant must aggressively pursue the communications business if it wants to meet its revenue targets of $100 billion in 1990 and $200 billion in 1995.

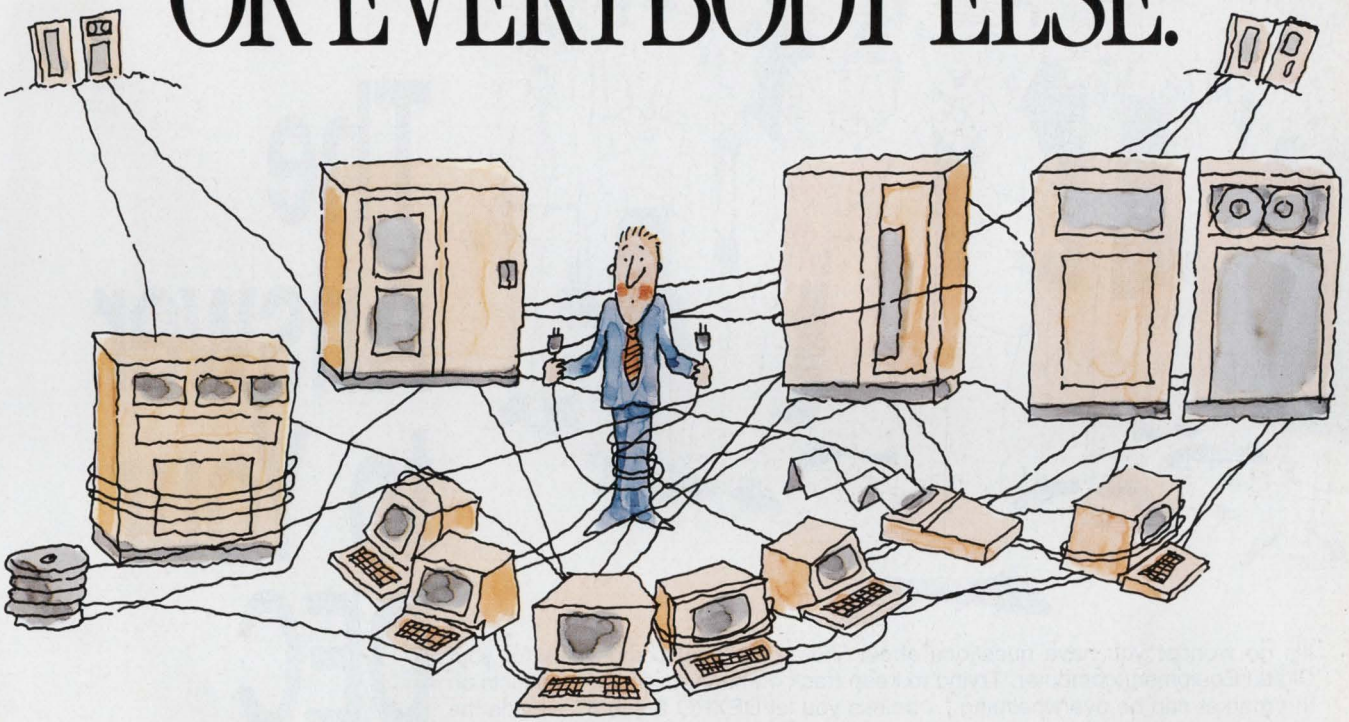
IBM already pulls in over 20% of its revenues from communications-oriented products, systems, and services. And that total is growing rapidly as more and more companies see networking as a strategic asset and even a competitive weapon.

IBM also sees networking as a strategic weapon in its product arsenal. It views SNA's VTAM as the vital connection, a springboard for the distributed DBMS networks of the '90s. All of this means that the new VTAM release will almost certainly be the most important piece of software to come out of IBM this year. ■

Cartoon by Nick Downes

Dale Kutnick is research director at the Gartner Group.

IN CORPORATE NETWORKING, IT'S BANYAN OR EVERYBODY ELSE.



When it comes to linking all the elements of a corporate-wide network, you have two choices:

A costly combination of single and multi-cluster LANs; disk, print and file servers; protocol converters, mainframe upgrades and mountains of complicated software—all from multiple vendors.

Or a Virtual Networking System from Banyan.

Banyan's family of network servers, with their powerful VINES (for Virtual Networking Systems) architecture, are the *only* single solutions available today that meet all your networking needs.

You can tie together several or several thousand PCs in single clusters, multiple LANs or wide area networks. And tie similar and dissimilar LANs to minis or mainframes of like or different manufacture, both locally or remote, in a true distributed information sharing system.

Because only Banyan approaches networking from the standpoint of *distributed computing*, where one or more LANs must be supported within departments, between departments, between buildings even in distant cities.

Simply put, without replacing any existing systems or applications, you can build new applications and integrate them *all* in a corporate-wide network. And if that's not enough, there's a responsive direct support program.

If you need to be further convinced to choose Banyan over everybody else, call 617/898-2404, or write for details

Please send me more information on the Banyan Network Server. DM 3/15/87

Name _____ Title _____

Company _____

Address _____

City _____ State _____ Zip _____

Telephone ( ) _____ Ext. _____

BANYAN

The networking decision you make only once.

Banyan Systems Inc.
135 Flanders Road, Westboro, MA 01581

CIRCLE 44 ON READER CARD

The Answer to Your DEC Computing Questions.

It's no wonder you have questions about finding the right compatibles for your Digital Equipment computer. Trying to keep track of the thousands of products on the market can be overwhelming ... unless you let DEXPO South 87 provide the solutions.

This show is the right source for all the DEC-compatible hardware, software, systems, services and supplies you need. Review 10,000 products from 250 leading vendors. Compare technology, price and performance.

DEXPO is for everyone who is installing, expanding, or improving DEC systems. Get hands-on demonstrations of products for every DEC computer. From DECmate to MicroVAX II. PDP-11 series to VAX 8000 series. Plus personal attention and consultations from vendors eager to serve your special needs.

A bonus for DECUS* symposium attendees

If you attend the Digital Equipment Computer Users' Society symposium in Nashville, you'll receive FREE admission to DEXPO South 87. Write or call for complete information.

FREE: Show Preview features over 100 DEC compatibles

Register today and we'll send you a free Show Preview with news of over 100 of the very latest DEC-compatible products. You'll also get money-saving VIP tickets to the *only* show exclusively serving DEC users.

To Register ...

Call (800) 628-8185 between 8:30 a.m. and 5:30 p.m., Eastern Time (in New Jersey, call (609) 987-9400).

Call TOLL-FREE 800-628-8185. In New Jersey 609-987-9400.

Organized by Expoconsul International, Inc., 3 Independence Way, Princeton, NJ 08540.

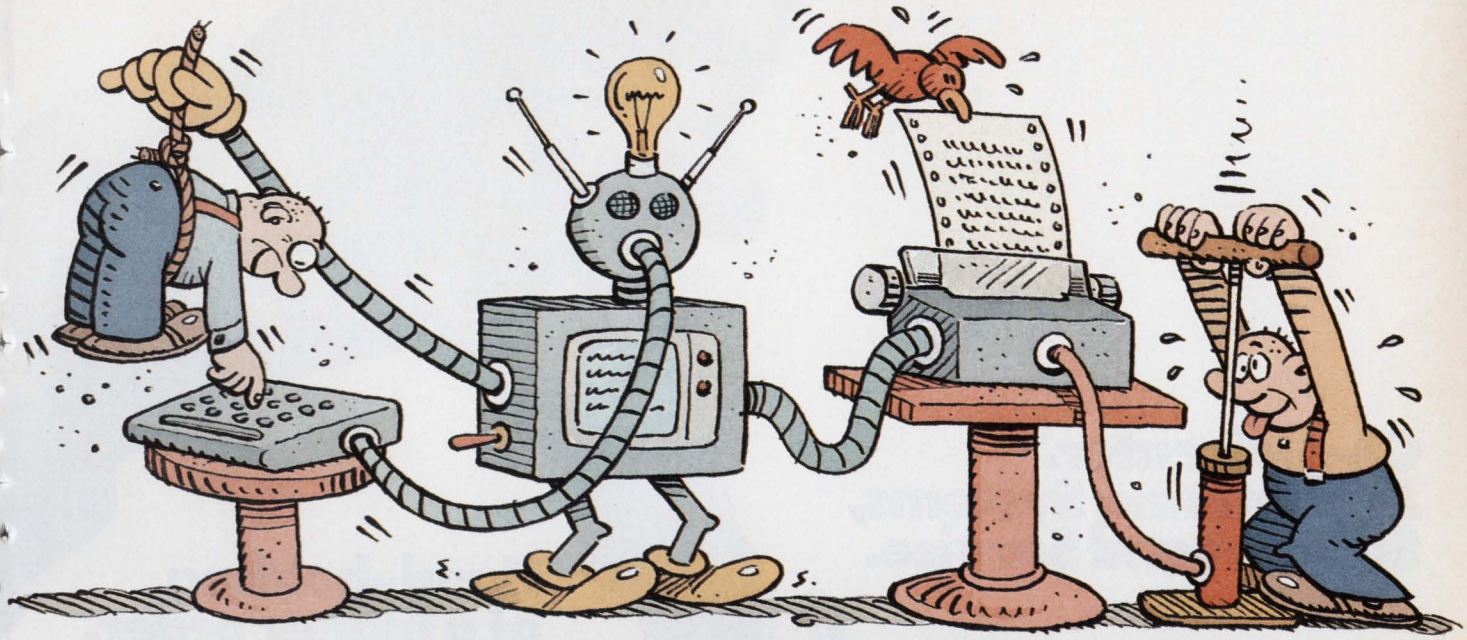
DEXPO® SOUTH 87

The Twelfth National DEC*-Compatible Exposition

CONVENTION CENTER · NASHVILLE, TN

APRIL 28 – 30, 1987

*DEC and DECUS are registered trademarks of Digital Equipment Corp. DECUS is not sponsored by or affiliated with DEXPO.



One piece of computer equipment that Sorbus® doesn't service--yet.

Sorbus services more IBM® equipment than anybody else (except IBM). That includes the entire PC family, naturally. Plus Series I, System/34, System/36 and 36 PC, and System/38 minis. Not to mention 370, 4300, 303X, and 308X mainframes.

All the same, IBM is just the beginning.

We service more than 3,000 products, altogether. Including micros from 13 manufacturers, disk drives from 31, modems from 12, printers from 31, and so on, and so on. And we're the *only* authorized service company for MAI Basic Four® micros and minis.

For companies with mixed-vendor systems, our single-source convenience can mean the end of finger-pointing between service suppliers. And since we can't blame your trouble on anybody else, all we can do is fix it.

Fast. We're usually on-site within two hours, and we're usually done within another hour and a half.

For one-call convenience tomorrow, there's one call you should make today. Call Sorbus. **1-800-FOR-INFO.**

Sorbus®
A Bell Atlantic™ Company

50 E. Swedesford Road
Frazer, PA 19355

IBM is a registered trademark of International Business Machines, Inc. Sorbus is a registered trademark of Sorbus Inc.

CIRCLE 46 ON READER CARD

CA-Unicenter.® Automating Systems, Support and Service.

Hand-holding of a higher order.

Now no matter what your operating system: VSE, VM, or MVS, you can automate all data center operations. New CA-UNICENTER/VM joins CA-UNICENTER/VSE and CA-UNICENTER/MVS to automate the management of resources, production, performance, accounting, security—and more. No matter what operating system, data center productivity will be greatly increased, manual involvement virtually eliminated.

CA-UNICENTER also automates support and service, too. A hard-disk PC provides a direct link between your mainframe and the Computer Associates' mainframe for online communication of all problems and online responses to all requests. Tutorials and HELP are PC based too. All in all automated hand-holding the like of which you've never experienced before.

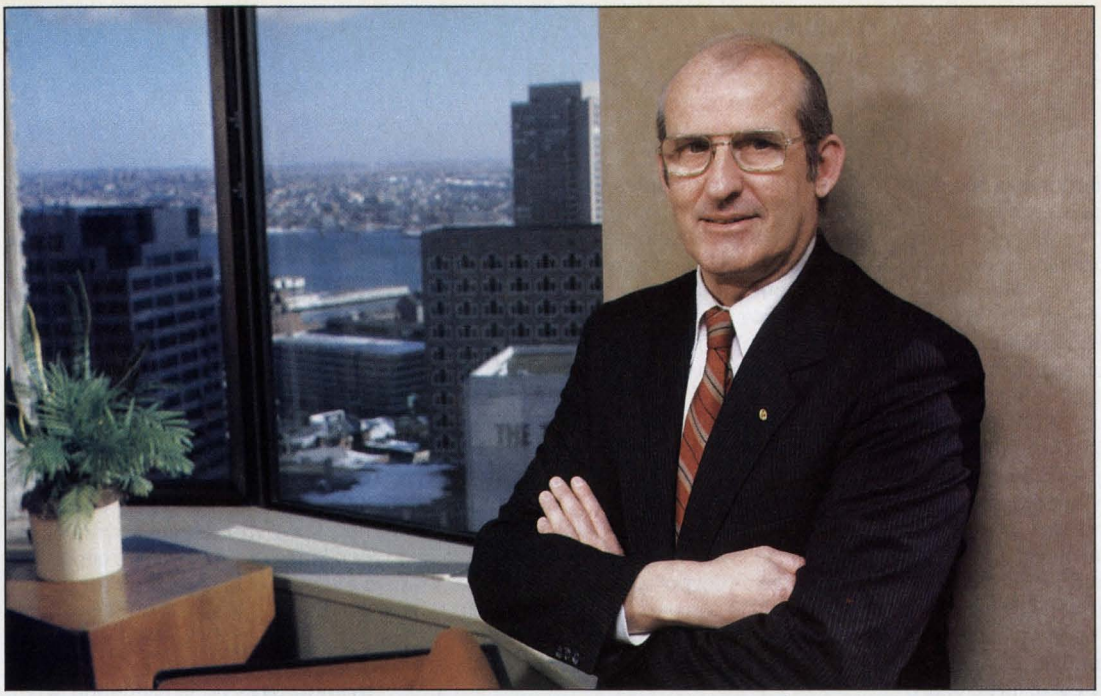
The automated data center with automated support and service. Its time has come and only Computer Associates can deliver it complete today. Call Dana Williams at 800-645-3003. CA-UNICENTER—it's the only way to go.

COMPUTER ASSOCIATES

Software superior by design.™

711 Stewart Avenue, Garden City, N.Y. 11530-4787

CIRCLE 47 ON READER CARD



Photograph by Richard Howard

At 57, Bill Synnott, director of corporate information systems and services at the Bank of Boston, finds himself in the same dilemma that's facing many other dp veterans. At a time when these MIS veterans should be receiving credit for their accomplishments, they're either being forced out through early retirement programs or stripped of their authority by companies searching for more business-oriented managers of information technology.

Technology—Sword or Shield?

BY RALPH EMMETT CARLYLE

For Bill Synnott, there will be life after death in the dp department. After years of laboring in what he dubs a "thankless" profession, the 57-year-old MIS luminary at the Bank of Boston has elected to take early retirement, setting out to "grab some glory" by pursuing a career as an author, lecturer, and consultant.

Synnott is characteristically lighthearted about his decision to leave the bank after 20 years. "The thing I'll miss most," he declares, "is the best harbor view in Boston." Nevertheless, it's clear that his parting has a bittersweet quality. A recent decentralization program left Synnott with a greatly reduced budget and staff, both slashed by almost one fifth. Synnott now oversees a $10 million budget and a staff of 115 people. A loss of prestige also seems evident in his new title—director, corporate information systems and services. Since 1975, Synnott had served as senior vp at the Bank of Boston.

The tall, amiable executive appears uncomfortable with the subject of his departure, preferring instead to discuss the new world that is opening up for him with his second book, *The Information Weapon,* due out next month from John Wiley & Sons, New York. That weapon got turned on Synnott, who's facing a situation that has become all too familiar throughout the industry.

"Many senior dp executives are closing on retirement age at a time when corporations are on cost- and expense-reduction missions," explains Joseph Ferreira, a director at Index Systems Inc., a Cambridge, Mass., consulting company. "At a time when many of these veterans should be receiving credit for a lifetime of accomplishment, they are either being forced out or stripped of authority by bosses searching for more business-oriented managers of information technology," declares Ferreira, who is an advisor to DATAMATION.

In Synnott's case, the irony is that he predicted this dper dilemma in his first book, *Information Resource Management* (John Wiley & Sons, 1981), which he coauthored with William H. Gruber. In the book, he introduced the concept of the chief information officer (cio). Critics have charged that the notion, since it came from a dp vet, was a ploy to increase the stature and control of the MIS boss and the budget he manages.

More ironic is the fact that Synnott, who says he acted as cio for 16 years at the Bank of Boston, never formally re-

ceived the title. That honor was recently bestowed upon a banker to whom Synnott will report until he leaves in July. "You might say I predicted my own downfall," quips Synnott. "Hoisted by my own petard, so to speak."

In his first book, Synnott pointed out in no uncertain terms that the cio position would increasingly be filled not by MISers but by business managers. That message is repeated in *The Information Weapon,* which describes how control of technology will slowly but inexorably be transferred away from the technocrats and into the hands of business managers.

"In a way, my two books describe an emerging scenario in which my talents, and those of my peers in senior MIS management, are redundant," says Synnott philosophically. "Few of us dp veterans relish the thought of managing in a decentralized environment. We're used to something we can get our arms around, something we can control—not some amorphous organizational culture."

More of a Cost Than an Asset

There's growing evidence that many corporations view their senior dp management as more of a cost than an asset. Index Systems' Ferreira offers one overriding reason why: "Having relegated computers to the back office as cost-cutting tools, many chief execs don't really see the value of their MIS vps or the value of technology as a competitive weapon." This devaluation of dp pros is evident in the pension programs that some companies have designed to encourage their MIS chiefs to take early retirement. Under these plans, top MIS executives who typically earn around $150,000 a year can retire on half pay at 55.

"There is little inducement to hang around any longer," declares Synnott. "If I stay around until I'm 62, I'll only get 20% more than I can get now. Many of my friends and peers are coming out in droves because of the pension plan alone." He declines to name any.

For those MIS veterans approaching retirement age, the choice seems to come down to two things: they can stay in a shrinking backwater operation or they can seek new growth within their organizations as business managers. The business manager road, however, is only open in those few, leading-edge corporations that believe information technology can be used as a competitive weapon—or as Synnott would say, as an "information weapon."

In these companies where technology is perceived as a sword rather than a shield, these "weapons" are used aggressively to pioneer new markets. "The accent is on innovation and creating systems for customers, not on using computers as internal productivity tools as before," Synnott explains in the new book, which offers strategies and structures to corporations seeking to toe this technological line.

But even in these innovative firms, seasoned systems bosses may not get ahead. Ferreira says that MIS chiefs will advance only when their companies perceive them as corporate officers first and dp specialists second. "The trouble is, now that information technology is migrating from the large data centers, MIS executives mostly see that their stature is down, their authority is diminished. They don't see that in a different kind of way they have more leverage now as policymakers and influencers."

MOST MIS TYPES ARE NOT ADEPT AT MANAGING BUREAUCRACIES.

Nevertheless, it's still hard for dpers to become business managers when they're in their 50s. "We're not political animals," confesses Synnott. "And most of us are not adept at managing bureaucracies." Even those few mainstream MISers who share Synnott's vision are frustrated by corporate culture, tending to prefer the world of ideas to the world of people.

The Bank of Boston executive sees himself as a creative thinker, not a team player. Synnott relishes early morning writing sessions at his mountain retreat in New Hampshire. This is where his ideas flow.

The work place is where his ideas meet frustration. Synnott bemoans the length of time it takes for his ideas to be realized in a corporate bureaucracy. "Even the innovative customer support systems that originated at places like American Hospital Supply and American Airlines took 10 years from seed to fruition," he complains. "I can't wait that long at Bank of Boston. I've run out of patience."

