

DATA**MATION** 86[®]

OEM EDITION NOVEMBER 15 \$3 A CAHNS PUBLICATION

DEPARTMENTAL PROCESSING: A NEW LINE FOR DP

PLUS
MIS RATES THE ISSUES
PLUG COMPATIBLES REBOUND
OLTP AT AMEX

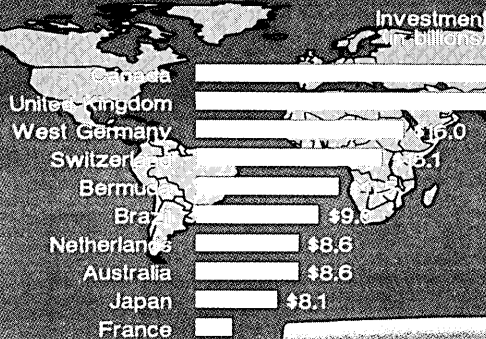


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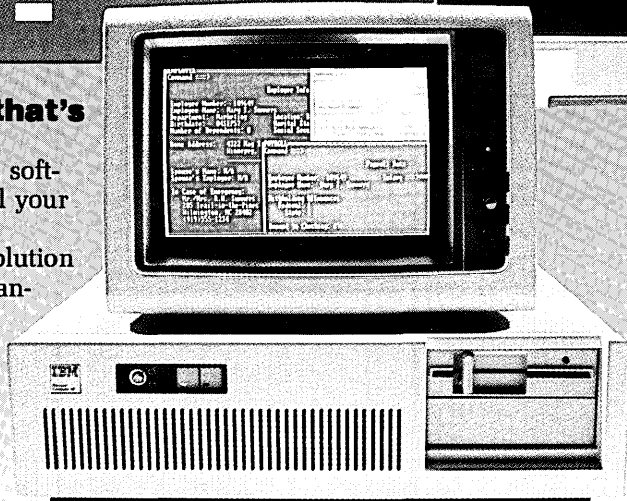
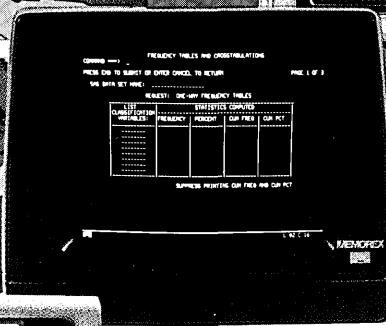
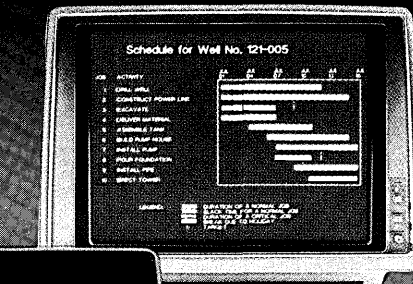
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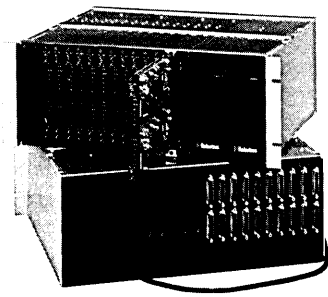
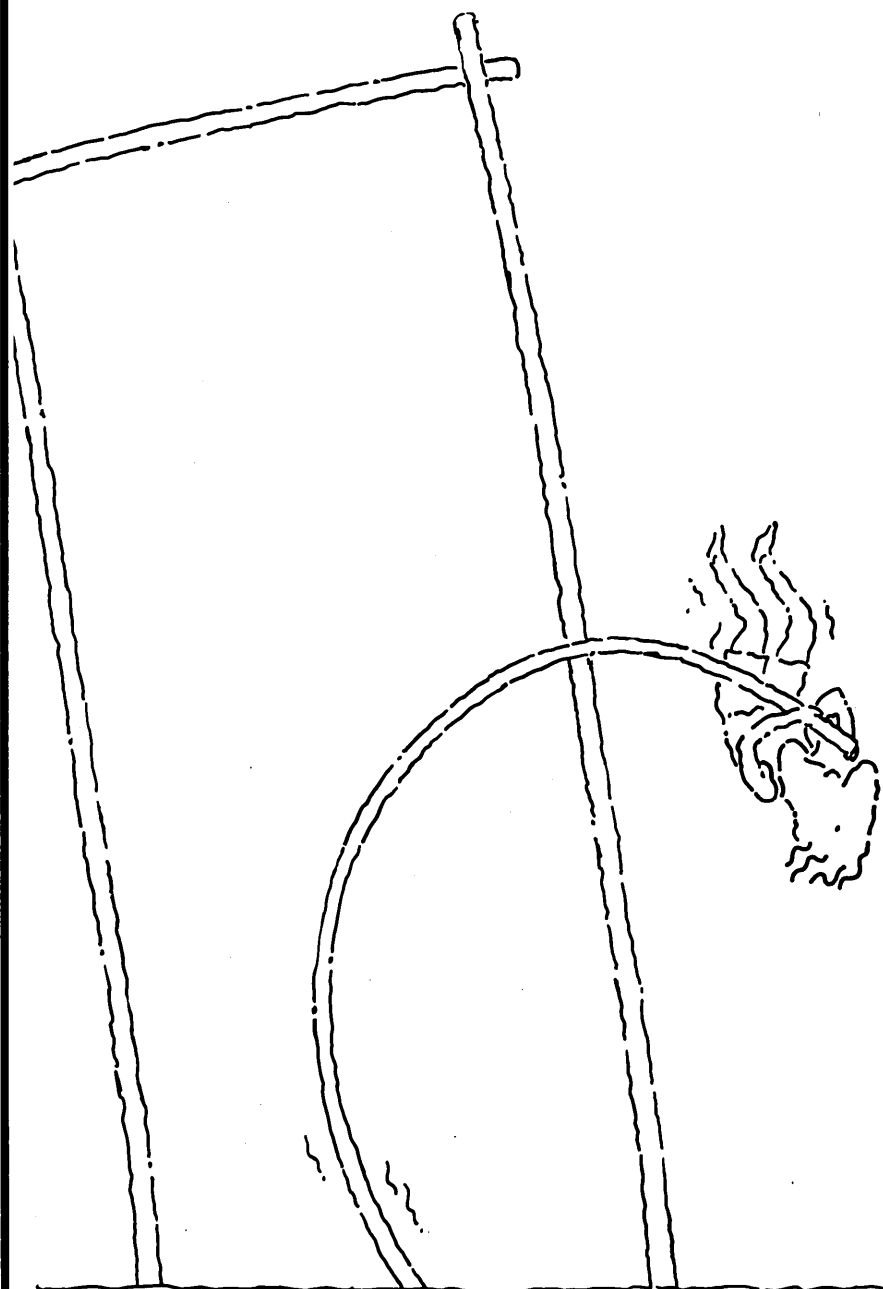
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INGRES. The Distributed SQL Relational DBMS.

DATA MATION

NOVEMBER 15, 1986/\$3 U.S.A.
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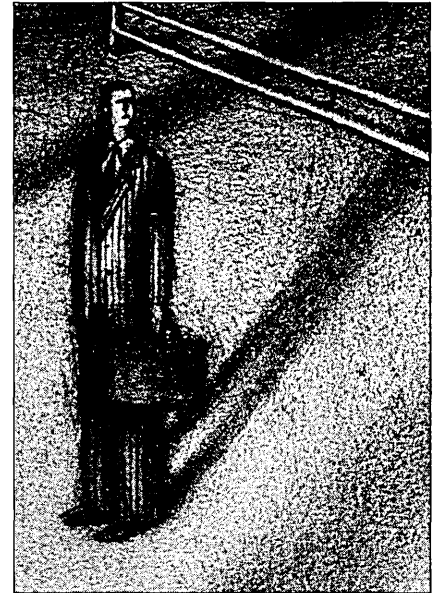
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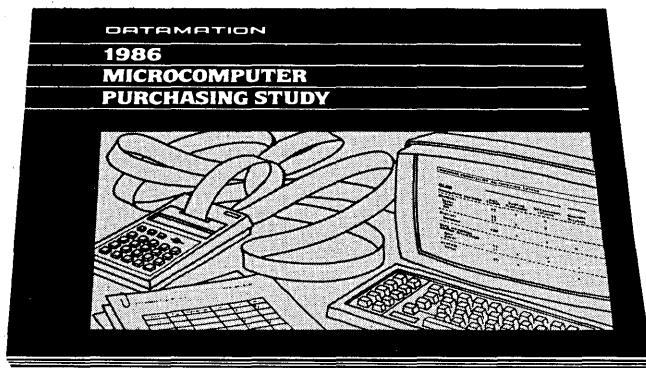
- 5 **MORE FOR LESS**

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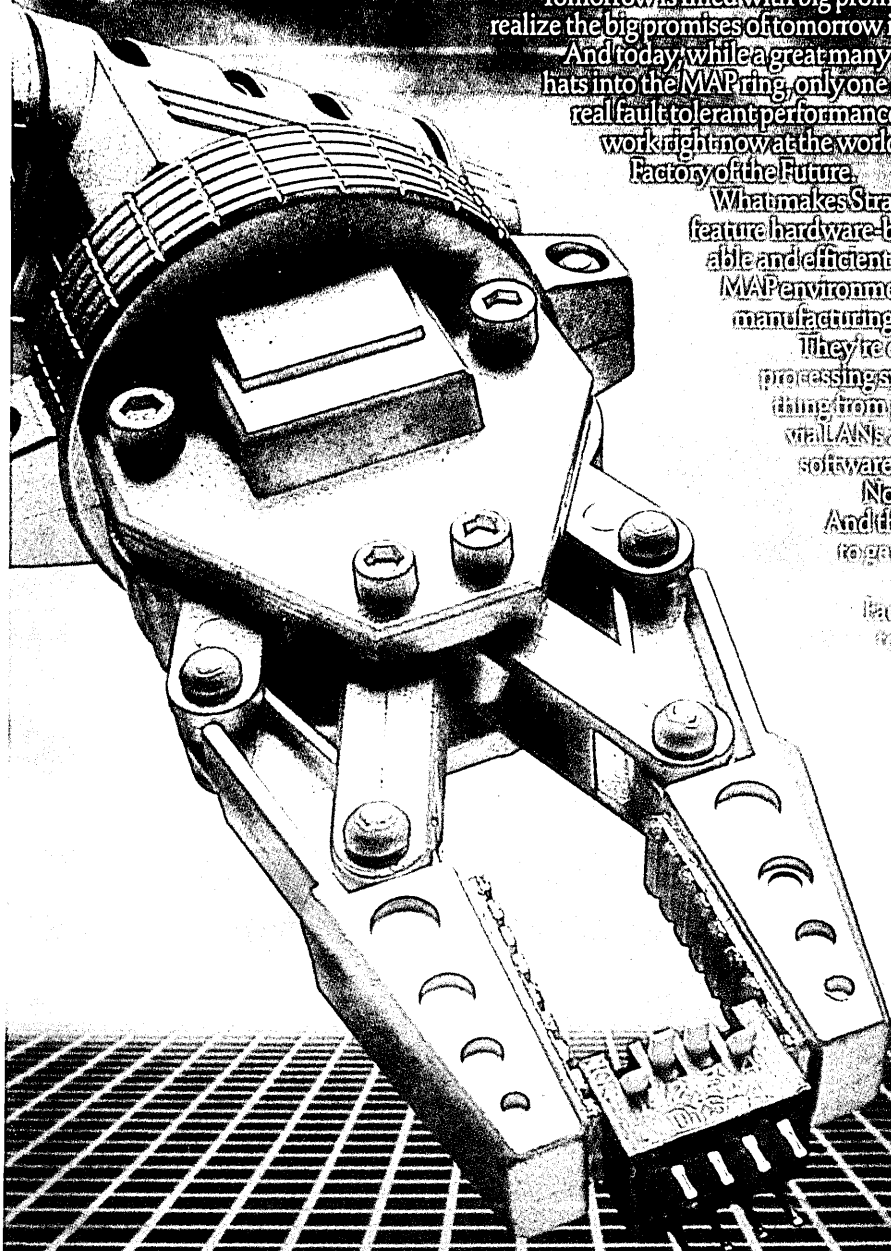
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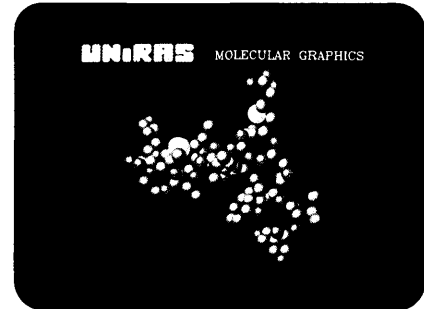
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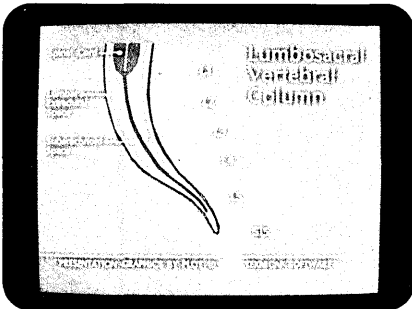
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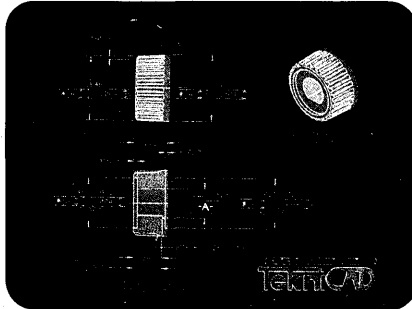
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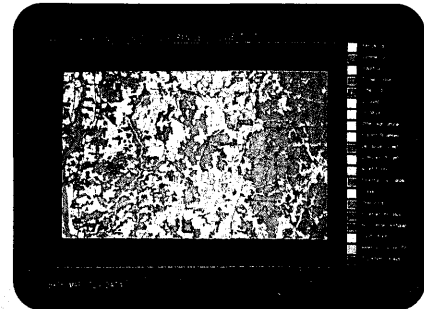
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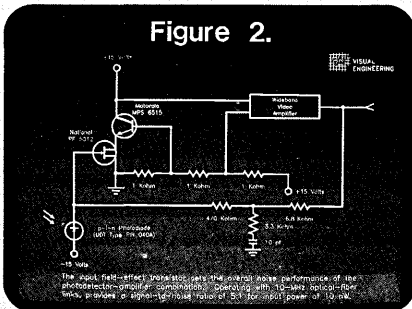
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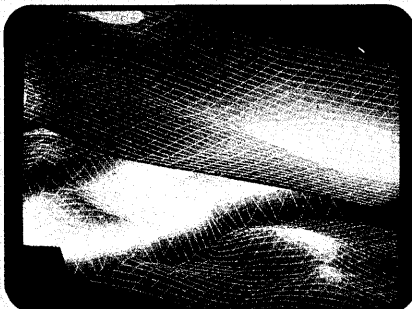
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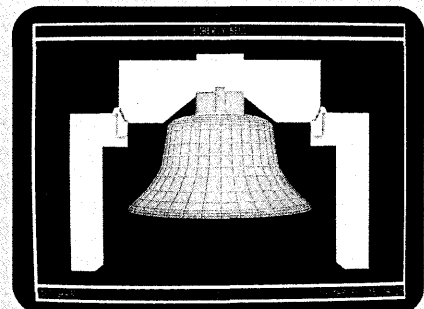
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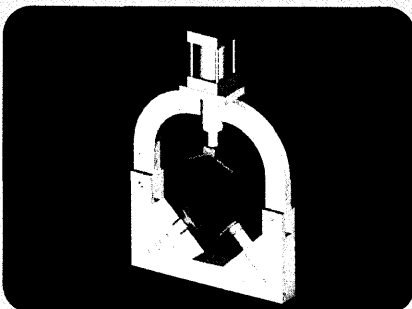
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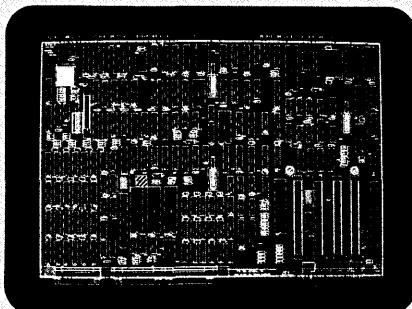
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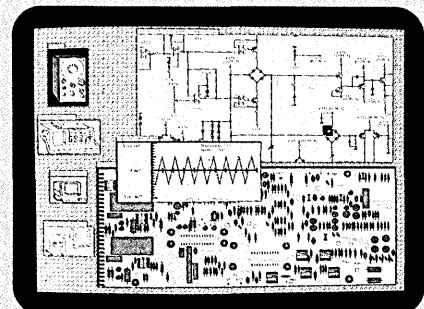
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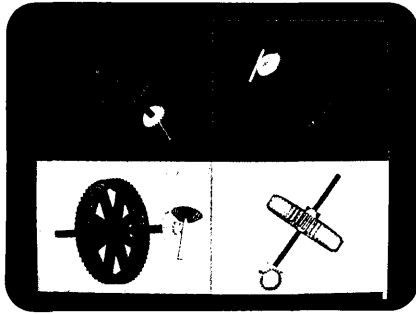
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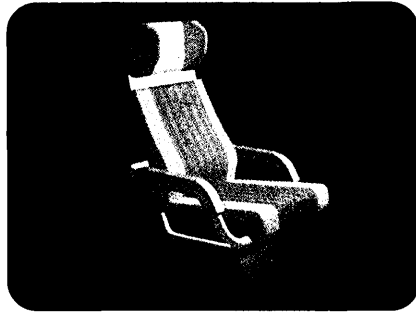
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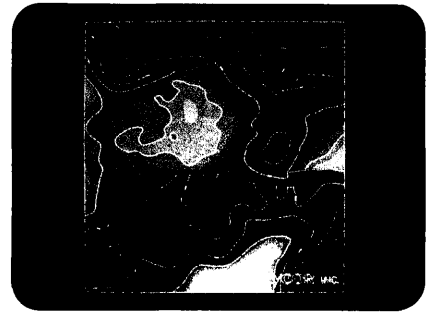
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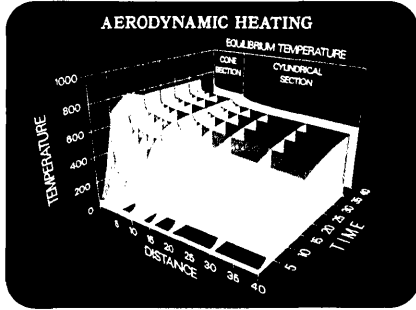
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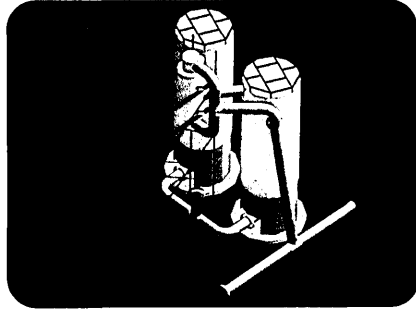
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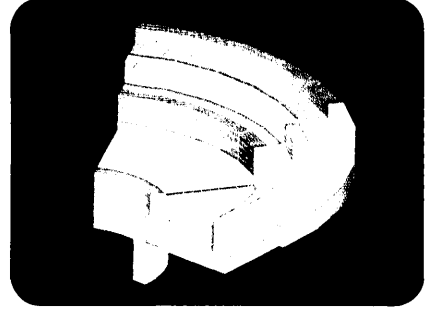
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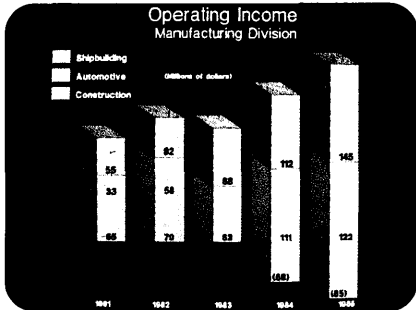
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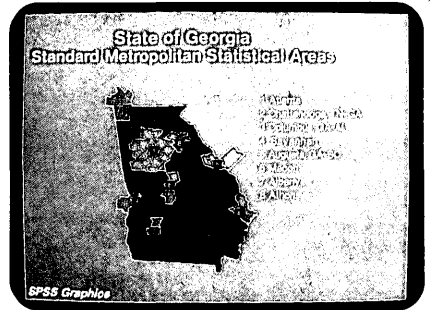
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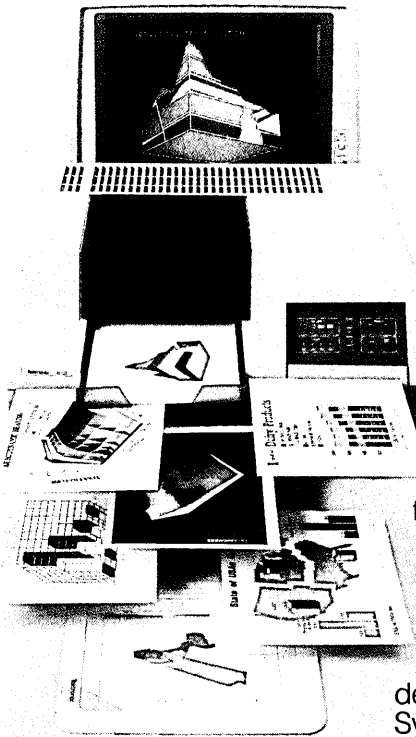
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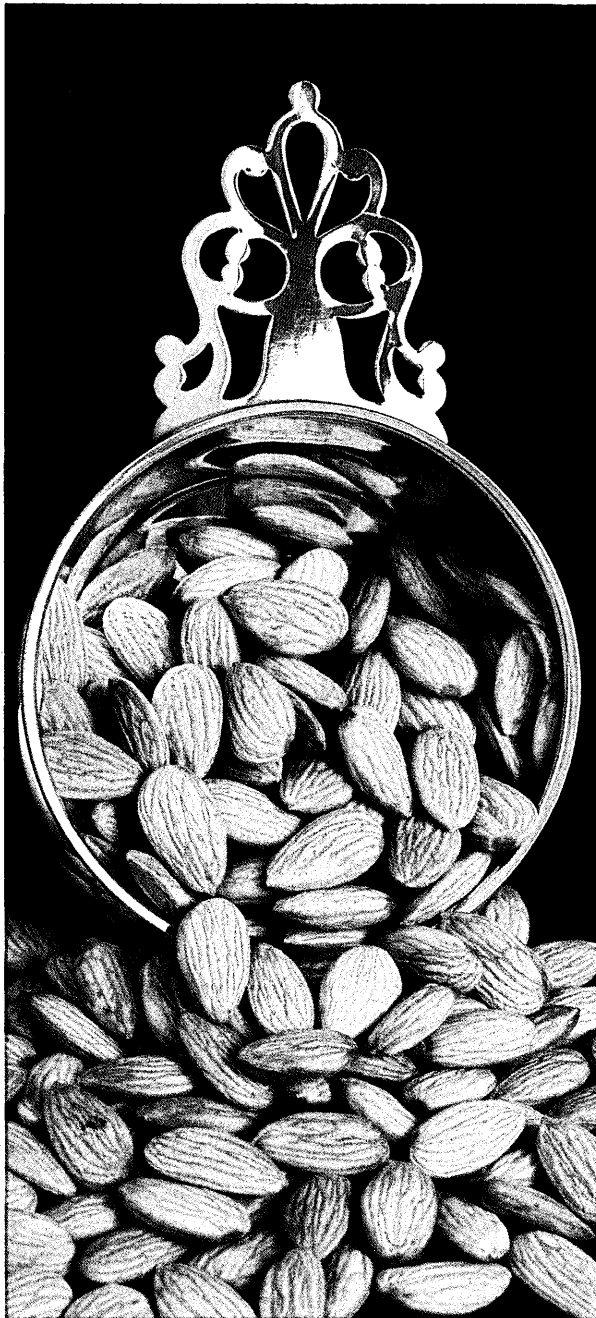
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LOOK AHEAD

GM LESSENING ITS MAP ROLE?

How much longer will GM be in the driver's seat of the MAP bandwagon? Sources at the automaker confide that "GM wants to get out of leading the MAP standard." GM apparently feels that its mission to build MAP into a world standard is well on its way and that when the 3.0 version of MAP is released, MAP will be stable enough to develop under its own momentum. Besides, the cost of promoting MAP on an international scale is becoming prohibitive. "There should be no need for GM to be the catalyst anymore," says the GM source. "That's what we are counting on." The word is that GM is talking to the Corporation for Open Systems about taking over the standards testing leadership role.

NEW 4300 PCM ON THE BOARDS

So you thought the days of new companies being formed to make IBM-compatible hardware were gone for good? Not quite. A group of engineers, many from Storage Technology Corp.'s defunct pcm effort, have formed Synthesized Computer Systems Inc. in San Jose. They are working on a CMOS-based 4381-class compatible system, sources say. SCSI president Jacques Losq isn't talking about the project yet, but sources say the startup plans to have Japanese chip maker NEC manufacture the 3MIPS to 4MIPS processor. Who would invest in yet another effort to challenge IBM's midrange computer family? Well, one SCSI investor is Gene Amdahl, the founder of Amdahl Corp., Sunnyvale, Calif., and the first pcmer.

WANG TO BUILD R&D CENTER IN GERMANY

Wang, the factory systems company? It may sound like a contradiction in terms, but the company is planning to set up an R&D center in Karlsruhe, West Germany, to produce Wang factory systems for markets around the world. The company has already built up an installed base of around 5,000 Wang 2200 and VS systems in West Germany, running production planning and control applications with software from over 20 local software houses. It also has two CAD packages available on its systems and a deal with a local firm, Klaus Hölscher Datensysteme, to produce Wang-compatible factory-floor data collection terminals.

EXTENDING THE EXTENDERS

There is more than meets the eye in Data Switch's newest offering for extending channels on IBM control units. The Shelton, Conn., company is about to introduce the Channelnet 9055, a mainframe extender that takes advantage of recently available 44Mbps public fiber-optic communications links. The marriage will boost channel extension capabilities between computer and data streaming control units to miles from today's range limit of hundreds of feet. It could also eliminate the need for a redundant computer for remote

LOOK AHEAD

IBM MOVING TO ADOPT X.400 IN EUROPE

backup storage applications. Although it is not yet certain what distance Data Switch will guarantee to its early customers, it is known that a set of 9055s is working at a Big Three automaker over a six-mile link containing at least two carrier central office switches. Company insiders say that a cpu-to-tape-drive link with two 9055s has been tested at up to 62 miles under control conditions. Prices aren't firm, but insiders do say that the design target was under \$500,000 for a two-unit set of 9055s.

IBM is moving closer to full adoption of the X.400 messaging standard in Europe. Following the demonstration of an X.400 interface to PROFS earlier this year, the company is asking local software firms in West Germany to help implement X.400 under MVS for the West German academic research network DFN. West German sources also say that IBM is putting together an X.400 gateway to DISOSS.

MORE ON THOSE TCM FAILURES

Maybe, you're saying to yourself, the reliability problems reported on thermal conduction modules in IBM's 3090 mainframe (see "Pinning the Tail," Oct. 1, p. 22) were only isolated incidents. Well, a recently conducted but unreleased Gartner Group survey of large IBM users indicates otherwise. Sixty-eight 3090 users were asked if they had run into breakdowns and, if so, what failed on their systems. Thirty-eight of them reported failures in their thermal conduction modules. Many of the users, however, considered the TCM failures nothing out of the ordinary, the survey found.

HP LOW-END UNIT COMING

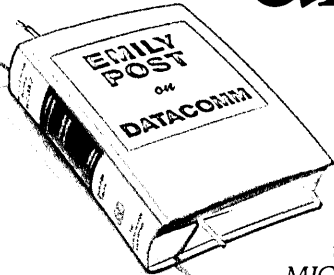
It may not take the sting out of the recent delays in Hewlett-Packard's Spectrum minicomputer development program, but the company later this month will replace the low end of its HP 3000 product line with a low-cost NMOS-based product internally called the Micro 3000. The new entry uses HP's NMOS III process but not the Spectrum RISC architecture. It will replace both the CMOS-based 3000 Series 37 entry-level system and the TTL-based Series 42.

RUMORS AND RAW RANDOM DATA

Word has it that Locus Computing Corp., Santa Monica, Calif., developer of DOS/Unix integration products, is planning to enter the commercial market sometime in 1987. Until now, the company has dealt exclusively in the oem markets. . . . Insiders at Gould Inc.'s Computer Systems Division, Fort Lauderdale, Fla., say an expected new family of high-performance computers (see Look Ahead, Feb. 15, p. 9), described as being in the minisupercomputer class, is on schedule. Look for more details to emerge sometime next month or in January.

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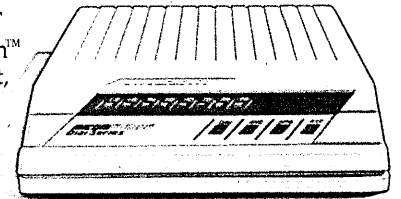
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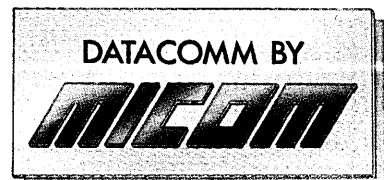


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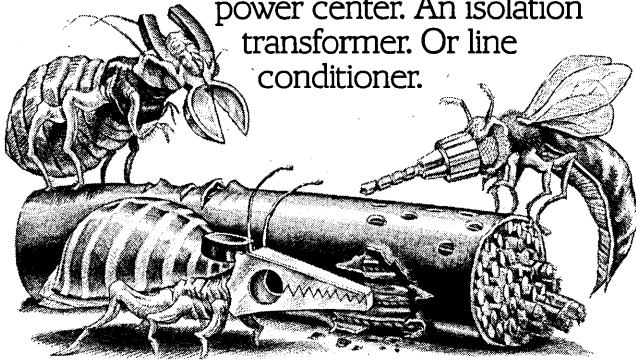
As Bell Labs reports in a major study of 24 computer sites, motor-generators solved 96 percent of their power line problems.

Full UPS with 15 minutes of battery reserve took care of only two percent more.

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They can be transients, sags, glitches, surges and brownouts. Dirty power bugs that can lose data, crash heads, blow delicate circuitry and grind your operations to a halt.

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Get an objective opinion.

Make sure it's well-qualified, from someone with no ax to grind.

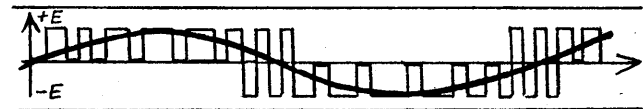
Only one computer power protection specialist has a complete product line from switch-gear to transformers to motor-generator



sets to full UPS systems, both static *and* rotary. Emergency Power Engineering, Inc. EPE, for short.

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If you haven't looked at rotary UPS lately, EPE systems will amaze you. They're the only UPS systems you can grow into. Just start with our Powerbloc motor-generator modules

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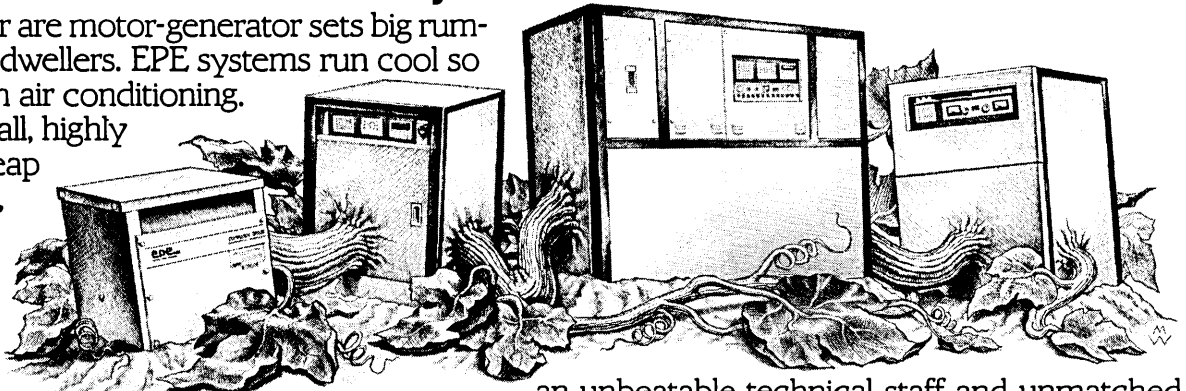
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Nov. 14-16, Bangkok, Thailand. Contact Prof. Srisakdi Charonman, TDF Project Director, King Mongkut's Institute of Technology, Ladkrabang, Bangkok 10520, Thailand, (66-2) 326-9969.

IMAGEXPO '86 (Imaging Materials Industry Conference and Exposition).

Nov. 16-19, Geneva, Switzerland. Contact Diamond Research Corp., P.O. Box 128, Oak View, CA 93022, (805) 649-2209.

17th Annual Canadian Computer Show.

Nov. 17-20, Toronto. Contact Robert Grainger, Group Show Manager, Industrial Trade Shows Inc., 20 Butterick Rd., Toronto, Ontario, M8W 3Z8, (416) 252-7791.

International Conference on Computer Technology.

Nov. 17-21, Madrid, Spain. Contact CITEMA, Plaza de Alonso Martinez, 3-2 Dcha., 28004 Madrid, Spain, (33-1) 448 47 94.

Expert Systems: R&D Activities in Belgium.

Nov. 18, Mol, Belgium. Contact R. Billiau, Studiecentrum Voor Kernenergie/Centre d'Etude de l'Energie Nucleaire, Boeretang 200, B-2400, Mol, Belgium, (0-14) 311801.

IWCS (35th International Wire and Cable Symposium).

Nov. 18-20, Reno. Contact L.G. Hewitt, IWCS, P.O. Box 7597, Shrewsbury, NJ 07701, (201) 544-2770.

Localnet '86 (Exhibition of Local Area Networks).

Nov. 18-20, San Francisco. Contact Online International Inc., 989 Avenue of the Americas, New York, NY 10018, (212) 279-8890.

PRONIC 86 (International Exhibition of Equipment and Products for Electronics).

Nov. 18-21, Paris. Contact SDSA, 20 rue Hamelin, F 75116 Paris, France, (33-1) 45 05 13 17.

Japan Office 86 (Trade Fair for Office Equipment and Technology).

Nov. 26-29, Tokyo. Contact Lorraine Kallman, Kallman Associates, 5 Maple Ct., Ridgewood, NJ 07450-4431, (201) 652-7070.

DECEMBER

IFIP/Sec'86 (Fourth International Conference and Exhibition on Computer Security).

Dec. 2-4, Monte Carlo, Monaco. Contact Marie-Martine Sain-

flou, Agence de l'Informatique, Tour Fiat cedex 16, 92084 Paris, La Defense, France, (33-1) 47 96 43 35.

Second International Conference on Artificial Intelligence.

Dec. 2-5, Marseilles, France. Contact Viviane Bernadac, Institut International de Robotique et d'Intelligence Artificielle de Marseille, 2 rue H. Barbusse, 13241 Marseille cedex 1, France, 91 91 36 72.

Singapore Informatics '86 (Information Technology Exhibition).

Dec. 3-7, Singapore. Contact Interport Ltd., P.O. Box 338, Sunset Beach, CA 90742, (213) 592-4446.

Management and Maintenance of Communications Networks Seminar.

Dec. 4, New York. Contact M. Madrigal, New York Telephone, 1166 Avenue of the Americas, Room 2300, New York, NY 10036.

1986 World of Electronic Data Interchange Forum and Exhibit.

Dec. 9-10, Washington, D.C. Contact Edward A. Guilbert, TDCC/EDIA, 1101 17th St. NW, Suite 712, Washington, DC 20036-4775, (202) 293-5514.

International Oem Design Show and Integrated Manufacturing Exposition.

Dec. 9-11, New York. Contact Bill Little (oem) or Carol Hurley (IMEX), Penton Expositions, Suite 900, 122 E. 42nd St., New York, NY 10168, (800) 634-4639.

CMG '86 (Computer Measurement Group's International Conference).

Dec. 9-12, Las Vegas. Contact General Chairman, CMG '86, CMG Headquarters, 6397 Little River Turnpike, Alexandria, VA 22312, (703) 354-3306.

Interface in Japan '86.

Dec. 11-13, Tokyo. Contact Linda M. Yogel, The Interface Group Inc., 300 First Ave., Needham, MA 02194, (617) 449-6600.

DEXPO (DEC-Compatible Industry Exposition) East 86.

Dec. 17-19, New York. For information, contact Expoconsul International Inc., 3 Independence Way, Princeton, NJ 08540, (609) 987-9400.

Microcomputer Graphics Show and Conference.

Dec. 17-19, New York. Contact Expoconsul International Inc., 3 Independence Way, Princeton, NJ 08540, (609) 987-9400.

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Ven-Tel modems let you use your phone to exchange information with PCs anywhere in the world. We think that's pretty exciting.

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Our free 24-page booklet, "How To Select The Correct Modem," contains specific information about our full line of modems. To request your copy, call 800-538-5121. In California, call 408-727-5721.

CIRCLE 9 ON READER CARD



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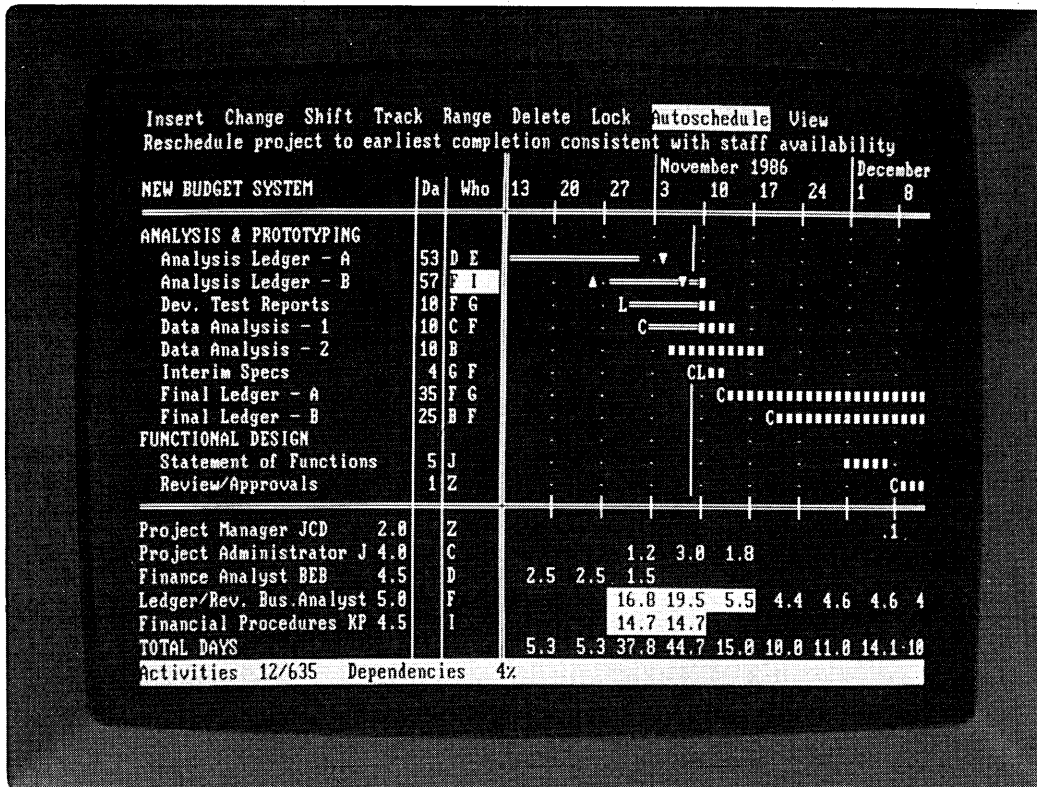
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Workbench was designed for the IBM PC, XT, AT, 3270PC and compatibles; the DEC Rainbow; and the Wang PC. Registered trademarks
IBM—International Business Machines Corporation. DEC Rainbow—Digital Equipment Corporation. Wang PC—Wang Laboratories, Inc.

CIRCLE 11 ON READER CARD

LETTERS

SAME OLD STUFF

Richard Thomas DeLamarter is putting stale wine in new bottles in "Square Pegs, Round Holes, Big Bucks" (Oct. 1, p. 52).

Allegations that IBM has been unlawfully anticompetitive have been found to be unwarranted and firmly laid to rest by the Justice Department, the courts, and the European Economic Commission.

It boggles the mind that anyone still thinks the information processing industry—which includes more than 15,000 companies worldwide—is anything but extremely competitive.

It is difficult to take Mr. DeLamarter, his article, and his book very seriously.

PETER F. JUDICE
Director of Information
IBM
Armonk, New York

My thanks to the editors of DATAMATION for their courage in printing "Square Pegs, Round Holes, Big Bucks." I'm sure this controversial subject will not endear you to Big Blue. Yet, the truth will set you free.

My thanks to Richard Thomas DeLamarter for his efforts in uncovering this scandal. It's ironic that a communications company should create the high-tech "Tower of Babel."

V.T. MIGLIORE
San Jose, California

SAVE THE SLIDE RULE!

Regarding the illustration for your article, "From Slide Rules to Supercomputers" (Oct. 1, p. 88), I was appalled at the photograph of the slide rule that was mangled, destroyed, and stabbed into the dirt. Is this the way to treat an old friend? Is this the way to treat a device that was at one time the mainstay of mathematical calculations? Is this the way to treat a piece of equipment that was once the trademark of the "eggheaded" student? Why, I remember when you could tell engineering students by the fact that they wore slide rules on their belts in a manner



similar to Gen. George S. Patton wearing his ivory-handled Colt .45. It was, indeed, a status symbol.

I have been in this business for a quarter century, dating back to the days of IBM's EAM punched card equipment. I owned a slide rule long before there were any such contraptions as "handheld calculators," and I still have a slide rule that I keep as an affectionate remembrance of the days when calculations had to be done without umpteen digits of exponentiation.

Why, there is even a slide rule on display in the Los Alamos National Laboratory Museum that was used by J. Robert Oppenheimer, the father of the atom bomb! Now those people know how to treat a slide rule.

I make the following plea:

If there is anyone out there who has a slide rule and who wants it to have a good home where it will be appreciated, revered, and treated with kindness and care, please send it to me. I will make sure that it is placed with my other historical museum pieces, such as original IBM vacuum tubes, core memory, and transistors.

CHARLES M. PROVINCE
Union-Tribune Publishing Co.
San Diego, California

NOT STANDALONE

In "Wide of the Mark" (Sept. 1, p. 31), it was inaccurately stated that Techmart, Silicon Valley's Marketing Center, has shifted its emphasis from a computer mart to a convention and conference center.

Techmart is a high-tech marketing center located in a complex that includes a convention center and a business-class hotel. The Techmart Marketing Center is focused on providing a wide range of business/marketing services, product showrooms, educational facilities, and an exhibition center for new product introductions. At the same time, Techmart can take advantage of the traffic generated at nearby conventions and conferences. This is an additional benefit Techmart offers, and not its main focus.

In fact, these very capabilities are what distinguish the Techmart Marketing Center from other standalone "marts."

HARVEY HARTMAN
Director of Marketing
Techmart
San Jose, California

THE NAME GAME?

Your Readers' Forum is described as "an exchange of readers' ideas and experiences." Recently, in "Home News" (Sept. 15, p. 157), you published an opinion from a gentleman who apparently has no ideas and very little experience.

"Ol' Jake" obviously is uninformed as to the positive merits of the recent Burroughs-Sperry merger. News must travel very slowly to the "Rusting Hills Home for the Decrepit and Bewildered."

I have heard that the "Rusting Hills Home" is actually a retreat for poor souls who fell off high cliffs after following a statement of direction from "Big Blue." If this is indeed the case, hopefully "Ol' Jake" can still recover with help from "Mike Burr" and "Gerry Sperry."