That impatience shows through. "My peers and I have given our careers," he says. "Like all pioneers, we've opened the way for others to reap the benefits as the computer industry matures." There have also been benefits on the company side—benefits that seem to have gone unrecognized. Synnott insists that he has been containing costs and "fighting fires" for decades with either no feedback or negative responses. "Who ever gave us any credit for it?" he asks wistfully.

Old Before Their Time

Synnott says he is saddened when he sees MISers retiring all around him—"some of them burned out, old in body and spirit before their time." But what could be the end for some of these troopers may be just a beginning for Synnott. For while some dp veterans are forced out of their corporations and into consulting by default, Synnott has a promising career waiting in the wings. His writing and speeches have already attracted a wide audience.

"I can see the future of this industry and I'm anxious to get there quickly," he says. "I'll get there a lot sooner as a consultant." In that role, Synnott will be preaching his MIS gospel at corporations throughout the country.

It could be that he is a late bloomer who has only just begun to hit his stride. Such a suggestion would come as a surprise to the modest man who came from modest beginnings. "I come from a poor family and went to work early in life. What education I eventually received," he explains, "came later in life and I feel like I'm learning all the time."

Synnott went to Harvard Business School and Boston University when he was in his mid-40s and already well established in the banking industry. "After learning for more than 30 years," he says, "I'd like to teach for the next five."

And write books, of course. Synnott says his colleagues at the bank often ask him why he writes his books. After a great deal of thought, he concluded that the book writing was part of an ongoing process to get to know himself better.

"The books will be there for my kids," he says, gazing out his office window at the boats in the harbor. It's clear that Synnott has set his course. He's finally arrived at something fixed and permanent in a shifting world. ■

The TeleVideo 905 terminal. What a difference $10 makes.

Let's face it; there are a lot of $399 terminals being sold these days. You get a basic box, a few tacked-on bells and whistles, and not a whole lot more.

But now there's the TeleVideo® 905. At $409, it has a feature set so powerful, your customers will think they're sitting at an expensive workstation.

For example, there's a sleekly designed monitor case with full tilt and swivel.

A full-size keyboard with sculptured keycaps for smooth, comfortable typing. Thirty-two non-volatile, programmable function keys. Keyswitches that have been tested to 100,000,000 strokes. Even an enhanced numeric keypad.

There's also a buffered printer port. And, of course, compatibility with the TeleVideo 925 command set, the most popular and widely emulated ASCII command set in the world.

If you'd like more information just get in touch with the nearest TeleVideo regional office listed below, and we'll give you the name of your nearest distributor.

The TeleVideo 905. What a difference $10 makes.

TELEVIDEO 905 VS. WYSE WY-30		
FEATURES	TELEVIDEO 905	WYSE WY-30
Programmable function keys	32	4
Tilt and swivel standard	Yes	No
High contrast super dark Matsushita screen	Yes	No
WordStar® mode	Yes	No
Full-size keyboard	Yes	No

TeleVideo®
Settle for more.

TeleVideo Systems, Inc., 1170 Morse Avenue, Sunnyvale, CA 94088-3568, (408) 745-7760, Regional Offices: Northwest (408) 745-7760, Southwest (714) 476-0244, South Central (214) 550-1060, Southeast (404) 447-1231, Midwest (312) 397-5400, East (516) 496-4777, Northeast (617) 890-3282, AMSTERDAM: 31.2503.35444, PARIS: 33.1.4687.34.40, LONDON: 44.9905.6464.

CIRCLE 48 ON READER CARD

FASTER, FASTER, FASTER!

RAD data compressors let you communicate TWICE AS FAST!

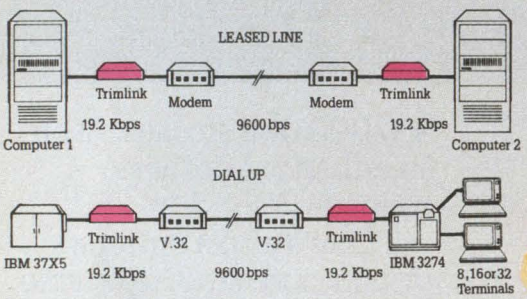
What's more, you can cut your communication costs by as much as half.

How do we do this? By using an adaptive coding algorithm, our sync and async compressors continually analyze incoming data and then code it – abbreviating texts and numerics. By compressing the data, line capacity is doubled, enabling data to be transmitted twice as fast.

For example, you can transmit at 19.2 kbps while using 9.6 kbps modems! At the receiving end, the compressor completely restores the data – without change or distortion, using error correction to speed your data, even through noisy lines.

Both the sync compressor, **TRIMLINK,** and the async unit, **COMPRESSORAD,** operate on dial-up or leased lines with most protocols, standard or tailor made. Just plug in the compressors and switch up to 19.2 kbps using your existing modems. You'll see how well we suit your current equipment.

Find out more about speeding your communications while cutting your costs. Contact your nearest distributor today and discover how data compression can put you ahead in the race.



From the growing Rad family

RAD

data communications ltd.

U.S. Headquarters
151 West Passaic St., Rochelle Park, NJ 07662
Tel. (201) 587-8822, Telex: 6502403647 MCI, Fax: 201-368-2102

International Headquarters
8 Hanechoshet St., Tel Aviv 69710, Israel
Tel. 972-3-483331, Telex: 371263 RADCO IL, Fax: 972-3-475933

AUSTRALIA Datacraft D.C. Ltd. (03) 726 9911
ENGLAND G.A.D.C. Ltd. 044 282 4011
CANADA Tele-Radio Systems Ltd. (416) 851-2231
W. GERMANY Telemation GmbH (06173) 70900
NETHERLANDS Koning en Hartman B.V. (015) 609906
NORWAY Data Equipment A/S 02-37 57 30
SOUTH AFRICA X-ON Communications (Pty) Ltd. (011) 789 1441
SWEDEN Alfanet Communications ab. 08-16 01 45
BELGIUM INES Datacom NV (02) 720.51.61
FRANCE Datatel (1)46 03 96 00
DENMARK Datalog A/S 01-20 00 66
ITALY Dataconsyst S.p.A. (02) 21 36 551
JAPAN Furukawa Agency 03-794 4267
NEW ZEALAND Datacom Equipment Ltd. (04) 846189
PORTUGAL Etatronica Lda 01 31 99 80
SPAIN Payma S.L. (91) 733 20 50
SWITZERLAND Interep S.A. 022/43 11 50

CIRCLE 61 ON READER CARD

To Over 30,000 Installations, MultiLink® MEANS Multi-User.

At over 30,000 sites, as many as one-quarter of a million users tap into the power of MultiLink® Advanced everyday.

Since 1983, they've come to rely on our multi-tasking, multi-user system for compatibility with their favorite software, and the ability to share disks, files, printers, and programs in a *true* PC-DOS environment.

From the largest of the Fortune 500 to the smallest in small business, MultiLink® has provided a cost-effective multi-user solution that's available from no one else.

MultiLink® Means Cost-Effective Timesharing on a PC. MultiLink® Advanced utilizes the principle of timesharing by sharing a central PC's peripherals, files, and processor time among nine users. Up to eight inexpensive terminals can be connected to a single non-dedicated IBM PC, XT, AT or 100% compatible using standard RS-232 ports. Each terminal effectively emulates a PC having up to 512K RAM.

PC-Shadow™ Workstations, shown below, even have an AT look-alike, as well as work-alike, keyboard, display, and serial port. In addition, password-protected remote access via modem can be made with either dumb terminals or PCs running our terminal emulation software.

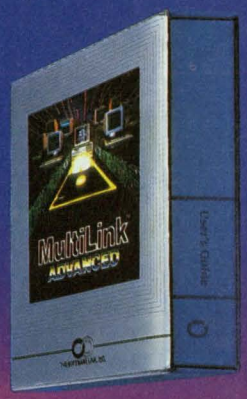
MultiLink® Means PC-DOS Compatibility with a *Software-Driven* System. Lotus 1-2-3, Symphony, WordStar, dBASE III, & Multimate are just a sampling of the wide variety of PC-DOS software that's fully compatible.

Our software-driven system is also IBM NETBIOS compatible, so programs that are written for IBM's Token Ring will run on our multi-user system, as well.

MultiLink® Means Multi-User to Leading Computer Publications. Whether you read *PC Magazine*, "MultiLink® Advanced delivers on...convenience, speed, and flexibility," or *InfoWorld*, "If you want a low-cost multiuser system with up to eight terminals, MultiLink® Advanced is worth a serious look," it becomes clear that MultiLink® Advanced is a formidable contender in the multi-user marketplace.

See What MultiLink® Can Mean to You. Learn, firsthand, how our multi-user system can benefit your company. Call The Software Link TODAY for complete information and the authorized dealer nearest you. MultiLink® Advanced is $595 and comes with a money-back guarantee.

MultiLink® ADVANCED

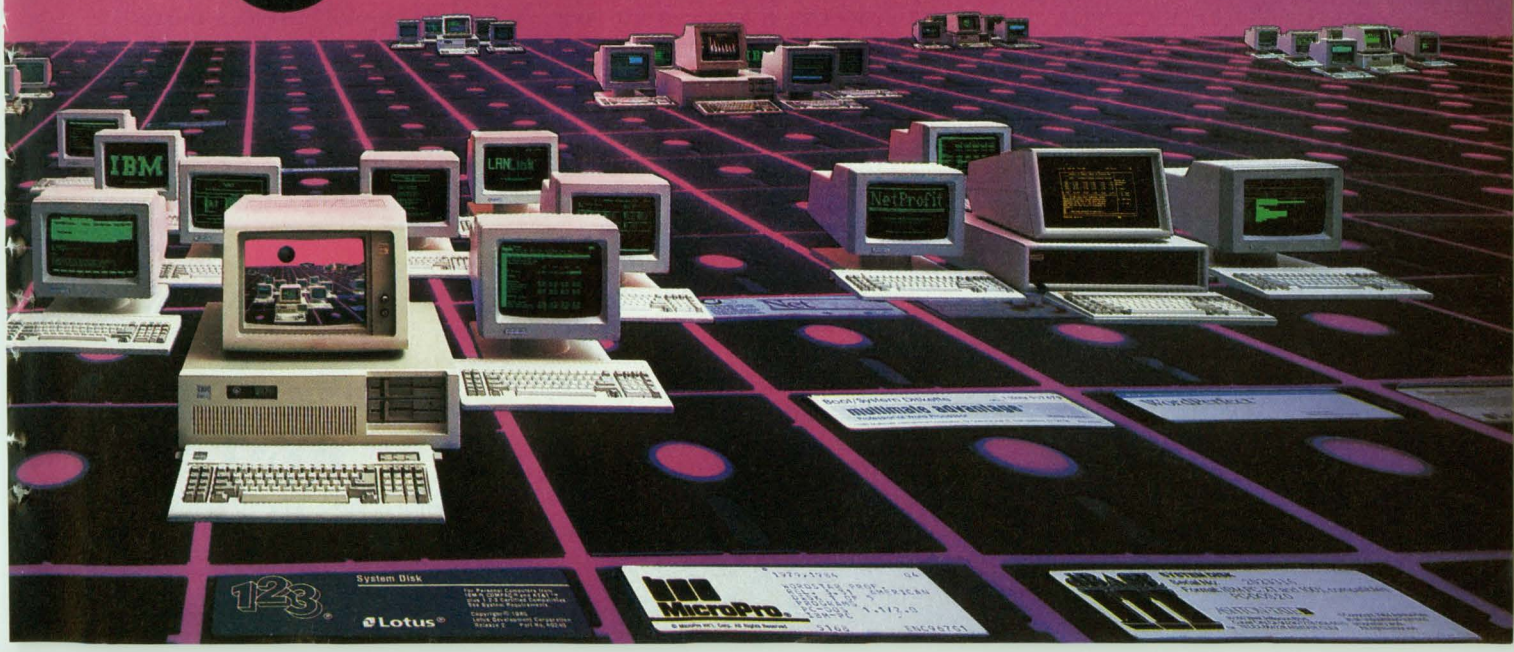


THE SOFTWARE LINK, INC.
8601 Dunwoody Place, Suite 632, Atlanta, GA 30338 Telex 4996147 SWLINK
CALL: 404/998-0700

Dealer Inquiries Invited

THE SOFTWARE LINK, INC./CANADA
250 Cochrane Drive, Suite 12 Markham, Ontario L3R 6B7
CALL: 416/477-5480

CIRCLE 51 ON READER CARD



AT&T IS IN SMARTER PROPOSALS.

WITH THE AT&T ACCUNET® FAMILY OF DIGITAL SERVICES AND THE AT&T CONSULTANT LIAISON PROGRAM.

For high-quality, end-to-end digital communications, the smarter proposal is AT&T's ACCUNET Family of Digital Services.

Our extensive line of digital services, including DATAPHONE® Digital Service, ACCUNET® T1.5 Service, ACCUNET® Reserved 1.5 Service, ACCUNET® Packet Service and ACCUNET® Switched 56 Service, can answer virtually all of your customer's information transfer needs.

From Electronic Order Exchange and Video Teleconferencing, to CAD/CAM and Bulk Data Transfer.

All with excellent digital reliability and accuracy.

But just as importantly, through the AT&T Consultant Liaison Program, we can work with you to integrate these services into your proposals, so that your recommendations will maximize your client's movement and management of information on a global scale.

In addition, our CLP Network Communications Applications and Services manual (available for a small fee) provides you with a comprehensive fingertip reference for all of AT&T's wide array of network services.

In short, the people and services of AT&T can help you make more informed, strategic recommendations to solve your customer's complex business needs.

And that's a smarter proposal for you, as well as your customers.

The AT&T ACCUNET Family of Digital Services and the AT&T Consultant Liaison Program. More good reasons to partner with AT&T.

To find out more, talk with your account executive at AT&T. Or call **1 800 CLP-INFO.**

AT&T
The right choice.

A new survey of programmers and analysts finds that most of them like their jobs, primarily because of the kind of work they are asked to do. Most even like the salaries they are paid. Programmers and analysts who work for dp companies feel their work is appreciated, but outside the field, many think management is hostile, seeing dp as a cost, not a resource.

What You Should Know About Programmers

BY MARJORIE FREEDLAND

Just who *are* the men and women you've trusted to write critically important systems and applications for your company? What do systems analysts and programmers think about their work? What do they think of their bosses? Why do they quit? Are programmers and analysts optimistic about advancement within their firms? About the job market outside?

To find out, DATAMATION and Deutsch, Shea & Evans, a human resources research and advertising firm, conducted a dp career survey. In September 1986, 5,000 names were selected from DATAMATION's national circulation list. The survey targeted systems analysts, programmers, and their immediate managers: supervisors of analysis; senior systems analysts; chief, lead, and senior programmers. Thirty-five percent, or 1,751, responded. The proportion was 70% staffers, 30% supervisors.

"ALL DP PROBLEMS GO THROUGH ME."

The current survey updates and extends a profile of the dp professional that began when DSE surveyed DATAMATION readers in 1978. Wherever applicable, we compared today's findings with those reported eight years ago.

First things first: why did these people opt for their jobs? Multiple answers were permitted, so the total does not equal 100%.

It is encouraging that most took their jobs because they expected to like the work: 42% of the sample say they find their jobs creative, exciting, and above all, professionally challenging. They write about "hot new projects," as well as diversity, i.e., "always something new." They enjoy their autonomy and freedom from supervision, and the scope of their responsibilities—"All dp problems go through me." The nature of the work is more important today than in 1978's survey, when 35% reported it was the reason they had chosen their jobs.

The next biggest factor was salary and benefits, which 36% of the 1986 sample cite as most important, down from 39% in 1978. Significantly, there is noticeably less concern with salary among young, entry-level people, who admitted they just needed a job, and among senior people—55 years or older, or with their company at least 15 years.

Opportunity for advancement was the deciding factor for 28% of the sample, somewhat more so among the younger participants.

Potential for training and education (8%) was more important to the younger and less experienced. Job stability had limited impact (6%), as did the relation of their new position to prior experience or background (2%).

Job location was a key point for 23% of the sample, but the oldest, most tenured, and least experienced are considerably more flexible. Working conditions and environment—things such as flextime—were of top importance for 10%.

Company's Culture, Style Important

For 8%, it was the image of the organization itself—its reputation, corporate culture, management style, and stability—that drew them to their company. Private-sector employers, particularly the Fortune 1000, are highly regarded. Another 3% commended the size and

FIGURE 1 Why They Left

NEGATIVE FACTORS ABOUT PRIOR DP POSITION

CAREER FACTORS	%
Lack of advancement	18
Poor compensation	15
No job security	2
Lack of training/education	1
THE EMPLOYER	
Poor management, organizational politics	9
Restructured, out of business	6
Poor attitude	3
Relocated	2
THE WORK	
Unchallenging, uninteresting	10
Location/relocation	8
Working conditions/ environment	8
Outdated equipment, systems	3
Laid off	2
Other	5
None/did not comment	6
No prior dp employer	30
	*

*Total exceeds 100%, due to multiple response.
Base: Total number of respondents 1,751 = 100%

FIGURE 2 What's Good

MOST SATISFYING ASPECT OF PRESENT POSITION

THE WORK	%
Challenging, autonomous, diversified, scope of responsibilities	67
CAREER FACTORS	
Compensation	5
Training/education	4
Job security	2
Advancement opportunities	1
Client/user contact	8
Working conditions/environment	7
Equipment/systems	6
Caliber of coworkers	5
Management recognition, attitude/support	2
Other	1
Nothing/did not comment	9
	*

*Total exceeds 100%, due to multiple response.
Base: Total number of respondents 1,751 = 100%

scope of the dp operation.

Seven percent wanted to work with equipment, systems, and methods on the "leading edge of technology."

Six percent report that this was their only offer. One confides, "Unemployment doesn't pay very well." In some cases, lack of experience or advanced age present problems: "Entry-level positions are difficult to find," writes one, and an "over 45" writes, "No other employer would consider my application."

Since 70% of the respondents have had at least one other dp job, why did they leave it? As Figure 1 shows, they were frustrated in their careers (36%), disenchanted with their employers (20%), bored with their work (10%), unhappy with the location (8%), working conditions (8%), and equipment and systems (3%). In essence, a replay of the scenario in 1978.

Dissatisfaction with previous employers is intense; it focuses on management, which movers variously describe as ignorant, inept, obnoxious, even tyrannical. Bad enough if bosses were "wishy-washy," worse if they were "half-ass management always yelling and screaming, never doing any long-term building." Job movers deplored the bureaucratic and political atmosphere—in corporations as well as government agencies—that fosters the "buddy systems of promotions.

Long hours, having to work weekends, and hectic schedules inspired defections. Dress codes and specified times for coffee breaks and lunch hours also sent programmers looking for the exits. Some left because they were tired of working with obsolete equipment or technology.

People seem happier with their present jobs. As Figure 2 indicates, two thirds (67%) report—as they had anticipated—it's the work itself that most turns them on. This percentage is virtually unchanged from 1978.

What's the flip side of the coin? What bugs them most about their current jobs?

FIGURE 3 What's Bad

LEAST SATISFYING ASPECT OF PRESENT POSITION

MANAGEMENT	%
	15
THE ORGANIZATION	
Bureaucratic, political, too large	12
CAREER FACTORS	
Lack of advancement	11
Compensation	8
Lack of training/education	3
THE WORK	
Unchallenging, unsatisfying, paperwork, documentation	16
Working conditions/environment, understaffing	12
Lack of recognition	5
Outdated equipment, systems	5
Caliber of coworkers/users	4
Budget limitations	2
Limited authority	1
Location	1
Nothing/did not comment	17
	*

*Total exceeds 100%, due to multiple response.
Base: Total number of respondents 1,751 = 100%

Management Problems Bug Them

The main source of dissatisfaction centers, as in the 1978 survey, on management and organizational problems. Politics and bureaucracy are specifically reported by 27% (see Figure 3). Those who changed their job because of management may not have improved their situation in this regard.

Disenchantment with the organization focuses on "power politics" played in both large corporations and government agencies. Younger respondents, less familiar with the workings of mammoth hierarchies, complain about this more often than older professionals.

Career factors are most unsatisfying for 22%. Leading the list is lack of advancement, in their words, "nowhere to go," "no future," "no definite career path," and "a lack of mobility—horizontal or vertical." Those dissatisfied with compensation resent not being paid for overtime, not receiving bonuses, and management's failure to relate salary to performance and/or increased responsibilities. Others don't like the "hit or miss" quality of training.

The work, which so many find exciting and stimulating, is boring to 16%, particularly the older survey participants. They hate "paper-pushing projects," the "drudgery of documentation" and maintenance—and the lack of challenge.

Their working conditions come in for criticism as well. They heartily dislike the high level of job stress to which they are submitted: long hours, understaffing, poor physical layout, in short, "high-pressure, high-tension, Theory X envi-

TO MAKE ORACLE, INGRES, INFORMIX, AND UNIFY REALLY FLY, YOU HAVE TO GET ON A PLANE.

We're so sure Sequent will improve the performance of your relational database application, we'll pay for your trip to the Sequent Support Center nearest you to do the benchmark.*

ANNOUNCING A DEPARTURE FROM ORDINARY DATABASE COMPUTING.

No uniprocessor running Oracle,® Ingres,® Informix,® or Unify® can match Sequent's transparent parallel technology for performance, expandability, flexibility, and cost.

No multiprocessor can match it. No other system. Period.

Sequent gives you consistently high performance even under the heaviest loads. Easy porting of software. And the ability to expand up to hundreds of users.

A uniprocessor with the same kind of power would cost you four times the price.

THE 30 MINUTE UPGRADE.

It's not only less expensive to expand our system than any other system in the industry, it's faster.

Anytime you need more performance, you simply add another board.

The box doesn't change. The software doesn't change. The whole thing takes about 30 minutes.

For a free brochure and all the facts about benchmarking your database application at the Sequent Support Center nearest you, call 800-854-0428.

We'll do more than pay for the phone call. We'll pay for the trip.

SEQUENT
The Practical Parallel®

"Put me on the next plane to Sequent"

*You must qualify. Offer ends May 31, 1987.

CIRCLE 53 ON READER CARD

So far it's won everything but the swimsuit competition

On September 9, 1986, Compaq® introduced a new personal computer, the COMPAQ DESKPRO 386™. We called it the most advanced personal computer in the world.

Today, that's what everyone calls it.

Industry experts, users and the media agree that the COMPAQ DESKPRO 386 reaches the highest level ever for PC speed, compatibility, performance and expandability.

Award-winning performance

So it's not surprising that *FORTUNE* magazine named the COMPAQ DESKPRO 386 one of the most significant products of 1986.

As did *Business Week*.

Venture magazine proclaimed the COMPAQ DESKPRO 386 one of the year's best entrepreneurial ideas.

And *PC Magazine* highlighted it as a product of the year, while singling it out for technical excellence in the desktop class.

The critics rave

The COMPAQ DESKPRO 386 is also winning critical acclaim from industry experts.

PC Magazine noted: "The COMPAQ DESKPRO 386 does it with class, with speed and with sound hardware and software design. In a market where it often takes a few tries to get a new product right, Compaq has clearly done it right the first time."

USA TODAY reported that the COMPAQ DESKPRO 386 "marks a new generation of PC's that will make previous desktop models look like slide rules."

Almost every major industry and news publication reacted the same. Ditto for users.

Blockbusting sales

COMPAQ DESKPRO 386 sales are surpassing expectations, as thousands of users are putting it to work immediately. To run productivity software. For CAD/CAE applications. Software development. And as network file servers for businesses of all sizes.

The most advanced personal computer in the world

It's no wonder. We designed the COMPAQ DESKPRO 386 with dozens of enhancements that put it in a class by itself.

Feature presentation

The high-speed, 32-bit, 16-MHz, Intel® 80386 microprocessor lets you run today's software two to three times faster than ever. Plus it opens doors to applications never possible before on a PC.

Compaq enhanced each component to optimize power and speed, without sacrificing compatibility, giving you the most advancements ever engineered into an industry-standard PC.

A memory management system that breaks the 640-Kbyte barrier of current operating systems. More storage with faster access. More expandability. More connectivity. Simply more power for more people to do more things.

Add it up and the COMPAQ DESKPRO 386 is the first desktop PC to give you a true minicomputer level of performance. And that sets the precedent by which all future advanced-technology computers will be judged.

See for yourself

So while some may copy its engine, none will duplicate the uncompromising performance built into the COMPAQ DESKPRO 386. It's that firm refusal to settle for compromises that makes every Compaq personal computer best in its class.

See why. For the location of your nearest Authorized COMPAQ Computer Dealer, or for a free brochure, call 1-800-231-0900, operator 30. In Canada, call 416-449-8741, operator 30.

It simply works better.

COMPAQ
DESKPRO 386™

ronment." Working on outdated equipment and systems is a further source of discontent, e.g., "being 'closet-cased' on dinosaur applications."

"Working With Morons"

The caliber of people they work with and those they work for causes additional dissatisfaction. They express it as: "working with morons," "unreasonable users, underachieving subordinates," "immature trainees," "political hirings of incompetent people."

How are they doing financially? According to survey results, the employee doing best is a male dp manager, at least 40 years old, with an advanced degree, 20 or more years in the field, and similar tenure with his employer—a Fortune 1000 computer/dp manufacturer with a very large dp staff, located in a major metropolitan area on either coast.

Figure 4 gives salary ranges and medians, overall and by sex and age. It shows that men are paid more than women and, as would be expected, older respondents earn more than younger ones. But there doesn't seem to be much difference in the earnings of dp staffers with associate's certificates and those who do not report any degree.

Managers are better compensated than those with staff functions—no surprise—but systems/software designers are paid nearly as well. Among the other functions, applications programming is the least financially rewarding.

What kinds of employers offer the most compensation? Employees of corporations in which data processing is the raison d'être average between $40,000 and $44,999. Next best paid are respondents in utilities, followed by government workers. People who earn the least are those who work in academia. Fortune 1000 salaries average nearly $5,000 more than those paid by other organizations ($42,000 as compared with $37,100). As a rule, the larger the data processing department, the higher the compensation.

There is also some variation in salary by location. The highest median is reported in the Mid-Atlantic states, $40,500, followed by $40,000 in the West and $39,900 in the Southeast. Below the average for the overall sample ($39,000) are salaries in the Southwest, $38,700; in New England, $37,800; and in the Midwest, $36,500.

Generally, programmers and analysts seem content with their salaries, although few mention compensation as the most satisfying part of their work. Eighty-three percent describe themselves as satisfied, 25% highly so, 58% moderately. Only 16% are dissatisfied—14% somewhat, 2% very. These percentages are virtually the same as were reported in 1978.

By geographic region, satisfaction with earnings relates, in general, to salary level, but there is one exception: respondents in the Midwest are apparently as happy with their lower salaries (84%) as their more highly compensated peers in the Mid-Atlantic (83%), Southeast (83%), and Western (86%) regions.

Who They Are

There are more women in this year's sample, 18% compared with just 13% in the 1978 study, and the current participants are a bit older. The median age for men is 39. For women it is 36, suggesting that their entry into the field is more recent. Eight years ago the average age for both sexes was in the 25- to 34-year range.

As before, 95% are college educated, 57% with undergraduate experience, 38% having taken graduate courses. There is virtually no change in the degrees they hold: 8% associate's, 46% bachelor's, 25% master's, and 2% doctorates. In both surveys, 19% of the sample did not have college degrees. Not all majored in dp, computer science, or math. Many majored in business administration, engineering and science, social sciences, liberal arts, or education, with wide-ranging academic specialties, such as Far East studies, Spanish linguistics, anthropology, and religion.

In spite of their impressive academic credentials and access to formal training programs, half of them say they got their best training on the job and through self-teaching. Employer and vendor training programs were other sources of training.

By primary job function, systems analysis/programming dominates the sample: 17% in systems analysis, 29% in systems analysis/programming. Another 19% describe themselves as programmers—12% applications, 7% operating systems. Management positions are held by 17%. Of the rest, 9% are in systems and software design, 3% in database administration, and 9% in other functions, including quality assurance, security, consulting, and technical, operating, and marketing support. The 1978 sample was slanted more toward programming (43%). Systems analysis/programming comprised 35%, management 14%, systems design 21%, other functions 3%. (Multiple disciplines were reported in both samples.)

While the 1986 sample population is experienced and occupationally mobile, there is less job movement than eight years ago. The term "job hoppers" does not apply here: 61% have been in dp for 10 years or more, and 40% have remained with their present employer 10 years or more. The current group is slightly more experienced than 1978's, in which just 51% had 10 years in the field, 30% having spent 10 or more years with the same employer. In both samples, 81% had been in the field six or more years, but more stay with the same employer now than did then.

Furthermore, 30% of the sample are working for their first employer. Another 44% have had just one or two others. Only 13% have had three dp employers, 6% report four, 7% report five, and less than 1% report six or more prior dp employers. The pattern was essentially the same in the 1978 survey, but because the typical current respondent has been in the field longer, the pattern is further evidence of a trend toward staying put.

Their employers are in both the public and private sectors: 25% of the respondents work for agencies of the federal, state, or local government; 24% in non-dp manufacturing or processing facilities; 17% for computer/dp manufacturing, services, or consulting organizations; 13% in business or financial firms; 7% in academia; 5% in utilities; and 9% in other establishments such as research and development, transportation services, health care/medical, wholesale/retail trade, etc. Moreover, 38% are employees of Fortune 1000 companies.

Responses came in from all over the U.S. The Southeast, Midwest, and Northeast each checked in with about 23% of responses; about 10% came from the Southwest; and about 20% from the Mountain and Western states. Approximately half the sample work in nine major metro areas: 16% in New York, 10% in Washington, D.C., 5% in the combined Bay Area (San Francisco, Oakland, and San Jose), 5% each in Los Angeles and Chicago, 3% each in Houston and Boston, and 2% each in Detroit and Minneapolis/St. Paul.

Except for some minor deviations, the characteristics of the 1978 and 1986 samples are comparable.

Too many people have been led to believe only DEC™ is experienced enough to service their computers.

For years, you've believed that only DEC has the expertise to service your computer. But that's just not true.

Because at Control Data, we've been in the computer maintenance business for over 25 years. And we fix everything from PCs to mainframes, even mixed peripherals.

So before you're led into signing another one of their service contracts, call us instead. **1-800-828-8001, ext. 58L.** In Minnesota, 612-921-4400, ext. 58L.

CONTROL DATA

CIRCLE 55 ON READER CARD

INDUSTRIAL STRENGTH.

The Datasouth High Performance Matrix Printers.

Tough customers demand tough printers. The kinds of printers that go where the work is, and get the job done. Printers built to work three shifts a day—all week, all month, all year—and never take vacations. Printers so solid and durable you'd think they were drop-forged. Printers like the Datasouth DS 180 and DS 220.

That kind of industrial-strength performance comes from knowing what a tough customer needs: rugged medium-speed printers that combine outstanding performance with the strength to pound out multipart forms up to 6 layers thick. Printers that put all the controls right on the front panel, so they're easy to use. And printers that offer a choice between a 180 cps draft mode printer, and a 220 cps multimode that produces Near Letter Quality text at 45 cps.

And at Datasouth we practice what we preach. The DS 180 and DS 220 work side-by-side with the hard-working people who build them right here in our Charlotte, North Carolina plant.

Put an industrial-strength printer to work for you. To find your nearest Datasouth distributor, call us at 1-800-222-4528.

Datasouth

AMERICA'S HIGH PERFORMANCE PRINTER COMPANY

P.O. Box 240947, Charlotte, NC 28224, (704) 523-8500, Tlx: 6843018, DASO UW SALES: 1-800-222-4528, SERVICE: 1-800-438-5050; West Coast office: 415-940-9828.

CIRCLE 56 ON READER CARD

FIGURE 4 Salary by Sex and Age Group

	SEX			AGE GROUP								
SALARY RANGE	TOTAL (1,751) 100%	MALE (1,420) 81%	FEMALE (315) 18%	UNDER 25 (35) 2%	25-29 (218) 13%	30-34 (311) 18%	35-39 (359) 21%	40-44 (322) 18%	45-49 (236) 13%	50-54 (144) 8%	55-59 (93) 5%	60 OR OVER (28) 2%
No. of respondents in sex or age group = 100%	%	%	%	%	%	%	%	%	%	%	%	%
Under $25,000	8	6	17	40	21	10	6	3	3	4	2	0
$25,000 - 29,999	10	9	15	28	23	14	10	5	5	3	3	7
$30,000 - 34,999	17	16	22	20	30	23	17	14	10	6	5	14
$35,000 - 39,999	18	18	19	3	15	21	24	18	13	15	21	14
$40,000 - 44,999	19	21	13	—	5	15	20	26	23	28	27	29
$45,000 - 49,999	12	13	6	—	2	10	12	12	21	14	16	7
$50,000 - 54,999	8	8	5	3	*	4	5	10	12	14	13	11
$55,000 or more	7	8	*	3	*	2	6	10	12	15	12	18
No answer	1	1	2	3	2	1	*	2	1	1	1	0
Median salary (in $ thousands)	$39.0	$40.2	$33.9	$26.5	$30.8	$35.4	$38.4	$41.9	$44.0	$43.9	$43.4	$42.5

*Less than 1%

Note: The few respondents who did not specify sex or age group are excluded from the sex and age analyses.

How do they rate their chances for advancement? A slim majority, 54%, are satisfied, but 45% are not. The 12% who are "highly" satisfied are offset by 12% who are "very" dissatisfied. This ambivalence is not surprising in view of the lackluster hopes for advancement we've already noted. It represents a more negative viewpoint than was reported eight years ago. Then, 60% were optimistic about advancement opportunites, and only 40% were not.

Older Respondents Gloomy

The "under-35s," who may not have experienced competition for a higher-level job as yet, are somewhat more positive. Older respondents, aged 50 or more, are decidedly gloomy.

Particularly frustrated is the 50-to-54 age group, still hoping for upper-echelon positions. For the most part, the longer a programmer has been with his or her present employer, the less satisfied, but discontent does lessen for those over 54; perhaps diminished expectations lead to less discontent with the status quo.

Prospects for promotion appear brighter in the Fortune 1000 companies (60%) than in other organizations (51%). As might be expected, the larger the dp department, the more satisfied programmers and analysts are likely to be with advancement opportunities, since more openings are potentially available.

But suppose a programmer is angling for a new job. What does it look like on the street? How do programmers and analysts see the job market at their own experience levels compared with five years ago? Are more or fewer opportuni-

"Management Has No Earthly Idea . . . ."

The programmer's perception of how management views the dp function was another facet of the management/dp relationship the survey investigated. Participants were asked, "Do you think management adequately appreciates the contribution the computer/dp department makes to your organization's overall operation? Why do you [don't you] think so?"

A bare majority, 52%, feel appreciated and answer yes, 36% say no, 11% don't know, and 1% didn't reply. This shows no significant change from the previous survey. It is no surprise that in the large dp departments of computer/dp manufacturing or business and finance firms, there is widespread feeling that management is appreciative. People in non-dp manufacturing/processing or utilities, however, hold the opposite view.

The 30-to-44 age group feels relatively unappreciated by management, since the promotions they strive for are evidently not forthcoming.

The yes responses: they know they're appreciated because management tells them so. "Praise from above flows bountifully," says one respondent. Others report "numerous accolades from management," "positive feedback," and "always getting compliments." They bask in the recognition and respect: "My input is sought after, my suggestions implemented."

Those who work in dp-intensive organizations say that their employers couldn't do without their work. "They have to appreciate dp. Otherwise, they would have nothing to sell!" "Our products make the profits"; "It is the life blood of our business"; and "We are a dp service bureau—that's the name of the game!"

The no responses: managers don't understand dp and don't want to understand, the unappreciated complain. They view management as "either computer illiterate or computer phobic"—distrustful, resentful, and fearful of the technology and the people who use it. They report sarcastically that management "has no earthly idea of what dp people do," "thinks that "anyone with 10 days' training can perform the work," and "You push a button and bingo! it's done." Other managers are described contemptuously as treating dp as a car and programmers as auto mechanics.

These respondents say they are taken for granted, not treated as true professionals—never told "good job" but always reprimanded for mistakes. They are not regarded as partners of management, but almost as adversaries. Poor management in the form of indifference, lack of communication, and a bureaucratic and "speak only when spoken to" style were also cited. From non-dp-oriented industries come reports that dp is considered overhead, "a necessary evil," and somewhat "like a spare tire, i.e., we have a specific purpose, and when we're needed, we're needed. Otherwise, we tend to be excess baggage."

XEROX

A Xerox Electronic Publishing System turns turnaround time into no time.

You've accomplished the impossible. You were given 11 documents to publish in seven days. And now that you've got them done, you're told one needs a minor change, three need small changes and seven need major changes. But, instead of panicking, you calmly collect your thoughts and sit down at the terminal of your Xerox XPS 700 Series Electronic Publishing System. The system that's sophisticated enough to let you turn out document after document with practically no turnaround time.

But a Xerox Electronic Publishing System can do more than just make it possible to meet seemingly impossible deadlines. It can make your business more competitive. For instance, let's say you're bidding on a big project. And there's a last-minute change in specs. That change may delay your competition's bid as they wait for new proposals, contracts, manuals and documentation to be printed. With a Xerox Electronic Publishing System, jobs that used to take days take hours. And changes that took hours now take only a few minutes.

In practically no time, a Xerox Electronic Publishing System can pay for itself. It'll pay for itself by saving you time and overtime charges. And because it uses a powerful and proven integrated composition software package, it's easy to use. Which means you won't have to go to great expense or time to train someone to use it.

If you'd like to learn more about electronic publishing, take the time to speak to a Team Xerox member. Send in the coupon below or call Team Xerox at 1-800-TEAM-XRX. We'll do more than just offer you the widest selection of electronic publishing equipment available. We'll offer you the resources of Team Xerox. Experts who'll give you the advice, service and support you need to set up your system and keep it running. So that your system will always be able to turn your turnaround time into no time.

Team Xerox

Xerox brings out the genius in you.

Xerox Corporation, P.O. Box 24, Rochester, NY 14692.

☐ Please have a sales representative contact me.

☐ Please send information on Xerox Electronic Publishing Systems.

NAME (Please Print)

COMPANY TITLE

ADDRESS

CITY STATE ZIP

PHONE

Or, if you can't wait, call

1-800-TEAM-XRX, ext. 186B

186B (1-800-832-6979, 186B). 071-3/15-87

XEROX® and XPS 700® are registered trademarks of XEROX CORPORATION.

CIRCLE 58 ON READER CARD

ties available? Overall, the survey revealed cautious optimism. While more are upbeat than are pessimistic—35% to 23%—a quarter of the respondents see no change, and 17% don't know or didn't answer.

Figure 5 shows how they answered by level of experience. The 20-year veterans are least unsure about the state of the job market. They've been there, know the market, and are the most negative: fully 30% perceive that there are fewer openings now.

The optimists in the sample see more widespread use of computers as the principal reason for their rosy picture of dp job availability. Optimists talk in terms of "exploding demand for applications development," and point to CAD/CAM, graphics, and spreadsheets as areas not widely available five years ago.

Why do others see their employment prospects as worse than five years ago? Mainly, they feel the pressures of a competitive job market. According to the pessimists, there is a glut of dp people. Those with minimal experience think the problem is a need for more experience, but seasoned professionals are feeling the crunch, too. Working professionals say the flood of entry-level people pouring out of school is reducing their opportunities. "New kids are cheaper," they say, and from all over the country come responses that indicate cost-conscious companies don't want to pay high premiums for experience; employers can train—and pay less to—a stream of well-educated, new college grads.

Pessimists also blame the sluggish economy in the nation and in their own areas. As evidence, they report seeing fewer recruitment ads in local newspapers.