RICK KLUGE
Account Representative
Burroughs Corp.
Wichita, Kansas

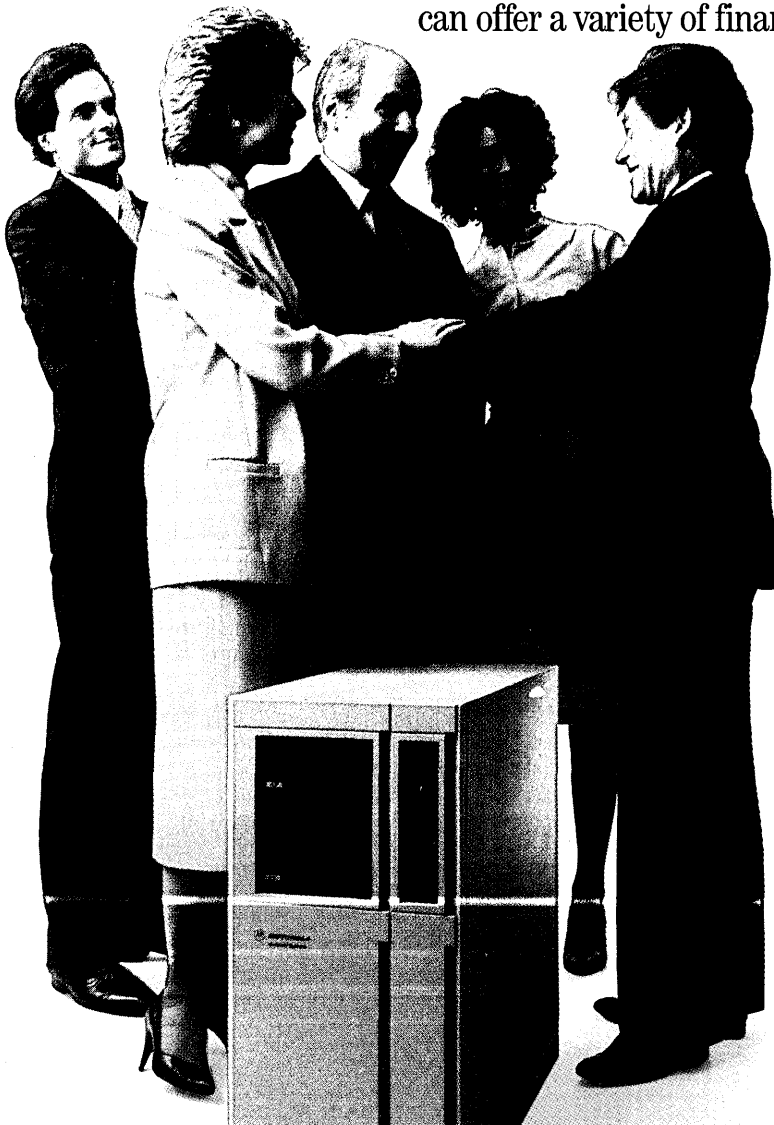
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The open architecture and open operating system of our new mid-range computers make them a powerful ally in multi-vendor solutions. In almost any environment, including IBM.

And to make sure that your solution, current and future, is complete as well as specific—no matter how vertical your application—we've formed some powerful alliances of our own with third-party vendors. We offer financial incentives, development support, and marketing assistance to both value-added resellers and independent software vendors.

We also have Motorola corporate alliances—a unique program of vertical technology integration from silicon to systems to solutions. Because of it, you get not only better solutions but greater reliability and faster delivery. And through Motorola Credit Corporation, we can offer a variety of financing alternatives.



You benefit, too, from the internal alliances within MCS. For example, every installation is backed by our nationwide customer support operation and comprehensive training programs.

Think of us not just as computer manufacturers but as allies. The Peacemaker in the Computer Wars. Write to us at 10700 N. DeAnza Blvd., M/S 42-20A, Cupertino, CA 95014. Or call 800-252-4488, ext. 739 (in California, 800-262-4488, ext. 739).



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CIRCLE 10 ON READER CARD

NEWS

IN PERSPECTIVE

POLICY

OUT OF AFRICA

IBM's move in South Africa may have symbolic importance but it won't spur an exodus by other U.S. or foreign companies.

by Willie Schatz

IBM is dead. Long live IBM.

Sure, there'll be some changes. The new IBM presence in South Africa—most probably a trust providing the financial foundation for a new company—won't have a direct connection to Armonk. The employees won't work for Big Blue. IBM USA won't own any equity assets. And, while the South African company will remain the exclusive distributor for IBM products, it will be open for business with the rest of the world.

Those moves, however, may be cosmetic surgery, and IBM's decision may have been motivated by more than just U.S. domestic political considerations.

"Obviously, U.S. sanctions had a major impact on our decision," says Jack Clarke, managing director of IBM South Africa, "as this had affected the attitude of customers in South Africa.

"The South African government told IBM about three weeks ago [in early October] that unless they had more local content in their PCs or assembled more locally, it would not buy any more equipment and the indications were that things would get even more difficult."

Cees Roon, chairman of the South African Computer Users Council, says it's hypocritical for IBM to sell its subsidiary because of the slow change in South Africa's policies. "Disinvestment pressure came at a time when IBM was experiencing a drop in profits worldwide. This, coupled with the drop in the rand [South Africa's currency]—which made South Africa's contribution worth half as much as it should have been—made it the right time to dump the South African operation because it was no longer worth fighting for."

The South African government reacted predictably to the news that IBM, South Africa's largest U.S. computer company and eighth largest U.S. employer, had apparently tossed in the towel.

"IBM, General Motors, and Coca-Cola leaving South Africa is a matter of regret," said a speaker on the Oct. 23

"Morning Comment," a Johannesburg radio show that reflects government policy. "But the three corporations have not initiated total withdrawals from South Africa. The transfers to South African ownership will have beneficial effects, and the shock of such actions can be absorbed. Foreign imposed dictates on South African business, such as the Sullivan Code [equal employment principles that most U.S. companies in South Africa follow], will become increasingly irrelevant. This in turn implies the diminution of U.S. influence in South Africa and the extent of this diminution will be related to the degree to which other American corporations follow the lead of their compatriots."

There may not be much of a crowd. U.S. competitors are saying that IBM can go its way and they'll go theirs. No European or Japanese computer company now doing business in South Africa is catching the first plane home.

"We're not motivated by what IBM, GM, or anyone else does," says Control Data spokeswoman Susan Bush. "We're going to stay in South Africa as long as we can contribute to peaceful change and operate a viable business." The day before IBM's statement, GM said that it plans to turn its South African operation into a local distributorship.

Similar sentiments were expressed by Hewlett-Packard and Burroughs, which, like CDC, derive less than 1% of their overall revenue from South African operations. HP spokeswoman Karen Gervais says that IBM and GM "were leaders in affecting change, and we'll miss their leadership," but she confirms that it will be business as usual for HP.

HP, CDC, and Burroughs, as well as IBM, remain on the 12-company "hit list" of the New York-based Interfaith Center for Corporate Responsibility (ICCR), one of the leading antiapartheid groups. ICCR has been active in many of the stop-doing-business-in-South Africa stockholder resolutions that have been raised at these companies' annual meetings in the last few years. ICCR plans at the next IBM annual meeting to sponsor a resolution, for which it hopes to garner IBM employee support, asking the company to halt all sales to South Africa.

Honeywell, which at press time was strongly rumored to be cutting out, hasn't had computer operations in South Africa since 1976. Its 160 South African employees provide sales and service for Honeywell's process control and instrumentation customers in the country.

The U.K.'s ICL, as well as West Germany's Siemens and Nixdorf, all contend that they will continue to operate in South Africa despite earning a minuscule percentage of their total revenues from

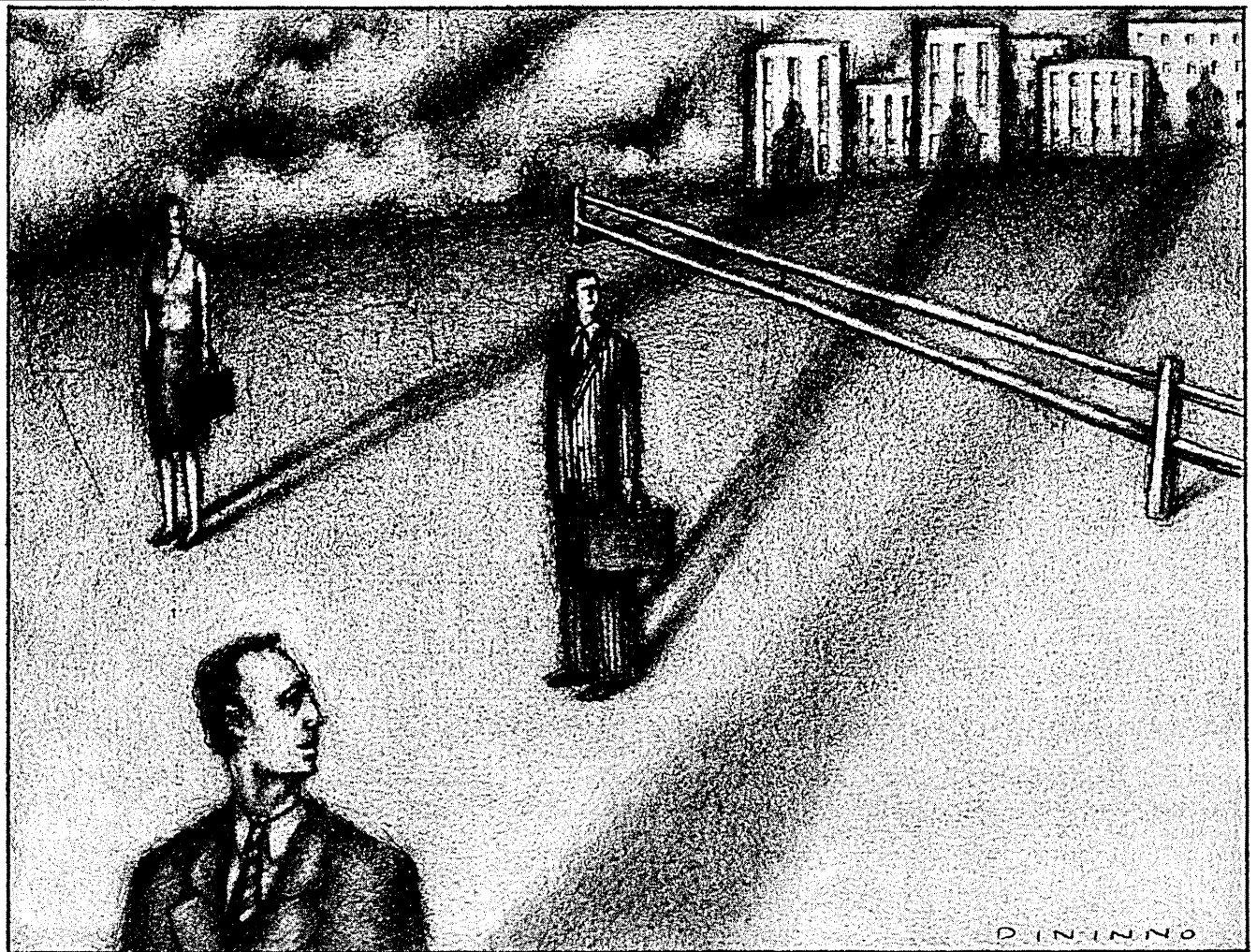


ILLUSTRATION BY STEVE DINUNNO

their South African operations.

While not saying it with ruffles and flourishes, many European suppliers suggest a lack of confidence in IBM's withdrawal. One, requesting anonymity, described it as nothing more than good public relations. A spokesman for BASF, a West German pcm, says, "There is no change in what IBM is doing, despite its statement that it is withdrawing from South Africa. As long as IBM continues to ship computers to South Africa there will be a pcm market and so we will ship, too. If IBM stops, we will reconsider."

BASF sells Hitachi midsized and large business computers and hard disk drives through Persetel, a South African distributor in which BASF has no financial interest. Persetel is a subsidiary of Reunert Information Systems, the fastest-growing computer company in South Africa. Reunert is a unit of Barlow Rand.

How much faster is Reunert/Persetel going to grow in the wake of IBM's departure? Asked about its future plans by DATAMATION, Hitachi, which was described by the *New York Times* as having taken sales away from IBM, says it had no idea what effect it had had on IBM sales in the past. The company also says it expects

no major change in the future. Asked further if it has any objection to its products being sold in South Africa and if it plans to continue supplying products for sale to that country for the foreseeable future, Hitachi says it will conform to Japanese government guidelines. The company says it has asked BASF to follow those guidelines and that BASF has complied.

It's conforming to another set of policies that reportedly has U.S. companies nervous. A new Sullivan Code rating is due shortly, and Reid Weedon from

"Disinvestment pressure came at a time when IBM was experiencing a drop in profits worldwide."

Arthur D. Little, the Sullivan Code auditor that awards the ratings, was in South Africa recently to explain the tougher ratings. The feeling in South Africa is that there will be considerable embarrassment for several of the Sullivan Code signatories when the ratings are made public.

So bye bye, Armonk; hello, reincarnated IBM South Africa. But, as the French say, *plus ça change, plus c'est la même chose*.

"We will be doing essentially the

same business," IBM spokesman Rich Coyle says. "We'll be dealing with the same customers. We're trying to ensure that the new business remains the same size as the current one. And if it becomes successful, we can make a profit."

So what else is new? For most of IBM's 34 years there, South Africa was almost as much of a gold mine for Big Blue as the country is for the rest of the world. IBM South Africa has about 20% of the overall computer market and as much as 40% of the mainframe installations, worth \$250 million in revenues.

How this may shake out under the new arrangement remains to be seen, but already there are signs of change. Clarke will head the new company, but IBM may have a difficult time with its no-layoff policy for the 1,500 employees still there. A South African source says all current employees may not be retained, and those let go may not receive the same handsome severance as those who left a year ago (there were 1,900 then). Several have resigned in protest.

How's the lessening of IBM's ties to South Africa going to play on the home front? Surprisingly well, according to those who have been in the forefront of

the drive to pull Big Blue out of Africa.

"I think it has some political significance because it's IBM and it's the biggest computer company in South Africa," says Tom Conrad, author of *Automating Apartheid*, published in 1982 by NARMIC/American Friends Service Committee, a leading Philadelphia-based antiapartheid group, of which he is a member. "It turns heads and starts people who weren't thinking about this to start thinking about it. And it's positive because they're selling their equity holdings. But we want them to stop all sales. So it's not all over now."

"I commend IBM, GM, Coke, and others who have left South Africa," says Tim Smith, executive director of ICCR. "It's a significant shift. It would be a political mistake to say nothing's happened, even if IBM is still maintaining its presence there. But for IBM, the issue has never been what assets it's had in South Africa. It's who they're selling to."

That's definitely going to be the same old song. The new company will have a three-year software and hardware contract and a five-year parts agreement with Armonk.

"We've been candid and up front about how we're doing this and how we're setting it up," says IBM spokesman Coyle. "To characterize it as a public relations effort misses the point entirely."

Coyle says, however, that IBM expects all current South African employees to become employees of the new company. "If it's necessary down the road for

U.S. competitors are saying that IBM can go its way and they'll go theirs.

the new company to reduce head count, IBM will help underwrite a safety net for a period of time," he says.

Not everyone sees it that way.

"It's all very well saying IBM is dead, long live the new company," says Tim Sargeant, managing director of CPL Computer Placements, an employment agency in Johannesburg, "but people in the South African dp industry are frightened of the prospect that in the future they may be cut off from new technology.

"IBM will enjoy a short honeymoon in the U.S., but when the realization sets in that the company is still doing business with South Africa, the pressure will hot up [sic]."

Isn't this where we came in? And why IBM tried to get out? ©

Assisting in the preparation of this story were Sarah Underwood, associate editor, Europe; Bob Poe, Tokyo bureau manager; and Jennigay Coetzer, a freelance computer writer in Johannesburg.

MIDRANGE COMPUTERS

CATCHING THE WAVE

IBM, pushing an open systems approach, is hoping to repeat its PC success with the 9370 and put the brakes on DEC.

by Jeff Moad

Is the combination of IBM's marketing muscle and a scaled-down, low-priced version of its 370 mainframe architecture enough to stop Digital Equipment Corp.'s VAX system from continuing to make impressive gains in the medium-scale commercial departmental computing market? Apparently IBM doesn't think so.

With its recently announced 9370 Information System, IBM is also attempting to enlist broad industry support by opening its mainframe architecture for the first time to an array of preexisting, non-IBM controlled industry standard interfaces. Ethernet. Multibus. SOEMI. TCP/IP. The 9370 supports them all and observers believe it will probably support many more in the near future. Add to that a new integrated I/O controller design, meant not only to attract value-added reselling, but also to encourage outside hardware vendors to market compatible 9370-class storage and even processor products; the result is a generic 370 that can be plugged into almost any data processing environment and that openly invites third-party hardware and software developers to jump on what IBM hopes will be a bandwagon.

"For IBM, it's the architectural equivalent of fast food—have it your way," says analyst Brian Jeffery, president of International Technology Group, Los Altos, Calif. "They've turned the 370 architecture into a generic MIPS box."

IBM's idea, say industry observers, is to get general industry help in establishing the 370 architecture as the departmental computing standard in place of VAX, before lower-cost multi-user Unix systems can gain a foothold. "IBM is playing catch-up with DEC in departmental computing, and it's looking for all the outside help it can get in establishing the 370 architecture in the midrange," says San Jose-based Dataquest Inc.'s analyst Kimball Brown. An IBM spokesman declined to make IBM officials available for an interview.

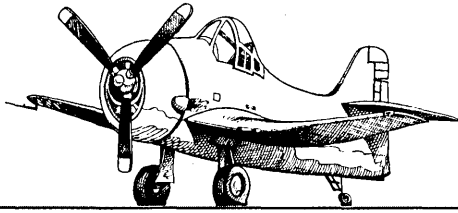
The 9370 becomes the first 370-compatible system to support Ethernet, the 10Mbps local area network standard that Digital has ridden to fame and fortune. The 9370 will support Ethernet via a communications subsystem controller just as it will support the Serial Original Equipment Manufacturer's Interface (SOEMI) via a workstation subsystem controller. Through the SOEMI interface, standard microcomputer interfaces like Multibus or Unibus will be supported, giving the 9370 the ability to play with a variety of hardware from different vendors.

Already, a number of outside hardware and software vendors are working on products that would gain leverage off the open characteristics of the 9370. Intel Corp., Santa Clara, has developed a high-speed interface called Fastpath that connects the 9370 with Multibus and Digital systems. FlexLink International, Palo Alto, is developing software that will expand Fastpath 9370 connects to include Apollo and Sun workstations. IBM is helping companies like FlexLink through its Marketing Assistance Program, which provides joint product demonstrations to large users.

The 9370's I/O design should also make it easier for outside hardware vendors to jump on the bandwagon, although initially it may pose problems for existing plug-compatible vendor Canaan Computer Corp., Trumbull, Conn. IBM splits the controller functions between those that work with the core 370 environment and those that work with the external storage or communication hardware on the other end of the controller. The internal controller functions are integrated into the 9370 at memory card level, so observers expect that potential third-party 9370 disk, tape, or communications hardware vendors would have an easier time developing add-on 9370 products.

That is in sharp contrast to Digital's recent efforts to restrict third-party hardware vendors from attaching certain storage modules and other peripherals to its proprietary VAXBI bus.

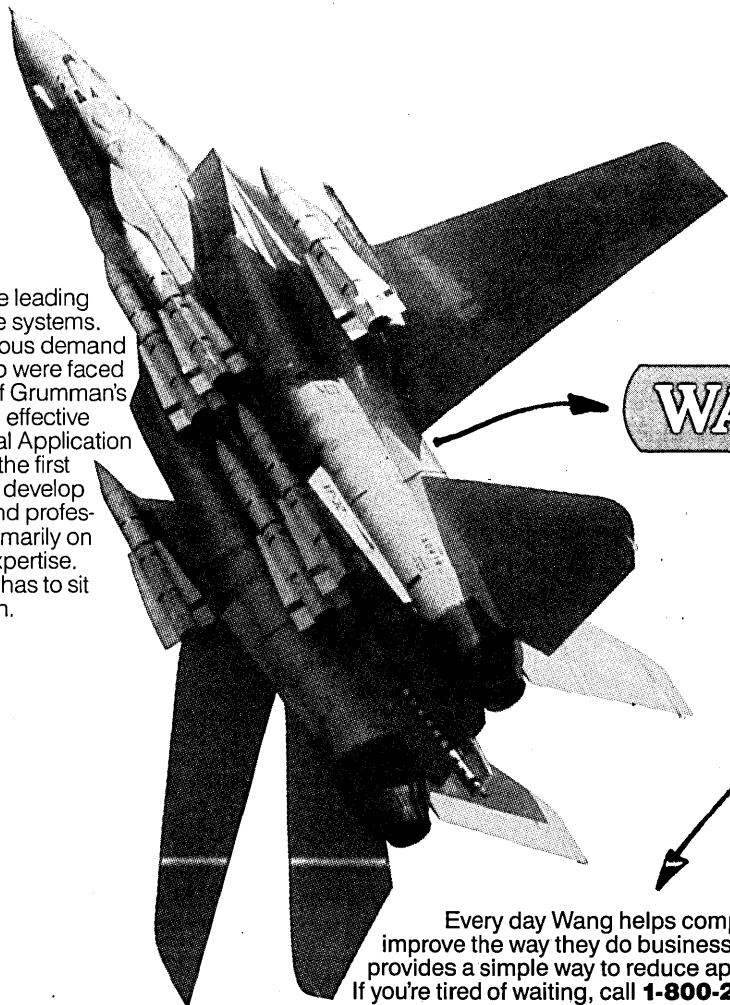
On the software side, one of the keys to the open 9370 is what IBM calls the Transparent Services Access Facility (TSAF), an enhancement to the VM/SP Release 5 operating system that provides VM program-to-program support and transparent access to programs on other VM machines. TSAF also is the feature that provides operating system support for non-IBM environments. IBM says that support in the fourth quarter of 1987 will be for Ethernet and TCP/IP, but analysts including ITG's Jeffery expect TSAF eventually will be used to allow the 9370 to support non-IBM standards such as IEEE 802.5 (MAP), ISO/OSI, and possibly even



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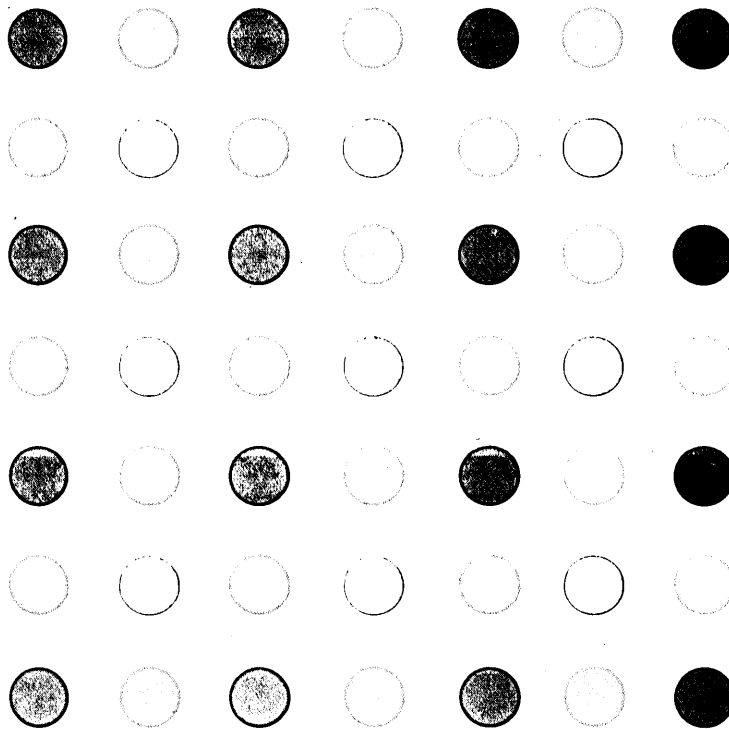
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NEWS IN PERSPECTIVE

AT&T's Starlan.

The TSAF feature in VM also may make it easier for third-party software developers to tailor applications for the 9370, especially applications such as distributed databases that are designed to take advantage of transparent remote access capabilities. Some observers expect IBM's own distributed database product development effort at San Jose, under the code name Starburst, to be keyed to the 9370 and TSAF.

Most IBM-oriented third-party software vendors don't need much encouragement to develop applications for the growing departmental computing market. Many software vendors such as Cullinet, Westwood, Mass., have been hurt by IBM's weakness in midrange systems. "This [the 9370] could save Cullinet," says John McCarthy, director of research at Cambridge-based Forrester

"For IBM, it's the architectural equivalent of fast food—have it your way."

Research Inc. Cullinet will accommodate products such as its IDMS-R database system to the 9370 while it continues with plans to convert its products to the VAX environment, a company spokesman says.

At the same time, the 9370 could stop or delay some software vendors from supporting Digital. Applied Data Research Inc., Princeton, N.J., has been closely studying a move to support Digital, says senior vice president Martin Goetz, "but the 9370 probably will keep us exclusively in the IBM camp," he says. "The 9370 will stop DEC in a majority of cases, especially among large customers that already have IBM mainframes." ADR, meanwhile, continues with its strategy of pursuing high-level languages such as C.

Many software vendors expect IBM to encourage third-party development for the 9370 through joint marketing arrangements. Officials from IBM Information Services have been holding meetings with third-party software vendors and, according to Cullinet, the message is, "IBM expects at least half of its software revenue on this product to come from applications. To a significant degree, a lot of that will come as a result of IBM relationships with third parties."

Sources say much of IBM's early effort has been focused on getting outside developers of technical and engineering applications to convert products to the 9370, one version of which, the 9377, comes with floating point accelerator hardware and an arithmetic facility.

While most observers give the 9370 little chance of overtaking Digital in its core technical market stronghold, it is clear that most commercial users must at

least take notice of the 9370. Several large users contacted by DATAMATION have started evaluating the 9370 already, focusing first on its price/performance profile. At just over \$70,000 per MIPS, the 9370, ranging between 0.5MIPS and 2.5MIPS, stacks up well against the VAX, most users feel. By the time selected fixed configurations of the 9370 start shipping in the third quarter of next year, however, most observers expect any price/performance advantage the 9370 might currently enjoy to be erased by Digital.

Users seem to feel there are several key questions about the 9370 still to be answered. One is compatibility. IBM will say only that most applications written for existing releases of VM and DOS/VSE will run on the 9370. Certain compatibility restrictions will apply, however. For one thing, the application cannot depend on the presence of specific memory, I/O equipment, or optional features since there are differences, including different disk drives and controller, between the 9370 and other 370 systems. Also, the application cannot be dependent on processor cycle times, IBM says.

According to J.M. Graziani, MIS vice president at San Francisco-based Southern Pacific Transportation Co., "We've looked at DEC and Sperry for departmental computing, but what we like about the 9370 is the idea that we could use the same software in our systems from the bottom up. What we need to know now is how much of our software will run." Southern Pacific is considering the use of the 9370 for remote process control and high-volume data collection applications.

Some potential 9370 users are disappointed at the system's limited MVS capability. The system does not support MVS/XA at all. Although the larger 9375 and 9377 versions do support MVS/SP and CICS, users choosing to run MVS on the 9370 must also use the System/370 block multiplexor channel, but cannot attach to controllers supporting token ring, Ethernet, or the smaller, less expensive new disk and tape drives.

"That means I still can't have an MVS system running next to my desk," says Fran Hildebrand, district manager for future technology at San Francisco-based BOC PacBell.

IBM won't say if or when the 9370 would support MVS/XA or if its plans include making MVS/SP easier to run on the 9370. Most observers do, however, expect the system to pick up more operating systems in the future. IBM has already said it is evaluating support of the System 8100's DPPX operating system on a 370 machine and could act as early as the first quarter of 1987. Many observers believe that machine would be the 9370. IBM has given no

indication whether the 9370 would support S/36 or S/38 operating systems, however.

Users are also concerned about support costs on the 9370. Although IBM brought 9370 hardware and system software costs down by liberalizing volume discount programs and introducing a graduated one-time software charge program many potential users are worried about having to hire programmers for a 9370 operating as a distributed system. According to PacBell's Hildebrand, "We're evaluating the 9370 along with DEC, AT&T, Pyramid, and CCI [Computer Consoles Inc.]. Support costs on the 9370 are something we're looking at hard. So far IBM hasn't given us a good idea what those costs would be."

An IBM spokesman says the new VM/Integrated System OS with optional integrated programming assist functions will allow the 9370 to be used by others besides skilled systems programmers. Still, the 9370 will run up higher support costs than the current System/36 or System/38. The question for users—especially those operating in sites not connected to a mainframe—is how much higher.

Support costs will not be as significant an issue in large organizations where the 9370 can be supported remotely from an IBM mainframe through remote support facilities built into VM/SP Release 5.

"The 9370 plays right into the hands of MIS executives at those large customer sites."

Many observers believe the 9370 will have its strongest appeal in such large, IBM-oriented organizations.

"The 9370 may be more expensive to support than an HP or DEC machine, but it will get sold mainly into the entrenched IBM customer base," says Dataquest's Brown. "The 9370 plays right into the hands of MIS executives at those large customer sites. The last thing they want to do is hire VAX programmers."

Most observers feel Digital and others like HP will still have strong support among smaller users, technical users, and those at remote departmental sites not tied to a mainframe. There, the mini-computer vendors seem to offer better user interfaces and better pc support.

If IBM's efforts to open the 370 architecture and attract third-party and reseller support pay off, however, the 9370 could also find success in niche markets outside large MIS shops. According to Forrester's McCarthy, "DEC's going to pound hard on the idea that they have it today, while IBM's midrange strategy is promises, but IBM, by opening up the system, has taken a big step in catching up with DEC." ©

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PRICING

WANNA MAKE A DEAL II?

Mainframe software price cutting continues as suppliers adopt some new strategies to deal with increasingly savvy users.

by Karen Gullo

Price cutting is alive and well in the mainframe applications software market. In the year since DATAMATION reported that some vendors were slashing as much as 50% to 75% off the list price of mainframe accounting software (see "Wanna Make a Deal?" Nov. 15, 1985, p. 38), the situation apparently has changed little. Most sources say discounts of 40% to 50% are common, and price cutting has spread to the market for database software as well.

What's different today are the attitudes that buyers have adopted toward discounting and the pricing strategies software vendors have embraced to cope with life in the discount aisle. Buyers have come to expect significant discounts, rendering price a higher priority in competitive bidding situations when two or three vendors vie for the same business. On the supplier side, some offer short-term leases or graduated price scales or use various packaging and price strategies to keep sales up.

Price cutting has taken its toll of the software industry. First, it seems to have driven prices up somewhat. Many observers hint that by raising prices, vendors may be trying to offset the effect discounting has on the bottom line. No software vendor would admit as much, however. "Vendors have created their own nightmare," says Bill Ammann, business systems manager at Newsday, Melville, N.Y. "They've discounted so much that now everyone expects it and no one will pay list."

Just what effect discounting has had on software companies' bottom lines is a matter of debate. The industry slump will result in a flat year for many companies, say analysts, but, more specifically, there are those who believe that discounting plays a part in poor financial performance. "Of course it affects the company bottom line," says Richard Linting, director of applications software development in the consulting division of Arthur Andersen, Chicago. "The whole industry has

felt the impact of a tough market and margins are not what they had been."

Just as important, however, is the psychological effect discounting has had on the software industry. While users have come to expect discounts, they complain that taking advantage of price cutting often causes political tension between the MIS department and end users. "The biggest cost involved [in discounting] is in employee morale," says Joe Lerro, assistant vice president, corporate controller at Bankers Trust Co., New York. "You give a team of people the mission of evaluating a product, and they come up with an evaluation into which they've put a lot of time and effort, then someone comes along and takes someone out to dinner and all of a sudden you get \$35,000 off list price and we throw out the evaluation. It's not good for the software industry."

Richard Korsak, accounting manager at Siemens Gammasonics Inc., Des Plaines, Ill., says when his company bought an order entry and accounts receivable package from Management Science America, Atlanta, in the spring, the company threw in a general ledger package. "It was a good deal and very lucrative, and you get a feather in your cap for knowing someone and getting a good deal, but it caused a big hassle among the users," Korsak says. "Discounting causes a lot of political BS."

In many cases price is not a leading factor in a buyer's decision to purchase software, say both users and vendors. Even so, vendors are looking for creative pricing strategies to deal with the discounting environment. Martin Goetz, chief technology officer at Applied Data Research, Princeton, N.J., says his company has been moving away from permanent leasing and is offering one-month and six-month leases. If buyers looking at ADR software are offered a discount from a competitor, Goetz says, ADR will respond, as long as the buyer puts it in writing that he or she was offered a discount. Contrary to what most vendors say, Goetz believes there is less discounting in the industry than there was a year ago.

Steve Weinberg, vice president of marketing at McCormack and Dodge, says that while discounting is still prevalent, the average discount on a deal is lower now than it was in 1985. "A fair amount of the time we're responding to discounting by our competitors," Weinberg says. "We are forced to lower our prices sometimes." Weinberg wouldn't say what the average discount was, but guessed it was less than 10%. He did say, however, that some M&D prices have increased 8% in the last year and will likely increase by as much next year. He stresses, however, that M&D does not increase prices in response to discounting.

Doug MacIntyre, vice president of marketing at MSA, M&D's chief rival, says he has seen no change in discounting over the past year. "There's no more discounting than there has been. It's not good or bad, it's just the way things are done." MacIntyre says that most of the price cuts MSA offers are legitimate discounts for second-site purchases and multipackage deals. "Much of what is called discounting is a reconfiguration of the package. Forty percent is a standard discount for anyone buying a second site for a system he already has, and more people are buying for multiple sites."

"Discounting has made the client a lot smarter, and now he knows how to play vendors off each other," says Jeff Goodman, president of Software International, Andover, Mass. "We've created a monster and it's alive and well."

There's a mentality among software vendors that getting 50% off list is better than getting nothing, says Dennis Yablonski, president of Cincom Systems, Cincinnati. Yablonski says Cincom does not discount but sees plenty of it.

Cincom offers functional pricing, that is, pricing based on the number of terminals or cpu size. That way, smaller users pay lower prices for their first systems, and then pay more as they grow. "We've been doing this for a couple of

"Vendors have created their own nightmare."

years, but right now I would say we use it as a mechanism to respond to discounting," says Yablonski.

Meanwhile, IBM and its recent announcement of a new line of small 370 processors and software offerings looms in the distance. MSA, M&D, ADR, Software International, Computer Associates, and Cincom all say they are working to move their software over to the new hardware. The software vendors polled by DATAMATION eye the announcement with guarded indifference, claiming that they are not affected by IBM.

Thomas J. Lawton, editor of Computer Services Report, Belmont, Mass., says the announcements could have a striking impact on the industry. "The trend has been continuous increases in software prices, so for IBM to turn around and announce price reductions could be a very big event for the industry."

While the general feeling in the software industry is that price cutting is having a negative impact, there seems to be no end in sight. "Ultimately, the software companies lose, but so will buyers," says Goodman at Software International. "With vendors getting less than list for products, they will have less to reinvest in new products and enhancements." ©

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ORACLE stores data from different tables on the same physical disk page. This technique—called *multi-table clustering*—permits you to access data from multiple tables in one disk read operation. Clustering improves ORACLE performance on all multi-table operations, such as join queries, update transactions, etc.

□ REASON #5: HIGH-SPEED RELATIONAL SORT FACILITY OPTIMIZES DATA AGGREGATION

Ad hoc relational queries frequently request that data be grouped, ordered or otherwise sorted. V5's internal sort facility performs aggregation and elimination early, faster than previously thought possible.

□ REASON #6: EFFICIENT ROW-LEVEL LOCKING OPTIMIZES TRANSACTION THRUPUT.

Row-level locking and a read-consistency model optimizes ORACLE V5 transaction concurrency. For the first time, high transaction thruput is achieved by a fully relational DBMS.

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Oracle introduced the first relational DBMS and the first implementation of SQL back in 1979. Today ORACLE is installed on thousands of minis and mainframes, and over ten-thousand PCs. ORACLE is the only SQL-compatible relational DBMS that's portable across IBM mainframes, DEC, DG, HP and most other vendors' minis and micros, including the IBM PC. And ORACLE applications and databases are connectable across different hardware and operating system, providing you with a true distributed solution to your information needs.

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| AL Mobile Sep 10 | Tampa Aug 6 | Nov 4, Dec 18 | Sep 23, Oct 28, Nov 13 | Lubbock Oct 2 |
| AR Little Rock Sep 30 | GA Atlanta Sep 23, Nov 6 | MO Kansas City Aug 12, | Columbus Sep 24, Oct 29, Nov 12 | San Antonio Aug 27, Nov 5 |
| AZ Phoenix Aug 5, Oct 16, Dec 2 | Columbus Oct 8 | St. Louis Jul 30, Sep 25, Nov 19 | Dayton Sep 9, Nov 5 | UT Salt Lake City Aug 6, Sep 16, |
| CA Los Angeles Aug 6, Sep 11, | IA Des Moines Aug 27, | MS Jackson Sep 11 | OK Oklahoma City Sep 3, Dec 3 | Oct 7, Dec 4 |
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| Oct 21, Nov 13 | MA Boston Sep 16, | NY Albany Jul 23, Sep 11, Nov 20 | | |
| CO Denver Sep 18, Oct 21, Dec 10 | Oct 15, Nov 12, Dec 10 | New York City Jul 24, Aug 12, | | |
| CT Hartford Sep 10, Oct 13, | Burlington Aug 10 | Aug 26, Sep 3, Sep 17, Oct 2, | | |
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NEWS IN PERSPECTIVE

MICROCOMPUTERS

ROCKING THE BOAT

**Amstrad's low-priced micro spurs
a round of software price cutting
in Europe.**

by Sarah Underwood

Europe's microcomputer users never had it so good. Following the launch of a range of inexpensive IBM-compatible micros in Europe last September by U.K. electronics company Amstrad, major software companies such as Digital Research, Microsoft, and MicroPro have slashed prices on some of their most popular products.

Bundled with the \$600 Amstrad PC1512 machines in Europe are Digital Research's Gem programs, worth \$300, as well as Microsoft's MS/DOS 3.2. The bargain basement prices don't stop with system software; applications packages such as WordStar and SuperCalc are down to the \$100 mark for the new Amstrads. In Europe, the usual prices for those packages are up to six times that amount.

Some observers believe that in Europe, at least, the price cutting may be a trend. Says Simon Pearce, director of micro services at the European subsidiary of market research company IDC, "The offering of SuperCalc 3, WordStar Easy, and Reflex at a cost of \$100 in Europe will result in a round of dramatic price cuts by all major software houses. Users can look forward to the prices of standard packages of the spreadsheet, word processing, and database variety falling by more than 50% in the next few months."

The hardware that brought on this price slashing was conceived in the East End of London and built in South Korea. Amstrad, which made its name in the consumer electronics business, introduced six models in its new PC1512 IBM-compatible range, from the low-end model with a single disk drive and monochrome screen for \$600 to a 20MB hard-disk, color screen system at \$1,350. Amstrad hopes to sell 800,000 machines in the first year.

Although the Amstrad launch has rocked the European micro software boat, it is unlikely to have the same effect in the U.S. "The Amstrad is irrelevant in the U.S. because the market's a year ahead and Amstrad has neither the reputation nor the price advantage it has

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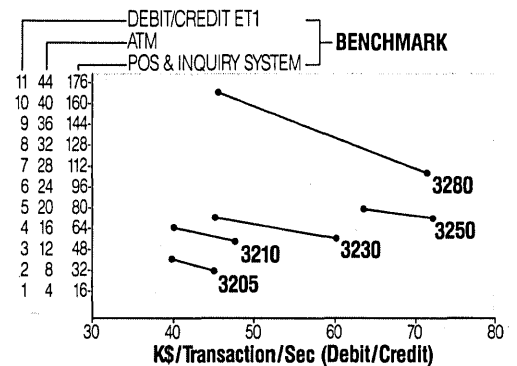
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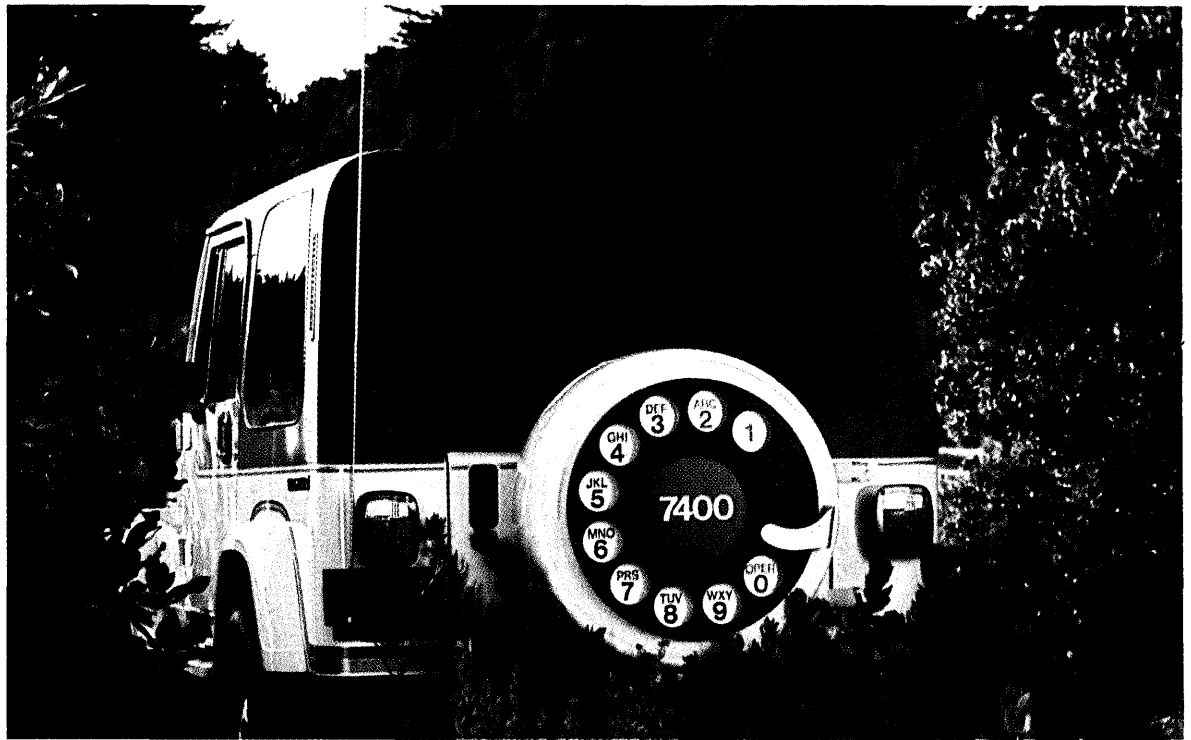
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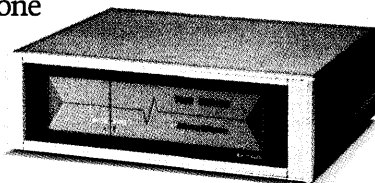
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CIRCLE 19 ON READER CARD

NEWS IN PERSPECTIVE

here," notes Pearce in London.

Sears World Trade, which has an exclusive deal with Amstrad to sell the machines in the U.S. starting in January, is out to prove that the tough pricing can work in the U.S. Otto Georgi, senior manager of Sears' consumer electronics group, argues that "Customers paying \$600 for a computer won't want to pay \$500 for software."

The company already markets the Amstrad PCW8256 word processor through its U.S. retail chain, but admits that sales have been slower than antici-

Some observers believe that in Europe, at least, the price cutting may be a trend.

pated because Amstrad is a relatively unknown quantity in the U.S. Bearing this in mind, Sears is considering a move into software distribution, backing the new IBM clone from Amstrad with popular packages labeled as "tried and tested."