Canned Software Dispiriting Trend

They also mention several other reasons they think the job market is not as good now. For one, the dp field is growing at a slower pace than it used to. Also, in a tight market, employers can be more selective, hiring better educated and more experienced people. The abundance of prepackaged or "canned" software is another dispiriting trend to the pessimists. "You can buy any program you want for $100, instead of paying $20,000 for a programmer," explains one respondent. Changes in computer technology and equipment and the need for candidates with specialties further erode job opportunities. Growing use of the new, such as pcs, and declining use of the old, i.e., 3GLs, is bad news for staffers with the "wrong" experience.

Optimistic or pessimistic, only 2% of the sample say they hope to leave the dp field within the next few years, but many are looking for some kind of change. The largest number, 39%, want to be managers, 26% specifically in dp or MIS. A reassuring 20% want to remain as professionals, 8% at just their current level. Retirement is the aim of 11%, 5% want to do consulting, and another 5% want to be self-employed, in dp or otherwise.

What can we conclude from this career research? A key point is that most dp professionals are still fascinated with their work. This and their generally reported satisfaction with salary seem to compensate for day-to-day annoyances. Few want to leave the field.

A growing concern is with the lack of opportunities for advancement. Today's programmers and analysts feel acutely the crunch of too many staffers chasing too few promotions.

Although most see more job opportunities today at their level than five years ago, it is painfully evident that not all who have changed jobs to get ahead have achieved their goals. ■

Marjorie Freedland is vice president/director of research at Deutsch, Shea & Evans Inc., New York, the human resources advertising, research, and communications organization.

FIGURE 5 Number of Job Opportunities

(NOW VS. FIVE YEARS AGO)	YEARS OF EXPERIENCE						
	TOTAL (1751)	UNDER 2 (43)	2 - 5 (270)	6 - 9 (349)	10 - 14 (320)	15 - 19 (313)	20 OR MORE (437)
No. of respondents in experience level = 100%	%	%	%	%	%	%	%
More opportunities now	35	28	39	36	34	38	30
Fewer opportunities now	23	28	15	23	24	19	30
About the same	25	5	21	22	27	29	28
Don't know/no answer	17	39	25	19	15	14	12

How Did They Get Their Jobs?

Have programmers and anaylsts changed their job-hunting techniques since 1978?

Most frequently (32%), those surveyed applied directly. The more experience and tenure they had, the more likely they were to have done so. The older respondents (45 and above), in particular, went straight to the employer.

Seventeen percent went through employment agencies or search firms. The method was effective for those tenured five years or less, but not for mature professionals.

Sixteen percent responded to recruitment ads in newspapers or trade/professional journals. Women and young dp staffers relied heavily on advertising. In fact, for the "under-25s" it was the job-search method reported most often. Furthermore, recruitment advertising was used consistently by all age, experience, and tenure sectors except the highest tenure level.

Referral by a company employee (16%) or a business associate (11%) were other ways they gained entrée. The most senior respondents, 60 or older, used referrals more often than others.

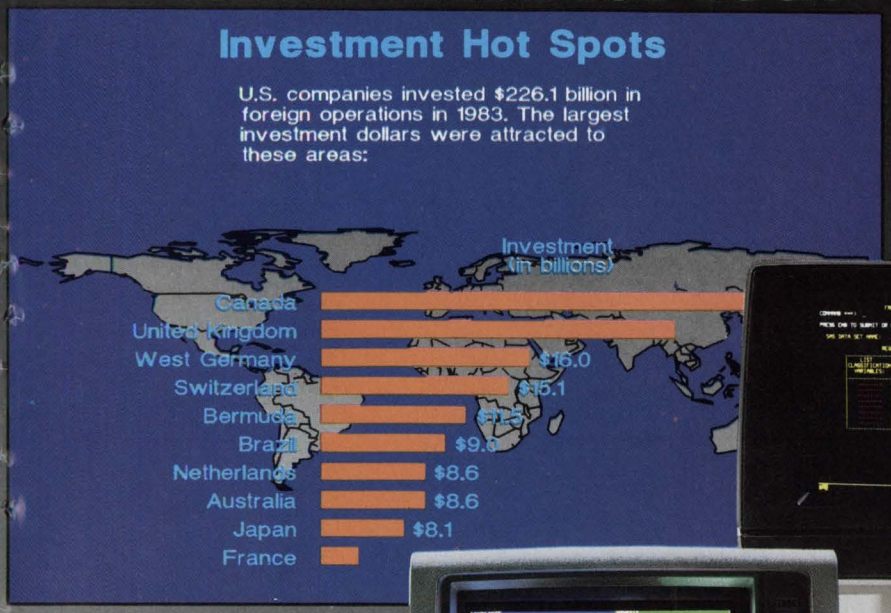
Ten percent were recruited from college. The "under-30s" and those with little or no experience were more likely to have been recruited this way than their older, more experienced coworkers. Among Fortune 1000 respondents, 15% were recruited on campus, an indication that the recruitment efforts of these firms in the college market are productive.

Other methods were reported by 3%, including intracompany transfers, recruitment by the company, and civil service or other competitive government exams.

The modus operandi was the same eight years ago, but college recruiting and responding to recruitment advertising have increased since then, by 5% and 4% respectively.

THE SAS® SYSTEM

The Fourth Generation Solution That Works for You.



One Solution that's Powerful.

Now there's one software solution for all your Information Center applications. One solution for efficient data management, accurate statistics, easy report writing, and customized graphics. One solution—the SAS® System.

You can choose between the simple English-like command language or a front-end menuing system. On-line help facilities make it easy to handle every application, quickly and accurately. You can track sales leads, determine market share, present results. File employee records, analyze benefit programs, manage the payroll. Take orders, keep inventory, produce mass mailings. Schedule projects, determine product mix, make forecasts, produce spreadsheets. All this and more with the SAS System.

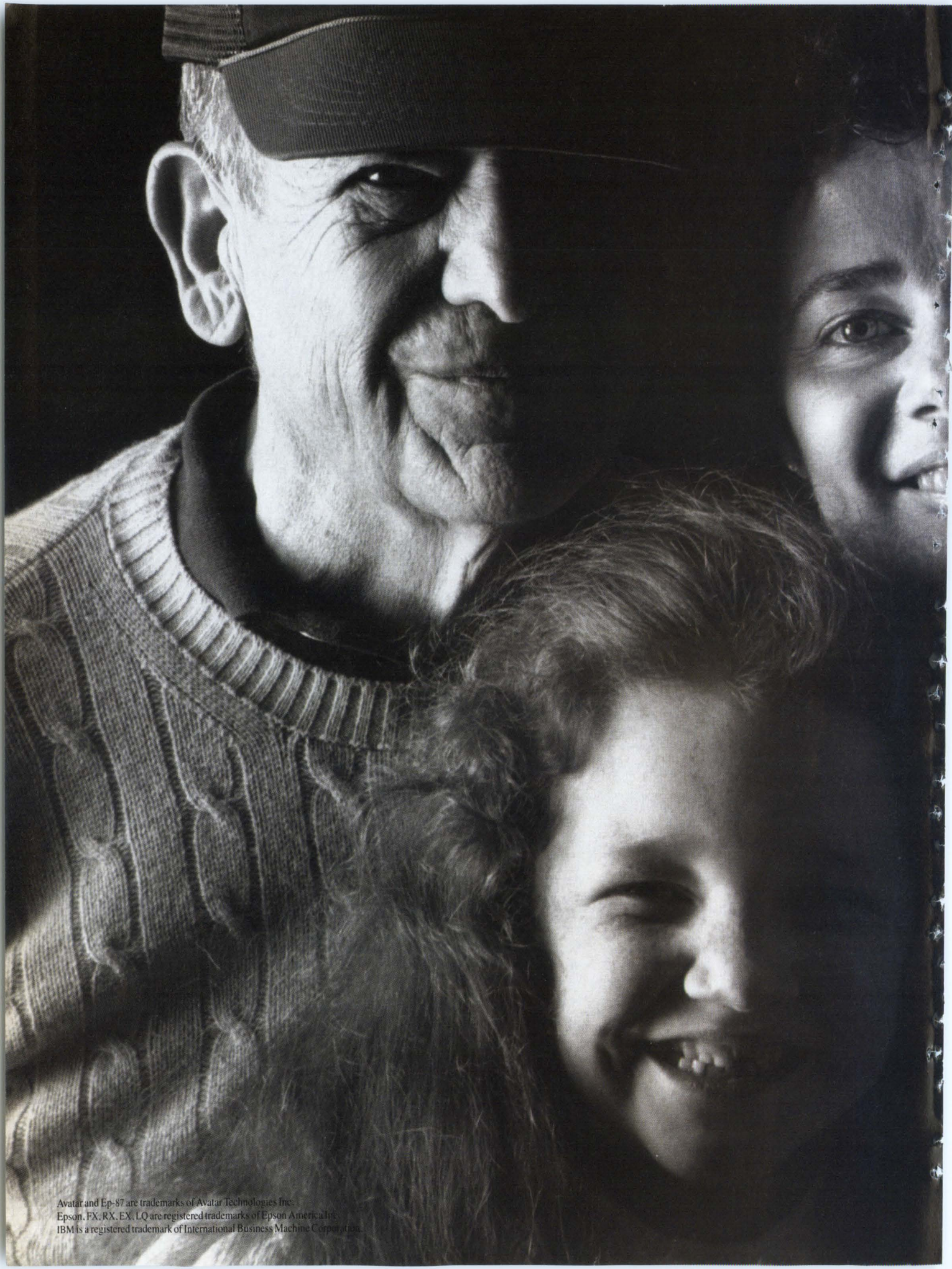
One Solution that's Friendly.

It's easy with the SAS System. You can write front-ends for all your applications. And with a few keystrokes, you can change them as your information needs change. A convenient screen manager lets you edit, display, and control your work without ever leaving your desk. And if you need to move between several operating systems, you'll find the language, syntax, and commands the same for the mainframe, minicomputer, and PC SAS System.

The SAS System runs on IBM 370/30xx/43xx and compatible machines under OS, TSO, CMS, DOS/VSE, SSX, and ICCF; on Digital Equipment Corp. VAX™ 8600 and 11/7xx series under VMS™; on Prime Computer, Inc. Prime 50 series under PRIMOS®; on Data General Corp. ECLIPSE® MV series under AOS/VS; on IBM XT/370 and AT/370 under VM/PC; and on the IBM PC XT and PC AT under PC DOS. Not all products are available on all operating systems.

Whatever your application, the SAS System is your Fourth Generation Software Solution. Call us today.

SAS Institute Inc.
SAS Circle, Box 8000
Cary, NC 27511-8000, USA
Telephone (919) 467-8000, x280
Telex 802505



It wasn't that they didn't like each other. It was just that they were never properly introduced.

Meet F. X. Epson, R. X. Epson, E. X. Epson, and, last but not least, L.Q. Epson. Now the whole gang can talk to your IBM mainframe thanks to a mutual friend. The Avatar Ep-87 Coax Adapter.

In fact, the Ep-87 can have more Epson printers on speaking terms with a 3270 network than anyone else. And with a savings of up to 75% over IBM 3287 printers, no wonder it's a friend of the family.

Because it's a board, the Ep-87 fits right in – you'll never know it's there.

The Avatar Ep-87. It couldn't have happened to a nicer family.

Avatar Technologies Inc., 99 South Street, Hopkinton, MA 01748.

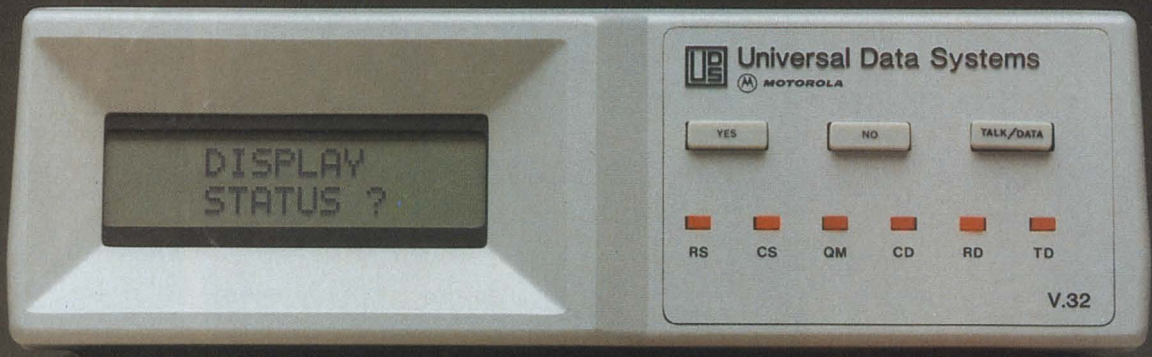
Avatar. All you need to know about 3270 connectivity.

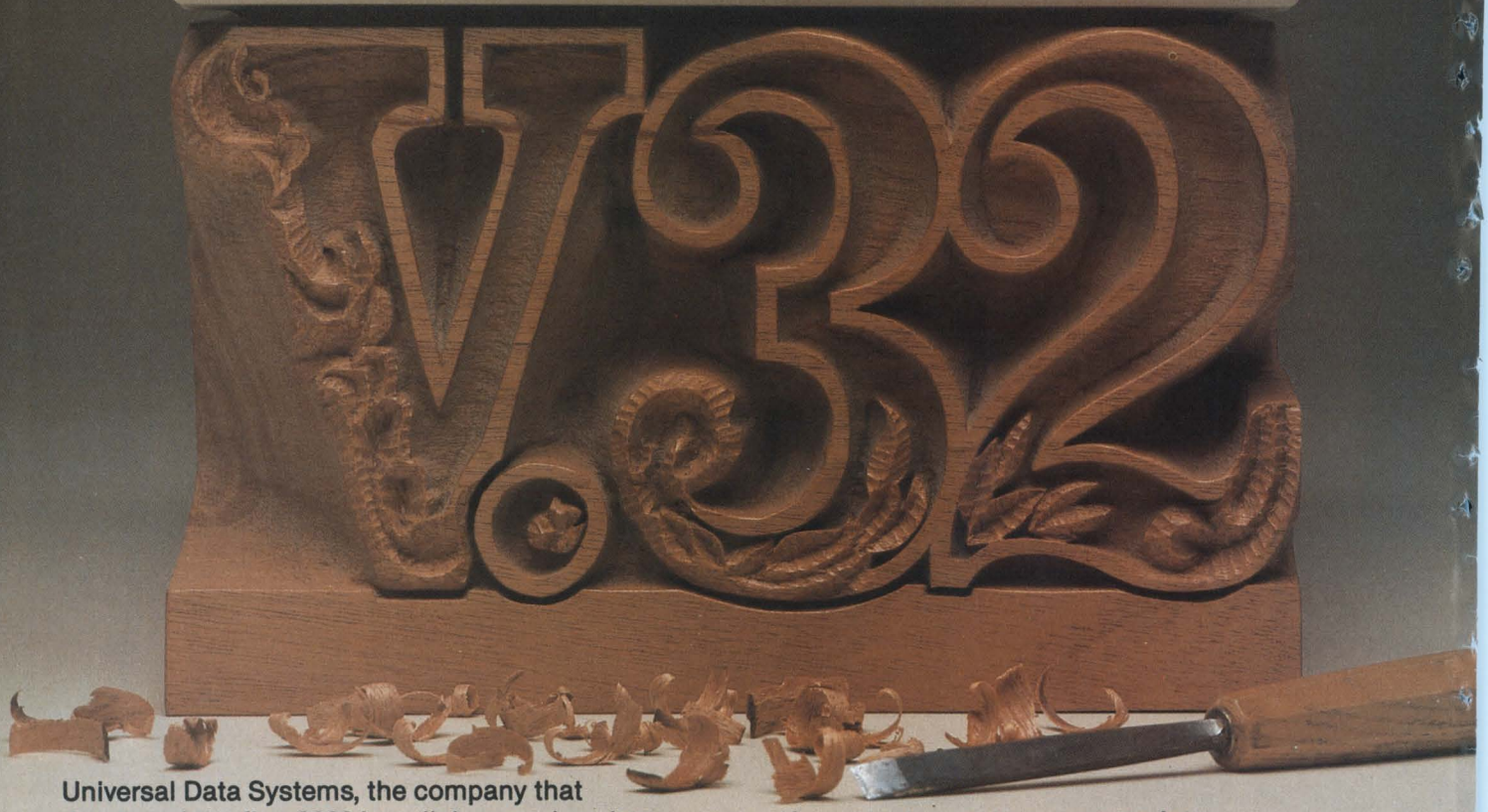
617 435 6872

CIRCLE 60 ON READER CARD

Avatar®

A special kind of craftsmanship





Universal Data Systems, the company that developed the first 9600 bps dial-up modem, has now applied its special brand of craftsmanship to the CCITT V.32 specification.

The result is a *full-duplex* 9600 bps device for the switched telephone network. When substandard line conditions are encountered, the device offers automatic fallback to 4800 bps, while maintaining the full-duplex communications capability.

As you expect from UDS, the device fully utilizes the latest in CMOS technology for low-noise performance and very low (less than 20W) power consumption. A new LCD control panel displays and configures modem set-up selections and displays outputs from the unit's comprehensive self-test regime. Auto-dial capability is also included.

If your system must accommodate periodic bursts of high-throughput, full-duplex communication, UDS craftsmanship and the V.32 standard provide a reliable, cost-effective solution. For complete technical details and quantity prices, contact Universal Data Systems, 5000 Bradford Drive, Huntsville, AL 35805. Telephone 205/721-8000; Telex 752602 UDS HTV.

$2495.00
Quantity One

Universal Data Systems

MOTOROLA INC.
Information Systems Group

PREMIERING AT INTERFACE: BOOTH 1068!

Created by Dayner/Hall, Inc., Winter Park, Florida

CIRCLE 49 ON READER CARD

Real Time

OFF-LINE

ONE OF THE MOST talked about announcements of 1986 was the introduction of the first Intel 80386-based products. As hardware and software vendors jumped on the 386 bandwagon and the pros and cons of the faster chip were debated, it became evident that the advanced technology is here to stay. Thirty 386-based system products have already been announced and over 200 designs are now in progress, says Intel, which says it shipped 90,000 of the 386 chips last year.

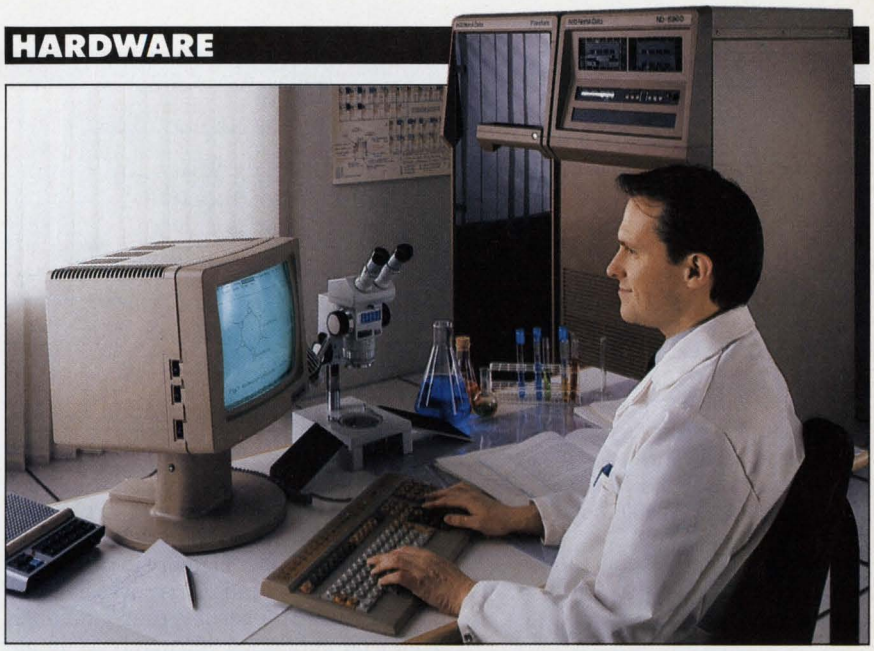
Intel recently unveiled its next generation of 386 chip technology, consisting of a 20MHz version of the 80386 chip (the first version was 16MHz), a numerics coprocessor, an integrated system peripheral device, and a cache control device. Together these components make up Intel's oem offering, which it calls its "tuned computing engine."

Citing the movement toward standards and the trend toward higher performance in the microcomputer, workstation, and minicomputer arenas, Intel feels VLSI is the vehicle for achieving both. Intel also makes note of the growing move toward DOS/Unix multitasking environments, which its chip technology allows for.

The 80386-20 chip operates at 4MIPS to 5MIPS, a 25% increase over the 16MHz version. Intel claims the chip exceeds the VAX 8600 and IBM 4381 in cpu performance. The 80386-20 chips are $599 each. The 82380 Integrated System Peripheral incorporates a DMA controller that can use the 80386's entire 32-bit bus bandwidth via eight programmable channels. With it, Intel claims system I/O speeds five to 10 times above existing solutions. The price is $149 each. The 32-bit 80387 numerics coprocessor is said to provide a four- to six-time performance boost to standard numerics applications running on the previous generation 80287. The 80387 was announced last October along with the 80386, and some manufacturers, such as Zenith Data Systems, have introduced 80386-based systems with 80387 sockets built in. The new coprocessor is object-code compatible with the 8087 and 80287 coprocessors. The price is $500 each. The 82385 Cache Controller, available late this year, can store 32KB of the most frequently used code and data from the full 80386 physical address range of 4GB, thus improving system bus utilization.

An Intel spokesman said the next step in 386 technology—probably a 24MHz version—may be available by the fourth quarter. As for the inevitable 80486, the spokesman would say only, "It's definitely under development."

HARDWARE



Using CMOS gate array technology, Norsk Data's ND-5000 Series provides up to eight times the power of its previous superminis.

Norsk Data Extends Supermini Product Line

New computers provide eight times more power and feature CMOS gate array technology.

BY THERESA BARRY

Norsk Data, the Oslo, Norway-based manufacturer of minicomputers and superminis, expects to have another good year in 1987—the company has been growing at 30% for the last couple of years. In this healthy environment, the company recently announced three additions to its line of superminis. The ND-5000 Series is said to provide as much as eight times the capacity of Norsk's current ND-570/CX supermini. To achieve this, Norsk is using CMOS gate array technology, which the company first used in its Butterfly series of workstations, introduced to the U.S. market last November.

The three new computers are the ND-5700, ND-5800, and ND-5900. The ND-5900 is a multiprocessor version, which can include two, three, or four cpus. Norsk says that each of the new computers can be the main computer in a medium-sized network, or a local computer in a large distributed network. The ND-5000 Series can be distributed and linked to other systems via Norsk's ND-Cosmos data communications and distribution facility.

As with other Norsk Data products, the ND-5000 Series was designed in accordance with the ND-Safe product philosophy, meaning all products use the same operating system, the same communications facilities, and the same applications software.

The ND-5000 computers range in price from $400,000 to $1.53 million. The computers are manufactured in Norway and are marketed in the U.S. through strategic agreements. NORSK DATA N.A., Westborough, Mass. CIRCLE **250**

Graphics Controller

Metheus introduces second high-resolution controller in 1000 Series.

The Metheus 1004 is a new high-resolution color graphics controller that Metheus says is designed for the PC-based CAD, CAM, and CAE markets.

The new controller offers a screen

resolution of 1,024 by 768 and displays 16 colors from a palette of 4,096. The controller occupies a single eight-bit slot in AT-compatible and XT-compatible machines.

The controller also offers IBM CGA (color graphics adapter) emulation, allowing the user to run PC/DOS application programs on the high-resolution display. Text is displayed on a 960 by 600 resolution window. The 1004 is said to be 100% compatible with existing Omega/PC controllers. It also features built-in security verification hardware.

The price of the Metheus 1004 is $2,995, and it's available now. METHEUS CORP., Hillsboro, Ore. CIRCLE **254**

Two New Laptops

Grid goes lighter and IBM adds memory and an LCD.

Grid Systems has extended its line of laptop computers with the GridLite, which weighs in at a mere 8.5 pounds. The laptop features a 10-inch diagonal "supertwist" LCD screen (liquid crystal molecular chains are twisted, causing light waves to bend and producing darker characters), and a 1,200/300 baud internal modem is available.

GridLite can be configured with 640K of system RAM and up to 1MB of internal EMS RAM. It also has the capacity for an additional 1MB of ROM. The keyboard is identical to that of the GridCase Plus, which has also been enhanced with more memory and storage options. The GridLite is available now and is priced at $1,750. EMS RAM is available at $295 for 0.5MB and $395 for 1MB. GRID SYSTEMS CORP., Mountain View, Calif. CIRCLE **252**

IBM has enhanced the PC Convertible, the laptop it introduced last year. Enhancements include a new liquid crystal display with "supertwist" technology, a new internal modem that supports communications applications using either the IBM or Hayes Attention command set, and a new 256K memory card that allows for expansion of user memory to 640K.

The enhanced LCD is now part of the standard PC Convertible configuration. It may be purchased separately as an upgrade. The PC Convertible with enhanced liquid crystal display is priced at $1,995; the enhanced LCD alone is $250; the enhanced internal modem is $450; and the 256K memory card is $390. IBM, Information Systems Group, Rye Brook, New York. CIRCLE **253**

Serial Dot Matrix Printers

Three new printers from Output feature 850cps speeds.

Output Technology Corp., a manufacturer of high-speed serial dot matrix printers, recently introduced its fastest products.

The TriMatrix 850XL features a burst speed of 850cps and a throughput of 240 lines per minute. It's the first in a new series, called the TriMatrix 800, which is based on OTC's 700 Series of 700cps printers.

The 850XL is said to be optimized for 136-column printing and is capable of handling up to six-part forms. OTC says the 850XL offers all features and functions of the 700 Series including front-panel menu programming, multipitch printing, front and bottom paper feed, 8K data buffers, serial and parallel ports, and Epson and DEC printer emulations. The 850XL has an increased baud rate of up to 19.2K. It's priced at $2,395 and is available this month.

Also unveiled by Output were two TriMaster 800 printers for the IBM S/3x and 3270 markets, both featuring 850cps speeds and throughput of 240lpm. Both printers deliver all the features of the 850XL.

The 888XL is aimed at IBM 34/36/38 users and features an internal protocol converter for connection to 3x systems through a twin-ax port. A parallel port is also standard. Printer emulations offered are IBM 4214, 5224, 5225, 5256, and Epson. The price of the 888XL is $3,795, and it will be available next month.

The 889XL is targeted for IBM 3270-terminal systems. It features coax and parallel ports and emulations for IBM 3287, 3262, and Epson printers. It's priced at $3,995 and will also be available next month. OUTPUT TECHNOLOGY CORP., Spokane, Wash. CIRCLE **255**

Epson's Newest Micro

Equity III+ has optional math coprocessor for scientific tasks.

Epson has introduced the Equity III+ to replace its Equity III microcomputer. It's a 16-bit IBM AT-compatible machine that comes equipped with an 80286 microprocessor capable of running at three switch-selectable speeds: 6MHz, 8MHz, or 10MHz. An optional multispeed 80287 math coprocessor is available for scientific and engineering tasks. A built-in parallel port and serial port are also standard.

A basic configuration includes 640KB of main memory, expandable to 15.5MB; 64KB of ROM; an internal system clock/calendar; a security keylock switch; a 1.2MB, 5¼-inch floppy disk drive; and an enhanced IBM AT-style keyboard. The latest version of MS/DOS and a set of system diagnostics and GW-BASIC are included.

Options include an IBM-compatible color graphics adapter, multimode graphics adapter, and enhanced graphics adapter boards, plus a selection of color and monochrome monitors. Additional 360KB or 1.2MB, 5¼-inch floppy drives, additional hard drives, or tape backup devices are also available. The base price is $2,695; equipped with a 40MB Winchester drive, the system is $3,895. EPSON AMERICA, Computer Products Division, Torrance, Calif. CIRCLE **257**

What can you expect from the new LaserJet Series II Printer?

we never stop asking "What if..."

Everything.

Because the LaserJet Series II Printer from Hewlett-Packard is the product of experience.

It's a second generation printer from the company with the world's largest installed base of laser printers.

Whatever your company's needs, the LaserJet Series II will deliver the performance you expect, at up to 8 pages/minute.

Take a simple memo like the Soup letter we created with Microsoft Word. As you can see, you can print in a variety of formats and type styles with our wide selection of LaserJet fonts.

Or you can create a sophisticated combination of text and graphics. With additional plug-in memory, you can also produce full-page 300 dpi graphics, like our Nuts form shown below. To do this, we used HP's new ScanJet desktop scanner, Microsoft Windows and Pagemaker® from Aldus.

With support by more than 500 of the most popular software packages, the LaserJet Series II Printer can produce whatever type of business document you need. And LaserJet Series II works with all popular PCs so it can easily be integrated into your existing system.

In fact, only the price is unexpected—starting as low as $2495.*

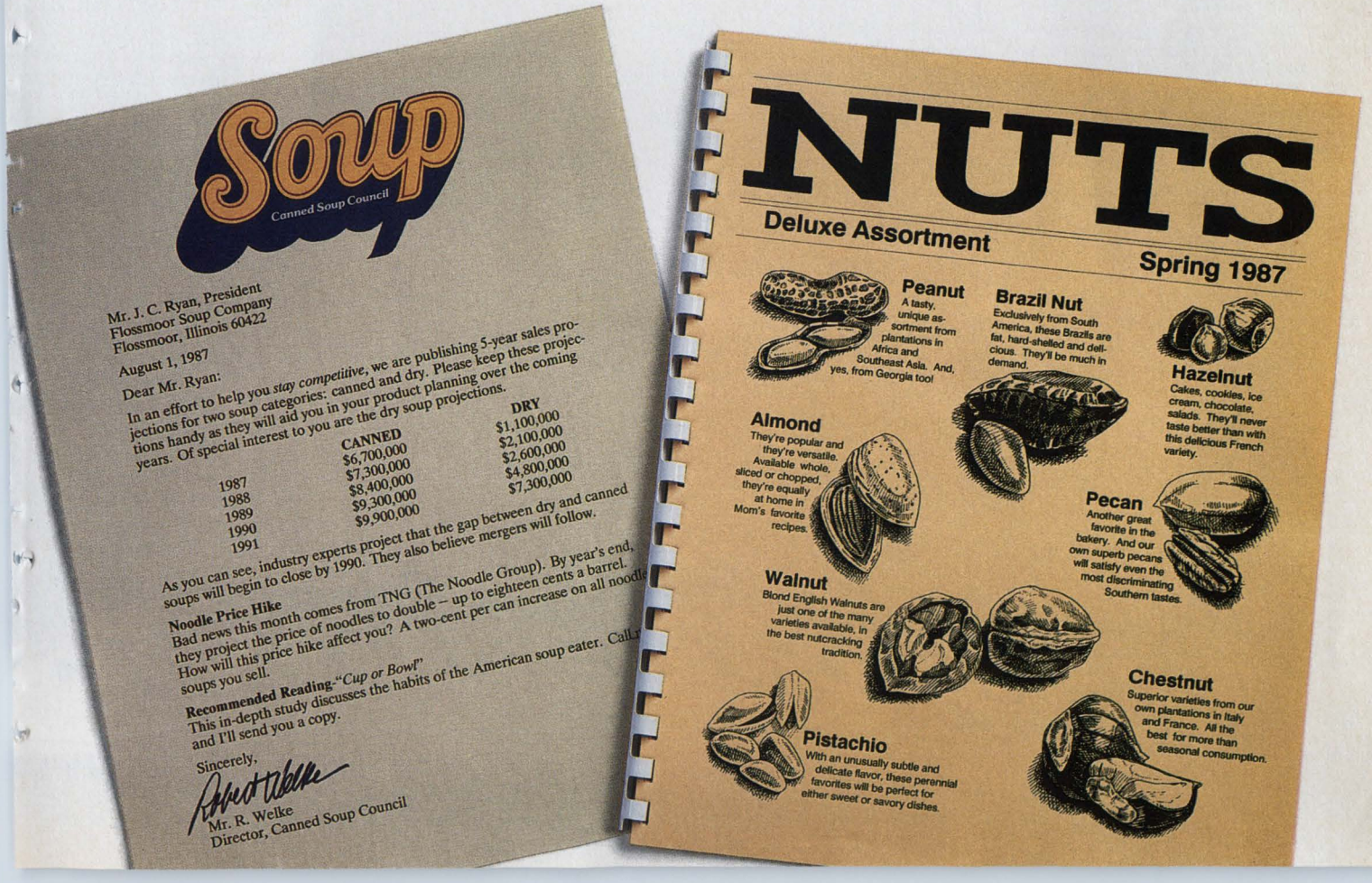
For the authorized dealer nearest you, call us at 1 800 367-4772, Ext. 275K.

HEWLETT PACKARD
Business Computing Systems

Microsoft is a registered trademark of Microsoft Corp. Pagemaker is a U.S. registered trademark of Aldus Corporation.

*Suggested U.S. list price. © 1987 Hewlett-Packard Co. PE12702DM3

CIRCLE 62 ON READER CARD



CONFESSIONS OF A DOWNED COMPUTER.

"They always blame me," it sobbed, "when half the time the electric power's at fault."

"All that raw electric power does funny things to my system."

The slightest dip or surge in electricity can play havoc with me. Even a few millisecond power disturbance can cause me to forget important data, give out misinformation, or cause damage to my hardware.

And, these disturbances are not just an occasional thing. Surveys done by AT&T Bell Laboratories and I.B.M. show they occur on the average of 135 times a year and can account for as much as 50% of all computer down time. That's why I need AT&T Power Protection Systems.

"I need the AT&T Power Protection Systems to turn my downtime into up time."

These AT&T Power units take raw, unpredictable commercial electric power, clean it, and distribute it to my system as pure regulated power. (Ahhhhhhhh.) And they support the widest variety of computers and communication equipment. The products include the AT&T Uninterruptible Power System (UPS), which has a built-in battery reserve to protect against all power fluctuations, as well as blackouts. Or, when a power reserve isn't necessary, there's the AT&T Power Line Conditioner (PLC), which eliminates 76% of all power disturbances.

"AT&T, you're the only one for me."

AT&T is the only company that designs, manufactures and services power protection equipment and also makes computers. So they understand me better. They know my problems and the right way to solve them. In fact, the architecture for their Uninterruptible Power Systems is patented. It includes fewer components for greater reliability and efficiency. So, do your computer a favor. Don't wait for it to act funny before you act. Find out more about the AT&T Power Protection Systems. Call 1-800-372-2447, or send the coupon to: AT&T Power Protection Systems, Attn: K.K. Ketterer, 961 Marcon Blvd., Dept. 203130, Allentown, PA 18103.

AT&T Power Protection Systems
Attn: K.K. Ketterer,
961 Marcon Blvd.,
Dept. 203130, Allentown, PA 18103.

Please send me the following:
- ☐ UPS Literature
- ☐ PLC Literature
- ☐ VAR Program Information
- ☐ Distributor Program Information
- ☐ Please have a sales representative contact me.

Name _____

Title _____

Company _____

Address _____

City _____

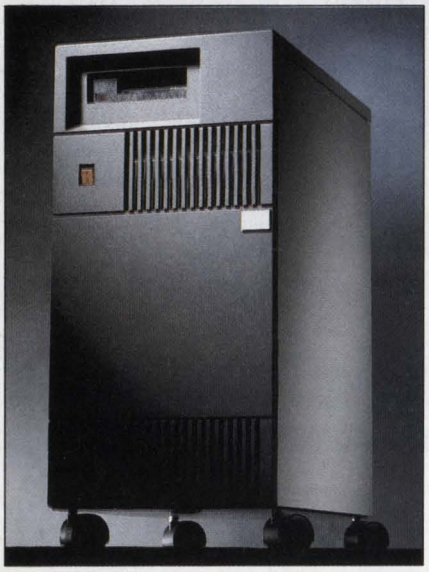
State _____ Zip _____

Phone _____

AT&T
The right choice.

CIRCLE 63 ON READER CARD

Real Time



Parallel Processor

Designed for expert system and signal processing applications

The DADO, a "massively parallel" computer recently announced by Fifth Generation Computer Corp., is designed for expert system and signal processing applications. It employs up to 8,191 Motorola 68020 microprocessors arranged in a binary tree. The machine is said to outperform traditional von Neumann computers in certain narrowly defined applications, such as searching databases, recognizing speech, and matching image patterns.

Fifth Generation claims the system's performance grows at a nearly linear rate as processing elements, containing mpus, memory, and communications channels, are added. The DADO machine is designed for standalone use or to serve as a shared resource on local networks. It is controlled by the Unix operating system. A C compiler is available now, and compilers for languages such as LISP, FORTRAN and OPS5 are planned for second quarter delivery. The vendor has licensed DADO's design from Columbia University, New York, where the hardware was invented.

Fifth Generation has also teamed up with AT&T's Federal Systems operation to develop a speaker-independent, large vocabulary, real-time speech recognition system and has subcontracted with DARPA to develop industrial expert systems.

Prices begin at about $25,000 for an eight-processor system; a similar version with a signal processing chip on each processing element is $32,000. A 512-processor system is priced at about $575,000 without the signal processing chips. A host development workstation, built by Sun Microsystems, is also available for approximately $20,000. Deliveries were set to begin this month. FIFTH GENERATION COMPUTER CORP., New York. CIRCLE **251**

Entry-Level Business Computer

Point 4 unveils multiuser system for small, growing companies.

The recently introduced Mark 2E is Point 4's entry-level multiuser business computer. The system operates at 3.6MIPS and has the ability to support up to 17 users. It contains a Winchester disk with an unformatted capacity of up to 143MB. Backup and program load capabilities are provided by a 60MB streaming cartridge tape subsystem. An optional 1MB floppy disk drive is available.

The basic Mark 2E is configured with four asynchronous ports and can be expanded to 16 ports in four-port increments. An optional 17th binary synchronous port can be added for computer-to-computer communications. The system runs on Point 4's IRIS (Interactive Real-time Information System) operating system. Point 4 claims that software created for the Mark 2E is upwardly compatible and will function on its largest 128-user system, the Mark 12.

A basic system with a 280 nanosecond cpu, 256KB of RAM, four-port multiplexor, ST-506 disk controller with QIC-02 streamer tape interface, 27MB hard disk, 60MB quarter-inch tape streamer, desktop enclosure, and Mapped Iris license is priced at $11,395. POINT 4 DATA CORP., Tustin, Calif. CIRCLE **258**

New NCR Tower

Based on loosely coupled design that allows for incremental growth

The latest in the NCR Tower series is the high-end Tower 32/800. Housed in the familiar Tower slim-line cabinet, this 32-bit machine is based on Unix System V and can be configured to support from 32 to 112 users. The 32/800 is designed with Motorola 68020 and 68010 processors.

The architecture of the Tower 32/800 is a loosely coupled, incremental, multiprocessor design. This allows for applications processors, file processors, terminal processors, communications processors, and LAN processors to be incorporated into the system in increments while maintaining the user's original investment. NCR says that maximum system performance is achieved by distributing many of the Unix processing elements to multiple processors. This distribution, NCR says, is transparent to the user.

The Tower 32/800 is priced at approximately $105,000 for a 32-user configuration, which includes two applications processors with 4MB of RAM each, four eight-port terminal processors, one file processor, and 340MB of disk storage. A typical 112-user price is $160,000, which includes two applications processors with 4MB of RAM each, 14 eight-port terminal processors, two file processors, and 850MB of disk storage. NCR CORP., Dayton, Ohio. CIRCLE **256**

Looking Back

TWENTY-FIVE YEARS AGO IN DATAMATION: "General Mills will step up their program to recruit personnel experienced in both development and production of digital computer systems. The decision . . . was based on 'the success in marketing the AD/ECS-20 and AD/ECS-37.' " ("General Mills to Expand Dp Activities," in News Briefs, March 1962, p. 86.)