However, the comparatively large number of low-priced compatibles on the U.S. market—from companies such as Tandy and Epson—has already triggered some lower prices for packaged software. In the U.S., there has been some pressure on microcomputer software prices,

brought on by such companies as Borland International Inc., Scotts Valley, Calif. (see "A Moving Target," Dec. 1, 1985, p. 47). Borland's strategy of drastically reduced software prices apparently has not taken hold throughout the industry. What's more, not every major international software company is convinced that it should move down market—even in Europe.

In the U.K., Lotus and Ashton-Tate refused to drop prices at first, arguing that low-priced software would force vendors to scrimp and save on service and support. Ashton-Tate has since changed its mind and promises to produce versions of dBase II and Framework for under \$200. Lotus, however, remains adamant. "Customers' criteria for buying our software are not based on price but on value. We're interested in high-quality, high-value sales," counters a company spokesman. Lotus maintains that its support of the corporate market has allowed it to hold the \$495 recommended retail price that its 1-2-3 spreadsheet package has carried since its launch in 1982.

Lotus's stance is unlikely to affect European sales of the machines. Pearce expects the U.K., Italy, France, and Scandinavia to take as many machines as Amstrad can make. In fact, by the end of

only the second day after the Amstrad launch, Danish users alone had ordered 2,000 of the pcs. U.K. orders, meanwhile, are now close to 150,000 units.

Although it remains to be seen what effect, if any, the Amstrad entry will have on the U.S. market, the evidence appears clear that it has forced changes on the European scene. The question now being posed, however, is how widespread and long-lasting those changes will be, and how long Amstrad will hang on to its competitive edge. ©

Fred Lamond, technology editor, Europe, assisted in the preparation of this article.

WEALTH

HOW TO GET RICH

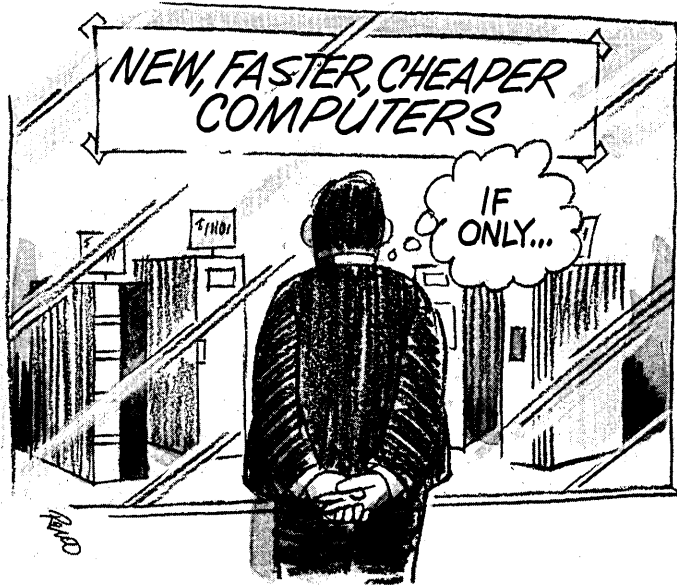
Computers can make you very, very rich. So can tuberous vegetables.

by Parker Hodges

An annual ritual of the overprivileged is behind us for 1986. All over the country, rich folks, their fans, and their dependents waited—presumably breathlessly—for *Forbes* magazine to publish its yearly Forbes 400, a catalog of the 400 richest Americans. Plutocrats wondered, did I make it? Plutocrats' spouses wondered, shall I move to a community property state? And the rest of the world wondered how it could get rich, too.

Computers put several people on the list. The richest was ED's H. Ross Perot, clocking in at \$2.5 billion. David Packard has \$2 billion. William Hewlett has \$1 billion in HP stock. Dr. An Wang has \$550 million. After going public with Microsoft, Bill Gates is new to the list this year with at least \$315 million. (Microsoft stock also enriched Microsoft co-founder Paul Gardner Allen, now ceo of Asymetrix, but his \$175 million didn't quite make the list's \$180 million cutoff.) Ken Olsen has \$275 million worth of DEC stock. Max Palevsky's \$200 million net worth is based on the \$100 million he got when he sold Scientific Data Systems to Xerox. William Millard is still worth \$200 million from his Computerland holdings, despite his court losses. In the basement of the 400 is Steven Jobs with a net worth of \$185 million. Nevertheless, top fortunes account for only \$7.23 billion of the \$156 billions—at minimum—that are owned by the 400. And, nowhere to be found on *Forbes*'s list is anybody from the Watson family.

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CIRCLE 21 ON READER CARD

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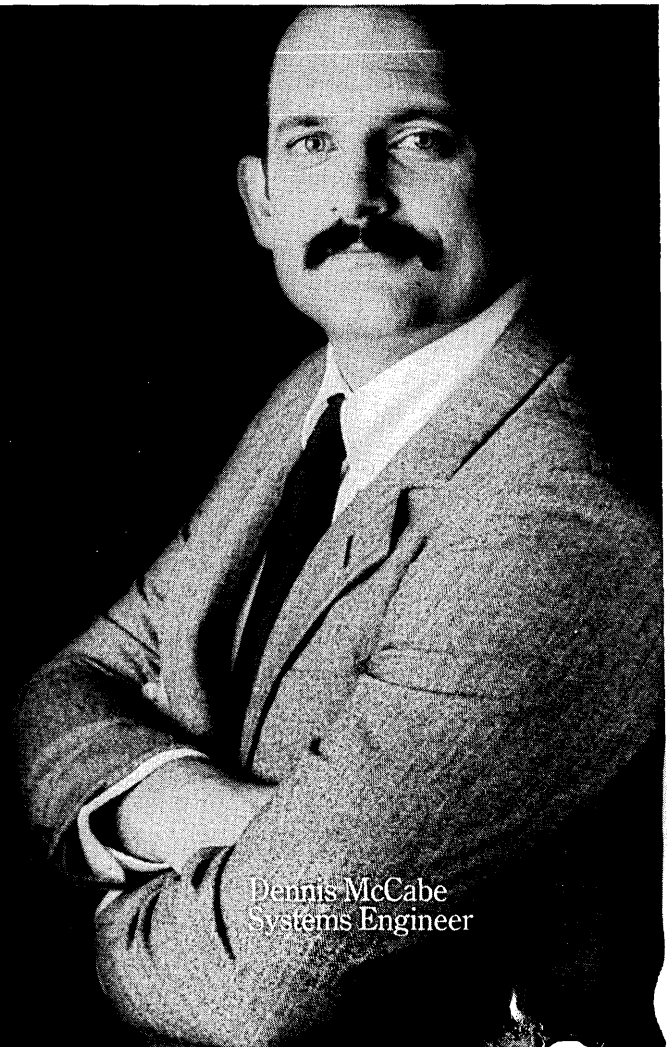
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Dennis McCabe
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CIRCLE 23 ON READER CARD

NEWS IN PERSPECTIVE

the surest way to vast wealth. The smartest career choice? Inheritor. Almost half the 400 got rich by wisely choosing to be born that way. For example, about 10% of the list owe their money to membership in either the Rockefeller, Mellon, or du Pont clans. Self-made tycoons are likely to have scored in real estate, retailing, or the media. But the big green can come from almost anywhere: *Forbes* describes the "primary source" of Idahoan John Richard Simplot's money as "potatoes." ©

TAXES

TWO THIRDS OF A LOAF

The computer industry seems to have done fairly well under the new tax law.

by Willie Schatz

Now that it's on the books as P.L. 99-514, the Tax Reform Act of 1986 seems to be a tale of legislative and executive sound and

fury, but in the end signifying not very much.

"It's not likely that many systems within a corporation will be impacted by the tax law," says Larry Schoenberg, chairman and chief executive of AGS Computers Inc., Mountainside, N.J. "In fact, I can't envision what systems would be impacted. We've got items like fixed assets and accounts payable and I can't think of any significant changes to them.

"From an MIS standpoint, I think it's going to affect an MIS director more by implication than by a direct hit. If your company's in a bracket where the lower corporate rate improves earnings, then capital expenditures could be affected. That may either help or hurt the MIS budget."

Those numbers will obviously affect equipment purchases. Some serious number crunching will have to occur before a company decides whether 1987 will be a downer or an upper for software and hardware. Ironically, one factor in that determination may be the death of the Investment Tax Credit (ITC).

You remember the ITC. Announcements of its death almost two years ago (see "What Price ITC?" Feb. 15, 1985, p. 40) were not greatly exaggerated. It expired last Jan. 1. And now that

there's a hole in the Internal Revenue Code where ITC used to live, there are a large number who mourn its passing.

"I don't see the tax bill affecting the internal way the corporation runs," says Paul O'Connor, director of taxation for Cullinet Software, Westwood, Mass. "There won't be a lot of day-to-day changes. I don't see Cullinet's product mix—fixed assets and other systems—

"There may be an indirect slowdown in software purchases because the motivation for computer purchases may be decreased."

changing. We've lived with other tax changes before and the sun's still coming up the same way.

"But I think the ITC is a big loss. That motivated people to buy computers. Was that the sole reason? Of course not. It was nice, but no one bought just because of the ITC. There never was an ITC for purchasing software, so there's going to be no change there. But there may be an indirect slowdown in software purchases because the motivation for computer purchases may be decreased."

The ITC's benefits weren't restricted to the high-tech slice of the business

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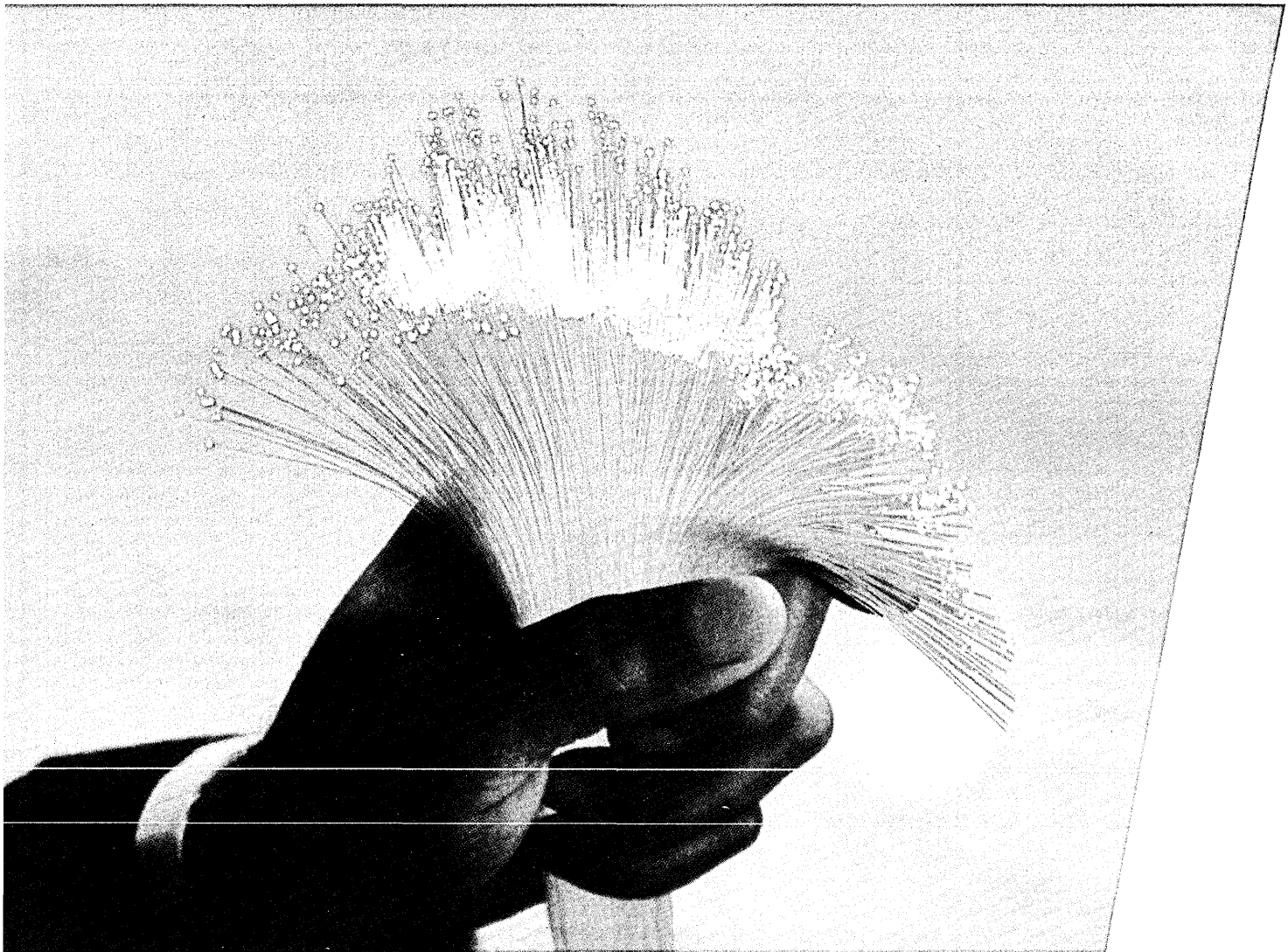
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NEWS IN PERSPECTIVE

pie. The 8% to 10% credit—depending upon the bookkeeping employed by the taker—applied to equipment purchases across the board. So everything will be more expensive, not just that software package or hardware upgrade for which your company's been itching.

"Losing ITC hurts everything," says Ted Heydinger, vice president for government relations at CBEMA. "It's going to have some negative impact, but I don't think it's going to be all that bad. It doesn't hit us specifically.

"We aren't changing our purchasing patterns because the ITC is gone," says Gary Benson, property tax specialist for Pillsbury Products, Minneapolis. "The ITC has died many deaths before and always comes back. I give it 18 months this time."

That's going to be a hard road to travel if the high-tech community decides it wants to make the trip. But it will be a stroll in the park compared with the struggle over maintaining the Research and Development (R&D) Tax Credit.

After expiring last Dec. 31, the R&D credit survived some serious mayhem to emerge relatively unscathed. It was given a new life span of three years, until Dec. 31, 1988. The incremental credit was reduced to 20% from 25% of

the excess of the qualified research expenses for the taxable year. The rate reduction was a downer, as was the elimination of leased equipment expenses from the credit. Limiting the credit to 75% of a taxpayer's tax liability in excess of \$25,000 makes the R&D credit the same as any other business tax credit.

But the bill finally brings equality to software development costs. With some exceptions, software costs are to be treated the same as hardware costs for taxable years before the effective date of the new specific rule. The regulations will

"Extension of the R&D Tax Credit and including software was a major victory."

apply retroactively to taxable 1981 through 1985. So the software industry can say good riddance to the confusion that has prevailed since issuance of the 1983 proposed regulations on the R&D credit.

Creative software geniuses aren't quite home free, though. According to an analysis by Mary Jane Saunders, an ADAPSO attorney, "Costs associated with software that is developed by or for the benefit of the taxpayer primarily for the taxpayer's own internal use will be eligi-

ble for the credit only if the software is used in 1) the taxpayer's otherwise qualified research, or 2) in a production process that meets the requirements of the credit." The example cited in the conference report is software developed for use in robotics, where the robotics will be used in a manufacturing process. The taxpayer's research expenses in developing the underlying robotics are eligible for the credit. But if neither of those two shoes fits, the taxpayer can't wear the R&D credit. So costs related to software will not be eligible for the credit where the software is used internally.

"The R&D situation definitely affected us," AGS's Schoenberg says. "We cut back on our R&D spending in this year because we thought there was a low probability of the credit being available." Now that it's real, as of last Jan. 1, look for an increase in R&D spending.

There's more good news for software companies. A tax law on the books since the 1930s subjects personal holding companies to a 50% tax, in addition to the corporate income tax, on personal holding company income that is not distributed to shareholders. That's essentially everything left over after payment of taxes.

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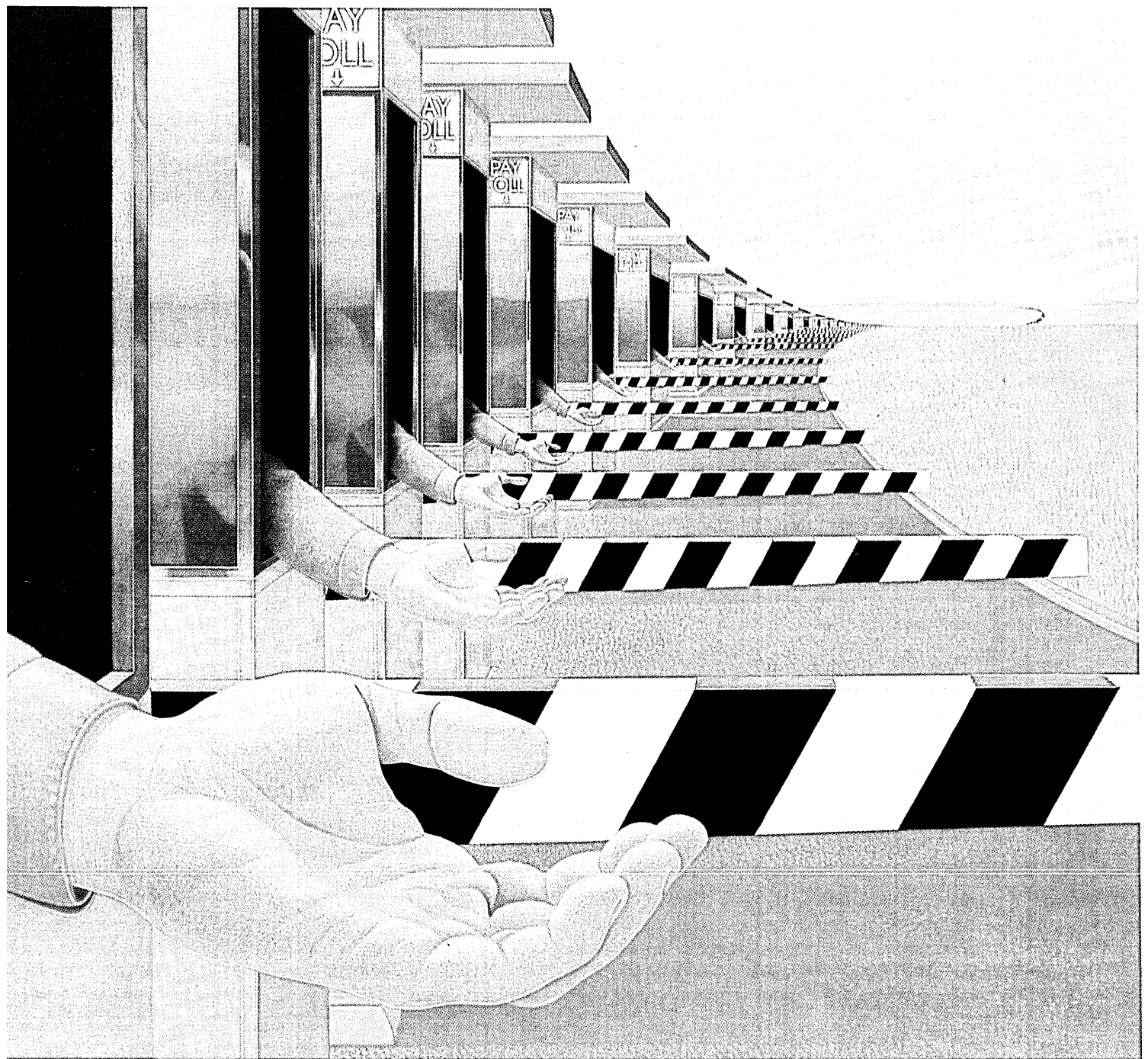
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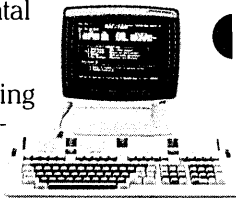
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NEWS IN PERSPECTIVE

come to mind as examples of personal holding companies, go to the head of the class. The Internal Revenue Service had never come down on those or other personal software holding companies. But just having the law around was making many companies dash to their tax advisors. Enforcing it could have meant as much as a \$10 million to \$15 million tax liability for the industry's biggest names, and a source close to the situation reports that Microsoft and the IRS were already talking about working something out. Now, such talks have been recessed.

The Tax Reform Act makes an exception from the definition of personal holding company income for computer software royalties received by corporations that are engaged "in the active conduct of the trade or business of developing or manufacturing computer software" provided that, among other conditions, the software must be developed or manufactured by the corporation in connection with such trade or business and the royalties meeting the first requirement must account for at least half of the corporation's ordinary gross income for the year. The provision is effective for royalties received on, before, or after Dec. 31, 1986.

So, after all this, just how did the high-tech industry do?

"We got about two thirds of a loaf," Saunders says. "Extension of the R&D Tax Credit and including software was a major victory. So was the software exception for personal holding companies [which was added on the last night of the House-Senate conference]. And the reduction in rates is obviously good."

No lie. According to Betty Seezor, director of shareholder relations for Management Science America, Atlanta, the company paid taxes at a 49% rate in 1986. That will drop to between 40% and 43% in 1987 and to 38% in 1988.

"If you buy the argument that high tech was paying more than its fair share compared to other industries, we won because the rate will be lower," says Cullinet's O'Connor. "We'll now be more balanced relative to other industries."

"We're pleased with the overall outcome," says CBEMA's Heydinger. "It's going to lead to fairer distribution of taxes. Now high tech will pay its fair share, not too much like it was doing."

"We were supportive all along. We even had a consensus on what position the association should take. We didn't get everything we wanted, but I don't think anybody did."

That must mean Congress did something right. ©

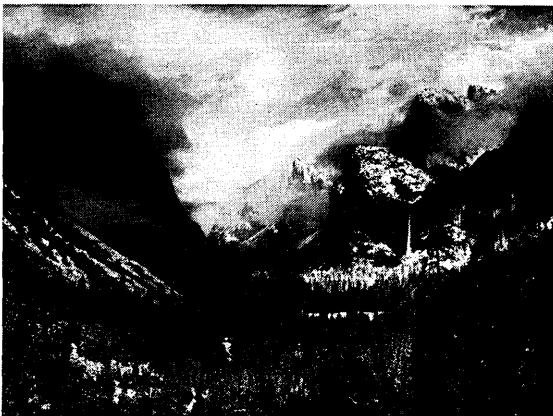
BENCHMARKS

EARNINGS UP, AND DOWN:

Digital Equipment Corp. saw earnings soar 153% on a 26% gain in sales for the most recent quarter, compared to the same quarter a year ago. IBM, strapped with an incompatible product line, reported income for the same periods down by 27% on a mere 1.8% rise in sales. While Digital rejoiced, IBM shuffled executives at the top of the corporation, replacing chief financial officer Allen Krowe with Frank A. Metz Jr., former group executive at the Information Systems & Products Group, and realigning reporting responsibilities for three key product lines. Krowe becomes group executive in charge of PC, small processor and storage, and communications activities. Among the communications activities affected is the Rolm telephone subsidiary.

OSI FEVER SPREADS:

Europeans are preaching the OSI networking gospel with renewed fervor. Heading the list of new OSI organizations is SPAG Services, set up by eight members of the European Standards Promotion and Application Group (SPAG)—Groupe Bull, ICL, Nixdorf, Olivetti, Philips, Siemens, Thom-



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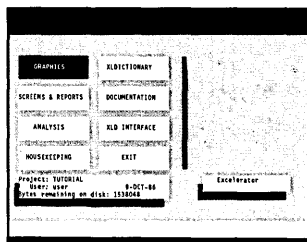
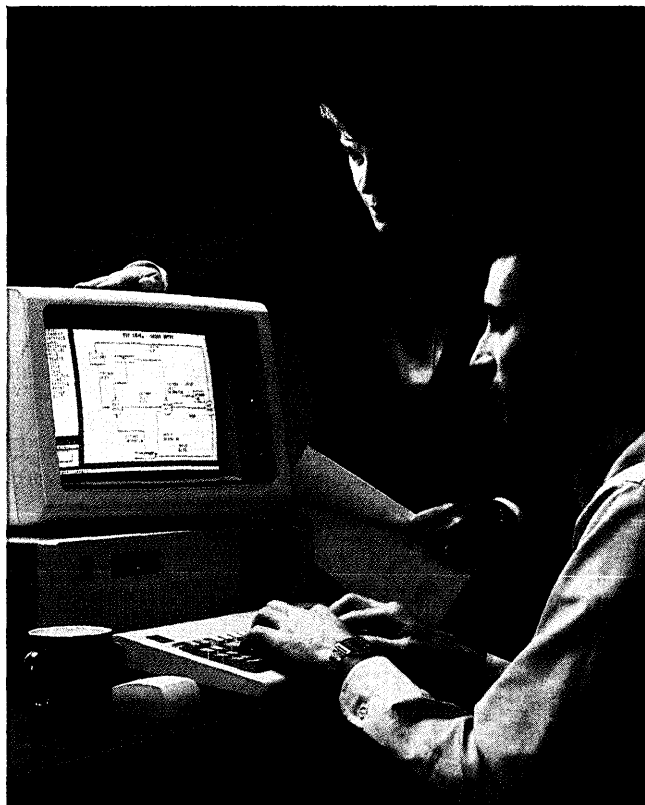
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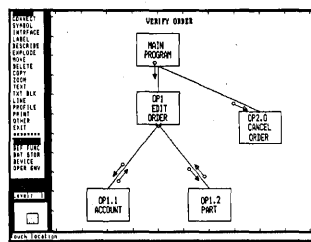
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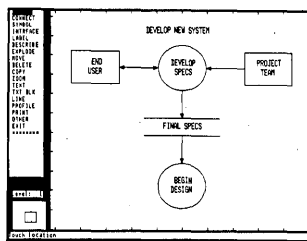
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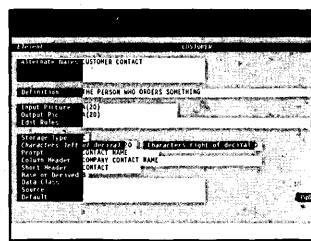
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BENCHMARKS

son, and Italy's STET. The new organization will provide conformance testing to OSI norms set by European standards organizations.

Another new initiative in coordinating the technical aspects of OSI is the U.K.-based IGOSIS, a group of 20 U.S. and European companies including Digital, ICL, and British Telecom. IGOSIS will work on functional OSI standards, complementing Eurosinet, the U.K.-based body developing permanent demonstrations of OSI internetworking.

While not a member of these strategic groups, IBM is nevertheless outwardly increasing its European commitment to OSI. It has opened an OSI center in Rome that will work closely with IBM's networking groups in Palo Alto and Heidelberg, West Germany.

IBM ELECTRONIC MAIL: IBM has announced its first product integrating the DISOSS office software, SNA networking, and its DIA/DCA protocols. Called Screenmail, it's the work of IBM's Business Network Services group in the U.K. If all is successful, IBM plans to take the electronic mail system into international markets. Screenmail is available to 3270 users connected to a host on IBM's value-added network, as well as PC and Sys-

tem/36 users running Personal Services software. The Displaywriter and 5520 Administrative System are supported.

NCR SCORES: NCR Corp. has been awarded a \$20 million contract from E.F. Hutton, New York, to supply 10,000 model 3390, Intel 80286-based workstations. NCR reportedly beat IBM, Data General, and Hewlett-Packard for the contract. Hutton account executives will use the machines, which replace Bunker Ramo System 7 terminals, at 400 domestic retail branches and worldwide offices.

STEPS DOWN: The president and chief executive of Floating Point Systems Inc., Lloyd Turner, resigned from the Beaverton, Ore.-based maker of vector processors. At the same time, C.N. Winningstad stepped aside as chairman. Replacing Turner as chief executive and also assuming the chairmanship was Milton R. Smith, a Floating Point cofounder who has been on the board since 1970. George P. O'Leary, a former vice president and director, was named president and chief operating officer. The executive changes come at a troubling time for Floating Point, which was expected to post its second consecutive losing quarter late last month.

FORMER EDITOR DIES: William Rolph, a former DATAMATION editor known for his sense of humor and elegant writing style, died last month in San Pedro, Calif. He was 62 years old. Rolph joined the magazine in 1965 and served as articles editor until 1973. His fellow staffers credit him with selecting and editing articles that set a high standard for technical and literary excellence in computer journalism. "He did an exceptional job," recalls Ed Yasaki, former managing editor. "He was responsible for establishing the magazine's unique style during the period of its biggest growth." Michael Cashman, former products editor, says, "He was a great teacher, a real mentor."

Before joining DATAMATION, Rolph had been a proofreader at the *Los Angeles Times*, a writer at Electro-Data Corp., Pasadena, Calif., which became the core of Burroughs' computer operations, and a freelancer. Upon leaving DATAMATION, he joined Xerox Data Systems, El Segundo, Calif., where he continued to write. After retiring from Xerox in 1981, Rolph worked again as a freelancer, writing, among other things, gag lines for cartoonist Henry Martin, whose work appears in the *New Yorker* and DATAMATION. He is survived by his wife Patsy, daughter Sarah, and son Jonathan.

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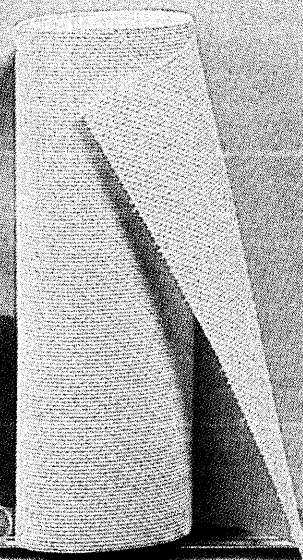
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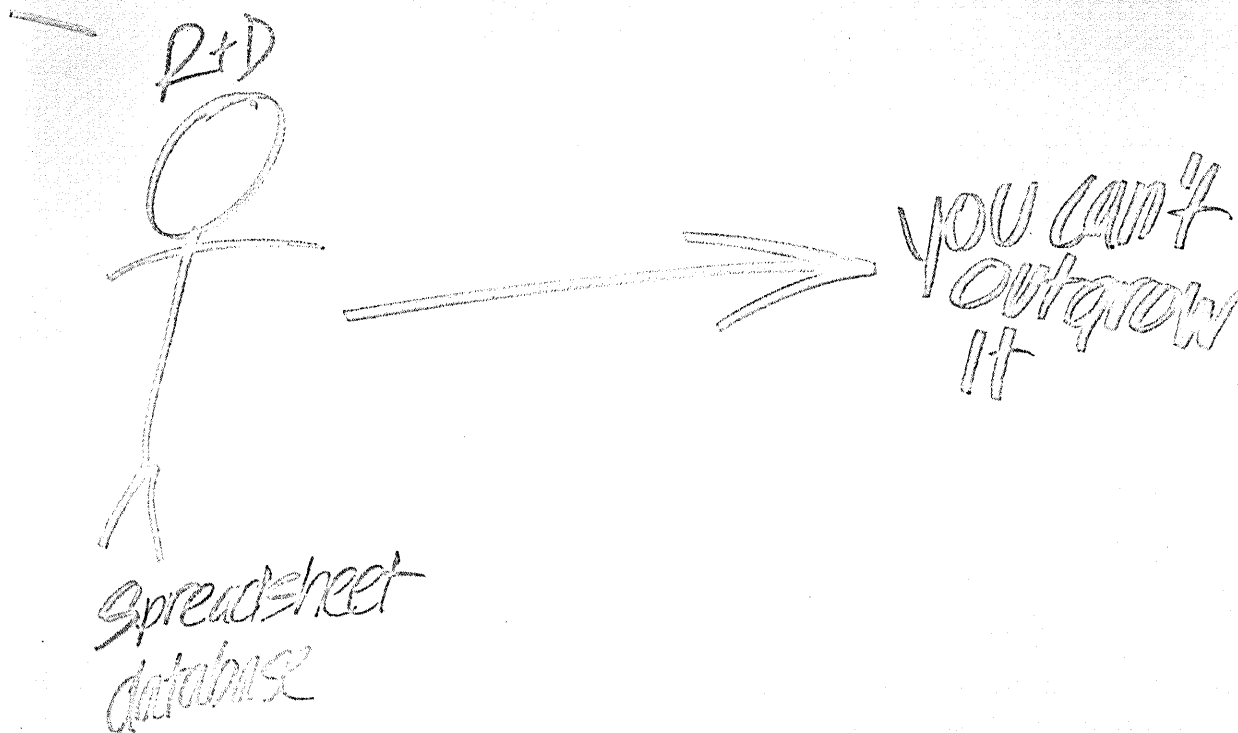
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BEHIND THE NEWS

TALL IN THE SADDLE

Pcmers Amdahl and NAS are riding high in mainframes these days, but the peripherals side of the business is still facing credibility problems.

by Jeff Moad

You wouldn't expect the few survivors of what has amounted to a bloody war of attrition against makers of IBM plug-compatible mainframe hardware to be quite so buoyantly optimistic. After all, the last few years have seen a parade of hopeful pcm processor and storage vendors stumble and fall victim to IBM competitive challenges and their own technical or financial inadequacies. The roll call of those having fallen in battle is long and includes midrange cpu makers Magnuson Corp. and IPL Systems Inc., large-scale pcm developer Trilogity Ltd., and pcm disk makers Control Data Corp. and Ibis Systems, to name just a few.

Why, then, are survivors like Amdahl Corp. and National Advanced Systems smiling? It's not that they are unaware of the challenges they face. In recent years, both Amdahl and NAS have come closer than they'd like to admit to joining the list of dearly departed pcm vendors. But now when the two major surviving plug-compatible manufacturers look around them, they don't see skeletons. They see opportunities.

After years of struggling—to match IBM mainframe and storage offerings, to keep up with increasingly aggressive IBM production schedules and pricing practices, and to deal with IBM legal challenges or their own technical problems—Amdahl and NAS are, at least for the time being, able to compete on almost an equal footing with IBM. In the last six months, the two companies have started shipping large-scale mainframes that meet or exceed the performance of IBM's most powerful 3090 mainframe. Both NAS and Amdahl, with the help of their Japanese technology and manufacturing partners, are now shipping large mainframe disk storage devices that match IBM's current top-of-the-line 3380 Model E device.

In a business where product availability cycles are everything, Amdahl and NAS are riding high. Both companies claim they are picking up mainframe market share at the expense of IBM. Analysts have raised their 1987 Amdahl earn-

ings estimates to \$1.50 a share from 60 cents in 1986. NAS is also profitable, with annual sales of about \$400 million. More important, both maintain they are slowly succeeding in their efforts to convince large data processing users that the pcm vendors are here to stay. Says Amdahl president and chief executive Jack Lewis, "We have to stay up with IBM on product cycle. But in the last 15 years, we have proven we can react well enough to do that. Users are now viewing us as being more reliable, and they're now more comfortable than ever in pursuing a multivendor strategy."

And, just as the pcm vendors seem to have caught up with IBM mainframe technology, they believe they may be in store for another break. There are signs IBM may soon be forced to modify its aggressive pricing policy, which has pushed mainframe and storage tags down industrywide by more than 20% per year and put pressure on the pcms and their Japanese suppliers. If IBM does stabilize or even slightly boost mainframe and DASD prices in order to prop up its own sagging bottom line, the pcmers say they could be in a position to improve their own profit margins or to make even more market share gains.

Amdahl owned 10.3% of the IBM-compatible mainframe market in 1985 with about 330 mainframes shipped, according to Dataquest, the market research company based in San Jose. Lewis predicts that in 1987 the company could double its mainframe market share if IBM does not significantly upgrade its 3090 mainframe. If all goes well, analysts predict Amdahl could top the \$1 billion annual sales mark this year.

NAS, a wholly owned subsidiary of Santa Clara-based National Semiconductor Corp., distributes processors and stor-



JACK LEWIS of Amdahl: "We have to stay up with IBM on product cycle. We have proven we can do that."

age devices built by Hitachi Ltd. The company controlled 8.4% of the compatible processor market in 1985, according to Dataquest. NAS, by the end of September, claimed to have shipped 18 of its new 28MIPS AS/XL-60 mainframes, outdistancing Amdahl's 5890-300 shipment rate. According to sales vice president Jerry Ungermann, NAS does not expect to stay ahead of Amdahl in this area, but the company could increase its mainframe shipments in 1987 by between 60% and 100%. "We're becoming a viable, meaningful alternative to IBM," says Ungermann. "Users are finding out all the things we have been saying are true."

The pcm horizon is not without its troubling clouds, of course. Surviving U.S. pcm disk and tape vendors Memorex and Storage Technology Corp. are having a hard time making significant market share inroads. In fact, they are still playing catch-up in both the 3380 disk and 3480 cartridge tape drive markets. At the same time, Storage is struggling to restore its tarnished image and to reemerge from Chapter 11 bankruptcy status, while officials at Memorex—a Burroughs Corp. subsidiary—must continually reassure users that they will not abandon the pcm market in favor of becoming a captive supplier to Burroughs and Sperry.

Amdahl and NAS, too, must deal with uncertainty, and not just that brought on by speculation over when IBM will upgrade or replace its current Sierra mainframe product line. Fujitsu, which owns 49% of Amdahl and supplies the U.S. company with processor logic and packaging technology, is currently facing a legal challenge from IBM. That company, in a formal arbitration proceeding, is claiming that Fujitsu's operating system borrowed too freely from MVS/XA, and IBM is reportedly seeking a large cash award and incentives for Fujitsu to rewrite its OS. The move has prompted Fujitsu officials to hint that in the future the company will move its architecture away from IBM compatibility.

Most recently, Fujitsu Ltd. executive director Shoichi Ninomiya said, "We remain enthusiastic about providing IBM-compatible functions in Fujitsu systems to the extent there is customer demand for specific functions. But Fujitsu does not intend to feature every function provided by IBM as a plug-compatible supplier would." Fujitsu is said to be planning the first shipment of one of its M-380 mainframes running a native version of the AT&T Unix operating system.

The issue already has pushed Fujitsu's West German oem, Siemens, to drop its mainframe distribution agreement after it expires in 1989 and to consider a joint mainframe venture with BASF, which currently sells a plug-com-



DAVID MARTIN of NAS: "We need to change the image of pcm vendors as parasitic copiers."

patible version of the Hitachi mainframe. Siemens says a definitive decision on combining pcm operations with BASF will be made by the end of this year. So far, Siemens has shipped about 250 Fujitsu systems, 25 of them running the Fujitsu operating system.

The outcome of the IBM-Fujitsu legal struggle should not directly affect Amdahl, which sells the Fujitsu technology built into its own architecture, running software licensed from IBM. Should Fujitsu be forced in future product generations to move away from an IBM-compatible architecture, it would put a crimp in Amdahl's and Fujitsu's plans to bring their product architectures closer together and save on product development costs. Lewis says Amdahl and Fujitsu will continue to look for common technological ground. But, he suggests, under the current circumstances, there's a limit to how close the two companies' architectures can come. "If we could convince Fujitsu our architecture is the right one, it could go further," Lewis says.

Even in the unlikely event that Fujitsu ended its relationship with Amdahl altogether, many observers feel Amdahl has the technical resources to continue on its own. "Amdahl uses Fujitsu only for subassemblies. Architecturally, Amdahl doesn't depend on Fujitsu," says Ulric Weil, an analyst with the Washington, D.C.-based Gartner Group. "Amdahl could carry on on its own, but it would not be easy."

Despite the current optimism coming from NAS and Amdahl, many observers believe both Fujitsu and Hitachi have lost a good deal of their enthusiasm for the pcm market. While Fujitsu already has made it clear it is reevaluating its direct participation in the pcm busi-

ness, Hitachi won't discuss its pcm strategies, perhaps still smarting from the government's IBM-inspired trade secrets case against the Japanese firm in 1982. Goldman Sachs analyst Charles Elliot, who is based in Tokyo, says, "Hitachi would have us believe they've sorted out their legal problems. But IBM may be testing itself on Fujitsu to see what it can do, and then will turn its attention to Hitachi again. The conclusion reached with Fujitsu will set the guidelines."

Under an agreement signed by Hitachi in 1982, IBM could force Hitachi into an arbitration similar to that Fujitsu now faces. According to Phil Townsend, an analyst for Morgan Stanley in Tokyo, "They haven't announced it, but Hitachi seems to want to get out of the pcm business. They courted both Burroughs and Sperry, but nothing came of it."

Hitachi has also been negotiating an agreement with Sperry under which Hitachi would sell Sperry advanced storage devices and logic technology. Although that relationship is now up in the air following Sperry's acquisition by Burroughs, some observers see the talks as indicating Hitachi's desire to expand its U.S. marketing channels beyond NAS and beyond the pcm business. Analysts in Japan still believe Hitachi is some day likely to take over direct U.S. distribution of its mainframes from NAS, which currently has no exclusive marketing deal with Hitachi. According to analyst Weil, "Hitachi

"Users are now more comfortable than ever in pursuing a multivendor strategy."

chi may be asking itself if National Semiconductor is the right partner for what they want to achieve." NAS says additional distributors would be good for users, conceding that any exclusivity with Hitachi is not in the cards.

Still, although Fujitsu and Hitachi seem to be questioning their own pcm strategies, in the long run the two companies have little alternative if they want to remain in the large mainframe market, observers believe. As traditional suppliers like Sperry and Honeywell continue to lose mainframe market share, the mainframe market is increasingly IBM compatible. According to Goldman Sachs Tokyo analyst William Arrah, "The general feeling here is that Fujitsu might like to move away from plug compatibility, but given the extent it is committed already, it wouldn't be practical."

Many U.S. users seem less interested in the uncertainty surrounding the American pcm vendors' relationships with their Japanese suppliers than they are in what they call the superior performance and reliability of the pcm gear

BEHIND THE NEWS

itself and in the resale value of the equipment. Most NAS customers, in fact, seem to take some comfort in the fact that Hitachi has a stake in the NAS installed equipment base and probably would step in if NAS ran into insurmountable problems. According to one NAS user, Tom Blodgett, who is senior vice president of Miami-based Southeast Bank, "When we first got involved with NAS in June of 1984, there was some fear that one day they might go out of business. But we concluded that the risk was zero because they're backed by Hitachi, and Hitachi's not going to walk away from its customers."

Southeast Bank is one of those users that has been convinced in recent years that pcms represent a viable alternative and bring competition among vendors, which ultimately means lower prices and better support for users. According to Blodgett, "Two and a half years ago, Southeast Bank was an IBM monopoly." All of the bank's cpus, disks, tape, and 5,000 terminals were Blue. Then, in June of 1984, facing performance problems with IBM 3380 disk drives, Blodgett convinced bank management to try NAS 3380-class disks. "When we were satisfied with that installation, we started looking at other NAS products," says Blodgett.

A year ago, the bank cleared out two IBM 3081 GX systems and over 200 gigabytes of disk storage and brought in more NAS disks and two NAS mainframes, an AS/9080 and an AS/8063. As part of the deal, Southeast Bank this summer upgraded the 9080 machine to NAS's new AS/XL-60 mainframe. NAS bought back the used 9080, a tactic the company has used extensively to win new hardware sales. Altogether, Blodgett figures, the bank saved \$4 million on the NAS hardware and improved its on-line uptime from 97.5% to 99%.

Just as important, says Blodgett, by replacing an IBM monopoly with a multivendor strategy, the bank has earned itself improved support and expects better pricing when it comes time to upgrade again. According to Blodgett, "There is still a group of management people who simply won't talk to them [pcms]. That is unfortunate, because it means IBM is running their dp shop. That should be management's job, not IBM's."

Despite rumored early performance problems on the XL-60, users including Southeast Bank, Dialogue (Lockheed's subsidiary in Mountain View, Calif.), and Grumman, Bethpage, N.Y., all told DATAMATION the air-cooled \$4.8 million system has performed at or above advertised levels, roughly 10% better than the IBM 3090-200. Blodgett says a microcode problem between

the XL and the bank's 3705 communications processor has been fixed.

NAS's successful early experience with the XL solved a serious competitive problem for the company. Before NAS started shipping the XL in June, sales of its 9080 had dwindled to a trickle as IBM started shipping its more powerful 3090. In the interim, NAS tried to focus marketing efforts on its midrange AS/8000 product line. And NAS prayed that the advanced XL, which uses 2,000- and 5,000-gate ECL chips, would actually work as a plug-compatible machine. NAS also took a number of large customers to Hitachi's computer works in Japan to see the XL working. Now NAS claims XL bookings are limited mainly by the size of its 80-person sales force, which the company is increasing by 40% this year.