FIFTEEN YEARS AGO IN DATAMATION: "RCA's decision to get out of the general purpose computer business had massive consequences—as a result, nearly 8,000 people . . . lost their jobs and more than 500 customers with about $1 billion of equipment were confused about their future. In all, RCA got a $490 million pretax write-off . . . about twice the size of the largest previous bust in the history of U.S. business—the $250 million write-off Ford Motor Co. got for bombing with the Edsel." ("Curtain Act at RCA" by W. David Gardner, March 1972, p. 34.)

TEN YEARS AGO IN DATAMATION: "IBM will have captured 7% of the minicomputer market by the end of this year, having shipped about 6,000 Series/1 minis, and will have 20% of the market by the end of 1983, according to a new market research report . . . ." (From Source Data, March 1977, p. 48.)

P4781

Advertisers' Index

Circle		Page
31	Adobe Systems	57
28	AGS Computers	51
66	Amdahl Corporation	123
—	AST Research Inc.	1
9	Attachmate	8
—	AT&T Communications	90
—	AT&T Info Systems	58-59
63	AT&T Technology	110-111
—	AT&T Technology	74
39	Avanti Corporation	72-73
60	Avatar	104-105
44	Banyan Systems, Inc.	81
7	C.Itoh	5
—	Compaq Computer Corp.	94-95
47	Computer Associates/SPD	84
22	Concurrent Computer Corporation	36
55	Control Data Corp.	97
24	Cullinet	40-41
13	CXI	16
12	Data General	14-15
6	Data Group	4
56	Datasouth	98
18	Datapoint	29
34	Datasphere	64
37	Develcon	68
8	Digital Communications Associates	6-7
—,67.	Digital Equipment Corporation	52-53, 124-125
41	Duquesne Systems, Inc.	75
42	Emergency Power Engineering	76-77
30	Emerson ICD	54
3	Equinox Systems Inc.	Cov 4
—	Expoconsul International, Inc.	82
76	*Facit A.B.	56-2, 56-3
2	Fujitsu America, Inc.	Cov 3
57	GE/RCA	99
38	General Instrument	71
19,62	Hewlett Packard	30-31, 109
17	ITT—CSG	27
70	Impact Systems, Ltd.	131
77	*Intel Corporation	56-4
11	Intelogic Trace	13
—	Interface Group	127
—	Lotus Symphony	46-47
15	McCormack & Dodge	23
75	*McData Corporation	56-1
35	Nissho Iwai American Corp.	65
27	Novell	49
69	Okidata	129
—	Oracle	33
61	RAD Data Communications	88
43	Radio Shack	78
19	Relational Technology Inc.	21
—	SAS Institute	Cov 2, 103
53	Sequent Computer Systems	93
71	Sicob	132
50,51	Software Link	89
46	Sorbus Service	83
23	TRW Customer Service Division	39
25	Tandem Computers	42
10	Tangram Systems	11
21	Tektronix, Inc.	34-35
36	Telenet/U.S. Sprint	66-67
65	Telex Computer Products	121
48	TeleVideo	87
—	Texas Instruments	63
79	*Text Lite B.V.	56-11
64	Tymnet	118
49	Universal Data Systems	106
5	VM Software, Inc.	4
78	*Wandel & Goltermann	56-8
16	Xerox—Printing Systems	24-25
58	Xerox—Lasography	101

*OEM Edition

TYMNET MAKES YOUR IBM EQUIPMENT WORK SMARTER.

Tymnet's Services for use with IBM® systems are a full array of value-added solutions for your wide-area IBM data communications requirements. These, of course, begin with X.25 capabilities. We helped create X.25. And we still lead the field.

Tymnet also makes your IBM equipment work smarter with our unique Async-To-3270 protocol conversion service—the only network-resident service allowing inexpensive ASCII terminals and PCs to access IBM 3270 environments.

This integrated solution means you don't have to purchase special hardware and software. And your users gain single-footprint access to both IBM 3270 and async hosts.

What's more, you get support for both 3270 Bisync and SNA/SDLC protocols and inexpensive ASCII printers. Plus call access to the TYMNET network at 1200 or 2400 bps.

Tymnet's Services do more than make the async-to-3270 connection. We also offer communications services for synchronous terminal devices like 3270s, 3770s, 5250s, and 2780/3780 HASP devices. Better still, Tymnet manages everything for you.

Our Services are currently hard at work for more than 200 major companies using IBM systems. To find out how you can make your IBM equipment work smarter, call or write for the Tymnet brochure describing services for use with IBM systems.

TYMNET
2710 Orchard Parkway
San Jose, CA 95134
(408) 942-5254 ext. 73

ONE COMPANY, MANY SOLUTIONS

CIRCLE 64 ON READER CARD

See Us At Booth #1954

INTERFACE '87

15th ANNUAL CONFERENCE & EXPOSITION
FOR COMMUNICATIONS & INFORMATION NETWORKS

Co-Sponsored by
BusinessWeek and Data Communications
March 30–April 2, 1987 □ Las Vegas Convention Center
Las Vegas, Nevada

TYMNET®

MCDONNELL DOUGLAS NETWORK SYSTEMS COMPANY

UPDATES

DESPITE THE BELIEF within the computer industry that either MVS or VM will soon become the cornerstone of IBM's operating system strategy—rendering DOS obsolete—a study suggests that Big Blue has not yet identified the one key operating system that can match the strategy of its chief competitor, Digital Equipment Corp., and its VMS operating system. In fact, research firm Computer Intelligence, La Jolla, Calif., provides evidence that DOS may be with us for a long time.

The three major operating systems in the IBM/pcm world are DOS, which includes DOS, DOS/VS, and DOS/VSE; OS, which includes OS/VS/1, MVS, and MVS/XA; and VM, which includes VM/SP, VM/IS, VM/CMS, and VM/XA.

VM is IBM's fastest growing operating system, although it currently has the smallest installed base. Software and services companies are placing their bets on it to be the IBM operating system of the future. CI notes that from December 1982 to December 1986, the number of IBM/pcms in the U.S. running VM increased to 34% from 19%. VM has become popular on both small and medium-sized systems, says CI, due to the interactive programming environment VM/CMS offers. MVS has also experienced growth, CI reports, although not as dramatic, growing to 49% in 1986 from 45% in 1982. The most dramatic growth within that environment has been in MVS/XA, which grew to 37% of the MVS base in 1986 from just 7% in 1984. CI sees IBM continuing to encourage users to convert to the more costly MVS/XA during 1987, but feels this migration is further in the future. CI analyst Jerry Berry notes that "It's not happening as fast as IBM had hoped it would."

IBM's current strategy, as CI sees it, appears to be to promote its latest variants of VM for its low-end to midrange systems, and its top-of-the-line MVS/XA for medium to high-end systems, suggesting that DOS will be replaced. But, CI notes, although the number of cpus running DOS operating systems is decreasing, almost half of the 11,000 IBM/pcm users it surveyed (70% of U.S. sites) continue to operate one of the DOS systems, suggesting that DOS will be around for some time.

The reason for the prevalence of DOS is the existence of older IBM computers like the IBM 360 and 370 systems, which are strictly DOS oriented. These systems are only gradually being replaced by new, MVS-oriented cpus. CI supports its view further by adding that IBM recently introduced a new version of DOS/VSE for the IBM 9370 series.

SOFTWARE

Software Development System from BST

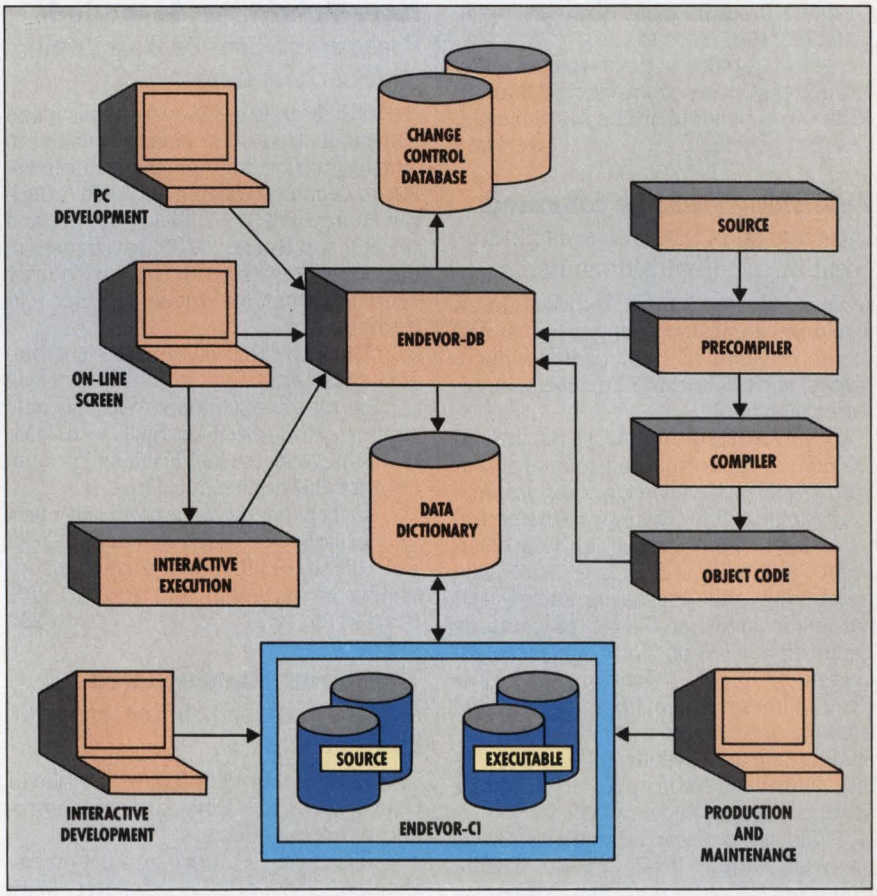
Business Software Technology's first release is for Cullinet's IDMS/R environment.

BY THERESA BARRY

Endevor-DB from Business Software Technology Inc. is an integrated software development management system for applications running under Cullinet's IDMS/R environment. BST says Endevor-DB tracks changes made in the application development process, records and groups the changes, and automates the quality assurance and migration of those changes to the testing and production environment.

The system is made up of five components. One tracks all changes (who, when, why); another controls access to dictionary entities; the third organizes and reports changes in key categories; the fourth indentifies differences between application systems; and the last helps users identify changes to application systems that are being moved from development to test and production levels. BST says that these five facilities interact with Endevor's change control database to manage Cullinet's IDMS/R application development and operations environment, including compilers and tools such as ADSA and ASF. Endevor-DB is available now and is priced at $57,500.

Business Software Technology was formed in 1984 by former Cullinet employees. The company's other product is Endevor-C1, a change control sys-



Endevor-DB's five components interact with Endevor's change control database.

tem for the nondictionary-driven development environment. BST acquired that product along with the assets of its developer, Condor Technology (New York), last fall. BUSINESS SOFTWARE TECHNOLOGY INC., Westborough, Mass. CIRCLE **260**

Playback Facility

SPSS Inc. adds feature to Graphics package.

SPSS Graphics Playback facility is now available in release 1.1 of SPSS Graphics for IBM CMS and Prime minicomputers. It's available for DEC VAX systems in release 1.1, level 2 of SPSS Graphics.

With Playback, users can replay a previous SPSS Graphics session in an interactive or batch mode. This enables the user to produce the same types of graphics or maps on a regular basis using different data each time. Playback creates a logfile of an interactive session, which records every command entered, menu selected, and form filled out during the session. In a Playback session, Graphics takes its input from this logfile instead of the keyboard.

SPSS Graphics with Playback facility has a license price of between $3,000 and $15,000, depending on the system used. SPSS INC., Chicago. CIRCLE **261**

Publishing Package Enhanced

Interleaf adds features to facilitate creation of complex documents.

A new release, 3.0, of Interleaf Inc.'s Technical Publishing software is suited to the creation of long, complex documents, such as technical manuals, directories, and books.

New features in Release 3.0 include full editing and formatting control of text with graphics, revision tracking, an equation package for creating mathematical formulas, a "book" facility for long document assembly, including automatic numbering and cross-referencing and automatic index and table of contents generation, additional CAD interfaces, including HPGL, IGES, MacDraw, and MacPaint filters, isometric and freehand drawing, new graphics input options, including line-art scanner and tracing tablet, enhanced software for editing scanned images, and new typefaces.

The new release is bundled with 32-bit workstations from Apollo, Digital Equipment Corp., and Sun Microsystems. An entry-level configuration including a workstation, TPS software, and an Interleaf laser printer is priced at $29,900. Unbundled TPS software is $15,000 per license. The options mentioned are priced separately. INTERLEAF INC., Cambridge, Mass. CIRCLE **266**

Widgets Explained!

We at **Widget International** are often asked for some background on the origin of the word *widget*. Everyone here knows what we mean when we say *widget*, but anyone who has looked the word up in a dictionary knows that it doesn't appear in any of the standard dictionaries. Even in *The Oxford English Dictionary*, the most complete dictionary of them all, there is no entry between *widgeon* and *widow*.

We have done some research of our own and come up with a few answers to the public's questions, and we would like to share these with you.

We have found that many people associate *widgets* with *widgeons*, an interesting kind of wild duck. This is an ingenious and appealing, though inaccurate, explanation that may be accounted for by their latching on to the closest word that they can find.

We have found that many people associate widgets with widgeons, an interesting kind of wild duck. This is an ingenious and appealing, though inaccurate, explanation.

In the dictionary, *widgeon* is the only word that is the least bit like *widget*. Actually, *widgeon* and *widget* may have gone through similar transformations over the course of history, as we shall demonstrate in the next few sentences, we hope. A typical example follows:

The president of **Widget International**, Paul Reynolds, has offered one explanation of the origin of the word that should satisfy almost everyone: *widget* is a word that has existed since the beginning of human language. Before there were individual names for things, everything was a *widget*. People would ask, for example, "Would you please hand me that widget, so that I can fix this widget?"

Before language became sophisticated, even eyes and ears were called "widgets."

Microdocument

More Mainframes Supported

Pacbase now runs on Honeywell and Sperry systems.

CGI's Pacbase is a life-cycle applications generator that has been available in North America only on IBM mainframes. It is to become available on North American Honeywell DPS-7, DPS-8, DPS-88, and DPS-90, and Sperry 1100 mainframes in the second quarter. It has previously been available for those machines in Europe.

CGI claims that current IBM customers can generate systems for Honeywell and Sperry environments. With this new version, Honeywell or Sperry installations can generate batch and on-line systems for their own environments.

Prices for the Honeywell and Sperry versions of Pacbase range from $149,000 to $299,000, depending on operating environment. CGI SYSTEMS INC., Pearl River, N.Y. CIRCLE **262**

Three from Thoroughbred

A port to Compaq 386, security device, and RDBMS

The Thoroughbred Software Division of Concept Omega Corp. recently introduced three products.

The first is a port to the Compaq Deskpro 386 portable computer. With the port, says Thoroughbred, all applications written in Thoroughbred BASIC under Thoroughbred/OS can be run on the Compaq. The product is available in single-user, three-user, six-user, and 10-user versions. It is priced from $495 to $2,795. Thoroughbred claims to have migrated Thoroughbred BASIC to over 60 different computer manufacturers' hardware and expects to do more in 1987.

The second new product is Passport, a device for securing software. This allows vars to tie their proprietary software applications to a particular computer system via serial numbers. Passport can be plugged directly into the serial port of a standalone system or between the port and any terminal on a multiuser system.

The serial number, visible internally and externally, can then be used to encode any proprietary program desired. A user can make any number of backup copies, but they are usable only on his or her system.

Passport will be bundled with Thoroughbred BASIC under Unix and Xenix and with Thoroughbred/OS. Prices range from $495 to $12,995, depending on the size of the system.

Thoroughbred has also announced Idol-II, a relational database management and retrieval system, designed for use in the Thoroughbred BASIC multiuser environment. It's an extension of the company's 10-year-old Idol DBMS. Its new features include a multirecord data management capability that allows the user to view and edit multiple file records simultaneously. Prices for Idol-II range from $795 to $3,895. THOROUGHBRED SOFTWARE, Somerville, N.J. CIRCLE **263**

Project Management System

Designed to interact with popular database and spreadsheet files

Pro*Path*Plus from SoftCorp is a critical path method project management system designed to interact with programs using Lotus 1-2-3, dBase III, DIF, and ASCII files.

Users can create projects directly from data in spreadsheets or DBMS files and can export project information to other programs for analysis and reporting.

The program performs scheduling and automatic resource leveling. The program also allows graphics dot matrix printers to rotate reports and Gantt and PERT charts 90 degrees, printing them on one continuous piece of paper. Network

Cleans desks and does windows with one keystroke.

Reduce functions typed from the keyboard to just one keystroke.

Introducing the new C078 Combined Function Terminal. A new, innovative terminal for improving operations in Credit Collections, Purchasing, Customer Service, and many other areas.

Now a 3270 plug compatible terminal that combines telephony, user functions, and interactive data all in one. With programmable soft keys you clear the desk of calendar, calculator, notes and telephone.

The new Telex C078 Combined Function Terminal. To put your finger on this new productivity tool, call Telex. USA: 1-800-331-2623, Ext. 3284 (Oklahoma, 1-918-628-3284). INTERNATIONAL: 1-617-769-8000. CANADA: 1-800-268-3233. EUROPE: 41-38-22-6101.

The First to Put 3270 Compatibility and Productivity on Speaking Terms.

TELEX

TELEX COMPUTER PRODUCTS, INC.

CIRCLE 65 ON READER CARD

diagrams of projects are automatically produced. Projects can include up to 500 tasks, which can be linked together. Automatic subproject rollup and mass update facilities are included; subproject explosion during printing is an option.

International date and number formats can be selected and up to 120 holidays can be removed from the schedule for international use.

The software Pro*Path*Plus runs on the IBM network and supports the IBM PC Convertible. Softcrop says the program is not a new release of Advanced Pro-Path 6, a low-end Softcorp project manageent system, but users of that program can upgrade for $150. Otherwise, Pro*Path*Plus is priced at $495. SOFTCORP, Clearwater, Fla. CIRCLE **269**

Sterling Goes DB2

Enhances two products to support IBM's Relational DBMS

Predicting that IBM's DB2 will be the dominant database manager in 1990, Sterling Software's Answer Systems Division has added DB2 support to two products. One is the recently announced release 10.1 of the Mark IV mainframe application development package. Mark IV's Relational Support/1 has been in use at selected user sites since July 1986. Its features help users work with DB2 and SQL/DS tables.

Other functional capabilities added to Mark IV include an IMS/VS checkpoint/restart feature, and data dictionary enhancements for simplified management of various Answer Systems' products. An ISPF program preparation facility and a performance optimization capability for CMS environments are optional.

Release 10.1 is free to current customers of Mark IV. Relational Support/1 and the ISPF program preparation facility are priced separately at $15,000 per feature. Mark IV pricing ranges from $75,000 to $150,000. Answer/DB for the Personal Computer, a micro-to-mainframe link, is the second product to add DB2 support.

Answer/DB takes users through a series of menus to select and extract information from an IBM mainframe computer and deliver it to a pc. IBM agreed to help market Answer/DB to IMS users last year. With DB2 support, Answer/DB is priced from $45,000 to $200,000, depending on the size. STERLING SOFTWARE, Answer Systems Division, Canoga Park, Calif. CIRCLE **264**

Unix/Real-Time System

Modcomp provides Unix development and real-time processing.

The Realix operating system, recently introduced by Modcomp for its Classic 32/85 minicomputers, brings features of AT&T's Unix System V.2 to Modcomp's own MAX 32 real-time operating system.

Realix is said to provide over 125 tools and utilities for program development, including editors for data files, source programs, and text; text processors and formatters; tools for creation, deletion, maintenance, and backup; and tools for electronic communications. A Bourne shell is included, as is a C compiler that generates Modcomp machine code.

Routines are available for standard I/O operations, file access and status information, string manipulation, memory allocation, and mathematical operations. Realix also supports multiprogramming in FORTRAN, Pascal, and COBOL. A user can create programs under Unix and then link, catalog, and execute them as real-time tasks under MAX 32.