Amdahl was in an even more precarious position as it approached the first 5890-300 shipment in August. Performance problems in software development

Surviving U.S. pcm disk and tape vendors Memorex and STC are not making significant market share inroads.

and in its previous 5860 mainframe generation meant the company could not support IBM's MVS/XA operating system for one year, nor could the company ship a dual-processor version of the system for three years after IBM did. The problems cost Amdahl much of its hard-won customer support. In fact, according to analyst Weil, "Amdahl lost market share because of its 5860 problems. They are encouraged by 5890 performance, but so far they have only started to win back their market losses."

"We went through hell with the 5860," says Ronald L. Woodall, executive vice president at Chilton Corp., an Amdahl user since 1977. But, says Woodall, Amdahl finally solved many of the performance problems when it finally shipped the 5870 dual processor. The 5890-300 has been flawless, Woodall says. In fact, in August Amdahl said the 5890-300 was running at between 36MIPS and 38MIPS at early customer sites, or 10% faster than Amdahl initially said it would, making the system significantly faster than the IBM 3090-200 and about on par with the 3090-400. Amdahl says it is on schedule to ship a four-processor version of the 5890 with 1.7 to 1.9 times the performance of the 5890-300 in the fourth quarter of 1987. Amdahl figures the 5890-300 and 5890-600 will then bracket the 3090-400 in performance. A 31MIPS dual processor, the 5890-200, is due out in the first quarter.

Both NAS and Amdahl are looking for improved 1987 sales based partly on

the higher prices they can charge for the new machines. They are hoping IBM is serious about putting the brakes on price cuts. Earlier this summer, IBM chief financial officer Allen Krowe said in published reports, "Strong competition and slower growth mean pressure on profits. Price reductions are likely to be a less attractive alternative . . ."

The pcms are hoping that means IBM will both moderate its official list price reductions and ease up on its aggressive volume purchase agreements through which it has offered large customers discounts of up to 39%. According to NAS sales vp Ungermann, "We see IBM trying to reverse customer psychology where they expect two price cuts per year and large VPAs [volume purchase agreements]. In the last year, IBM has found the market has lost much of its price elasticity. IBM's last 10% price cut basically lost them their 1986 profitability."

Amdahl's ceo Lewis isn't a wholehearted believer in the IBM price stabilization theory. "Historically, IBM has priced its new systems at \$5 million. Before they bring the new ones out, they try to get the old ones down to about \$3 million. I don't see that changing."

But, agrees Lewis, IBM may temporarily try to hold prices steady to boost sagging margins. "They don't have that lease base revenue cushion anymore, and I think they're realizing that price elasticity isn't what they thought it was," says Lewis.

If IBM does hold pricing steady, don't expect the pcms to put their survival on the line in a big volume market share push. Instead, the compatible mainframe vendors are more likely to hold volumes relatively steady and focus on improving profitability. According to Lewis, "We have to plan our volumes a year and a half in advance, so we're not in a position to boost them overnight. Besides, we don't want to get greedy and build up capacity the way STC did, only to get hurt." Amdahl has said it will ship between 200 and 300 processors next year.

While they attempt to divine IBM's pricing plans, the pcm vendors must also guess at when IBM will roll out its next generation, the multiprocessor Summit mainframe product line. IBM has called the current Sierra family its mainframe line for the '80s, and the pcms are hoping that's true. If so, Amdahl, NAS, and their Japanese partners can continue to leverage their current mainframe technologies for at least the next three years.

Of course, the pcms don't expect IBM to stand still. Both are working on four-, six-, and eight-processor implementations of the current designs, and they anticipate IBM operating system and I/O

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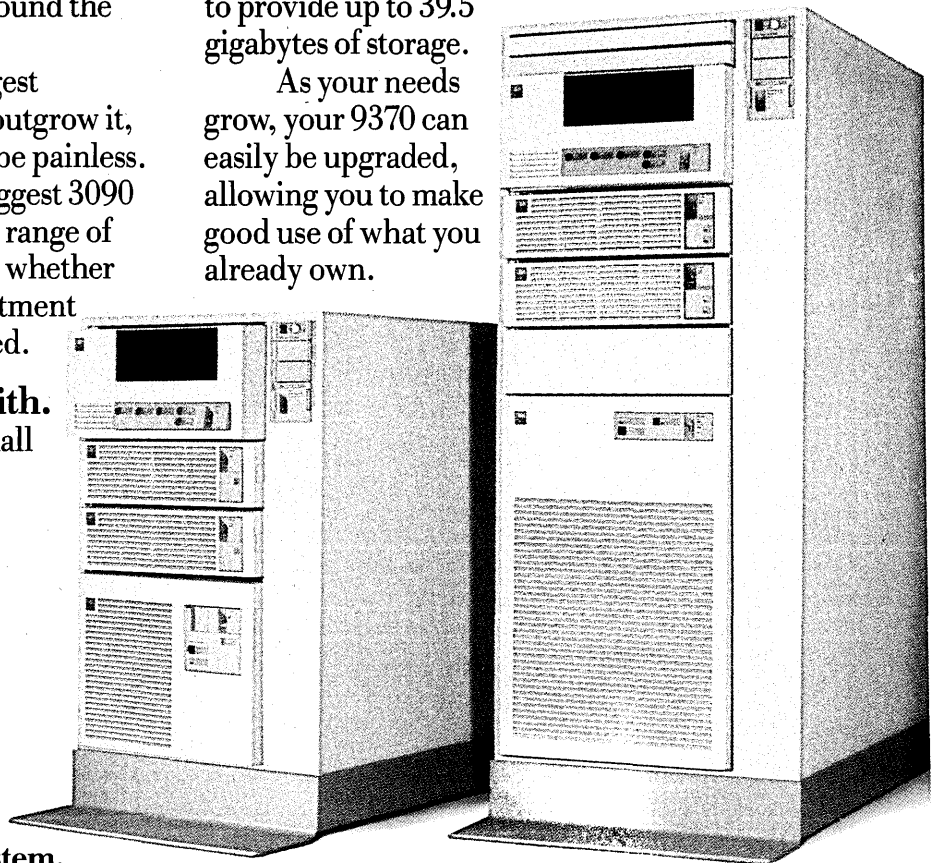
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| ARCHITECTURE: | S/370 |
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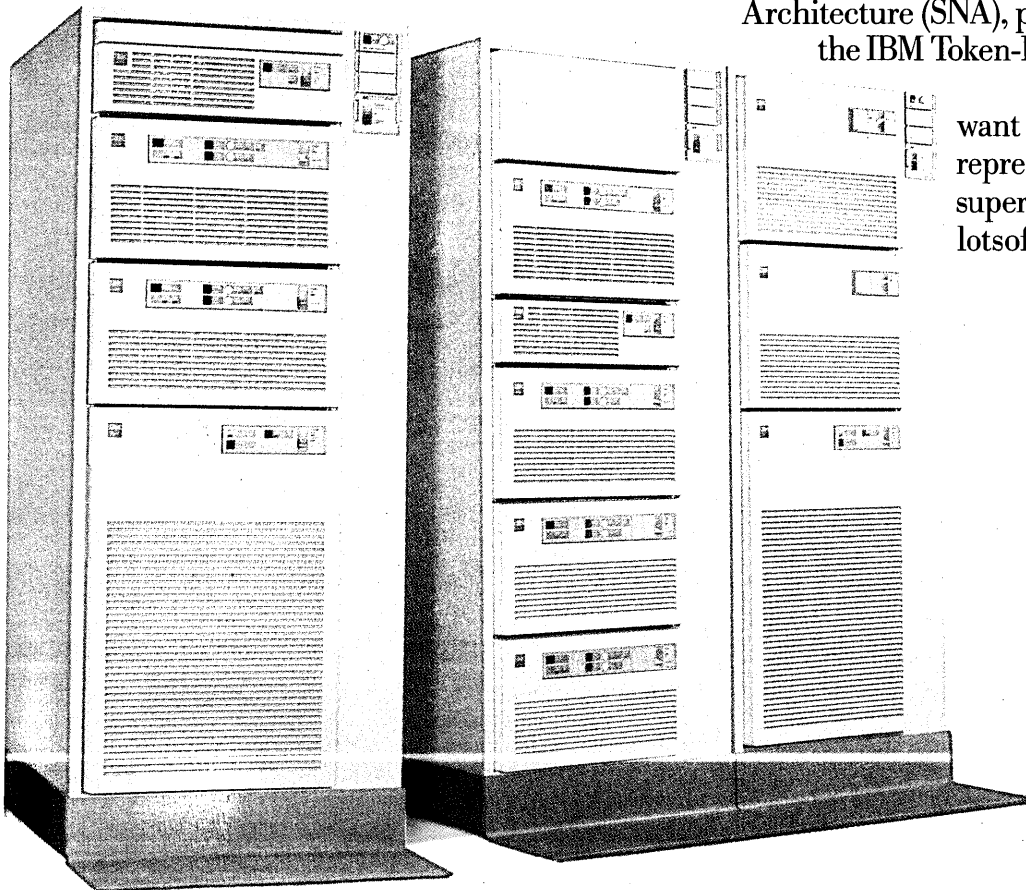
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*These IBM 9370 full precision LINPACK data have not been published in the Argonne National Laboratory Technical Memorandum, but are based on IBM measurements and will be submitted to Argonne National Laboratory for publication.

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channel upgrades that will better differentiate the 3090 from its 308X predecessor. Some observers expect a six-processor implementation of the 3090 to be announced in the first quarter. A 4.5Mbps channel speed upgrade has long been expected. According to Lewis, "There are some things they could do in the operating system where large segments of MVS code can only be supported on one cpu at a time."

The pcm suppliers are assuming that the Summit follow-on mainframe line will support more processors on a single system and may involve major operating system upgrades. But a key issue is the number of processors that the base Summit system will support. While Sierra is based on the two-processor so-called diadic architecture, the next generation

"There is still a group of management people who simply won't talk to pcms. That is unfortunate because it means IBM is running their dp shop."

could be a four-way or a six-way-based design. "We're looking at that, and right now we think it will be four-way," says Lewis.

Anticipating IBM's moves and responding to them rapidly continues to be the pcms' bread and butter. But, with their desire to present themselves as viable, long-term players, they have increasingly focused on offering unique product features IBM doesn't have. Says NAS president David Martin, "We need to change the image of pcm vendors as parasitic copiers."

To that end, Amdahl recently leapedfrogged IBM and announced a 4.5Mbps channel on its semiconductor disk storage device, a debut more significant for its timing than for its content. Amdahl also offers a native implementation of Unix on its mainframe line and a feature it calls multiple domains, which allows a system to be split into what amounts to two independent processors. Amdahl is still expected to market a transaction processing operating system code-named Aspen, which has been long in development. Aspen probably will be sold as an option running under multiple domains.

Lewis admits Amdahl's goal in offering products not available from IBM is to make it more difficult or more expensive for customers to switch back to IBM once they have moved to Amdahl. At the same time, Amdahl hopes to be able to sell its innovative products at prices equal to IBM's. "Other vendors who don't innovate have to compete more on price," says Lewis.

NAS officials flare at the suggestion

STILL LOYAL TO HIS DREAM

If, as vendors of IBM-compatible mainframe gear claim, their presence has kept IBM honest and driven prices down, users have one man to thank. Gene Amdahl created the pcm market when, in 1970, one year after IBM decided to unbundle its operating system software from its mainframe hardware, he founded Amdahl Corp. in Sunnyvale, Calif.

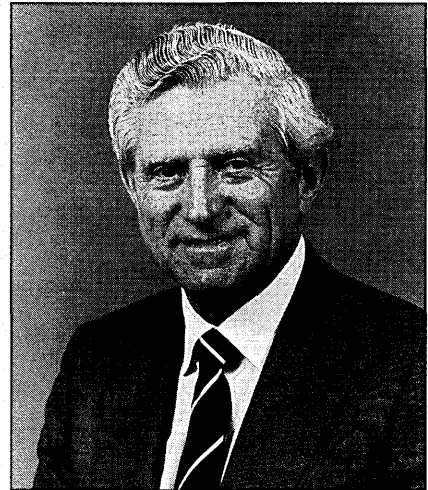
Today, Dr. Amdahl is chairman of Trilog Ltd., the Cupertino, Calif., parent company of scientific supermini-computer vendor Elxsi Systems in San Jose. But he still keeps a close eye on the pcm business. For the most part he is encouraged by what he sees. "Amdahl Corp. is nearly a \$1 billion company today, and they have gained a lot of customer acceptance," says Amdahl. "Also, there is more recognition that if users don't have more than one supplier, they will be at the mercy of IBM. Without competition, IBM can be merciless."

That's not to say the plug-compatible manufacturers don't face major challenges. Dr. Amdahl expects IBM to try to take back much of what it gave when it unbundled software in July of 1969. "IBM's next step is likely to be to bundle more I/O interfaces into its systems, making it more difficult for pcms to respond and getting around EEC requirements that they share specs on interfaces between two separately priced products. I'm sure they will do that, and there's a good chance they will get away with it legally. IBM carries a lot more clout than the Justice Department."

But Amdahl believes the pcms will be able to respond to such a challenge, partly because today Amdahl Corp. and National Advanced Systems are backed by large, technologically rich Japanese companies, Fujitsu and Hitachi. "Their participation is essential for the survival of pcms. IBM has managed to kill off U.S. pcm competitors. But the Japanese are suited to the pcm business because of their cultural cohesiveness and because they take a long-term view."

Amdahl insists he is still glad Fujitsu became an early investor in and tech-

they don't provide product innovation, or worse, that they reverse-engineer IBM designs. "Anyone comparing the technology, architecture, and resulting performance of the XL cannot conclude that we reverse-engineered anything," says Martin. But he says NAS does take a more conservative approach to product innovation. "We're trying to make decisions about what we announce based on what a large number of customers actually want." Among features available from Hitachi and under review by NAS are 6Mbps channels, an integrated database



GENE AMDAHL, chairman of Trilog Ltd., is encouraged by what he sees.

nology partner with Amdahl Corp. But he continues to be resentful that Fujitsu, now a 49% owner of Amdahl Corp., eventually took more control of the company than he wanted. Amdahl blames the company's other investors and its board for that. "They were overly concerned with protecting Fujitsu's interests," he says, contending that they turned over to Fujitsu manufacturing too much of Amdahl Corp.'s product.

Amdahl's bid at Trilog in the early 1980s to compete with a plug-compatible mainframe against Amdahl Corp. and Fujitsu failed. But Amdahl disagrees with current pcm vendors and observers who say there will be no new players in the pcm market due to entry cost barriers. "I don't believe that," asserts Amdahl. "It's getting harder, but it's not impossible with real innovation. I'm also looking at getting involved." In fact, in recent months Amdahl has become a private investor in two new pcm ventures: Keylogic Corp., Sunnyvale, Calif., which is developing a compatible transaction operating system, and Synthesized Computer Systems Inc. of San Jose, which is building a 4381-class processor.

—J.M.

processor, and an integrated storage facility using 1MB memory chips.

The pcm vendors' ability to ship competitive products and provide key compatible innovations seems to be paying off. At least one very large user, the Hartford Insurance Group, Hartford, Conn., is seriously evaluating both the AS/XL and the 5890 after years as an IBM-only cpu shop. According to Hartford director of data center technology Gary Cox, the insurance giant will decide by the end of the year whether to start replacing its four IBM 3084s and four IBM

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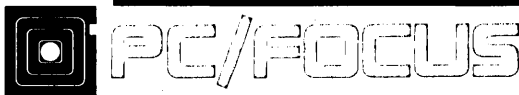
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BEHIND THE NEWS

3081 systems with pcm hardware. "We're at the decision point," says Cox. "We've spent six months taking a hard look at the pcms for the first time in a long time."

Driving the Hartford's interest in pcms is a desire to cut software costs by minimizing the number of its mainframes as well as to continue to partition cpus running different IMS sessions as the company can now do on the 3084 but could not do with IBM's new 3090-class systems. "We're trying to cut our costs, and we're looking for the kind of flexibility IBM can't give us right now," Cox says. Cox adds he is particularly intrigued by Amdahl's multiple domains feature.

In addition, the Hartford is convinced it can get much better vendor support by bringing in different cpu vendors. The Hartford has used StorageTek disk and tape drives for years. Cox says Hartford's concern over Storage's technical and financial problems has been more than offset by the improved vendor support the company has received from both IBM and StorageTek. "Sure, a year and a half ago we were concerned about STC, and we have reduced their presence in our shop somewhat," says Cox. "But when we decided to go to a pcm for storage, it was a long-term decision. We still look at it that way, and we think STC will continue to be a viable vendor."

While the pcm vendors of large-scale mainframes seem to be gaining ground, the U.S. makers of pcm storage

Many observers believe both Fujitsu and Hitachi have lost a good deal of their enthusiasm for the pcm market.

products continue to struggle. Eighteen months after IBM started shipping its double-capacity 3380 Model E storage device, both Memorex and StorageTek are just beginning to ship their own comparable products in volume. Both companies had to solve technical problems on their 3380 single-capacity drives before they could move on to double capacity.

Memorex starts shipping its double-capacity drive in limited quantities in the fourth quarter. The company hopes to get "close to full volume" by the second quarter of next year, according to Robert J. Bodnar, director of storage product marketing.

Although most observers feel StorageTek still has shipped only limited quantities of its double-capacity 8380 E drive, company officials say volume shipments started in July. In fact, StorageTek president Ryal Poppa claims, "We feel we are currently the double-capacity volume leader among pcms now." Still, he admits, "We don't like being this far behind IBM. We would have liked to have the

same product on the same day."

Both StorageTek and Memorex say the timing of their double-capacity shipments does not present a major problem because users have been slower than expected to migrate from single-capacity to double-capacity drives. While IBM charges only \$21 per megabyte for double-capacity drives compared with \$28 per megabyte for single capacity, the pcms say most dp shops use only about 60% of their E Model capacity for performance and data protection reasons. In an attempt to stimulate double-capacity demand, IBM has inaugurated free temporary trial offers.

While both StorageTek and Memorex believe there is still time for them in the 3380 Model E market, Memorex's technical problems and StorageTek's financial woes have helped IBM strengthen its hold in compatible disks. They also have opened the door for NAS and Amdahl, selling Hitachi and Fujitsu products, to gain a foothold in the market. In April NAS started shipping a double-capacity drive, upgradable from its single-capacity model. The company claims to be shipping about 250 double-capacity drives per month currently and hopes to boost that next year, when Hitachi completes a new plant at Odiwara, Japan, and another in Norman, Okla. NAS claims to be filling about 8% of all double-capacity orders currently, and peripherals now make up about 40% of the subsidiary's sales.

Hitachi also is understood to be doing well on double-capacity sales in Europe through NAS and BASF. Another possible outlet for the Hitachi drives is a startup marketing company, Aweida Systems, run by StorageTek founder and former chairman, Jesse Aweida. Aweida is reselling 3380-class Hitachi drives that it buys through NAS and is remarketing a 3480-class cartridge tape drive made by Aspen Peripherals, a Longmont, Colo., startup.

Amdahl has been less aggressive in the disk market. It will start shipping a double-capacity model in the fourth quarter. But Amdahl expects to ship as many as 6,500 single-capacity drives in 1986, primarily to current cpu customers. "We're not trying to be number one in DASD," says Amdahl's Lewis. "We'll offer a high-reliability product to our customers, but in storage product design you have less flexibility. You have to be compatible right down to the way you format the disks. That's not our kind of market."

NAS also claims an advantage over its pcm competitors with availability of Model 22- and 23-class cache disk controllers. StorageTek currently markets older Model 12- and 13-class controllers, and Memorex has no comparable cache

controller. That has kept Memorex out of some large government bids, including a massive Department of Agriculture contract on which NAS, StorageTek, and IBM are bidding.

StorageTek is also hoping to score big in the emerging 3480 cartridge tape drive market. Long the pcm nine-track tape leader, the company is the only end-user pcm vendor developing a 3480-class product in-house. Poppa says StorageTek will announce its product early in the first

While they scramble to find or build marketable products, pcm peripherals vendors face another problem: credibility.

quarter of next year for shipment in mid-1987. StorageTek also plans a cartridge library device, to be available in the third quarter.

NAS, Memorex, and Amdahl all hope to find Japanese-made 3480-class products they can market in the U.S. None claims to have oem contracts in place yet, and most seem to be hoping the 3480 market, like the double-capacity 3380 market, will take a while to develop.

While they scramble to find or build marketable products, pcm peripherals vendors face another problem: credibility. Control Data's exit from the pcm peripherals market and the highly public problems of Memorex and StorageTek have hurt. Some users, like the Canadian provincial government of Alberta and Lockheed's Dialogue division have had to replace many strings of drives that didn't work. While some affected users have turned to other pcm suppliers for replacement drives, others have gone back to IBM. "To some extent we all get painted by the same brush," says NAS director of peripherals marketing Kenneth J.A. Page. "If STC or Memorex misses a deadline, we're all affected by that. It takes years to establish your own identity in the business so that you can overcome mistakes of others."

StorageTek's Poppa agrees: "It will take us a lot of sales calls and a couple of years to resolve all the questions."

Even the surviving pcm vendors aren't immune from questions about their viability. According to NAS president Martin, "A lot of people look back and see the skeletons—the Magnusons and IPLs. The difference is they all tried a vertical approach to the market. The name of the game is a broad product offering so customers can look to you as a permanent alternative to IBM. It takes a pragmatic approach to partnering." ©

Associate editor, Europe, Sarah Underwood and Tokyo bureau manager Bob Poe contributed to this story.



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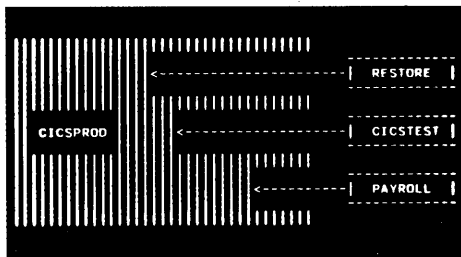
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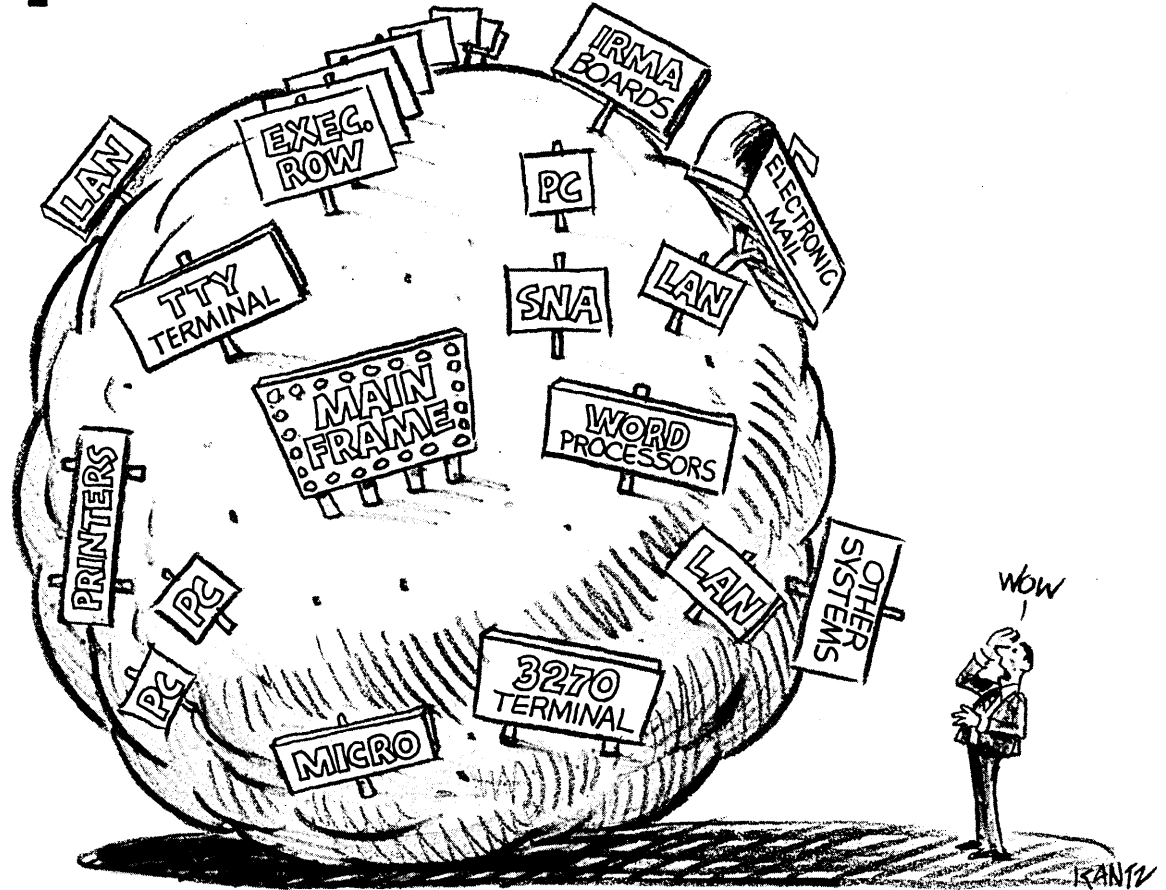
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WORLD WATCH

SHANGHAI - For the first time, Japanese companies have gotten in on the ground floor of a large-scale computer project in China. Japan's NEC Corp., trading company Nissho Iwai, and the Dai-Ichi Kangyo Bank have joined forces and won a deal developing a manufacturing computer and communications system based in Shanghai. The network, which is part of China's five-year development plan for the late '80s, will link local factories with distributors in six of China's eastern provinces.

LONDON - Britain's ICL has become the first non-U.S. computer company to join the Corporation for Open Systems (COS) standards organization. A driving force behind the European Standards Promotion and Application Group (SPAG) set up in 1982, ICL also became a founder of SPAG Services, an OSI conformance testing company, in Brussels last month. The U.K.'s Central Computer and Telecommunications Agency joined COS in September.

GENEVA - After 10 months of wrangling, American and European trade experts have agreed on a standard for electronic data interchange (EDI) designed to replace all the paperwork in international trading. The standard, to be adopted by the United Nations and ANSI in the U.S., covers terminology, syntax, trade data directories, and electronic messaging. With world trade close to \$2 trillion a year, the U.N. estimates that the standard could help save as much as \$20 billion.

TOKYO - Without saying why, General Motors has backed out of a Tokyo-based international network company being set up to compete with Japan's overseas telecom carrier Kokusai Denshin Denwa. But the remaining partners, C. Itoh, Britain's Cable and Wireless, and Toyota, aren't too worried. In GM's place have stepped Merrill Lynch and Pacific Telesis, and GM still has the option to join later on. The group hopes to launch the new voice, data, and facsimile service by April 1988.

TURIN, ITALY - Automaker Fiat has confirmed it is close to a deal with IBM to set up a joint company offering value-added network (VAN) services in Italy. IBM refuses to comment, but Fiat discloses it is also talking to around a dozen small Italian companies about getting involved. With a manufacturing systems deal already signed with Digital Equipment Corp., Fiat is the favored partner for U.S. firms in Italy.

SYDNEY - Major U.S. suppliers including IBM, DEC, Wang, and Amdahl are scrambling to take advantage of Australia's new rules for government contracts. The Department of Industry, Trade and Commerce (DITAC) no longer expects foreign firms to have local content worth 30% of bids for government systems. Instead, suppliers must sign a three-year technology transfer deal. Prime and Ericsson have already won DITAC approval. Others are offering software and R&D projects for a slice of the action.

STOCKHOLM - The X/Open Unix support group, which includes DEC, Sperry, Hewlett-Packard, and seven European suppliers, has announced the first commercial internationalization interface definition for Unix. Based on work done by HP, the definition covers 8-bit character sets so that different languages can be supported. In the future, the interface will be extended to 16 bits to cope with Japanese and Chinese.

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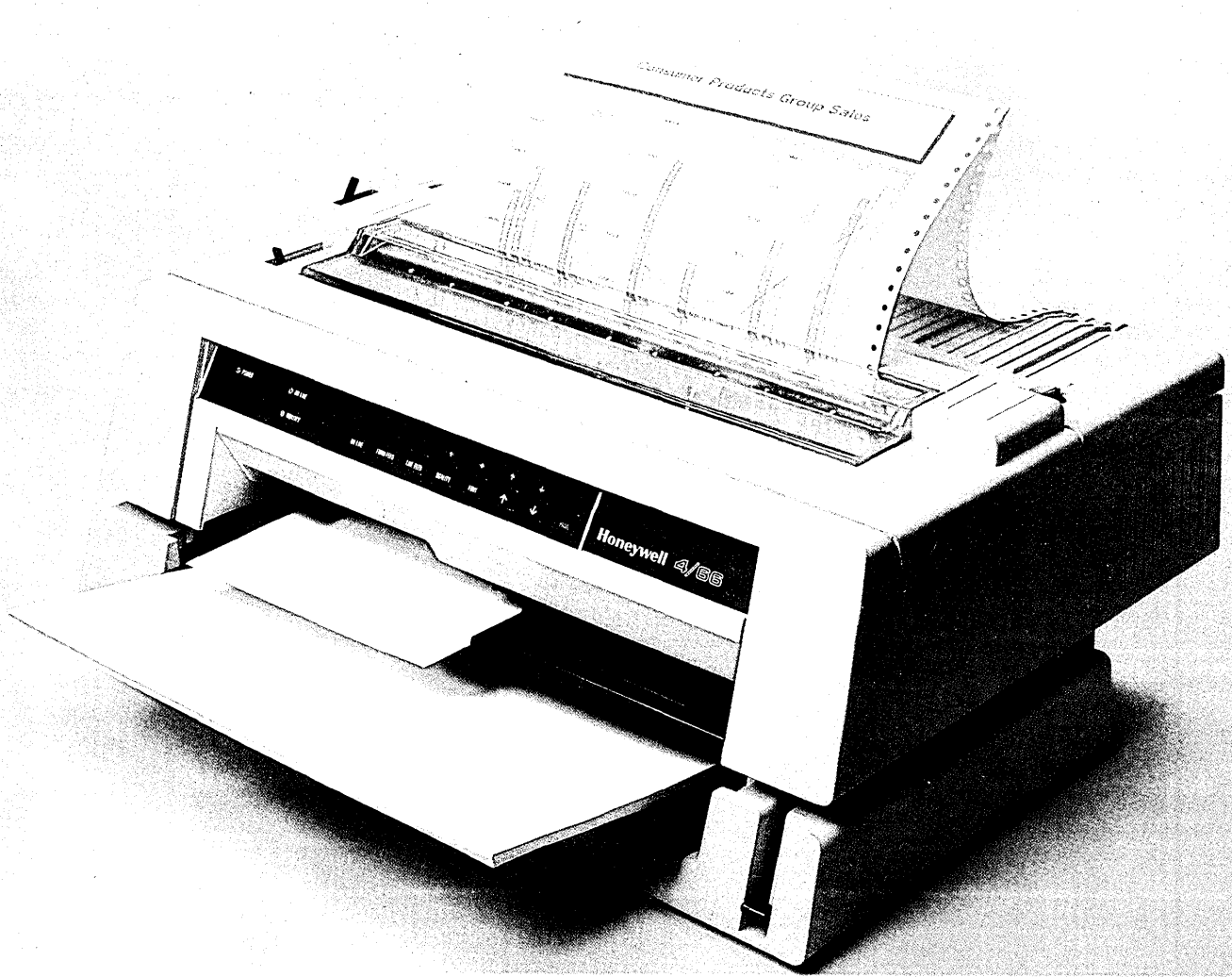
No wonder the 4/66 is silencing the competition. There are at least three good reasons why. The unique print head is one. Designed to generate very low heat, the 18-needle head is encapsulated in an anti-noise shield. So it will make little more noise in an office than it does in this photograph.

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Print quality? Another reason the 4/66 stands out. With three modes (480 cps "draft", 180 cps "near letter quality", and 75 cps letter quality), up to 20 optional type fonts and one to seven colors for graphics output.

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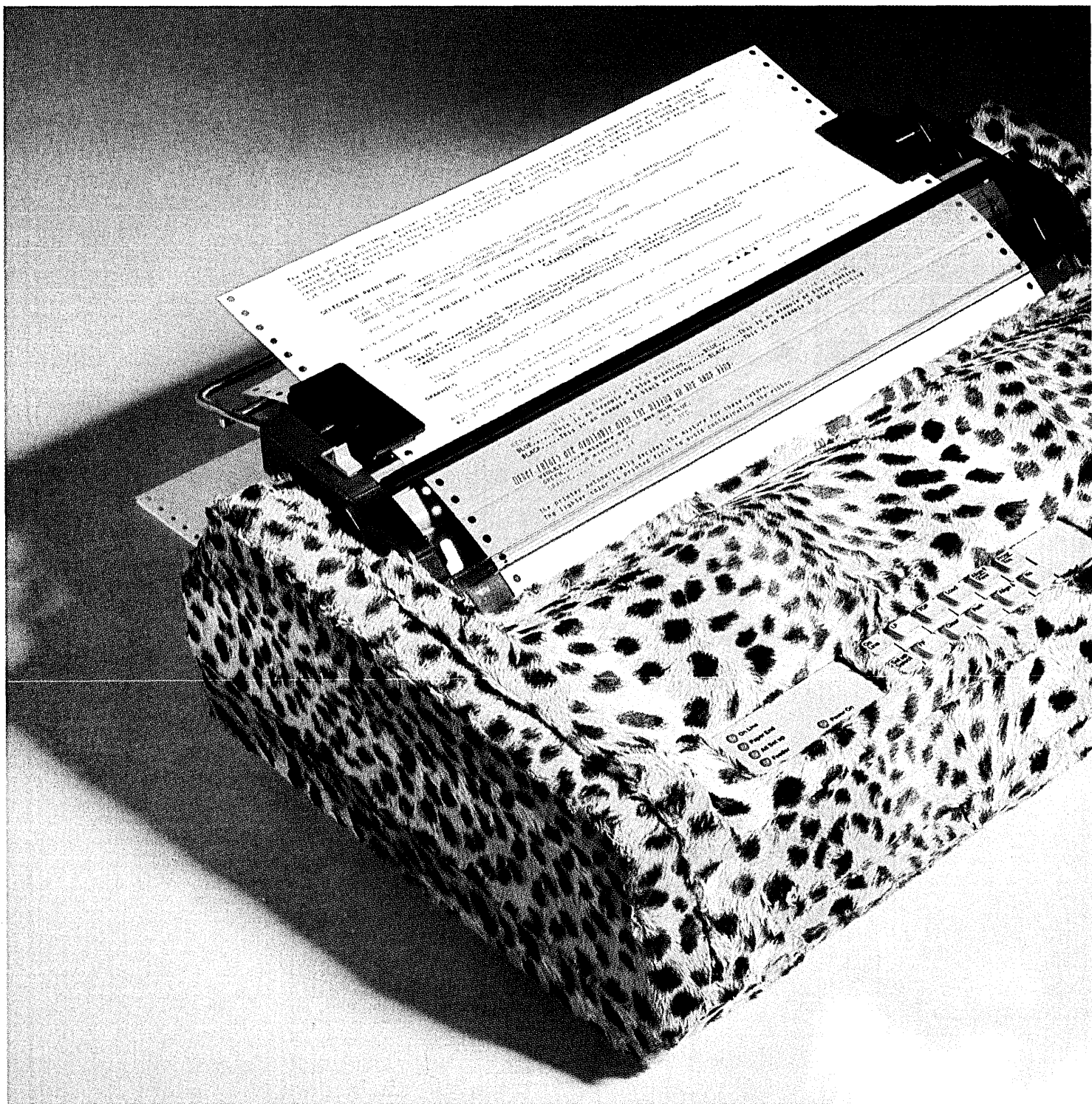
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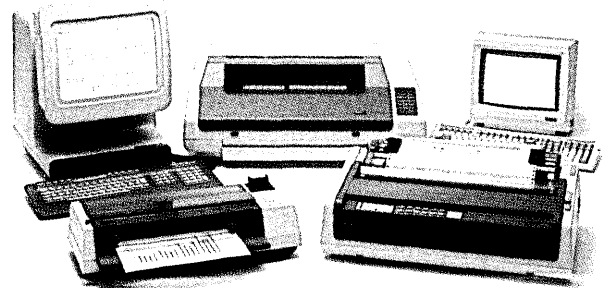
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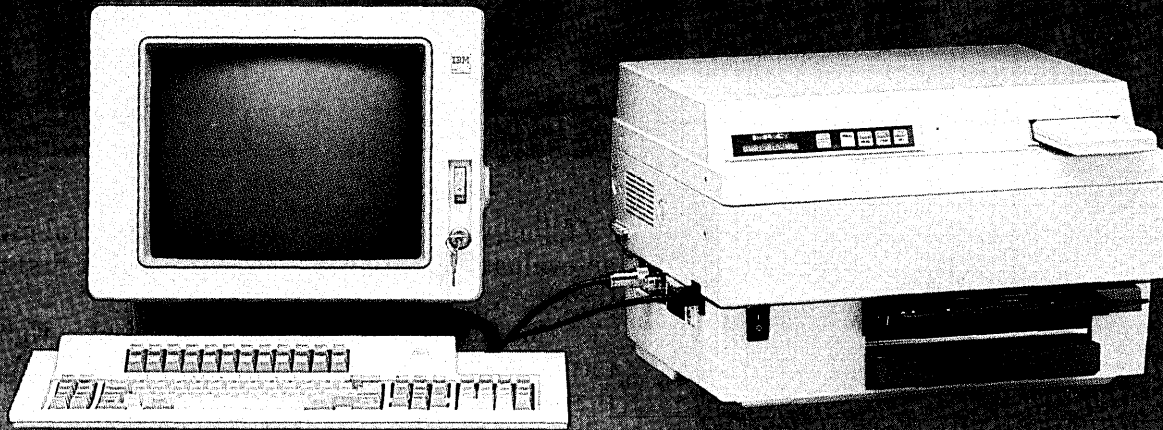
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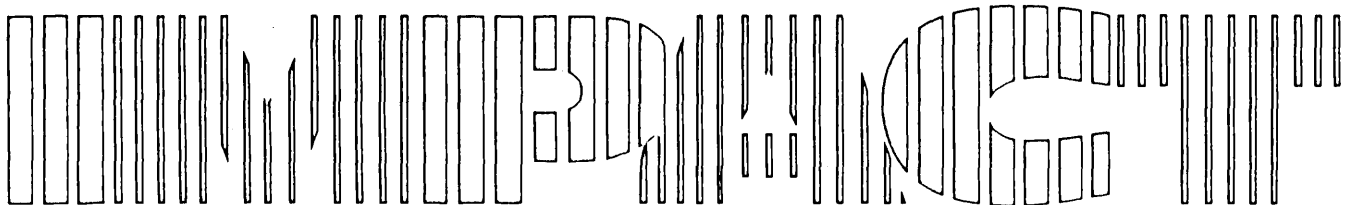
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TECHNICAL EXCELLENCE FROM DOWNUNDER

CIRCLE 72 ON READER CARD

Our annual survey shows oems and vars are selling more systems and making less money.

MORE FOR LESS

by Edith Holmes

The year 1985 was a banner one for end users looking for bargains in small systems; for them, the industry slump paid off by bringing prices down. But original equipment manufacturers and value-added resellers weren't thrilled: they had to sell more computers and peripherals to meet their revenue goals.

These general conclusions are spelled out in a recently released survey of the oem/systems house market. To a large extent, the current year is little changed from the last. The annual survey by Technical Publishing Co., publisher of DATA-MATION, shows that while the number of oems and vars participating in its study jumped from 2,011 to 4,256 firms, a 112% increase, the value of the systems they sold grew only 34%. For the majority of the companies in this market, the average value of each system sold fell more than \$9,500.

The survey—which represents roughly 75% of the total domestic oem/systems house market—also shows that in 1985 IBM stole the march on Digital Equipment Corp. in a minicomputer market that shrank 16% (see Fig. 1). In the meantime, IBM continued to outdistance its competition in the booming oem micro market—a field that grew 71.6% (see Fig. 2).

In 1985, the 4,256 firms included in Technical's 1986 edition of the *Directory of Systems Houses and Computer Oems* sold 233,893 computer systems for \$5.1 billion. A year earlier, the directory listed 2,011 companies selling 155,574 systems for \$3.8 billion. The doubling of the survey's database makes many direct comparisons between 1984 and 1985 data unwise, if not impossible. It isn't possible, for example, to determine what improvement 1985 oem sales achieved over those in 1984.

But the average system price of

\$21,804 in 1985, compared with \$24,426 in 1984, suggests that last year the industry's integrators and resellers could not afford to sit back and wait for customers to come to them.

Indeed, other data indicate that many of these firms saw the value of the systems they sold drop far more than \$2,622 between 1984 and 1985. Hardware/product oems and systems houses and integrators—companies that in Technical's survey account for 78% of the value of the systems sold, or nearly \$4 billion, and 58% of the systems sold, some 135,658 computers—sold their products for \$9,585 less last year than they did the year before.

Representing 22% of the survey sample, dealers, distributors, and commercial oems did better, actually increasing the average value of the systems they sold by \$2,085. Software distributors and oems, 20% of those surveyed, raised the value of their products by \$160.

SAME STATES IN LEAD

The geographic distribution of those surveyed remained the same at the top from one year to the next, with California holding on to 18.1% of these oems and vars. New York kept its number two position, with 9% of these firms calling the Empire State home. Massachusetts slipped to fifth place from third, hanging on to 5% of the resellers polled, while Texas took over as number three with 6.2% and New Jersey came in fourth with 5.4%.

In general, the Midwest and Midatlantic posted losses of oems and vars. Among these states are Virginia, Maryland, Pennsylvania, Ohio, Illinois, and Minnesota. Florida showed a gain—to 4.5% of the companies surveyed in 1985 from 3.2% in 1984.

In still another measure of the

health of the oem market, the rate of new resellers entering the field remains low. Despite the larger sample size, fewer new companies started up in 1985 than in the previous nine years. Only 162 firms were formed last year. Further, the rate of expansion for this segment of the industry has dropped steadily to 4% today from a high of 20.2% in 1978.

The survey's assessment of systems houses and oems by size suggests that much of the increase in the database is in small companies with sales under \$10 million and staffs of 50 or fewer employees. Nearly 92% of the firms in the survey sample report revenues of less than \$10 million, and 88.5% have staffs of 50 or less.

In fact, the greatest growth in the industry, according to the survey, is in firms earning \$1 million or less annually. The number of companies in this category grew to 58% from 46%. Oems and vars in the \$1.1 million to \$10 million category and in the \$10.1 million to \$100 million category lost 5.2% and 6.8%, respectively.

Over half of the survey sample (55.2%) have 10 or fewer employees. Another 23.3% of the sample have between 11 and 25 employees.

An examination of the end-user markets served by oems and vars shows a rise in the number of these companies selling to the construction industry, to 7.3% in 1986 from 3.4% in 1985. Similarly, finance, insurance, and real estate markets were customers of 11.3% of the resellers in last year's survey, compared with 17.2% this year.

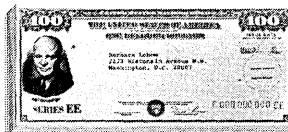
Downturns appear in the number of oems and vars selling to manufacturers (to 14.3% from 19.4%), retailers (to 6.7% from 9%), and public administrators (to 3.5% from 6%). Services also fell slightly, to 31% from 34.3%.

Again, all of these data must be



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FIG. 1
MINICOMPUTER SALES VIA OEMS

| MANUFACTURER | PERCENT SHARE OF MINICOMPUTERS SOLD VIA SYSTEMS HOUSES/OEMs | | | | |
|-------------------------------------|---|---------------|---------------|---------------|---------------|
| | 1981 | 1982 | 1983 | 1984 | 1985 |
| ADDS | — | — | — | — | 1.3 |
| AT&T | — | — | — | — | 1.9 |
| Burroughs | — | — | — | — | 1.1 |
| Data General | 21.5 | 11.5 | 6.1 | 3.4 | 4.3 |
| Datapoint | 4.2 | 4.1 | 3.0 | 1.3 | 1.1 |
| Digital Equipment | 48.4 | 42.8 | 28.4 | 39.4 | 28.9 |
| Hewlett-Packard | 6.0 | 7.2 | 3.9 | 1.6 | 3.3 |
| IBM | 3.2 | 4.7 | 14.5 | 28.4 | 31.0 |
| Motorola/Four Phase | — | — | — | — | 2.4 |
| Prime | 1.5 | 11.0 | 1.4 | 1.6 | 2.0 |
| Sperry Univac | — | — | — | — | 1.1 |
| Texas Instruments | 1.8 | 5.5 | 2.3 | 3.8 | 6.0 |
| Wang Laboratories | — | — | 3.9 | 3.1 | 1.7 |
| All others | 10.9 | 11.8 | 26.9 | 14.9 | 13.9 |
| Total Sample (units shipped) | 14,463 | 13,440 | 20,424 | 40,567 | 34,084 |

FIG. 2
PERSONAL COMPUTER SALES VIA OEMS

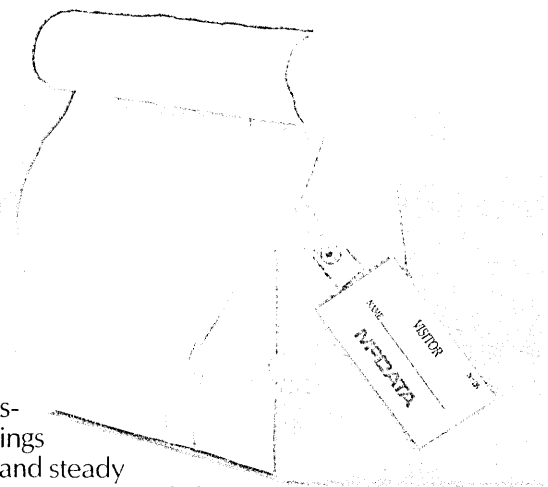
| MANUFACTURER | PERCENT OF PERSONAL COMPUTERS SOLD VIA SYSTEMS HOUSES/OEMs | | | | |
|-------------------------------------|--|---------------|---------------|----------------|----------------|
| | 1981 | 1982 | 1983 | 1984 | 1985 |
| Altos Computer | — | 4.9 | 4.6 | 3.2 | 5.3 |
| Apple | 37.9 | 20.3 | 4.9 | 7.1 | 6.6 |
| AT&T | — | — | — | — | 3.6 |
| Atari | — | — | — | — | 2.1 |
| Bondwell | — | — | — | — | 2.5 |
| Columbia | — | — | — | — | 1.0 |
| Commodore | 6.5 | 5.4 | 10.3 | 10.0 | 1.8 |
| Compaq | — | — | — | — | 3.2 |
| Convergent Technologies | — | — | — | — | 1.4 |
| Corona Data Systems | — | — | 3.5 | 2.2 | 1.9 |
| Cromemco | 2.1 | 2.4 | 4.9 | 2.4 | 1.1 |
| Digital Equipment | — | 1.0 | 11.4 | 6.2 | 2.9 |
| Hewlett-Packard | — | — | 1.0 | 1.1 | 1.3 |
| IBM | 3.7 | 11.3 | 9.1 | 21.4 | 32.8 |
| ITT Information Systems | — | — | — | — | 1.8 |
| Leading Edge | — | — | — | — | 1.6 |
| Sanyo | — | — | — | — | 1.8 |
| Sperry Univac | — | — | — | — | 1.1 |
| Televideo | — | 3.5 | 8.5 | 4.9 | 4.0 |
| Texas Instruments | — | 3.3 | 4.3 | 5.7 | 1.4 |
| Wang Laboratories | — | — | — | 4.0 | 1.1 |
| Wyse Technology | — | — | — | — | 1.1 |
| Zenith | — | — | — | 1.2 | 5.2 |
| All others | 40.9 | 36.2 | 21.1 | 12.8 | 13.4 |
| Total Sample (units shipped) | 21,750 | 36,792 | 67,732 | 115,007 | 197,346 |

evaluated with care, since this year's survey includes many new end-user markets not covered before. No less than 37 of the 77 listed industries are new.

Because more than twice the number of companies responded to Technical's survey in 1985, it is not possible to de-

termine either the fastest-growing or fastest-shrinking end-user markets. Overall, however, general business/accounting and specialized business/accounting applications account for fewer of the total systems sold last year than they did the year before (see Fig. 3), yet they still account for nearly

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CIRCLE 73 ON READER CARD

OEM EDITION

Biggest news of the survey is the 10-point drop in Digital's share of the oem minicomputer marketplace.

half (46.2%) of all applications. Some of this drop may be owed to the bigger survey base and the addition of new group and subgroup categories not included before, such as the scientific and systems tools listings.

Together with office automation applications, business and accounting are still on top (see Fig. 4). Gains for office automation may reflect the fact that word processing is finally being implemented by big corporations. The drop in earth resources applications may reflect the problems being experienced by the oil industry.

Perhaps the biggest news from this year's survey is the 10-point drop in Digital Equipment Corp.'s share of the oem minicomputer marketplace, despite the increased sample size (see Fig. 1). In the meantime, IBM's market share rose three points to take first place with 31%.

The oem minicomputer game still belongs to these two vendors, however. The survey shows a minor reshuffling in rank for the other manufacturers of these computers. Texas Instruments is Digital Equipment's and IBM's nearest competitor with a 6% share of the market. Wang Laboratories' share dropped by nearly half to 1.7%.

IBM continues to lead in microcomputer sales to oems and vars, as well, expanding its market share to 32.8% in 1985 from 21.4% in 1984 (see Fig. 2). Zenith is the only other company to post an increase in share—to 5.2% from 1.2%. Zenith's performance may be owed in large part to the massive federal government contracts it has won in the past three years.

The 11 companies new to the list of oems and vars selling personal computers—among them AT&T, Compaq, and Leading Edge—managed to capture 21.2% of this market in 1985. All told, they sold more than 41,000 systems, enough to rouse IBM: recent IBM product introductions, notably the 286 XT, confirm the impression that the clone makers have captured Big Blue's attention.

SEVERAL NEW FIRSTS

In addition to the doubled database, this year's survey includes several other "firsts"—answers to questions that haven't been asked before in the eight-year history of the systems house and computer oem directory. Asked to classify the systems they sold in 1985, for example, a healthy majority of the 4,256 companies responding (61.3%) list multi-user and standalone microcomputers.

This figure lends weight to the generally accepted notion that the third-party channel is, first and foremost, an outlet for micros. These data also may reflect the in-

FIG. 3

TOTAL VAR MARKET BY BROAD APPLICATION CATEGORIES—1985

| MARKET | PERCENT OF TOTAL SYSTEMS SHIPPED | | | |
|--------------------------------------|----------------------------------|----------------|----------------|----------------|
| | 1982 | 1983 | 1984 | 1985 |
| General Business Accounting | 35.58 | 28.04 | 31.47 | 16.39 |
| Specialized Business Accounting | 27.22 | 23.67 | 23.46 | 15.83 |
| Office Automation/Productivity | 8.69 | 7.80 | 8.25 | 9.78 |
| Manufacturing Production | 11.81 | 14.03 | 13.42 | 13.20 |
| Industrial Automation | 4.88 | 6.40 | 4.86 | 4.25 |
| Design Automation | .75 | .99 | 1.13 | 3.84 |
| Earth Resources | 2.09 | 1.66 | 1.87 | 1.55 |
| Scientific | * | * | * | 2.92 |
| Real-Time Data Acquisition & Control | 2.22 | 2.53 | 1.89 | 3.51 |
| Graphics | 1.58 | 2.04 | 1.98 | 3.20 |
| Communications | 6.73 | 7.71 | 6.67 | 11.65 |
| Health/Medical Services | .41 | 1.97 | .88 | 2.84 |
| Laboratory | 1.67 | 1.53 | 1.39 | 2.29 |
| Computer Aided Publishing | .32 | .34 | .35 | 1.77 |
| Systems Tools | * | * | * | 4.39 |
| Other Applications | 2.05 | 2.29 | 2.38 | 2.59 |
| Total Systems | 171,236 | 171,842 | 155,574 | 233,893 |

*Not included in previous years

FIG. 4

TOP APPLICATIONS FOR VARS—1985

| APPLICATION | 1985 UNIT SHIPMENT |
|--------------------------------|--------------------|
| Word Processing | 308,242 |
| General Ledger | 305,654 |
| Accounts Receivable | 302,482 |
| Accounts Payable | 300,582 |
| Billing/Invoicing | 295,028 |
| Payroll | 292,099 |
| Database Management | 291,743 |
| Order Entry | 289,181 |
| Spreadsheets | 274,047 |
| Sales Analysis/Forecasting | 264,133 |
| Integrated (wp, DBMS, ss) | 246,009 |
| Electronic Mail | 230,563 |
| Graphics | 228,404 |
| Management Information Systems | 222,951 |
| Inventory Control | 213,966 |

creasing focus of the entire industry on the desktop. Less than one third of the surveyed firms sold anything bigger. Only 15.6% of these companies indicate they sold minicomputers, and just 11.7% report sales of superminis.

Technical workstations, too, have yet to be marketed in a big way through this channel; only 8.3% of the oems and vars polled sold them. Similarly, at the low

end of the spectrum, just 3.1% of the responding companies say they market board computers.

When asked—for the first time in the directory's history—to describe the systems they sold last year, the responses of those surveyed form a pyramid. Corporate resource computers serving more than 128 users and costing in excess of \$1 million are at the top, and work group and single-user

FIG. 5

PERIPHERALS SALES VIA OEMS

| TYPE OF PERIPHERAL | QUANTITY SOLD VIA OEMS | | | | |
|---------------------------------|------------------------|----------------|----------------|----------------|----------------|
| | 1982 | 1983 | 1984 | 1985 | % CHANGE |
| PRINTERS | | | | | |
| Serial: Dot matrix | 68,994 | 82,999 | 120,747 | 363,757 | + 201.3 |
| Serial: Daisy, thimble | 20,524 | 25,761 | 45,713 | 64,747 | + 41.6 |
| Serial: Ink jet | * | * | * | 30,139 | NA |
| Serial: Thermal transfer | * | * | * | 18,903 | NA |
| Serial: Direct transfer | * | * | * | 6,142 | NA |
| Line: Thermal transfer | * | * | * | 199 | NA |
| Line: Dot matrix | * | * | * | 26,187 | NA |
| Line: Fully formed | * | * | * | 11,524 | NA |
| Page printers (laser, LED, LCS) | * | * | * | 116,590 | NA |
| Teleprinters | 19,403 | 14,830 | 21,586 | 6,028 | - 72.1 |
| Plotters: A4, B4 size | * | * | * | 7,903 | NA |
| Plotters: Oversize | 1,205 | 3,093 | 2,319 | 1,421 | - 38.7 |
| GROUP TOTAL | 110,126 | 126,683 | 190,365 | 653,540 | NA |
| DISK DRIVES | | | | | |
| 3½-inch floppy diskette drives | — | — | 34,614 | 70,827 | + 104.6 |
| 5¼-inch floppy diskette drives | — | — | 92,388 | 398,560 | + 331.4 |
| 8-inch floppy diskette drives | * | * | * | 27,424 | NA |
| 5¼-inch Winchester drives | * | * | * | 86,713 | NA |
| 8-inch Winchester drives | 8,423 | 6,843 | 15,584 | 14,838 | - 4.8 |
| 14-inch Winchester drives | 3,690 | 4,671 | 4,594 | 4,701 | + 2.3 |
| Disk emulators | * | * | * | 1,615 | NA |
| Fixed disk drives | 3,675 | 4,466 | 18,349 | 37,903 | + 106.6 |
| Removable disk drives | 8,958 | 7,610 | 19,234 | 31,226 | + 62.3 |
| GROUP TOTAL | 83,549 | 94,588 | 184,763 | 673,807 | NA |
| TAPE DRIVES | | | | | |
| Cassette/cartridge drives | 6,708 | 8,106 | 10,454 | 47,484 | + 354.2 |
| Reel-to-reel drives | 4,296 | 6,463 | 6,256 | 65,460 | + 946.4 |
| GROUP TOTAL | 11,004 | 14,569 | 16,710 | 112,944 | + 575.9 |
| CRT TERMINALS/MONITORS | | | | | |
| Alphanumeric, monochrome | * | * | * | 242,394 | NA |
| Alphanumeric, color | * | * | * | 37,231 | NA |
| Graphic, monochrome | * | * | * | 72,881 | NA |
| Graphic, color | * | * | * | 36,849 | NA |
| GROUP TOTAL | — | — | — | 389,355 | NA |
| MODEMS | | | | | |
| Limited distance | * | * | * | 67,969 | NA |
| Voiceband | * | * | * | 52,416 | NA |
| Wideband | * | * | * | 15,962 | NA |
| Acoustic couplers | * | * | * | 7,708 | NA |
| Fiber optic | * | * | * | 2,049 | NA |
| GROUP TOTAL | — | — | — | 146,104 | NA |
| CONVERTERS | | | | | |
| Protocol | * | * | * | 4,718 | NA |
| Interface | * | * | * | 11,763 | NA |
| Code/speed/mode | * | * | * | 364 | NA |
| Terminal emulators | * | * | * | 22,170 | NA |
| GROUP TOTAL | — | — | — | 39,015 | NA |
| OTHER | | | | | |
| Memory expansion boards | 14,643 | 7,558 | 31,276 | 172,763 | + 452.4 |
| Multiplexors | * | * | * | 109,386 | NA |
| GROUP TOTAL | 14,643 | 7,558 | 31,276 | 282,149 | NA |

*Not included in previous years
NA: not available

Unix's still-tarnished image in the marketplace may remain less than sterling.

computers supporting between one and 10 users and selling for \$5,000 to \$25,000 are at the bottom.

Just 3.4% of the oems and vars sold big corporate resource computers, while 59.1% of these companies marketed their solutions to single users and work groups of two to 10.

Vars and oems selling 11- to 20-user departmental computers for between \$25,000 and \$75,000 comprise 19.8% of the sample. Next up the pyramid are the 11.3% of those surveyed who sold large department computers aimed at between 21 and 64 users and priced between \$75,000 and \$250,000, followed, on top, by the 6.4% who sold business unit computers for groups of 65 to 128 users and at a cost of \$250,000 to \$1 million.

Again, the emphasis in the systems house/computer oem market is on small systems for small groups of people. The survey data also suggest that this is an industry of small businesses that sell to small business.

In other firsts, the directory's oems and vars were asked to specify the I/O bus

standards and operating systems that their products support. At least seven firms are contenders in the race for most used I/O bus standard.

S-100 BUS STANDARD IN LEAD

The S-100 bus standard currently holds the lead with the commitment of 16.6% of the responding companies, followed closely by the STD standard at 14.5%, Multibus-I at 13.3%, and Q-bus at 12.4%. The VME standard has the support of 6.4% of those surveyed, while Versabus is at the bottom of the heap with 1.6%. Another 28.5% of the oems and vars adhere to "other" standards not listed by name in the survey questionnaire.

Together, MS/DOS and PC/DOS, the Microsoft Corp. operating system for microcomputers and its IBM PC incarnation, are sold and supported by nearly half (48.1%) of the 4,256 companies covered in the survey. CP/M continues to have a presence in the oem/systems house market with a 12.4% share of these firms.

AT&T's Unix operating system, meanwhile, is used in some form by 21.8% of the

responding vars and oems. Its still-tarnished image in the marketplace may remain less than sterling, however, so long as its total market share is divided among Unix BSD 4.2 (3.3%), Unix Systems III and V (9.0%), and Microsoft's Xenix (9.5%).

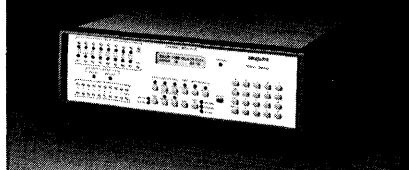
For the first time, Technical Publishing tried to assess software purchases by the oems and systems houses in its database. As expected, the data show this field to be hotly contested. The industry leaders—Microsoft, Lotus Development Corp., and Ashton-Tate—are on top in that order with less than 5% of the market each. Here, IBM holds a 2.9% oem market share, behind Softsel (3.6%), MicroPro (3.2%), and MBSI/Realworld (3.0%).

The oems and vars surveyed sold nearly 2.3 million peripheral devices in 1985 (see Fig. 5). Once again, however, comparisons with 1984 data must be made carefully, considering the expanded survey sample.

In addition, comparisons to past years are often not possible at all. As with end-user applications, many new peripheral categories are tracked that were not in-

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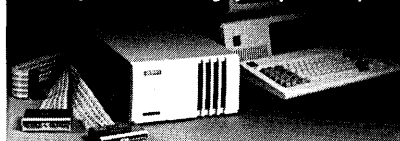


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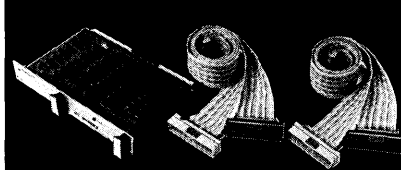


DW110 PACE Channel Simulator System

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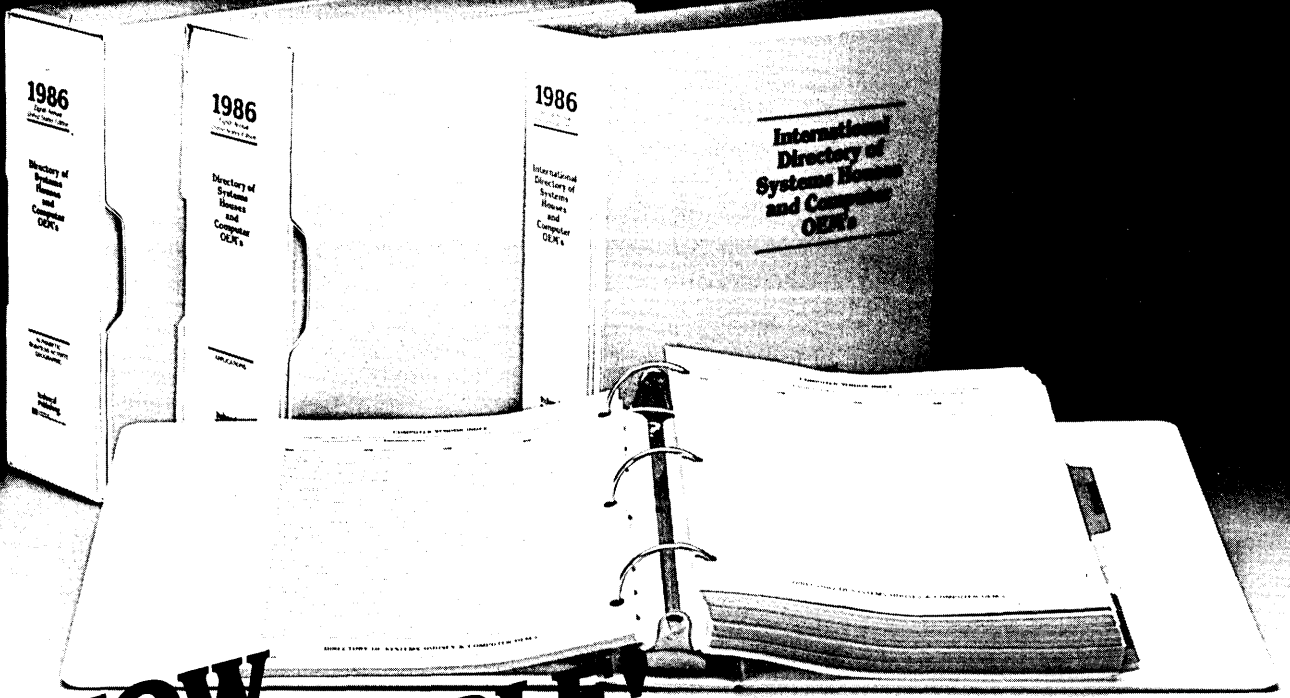
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OEM EDITION

The oems and vars surveyed sold nearly 2.3 million peripheral devices in 1985.

cluded before, like modems and converters.

Out of 2,296,914 peripheral devices sold in 1985, disk drives top the list at 673,807 units, followed by printing devices at 653,540 units. The data suggest that the products to watch in these categories are 3½-inch floppy diskette drives and page printers, whether laser, LED, or LCS.

Oems and vars report they sold 70,827 of the 3½-inch drives and 116,590 of the page printers last year, perhaps reflecting the personal computer industry's move to the smaller drive and the promise—if not yet the reality—of desktop publishing. Meanwhile, the market for plotters, dominated by Hewlett-Packard, is plunging, a fact unmitigated by the survey's doubled sample size.

Shugart lost more than half of its 1984 29.6% share of the 3½-inch floppy drive market to several new players, including Canon, Fujitsu, Sony, and 3M. Apple now leads the field with a 14.9% share, although it fell five percentage points between 1984 and 1985. Texas Instruments commands the page printer market with an 86.5% share. The company's nearest com-

petitor in this field is Hewlett-Packard with a 4% share.

The industry workhorses in the printer and disk drive categories—the serial dot matrix printer and the 5¼-inch floppy diskette drive—continue to dominate their fields, posting 1985 oem/var sales of 363,757 units and 398,560 units, respectively.

Okidata is king in dot matrix printers with a 45% share of the market. The company leads several other printer categories in the survey, too, including serial thermal transfer printers, where it has 79.4% of the market, and line thermal transfer printers, where it boasts a 38.2% share.

Olivetti has a firm hold in 5¼-inch diskette drives, meantime, with a 25.1% market share. Otherwise, both the dot matrix printer and 5¼-inch diskette drive markets are quite fragmented among several contenders, with a number of firms posting an oem market share for the first time in 1985.

Monochrome devices still comprise the bulk of oem/var crt terminal and monitor sales. The combined total of quantities

sold in 1985 for alphanumeric color and graphic color terminals and monitors—74,080 units—doesn't even begin to approach the 242,394 alphanumeric monochrome displays sold.

The big player in this sizable market is Wyse with a 35.7% share. Wyse's nearest competitor in alphanumeric monochrome devices is IBM with 10.7% of the market. The market for color alphanumeric terminals and monitors is led by Thomson with 18.8%, followed by DEC with 10.1%. Thomson dominates the graphic color terminal and monitor market too with a 13.6% share.

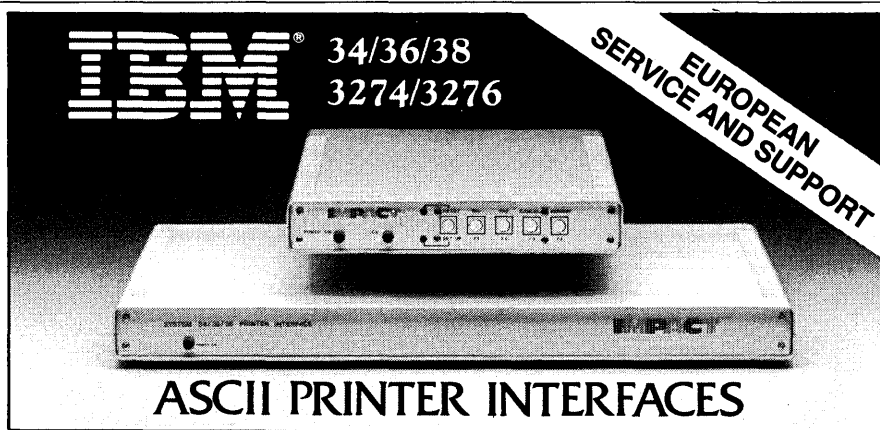
The modem and converter categories are driven by their standard product offerings, as well. Limited distance and voiceband modems (totaling 120,385 units last year) and terminal emulators (at 22,170 units) lead oem/var peripheral sales in these areas.

Not surprisingly, Hayes is the name to know in modems with a 20.9% share of the limited distance market segment and a 16.4% share of the voiceband segment. Hard on Hayes's heels in voiceband modems, however, are Anchor Automation with 14.8% of the oem market and Racal-Vadic with 14.7%. DCA comes out on top in terminal emulators with a 27.5% market share, as it does in protocol converters with 24.1% of the field.

As in the past, memory expansion boards continue to sell briskly. Some 172,763 units were peddled by resellers in 1985. In this area, AST Research continues to be the primary oem vendor with an 18.7% market share. Its closest competitor is Quadram with 7.1% of the oem market.

Like so much of the industry, oems and vars clearly felt the continued slump in the market for computers during 1985. While the number of companies polled went up, the total value of the systems they sold went down. IBM's performance in micros and minis and the continued strong showing of leading oem vendors in other product segments, however, indicates that the reseller market is stable. From such a base, oems and vars stand a better chance of benefiting from the upturn when it comes. ©

The three-volume 1986 *Directory of Systems Houses and Computer Oems* lists 4,256 companies in alphabetical order, by location and oem/var category, by applications offered, as well as by cpu vendors and types of peripherals sold. Priced at \$795, it is available from Technical Publishing Co., 199 Wells Ave., Newton Centre, MA 02159, (617) 964-8890.



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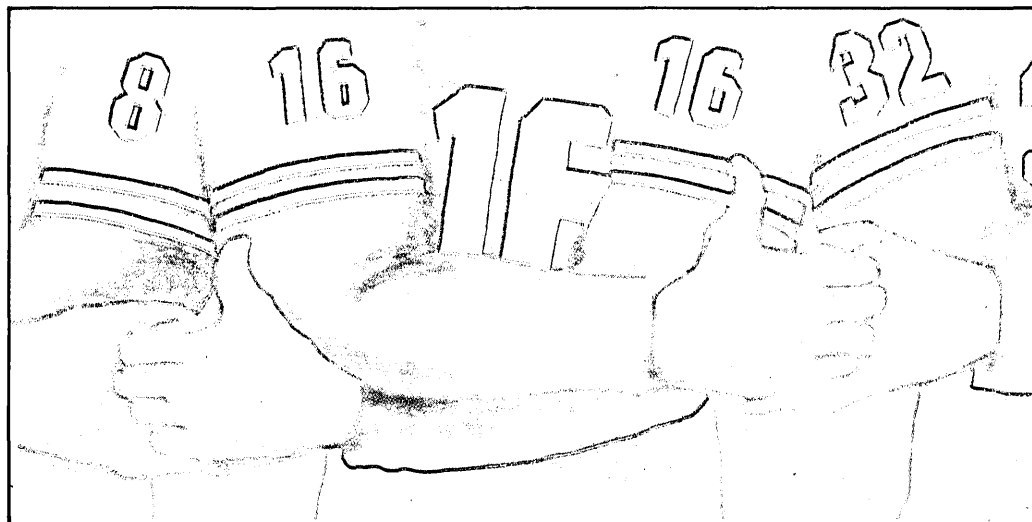


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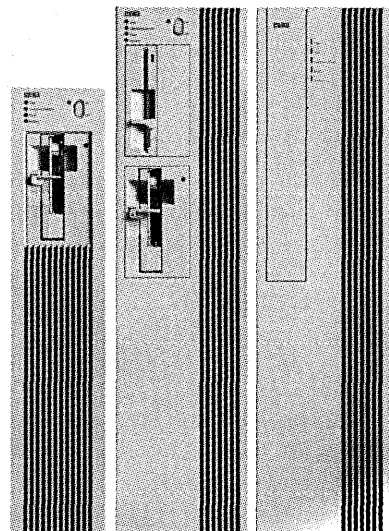
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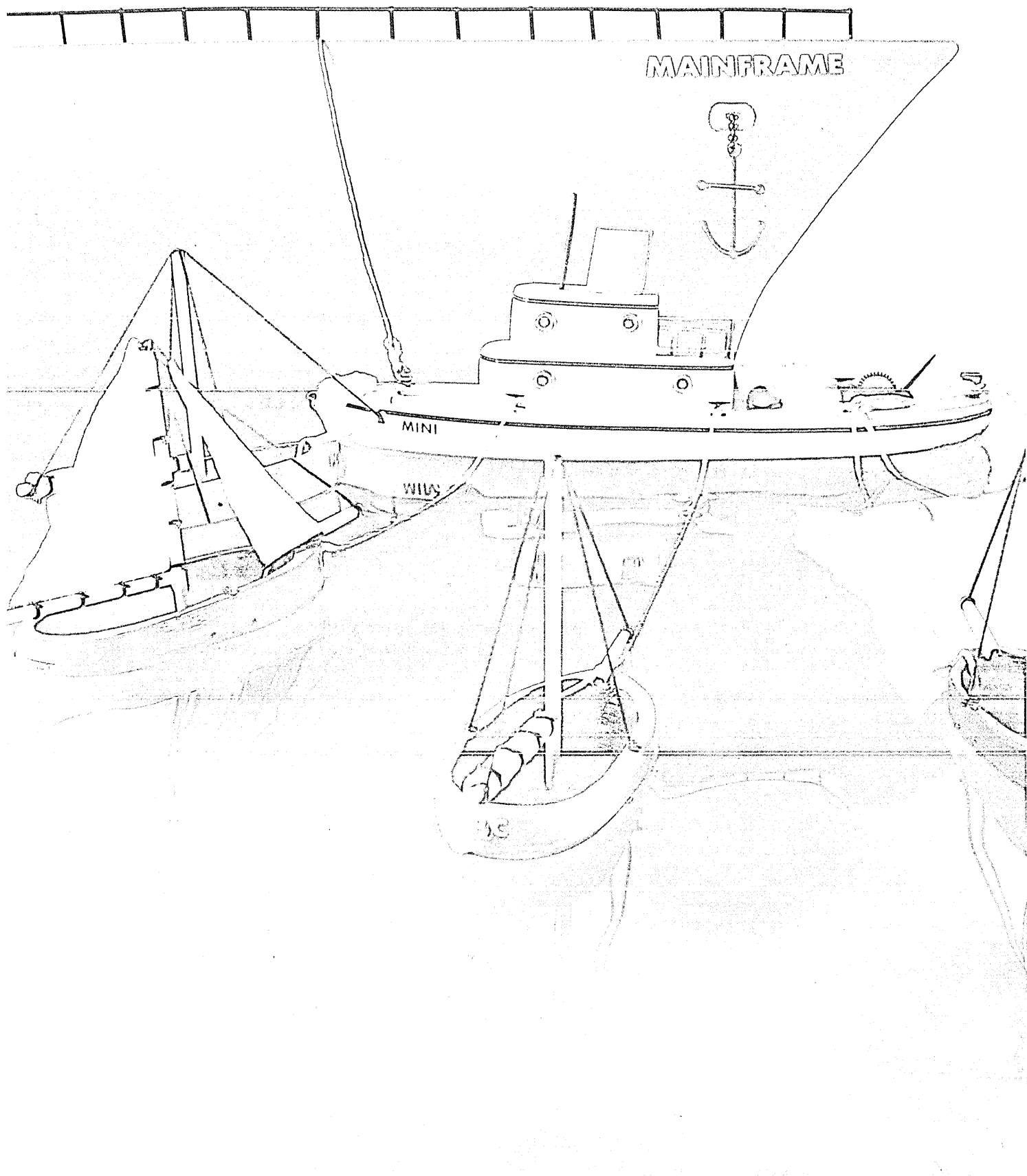


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CIRCLE 40 ON READER CARD



MAINFRAME

MINI

WILLY

13

Departmental computers are destined to become the shippers of corporate information and other resources.

NEW PORTS OF CALL

by George F. Colony

With the mainframe and personal computer marketing games virtually over and won by IBM, the user focus in large companies has shifted to networks of midrange systems. These medium-sized computers will be the bridge between the microcomputer and the mainframe. Ultimately, they will become a means of harmonizing large populations of pcs with corporate information, especially centralized databases.

Some have argued that departmental computing is little more than rehashed distributed data processing—that tarnished icon of the late '70s. Yet the primary force fueling the departmental computing drive is the pc, which was certainly not around in the days of distributed dp. Today, micro users are beginning to demand integration—integration that enables their desktop machines to tap into corporate resources including databases, networks, and server-based software.

Departmental computing will be the best means of delivering that pc integration. In this computing context, departmental systems will act as pc “servants,” doling out resources such as software and database information to micros on demand. These systems can thus be thought of as departmental resource processors (DRPs). The DRP is not a traditional timeshared minicomputer. It is an evolved version of the mini, cast in the new role of pc servant.

At a minimum, the DRP is a 32-bit, multitasking engine. Simply stated, it sits in the intermediate space between the microcomputer and the host, acting as a gateway from the department to mainframe. It bridges laterally to other departments on a peer-to-peer basis and also controls department resources such as databases. The DRP balances shared data such as corporate information with personal data like a Lotus 1-2-3 spreadsheet.

Few, if any, terminals attach to the DRP. Micros are connected over a high-speed local area network to the departmen-

tal computer. In addition to the evolved minicomputer, the DRP engine could also be a PBX/hybrid à la the Northern Telecom (Mississauga, Ont.) Meridian/DV-1; an advanced file server with communications and database like Westboro, Mass.-based Banyan System Inc.'s Virtual Network System; or a specialized system like Los Gatos, Calif.-based Britton Lee Inc.'s database server.

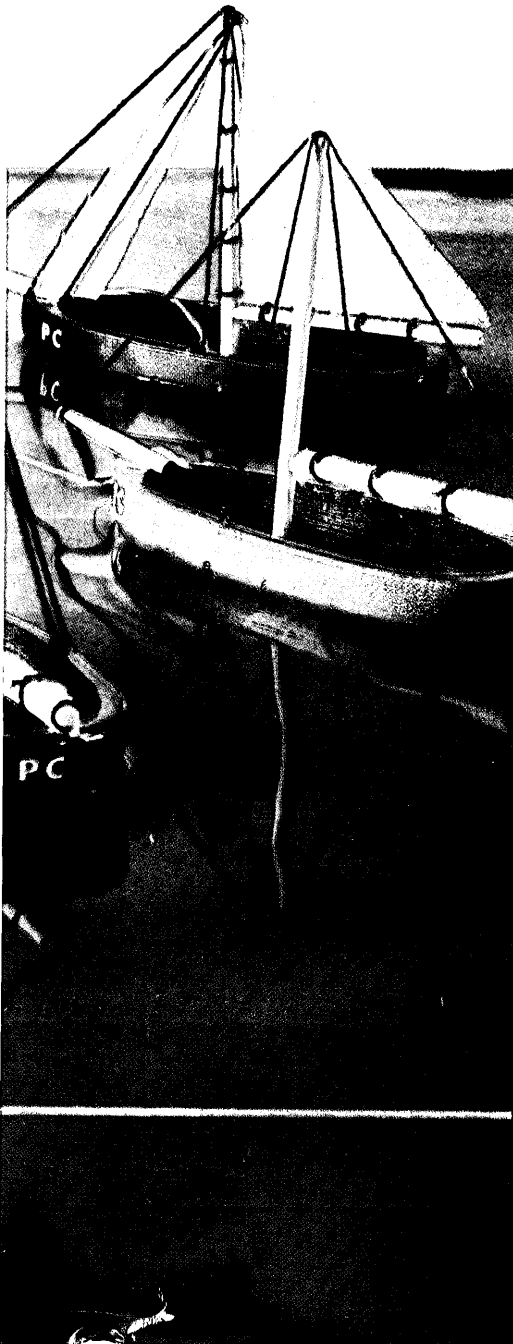
In its role as pc integrator/slave/adjunct, the departmental resource processor will provide the following functions to micro users:

- Communications control: linking with a diverse set of nodes within the corporation, such as the host computer, and with the outside world through public databases like Dow Jones;
- Distributed databases: the local database running on the DRP will be closely tied to a superset version at the mainframe and to an individual version located on the pcs;
- New generation of office systems: providing decision support, text filing, and group scheduling through polled pc-based calendars;
- Pc software distribution: provided from the mainframe to the DRP and down to each pc, which eliminates costly manual software administration and distribution;
- Support for departmental, vertical applications: as the minicomputer grows into its DRP role, it must continue to run such embedded applications as order entry, general ledger, and word processing.

FOUR BASIC BENEFITS

From a user standpoint, the DRP has four basic benefits. First, it provides access to a wide variety of corporate information. Second, DRP implementation parallels corporate structures that are based around departments. The departmental computer also satisfies a user's psychic need for independence. Finally, DRPs give middle management a more active role in technology management.

Personal computers appeal to U.S.



It remains to be seen whether IBM's 9370 will break DEC's lock on the DRP market.

corporate users because the machines stand alone, unencumbered by the scrutiny or formal rules of the MIS department. Presented within this framework, pcs pose a minimal threat to the status quo.

Over the past two years, micro users have demanded to be assimilated into the corporate information structure. The fast growth in the installation of 3270 emulation boards attests to this. New user networking requirements have reached a critical mass as personal computer populations have expanded at the departmental level (see Fig. 1).

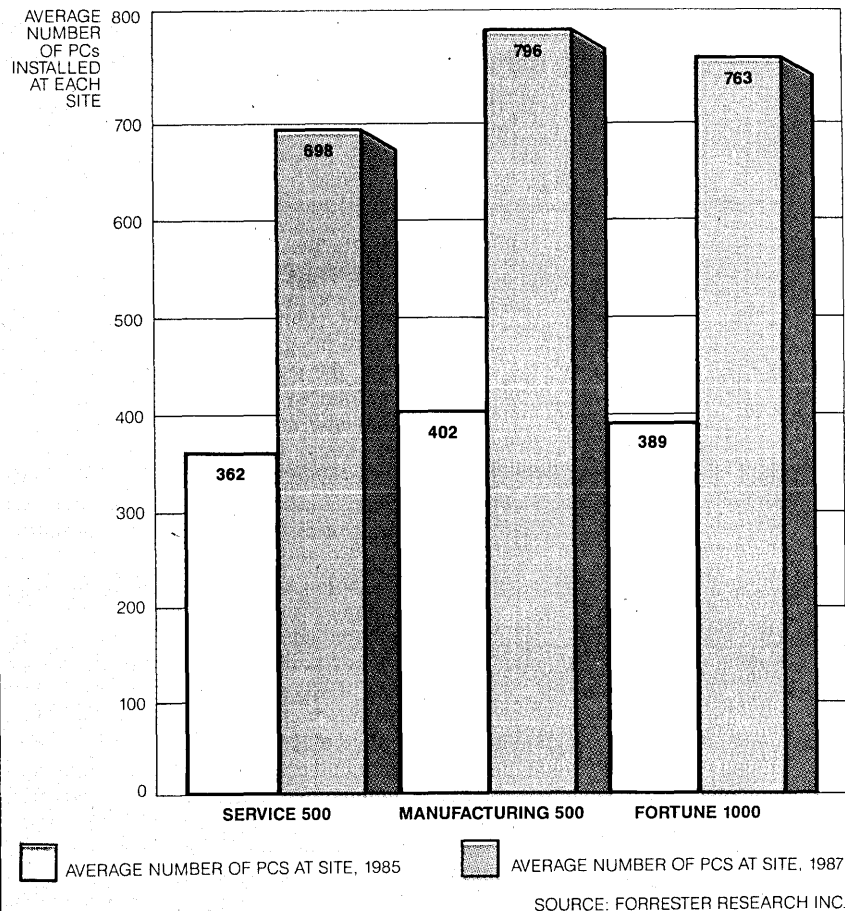
The primary *raison d'être* for departmental computing is its promise of improving company communications. The obvious tool for making that improvement is the microcomputer, which is underutilized in many firms. Users looking for a way to leverage their pc investments are prime candidates for DRP. Integration by means of a DRP would extend micro muscle by giving users a way to share files easily without having to move diskettes around manually, thus eliminating "sneakernet." Users would also have a means of linking with and building departmental databases, giving users access to reports and correspondence that were formerly stuck away in file cabinets or buried in an unwieldy MIS "green bar" report. In addition, departmental processing provides more efficient use of pc software by tightly coupling it with the DRP database.

Departmental resource processing closely matches the organizational structure within large companies. This can be determined by examining the type of information pc users in those companies want to access. An informal survey by Forrester Research Inc., Cambridge, Mass., found that 60% of that information is located within the user's department, 25% is somewhere else in the user's site, 10% is at a remote location in the company—most likely in a mainframe—and 5% is in a public database like Dow Jones.

Micro-to-mainframe links assume that pc users are oriented to host-based information. Unfortunately, this approach overlooks the critical mass of information that is contained at the department or work group level. With micro-to-mainframe connections, intradepartmental correspondence must go "around the horn" to the mainframe to reach a nearby desk.

The micro-to-mainframe route also puts end users right back in their predicaments of old—being subject to the whims, rules, and backlogs of centralized, mainframe/batch-oriented MIS management. The DRP, on the other hand, meets users' psychic requirements for autonomy. They

FIG. 1
AVERAGE NUMBER OF PCS INSTALLED



can set their own priorities and manage information based on departmental timetables and, even more important, they don't have to fight with the MIS department to get their work done. The DRP gives user departments the independence to own and ultimately control their own data, free of the corporate demands placed on that information.

PROBLEMS STILL TO BE SOLVED

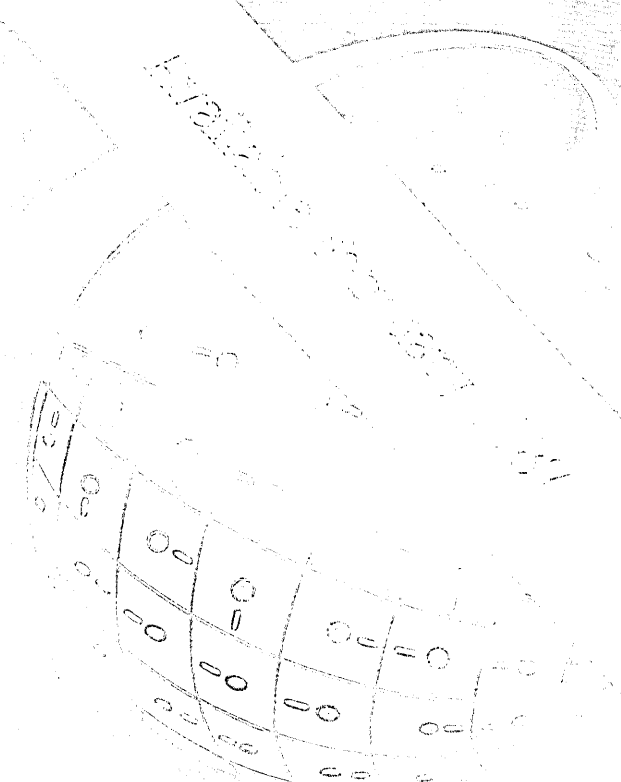
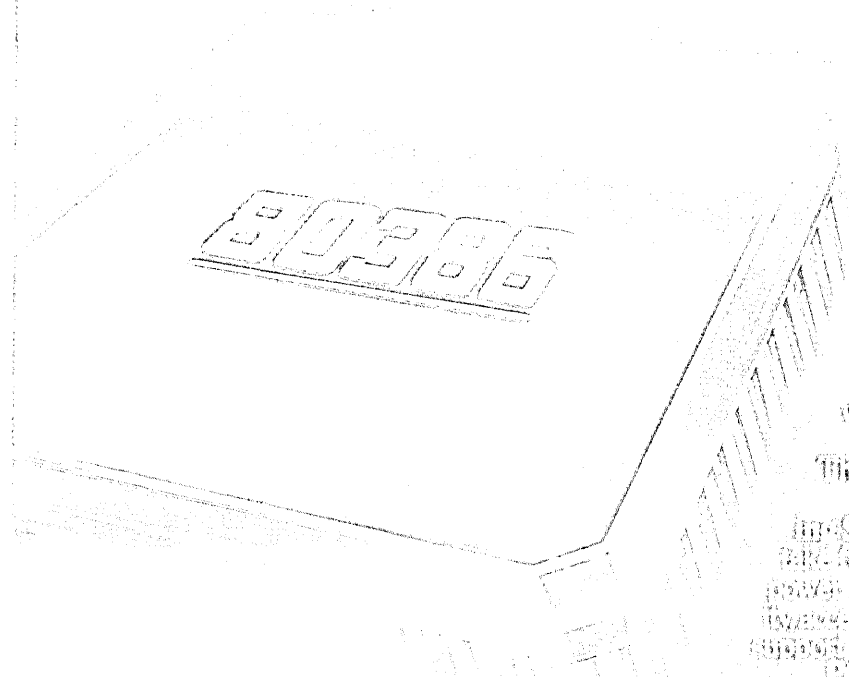
While distributed resource processing offers much promise for the future, there are still problems—technical as well as nontechnical—that must be resolved before the concept can be successfully implemented. These problems come in the four main areas of security, distributed database, incompatibility, and organizational resistance. On the security side, the distribution of data among many departmental computers will

make it far more difficult to track, manage, and protect sensitive information. In the end, securing data that are fragmented on many departmental systems could become the most critical factor blocking full implementation of DRP.