Realix is delivered with all standard MAX 32 elements, system processors, standard compilers, and libraries on the first disk drive of a Classic 32/85, and all Unix elements, tools, utilities, and libraries on the second drive. It will be available in the second quarter at a price ranging from $12,000 to $15,000. MODCOMP, Fort Lauderdale, Fla. CIRCLE **267**

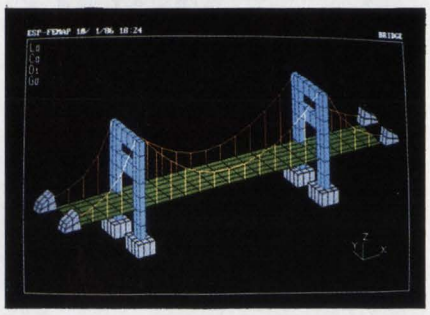
Finite Element Modeling

For development of both 2-D and 3-D models

Enterprise Software Products is a startup whose first product is FEMAP, a finite element modeling package for the IBM PC family.

FEMAP includes read and write interfaces to MSC/PAL and MCS/Nastran from MacNeal-Schwendler Corp, Los Angeles. Users also can invoke MSC/PAL solution routines directly from FEMAP.

FEMAP supports both the color graphics adapter (CGA) and the enhanced graphics adapter (EGA), with 3-D color-shaded hidden-line and wire-frame plotting available for both. The FEMAP element library contains 14 element types, including beams, quadrilateral and triangular plates (linear and parabolic), plane stress and plane strain membranes, shear panels, parabolic axisymmetric triangles, scalar springs and dampers,



masses and linear tetra, wedge, and brick solid elements.

Applied loads include nodal forces and moments, gravity, element pressures, line loads, centripetal accelerations, and enforced displacements and accelerations. Constraints include applied boundary conditions and permanent constraints at the node level. Multilevel, user-defined coordinate systems are available for complicated geometry.

An on-line calculator and program file interface are included. The price of FEMAP is $995 and it's available now. ENTERPRISE SOFTWARE PRODUCTS INC., Harleysville, Pa. CIRCLE **268**

DBMS for the Mac

Nantucket announces system for three Macintosh models.

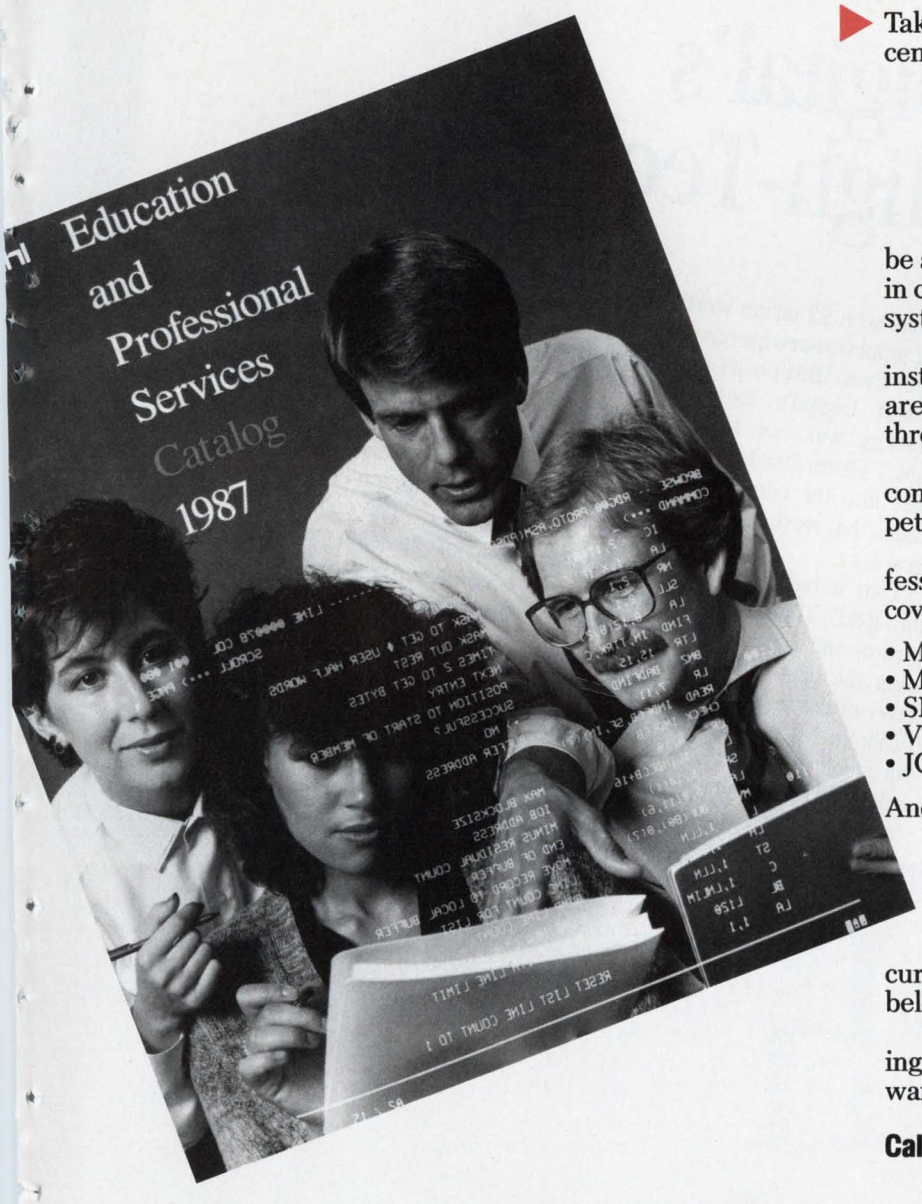
McMax is Nantucket Corp.'s newest relational database management system, created for all Apple Macintosh computers.

Nantucket claims McMax is compatible with Ashton-Tate's dBase III DBMS, so users can develop applications in either McMax or dBase and run them interchangeably on either a Macintosh or a PC. McMax is said to be able to manipulate structured data from multiple files and produce customized reports. The system handles files up to 63MB in size, with up to 16 million records. Each file can have seven active index files and as many as 100 index expressions. Ten separate files can be open simultaneously for merging data between them.

Each record is stored sequentially with a fixed record length of up to 32KB and up to 2,000 fields of 253 alphanumeric characters each. McMax supports Microsoft's format and can exchange data with other Macintosh applications.

McMax is priced at $295, is not copy protected, and requires a minimum of 512KB of RAM and a hard disk drive or dual floppy drives. NANTUCKET CORP., Universal City, Calif. CIRCLE **265**

Amdahl instructors have been where you want to go.



Take a course at any of our six education centers, and one thing's sure:

Your instructor has practiced what he'll preach. He's a professionally trained instructor...and an experienced system programmer.

What's more, in many courses you'll be able to practice what he preaches, too—in class, hands-on, on a high performance system.

Expert instructors and hands-on instruction are two reasons why our courses are favored by knowledgeable people throughout the industry.

Fact is, over two-thirds of our students come from organizations that use our competitors' machines.

This year, Amdahl Education and Professional Services is offering over 50 courses, covering:

- MVS/SP1
- MVS/XA
- SMP/E
- VSAM
- JCL
- VM/CMS
- CP
- VM/HPO
- VM/XA
- IMS/VS
- ACF/NCP
- ACF/VTAM
- SNA
- JES2
- ASSEMBLER

And you can take them in these cities:

- ★ Chicago
- ★ Houston
- ★ New York
- ★ Columbia (MD)
- ★ Los Angeles
- ★ Santa Clara

For a catalog that details our full 1987 curriculum, call one of the numbers shown below.

You'll find this catalog helpful in selecting courses that will help you get where you want to go, professionally.

Call 1-800-233-9521, ext. 46 or 1-800-233-5727, ext. 46 in CA

amdahl®

The Smart Choice

CIRCLE 66 ON READER CARD

A story worth repeating.

Dun's Business Month/December 1986

THE BEST-MANAGED COMPANIES 1986

Digital's High-Tech Coup

As the leader and guiding spirit of Digital Equipment Corp., the computer company he founded 29 years ago, President Kenneth H. Olsen has remained committed to his vision of a business driven by technology. That commitment, which long ago made Digital a leader in minicomputers, has now propelled the company into undisputed leadership of the industry's most vital new technology: networking. Churning out an impressive array of sophisticated compatible computers and communications software, it has emerged as the only computer vendor that can efficiently tie together all elements of the [illegible] office. "It comes down

tal has won $2 billion worth of orders that would otherwise have gone to Big Blue. Even IBM positions its products against Digital's these days. "Our strategy was not to compete with IBM," Olsen insists. "It was to introduce into the commercial area those things that worked so well in the technical area."

That it has done. Pouring billions into R&D, Digital has introduced computers and communications software over the past two years that are the envy of the industry. Most successful of all: the MicroVAX II, a line of pow[illegible]ful small computers, which r[illegible] sales of $1 billion in fiscal [illegible] full year on the ma[illegible]

cal strategy of designing an entire line of computers around a single unifying architecture, called the VAX, which would allow every computer to run the same software, use the same data bases and be hooked up to the same communications equipment.

The common architecture greatly simplified the enormously complex task of devising a com[illegible] scheme that co[illegible] togeth[illegible] f[illegible]

COMPUTER SALES & SOFTWARE PROFESSIONALS

Digital's success story is the stuff headlines are made of.

We came along with the computing solution that the world had been waiting for—and pushed tales of a 'high tech slowdown' off the page.

While other computer companies talked percentage drops and worst-case scenarios—we have brought Wall Street to its feet with some amazing numbers.

The pioneers of compatibility have brought to market the broadest range of products available with the same architecture.

Yes, we have computers working together—at last the desktop talks to the data center, the factory floor to the executive suite, and the London office to U.S. headquarters.

We just happen to believe that information was meant to be shared.

And the same applies to success.

If you have problem-solving and sales skills, industry or vertical market expertise, solid communications skills, and a knowledge of Digital's products—and how to position them competitively—let's talk about making headlines together.

Computer Sales Professionals

You will be involved in presenting our full range of sophisticated systems and designing leading edge answers to a wide variety of customer problems. We expect you to talk solutions with all levels of a customer organization. We require:

- 5-10 or 10+ years computer sales experience selling mini or mainframe systems
- large account management expertise
- knowledge of computer services, such as timesharing or software

Software Business Consultants

In this consulting role, industry experts will develop strategies that match Digital's product strategies to the individual needs of customers. This will involve developing architectures around specific application areas. We require:

- a minimum of 15 years proven experience within the finance/banking industry or other vertical industries
- an ability to integrate Digital's products and technology solutions with customer business goals
- knowledge of networking technologies and project management experience desirable

Software Systems Architects

You will design system configurations with specific industry focus. This will involve consulting with customers, designing solutions and providing quality assurance. We require:

- a minimum of 8 years experience with Digital's DNA or related SNA products
- familiarity with VAX/VMS* or similar 32-bit operating system technology
- knowledge of Ethernet/LAN or comparable competitor products

Software Specialists

You will work directly with sales professionals and customers to define computing needs, as well as be directly responsible for the technical management of sales projects. We require:

- a minimum of 3 years of technical pre-sales or sales support experience working directly with sales reps or customers
- experience in technical management of projects during the pre-sales cycle
- VAX* and/or systems expertise with general knowledge of comparable competitor products

---

For opportunities throughout the country...

Call 1-800-DEC-HIRE
24 hours a day, 7 days a week

If you can't call, write U.S. Field Employment-National, Dept. 0315 3807, Digital Equipment Corporation, 129 Parker Street, PKO3-2/C29, Maynard, Massachusetts 01754.

We are an affirmative action employer.

* Trademarks of Digital Equipment Corporation

Be part of the story...now.
Call 1-800-DEC-HIRE

digital™

CIRCLE 67 ON READER CARD

BOOKS

The Picture of Refinement

DESIGNING THE USER INTERFACE: STRATEGIES FOR EFFECTIVE HUMAN-COMPUTER INTERACTION
by Ben Shneiderman, Addison-Wesley, Reading, Mass. (1987, 436 pp., $29.95).

BY JOHN M. CARROLL

As Ben Shneiderman notes in the early pages of *Designing the User Interface: Strategies for Effective Human-Computer Interaction,* new books on human-computer interaction are appearing monthly. Nevertheless, a new book by Shneiderman is special. His 1980 book, *Software Psychology: Human Factors in Computer and Information Systems* (Little, Brown, Boston), was the definitive presentation of human factors in computing systems at the time. His new work provides an opportunity for taking stock of interim progress and reflecting on future directions.

As in *Software Psychology,* Shneiderman takes pains in his new book to help the reader understand *how* the field advances, not merely where it is now. Toward this end, Shneiderman's 1980 book extensively reviewed details of experimental design and laboratory methodology imported wholesale from academic psychology. The new book reviews a variety of domain-specific abstractions, theories, guidelines, and principles of human-computer interaction, and domain-specific methodology, including prototyping and usability specifications. This is a measure of the field's progress.

More than half of the 1980 book addressed itself to programming and database query issues, reflecting the "professional programmer" focus of research in the 1970s. The new book has a far broader scope encompassing personal computing, office applications, command and control systems, and CAD/CAM, as well as programming. A great deal of attention is given to interaction styles: menu selection systems, command languages, and direct manipulation. The direct manipulation chapter is of special interest perhaps because Shneiderman himself is one of the chief proponents of this new interface genre.

Chapters are also devoted to I/O devices, to response time and display rate, and to user assistance. There are many contrasts with the earlier book. Speech, for example, is no longer mere possibility, and window management and the use of color are now major topics.

Shneiderman argues for usability testing and redesign throughout the systems development process, and for measurable usability specifications playing a role analogous to functional specifications. The final chapter addresses the "larger" context, namely, that more powerful, more diverse, and more usable systems can have an impact on our lives—for the better and for the worse. Shneiderman ended *Software Psychology* with such a chapter too, recognizing how easily we can all lose the user interface forest for the trees.

My enthusiasm for Shneiderman's new book is qualified in just a few respects. Although there are many references to the "syntactic/semantic" model as "a way to organize the design process," this is never adequately demonstrated. I had a similar reaction to Shneiderman's commitment to "reductionist" methodology in psychology. The most interesting and valuable portions of the book—in fact, the majority of the book's contents—are descriptive, analytically qualitative, and frequently just informed opinion. This didn't make the book less interesting or valuable to me, but it caused me to wonder what reductionist psychology is doing in the book and in the field.

Despite these reservations, the new book lives up to expectations: it is broad in scope, packed with information, and delightful to read. Shneiderman covers the ever-broadening landscape of human-computer interaction with a witty and caring intimacy. He knows the entire field as few people do. The book is a fine complement to *Software Psychology* (most publications referenced in the new book appeared after 1980). *Designing the User Interface* is the most accessible and comprehensive introduction to human-computer interaction now in print. ■

John M. Carroll, manager of Advisory Interfaces at IBM's T.J. Watson Research Center and author of What's in a Name: An Essay in the Psychology of Reference *(W.H. Freeman, New York, 1985), recently edited* Interfacing Thought: Cognitive Aspects of Human-Computer Interaction *(MIT Press, Cambridge, 1987).*

CALENDAR

MAY

Second International Supercomputer Conference and Exhibition.
May 3-8, Santa Clara. Contact Michelle Aden, CYDROME, 1589 Centre Pointe Dr., Milpitas, CA 95035, (408) 943-9460.

Canadian Information Processing Society (CIPS) Congress '87.
May 12-14, Winnipeg, Canada. Contact CIPS, Winnipeg Section, P.O. Box 2610, Winnipeg, Manitoba R3C 4B3, Canada, (204) 947-2837.

Society for Information Display (SID) International Symposium.
May 12-14, New Orleans. Contact Hildegarde Hammond, Palisades Institute for Research Services Inc., 201 Varick St., New York, NY 10014, (212) 620-3388.

Scientific Computing and Automation Europe.
May 13-15, Amsterdam. Contact Elsevier Science Publishing Co. Inc., 52 Vanderbilt Ave., New York, NY 10017.

E&M'87 (Software/Computing Conference and Exhibition).
May 19-21, Rosemont, Ill. Contact Tower Management Co., 331 W. Wesley St., Wheaton, IL 60187, (312) 668-8100.

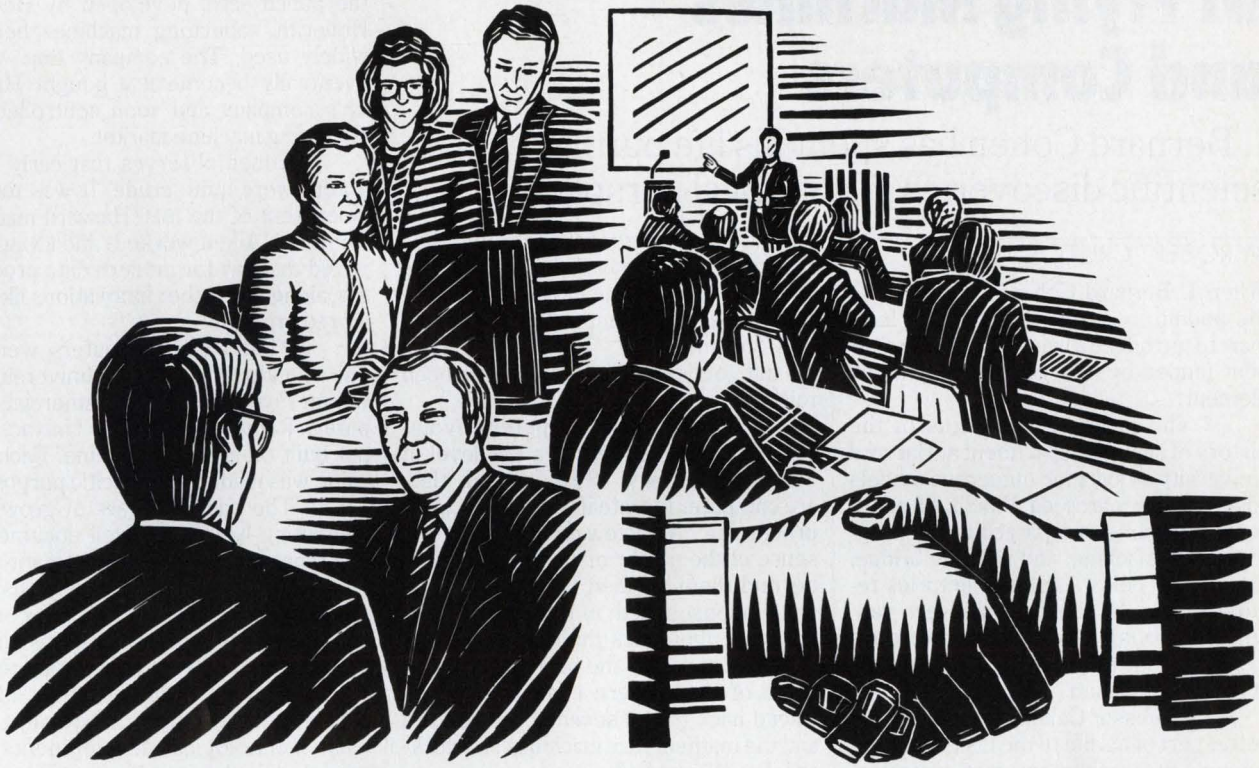
IBERICOM'87 (International Conference on Data Communications).
May 19-21, Lisbon. Contact IBERICOM Secretariat, Associacao Portuguesa de Informatica, Av. Almirante Reis 127, 1 Esq. 1100, Lisbon, Portugal.

International Conference on Communication and Data Communication.
May 25-27, Brussels. Contact Université Libre de Bruxelles, Section Informatique et Sciences Humaines, 39 rue de Bruxelles, B-1400 Nivelles, Belgium, (067) 21 85 29.

ACM SIGMOD-87 (Association for Computing Machinery's Special Interest Group on Management of Data).
May 27-29, San Francisco. Contact ACM, 11 W. 42nd St., New York, NY 10036, (212) 869-7440.

ISDN (Integrated Service Digital Network) '87.
May 31-June 4, Monterey, Calif. Contact IEEE Communications Society, 345 E. 47th St., New York, NY 10017-2394, (212) 705-7018.

COMDEX/Spring '87 GETS YOU GROWING.



Go to COMDEX/Spring '87 and gear your business up for extra profits and growth. Because there you'll gather all the resources you need to make the most of the busiest selling season of the year.

Exhibits to grow on

COMDEX/Spring '87 unites you with the hottest selling products and services including hardware and software to automate and integrate offices. New tools and techniques for communications and networking. Advances in micro-to-mainframe links. Mass storage devices such as CD ROM. CAD/CAM and desktop publishing products. All the products and services to grow on.

Insight to grow on

With a Conference that includes the acclaimed Desktop Publishing and CAD/CAM Seminars, and special sessions on microcommunications and software challenges, COMDEX/Spring '87 shows you the workings of today's money machines.

Thousands of resellers from all over the country are gearing up for growth at COMDEX/Spring '87. Get your business growing by completing and sending in the coupon for attendee information.

Produced by The Interface Group, Inc., 300 First Avenue, Needham, MA 02194.

COMDEX®/Spring '87

June 1–4, 1987
Georgia World Congress Center
Atlanta, Georgia
It's time to get up and grow.

I want to get up and grow at COMDEX/Spring '87!

☐ Send me complete attendee information
☐ Send me exhibitor information.

Name_____

Title_____

Company_____

Address_____

City_____ State_____ Zip_____

Phone ( )_____

Return to: The Interface Group, Inc.
300 First Avenue
Needham, MA 02194-2720

DM-3-15-87

CIRCLE 68 ON READER CARD

PEOPLE

Of Flying Machines and Computers

I. Bernard Cohen has spent his life putting scientific discoveries in historical perspective.

BY ROBERT CRUTCHFIELD

When I. Bernard Cohen stepped up to the podium recently at the Dallas Infomart to introduce a traveling museum exhibit funded by IBM, he was truly in his element.

The professor emeritus of the history of science department at Harvard University stood amid numerous models based on Leonardo da Vinci's fifteenth century visions of a parachute, helicopter, flying machine, and rotating bridge. Just a floor below and five centuries removed from the Renaissance were vendor showrooms displaying tomorrow's candidates for future generations to ogle at in some museum.

Professor Cohen has devoted the better part of his life to the task of putting science and technology into historical perspective. He has won world recognition for his study of Sir Isaac Newton, and is equally noted for his studies of Benjamin Franklin and the rise of electricity as a field of science.

The spry, 73-year-old educator was the first American to receive a bachelor's degree (in 1937) in the emerging study of the history of science from Harvard. Later, he founded a department there dedicated solely to the history of science.

Professor Cohen is regarded as one of the few specialists in the relatively new area of the history of computers and information processing. He has conducted many interviews with founders and innovators, and has been active in ensuring the preservation of both hardware and software.

Cohen recalls interviewing industry pioneer Howard Aiken shortly before Aiken's death in March 1983. Aiken told the historian that "the day will come when they will give away hardware and sell the software to go along with it."

"That trend has already started," Cohen says. "The price of software is going up while the cost of hardware is dropping."

Besides the technological advances the computer has brought, Cohen observes, there have also been social changes. "During the '50s and '60s people viewed the computer as a helpful tool," he points out. "Today, many privacy and confidentiality issues have been raised."

Of the microcomputer revolution, Cohen says there is a low level of computer literacy. "People think they are computer literate if they can do word processing. "Very few people have a real sense of the power of a computer—it is beyond them." When talking about the tremendous growth in the computer industry, Cohen says the discussion cannot be confined to the postwar era. The roots of the modern computer can be traced back to the seventeenth century and the mathematics machines of Schickard, Pascal, and Leibnitz.

He credits Charles X. Thomas of France for actually building calculating machines in the 1830s. Other nineteenth century inventors who paved the way for the modern computer include Charles Babbage and George Scheutz. Though Babbage never fully completed his machines, Scheutz did. With the advent of the punch card, developed by Herman Hollerith, tabulating machines became widely used. The company that would eventually become IBM bought Hollerith's company and soon controlled the tabulating machine market.

Cohen observes that early computers were quite crude. It was the development of the IBM/Harvard machine (on which Aiken worked) and ENIAC that paved the way for modern data processing, along with other innovations like the stored program.

"The early computers were all one of a kind and built by universities," Cohen says. "The first commercial computer, Remington Rand's Univac, was not built on an assembly line. Each machine was made for a specific purpose."

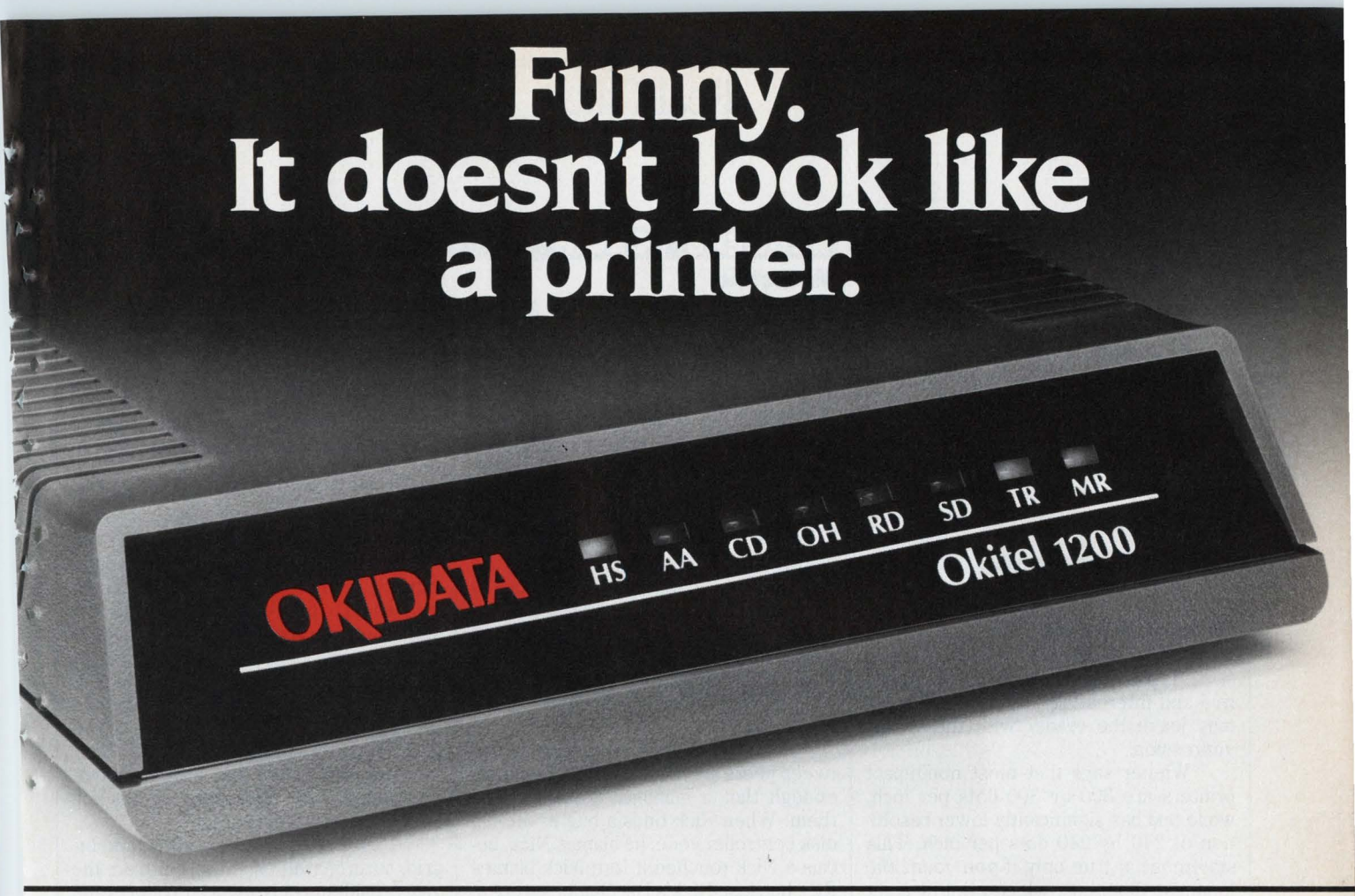
The past 40 years of growth in computing have been well documented for future historians, the professor says. "There are a number of individuals who are very concerned about the recording and preservation of this industry's history," he comments. On predicting the industry's future from the study of the past, Cohen says that "no one can gauge what technological developments will take place in the next 10 years."

If anything, he comments, studying the history of computers shows how dynamic the industry is. And when historians of the future study this era, the efforts of people like this Harvard professor will ensure that that has been well documented.

I. BERNARD COHEN: "Very few people have a real sense of the power of a computer."

Photograph by Layne Murdoch

Funny. It doesn't look like a printer.



It's Not. It's the New OKIDATA PC Modem.

If the name's familiar but you can't place the face, relax. The new OKITEL™ 1200 is every bit as good at "bits per second" as our printers are at "characters per second."

And that's very good.

You see, besides being a big name in personal printers, OKIDATA is a titan in telecommunications. Our parent company is one of the biggest telecommunication equipment suppliers in Japan.

Get It Right the First Time With Automatic Adaptive Equalization.

Because the OKITEL 1200 automatically adapts to widely varying line quality, your data rarely gets lost or disconnected by a "noisy" line. So you hardly ever have to re-transmit. A convenience usually found only in higher-speed modems.

Our new PC modem also offers auto-dialing, auto-answering, and auto-disconnecting. The ability to use tone or pulse-dialing. As well as a special self-diagnostic loopback.

On-Line, On-the-Double.

To help you get instantly acquainted with your OKITEL 1200, we're including a special introductory offer that provides up to $150 in discounts on three of the most popular on-line services: CompuServe®, Newsnet® and Dow Jones® News/Retrieval.

Turn Ordinary Minutes Into OKIDATA Minutes.

When you use a modem, every minute means money. But an OKIDATA Minute actually saves you money. You get a full 60 seconds of quality time every minute you're on-line because you get it right the first time.

The OKITEL 1200 PC Modem. Fewer transmission breaks, plus automatic error detection and automatic adaptive equalization.

Start getting your money's worth out of every modem minute. Get the new OKITEL 1200 modem with the very familiar—and very respected—name.

Call toll-free, 1-800-OKIDATA for the name of the OKIDATA dealer nearest you.

CIRCLE 69 ON READER CARD

OKIDATA®
an OKI AMERICA company

LETTERS

Excess is Best

Is there no one out there who can save us from the excesses of graphic designers?

DATAMATION has taken a giant step backward in redesigning the magazine. It is now very difficult to see at a glance where articles start and finish.

The new mix of text and graphics with gray screens, confusing rules, and poor font selection gets a very large zero for readability and visual appeal.

JIM HARDY
Southam Murray Printing
Weston, Ontario

More on Printing

"The ABCs of Printing," by Hesh Wiener (Dec. 1, p. 59) is generally quite informative and interesting, but several errors may leave the reader with the wrong impression.

Wiener says that most nonimpact printers are 300 by 300 dots per inch, while IBM has significantly lower resolution of 240 by 240 dots per inch. This statement is true only if you count the Japanese desktops, which print at eight or 10 pages per minute. However, Mr. Wiener's article addresses high-speed computer output printers, and in this arena most new products are 240 by 240 dots per inch (or less): Bull 6050, 6090; Datagraphix 4800, 6800, 9800; Fujitsu 6700 (3052), 3051; Hewlett-Packard 2680; NCR 6480; Siemens 2200, 2300; Sperry (Unisys) 0777; and Storage Technology 6100.

Xerox is the only present vendor with 300 by 300 dots per inch; Kodak has yet to commence shipments. Further, "resolution" (addressability is a more accurate term) is only one dimension of print quality, and the user's perception of the IBM 3800 Model 3 print quality is that it is quite good.

No mention is made of many of the significant printer vendors in the North American market, including Datagraphix (which had the third largest share of 3800-class shipments in 1985); Sperry (Unisys), which has been in the printer business as long as IBM has; or Siemens, which claims to have a larger shipment share than IBM in Western Europe (if you count the 100-page-per-minute ND-3), and a significant and growing share of the North American market through distributors such as Datagraphix, Storage Technology, or NCR.

H.G. SUITER JR.
Datagraphix Inc.
San Diego, California

READERS' FORUM

Microethics

When an agency of the federal government sues your corporation, or your ceo is indicted for fraud, or the press attacks your company's hiring practices, all personnel suffer: some may be laid off, some may lose money when the corporation's stock plummets, and some may be forced to take cuts in salary. Most corporate citizens consider this unfair, because we like to think that most of us are purely blameless. Somebody upstairs is overcharging the Defense Department, while we—hell, we've never stolen so much as a paper clip.

But *ethos*, or character, encompasses the little things, too. There is a framework required for dealing ethically with smaller matters; we might call it a microethic.

In the project team. Battles between peers are common, but often quiet enough that a manager doesn't notice them. When Rick finds a bug in the old disk controller code, he blames Nick, because Nick touched it last; Nick blames Rick because Nick's last changes were in a more delicate area; and Dick ignores them both, because he wrote the original controller code, and it worked fine before they tried to add all those silly bells and whistles. All venial sins, but in combination they could create the deadly sin of leaving a customer's controller broken.

Dick might have offered his knowledge of the big picture; Nick and Rick might have offered their code to each other for review before it was implemented. Together, they might have avoided the bugs.

What will really happen is that Rick will triumphantly find Nick's bugs sometimes, and other times the opposite will happen, and Dick will continue smirkingly to ignore them both. And all three engineers blame their manager, who was the one who demanded all those bells and whistles in the first place.

Their manager, if he sees this going on at all, will murmur something about the healthiness of competition.

In the department. The manager should know better, since he has seen the adverse effect of competition among fellow project managers Alfred and Ingrid. Alfred wants his team's minicomputer in Ingrid's lab. After all (Alfred says), Ingrid's lab is only a few steps away from the offices of Alfred's team, and there's a spot in the corner of the lab that will accommodate the mini with a few feet to spare.

No way, says Ingrid, but she doesn't say why. She doesn't say, because she's been wheedling the director about a pet project of hers, and doesn't want word to leak out. (She suspects Alfred wants to buy into some of the glory of her prospective supermini project.) Her pet project will require that space in the lab.

The reason why Alfred had to have the mini moved somewhere is equally selfish: the company doesn't sell the machine anymore, and even though Alfred's team still has to support it, Alfred wants to hide the mini and make the supermicro project (Alfred's pet project) a little more visible to upper management people who happen down the hallway. Out with the old and in with the technologically unfeasible, that's the joint motto of Ingrid and Alfred. Their projects will never see daylight—but, they know, their pioneering efforts will look terrific on their résumés.

And companywide. Alfred and Ingrid, in turn, aren't so different from the vice presidents of Network Products and Computer Products, who are Harry and Mary, respectively. Harry waves bar graphs showing the company was built on modems; Mary produces four-color pie charts proving that computer sales have kept the company alive through hard times. Each argues persuasively for a fatter budget—at the expense of the other. Fighting for departmental victories, they've lost sight of larger ones that would benefit the entire corporation.

What these characters have in common is a petty and egocentric view. Similarly, most of our visions do not include furthering knowledge, or solving problems, or even making a profit for the company.

If somebody up there pins a badge on us that says "hero," or if the next raise is substantially larger than the last, or if a promotion is offered us, we have achieved our goals. We read books that have words like "power" and "success" and "money" in their titles, but terms like "cooperation," "sacrifice," "concession" are words we last heard in Little League.

We might review our feelings that we are morally superior to that ceo in front of the federal grand jury; we may discover our scruples differ not in substance, but merely in degree.

BRUCE C. KULA
Software Engineer
Indian Rocks Beach, Florida

Advertising Offices

Francie Bolger,
Eastern Regional Sales Manager
Eastern District Managers:
John M. Gleason, Kathleen A. Murray
New York, NY 10022
875 Third Ave.
(212) 605-9400
Plymouth Meeting, PA 19462
Plymouth Plaza, Suite 201
(215) 825-4410

New England District Managers:
Ed Rappaport, Michael W. Andrea
Newton, MA 02159
199 Wells Ave.
(617) 964-3730

Southern District Manager:
Scott Schumacker
Atlanta, GA 30329
4 Executive Park Drive N.E., Suite 1205
(404) 633-5112

Midwest District Manager:
Joseph P. Gleason
Barrington, IL 60010
1301 S. Grove Ave.
(312) 381-1840

James E. Filiatrault,
Western Regional Sales Manager
Western District Managers:
Janet Engelbrecht
Mountain View, CA 94043
2680 Bayshore Frontage Rd., Suite 401
(415) 965-8222

Robert J. Rielly
Los Angeles, CA 90035
1801 S. LaCienega Blvd.
(213) 559-5111

William M. Wilshire
Irvine, CA 92715
2061 Business Center Dr., Suite 111
(714) 476-2511

Southwest District Manager:
Thomas C. Rousseau
Dallas, Texas 75243
9330 LBJ Freeway, Suite 1060
(214) 644-3683

Postcard Inquiry Service/Recruitment/
Marketplace:
Liz Martin
(312) 381-1840

CAHNERS PUBLISHING COMPANY

William M. Platt, President
Terrence M. McDermott, Executive Vice President
Edwin V. Burkholder, Group Vice President
Jerry D. Neth, Vice President/ Publishing Operations

Cahners Publishing Company, A Division of Reed Publishing USA. Specialized Business and Consumer Magazines for Building & Construction, Interior Design, Electronics & Computers, Foodservice & Lodging, Manufacturing, Book Publishing & Libraries, Medical/Health Care, Child Care & Development.

International Headquarters
27 Paul St., London, EC2A 4JU England
Tel: 01-628-7030, Telex: 914911-TECPUB G,
Fax: 01-628-5984
Sal Massimino, Managing Director,
International Operations
U.K., Scandinavia, Netherlands:
Martin Sutcliffe
France:
Alasdair Melvelle
W. Germany, Austria, Switzerland, E. Europe:
Uwe Kretzschmar

Japan:
Hiroshi Sato
IRM, Inc.
Rosei Building, 4-2,
Higashi Azabu 1-Chome,
Minato-Ku, Tokyo 106, Japan
Tel: (03) 584-1241, Telex: 242-2588
IRMTOK J

Israel:
Roseline Lewin-Wainberg
Technical Publishing Co.
68 Sokolov St.
Ramat Hasharon 47 235, Israel
Tel: 03-49 12 69

Sicob 1987
The World Business Show

GO!

4... FASTEN YOUR SEAT BELTS!
The international business forum of the year awaits you. Now your ambitions can really get off the ground.

3... GET READY FOR DEPARTURE!
Exhibitors from all over the world will be coming to take advantage of the multiple direct contacts that only SICOB can offer.

2... ALL SYSTEMS GO!
The latest in data processing, telecommunications, duplication, office organisation and office automation will be on board from April 6th to 11th. Fly with the VIP's at the Data Processing, Office Automation and Office Organisation Conventions.

1... TAKE OFF INTO SPACE!
Discover Paris-Nord, the most modern exhibition centre in Europe. 118,000 m^2 of the latest advances in technology.

GO!... SICOB 1987. THE WORLD BUSINESS SHOW.

SICOB
SEE THE LATEST. SEE IT ALL.

SICOB FRANCE
4, place de Valois 75001 Paris -
Tél : 42.61.52.42 - Télex : 212.597 F

PROMOSALONS : INTERNATIONAL TRADE EXHIBITIONS IN FRANCE, INC - 8, West 40th street - suite 1505 - New York, N.Y 10018 - Tel : 1 (212) 869.1720 - Telex : 427.563 FRSHOWS

ROUX, SEGUELA, CAYZAC & GOUDARD

From 6th to 11th April 1987
38th International Sicob Exhibition - Paris France