There are other distributed database concerns as well. To make DRP work, databases must be divided into three parts: one small portion at the pc, a departmental version at the DRP, and a corporate superset at the mainframe. This type of fragmented database is not currently available, except in a more general form in the Focus software from Information Builders, New York.

The incompatibility issue is the third trouble spot. PC/DOS, minicomputer operating systems like VMS, and mainframe systems like MVS share no compatibility. These big differences between machines will hamper the cooperative relationship

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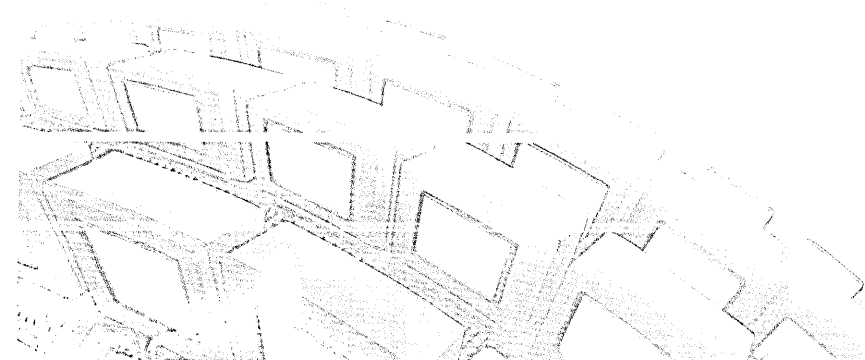
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envisioned by distributed resource processing. Attitudes inside the user organization could also stymie the development of DRP. At the end user's end, micro managers may protest because they'll feel that departmental processing will erode their hard-won autonomy from the MIS department. MISers wedded to the IBM way may fight DRP because Big Blue's offerings in this area are weak.

RULES OF GAME WILL CHANGE

There is no doubt that departmental computing will change the rules of the game for IBM and other systems suppliers such as Digital Equipment Corp. and Wang. The old image of the minicomputer as a timeshared facility will have to be discarded in the new era of departmental computing. Terminals will become much less important and vertical solutions/software will have to be reconfigured to fit with distributed database and other DRP-based systems.

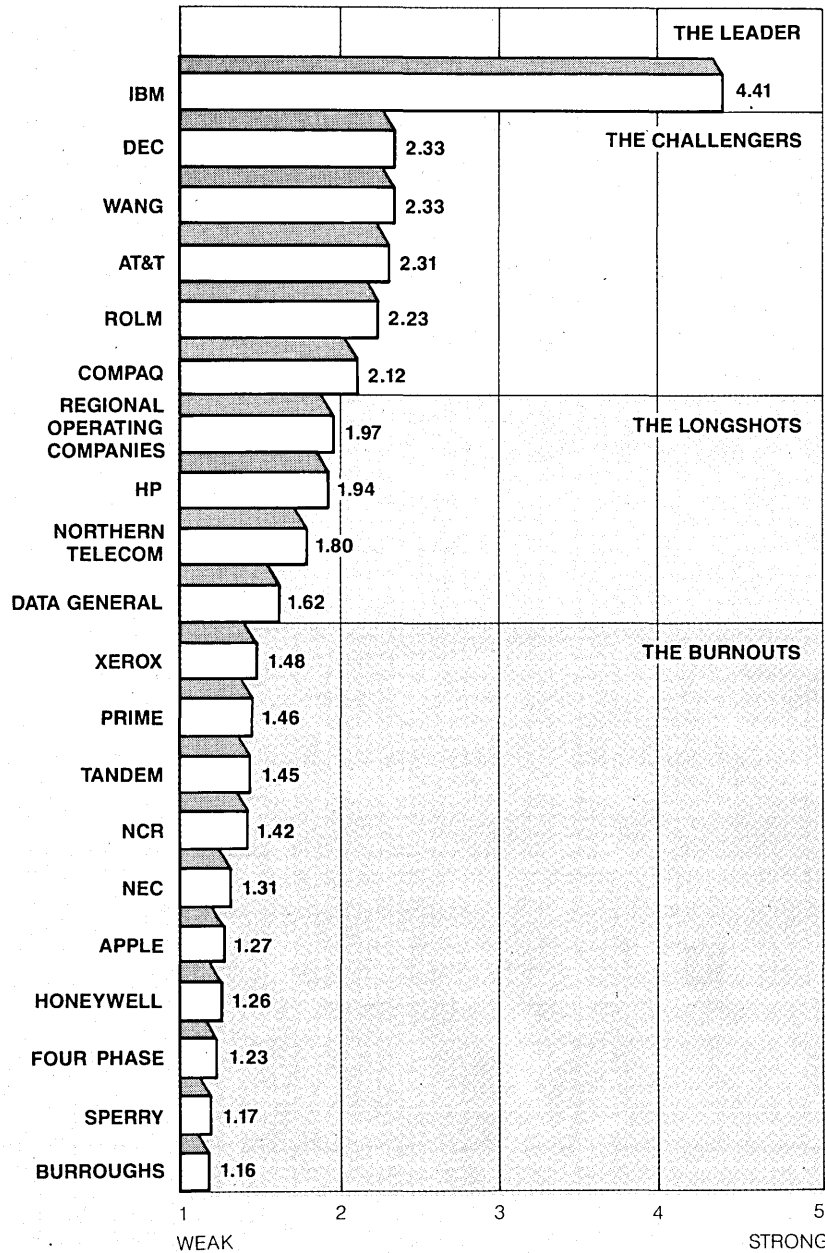
To get an idea of current positioning in the DRP market, Forrester conducted a survey of 300 Fortune 1000 companies, asking them to rate 20 vendors as providers of pc integration products. The respondents to the survey were primarily high-level computer, office automation, or communications planners who had such titles as director of data processing, director of MIS, and director of communications. The survey results are shown in Fig. 2.

The vendors in the DRP market can be divided into four groups: the Leader, the Challengers, the Longshots, and the Burnouts. There's no surprise who's leader of the pack. Despite its continuing problems at the midrange level, IBM is still perceived to be the primary vendor to large users. IBM's 4.41 score was much better than its nearest competitors, Wang and Digital Equipment, each of which had a 2.33 rating. The company's continuing support from users will give it time to regroup its midrange efforts for a full frontal assault on Digital. IBM's salient weapon? It's a scaled-down 4300.

Next come the Challengers, headed by DEC. The company's micro integration rating is surprisingly low. Digital's recent moves to improve pc attachment to its VAX line, including offering DOS services under VMS, should make the company a closer competitor to IBM in the short term.

In spite of recent difficulties, Wang has held onto the confidence of its customers. If its problems persist, however, Wang can be expected to quickly fade into the league of Longshots. Ranking very close to both DEC and Wang is AT&T. While AT&T continues to lose an unprecedented amount

FIG. 2
USER RATING OF VENDORS AS PC INTEGRATION PROVIDERS



SOURCE: FORRESTER RESEARCH INC.

of money in its attempts to crack the computer business, the company still scores relatively high grades from users.

Rolm rated well because it was able to ride on IBM's coattails. In fact, a number of survey respondents directly equated Rolm with IBM, grading the PBX vendor accordingly. Last but not least comes Houston-based Compaq, the most surprising member of the Challengers. The company's good user rating is an indication of its strength as a pc supplier to the Fortune 1000.

There are four companies in the

Longshots list. First come the regional operating companies, which are the wild cards in the DRP market. Then there's Hewlett-Packard, which offers a rich mix of departmental products. Nevertheless, the California company's sales force continues to be oriented toward the scientific/engineering environment.

Northern Telecom also has some marketing problems. The firm's DV-1, which is conceptually targeted at the departmental computing domain, has users confused about whether the system is really a small PBX or a pc integration vehicle.

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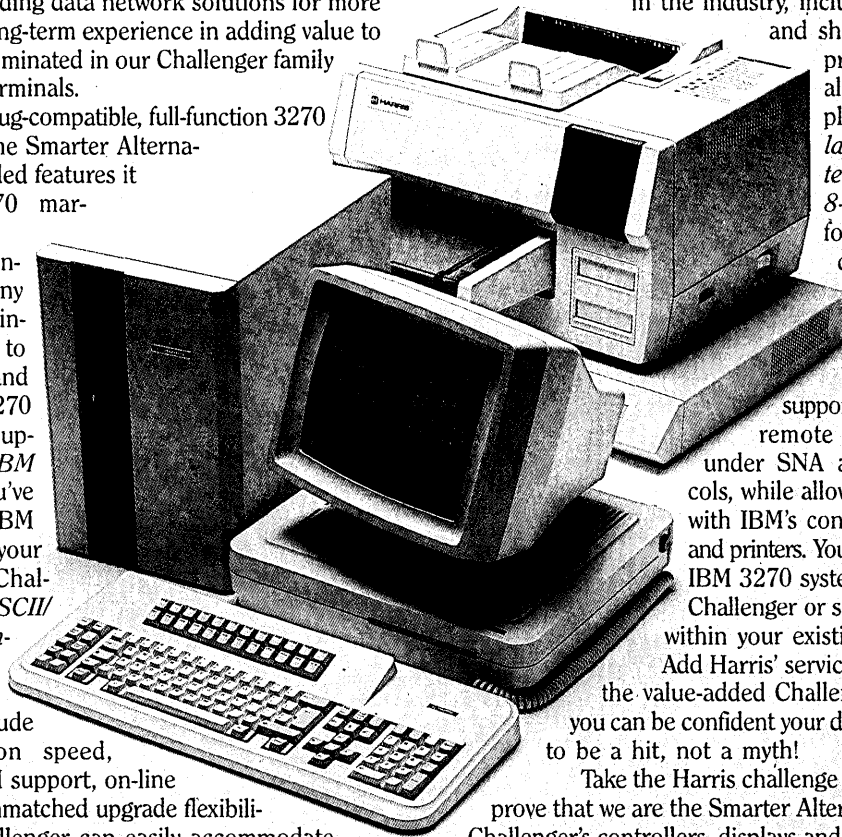
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If IBM does not strike back with a viable midrange offering, DEC will have a lock on the DRP market over the next two years.

Next comes Massachusetts mini maker Data General. On the departmental scene early with its CEO system, DG has not followed through with a complementary pc integration strategy.

The Burnout companies have seen their fortunes with the Fortune 1000 ebb and flow. Xerox, Prime, Tandem, NCR, NEC, Apple, Honeywell, Four Phase, Sperry, and Burroughs have been relegated to filling niches or trying to hold on to their limited installed bases. Forrester sees Xerox, NEC, NCR, and Prime as the only vendors capable of boosting themselves into the ranks of the Challengers.

The Challengers, of course, are all IBM's closest rivals. That closeness is a function of IBM's strength, which will be greatly enhanced if it can get its act together at the midrange level. In that case, the mighty company's domination of the microcomputer and mainframe markets would act as a pincer against other DRP suppliers. It remains to be seen whether IBM's new midrange offering—the 9370, unveiled in October—will be enough to break Digital Equipment's current lock on the DRP market.

AT&T, Data General, Wang, Hewlett-Packard, Prime, and Northern Telecom could also emerge as important players in the departmental computing realm. Other companies such as NEC, NCR, and Sperry

must hit a home run if they hope to avoid niche roles in the Fortune 1000 firms.

In those top firms strategies for harmonizing pcs remain elusive. The relative immaturity of IBM's token ring network and the failure of the System/36 as a pc integration vehicle have hampered the harmonization effort. So have minicomputer vendors that have come up with unfocused solutions to the problem. The high cost/low functionality of micro-to-mainframe links has also not helped users in their quest for pc harmonization.

What could help users in that quest is the departmental computer, which will be the key to tying pcs with corporate networks. That bridging function will be just one of the chores performed by the DRP. In fact, the greatest strength of the DRP is its ability to play many roles, evolving over time from a cost-effective local processor into a pc servant/communications hub.

The departmental computer will have a broad impact on how medium-sized and large-sized companies manage technology. In the future, central information resources that are based around the mainframe will be pushed out into departments. As a result, the central site will lose some programmers and operations personnel, who will be moved out to maintain and manage departmental computers. A part of the central database will also be transferred

into departmental systems that are closer to users. In addition, some end-user applications development will be distributed.

The host will play a diminished role as peer-to-peer networks proliferate. Mainframes, however, will not go away. The host will continue to run large transaction processing systems, applications that require a high level of security, and some jobs that lend themselves to centralization such as corporate ledgers. Mainframes will also carry the corporate database, acting as the main repository for information distributed in departmental computers.

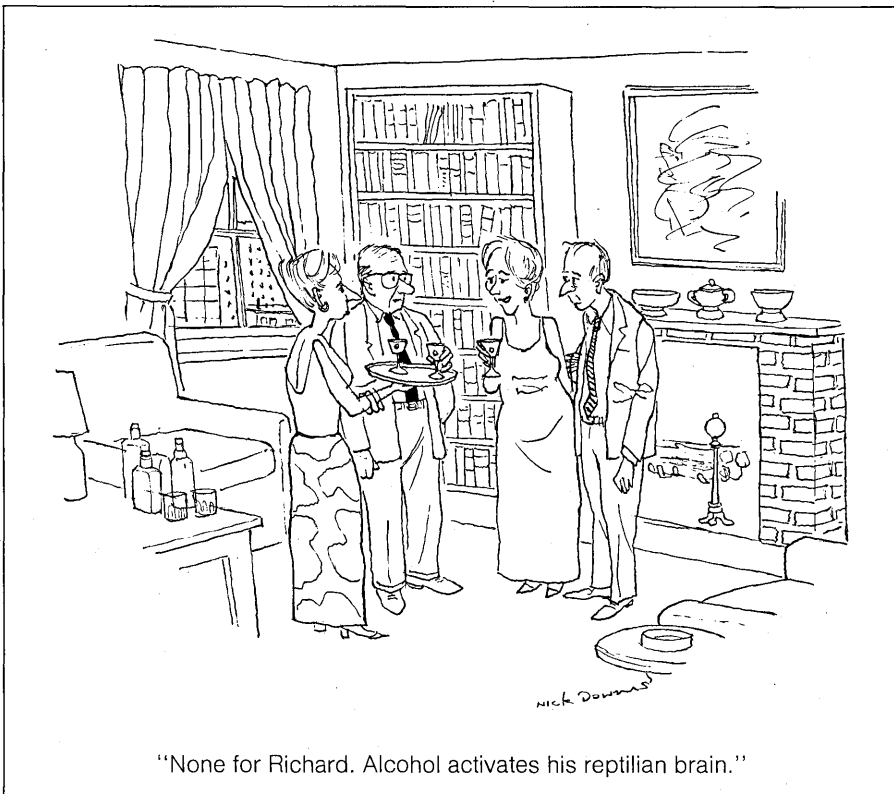
As resources become more highly distributed in Fortune 1000 companies, a new model of information management will be required. In this new management mode, centralized, vertical information management will flatten out, becoming more horizontal in structure. The MIS department will have less of a direct role in equipment acquisition. Instead, it will become more of a consultative entity, setting broad strategic goals for the company. Direct control of information systems will be transferred to "mini-MIS" organizations in departments or at sites.

Under this envisioned management model, the MIS department will set standards for a top-down architecture. This architecture will likely include IBM's SNA and DISOSS, database standards, and other broadly defined resources. Meanwhile, the mini-MIS operation, functioning as a grass roots group, will define bottom-up requirements such as pc/DRP applications, local databases, and local area networking.

These bottom-up requirements would interlock with the top-down architecture. Also, in most companies, the top-down architecture will, to a certain extent, channel the general direction of bottom-up requirements. Nevertheless, the MIS battle plan must still be flexible and responsive to end-user needs.

Answering those needs is crucial, because ultimately only end-user departments can understand how computer and communications systems can be used to gain a specific competitive advantage. In this sense, mini-MIS will guide the tactical use of technology inside the corporation. The MIS department will then become the corporate technologists, ensuring that the strategic technology plan squares with the corporate strategy. They may also manage what's left of that vestige of the '70s—the mainframe. ©

An analyst in office systems and communications, George F. Colony is president of Forrester Research Inc. in Cambridge, Mass.



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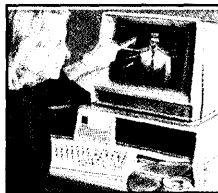
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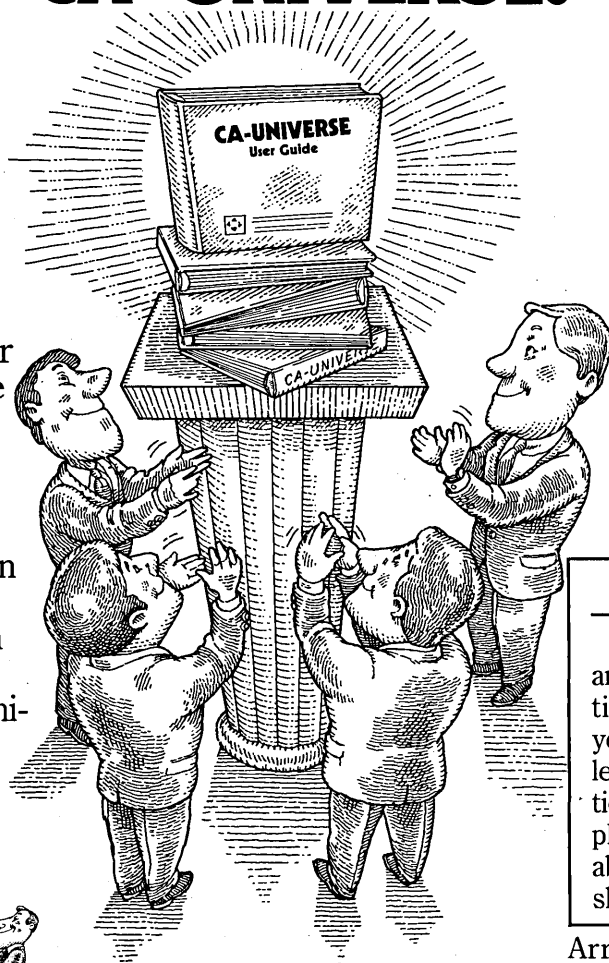
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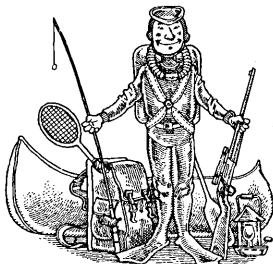
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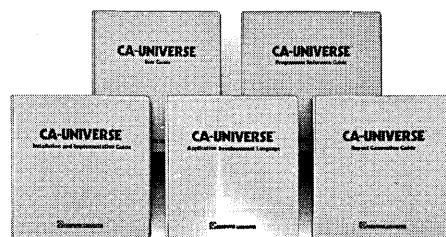
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**A new survey says the end-user revolution is over;
the action has moved to other battlefields.**

MIS RATES THE ISSUES

**by Martin Herbert
and Curt Hartog**

What are the key issues facing MIS managers? What are the major effects of the rapid increase in end-user computing? To find out, the Center for the Study of Data Processing (CSDP) of Washington University, St. Louis, in conjunction with DATAMATION conducted a survey of Fortune 1000 companies throughout the U.S.

The results of the survey are quite diverse, but two conclusions stand out. The end-user "revolution," as seen by MIS managers, is over, and a counterrevolution aimed at winning the hearts and minds of top management has begun. The three top-rated issues—alignment of MIS with business goals, data utilization, and education of senior personnel—portray a major repositioning of MIS management attitudes. Gaining control of end-user computing now appears less important than demonstrating to top management the value of a responsive MIS in accomplishing business goals.

These are the key findings from a two-part questionnaire sent to 1,500 managers identified as "key man on-site" in their companies. Six hundred questionnaires were returned—a solid response rate of 40%. Within the survey population, manufacturers were most heavily represented (42%, about one third of whom were computer manufacturers). Finance, trade, utilities, and government were each represented on from 8% to 12% of the questionnaires returned.

Although the companies were large—half of them had billion-dollar sales or revenues—50% of all respondents (and 40% from the billion-dollar companies) worked at sites with no more than 20 employees. About half reported that their companies had chief information officers (cios) or their equivalents.

The overall rankings from the 23 questions comprising the first part of the questionnaire are represented in Fig. 1.

The significance of alignment's number one position cannot be overstated. At a time when competitive pressures are squeezing many organizations and forcing cuts of personnel and unproductive busi-

ness units, MIS managers are shifting their horizons from technical management and planning to the business objectives defined by top corporate leadership.

Somewhat surprisingly, the second-highest rating went to data utilization. On first glance, the importance of this rather narrow and technical issue is not apparent. Yet, in conjunction with the high ranking of alignment, the overall sense is clear. Alignment means assuring that data are made available to the right person in a timely manner, the crux of data utilization. From another angle, data utilization is both the goal of alignment and the means to increase it.

The third-ranked issue, educating senior personnel, follows the same pattern. Its intrinsic value is not obvious, but, given the number one and two rankings of alignment and data utilization, the importance of communicating MIS's role and its potential contribution to senior management makes sense.

Increasingly, MIS management seeks to coordinate key decisions about information technology with corporate strategic and tactical objectives. For example, in converting from DOS to MVS, many MIS managers may focus on discovering corporate strategic plans in order to inform management better about the business consequences of the conversion.

STRATEGIC VIEW OF MIS

Taken together, the three highest-ranked issues comprise a strategic view of an MIS function more oriented toward business objectives. MIS managers, traditionally viewed as good technical leaders, indirectly portrayed themselves in the survey as being (or wishing to be) part of the top corporate management team. Hence, the top issues reflect an emphasis on MIS effectiveness instead of efficiency.

Despite this strategic sense of their mission, respondents predictably ranked software development and productivity very high (fourth and fifth, respectively). Software development is MIS's traditional bread and butter role, the activity that, for better or worse, characterizes dp to the rest of the corporation. Productivity focuses

mainly on how well MIS performs that software development role.

In fact, the emphasis on software development productivity overlaps one aspect of the current strategic emphasis: responding quickly to changing business needs. The combination of intense competitive pressures and the availability of information technology in user departments makes business managers less inclined to queue up for new, MIS-developed systems—to become part of the backlog. In turn, politically savvy MIS managers are seeking major improvements in productivity.

In any case, the five highest-rated issues reveal two patterns: a strategic focus on top management and a traditional emphasis on building information systems. Planning, ranked sixth, lends itself to both.

Three of the four issues that round out the top 10 suggest another grouping: integration of technologies, telecommunications technology, and office automation. Together, these illustrate the growing role of information technologies outside of the traditional MIS shop and the backbone role of telecommunications in distributing the benefits of automation.

A major surprise is the absence of end-user computing (ranked 12th) from the top group. Comments made in the second part of the questionnaire do not suggest that all the problems are solved, but that opinion about the impact of end-user computing is divided.

The lower-ranked issues fit into four categories: narrowly focused items, such as CIM, centralization, and measuring productivity; leading edge technical topics, such as expert systems and artificial intelligence, and fourth generation languages; issues that are apparently losing importance as they lose their newness, such as information centers and telecommunications deregulation; and leading edge alignment topics, such as decision support systems, strategic systems, and external data.

It is wise to remember that in taking a first sweeping glance at the results, the rankings do not measure the absolute importance of any given issue. Importance varies according to industry categories, size of company, and many other variables. In a deeper sense, the ranking of the issues is an

A major surprise is the absence of end-user computing from the top group of issues.

indication of the managerial bias of the survey population. The lower ranking of newer or more narrowly focused items reflects accurately the character and concerns of managers as opposed to technical practitioners. Given the strong orientation toward aligning MIS with corporate goals revealed in the survey's top-rated issues, the lower ranking of many items is even more understandable.

The strong response rate lends weight to the survey findings and encourages comparisons with prior surveys. In particular, comparisons with the 1985 CSDP Opinion Survey and another published by the *MIS Quarterly* (September 1984) elicit some significant trends.¹

Because the actual sampling for the 1984 survey was done over a six-month period in 1982-83, the trends uncovered by comparison with current findings cover almost four years. Fig. 2 compares rankings from the three surveys.

These can be examined in several ways. Easily overlooked are the eight issues that have remained relatively stable across the three studies. Using the 1986 rankings, that group is shown in Fig. 3.

THREE CLUSTERS OF ISSUES

The issues group themselves neatly into three clusters near the top, middle, and bottom of the rankings. The top cluster, of course, reflects MIS's traditional mission, as discussed earlier. The middle group, significantly lower, represents MIS's initiatives toward end-user computing. The bottom group contains largely new or narrowly focused technologies that have not yet reached the mainstream. It should be noticed that Expert Systems and Artificial Intelligence had a much higher average rating in 1986 than in 1985, when it was far below all other issues.

Issues that have increased or decreased are described in Fig. 4.

Some items stand out dramatically, such as end-user computing, which has dropped precipitously. Even more interesting is the reversal in the positions of plan-

¹Curt Hartog and Martin Herbert, *1985 CSDP Opinion Survey* (St. Louis: Washington University, 1985); Gary W. Dickson, Robert L. Leitheiser, James C. Wetherbe, and Mal Nechis, "Key Information Systems Issues for the 1980's," *MIS Quarterly*, 8 (September 1984), pp. 135-59.

²E.W. Martin, "Critical Success Factors of Chief MIS/Dp Executives," *MIS Quarterly*, 6 (June 1982), pp. 1-9.

³W.F. McFarlan, J.L. McKenney, and P. Pyburn, "The Information Archipelago: Plotting a Course," *HBR*, Jan.-Feb. 1983, pp. 145-56; M.E. Porter, *Competitive Advantage: Creating and Sustaining Superior Performance* (New York: Free Press, 1985); R. J. Benson and M.N. Parker, "Enterprise-wide Information Management: An Introduction to the Concepts" (IBM L.A. Scientific Center, May 1985).

FIG. 1

AVERAGE RANKINGS

Respondents rated issues as not important, somewhat important, fairly important, or extremely important. The overall rankings are derived from the average rating across all respondents, with not important scored as 1, and extremely important as 4.

| RANK | ISSUE | AVERAGE RATING |
|------|--|----------------|
| 1. | Aligning MIS with Business Goals | 3.54 |
| 2. | Data Utilization | 3.49 |
| 3. | Educating Senior Personnel | 3.33 |
| 4. | Software Development | 3.31 |
| 5. | Productivity | 3.26 |
| 6. | Planning | 3.25 |
| 7. | Integration of Technologies | 3.21 |
| 8. | Telecommunications Technology | 3.17 |
| 9. | Quality Assurance | 3.16 |
| 10. | Office Automation | 3.09 |
| 11. | Data Security | 3.06 |
| 12. | End-user Computing | 3.00 |
| 13. | Recruiting and Training | 2.91 |
| 14. | Information Centers | 2.82 |
| 15. | External Data | 2.82 |
| 16. | Decision Support Systems | 2.81 |
| 17. | Centralization | 2.70 |
| 18. | Telecommunications Deregulation | 2.63 |
| 19. | Measuring Productivity | 2.59 |
| 20. | Fourth Generation Languages | 2.57 |
| 21. | Strategic Systems | 2.42 |
| 22. | CIM | 2.25 |
| 23. | Expert Systems and Artificial Intelligence | 2.21 |

ning and alignment since the 1984 survey. Because they are so closely related, the exchange suggests that alignment has replaced planning as the key issue for MIS management. In the earliest study that mentioned the alignment issue ("support of the objectives and priorities of the parent organization"), it ranked sixth.²

Planning, of course, has always aimed at coordinating MIS objectives with corporate goals, but the popularization of a more strategic and "competitive" view of MIS has recently gained currency through the work of Warren McFarlan, Michael Porter, and enterprise studies like the annual CSDP-IBM conferences on Enterprise-Wide Information Management.³ At the same time, the notion of making MIS more integral to senior management through a cio has gained wider acceptance. Half of the 600 survey respondents indicated that their organization had a cio. Hence, the hypothesis is that generic MIS planning has been displaced—or replaced—by the much more specific notion of alignment.

Looking at the other issues that have increased or decreased in importance, it is likely that the shift to an alignment perspective has had a clear "pulling" effect.

Items like data utilization and education of senior personnel are pulled up sharply, one reflecting a technical and the other an organizational consequence of an alignment strategy. Telecommunications technology—again, an issue with strategic ramifications beyond its technical parameters—also can be seen as pulled up by alignment. In fact, decision support systems, which may have been pulled up by the alignment strategy, registered the largest gain in average rating from 1985 to 1986.

Turning from the alignment hypothesis to issues that dropped in importance, end-user computing and data security stand out above the rest. Why they have dropped is not obvious. To a great degree, end-user computing may appear a less monolithic issue, and addressing its component parts separately may decrease its overall importance. Managers may also feel more control over some of the components, which could explain the drop of data security. Finally, the two issues may simply be falling into line with the perceived importance of related issues, such as information centers and office automation, clustered in the middle of the rankings.

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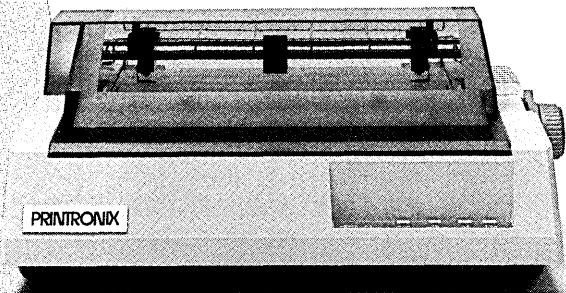
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The drop in recruitment and training could be explained by market factors, while the decline in telecommunications deregulation may reflect an issue becoming less important because its effects are better known. In any case, the trends reveal MIS managers as more politically aware and more like business managers than is sometimes assumed.

End-user computing. The second section of the survey, which examines end-user computing's impact on the MIS function, partially supports the alignment hypothesis. For example, in describing how the MIS function has changed as users have undertaken more application development, 63% said MIS had assumed a more advisory role and 40% said that MIS was more strategically postured. (Many of the questions allowed multiple answers, so the percentages do not add up to 100%.)

IMPORTANT PATTERN RESULTS Pursuing the alignment hypothesis obscures equally important patterns in the results. One very striking view emerges when the questions are grouped into four categories: Training, Data, MIS Roles, and Effects of End-user Computing.

In each of the four, the results can be examined by company revenues, size of shop, type of industry, and presence of a cio function. Results for certain questions were also classified according to responses on other questions.

Training. The results portray a diversity of approaches to the training of users. Responses to a question about how training should be delivered were almost equally divided among the following: in anticipation of user demand, as users request courses, and in assisting users to develop their own courses. Similarly, responses to inquiries concerning the ways MIS uses its staff for training also divide equally between "assign full-time staff" and "create liaisons to user management."

There were also significant variations among respondent types. Those who thought MIS had less power and that planning had become harder because of increased user participation were more likely to choose reactive approaches to training. That is, they were more likely to develop training and consulting on an "as needed" basis.

Another question asked for the objectives of the information center. Each of the six objectives listed was chosen by at least a quarter of the respondents, with "consulting help on specific problems" and "training in hardware and software packages" chosen by more than half.

Interestingly, a question that asked

FIG. 2
ISSUES RANKED BY YEAR OF STUDY

| ISSUE | 1984 RANK | 1985 RANK | 1986 RANK |
|---------------------------------|-----------|-----------|-----------|
| Planning | 1 | 1 | 6 |
| End-User Computing | 2 | 4 | 12 |
| Integration of Technology | 3 | 7 | 7 |
| Software Development | 4 | 3 | 4 |
| Productivity | 5 | NA | 5 |
| Alignment | 7 | 2 | 1 |
| Recruiting and Training | 8 | 15 | 13 |
| Data Utilization | 9 | 4 | 2 |
| Decision Support Systems | 10 | 19 | 16 |
| Office Automation | 12 | 11 | 10 |
| Telecommunication Technology | 13 | 10 | 8 |
| Data Security | 14 | 6 | 11 |
| AI and Expert Systems | 18 | 21 | 23 |
| Educating Senior Personnel | —* | 8 | 3 |
| Quality Assurance | — | 9 | 9 |
| Information Centers | — | 12 | 14 |
| Telecommunications Deregulation | — | 13 | 18 |
| Measuring Productivity | — | 14 | 19 |
| Fourth Generation Languages | — | 16 | 20 |
| Centralization | — | 17 | 17 |
| External Data | — | 18 | 15 |
| CIM | — | 20 | 22 |
| Strategic Systems | — | — | 21 |

*Issue not included in prior surveys. NA: not asked

for the areas in which MIS should educate users drew high numbers (60% to 70%) for such traditional MIS areas as "requirements definition" and "backup and recovery techniques." This suggests two interpretations: either MIS managers are willing to let users develop their own applications, or MIS managers have been forced to relinquish applications to users yet still feel accountable for the results.

These high numbers also suggest that MIS managers are willing to let go of users who have been entrusted with the crucial role of developing applications.

Data. The results in this category contain few surprises. MIS tends to set standards either for all corporate or for some departmental systems. Access to corporate data is in turn governed more by MIS or corporate policies than by technical restraints. Smaller business units (revenues less than \$25 million) and smaller shops (fewer than 20 dp employees) were more likely than others to choose departmental standard setting and technical constraints to data access.

MIS frequently, but not universally, had the overall responsibility for assuring the quality of corporate data. Each of the aspects listed (security, timeliness, integrity, etc.) was chosen by 60% to 77% of the respondents. These numbers were lower for smaller shops and business units.

MIS roles. Questions grouped under MIS roles indicate the ferment now occurring in the field. Predictably, the MIS director was most frequently chosen as the job category most responsible for managing technology changes in the organization,

FIG. 3
STABLE ISSUES

| ISSUE | 1986 RANKING |
|-----------------------|--------------|
| Software Development | 4 |
| Productivity | 5 |
| Quality Assurance | 9 |
| Office Automation | 10 |
| Information Centers | 14 |
| Centralization | 17 |
| CIM | 21 |
| Expert Systems and AI | 23 |

but only 38% chose that response. Ten percent chose no one, and respondents who made this choice were more likely to think that MIS had less power and that planning was harder. They were also more likely to work in companies that had no cio. Respondents in the Trade and Finance categories were less likely to say no one; those in the Utility category were more likely to choose that response.

A question about future MIS roles as users assume more responsibility for technology found the highest number (74%) viewing MIS in a consulting role to departmental systems. The percentage is even higher in the Trade category. The percentages across all the other response categories are relatively modest, yet the categories describe MIS's traditional, central roles. For example, only 58% said that developing

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MIS managers are more politically aware and more like business managers than is sometimes assumed.

core business systems would be a major MIS role, and only 49% said that operating core business systems would be. Five years ago, these rates would probably have been much closer to 100%. When the focus moves to smaller shops, the percentages drop into the 30s.

SEE MIS FUNCTIONS CHANGING

Clearly, MIS managers view their departments' roles and functions as changing in fundamental

ways as a result of users acquiring information technology. When asked how their departments' roles and functions have changed as a result of users acquiring information technology, 40% said their departments were more strategically postured, while 33% said they were more operationally oriented. This contrast suggests that the impact of users has been felt in widely differing ways. Other new roles were emphasized; among them, MIS's telecommunications responsibility was seen as increasing sharply as a result of micro-to-mainframe links and LAN products.

Effects of end-user computing. The most interesting results appear in this category. Responses to a question identifying the MIS roles most affected by the transfer of information technology to users did not point dramatically to the MIS director (19%) or department head (15%), though they were chosen most frequently.

The most dramatic division of results occurred in response to an item asking how the power of the central MIS department has been affected by users undertaking more applications development. About half (46%) said the department was not affected. The remaining half divided almost equally: 24% said less powerful, while 27% said more powerful. Smaller business units within this half gave more of the latter response and fewer of the former, possibly because MIS professionals are closer to users in smaller organizations. By industry category, Utilities were more likely to choose less powerful; Trade, Finance, and Government were more likely to choose more powerful.

The same sharp division of opinion emerged in an open-ended question that asked how the climate of MIS planning changed as a result of increased user participation. About 25% of the responses were classified as better or more cooperative, and another 25% as harder. Another 15% indicated that the climate was unchanged, and together these three categories comprise about two thirds of all responses. Only 7% said that the planning climate had a more strategic flavor.

Comments help to bring out the

FIG. 4

ISSUES THAT CHANGED RANKS

| ISSUE | 1984 RANK | 1985 RANK | 1986 RANK |
|--------------------------------|-----------|-----------|-----------|
| UP | | | |
| Alignment | 7 | 2 | 1 |
| Data Utilization | 9 | 4 | 2 |
| Educating Senior Personnel | — | 8 | 3 |
| Telecommunication Technology | 13 | 10 | 8 |
| External Data | — | 18 | 15 |
| DOWN | | | |
| Planning | 1 | 1 | 6 |
| End-User Computing | 2 | 4 | 12 |
| Integration of Technology | 3 | 7 | 7 |
| Recruiting and Training | 8 | 15 | 13 |
| Telecommunication Deregulation | — | 13 | 18 |
| Fourth Generation Languages | — | 16 | 20 |

range and intensity of the responses. One respondent wrote, "Users have participated for the past three to four years. Each year the process has become more integrated and better tuned as awareness increases. We start earlier, we gather more information, and top management plays a role in the final approval or deferral of automation objectives. MIS operating and capital budgets come from this process."

Another responded, "Planning is shifting toward user requirements. Instead of telling the user what he or she will be using, we ask users what will make them better decision makers."

In the same vein, "User participation is real world, an eye-opener to the flexibility needed in today's environment. But changes in old ways of thinking are slower than needed."

Some comments are less positive. "We are becoming package installers and data custodians, not report writers"; "Planning eliminated"; "More confused"; and finally, "Greater dysfunctional centralization of decision power. The blind leading the sighted."

USERS NOT COMPETENT

When we asked what the single most difficult problem created by user participation was, user incompetence or intransigence was most frequently mentioned (19%). Complaints about users ran the gamut from ignorance to arrogance to lack of commitment. "Ignorance of the complexities and lack of good tools," wrote one respondent. "Everything they read makes it appear simple"; "Everyone is an expert," another noted. "They know the 'perfect' answer to meet their needs"; "False presumption of expertise and consequent disputes over IS strate-

gy." Only about one third of those who identified user incompetence as the major problem had a cio, vs. 55% of all others.

Resentment of users is hardly news, of course, but considering that the respondents were predominantly managers, it is interesting that no other category drew more than 11% of the answers. About 11% indicated that control of standards was more difficult, and another 9% said that providing education or training was a major problem. Another 10% pointed to added cost or effort, and 10% mentioned data (access, security, integrity).

One question asked how technology transfer has worked in reverse—from users back to MIS. It was the least understood item in the survey: many did not answer, or gave inappropriate answers. The intention of the item was to see if technology transfer has begun to come full circle, from MIS to users and back to MIS.

For some respondents, the item was again an opportunity to blast the enemy: "Users seldom present a coherent requirement. They want 'packaged' software on pcs, but don't want to accept limits and restrictions of the software. MIS is expected to 'plug in a few changes'"; "When a user solution doesn't work or user staff changes, especially when the guru leaves, MIS must be able to step in and take over, frequently on short and hostile notice." For others, it was a chance to reassert eternal verities, such as taming the wild user: "At a given level of frustration the user will give back system responsibility. The user then is more sympathetic and patient with MIS problems"; "The micro originally created a barrier for the end users, but now they are crawling back to MIS for expert help instead of going to salesmen."

Those who understood the item—

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Respondents attach much less importance to end-user computing than was true several years ago.

admittedly a subjective judgment—gave interesting answers. “MIS serves as an information clearinghouse,” one commented, “and users are field testing programs and equipment.” Another tied the item directly into MIS productivity needs: “Technology transfer has broadened the traditional programmer’s tool kit. Programmers are now using end-user tools [hardware and software] to increase productivity, speed of development, and the quality of the finished product.” Another attributed the benefit to better communication: “I feel that in our business the transfer is just getting started. I also feel that it has helped MIS to see real business needs of the user. There is more communication between user departments and MIS, which helps to solve the *real* problem.”

NEW VIEW OF MIS ROLES

Most interesting are the answers pointing to a new view of MIS roles and capabilities: “Technology transfer has caused us to look again at our productivity tools and how we measure productivity”; “Users have discovered

ways of using existing systems of technology that we were not aware of”; “Yes, users have forced improvements. Users are more expert in some query and analysis packages, such as SAS”; “The users provide and test the knowledge base of what’s new and useful”; “We have several users doing things we are not able to stay abreast of.”

Still more on new MIS roles: “Technology transfer has made us more aware of the user’s needs, constraints, and interests in the automation process. I believe it has created a closer working relationship between the persons utilizing data processing services and MIS personnel, as compared to the earlier days of automation.”

In 1986, MIS managers are seeking to align MIS with corporate strategic plans and objectives. To succeed, they must both educate senior management and manage data utilization as effectively as possible. In addition, they must perform MIS’s traditional mission of software development to the satisfaction of users, ideally with increased productivity. In general, the overall ranking of the issues portrays respondents as more politically astute and business ori-

ented than is often thought.

On the whole, the respondents attach much less importance to end-user computing than was true several years ago. The pc may be a star, but most managers are not hitching their dp wagons to it.

The broad picture, then, conveys a decidedly managerial outlook, with MIS managers clearly focused on the main chance. Yet, in looking up to alignment with senior management, managers may overlook the productivity potential of some lower-rated issues, such as fourth generation languages, and the continuing power shifts occurring around end-user computing. The counterrevolution may be under way, but the enemy is still alive and kicking. As noted in one comment, “Users have little or no past to be prisoner of.” ©

Martin Herbert is a senior associate and Curt Hartog is an assistant director of the Center for the Study of Data Processing at Washington University in St. Louis. Hartog has previously contributed to DATAMATION. Herbert is currently conducting research in systems development.

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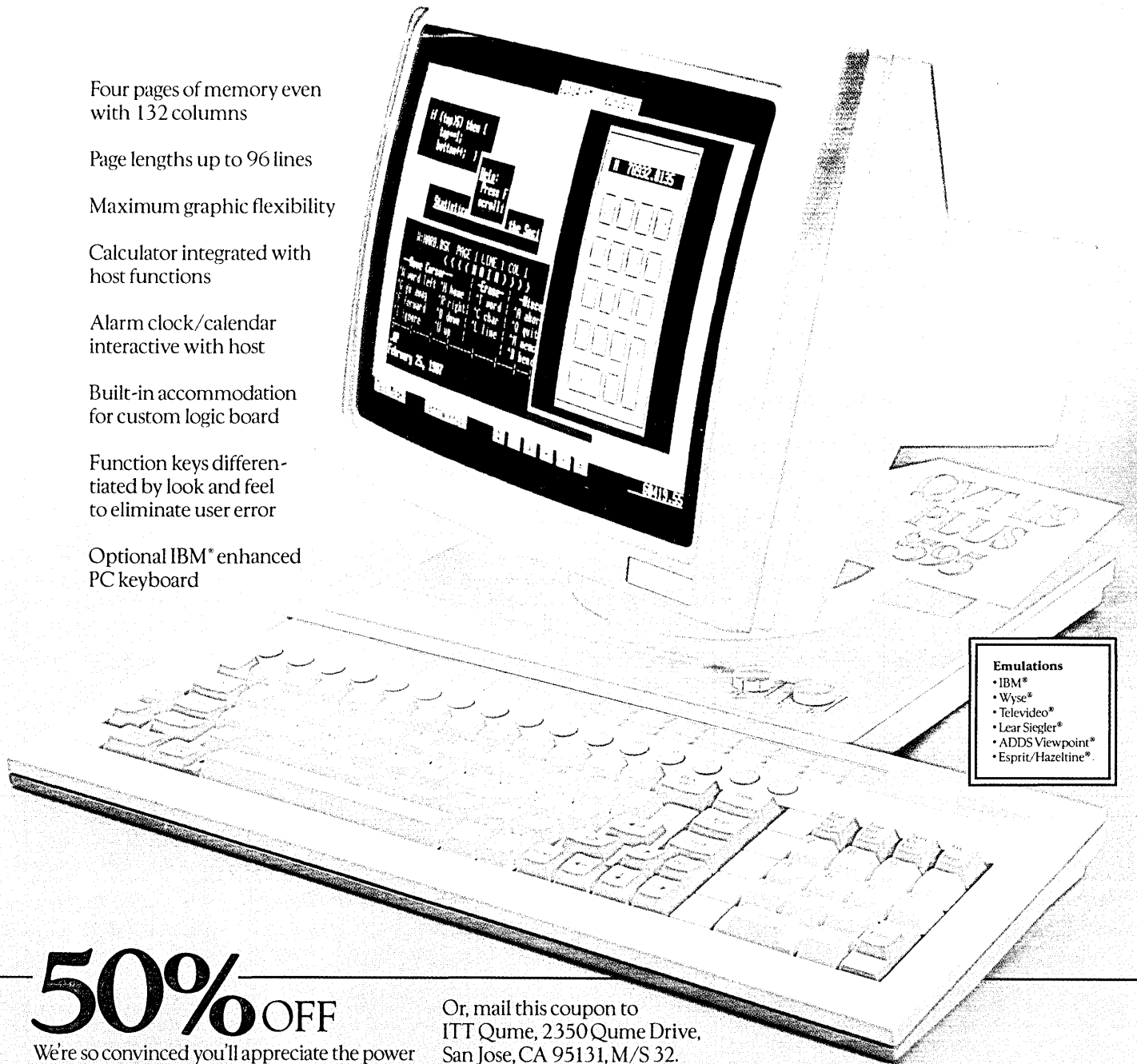
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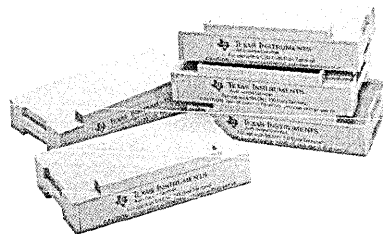
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MASTER PLAN FOR LANS

by William Stallings

You're having a network management nightmare: you're up to your ears in departmental LANS. You didn't buy them, but you've got to figure out how to hook them all up to each other and to your company's database. While you're trying to sort through this mess, department managers nip at your heels, begging for interconnectivity. Down the hall, your boss is yelling about keeping costs down. You wake up, and the most frightening part of the nightmare hits you: this isn't just a bad dream, it's your job.

Network managers in today's corporations are faced with an assortment of departmental LANS that have been procured by various managers and are used in different ways. All must be interconnected for effective distribution of information throughout the company. Protocols are required to provide end-to-end communications across the collection of LANS. Conventions are needed for things such as file formats and file access mechanisms. On top of that, personnel may have to be trained to use the various network operator interfaces and the sundry procedures for fault diagnosis and repair. Caught in the middle is the network manager, who, like a puppeteer, is pulling the strings of departmental LANS to put together the best show.

The departmental LAN cannot stand alone. Studies of the distribution of information within a corporation show that roughly half of the data generated within a department is distributed within that department only. Forty percent goes to other offices in the same building, while 10% is distributed outside, either to other parts of the company or to customers and suppliers. Clearly, the departmental LAN must be connected to other LANS both inside and outside the building.

The obvious solution would appear to be a single LAN that covers the entire building and hosts all the other devices. While this approach would clean up network management problems, it may not be the most flexible or cost-effective alternative.

A better strategy is for the central network planner to design and coordinate a

hierarchy of LANS to accommodate the wide range of departmental equipment that must be interconnected. Usually included are microcomputers, either single-user pcs or multi-user workstations, that must exchange small data packages, such as messages, word processing files, and spreadsheets. These kinds of interactive applications require modest data rates—9,600bps per user is adequate and 56Kbps is heavenly. Such low data rate requirements mean that these departmental micros can be serviced by a relatively low-performance, inexpensive LAN. A data rate between 1Mbps and 5Mbps is adequate. It is desirable, as well as possible, to buy a connection for a few hundred dollars.

Some larger departments or divisions may use a single LAN to hook up equipment requiring higher speeds. For example, minicomputers and facsimile machines need faster LANS to keep up with the longer files and bulk data they transfer. For larger departmental LANS, expect to pay almost a thousand dollars. Also, look for data rates between 5Mbps and 10Mbps.

The lay of the LAN is much different in larger organizations. There, multiple mainframes are the core of the central operation that supports large databases and applications, such as modeling, that require heavy computing power. These mainframes are tied together for data exchange and for the creation of backup files.

If each department has its own LAN, then the LANS themselves have to be connected. Since half the data generated by each department leaves that department, the volume of interdepartmental traffic may be substantial, which results in high data rate requirements.

BACKBONE LAN FOR LINKING

To link multiple LANS, a backbone LAN is necessary. There are two general approaches: multiple channels that provide relatively low data rates (5Mbps to 10Mbps), or a single channel that offers a relatively high data rate (50Mbps to 100Mbps). The multiple channel backbone LAN can be used with a broadband local network, but make sure that bridges are provided between channels for full connectivity. Those bridges must be

carefully designed to avoid bottlenecks. A good high-speed backbone LAN is an optical fiber ring system that operates in the 80Mbps to 100Mbps range.

If you are tempted to dispense with the department-level LAN altogether and use only the backbone LAN to connect departmental gear, keep in mind that there are several drawbacks to this approach: with only a single LAN on premises, even a short service interruption could result in a major disruption for users. Even a high-capacity backbone LAN that carries both intradepartmental and interdepartmental traffic could become saturated as the number of devices attached to the net increases over time.

Another alternative that sounds good in theory but doesn't work in practice is the back-end network that connects large computer systems and data storage devices. Such back-end LANS are not suitable backbones, because they work best hosting a few devices situated within a short distance of each other. A backbone LAN by definition must support many devices over long distances.

The hierarchical LAN method allows the network planner to optimize a networking facility for cost and performance. Once the multiple-LAN system is in place, the real trick is to successfully manage and exploit it. From a software point of view, standardized distributed application software—in such areas as database management, electronic mail, document interchange, and file transfer—is necessary. Unfortunately, standards in these areas are slow to develop and slow to mature.

In the area of hardware, standardized solutions do exist, many of them from IEEE's 802 series of local network communications systems standards. The network planner can choose LAN equipment that conforms to accepted standards, allowing the development of a hierarchical system with a limited number of different network types. This should help keep the management and maintenance of the network within reasonable bounds while ensuring compatibility with equipment that's bought at a later date. In most cases, products that conform to the standard are available, or soon will be.

A hierarchy of local networks may provide the most effective and flexible solution.

For small departmental LANs, there are several choices. The first to be standardized was the carrierband system, which is based on broadband technology and is part of the IEEE 802.4 token bus broadband standard. Developed primarily to meet factory environment needs, carrierband could also be used in the office.

Two more recent standards included in the IEEE 802.3 CSMA/CD baseband standard were developed specifically for the office environment. One is very similar to Ethernet. The other—referred to as Cheapernet—is similar to Ethernet but is less expensive because it uses thinner, more flexible, coaxial cable. This simple change

allows the use of less expensive electronics in the transceiver. The disadvantage is that Cheapernet supports fewer devices over shorter distances than Ethernet.

Another standard developed as part of IEEE 802.3 is StarLan—a 1Mbps twisted-pair system designed to use the unshielded twisted pair that already exists within the building. StarLan is a very low cost system with correspondingly low performance.

For larger department-level or division-level systems, the IEEE 802 standards also provide a variety of alternatives. The original IEEE 802.3 standard for a 10Mbps baseband LAN is based on Ethernet. That means that many of the Ethernet vendors are able to offer this standard at about the same cost as Ethernet.

Another option for large departments is the IEEE 802.5 twisted-pair token ring standard. Although the speed of the token ring is a modest 4Mbps, its performance is considerably more efficient than the CSMA/CD protocol used by Ethernet and 802.3. The result is that the token ring is about as effective as the Ethernet type of system in meeting peak demands.

In addition to providing carrierband, the IEEE 802.4 token bus standard offers a broadband system. This system can meet the needs of large departments or divisions and, by using multiple channels, can serve the backbone function as well.

A backbone alternative to the token bus broadband is a new optical fiber standard being developed that offers high capacity and electromagnetic isolation from the environment. Referred to as Fiber Distributed Data Interface (FDDI), this standard specifies a 100Mbps optical fiber ring. The FDDI standard should be finalized by ANSI by year-end and products should be available before the end of 1987.

The explosive and largely unplanned proliferation of dp equipment within organizations dictates the need for effective networking facilities. The very nature of the distributed environment makes it unlikely that an organization will end up with a single LAN per company.

Cost and performance considerations suggest that a hierarchy of local networks may provide the most effective and flexible solution. Fortunately, local network standards exist that span this hierarchy, giving the network planner the opportunity to design a rational master plan for local networking. ©

William Stallings, who is president of Comp/Comm Consulting, Great Falls, Va., is a frequent contributor to DATAMATION and the author of *Networks, Second Edition*, recently released by Macmillan.

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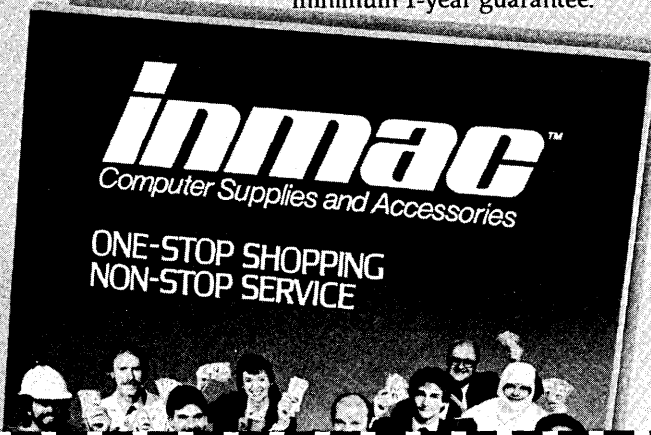


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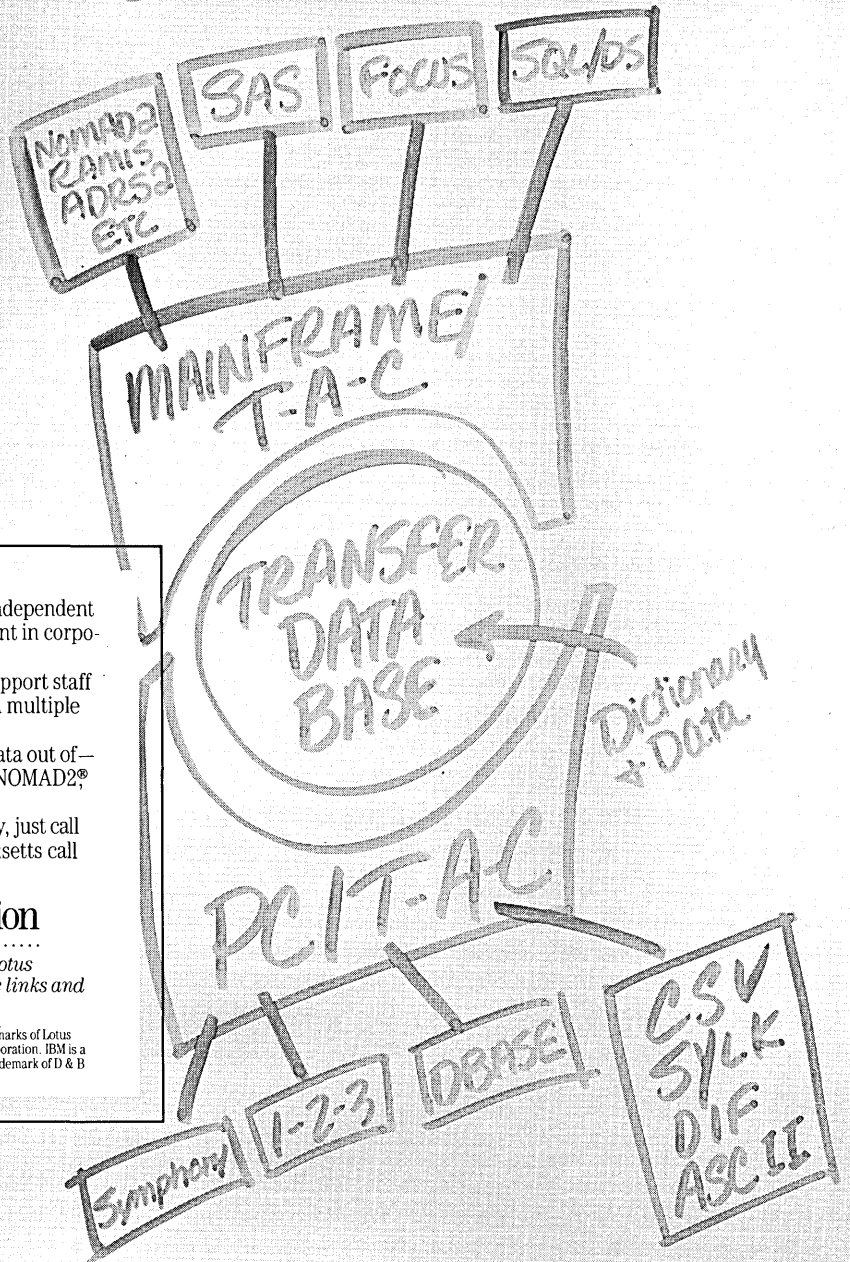


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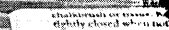
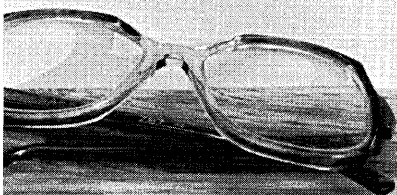
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| ON | 102277754 | BOSTON | ZINCINC | 333009900044 | KL23450987 | 007 | 12/01/85 | CENTRALLA | BOSTON | ATAJAIR | |
| | 100000456 | CHICAGO | AASEWER | 98750372378 | KL23090867 | 999 | ONHOLD | WOODLAWN | CHICAGO | DUMAIR | |
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| T | 100674637 | SANJOSE | ACDCORP | | | | 10/08/85 | SACRAMENTO | SANJOSE | EZHAULER | |
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|--|----------------|------------|------------|
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| Optional Graphics model | Yes | No | No |
| Dynamically allocated non-volatile function key memory | 512 | 128 | 140 |
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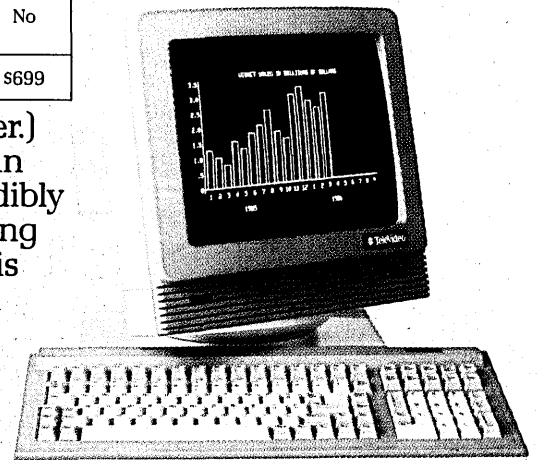
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CIRCLE 52 ON READER CARD

Why American Express customer service reps can make account adjustments so quickly.

AMEX DESIGNS AN OLTP SYSTEM

by **Barbara Elazari**

Designing an on-line transaction processing application, a programmer-analyst once told me, is like painting a picture: there's a lot of inspiration required. Still, a tp application is developed in specific and defined stages. In this article I will lead you through those stages by describing events that occurred during the development of an account adjustment system at American Express.

First, a little background. In the mid-1970s, it became obvious that the continued manual handling of American Express's credit card operations would put a cap on the otherwise healthy growth of that business. By 1976, the company had made IMS the backbone of its data processing facilities, setting the stage for our efforts to automate the operations areas. This wide-ranging project came to be known as Modernization, and it was realized in all its phases by 1984.

One phase of the Modernization project dealt with customer service activities. The goal here was to automate all the clerical work performed in support of customer accounts—activities such as account maintenance, ordering microfilm of statements and charges, writing letters, and financial adjustments. The rather cryptic name for this phase of the Modernization project was Lift Memo, and it is the development of the financial adjustment portion of Lift Memo that I will trace here.

Determining the business need. The broad mandate of the adjustment processing project was to provide an on-line IMS facility to capture, edit, process, and report on internally generated adjustments to cardmember accounts. The system would have to be available seven days a week, essentially 24 hours a day. A project team was formed, and the first phase within the project life cycle—gathering of the business requirements—was started. It became apparent early in the process that the application was not as straightforward as it originally seemed.

Because American Express stresses customer service, we found the customer service representatives were performing from 25 to 30 different types of account adjustments, each with its own unique data elements and methods of processing. To further complicate matters, the work flows surrounding many of these adjustments were different from each other and would require specialized system support. For example, account adjustments to give a cardmember credit for a magazine subscription would have to trigger a process for advising the magazine that the cardmember was canceling the subscription.

Another type of adjustment—for returning a credit balance to a cardmember—required an interface to a printer that could print the check. I call this the Pandora's box syndrome. It seems relatively innocent on the outside, but once you open it up—watch out!

Even worse is the phenomenon of "moving the rock." The idea is that most of us work like ants under a rock: conditions may not be ideal, but as long as the rock doesn't move we find a way to live with it. So it is with users and their operating environment. Change it, and they'll swarm around trying to adapt. Our project team moved the rock in working with users to gather requirements, and we were inundated with all kinds of requests, many of which were related to adjustment processing only by a real stretch of the imagination.

The process of gathering requirements became very much a process of filtering out the false leads in order to get to the real thing.

DEFINING USERS NEEDS

Dealing with multiple users. Having completed our preliminary analysis, we needed to review our findings with the user community. When we started the project in 1980, there were five operations centers with approximately 800 users providing customer service in the U.S. and Canada. By the end of the project

in 1982, there were six operations centers and 1,000 users. In this kind of dynamic environment, determining user requirements becomes a monumental and often frustrating task.

One of the first business issues we had to address was whether to build one system to support all centers, or multiple systems, each unique in its processing, to reflect the fact that each operations center had its own procedures.

In the end the decision was to enforce conformity upon the centers and build one system. In general, we were successful in gaining consensus on points in dispute; the adjustment transactions, however, are peppered throughout with special code for one center or another.

The agreements were forged by a team of users comprising several representatives from each center, with the authority to make decisions on the requirements. The team was led by a remarkable man, by turns a benevolent dictator and an ancient philosopher, who was able to gain commitment on all manner of disputed issues. His roots were on the user side, and his determined leadership proved absolutely essential to the implementation of such a broad-scale project.

The business requirement document. With the analysis completed and a user team in place, the next step was the publication of the business requirement document. Also known as the bible because it was the final word on disputed items, this document progressed through three stages—general requirements, detailed requirements, and, finally, signed-off requirements.

Each stage required a marathon user meeting lasting several 10-hour days and producing copious lists of open items. Tired users stumbled home to their centers, only to be barraged by memos and phone calls from the team leader reminding them that due dates on their research tasks had come and gone.

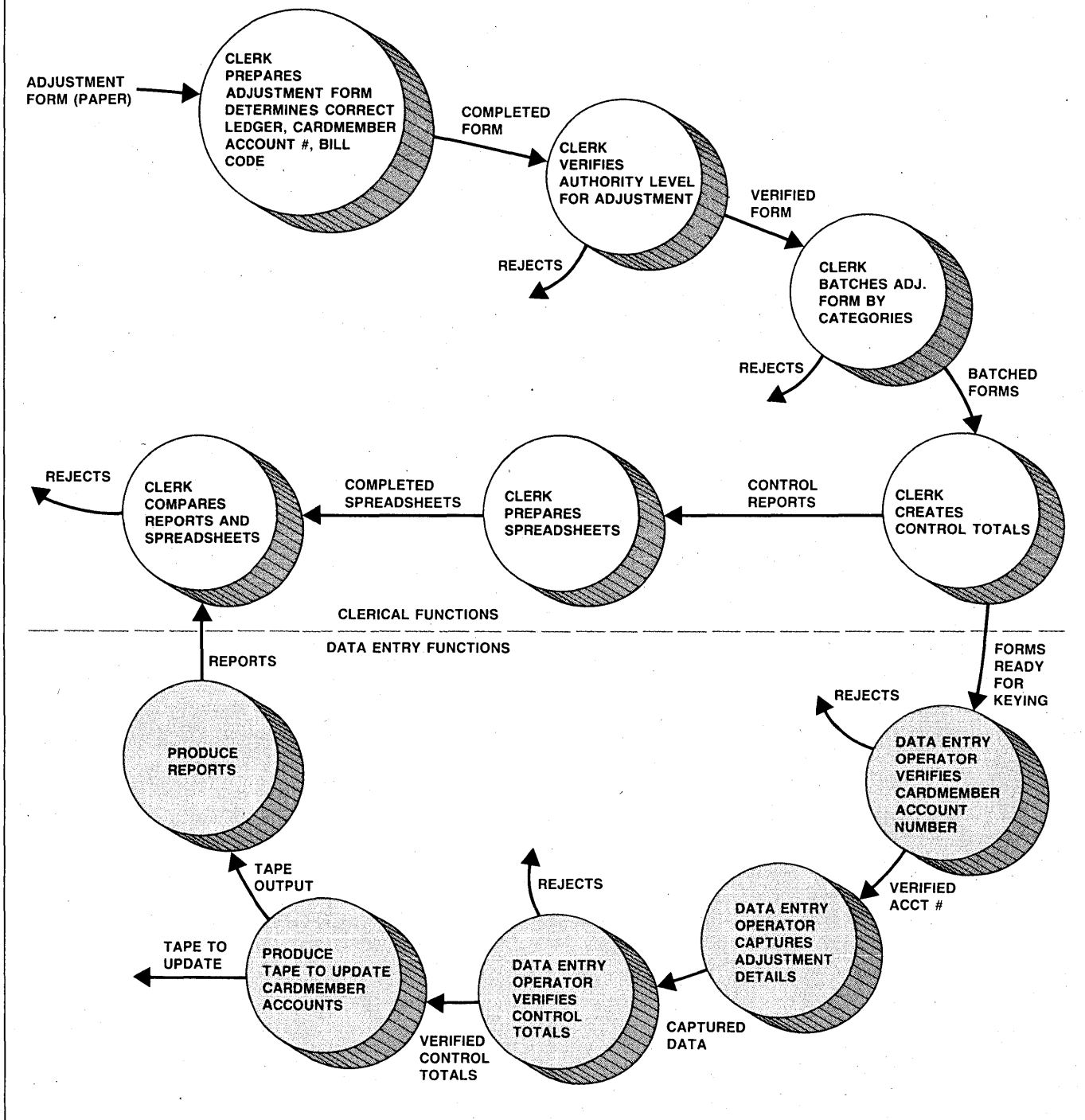
At this point in the process, the project team decided to address only the

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FIG. 1

LOGICAL MODEL OF MANUAL ADJUSTMENT PROCESSING SYSTEM



60% to 70% of adjustments that had common elements. The automation of specialized types of adjustments was not cost beneficial; their volume was too small.

The signed-off business requirement document had full definition: graphic displays of transactions; description of each data element with optional, required, or not-allowed values; definition of all editing against data elements; and representations of report formats.

The change control process. At some point in the project life cycle, a cap has to be put on new requirements in order to allow the project team to finalize a design approach. Ideally, this should occur when the detailed business requirements document is officially signed off. Unfortunately, we learned that lesson the hard way; we continued to take new requests for seemingly simple changes. The result was confusion among the programming staff as to what

they were really supposed to be doing.

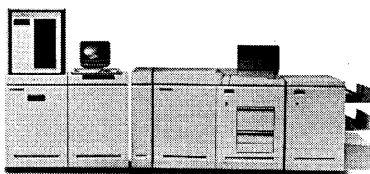
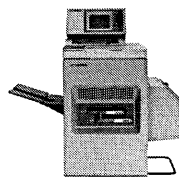
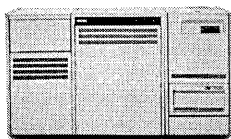
The change control process is nothing more or less than an attempt to freeze requirements so that the best possible design approach can be determined and coding can be accomplished as efficiently as possible. All new requests were submitted by the users in writing; the project team sized them and determined whether they could be incorporated into the project. Requests that could not be included were doc-

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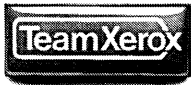
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CIRCLE 53 ON READER CARD

umented for inclusion in future phases. In 1985, three years after the adjustment processing facility was implemented, we were still working on change controls submitted during the original requirements phase.

The analysis process. Analysis, an instructor once told me, is "the study of a business system prior to changing the established relationships of people, machines, and methods." The importance of the analysis phase cannot be overstated; it is crucial to the development of transactions that are user friendly, efficient, and functional.

Once the general business requirements were published and agreed upon by the user community, the project team began the system analysis phase. This consisted of three steps: studying the current system of physically doing business; deriving a logical model of the current business system; and creating a logical model of the desired new business system.

Fig. 1 depicts the logical model for adjustment processing before any changes were made. Fig. 2 shows the new logical model, which became the basis for our design. The advantages of the new model over the old are four:

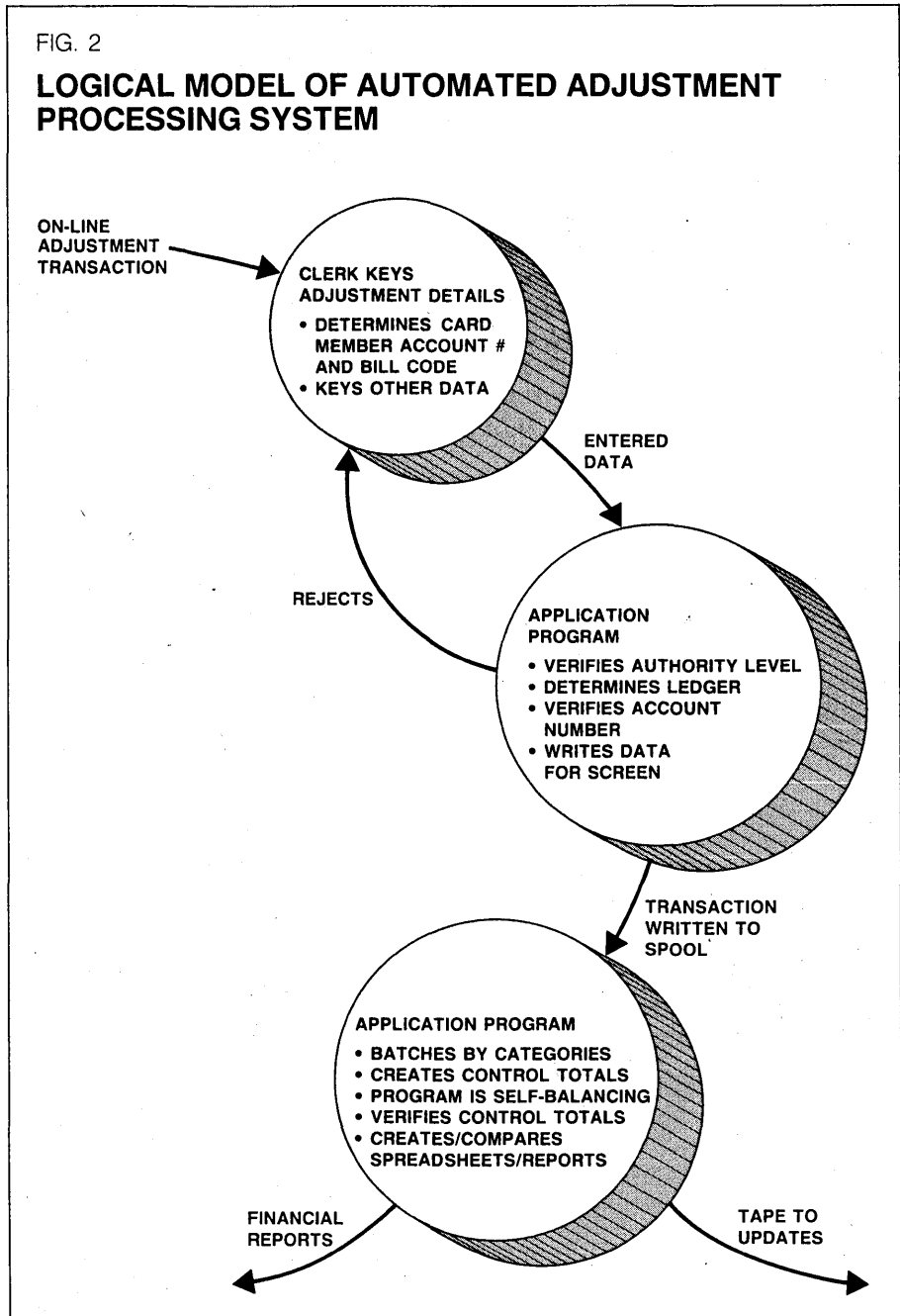
- All rejected adjustments are caught in the first pass, which eliminates downstream rejects.
- The majority of the functions are combined within the application, ensuring data integrity and reducing human error.
- The adjustment process takes only 24 hours, as opposed to the original two to three days.
- There are productivity gains in the clerical areas, as staff are freed up for other duties.

DATA ELEMENT ANALYSIS

With the modeling completed, the next step for the project team was data element analysis. We looked at all adjustment types for which analysis had been performed and found that 60% to 70% of them fell into one of 10 categories. We then proceeded to identify all data elements associated with these categories. Some data elements were common to all types of adjustments, while others were unique to only one type. The list of data elements we used is shown in Fig. 3.

Although not all elements were common to all adjustment types, we determined that five elements were used in every case, and these became the processing key—account number, bill code, originator ID, adjustment amount, and adjustment date.

The critical aspect of the analysis phase was to identify all data elements and their interrelationships. At this point, we



confronted a catch-22. By limiting the scope of the project to 70% of known adjustment types, we deliberately overlooked additional data elements that would be required for the remaining adjustment types and their integration into our model. We made this decision in order to be able to deliver a system in under 12 months' development time.

On the other hand, we also knew that the definition of new elements would require record layout changes, file expansions, and database expansions and conversions. These become monumental efforts in a complex IMS environment with a multiplicity of transactions, programs, databases, and users being affected.

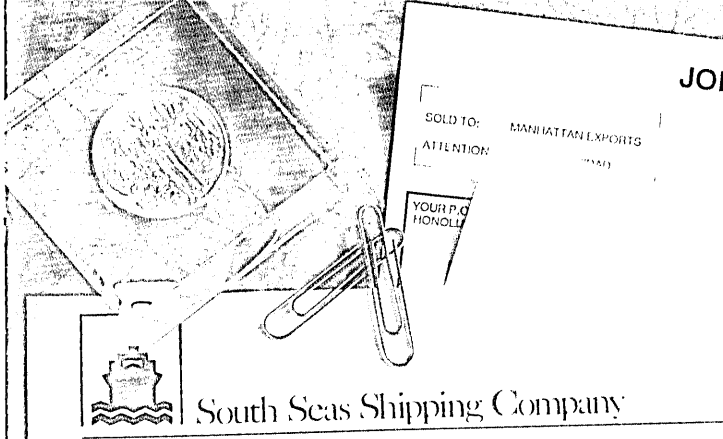
In retrospect, we believe we made the right decision; changing business needs dictate changes to systems that cannot al-

ways be predicted when deriving logical business models. This was just one of many tradeoffs that have to be made at every step of the process.

The system design. At this point we had completed approximately 50% of the project life cycle. The system design phase is the point where the project team was able to move from logical models to physical models.

The system consists of an on-line component and a batch component. The on-line portion (see Fig. 4) is composed of 10 on-line transactions, which perform data editing, validation, and collection. Accepted transactions are written to a spool database for subsequent processing by the batch component.

In addition, several other databases are updated in a real-time mode with infor-



November 20, 1985

Ms. Cathy Lyons
Import Officer
Botanical Research Ltd.
55 Wewak Road
Moresby, Papua, New Guinea

Re: Palm Fruit Research

Dear Ms. Lyons:

This letter confirms the agreement we reached at our meeting last week in San Francisco. Botanical Research, Ltd. will recommend the optimal conditions for shipping palm fruit and palm oil. Most important issues for consideration are: temperature during shipping and length of time between shipping.

Completed by June 1, 1987.

South Seas Shipping Company
Corporate Organizational Chart

PRESIDENT
Trevor Cardinal

PLRSC...

INVESTOR'S UPDATE

SHIPPING GOES WILD IN SOUTH PACIFIC

BY SUZANNE FARHARD
DIRECTOR OF SALES

South Seas is causing a ruckus in the shipping world. It's totally every other ship. South Seas has managed to maintain its growth despite the strong dollar and lower-than-ever freight rates. For the first quarter ending on March 31, South Seas turned in a record \$20 million profit on sales of \$117.1 million. President Trevor Cardinal cited several reasons for this record-breaking quarter. First of all, by spreading operations into special-order, price insensitive commodities like palm oil and tuna, South Seas has been relatively unaffected by the strong dollar and unfavorable exchange rates. Second, South Seas is now reaping the benefits of long-term relationships it has developed with port authorities throughout the South Pacific. These relationships have let South Seas keep its rates competitive, yet profitable, during recent freight rate wars.

Finally, Mr. Cardinal said South Seas had money left over from funds it set aside last year for costs associated with the building and launching of new container ships.

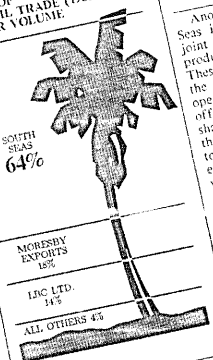
Outlook for Sales

Spectacular sales for the first quarter will set the pace for what industry analysts expect will be a record year for South Seas. "South Seas will be the industry leader by 1990," says Michael Wong, a vice president at Donovan, Kroll & Co. "Their growth strategy is sound and their balance sheet gives them the financial muscle to continue to grow even during the current slump in the shipping industry."

Competitive Factors

One of the primary factors in South Seas's success has been the company's ability to identify new market opportunities and then to establish the dominant position in that market. The palm oil trade is a prime example of this successful strategy. Since entering the market in 1977, South Seas has become a key player in the specialty shipping market.

SHARE OF PALM OIL TRADE (1985) DOLLAR VOLUME



However, IBC Ltd. is expected to become a more aggressive player. The Singapore concern had concentrated its efforts on Indian hand container freight in the Indian Ocean. Last year, IBC purchased the ailing Barton Line. This move alone more than doubled IBC's tonnage capacity. Several of these unit-sized palm oil trade and are expected to enter service by mid-1986.

So far, the IBC has been unsuccessful in winning any of South Seas's customers. In the future, the increased competition can be expected to depress both prices and margins, but for the short-term, South Seas contracts with most of the palm oil industries largest producers should insulate it.

Joint Ventures Considered

Another growth strategy South Seas is exploring is to establish joint ventures with several of the producers of these commodities. These ventures would be similar to the Transpac/South Seas venture, in that South Seas would offer its shipping capabilities to a share of the venture. At this time, the company is holding exploratory talks with many agri-export firms. Another potential partner would be to join with a major European exporting concern.

One company expected to be interested in a joint venture with South Seas is MountainView. MountainView has seen South Seas as a potential competitor for its products market. In response to this demand, MountainView has begun to strengthen its...

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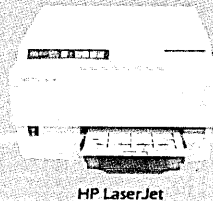
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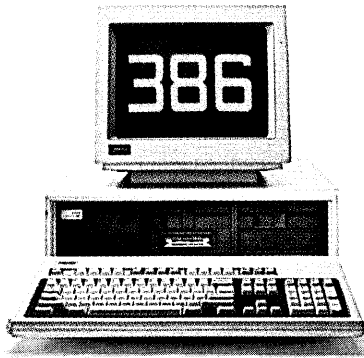


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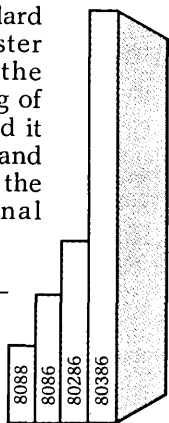
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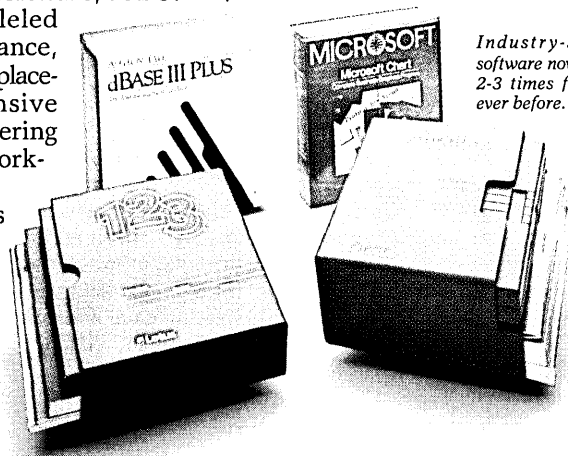
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mation about the adjustment.

The system is available 24 hours a day, except for a daily period of about half an hour when it is taken off-line. During this period captured transactions are extracted from the spool and processed through the batch component for update to various billing systems. A discussion of the batch side is beyond the scope of this article.

In the analysis phase, as previously stated, there are 10 types of adjustments. The project team opted to create individual transactions for specific types of adjustments, rather than develop one or two generic screens. There were several reasons for this.

First, we wanted to build intelligence into the system in order to reduce operator error. In order to achieve this the system had to know that only certain bill codes (a bill code further defines the nature of the adjustment) were valid for specific transactions. Therefore, the transaction name became the control point for a great deal of editing.

MAKING SYSTEM FRIENDLY

Another reason for multiple transactions was to make the system user friendly. Typically a customer service representative reviews the cardmember request and decides what type of adjustment is required. She (or more and more these days he) will then select the appropriate screen, and all required or optional data elements will be presented. The representative does not have to remember which data elements to use, or skip over many unnecessary fields.

Finally, multiple transactions can facilitate future development if some unique processing is required for one type of adjustment, or if a new type of adjustment is needed; a specific transaction can be enhanced without affecting the others. There is also a drawback here: if a new data element is required for all types of adjustments, then all 10 screens have to be changed. That, in fact, did turn out to be the case, and even as I wrote this article we were adding ticket number as a data element to all transactions. How much simpler it would have been at the beginning!

A word about why we decided not to design a fully real-time system with on-line update of adjustment details as well as on-line inquiries.

Because of the financial nature of the transactions, our controller did not feel comfortable with direct update of the cardmember database. In case of any database failure and subsequent recovery and restore procedure, the risk of losing or failing to

FIG. 3

DATA ELEMENTS LIST

- Account number
- Adjustment category
- Stuffer code
- lata code
- Refer to ID
- Receipt date
- Bill code
- Originator ID
- Payable to
- Ledger account #
- Case type
- Case #
- Adjustment amount
- Adjustment date
- Mailing address
- Transmittal #
- Authorization level

AUDIT TRAIL INFORMATION

- Statement month/yr
- Item capture centre
- Item service establishment number
- Item amount
- Item batch #
- Item capture date
- Item sequence #

recover any transactions, no matter how remote, was unacceptable.

A key consideration in the system design was the location of the data. As seen in Fig. 4, the data are derived from four places:

- on-line transactions,
- multiple databases,
- other transactions (via message switch), and
- multiple tables.

Just as in the analysis phase, it was crucial for the project team to determine where the required data resided and in what form, be it database, table, file, etc. This in turn dictated the specific structure of the application.

As Fig. 4 indicates, the adjustment system is designed with multiple database reads and updates. Information is retrieved from various databases in order to perform the numerous edits and validations required; when the transaction has completed executing, other databases are updated with the appropriate details.

The volume of transactions to be put through the system was a key design consideration. A year ago, approximately 60,000 adjustments were processed through two cpu sites in a 24-hour period, each accounting for approximately half the volume. An interesting point was that the 80/20 principle applied; 80% of the throughput was executed by 20% of the transactions. In this case, two transactions were invoked approximately 800,000 times a month in one cpu, while the remaining transactions accounted for approximately 200,000 executions.

Note that there were more transactions executed than adjustments written. This was because around 30% of all adjustments go through a review process called overlimit; the transaction is written to the overlimit database from which it is subsequently processed.

Throughput was a mitigating factor in the decision not to design a real-time financial update system. The critical factor was response time. At American Express, the on-line system service levels were set at 95% availability, with three- to five-second response time per transaction. In fact, many of the on-line transactions perform

well under this level (three seconds is about average) and the user community has come to expect it.

SPLIT SECONDS COUNT

For this reason, the number of database reads and writes was an important aspect of the system design. A fraction of a second makes a big difference when dealing with these levels of throughput and response time.

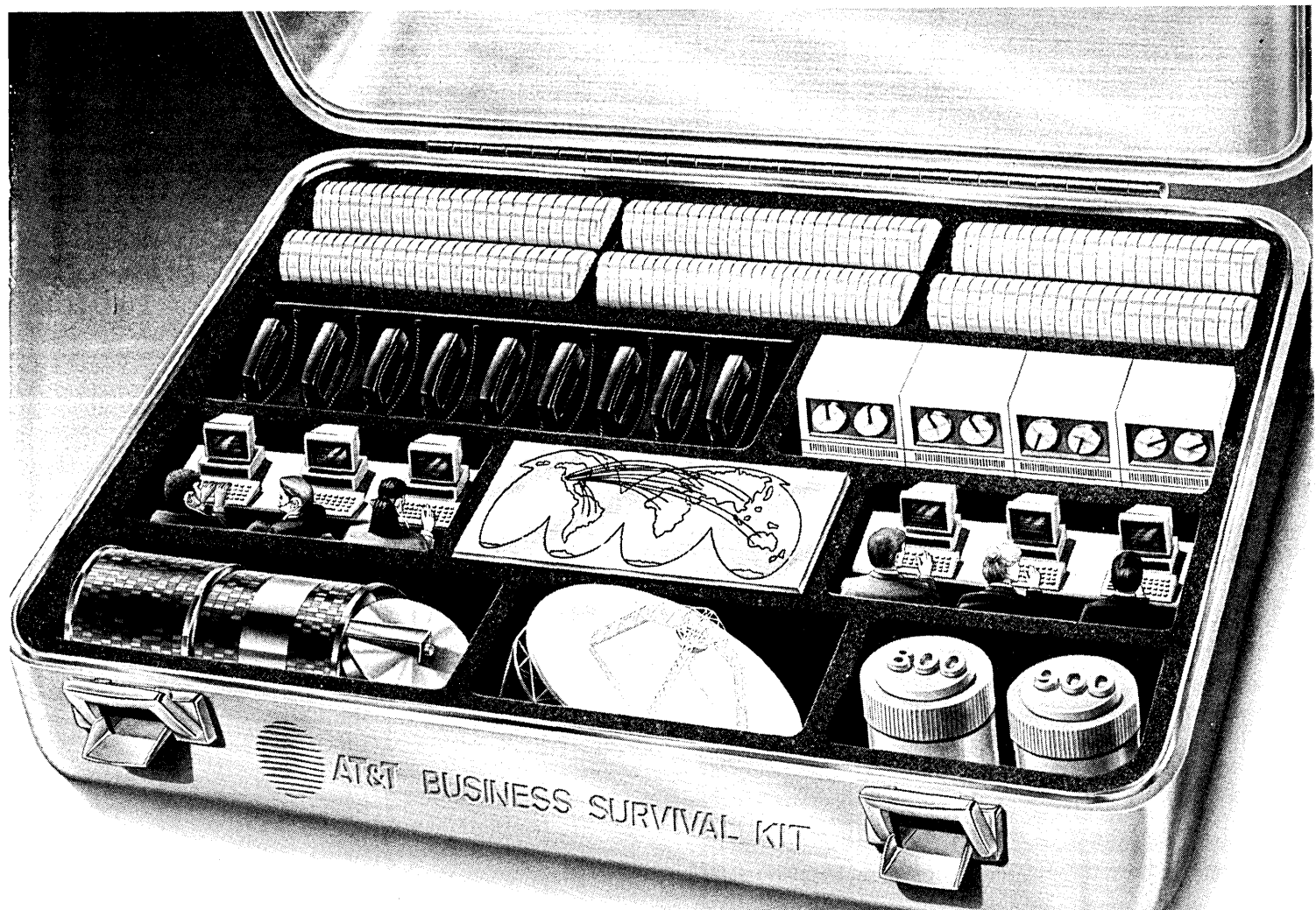
The system design also had to consider the hardware necessary for data collection. Since the adjustment processing facility was the second phase in the Modernization process, there were already a great many terminals throughout the operations centers. Because of the sensitive nature of these financial transactions, tight controls were in effect; every service agent needed a dedicated terminal for data entry. Today there are more than 1,200 employees involved in customer service throughout the United States and Canada, and each one has a terminal.

There were many walkthroughs during the design phase; this was one method of ensuring that we were not straying off the main path. We continually checked our design against the business requirements to ensure we had covered all its aspects or documented what could not be supported. We had walkthroughs with the project team, the database administration group, and the business requirements people.

Transaction design. With the system design phase finalized, the project team could get on with the task of laying out the program flow. Although there are many parts to this process, the pivotal point is designing the transactions.

Screen layout was straightforward. We took the data elements required for each transaction and laid them out on the screen, starting top to bottom and left to right. In general, we put required elements first and optional fields later in order to save skipping over fields. This is because the cursor moves through the screen in the same manner—top to bottom and left to right.

All fields are edited to ensure entry of valid data; required fields must contain a value specified as valid, optional fields may



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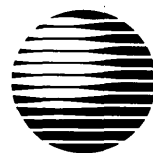
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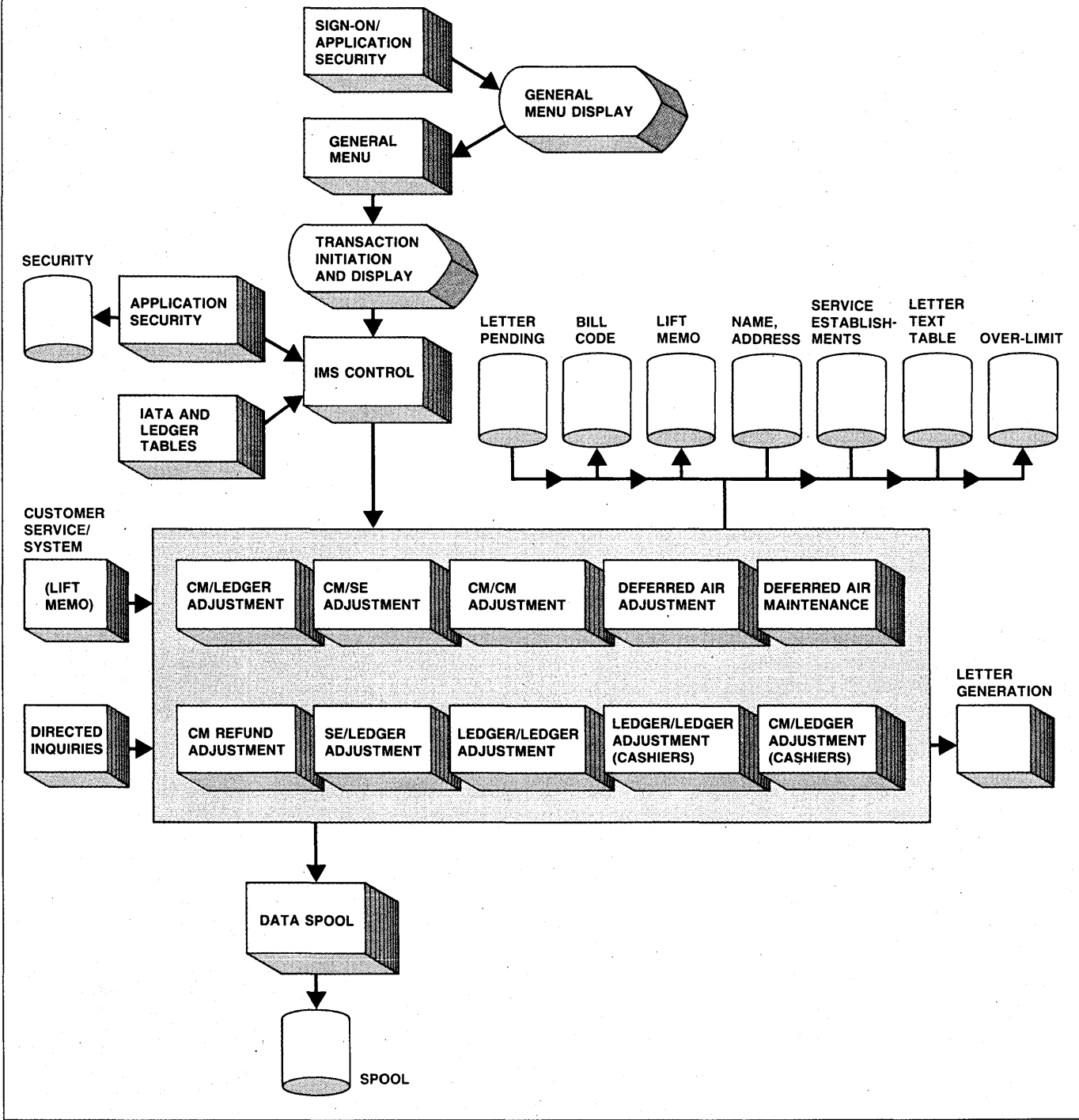


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FIG. 4

FINANCIAL ADJUSTMENT SYSTEM (ON-LINE COMPONENT)



or may not contain values specified as valid, and not-allowed fields must be blank. Cross-field edits describe optional fields where edit restrictions vary according to the values assigned to certain required fields. For example, if a certain value is in the bill code field, then a specific value must also be in the case-type field.

The program was designed to execute all functions in one pass and return a positive acknowledgment to the screen

when completed. In case of an error, a message indicating the type of error is returned to the screen, the cursor is positioned at the field in question, and the field is highlighted. If multiple errors are present, the cursor is returned to the first required field in error and all error fields are highlighted.

It was important to prevent abends in the on-line transactions. If the program is editing correctly, as is normally the case, there will be no abends. But sometimes a

program can get so confused that it does not know what to do. To prevent an abend in this situation, we designed a mechanism to write two messages: a technical message to a special system output device for the programmer, and a user message to the terminal, advising the operator to try later.

As shown in Fig. 4 these transactions can receive data from and pass them to other transactions. For this reason some data are carried on the screen but are not

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In 1985, we were still working on change controls submitted during the original requirements phase.

displayed to the user. These nondisplayed data can be passed to a subsequent transaction as part of its input data area.

Because the transactions have to handle the creation of financial records, a system of double security was designed. First, any operator attempting to process a transaction has to have an ID that is cleared for access to the transaction name. Second, authority levels were created to control the dollar amount limit an operator can process. If the dollar amount is exceeded, the adjustment is routed to someone with a higher authority level for approval. All this data is stored in specialized databases.

PROJECT'S SHORTEST PHASE

Code, test, and release to production. Although this was the phase that actually produced the adjustment processing system, in fact it accounted for the shortest period of time within the project's life cycle. (This, of course, was as it should have been; lack of space prevents me from saying anything else about this crucial phase.)

Implementation. Finally we were

ready to implement the system in the user community. During the testing phase we had a core group of users involved, much the same as during the business requirements phase. In their respective centers, they became the local experts on the functioning of the system.

The team created a master implementation plan covering a multiplicity of tasks. Some of the major items were

- *Work flow changes.* There were major changes in the way work was received and passed on.
- *User training.* A self-paced audiovisual training package was developed and administered.
- *Modified job functions.* Some jobs had increased responsibilities while others were practically eliminated.
- *Retraining.* Because of modified job functions, some people required retraining in other jobs.
- *Hardware.* We had to make sure that everyone who needed a terminal would have one when training was completed.
- *On-site support.* Project team members and the user testing team had to be avail-

able at initial implementation to answer questions and solve problems.

• *Internal public relations strategy.* We used videotapes, employee newspaper articles, and group meetings to allay any fears.

Within a two- to three-month period, all centers had completed their training and were using approximately 90% of the new system. Some problems were solved within the operations area by work flow accommodations; others were funneled back to the project team for software changes.

The adjustment processing facility was implemented in 1982. The majority of its users no longer remember the paper-based method of processing account adjustments. We feel that this fact, in itself, points to the success of the system. ©

Barbara Elazari is a project manager in the business systems development department of American Express in Fort Lauderdale, Fla. She has been involved with the Modernization project since its inception and has worked both in the business requirements area and, more recently, in project management.

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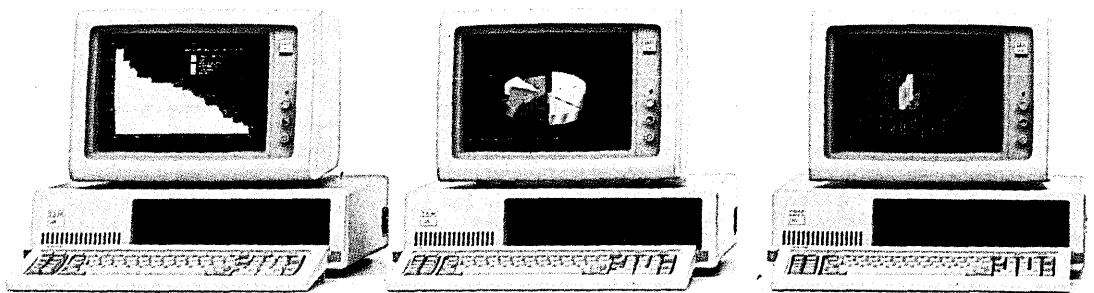
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CIRCLE 51 ON READER CARD

HARDWARE

OFF-LINE

In a recent market research report on the display terminal market, Dataquest Inc., San Jose, predicted the display terminal industry is entering a "pivotal period," and that 1987 will present new market opportunities.

Dataquest divides this market into four functionality segments: terminals supplied by minicomputer manufacturers protocol-specific to IBM S/3Xs; terminals protocol-specific to Burroughs, Honeywell, or Sperry mainframes; terminals protocol-specific to the IBM 3270; and nonprotocol-specific terminals supplied by independent vendors.

Dataquest says the factors that will make 1986 pivotal include a move away from systems specific to the second segment listed to the systems of other manufacturers, notably IBM and Digital; a move toward communicating pcs, which offer a less expensive alternative to high-priced mainframe terminals; price sensitivity in all segments; and the impact of the Intel 80386 processor and the systems built around it, which will usher in new multi-user systems and spur the shipment of display terminals.

Dataquest also projects growth in IBM PC-compatible terminals which provide more multi-user capability. Processing terminals will slowly take hold, but Dataquest believes IBM or Digital must first "legitimize" this market with product.

Finally, Dataquest sees some terminal manufacturers seeking alliances or major contracts, and others searching for new technolog-

ical breakthroughs.

Of the more than 2.5 million units Dataquest predicts will be shipped in 1986 (a 10% increase over 1985), independent manufacturers, the fourth segment, will be the fastest growing and most active as far as new technology is concerned. Dataquest notes that Wyse Technology, San Jose, continues to hold a lion's share of this segment, with over 28% of shipments. Wyse is also ranked the number two terminal vendor in the U.S. in all categories. Its nearest competitor in the fourth segment is TeleVideo, also of San Jose, with a 12% share.

While Wyse and TeleVideo appear entrenched in their positions, Dataquest suggests that three companies in this segment should be watched closely--Link Technologies of Fremont, Calif.; Ampex of Redwood City, Calif.; and Kimtron of Santa Clara, which are ranked seventh, eighth, and ninth, respectively.

Link Technologies, for example, has risen in the Dataquest rankings from number 29 in 1984, to ninth in 1985, to its present ranking of seventh. Link recently introduced its latest product, the MC3. This "multiple concept" terminal, which allows communication with multiple host computers (IBM compatible, ANSI compatible, or ASCII compatible), has three communications ports and supports multiple keyboards. Link is also offering a three-year warranty on the MC3; it claims this is unprecedented among independent terminal manufacturers. Link is promising more products in the MC series this year.

HIGH-END DESKTOP

Rexon has introduced a ninth model to its Rexon Five Family of supermicrocomputers. The RX305 is based on a 10MHz Intel 80286 processor and is a general purpose version of the RX305-TX Xenix-based machine introduced in early August. Rexon says the RX305 and RX305-TX are its most powerful desktops, supporting up to 16 users and providing total disk capacity of over 380MB. The RX305 is a less expensive model since it does not include some Unix-specific features of the TX model.

In a standard configuration, the RX305 includes four serial and two parallel ports, 512KB of main memory, a 60MB cartridge tape drive, and a 191MB hard-disk drive with an average access time of 20msec. The system can be configured with Xenix System V or with Rexon's Business BASIC-compatible Recap operating system. Options include a second disk drive, an internal 5¼-inch floppy disk drive, a 1,600bpi half-inch tape drive, memory expansion up to 4MB, an 80287 coprocessor, and expansion up to 16 serial and five parallel ports. Available now, the RX305 is priced at \$19,990. REXON BUSINESS MACHINES, Culver City, Calif.

FOR DATA CIRCLE 303 ON READER CARD

UNIX-BASED SYSTEMS

Honeywell's recently introduced xps-100 Series of Unix-based systems features three models: the X-10, X-20, and X-40. All three have an operating system based on Unix System V, Release 2. The X-20 and X-40 are configured around the Motorola MC68020 and the X-10 uses the MC68010. All incorporate standard bus structures and support asynchronous, bisynchronous, and IBM SNA connections, as well as Ethernet LANs and public data networks.

The X-10 supports up to 16 users at a rate of .41MIPS to .56MIPS. It has a Multibus-1, .5MB to 6.5MB of main memory, 120MB maximum disk storage, 16 serial ports, a parallel printer port, and 60MB quarter-inch streamer tape drive. The X-

HARDWARE

20 can support up to 20 users and features 1.7MIPS to 2.1MIPS, a VMEbus, 2MB to 10MB main memory, 435MB of disk storage, 32 serial ports, four parallel printer ports, and 60MB tape drive. The X-40 supports up to 64 users and features 3.7MIPS, dual MV68020s, a VMEbus, 4MB to 20MB memory, 870MB of disk storage, 64 serial ports, eight parallel printer ports, and 60MB disk storage. The X-20 can be field upgraded to the X-40. The X-10 and X-20 are source code compatible. The X-20 and X-40 are object code compatible. Base prices for the models are: \$7,475 for the X-10, available now; \$16,580 for the X-20, available fourth quarter; and \$41,630 for the X-40, available first quarter next year. HONEYWELL, Billerica, Mass.

FOR DATA CIRCLE 301 ON READER CARD

NEW MAINFRAMES

Honeywell introduced new models in the DPS 88 mainframe family that the company says are designed for mixed workload environments comprising on-line and traditional batch processing. Six models of the DPS 88 replace the DPS 88/40 and 88/80 series. The DPS 88/890 series includes a dual-redundant tandem DPS 88/892T, a dual-processor 88/892, and a single-processor 88/891. The DPS 88/860 series includes the DPS 88/862T, 88/862, and 88/861. The DPS 88/860 models deliver two thirds the performance of the full-capacity DPS 88/890, according to Honeywell. All models will be available fourth quarter and the prices range from \$1,740,000 for the single-processor DPS 88/861 to

\$4.5 million for the dual-redundant DPS88/892T. HONEYWELL INC., Phoenix, Ariz.

FOR DATA CIRCLE 302 ON READER CARD

NONIMPACT PRINTER

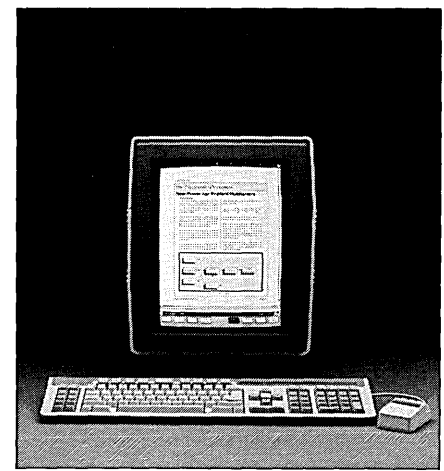
Eastman Kodak Co. entered the nonimpact printer market recently with the Kodak Ektaprint 1392 printer. Kodak says the product can generate text and graphics at 92 images per minute using a light-emitting diode (LED) array image writer and has a resolution of 300 by 300dpi. Up to five type styles, proportional and monospace, and a variety of pitch and point sizes are available. Two paper drawers, accommodating 3,500 sheets of paper, are featured.

The unit can run continuously in the simplex mode, process transparencies, and perform slipsheeting and cover insertion. The 1392 can be linked to the KEEPS electronics publishing system, allowing users to recall or create documentation electronically and print the desired number of copies, and also interfaces with the Kodak Telassistance network for remote diagnostics and repair. Available by April '87, the 1392 will be priced at under \$200,000, and will also be available to oems. EASTMAN KODAK CO., Rochester, N.Y.

FOR DATA CIRCLE 304 ON READER CARD

PUBLISHING SYSTEM

NBI Inc. has introduced the NBI 5000S Pro-Publisher, an electronic publishing system that features a 17-inch crt and has a resolution of 1,024 by 1,440, equivalent



to 120dpi. The display is designed to show a full 8.5-by-11-inch page of text with margins and text endings, and is a noninterlaced screen, which eliminates flicker. The Pro-Publisher is priced at \$12,990; current NBI customers using the 14-inch 5000S Integrated Workstation can purchase Pro-Publisher for \$1,795.

NBI also introduced the NBI 908 graphics laser printer, which features an NBI-designed, Postscript-compatible raster image processor. The 908 prints eight pages per minute with a resolution of 300 by 300dpi. Several interfaces for non-NBI customers are being offered. Available this fall, it is priced at \$6,995. NBI, Boulder, Colo.

FOR DATA CIRCLE 305 ON READER CARD

LAPTOP

GRiD Systems Corp. has added two enhanced models to its GRiDcase line of laptop computers. The two models are available with enhanced yellow LCD or light-emitting plasma displays, and can be configured with either an internal 3.5-inch floppy disk drive or an internal 10MB internal hard-disk drive. Features of both models are: a 71-key keyboard, up to 1MB of programmable ROM, an optional 10MB internal hard disk, and a connector for GRiD's new 1.5-pound Pocket Floppy. The keyboard has been redesigned for these models to include a separate row of function keys and a numeric overlay keypad. Additionally, F11 and F12 function keys are featured. These, says GRiD, are useful for IBM-mainframe communications. Users can equip the GRiDcase Plus with 640KB of RAM, serial and parallel ports, internal 1,200baud Hayes-compatible modem, RGB video output, and IBM PC expansion box to access LANs. Available now, prices start at \$2,750 for the model with internal 3.5-inch floppy; \$975 for the internal hard-disk option; and \$295 for the Pocket Floppy. GRID SYSTEMS CORP., Mountain View, Calif.

FOR DATA CIRCLE 307 ON READER CARD

—Theresa Barry

HARDWARE SPOTLIGHT

MULTI-USER COMPUTERS

Texas Instruments has added to its line of System 1000 multi-user computers the System 1100, available in three models, and the Model 1515-1.

The System 1100 features cache memory management, 1MB RAM expandable to 15MB in 512K increments, a system monitor, eight terminal ports, and a 60MB tape backup. System 1100, Model 1105 has a 48MB Winchester disk; the Model 1110 has an 87MB disk; and the Model 1115 has a 140MB disk. Up to two 140MB disk drives can be combined in the Model 1115 to provide up to 280MB of mass storage. An eight-port multiplexor is standard on the 1100 and an additional eight-port multiplexor can be added to expand to 24 terminals. The prices for the computers range from \$15,000 to \$22,000, and they will be available in the first quarter of 1987.

The Model 1515-1 is designed to support 30 or more users and is a single-processor model of the multiprocessor System 1500 announced in March. It uses

the same NuBus chassis, peripherals, and expansion options as other 1500 models, and can be expanded to support up to 128 users. Also featured are a system monitor, 2MB of RAM, a 140MB Winchester, a communications carrier board with an eight-terminal port option and a 60MB tape backup. The 1515-1 is available now for \$50,000.

Also new from TI is the Model 945 intelligent workstation, which can be attached to any TI multi-user computer as a terminal using TI 931 emulation. It can run IBM PC, MS/DOS-based productivity software. The Model 945 is available now, for \$1,495.

TI plans to have TI System V, the company's version of the Unix System V operating system, available for the System 1100 and the multi-user Business-Pro in the first quarter of '87. It's now available for the System 1500 as is COBOL System V from Micro Focus, which will also be available for the System 1100 in '87. TEXAS INSTRUMENTS, Dallas.

FOR DATA CIRCLE 300 ON READER CARD



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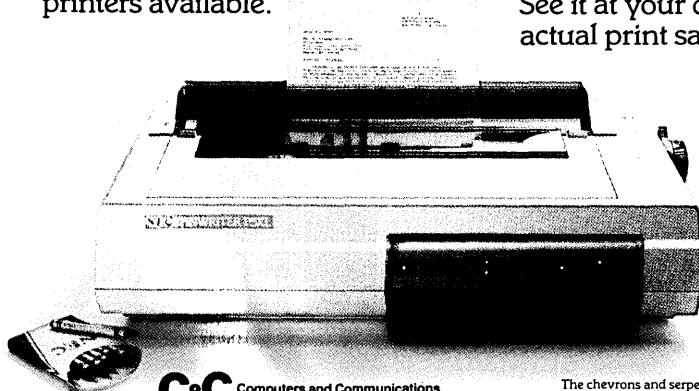
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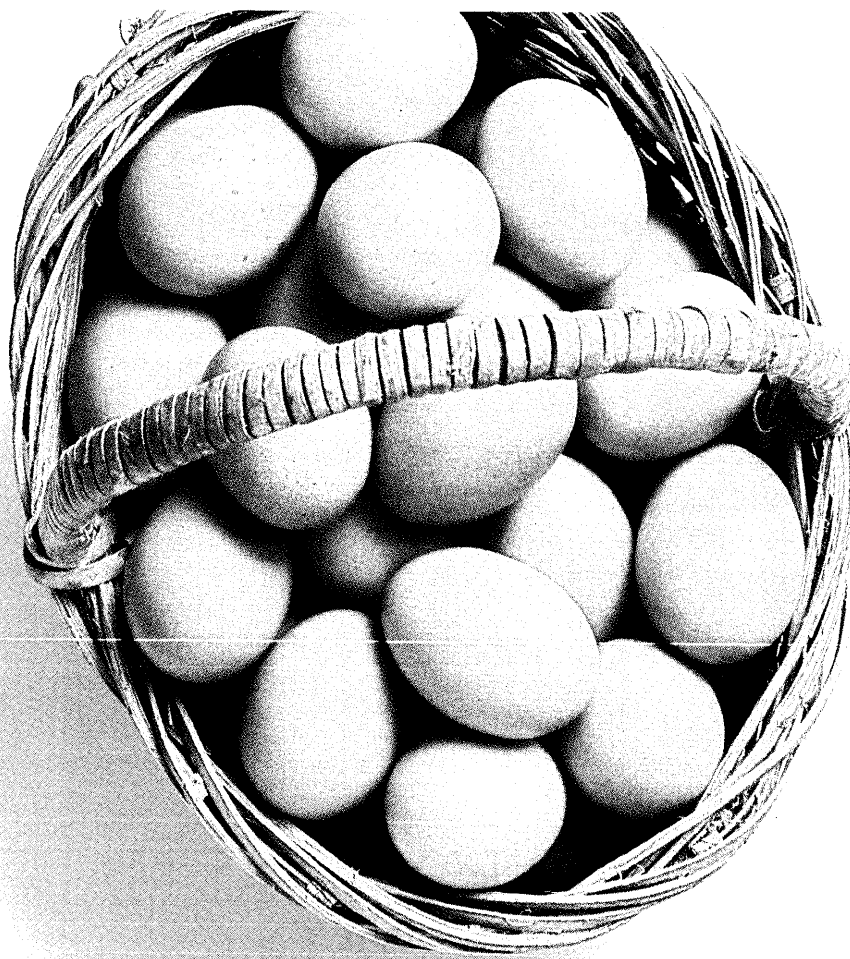
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CIRCLE 56 ON READER CARD



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CIRCLE 61 ON READER CARD

SOFTWARE AND SERVICES

UPDATES

One problem MIS departments have in developing end-user mainframe applications is the restriction imposed by 3270-type screens, which do not provide the ease of use that micro-based software does with its windowing capabilities.

D&B Computing Services of Wilton, Conn., is planning for January 1987 release what appears to be the first mainframe windowing product. Nomad Windows will be an integral part of D&B's Nomad2 4GL/DBMS, which is used in IBM-mainframe operating system environments. D&B claims there are over 100,000 Nomad users.

With Nomad Windows, D&B is predicting improvements in communication between users and Nomad2 and in application development.

Nomad Windows is written in assembler code and is modeled after IBM's TopView. In Nomad, the windowing capability is invoked by a "windows on" command. With Windows, applications developers can keep track of all valid entries, allowing them to create "histories" of their work. D&B claims that Nomad Windows will make other design options available for mainframe screen-driven systems: screen layouts can be larger than the screen, several windows can be updated simultaneously, forms can be cascaded, pop-up windows and boxes can be used and removed, forms can be used directly with interactive commands, and new commands for automatic menuing and scrolling are provided.

D&B claims that error handling becomes much simpler and quicker with windowing

because it cuts down on the user's need to guess what the error is and to retype. Even when a user goes back to the 3270 screen and types an error, an error window will pop up.

D&B is also planning a pc version of Nomad for release in January. Pc Nomad is also modeled after TopView and D&B claims it will be completely menu driven and compatible with the new release of Nomad2 with windows.

Nomad2, Release 400, with interactive Nomad Windows will be available in January and will be a normal upgrade with no price increase for current Nomad users. Nomad Windows within user applications, with procedural windows and with additional editing features, will be available with the next version of Nomad2, slated for mid-1987 release.

Bruce Edwards, a systems analyst at a division of a major oil company based in Texas, is a Nomad user who is very enthusiastic about this upcoming release of Nomad. "It [the windowing capability] will take me a long way," he says. Edwards feels the product will allow the applications developed on a mainframe to have more of a pc feel and look, which is what most users are familiar with. "Applications will look more slick, with less effort on my part. Windowing will merge mainframe and pc environments so that users won't know the difference."

Some mainframe software vendors, including ADR, Princeton, N.J., and IBM, do have mainframe products that allow users to work on up to three systems on one screen, but do not provide true windowing.

DB2 PRODUCT

Dylakor's DYL-DB2, Release 1.5, is an information retrieval and management system that is said to allow DB2 data to mix with data from other sources, including standard IMS, QSAM, VSAM, DAM, Total, ADABAS, and Datacom/DB database files. It was designed to work with Dylakor's 4GL information management systems DYL-280 and DYL-280 II. Working within them, DYL-DB2 provides embedded SQL syntax support for DB2 statements, and is able to use their report-writing functions. The product is also compatible with DYL-270, Dylakor's information management and extraction tool.

DYL-DB2 runs on the IBM 370, 30xx Series, 43xx Series, and pcm machines running MVS and MVS/XA under TSO. It requires 150KB of memory. With DYL-20, the price is \$17,380; with DYL-280 II, it's \$21,380; alone, it's \$6,380. The product is available now. STERLING SOFTWARE INC., DYLAOKR DIV., Granada Hills, Calif.

FOR DATA CIRCLE 325 ON READER CARD

RASTERIZER

The KMW RIP-200xi is a rasterizer/compressor that offers IBM mainframe users with Xerox laser printers the ability to prepare graphics without the overhead of cpu-intensive image processing.

The product is designed to replace the Xerox Electronic Printer Image Construction (EPIC) software and combines the processing power of a dedicated raster image processor with the communications speed of a direct channel interface to provide users with the capability of combining business graphics, charts, and mechanical drawings with text.

Graphic elements are rasterized by the device at speeds of up to 46nsecs per pixel and stored in an internal bit map, according to KMW. The bit map image is compressed and transferred back to the mainframe as a binary image file, which can then be merged with text stored on the laser printer to create a complete page.

The RIP-200XI costs \$26,000 and

SOFTWARE AND SERVICES

runs under MVS, VM, and DOS. KMW SYSTEMS CORP., Austin, Texas.

FOR DATA CIRCLE 326 ON READER CARD

WANG-IBM-CULLINET

Wang Laboratories has introduced PACE/Cullinet Connection, which gives Wang VS users access to Cullinet's IDMS/R databases and IBM VSAM files via C/ICMS, and allows nonmainframe users to access extracts of VSAM files and of IBM IMS, IBM DL/s, Cincom Total, and ISMS/R production databases. Users make their requests for information through the menu selection screens provided by the query facility of Wang's Professional Application Creation Environment (PACE). The queries are translated into a format that allows Cullinet's C/ICMS to supply the information, which is then presented to the user in PACE format. Users can format the data into reports, convert it into a VS 20/20 spreadsheet or a Wang Office message, create a PACE table, transform it into a Wang Word Processing document or a graph via VS Graphics Facility.

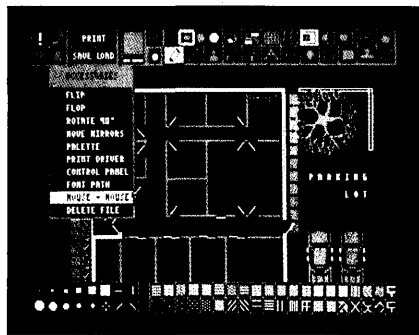
Available in December, the package is priced at \$5,000, \$7,500, and \$15,000, depending on the VS system on which it's installed. WANG LABORATORIES INC., Lowell, Mass.

FOR DATA CIRCLE 327 ON READER CARD

GRAPHICS COMMUNICATION

TeleVision from LCS/Telegraphics is a new software package that enables IBM PC and compatible users to send and receive both images and text through electronic mail systems. It uses data compression and encoding techniques to reduce the size of images and binary data files, allowing them to be transferred through text-based hosts.

TeleVision is a mouse-driven, icon-activated program. Included is an integrated graphics editor. Color graphics can be captured from other programs, enhanced, and then transmitted. Preproduced images can be downloaded from



on-line databases and merged with locally created graphics. TeleVision can emulate DEC VT-100/102 and VT-52, and tty terminals, and supports file transfers with Xon/Xoff flow control, line-oriented protocols, xModem, and the Hayes verification protocol. TeleVision runs on the IBM PC, XT, AT, and compatibles with 256K RAM, a color graphics adapter, a mouse, and a Hayes-compatible modem. It is priced at \$99. LCS/TELEGRAPHICS, Cambridge, Mass.

FOR DATA CIRCLE 328 ON READER CARD

WP CONVERSION

New software and hardware products from Principal Systems Inc. allow for the conversion of word processing documents from one format to another. PC Switch allows for converting among popular IBM PC word processing packages, PC Switch Card is a printed circuit board with software that plugs into an IBM PC and supports conversion of 5¼-inch disks from dedicated word processing systems, and PC Switch Drive is a half-height disk drive that is able to accommodate eight-inch disks from older word processing systems.

Dedicated word processors and PC word processing software packages supported by Principal include the Lanier No Problem, LTE-2, and Shared System; CPT; Wang OIS; IBM Displaywriter, 5520, and OS/6; Micom 2000/3000; Redactron; Xerox 850/860; IBM Displaywrite III; Word

Perfect; MicroSoft Word; WordStar; Multimate; and Samna.

PC Switch in a software-only configuration is priced at \$495, PC Switch Drive is \$895, and PC Switch Card is \$2,795. PRINCIPAL SYSTEMS INC., Norcross, Ga.

FOR DATA CIRCLE 329 ON READER CARD

SNA EXTENSION

IBM has extended the function of the Netview/PC software program to locate problems in Systems Network Architecture devices available from non-IBM vendors. The new version of Netview/PC can also monitor voice communications products and devices attached to IBM's token ring LAN. Independent vendors can program their SNA-compatible devices to use the program's application programming interface. Designed to run on IBM XT or AT computers, the software gives a central network operator the ability to track problems as they occur and log them for later analysis. The Netview/PC software carries a one-time charge of \$2,000 and is scheduled to be available in the second quarter of next year. An associated token ring network manager program will be available at about the same time for a one-time charge of \$1,495. IBM CORP., Armonk, N.Y.

FOR DATA CIRCLE 336 ON READER CARD

EXPERT SYSTEM

Case Communications Inc. recently introduced the 5010ES-DCX, calling it the initial product in its planned Case 5000ES Series of expert systems for data communications network management. Created for Case DCX datacom processors, the product is based on OPS-83 AI software, developed at Carnegie-Mellon University, Pittsburgh. OPS-83 is programmed in C and runs under Unix, enabling 5000ES users to utilize existing standard computer hardware instead of AI computers. The software allows users to determine the network configuration for their specific requirements and to reconfigure DCX networks when equipment is added or network requirements change.

Users enter network information into the 5010ES-DCX's terminal by selecting menu options and answering a series of questions that are posed by the expert system. The 5010ES-DCX completes the configuration process. The resulting network description, a configuration map, can then be loaded directly into the DCX network. A user can define part of the configuration to specify unique conditions of an existing network that need to remain unchanged. The price for 5010ES-DCX is \$15,000 and it's available this quarter. CASE COMMUNICATIONS, Columbia, Md.

FOR DATA CIRCLE 338 ON READER CARD

—Theresa Barry

SOFTWARE SPOTLIGHT

DESIGNAID FOR THE VAX

Nastec Corp. has announced an expanded version of DesignAid for the DEC VAX-station product family. DesignAid/VS, which supports the early phases of the software engineering life cycle, is geared toward the defense and engineering communities. The program allows users to trace requirements in compliance with MIL STD 2167. Documentation facilities include integrated graphics and word processing and the ability to link and organize documents. DesignAid interfaces to DEC's WPS Plus and DECpage and includes structured analysis and design support for Yourdon/DeMarco and Wer-

nier/Orr diagrams.

Additional features of DesignAid/VS are a multiwindow interface implemented within the standard DEC windowing convention, central development database files accessible via DEC's distributed networking architecture, support for DEC printers, and ASCII file compatibility with DesignAid files on the IBM PC or Convergent IWS workstation. DesignAid/VS was developed in cooperation with Digital Equipment Corp. and RCA Aerospace and Defense. It is priced at \$9,900 and is available now. NASTEC CORP., Southfield, Mich.

FOR DATA CIRCLE 333 ON READER CARD



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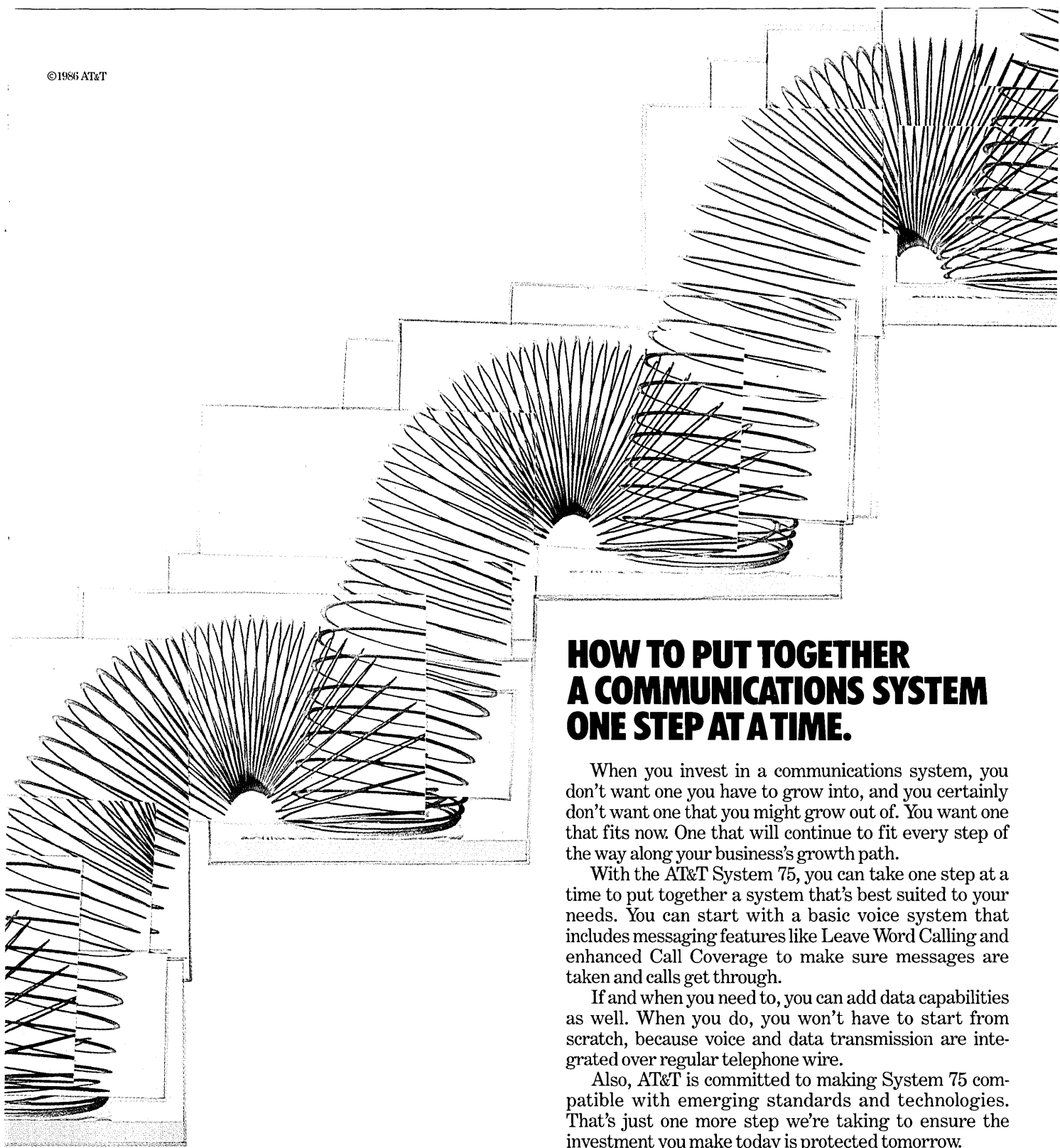
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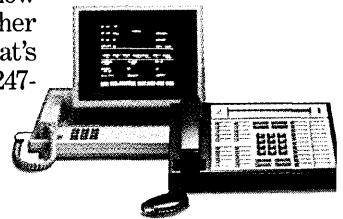
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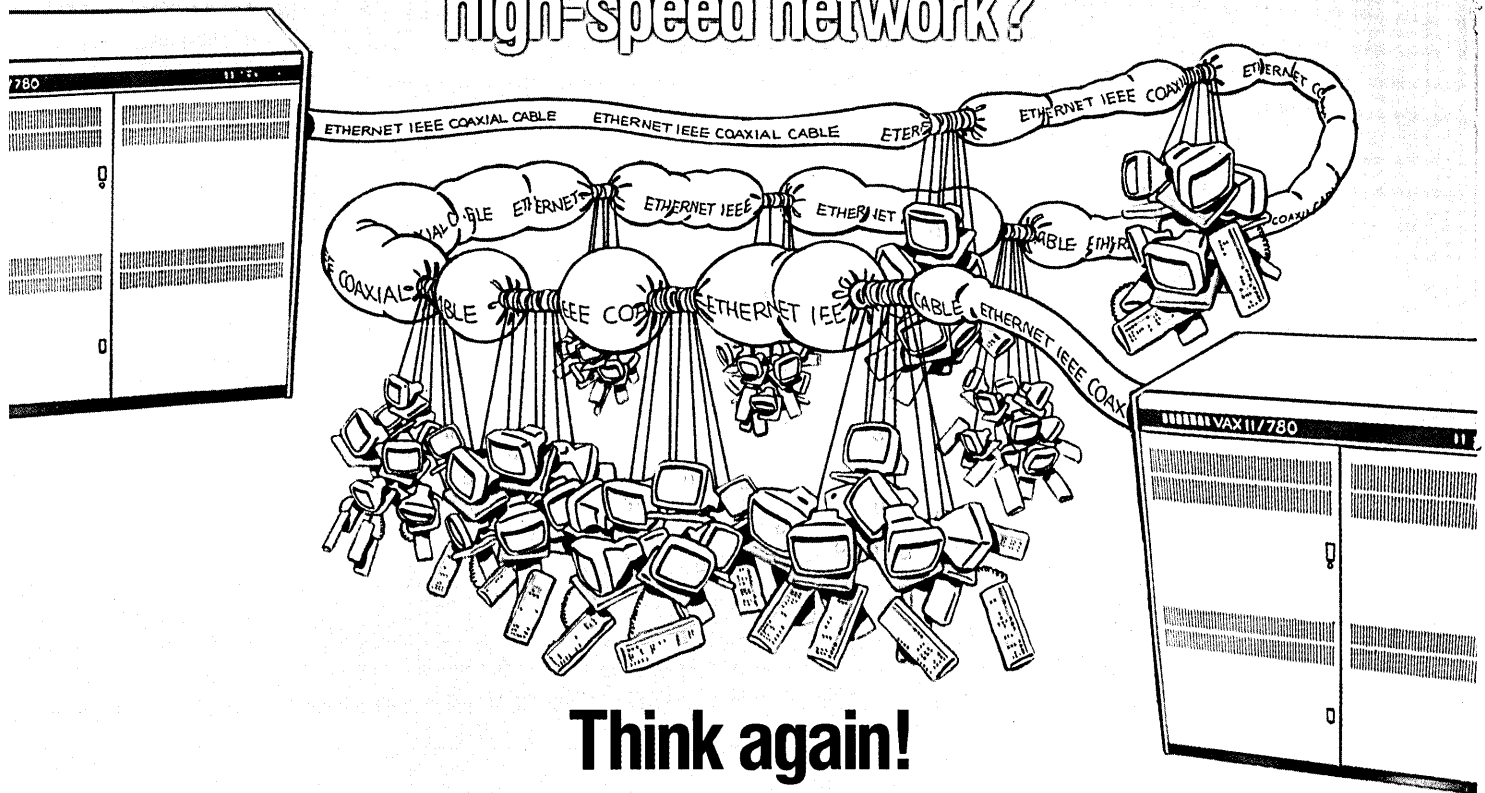
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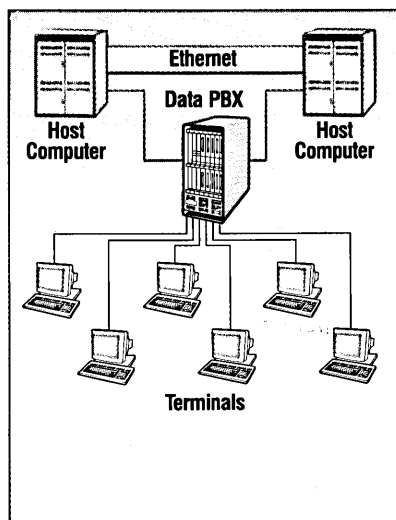
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